Annual reports

Australia's notifiable disease status, 2009: Annual report of the National Notifiable Diseases Surveillance System

NNDSS Annual Report Writing Group

Abstract

In 2009, 65 diseases and conditions were nationally notifiable in Australia. States and territories reported a total of 236,291 notifications of communicable diseases to the National Notifiable Diseases Surveillance System, an increase of 48% on the number of notifications in 2008. This increase was largely due to cases of influenza A(H1N1) pandemic 2009. In 2009, the most frequently notified diseases were vaccine preventable diseases (101,627 notifications, 43% of total notifications), sexually transmissible infections (73,399 notifications, 31% of total notifications), and gastrointestinal diseases (31,697 notifications, 13% of total notifications). There were 18,861 notifications of bloodborne diseases; 8,232 notifications of vectorborne diseases; 1,919 notifications of other bacterial infections; 552 notifications of zoonoses and 4 notifications of quarantinable diseases. *Commun Dis Intell* 2011;35(2):61–131.

Keywords: Australia, communicable diseases, epidemiology, surveillance

Introduction

Australia's notifiable diseases status, 2009, is an annual surveillance report of nationally notifiable communicable diseases. Communicable disease surveillance in Australia operates at the national, jurisdictional 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 6 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. In September 2007, the *National Health Security Act 2007*[1] received royal assent. This Act provides a legislative basis for and authorises the exchange of health information, including personal information, between jurisdictions and the Commonwealth. The Act provides for the establishment of the National Notifiable Diseases List,[2] which specifies the diseases about which personal information can be provided. The *National Health Security Agreement*,[3] signed by Health Ministers in April 2008, establishes operational arrangements to formalise and enhance existing surveillance and reporting systems, an important objective of the Act. Under the Agreement, in 2009 states and territories forwarded de-identified data on the nationally agreed set of 65 communicable diseases to the Department of Health and Ageing for the purposes of national communicable disease surveillance, although not all 65 diseases were notifiable in each jurisdiction. Data were renewed electronically from states and territories, daily or several times a week. The system was complemented by other surveillance systems, which provided enhanced information on various diseases, including four that are not reported to the National Notifiable Diseases Surveillance System (NNDSS).

In 2009, the NNDSS core dataset included the following 5 mandatory data fields: unique record reference number; notifying state or territory; disease code; confirmation status and the date when the public health unit was notified (notification receive date).

In addition, the following core but non-mandatory data fields were supplied where possible: date of birth; age at onset; sex; Indigenous status; postcode of residence; disease onset date; date when the medical practitioner signed the notification form (notification date), death status, date of specimen collection and outbreak reference number (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 were collected and reported to NNDSS. Data quality was monitored by the Office of Health Protection and the National Surveillance Committee (NSC) and there was a continual process of improving the national consistency of communicable disease surveillance through the daily, fortnightly and quarterly review of these data.

While not included in the core national dataset, enhanced surveillance information for some diseases (invasive pneumococcal disease, hepatitis C, tuberculosis and some sexually transmissible infections) were reported from states and territories to NNDSS but not included in this report. Additional information concerning mortality and specific health risk factors for some diseases were obtained from states and territories and included in this annual report.

Newly diagnosed HIV infection and AIDS were notifiable conditions in each state or territory health jurisdiction in 2009 and were forwarded to the National HIV Registry and National AIDS Registry at the Kirby Institute (formerly known as the National Centre in HIV Epidemiology and Clinical Research). Further information can be found in the Kirby Institute's annual surveillance report.[4]

The surveillance for the classical and variant forms of Creutzfeldt-Jakob disease (CJD) in Australia is conducted through the Australian National Creutzfeldt-Jakob Disease Registry (ANCJDR) since its establishment in October 2003. CJD is a nationally notifiable disease and by June 2006, CJD was notifiable in all states and territories. Further surveillance information on CJD can be found in surveillance reports from the ANCJDR.[5]

Information from communicable disease surveillance is communicated through several avenues. The most up-to-date information on topics of interest is provided at fortnightly teleconferences of the Communicable Diseases Network Australia (CDNA) and a summary of these reports is available online from http://www.health.gov.au/cdnareport[6] The *Communicable Diseases Intelligence* (CDI) quarterly journal publishes surveillance data and reports of research studies on the epidemiology and control of various communicable diseases.

Notification rates for each notifiable disease were calculated using the estimated 2009 mid-year resident population supplied by the Australian Bureau of Statistics[7] (ABS) (Appendix 1 and Appendix 2). 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 either the direct method of standardisation for gastrointestinal diseases, or indirect method for sexually transmissible infections, with 2006 Census data as the standard population, (Map 1, Table 1).[8] The Northern Territory was represented by Statistical Subdivisions (SSD) and in the case of Greater Darwin, by the combination of the Tiwi Islands, Darwin, Palmerston and Litchfield SSD. This combination helped preserve confidentiality while improving legibility at the printed map scale. The geocode 77777 for Greater Darwin is nominal.

Notifications were summed by the postcode weighting calculated by the ABS Postcode Concordance.[9] These ABS concordance data were used to proportionally allocate notifications into SDs/SSDs according to the percentage of the population of the postcode living in the region. The total notifications per region are displayed in the relevant area.

Disease rates were calculated per 100,000 population for the relevant areas using ABS population data.[7] Rates were mapped for different SDs and ordered into five groups using the Jenks Natural Breaks method whereby the largest breaks between natural clusters of ordered data were identified and used as class boundaries. A class '0' was added to account for areas with no notifications, for a total of six rate classes per map. Note that the classification is data dependent and changes from map to map.

Notes on interpretation

The present report is based on 2009 'finalised' data from each state or territory agreed upon in July 2010 and represents a snap shot of the year after duplicate records and incorrect or incomplete data were removed. Therefore, numbers in this report may vary slightly from the numbers reported in *CDI* quarterly publications.

Analyses in this report were based on the date of disease diagnosis in an attempt to estimate disease activity within the reporting period. The date of diagnosis is the onset date or where the date of onset was not known, the earliest of the specimen collection date, the notification date, or the notification receive date. As considerable time may have elapsed between the onset and diagnosis dates for hepatitis B (unspecified), hepatitis C (unspecified) and tuberculosis, the

earliest of specimen date, health professional notification date or public health unit notification receive date was used for these conditions.

Notified cases often 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 the National Notifiable Diseases List[2] was established, some diseases are not yet notifiable in all 8 jurisdictions (Table 2).

Changes in surveillance practices may have been introduced in some jurisdictions and not in others, and makes the comparison of data across jurisdictions difficult. In this report, some information was obtained from states and territories, including changes in surveillance practices, screening practices, laboratory practices, and major disease control or prevention initiatives to assist in the interpretation of the 2009 data.

Postcode information usually reflects the residential location of the case, but this does not necessarily represent the place where the disease was acquired. In December 2008, the CDNA endorsed the NNDSS cross-border notification protocol, which determines that the jurisdiction of residence of a case has the responsibility of reporting the notification to NNDSS. This was implemented from 1 January 2009, and may also affect some retrospective notifications by removing duplicates and preventing the loss of notification data in NNDSS.

Data completeness was assessed for the notification's sex, age at onset, and Indigenous status, and reported as the proportion of complete notifications. The completeness of data in this report is summarised in the Results.

The per cent of data completeness was defined as:

Per cent of data completeness = (total notifications – missing or unknown) / total notifications x 100

The Indigenous status was defined by the following nationally accepted values:[10]

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

Figure 1: Communicable diseases notifiable fraction

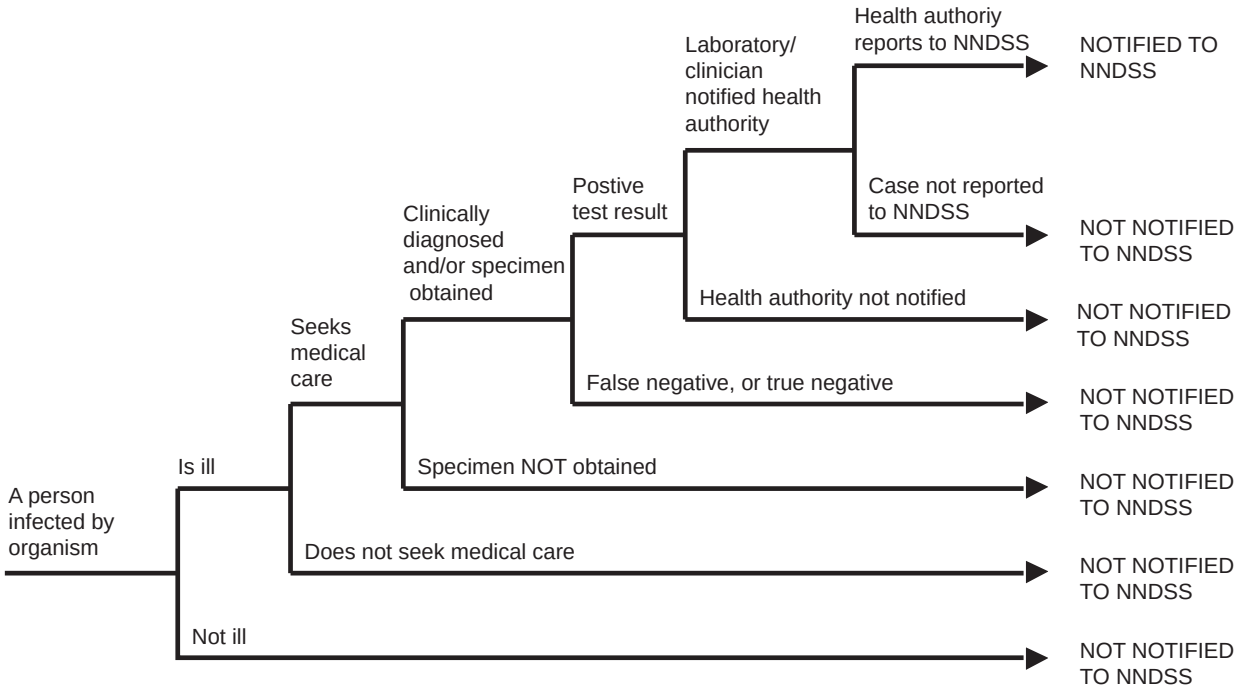
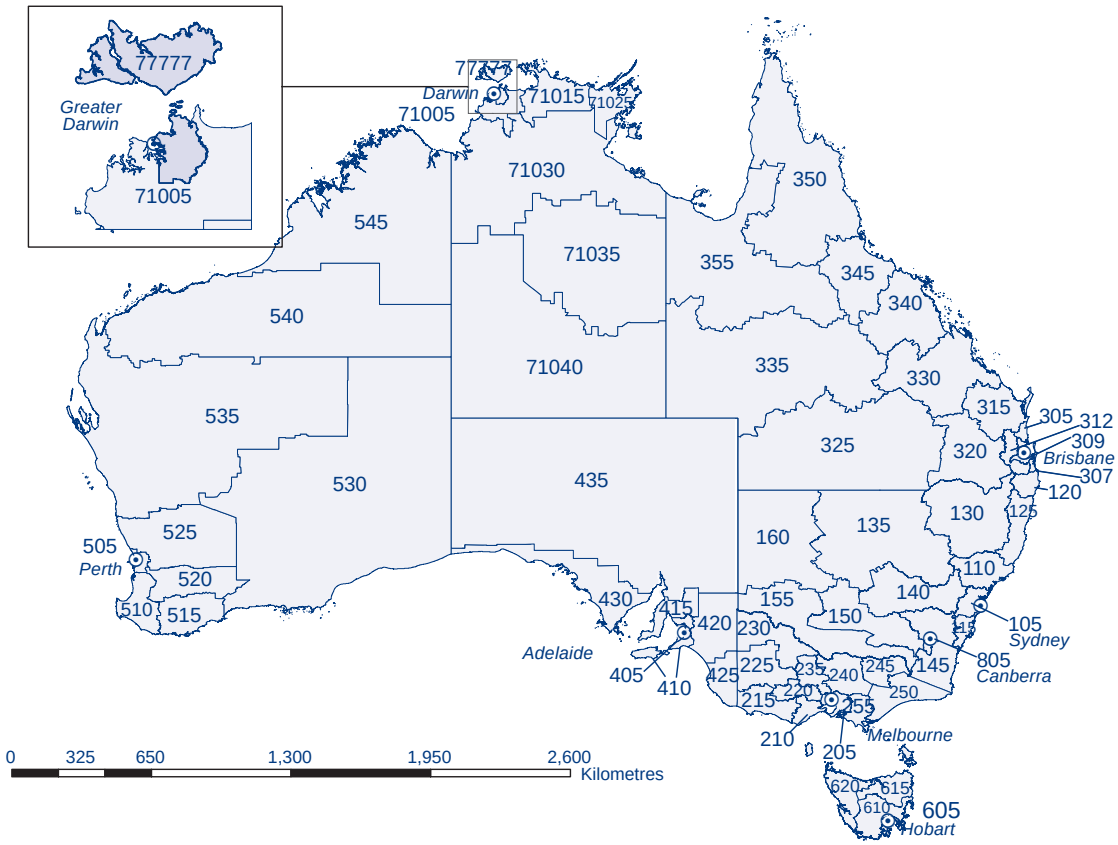


Table 1: Australian population by Statistical Division and Statistical Subdivision for the Northern Territory, 2009

SD code	Statistical Division	Population
Australian Capital Territory		
805	Canberra	351,868
New South Wales		
105	Sydney	4,504,469
110	Hunter	644,279
115	Illawarra	431,160
120	Richmond–Tweed	241,954
125	Mid-North Coast	309,588
130	Northern	184,822
135	North Western	118,535
140	Central West	183,157
145	South Eastern	216,593
150	Murrumbidgee	158,593
155	Murray	118,540
160	Far West	22,731
Northern Territory (Subdivisions)		
71005	Finniss	2,865
71015	Alligator	6,806
71025	East Arnhem	16,070
71030	Lower Top End NT	23,868
71040	Central NT	40,967
77777	Greater Darwin	127,285
Queensland		
305	Brisbane	2,004,262
307	Gold Coast	515,157
309	Sunshine Coast	323,423
312	West Moreton	94,660
315	Wide Bay–Burnett	287,425
320	Darling Downs	237,211
325	South West	26,277
330	Fitzroy	220,714
335	Central West	12,270
340	Mackay	172,735
345	Northern	227,340
350	Far North	269,650
355	North West	33,979
South Australia		
405	Adelaide	1,187,466
410	Outer Adelaide	136,623
415	Yorke and Lower North	47,052
420	Murray Lands	70,426
425	South East	65,978
430	Eyre	35,556
435	Northern	80,489
Tasmania		
605	Greater Hobart	212,019
610	Southern	37,456
615	Northern	141,434
620	Mersey–Lyell	112,383
Victoria		
205	Melbourne	3,995,537
210	Barwon	285,096
215	Western District	106,268
220	Central Highlands	155,585
225	Wimmera	50,878
230	Mallee	94,736
235	Loddon	183,659
240	Goulburn	210,114
245	Ovens–Murray	99,872
250	East Gippsland	86,812
255	Gippsland	174,671
Western Australia		
505	Perth	1,658,992
510	South West	246,202
515	Lower Great Southern	58,851
520	Upper Great Southern	19,169
525	Midlands	55,730
530	South Eastern	58,727
535	Central	64,849
540	Pilbara	47,528
545	Kimberley	35,009
Other territories		–
Australia	**Total**	**21,944,741**

Source: Australian Bureau of Statistics. Population by Age and Sex, Regions of Australia, 2009; 2010. ABS Catalogue: 3235.0.[8]

Map 1: Australian Bureau of Statistics Statistical Division codes, Australia, and Statistical Subdivision codes, Northern Territory, 2009



Notes on cases definitions

Each notifiable disease is governed by a national surveillance case definition for reporting to the NNDSS. These case definitions were agreed by CDNA and implemented nationally from January 2004 and were used by all jurisdictions for the first time in 2005. These case definitions are reviewed by the Case Definitions Working Group* (CDWG) and seeks to be consistent with the Public Health Laboratory Network laboratory case definitions.

The national surveillance case definitions and their review status are available from http://www.health.gov.au/casedefinitions

Results

There were 236,291 communicable disease notifications received by NNDSS in 2009 (Table 3).

In 2009, the most frequently notified diseases were vaccine preventable diseases (101,627 notifications, 43.0% of total notifications), sexually transmissible infections (73,399 notifications, 31.1% of total notifications), and gastrointestinal diseases (31,697 notifications, 13.4% of total notifications).

There were 18,861 notifications of bloodborne diseases; 8,232 notifications of vectorborne diseases; 1,919 notifications of other bacterial infections; 552 notifications of zoonoses and 4 notifications of quarantinable diseases. In 2009, the total number of notifications was the highest recorded in NNDSS

Table 3: Notifications to the National Notifiable Diseases Surveillance System, Australia, 2009, by disease category rank order

Disease category	Number	%
Vaccine preventable diseases	101,627	43.0
Sexually transmitted infections	73,399	31.1
Gastrointestinal diseases	31,697	13.4
Bloodborne diseases	18,861	8.0
Vectorborne diseases	8,232	3.5
Other bacterial diseases	1,919	0.8
Zoonoses	552	0.2
Quarantinable diseases	4	0.0
Total	236,291	100.0

* The Case Definitions Working Group is a working group of the Communicable Diseases Network Australia.

Table 2: Diseases notified to the National Notifiable Diseases Surveillance System, Australia, 2009

Disease	Data received from
Bloodborne diseases	
Hepatitis (NEC)	All jurisdictions, except Western Australia
Hepatitis B (newly acquired)	All jurisdictions
Hepatitis B (unspecified)	All jurisdictions
Hepatitis C (newly acquired)	All jurisdictions, except Queensland
Hepatitis C (unspecified)	All jurisdictions
Hepatitis D	All jurisdictions
Gastrointestinal diseases	
Botulism	All jurisdictions
Campylobacteriosis	All jurisdictions, except New South Wales
Cryptosporidiosis	All jurisdictions
Haemolytic uraemic syndrome	All jurisdictions
Hepatitis A	All jurisdictions
Hepatitis E	All jurisdictions
Listeriosis	All jurisdictions
Salmonellosis	All jurisdictions
Shigellosis	All jurisdictions
STEC, VTEC*	All jurisdictions
Typhoid	All jurisdictions
Quarantinable diseases	
Cholera	All jurisdictions
Highly pathogenic avian influenza in humans	All jurisdictions
Plague	All jurisdictions
Rabies	All jurisdictions
Severe acute respiratory syndrome	All jurisdictions
Smallpox	All jurisdictions
Viral haemorrhagic fever	All jurisdictions
Yellow fever	All jurisdictions
Sexually transmissible infections	
Chlamydial infections	All jurisdictions
Donovanosis	All jurisdictions
Gonococcal infection	All jurisdictions
Syphilis < 2 years duration	All jurisdictions
Syphilis > 2 years or unspecified duration	All jurisdictions, except South Australia
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 2 *continued*: Diseases notified to the National Notifiable Diseases Surveillance System, Australia, 2009

Disease	Data received from
Vaccine preventable diseases, *continued*	
Varicella zoster (chickenpox)	All jurisdictions, except NSW
Varicella zoster (shingles)	All jurisdictions, except NSW
Varicella zoster (unspecified)	All jurisdictions, except NSW
Vectorborne diseases	
Arbovirus infection (NEC)	All jurisdictions
Barmah Forest virus infection	All jurisdictions
Dengue virus infection	All jurisdictions
Japanese encephalitis virus infection	All jurisdictions
Kunjin virus infection	All jurisdictions
Malaria	All jurisdictions
Murray Valley encephalitis virus infection	All jurisdictions
Ross River virus infection	All jurisdictions
Zoonoses	
Anthrax	All jurisdictions
Australian bat lyssavirus	All jurisdictions
Brucellosis	All jurisdictions
Leptospirosis	All jurisdictions
Lyssavirus (NEC)	All jurisdictions
Ornithosis	All jurisdictions
Q fever	All jurisdictions
Tularaemia	All jurisdictions
Other bacterial infections	
Legionellosis	All jurisdictions
Leprosy	All jurisdictions
Meningococcal disease (invasive)	All jurisdictions
Tuberculosis	All jurisdictions

No new diseases were added to the disease list in 2009.

* Infection with Shiga toxin/verotoxin-producing *Escherichia coli* (STEC/VTEC).

NEC Not elsewhere classified.

since the surveillance system commenced data collection in 1991. There was an increase of 48% compared with notifications in 2008 (Figure 2). This increase was largely due to cases of influenza A(H1N1) pandemic 2009.

Notifications and notification rates per 100,000 population for each disease by state or territory, in 2009, are shown in Table 4 and Table 5 respectively. Trends in notifications and rates per 100,000 population for the period 2004 to 2009 are shown in Table 6.

The year in which diseases became notifiable to NNDSS in each jurisdiction is shown in Table 7.

Figure 2: Notifications received by the National Notifiable Diseases Surveillance System, Australia, 1991 to 2009, by year of diagnosis

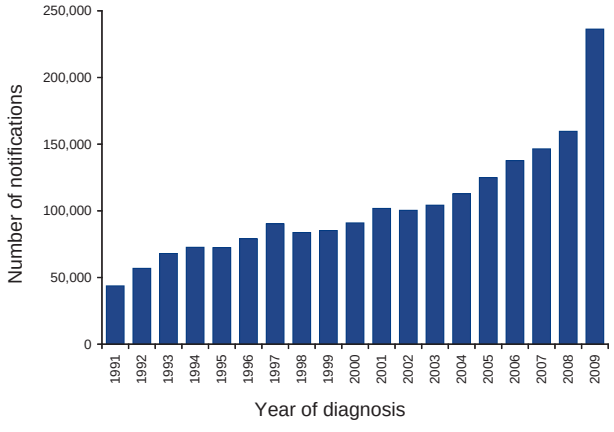


Table 4: Notifications of communicable diseases, Australia, 2009, by state or territory

Disease	State or territory								
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust
Bloodborne diseases									
Hepatitis (NEC)	0	0	0	0	0	0	0	0	0
Hepatitis B (newly acquired)*	5	36	4	49	9	8	88	39	238
Hepatitis B (unspecified)†	101	2,651	152	1,022	447	77	1,948	709	7,107
Hepatitis C (newly acquired)*	7	41	5	NN	45	21	188	94	401
Hepatitis C (unspecified)†,‡	158	3,913	160	2,709	503	262	2,322	1,054	11,081
Hepatitis D	0	9	0	13	0	0	12	0	34
Gastrointestinal diseases									
Botulism	0	0	0	1	0	0	0	0	1
Campylobacteriosis§	357	NN	205	4,610	1,755	626	5,838	2,582	15,973
Cryptosporidiosis	106	1,463	150	1,460	106	66	1,039	235	4,625
Haemolytic uraemic syndrome	0	4	0	2	4	0	2	0	12
Hepatitis A	6	98	1	56	59	5	303	35	563
Hepatitis E	0	17	0	3	0	0	8	5	33
Listeriosis	2	26	0	14	4	3	27	15	91
Salmonellosis	225	2,736	487	2,471	681	166	1,647	1,120	9,533
Shigellosis	8	156	85	115	51	2	85	120	622
STEC,VTEC‖	0	21	1	23	62	0	16	6	130
Typhoid fever	2	47	0	13	2	1	42	8	115
Quarantinable diseases									
Cholera	0	3	0	0	0	0	1	0	4
Human pathogenic avian influenza in humans	0	0	0	0	0	0	0	0	0
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
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¶,**	941	14,948	2,115	16,721	3,757	1,453	13,889	8,836	62,660
Donovanosis	0	0	0	1	0	0	0	0	1
Gonococcal infection**	55	1,655	1,504	1,570	400	21	1,515	1,339	8,059
Syphilis – all**,††	33	910	137	475	53	28	858	182	2,676
Syphilis <2 years duration**	11	522	38	179	53	10	390	88	1,291
Syphilis >2 years or unspecified duration†,**	22	388	99	296	NDP	18	468	94	1,385
Syphilis – congenital**	0	0	3	0	0	0	0	0	3
Vaccine preventable diseases									
Diphtheria	0	0	0	0	0	0	0	0	0
Haemophilus influenzae type b	0	6	0	6	1	0	2	4	19
Influenza (laboratory confirmed)	1,259	12,393	1,967	18,363	10,752	1,305	6,990	5,533	58,562
Measles	1	19	1	32	3	2	36	10	104
Mumps	0	40	13	34	12	1	45	20	165
Pertussis	351	12,436	215	6,216	5,346	616	3,778	778	29,736
Pneumococcal disease (invasive)	29	477	86	270	145	35	368	149	1,559
Poliomyelitis	0	0	0	0	0	0	0	0	0
Rubella	0	7	0	6	3	0	6	5	27
Rubella – congenital	0	0	0	0	0	0	0	0	0
Tetanus	0	2	0	0	0	0	1	0	3

Table 4, *continued*: Notifications of communicable diseases, Australia, 2009, by state or territory

Disease	State or territory								
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust
Vaccine preventable diseases, *continued*									
Varicella zoster (chickenpox)	2	NN	87	153	475	34	530	318	1,599
Varicella zoster (shingles)	12	NN	112	259	1,045	117	575	539	2,659
Varicella zoster (unspecified)	66	NN	3	3,835	280	80	1,847	866	6,977
Vectorborne diseases									
Arbovirus infection (NEC)	0	0	0	23	0	0	3	0	26
Barmah Forest virus infection	3	359	117	799	36	3	15	154	1,486
Dengue virus infection	17	132	27	1,036	17	2	38	133	1,402
Japanese encephalitis virus infection	0	0	0	0	0	0	0	0	0
Kunjin virus infection‡‡	0	0	1	1	0	0	0	0	2
Malaria	3	92	14	185	32	5	113	82	526
Murray Valley encephalitis virus infection‡‡	0	0	1	1	0	0	0	2	4
Ross River virus infection	2	912	427	2,154	326	29	85	851	4,786
Zoonoses									
Anthrax	0	0	0	0	0	0	0	0	0
Australia bat lyssavirus	0	0	0	0	0	0	0	0	0
Brucellosis	0	4	0	22	2	0	3	1	32
Leptospirosis	2	18	4	110	0	0	11	1	146
Lyssavirus (NEC)	0	0	0	0	0	0	0	0	0
Ornithosis	0	22	0	0	3	0	38	2	65
Q fever	0	139	3	131	9	0	25	2	309
Tularaemia	0	0	0	0	0	0	0	0	0
Other bacterial diseases									
Legionellosis	4	94	3	56	44	0	50	51	302
Leprosy	0	0	0	2	0	0	1	0	3
Meningococcal infection§§	2	96	6	60	22	3	42	28	259
Tuberculosis	23	488	28	218	58	9	419	112	1,355
Total	**3,782**	**56,470**	**8,124**	**65,300**	**26,550**	**4,980**	**44,849**	**26,020**	**236,075**

* Newly acquired hepatitis includes cases where the infection was determined to be acquired within 24 months prior to diagnosis.

