Annual Reports

Australia's notifiable diseases status, 2005: annual report of the National Notifiable Diseases Surveillance System

Rhonda Owen, Paul W Roche, Kirsty Hope, Keflemariam Yohannes, April Roberts, Conan Liu, Stefan Stirzaker, Fiona Kong, Mark Bartlett, Basil Donovan, Iain East, Gerard Fitzsimmons, Ann McDonald, Peter B McIntyre, Robert I Menzies

With contributions from:

National organisations

Communicable Diseases Network Australia and subcommittees

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

World Health Organization Collaborating Centre for Reference and Research on Influenza

State and territory health departments

Communicable Diseases Control Unit, Australian Capital Territory Department of Health and Community Care, Australian Capital Territory

Communicable Diseases Surveillance and Control Unit, NSW Health Department, New South Wales

Centre for Disease Control, Northern Territory Department of Health and Community Services, Northern Territory

Communicable Diseases Unit, Queensland Health, Queensland

Communicable Diseases Control Branch, South Australian Department of Human Services, South Australia

Communicable Disease Prevention Unit, Department of Health and Human Services, Tasmania

Communicable Diseases Section, Department of Human Services, Victoria

Communicable Diseases Control Directorate, Department of Health, Western Australia

Abstract

In 2005, 60 diseases and conditions were nationally notifiable in Australia. States and territories reported a total of 125,461 cases of communicable diseases to the National Notifiable Diseases Surveillance System: an increase of 10% on the number of notifications in 2004. In 2005, the most frequently notified diseases were sexually transmissible infections (51,557 notifications, 41% of total notifications), gastrointestinal diseases (29,422 notifications, 23%) and bloodborne diseases (19,278 notifications, 15%). There were 17,753 notifications of vaccine preventable diseases; 4,935 notifications of vectorborne diseases; 1,826 notification of other bacterial infections (legionellosis, leprosy, meningococcal infections and tuberculosis) and 687 notifications of zoonotic diseases. *Commun Dis Intell* 2007;31:1–70.

Keywords: Australia, communicable diseases, epidemiology, notifiable diseases, surveillance

NNDSS annual report contents

Cont'd next page

Annual report contents, *continued*

Tables

Figures

Cont'd next page

Figures, continued

Cont'd next page

Figures, continued

Maps

Abbreviations used in this report

ABL	Australian bat lyssavirus
AIDS	Acquired immune deficiency syndrome
AFP	Acute flaccid paralysis
AGSP	Australian Gonococcal Surveillance Programme
ASPREN	Australian Sentinel Practice Research Network
BFV	Barmah Forest virus
CDI	*Communicable Diseases Intelligence*
CDNA	Communicable Diseases Network Australia
CSF	Cerebrospinal fluid
DENV	Dengue virus
DoHA	Australian Government Department of Health and Ageing
DSS	Dengue shock syndrome
DTP	Diphtheria-tetanus-pertussis vaccine
HBV	Hepatitis B virus
Hib	*Haemophilus influenzae* type b
HIV	Human immunodeficiency virus
HPAIH	Highly pathogenic avian influenza in humans
HUS	Haemolytic uraemic syndrome
ICD10-AM	International Classification of Diseases, version 10, Australian Modification
IPD	Invasive pneumococcal disease
JEV	Japanese encephalitis virus
KUNV	Kunjin virus
LabVISE	Laboratory Virology and Serology Reporting Scheme
MIC	Minimum inhibitory concentration
MMR	Measles-mumps-rubella vaccine
MVE	Murray Valley encephalitis virus
NNDSS	National Notifiable Diseases Surveillance System
NCHECR	National Centre in HIV Epidemiology and Clinical Research
NEC	Not elsewhere classified
NIP	National Immunisation Program
NN	Not notifiable
RRV	Ross River virus
SARS	Severe acute respiratory syndrome
SLTEC	Shiga-like toxin-producing *Escherichia coli*
STI(s)	Sexually transmissible infection(s)
TB	Tuberculosis
VPD(s)	Vaccine preventable disease(s)
VTEC	Verotoxigenic *Escherichia coli*
WHO	World Health Organization

Introduction

Australia's notifiable diseases status, 2005, is an annual surveillance report of nationally notifiable communicable diseases. Communicable disease surveillance in Australia operates at the national, state and local levels. Primary responsibility for public health action lies with the state and territory health departments. The role of communicable disease surveillance at a national level includes:

- identifying national trends;
- guidance for policy development and resource allocation at a national level;
- monitoring the need for and impact of national disease control programs;
- coordination of response to national or multi-jurisdictional outbreaks;
- description of the epidemiology of rare diseases, that occur infrequently at state and territory levels;
- meeting various international reporting requirements, such as providing disease statistics to the World Health Organization (WHO), and;
- support for quarantine activities, which are the responsibility of the national government.

Methods

Australia is a federation of six states (New South Wales, Queensland, South Australia, Tasmania, Victoria and Western Australia) and 2 territories (the Australian Capital Territory and the Northern Territory). State and territory health departments collect notifications of communicable diseases under their public health legislation. The Australian Government Department of Health and Ageing (DoHA) does not have any legislated responsibility for public health apart from human quarantine. States and territories voluntarily forward data on a nationally agreed set of communicable diseases to DoHA for the purposes of national communicable disease surveillance.

Sixty communicable diseases (Table 1) agreed upon nationally through the Communicable Diseases Network Australia (CDNA) are reported to the National Notifiable Diseases Surveillance System (NNDSS). The system is complemented by other surveillance systems that provide information on various diseases, including some that are not reported to NNDSS.

The national dataset included fields for unique record reference number; notifying state or territory; disease code; age; sex; indigenous status; postcode of residence; date of onset of the disease; death, date of report to the state or territory health department and outbreak reference (to identify cases linked to an outbreak). Where relevant, information on the species, serogroups/subtypes and phage types of organisms isolated, and on the vaccination status of the case was collected. While not included in the national dataset, additional information concerning mortality and specific health risk factors for some diseases was obtained from states and territories.

Notification rates for each notifiable disease were calculated using 2005 mid-year resident population supplied by the Australian Bureau of Statistics (Appendix 1). Where diseases were not notifiable in a state or territory, national rates were adjusted by excluding the population of that jurisdiction from the denominator. For some diseases age adjusted rates were calculated using the indirect method of standardisation, with 2001 census data as the standard population.

The geographical distribution of selected diseases was mapped using ArcGIS (ESRI, Redlands, CA, USA) software. Maps were based on the postcode of residence of each patient aggregated to the appropriate Statistical Division (Map 1). Rates for the different Statistical Divisions were ordered into six groups — the highest value, the lowest value above zero, those equal to zero, and the intermediate values sorted into three equal-sized groups. The Statistical Divisions in the Australian Capital Territory were combined to calculate rates for the territory as a whole.

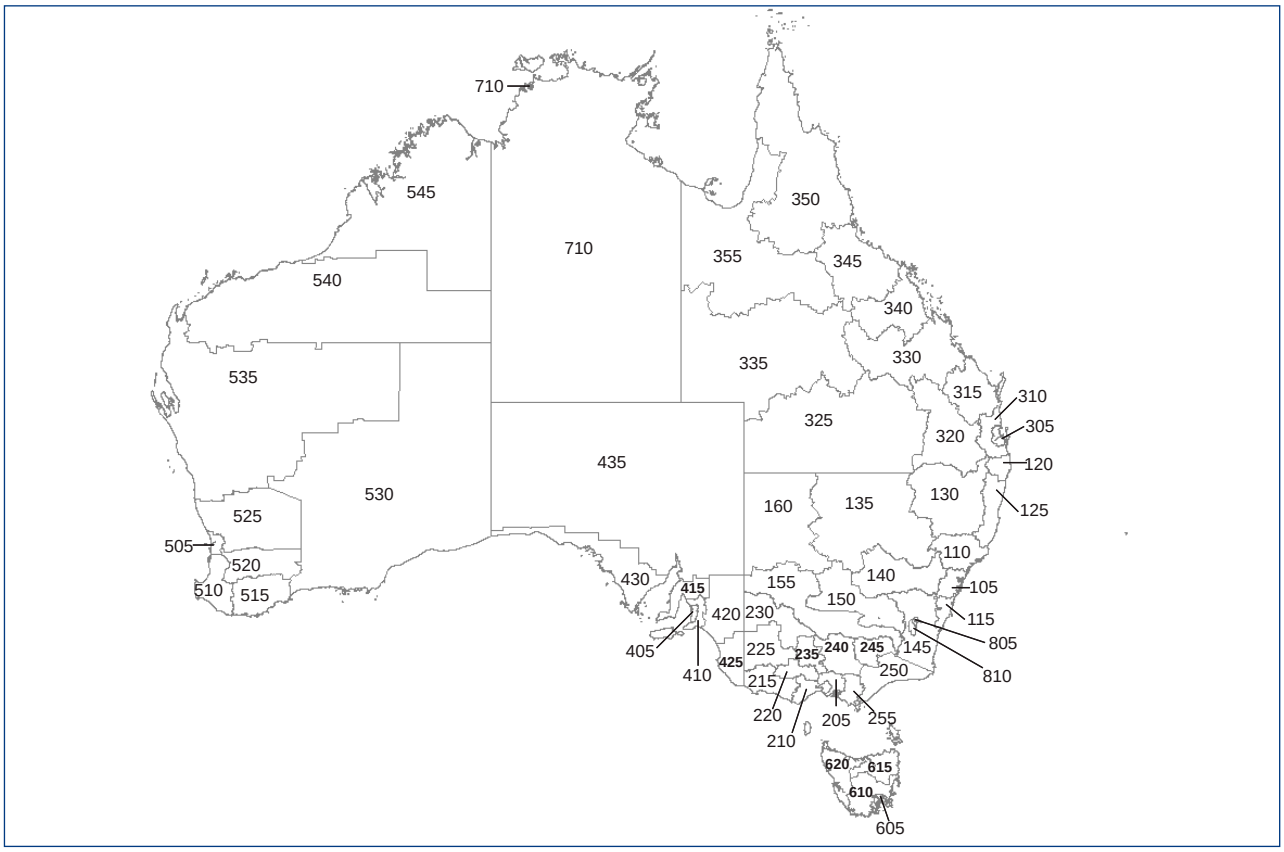
Information from communicable disease surveillance is disseminated through several avenues of communication. At the fortnightly teleconferences of the Communicable Diseases Network Australia the most up-to-date information on topics of interest to the network is provided. The *Communicable Diseases Intelligence* (*CDI*) quarterly journal publishes surveillance data and reports of research studies on the epidemiology and control of various communicable diseases. The Communicable Diseases Australia website publishes disease surveillance summaries from the NNDSS.

Notes on interpretation

The present report is based on 2005 'finalised' data from each state and territory. States and territories transmitted data to NNDSS on average every other day, and the final dataset for the year was agreed upon in June 2006. The finalised annual dataset represents a snap shot of the year after duplicate records and incorrect or incomplete data have been removed. Therefore, totals in this report may vary slightly from the totals reported in *CDI* quarterly publications.

Analyses in this report were based on the date of disease onset in an attempt to estimate disease activ-

Map 1. Australian Bureau of Statistics Statistical Divisions, and population by Statistical Division, 2005



Statistical Division		Population	Statistical Division		Population	Statistical Division		Population
Australian Capital Territory			*Queensland continued*			*Victoria*		
805	Canberra*	325,536	320	Darling Downs	222,478	205	Melbourne	3,634,233
New South Wales			325	South West	26,938	210	Barwon	269,752
105	Sydney	4,254,894	330	Fitzroy	189,838	215	Western District	101,441
110	Hunter	610,526	335	Central West	12,174	220	Central Highlands	148,294
115	Illawarra	414,168	340	Mackay	147,374	225	Wimmera	50,884
120	Richmond-Tweed	225,886	345	Northern	205,628	230	Mallee	92,087
125	Mid-North Coast	295,144	350	Far North	238,454	235	Loddon	175,406
130	Northern	179,103	355	North West	34,167	240	Goulburn	203,989
135	North Western	118,885	*South Australia*			245	Ovens-Murray	96,642
140	Central West	180,064	405	Adelaide	1,129,269	250	East Gippsland	83,126
145	South Eastern	202,757	410	Outer Adelaide	123,924	255	Gippsland	166,492
150	Murrumbidgee	153,871	415	Yorke and Lower North	44,907	*Western Australia*		
155	Murray	115,523	420	Murray Lands	68,756	505	Perth	1,477,815
160	Far West	23,428	425	South East	63,499	510	South West	219,812
Northern Territory			430	Eyre	34,661	515	Lower Great Southern	53,738
705	Darwin	111,300	435	Northern	77,017	520	Upper Great Southern	17,760
710	NT - balance	91,493	*Tasmania*			525	Midlands	52,372
Queensland			605	Greater Hobart	203,638	530	South Eastern	53,661
305	Brisbane	1,810,943	610	Southern	35,806	535	Central	59,925
310	Moreton	818,981	615	Northern	137,936	540	Pilbara	39,282
315	Wide Bay-Burnett	256,993	620	Mersey-Lyell	107,883	545	Kimberley	35,748
			910	*Other Territories*	2,683	Total Australia		20,328,984

* Includes Statistical Division 810 'ACT – balance'.

ity within the reporting period. Where the date of onset was not known however, the date of specimen collection or date of notification, whichever was earliest, was used. As considerable time may have lapsed between onset and diagnosis dates for hepatitis B (unspecified) and hepatitis C (unspecified), for these conditions the date of diagnosis, which is the earliest of specimen, notification or notification received dates supplied, was used.

Notified cases can only represent a proportion (the 'notified fraction') of the total incidence (Figure 1) and this has to be taken into account when interpreting NNDSS data. Moreover, the notified fraction varies by disease, by jurisdiction and by time.

Methods of surveillance vary between states and territories, each having different requirements for notification by medical practitioners, laboratories and hospitals. Although there is a list of national notifiable diseases, some diseases are not yet notifiable in some jurisdictions (Table 1).

Changes in surveillance practices introduced in some jurisdictions and not in others are additional factors that make comparison of data across jurisdictions difficult. In this report, information obtained from states and territories on any changes in surveillance practices including screening practices, laboratory practices, and major disease control or prevention initiatives undertaken in 2005, was used to interpret data.

Postcode information usually reflects the residential location of the case, but this does not necessarily represent the place where the disease was acquired. As no personal identifiers are collected in NNDSS, duplication in reporting may occur if patients move from one jurisdiction to another and were notified in both.

The completeness* of data in this report is summarised in Appendix 3. The case's sex was complete in 99.9% of notifications and date of birth in 99.8% of notifications. In 2005, indigenous status† was complete in 50% of notifications, but varied by jurisdiction. Indigenous status was complete for 100% of data reported in Western Australia, 92.3% in the Northern Territory, 89.2% in South Australia, and 52.4% in Victoria. In the remaining jurisdictions, less than 50% of data were complete for indigenous status.

Data completeness on indigenous status also varied by disease; in notifications of typhoid, syphilis, *Haemophilus influenzae* type B, tuberculosis (TB) and meningococcal infections was more than 90%

* Data completeness = (Total – unknown or missing)/total x 100.

† 'Indigenous status' is a variable defined by the following values:

1. Indigenous – (Aboriginal but not Torres Strait Islander origin);
2. Indigenous – (Torres Strait Islander but not Aboriginal origin);
3. Indigenous – (Aboriginal and Torres Strait Islander origin);
4. Not Indigenous – (not Aboriginal or Torres Strait Islander origin);
9. Not stated

Blank/missing/null =No information provided

Figure 1. Communicable diseases notification fraction

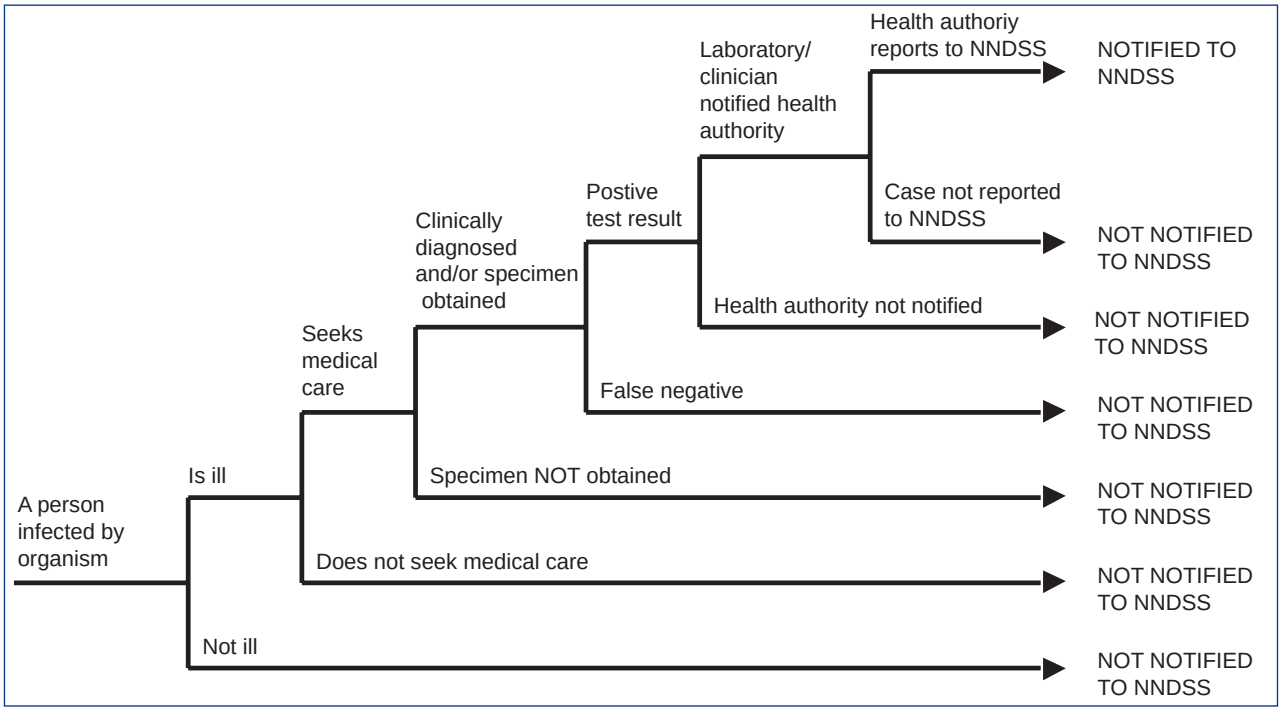


Table 1. Diseases notified to the National Notifiable Diseases Surveillance System, Australia, 2005

Disease	Data received from
Bloodborne diseases	
Hepatitis B (incident)	All jurisdictions
Hepatitis B (unspecified)*	All jurisdictions
Hepatitis C (incident)	All jurisdictions except Qld
Hepatitis C (unspecified)*,†	All jurisdictions
Hepatitis D	All jurisdictions
Gastrointestinal diseases	
Botulism	All jurisdictions
Campylobacteriosis‡	All jurisdictions except NSW
Cryptosporidiosis	All jurisdictions
Haemolytic uraemic syndrome	All jurisdictions
Hepatitis A	All jurisdictions
Hepatitis E	All jurisdictions
Listeriosis	All jurisdictions
Salmonellosis (NEC)	All jurisdictions
Shigellosis	All jurisdictions
SLTEC, VTEC§	All jurisdictions
Typhoid	All jurisdictions
Quarantinable diseases	
Cholera	All jurisdictions
Plague	All jurisdictions
Rabies	All jurisdictions
Severe acute respiratory syndrome	All jurisdictions
Smallpox	All jurisdictions
Tularaemia	All jurisdictions except ACT
Viral haemorrhagic fever	All jurisdictions
Yellow fever	All jurisdictions
Sexually transmissible infections	
Chlamydial infection (NEC)‖	All jurisdictions
Donovanosis	All jurisdictions
Gonococcal infection	All jurisdictions
Syphilis (all)¶	All jurisdictions
Syphilis – infectious	All jurisdictions
Syphilis – More than 2 years or unknown duration	All jurisdictions
Syphilis – congenital	All jurisdictions
Vaccine preventable diseases	
Diphtheria	All jurisdictions
Haemophilus influenzae type b	All jurisdictions
Influenza (laboratory confirmed)**	All jurisdictions
Measles	All jurisdictions
Mumps	All jurisdictions
Pertussis	All jurisdictions
Pneumococcal disease (invasive)	All jurisdictions
Poliomyelitis	All jurisdictions
Rubella	All jurisdictions
Rubella – congenital	All jurisdictions
Tetanus	All jurisdictions

Table 1. Diseases notified to the National Notifiable Diseases Surveillance System, Australia, 2005, *continued*

Disease	Data received from
Vectorborne diseases	
Barmah Forest virus infection	All jurisdictions
Dengue	All jurisdictions
Flavivirus infection (NEC)††	All jurisdictions except ACT
Japanese encephalitis virus	All jurisdictions
Kunjin virus‡‡	All jurisdictions except ACT
Malaria	All jurisdictions
Murray Valley encephalitis	All jurisdictions except ACT
Ross River virus infection	All jurisdictions
Zoonoses	
Anthrax	All jurisdictions
Australian bat lyssavirus	All jurisdictions
Brucellosis	All jurisdictions
Leptospirosis	All jurisdictions
Lyssavirus unspecified	All jurisdictions
Ornithosis§§	All jurisdictions
Q fever	All jurisdictions
Other bacterial infections	
Legionellosis	All jurisdictions
Leprosy	All jurisdictions
Meningococcal infection||||	All jurisdictions
Tuberculosis	All jurisdictions

* Unspecified hepatitis includes cases in whom the duration of infection could not be determined.

† In Queensland, includes incident hepatitis cases.

‡ Notified as 'foodborne disease' or 'gastroenteritis in an institution' in New South Wales.

§ Infection with Shiga-like toxin-/verotoxin-producing *Escherichia coli* (SLTEC/VTEC).

|| Includes *Chlamydia trachomatis* identified from cervical, rectal, urine, urethral, throat and eye samples, except for South Australia which reports only genital tract specimens; the Northern Territory which excludes ocular specimens; and Western Australia which excludes ocular and perinatal infections.

¶ Does not include congenital syphilis.

** Laboratory-confirmed influenza is not a notifiable disease in South Australia but reports are forwarded to NNDSS.

†† Flavivirus (NEC) replaced Arbovirus (NEC) from 1 January 2004.

‡‡ In the Australian Capital Territory, Murray Valley encephalitis virus and Kunjin virus are combined under Murray Valley encephalitis virus.

§§ In the Australian Capital Territory, ornithosis is reported as chlamydia not elsewhere classified.

|||| Only invasive meningococcal disease is nationally notifiable. However, New South Wales, the Australian Capital Territory and South Australia also report conjunctival cases.

NN Not notifiable.

NEC Not elsewhere classified.

complete for indigenous status, while in notifications of other diseases such as Barmah Forest virus infection, influenza (laboratory-confirmed), and hepatitis C (unspecified) infections, data completeness was below 40%.

Notes on case definitions

In this report each notifiable disease is introduced with a case definition, the 'CDNA case definition'. These case definitions were agreed upon by CDNA to be implemented nationally by January 2004.

CDNA case definitions are only intended for reporting to NNDSS. In 2005 they were used by all jurisdictions for the first time. States and territories may also have case definitions which reflect their local public health needs. These may be the same as or more comprehensive than the CDNA case definitions.

Results

Summary of 2005 data

There were 125,461 communicable disease notifications received by NNDSS in 2005 (Table 2). Notification rates per 100,000 population for each disease by state or territory are shown in Table 3. Trends in notifications and rates per 100,000 population for the period 2001 to 2005 are shown in Table 4.

Table 2. Notifications of communicable diseases, Australia, 2005, by state or territory

Disease	State or territory								
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust
Bloodborne diseases									
Hepatitis B (incident)	5	56	5	59	8	3	78	31	245
Hepatitis B (unspecified)*	88	2,711	199	945	325	54	1,679	395	6,396
Hepatitis C (incident)	11	41	3	NN	50	26	122	104	357
Hepatitis C (unspecified)*,†	163	4,424	254	2,790	559	215	2,861	984	12,250
Hepatitis D	0	15	0	11	0	0	2	2	30
Gastrointestinal diseases									
Botulism	0	0	0	2	0	0	1	0	3
Campylobacteriosis‡	402	NN	248	4,416	2,089	760	6,109	2,444	16,468
Cryptosporidiosis	27	851	82	1,360	167	22	518	182	3,209
Haemolytic uraemic syndrome	0	11	0	2	1	2	3	1	20
Hepatitis A	3	83	64	50	10	2	59	54	325
Hepatitis E	2	7	0	8	0	0	12	2	31
Listeriosis	3	25	0	7	6	0	9	4	54
Salmonellosis (NEC)	95	2,179	393	2,613	577	302	1,481	801	8,441
Shigellosis	7	135	196	80	48	5	105	156	732
SLTEC, VTEC§	0	16	0	9	40	2	8	12	87
Typhoid	0	28	0	3	2	0	11	8	52
Quarantinable diseases									
Cholera	0	0	0	0	0	0	2	1	3
Plague	0	0	0	0	0	0	0	0	0
Rabies	0	0	0	0	0	0	0	0	0
Severe acute respiratory syndrome	0	0	0	0	0	0	0	0	0
Smallpox	0	0	0	0	0	0	0	0	0
Tularaemia	NN	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 transmitted infections									
Chlamydial infection (NEC)‖	700	11,283	1,583	9,721	2,706	871	9,004	5,443	41,311
Donovanosis	0	0	4	8	0	0	0	1	13
Gonococcal infection	33	1,577	1,738	1,444	399	35	1,208	1,581	8,015
Syphilis (all)¶	14	845	229	380	18	30	496	191	2,203
Syphilis < 2 years duration	4	244	93	128	7	6	120	19	621
Syphilis > 2 years or unknown duration	10	601	136	252	11	24	376	172	1,582
Syphilis – congenital	0	8	5	2	0	0	0	0	15

Table 2. Notifications of communicable diseases, Australia, 2005, by state or territory, *continued*

Disease	State or territory								
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust
Vaccine preventable diseases									
Diphtheria	0	0	0	0	0	0	0	0	0
Haemophilus influenzae type b	0	7	1	4	0	0	3	2	17
Influenza (laboratory confirmed)**	39	1,414	61	1,698	275	19	595	466	4,567
Measles	0	5	0	1	0	1	2	1	10
Mumps	1	111	7	71	8	0	20	23	241
Pertussis	315	5,802	92	1,775	1,507	33	1,163	513	11,200
Pneumococcal disease (invasive)	30	641	71	325	134	44	300	139	1,684
Poliomyelitis	0	0	0	0	0	0	0		0
Rubella	0	10	0	9	0	0	6	6	31
Rubella – congenital	0	0	0	0	0	0	1	0	1
Tetanus	0	1	0	0	0	1	0	0	2
Vectorborne diseases									
Barmah Forest virus infection	0	448	51	680	40	1	16	83	1,319
Dengue	2	48	14	115	5	0	16	18	218
Flavivirus infection (NEC)††	NN	6	0	20	0	0	3	0	29
Japanese encephalitis virus	0	0	0	0	0	0	0	0	0
Kunjin virus‡‡	NN	0	0	1	0	0	0	0	1
Malaria	12	204	47	297	43	24	110	85	822
Murray Valley encephalitis virus	NN	0	1	1	0	0	0	0	2
Ross River virus infection	6	585	209	1,179	153	5	96	311	2,544
Zoonoses									
Anthrax	0	0	0	0	0	0	0	0	0
Australian bat lyssavirus	0	0	0	0	0	0	0	0	0
Brucellosis	0	3	0	37	0	0	1	0	41
Leptospirosis	0	35	5	72	3	0	10	5	130
Ornithosis§§	0	121	0	2	1	0	34	3	161
Lyssavirus unspecified	0	0	0	0	0	0	0	0	0
Q fever	0	142	3	157	17	0	30	6	355
Other bacterial infections									
Legionellosis	0	89	3	49	58	3	63	70	335
Leprosy	0	1	3	3	0	0	0	3	10
Meningococcal infection‖‖	8	140	11	62	26	10	90	47	394
Tuberculosis	0	453	27	114	46	13	367	67	1,087
Total	1,966	34,561	5,609	30,582	9,321	2,483	26,694	14,245	125,461

* Unspecified hepatitis includes cases in whom the duration of infection could not be determined.

† In Queensland, includes incident hepatitis cases.

‡ Notified as 'foodborne disease' or 'gastroenteritis in an institution' in New South Wales.

§ Infection with Shiga-like toxin-/verotoxin-producing *Escherichia coli* (SLTEC/VTEC).

‖ Includes *Chlamydia trachomatis* identified from cervical, rectal, urine, urethral, throat and eye samples, except for South Australia which reports only genital tract specimens; the Northern Territory which excludes ocular specimens; and Western Australia which excludes ocular and perinatal infections.

¶ Does not include congenital syphilis.

** Laboratory-confirmed influenza is not a notifiable disease in South Australia but reports are forwarded to NNDSS.

†† Flavivirus (NEC) replaced Arbovirus (NEC) from 1 January 2004.

‡‡ In the Australian Capital Territory, Murray Valley encephalitis virus and Kunjin virus are combined under Murray Valley encephalitis virus.

§§ In the Australian Capital Territory, ornithosis is reported as chlamydia not elsewhere classified.

‖‖ Only invasive meningococcal disease is nationally notifiable. However, New South Wales, the Australian Capital Territory and South Australia also report conjunctival cases.

NN Not notifiable.

NEC Not elsewhere classified.

Table 3. Notification rate for communicable diseases, Australia, 2005, by state and territory (per 100,000 population)

Disease	State or territory								
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust
Bloodborne diseases									
Hepatitis B (incident)	1.5	0.8	2.5	1.5	0.5	0.6	1.6	1.5	1.2
Hepatitis B (unspecified)*	2.5	40.0	98.1	23.8	21.1	11.1	33.4	19.7	31.5
Hepatitis C (incident)	3.4	0.6	1.5	NN	3.2	5.4	2.4	5.2	1.8
Hepatitis C (unspecified)*,†	50.1	65.3	125.3	70.4	36.3	44.3	57.0	49.0	60.3
Hepatitis D	0.0	0.2	0.0	0.3	0.0	0.0	0.0	0.1	0.1
Gastrointestinal diseases									
Botulism	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Campylobacteriosis‡	123.6	NN	122.3	111.4	135.5	156.6	121.6	121.6	121.5
Cryptosporidiosis	8.3	12.6	40.4	34.3	10.8	4.5	10.3	9.1	15.8
Haemolytic uraemic syndrome	0.0	0.2	0.0	0.1	0.1	0.4	0.1	0.0	0.1
Hepatitis A	0.9	1.2	31.6	1.3	0.6	0.4	1.2	2.7	1.6
Hepatitis E	0.6	0.1	0.0	0.2	0.0	0.0	0.2	0.1	0.2
Listeriosis	0.9	0.4	0.0	0.2	0.4	0.0	0.2	0.2	0.3
Salmonellosis (NEC)	29.2	32.2	193.8	65.9	37.4	62.2	29.5	39.8	41.5
Shigellosis	2.2	2.0	96.7	2.0	3.1	1.0	2.1	7.8	3.6
SLTEC,VTEC§	0.0	0.2	0.0	0.2	2.6	0.4	0.2	0.6	0.4
Typhoid	0.0	0.4	0.0	0.1	0.1	0.0	0.2	0.4	0.3
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
Severe acute respiratory syndrome	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Smallpox	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tularaemia	NN	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 infections									
Chlamydial infections (NEC)‖	215.3	166.6	780.6	245.2	156.0	179.5	179.3	270.8	203.2
Donovanosis	0.0	0.0	2.0	0.2	0.0	0.0	0.0	0.0	0.1
Gonococcal infection	10.1	23.3	857.0	36.4	25.9	82.2	24.1	78.7	39.4
Syphilis (all)¶	4.3	12.5	112.9	9.6	1.2	6.2	9.9	9.5	10.8
Syphilis < 2 years duration	1.2	3.6	45.9	3.2	0.5	1.2	2.4	0.9	3.1
Syphilis > 2 years or unknown duration	3.1	8.9	67.1	6.4	0.7	4.9	7.5	8.6	7.8
Syphilis – congenital	0.0	0.1	2.5	0.1	0.0	0.0	0.0	0.0	0.1
Vaccine preventable diseases									
Diphtheria	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Haemophilus influenzae type b	0.0	0.1	0.5	0.1	0.0	0.0	0.1	0.1	0.1
Influenza (laboratory confirmed)**	12.0	20.9	30.1	42.8	17.8	3.9	11.8	23.2	22.5
Measles	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Mumps	0.3	1.6	3.5	1.8	0.5	0.0	0.4	1.1	1.2
Pertussis	96.9	85.6	45.4	44.8	97.7	6.8	23.2	25.5	55.1
Pneumococcal disease (invasive)	9.2	9.5	35.0	8.2	8.7	9.1	6.0	6.9	8.3
Poliomyelitis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rubella	0.0	0.1	0.0	0.2	0.0	0.0	0.1	0.3	0.2
Rubella – congenital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tetanus	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0

Table 3. Notification rate for communicable diseases, Australia, 2005, by state and territory (per 100,000 population), *continued*

Disease	State or territory								
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust
Vectorborne diseases									
Barmah Forest virus infection	0.0	6.6	25.1	17.2	2.6	0.2	0.3	4.1	6.5
Dengue	0.6	0.7	6.9	2.9	0.3	0.0	0.3	0.9	1.1
Flavivirus infection (NEC)††	NN	0.1	0.0	0.5	0.0	0.0	0.1	0.0	0.1
Japanese encephalitis virus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kunjin virus‡‡	NN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Malaria	3.7	3.0	23.2	7.5	2.8	4.9	2.2	4.2	4.0
Murray Valley encephalitis virus	NN	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
Ross River virus infection	1.8	8.6	103.1	29.7	9.9	1.0	1.9	15.5	12.5
Zoonoses									
Anthrax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Australian bat lyssavirus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brucellosis	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.2
Leptospirosis	0.0	0.5	2.5	1.8	0.2	0.0	0.2	0.2	0.6
Lyssavirus unspecified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ornithosis§§	0.0	1.8	0.0	0.1	0.1	0.0	0.7	0.1	0.8
Q fever	0.0	2.1	1.5	4.0	1.1	0.0	0.6	0.3	1.7
Other bacterial infections									
Legionellosis	0.0	1.3	1.5	1.2	3.8	0.6	1.3	3.5	1.6
Leprosy	0.0	0.0	1.5	0.1	0.0	0.0	0.0	0.1	0.0
Meningococcal infection‖‖	2.5	2.1	5.4	1.6	1.7	2.1	1.8	2.3	1.9
Tuberculosis	0.0	6.7	13.3	2.9	3.0	2.7	7.3	3.3	5.3

* Unspecified hepatitis includes cases in whom the duration of infection could not be determined.