† Unspecified hepatitis and syphilis includes cases where the duration of infection could not be determined.

‡ In Queensland, includes incident hepatitis C cases.

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

|| Infection with Shiga toxin/verotoxin-producing *Escherichia coli* (STEC/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 and Western Australia exclude ocular infections.

** In the national case definitions for chlamydial, gonococcal and syphilis infections the mode of transmission cannot be inferred from the site of infection. Transmission (especially in children) may be by a non-sexual mode (e.g. perinatal infections, epidemic gonococcal conjunctivitis).

†† Does not include congenital syphilis.

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

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

NEC Not elsewhere classified.

NN Not notifiable.

NDP No data provided.

Table 5: Notification rates for nationally notifiable communicable diseases, Australia, 2009, by state or territory

Disease	State or territory								Aust
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	
Bloodborne diseases									
Hepatitis (NEC)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hepatitis B (newly acquired)*	1.4	0.5	1.8	1.1	0.6	1.6	1.6	1.7	1.1
Hepatitis B (unspecified)†	28.8	37.3	67.6	23.2	27.5	15.3	35.9	31.7	32.5
Hepatitis C (newly acquired)*	2.0	0.6	2.2	NN	2.8	4.2	3.5	4.2	2.3
Hepatitis C (unspecified)†,‡	45.0	55.1	71.2	61.5	31.0	52.1	42.8	47.1	50.7
Hepatitis D	0.0	0.1	0.0	0.3	0.0	0.0	0.2	0.0	0.2
Gastrointestinal diseases									
Botulism	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Campylobacteriosis§	101.7	NN	91.2	104.6	108.2	124.5	107.6	115.4	108.1
Cryptosporidiosis	30.2	20.6	66.7	33.1	6.5	13.1	19.1	10.5	21.1
Haemolytic uraemic syndrome	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.1
Hepatitis A	1.7	1.4	0.4	1.3	3.6	1.0	5.6	1.6	2.6
Hepatitis E	0.0	0.2	0.0	0.1	0.0	0.0	0.1	0.2	0.2
Listeriosis	0.6	0.4	0.0	0.3	0.2	0.6	0.5	0.7	0.4
Salmonellosis	64.1	38.5	216.6	56.1	42.0	33.0	30.3	50.1	43.6
Shigellosis	2.3	2.2	37.8	2.6	3.1	0.4	1.6	5.4	2.8
STEC,VTEC‖	0.0	0.3	0.4	0.5	3.9	0.0	0.3	0.3	0.6
Typhoid fever	0.6	0.7	0.0	0.3	0.1	0.2	0.8	0.4	0.5
Quarantinable diseases									
Cholera	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Human pathogenic avian influenza in humans	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
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 infection¶,**	268.0	210.5	940.6	379.4	231.5	289.1	255.9	395.0	286.4
Donovanosis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gonococcal infection**	15.7	23.3	668.9	35.6	24.7	4.2	27.9	59.9	36.8
Syphilis – all**,††	9.4	12.8	60.9	10.8	3.3	5.6	15.8	8.1	12.2
Syphilis < 2 years duration**	3.1	7.4	16.9	4.1	3.3	2.0	7.2	3.9	5.9
Syphilis > 2 years or unspecified duration†,**	6.3	5.5	44.0	6.7	NDP	3.6	8.6	4.2	6.8
Syphilis – congenital**	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0
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	0.0	0.1	0.1	0.0	0.0	0.2	0.1
Influenza (laboratory confirmed)	358.5	174.6	874.8	416.7	662.6	259.6	128.8	247.4	267.7
Measles	0.3	0.3	0.4	0.7	0.2	0.4	0.7	0.4	0.5
Mumps	0.0	0.6	5.8	0.8	0.7	0.2	0.8	0.9	0.8
Pertussis	99.9	175.2	95.6	141.1	329.4	122.6	69.6	34.8	135.9
Pneumococcal disease (invasive)	8.3	6.7	38.2	6.1	8.9	7.0	6.8	6.7	7.1
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	0.1	0.2	0.0	0.1	0.2	0.1
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	0.0	0.0	0.0	0.0

Table 5 *continued*: Notification rates for nationally notifiable communicable diseases, Australia, 2009, by state or territory

Disease	State or territory								Aust
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	
Vaccine preventable diseases, *continued*									
Varicella zoster (chickenpox)	0.6	NN	38.7	3.5	29.3	6.8	9.8	14.2	10.8
Varicella zoster (shingles)	3.4	NN	49.8	5.9	64.4	23.3	10.6	24.1	18.0
Varicella zoster (unspecified)	18.8	NN	1.3	87.0	17.3	15.9	34.0	38.7	47.2
Vectorborne diseases									
Arbovirus infection (NEC)	0.0	0.0	0.0	0.5	0.0	0.0	0.1	0.0	0.1
Barmah Forest virus infection	0.9	5.1	52.0	18.1	2.2	0.6	0.3	6.9	6.8
Dengue virus infection	4.8	1.9	12.0	23.5	1.0	0.4	0.7	5.9	6.4
Japanese encephalitis virus infection	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kunjin virus infection‡‡	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Malaria	0.9	1.3	6.2	4.2	2.0	1.0	2.1	3.7	2.4
Murray Valley encephalitis virus infection‡‡	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.1	0.0
Ross River virus infection	0.6	12.8	189.9	48.9	20.1	5.8	1.6	38.0	21.9
Zoonoses									
Anthrax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Australia bat lyssavirus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brucellosis	0.0	0.1	0.0	0.5	0.1	0.0	0.1	0.0	0.1
Leptospirosis	0.6	0.3	1.8	2.5	0.0	0.0	0.2	0.0	0.7
Lyssavirus (NEC)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ornithosis	0.0	0.3	0.0	0.0	0.2	0.0	0.7	0.1	0.3
Q fever	0.0	2.0	1.3	3.0	0.6	0.0	0.5	0.1	1.4
Tularaemia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other bacterial diseases									
Legionellosis	1.1	1.3	1.3	1.3	2.7	0.0	0.9	2.3	1.4
Leprosy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Meningococcal infection§§	0.6	1.4	2.7	1.4	1.4	0.6	0.8	1.3	1.2
Tuberculosis	6.5	6.9	12.5	4.9	3.6	1.8	7.7	5.0	6.2

* Newly acquired hepatitis includes cases where the infection was determined to be acquired within 24 months prior to diagnosis.

† Unspecified hepatitis and syphilis includes cases where the duration of infection could not be determined.

‡ In Queensland, includes incident hepatitis C cases.

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

|| Infection with Shiga toxin/verotoxin-producing *Escherichia coli* (STEC/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 and Western Australia exclude ocular infections.

** In the national case definitions for chlamydial, gonococcal and syphilis infections the mode of transmission cannot be inferred from the site of infection. Transmission (especially in children) may be by a non-sexual mode (e.g. perinatal infections, epidemic gonococcal conjunctivitis).

†† Does not include congenital syphilis.

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

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

NEC Not elsewhere classified.

NN Not notifiable.

NDP No data provided.

Table 6: Notifications and notification rate for communicable diseases, Australia, 2004 to 2009, (per 100,000 population)

Disease	Number of notifications						5-year mean	Ratio	Notification rate per 100,000 population					
	2004	2005	2006	2007	2008	2009			2004	2005	2006	2007	2008	2009
Bloodborne diseases														
Hepatitis (NEC)	0	1	1	0	1	0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hepatitis B (newly acquired)*	283	253	292	294	258	238	276.0	0.9	1.4	1.2	1.4	1.4	1.2	1.1
Hepatitis B (unspecified)†	5,641	6,264	6,224	6,847	6,518	7,107	6,298.8	1.1	28.0	30.7	30.1	32.5	30.4	32.5
Hepatitis C (newly acquired)*	457	379	442	384	362	401	404.8	1.0	2.8	2.3	2.7	2.3	2.1	2.3
Hepatitis C (unspecified)†,‡	12,348	11,901	11,863	11,868	11,098	11,081	11,815.6	0.9	61.3	58.4	57.3	56.3	51.8	50.7
Hepatitis D	29	32	30	34	42	34	33.4	1.0	0.1	0.2	0.1	0.2	0.2	0.2
Gastrointestinal diseases														
Botulism	1	3	1	1	0	1	1.2	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Campylobacteriosis§	15,586	16,498	15,420	16,995	15,524	15,973	16,004.6	1.0	116.1	121.0	111.1	120.0	107.5	108.1
Cryptosporidiosis	1,676	3,213	3,200	2,810	2,003	4,625	2,580.4	1.8	8.3	15.8	15.5	13.3	9.3	21.1
Haemolytic uraemic syndrome	16	20	14	19	31	12	20.0	0.6	0.1	0.1	0.1	0.1	0.1	0.1
Hepatitis A	319	327	281	165	277	563	273.8	2.1	1.6	1.6	1.4	0.8	1.3	2.6
Hepatitis E	28	30	24	18	44	33	28.8	1.1	0.1	0.1	0.1	0.1	0.2	0.2
Listeriosis	67	54	61	50	68	91	60.0	1.5	0.3	0.3	0.3	0.2	0.3	0.4
Salmonellosis	7,841	8,422	8,252	9,529	8,303	9,533	8,469.4	1.1	39.0	41.3	39.9	45.2	38.7	43.6
Shigellosis	520	729	546	600	829	622	644.8	1.0	2.6	3.6	2.6	2.8	3.9	2.8
STEC, VTEC‖	49	86	70	106	106	130	83.4	1.6	0.2	0.4	0.3	0.5	0.5	0.6
Typhoid fever	73	52	77	90	105	115	79.4	1.5	0.4	0.3	0.4	0.4	0.5	0.5
Quarantinable diseases														
Cholera	5	3	3	4	4	4	3.8	1.1	0.0	0.0	0.0	0.0	0.0	0.0
Human pathogenic avian influenza in humans	0	0	0	0	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	0.0	0.0
Rabies	0	0	0	0	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	0.0	0.0
Smallpox	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Viral haemorrhagic fever	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow fever	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 6 *continued*: Notifications and notification rate for communicable diseases, Australia, 2004 to 2009, (per 100,000 population)

Disease	Number of notifications						5-year mean	Ratio	Notification rate per 100,000 population					
	2004	2005	2006	2007	2008	2009			2004	2005	2006	2007	2008	2009
Sexually transmissible infections														
Chlamydial infection[¶, **]	36,169	41,293	47,425	52,009	58,449	62,660	47,069.0	1.3	179.7	202.5	229.1	246.8	272.7	286.4
Donovanosis	10	13	6	3	2	1	6.8	0.1	0.0	0.1	0.0	0.0	0.0	0.0
Gonococcal infection**	7,170	8,070	8,565	7,685	7,655	8,059	7,829.0	1.0	35.6	39.6	41.4	36.5	35.7	36.8
Syphilis – all**,[††]	2,065	1,934	2,197	2,758	2,674	2,676	2,325.6	1.2	10.3	9.5	10.6	13.1	12.5	12.2
Syphilis <2 years duration**	628	653	883	1,412	1,310	1,291	977.2	1.3	3.1	3.2	4.3	6.7	6.1	5.9
Syphilis >2 years or unspecified duration**	1,437	1,281	1,314	1,346	1,364	1,385	1,348.4	1.0	7.1	6.8	6.9	6.9	6.9	6.8
Syphilis – congenital**	13	17	13	7	6	3	11.2	0.3	0.1	0.1	0.1	0.0	0.0	0.0
Vaccine preventable diseases														
Diphtheria	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Haemophilus influenzae type b	15	17	22	17	25	19	19.2	1.0	0.1	0.1	0.1	0.1	0.1	0.1
Influenza (laboratory confirmed)[‡‡]	2,135	4,557	3,254	10,445	9,130	58,562	5,904.2	10.0	10.6	22.3	15.7	49.6	42.6	267.7
Measles	44	10	125	12	65	104	51.2	2.1	0.2	0.0	0.6	0.1	0.3	0.5
Mumps	102	240	275	586	285	165	297.6	0.6	0.5	1.2	1.3	2.8	1.3	0.8
Pertussis	8,748	11,164	9,764	4,862	14,285	29,736	9,764.6	3.0	43.5	54.7	47.2	23.1	66.7	135.9
Pneumococcal disease (invasive)	2,372	1,692	1,453	1,479	1,634	1,559	1,726.0	0.9	11.8	8.3	7.0	7.0	7.6	7.1
Poliomyelitis	0	0	0	1	0	0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rubella	31	29	59	34	36	27	37.8	0.7	0.2	0.1	0.3	0.2	0.2	0.1
Rubella – congenital	1	1	0	2	0	0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tetanus	6	2	3	3	4	3	3.6	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Varicella zoster (chickenpox)[§§]	NN	16	1,558	1,668	1,795	1,599	1,259.3	1.3	NN	0.2	17.8	18.6	19.7	10.8
Varicella zoster (shingles)[§§]	NN	7	1,092	1,561	2,309	2,659	1,242.3	2.1	NN	0.1	12.5	17.4	25.3	18.0
Varicella zoster (unspecified)[§§]	NN	141	3,678	4,286	4,415	6,977	3,130.0	2.2	NN	1.6	42.0	47.9	48.3	47.2
Vectorborne diseases														
Arbovirus infection (NEC)[¶¶]	66	28	32	24	26	26	35.2	0.7	0.3	0.1	0.2	0.1	0.1	0.1
Barmah Forest virus infection	1,100	1,322	2,133	1,715	2,097	1,486	1,673.4	0.9	5.5	6.5	10.3	8.1	9.8	6.8
Dengue virus infection	351	220	189	316	562	1,402	327.6	4.3	1.7	1.1	0.9	1.5	2.6	6.4
Japanese encephalitis virus infection	1	0	0	0	1	0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kunjin virus infection[¶¶]	6	1	3	1	1	2	2.4	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Malaria	545	817	770	568	529	526	645.8	0.8	2.7	4.0	3.7	2.7	2.5	2.4
Murray Valley encephalitis virus infection[¶¶]	1	2	1	0	2	4	1.2	3.3	0.0	0.0	0.0	0.0	0.0	0.0
Ross River virus infection	4,205	2,538	5,544	4,202	5,652	4,786	4,428.2	1.1	20.9	12.4	26.8	19.9	26.4	21.9

Table 6 *continued*: Notifications and notification rate for communicable diseases, Australia, 2004 to 2009, (per 100,000 population)

Disease	Number of notifications						5-year mean	Ratio	Notification rate per 100,000 population					
	2004	2005	2006	2007	2008	2009			2004	2005	2006	2007	2008	2009
Zoonoses														
Anthrax	0	0	1	1	0	0	0.4	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	0.0	0.0
Brucellosis	38	41	51	38	47	32	43.0	0.7	0.2	0.2	0.2	0.2	0.2	0.1
Leptospirosis	177	129	145	108	112	146	134.2	1.1	0.9	0.6	0.7	0.5	0.5	0.7
Lyssavirus (NEC)	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ornithosis	239	164	165	93	102	65	152.6	0.4	1.2	0.8	0.8	0.4	0.5	0.3
Q fever	460	352	410	448	376	309	409.2	0.8	2.3	1.7	2.0	2.1	1.8	1.4
Tularaemia	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other bacterial infections														
Legionellosis	312	331	349	306	272	302	314.0	1.0	1.6	1.6	1.7	1.5	1.3	1.4
Leprosy	6	10	7	13	11	3	9.4	0.3	0.0	0.0	0.0	0.1	0.1	0.0
Meningococcal infection***	406	392	318	305	285	259	341.2	0.8	2.0	1.9	1.5	1.4	1.3	1.2
Tuberculosis	1,056	1,078	1,205	1,133	1,203	1,355	1,135.0	1.2	5.2	5.3	5.8	5.4	5.6	6.2
Total	**112,791**	**124,895**	**137,613**	**146,503**	**159,620**	**236,075**								

* Newly acquired hepatitis includes cases where the infection was determined to be acquired within 24 months prior to diagnosis.

† Unspecified hepatitis and syphilis includes cases where the duration of infection could not be determined.

‡ In Queensland, includes incident hepatitis C cases.

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

‖ Infection with Shiga toxin/verotoxin-producing *Escherichia coli* (STEC/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 and Western Australia exclude ocular infections.

** In the national case definitions for chlamydial, gonococcal and syphilis infections the mode of transmission cannot be inferred from the site of infection. Transmission (especially in children) may be by a non-sexual mode (e.g. perinatal infections, epidemic gonococcal conjunctivitis).

†† Does not include congenital syphilis.

‡‡ Influenza (laboratory confirmed) became notifiable in South Australia on 1 May 2008.

§§ Varicella zoster became notifiable in Victoria on 21 September 2008.

‖‖ Arbovirus (NEC) replaced Flavivirus (NEC) in 2008.

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

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

NEC Not elsewhere classified.

NN Not notifiable.

Table 7: Earliest notification year for which NNDSS contains disease data, Australia, by state or territory*

Disease	Year in which data first sent to Commonwealth								Period of national reporting	Exceptions to national reporting
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA		
Bloodborne diseases										
Hepatitis (NEC)	1991	1991	1991	1991	1991	1991	1991	NN	1991 to present	WA do not report
Hepatitis B (newly acquired)	1995	1993	1993	1994	1993	1993	1993	1994	1995 to present	ACT did not report 1994
Hepatitis B (unspecified)	1991	1991	2004	1994	1991	1991	1991	1991	1991 to present	
Hepatitis C (newly acquired)	1995	1993	2005	NN	1993	1995	1997	1995	1993 to present	All jurisdictions except Qld
Hepatitis C (unspecified)	1991	1991	1991	1991	1994	1991	1991	1993	1995 to present	Includes reports of incident hepatitis C, 1991 to 1994
Hepatitis D	1999	1999	1999	1997	1999	1999	1999	2001	1999 to present	WA did not report 1999–2000
Gastrointestinal diseases										
Botulism	1992	1998	1998	1997	1993	1992	1992	2001	1992 to present	State reporting started as shown
Campylobacteriosis	1991	NN	1991	1991	1991	1991	1991	1991	1991 to present	NSW do not report
Cryptosporidiosis	2001	2001	2001	1996	2001	2001	2001	2001	2001 to present	
Haemolytic uraemic syndrome	1999	1999	1999	1997	1999	1999	1999	1999	1999 to present	
Hepatitis A	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	
Hepatitis E	1999	1999	1999	1999	1999	1999	1999	2001	1999 to present	WA did not report 1999–2000
Listeriosis	1991	1991	1994	1991	1992	1991	1991	1991	1991 to present	SA did not report 1991 NT did not report 1991–1993
Salmonellosis	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	
Shigellosis	1991	2001	1991	1997	1991	1991	1991	1991	1991 to present	NSW did not report 1991–2000 Qld did not report 1991–2006
STEC, VTEC	1999	1999	1999	2002	1999	1999	1999	2001	1999 to present	Qld did not report 1991–2002 WA did not report 1999–2001
Typhoid†	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	
Quarantinable diseases										
Cholera	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	
Highly pathogenic avian influenza in humans	2004	2004	2004	2004	2004	2004	2004	2004	2004 to present	
Plague	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	
Rabies	1993	1997	1991	1991	1991	1991	1991	1991	1991 to present	
Severe acute respiratory syndrome	2003	2003	2003	2003	2003	2003	2003	2003	2003 to present	
Smallpox	2004	2004	2004	2004	2004	2004	2004	2004	2004 to present	
Viral haemorrhagic fever	1993	1991	1991	1991	1991	1991	1991	1991	1991 to present	
Yellow fever	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	
Sexually transmissible infections										
Chlamydial infection (NEC)	1993	1991	1991	1991	1993	1991	1991	1993	1994 to present	NSW did not report 1994–1998
Donovanosis	1991	2002	1991	1991	2002	1993	1991	1991	1991 to present	NSW and SA did not report 1991–2001 Tasmania did not report 1991–1992
Gonococcal infection‡	1991	1993	1991	1991	1991	1991	1991	1991	1991 to present	
Syphilis – all§	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	

Table 7 *continued*: Earliest notification year for which NNDSS contains disease data, Australia, by state or territory*

Disease	Year in which data first sent to Commonwealth								Period of national reporting	Exceptions to national reporting
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA		
Sexually transmissible infections, *continued*										
Syphilis < 2 years	2004	2004	2004	2004	2004	2004	2004	2004	2004 to present	
Syphilis > 2 years or unspecified duration	2004	2004	2004	2004	2004	2004	2004	2004	2004 to present	
Syphilis – congenital	2003	2003	2003	2003	2003	2003	2003	2003	2003 to present	
Vaccine preventable diseases										
Diphtheria	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	
Haemophilus influenzae type b	1991	1991	1991	1991	1991	1991	1991	1994	1991 to present	WA did not report 1991–1993
Influenza (laboratory confirmed)	2001	2001	2001	2001	2001	2001	2001	2001	2001 to present	
Measles	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	
Mumps	1992	1992	1995	1997–1998; 2002	1994	1995	1992	1994	1995 to present	Qld did not report (1995–1996 & 1999–2000)
Pertussis	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	
Pneumococcal disease (invasive)	2001	2001	2001	1997	2001	2001	2001	2001	2001 to present	
Poliomyelitis	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	
Rubella[‖]	1991	1991	1993	1991	1993	1995	1992	1994	1993 to present	Tasmania did not report 1993–1994
Rubella – congenital	2003	2003	2003	1997	2003	2003	2003	2003	2003 to present	
Tetanus	1991	1991	1991	1985	1991	1991	1991	1991	1991 to present	Qld did not report 1991–1993
Varicella zoster (chickenpox)	2006	NN	2006	2006	2006	2006	2008	2006	2006 to present	All jurisdictions except NSW Reported by Victoria in September 2008
Varicella zoster (shingles)	2006	NN	2006	2006	2006	2006	2008	2006	2006 to present	All jurisdictions except NSW Reported by Victoria in September 2008
Varicella zoster (unspecified)	2006	NN	2006	2006	2006	2006	2008	2006	2006 to present	All jurisdictions except NSW Reported by Victoria in September 2008
Vectorborne diseases										
Barmah Forest virus infection	1995	1995	1997	1995	1995	1995	1995	1995	1995 to present	
Dengue virus infection	1993	1991	1991	1991	1991	1991	1991	1995	1991 to present	ACT did not report 1991–1992
Arbovirus infection (NEC)[¶,**]	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	Includes JEV, MVEV and Kunjin 1991–2000
Japanese encephalitis virus infection	2001	2001	2001	2001	2001	2001	2001	2001	2001 to present	
Kunjin virus	2001	2001	2001	2001	2001	2001	2001	2001	2001 to present	Reported under MVEV in ACT
Malaria	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	
Murray Valley encephalitis virus infection	2001	2001	2001	2001	2001	2001	2001	2001	2001 to present	Combined with Kunjin in ACT
Ross River virus infection	1993	1993	1991	1991	1993	1993	1991	1991	1993 to present	
Zoonoses										
Anthrax	2001	2001	2001	1991	2002	2001	2001	2001	2001 to present	
Australian bat lyssavirus	2001	2001	2001	1998	2001	2001	2001	2001	2001 to present	
Brucellosis	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	

Table 7 *continued*: Earliest notification year for which NNDSS contains disease data, Australia, by state or territory*

Disease	Year in which data first sent to Commonwealth								Period of national reporting	Exceptions to national reporting
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA		
Zoonoses, *continued*										
Leptospirosis	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	
Lyssavirus (NEC)	2001	2001	2001	1998	2001	2001	2001	2001	2001 to present	
Ornithosis	1991	2001	1991	1992	1991	1991	1991	1991	1991 to present	NSW did not report 1991–2000 Qld did not report 1997–2001
Q fever	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	
Tularaemia	2004	2004	2004	2004	2004	2004	2004	2004	2004 to present	
Other bacterial infections										
Legionellosis	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	
Leprosy	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	
Meningococcal infection	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	
Tuberculosis	1991	1991	1991	1991	1991	1991	1991	1991	1991 to present	

* Data from the National Notifiable Diseases Surveillance System annual reports from 1991. First full year of reporting to Commonwealth is shown. Some diseases may have been notifiable to state or territory health departments before the dates shown here.

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

‡ Includes neonatal ophthalmia in the Northern Territory, Queensland, South Australia, and Victoria.

§ Includes syphilis – congenital from 1991 to 2002.

|| Includes rubella – congenital from 1991 to 2002.