† In Queensland, includes incident hepatitis cases.

‡ Notified as 'foodborne disease' or 'gastroenteritis in an institution' in New South Wales.

§ Infection with Shiga-like toxin-/verotoxin-producing *Escherichia coli* (SLTEC/VTEC).

|| Includes *Chlamydia trachomatis* identified from cervical, rectal, urine, urethral, throat and eye samples, except for South Australia which reports only genital tract specimens; the Northern Territory which excludes ocular specimens; and Western Australia which excludes ocular and perinatal infections.

¶ Does not include congenital syphilis.

** Laboratory-confirmed influenza is not a notifiable disease in South Australia but reports are forwarded to NNDSS.

†† Flavivirus (NEC) replaced Arbovirus (NEC) from 1 January 2004.

‡‡ In the Australian Capital Territory, Murray Valley encephalitis virus and Kunjin virus are combined under Murray Valley encephalitis virus.

§§ In the Australian Capital Territory, ornithosis is reported as chlamydia not elsewhere classified.

‖‖ Only invasive meningococcal disease is nationally notifiable. However, New South Wales, the Australian Capital Territory and South Australia also report conjunctival cases.

NN Not notifiable.

NEC Not elsewhere classified.

Table 4. Notifications and notification rate for communicable diseases, Australia, 2001 to 2005, (per 100,000 population)

Disease	Notifications					Rate per 100,000 population				
	2001	2002	2003	2004	2005	2001	2002	2003	2004	2005
Bloodborne diseases										
Hepatitis B (incident)	422	383	345	282	245	2.2	2.0	1.7	1.4	1.2
Hepatitis B (unspecified)*	8,025	6,353	5,824	5,829	6,396	41.2	32.3	29.3	29.0	31.5
Hepatitis C (incident)	694	438	518	453	357	3.6	2.2	2.6	2.3	1.8
Hepatitis C (unspecified)*,†	19,370	14,462	13,716	12,993	12,250	99.4	73.6	69.0	64.6	60.3
Hepatitis D	20	20	27	28	30	0.1	0.1	0.1	0.1	0.1
Gastrointestinal diseases										
Botulism	2	0	1	1	3	0.0	0.0	0.0	0.0	0.0
Campylobacteriosis‡	16,134	14,740	15,357	15,579	16,468	125.3	113.3	116.4	116.4	121.5
Cryptosporidiosis	1,629	3,266	1,223	1,684	3,209	8.4	16.6	6.2	8.4	15.8
Haemolytic uraemic syndrome	3	12	15	16	20	0.0	0.1	0.1	0.1	0.1
Hepatitis A	539	388	431	319	325	2.8	2.0	2.2	1.6	1.6
Hepatitis E	14	12	12	28	31	0.1	0.1	0.1	0.1	0.2
Listeriosis	64	62	69	67	54	0.3	0.3	0.3	0.3	0.3
Salmonellosis (NEC)	7,050	7,699	7,008	7,834	8,441	36.2	39.2	35.2	39.0	41.5
Shigellosis	567	504	442	520	732	2.9	2.6	2.2	2.6	3.6
SLTEC, VTEC§	46	58	52	49	87	0.2	0.3	0.3	0.2	0.4
Typhoid	77	68	51	76	52	0.4	0.3	0.3	0.4	0.3
Quarantinable diseases										
Cholera	4	5	1	5	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
Severe acute respiratory syndrome	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Smallpox	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Tularaemia	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 transmitted infections										
Chlamydial infections (NEC)‖	20,330	24,043	30,439	36,227	41,311	104.3	122.4	153.1	180.1	203.2
Donovanosis	32	17	16	10	13	0.2	0.1	0.1	0.0	0.1
Gonococcal infection	6,291	6,279	6,792	7,187	8,015	32.3	32.0	34.2	35.7	39.4
Syphilis (all)¶	1,851	1,958	2,007	2,332	2,203	9.5	10.0	10.1	11.6	10.8
Syphilis < 2 years duration	0	0	0	615	621	0.0	0.0	0.0	3.1	3.1
Syphilis > 2 years or unknown duration	1,851	1,958	2,007	1,717	1,582	9.5	10.0	10.1	8.5	7.8
Syphilis – congenital	21	18	13	12	15	0.1	0.1	0.1	0.1	0.1
Vaccine preventable diseases										
Diphtheria	1	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Haemophilus influenzae type b	20	30	19	15	17	0.1	0.2	0.1	0.1	0.1
Influenza (laboratory confirmed)**	1,294	3,652	3,483	2,133	4,567	6.6	18.6	17.5	10.6	22.5
Measles	141	32	93	45	10	0.7	0.2	0.5	0.2	0.0
Mumps	116	67	77	102	241	0.6	0.3	0.4	0.5	1.2
Pertussis	9,506	5,407	5,096	8,752	11,200	48.8	27.5	25.6	43.5	55.1
Poliomyelitis	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Pneumococcal disease (invasive)	1,761	2,432	2,238	2,296	1,684	9.0	12.4	11.3	11.4	8.3
Rubella	264	254	54	31	31	1.4	1.3	0.3	0.2	0.2
Rubella – congenital	0	1	3	1	1	0.0	0.0	0.0	0.0	0.0
Tetanus	3	4	4	5	2	0.0	0.0	0.0	0.0	0.0

Table 4. Notifications and notification rate for communicable diseases, Australia, 2001 to 2005, (per 100,000 population), *continued*

Disease	Notifications					Rate per 100,000 population				
	2001	2002	2003	2004	2005	2001	2002	2003	2004	2005
Vectorborne diseases										
Barmah Forest virus infection	1,143	867	1,369	1,106	1,319	5.9	4.4	6.9	5.5	6.5
Dengue	131	165	860	351	218	0.7	0.8	4.3	1.7	1.1
Flavivirus infection (NEC)††	88	72	60	61	29	0.5	0.4	0.3	0.3	0.1
Japanese encephalitis virus	0	0	1	1	0	0.0	0.0	0.0	0.0	0.0
Kunjin virus‡‡	5	0	18	12	1	0.0	0.0	0.1	0.1	0.0
Malaria	719	462	595	558	822	3.7	2.4	3.0	2.8	4.0
Murray Valley encephalitis virus	6	2	0	1	2	0.0	0.0	0.0	0.0	0.0
Ross River virus infection	3,226	1,451	3,850	4,210	2,544	16.6	7.4	19.4	20.9	12.5
Zoonoses										
Anthrax	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Australian bat lyssavirus	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Brucellosis	21	40	20	39	41	0.1	0.2	0.1	0.2	0.2
Leptospirosis	250	159	127	177	130	1.3	0.8	0.6	0.9	0.6
Ornithosis§§	137	199	199	237	161	0.7	1.0	1.0	1.2	0.8
Lyssavirus unspecified	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Q fever	693	762	562	463	355	3.6	3.9	2.8	2.3	1.7
Other bacterial infections										
Legionellosis	310	313	333	312	335	1.6	1.6	1.7	1.6	1.6
Leprosy	10	6	5	7	10	0.1	0.0	0.0	0.0	0.0
Meningococcal infection‖‖	686	681	558	405	394	3.5	3.5	2.8	2.0	1.9
Tuberculosis	932	1,041	959	1,061	1,087	4.8	5.3	4.8	5.3	5.3
Total	104,648	98,884	104,942	113,912	125,461					

* Unspecified hepatitis includes cases in whom the duration of infection could not be determined.

† In Queensland, includes incident hepatitis cases.

‡ Notified as 'foodborne disease' or 'gastroenteritis in an institution' in New South Wales.

§ Infection with Shiga-like toxin-/verotoxin-producing *Escherichia coli* (SLTEC/VTEC).

‖ Includes *Chlamydia trachomatis* identified from cervical, rectal, urine, urethral, throat and eye samples, except for South Australia which reports only genital tract specimens; the Northern Territory which excludes ocular specimens; and Western Australia which excludes ocular and perinatal infections.

¶ Does not include congenital syphilis.

** Laboratory-confirmed influenza is not a notifiable disease in South Australia but reports are forwarded to NNDSS.

†† Flavivirus (NEC) replaced Arbovirus (NEC) from 1 January 2004.

‡‡ In the Australian Capital Territory, Murray Valley encephalitis virus and Kunjin virus are combined under Murray Valley encephalitis virus.

§§ In the Australian Capital Territory, ornithosis is reported as chlamydia not elsewhere classified.

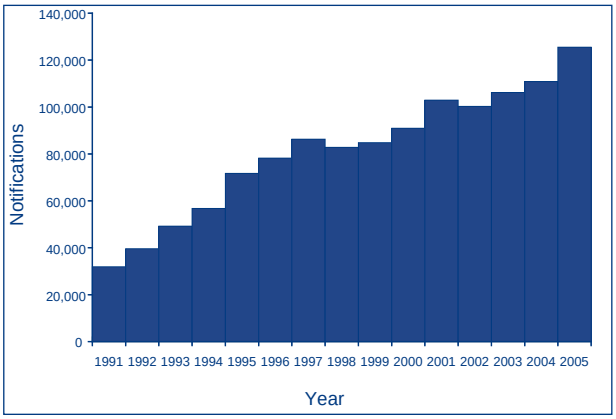
‖‖ Only invasive meningococcal disease is nationally notifiable. However, New South Wales, the Australian Capital Territory and South Australia also report conjunctival cases.

NN Not notifiable.

NEC Not elsewhere classified.

In 2005, the total number of notifications was the highest recorded in NNDSS since the system began in 1991. There was an increase of 10% compared to the total number of notifications in 2004 (Figure 2).

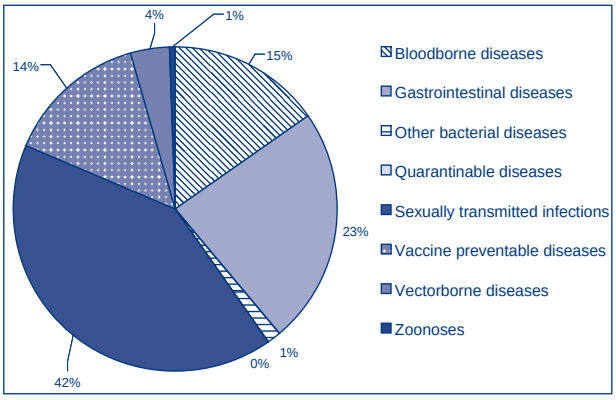
Figure 2. Trends in notifications received by the National Notifiable Diseases Surveillance System, Australia, 1991 to 2005



In 2005, the most frequently notified diseases were sexually transmissible infections (51,557 notifications, 41% of total notifications), gastrointestinal diseases (29,422 notifications, 23%) and bloodborne diseases (19,278 notifications, 15%).

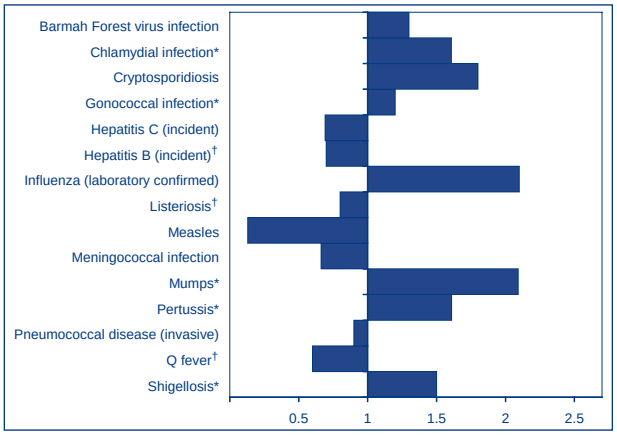
There were 17,753 notifications of vaccine preventable diseases; 4,935 notifications of vectorborne diseases; 1,826 notification of other bacterial infections and 687 notifications of zoonotic diseases (Figure 3).

Figure 3. Notifications to the National Notifiable Diseases Surveillance System, Australia, 2005, by disease category



The major changes in communicable disease notifications in 2005 are shown in Figure 4 as the ratio of notifications in 2005 to the mean number of notifications for the previous 5 years. The number of notifications of chlamydial, gonococcal, shigellosis, mumps, pertussis, SLTEC/VTEC and hepatitis E infections surpassed the expected range (5-year mean plus 2 standard deviations). Notifications of hepatitis B (incident), Q fever, flavivirus and listeriosis infections were below the expected range (5-year mean minus 2 standard deviations). Notifications for the remaining diseases were within the historical range.

Figure 4. Comparison of total notifications of selected diseases reported to the National Notifiable Diseases Surveillance System in 2005, with the previous 5-year mean



* Number of notifications surpassed the expected range (i.e. 5-year mean +2 standard deviations).

† Number of notifications was less than the expected range (i.e. 5-year mean –2 standard deviations).

In the financial year 2004–05, there were 87,520 hospital separations in Australian hospitals with a primary diagnosis of infectious diseases (International Classification of Diseases, version 10, Australian Modification (ICD10–AM) codes A01–B99, Australian Institute of Health and Welfare). This represents 1.2% of all hospital separations in that period. A further 65,494 separations were recorded with a principal diagnosis of influenza or pneumonia (ICD10–AM J10–J18).[1]

Bloodborne diseases

Bloodborne viruses reported to the NNDSS include hepatitis B, C, and D. HIV and AIDS diagnoses are reported directly to the National Centre in HIV Epidemiology and Clinical Research (NCHECR). Information on national HIV/AIDS surveillance can be obtained through the NCHECR website at www.med.unsw.edu.au/nchecr

Hepatitis B

Incident hepatitis B notifications

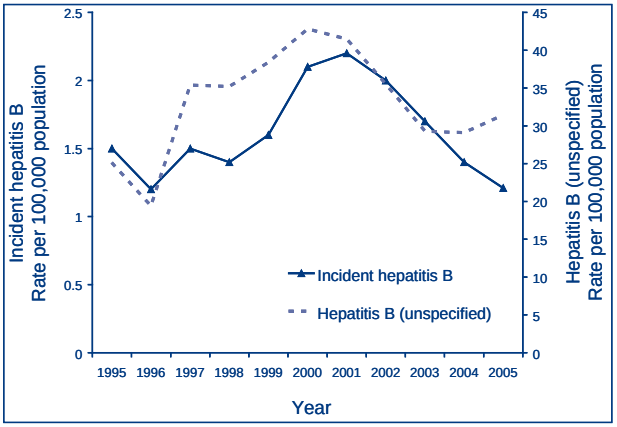
Case definition – Hepatitis B (incident)

*Only **confirmed cases** are reported.*

***Confirmed case:** Detection of hepatitis B surface antigen (HBsAg) in a case shown to be negative within the last 24 months, OR detection of hepatitis HBsAg and IgM to hepatitis B core antigen in the absence of prior evidence of hepatitis B infection OR detection of hepatitis B virus by nucleic acid testing and IgM to hepatitis B core antigen in the absence of evidence of prior hepatitis B infection.*

In 2005, 245 cases of incident hepatitis B infection were reported to NNDSS, giving a national notification rate of 1.2 cases per 100,000 population. The Northern Territory recorded the highest notification rate in 2005 with 2.5 cases per 100,000 population. Over the past 10 years, the rate of notification of incident hepatitis B infection increased from 1.5 cases per 100,000 population in 1996 to 2.2 cases per 100,000 population in 2002 and then declined to 1.2 cases per 100,000 population in 2005 (Figure 5).

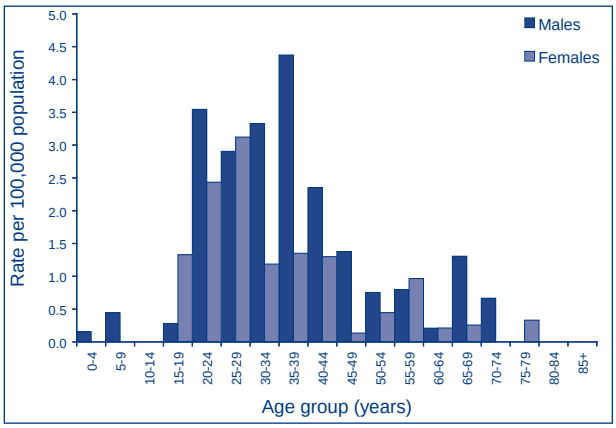
Figure 5. Notification rate of incident hepatitis B and hepatitis B (unspecified), Australia, 1995–2005, by year*



* Year of onset for incident hepatitis B and year of report for hepatitis B (unspecified) notifications.

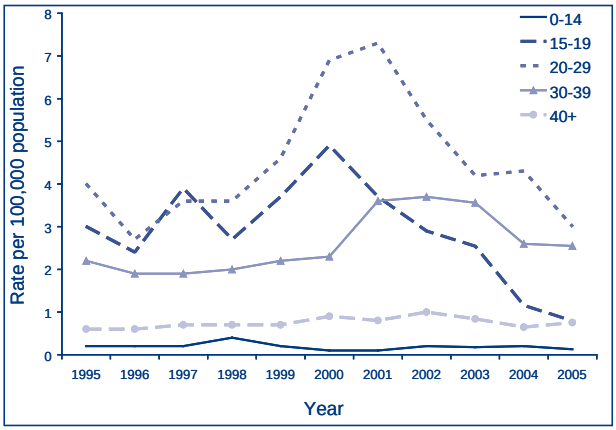
In 2005, the 35–39 year age group among males (4.4 cases per 100,000 population) had the highest rate of incident hepatitis B infection whereas the 25–29 year age group had the highest notification rate (3.1 cases per 100,000 population) (Figure 6) among females. Notifications of incident hepatitis B infection in males exceeded those in females, with a male to female ratio of 1.8:1 in 2005.

Figure 6. Notification rate of incident hepatitis B infections, Australia, 2005, by age group and sex



Trends in incident hepatitis B infection by year and age group are shown in Figure 7. In 2001–2005, the notification rate of incident hepatitis B fell by 81% among cases in the 15–19 year age group, and by 58% among cases in the 20–29 year age group. Increased adolescent vaccine coverage may have played a role in this reduction.

Figure 7. Notification rate of incident hepatitis B infections, Australia, 1995 to 2005, by year and age group



The source of exposure for cases of incident hepatitis B infection in 2005 was reported from South Australia, Victoria and the Australian Capital Territory (Table 5). In 2002–2005, the proportion of notifications of newly-acquired hepatitis B infection associated with injecting drug use, or heterosexual contact only, remained relatively stable at around 45%–50% and 21%–22%, respectively. The proportion of notifications of newly-acquired hepatitis B infections with an undetermined source of exposure to hepatitis B virus (HBV) declined from 23% in 2002 to 15% in 2005.

Table 5. Incident hepatitis B infection, Australia,* 2005, by exposure category

Exposure category	Number	Percentage
Injecting drug use	45	46
Sexual contact	33	34
Male homosexual contact	7	21
Heterosexual contact	22	67
Not specified	4	12
Blood/tissue recipient	0	0
Skin penetration procedure	1	1
Healthcare exposure	0	0
Household contact	3	3
Other	1	1
Undetermined	15	15
Total	98	100

Source: National Centre in HIV Epidemiology and Clinical Research 2006.[2]

* Data from South Australia, Victoria and the Australian Capital Territory only.

Hepatitis B (unspecified) notifications

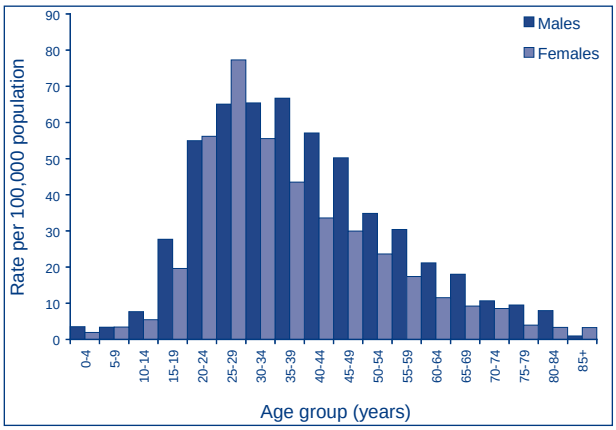
Case definition – Hepatitis B – unspecified

*Only **confirmed cases** are reported.*

***Confirmed case:** Detection of hepatitis B surface antigen or hepatitis B virus by nucleic acid testing in a case who does not meet any of the criteria for a newly acquired case.*

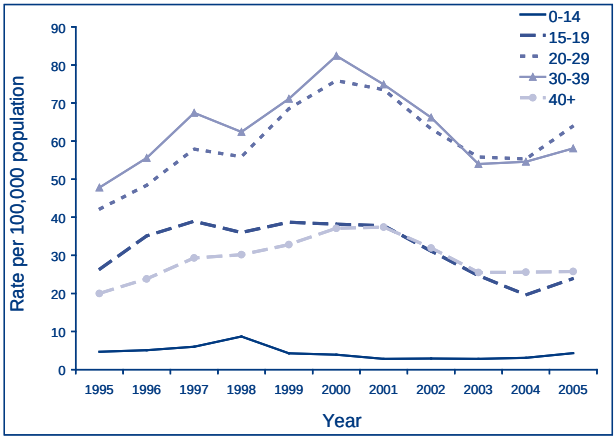
In 2005, a total of 6,396 cases of hepatitis B (unspecified) infection were notified to NNDSS, giving a rate of 31.5 cases per 100,000 population. The Northern Territory (98.1 cases per 100,000 population), New South Wales (40.0 cases per 100,000 population) and Victoria (33.4 cases per 100,000 population) recorded the highest notification rates. The male to female ratio was 1.7:1. Among males, the highest notification rate was in the 25–29, 30–34 and the 35 –39 year age groups (65.0 cases per 100,000 population), whereas among females, the highest notification rate was in the 25–29 year age group (77.0 cases per 100,000 population, Figure 8).

Figure 8. Notification rate of hepatitis B (unspecified) infections, Australia, 2005, by age group and sex



Notifications of hepatitis B infection (unspecified) increased from 19.4 in 1996 to 42.8 in 2000 and then declined to around 29 cases per 100,000 population in 2003–2005 (Figure 5). Trends in hepatitis B (unspecified) infection by age group and year are shown in Figure 9. In 2005, rates of hepatitis B (unspecified) notifications remained stable compared to 2003 and 2004 rates. There were marginal increases in the 15–19 and 20–29 year age groups by 22% and 17%, respectively.

Figure 9. Notification rate of hepatitis B (unspecified) infections, Australia, 1995 to 2005, by year and age group



In 2005, 36 cases of HBV (1 incident and 35 unspecified) infection in children in the 0–4 year age group were reported. Approximately 95% of infants born in Australia in 2005 received hepatitis B vaccination (http://www.ncirs.usyd.edu.au, 2006).

Hepatitis C

Incident hepatitis C notifications

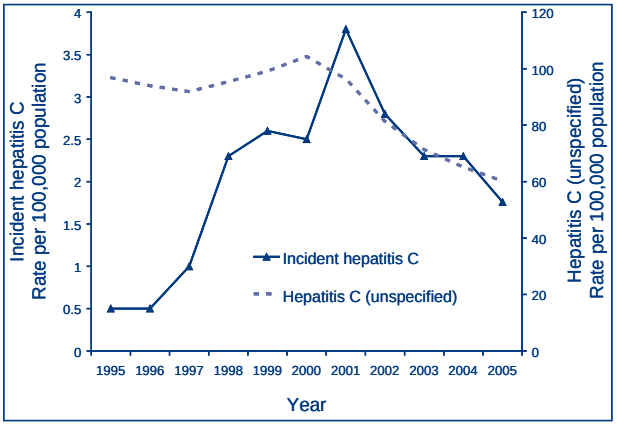
Case definition – Hepatitis C (newly acquired - incident)

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires detection of anti-hepatitis C antibody or detection of hepatitis C virus in a case with a negative test recorded in the last 24 months OR Detection of anti-hepatitis C antibody in a case aged 18 to 24 months or detection of hepatitis C virus in a case aged 1 to 24 months OR detection of anti-hepatitis C antibody or hepatitis C virus AND clinical hepatitis within the last 24 months (defined as jaundice, urine bilirubin or ALT seven times the upper limit of normal) where other causes of acute hepatitis have been excluded.*

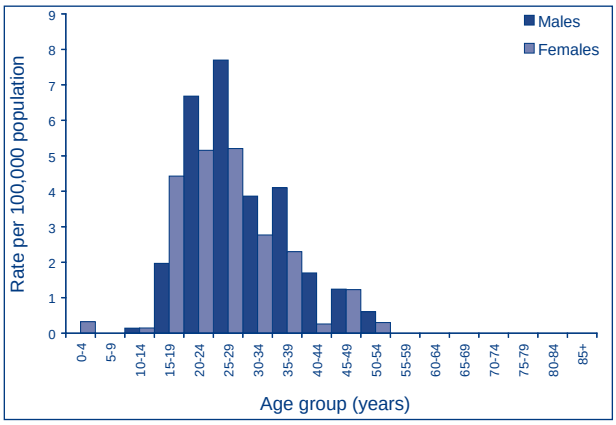
A total of 357 incident cases of hepatitis C with an onset date in 2005 were notified, giving a notification rate of 1.8 cases per 100,000 population (Figure 10). The proportion of all hepatitis C notifications in 2005 that were documented as incident cases was 3%. The highest rate of incident hepatitis C infection was reported from Tasmania and Western Australia (5.2 cases per 100,000 population).

Figure 10. Notification rates for hepatitis C infections (incident and unspecified), Australia, 1995 to 2005



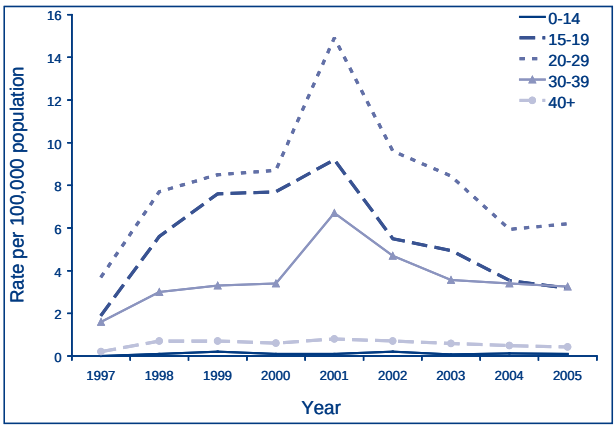
In 2005, the highest rate of incident hepatitis C notification was in the 25–29 age group in males (7.7 cases per 100,000 population) and in the 20–24 and 25–29 age groups in females (5.2 cases per 100,000 population) (Figure 11).

Figure 11. Notification rate of incident hepatitis C infections, Australia, 2005, by age group and sex



Trends in the age distribution of incident hepatitis C infection are shown in Figure 12. In 2001–2005, notification rates declined by 56% in the 15–19 year age group, by 51% in the 20–29 year age range and by 43% in the 30–39 year age range.

Figure 12. Notification rate of incident hepatitis C infections, Australia, 1997 to 2005, by year and age group



The exposure history of cases of incident hepatitis C was collected in the Australian Capital Territory, South Australia, Victoria and Western Australia in 2005 (Table 6). At least 65% of incident hepatitis C infections were among people with a history of injecting drug use.

A total of 9,700 cases (range 6,600–13,200 cases) of incident hepatitis C infection were estimated to have occurred in Australia in 2005.[3] This means that one in 27 incident cases (range 1 in 18 to 1 in 37 cases) had been notified.

Table 6. Incident hepatitis C infection, Australia,* 2005, by exposure category

Exposure category	Number	Percentage
Injecting drug use	261	62.3
Sexual contact	11	2.6
Blood/tissue recipient	1	0.2
Skin penetration procedure	7	1.7
Healthcare exposure	1	0.2
Household contact	3	0.7
Other	18	4.3
Undetermined	117	27.9
Total	419	100.0

* Data from the Australian Capital Territory, South Australia, Tasmania, Victoria and Western Australia only, (NCHECR, 2006[2]).

Hepatitis C (unspecified) notifications

Case definition – Hepatitis C (unspecified)

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires detection of anti-hepatitis C antibody or detection of hepatitis C virus in a case who does not meet any of the criteria for a newly acquired case and is aged more than 24 months.*

In 2005, 12,250 hepatitis C (unspecified) infections were notified to NNDSS, giving a notification rate of 64.6 cases per 100,000 population. The national notification rate for hepatitis C (unspecified) infection declined from 104 cases per 100,000 population in 2000 to 64.6 cases per 100,000 population in 2005 (Figure 10). Improved surveillance practice, such as better classification of incident cases and increased duplicate checking, may account for some of the decrease in hepatitis C (unspecified) notifications.

In 2005, the Northern Territory continued to have the highest notification rate (125.3 cases per 100,000 population). Nationally, the male to female ratio was 1.7:1. The highest notification rates occurred in the age groups 25–29, 30–34 and 35–39 year age groups (166.3 cases per 100,000 population) among males and in the 25–29 year age group (103.9 cases per 100,000 population) among females (Figure 13).

Trends in the age distribution of hepatitis C (unspecified) infection are shown in Figure 14. Between 2000 and 2005, the notification rates of hepatitis C

Figure 13. Notification rate of hepatitis C (unspecified) infections, Australia, 2005, by age group and sex

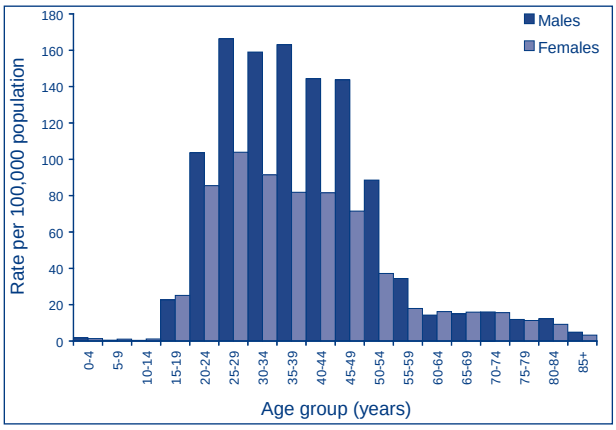
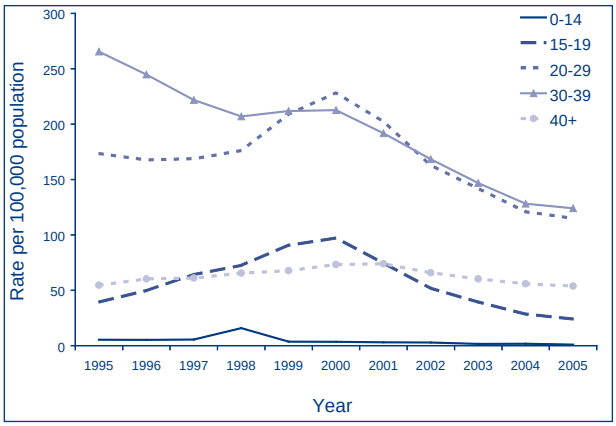


Figure 14. Notification rate of hepatitis C (unspecified) infection, Australia, 1995 to 2005, by age group



(unspecified) among the 15–19 year age group decreased on average by 19% per year, and in 2005 it decreased by 38%. Notification rates also fell by 4% per year in the same period (2000 to 2005) among cases in the 20–29 year age group and by 32% in 2005. Rates in the other age groups remained relatively stable during this period. The decline in the rate of notification of hepatitis C infection may be attributable to a reduction in risk behaviour related to drug injecting among young people, but changes in the rates of testing may also have contributed to the decline.

In 2005, an estimated 197,300 people were living in Australia with chronic hepatitis C infection, of which 153,900 had early liver disease (Stage 0/1); 38,100 had moderate liver disease (Stage 2/3); and 5,300 were living with hepatitis C related cirrhosis.[3]

Hepatitis D

Case definition – Hepatitis D

*Only **confirmed cases** are reported.*

***Confirmed case:** Detection of IgM or IgG antibodies to hepatitis D virus or detection of hepatitis D on liver biopsy in a case known to be hepatitis B surface antigen positive.*

Hepatitis D is a defective single-stranded RNA virus that requires the hepatitis B virus to replicate. Hepatitis D infection can be acquired either as a co-infection with hepatitis B or as a super-infection with chronic hepatitis B infection. People co-infected with hepatitis B and hepatitis D may have more severe acute disease and a higher risk of fulminant hepatitis compared with those with hepatitis B alone. The modes of hepatitis D transmission are similar to those for hepatitis B, and in countries with low hepatitis B prevalence, injecting drug users are the main risk group for hepatitis D.

There were 30 notifications of hepatitis D to the NNDSS in 2005 giving a notification rate of 0.2 cases per 100,000 population. The male to female ratio was 2.4:1. Of the 30 notifications, 15 were reported from New South Wales, 11 from Queensland and 2 each from Victoria and Western Australia.

Gastrointestinal diseases

In 2005, gastrointestinal diseases that were notified to NNDSS were: botulism, campylobacteriosis, cryptosporidiosis, haemolytic uraemic syndrome (HUS), hepatitis A, hepatitis E, listeriosis, salmonellosis, shigellosis, Shiga-like toxin-producing *Escherichia coli*/verotoxigenic *E. coli* (SLTEC/VTEC) infections and typhoid.

Notifications of gastrointestinal diseases increased by 12%; from 26,173 in 2004 to 29,422 in 2005 (Table 4). Compared with 2004, there was a decrease in the number of notifications of listeriosis (13 notifications; 19%) and typhoid (24 notifications; 31%) in 2005. Variable increases were reported for all other gastrointestinal disease; botulism (200%), campylobacteriosis (6%), cryptosporidiosis (91%), haemolytic uraemic syndrome (25%), hepatitis A (2%), hepatitis E (11%), salmonellosis (8%), shigellosis (41%) and SLTEC/VTEC (78%). The number of notifications were within the historical range (i.e. within the 5-year mean and 2 standard deviations) except for hepatitis E which had an excess of 1 case, shigellosis which had an excess of 136 cases, and SLTEC/VTEC, which had an excess of 26 cases above the upper historical range. Listeriosis notifications were 6 cases below the lower historical range.