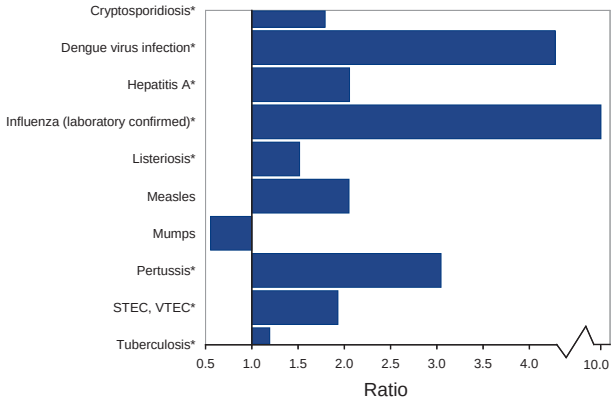
¶ Before 1997, includes Ross River virus infection, dengue virus infection and Barmah Forest virus infection.

** Flavivirus (NEC) replaced arbovirus (NEC) 1 January 2004. Arbovirus (NEC) replaced Flavivirus (NEC) in 2008.

NN Not notifiable

The major changes in communicable disease notifications in 2009 are shown in Figure 3 as the ratio of notifications in 2009 to the mean number of notifications for the previous 5 years. Notifications of dengue virus infection, influenza (laboratory confirmed), pertussis and hepatitis A were highest since 2004 and exceeded the expected range (5-year mean plus 2 standard deviations). Notifications of mumps, measles, tuberculosis and Shiga toxin/verotoxin-producing *Escherichia coli* (STEC/VTEC) were within the historical range.

Figure 3: Comparison of total notifications of selected diseases reported to the National Notifiable Diseases Surveillance System in 2009, with the previous 5-year mean



* Exceeded 2 standard deviations above the 5-year mean.

Data completeness

The case's sex was complete in 99.7% of notifications and age at onset in close to 100% of notifications (Table 8). In 2009, Indigenous status was complete in 49.6% of notifications, and this varied by jurisdiction. Indigenous status was complete for 93.1% of data reported in the Northern Territory, 86.2% in Western Australia and 79.5% South Australia. Indigenous status was complete for less than 50% in the remaining jurisdictions.

Data completeness on Indigenous status also varied by disease (Appendix 3). There were 5 diseases for which notifications were 100% complete for Indigenous status.[10] A further 7 diseases equalled or exceeded 90% completeness for Indigenous status. Of the 18 priority diseases agreed to by CDNA and the NSC in 2009 for improving Indigenous identification, seven had an Indigenous completeness that

Table 8: Completeness of National Notifiable Diseases Surveillance System data received, Australia, 2009, by state or territory*

	State or territory								
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust
Total notifications	3,782	56,686	8,124	65,300	26,549	4,980	44,850	26,020	236,291
Sex									
Unknown/missing	1	395	12	27	3	8	318	2	766
Per cent complete	100.0	99.3	99.9	100.0	100.0	99.8	99.3	100.0	99.7
Age at onset									
Unknown/missing	0	6	8	0	1	2	74	1	88
Per cent complete	100.0	100.0	99.9	100.0	100.0	100.0	99.8	100.0	100.0
Indigenous status									
Unknown/missing	3,105	43,347	564	36,648	5,433	2,595	23,720	3,596	119,008
Per cent complete	17.9	23.5	93.1	43.9	79.5	47.9	47.1	86.2	49.6

* Indigenous status is usually obtained from medical notification and completeness varies by disease and by state and territory. This reflects differences in notification requirements (i.e. depending on the jurisdiction, some diseases are primarily or completely notified by pathology laboratories rather than clinicians) and the fact that it is not possible to follow-up all cases for diseases with a large volume of notifications and/or not requiring specific case-based public health action.

exceeded 90% (donovanosis, *Haemophilus influenzae* type b, congenital syphilis, meningococcal infection, syphilis less than 2 years duration, tuberculosis and hepatitis A). The diseases for which there was less than 90% Indigenous completeness included dengue virus infection, gonococcal infection, leprosy, measles, pneumococcal disease (invasive), and shigellosis. In 2009, CDNA set target thresholds of 95% completeness for key diseases and 80% completeness for the remainder of the notifiable diseases.

Bloodborne diseases

In 2009, the bloodborne viruses reported to the NNDSS were hepatitis B, C, and D. Both hepatitis B and C cases are notified to the NNDSS as either 'newly acquired', where evidence was available that the infection was acquired within 24 months prior to diagnosis; or 'greater than 2 years or unspecified' period of infection. These categories were reported from all states and territories except Queensland where all cases of hepatitis C, including newly acquired, were reported as 'greater than 2 years or unspecified'. The determination of a case as 'newly acquired' is heavily reliant on public health follow-up, with the method and intensity of follow-up varying by jurisdiction and over time.

In interpreting these data it is important to note that changes in notifications over time may not solely reflect changes in disease prevalence or incidence. Testing policies[11] and screening programs, including the preferential testing of high risk populations such as persons in prison, injecting drug users and persons from countries with a high prevalence of hepatitis B or C, may contribute to these changes.

Information on exposure factors relating to the most likely source(s) or risk factors of infection for hepatitis B and C was reported in a subset of diagnoses of newly acquired infections. The collection of these enhanced data are also dependant on the level of public health follow-up, which is variable by jurisdiction and over time.

Further information regarding the surveillance of these infections are described within the hepatitis B and hepatitis C sections.

Notifications of HIV and AIDS diagnoses are reported directly to the Kirby Institute, which maintains the National HIV Registry and the National AIDS Registry. Information on national HIV/AIDS surveillance can be obtained from the Kirby Institute website at www.nchecr.unsw.edu.au

Hepatitis B

Hepatitis B notifications are classified as either 'newly acquired' (infection acquired within 24 months prior to diagnosis) or 'unspecified' (infection acquired more than 24 months prior to diagnosis or not able to be specified). The classification of hepatitis B cases is primarily based on serological evidence or evidence of a previously negative test within the 24 months prior to diagnosis. In 2009, there were 7,345 notifications of hepatitis B (both newly acquired and unspecified), equating to a rate of 33.6 notifications per 100,000 population. Following a peak in hepatitis B notifications between 2000 and 2001 (41.3 and 39.9 per 100,000 population, respectively), the overall hepatitis B notification rate declined and remained relatively stable at around 32 notifications per 100,000 population between 2003 and 2009 (Figure 4). Of the jurisdictions, the

Northern Territory recorded the highest rate of hepatitis B notifications in 2009 (69.4 per 100,000 population), followed by New South Wales (37.8 per 100,000 population) and Victoria (37.5 per 100,000 population).

Since the introduction of the adolescent hepatitis B vaccination program for children aged 10–13 years in 1997 and the universal infant program in 2000,[12] there has been a general decline in overall hepatitis B notification rates, especially amongst the 15–19 and 20–29 years age groups. In 2009, one notification of newly acquired hepatitis B and 5 notifications of hepatitis B (unspecified) were reported in children in the 0–4 years age group, representing 0.4% and 0.1% of hepatitis notifications in these categories, respectively. Approximately 93% of the 2008 Australian birth cohort received the full course of the hepatitis B vaccine.[13–17]

Newly acquired hepatitis B notifications

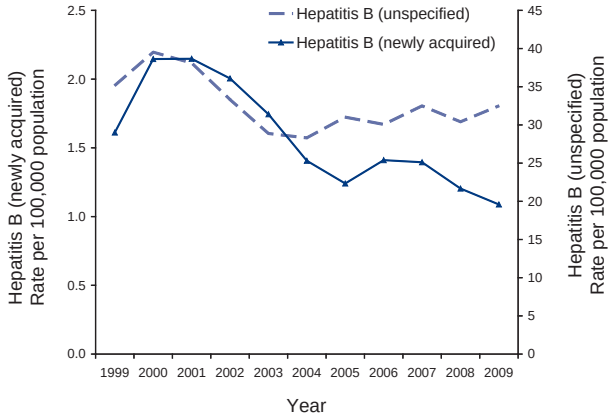
In 2009, 238 newly acquired hepatitis B notifications (1.1 per 100,000 population) were reported to the NNDSS, which was fewer than the number reported in 2008 (258 notifications; 1.2 per 100,000 population). The 2009 notification rate was the lowest since 1999, following a peak of 2.1 notifications per 100,000 population between 2000 and 2001 (Figure 4).

Nationally, the proportion of all hepatitis B notifications in 2009 that were documented as newly acquired cases was 3.2%, compared with 3.8% in 2008. The proportion of newly acquired infections compared with total hepatitis B infections varied substantially: Tasmania (9%); the Australian Capital Territory, Queensland and Western Australia (5%); Victoria (4%); the Northern Territory (3%); South Australia (2%); and New South Wales (1%). The highest notification rates of newly acquired hepatitis B infection were reported from the Northern Territory (1.8 per 100,000 population), closely followed by Western Australia (1.7 per 100,000 population) and Victoria and Tasmania (1.6 per 100,000 population). The identification and classification of newly acquired hepatitis B is reliant upon public health follow-up, the extent of which varies between jurisdictions and over time.

In 2009, the highest notification rate of newly acquired hepatitis B infection was observed in the 25–29 years age group amongst males (3.9 per 100,000 population) and in the 35–39 years age group amongst females (2.5 per 100,000 population) (Figure 5). Overall, notifications of newly acquired hepatitis B infection were higher amongst males, with a male to female ratio of 1.9:1.

Trends in newly acquired hepatitis B infection by year and age group are shown in Figure 6. Between 2000 and 2009, the notification rate of newly acquired hepatitis B fell substantially amongst persons aged 15–19 years (87%) and 20–29 years (71%). These trends occurred in both sexes.

Figure 4: Notification rate for newly acquired hepatitis B* and unspecified hepatitis B,† Australia, 1999 to 2009, by year‡

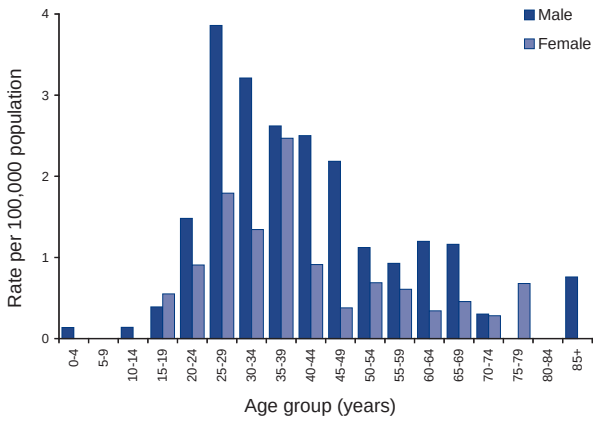


* Data for newly acquired hepatitis B for the Northern Territory (1999–2004) includes some unspecified hepatitis B cases.

† Data for unspecified hepatitis B for all jurisdictions except the Northern Territory between 1999 and 2004.

‡ Year of diagnosis for newly acquired hepatitis B and for hepatitis B (unspecified) notifications, and not necessarily year of infection.

Figure 5: Notification rate for newly acquired hepatitis B, Australia, 2009, by age group and sex

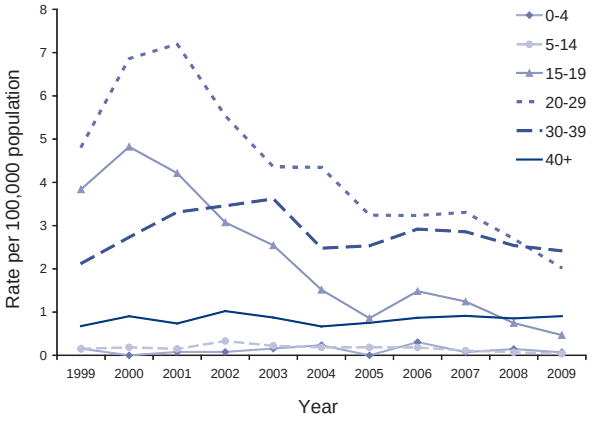


Of the 238 newly acquired hepatitis B notifications reported in 2009, the exposure history of 150 notifications from all jurisdictions except Queensland and Western Australia were assessed† (Table 9). In

† Prior to 2009 enhanced hepatitis B surveillance data were reported to the National Centre in HIV Epidemiology and Clinical Research from health authorities in jurisdictions.

2009, 59% of these notifications had at least one risk factor recorded, with the source of exposure not recorded or unable to be determined for the remainder of these cases. Between 2006 and 2009, the proportion of notifications associated with injecting drug use declined from 43%18 to 33%. The proportion of diagnoses reporting a history of heterosexual contact with a hepatitis B positive partner also decreased from 21% in 2005 to 12% in 2009. Additional information was also collected on the country of birth of newly acquired cases from all jurisdictions except Queensland. The majority of these newly acquired diagnoses occurred amongst Australian-born persons, and the proportion of overseas-born people with hepatitis B was similar to the proportion of overseas-born people in the Australian population.[18]

Figure 6: Notification rate for newly acquired hepatitis B,* Australia, 1999 to 2009, by age group and year



* Data for newly acquired hepatitis B for the Northern Territory (1998–2004) includes some unspecified hepatitis B cases.

Table 9: Newly acquired hepatitis B notifications, selected jurisdictions,* 2009, by sex and exposure category†

Exposure category	Number of exposure factors reported†			Percentage‡ of notifications* (n=150)
	Male	Female	Total	
Injecting drug use	32	18	50	33.3
Imprisonment	7	1	8	5.3
Skin penetration procedure	10	6	16	10.7
Tattoos	9	4	13	8.7
Ear or body piercing	–	2	2	1.3
Acupuncture	1	–	1	0.7
Healthcare exposure	7	5	12	8.0
Surgical Work	4	2	6	4.0
Major Dental Surgery	–	2	2	1.3
Blood/tissue recipient	2	1	3	2.0
Haemodialysis	1	–	1	0.7
Sexual contact – hepatitis B positive partner	14	9	23	15.3
Opposite sex	11	9	20	13.3
Same sex	3	–	3	2.0
Household contact	5	6	11	7.3
Needlestick or bio-hazardous injury§	1	–	1	0.7
Other	22	8	30	20.0
Sexual contact – unknown hepatitis B status partner‖	16	4	20	13.3
Notifications with at least one risk factor recorded	60	28	88	58.7
Risk factor unable to be determined	3	2	5	3.3
Unknown (not recorded)	36	21	57	38.0
Total number of exposure factors reported†	137	76	213	–
Total number of notifications*	99	51	150	–

* Notifications from the Australian Capital Territory, New South Wales, the Northern Territory, South Australia, Tasmania and Victoria.

† More than one exposure category for each notification could be recorded.

‡ The denominator used to calculate the percentage is based on the total number of notifications from all jurisdictions, except Queensland and Western Australia. As more than one exposure category for each notification could be recorded, the total percentage does equate to 100%.

§ Includes both occupational and non-occupational exposures.

‖ Established through analysis of free text field.

Unspecified hepatitis B notifications

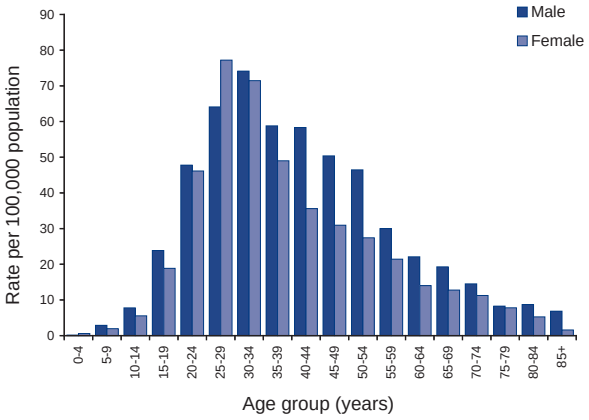
In 2009, a total of 7,107 notifications of unspecified hepatitis B infection were reported to the NNDSS, compared with 6,518 notifications in 2008. The Northern Territory recorded the highest notification rate (67.6 per 100,000 population), followed by New South Wales (37.3 per 100,000 population) and Victoria (35.9 per 100,000 population).

The notification rate of hepatitis B (unspecified) has declined by 23% since 2001 (39.5 per 100,000 population) with the lowest annual rate observed in 2004 (28.5 per 100,000 population) (Figure 4). Since 2001, there has been a slight upward trend in the notification rate for hepatitis B (unspecified), with a rate of 32.5 per 100,000 population observed in 2009.

In 2009, sex was recorded in 7,019 of the 7,107 notifications (99%). The male to female ratio of notifications was 1.2:1. Notification rates were highest in males aged 25 to 44 years, peaking in the 30–34 years age group (74.1 notifications per 100,000 population). Among females, notification rates were highest in the 25–29 years age group (77.2 per 100,000 population), followed by the 30–34 years age group (71.5 per 100,000 population) (Figure 7).

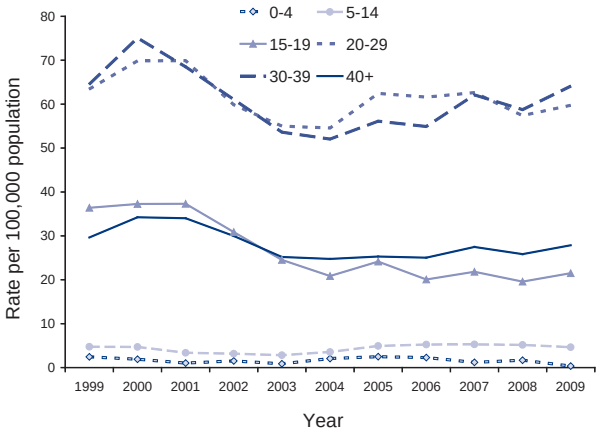
Trends in hepatitis B (unspecified) infection by year and age group are shown in Figure 8. Rates across most age groups were slightly higher in 2009 compared with 2008, with the 30–39 years age group increasing by 9.2% (58.7 to 64.1 notifications per 100,000 population). The highest notification rates continued to be observed amongst the 20–29 and 30–39 years age groups (59.7 and 64.1 per 100,000 population, respectively).

Figure 7: Notification rate for unspecified hepatitis B, Australia, 2009, by age group and sex*



* Excluding 94 cases whose sex or age were not reported.

Figure 8: Notification rate for unspecified hepatitis B,* Australia, 1999 to 2009, by age group and year



* Data for hepatitis B (unspecified) from all states except the Northern Territory between 1999 and 2004.

Hepatitis C

Hepatitis C notifications are classified as either 'newly acquired' (infection acquired within 24 months prior to diagnosis) or 'unspecified' (infection acquired more than 24 months prior to diagnosis or not able to be specified). Current testing methods cannot distinguish between newly acquired (incident) and chronic infections (greater than 2 years or unspecified). The identification of newly acquired cases is therefore dependent on evidence of a negative test result within 24 months prior to laboratory diagnosis or clinical hepatitis within the 24 months prior to a positive diagnostic test where other causes of acute hepatitis have been excluded. Ascertainment of a person's hepatitis C testing and clinical history usually requires active follow-up by public health units.

Between 1999 and 2009, total hepatitis C notification rates declined by 49.5% (104 to 52.5 notifications per 100,000 population), with the greatest reductions observed between 1999 and 2002 (24% decline) (Figure 9). These reductions followed a peak in case notifications associated with the detection and accounting of prevalent cases that occurred in the late 1990s through the expansion of testing in high risk groups.[19] The continuing decline in the notification rate may be attributable to reductions in risk behaviours related to injecting drug use, especially amongst young people, and the implementation of needle exchange programs.[19,20]

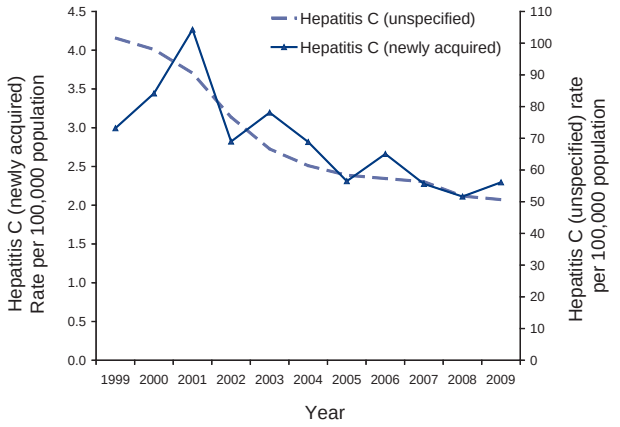
Although initial infection with the hepatitis C virus is asymptomatic or mildly symptomatic in more than 90% of cases, approximately 50%–80% of cases will go on to develop a chronic infection. Of those who develop a chronic infection, half will eventually develop cirrhosis or cancer of the liver.[21] In 2009, it

was estimated that 291,000 people living in Australia had been exposed to the hepatitis C virus. Of these, approximately 165,000 had chronic hepatitis C infection and early liver disease, 46,000 had chronic hepatitis C infection with moderate liver disease, 5,900 were living with hepatitis C related cirrhosis and 74,000 had cleared their infection.[18]

Newly acquired hepatitis C notifications

Notifications of newly acquired hepatitis C were reported from all jurisdictions except Queensland, where all cases of hepatitis C, regardless of whether they are newly acquired, are reported as unspecified. There were 401 newly acquired hepatitis C notifications reported in 2009 (362 notifications in 2008), giving a notification rate of 2.3 per 100,000 population (Figure 9).

Figure 9: Notification rate for newly acquired hepatitis C* and unspecified hepatitis C,† Australia, 1999 to 2009, by year



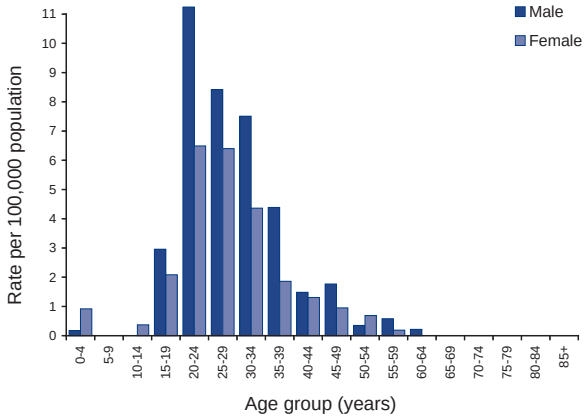
* Data for newly acquired hepatitis C from all states and territories except Queensland 1999 to 2009 and the Northern Territory 1999 to 2002.

† Data for unspecified hepatitis C provided from Queensland (1999–2009) and the Northern Territory (1999–2002) includes both newly acquired and unspecified hepatitis C cases.

Of all hepatitis C notifications in 2009, 3.5% were identified as newly acquired infections, which is comparable to previous years. Amongst jurisdictions, the proportion of newly acquired infections compared with total hepatitis C diagnoses varied substantially, with 8% in South Australia, Western Australia and Victoria; 7% in Tasmania; 4% in the Australian Capital Territory; 3% in the Northern Territory, and 1% in New South Wales. The highest rates of newly acquired hepatitis C infection were reported in Tasmania and Western Australia (4.2 per 100,000 population). The identification and classification of newly acquired hepatitis C is reliant upon public health follow-up to identify testing and clinical histories. The method and extent of case follow-up, and the population groups targeted, vary among jurisdictions, with newly acquired infection more likely to be detected in population groups that are tested frequently, such as those in prison settings.

Notification rates of newly acquired hepatitis C were highest in males in the 20–24 years age group followed by the 25–29 and 30–34 years age groups (11.2, 8.4 and 7.5 per 100,000 population, respectively). Peaks in the female population occurred in the 20–24 and 25–29 years age groups at around 6.5 notifications per 100,000 population (Figure 10).

Figure 10: Notification rate for newly acquired hepatitis C, Australia,* 2009, by age group and sex



* Data from all states and territories except Queensland.

Trends in the age distribution of newly acquired hepatitis C infection are shown in Figure 11. While rates for individual age groups vary from year to year, declines continue to be observed in the 15–19 and 20–29 years age groups. Annual rates in the other age groups continued to be relatively stable over the 1999 to 2009 period.

Exposure history surveillance data for all newly acquired hepatitis C notifications reported in 2009 were assessed from all jurisdictions except Queensland (Table 10). In 2009, 80% of these notifications had at least one risk factor recorded, with the source of exposure not recorded or unable to be determined for the remainder of these cases. Approximately 67% of notifications had a history of injecting drug use (42% of which with injecting drug use in the 24 months prior to diagnosis), and 19% had been detained in a correctional facility within the 24 months prior to diagnosis. Screening rates are generally higher in the prison entry population than the general population. A screening survey of prison entrants conducted over a two-week period in 2007 found that the prevalence of hepatitis C, based on hepatitis C antibody detection, was 35%.[13]

Table 10: Newly acquired hepatitis C notifications, selected jurisdictions,* 2009, by sex and exposure category†

Exposure category	Number of exposure factors reported†			Percentage‡ of notifications* (n=401)
	Male	Female	Total	
Injecting drug use	166	101	267	66.6
Imprisonment	68	8	76	19.0
Skin penetration procedure	48	24	72	18.0
Tattoos	34	13	47	11.7
Ear or body piercing	13	10	23	5.7
Acupuncture	1	1	2	0.5
Healthcare exposure	4	12	16	4.0
Surgical Work	3	11	14	3.5
Major Dental Surgery	1	1	2	0.5
Blood/tissue recipient	–	–	–	0.0
Sexual contact – hepatitis C positive partner	14	25	39	9.7
Opposite sex	12	24	36	9.0
Same sex	2	1	3	0.7
Household contact	6	12	18	4.5
Perinatal transmission	11	12	23	5.7
Needlestick or bio-hazardous injury§	3	2	5	1.2
Other	6	9	15	3.7
Notifications with at least one risk factor	193	127	320	79.8
Risk factor unable to be determined	11	6	17	4.2
Unknown (not recorded)	41	23	64	16.0
Total number of exposure factors reported†	378	234	612	–
Total number of notifications*	245	156	401	–

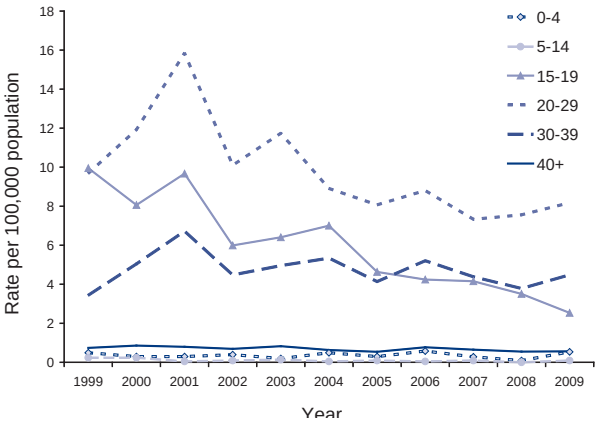
* Includes diagnoses in the Australian Capital Territory, New South Wales, South Australia, Tasmania, Victoria, Western Australia and the Northern Territory.