Botulism

Case definition – Botulism

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires isolation of* Clostridium botulinum *OR detection of* Clostridium botulinum *toxin in blood or faeces AND a clinically compatible illness (e.g. diplopia, blurred vision, muscle weakness, paralysis, death).*

Three cases of infant botulism in 2 males and a female were reported to NNDSS in 2005. All were aged less than 12 months. There have been 9 cases of infant botulism reported, but no classic foodborne botulism reported in Australia since botulism surveillance commenced in 1992.

Campylobacteriosis

Case definition – Campylobacteriosis

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires isolation or detection of* Campylobacter *species.*

There were 16,468 notifications of campylobacteriosis in Australia in 2005. Campylobacteriosis is notifiable in all jurisdictions except New South Wales. The national rate of notifications in 2005 was 121 cases per 100,000 population; an increase of 4% compared with the rate reported in 2004 (116 cases per 100,000 population). All jurisdictions with the exception of Victoria reported increases in notifications, with Western Australia and Tasmania reporting the largest increases (25% and 23%). Victoria reported a 5% decrease in notifications after a 12% increase in 2004. Tasmania had the highest notification rate in 2005 (157 cases per 100,000 population) and Queensland had the lowest notification rate (111 cases per 100,000 population) (Table 3).

Monthly notifications of campylobacteriosis in 2005, consistent with previous years (2000 to 2004), peaked in the fourth quarter of the year in early summer (Figure 15). In 2005, 12 *Campylobacter* related outbreaks were identified of which 9 were suspected to be foodborne.[4]

Children aged 0–4 years had the highest notification rate of *Campylobacter* infection (Figure 16). In this age group, notification rates were higher in males (260 cases per 100,000 population) than in females (187 cases per 100,000 population). The overall male to female ratio, as in previous years, was 1.2:1.

Figure 15. Trends in notifications of campylobacteriosis, Australia, 2000 to 2005, by month of onset

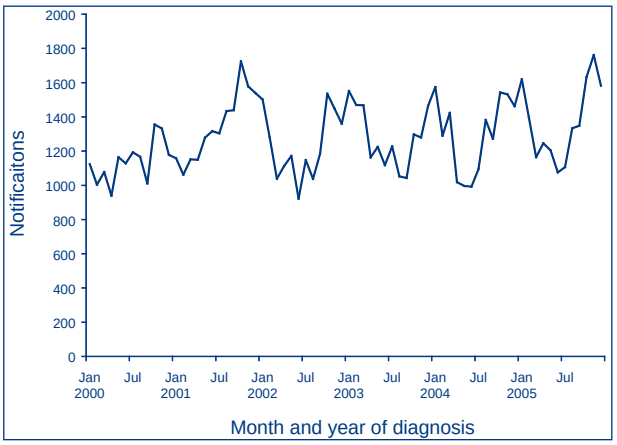
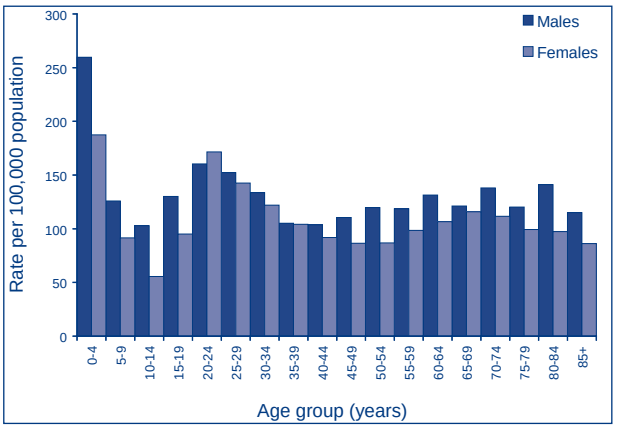


Figure 16. Notification rate for campylobacteriosis, Australia, 2005, by age group and sex



Cryptosporidiosis

Case definitions – Cryptosporidiosis

*Only **confirmed cases** are reported.*

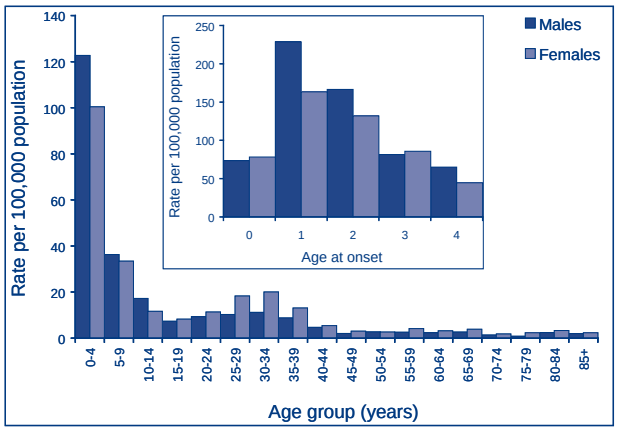
***Confirmed case:** Requires detection of* Cryptosporidium oocytes.

In 2005, a total of 3,209 cases of cryptosporidiosis were reported to NNDSS; an increase of 91% on the 1,684 cases reported in 2004. The national notification rate of 15.8 cases per 100,000 population represents an increase of 73% on the average notification rate for the previous 5 years.

All jurisdictions except the Northern Territory reported increases in cryptosporidiosis notifications, with increases ranging from 22% in Tasmania to 350% in the Australian Capital Territory. The Northern Territory and Queensland had a notification rate above the national average at 40 and 34 cases per 100,000 population, respectively.

Forty-four per cent of cryptosporidiosis cases notified in 2005 were under the age of 5 years. Compared to 2004, the notification rate in this age group increased by 72% in 2005. With a notification rate of 112 cases per 100,000 population, children under the age of 5 years continue to have the highest notification rate of cryptosporidiosis. Within this age group males aged 1 year had the highest notification rate at 229 cases per 100,000 population (Figure 17).

Figure 17. Notification rate for cryptosporidiosis, Australia, 2005, by age group and sex



Hepatitis A

Case definition – Hepatitis A

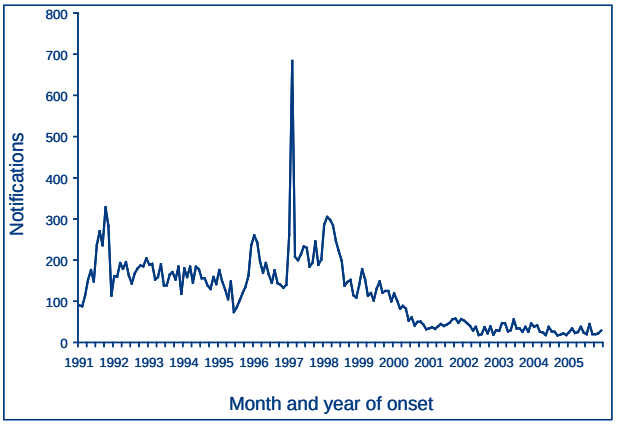
*Both **confirmed cases** and **probable cases** are reported.*

***Confirmed case:** Requires detection of anti-hepatitis A IgM, in the absence of recent vaccination, OR detection of hepatitis A virus by nucleic acid testing.*

***Probable case:** Requires clinical hepatitis (jaundice and/or bilirubin in urine) without a non-infectious cause AND contact between two people involving a plausible mode of transmission at a time when: (a) one of them is likely to be infectious (from two weeks before the onset of jaundice to a week after onset of jaundice), AND (b) the other has an illness that starts within 15 to 50 (average 28–30) days after this contact, AND at least one case in the chain of epidemiologically-linked cases (which may involve many cases) is laboratory confirmed.*

There were 325 cases of hepatitis A reported to NNDSS in 2005; a notification rate of 2 cases per 100,000 population. The notifications of hepatitis A have steadily decreased for the last decade, but remained stable in the period 2004 to 2005 (Figure 18).

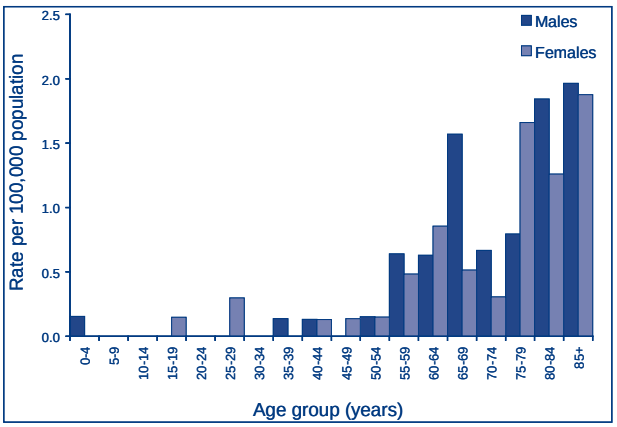
Figure 18. Trends in notifications of hepatitis A, Australia, 1991 to 2005, by month of notification



Compared to 2004, hepatitis A notification rates increased in 4 jurisdictions (ranging from 81% in Queensland to 351% in the Northern Territory) and decreased in 4 jurisdictions (ranging from 7% in Western Australia to 40% in New South Wales). The Northern Territory had the highest notification rate (32 cases per 100,000 population) followed by Western Australia (3 cases per 100,000 population).

The highest age-specific rate of hepatitis A notifications for both males and females was in the 5–9 year age group (3.2 cases and 3.4 cases per 100,000 population, respectively) (Figure 19). The overall male to female notification rate was 1:0.9.

Figure 19. Notification rate for hepatitis A, Australia, 2005, by age group and sex



Indigenous Australians had the highest burden of hepatitis A infection in 2005 with a rate of 9.9 cases per 100,000 population, compared with 0.6 cases per 100,000 population in the non-Indigenous population. In 2005 the indigenous status of 86% of cases of hepatitis A was complete and 15% of cases were identified as Indigenous people compared with 11% in 2004.

Hepatitis A is commonly spread from person to person or from contaminated food or water. Information on risk factors was known in 67% of all notifications. Overseas travel and household contact with another case were the main risk factors for hepatitis A infection (Table 7).

Table 7. Risk exposure associated with hepatitis A virus infection, Australia, 2005

Total number of cases	325
Number of cases with known risk factors*	
Injecting/recreational drug use	3
Household/close contact of case	52
Overseas travel	74
Childcare	9
Homosexual contact	9
Sex worker†	0
Other‡	2

* Exposures are not mutually exclusive hence more than one exposure per person is possible.

† Not available in New South Wales or Queensland.

‡ Includes association with persons from a country where hepatitis A is endemic and, living in an area where hepatitis A is endemic.

Hepatitis E

Case definition – Hepatitis E

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires detection of hepatitis E virus by nucleic acid testing OR, detection of hepatitis E virus in faeces by electron microscopy OR, detection of IgM or IgG to hepatitis E virus. If the person has not travelled outside Australia in the preceding 3 months, the antibody result must be confirmed by specific immunoblot.*

There were 31 cases of hepatitis E reported to NNDSS in 2005, an increase of 11% on the number of cases reported in 2004. Twelve cases were reported in Victoria, 8 in Queensland, seven in New South Wales, 2 in Western Australia and 2 in the Australian

Capital Territory. The male to female ratio was 2.1:1. Cases were aged between 10 and 74 years. Twenty-nine cases acquired their infections overseas: 17 had travelled to India, 3 to Vietnam, 3 throughout South East Asia and the remaining cases to other countries: mostly in Asia and South East Asia. One case in Victoria and 1 in Queensland were reported as locally acquired.

The Victorian Infectious Diseases Reference Laboratory detected a large increase in hepatitis E positive samples in the first quarter of 2005, which coincided with outbreaks of hepatitis E in India.[5]

Listeriosis

Case definitions – Listeriosis

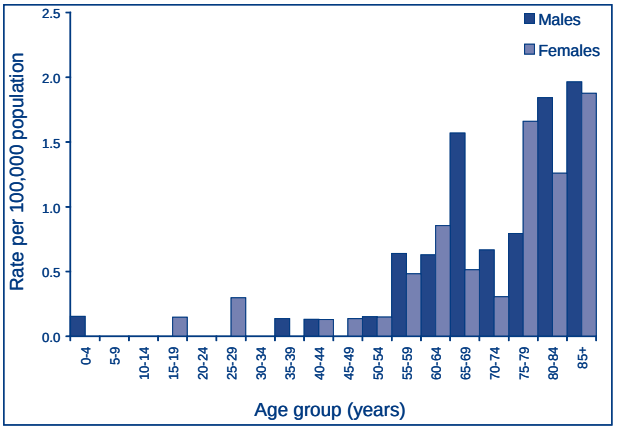
*Only **confirmed cases** are reported. Where a mother and foetus/neonate are both confirmed, both cases are reported.*

***Confirmed case:** Requires isolation or detection of* Listeria monocytogenes *from a site that is normally sterile, including foetal gastrointestinal contents.*

In 2005, 54 cases of listeriosis were reported to NNDSS, a notification rate of 0.3 cases per 100,000 population. This represents a decrease of 20% compared to the 5-year average. Eighty-five per cent of listeriosis cases were aged over 50 years, with the highest notification rate in the over 85 year age group in both males and females (Figure 20). Of 19 cases where the outcome of the infection was known, 3 cases died.

In 2005, there were 4 listeriosis cases of materno-foetal origin and 1 foetal death reported. An outbreak of listeriosis linked to the consumption of cold meats in South Australia, occurred in 2005. The Australian Capital Territory also reported a cluster of 3 cases but no common source was identified.[4]

Figure 20. Notification rate for listeriosis, Australia, 2005, by age group and sex



Salmonellosis (NEC)

Case definitions: – Salmonellosis

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires isolation or detection of* Salmonella *species (excluding* S. typhi *which is notified separately under typhoid).*

A total of 8,441 salmonellosis cases were reported to NNDSS in 2005, a rate of 41.5 cases per 100,000 population and a 6.6% increase from the rate reported in 2004 (39.0 cases per 100,000 population). The national notification rate for 2005 showed an increase of 14.1% over the mean rate for the previous 5 years.

The Northern Territory, Queensland and Tasmania had notification rates 4.7, 1.6 and 1.5 times the national notification rate, respectively (Table 3). The highest rates of notification of salmonellosis were reported in the northern part of the country (Map 2). In 2005, the Northern Territory, excluding Darwin, had the highest notification rate at 275 cases per 100,000 population. This Statistical Division had a notification rate of 288 cases per 100,000 population in 2004.

Traditionally, the incidence of *Salmonella* infections fluctuates seasonally, peaking in March. In 2005, several outbreaks caused *Salmonella* notifications to peak in January (Figure 21). Thirty-three per cent of salmonellosis cases in 2005 had dates of onset during the summer months.

As in 2004, the highest rate of notification was in children aged between 0–4 years (195 cases per 100,000 population): 29% of salmonellosis notifications were in this age group (Figure 22).

The National Enteric Pathogens Surveillance Scheme reported serovars for 8,241 isolates in 2005.[6] The 10 most frequently isolated serovars and phage types of *Salmonella*, which accounted for 45% of all isolates, are shown in Table 8. *Salmonella* Typhimurium 135, *Salmonella* Typhimurium 197 and *Salmonella* Typhimurium 170 were the 3 most frequently isolated serovars/phage types. Several outbreaks were associated with these 3 phage types, the largest, which affected 268 people in Victoria, was caused by phage type 197. *Salmonella* Typhimurium 44 appeared in the top 10 serovars for the first time in 2005.

Map 2. Notification rate for salmonellosis, Australia, 2005, by Statistical Division of residence

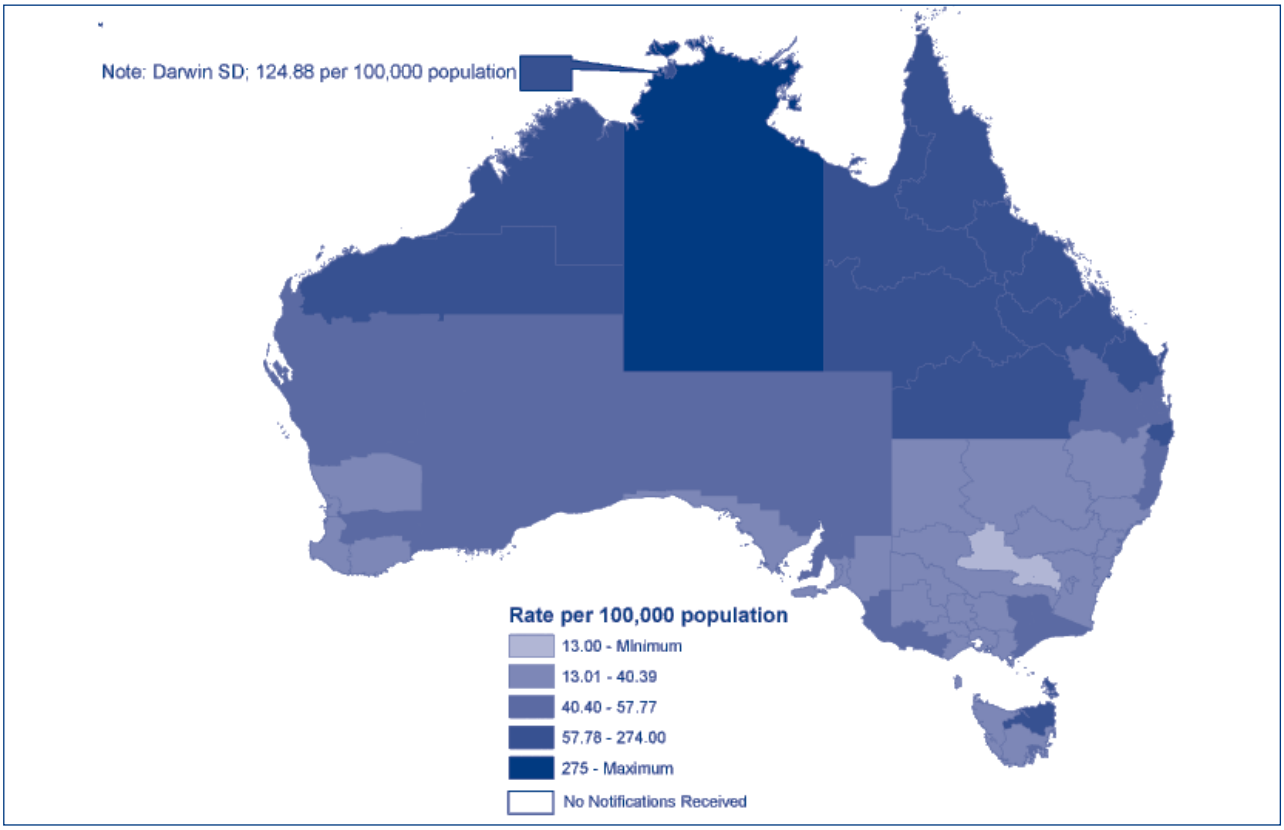


Figure 21. Trends in notifications of salmonellosis, Australia, 2000 to 2005, by month of onset

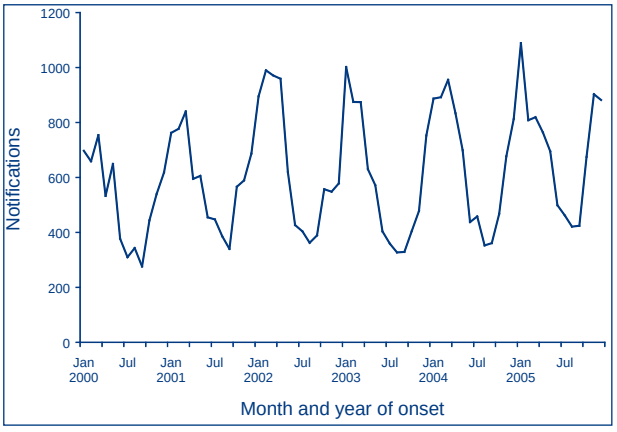
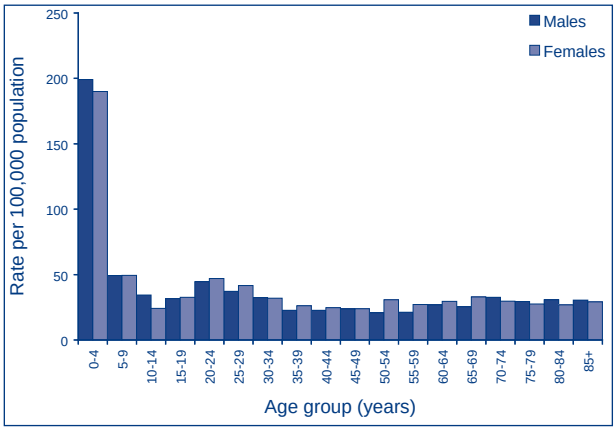


Figure 22. Notification rate for salmonellosis, Australia, 2005, by age group and sex



Salmonella Saintpaul was the most commonly reported serovar in Queensland and in the Northern Territory (11% and 12% of salmonellosis notifications). In all other jurisdictions *Salmonella* Typhimurium was the most commonly reported serovar. *Salmonella* Typhimurium 135 accounted for 59% of cases in Tasmania, 13% in the Australian Capital Territory and 9% in Western Australia. *Salmonella* Typhimurium 170 was the most commonly notified phage type in New South Wales and the Australian Capital Territory making up 15% and 13% of salmonellosis notifications respectively. In Victoria, *Salmonella* Typhimurium 197 was the most common phage type (19%) and in South Australia *Salmonella* Typhimurium 9 accounted for 10% of notifications (Table 8).

Outbreaks and clusters of salmonellosis

In 2005, OzFoodNet reported 104 clusters and outbreaks of salmonellosis of which 61% (63/104) were attributable to *S.* Typhimurium infection. Thirty-

Table 8. Top 10 isolates of *Salmonella*, Australia, 2005, by state or territory

Organism	State or territory									Total %
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust	
S. Typhimurium 135	14	188	1	135	23	175	198	68	802	16.6
S. Typhimurium 197	1	113	0	140	5	2	280	4	545	11.3
S. Typhimurium 170*	14	328	0	48	3	6	64	9	472	9.8
S. Saintpaul	3	42	48	271	13	2	24	33	436	9.0
S. Typhimurium 9	11	155	5	33	57	10	124	11	406	8.4
S. Virchow 8	2	28	10	182	6	1	7	12	248	5.1
S. Typhimurium 44	6	67	0	59	28	6	53	9	228	4.7
S. Birkenhead	0	85	0	128	0	0	6	1	220	4.5
S. Chester	1	30	14	87	14	1	10	29	186	3.8
S. Hvittingfoss	5	23	5	129	1	0	19	3	185	3.8
Sub-total	57	1,059	83	1,212	150	203	785	179	3,728	77.0
Other isolates	6	217	35	370	90	63	134	197	1,112	23.0

Source: National Enteric Pathogenic Surveillance System.

* Reported as *Salmonella* Typhimurium phage type 108 in some states and territories.

three foodborne outbreaks of salmonellosis were reported. These outbreaks affected 1,200 persons and resulted in 150 hospitalisations and 4 deaths.

Of the 5 significant foodborne outbreaks (affecting 50 or more persons each) in 2005, 4 were due to *Salmonella* Typhimurium: 1 outbreak of STM197 in Victoria; 2 of STM135 in Tasmania and one outbreak of STM64 in South Australia. The STM197 outbreak in Victoria was associated with dips served at a Turkish restaurant. The 2 STM135 outbreaks in Tasmania were associated with cakes prepared at a bakery and raw egg sauces in a restaurant. A single egg-farm supplied eggs to both premises. The STM64 outbreak in South Australia was associated with consumption of bread rolls from a restaurant. The fifth significant *Salmonella* outbreak occurred in Western Australia and was due to *Salmonella* Oranienburg associated with the consumption of alfalfa sprouts.[4]

Shigellosis

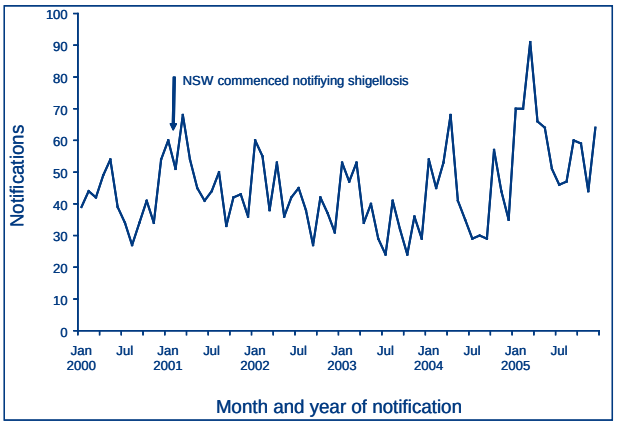
Case definitions – Shigellosis

Only ***confirmed cases*** *are reported.*

Confirmed case: *Isolation or detection of* Shigella *species.*

In 2005, a total of 732 cases of shigellosis were reported to NNDSS, a notification rate of 3.6 cases per 100,000 population. This rate was 39% higher than the rate reported in 2004 (2.6 cases per 100,000 population), and 40% higher than the 5-year average (Table 4). Notification rates for 2005 increased compared to 2004 in all jurisdictions except South Australia. The Northern Territory continued to have the highest notification rate at 96.7 cases per 100,000 population, an increase by 66.6% in notification rates compared to 2004. Nationally, notification rates of the disease had been declining for the period 1999 to 2003, then increased in 2004 and again in 2005. (Figure 23).

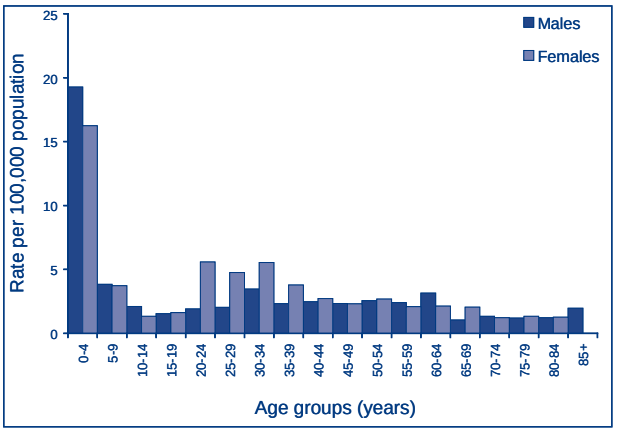
Figure 23. Trends in notifications of shigellosis, Australia, 2000 to 2005, by month of onset



The male to female rate ratio remained at 0.9:1. Children under the age of 4 years represented 31% of shigellosis notifications (Figure 24). This age group had a notification rate of 17.8 cases per 100,000

population, which was an increase of 40% compared to the rate reported in 2004 (12.7 cases per 100,000 population).

Figure 24. Notification rate for shigellosis, Australia, 2005, by age group and sex



The highest rate of shigellosis continues to be in Indigenous populations with a rate of 64 cases per 100,000 population compared to 0.5 cases per 100,000 population in the non-Indigenous population. In 2005, of the notifications of shigellosis where indigenous status of cases was complete (73% of all cases) 59% were identified as Indigenous. In the Northern Territory (where indigenous status was complete for 100% of notifications) 82% of shigellosis cases were Indigenous.

Shigella flexneri and *Shigella sonnei* infections accounted for 44% and 52% of shigellosis, respectively in 2005 (Table 9). Eighty-nine per cent of *Shigella flexneri* infections were further typed, of which 27% were type 4a mannitol negative and 27% were type 2a. Eighty-three per cent of *Shigella sonnei* infections were further typed, of which 54% were type A.

Shiga-like toxin-producing/verotoxigenic *Escherichia coli*

Case definitions – Shiga-like toxin-producing/ verotoxin-producing Escherichia coli *(SLTEC/ VTEC)*

Only ***confirmed cases*** *are reported.*

Confirmed case: *Requires isolation of Shiga-toxigenic/verotoxigenic* Escherichia coli *from faeces, OR, isolation of Shiga toxin or verotoxin from a clinical isolate of* E. coli *OR, identification of the gene associated with the production of Shiga toxin or vero toxin in* E. coli *by nucleic acid testing on isolate or raw bloody diarrhoea.*

Note: Where SLTEC/VTEC is isolated in the context of haemolytic uraemic syndrome (HUS), it should be notified as SLTEC/VTEC and HUS.

There were 87 cases of SLTEC/VTEC reported to NNDSS in 2005 compared with 49 cases in 2004. With a notification rate of 0.4 cases per 100,000 population, the rate of SLTEC/VTEC notifications represented an increase of 70% compared to the average for the previous 5 years. The increase in notifications was due to an increase in screening for SLTEC/VTEC by Western Australia, Victoria and parts of New South Wales. As in previous years, South Australia continued to routinely test bloody stools by polymerase chain reaction for genes coding for Shiga-like toxin. Forty-six per cent of all cases were notified in South Australia (2.6 cases per 100,000 population). The Australian Capital Territory and the Northern Territory did not report any cases of SLTEC/VTEC. OzFoodNet reported that among typed *E. coli* (49% of all notifications) 39% were subtype O157, 26% were subtype O11 and 16% were O26.[4]

Table 9. *Shigella* infections, Australia, 2005, by serogroups and state or territory

Organism	State or territory								Total	Per cent
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA		
S. boydii	0	4	1	0	0	0	2	1	8	1.1
S. dysenteriae	0	2	0	1	0	0	0	0	3	0.4
S. flexneri	1	29	128	20	32	3	21	91	325	45.5
S. sonnei	6	97	64	55	16	2	77	61	378	52.9
Sub-total	7	132	193	76	48	5	100	153	714	100.0
Unknown	0	3	3	4	0	0	5	3	18	–
Total	7	135	196	80	48	5	105	156	732	–

Haemolytic uraemic syndrome

Case definitions – Haemolytic uraemic syndrome (HUS)

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires acute microangiopathic anaemia on peripheral blood smear (schistocytes, burr cells or helmet cells) AND AT LEAST ONE OF THE FOLLOWING: acute renal impairment (haematuria, proteinuria or elevated creatinine level), OR, thrombocytopaenia, particularly during the first seven days of illness.*

Note: Where SLTEC/VTEC is isolated in the context of HUS, it should be notified as both SLTEC/VTEC and HUS.

In 2005, 20 cases of HUS were reported to NNDSS; a rate of 0.1 cases per 100,000 population, an increase of 23% on the rate in 2004 (15 cases). Eleven cases occurred in New South Wales. No HUS cases were notified in the Australian Capital Territory or the Northern Territory. Among the 20 cases of HUS notified in 2005, 55% were males. The median age among males was 13 years (range 1–68 years) and among females was 25 years (range 2–81 years). SLTEC was isolated in 9 cases of HUS. Toxigenic *E. coli* was identified in 9 of the 20 cases. The serotypes of these 9 were O111 (2), O157:H (2), OR:H– (1), O111:H– (1), O49 (1), and unknown (2).

Typhoid

Case definitions – Typhoid fever

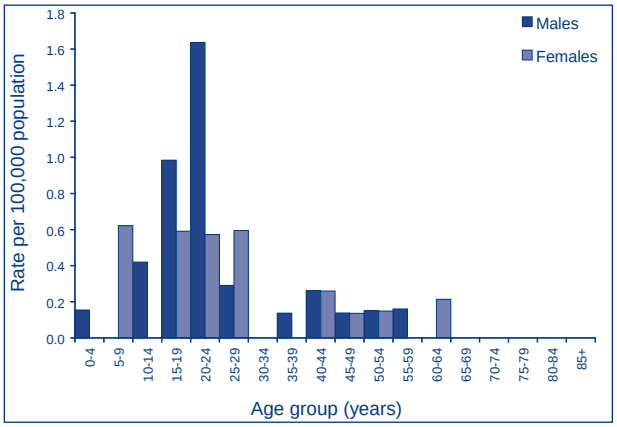
*Only **confirmed cases** are reported.*

***Confirmed case:** Requires isolation or detection of* Salmonella typhi.

In 2005, there were 52 notifications of typhoid; a rate of 0.26 cases per 100,000 population, representing an decrease of 23% compared to the average notification rate for the previous 5 years. All jurisdictions reported a decrease in notification rates except Western Australia, which reported a 67% increase. Nationally, the male to female ratio was 1:0.7, with the highest notification rates in males aged 20–24 and 15–19 years (1.6 and 1.0 cases per 100,000 population respectively) and in females aged 5–9 and 15–29 years (0.6 cases per 100,000 population) (Figure 25).

The National Enteric Pathogen Surveillance Scheme identified 50 *Salmonella* Typhi isolates in 2005, 42 of which were from Australian residents. Of the 42 Australian residents, 9 had no travel history recorded, 1 had not travelled, 1 had carrier contact, 1 was a carrier and the remaining 30 cases had travelled outside Australia including in South East Asia, Africa, Europe, Pacific Islands, and South America.[6]

Figure 25. Notification rate for typhoid, Australia, 2005, by age group and sex



Quarantinable diseases

Human diseases covered by the *Quarantine Act 1908*, and notifiable in 2005 were cholera, plague, rabies, yellow fever, smallpox, highly pathogenic avian influenza in humans (HPAIH), severe acute respiratory syndrome (SARS) and 4 viral haemorrhagic fevers (Ebola, Marburg, Lassa and Crimean-Congo).

HPAIH was declared a quarantinable disease on 23 March 2004 and consequently became subject to the routine quarantine powers available under the *Quarantine Act 1908*. SARS was declared a quarantinable disease under the *Quarantine Act 1908* on 7 April 2003.

Cholera

Case definition – Cholera

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires isolation of toxigenic* Vibrio cholerae *O1 or O139.*

In 2005, there were 3 cases of cholera notified in Australia, 2 from Victoria, and 1 from Western Australia. All cases were female. All cases acquired their disease overseas: 2 of the Victorian cases acquired it from Tanzania and the Western Australian case acquired it from Indonesia.

Three notifications were toxin producing *Vibrio cholerae* serogroup O1 Ogawa.

Cholera, plague, rabies, yellow fever, SARS, HPAIH, tuleraemia and viral haemorrhagic fevers are of international public health importance and are notified to the World Health Organization. Although no local transmission had been reported in Australia, these diseases continue to occur around the world. Travellers are advised to seek information on the risk of contracting these diseases in their destinations and take appropriate measures. More information on quarantinable diseases and travel health can be found on DoHA's web site at: http://www.health.gov.au/internet/wcms/Publishing.nsf/Content/health-pubhlth-strateg-quaranti-index.htm

Sexually transmissible infections

In 2005, sexually transmissible infections (STIs) reported to NNDSS were chlamydial infections, donovanosis, gonococcal infections, and syphilis. Two categories of adult syphilis have been reported since 2004: syphilis of less than 2 years duration – infectious (primary, secondary and early latent); and syphilis of greater than 2 years or unknown duration. These 2 categories are combined under 'syphilis – all.' Congenital syphilis is also reported to NNDSS. These conditions were notified in all states and territories.

Other national surveillance systems that monitor STIs in Australia include the Australian Gonococcal Surveillance programme, which is a network of specialist laboratories, and the National Centre in HIV Epidemiology and Clinical Research.

The national trends in the number and rates of STI notifications reported to NNDSS between 2000 and 2005 are shown in Table 4. In interpreting these data it is important to note that changes in notifications over time may not solely reflect changes in disease prevalence. Increases in screening rates[7,8] more targeted screening, the use of more sensitive diagnostic tests, as well as periodic public awareness campaigns may contribute to changes in the number of notifications over time.

Age adjusted notification rates were calculated for Indigenous and non-Indigenous populations for jurisdictions that had indigenous status data completed in more than 50% of notifications. These data however, should be interpreted cautiously as STI screening occurs disproportionately among Indigenous populations. Similarly, rates of testing for STI also differ between sexes.

Chlamydial infection

Case definition – Chlamydial infection

*Only **confirmed cases** are reported.*

***Confirmed case:** Isolation of* Chlamydia trachomatis *or detection of* Chlamydia trachomatis *by nucleic acid testing or detection of* Chlamydia trachomatis *antigen.*

Chlamydial infection continued to be the most commonly notified condition in 2005. A total of 41,311 notifications of chlamydial infection were received; a rate of 203 cases per 100 000 population. This represents an increase of 13% on the rate reported in 2004 (180 cases per 100,000 population). The rate of chlamydia notifications has increased each year since surveillance of the condition commenced in 1991. Between 2001 and 2005, chlamydial infection notification rates increased from 104 to 203 cases per 100,000 population, an increase of 95% (Table 4). This increase provided the impetus for the launch of Australia's first National STI Strategy in July 2005.[9] The prevalence of chlamydia varies by age group and other demographic and behavioural factors, and most major sections of the population are unaffected. [10]

Chlamydial infection notification rates were higher than the national average in the Northern Territory (781 cases per 100,000 population), Western Australia (271 cases per 100,000 population), Queensland (245 cases per 100,000 population) and the Australian Capital Territory (215 cases per 100,000 population) (Table 3). At a regional level, the Northern Territory excluding Darwin had the highest chlamydial infection notification rate at 1,596 cases per 100,000 population (Map 3).

In 2005, notification rates of chlamydial infection in males and females were 166 and 240 cases per 100,000 population, respectively. In 2005, notification rates increased by 14% in males and by 13% in females compared to 2004. The male to female ratio in 2005 was 1:1.5, which is similar to previous years. Rates in females exceeded those in males in the 10–14, 15–19, and 20–24 year age groups with ratios of 1:7, 1:3 and 1:2, respectively (Figure 26). Sixty-six cases of chlamydia were identified as congenital chlamydia infections. These cases, while still included in the total number of chlamydial infections for 2005, were excluded from analyses.

Map 3. Notification rate for chlamydial infections, Australia, 2005, by Statistical Division of residence

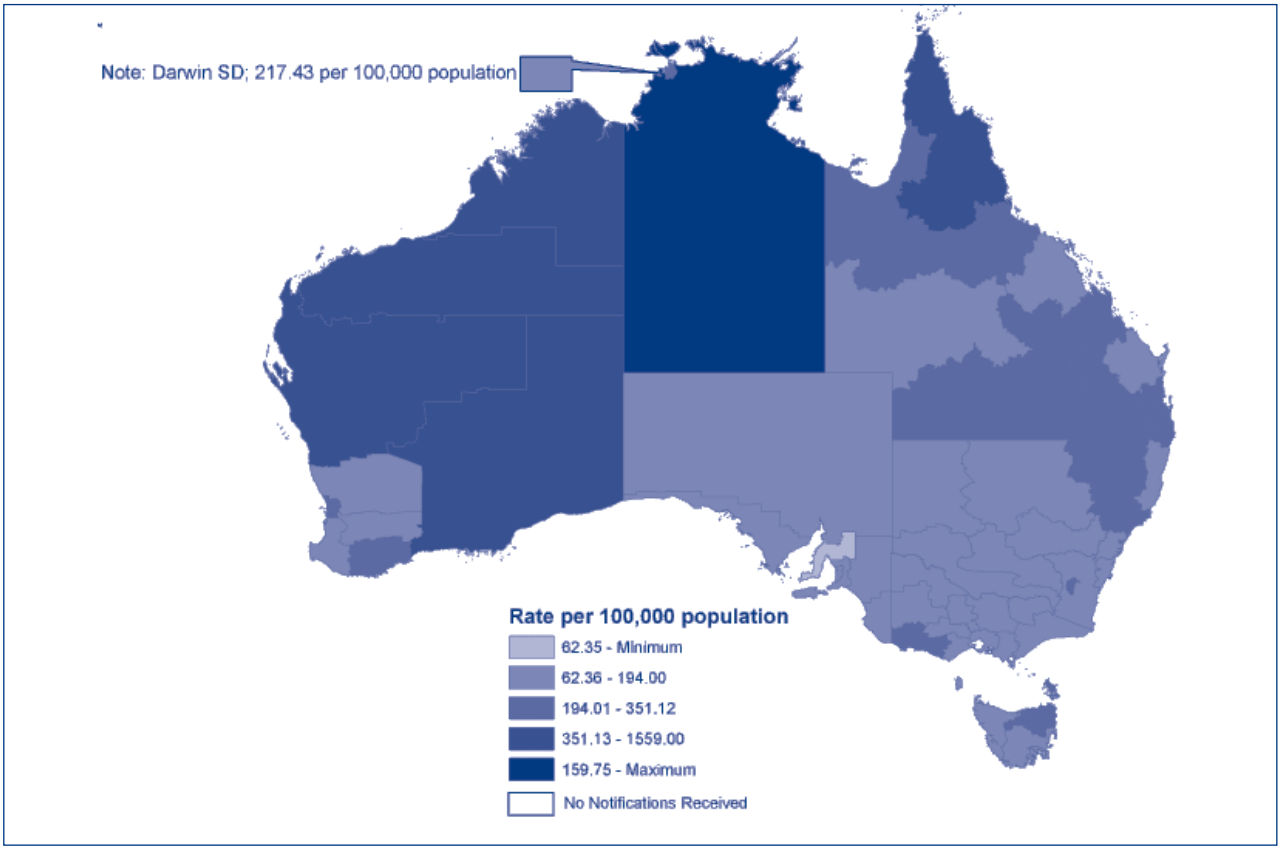


Figure 26. Notification rate for chlamydial infections, Australia, 2005, by age group and sex

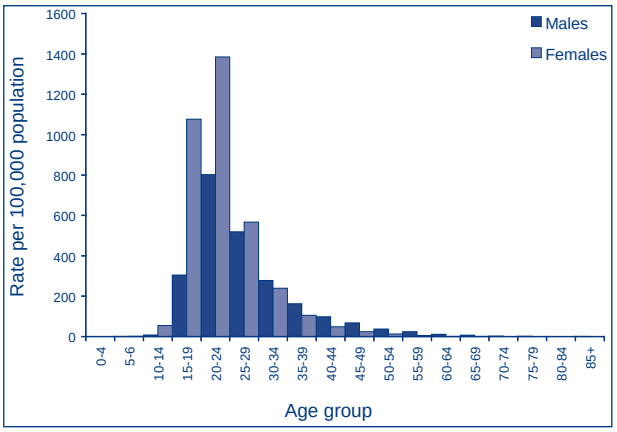
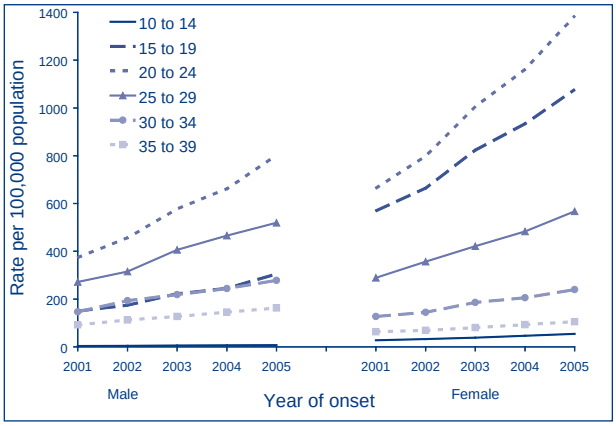


Figure 27. Trends in notification rate for chlamydia infection in persons aged 10–39 years, Australia, 2001 to 2005, by age group and sex



Age and sex notification rates between 2001 and 2005 show increases in all age groups between 10 and 39 years in both males and females (Figure 27). Since 2001, the highest average annual percentage increase occurred in the 20–24 year age group (21% in males and 20% in females).

In 2005, data on indigenous status was complete in 39% of cases of chlamydia infection; this is a decrease on the 59% reported in 2004 and the 43% notified in 2003. The combined chlamydial infection notifications in 4 jurisdictions with greater than 50% completeness of indigenous status (Northern Territory, South Australia, Victoria and Western Australia)

show that in 2005, the age adjusted notification rate was 989.9 cases per 100,000 Indigenous population, and 191.5 cases per 100,000 non-Indigenous population. The age adjusted ratio of Indigenous to non-Indigenous was 5.2:1.

Although surveillance data continues to show a substantial increase in chlamydia notifications nationally, it is important to note that changes in notifications over time may not solely reflect changes in disease prevalence. As a large proportion of cases with genital chlamydial infection are asymptomatic, notification rates for this disease are particularly susceptible to the overall rate of testing as well as the targeted testing of certain population sub-groups. In past years Medicare Australia data were utilised to determine if the number of chlamydia tests were also increasing.[10] With the changes to the Medicare item number, which occurred late for chlamydia testing in 2005, this is not currently possible.

Donovanosis

Case definition – Donovanosis

*Both **confirmed cases** and **probable cases** are reported.*

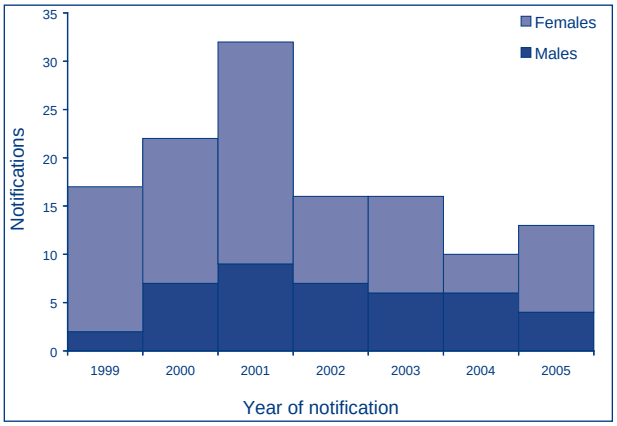
***Confirmed case:** Requires demonstration of intracellular Donovan bodies on smears or biopsy specimens taken from a lesion or detection of* Calymmatobacterium granulomatis *by nucleic acid testing of a specimen taken from a lesion AND clinically compatible illness involving genital ulceration.*

***Probable case:** Requires compatible sexual risk history in a person from an endemic area or a compatible sexual risk history involving sexual contact with someone from an endemic area.*

Donovanosis is a sexually transmissible infection characterised by a chronic ulcerative genital disease. Although uncommon, it is a disease of public health importance because it predominantly occurs in Indigenous communities; it has been identified as a potential co-factor in HIV transmission; and it is preventable.[11]

In 2005, 13 cases of donovanosis, 4 male and 9 female, were reported to NNDSS. Cases were reported from Northern Territory (4), Queensland (8) and Western Australia (1). Eleven cases of the total were among Indigenous people: 6 in Queensland, 4 in the Northern Territory and 1 in Western Australia. One non-Indigenous case and 1 case with unknown indigenous status were reported in 2005 (Figure 28). Cases in 2005 ranged in age from 12 to 53 years and the majority were aged 30–44 years.

Figure 28. Number of notifications of donovanosis, Australia, 1999 to 2005, by sex and year of notification



Gonococcal infections

Case definition – Gonococcal infection

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires isolation of* Neisseria gonorrhoeae, *or detection of* Neisseria gonorrhoeae *by nucleic acid testing or detection of typical Gram-negative intracellular diplococci in a smear from a genital tract specimen.*

In 2005, 8,015 notifications of gonococcal infection were received by NNDSS. This represents a rate of 39.4 cases per 100,000 population, an increase of 10% over the rate reported in 2004 (35.7 cases per 100,000 population). Nationally, there was an increase in the notification rates of females (by 13%), and males (by 9%) compared to 2004. The male to female ratio in 2005 was 2:1; unchanged in the previous 4 years and reflecting ongoing transmission among men who have sex with men.

The highest notification rate in 2005 was in the Northern Territory at 857 cases per 100,000 population (Table 3). Nationally, gonococcal notification rates for males and females were 54 and 25 cases per 100,000 population respectively. The exception to this pattern was the Northern Territory, where females had higher notification rates than males (820 versus 898 cases per 100,000 population). The geographical distribution of gonococcal notification rates

shows that the highest rate occurred in the Northern Territory (excluding Darwin) at 2,020 cases per 100,000 population (Map 4).

Notification rates of gonococcal infection in males exceeded those in females in all age groups except in the 10–14 and 15–19 year age groups (Figure 29). Trends in sex specific notification rates show that rates in males in the 15–19, 20–24 and 25–29 age groups continued to increase. Notification rates for males in the 30–44 age groups also increased in 2005. In females, increases occurred in the 15–19 and 20–24 age groups (Figure 30).

In 2005, the data completeness (68%) of indigenous status of gonococcal infection notifications was similar to that in 2004. The combined gonococcal infection notifications of 5 jurisdictions with indigenous status reported in more than 50% of notifications (the

Figure 29. Notification rate for gonococcal infections, Australia, 2005, by age group and sex

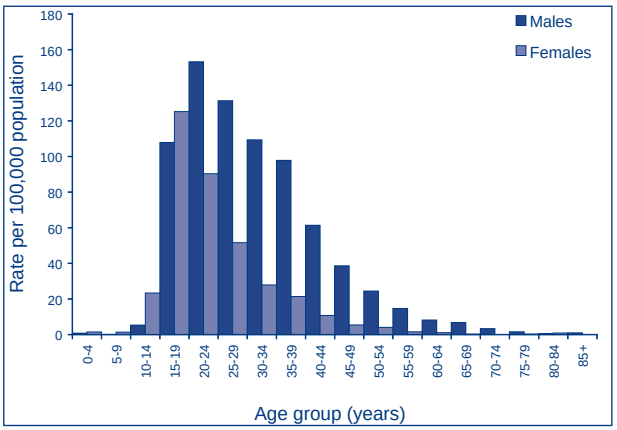
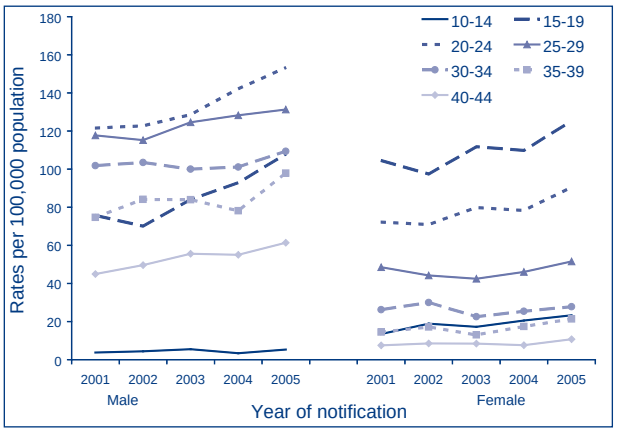
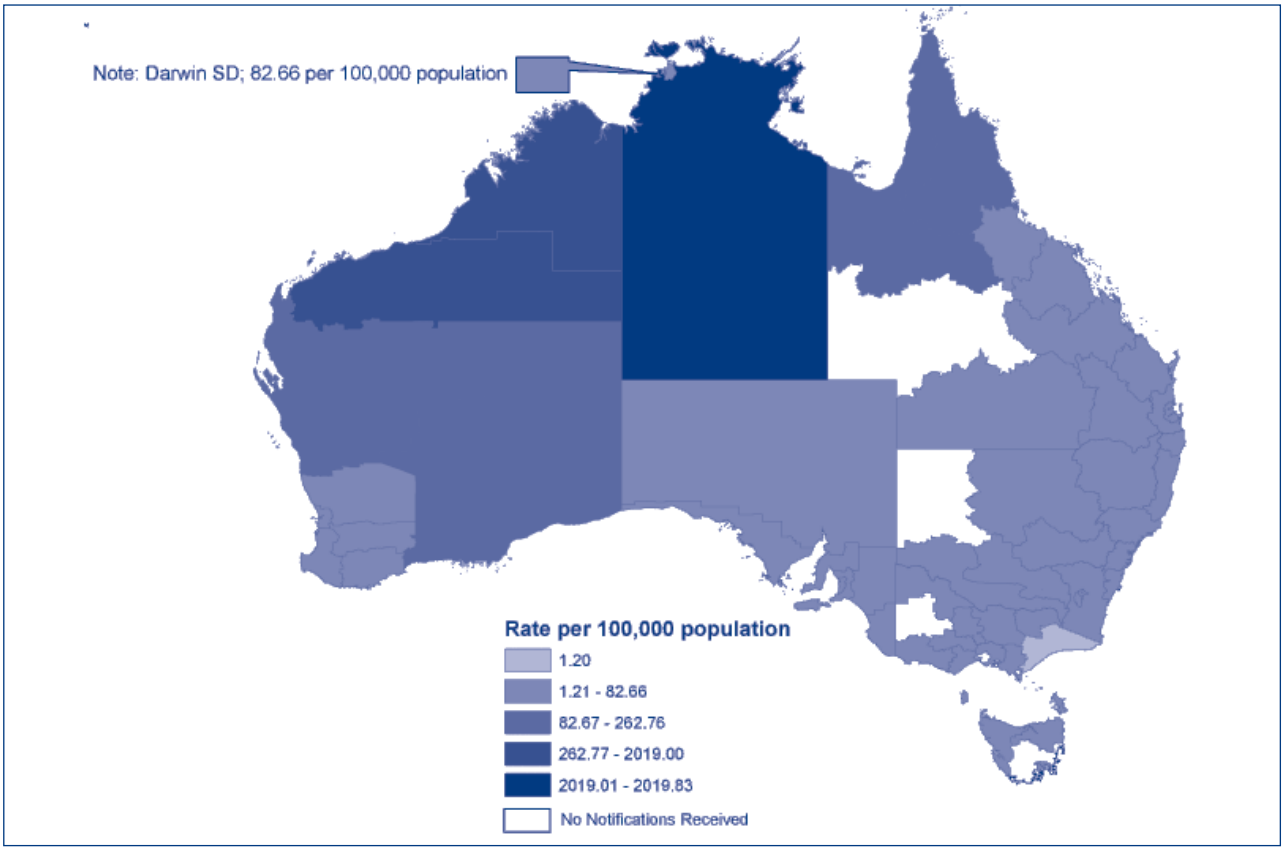


Figure 30. Trends in notification rate for gonococcal infections in persons aged 10–44 years, Australia, 2001 to 2005, by age group and sex



Map 4. Notification rate for gonococcal infections, Australia, 2005, by Statistical Division of residence



Northern Territory, Queensland, South Australia, Western Australia and Victoria) shows that the age adjusted notification rate in the Indigenous population was 1,590.9 cases per 100,000 population and 34.6 cases per 100,000 non-Indigenous population: a ratio of Indigenous to non-Indigenous of 46:1.

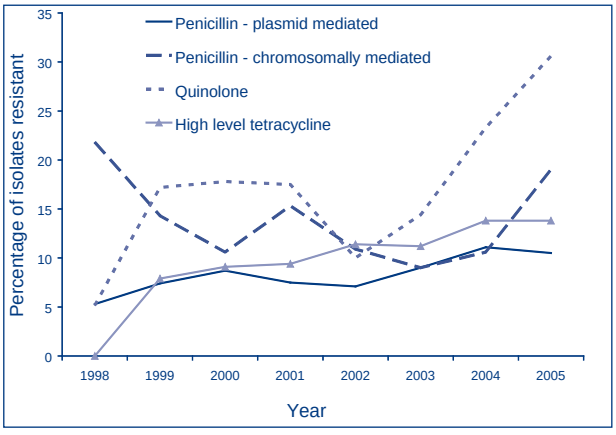
Other surveillance of gonococcal infections

The Australian Gonococcal Surveillance Programme (AGSP) is the national surveillance system of antibiotic susceptibility of gonococcal isolates. In each state and territory, a network of reference laboratories determines the susceptibility of isolates to a core group of antibiotics using a standard methodology. The following is the summary of their 2005 annual report.[12]

In 2005, a total of 3,980 isolates of gonococci were tested for antibiotic susceptibility. Eighty-three per cent of isolates were from men, of which 75% were obtained from the urethra, 13% from the rectum and 9% from the larynx. In females, 93% of isolates were obtained from the cervix. Proportions for site of infection were similar to those reported in 2004.

Trends in the proportion of isolates resistant to penicillin, quinolones and tetracycline are shown in Figure 31. In 2005, the proportion of isolates resistant to penicillin by plasmid-mediated resistance remained similar to 2004 (10.5%) while the proportion of isolates resistance to penicillin by chromosomally-mediated mechanisms increased to 19%. Quinolone resistance also increased to 30.6% from 23.3% in 2004. Ninety-three per cent of the quinolone resistant isolates were also resistant at a higher minimal inhibitory concentration (MIC) of 1 mg/L or more.

Figure 31. Proportion of gonococcal isolates showing antibiotic resistance, Australia, 1998 to 2005



Information on the country where resistant strains were acquired were available in 31% of infections for strains with plasmid-mediated resistance to penicillin, and 31% of infections for strains resistant to quinolone. This showed that 51% (66/128) of plasmid mediated resistance were locally required with the rest acquired from Western Pacific countries and South East Asia. Eight-four per cent of quinolone resistant strains were acquired locally and the remainder from overseas.

The distribution of infections with strains resistant to different antibiotic agents varies from jurisdiction to jurisdiction and urban to rural areas within each jurisdiction. The AGSP recommends that treatment regimes should be tailored to the local patterns of susceptibility. Nationally, the AGSP recommends the use of alternative treatments to quinolones for infections acquired.

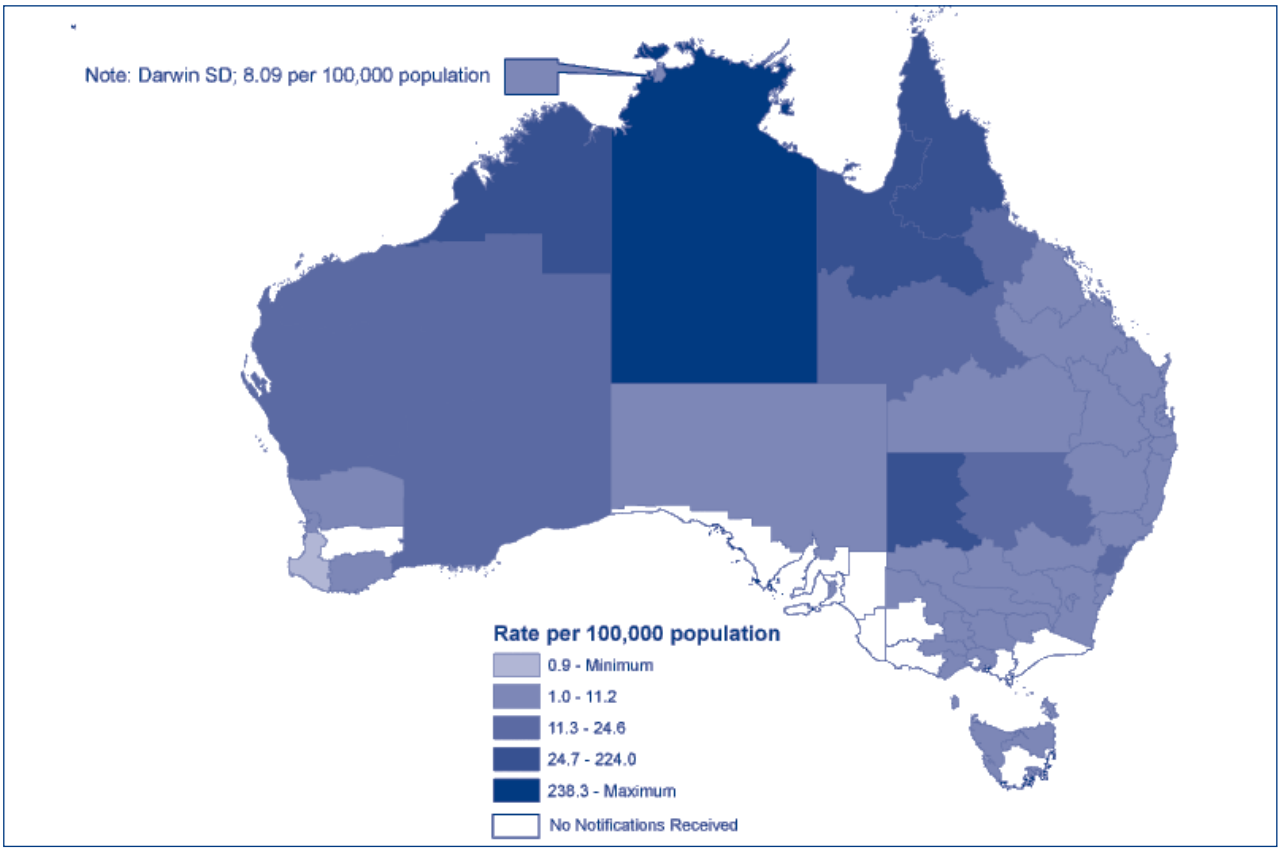
Syphilis (both categories)

In 2004, all jurisdictions began reporting adult syphilis infections to NNDSS categorised as: infectious syphilis of less than 2 years duration; and syphilis of more than 2 years or unknown duration; this continued in 2005. Detailed analysis is reported for the 2 categories, as well as for syphilis of both categories for the purpose of comparing rates to previous years.

In 2005, a total of 2,203 cases of syphilis infection of both categories were reported, representing a notification rate of 10.8 cases per 100,000 population, a decrease of 7% on the 11.6 cases per 100,000 population reported in 2004 (Table 4). The Northern Territory continued to have the highest notification rate of syphilis (113 cases per 100,000 population), although in 2005 the rate was 20% lower than the previous year. In 2005, there were increases in notification rates in the Australian Capital Territory (16%), Queensland (29%), and Victoria (15%). Recent outbreaks among men who have sex with men in Melbourne and Sydney[13,14] may have peaked. At the regional level, the highest notification rate was in the Northern Territory (excluding Darwin) at 238 cases per 100,000 population (Map 5).

Tasmania reported an increase of 114% but this was most likely in syphilis of unknown duration and due to screening practices.

Map 5. Notification rate for syphilis infections, Australia, 2005, by Statistical Division of residence



Syphilis – less than 2 years duration

Case definition – Syphilis – infectious (primary, secondary and early latent), less than 2 years duration

Only ***confirmed cases*** *are reported.*

Confirmed case: *Requires seroconversion in past two years (specific treponemal test (e.g. IgG enzyme immunoassay,* Treponema pallidum *haemagglutination assay,* Treponema palladium *particle agglutination,* Treponema pallidum *immobilisation assay), or fluorescent treponemal antibody absorption reactive when previous treponemal test non-reactive within past two years*

OR a fourfold or greater rise in non-specific treponemal antibody titre (e.g. Venereal Diseases Research Laboratory, Rapid Plasma Reagin) in the past two years, and a reactive specific treponemal test (e.g. IgG enzyme immunoassay, Treponema pallidum *haemagglutination assay,* Treponema pallidum *particle agglutination,* Treponema pallidum *immobilisation assay, or fluorescent treponemal antibody absorption)*

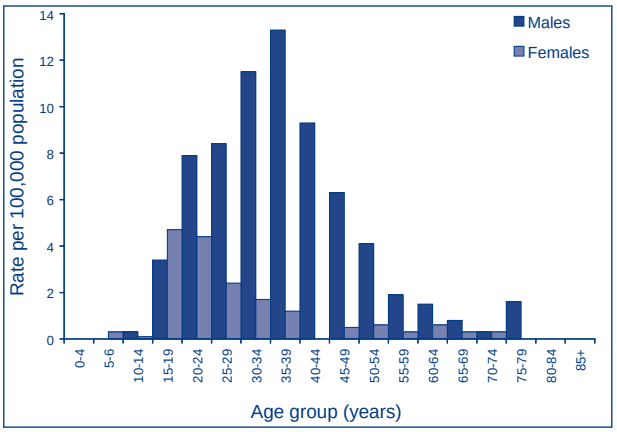
OR demonstration of Treponema pallidum *by darkfield microscopy (not oral lesions), direct fluorescent antibody tests, equivalent microscopic methods (e.g. silver stains), or nucleic acid testing or non-specific treponemal test (e.g. Venereal Diseases Research Laboratory, Rapid Plasma Reagin) reagin titre of greater than or equal to 1:8 AND presence of a primary chancre (or ulcer) or clinical signs of secondary syphilis.*

In 2005, a total of 621 cases of syphilis of less than 2 years duration were reported. This represents a notification rate of 3.1 cases per 100,000 population. The Northern Territory had the highest notification rate at 46 cases per 100,000 population in 2005.

The notification rates of syphilis of less than 2 years duration for males and females were 4.9 and 1.2 cases per 100,000 population, respectively. Notification rates were higher in males than in females in most jurisdictions. Nationally, the male to female ratio

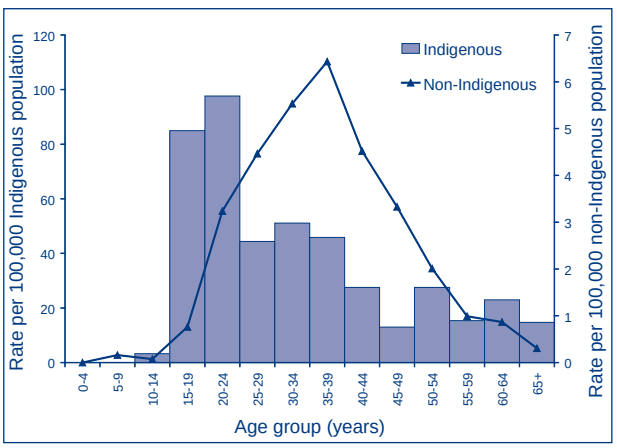
was 4:1, which was similar to 2004. Notification rates in males peaked in the 35–39 year age group (13 cases per 100,000 population) and in females in the 15–19 year age group (5 cases per 100,000 population) (Figure 32).

Figure 32. Notification rate for syphilis of less than two years duration, Australia, 2005, by age group and sex



Data on indigenous status was complete in 93% of cases of syphilis of less than 2 years duration. The age adjusted notification rate was 33.5 cases per 100,000 Indigenous population, and 2.3 cases per 100,000 non-Indigenous population: a ratio of Indigenous to non-Indigenous of 14:1. Age-specific notification rates showed that, compared to the non-Indigenous population, rates of syphilis of less than 2 years duration in the Indigenous population are an order of magnitude higher and peak in a younger age group (Figure 33).

Figure 33. Notification rate for syphilis of less than two years duration, Australia, 2005, by indigenous status



Syphilis of more than two years or unknown duration

Case definition – Syphilis of more than 2 years or unknown duration

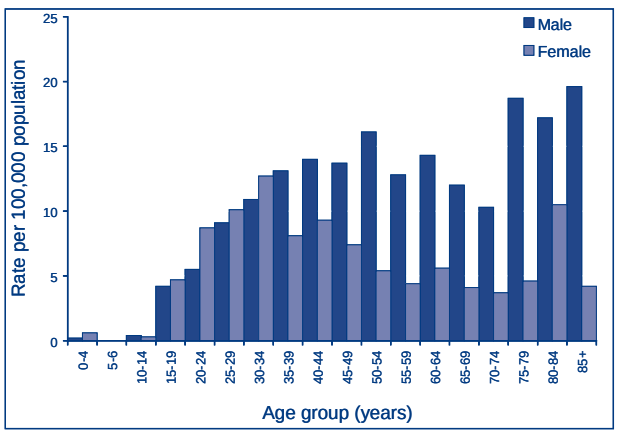
*Only **confirmed cases** are reported.*

***Confirmed case:** Does not meet the criteria for a case of less than 2 years duration AND either a reactive specific treponemal test (e.g. IgG enzyme immunoassay,* Treponema pallidum *haemagglutination assay,* Treponema pallidum *particle agglutination,* Treponema pallidum *immobilisation assay, or fluorescent treponemal antibody absorption) which is confirmed either by a reactive non-specific treponemal test (e.g. Venereal Diseases Research Laboratory, Rapid Plasma Reagin) OR a different specific treponemal test if the non-specific treponemal test is non-reactive AND the absence of a history of documented previous adequate treatment of syphilis, or endemic treponemal disease (e.g. Yaws).*

In 2005, a total of 1,582 cases of syphilis of more than 2 years or unknown duration were reported: a notification rate of 7.8 cases per 100,000 population. The Northern Territory had the highest notification rate at 67 cases per 100,000 population (Table 3).