† More than one exposure category for each notification could be recorded.

‡ The denominator used to calculate the percentage is based on the total number of notifications from all jurisdictions, except Queensland. As more than one exposure category for each case could be recorded, the total percentage does not equate to 100%.

§ Includes both occupational and non-occupational exposures.

Figure 11: Notification rate for newly acquired hepatitis C, Australia,* 1999 to 2009, by age group and year



* Data from all states and territories except Queensland (1999–2009) and the Northern Territory (1999–2002).

Unspecified hepatitis C notifications

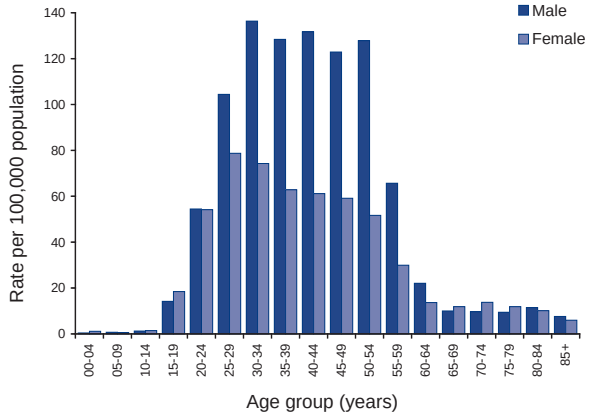
In 2009, 11,081 unspecified hepatitis C infections were notified to the NNDSS (50.7 per 100,000 population) compared with 11,098 notifications in 2008 (51.8 per 100,000 population).

The national notification rate for unspecified hepatitis C infection declined from 101.6 per 100,000 population in 1999 to 50.7 per 100,000 population in 2009 (Figure 9). Several factors may account for the decrease: changes in surveillance practices, including duplicate notification checking; a gradual decline in the prevalent group of hepatitis C cases accumulated prior to the introduction of hepatitis C testing in the early 1990s; and general reductions in risk behaviours related to injecting drug use, including the implementation of needle exchange programs.[18–20]

In 2009, the Northern Territory continued to have the highest notification rate (71.2 per 100,000 population) followed by New South Wales (55.1 per 100,000 population) and Tasmania (52.1 per 100,000 population). Queensland's rate was also high, at 61.5 per 100,000 population, however this included both newly acquired and unspecified cases.

The male to female ratio remained consistent with historical trends at 1.7:1. Amongst males, notification rates were highest across the age group range 30–34 to 50–54 years at around 129 per 100,000 population (range: 127.8 to 136.3). In the female population, notification rates were highest in the 25–29 and 30–34 years age groups, at 78.7 and 74.3 per 100,000 population respectively (Figure 12).

Figure 12: Notification rate for unspecified hepatitis C,* Australia, 2009, by age group and sex†



* Data provided from Queensland includes both newly acquired and unspecified hepatitis C cases.

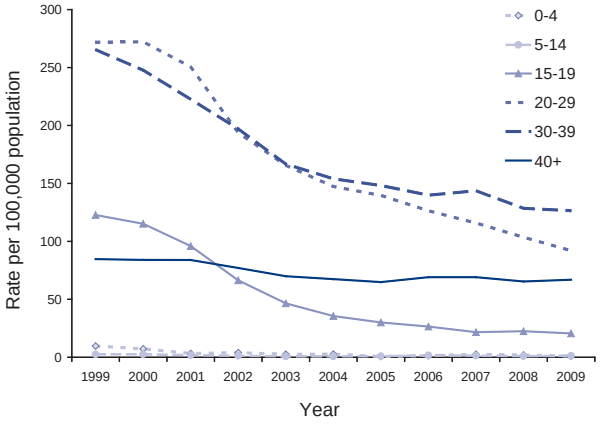
† Excludes 60 cases whose age or sex was not reported.

Trends in the age distribution of unspecified hepatitis C infection are shown in Figure 13. Between 2000 and 2009, the notification rate of unspecified hepatitis C declined by 82% amongst the 15–19 years age group, by 66% amongst the 20–29 years age group and by 49% in the 30–39 years age group. Trends in the 0–4 and the 40 years and over age groups have remained relatively stable over the past 10 years.

Hepatitis D

Hepatitis D is a defective single-stranded ribonucleic acid virus (RNA) that replicates in the presence of the hepatitis B virus. Hepatitis D infection can occur either as a co-infection with hepatitis B or as a super-infection with chronic hepatitis B infection.[21] 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 group at risk for hepatitis D.

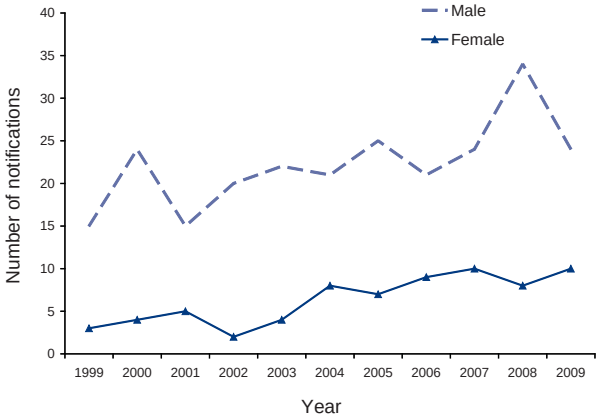
Figure 13: Notification rate for unspecified hepatitis C,* Australia, 1999 to 2009, by age group and year



* Data provided from Queensland (1999–2009) and the Northern Territory (1999–2002) includes both newly acquired and unspecified hepatitis C cases.

In Australia, the rate of hepatitis D remains low. In 2009, there were 34 notifications of hepatitis D (0.2 per 100,000 population) reported from Queensland (13), Victoria (12) and New South Wales (9). Over the past 5 years, notifications of hepatitis D have continued to remain relatively stable at around 34 notifications per year (range: 29 to 42), and over this time the male to female ratio was around 3:1 (Figure 14).

Figure 14: Notifications of hepatitis D, Australia, 1999 to 2009, by sex



Gastrointestinal diseases

In 2009, gastrointestinal diseases notified to NNDSS were: botulism, campylobacteriosis, cryptosporidiosis, haemolytic uraemic syndrome (HUS), hepatitis A, hepatitis E, listeriosis, salmonellosis, shigellosis, Shiga toxin-producing *Escherichia coli* (STEC) infections and typhoid.

Overall notifications of gastrointestinal diseases increased 16% from 27,308 in 2008 to 31,697 in 2009. Notifications of cryptosporidiosis, hepatitis A, listeriosis and STEC were notably increased compared with the 5-year mean (exceeded the mean by more than 2 standard deviations).

Australia's enhanced foodborne disease surveillance network, OzFoodNet, monitors the incidence of diseases caused by pathogens commonly transmitted by food, using population-based passive and enhanced surveillance for notifiable gastrointestinal diseases and for outbreaks of gastroenteritis and enteric disease. In 2009, OzFoodNet aggregated and analysed data from NNDSS, supplemented by enhanced surveillance data, on the following 9 diseases or conditions, a proportion of which may be transmitted by food: non-typhoidal salmonellosis, campylobacteriosis, listeriosis, shigellosis, typhoid, STEC infections, botulism, HUS and hepatitis A. The data and results from these analyses are summarised in the following sections but are reported in more detail elsewhere.[22]

Botulism

Botulism is a rare but extremely serious intoxication resulting from toxins produced by *Clostridium botulinum* (commonly toxin types A, B and E). Three forms of botulism are recognised; infant, foodborne and wound.[21] Infant botulism occurs when *C. botulinum* spores are ingested, germinate in the infant's intestine and the organism produces botulinum toxin. It does not include cases where the preformed toxin is ingested, these are considered foodborne.

One case of botulism was reported to NNDSS in 2009; an infant botulism case reported from Queensland.[22] The case was hospitalised in intensive care with onset of symptoms (acute flaccid paralysis) in March 2009. *C. botulinum* toxin was detected in a stool sample and culture by mouse bioassay, and identified as toxin type B. The infant was entirely breast-fed and had not had a bowel motion for approximately 2 weeks prior to admission. It was speculated that the slow transit time within the bowel provided time for the toxin to develop. Treatment included human immunoglobulin for infant botulism obtained from the United States of America.

There were no notifications of botulism reported in 2008 and one in 2007.

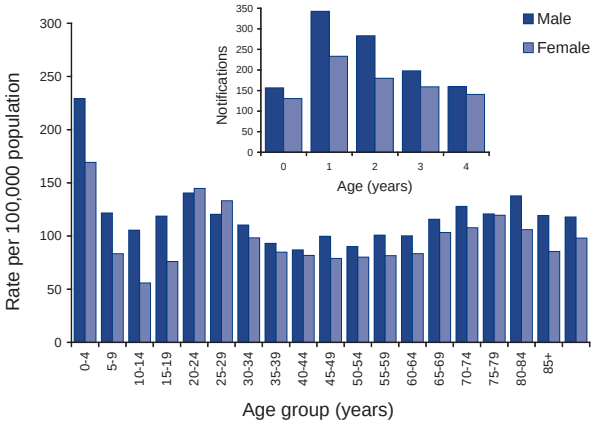
Campylobacteriosis

Campylobacteriosis is notifiable in all Australian jurisdictions, except New South Wales.

In 2009, there were 15,973 notifications of campylobacteriosis, similar to the 15,535 notifications reported in 2008. The national rate of campylobacteriosis notifications was also similar to the previous year, with 108.1 notifications per 100,000 population in 2009 compared with 107.5 per 100,000 in 2008.

Notification rates were highest amongst males in nearly all age groups. The highest age specific rate for both males and females was in infants aged 1 year (343 and 233 notifications per 100,000 population, respectively) with additional peaks in the 20–29 and 70–84 year age-groups (Figure 15).

Figure 15: Notification rate for campylobacteriosis, Australia, 2009, by age group and sex. Inset: age and sex in children aged under 5 years



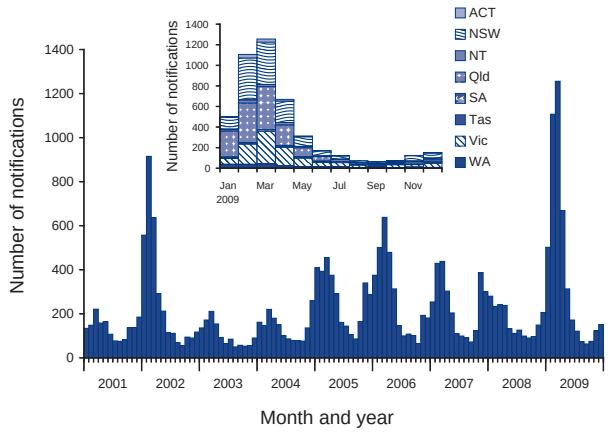
Cryptosporidiosis

In 2009, 4,625 notifications of cryptosporidiosis were reported to NNDSS, a national rate of 21.1 notifications per 100,000 population. This represents a 130% increase over the 2,003 notifications reported in 2008 and is the largest number reported since the disease became nationally notifiable in 2001 (Figure 16). Cryptosporidiosis notifications fluctuate from year to year, and notifications are most numerous in autumn and summer, with some regional variation.

The highest notification rate was in the Northern Territory, with a rate of 66.7 per 100,000 population (150 notifications). There were 4 recognised outbreaks of cryptosporidiosis in the Northern Territory in 2009, all of them occurring in remote Indigenous communities.

The largest number of notifications was reported from New South Wales (1,463), where notifications were increased by 143% compared with the 5-year mean of 861 notifications for the state. This increase was due to a large outbreak of cryptosporidiosis asso-

Figure 16: Notifications of cryptosporidiosis, Australia, by month and year, 2001 to 2009. Inset: by month and state or territory

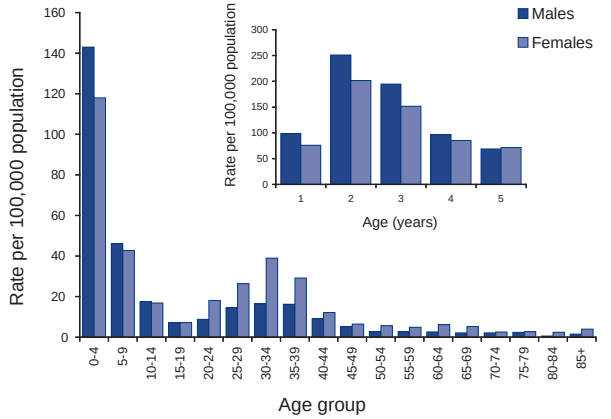


ciated with public swimming pools in early 2009. The NSW Department of Health (NSW Health) issued several public health alerts through the media, and NSW Health's Environmental Health Branch worked with the owners of the affected swimming pools to reduce the risk of further transmission.

The completeness of the Indigenous status field nationally (47.9%) was too low for meaningful analysis, but in the Northern Territory, cases amongst Indigenous people accounted for 64.7% of notifications in 2009, with 94.7% data completeness.

In 2009, 52.9% of nationally notified cases were female. Forty per cent of all notified cases were in children aged under 5 years with notification rates higher amongst males in this age group (Figure 17).

Figure 17: Notification rate for cryptosporidiosis, Australia, 2009, by age group and sex. Inset: age and sex in children aged under 5 years



Haemolytic uraemic syndrome

Haemolytic uraemic syndrome is a rare but serious disease, related to some gastrointestinal infections, and results in chronic complications in 40% of cases.[23] In 2009, there were 12 notifications of HUS (rate 0.05 per 100,000 population) (Table 3), compared with 31 in 2008 and a mean of 20 notifications per year (0.1 per 100,000 population) between 2004 and 2008.

The median age of HUS notifications was 10 years (range 1 to 89 years) and were most frequently reported amongst children aged 0–4 years (Table 11).

HUS can result from an antecedent STEC infection, but may be due to non-enteric infections, or non-infectious causes. An antecedent STEC infection was reported in 41.7% (5) of notified cases. One was associated with a non-Shiga toxin-producing *E. coli* infection, 1 case was associated with *Streptococcus pneumoniae* infection, and no aetiology was reported for the remaining 5 notifications.[22]

Table 11: Notifications of haemolytic uraemic syndrome, Australia, 2009, by age group

Age group	Number of notifications
0–4	4
5–9	2
10–14	2
15–19	0
20–24	0
25–29	1
30–34	0
35–39	0
40–44	0
45–49	0
50–54	0
55–59	0
60–64	1
65–69	0
70–74	0
75–79	1
80–84	0
85+	1

Hepatitis A

In 2009, there were 563 notifications of hepatitis A in Australia, a 104% increase compared with the 277 notifications in 2008 (Table 3). The rate of 2.6 notifications per 100,000 population compared with the 5-year mean of 0.3 per 100,000.[22] This

increase (Figure 18) was largely attributable to an outbreak of locally-acquired infections between 1 March 2009 and 18 March 2010, associated with the consumption of semi-dried tomatoes.[22,24]

Hepatitis A was most frequently notified amongst young adults (Figure 19). The median age of notified cases was 32 years (range 1–88 years). Half (50.4%) of all notified cases were female.

Figure 18: Notifications of hepatitis A, Australia, 1991 to 2008, by year of diagnosis

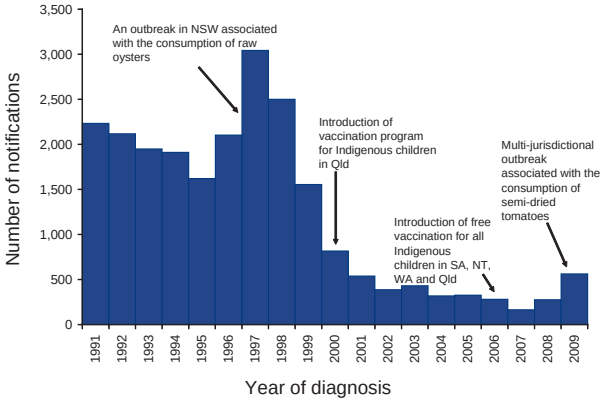
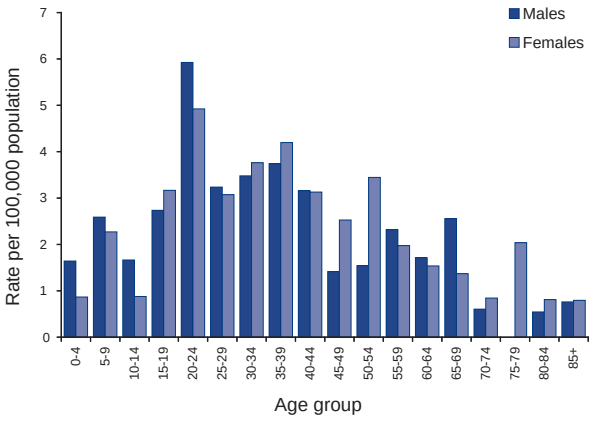


Figure 19: Notification rate for hepatitis A, Australia, 2009, by age group and sex



While overseas travel has been the most frequently reported risk factor for notified cases in recent years,[25] in 2009 a higher than usual proportion of notified cases were locally-acquired (67% in 2009 compared with less than 45% between 2004 and 2008). This increase was due to the semi-dried tomato outbreak (Table 12).

The proportion of notifications of hepatitis A in Australia in Indigenous persons remains low, with only 1% of notifications in 2009 reported as Indigenous, compared with 10%–12% (37–53 notifications) per year between 2003 and 2006, and less than 2% in 2007 and 2008 (0 and 3 notifications respectively). Indigenous status was known for 92% of notifications in 2009. This marked decrease in recent years in the number and proportion of notifications who were Indigenous is likely to be due in part to targeted vaccination programs for Indigenous children commencing in north Queensland in 1999, and the provision of free hepatitis A vaccine for all Indigenous children in the whole of Queensland, South Australia, Western Australia and the Northern Territory from 2006 (Figure 18).[26]

Hepatitis E

In 2009, there were 33 notifications of hepatitis E, compared with 44 notifications in 2008. Hepatitis E in Australia is associated strongly with overseas travel, with 68% (30)[27] and 89% (16/18)[28] of notified cases in 2008 and 2007 respectively known to have been acquired overseas. Data on travel status were not collated nationally in 2009.

Listeriosis

Invasive listeriosis commonly affects the elderly or immunocompromised, and is most common amongst people with serious or terminal underlying illnesses, but also amongst pregnant women and their newborn babies. Foetuses may become infected *in utero*. Laboratory-confirmed infections in a mother and unborn child or a neonate are notified separately in the NNDSS. However,

Table 12: Notifications of hepatitis A, Australia, 2004 to 2009, by place of acquisition

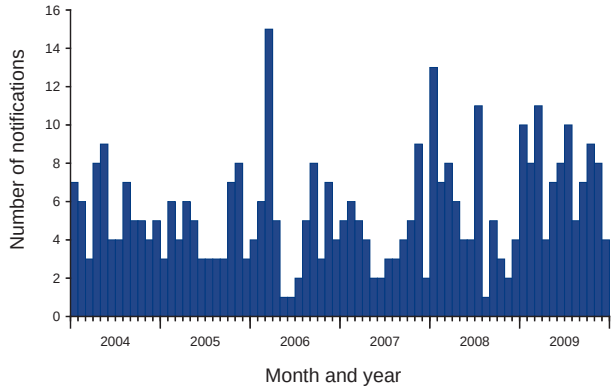
	Locally acquired		Acquired overseas		Unknown	
Year	%	n	%	n	%	n
2004	44.7	143	30.6	98	24.7	79
2005	36.7	121	31.8	105	31.5	104
2006	42.1	120	37.9	108	20.0	57
2007	30.5	50	57.9	95	11.6	19
2008	37.0	102	55.8	154	7.2	20
2009	67.0	377	30.4	171	2.7	15

OzFoodNet counts such pairs as 1 case', with the mother reported as the primary case, leading to differences in numbers from those reported here.

In 2009, 91 notifications of invasive *Listeria monocytogenes* infection were reported to NNDSS (0.4 per 100,000 population) compared with a 5-year historical mean of 60 notifications (0.3 per 100,000) (Figure 20). This increase was in part due to a multi-jurisdictional outbreak of listeriosis that was associated with the consumption of contaminated chicken wraps.[22]

Seventeen of these 91 notified cases (19%) were pregnancy related, occurring in pregnant women and/or their newborn babies. In 2009, 55% (41/74) of the non-pregnancy related cases were female. Fifty-six per cent (51/91) of notifications were in people aged 60 years or more (this group forms 19% of the Australian population) and the highest age-specific notification rate was in people aged 85 years or more (12 notifications, 3.1 per 100,000 population).

Figure 20: Notifications of invasive listeriosis, Australia, 2004 to 2009, by month and year



Salmonellosis (non-typhoidal)

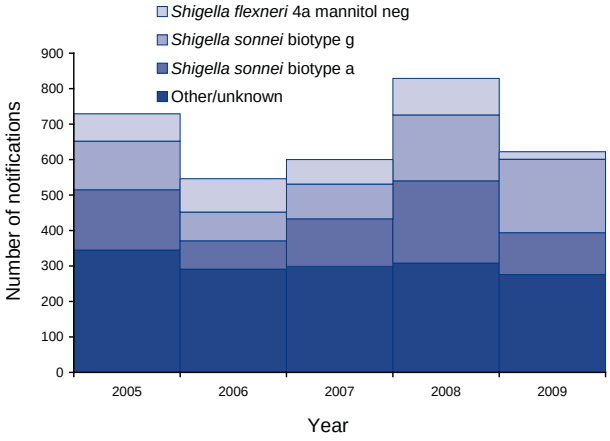
There were 9,533 notifications of salmonellosis in Australia in 2009 representing a rate of 43.6 notifications per 100,000 population, compared with a 5-year mean of 40.8 per 100,000.[22] Notification rates ranged from 30 per 100,000 in Victoria to 217 per 100,000 in the Northern Territory. In 2009, 51% of notifications were in females. Children aged 0–1 year had the highest age specific notification rate (300 per 100,000).

Individual notifications are rarely attributed to a particular source. In Australia, *Salmonella* infections, and in particular serotype Typhimurium, frequently manifest as outbreaks transmitted via contaminated food, and investigation of these outbreaks provides information about high-risk foods to inform policy and regulation. In 2009, OzFoodNet epidemiologists investigated 60 foodborne or suspected foodborne outbreaks of salmonellosis, affecting 771 people, although not all of these were laboratory-confirmed cases.[22] The most frequently reported *Salmonella* serotypes nationally were *S.* Typhimurium (32% of notified cases) and *S.* Enteritidis (18% of notified cases).

Shigellosis

In 2009, 622 notifications of shigellosis were reported, a rate of 2.8 per 100,000 population, similar to the 5-year mean of 3.1 per 100,000. As in previous years, the highest notification rate was in the Northern Territory (37.8 per 100,000), although this was lower than its 5-year mean (74.7 per 100,000).[22] *Shigella sonnei* biotype g (33%; 207) was the most commonly reported biotype in 2009, followed by *S. sonnei* biotype a (19%; 118) (Figure 21).

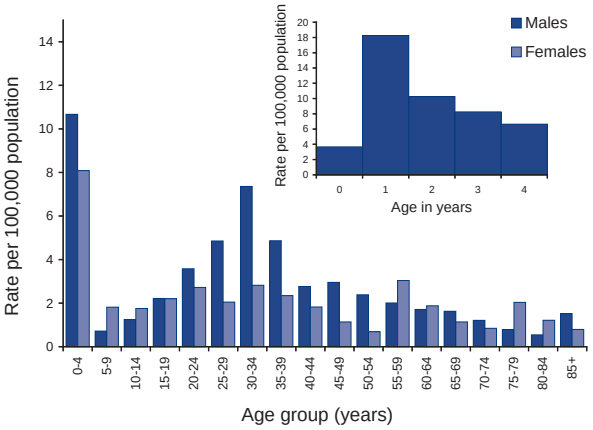
Figure 21: Notifications of shigellosis, Australia, 2005 to 2009, by biotype



Notification rates for shigellosis were highest in males and females aged 0–4 years (10.7 and 8.1 per 100,000, respectively). Secondary peaks were observed in males aged 30–44 years, and in females aged 55–59 years. Amongst children under 5 years of age, the highest notification rates were in children aged 1 year (Figure 22).

Information on Indigenous status was available for 66.6% (414) of notifications. Data completeness on Indigenous status varied by state or territory, with the Australian Capital Territory, New South Wales, Queensland, and South Australia being less than 85% complete. Amongst jurisdictions with greater than 85% completeness, the proportion of notified cases who identified as being of Aboriginal or Torres Strait Island origin was 48.6% (142/292).