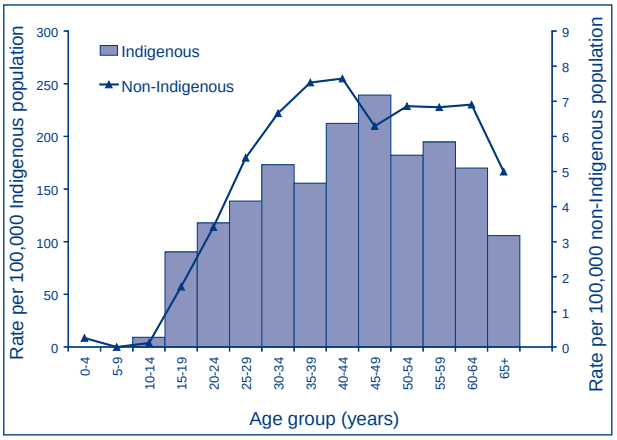
In 2005, notification rates of syphilis of more than two years or unknown duration in males and females were 9.4 and 6.1 cases per 100,000 populations, respectively. Notification rates were higher in males in all jurisdictions. Nationally, the male to female ratio was 1.5:1. Notification rates in males and females were similar in the younger age groups up to 30–34 years. In females, the rate peaked in the 30–34 year age group (13 cases per 100,000 population) while in males it remained high from 35 years (Figure 34).

Figure 34. Notification rate of syphilis of more than two years or unknown duration, Australia, 2005, by age group and sex



Data on indigenous status was complete in 67% of cases of syphilis of more than two years or unknown duration. The combined age adjusted rate for the jurisdictions with greater than 50% data completeness of indigenous status (all jurisdictions except New South Wales and the Australian Capital Territory) was 121 cases per 100,000 Indigenous population, and 5 cases per 100,000 non-Indigenous population: a ratio of Indigenous to non-Indigenous of 24:1. Age specific notification rates showed a similar pattern with age and no single distinct peak for either Indigenous and non-Indigenous groups. Overall, rates in the Indigenous population were an order of magnitude higher than those in the non-Indigenous (Figure 35).

Figure 35. Notification rate for syphilis of more than two years or unknown duration, Australia, 2005, by indigenous status



Congenital syphilis

Case definition – Congenital syphilis

*Both **confirmed cases** and **probable cases** are reported.*

***Confirmed case:** Requires treponemal-specific antibody titres (e.g.* Treponema pallidum *haemagglutination assay, pallidum particle agglutination, fluorescent treponemal antibody absorption in infant serum greater than fourfold higher than in maternal serum OR treponemal specific antibody titres in infant serum comparable with those in maternal serum and specific treponemal IgM enzyme-linked immunosorbent assay or immunofluorescence assay positive OR* T. pallidum *DNA in normally sterile specimen from infant (CSF, tissue) by nucleic acid testing.*

OR Dark field microscopy of infant lesion exudate or node aspirate smears (not oral lesions) to demonstrate characteristic morphology and motility of T. pallidum *OR demonstration of* T. pallidum *in infant tissues by special (e.g. silver) stains OR detection of* T. pallidum *DNA from an infant non-sterile site by nucleic acid testing OR reactive fluorescent treponemal absorbed-19S-IgM antibody test or IgM enzyme linked immunosorbent assay and treponemal-non specific antibody titre (e.g. RPR) in infant serum greater than fourfold higher than in maternal serum AND asymptomatic infection (in the infant of an infected mother) OR foetal death in utero OR stillbirth, which is a foetal death that occurs after a 20-week gestation or in which the foetus weighs greater than 500 g and the mother is untreated or inadequately treated for syphilis at delivery. Inadequate treatment is a non-penicillin regimen or penicillin treatment given less than 30 days prior to delivery OR clinical evidence of congenital syphilis on examination on:*

a. Age <2years: Hepatosplenomegaly, rash, condyloma lata, snuffles, jaundice (non-viral hepatitis), pseudoparalysis, anaemia, oedema

b. Age >2 years: Interstitial keratitis, nerve deafness, anterior bowing of shins, frontal bossing, mulberry molar, Hutchinson teeth, saddle nose, rhagades or Clutton joints

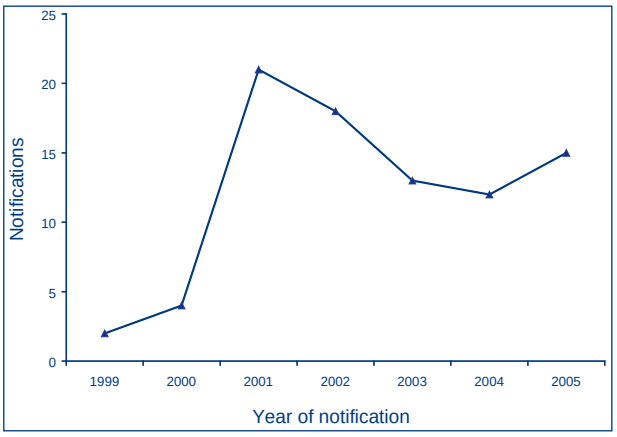
c. Evidence of congenital syphilis on long bone X-ray

d. Evidence of congenital syphilis on cerebrospinal fluid (CSF) examination

***Probable case:** An infant (regardless of clinical signs) whose mother has been inadequately treated for syphilis during pregnancy or an infant or child who has a reactive treponemal antibody test for syphilis and any one of the following: (1) any evidence of congenital syphilis on physical examination, (2) any evidence of congenital syphilis on radiographs of long bones, (3) a reactive cerebrospinal fluid Venereal Disease Research Laboratory Titre, (4) an elevated CSF cell count or protein (without other cause), (5) reactive fluorescent treponemal antibody absorbed assay –19S-IgM antibody test or IgM enzyme-linked immunosorbent assay.*

There were 15 cases of congenital syphilis notified in 2005, 8 males, 6 female and 1 of unknown sex. Eight of the cases were reported in New South Wales, 5 in the Northern Territory and 2 in Queensland. Eight were Indigenous, 4 non-Indigenous and 3 were unknown. There has been a gradual decline in the number of congenital syphilis notified in the Indigenous population since 2001 (Figure 36).

Figure 36. Trends in notifications of congenital syphilis, Australia, 2000 to 2005, by indigenous status* and year of notification



* Notifications with unknown indigenous status are recorded as non-Indigenous.

Vaccine preventable diseases

Introduction

This section summarises the national notification data for influenza and diseases targeted by the National Immunisation Program (NIP) in 2005. These include diphtheria, *Haemophilus influenzae* type b infection, measles, mumps, pertussis, invasive pneumococcal disease, poliomyelitis, rubella and tetanus. Data on hepatitis B and meningococcal disease, which are also targeted by the NIP, can be found in this report under 'bloodborne diseases' and 'other bacterial infections' respectively. Other vaccine preventable diseases presented in this report include hepatitis A and Q fever.

Two significant changes to the NIP occurred during this reporting period. In January 2005, free universal immunisation with the 7-valent pneumococcal conjugate vaccine (7vPCV) for children in the first year of life replaced the previous targeted immunisation program and free universal 23-valent pneumococcal polysaccharide vaccine (23vPPV) immunisation for adults over 65 years replaced a previous subsidised immunisation program. In November 2005, universal childhood immunisation against varicella at 18 months was introduced, with a catch-up program for children up to 12 years of age who had not had varicella vaccine, or a history of varicella infection. Inactivated polio vaccine (IPV) replaced oral polio vaccine (OPV) in various combination vaccines in 2005.

There were 17,775 notifications of vaccine preventable diseases (VPDs) with onset dates in 2005; 14% of the total notifications to NNDSS. Pertussis was the most commonly notified VPD (11,200 or 63% of all VPD notifications). Numbers of notifications and notification rates for VPDs in Australia are shown in Tables 2 and 3.

Diphtheria

Case definition – Diphtheria

*Both **confirmed cases** and **probable cases** are reported.*

***Confirmed case:** Requires isolations of toxigenic* Corynebacterium diphtheriae *or toxigenic* C. ulcerans.

***Probable case:** Requires isolation of* Corynebacterium diphtheriae *or* C. ulcerans *(toxin production unknown) and pharyngitis/laryngitis or toxic symptoms OR clinical symptoms and epidemiological links with laboratory confirmed case.*

There were no cases of diphtheria reported in 2005. The last case of diphtheria reported in Australia was a case of cutaneous diphtheria in 2001.

Haemophilus influenzae type b disease

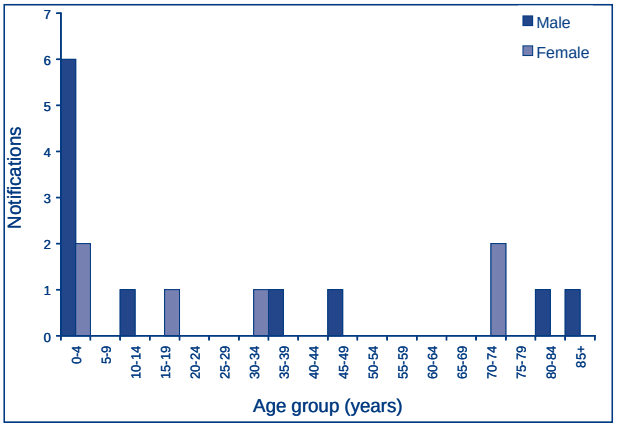
Case definition – Haemophilus influenzae *type b*

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires isolation of* Haemophilus influenzae *type b (Hib) from a sterile site OR detection of Hib antigen in cerebrospinal fluid consistent with meningitis.*

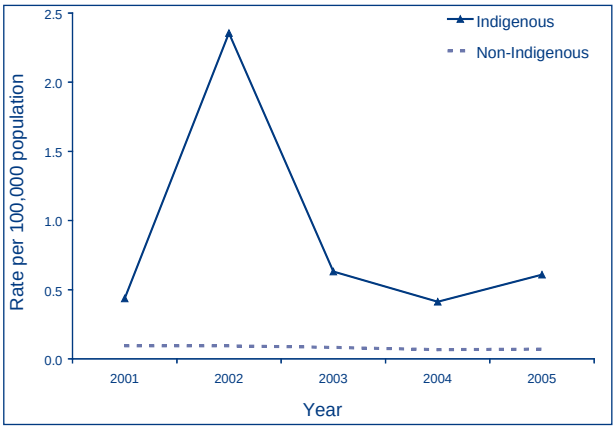
There were 17 notifications of Hib disease in 2005, a rate of 0.1 cases per 100,000 population. This was 2 more cases than reported in 2004. Eight cases (47% of total) were in children aged less than 5 years and 2 were infants aged less than 1 year. There were 11 cases in males and 6 in females, (male:female ratio 1.8:1) (Figure 37).

Figure 37. Notifications of *Haemophilus influenzae* type b infection, Australia, 2005, by age group and sex



Indigenous status was recorded for 16 of the 17 cases; 3 were Indigenous and 13 were non-Indigenous. The Hib notification rate was 0.6 cases per 100,000 population in Indigenous people and 0.07 cases per 100,000 population in non-Indigenous people; a ratio of 8.6:1. Between 2001 and 2005, Hib notification rates in Indigenous people have been between 4.6 and 8.6 times the rates in non-Indigenous people except in 2002 when the Indigenous rate was 25 times that of the non-Indigenous rate (Figure 38).

Figure 38. Notification rate for *Haemophilus influenzae* type b infections, Australia, 2001 to 2005, by indigenous status.



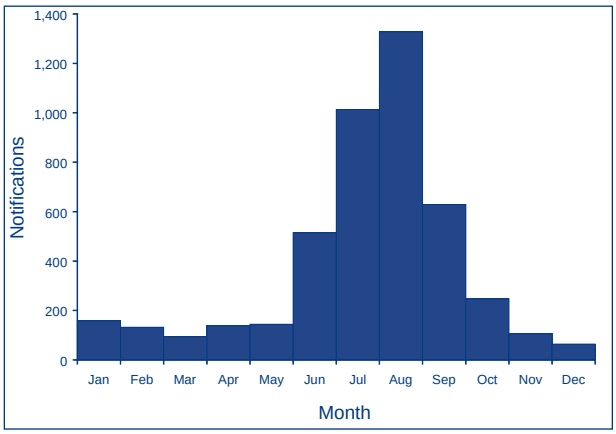
Cases under the age of 15 years were eligible for Hib vaccination. Of these 9 cases, 3 were unvaccinated, 2 partially vaccinated and 4 were fully vaccinated. The 4 fully vaccinated cases were all aged less than 5 years and met the case definition for vaccine failure, having received at least 2 doses of vaccine.

Influenza

> *Case definition – Influenza*
>
> *Only **confirmed cases** are notified.*
>
> ***Confirmed case:** Requires isolation of influenza virus by culture OR detection of influenza virus by nucleic acid testing OR detection of influenza virus antigen from an appropriate respiratory tract specimen OR a significant increase in antibody levels, or IgG seroconversion or fourfold or greater rise in antibody titre or a single high titre antibody.*

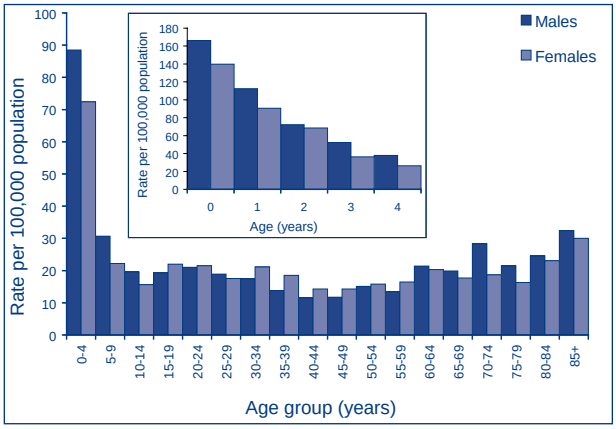
There were 4,567 reports of laboratory-confirmed influenza in 2005, a rate of 10.5 cases per 100,000 population. Notifications of influenza showed a peak in August (Figure 39).

Figure 39. Notifications of laboratory-confirmed influenza, Australia, 2005, by month of onset



Children aged less than 5 years made up 22% of all notifications and had a notification rate of 80.7 cases per 100,000 population (Figure 40) Children aged less than 1 year had the highest rate (153 cases per 100,000 population). The overall male to female ratio was 1:1.

Figure 40. Notification rate of laboratory-confirmed influenza, Australia, 2005, by age group and sex



In 2005, 4,379 (96%) influenza notifications had viral serotype data. Of these, 76% (3,338) were influenza A and 24% (1,041) were influenza B.

Of 1,174 influenza virus isolates analysed at the WHO Collaborating Centre for Reference and Research on Influenza in 2005, 689 were A(H3N2), 210 were A(H1N1) strains and 275 were influenza B. The majority of A(H3N2) viruses were antigenically similar to the 2005 vaccine strain A/Wellington /1/2004, but a quarter of isolates were more closely matched to the A/California/7/2004 viruses.[15]

There were a number of outbreaks of influenza in 2005, including an outbreak in New South Wales in a nursing home. Outbreaks of influenza B were reported in school-age children New Zealand in 2005 which resulted in 3 deaths.[16]

Measles

Case definition – Measles

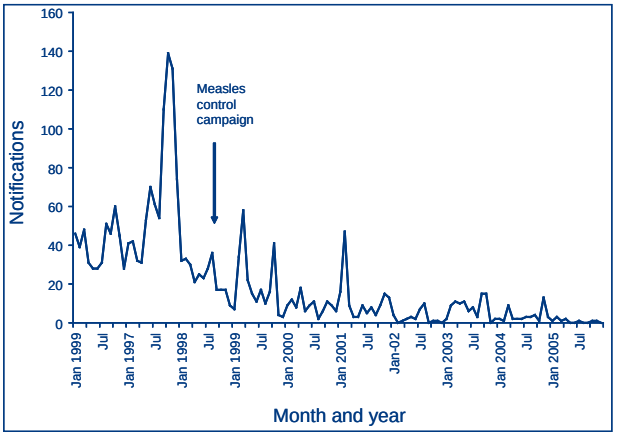
*Both **confirmed cases** and **probable cases** are notified.*

***Confirmed case:** Requires isolation of measles virus or detection of measles virus by nucleic acid testing OR detection of measles virus antigen OR IgG seroconversion or significant increase in antibody level or fourfold or greater rise in titre or detection of measles specific IgM antibody in a reference laboratory (except when vaccinated 8 days to 8 weeks prior to testing) OR clinical illness characterised by a maculopapular rash and fever and cough, coryza, conjunctivitis or koplik spots and epidemiological link to a laboratory confirmed case.*

***Probable case:** Requires detection of measles IgM antibody in other than an approved reference laboratory and clinical illness.*

There were 10 notified measles cases in 2005: 8 confirmed and 2 probable. This is the lowest annual rate for Australia since national surveillance began in 1991 (Figure 41). Five cases were reported from New South Wales, 2 from Victoria and single cases in Queensland, Tasmania and Western Australia. In 2005, there were no cases reported from the Australian Capital Territory, Northern Territory or South Australia (Tables 2 and 3).

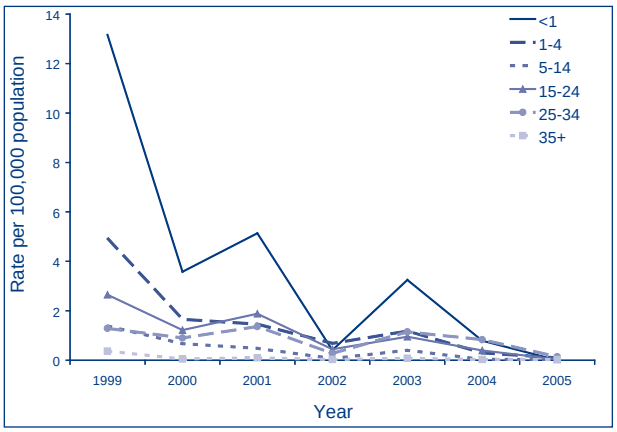
Figure 41. Notifications of measles, Australia, 1996 to 2005, by month of onset



There was only a single case of measles in children aged less than 5 years. The remaining 9 cases were aged between 11 and 42 years. Five cases were unvaccinated and 3 (including the child aged less than 5 years) were classified as fully vaccinated for age; however data on the number of doses received was missing in 2 of these cases. The vaccination status of the other 2 cases (aged 25 and 36 years) was unknown.

Figure 42 shows trends in measles notification rates by age group. In 2005, the largest proportion of measles cases occurred in adults, which reflects the success of measles vaccination programs in children and adolescents.

Figure 42. Trends in notification rate for measles, Australia, 1999 to 2005, by age group



Of the 10 measles cases reported in 2005, three cases were known to have acquired their infection outside Australia.

Mumps

Case definition – Mumps

*Only **confirmed cases** are notified.*

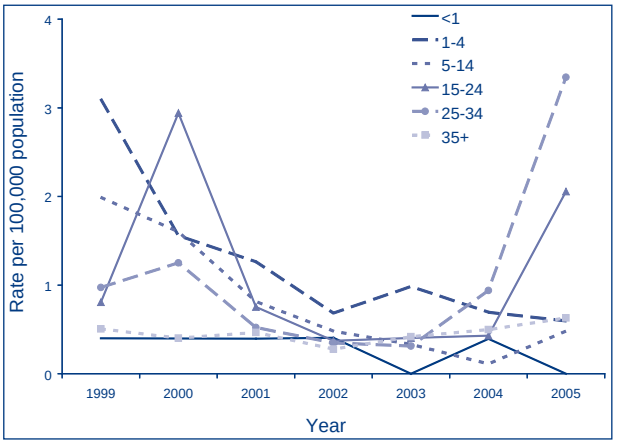
***Confirmed case:** Requires isolation of mumps virus or detection of mumps virus by nucleic acid testing or IgG seroconversion or significant increase in antibodies or a significant increase in antibody level, or a fourfold or greater rise in titre to mumps virus (except where there has been recent mumps vaccination) OR detection of mumps specific IgM antibody (in the absence of recent mumps vaccination) AND a clinically compatible illness characterised by swelling of the parotid or other salivary glands lasting two days or more without other apparent cause OR a clinically compatible illness AND an epidemiological link to a laboratory confirmed case.*

In 2005, there were 241 notifications of mumps (1.2 cases per 100,000 population), which was a 2.3-fold increase on the 102 cases reported in 2004. Cases were reported from all jurisdictions except Tasmania, with the largest number of cases (111) in New South Wales.

The highest rates were in males in the 25–29 year age group (6.2 cases per 100,000 population). The rate for the 0–4 year age group (0.6 cases per 100,000 population) was the same as in 2004. Unlike 2004 when the male to female ratio was 1:1, in 2005 there was a preponderance of male cases with a male to female ratio of 1.4:1.

Trends in age group notification rates for mumps show a sharp increase in the rates in the 25–34 year age and the 15–24 year age groups in 2005 (Figure 43).

Figure 43. Trends in notification rate of mumps, Australia 2005, by age group



The high rate of mumps in these age groups probably represents a susceptible cohort of individuals who have not been immunised. Mumps vaccine was made available in Australia in 1980 for use at 12–15 months of age and was combined with the measles vaccine in 1982. Therefore, no childhood doses of mumps vaccine were available to individuals in the 25–34 year age group and uptake of vaccine in older individuals from the 15–24 year age group was likely to be poor.

Eight cases were recorded as fully vaccinated; 9 as partially vaccinated; 108 as unvaccinated and there was no information on the vaccination status of the remaining 115 cases. Clusters of mumps cases were reported in 2005, one cluster of 5 cases occurred in an unvaccinated family of refugees in Queensland.

Pertussis

Case definition – Pertussis

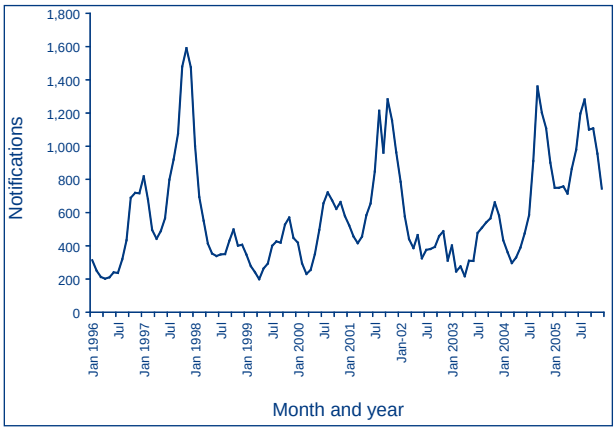
*Both **confirmed cases** and **probable cases** are notified.*

***Confirmed case:** Requires isolation of* Bordetella pertussis *or detection of* B. pertussis *by nucleic acid testing OR seroconversion or significant increase in antibody level or fourfold or greater rise in titre (in the absence of pertussis vaccination) or a single high-titre IgA to whole cells or detection of B. pertussis by immunofluorescence AND **clinical evidence** (a coughing illness lasting 2 weeks or more or paroxysms of coughing or inspiratory whoop or post-tussive vomiting) OR **clinical evidence** AND epidemiological link to a confirmed case.*

***Probable case:** Requires clinically compatible illness.*

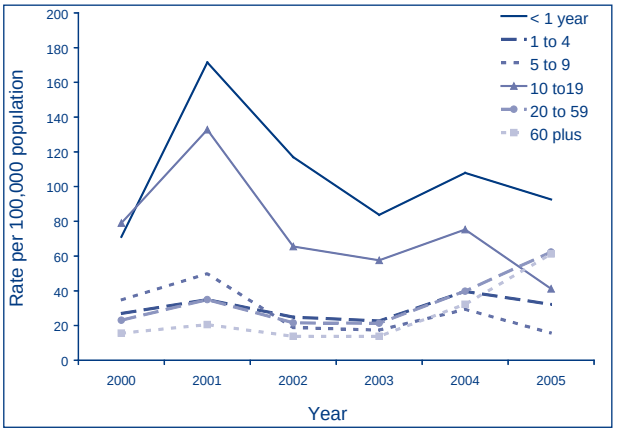
Pertussis continues to be the most common vaccine preventable illness in Australia, with periodic epidemics occurring at intervals of 3 to 5 years on a background of endemic circulation (Figure 44). In 2005 there were 11,200 cases notified to NNDSS (55.1 cases per 100,000 population). Of these, 10,744 were confirmed and 454 were probable, while the status of the remaining 2 cases was unknown.

Figure 44. Notifications of pertussis, Australia, 1996 to 2005, by month of onset



The highest notification rate was among children aged less than 1 year (237 cases, 92.2 cases per 100,000 population). The notification rate in persons aged 20–59 years and 60 years and over continued to increase in 2005 to 63.1 and 61.2 cases per 100,000 population, respectively (Figure 45). In 2005, 83% of pertussis cases were aged 20 years and over compared to 59% in 1999. Although severe morbidity and mortality are less likely in these age groups, they are an important pertussis reservoir,

Figure 45. Trends in notification rate of pertussis, Australia, 1999 to 2005, by age group

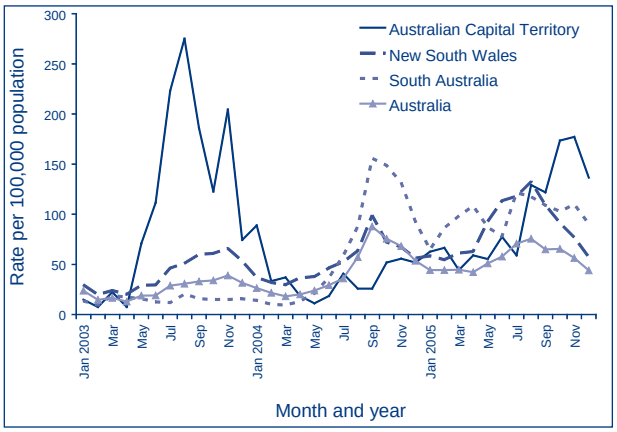


facilitating transmission to children too young to be fully vaccinated. In 2005, pertussis incidence in adolescents aged 10–19 years fell substantially from an average rate of 75.7 cases per 100,000 population between 1999–2004, to 41.5 cases per 100,000 population in 2005. School-based adolescent pertussis vaccination programs (including 2 whole of high school programs in New South Wales and Western Australia) began in a number of states in 2004, and the decrease in incidence in the targeted age group in 2005 may be the first evidence of the impact of this vaccine. Pertussis notifications were more common among women with a male to female ratio of 0.7:1.

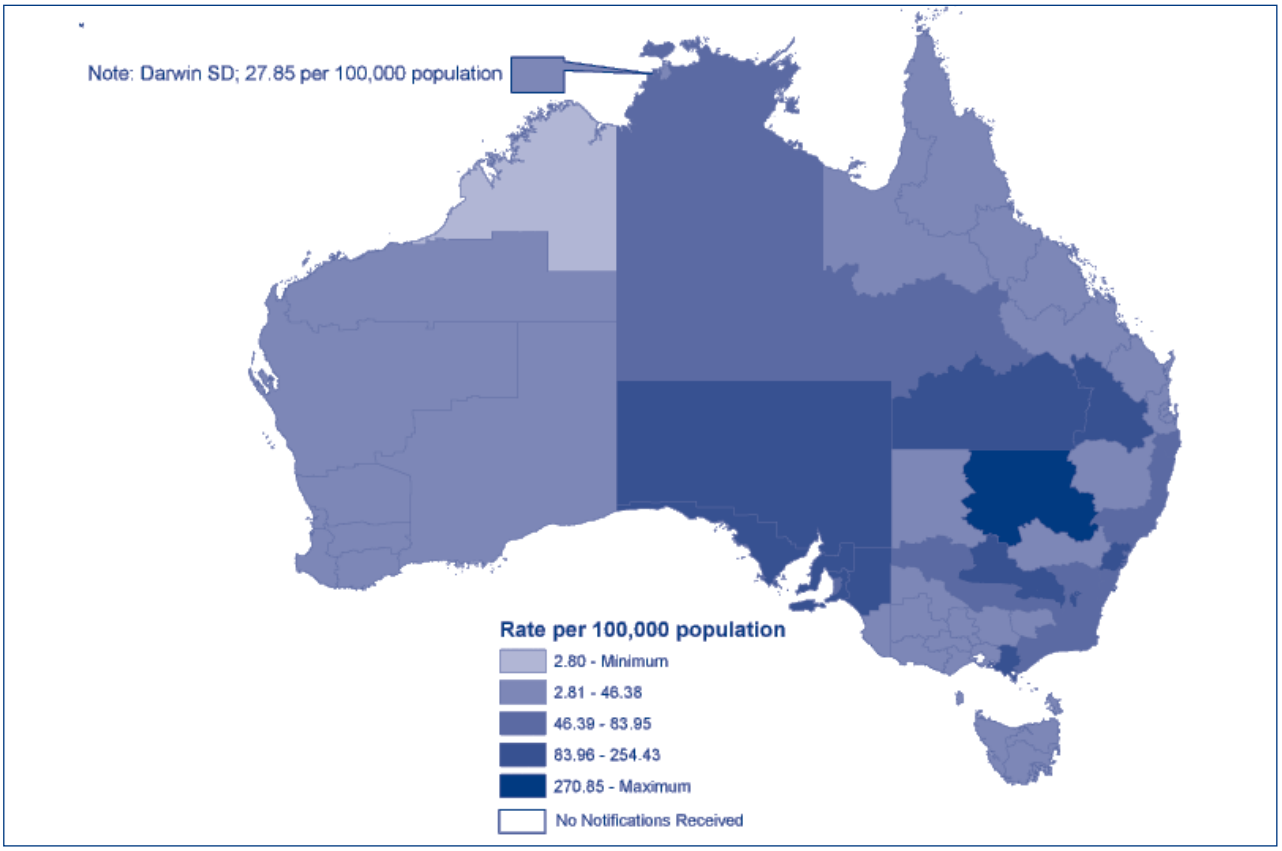
Notification rates of pertussis varied considerably by geographic location (Map 6).

The highest rates were reported from South Australia, New South Wales and the Australian Capital Territory. The trends in pertussis notification rates by month of diagnosis are shown for these 3 states and for Australia in Figure 46.

Figure 46. Notification rate for pertussis, Australian Capital Territory, New South Wales, South Australia, and Australia, 2003 to 2005, by month of notification



Map 6. Notification rate for pertussis, Australia, 2005, by Statistical Division of residence



Invasive pneumococcal disease

Case definition – Invasive pneumococcal disease

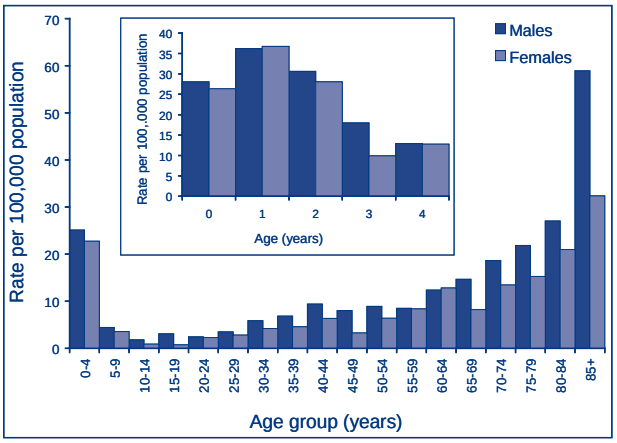
*Only **confirmed cases** are notified.*

***Confirmed case:** Requires isolation of* Streptococcus pneumoniae *from a normally sterile site by culture or detection by nucleic acid testing.*

There were 1,684 notifications of invasive pneumococcal disease (IPD) in Australia in 2005 giving a rate of 8.3 cases per 100,000 population. Notification rates declined in 2005 by 30% nationally with the declines in all jurisdictions of between 21 and 46%. The Northern Territory continued to have the highest notification rate (35 cases per 100,000 population) while Victoria had the lowest (6 cases per 100,000 population). The geographical distribution of IPD varied within states and territories, with the highest rates in central and northern Australia.

In 2005, rates of IPD fell in all age groups, particularly in children aged less than 5 years (20.4 cases per 100,000 population compared with 54.3 cases per 100,000 population in 2004). The rates in 1-year-olds also fell from 114 cases per 100,000 population in 2004 to 36.5 cases per 100,000 population. The highest rates in 2005 were in adults aged more than 85 years (40.9 cases per 100,000 population, Figure 47). The male to female ratio of IPD cases was 1.3:1.

Figure 47. Notification rate of invasive pneumococcal disease, Australia, 2005, by age group and sex



There were 164 cases of IPD among Indigenous people (9.7% of all cases). This represents a rate of 66 cases per 100,000 population compared with a rate of 7.6 cases per 100,000 population in non-Indigenous people.

Additional data were collected on cases of invasive pneumococcal disease in all Australian jurisdictions during 2005. Analyses of these data are reported separately.[17]

Poliomyelitis

Case definition – Poliomyelitis

*Both **confirmed cases** and **probable cases** are notified.*

***Confirmed case:** Requires isolation of wild-type poliovirus or detection of wild-type poliovirus by nucleic acid testing (confirmed in reference laboratory) and acute flaccid paralysis.*

***Probable case:** Requires acute flaccid paralysis not due to other causes as determined by the Polio Expert Committee.*

No cases of poliomyelitis were reported in Australia in 2005.

There were 36 notifications of acute flaccid paralysis (AFP) reported in 2005. Of these 30 occurred in children aged less than 15 years. This represents an AFP notification rate of 0.9 cases per 100,000 children aged less than 15 years which almost reaches the WHO indicator target for adequate AFP reporting of 1 case per 100,000 children. Three AFP cases, 1 aged more than 15 years, had poliovirus isolated from stool samples. The Polio Expert Committee reviewed the 3 cases and classified them as a non-polio AFP, diagnosed as transverse myelitis with the incidental isolation of a Sabin-like virus in 2 cases, while in the third, a type B/E toxin-producing *Clostridium botulinum* was detected and the case was classified as infant botulism.[18]

Rubella

Case definition – Rubella

*Both **confirmed cases** and **probable cases** are notified.*

***Confirmed case:** Requires isolation of rubella virus OR detection of rubella virus by nucleic acid testing OR IgG seroconversion or significant increase in antibody level or fourfold or greater rise in titre to rubella virus in the absence of recent rubella vaccination, OR detection of rubella specific IgM in the absence of recent rubella vaccination and confirmed in a reference laboratory.*

Probable case:** Requires **clinical evidence** AND **laboratory suggestive evidence** OR **epidemiological evidence.