Figure 22: Notification rate for shigellosis, Australia, 2009, by age group and sex. Inset: notifications in children aged under 5 years, Australia, 2009



Information on overseas travel status as a risk factor was available for 47.4% (295/622) of notified cases, with 45.8% (135/295) of these reporting overseas travel during the time when they were likely to have been exposed to the infection (Table 13). The most frequently reported countries of acquisition for imported cases were Indonesia (29.6%, 40/135) and India (11.9%, 16/135).[22]

Shiga toxin-producing *Escherichia coli* infections

There were 130 notifications of STEC in Australia in 2009,, a rate of 0.6 notifications per 100,000 population (Table 3) compared with the 5-year mean of 0.4 per 100,000.[22] Thirty-one per cent (40) of notifications in 2009 were known to have been associated with 3 jurisdictional outbreaks and a multi-jurisdictional cluster, which may in part explain the higher overall rate.

Rates of STEC infection are strongly influenced by jurisdictional practices regarding the screening of stool specimens.[29] In particular, South Australia routinely tests all bloody stools by polymerase chain reaction (PCR) for genes coding for Shiga toxins and other virulence factors, making rates for this state the highest in the country at 3.9 per 100,000 population.

In 2009, 56.9% of notified cases were female. The median age of notified cases was 44 years (range 0–91 years). Age specific notification rates were highest in younger (0–19 years) and older (55 years or older) age groups, with 35.4% (46/130) and 41.5% (54/130) respectively falling into these age groups (Figure 23).

Typhoid

There were 115 notifications of *S.* Typhi infection (typhoid) during 2009 (0.5 per 100,000 population), which was slightly higher than the 5-year mean of 0.4 per 100,000.[22]

Figure 23: Notification rate for Shiga toxin-producing *Escherichia coli*, Australia, 2009, by age group

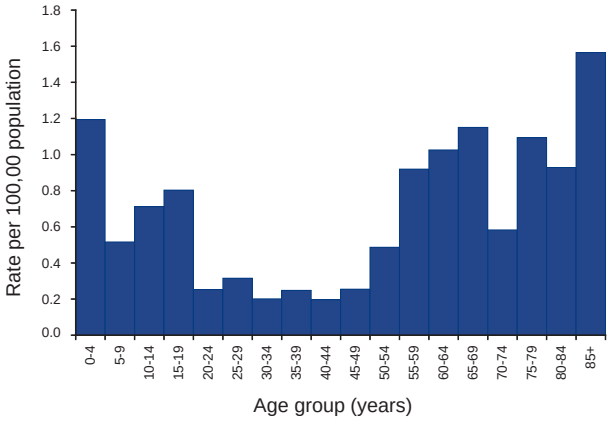


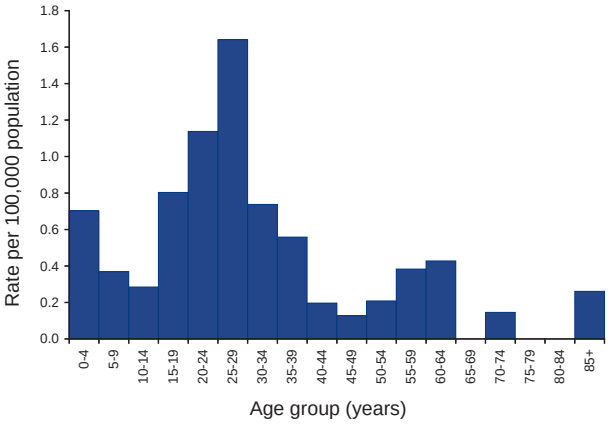
Table 13: Notifications of shigellosis, Australia, 2009, by overseas travel status

State or territory	Overseas travel			Overseas acquired (%)	Total
	Yes	No	Not stated/ unknown		
ACT	6	2	0	75.0	8
NSW	10	1	145	6.4	156
NT	2	4	79	2.4	85
Qld	20	48	47	17.4	115
SA	28	11	12	54.9	51
Tas	2	0	0	100.0	2
Vic	39	40	6	45.9	85
WA	28	54	38	23.3	120
Total	135	160	327	21.7	622

Similar to previous years, overseas travel was the primary risk factor for notified cases in 2009, with 88.7% (102/115) of notified cases known to have been acquired overseas, compared with 92.3% (97/105) in 2008.[27] India continues to be the most frequently reported country of acquisition, accounting for 61.8% (63/102) of overseas acquired cases in 2009, with a range of other countries in South and South East Asia reported as the place of acquisition, each by less than 1% of cases.

Age specific notification rates were highest in the 25–29 years age group (1.6 per 100,000 population) and the 20–24 years (1.1 per 100,000) age group (Figure 24), reflecting higher rates of overseas travel in young adults.

Figure 24: Notification rate for typhoid, Australia, 2009, by age group



Quarantinable diseases

Human diseases covered by the *Quarantine Act 1908,* and notifiable in Australia and to the WHO in 2009 were cholera, plague, rabies, yellow fever, smallpox, highly pathogenic avian influenza in humans (HPAIH), severe acute respiratory syndrome (SARS), human swine influenza (H1N1) and 4 viral haemorrhagic fevers (Ebola, Marburg, Lassa and Crimean–Congo).

Cholera, plague, rabies, smallpox, yellow fever, SARS, HPAIH, H1N1 and viral haemorrhagic fevers are of international public health importance. Travellers are advised to seek information on the risk of contracting these diseases at their destinations and to take appropriate measures. More information on quarantinable diseases and travel health can be found on the following web sites:

Australian Government Department of Health and Ageing web site at: http://www.health.gov.au/internet/main/publishing.nsf/Content/health-pubhlth-strateg-quaranti-index.htm

Smartraveller: The Australian Government's travel advisory and consular assistance service at: http://www.smartraveller.gov.au/

There were no cases of plague, rabies, smallpox, yellow fever, SARS, HPAIH or viral haemorrhagic fevers reported in Australia in 2009. Table 14 provides information on the occurrence of quarantinable diseases in Australia.

Table 14: Australia's status for human quarantinable diseases, 2009

Disease	Status	Date of last record and notes
Cholera	Free	A small number of cases are reported annually and related to overseas travel or imported food products.[27]
Plague	Free	Last case recorded in Australia in 1923.[30]
Rabies	Free	Last case (overseas acquired) recorded in Australia in 1990.[31]
Smallpox	Free	Last case recorded in Australia in 1938[32]
Yellow fever	Free	No cases recorded on shore in Australia – 5 occasions on which vessels arrived in Australian ports 1892–1915.[30]
SARS	Free	Last case recorded in Australia in 2003.[33]
HPAIH	Free	No cases recorded.[34]
H1N1	Currently circulating as seasonal virus	See vaccine preventable diseases section.
Viral haemorrhagic fevers		
Ebola	Free	No cases recorded.[35]
Marburg	Free	No cases recorded.[35]
Lassa	Free	No cases recorded.[35]
Crimean–Congo	Free	No cases recorded.[35]

Cholera

In 2009, there were 4 notifications of cholera reported to the NNDSS in Australia, three from New South Wales and one from Victoria. All were acquired overseas.

All cases of cholera reported since the commencement of the NNDSS in 1991 have been acquired outside Australia except for 1 case of laboratory-acquired cholera in 1996[36] and 3 cases in 2006.[37] There have been 19 cases of cholera notified between 2004 and 2008 (Table 6).

Sexually transmissible infections

In 2009, the sexually transmissible infections (STIs) reported to the NNDSS were chlamydial infection, donovanosis, gonococcal infection and syphilis. Other national surveillance systems that monitor STIs in Australia include the Australian Gonococcal Surveillance Programme (AGSP), which is a network of specialist laboratories monitoring antimicrobial susceptibility patterns of gonococcal infection, and the Kirby Institute, which maintains the National HIV Registry and the National AIDS Registry.

The national trends in the number and rates of STI notifications reported to the NNDSS between 2004 and 2009 are shown in Table 6. In interpreting these data it is important to note that changes in notifications over time may not solely reflect changes in disease prevalence: changes in screening programs,[38,39] the use of less invasive and more sensitive diagnostic tests and periodic public awareness campaigns may influence the number of notifications that occur over time. For some diseases, changes in surveillance practices may also need to be taken into account when interpreting national trends.

Direct age standardised notification rates, using the method described by the Australian Institute of Health and Welfare,[40] were calculated for Indigenous and non-Indigenous notifications for jurisdictions that had Indigenous status data completed for more than 50% of notifications over the period 2004 to 2009. Where the Indigenous status of a notification was not completed, these notifications were counted as non-Indigenous in the analysis. These data however, should be interpreted with caution as STI screening occurs predominately in specific high risk groups, including in Indigenous populations. Previous research into high rates of STIs amongst the Indigenous population in the Northern Territory suggested that the disparity in notification rates could be attributed to more targeted screening programs and poorer access to primary health care services, rather than to increased levels of transmission amongst Indigenous people.[41,42] Similarly, the differences in rates between females and males should be interpreted with caution, as rates of testing for STIs, symptom status, health care-seeking behaviours, and partner notification differ between the sexes.[43]

In the national case definitions for chlamydial, gonococcal and syphilis infections the mode of transmission cannot be inferred from the site of infection. Infections in children may be acquired perinatally (e.g. gonococcal conjunctivitis).[44] Notifications of chlamydial, gonococcal and non-congenital syphilis infections were excluded from analysis where the case was aged less than 13 years and the infection was able to be determined as non-sexually acquired.

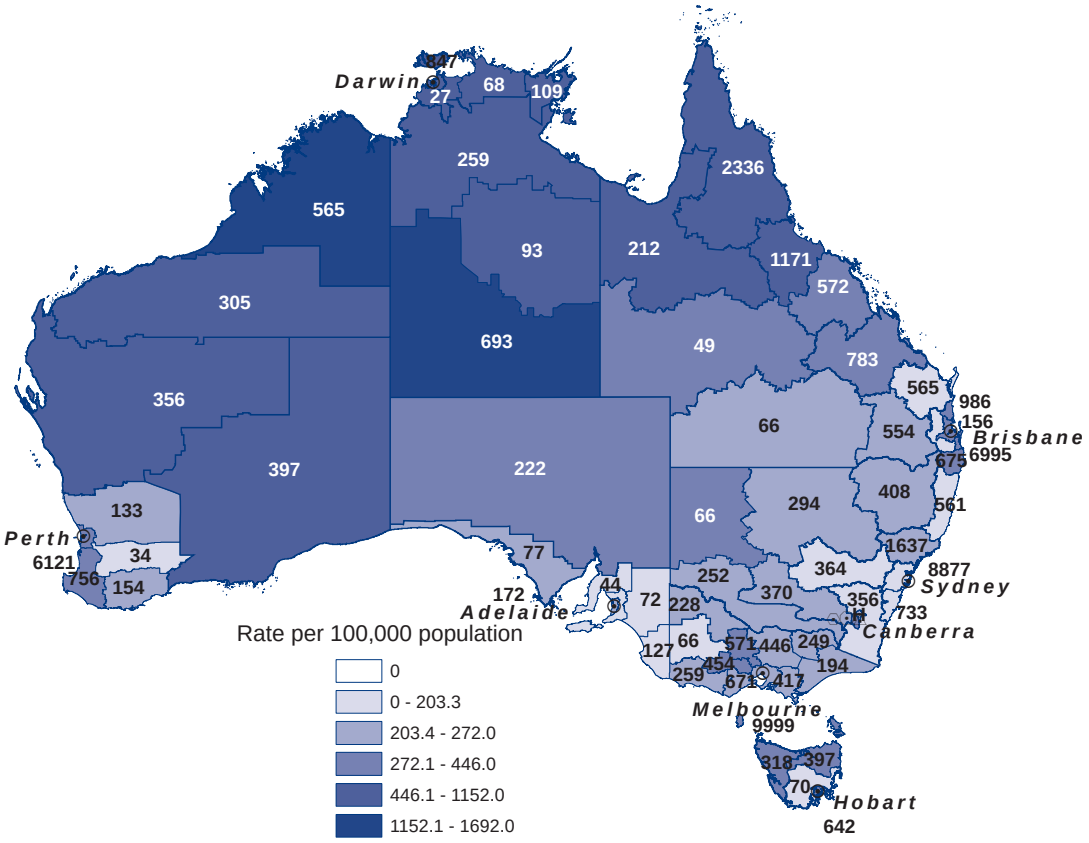
Chlamydial infection

Chlamydial infection continued to be the most commonly notified disease in 2009. Since chlamydial infection became a nationally notifiable disease in 1991 (1997 in New South Wales), the rate has increased in each consecutive year. In 2009, there were a total of 62,660 notifications of chlamydial infection, equating to a rate of 286 per 100,000 population. This represents an increase of 5% compared with the rate reported in 2008 (273 per 100,000 population). Between 2004 and 2009, chlamydial infection notification rates increased by 61%, from 180 to 286 per 100,000 population (Table 6).

Chlamydial infection notification rates were substantially higher than the national rate in the Northern Territory (941 per 100,000 population), Western Australia (395 per 100,000 population) and Queensland (379 per 100,000 population) (Table 5). At a regional level, chlamydial infection notification rates were highest in the Central NT Statistical Subdivision of the Northern Territory and the Kimberley Statistical Division of Western Australia (range: 1,152–1,692 notifications per 100,000 population), noting that notification rates in geographic areas where the estimated residential population and case numbers are small, should be interpreted with caution. Notifications rates were also substantially higher than the national rate (range: 446–1,152 notifications per 100,000 population) in the Statistical Divisions of the Far North West and Northern Queensland, the Pilbara, Central and South Eastern Western Australia, and the remaining Northern Territory Statistical Subdivisions, (Map 2).

In 2009, notification rates of chlamydial infection in males and females were 236 and 336 per 100,000 population respectively. When compared with 2008, notification rates increased by 7% in males and 4% in females. The male to female ratio in 2009 was 0.7:1, which was similar to previous years. Rates in

Map 2: Notification rates and counts* for chlamydial infection, Australia, 2009, by Statistical Division and Statistical Subdivision of residence in the Northern Territory



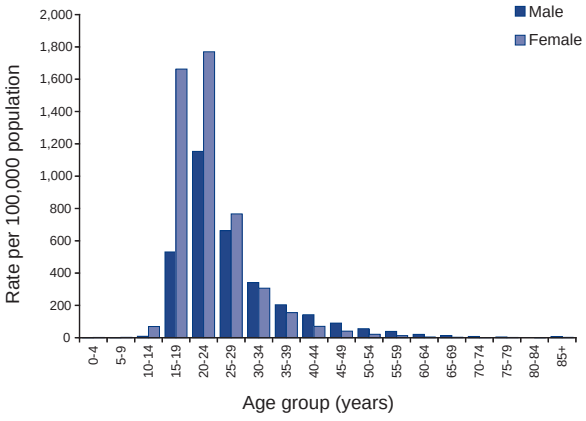
* Numbers in the shaded Statistical Divisions and Statistical Subdivisions represent the count of notifications.

females markedly exceeded those in males, especially in the 10–14 and 15–19 years age groups with ratios of 0.1:1 and 0.3:1, respectively (Figure 25).

Between 2004 and 2009, there was an increasing trend in chalmydia notification rates across all age groups, except the 10–14 years age group, and in both males and females (Figure 26). The greatest increase in notifications rates occurred in both males and females in the 15–19 (10% and 68% respectively) and the 20–29 (55% and 51% respectively) years age groups. These age groups accounted for around 80% of the annual number of notifications over the period 2004 to 2009.

From 2004 to 2009, the rates of chlamydial infection diagnoses increased in both Indigenous and non-Indigenous populations. Nationally in 2009, data on Indigenous status were complete in 49% of notifications; higher than the preceding 5-year average of 44% (range: 40%–48%). It should be noted that the completeness of Indigenous status identification in the notification data varies by year and by jurisdiction. Four jurisdictions had greater than 50% completeness of the Indigenous status field across the 2004 to 2009 period: the Northern Territory, South Australia, Tasmania and Western Australia. Among these jurisdictions, the combined age standardised notification rate ratio between Indigenous and non-Indigenous populations in 2009 was 3.6:1, with the disparity in notification rates improving substantially since 2000.

Figure 25: Notification rate for chlamydial infection, Australia, 2009, by age group and sex*



* Excludes 115 notifications for whom age or sex were not reported.

Between 2006 and 2008, rates of chlamydial infection notifications amongst these jurisdictions remained relatively stable at around 1,226 per 100,000 in the Indigenous population, but increased in the non-Indigenous population by 32%. In 2009, the rate of notifications in the Indigenous population declined by 10% compared with 2008, with relatively no change observed in the non-Indigenous population. At the jurisdictional level, between 2008 and 2009, chlamydia notification rates in the Indigenous population decreased in the Northern Territory, South Australia and Western Australia, while rates in their non-Indigenous counterparts remained relatively stable (Figure 27). The overall high Indigenous rates observed in the Northern Territory may be partly explained by high levels of screening, which take place in remote Indigenous communities.

Figure 26: Notification rate for chlamydial infection in persons aged 10–39 years, Australia, 2004 to 2009, by age group and sex

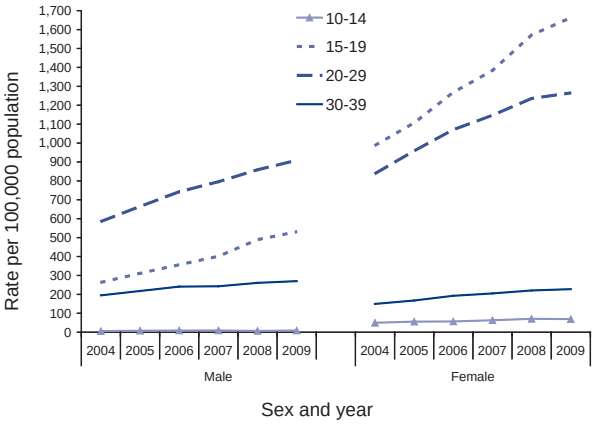
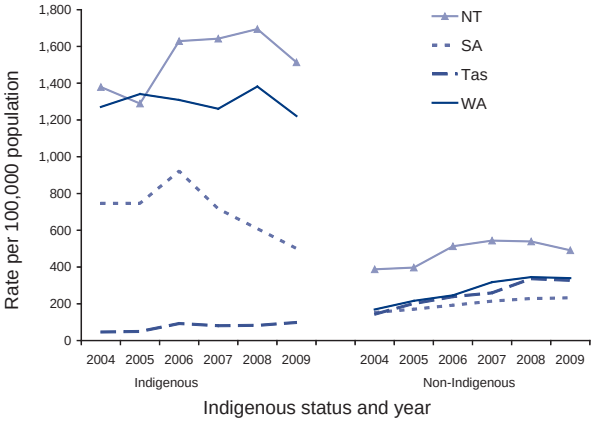


Figure 27: Notification rate for chlamydial infection, selected states and territories,* 2004 to 2009, by Indigenous status



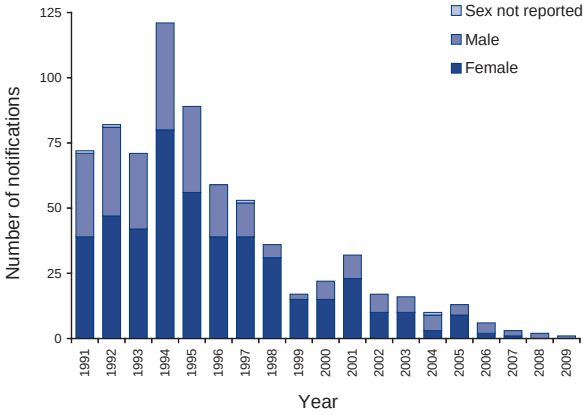
* Includes notifications in the Northern Territory, South Australia, Tasmania and Western Australia where Indigenous status completeness was reported for more than 50% of cases between 2004 and 2009.

Between May 2007 and June 2010, the Australian Department of Health and Ageing funded a pilot program called the Australian Collaboration for Chlamydia Enhanced Surveillance (ACCESS). The aim of the program was to monitor the uptake and outcome of chlamydia testing in Australia through a range of sentinel sites including sexual health services, general practices and laboratories. In 2009, ACCESS identified that chlamydia positivity, amongst people who accessed the sentinel sites, was 10.6% amongst males and 9.3% amongst females, with positivity highest in the 16–19 years age group across most of the sentinel sites.[18, 45] Enhanced surveillance of chlamydial notifications undertaken in Tasmania during 2008 identified that 57% of males presented as asymptomatic compared with 70% of females (personal communication, David Coleman, Tasmanian Department of Health and Human Services, 2 July 2010). Enhanced chlamydial surveillance data in Tasmania for the period 2001 to 2007 noted that females were more likely to have been tested for chlamydial infection as a result of screening, and males were more likely to have been tested when presenting with symptoms or as a result of contact tracing.[43] Therefore, notification rates for chlamydia, and other STIs, are particularly susceptible to overall rates of testing as well as targeted testing in certain high risk population sub-groups.

Donovanosis

Donovanosis was targeted for elimination in Australia through the National Donovanosis Elimination Project.[46] It predominantly occurred in rural and remote Indigenous communities in central and northern Australia and is now relatively uncommon. In 2009, one notification was reported to the NNDSS in an Indigenous male from Queensland (Figure 28).

Figure 28: Notifications of donovanosis, Australia, 1991 to 2009, by sex and year



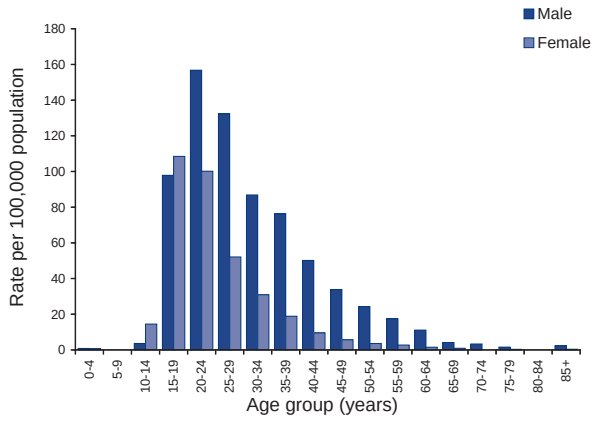
Gonococcal infections

In 2009, 8,059 notifications of gonococcal infection were reported to the NNDSS, equating to a notification rate of 36.8 per 100,000 population. This was a slight increase compared with 2008 (35.7 per 100,000 population). Due to a reporting issue, gonococcal notification data for Queensland is under-reported in 2009 and therefore should be interpreted with caution.

The highest notification rate in 2009 was in the Northern Territory (669 per 100,000 population), which was almost 18 times higher than the national rate (Table 5). Considerable declines in notification rates between 2008 and 2009 were observed in Western Australia (23%), South Australia (20%) and Tasmania (17%). Increases in notification rates for the same period were observed in Victoria (64%) and New South Wales (22%), with the Australian Capital Territory reporting an increase from 6.1 to 15.7 per 100,000 population.

Nationally, there was an increase in the gonococcal infection notification rates in males (6%) and a decrease in females (3%). Gonococcal infection notification rates were over two times higher amongst males compared with females (49.7 and 24.0 per 100,000 population respectively). The male to female rate ratio in 2009 was 2:1, which is similar to the previous 5 years. As in previous years, the exception to this pattern was the Northern Territory, where females had an overall higher notification rate than males (677 compared with 242 per 100,000 population). Nationally, notification rates of gonococcal infection in males exceeded those in females in all age groups except in the 10–14 and 15–19 years age groups (Figure 29).

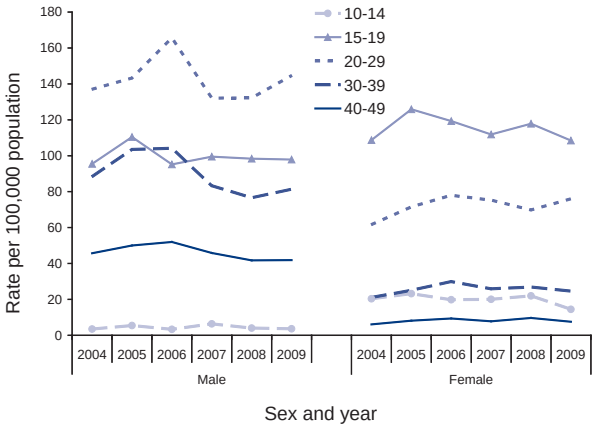
Figure 29: Notification rate for gonococcal infections, Australia, 2009, by age group and sex*



* Excludes 20 notifications for whom age or sex were not reported.

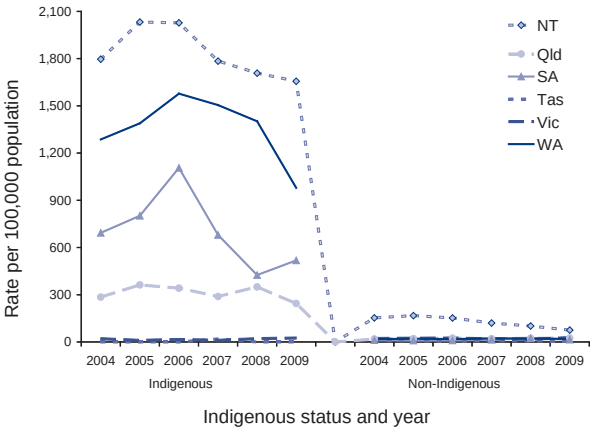
Trends in age specific notification rates show that there was an increase in gonococcal notifications amongst males in the 20–29 years age range in 2009 compared with 2007 and 2008. The notification rate of gonococcal infection in females across most age groups continued to have slight declines, with a small increase observed in the 20–29 years age group between 2008 and 2009 (Figure 30).

Figure 30: Notification rate for gonococcal infection in persons aged 10–49 years, Australia, 2004 to 2009, by age group and sex



In 2009, the data completeness of the Indigenous status field for gonococcal infection notifications was 65%, which was a decrease compared with previous years (around 70%). Six jurisdictions had greater than 50% completeness of the Indigenous status field: the Northern Territory, Queensland, South Australia, Tasmania, Victoria and Western Australia. Amongst these jurisdictions the combined age standardised notification rate for gonococcal infection was 634 per 100,000 in the Indigenous population and 24 per 100,000 in the non-Indigenous population resulting in an Indigenous to non-Indigenous rate ratio of 27:1. Between 2008 and 2009, rates of gonococcal infection notifications in the Indigenous population declined by 40% in Western Australia and 30% in Queensland, with a small decline also observed in the Northern Territory (3%). For the same period, an increase in the Indigenous notification rate of gonococcal infections was observed in South Australia (20%). Rates in the non-Indigenous population remained relatively stable over the 2004 to 2009 period, with declines observed in the Northern Territory between 2006 and 2009 (Figure 31). The overall high Indigenous rates observed in the Northern Territory may be partly explained by high levels of screening which take place in remote Indigenous communities.

Figure 31: Notification rate for gonococcal infection, selected states and territories,* 2004 to 2009, by Indigenous status and year



* Includes notifications in the Northern Territory, Queensland, South Australia, Tasmania, Victoria and Western Australia where Indigenous status completeness was reported for more than 50% of cases over a 5-year period.

Other surveillance of gonococcal infections

The AGSP is the national surveillance system for monitoring the antimicrobial resistance of *Neisseria gonorrhoeae* isolates, via a network of public and private reference laboratories located in each jurisdiction. Susceptibility testing to a core group of antibiotics: penicillin, ceftriaxone, spectinomycin, quinolone and tetracycline is performed on gonococcal isolates using a standardised methodology.

In 2009, the AGSP reported[47] a total of 3,220 gonococcal isolates that were tested for antibiotic susceptibility, representing approximately 40% of gonococcal infection notifications. The decreasing number of gonococcal isolates available for susceptibility testing is affected by the increasing use of non-culture based diagnosis methods.

Of the total number of isolates collected through the AGSP in 2009, there were 2,622 isolates from males, 596 isolates from females (male to female ratio 4.4:1) and there were 2 isolates for which the sex was not reported. In males, 71% of isolates were obtained from the urethra, 17% from the rectum and 10% from the pharynx. In females, the majority of isolates (89%) were obtained from the cervix.

In 2009, approximately 36% of gonococcal isolates had some level of resistance to the penicillins and 43% had some level of resistance to the quinolone antibiotic group. Since 2001, low numbers of isolates with decreased susceptibility to ceftriaxone have been identified in Australia, with 2% of isolates being 'non-susceptible' in 2009. As in previous years, the pattern of gonococcal antibiotic susceptibility differed between states and territories, and rural and urban areas within each jurisdiction,[48] where for example, in remote areas of some jurisdictions with high disease rates, penicillin-based treatments continue to be effective.

Syphilis (non-congenital)

In 2004, all jurisdictions began reporting to the NNDSS non-congenital syphilis infections categorised as: infectious syphilis (primary, secondary or early latent) of less than 2 years duration; and syphilis of more than 2 years or unknown duration. However, in South Australia, only notifications of infectious syphilis are reported to the NNDSS. Detailed analyses are reported for these two categories, as well as for syphilis of the combined categories (syphilis – all categories) for the purpose of showing trends in previous years.

In 2009, a total of 2,676 notifications of syphilis infection of all non-congenital categories were reported, representing a notification rate of 12.2 per 100,000 population; a slight decrease compared with 2008 (12.5 per 100,000 population) (Table 6, Figure 32). The Northern Territory continued to have the highest notification rate of syphilis (61 per 100,000 population), although the rate was 47% lower than in 2008. In 2009, there were increases in notification rates in Tasmania (26%), Queensland (15%), Victoria (7%), New South Wales (7%) and South Australia (5%). As in other developed countries, syphilis infection rates have continued to rise in Australia, predominantly affecting men who have sex with men.[49,50]

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

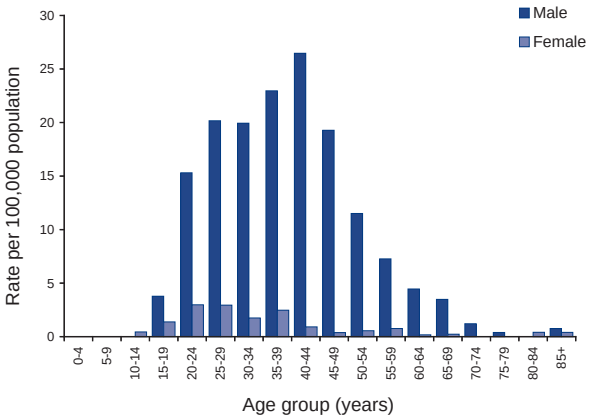
In 2009, 1,291 cases of infectious syphilis (primary, secondary and early latent), less than 2 years duration, were reported to the NNDSS. This represents a notification rate of 5.9 per 100,000 population, a decrease of 4% compared with 2008 (6.1 per 100,000 population) (Table 5). The rate of infectious syphilis notifications increased from 3.1 per 100,000 population in 2004 to 6.7 in 2007 and then declined to 5.9 in 2009 (Figure 32). Although the Northern Territory had the highest notification rate at 17 per 100,000 population in 2009, this was a substantial decrease compared with 2008 (38 per 100,000 population). The decrease was approximately the same in both sexes, even though there continued to be more cases in males than in females.[51]

Nationally, the notification rates of infectious syphilis for males and females were 10.8 and 1.4 per 100,000 population respectively, and represented a male to female ratio of 8:1 (Table 15). Notification

rates in males were highest in the 40–44 years age group (27 per 100,000 population), closely followed by the 35–39 years age group (23 per 100,000), whereas in females the highest notification rates were observed in the 20–24 and 25–29 years age groups (3.0 and 2.9 per 100,000 population respectively) (Figure 33).

Over the period 2005 to 2007, notification rates amongst males increased substantially, in the 20–29, 30–34 and 40–49 years age groups but have remained relatively stable since. The overall increases observed during this period were mainly attributed to men who have sex with men.[18] In females, for the 2004 to 2009 period, rates remained relatively steady, except in the 15–19 years age group where they decreased from a peak of 7.8 per 100,000 population in 2006 to 1.4 per 100,000 population in 2009 (Figure 34).

Figure 33: Notification rate for infectious syphilis (primary, secondary and early latent), less than 2 years duration, Australia, 2009, by age group and sex



* Excludes 1 notification for whom sex was not reported.

Figure 32: Notification rate for non-congenital syphilis infection (all categories), Australia, 2004 to 2009, by year

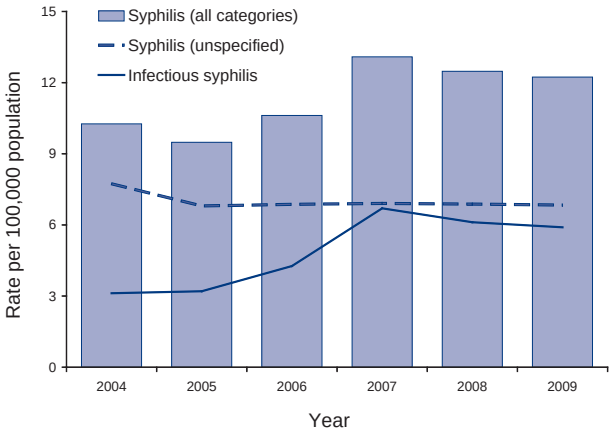


Figure 34: Notification rate for infectious syphilis (primary, secondary and early latent), less than 2 years duration, in persons aged 10 years or over, Australia, 2004 to 2009, by age group and sex

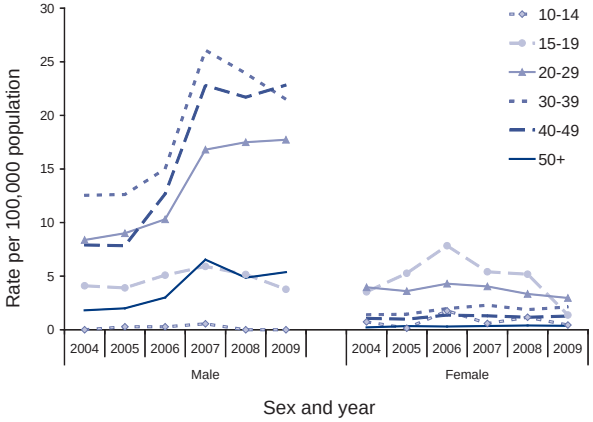


Table 15: Notifications and rates* for infectious syphilis (less than 2 years duration), Australia, 2009, by state or territory and sex†

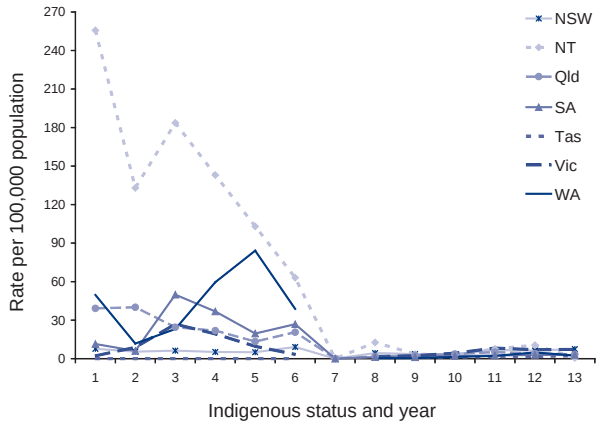
State or territory	Male		Female		Total†	
	Count	Rate*	Count	Rate*	Count	Rate*
ACT/NSW	504	13.7	22	0.6	533	7.2
NT	18	15.4	34	31.4	38	16.9
Qld	168	7.6	20	0.9	179	4.1
SA	44	5.5	7	0.9	53	3.3
Tas	10	4.0	2	0.8	10	2.0
Vic	369	13.7	17	0.6	390	7.2
WA	62	5.5	47	4.3	88	3.9
Total	1,175	10.8	149	1.4	1,291	5.9

* Notification rate per 100,000 population.

† Total includes 1 notification for whom sex was not reported.

In 2009, data on Indigenous status were complete for 96% of infectious syphilis notifications. All jurisdictions except the Australian Capital Territory had greater than 50% completeness of the Indigenous status field between 2004 and 2009. The age standardised notification rate was 23.7 per 100,000 in the Indigenous population and 5.6 per 100,000 in the non-Indigenous population, representing a ratio of 4:1. Age standardised notification rates varied widely across jurisdictions. Since 2006, Indigenous notification rates decreased across all of these jurisdictions except Western Australia, where the notification rate increased between 2005 and 2008 from 11–84 notifications per 100,000 population and declined to 39 per 100,000 population in 2009. This increase in Indigenous rates was largely attributable to an outbreak that occurred in 2008 in the Pilbara region amongst Aboriginal people (Figure 35).[52] Rates of infectious syphilis in the Indigenous population are highest in the 25–29 and 30–34 years age groups, compared with the non-Indigenous population where notification rates are highest in the 40–44 years age group.

Figure 35: Notification rate for infectious syphilis, selected states and territories,* 2004 to 2009, by Indigenous status and year



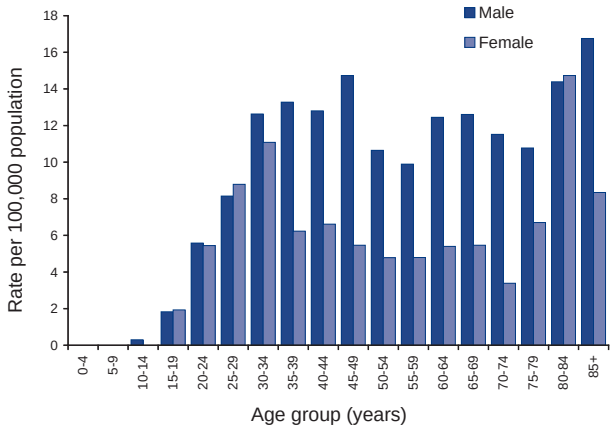
* Includes notifications in the Northern Territory, Queensland, South Australia, Tasmania, Victoria, Western Australia and New South Wales where Indigenous status completeness was reported for more than 50% of cases over a 5-year period.

Syphilis of more than 2 years or unknown duration

In 2009, a total of 1,385 notifications of syphilis of more than 2 years or unknown duration were reported to the NNDSS, giving a notification rate of 6.8 per 100,000 population, which was similar to the rate in 2008 (6.9 per 100,000 population). The Northern Territory continued to have the highest notification rate at 44 per 100,000 population, however, this was a decrease of 43% compared with 2008 (78 per 100,000 population).

In 2009, notification rates of syphilis of more than 2 years or unknown duration in males and females were 8.4 and 5.1 per 100,000 population, respectively (Table 16). Nationally, the male to female ratio was 1.7:1 (Figure 36). The distribution of notification rates across age groups in females was bimodal, with peaks in the 30–34 and 80–84 years age groups. In males, rates remained high from 30 years and over and peaks occurred in the 45–49 and 85 or over age groups. Rates in males were substantially higher than in females, especially in the 35–79 years age groups.

Figure 36: Notification rate for syphilis of more than 2 years or unknown duration, Australia,* 2009, by age group and sex†



* Data from all states and territories except South Australia.

† Excludes 14 notifications for whom age or sex was not reported.

Over the period 2004 to 2009, notification rates increased amongst males in the 30–39 and 40–49 years age groups, with a substantial decrease observed in the 15–19 years age group. In females for the same period, increases were observed in the 40 years or over age groups and substantial decreases were observed in the 15–19 and 20–29 years age groups (72% and 40% respectively) (Figure 37).

Congenital syphilis

Following a peak of 19 notifications in 2001, notifications of congenital syphilis have continued to decline in 2009 (Figure 38). There were 3 notifications of congenital syphilis reported in 2009, 1 male and 2 females. All 3 notifications were from the Northern Territory. Two of the notifications were Indigenous and one was non-Indigenous.

Table 16: Notifications and rates* for syphilis of more than 2 years or unknown duration, Australia,† 2009, by state or territory and sex

State or territory	Male		Female		Total‡	
	Count	Rate*	Count	Rate*	Count	Rate*
ACT/NSW	248	6.7	159	4.2	410	5.5
NT	52	44.6	47	43.5	99	44.0
Qld	166	7.5	130	5.9	296	6.7
SA	NDP	–	NDP	–	NDP	–
Tas	14	5.6	4	1.6	18	3.6
Vic	314	11.7	145	5.3	468	8.6
WA	57	5.0	37	3.4	94	4.2
Total	851	8.4	522	5.1	1,385	6.8

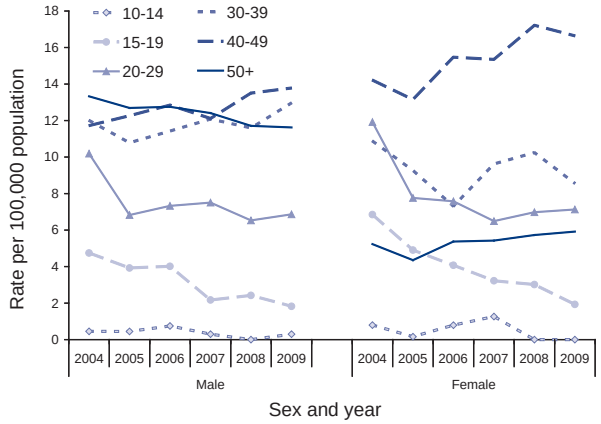
* Notification rate per 100,000 population.

† Data from all states and territories except South Australia.

‡ Total includes 12 notifications for whom sex was not reported.

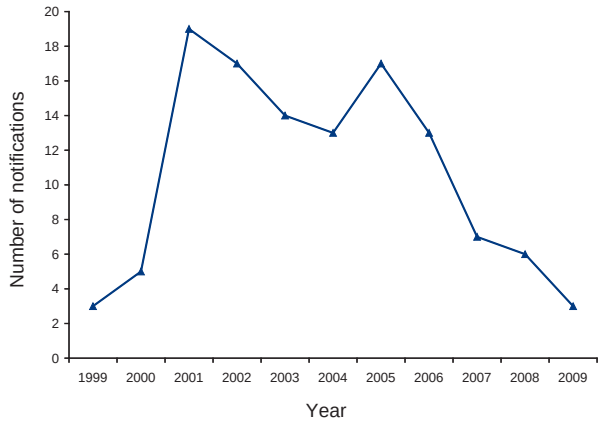
NDP No data provided.

Figure 37: Notification rate for syphilis of more than 2 years or unknown duration, Australia,* 2004 to 2009, by age group and sex



* Data from all states and territories except South Australia.

Figure 38: Notifications of congenital syphilis, Australia, 1999 to 2009



Vaccine preventable diseases

Introduction

This section summarises the national notification surveillance data for notifiable diseases targeted by the National Immunisation Program (NIP) in 2009. These include diphtheria, invasive *Haemophilus influenzae* type b infection, laboratory-confirmed influenza, measles, mumps, pertussis, invasive pneumococcal disease, poliomyelitis, rubella, tetanus and varicella zoster infections (chickenpox, shingles and unspecified). Data on hepatitis B and invasive 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 (VPDs) presented in this report include hepatitis A and Q fever under the 'Gastrointestinal' and 'Zoonoses' sections respectively. Rotavirus is not included as it is not a nationally notifiable condition. For more comprehensive reports on historical data, including notifications, hospitalisations and deaths, readers are referred to the regular CDI supplements *Vaccine Preventable Diseases in Australia,* the latest of which has recently been published.[53]

In 2009, there were 101,627 notifications of VPDs (43% of total) reported to the NNDSS. This was 2.9 times more notifications than in 2008 (33,983). Influenza was the most commonly notified VPD (58,778, 58% of total) followed by pertussis (29,736, 29% of total) reflecting the epidemics occurring as a result of these 2 diseases in 2009. The number of notifications and notification rates for VPDs in Australia are shown in Table 3 and Table 4, respectively.

There were no new vaccines added to the NIP in 2009. However, in response to the influenza pandemic experienced during 2009, a monovalent vaccine was developed and distributed through the national Pandemic (H1N1) 2009 Vaccination Program from the end of September 2009 to reduce transmission of the pandemic (H1N1) 2009 influenza virus and protect vulnerable individuals. Whilst the Program initially focused on particular priority groups, including health care workers and those vulnerable to severe health outcomes associated with influenza infection, the vaccine was also made available for free to everyone in Australia who wished to be vaccinated.

Vaccination coverage is an important factor influencing the incidence of VPDs. Since the commencement of the Australian Childhood Immunisation Register in 1996, immunisation coverage in children has been high by international standards, although areas of lower coverage remain, in which there is a potential for VPDs to occur and circulate. These mainly coincide with high levels of conscientious objectors to immunisation including coastal areas of South East Queensland, northern New South Wales, Adelaide and south-western Western Australia. On average, just 3% of children in Australia are not fully vaccinated for age, but in the above areas this proportion is much higher.[54]

Information on receipt of vaccines has historically been recorded on NNDSS using the 'vaccination status' field (full, partial or unvaccinated), plus a field capturing the number of doses. In January 2008 new, more detailed fields were added to record 'vaccine type' and 'vaccination date' for each dose. The new fields were intended to replace the old fields, with a transition period allowing either form of vaccination details. In 2009, four jurisdictions were using the new fields (Northern Territory, Queensland, Tasmania and New South Wales for selected diseases), while the remaining jurisdictions continued to use the old fields. In this report data on receipt of vaccines is presented for each disease combining data from the two different formats. No vaccine is 100% effective, and therefore infections sometimes do occur in fully vaccinated people, and some are reported later in this section. However, effective vaccines do provide a substantially lower chance of becoming infected, and/or reduced severity of disease. Monitoring vaccine failure rates is an important part of evaluating the NIP.

Diphtheria

Diphtheria is an acute illness caused by toxin-producing strains of the bacterium *Corynebacterium diphtheriae*. It normally involves the mucous membranes of the upper respiratory tract producing a membrane that can obstruct the airway. On rare occasions other mucous membranes or the skin can be affected. Diphtheria is spread by respiratory droplets or by direct contact with skin lesions or articles soiled by infected individuals.[21]

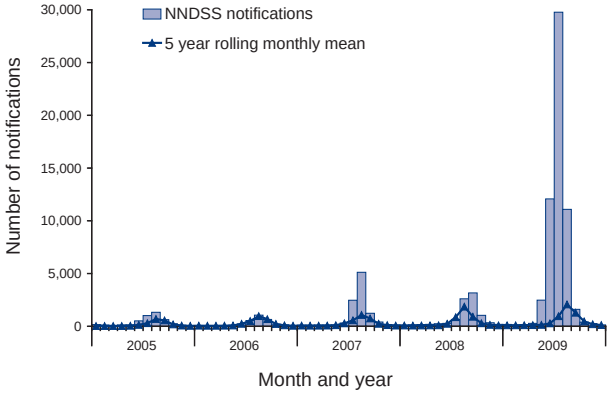
There were no notifications of diphtheria reported to NNDSS in 2009. The last notification of diphtheria reported in Australia was a case of cutaneous diphtheria (which affects the skin) in 2001, the only notification reported since 1992.

Influenza

In April 2009, the WHO announced the emergence of a novel influenza A virus, prompting the declaration of the first public health emergency of international concern since the *International Health Regulations (2005)* came into effect in 2007. The WHO subsequently raised the pandemic influenza alert in June 2009 to phase 6, the pandemic phase. The first notification of the pandemic (H1N1) 2009 influenza virus in Australia occurred in May 2009.

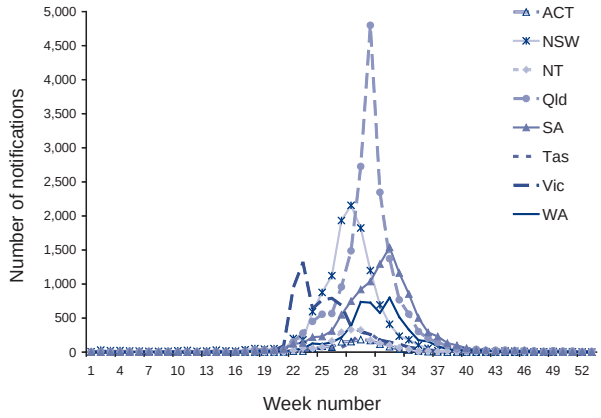
During the pandemic response, influenza notifications were reported by each jurisdiction using NetEpi, a web-based outbreak case reporting system, in addition to NNDSS. A more detailed analysis of enhanced data collected through NetEpi and additional sentinel surveillance systems will be reported in the 2010 National Influenza Surveillance Scheme annual report. The number of notifications in the Australian 2009 influenza season was the highest since national reporting to the NNDSS began in 2001, and substantially higher than in recent years (Figure 39). In 2009, there were 58,562 notifications of laboratory-confirmed influenza, a rate of 268 cases per 100,000 population. The number of notifications was 8.6 times greater than the 5-year mean and peaked in July with 29,770 notifications, but this over-representation is likely, at least in part, to reflect testing and laboratory practices in addition to real differences in the incidence of infection.[55] Notifications

Figure 39: Notifications of laboratory-confirmed influenza, Australia, 2009, by month and year of diagnosis



in the non-seasonal period were also higher than in previous years. Although Queensland continued to account for the highest proportion of all confirmed influenza cases notified (31%) (Figure 40), this figure was lower than previous years (the average for 2005–2008 was 44%, range 38%–54%). Throughout 2009, national testing protocols for each phase of the pandemic response were informed by the influenza SoNG.‡ For example during the 'Protect' phase the influenza SoNG focused on the testing of persons most at risk for severe disease outcomes, including people belonging to identified vulnerable groups and those presenting with severe disease presentation. However, due to local influenza activity and resource availability, testing rates in jurisdictions were variable.

Figure 40: Notifications of laboratory-confirmed influenza, Australia, 2009, by state or territory and week of diagnosis



In 2009, the highest notification rates occurred in the Northern Territory (875 per 100,000 population), followed by South Australia (663 per 100,000 population), Queensland (417 per 100,000 population) and the Australian Capital Territory (359 cases per 100,000 population) (Table 3).

In 2009, distribution of influenza notifications tended to occur in persons aged less than 55 years, with substantially higher rates observed in persons aged less than 30 years, compared with older age groups. In previous years, notifications of laboratory-confirmed influenza were highest in children aged 0–4 years (Figure 41), which represented, on average, 18% of notifications, whereas in 2009 they represented only 12% of notifications. In contrast, notification rates in 2009 were highest in the 5–9, 10–14 and 15–19 years age groups (Figure 42).

Figure 41: Notification rate for laboratory-confirmed influenza, Australia, 2006 to 2009, by age group

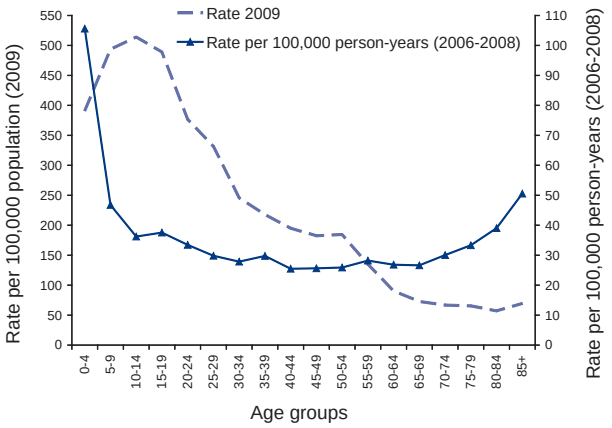
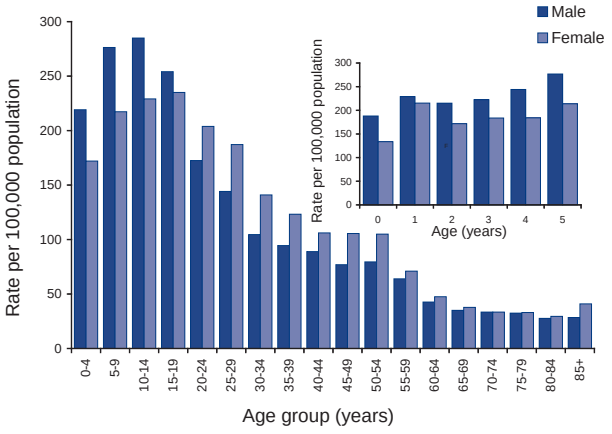


Figure 42: Notification rate for laboratory-confirmed influenza, Australia, 2009, by age group and sex*



* Excludes 128 notifications for whom age or sex were not reported.