***Laboratory suggestive evidence:** In a pregnant patient, detection of rubella-specific IgM that has not been confirmed in a reference laboratory, in the absence of recent rubella vaccination.*

Clinical evidence: A generalised maculopapular rash AND fever AND arthralgia/arthritis OR lymphadenopathy OR conjunctivitis

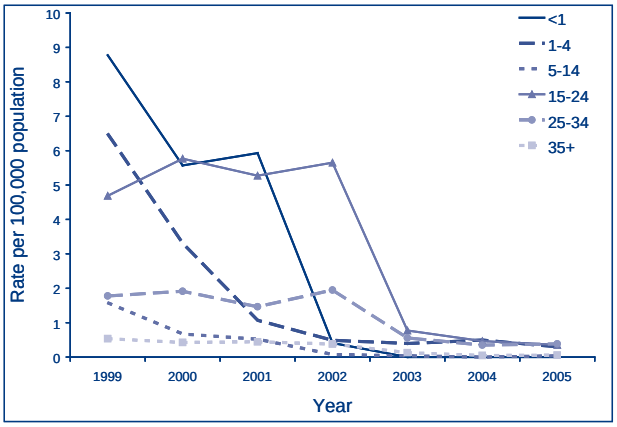
***Epidemiological evidence:** An epidemiological link is established when there is: 1. Contact between two people involving a plausible mode of transmission at a time when: a) one of them is likely to be infectious (about one week before to at least four days after appearance of rash) AND b) the other has an illness which starts within 14 and 23 days after this contact AND 2. At least one case in the chain of epidemiologically linked cases (which may involve many cases) is laboratory confirmed.*

In 2005, there were 31 notifications of rubella; 30 confirmed and 1 probable case, which represents a notification rate of 0.2 cases per 100,000 population. This is the lowest rate on record and a 6% reduction on 2004 (33 notifications, 0.2 cases per 100,000 population). In 2005, rubella cases were reported from NSW (10 cases), Queensland (9 cases), and 6 cases each from Victoria and Western Australia. No cases were reported from other jurisdictions.

The male to female ratio of notified cases in 2005 was 1:1, as in 2004. A predominance of male cases was seen in 1999 (M:F ratio: 1.4:1), 2002 (M:F ratio: 3.0:1) and 2003 (M:F ratio: 1.6:1).

Figure 48 shows trends in rubella notification rates in different age groups. The rates in all age groups remained stable in 2005. This pattern of declining rates by age group over time is similar to that for measles, with the exception of higher rubella notification rates in the 15–24 year age group, which persisted until 2002. Rubella cases in this age group were predominantly in males, and this may be related to the schoolgirl measles-mumps-rubella (MMR) vaccination program, prior to the inclusion of boys in 1993.

Figure 48. Trends in notification rate of rubella, Australia, 2005, by age group and sex



There was a single case of congenital rubella reported from Victoria in 2005: born to an unvaccinated overseas-born woman. Altogether there were 13 cases of rubella notified from women of child bearing age (15–49 years) in 2005.

Tetanus

Case definition – Tetanus

*Only **confirmed cases** are notified.*

***Confirmed case:** Requires isolation of* Clostridium tetani *from a wound in a compatible clinical setting and prevention of positive tetanospasm in mouse test using a specific tetanus antitoxin OR a clinically compatible illness without other apparent cause.*

In 2005, there were 2 notifications of tetanus. One was an 84 year old female and one was a 74-year old-male.

Childhood vaccination coverage reports

Estimates of vaccination coverage both overall and for individual vaccines for children at 12 months, 24 months and 6 years of age in 2005 are shown in Table 10, Table 11 and Table 12, respectively. During 2005, there were no significant changes in coverage for 'fully immunised' and individual vaccines for all 3 milestone ages. It is notable that the estimates for 'fully immunised' and diphtheria-tetanus-pertussis (DTP) vaccine at 24 months of age are higher than the 12 months coverage estimates since the 18 months DTPa booster was no longer required from September 2003. Estimates at 6 years of age for all vaccines still remain significantly lower than estimates at the 12 and 24 month milestones.

Vectorborne diseases

Notifications

During 2005, there were 4,935 notifications of mosquito-borne diseases reported to NNDSS. The notifiable mosquito-borne diseases include those caused by the alphaviruses (Barmah Forest virus and Ross River virus), flaviviruses (the viruses causing dengue, Murray Valley encephalitis, Kunjin and Japanese encephalitis) and malaria.

Alphaviruses

Alphaviruses are RNA viruses which cause disease epidemics characterised by fever, rash and polyarthritis. In Australia, Barmah Forest virus and Ross River virus are the alphaviruses of major public health significance. There are a variety of mosquito

Table 10. Percentage of Australian children born in 2004 immunised according to data available on the Australian Childhood Immunisation Register, estimate at one year of age

Birth date Vaccine	1 Jan–31 Mar 2004 % vaccinated	1 Apr–30 Jun 2004 % vaccinated	1 Jul–30 Sep 2004 % vaccinated	1 Oct–31 Dec 2004 % vaccinated
DTP	92.3	92.4	92.4	91.7
Polio	92.2	92.3	92.3	91.6
Hib	94.3	94.3	94.4	93.8
Hepatitis B	94.6	94.7	94.8	94.3
Fully immunised	91.0	91.0	91.0	90.2

Table 11. Percentage of Australian children born in 2003 immunised according to data available on the Australian Childhood Immunisation Register, estimate at two years of age

Birth date Vaccine	1 Jan–31 Mar 2003 % vaccinated	1 Apr–30 Jun 2003 % vaccinated	1 Jul–30 Sep 2003 % vaccinated	1 Oct–31 Dec 2003 % vaccinated
DTP	95.5	95.3	95.2	95.1
Polio	94.9	95.2	95.2	95.0
Hib	93.3	93.5	93.6	93.5
MMR	93.4	93.7	93.8	93.8
Hepatitis B	95.7	95.9	95.9	95.9
Fully immunised	91.8	92.1	92.1	92.1

Table 12. Percentage of Australian children born in 1999 immunised according to data available on the Australian Childhood Immunisation Register, estimate at six years of age

Birth date Vaccine	1 Jan–31 Mar 1999 % vaccinated	1 Apr–30 Jun 1999 % vaccinated	1 Jul–30 Sep 1999 % vaccinated	1 Oct–31 Dec 1999 % vaccinated
DTP	84.4	84.8	85.1	84.9
Polio	84.5	85.1	85.2	84.8
MMR	84.4	84.9	85.2	84.9
Fully immunised	83.2	83.8	84.0	83.8

vectors for Barmah Forest virus and Ross River virus that facilitate the transmission of these viruses in diverse environments (freshwater habitats, coastal regions, salt marshes, floodwaters, established wetlands and urban areas).[19]

Barmah Forest virus infection

Case definition – Barmah Forest virus infection

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires isolation of Barmah Forest virus, OR detection of Barmah Forest virus by nucleic acid testing, OR IgG seroconversion or a significant increase in antibody level or a fourfold or greater rise in titre to Barmah Forest virus, OR detection of Barmah Forest virus-specific IgM.*

There were 1,319 notifications of Barmah Forest virus (BFV) infection notified to NNDSS in 2005, which accounts for 27% of total mosquito-borne disease notifications for the reporting period. Fifty-two per cent of BFV notifications were reported from Queensland (n = 680) and 34% from New South Wales (n = 448). BFV notifications during 2005 were 1.3 times the mean for the previous 5 years.

The highest rates of BFV notifications were reported by the Northern Territory (25.1 cases per 100,000 population), Queensland (17.2 cases per 100,000 population), and New South Wales (6.6 cases per 100,000 population). The national BFV notification rate was 6.5 cases per 100,000 population, which was the second highest since 1999.

There was a peak in the BFV notification rate in the Northern Territory (82.8 cases per 100,000 population) during April 2005 and this was almost 4 times the peak notification rate observed in May 2004 (Figure 49). Queensland reported a peak BFV notification rate in May 2005 (32.1 cases per 100,000 population), whereas New South Wales reported a peak BFV notification rate in April 2005 (10.6 cases per 100,000 population). These were slight increases over the peak notification rates in the previous season.

The highest rate of BFV infection in 2005, was reported in the Mid-North Coast area of New South Wales (67.5 cases per 100,000 population, Map 7).

Map 7. Notification rate of Barmah Forest virus infections, Australia, 2005, by Statistical Division of residence

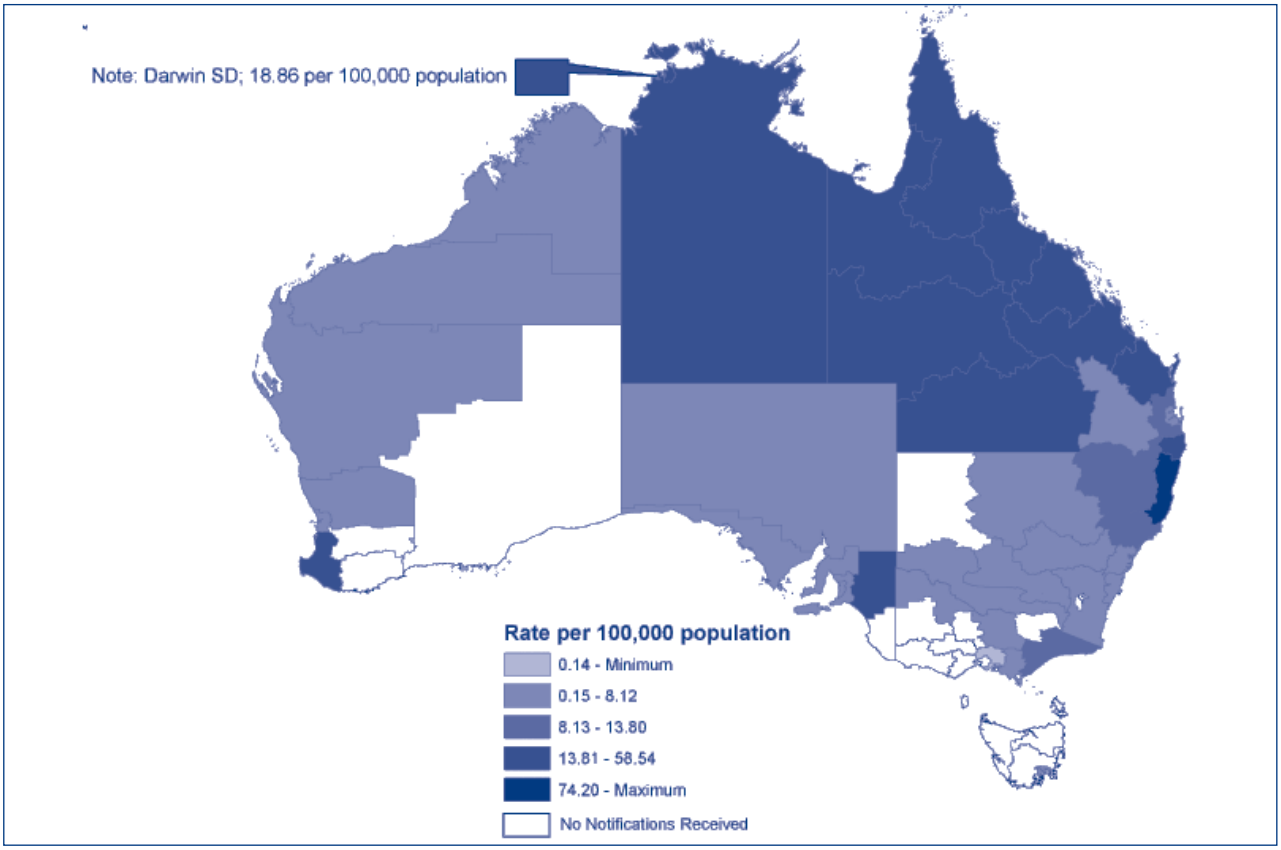


Figure 49. Notification rate of Barmah Forest virus infections, select jurisdictions, 1999 to 2005, by month and year of onset

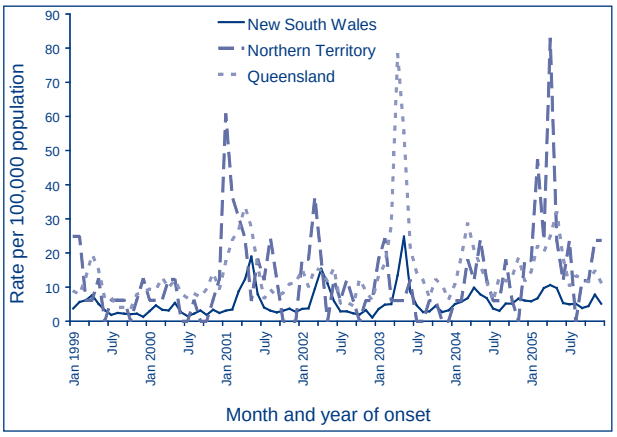
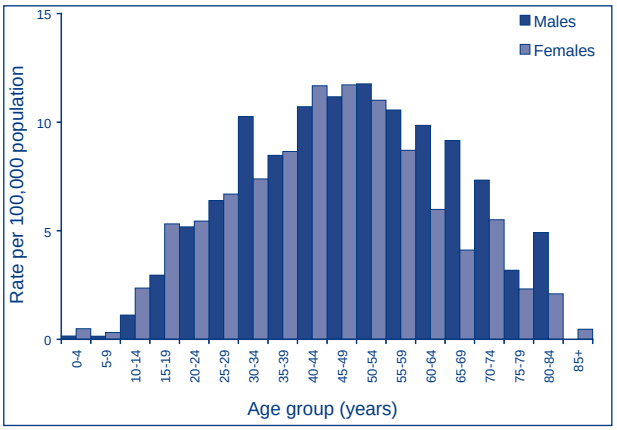


Figure 50 shows the age and sex distribution of BFV notifications. The BFV notification rate was highest amongst the 45–54 year age range (11.4 cases per 100,000 population), and the male to female ratio was 1:1. Males in the 50–54 year age group had the highest age-specific rate (11.8 cases per 100,000 population). The highest age-specific BFV notification rate in females was in the 40–44 and 45–49 year age groups (11.7 cases per 100,000 population).

Figure 50. Notification rate of Barmah Forest virus infections, Australia, 2005, by age group and sex



Ross River virus infection

Case definition – Ross River virus infection

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires isolation of Ross River virus, OR detection of Ross River virus by nucleic acid testing, OR IgG seroconversion or a significant increase in antibody level or a fourfold or greater rise in titre to Ross River virus, OR detection of Ross River virus-specific IgM.*

There were 2,544 notifications of Ross River virus (RRV) infection reported to NNDSS in 2005, which accounts for over one half (52%) of the total mosquito-borne disease notifications received in 2005.

The largest contributors to RRV notifications in 2005 were Queensland (46%, n = 1,179) and New South Wales (23%, n = 585). The highest rates of infection were reported by the Northern Territory (103.1 cases per 100,000 population), Queensland (29.7 cases per 100,000 population), and Western Australia (15.5 cases per 100,000 population). The national RRV notification rate for 2005 was 12.5 cases per 100,000 population.

Map 8 shows that the highest rate of RRV infection in 2005 was in the Northern Territory (122.4 cases per 100,000 population) and Mackay in Queensland (107.9 cases per 100,000 population).

RRV infection notifications in the Northern Territory peaked in February 2005 at 319.5 cases per 100,000 population (Figure 51). This was a 52% reduction from the peak notification rate from January 2004. Queensland reported a peak notification rate for RRV in March 2005 at 99.6 cases per 100,000 population, which was almost a 40% reduction from the peak notification rate in March 2004 (251.6 cases per 100,000 population).

The age and sex distribution of RRV notifications are shown in Figure 52. The national notification rate was highest in the 45–49 year age group (22.8 cases per 100,000 population) and the highest BFV notification rate in males (21.4 cases per 100,000 population) was also observed in this age group. The highest notification rate in females was recorded in the 45–49 year age range (25.1 cases per 100,000 population).

Map 8. Notification rate of Ross River virus infections, Australia, 2005, by Statistical Division of residence

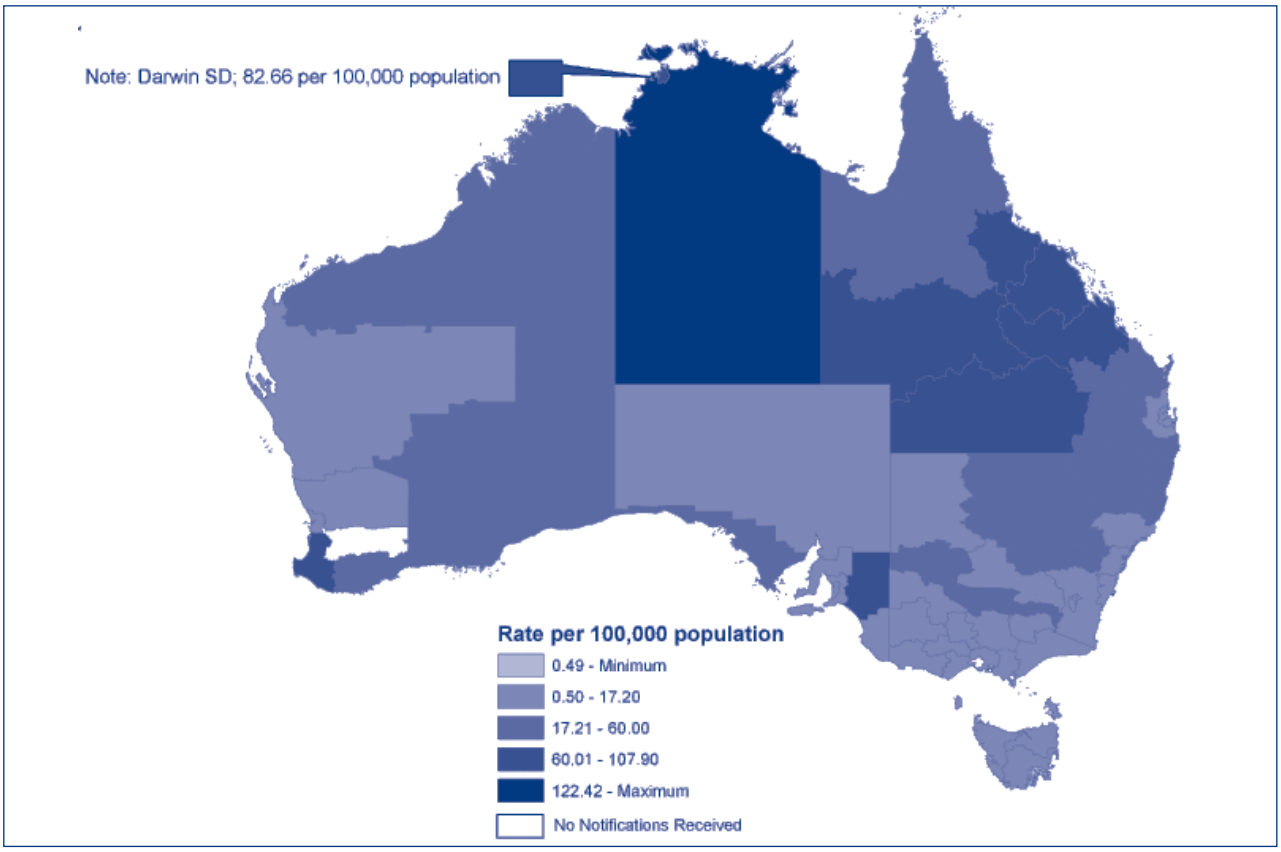


Figure 51. Notification rate of Ross River virus infections, select jurisdictions, 1999 to 2005, by month and season of onset

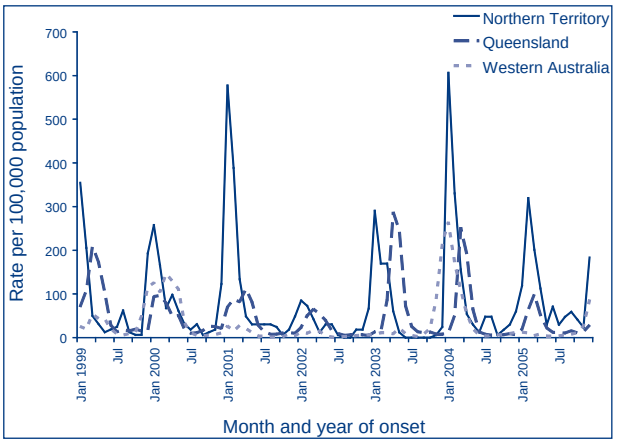
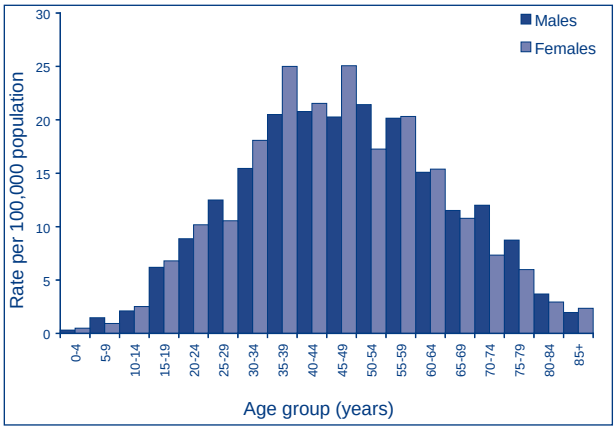


Figure 52. Notification rate of Ross River virus infections, Australia, 2005, by age group and sex



Flaviviruses

Flaviviruses are single-stranded RNA viruses, some of which are associated with epidemic encephalitis in various regions of the world. In Australia, the flaviviruses of public health importance are Murray Valley encephalitis (MVEV), Kunjin (KUNV), Japanese encephalitis virus (JEV) and dengue viruses (DENV).

The Sentinel Chicken Programme is a surveillance network involving New South Wales, the Northern Territory Victoria and Western Australia, and is designed to provide early warning of increased flavivirus activity.[20] Antibodies to MVEV and KUNV are detected in sentinel flocks located in four Australian states. Sentinel chicken surveillance reports from previous seasons have been

published,[21,22,23] and the latest report has been published as part of the National Arbovirus and Malaria Advisory Committee Annual Report 2005–06.[24]

Murray Valley encephalitis virus infection

Case definition – Murray Valley encephalitis virus

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires isolation of Murray Valley encephalitis virus, OR detection of Murray Valley encephalitis virus by nucleic acid testing, OR IgG seroconversion or a significant increase in antibody level or a fourfold or greater rise in titre to Murray Valley encephalitis virus, OR detection of Murray Valley encephalitis virus-specific IgM in cerebrospinal fluid in the absence of IgM to Kunjin, Japanese encephalitis or dengue viruses, OR detection of Murray Valley encephalitis virus-specific IgM in serum in the absence of IgM to Kunjin, Japanese encephalitis or dengue viruses. This is only accepted as laboratory evidence for encephalitic illnesses.*

AND Non-encephalitic disease: acute febrile illness with headache, myalgia and/or rash, OR encephalitic disease: acute febrile meningoencephalitis characterised by one or more of the following: 1. focal neurological disease or clearly impaired level of consciousness, 2. an abnormal computerised tomograph or magnetic resonance image or electrocardiograph, 3. presence of pleocytosis in cerebrospinal fluid, OR asymptomatic disease: Case detected as part of a serosurvey should not be notified.

Confirmation of laboratory result by a second arbovirus reference laboratory is required if the case occurs in areas of Australia not known to have established enzootic/endemic activity or regular epidemic activity.

There were 2 cases of MVEV infection reported in 2005. In March 2005, a case of MVEV was reported in a 30-year-old male from Normanton, Queensland. The second case of MVEV disease was also reported in March 2005 in a 3-year-old boy from a community in Arnhem Land who was transferred to Royal Darwin Hospital for treatment. The boy had a relatively mild illness and made a complete recovery. The boy's community was located near an extensive freshwater wetland with numerous water birds and frequent high numbers of common banded mosquitoes *Culex annulirostris* and *Culex palpalis*: 2 vectors of MVEV.

Kunjin virus infection

Case definition – Kunjin virus

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires isolation of Kunjin virus, OR detection of Kunjin virus by nucleic acid testing, OR IgG seroconversion or a significant increase in antibody level or a fourfold or greater rise in titre to Kunjin virus, OR detection of Kunjin virus-specific IgM in cerebrospinal fluid, OR detection of Kunjin virus-specific IgM in serum in the absence of IgM to Murray Valley encephalitis, Japanese encephalitis or dengue viruses. This is only accepted as laboratory evidence for encephalitic illnesses.*

AND Non-encephalitic disease: acute febrile illness with headache, myalgia and/or rash, OR encephalitic disease: acute febrile meningoencephalitis characterised by one or more of the following: 1. focal neurological disease or clearly impaired level of consciousness, 2. an abnormal computerised tomograph or magnetic resonance image or electrocardiograph, 3. presence of pleocytosis in cerebrospinal fluid, OR asymptomatic disease: case detected as part of a serosurvey should not be notified.

Confirmation of laboratory result by a second arbovirus reference laboratory is required if the case occurs in areas of Australia not known to have established enzootic/endemic activity or regular epidemic activity.

There was one notification of KUNV from Queensland during 2005, in a 48-year-old female with an onset in February 2005.

Dengue virus infection

Case definition – Dengue virus

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires isolation of dengue virus, OR detection of dengue virus by nucleic acid testing, OR IgG seroconversion or a significant increase in antibody level or a fourfold or greater rise in titre to dengue virus, proven by neutralisation or another specific test, OR detection of dengue virus-specific IgM in cerebrospinal fluid, in the absence of IgM to Murray Valley encephalitis, Kunjin, or Japanese encephalitis viruses, OR detection of dengue virus-specific IgM in serum, except in North Queensland. In North Queensland, dengue virus-specific IgM in serum is acceptable evidence ONLY when this occurs during a proven outbreak.*

AND A clinically compatible illness (e.g. fever, headache, arthralgia, myalgia, rash, nausea, and vomiting, with a possible progression to dengue haemorrhagic fever, dengue shock syndrome or meningoencephalitis).

Confirmation of laboratory result by a second arbovirus reference laboratory is required if the case occurs in previously unaffected areas of Australia. Currently North Queensland is the only area with the potential for indigenous (epidemic) dengue virus in Australia.

During 2005, there were 218 notifications of dengue virus infection reported to NNDSS, of which Queensland reported 115 notifications (53%). The only locally acquired notifications were reported by Queensland (n = 74), while other jurisdictions reported imported cases from overseas or from unknown sources. Queensland reported a peak in DENV notifications in March 2005 (n = 49). This was much lower than in the previous 2 years (Figure 53).

The Queensland notifications resulted from outbreaks that peaked in March in the Torres Strait Islands, and in May in Townsville. A summary of identified outbreaks of locally-acquired cases is shown in Table 13.

Dengue serotype 4 was the major serogroup circulating in Queensland during these outbreaks.

Figure 53. Notifications of dengue (locally-acquired and imported cases), select jurisdictions, January 1999 to December 2005, by month and year of onset

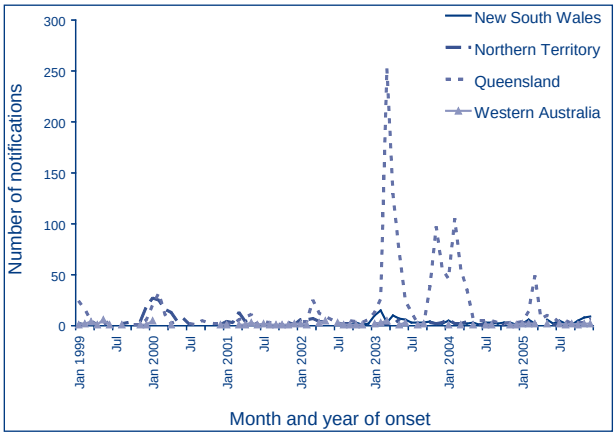


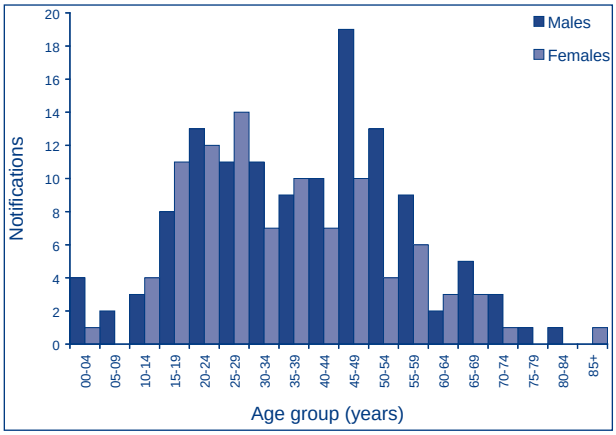
Table 13. Outbreaks of locally acquired cases of dengue, Queensland, 2005

Location	Reported cases	Duration	Type
Torres	56	10 weeks	Dengue 4
Townsville	18	16 weeks	Dengue 4

Data provided by Dr Jeffrey Hanna, Tropical Public Health Unit, Cairns, 2005.

The age and sex distribution of DENV notifications is shown in Figure 54. The highest rates occurred in the 45–49 year age group (19 cases) for males, and in females in the 25–29 year age range (14 cases).

Figure 54. Notifications of dengue (locally-acquired and imported cases), Australia, 2005, by age group and sex



Japanese encephalitis virus infections

Case definition – Japanese encephalitis virus

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires isolation of Japanese encephalitis virus, OR detection of Japanese encephalitis virus by nucleic acid testing, OR IgG seroconversion or a significant increase in antibody level or a fourfold or greater rise in titre of Japanese encephalitis virus-specific IgG proven by neutralisation or another specific test, with no history of recent Japanese encephalitis or yellow fever vaccination, OR detection of Japanese encephalitis virus-specific IgM in cerebrospinal fluid, in the absence of IgM to Murray Valley encephalitis, Kunjin and dengue viruses, OR detection of Japanese encephalitis virus-specific IgM in serum in the absence of IgM to Murray Valley encephalitis, Kunjin and dengue viruses, with no history of recent Japanese encephalitis or yellow fever vaccination.*

AND A clinically compatible febrile illness of variable severity associated with neurological symptoms ranging from headache to meningitis or encephalitis. Symptoms may include headache, fever, meningeal signs, stupor, disorientation, coma, tremors, generalised paresis, hypertonia, and loss of coordination. The encephalitis cannot be distinguished clinically from other central nervous system infections.

Confirmation of laboratory result by a second arbovirus reference laboratory is required if the case appears to have been acquired in Australia.

There were no human cases of JEV notified in 2005. The last JEV notification was reported by Queensland in February 2004 when a 66-year-old male acquired JEV from Papua New Guinea. There have been 9 other cases of JEV reported to NNDSS since 1995, although JEV was not nationally notifiable until 2001. Four of these 9 notifications were reported in Torres Strait Islanders from the Badu Island community. The other locally acquired JEV case was reported in a resident from the Cape York Peninsula, Queensland. The remaining 4 cases were reported as acquired overseas.

Flavivirus infections (NEC)

Case definition – Flavivirus infection (not elsewhere specified)

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires isolation of a flavivirus that cannot be identified in Australian reference laboratories or which is identified as one of the flaviviruses not otherwise classified, OR detection of a flavivirus, by nucleic acid testing, that cannot be identified in Australian reference laboratories or which is identified as one of the flaviviruses not otherwise classified, OR IgG seroconversion or a significant increase in antibody level or a fourfold or greater rise in titre of flavivirus specific IgG that cannot be identified or which is identified as being specific for one of the flaviviruses not otherwise classified. There must be no history of recent Japanese encephalitis or yellow fever vaccination, OR detection of flavivirus IgM in cerebrospinal fluid, with reactivity to more than one flavivirus antigen (Murray Valley encephalitis, Kunjin, Japanese encephalitis and/or dengue) or with reactivity only to one or more of the flaviviruses not otherwise classified, OR detection of flavivirus IgM in the serum, with reactivity to more than one flavivirus antigen (Murray Valley encephalitis, Kunjin, Japanese Encephalitis and/or dengue) or with reactivity only to one or more of the flaviviruses not otherwise classified. This is only accepted as laboratory evidence for encephalitic illnesses. There must be no history of recent Japanese encephalitis or yellow fever vaccination.*

AND Non-encephalitic disease: acute febrile illness with headache, myalgia and/or rash, OR encephalitic disease: acute febrile meningoencephalitis characterised by one or more of the following: 1. focal neurological disease or clearly impaired level of consciousness, 2. an abnormal computerised tomograph or magnetic resonance image or electrocardiograph, 3. presence of pleocytosis in cerebrospinal fluid.

Confirmation by a second arbovirus reference laboratory is required if the case cannot be attributed to known flaviviruses.

There were 29 flavivirus infection (not elsewhere classified or NEC) notifications during 2005; notified by Queensland (n = 20), New South Wales (n = 6) and Victoria (n = 9).

There were 5 Kokobera notifications and 1 KUNV from Queensland in this category. Eight notifications of the alphavirus Sindbis were included under flavivirus infections (NEC).

Malaria

Case definition – Malaria

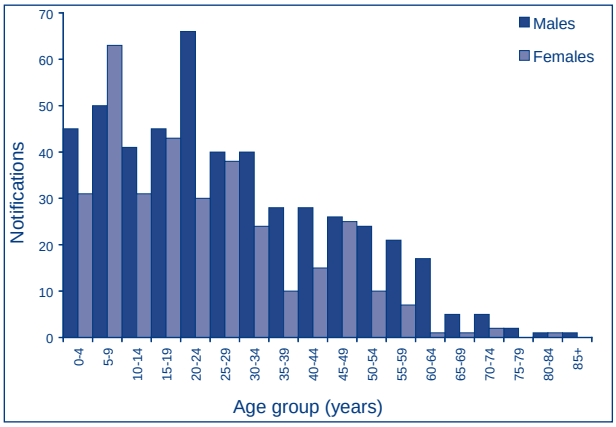
*Only **confirmed cases** are reported.*

***Confirmed case:** Requires detection and specific identification of malaria parasites by microscopy on blood films with confirmation of species in a laboratory with appropriate expertise, OR detection of* Plasmodium *species by nucleic acid testing.*

There were 822 notifications of malaria in Australia in 2005. The majority of cases were reported by Queensland (36%, n = 297), New South Wales (25%, n = 204), Victoria (13%, n = 110) and Western Australia (10%, n = 85). There were no reports of locally-acquired malaria during the reporting period.