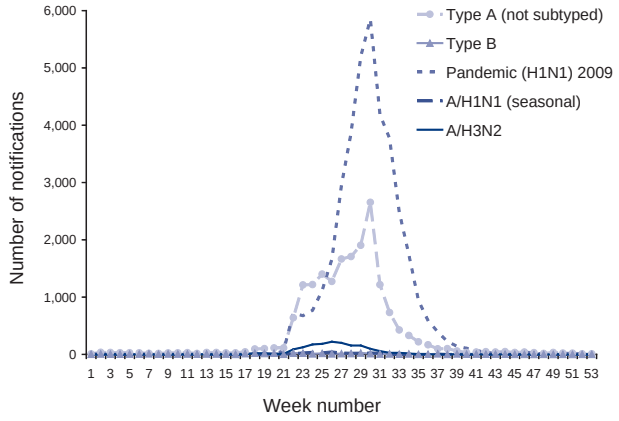
In 2009, 58,411 (99.8%) influenza notifications in the NNDSS and NetEpi had typing data. Of the typed notifications, 64.6% (37,750) were pandemic (H1N1) 2009, 31.4% (18,345) were notified as influenza A not subtyped, 2.8% (1,612) were influenza A/H3N2, 0.7% (410) were influenza B and 0.5% (294) were influenza A/H1N1 (seasonal) (Figure 43).

In 2009, 1,586 influenza virus isolates were subtyped by the WHO Collaborating Centre for Reference and Research on Influenza (WHOCC), representing almost 3% of laboratory-confirmed cases reported to

‡ Series of National Guidelines (SoNG) – developed in consultation with the Communicable Diseases Network Australia and endorsed by the Australian Health Protection Committee. Their purpose is to provide nationally consistent advice and guidance to public health units in responding to a notifiable disease event.

the NNDSS. Pandemic (H1N1) 2009 represented the majority (74%) of isolates subtyped, followed by influenza A(H3N2) (18%), seasonal A(H1N1) (7%) and influenza B (1%).

Figure 43: Notifications of laboratory-confirmed influenza, Australia, 2009, by type and week of diagnosis*



* Notifications of influenza 'untyped' (n=150) excluded from analysis.

The WHOCC also conducted antigenic characterisation on 884 of the influenza virus isolates, in similar proportions to those subtyped. The majority of pandemic (H1N1) 2009 isolates were characterised as A/California/7/2009-like. Seasonal influenza A(H1N1) viruses of the 2009 vaccine, A/Brisbane/59/2007, circulated sporadically throughout the year in very low numbers, being displaced by the pandemic (H1N1) 2009 strain.[56] Of the circulating influenza A(H3N2) viruses, most were antigenically similar to the 2009 A/Brisbane/10/2007 vaccine component, however the majority of these were low reactor versions indicating some drift in the strain. Although there were only a small number of influenza B viruses detected, antigenic characterisation showed a drift throughout the season in the 2009 vaccine strain, B/Florida/4/2006 (B/Yamagata lineage), to the B/Brisbane/60/2008 (B/Victoria lineage) strain.

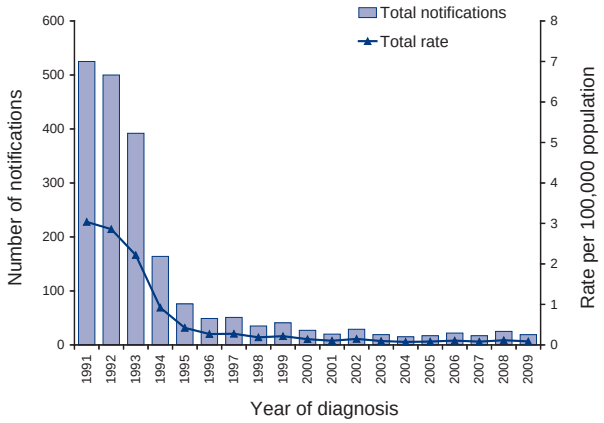
All 3 strains in the 2010 Southern Hemisphere influenza vaccine were different to those previously recommended in the 2009 Southern Hemisphere vaccine. The 2010 vaccine contained A/California/7/2009 (H1N1)-like, A/Perth/16/2009 (H3N2)-like and B/Brisbane/60/2008-like viruses.

Antiviral susceptibility testing for resistance to oseltamivir or zanamivir by enzyme inhibition assay (EIA) was conducted on 587 isolates of the pandemic (H1N1) 2009 strain by the WHOCC during 2009. Of these isolates, four showed resistance to oseltamivir. Molecular analysis of 276 isolates found 9 isolates (including the 4 oseltamivir resistant isolates identified through EIA) with the H275Y mutation, which is known to confer resistance to oseltamivir. Oseltamivir resistance was also found in the majority (36 of 37) seasonal A/H1N1 isolates tested, which is consistent with historical trends. In 2009 there were no reports of antiviral resistance in any of the A(H3N2) or influenza B isolates tested.

Invasive *Haemophilus influenzae* type b disease

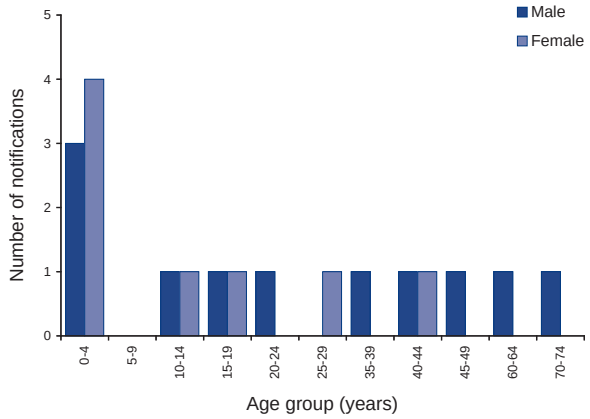
Invasive *Haemophilus influenzae* type b bacteria causes disease with symptoms dependant on which part of the body is infected. These include: septicaemia (infection of the blood stream); meningitis (infection of the membranes around the brain and spinal cord); epiglottitis (severe swelling of the epiglottis at the back of the throat); pneumonia (infection of the lungs); osteomyelitis (infection of the bones and joints) and cellulitis (infection of the tissue under the skin, usually on the face). Since the introduction of the Hib vaccine in 1993, there has been a marked reduction in total Hib notifications in Australia (Figure 44), which now has one of the lowest rates of Hib notifications in the world.[57]

Figure 44: Notifications and rates for invasive *Haemophilus influenzae* type b infection, Australia, 1991 to 2009, by year of diagnosis



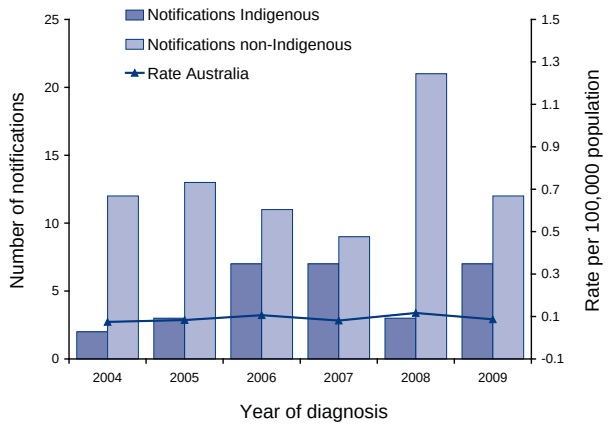
There were 19 notifications of Hib disease in 2009, a rate of 0.1 per 100,000 population, and six fewer than reported in 2008. Thirty-seven per cent (7) of notifications were amongst children less than 5 years of age with the majority of these (6/7) infants aged less than 1 year. The remaining 12 notifications ranged between 13 and 74 years. Fifty-eight per cent (11) were males resulting in a male to female ratio of 1.4:1. (Figure 45).

Figure 45: Notifications of invasive *Haemophilus influenzae* type b infection, Australia, 2009, by age group and sex



Indigenous status was 100% complete for notifications in 2009. Thirty-seven per cent (7/19) were reported as Indigenous and 63% (12/19) were non-Indigenous. The Hib notification rate in 2009 was 1.3 per 100,000 in Indigenous people and 0.1 per 100,000 in non-Indigenous people, a ratio of 13:1. Between 2004 and 2009, Hib rates for Indigenous people ranged between 5.5 and 30.3 times higher than for non-Indigenous people (Figure 46). However, these figures vary widely because of the low number of notifications. This analysis excludes those notifications with an unreported or unknown Indigenous status between 2004 and 2009 (4 for 2006 and 1 for each remaining year).

Figure 46: Notifications and rates for invasive *Haemophilus influenzae* type b infection, Australia, 2004 to 2009, by Indigenous status



All children under the age of 17 years in 2009 were eligible for Hib vaccination in infancy, as Hib vaccines were introduced to the NIP in April 1993 for all children born after February 1993. There were 9 notifications for children less than 17 years of age in 2009. The majority (7/9) of these were one year of age or less of which five were vaccinated and two were not vaccinated. Of the five who were vaccinated four had received 1 dose of a Hib containing vaccine and one had received 2 doses. Although four of these 5 vaccinated cases had received their age appropriate dose of vaccine none of the five had received the full course of recommended vaccine, which includes 3 or 4 doses depending on Indigenous status. The remaining two were a 13-year-old who had received 3 doses and a 14-year-old with unknown vaccination status.

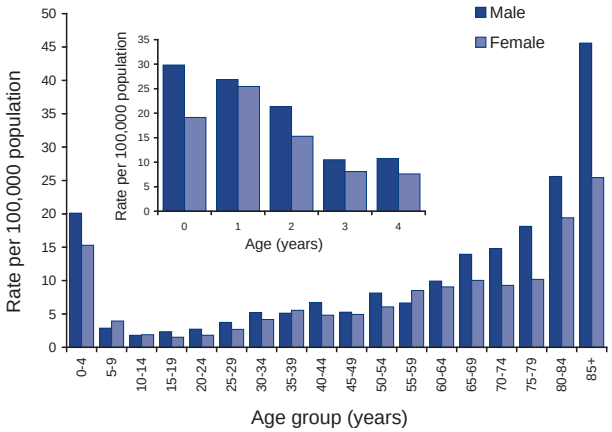
Invasive pneumococcal disease

There were 1,559 notifications of invasive pneumococcal disease (IPD) in Australia in 2009, a rate of 7.1 notifications per 100,000 population. This was a small decrease of 4% from the 1,634 reported in 2008 (7.6 per 100,000). An increase in rates in 2009, compared with 2008, was seen in the Australian Capital Territory (29, 8.3 per 100,000), the Northern Territory (86, 38.2 per 100,000), South Australia (145, 8.9 per 100,000) and Victoria (368, 6.8 per 100,000). A decrease in notifications was noted in Queensland (270, 6.1 per 100,000), New South Wales (477, 6.7 per 100,000), Tasmania (35, 7.0 per 100,000), and Western Australia (149, 6.7 per 100,000).

In 2009, males accounted for 54% (843) of the 1,559 notifications of IPD. In most age groups there were more male than female notifications, resulting in a male to female ratio of 1.2:1. Figure 47 shows that the highest rates of IPD in 2009 were notified in persons aged 85 years or over (32.3 per 100,000) and in children aged 1 year (26.2 per 100,000).

In 2001, the 7vPCV became available for infants and children at high risk of IPD, including Indigenous infants. In 2005 it was added to the NIP for all children up to 2 years of age.[12] Rates of IPD disease

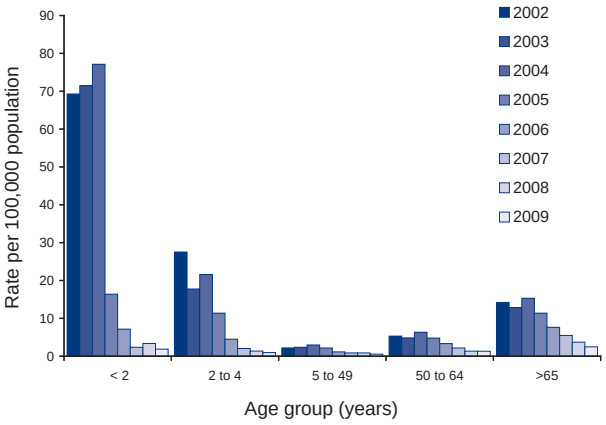
Figure 47: Notification rate for invasive pneumococcal disease, Australia, 2009, by age group and sex



caused by 7vPCV serotypes have declined between 2004 and 2009 from 7.7 to 1.0 per 100,000 (1,548 to 216 notifications). The decline was seen across all age groups (Figure 48). Those aged 65 years or more had the greatest rate of IPDs caused by 7vPCV serotypes in 2009 (72, 2.5 per 100,000) with those aged less than 2 years having a rate of 1.9 per 100,000 (11 notifications).

Additional data were collected on notifications of IPD in all Australian jurisdictions during 2009. More detailed analyses can be found in the IPD annual report series published in CDI.

Figure 48: Notification rate for invasive pneumococcal disease caused by 7vPCV serotypes, Australia, 2002 to 2009, by age group

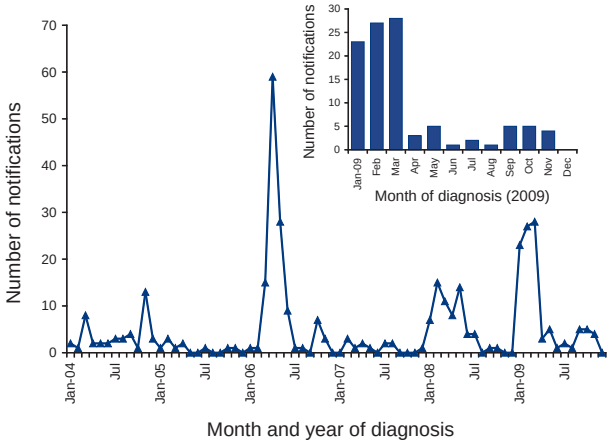


Measles

Measles is a highly infectious, acute viral illness spread by respiratory secretions, including airborne transmission via aerosolised droplets. The prodrome, lasting 2 to 4 days, is characterised by fever and malaise followed by a cough, coryza and conjunctivitis. It is usually followed by a maculopapular rash, which typically begins on the face, and then becomes generalised. Measles can be a severe disease, with complications such as otitis media, pneumonia, and acute encephalitis. Subacute sclerosing panencephalitis (SSPE) is a late, rare (approximately 1 in 100,000 cases) complication of measles,[21] which is always fatal.[12] Evidence suggests that endemic measles has been eliminated from Australia, since at least 2005.[58]

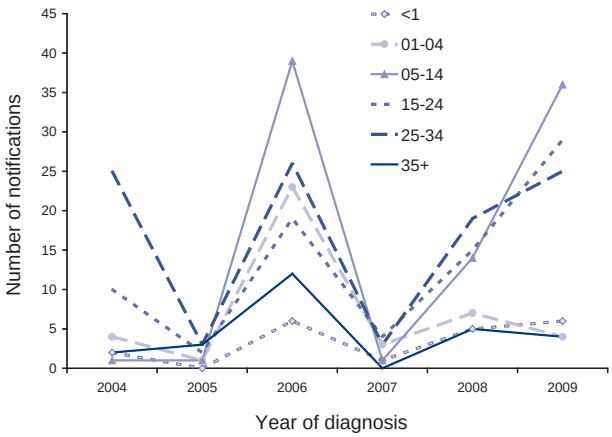
There were 104 notifications of measles reported to NNDSS in 2009, representing a rate of 0.5 notifications per 100,000 population. This represents an increase from the 65 notifications reported in 2008 (0.3 notifications per 100,000 population) and the 12 reported in 2007 (0.1 per 100,000) (Figure 49). In 2009, notifications were reported from all states and territories: Victoria (36), Queensland (32), New South Wales (19), Western Australia (10), South Australia (3), Tasmania (2), the Australian Capital Territory (1) and the Northern Territory (1).

Figure 49: Notifications of measles, Australia, 2004 to 2009, by month and year of diagnosis



In 2009, 63% (66/104) of measles notifications were male. The age at diagnosis ranged from 6 months to 56 years with the median age being 16 years. There was an increase in notifications in three age groups (5–14 years, 15–24 years and 25–34 years) compared with 2008, while the remaining three age groups (< 1 year, 1–4 years and 35+) remained relatively constant compared with 2008 (Figure 50). This increase was highest in the 5–14 years age group with 36 notifications in 2009 compared with 14 in 2008; in part influenced by an outbreak in a Sunshine Coast High School in Queensland, in which 18 cases were in this age group.

Figure 50: Notifications of measles, Australia, 2004 to 2009, by age group and year of diagnosis

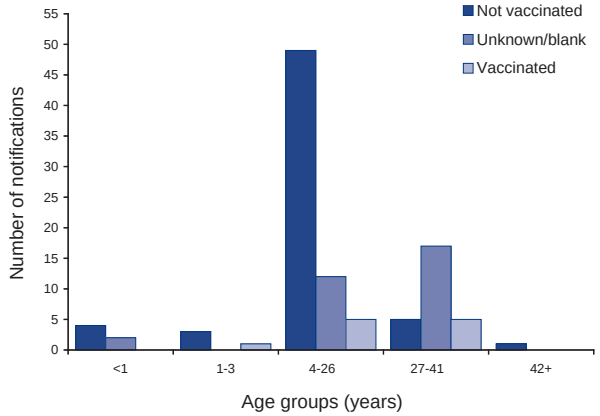


In 2009, 34% (35/104) of notifications were reported as being acquired from overseas including: Vietnam (11), India (6), Thailand (4), the Philippines (2), the United Kingdom (2), the United States of America (2), New Zealand (2) and 1 importation each from Iran, France, South Africa, China, Indonesia and Korea. Of the remaining 69 locally-acquired cases, 62 were epidemiologically linked to the imported cases. There were 3 outbreaks with more than 5 cases during 2009: one with 25 cases in a Sunshine Coast high school in Queensland that was linked to an imported case from India, one with 20 cases in Victoria that was also linked to an imported case from India, and one with 11 cases in Victoria that was linked to an imported case from Iran. Seventy-six of the 104 cases were linked to specific genotypes of which 29 were identified as D4, 26 as D8, 19 as H1 and 2 as D9.

Two doses of the MMR vaccine are funded under the NIP for children and provided at 12 months and 4 years of age. The MMR induces long-term measles immunity in 95% of recipients after a single dose and 99% of recipients after the 2nd dose.[12]

Nationally, there was information on vaccination for 70% (73/104) of notifications in 2009 of which 85% (62/73) were not vaccinated and 15% (11/73) had been vaccinated (1 with 2 doses and 9 with 1 dose and the remaining 1 case with no dose number stated; Figure 51). There were 6 notifications in infants less than 1 year of age at diagnosis who were ineligible for routine vaccination. Only one of the 4 cases in children between one and 3 years of age, who were eligible for 1 dose of the MMR, were vaccinated. Fifty-four notifications with vaccine information available were between four and 26 years of age and eligible for 2 doses of MMR. Ninety-one per cent (49/54) of those were not vaccinated and 9% (5/54) had been vaccinated. Two of those vaccinated in this age group had 2 doses and 2 cases had 1 dose of a measles-containing vaccine

Figure 51: Notifications of measles, Australia, 2009, by age group and vaccination status



and the remaining case had no dose number stated. There were 10 notifications with information on vaccination in the 27–41 years age group. This age group is considered to be a susceptible age cohort because many may have missed being vaccinated as infants when coverage was still low and the risk of natural immunity through exposure was declining. Of these, 50% were not vaccinated. Of the 5 vaccinated cases in this age group, four had 1 dose and the additional case had no dose number stated. The remaining 1 notification was in the 42 years or over age group and not vaccinated.

Mumps

Mumps is an acute viral illness transmitted by the respiratory route in the form of air-borne droplets or by direct contact with saliva of an infected person. A high proportion of mumps infections involve non-specific symptoms including fever, headache, malaise, myalgia and anorexia with approximately one-third of infections being asymptomatic. The characteristic bilateral, or occasionally unilateral, parotid swelling occurs in 60% to 70% of clinical cases.[21]

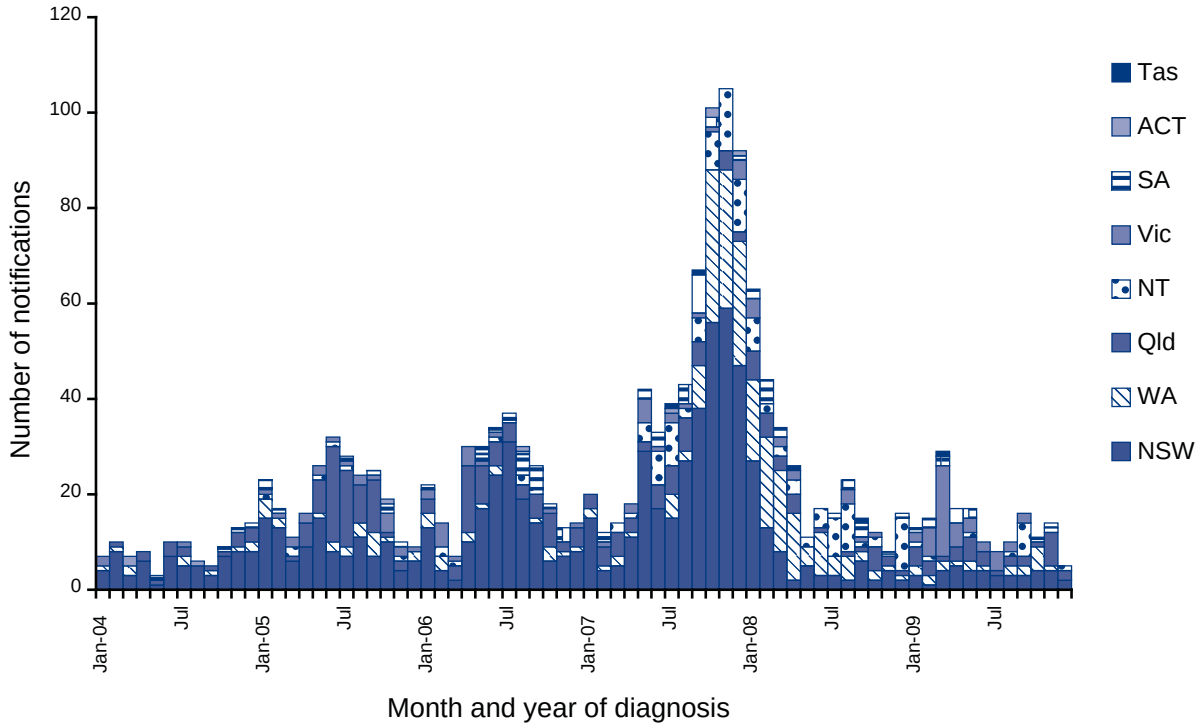
In 2009, there were 165 notifications of mumps (0.8 notifications per 100,000 population), compared with the 285 notifications (1.3 per 100,000) reported in 2008 (Figure 52) and a ratio of 0.6 compared with the 5-year mean. The crude national rate has continued to decrease in 2009 after increasing from 2004 and peaking in 2007 at 2.8 per 100,000 (Figure 53).

Notifications in 2009 were reported from all jurisdictions except the Australian Capital Territory, with 27% (45/165) from Victoria, 24% (40/165) from New South Wales and 21% (34/165) from Queensland. The highest rate was in the Northern Territory with 5.8 notifications per 100,000 population (13 notifications) followed by Western Australia with 0.9 per 100,000 (20 notifications).

There were no large mumps outbreaks in 2009. There were 2 small clusters notified to the NNDSS, the 1st involving 6 locally-acquired cases in Victoria and the 2nd was a localised cluster of 8 cases in a small country town in the Northern Territory.

In 2009, there were notifications of mumps in all age groups with the highest rates amongst adolescents (15–24 years) and young adults (25–34 years; Figure 53) reflecting historical vaccination schedules. Adolescents aged 15–24 years were eligible for 2 doses of a mumps-containing vaccine; however, coverage with the 2nd dose may have been suboptimal for some members of this cohort as they would have no longer been in primary school during the 1998 Measles Control Campaign (MCC). Only a small proportion of the young adults aged 25–34 years would have been eligible for 2 doses of

Figure 52: Notifications of mumps, Australia, 2004 to 2009, by state or territory and month of diagnosis



a mumps-containing vaccine, and many would not have been eligible for 1 dose. However, some of this cohort would have developed natural immunity as exposure to wild virus was still likely when they were young children.[59]

In 2009, the highest rates were for males in the 20–24 and 25–29 years age groups (Figure 54), which is similar to 2008. Sixty per cent of notifications (99/165) were male, which is a similar proportion to the 5-year mean.