The largest number (n = 113) of malaria notifications was reported in refugee children,[25] in the 5–9 year age group (Figure 55). The male to female ratio was 1:0.7.

Figure 55. Notifications of malaria, Australia, 2005, by age group and sex



The infecting *Plasmodium* species was reported for 97% of malaria notifications in 2005 (Table 14). Of these 822 notifications, *P. falciparum* (56%, n = 460) and *P. vivax* (35%, n = 285) were the predominant species while untyped *Plasmodium* species accounted for 2% (n = 13). The remaining cases were *P. ovale* (3%, n = 24), *P. malariae* (1%, n = 10) and mixed *Plasmodium* species infections (4%, n = 30).

Zoonoses

Zoonoses are diseases and infections naturally transmitted between non-human vertebrate animals and humans.[26] Animal hosts play an essential role in maintaining the infection in nature, and humans are only accidental hosts.[27] Animals are thought to be the origin of approximately 75% of emerging human infectious diseases[28] and wildlife contribute

Table 14. Malaria notifications in Australia, 2005 by parasite type and jurisdiction

Parasite type	State or territory									
	Type (%)	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust
Plasmodium falciparum	56	6	119	29	149	33	18	39	67	460
Plasmodium malariae	1	0	2	0	4	0	0	2	2	10
Plasmodium ovale	3	0	6	2	8	0	0	6	2	24
Plasmodium vivax	35	6	64	16	133	5	6	50	5	285
Plasmodium species	2	0	2	0	3	3	0	2	3	13
Mixed P. falciparum and *P. vivax**	0.2	–	1	–	–	1	0	0	0	2
Mixed *P. falciparum* and other species*	3	–	9	–	–	1	0	11	0	21
Mixed *P. vivax* and other species*	0.1	–	1	–	–	0	0	0	0	1
Mixed infection (unspecified)*	0.7	–	0	–	–	0	0	0	6	6
Total	100	12	204	47	297	43	24	110	85	822

* New South Wales, South Australia, Tasmania, Victoria and Western Australia report mixed species infections per notified case. Queensland, the Northern Territory and the Australian Capital Territory report one notification for each species in a mixed infection.

† Unknown.

significantly to this threat. In Australia, the Federal Government, through the animal and human agencies, is proactively addressing this threat by strengthening the link between animal and human health systems. In 2005, zoonotic diseases notifiable to the NNDSS were anthrax, Australian bat lyssaviral or lyssaviral (unspecified) infection, brucellosis, leptospirosis, ornithosis and Q fever. During 2005, a total of 687 notifications of zoonotic disease (0.5% of total notifications) were made to the NNDSS.

Anthrax

Case definition – Anthrax

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires isolation of* Bacillus anthracis*-like organisms or spores confirmed by a reference laboratory*

OR Detection of Bacillus anthracis *by microscopic examination of stained smears, OR detection of* Bacillus anthracis *by nucleic acid testing AND Cutaneous: skin lesion evolving over 1–6 days from a papular through a vesicular stage, to a depressed black eschar invariably accompanied by oedema that may be mild to extensive, OR gastrointestinal: abdominal distress characterised by nausea, vomiting, anorexia and followed by fever, OR rapid onset of hypoxia, dyspnoea and high temperature, with radiological evidence of mediastinal widening, OR meningeal: acute onset of high fever, convulsions, loss of consciousness and meningeal signs and symptoms.*

No cases of anthrax were notified to NNDSS in 2005. The last reported human cases of anthrax in Australia (both cutaneous anthrax) occurred in July 1998 and February 1997.

Anthrax is a notifiable animal disease subject to compulsory government control strategies including: vaccination of susceptible livestock located on sites with a known history of anthrax; epidemiological investigation of outbreaks; quarantine and decontamination of affected premises; and safe disposal of carcases. Certain rural areas in central New South Wales and northern and north-eastern Victoria are associated with recurring cases of anthrax in cattle and sheep. In these endemic areas, anthrax has a low and decreasing prevalence and cases only occur sporadically.

In 2005, 9 confirmed anthrax incidents occurred. All except one occurred in the known anthrax endemic areas; the exception was in an area where anthrax had been reported in a neighbouring district in 1973. Cases involved sheep, cattle or both. In all cases, properties were subject to the recommended protocol of quarantine, carcass incineration or burial, site disinfection and vaccination of in-contact animals. All movements from affected properties were traced, and there was no risk of further spread of disease.[31]

Australian bat lyssaviral and lyssaviral (unspecified) infections

Case definition – Australian bat lyssavirus

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires isolation of Australian bat lyssavirus confirmed by sequence analysis, OR detection of Australian bat lyssavirus by nucleic acid testing.*

Case definition – Lyssavirus (unspecified)

*Only **confirmed cases** are reported AND only where there is insufficient evidence to meet a case definition for Australian bat lyssavirus or rabies.*

***Confirmed case:** Requires positive fluorescent antibody test result for lyssaviral antigen on fresh brain smears, OR specific immunostaining for lyssaviral antigen on formalin fixed paraffin sections of central nervous system tissue, OR presence of antibody to serotype 1 lyssavirus in the cerebrospinal fluid, OR detection of lyssavirus-specific RNA (other than to Australian bat lyssavirus or rabies).*

AND Acute encephalomyelitis with or without altered sensorium or focal neurological signs.

No new cases of either Australian bat lyssaviral or lyssaviral (unspecified) infections were notified during 2005. The 2 known cases of human infection with Australian bat lyssavirus were fatal and occurred in 1996 and 1998 following close contact between bat-handlers and infected bats.

There are 2 strains of Australian bat lyssavirus known: one circulates in frugivorous bats, sub-order Megachiroptera, and the other circulates in the smaller, mainly insectivorous bats, sub-order Microchiroptera. Each strain has been associated with one human fatality. Surveillance indicates infected bats are widespread at a low frequency on the Australian mainland.[29] Research suggests that the virus has been associated with bats in Australia for more than 1,500 years[30] and that its recent 'emergence' is in all likelihood due to changes in human behaviour and in bat ecology due to habitat loss and changes in feed availability.

Brucellosis

In 2005, 41 cases of brucellosis were reported to the NNDSS, giving a national notification rate of 0.2 cases per 100,000 population. Cases were from Queensland (37 cases), New South Wales (3 cases) and Victoria (1 case). The highest notification rate (90 cases per 100,000 population) was from the Central West region of Queensland (Map 9). There is little evidence of change in the national or Queensland notification rates of brucellosis over the last 13 years (Figure 56). Most cases were male (n = 35, male to female ratio 6:1), and of these, 80% were aged between 15 and 39 years.

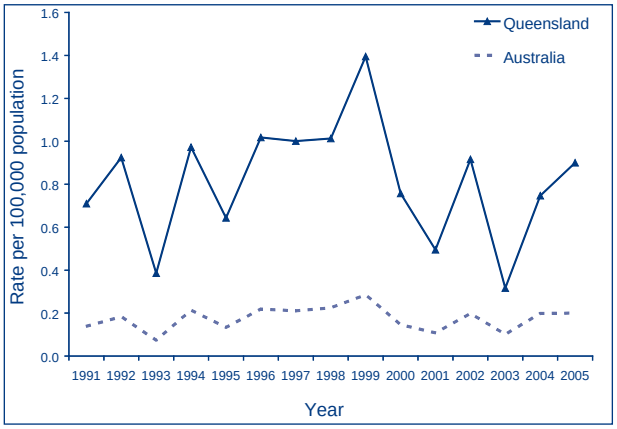
Case definition – Brucellosis

*Only **confirmed cases** are reported.*

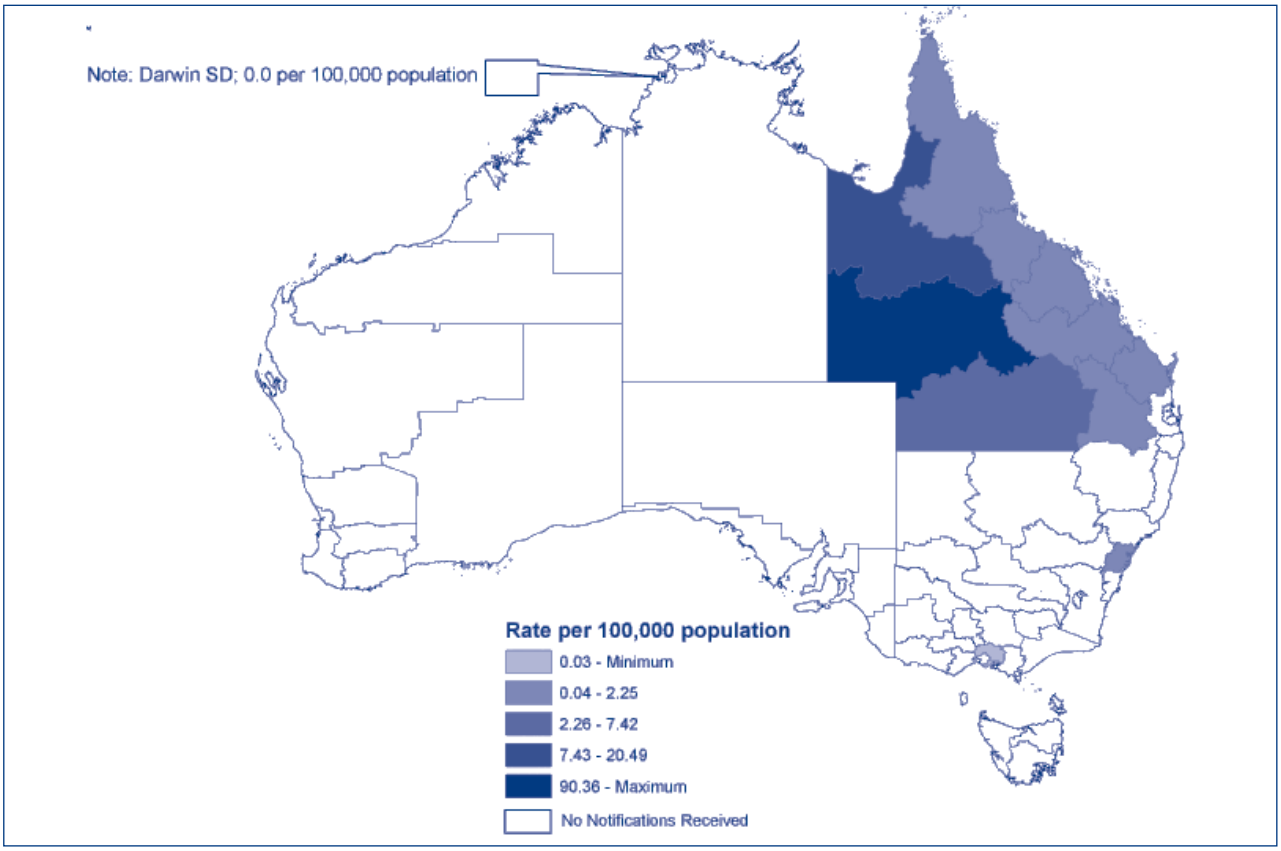
***Confirmed case:** Requires isolation of* Brucella *species, OR IgG seroconversion or a significant increase in antibody level or a fourfold or greater rise in titre in* Brucella *agglutination titres or complement fixation titres between acute and convalescent phase serum samples. (Where possible both tests should be conducted at the same laboratory), OR a single high* Brucella *agglutination titre.*

Species data was available for 31% of notifications (n = 13). Of these 10 were *Brucella suis*, (all acquired in Queensland) and 2 cases from New South Wales and a case from Victoria were *Br. melitensis* (all overseas acquired).

Figure 56. Trends in notification rate for brucellosis, Australia and Queensland, 1991 to 2005



Map 9. Notification rate for brucellosis, Australia 2005, by Statistical Division of residence



Bovine brucellosis (*Brucella abortus*) was eradicated from the Australian cattle herd in 1989[31] and is presently considered an exotic animal disease in Australia. Caprine and ovine brucellosis (caused by *Brucella melitensis*) has never been reported in Australian sheep or goats. Swine brucellosis (caused by *B. suis*) is confined to small areas of northern Australia where it occurs in feral pigs and occasionally spills over into domestic pigs. *B. suis* was not detected in domestic piggeries during 2005.[31]

Leptospirosis

Case definition – Leptospirosis

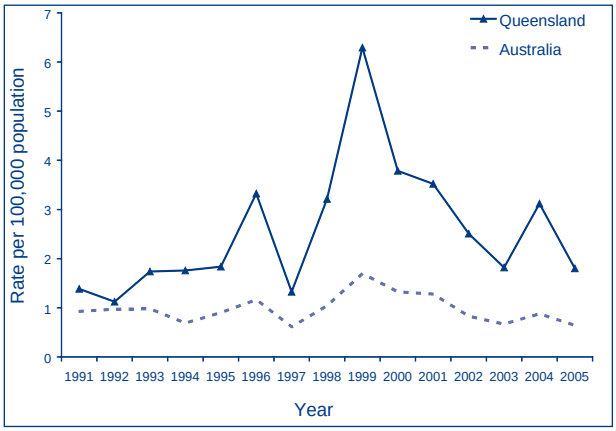
*Only **confirmed cases** are reported.*

***Confirmed case:** Requires isolation of pathogenic* Leptospira *species, OR a fourfold or greater rise in* Leptospira *agglutination titre between acute and convalescent phase sera obtained at least two weeks apart and preferably conducted at the same laboratory, OR a single* Leptospira *micro agglutination titre greater than or equal to 400 supported by a positive enzyme-linked immunosorbent assay IgM result.*

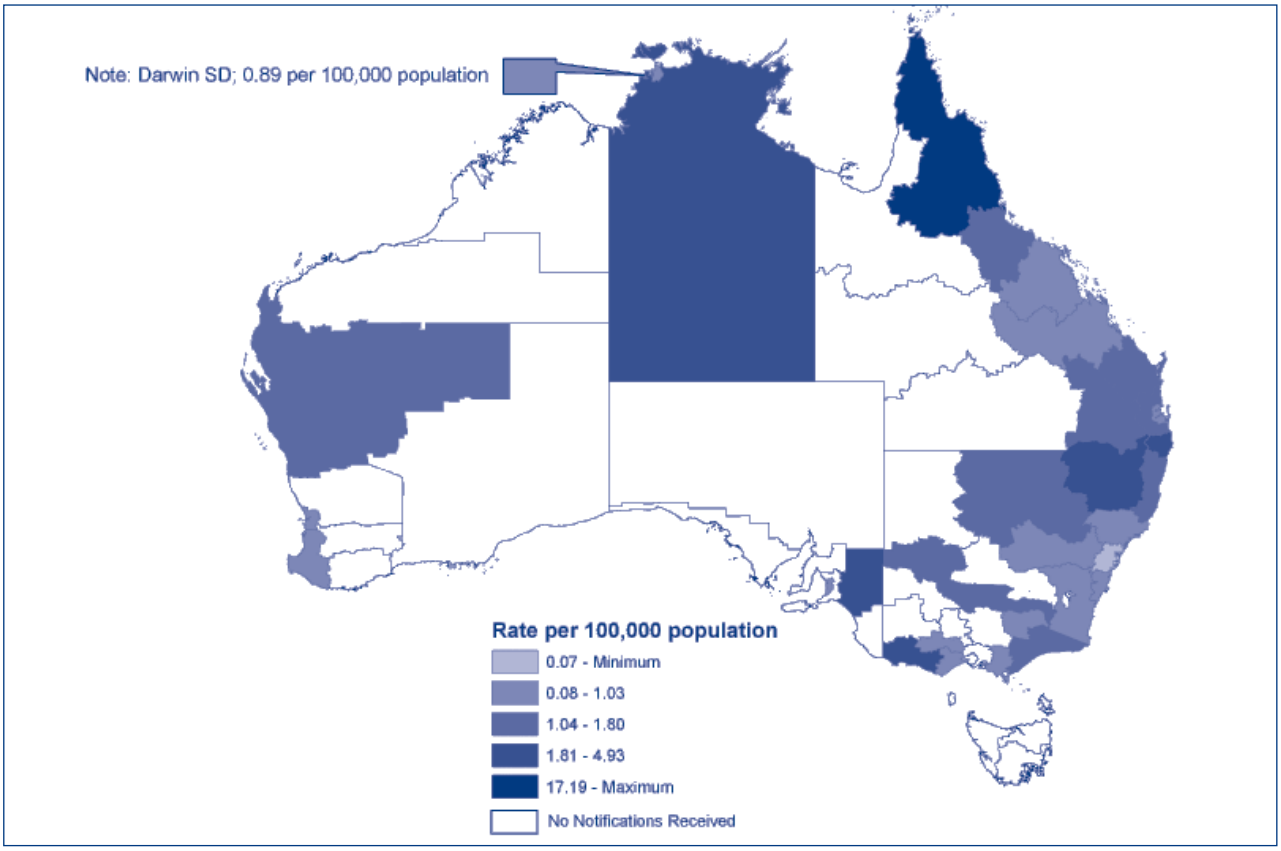
Leptospirosis is caused by spirochaetes of the genus, *Leptospira*. Nationally, 130 notifications of leptospirosis were received during 2005 (0.6 cases per 100,000 population). This rate is lower than in 2004. During the last 13 years, notification rates peaked in 1999 and declined from 2000 onwards (Figure 57).

In 2005, the highest notification rates were in Northern Territory (5 notifications, 2.5 cases per 100,000 population), Queensland (72 notifications, 1.8 cases per 100,000 population), and New South Wales (35 notifications, 0.5 cases per 100,000 population). Thirty-two per cent of all notifications were

Figure 57. Trends in notification rate for leptospirosis, Australia and Queensland, 1991 to 2005



Map 10. Notification rate for leptospirosis, Australia 2005, by Statistical Division of residence



from Far North Queensland (Map 10); the notification rate in this region was 18 cases per 100,000 population.

Most leptospirosis cases were male (n = 109, male to female ratio 5:1), and the 30–34 year age group had the highest notification rate (2.8 cases per 100,000 population).

Ornithosis

Case definition – Ornithosis

*Both **confirmed cases** AND **probable cases** are reported.*

***Confirmed case:** Requires A fourfold rise or greater in antibody titre against* Chlamydia psittaci *as demonstrated by micro-immunofluorescence (MIF) on acute and convalescent sera (collected at least two weeks later) tested in parallel, OR detection of* C. psittaci *by nucleic acid testing or culture.*

AND Pneumonia, OR AT LEAST TWO of the following: fever, headache, myalgia, rigors, dry cough or dyspnoea.

AND Exposure to birds or bird products, or proximity to an outbreak of ornithosis.

***Probable case:** Requires a single high total antibody level or detection of IgM antibody to* C. psittaci *by MIF, OR a single high total antibody titre to* Chlamydia *species demonstrated by complement fixation (CF) in at least one sample obtained at least two weeks after onset of symptoms, OR a fourfold or greater rise in antibody titre against* Chlamydia *species as demonstrated by CF.*

AND Pneumonia, OR AT LEAST TWO of the following: fever, headache, myalgia, rigors, dry cough or dyspnoea.

AND Exposure to birds or bird products, or proximity to an outbreak of ornithosis.

In 2005, there were 161 ornithosis infections notified to NNDSS, giving a national rate of 0.8 cases per 100,000 population; representing a decrease on the 1.2 cases per 100,000 population reported in 2004. The national notification rate increased from 1997 to 2004, but in 2005 slightly decreased to equal that reported in 2001 (Figure 58).

New South Wales had the highest number of notifications (121 notifications, 1.8 cases per 100,000 population). Notifications were also received from Victoria (34 cases), Queensland (2 cases), Western Australia (3 cases) and South Australia (1 case). The majority of cases were male (n = 89, male to female ratio 1.2:1). Eighty per cent of cases were aged 40 years and over, with the highest notification rate in males in the 80–84 year age group (6 notifications, 3.5 cases per 100,000 population) and in females in the 55–59 year age group (12 notifications, 1.9 cases per 100,000 population) (Figure 59).

Figure 58. Trends in notification rate for ornithosis, Australia, 1991 to 2005

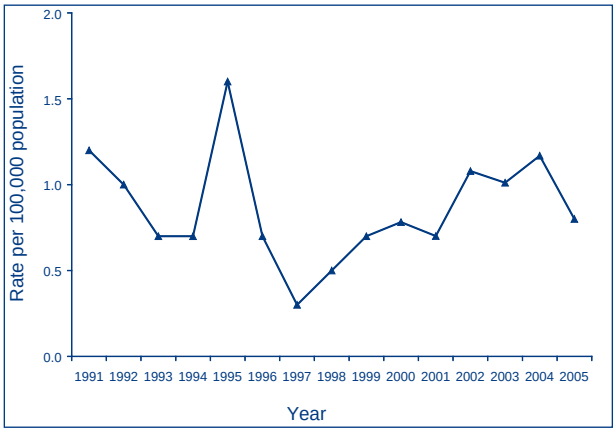
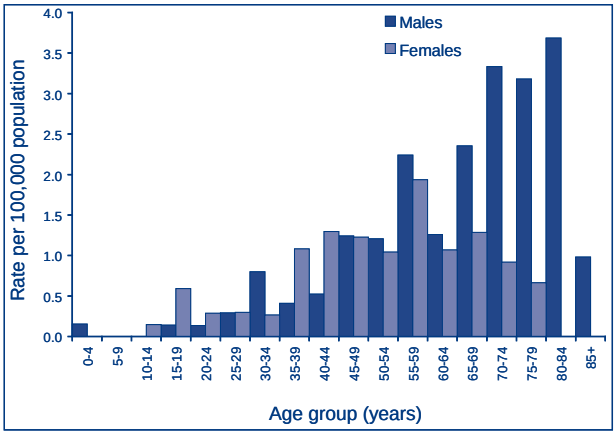


Figure 59. Notification rate for ornithosis, Australia, 2005, by age group and sex



Notification rates of ornithosis continued to be 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 and poultry processing plants. An outbreak investigation in rural Victoria in 1995 showed an association with lawn mowing and gardening in areas with high numbers of native birds.[32] Shedding of *Chlamydia psittaci* into the environment by native birds and subsequent inhalation of aerosolised dust and bird excreta was postulated as the mechanism of human

infection. Sub-clinical infection with *C. psittaci* is common in numerous wild and domesticated bird species in Australia.[33, 34]

Q fever

Case definition – Q fever

*Only **confirmed cases** are reported.*

***Confirmed case:** Requires detection of* Coxiella burnetii *by nucleic acid testing, OR seroconversion or significant increase in antibody level to Phase II antigen in paired sera tested in parallel in absence of recent Q fever vaccination, OR detection of* C. burnetii *by culture (note this practice should be strongly discouraged except where appropriate facilities and training exist).*

OR Detection of specific IgM in the absence of recent Q fever vaccination.

AND A clinically compatible disease.

In 2005, 355 cases of Q fever were notified to the NNDSS, a decrease of 23% on 2004. At 1.7 cases per 100,000 population, the Q fever notification rate in 2005 was lowest since 1991 (Figure 60). The highest rates of notifications were from Queensland (157 notifications, 4 cases per 100,000 population) and New South Wales (142 notifications, 2 cases per 100,000 population). The highest age-specific rates were in the 40–44 and 50–54 year age groups for males (5.7 cases per 100,000 population), and in the 45–49 and 50–54 year age groups for females (1.6 cases per 100,000 population). Few cases were reported from children or the elderly. The male to female ratio was 4:1.

Q fever has long been associated with work in the Australian livestock industry and abattoir workers are at high risk of infection. Since October 2000, abattoir workers and shearers have been eligible for free vaccination under the National Q Fever Management Program (Figure 61). The second phase of the Q fever vaccination program began in October 2001 to include workers in the beef, sheep and dairy industries and was completed on 30 June 2004. However, Victoria and South Australia have extended the Program until 30 June 2006 and Queensland has extended it until 30 June 2007.

Figure 60. Trends in notification rate for Q fever, Australia, 1991 to 2005

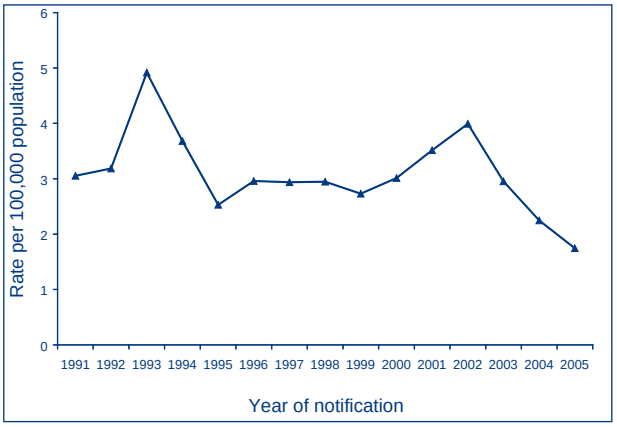
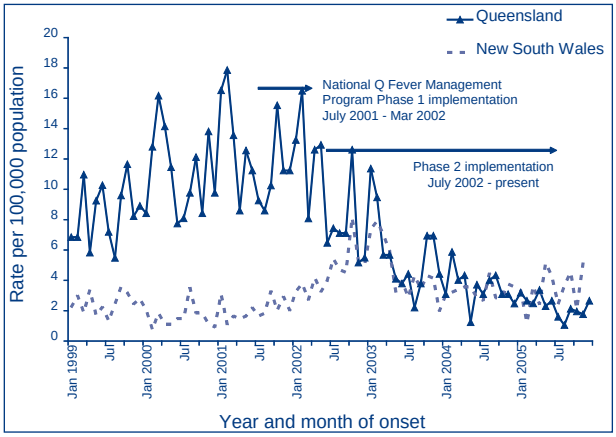


Figure 61. Notification rate for Q fever, Queensland and New South Wales, 1999 to 2005, by month of onset*



Other bacterial infections

Legionellosis, leprosy, meningococcal infection and tuberculosis were notifiable in all states and territories in 2005 and classified as 'other bacterial infections' in NNDSS. A total of 1,826 notifications were included in this group in 2005, which accounted for 1.4% of all the notifications to NNDSS, a similar total and proportion as in 2004 (1,719 notifications and 1.6% of total).

Legionellosis

Case definition – Legionellosis

*Both **confirmed cases** and **probable cases** are notified.*

***Confirmed case:** Requires isolation of* Legionella, *OR the presence of* Legionella *urinary antigen OR seroconversion or a significant increase in antibody level or a fourfold or greater rise in titre to* Legionella.

AND fever or cough or pneumonia.

***Probable case:** Single high titre antibody titre to* Legionella, *OR detection of* Legionella *by nucleic acid testing, OR detection of* Legionella *by direct fluorescence assay.*

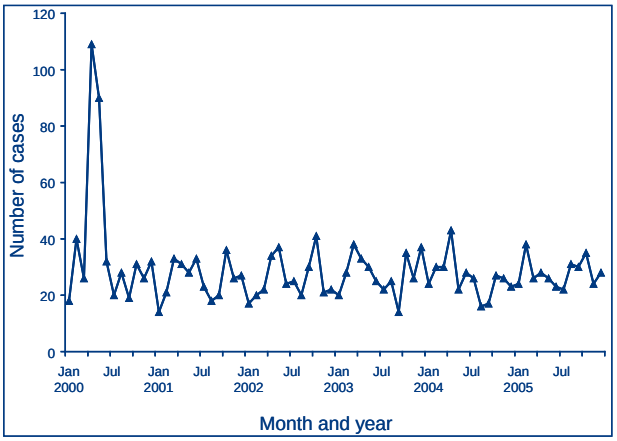
AND fever or cough or pneumonia.

Legionellosis includes notifications of infections caused by all *Legionella* species. There were 335 notifications of legionellosis reported in 2005, giving a national rate of 1.65 cases per 100,000 population. Of these, 264 cases (78.8%) were confirmed and 71 (21.2%) had a probable diagnosis.

In 2005, the highest rates of legionellosis were reported in South Australia (1.9 cases per 100,000 population, 58 cases) and Western Australia (1.7 cases per 100,000 population, 70 cases). Overall, the rate of notification was 1.65 cases per 100,000 population.

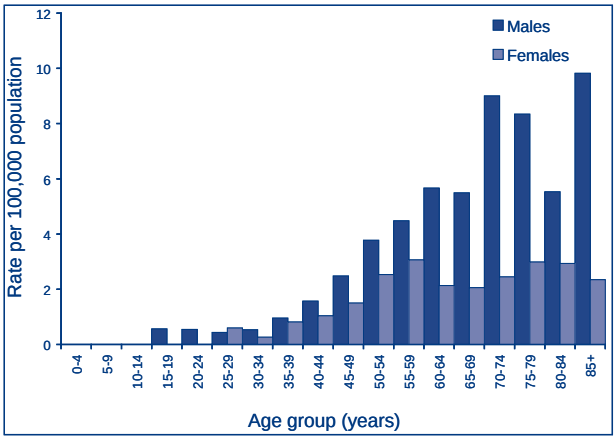
Legionellosis notifications showed a peak in autumn and spring, as in previous years (Figure 62). Rates of legionellosis have ranged between 0.8 and 2.6 cases per 100,000 population between 1999 and 2005; except in 2000, when rates reached 6.9 cases per 100,000 population as a result of the Melbourne aquarium outbreak with 125 cases.[34]

Figure 62. Trends in notification rate of legionellosis, Australia, 2000 to 2005, by month of onset



In 2005, men accounted for 220 of the 335 notified cases of legionellosis resulting in a male to female ratio of 1.9:1. There were no cases in children aged under 15. Overall, the highest rate of infection was 5.6 cases per 100,000 population in the 70–74 year age group. The highest rate in men occurred in the over 85 year age group (9.8 cases per 100,000, n = 10) and in women the highest rate was in the 75–79 year age group (3 cases per 100,000 population, n = 21) (Figure 63).

Figure 63. Notification rate for legionellosis, Australia, 2005, by age group and sex



Data on the causative species were available for 315 of 335 (94%) legionellosis cases. Of these, 159 (50.5%) cases were identified as *L. pneumophilia*, 153 (48.6%) were *L. longbeachae* and 3 (1%) cases were *L. micdadei* or *L. bozemanii* (Table 15).

Data on the deaths in legionellosis cases was available for 195 (58.2%) notifications. There were 16 deaths due to legionellosis in Australia in 2005, giving a case fatality rate of 4.8%. The break down of deaths by jurisdiction and infecting *Legionella* species is shown in Table 16. The case fatality rate for infections with *L. longbeachae* infections (4.6%) was higher than for *L. pneumophila* (3.8%) though this difference did not reach statistical significance. Case fatality rates may be overestimated given the large proportion of cases without details of outcomes.

Table 15. Notifications of legionellosis, Australia, 2005, by species and state or territory

Species	State or territory								
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust
Legionella longbeachae	0	24	1	15	45	1	10	57	153
Legionella pneumophila	0	64	1	27	12	1	44	10	159
*Other Legionella**	0	0	0	1	1	0	1	0	3
Unknown species	0	1	1	6	0	1	8	3	20
Total	0	89	3	49	58	3	63	70	335

* *Legionella micdadei* or *Legionella bozemanii.*

Table 16. Deaths due to legionellosis, Australia, 2005, by species and state or territory

Species	State or territory								
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust
Legionella longbeachae	0	0	0	1	1	1	0	4	7
Legionella pneumophila	0	0	0	1	2	0	1	2	6
Legionella micdadei	0	0	0	0	0	0	0	0	0
Unknown species	0	0	0	0	0	0	3	0	3
Total	0	0	0	2	3	1	4	6	16

An outbreak of 14 cases of Legionnaires' disease was reported from southern Sydney, New South Wales. Of these, 12 were initially diagnosed by detection of urinary antigen and 2 by a fourfold rise in antibody titres to *Legionella pneumophila* serogroup 1. Nine people were hospitalised and there were no fatalities. A notable factor in this outbreak was the mild nature of the symptoms. The people affected were aged from 18 to 88 years, and 86% were male.

Leprosy

Case definition – Leprosy

*Only **confirmed cases** are notified.*

***Confirmed case:** Requires demonstration of acid fast bacilli in split skin smears and biopsies prepared from ear lobe or other relevant sites or histopathological report from skin or nerve biopsy compatible with leprosy (Hansen's disease) examined by an anatomical pathologist or specialist microbiologist AND compatible nerve conduction studies or peripheral nerve enlargement or loss of neurological function not attributable to trauma or other disease process, or hypopigmented or reddish skin lesions with definite loss of sensation.*

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

In 2005, 10 leprosy cases were notified to NNDSS compared to 5 cases in 2004. There were 3 cases each in Western Australia, the Northern Territory and Queensland and 1 in New South Wales. Four cases occurred in men and 6 in women. Fifty per cent of cases were Indigenous Australians (2 in Western Australia and 3 in the Northern Territory). One case was reported to have been imported from overseas. The youngest case notified in 2005 was aged 19 years, and the oldest was aged 85 years.

Invasive meningococcal disease

Case definition – Invasive meningococcal disease

*Both **confirmed cases** and **probable cases** are notified.*

***Confirmed case:** Defined as isolation of* Neisseria meningitidis *from a normally sterile site. Alternatively, detection of meningococcus by nucleic acid testing, or Gram negative diplococci in Gram stain in specimens from a normally sterile site or from a suspicious skin lesion, OR high titre IgM or a significant rise in IgM or IgG titres to outer membrane protein antigens, OR positive polysaccharide antigen test in cerebrospinal fluid AND disease compatible with invasive meningococcal disease.*

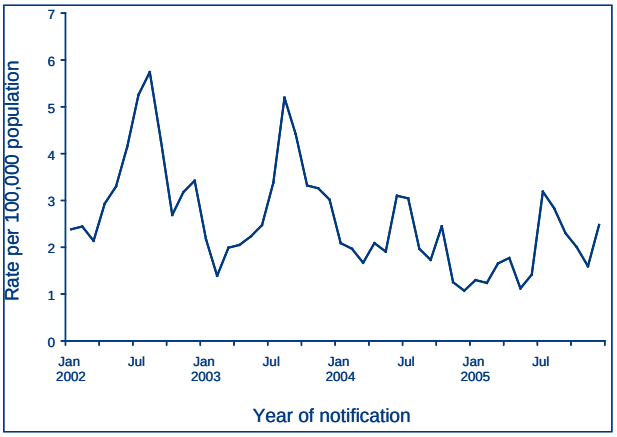
***Probable case:** Defined as the absence of evidence for other causes of clinical symptoms AND EITHER clinically compatible disease including haemorrhagic rash OR clinically compatible disease and close contact with a confirmed case within the previous 60 days.*

Historically, in Australia, serogroups B and C have been the major cause of invasive meningococcal disease; however in 2005 serogroup B caused more disease than serogroup C as a result of the National Meningococcal C Vaccination Program, which commenced in January 2003.[35]

In 2005, there were 393 notifications of invasive meningococcal disease in Australia, a decrease from 408 in 2004, and the lowest notifications since 1996. The national notification rate in 2005 was 1.9 cases per 100,000 population. The highest rate was reported from the Northern Territory (5.4 cases per 100,000, 11 cases).

Fifty-five per cent of cases (n = 218) occurred in males, giving a male to female ratio of 1.2:1. As in previous years, the largest number of cases occurred in winter and spring (Figure 64). The majority of cases (n = 352, 89.3%) were confirmed, and 42 (10.7%) had a probable diagnosis.

Figure 64. Trends in notification rate for meningococcal infections, Australia, 2002 to 2005, by month of onset

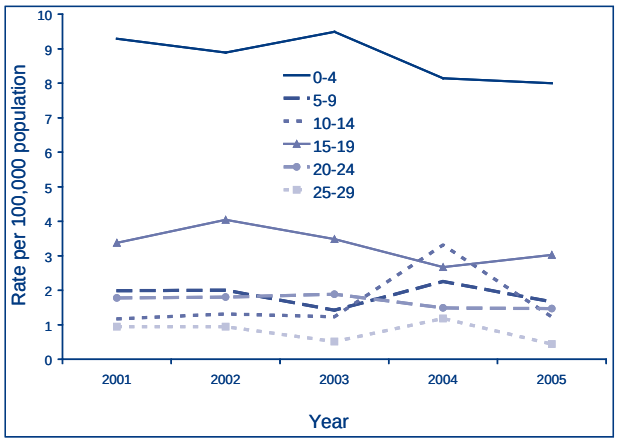


Of the 393 meningococcal notifications in 2005, 326 (82.7%) were serogrouped. Of these, 256 (78.5%) were serogroup B, 46 (14.1%) were serogroup C and 24 (7.4%) were infections with serogroup Y, serogroup W135 or serogroup A or serogroup 29–E (Table 17). In comparison, in 2004 81% (332/408) of notified cases were serogrouped; 240 (72.2%) were serogroup B and 74 (22%) were serogroup C.

The highest age specific meningococcal notification rate was in children aged 0–4 years with a rate of 10.4 cases per 100,000 population (131 cases). Seventy-seven per cent (101/131) of cases were serogroup B infection, which is the highest age-specific rate for serogroup B infection, with 8 cases per 100,000 population (Figure 65). In the 15–19 year age group, the overall rate of meningococcal infection was 3.9 cases per 100,000 population (54 cases), 42 (78%) of which were serogroup B. There were decreases in notification rates for the 25–29, 10–14 and 5–9 year age groups (Figure 65).

In the 25–29 year age group, there was a significant decrease in the number of serogroup B infections between 2004 and 2005 (OR = 2.72, 1.51–4.92, $p < 0.001$). There were 16 cases (1.2 cases per 100,000 population) in 2004, which was the highest reported number in the previous 5 years. In 2005, there were 6 notified cases (rate of 0.4 cases per 100,000 population), which is comparable to the number of notifications in 2003 (7 cases, 0.5 cases per 100,000 population). Decreases in the age-specific rates in the 10–14 and 5–9 years age groups were not significant (Figure 65).

Figure 65. Notification rate for meningococcal group B infections, Australia, 2001 to 2005, by age group



There was a marked decrease in meningococcal C infection rates during 2003, the year the National Meningococcal C Vaccination Program was introduced. In 2005, the decrease in rates of serogroup C infection was greatest in the 15–19 year age group (Figure 66). In 2002, the serogroup C infection rate in this age group was 4.6 cases per 100,000 population (63 cases). Since then the rate in this age

Table 17. Notifications of meningococcal infection, Australia, 2005, by serogroup and state or territory

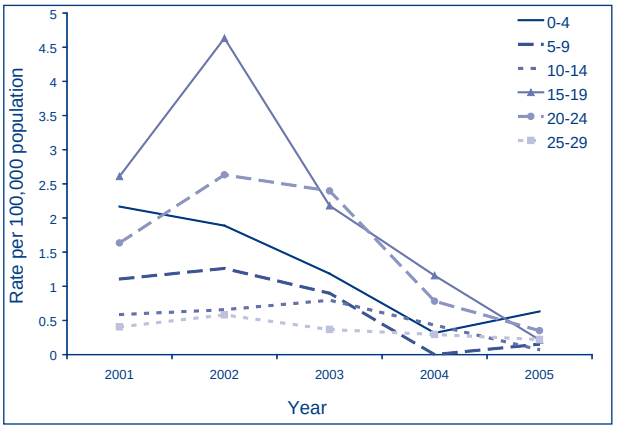
Species	State or territory								
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust
Serogroup B	4	72	6	43	18	10	62	41	256
Serogroup C	3	17	2	12	4	0	7	1	46
Other serogroups*	1	12	0	1	1	0	1	0	24
Unknown serogroup	0	39	3	6	3	0	13	3	67
Total	8	140	11	62	26	10	89	47	393

* Other includes serogroups A, 29-E, Y and W135.

group has decreased steadily to 0.2 cases per 100,000 population (3 cases) in 2005. There was a significant decrease in the number of infections between 2004 and 2005 (OR = 5.35, 1.48–23.06, p < 0.005).

There were decreases in rates of serogroup C infections in all age groups except 0–4 years. The rate in the 20–24 year age group fell from 0.8 cases per 100,000 population (11 cases) in 2004 to 0.3 cases per 100,000 (5 cases) in 2005. In the 0–4 year age group, 8 cases (0.3 cases per 100,000 population) of meningococcal C infection were reported compared to 4 cases in 2004 (0.6 cases per 100,000 population). This is the first increase in the notification rate since 2001 (Figure 66).

Figure 66. Notification rate for meningococcal group C infections, Australia, 2000 to 2005, by age group



The proportion of notified meningococcal samples that were not typed has decreased in recent years in all age groups. The proportion of untypeable samples in each age group is similar.

Data on death outcomes of meningococcal cases were available for 195 (49.5%) cases of meningococcal infection. There were 21 deaths recorded in 2005 giving a crude case fatality rate of 10.8%. The breakdown of deaths by jurisdiction and serogroup are shown in Table 18. The case fatality rate for group C meningococcal infections was 8.7%. For meningococcal group B infections it was 5.1%.

Laboratory-based meningococcal surveillance

The Australian Meningococcal Surveillance Programme was established in 1994 to monitor and analyse isolates of *Neisseria meningitidis* from cases of invasive meningococcal disease in Australia. The program is undertaken by a network of reference laboratories in each state and territory, using agreed standard methodology to determine the phenotype (serogroup, serotype and serosubtype) and the susceptibility of *N. meningitidis* to a core group of antibiotics. The results of the surveillance in 2005 have recently been published.[36]

In 2005, a total of 345 isolates of *N. meningitidis* were analysed by the program. Consistent with routine surveillance data, serogroup B continued to be the predominant strain (251 isolates, 72.8%) nationally, followed by serogroup C (50 isolates, 14.5%). Serogroup B strains predominated in all jurisdictions.

The pattern of age distribution for meningococcal infection varied by phenotype. The highest proportion of serogroup B infections, occurred in the 0–4 year age group (99 cases, 90%). The largest proportions of serogroup C occurred in the 20–24 year (62%), and over 25 years (27%) age groups. This represents a shift in the age distribution of serogroup C infections, which have previously been reported most frequently in the 15–19 year age group.

In 2005, 206 of the 345 (59.7%) isolates were tested for susceptibility to the penicillin group of antibiotics. While 65 (31.5%) specimens were fully sensitive to penicillin (MIC 0.03 mg/L or less), 140 (68%) were less sensitive (MIC 0.06–0.5 mg/L). All isolates tested

Table 18. Deaths due to meningococcal infection, Australia, 2005, by serogroup and state or territory

Species	State or territory								
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust
Serogroup B	0	4	0	1	1	0	4	3	13
Serogroup C	0	2	0	2	0	0	0	0	4
Other serogroups*	0	2	0	0	0	0	1	0	3
Unknown serogroup	0	0	0	0	0	0	1	0	1
Total	0	8	0	3	1	0	6	3	21

* Other includes serogroups A, Y and W135. (2 deaths were W135 infections, 1 was Y).

were susceptible to third generation cephalosporins and the prophylactic antibiotics, ciprofloxacin and rifampicin.

Tuberculosis (TB)

Case definition – Tuberculosis

*Only **confirmed cases** are notified.*

***Confirmed case:** Defined as of* Mycobacterium tuberculosis *complex by culture, OR detection of* M. tuberculosis *complex by nucleic acid testing except which it is likely to be due to previously treated or inactive disease OR clinical diagnosis of tuberculosis including clinical follow-up assessment to ensure a consistent clinical course.*

While Australia has one of the lowest rates of tuberculosis in the world, the disease remains a public health problem in the overseas-born and Indigenous communities. In 2005, 1,087 TB notifications were received by NNDSS; a rate of 5.4 cases per 100,000 population. In 2004, there were 1,076 cases notified nationally. The notification rate of TB was higher than the national average in the Northern Territory (6.7 cases per 100, 000 population), while the lowest rate occurred in Tasmania (1.3 cases per 100, 000 population).

The highest incidence was reported in people born overseas (20.6 cases per 100,000 population) and Indigenous Australians (5.2 cases per 100,000 population). The rate in the non-Indigenous Australian-born population was 0.8 cases per 100,000 population.

Further details can be found in the report published in this journal, 'Tuberculosis notifications in Australia, 2005'.[37]

Other communicable disease surveillance

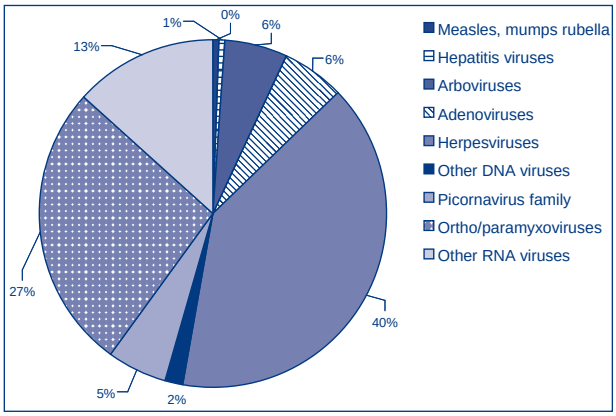
Laboratory Virology and Serology Reporting Scheme

The Laboratory Virology and Serology Reporting Scheme (LabVISE) is a passive surveillance scheme based on voluntary reports of infectious agents from sentinel virology and serology laboratories around Australia. LabVISE provides data on diagnoses of a number of infectious viruses, parasites and fungi. Interpretation of data from LabVISE is limited by uncertainties regarding its representativeness, lack of denominator data to calculate positivity rates, variable reporting coverage over time and lack of consistent case definitions. However, LabVISE has an important role in supplementing information of diseases under surveillance in NNDSS and in monitoring infectious agents that are not reported by other surveillance systems.

In 2005, a total of 12 laboratories reported 22,316 infectious agents to LabVISE. This represents a 15% decrease in the number of reports received in 2004 (Table 19). Most of the reports were from South Australia (30%), Queensland (27%) and Western Australia (16%) (Table 19).

Fifty three per cent (11,747) of all reports received by LabVISE were viral infectious agents, and the remaining 47% (10,569) were bacterial or other infectious agents. Among viruses, herpes viruses (40%; 4,691) were the most commonly reported followed by ortho/paramyxoviruses (27%; 3,158), which includes influenza, parainfluenza and respiratory syncytial viruses (Figure 67). Among non-viral infectious agents, *Chlamydia trachomatis* (48%; 5,049), *Bordetella pertussis* (15%; 1,573) and *Mycoplasma pneumoniae* (12%; 1,309) were the most commonly reported pathogens.

Figure 67. Reports of viral infections to the Laboratory Virology and Serology Reporting Scheme, 2005, by viral group



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 each week on a number of conditions selected annually. Sentinel general practices contributing to the ASPREN scheme are mostly located in capital cities and larger regional centres on the east coast of Australia. The data provide an indicator of the burden of disease in the primary care setting and allows trends in consultation rates to be detected.

Table 19. Infectious agents reported to the Laboratory Virology and Serology Reporting Scheme, 2005, by state or territory

Organism	State and Territory								Total 2005	Total 2004
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA		
Measles virus	–	1	–	4	2	–	1	–	8	35
Mumps virus	–	1	–	10	11	–	15	1	38	6
Rubella virus	–	–	–	6	–	–	4	2	12	20
Hepatitis A virus	–	3	2	17	29	–	–	2	53	51
Hepatitis D virus	–	–	–	1	9	–	4	–	14	8
Hepatitis E virus	–	–	–	2	1	–	9	–	12	14
Ross River virus	–	7	45	269	93	2	15	21	452	743
Barmah Forest virus	–	8	1	144	32	–	–	–	185	195
Flavivirus (unspecified)	–	1	3	30	–	–	3	–	37	102
Adenovirus type 1	–	1	–	–	–	–	6	–	7	–
Adenovirus not typed/pending	–	167	1	84	308	1	118	1	680	1,052
Herpes virus type 6	–	–	–	–	–	–	2	–	2	6
Cytomegalovirus	13	295	11	90	524	10	96	3	1,042	834
Varicella-zoster virus	7	152	11	882	386	11	48	2	1,499	2,061
Epstein-Barr virus	–	93	87	812	729	4	66	357	2,148	2,367
Poxvirus group not typed	–	1	–	–	–	–	1	–	2	2
Parvovirus	1	16	–	93	61	1	30	–	202	413
Coxsackievirus A9	–	3	–	–	–	–	–	–	3	1
Coxsackievirus A16	1	5	–	–	–	–	–	–	6	5
Echovirus type 5	–	2	–	–	–	–	–	–	2	–
Echovirus type 6	–	2	–	–	–	–	–	–	2	–
Echovirus type 7	–	8	–	–	–	–	–	–	8	12
Echovirus type 9	–	2	–	–	–	–	–	–	2	10
Echovirus type 11	–	4	–	–	–	–	–	–	4	20
Echovirus type 13	–	1	–	–	–	–	–	–	1	–
Echovirus type 18	1	13	–	–	–	–	–	–	14	19
Echovirus type 22	–	1	–	–	–	–	–	–	1	2
Echovirus type 30	1	34	–	–	1	–	–	–	36	7
Poliovirus type 1 (uncharacterised)	–	21	–	–	–	–	–	–	21	18
Poliovirus type 2 (uncharacterised)	–	19	–	–	–	–	–	–	19	21
Poliovirus type 3 (uncharacterised)	–	6	–	–	–	–	–	–	6	9
Rhinovirus (all types)	3	265	–	–	58	1	2	–	329	617
Enterovirus type 71 (BCR)	1	2	–	–	–	–	–	–	3	3
Enterovirus not typed/pending	5	126	–	25	13	1	18	–	188	205
Picornavirus not typed	–	–	–	–	–	1	–	–	1	4
Influenza A virus	–	159	3	97	356	–	93	–	708	492
Influenza A virus H3N2	–	1	–	–	–	–	1	–	2	–
Influenza B virus	–	46	–	25	146	1	39	–	257	219
Parainfluenza virus type 1	–	25	–	2	17	–	20	–	64	143
Parainfluenza virus type 2	–	22	–	4	18	–	5	–	49	15
Parainfluenza virus type 3	–	129	–	13	201	2	45	–	390	655
Respiratory syncytial virus	2	750	–	262	338	57	267	3	1,679	2,599
Paramyxovirus (unspecified)	–	–	–	–	–	–	9	–	9	–
HTLV-1	–	–	–	–	8	–	1	–	9	15
Rotavirus	2	484	1	1	588	12	182	–	1,270	1,247
Astrovirus	–	–	–	–	–	–	4	–	4	–

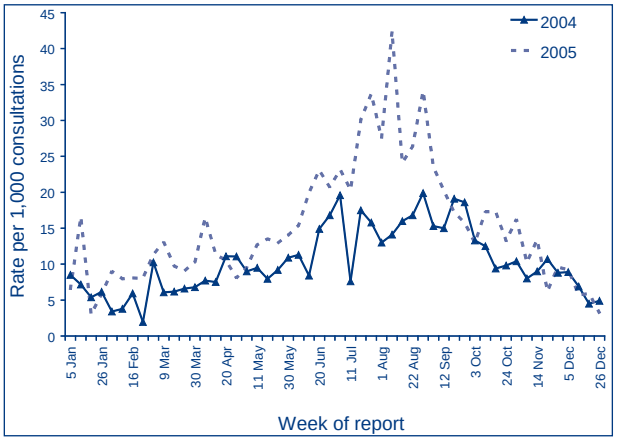
Table 19. Infectious agents reported to the Laboratory Virology and Serology Reporting Scheme, 2005, by state or territory, *continued*

Organism	State and Territory								Total 2005	Total 2004
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA		
Norwalk agent	–	–	–	–	–	–	267	–	267	659
Chlamydia trachomatis not typed	10	773	10	2,324	1,809	59	61	3	5,049	5,257
Chlamydia pneumoniae	–	4	–	–	–	–	4	–	8	9
Chlamydia psittaci	–	2	–	–	1	–	50	–	53	173
Chlamydia species	–	–	–	–	–	–	1	–	1	3
Mycoplasma pneumoniae	–	111	20	458	342	45	244	89	1,309	1,374
Mycoplasma hominis	–	7	–	–	–	–	–	–	7	5
Coxiella burnetii (Q fever)	1	10	–	39	87	–	25	–	162	173
Rickettsia prowazeki	–	–	–	–	161	–	–	–	161	105
Rickettsia australis	–	–	–	–	–	–	1	–	1	–
Rickettsia tsutsugamushi	–	–	–	–	71	–	–	–	71	67
Rickettsia - Spotted fever group	–	–	–	–	232	4	–	–	236	139
Streptococcus group A	–	11	–	441	–	1	156	–	609	467
Yersinia enterocolitica	–	6	–	–	–	–	–	–	6	8
Brucella abortus	–	1	–	–	1	–	1	–	3	6
Brucella species	–	5	–	9	–	–	–	–	14	9
Bordetella pertussis	1	87	5	224	992	1	263	–	1,573	1,358
Bordetella parapertussis	–	–	–	–	–	–	2	–	2	1
Legionella pneumophila	–	5	–	–	10	–	8	–	23	77
Legionella longbeachae	–	2	–	–	41	–	8	–	51	76
Legionella species	–	–	–	1	–	–	–	–	1	15
Cryptococcus species	–	2	–	8	31	–	–	–	41	38
Leptospira species	–	1	–	19	13	–	–	–	33	23
Treponema pallidum	2	180	4	489	410	–	1	–	1,086	1,154
Entamoeba histolytica	–	–	–	7	–	–	7	–	14	14
Toxoplasma gondii	–	16	–	10	13	1	5	–	45	41
Echinococcus granulosus	–	1	–	–	9	–	–	–	10	15
Total	51	4,100	204	6,902	8,152	215	2,208	484	22,316	25,513

In 2005, influenza-like illnesses (ILI), gastroenteritis, and varicella infections (chickenpox and shingles) were the communicable diseases reported to ASPREN. Each week an average of 29 general practitioners (range 15–36) provided information from an average of 2,996 (range 1,081–3,698) consultations per week.

During 2005, a rise in reports of Influenza-like illness (ILI) to ASPREN was evident from mid-June (week 24), one week earlier than in 2004 (Figure 68). In 2005, the peak ILI rate was observed in early August (week 32) at 42 cases per 1,000 consultations, which was over twice the peak rate in 2004.

Figure 68. Consultation rate of influenza-like illness, ASPREN, 2005 compared with 2004, by week of report



Consultations for gastroenteritis fluctuated between 9 to 24 cases per 1,000 consultations. Rates reported for 2005, appeared to be similar to 2004 (Figure 69).

Reports of varicella infections were available only from week 13 in 2005. Rates of shingles exceeded those for chickenpox in most weeks but there was no recognisable seasonal pattern (Figure 70).

Figure 69. Consultation rate of gastroenteritis, ASPREN, 2005 compared with 2004, by week of report

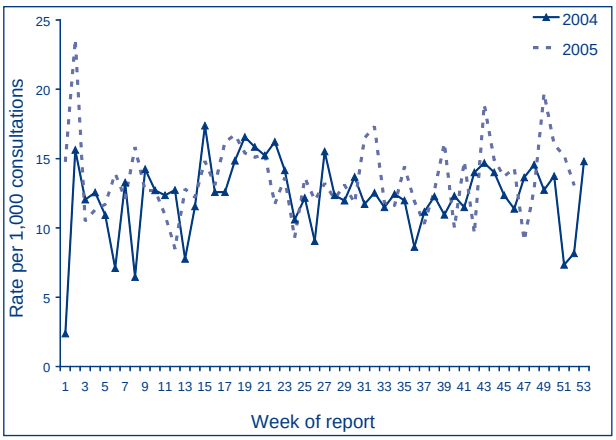
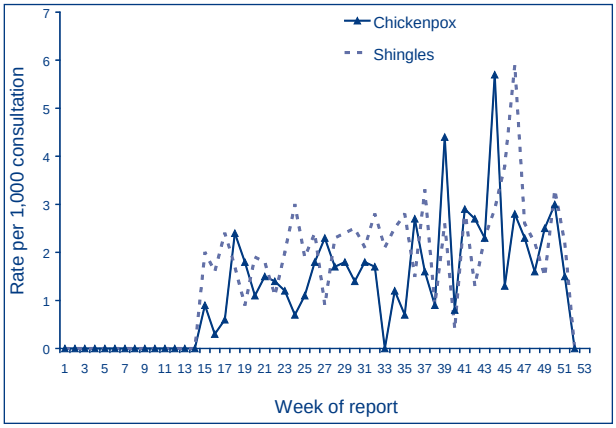


Figure 70. Consultation rate for varicella infections, ASPREN, 2005, by week of report



Appendices

Appendix 1. Mid-year estimate of Australian population, 2005, by state or territory

	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Australia
Male	160,939	3,369,591	106,695	1,981,864	764,238	239,448	2,478,879	1,007,798	10,110,836
Female	164,222	3,404,658	96,098	1,982,104	777,795	245,815	2,543,467	1,002,315	10,217,773
Total	325,161	6,774,249	202,793	3,963,968	1,542,033	485,263	5,022,346	2,010,113	20,328,609

Appendix 2. Mid-year estimate of Australian population, 2005, by state or territory and age group

Age	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Australia
0–4	20,185	424,073	17,499	253,957	87,820	30,072	306,350	124,313	1,264,507
5–9	20,453	438,016	16,527	268,698	94,737	31,905	317,482	133,407	1,321,465
10–14	21,810	457,361	16,495	284,410	101,053	34,539	334,764	141,554	1,392,249
15–19	23,604	454,452	14,771	277,675	103,078	34,076	335,465	145,108	1,388,471
20–24	28,286	464,323	16,299	285,703	104,614	30,988	356,918	144,095	1,431,363
25–29	25,530	456,598	16,816	263,517	94,057	26,614	343,837	134,164	1,361,259
30–34	25,473	510,560	18,294	293,071	103,565	30,345	380,007	147,174	1,508,671
35–39	24,087	482,143	16,916	284,852	107,820	32,239	374,844	148,621	1,471,707
40–44	24,538	510,760	16,274	299,080	115,971	36,313	378,221	155,070	1,536,470
45–49	23,823	481,819	14,184	282,153	113,184	36,261	358,481	149,107	1,459,226
50–54	22,452	439,663	12,741	258,771	104,974	33,954	325,527	136,630	1,334,942
55–59	20,276	410,855	10,027	245,445	100,585	32,292	302,834	122,881	1,245,336
60–64	13,341	317,556	6,547	186,500	75,820	25,240	229,389	90,449	944,942
65–69	9,858	262,815	3,971	146,142	63,414	20,833	191,996	72,702	771,804
70–74	7,365	217,394	2,274	113,434	53,425	16,681	159,522	56,896	627,027
75–79	6,204	193,608	1,589	96,885	50,420	14,316	142,325	47,626	552,987
80–84	4,587	141,475	882	69,274	37,591	10,480	103,364	33,499	401,156
85+	3,289	110,778	687	54,401	29,905	8,115	81,020	26,817	315,027
Total	325,161	6,774,249	202,793	3,963,968	1,542,033	485,263	5,022,346	2,010,113	20,328,609

Appendix 3. Completeness of National Notifiable Diseases Surveillance System data received, Australia, 2005, by state or territory

	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust
Total notifications	1,677	31,016	5,132	27,534	7,992	1,970	24,246	14,356	113,923
Sex									
Unknown/missing	1	0	0	7	0	1	151	7	167
Per cent complete*	99.9	100	100	99.9	100	100	98.9	100	99.9
Age									
Unknown/missing	1	24	9	0	2	7	106	12	161
Per cent complete*	99.9	99.9	99.8	100	100	99.6	99.6	99.9	99.8
Indigenous status†									
Not stated/missing	1,619	22,886	394	17,725	861	1,465	11,540	3	56,493
Per cent complete*	3.5	26.2	92.3	35.6	89.2	25.6	52.4	100	50.4

* Data completeness = (Total – unknown or missing)/total x 100.

† 'Indigenous status' is a variable defined by the following values:

1. Indigenous – (Aboriginal but not Torres Strait Islander origin);
2. Indigenous – (Torres Strait Islander but not Aboriginal origin);
3. Indigenous – (Aboriginal and Torres Strait Islander origin);
4. Not Indigenous – (not Aboriginal or Torres Strait Islander origin);
9. Not stated

Blank/missing/null =No information provided

Author details

Rhonda Owen[1]
Paul W Roche[1]
Kirsty Hope[1]
Keflemariam Yohannes[1]
April Roberts[1]
Conan Liu[1]
Stefan Stirzaker[1]
Fiona Kong[1]
Mark Bartlett[2]
Basil Donovan[3]
Iain East[4]
Gerard Fitzsimmons[5]
Ann McDonald[3]
Peter B McIntyre[6]
Robert I Menzies[6]

1. Surveillance Policy and Systems Section, Office of Health Protection, Australian Government Department of Health and Ageing, Canberra, Australian Capital Territory
2. Manager, Surveillance, Communicable Diseases Branch, NSW Health Department, North Sydney, New South Wales
3. National Centre in HIV Epidemiology and Clinical Research, University of New South Wales, Sydney, New South Wales
4. Epidemiology and Modelling Section, Office of the Chief Veterinary Officer, Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, Australian Capital Territory
5. Epidemiologist, OzFoodNet, Food Safety and Surveillance Section, Office of Health Protection, Australian Government Department of Health and Ageing, Canberra, Australian Capital Territory
6. National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases, Westmead, New South Wales

Corresponding author: Ms Rhonda Owen, Surveillance Policy and Systems Section, Office of Health Protection, Australian Government Department of Health and Ageing, PO Box 9848 (MDP 14), CANBERRA ACT 2601. Telephone: +61 2 6289 9040. Facsimile: +61 2 6289 7791. Email: rhonda.owen@health.gov.au

References

1. Australian Institute of Health and Welfare (AIHW). Australian Hospital Statistics 2003-04. 2005. Available from: http://www.aihw.gov.au/publications/hse/ahs03-04/Supplementary_Chapter_9.xls Accessed on 3 November 2005.
2. National Centre in HIV Epidemiology and Clinical Research HIV/AIDS. viral hepatitis and sexually transmissible infection in Australia, Annual Surveillance Report 2006. Sydney: The University of New South Wales,; 2006.
3. Ministerial Advisory Committee on AIDS SHaH, Hepatitis C Sub-Committee, Hepatitis C Virus Projections Working Group. Estimates and projections of the hepatitis C virus epidemic in Australia. Sydney: NCHECR, the University of New South Wales; 2006.
4. OzFoodNet Working Group. Burden and causes of foodborne disease in Australia: annual report of the OzFoodNet network, 2005. *Commun Dis Intell* 2006;30:278-300.
5. Cowie C, Breschkin A, Kelly H. Hepatitis E virus: overseas epidemics and Victorian travellers. *Med J Aust* 2005;183:491-493.

6. National Enteric Pathogens Surveillance System. NEPPS human annual report, 2005. Melbourne: Microbiological Diagnostic Unit, University of Melbourne; 2006.
7. Hocking J, Fairley C, Counahan M, Crofts N. The pattern of notification and testing for genital *Chlamydia trachomatis* infection in Victoria, 1998-2000: an ecological analysis. *Aust N Z J Public Health* 2003;27:405-408.
8. Chen M, Fairley C, Donovan B. Nowhere near the point of diminishing returns: correlations between chlamdyia testing and notification rates in New South Wales. *Aust N Z J Public Health* 2005;29:249-253.
9. Australian Government Department of Health and Ageing. National Sexually Transmissible Infections Strategy: 2005-2008. Canberra: Commonwealth of Australia; 2005.
10. Chen M, Donovan B. Genital *Chlamydia trachomatis* infection in Australia: epidemiology and clinical implications. *Sex Health* 2004;1:189-196.
11. Bowden F, on behalf of the National Donovanosis Eradication Advisory Committee. Donovanosis in Australia: going, going... *Sex Transm Infect* 2005;81:365-366.
12. Australian Gonococcal Surveillance Programme. Annual report of the Australian Gonococcal Surveillance Programme, 2005. *Commun Dis Intell* 2006;30:205-210.
13. Jin F, Prestage G, Kippax S, Pell C, Donovan B, Kaldor J, et al. Epidemic syphilis among homosexually active men in Sydney. *Med J Aust* 2005;183:179-183.
14. Fairley C, Hocking J, Medland N. Syphilis: back on the rise, but not unstoppable. *Med J Aust* 2005;183:172-173.
15. Firestone SM, Barr IG, Roche PW, Walker JC. Annual report of the National Influenza Surveillance Scheme. *Commun Dis Intell* 2006;30:189-200.
16. Annual NZ Notifiable Disease Report, 2005. Available from: ://www.surv.esr.cri.nz/surveillance/annual_surveillance.php?we_objectID=1016 Accessed on.
17. Roche P, Krause V, Cook H, Bartlett M, Coleman D, Davis C, et al. Invasive pneumococcal disease in Australia, 2005. *Commun Dis Intell* 2007;31:86-100.
18. Brussen KA, Roberts J, Ibrahim A, Stambos V, Thorley BR. Annual report of the Australian National Poliovirus Reference Laboratory, 2005. *Commun Dis Intell* 2006;30:334-340.
19. Russell RC, Dwyer DE. Arboviruses associated with human disease in Australia. *Microbes Infect* 2000;2:1693-1704.
20. Broom AK, Azuolas J, Hueston L, Mackenzie JS, Melville L, Smith DW, *et al.* Australian encephalitis: Sentinel Chicken Surveillance Programme. *Commun Dis Intell* 2001;25:157-160.
21. Broom AK, Whelan PI, Azuolas J, Dwyer D, Hueston L, Mackenzie JS, *et al.* Sentinel Chicken Surveillance Programme in Australia, 1 July 2001 to 30 June 2002. *Commun Dis Intell* 2002;26:428-429.
22. Broom AK. Sentinel Chicken Surveillance Program in Australia, July 2002 to June 2003. *Commun Dis Intell* 2003;27:367-369.
23. Broom AK, Whelan PI. Sentinel Chicken Surveillance Program in Australia, July 2003 to June 2004. *Commun Dis Intell* 2005;29:65-70.
24. Liu C, Johansen C, Kurucz N, Whelan P. Communicable Diseases Network Australia National Arbovirus and Malaria Advisory Committee annual report 2005-06. *Commun Dis Intell* 2006;30:411-429.
25. Liu C, Broom AK, Kurucz N, Whelan PI. Communicable Diseases Network Australia: National Arbovirus and Malaria Advisory Committee annual report 2004-05. *Commun Dis Intell* 2005;29:341-357.
26. World Health Organization. Zoonoses. Technical report series no. 169. Geneva; 1959.
27. World Health Organization. Report of the WHO/FAO/OIE joint consultation on emerging zoonotic diseases. Geneva; 2004.
28. Taylor LH, Latham SM, Woolhouse ME. Risk factors for human disease emergence. *Philos Trans R Soc Lond B Biol Sci* 2001;356:983-989.
29. Warrilow D. Australian bat lyssavirus: a recently discovered new rhabdovirus. *Curr Top Microbiol Immunol* 2005;292:25-44.
30. Warrilow D, Smith IL, Harrower B, Smith GA. Sequence analysis of an isolate from a fatal human infection of Australian bat lyssavirus. *Virology* 2002;297:109-119.
31. Animal Health Australia. Animal Health in Australia, 2004. Canberra, Australia: AHA, Department of Agriculture, Forestry and Fisheries (NAHIS); 2005.
32. Williams J, Tallis G, Dalton C, Ng S, Beaton S, Catton M, et al. Community outbreak of psittacosis in a rural Australian town. *Lancet* 1998;351:1697-1699.
33. Hughes KL. Chlamydial Infections in Birds and Mammals and their Zoonotic Potential. In: *Zoonoses: Australian Veterinarians in Public Health (Proceedings 194)*: Post Graduate Committee in Veterinary Science University of Sydney; 1992.
34. Li J, O'Brien ED, Guest C. A review of national legionellosis surveillance in Australia, 1991 to 2000. *Commun Dis Intell* 2002;26:462-470.
35. Cohen J. Introduction of the National Meningococcal C Vaccination Program. *Commun Dis Intell* 2003;27.
36. Australian Meningococcal Surveillance Programme. Annual report of the Australian Meningococcal Surveillance Programme, 2005. *Commun Dis Intell* 2006;30:211-221.
37. Roche P, Bastian I, Krause V, Antic R, Brown L, Christensen A, et al. Tuberculosis notifications in Australia, 2005. *Commun Dis Intell* 2007;31:71-80.