Indigenous status was reported for 65% (107/165) of mumps notifications, of which 90% (96/107) were reported as non-Indigenous and 10% (11/107) as Indigenous. This represents a 40% decrease in the proportion of Indigenous vs non-Indigenous notifications in 2009 compared with 2008 in which 50% were reported as Indigenous. The higher rate of Indigenous notifications in 2008 was influenced by an outbreak amongst Indigenous communities in the Kimberley region of Western Australia and the Northern Territory.[60]

The mumps component of the MMR vaccine has been estimated to be the least effective of the 3 components ranging from providing 62%–88% and 85%–95% protection for the 1st and 2nd dose

Figure 53: Notification rate for mumps, Australia, 2004 to 2009, by age group

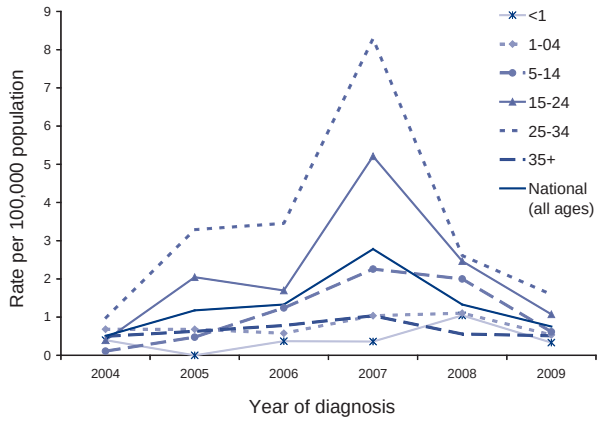
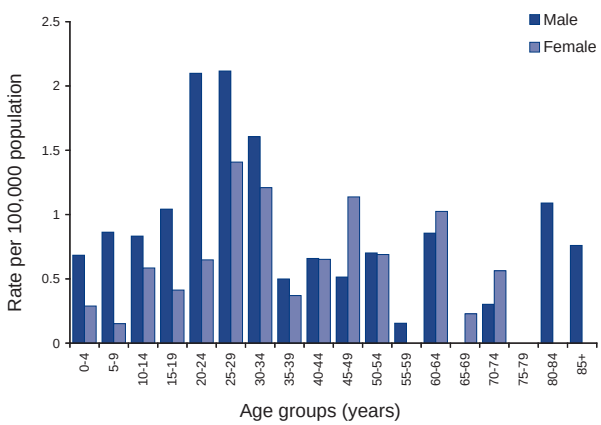


Figure 54: Notification rate for mumps, Australia, 2009, by age group



respectively.[61, 62] Reduced effectiveness of the mumps vaccine has been demonstrated over time such that waning immunity may at least partially account for the proportion of vaccinated mumps cases, and contribute to mumps outbreaks in older vaccinated populations.[62]

Nationally, information on vaccination was available for 34% (56/165) of the notifications, of which 59% (33/56) were not vaccinated and 41% (23/56) were vaccinated. The remaining 66% (109/165) were reported as not applicable or unknown. Of the vaccinated notifications 26% (6/23) had 2 doses and 43% (10/23) reported one dose of a mumps-containing vaccine, with the remaining seven having dosage information missing or unknown. Nine of the 11 Indigenous notifications had a reported vaccination status of which 89% (8/9) were vaccinated, one with 2 doses and seven with 1 dose of a mumps-containing vaccine, and one was not vaccinated.

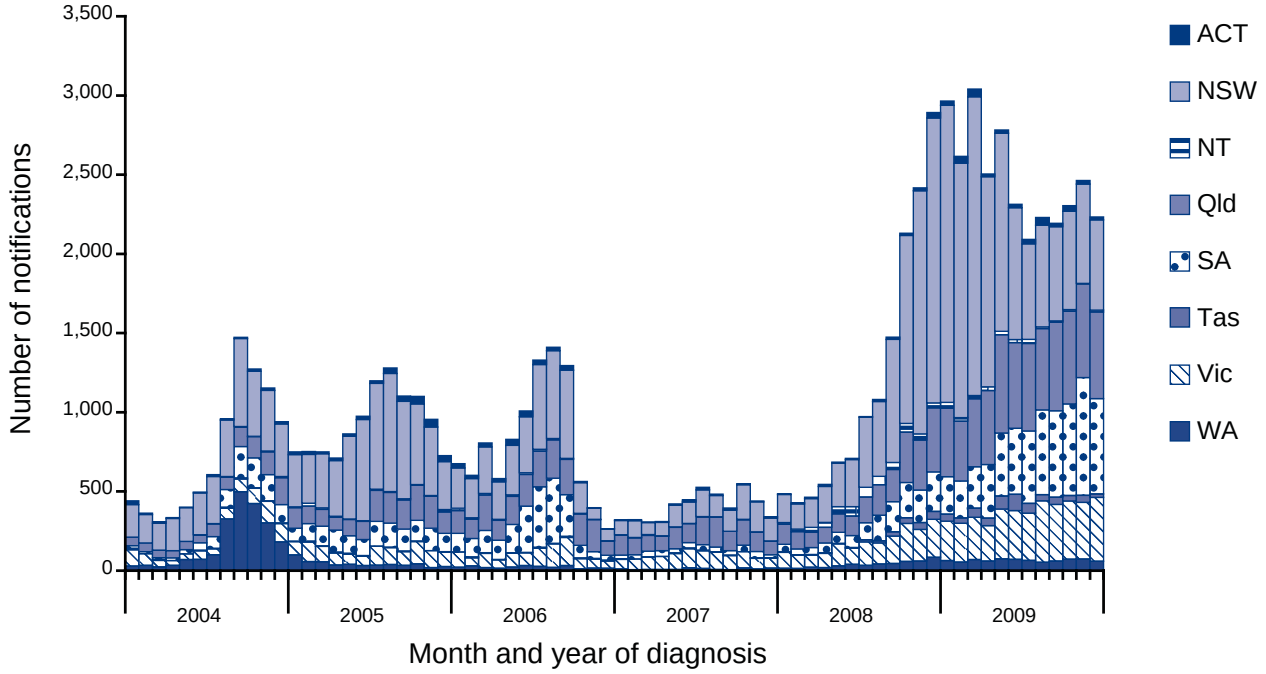
Pertussis

Pertussis is the most common vaccine preventable illness in Australia after influenza. It is a highly infectious disease caused by *Bordetella pertussis* and spread by respiratory droplets. Epidemics occur at regular intervals of approximately 3 to 4 years, which can vary from region to region, on a background of endemic circulation. In vaccinated populations these outbreaks tend to be smaller with less mortality and morbidity than in unvaccinated populations.[21] While pertussis can affect people of any age, infants are at highest risk of more severe disease as maternal antibody does not provide reliable protection and adequate immunity is not achieved through vaccination until receiving a 2nd dose at 4 months of age.[63] The majority of notifications usually occur in the spring and summer months.

In 2009, 29,736 notifications of pertussis including 2 deaths were reported to NNDSS. This represents a notification rate of 135.9 notifications per 100,000 population, a 2-fold increase in notifications compared with 2008 (14,285; 66.7 per 100,000) and 3 times the 5-year mean (9,764). Both deaths were in infants less than 2 months of age and too young to be protected by vaccination. The increase in notifications reflects the Australia-wide epidemic that began in mid-2008. (Figure 55). The causes of this epidemic are unclear but contributing factors may include suboptimal vaccine coverage, improved testing methods and case finding, and waning immunity levels in the vaccinated population.

In response to the nation-wide outbreak, many states and territories implemented public awareness campaigns and funded a booster vaccination program for parents of infants as part of a cocooning strategy to protect vulnerable infants from infection. These jurisdictions included Victoria and Queensland (for parents), the Northern Territory (for parents, carers and siblings of babies under 7 months of age), New South Wales (for parents, grandparents and other carers of infants) and the Australian Capital Territory (for parents and grandparents).

Figure 55: Notifications of pertussis, Australia, 2004 to 2009, by state or territory and month of diagnosis



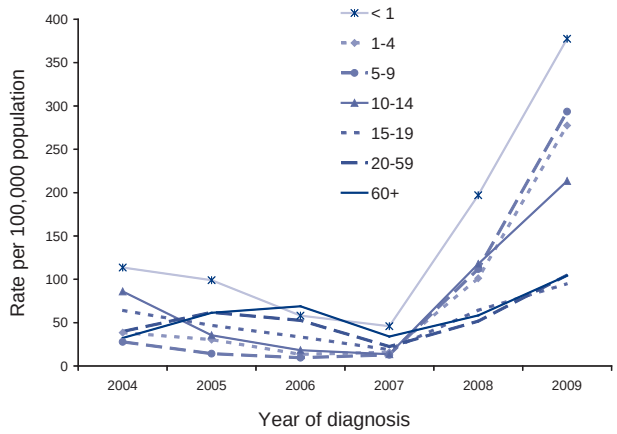
The government convened a Pertussis Working Party of the Australian Technical Advisory Group on Immunisation (ATAGI) in February 2009 to review the NIP schedule in light of the epidemic. ATAGI is continuing to consider all the available scientific evidence including options to optimise protection for babies in particular.

Notification rates in 2009 varied widely with age. Children aged less than 15 years had a higher rate of infection (271.8 notifications per 100,000 population) than those adolescents and adults 15 years of age or over (103.8 per 100,000) giving a rate ratio of 2.6. While this was similar to the 2008 rate ratio of 2.2, it contrasts markedly with the 2007, 2006, and 2005 rate ratios of 0.7, 0.3 and 0.5 respectively, reflecting the higher rate in adults relative to children during those years.

The highest rates amongst children were in infants less than 1 year of age (377.5 notifications per 100,000 population) followed by those aged 5–9 years (293.5 per 100,000) and those aged 1–4 years (277.5 per 100,000). This trend reflects that of 2008 but contrasts with 2007 when age group rates were more closely clustered.

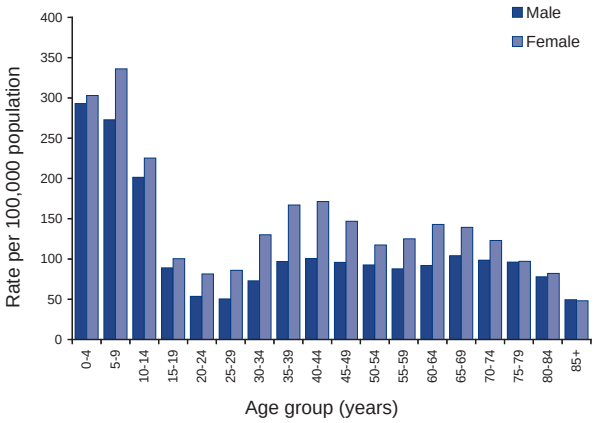
Between 2004 and 2007, a period inclusive of the last national epidemic in 2005/2006, age group notification rates were either trending down or remaining relatively constant but since 2007 rates have been increasing. This increase is most marked amongst those less than 15 years of age (Figure 56).

Figure 56: Notification rate for pertussis, Australia, 2004 to 2009, by age group



Fifty-seven per cent (16,858/29,736) of notifications in 2009 were female and 43% (12,837/29,736) were male, 41 had no sex specified (Figure 57). The highest rate amongst females was in the 5–9 years age group (336.1 per 100,000 population) with the highest rate in males being in the 0–4 years age group (293.0 per 100,000). While rates for both sexes were highest in those aged less than 15 years, the pattern of predominance of female notification rates compared with males occurred in all age groups except for those aged 75 years or over.

Figure 57: Notification rate for pertussis, Australia, 2009, by age group and sex



Follow-up is required in order to determine the vaccination status of individual cases. In a large outbreak, follow-up of all cases is not possible and as per national guidelines, jurisdictions prioritised follow-up to those less than 5 years of age. This age group made up 14% (4,266/29,736) of all notifications in 2009.

While the pertussis vaccine is not 100% effective and does not confer life-long immunity, vaccine effectiveness is estimated to be 68% after receiving 1 dose of vaccine, increasing to 92% after the 2nd dose,[64] and greater than 99% following subsequent doses.[65] Immunity to disease decreases over time post vaccination with estimates of protection remaining for 4–12 years.[64] The current vaccine schedule for pertussis under the NIP includes a dose provided at 2, 4 and 6 months of age followed by a booster at 4 years of age and again at 12–17 years of age (the timing of this last booster dose varies by jurisdiction).

Nationally, information on vaccination was available for 86% (3,676/4,266) of all notifications in children less than 5 years of age of which 80% (2,937/3,676) had received at least 1 pertussis containing vaccine and 18% (658/3,676) were not vaccinated. No data were entered or vaccination status was unknown for 14% (590/4,266) of the total notifications in this age group.

Of those 1,126 notifications less than one year of age, 54% (604/1,126) were vaccinated of which 41% (245/604) had received two or more doses of a per-

tussis vaccine. Twenty-one per cent (236/1,126) were less than 6 weeks of age and too young for their first scheduled dose of vaccine at 2 months.

Of 1,270 notifications for children aged between 3.5 and less than 5 years of age eligible for the first booster dose, only 15% (194/1,270) were reported as having had this 4th dose.

Pertussis notification rates varied considerably by state or territory and residential location. By jurisdiction, rates were highest in South Australia (5,346, 329.4 notifications per 100,000 population) followed by New South Wales (12,436, 175.2 per 100,000), Queensland (6,216, 141.1 per 100,000), Tasmania (616,122.6 per 100,000), the Australian Capital Territory (351, 99.9 per 100,000), the Northern Territory (215, 95.6 per 100,000), Victoria (3,778, 69.6 per 100,000) and Western Australia (778, 34.8 per 100,000).

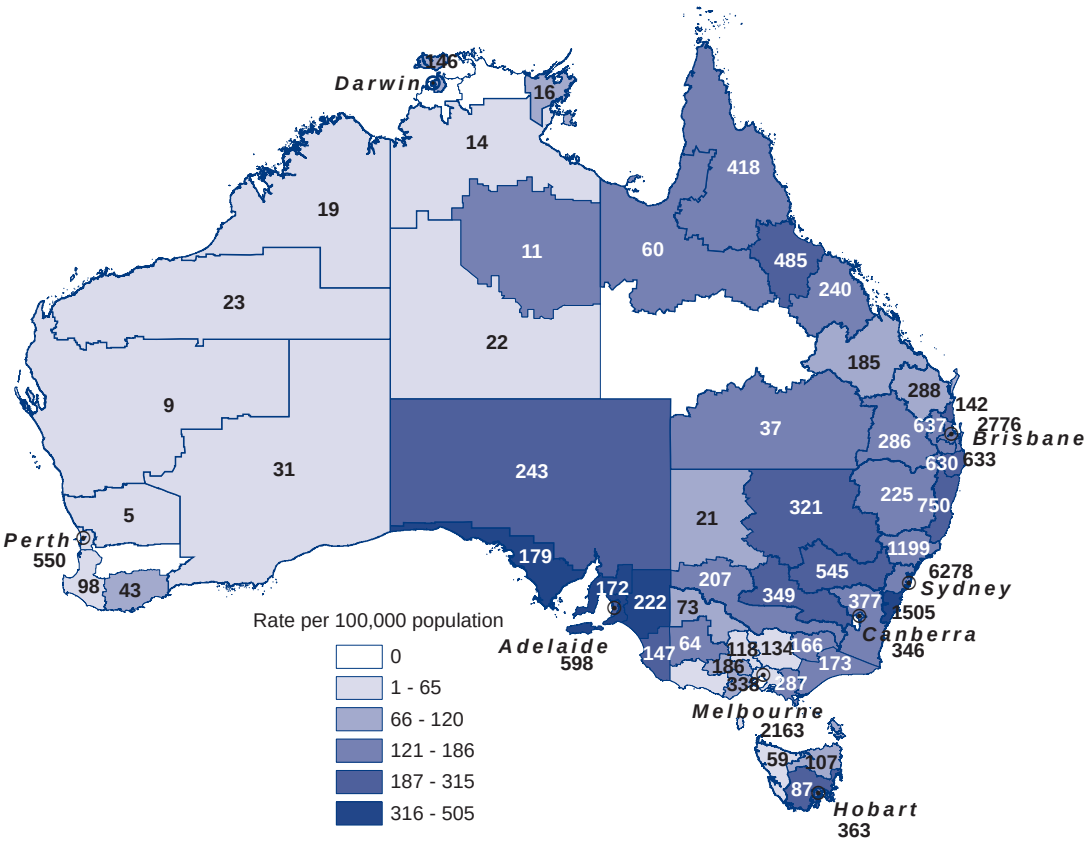
Rates by SD also varied widely across most jurisdictions except for South Australia where they were uniformly high (Map 3). In New South Wales rates were highest in the Illawarra SD (1,505 notifications, 349.1 notifications per 100,000 population), with high rates also reported from coastal, north and central western areas. In Queensland rates were highest in the Northern SD (485, 213.3 per 100,000) followed by the Sunshine Coast (637, 197.0 per 100,000). The East Gippsland and Ovens-Murray SDs had the highest rates in Victoria (173 and 166 respectively, 199.3 and 166.2 per 100,000), while in Tasmania, the Southern and Greater Hobart SDs had the highest rates (87 and 363 respectively, 232.3 and 171.2 per 100,000). Western Australia's rates remained low compared with the rest of Australia in 2009. Rates by SD should be interpreted with caution, as they can be high or low depending on the size of the population.

Poliomyelitis

Poliomyelitis is a highly infectious disease caused by gastrointestinal infection by a poliovirus. Transmission occurs primarily from person to person via the faecal-oral route. In most cases poliovirus infection is not symptomatic however in less than 1% of cases the virus may invade the nervous system and cause acute flaccid paralysis (AFP).[21]

In 2009, there were no notifications of poliomyelitis in Australia, which along with the Western Pacific Region remained poliomyelitis free. Poliomyelitis

Map 3: Notification rates and counts* for pertussis, Australia, 2009, by Statistical Division of residence and Statistical Subdivision for the Northern Territory



* Numbers shown in the Statistical Divisions and Statistical Subdivisions represent the count of notifications.

is a notifiable disease in Australia with clinical and laboratory investigation conducted for cases involving patients of any age with a clinical suspicion of poliomyelitis. Australia follows the WHO protocol for poliomyelitis surveillance and focuses on investigating cases of AFP in children under 15 years of age. The WHO target for AFP surveillance in a polio non-endemic country is 1 case of AFP per 100,000 children aged less than 15 years. Between 1 January and 31 December 2009 there were 54 eligible AFP cases notified to the National Polio Reference Laboratory (NPRL) of which all were classified as non-poliomyelitis. The 2009 non-poliomyelitis AFP rate was 1.17 hence meeting the WHO AFP surveillance indicator for the 6th time since 1995. Details of the 2009 notifications are provided in the 2009 annual report of the Australian NPRL.[66]

Rubella

Rubella is generally a mild and self-limiting viral infectious disease. It is spread from person to person through direct contact with respiratory secretions or via air-borne droplets. Clinically, rubella can be difficult to distinguish from other diseases that cause a febrile rash, such as measles, and is asymptomatic in up to 50% of cases. Rubella infection in pregnancy can cause foetal infection resulting in congenital rubella syndrome (CRS). CRS occurs in up to 90% of infants born to women who are infected during the first 10 weeks of pregnancy and may result in foetal malformations and death.[21]

In 2009, there were 27 notifications of rubella (0.1 notifications per 100,000 population), a decrease compared with the 36 notifications in 2008. Notifications were reported from New South Wales (7), Victoria (6), Queensland (6), Western Australia (5) and South Australia (3). The age profile of rubella notifications in 2009 was similar to 2008. There were small numbers of notifications reported across the age groups with none in infants less than 1 year of age or for adults over 60 years of age (Figure 58). The median age was 29 years and 74% (20/27) of notifications were adults between 20 and 49 years of age. The overall male to female ratio of notified cases in 2009 was 1.7:1, (17 males and 10 females). Of the 10 females, 80% were notified in women of child-bearing age (17–47 years). There were no notifications of CRS reported in 2009.

Figure 59 shows that rubella notifications in different age groups have continued to trend at low levels since 2004, except for a spike amongst the 25–34 years age range in 2006. This spike was primarily due to an increase of notifications from the South Eastern and Central Sydney SDs in New South Wales. It was concentrated in those aged 15–44 years, however there was no single identifiable source for the increase in notifications.[67]

A single dose of rubella vaccine produces an antibody response in more than 95% of recipients and while antibody levels are lower than after natural infection, they are shown to persist for at least 16 years in the absence of endemic disease.[12] Rubella vaccine is included in the combined MMR vaccine and provided under the NIP at 12 months and 4 years of age.

Figure 58: Notifications of rubella, Australia, 2009, by age group and sex

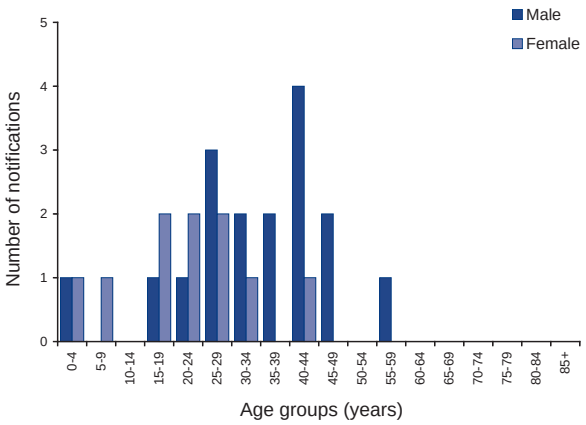
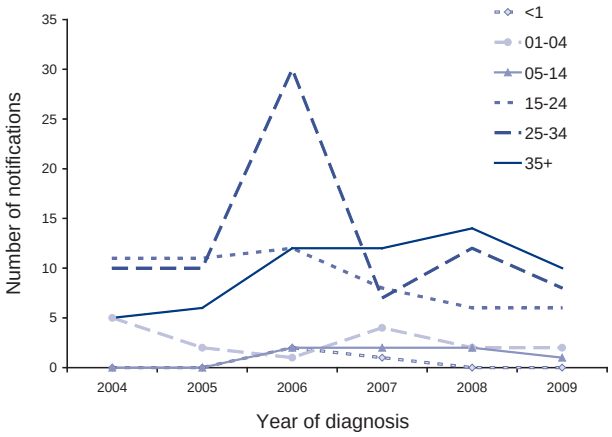


Figure 59: Notifications of rubella, Australia, 2004 to 2009, by age group



Nationally, information on vaccination was available for 48% (13/27) of rubella notifications of which the majority, 62% (8/13), was not vaccinated and 38% (5/13) were vaccinated. The remaining 52% (14/27) were stated as either unknown or blank. Of the 8 male notifications with information on vaccination reported, 71% (5/8) were not vaccinated, all of whom were adults in the 18–44 years age range, and three had received 1 dose of a rubella-containing vaccine. Of the 5 female notifications in 2009 with vaccination information reported, 60% (3/5) were not vaccinated (two were women of child-bearing

age: 17-year-old and 24-year-old) and two had received at least 1 dose of a rubella-containing vaccine (4-year-old and 40-year-old).

None of the rubella notifications in 2009 was identified as Indigenous, although seven of the 27 were of unknown status.

Tetanus

Tetanus is an acute, often fatal, disease caused by the toxin produced by the bacterium *Clostridium tetani*. Tetanus spores usually enter the body through contamination of a wound with soil, street dust or animal or human faeces.[21] The neurotoxin acts on the central nervous system to cause muscle rigidity with painful spasms. Generalised tetanus, the most common form of the disease, is characterised by increased muscle tone and generalised spasms. Early symptoms and signs include increased tone in the jaw muscles, difficulty in swallowing, stiffness or pain in the neck, shoulder and back muscles. In Australia, tetanus is rare, occurring primarily in older adults who have never been vaccinated or were vaccinated in the remote past.[12]

Tetanus vaccination stimulates the production of antitoxin, which protects against the toxin produced by the organism. Complete immunisation (3 primary doses and 2 boosters included for children on the NIP) induces protective levels of antitoxin lasting throughout childhood, but by middle age about 50% of vaccines have low or undetectable levels. It is recommended, though not funded under the NIP, that all adults who reach the age of 50 years and have not received a booster of a tetanus-containing vaccine in the previous 10 years, should have one.[12]

In 2009, there were 3 notifications of tetanus, two from New South Wales and one from Victoria, all over 34 years of age. Of the 3 notifications, 2 male and 1 female, one had been partially vaccinated with 1 dose and the remaining two had no vaccination status recorded.

Varicella zoster virus infections

Chickenpox (also known as varicella) and shingles (also known as herpes zoster) are both caused by the varicella-zoster virus (VZV). VZV is a member of the herpesvirus family and is highly contagious. Chickenpox occurs on initial infection with the virus. The virus then stays dormant in the body's nerve cells and has a 20%–30% chance of reactivating as shingles later in life.[21]

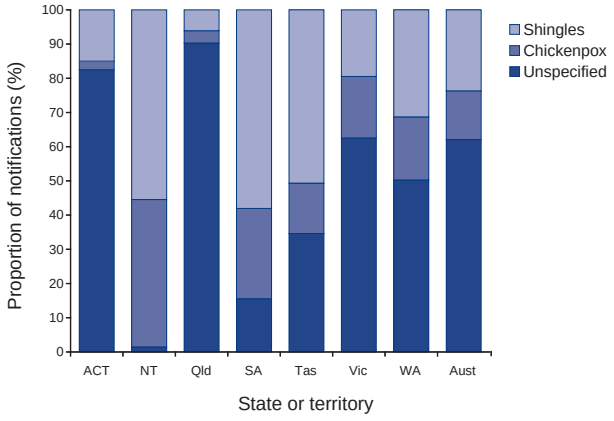
In November 2005, the varicella-zoster vaccine was added to the NIP schedule as a single dose due at 18 months (for children born on or after 1 May 2004), or as a catch-up dose at 10–13 years of age. In 2006, the Communicable Diseases Surveillance Network Australia (CDNA) agreed to make 3 categories of VZV infection notifiable: chickenpox, shingles and varicella infection (unspecified). The year 2009 was the first complete year in which all jurisdictions, except New South Wales, sent VZV data to NNDSS.

In 2009, there were 11,235 VZV notifications from the 7 reporting jurisdictions. This was 10% more than in 2008. Sixty-two per cent (6,977) were unspecified varicella infection, 14% (1,599) were chickenpox and 24% (2,659) were shingles.

Varicella-zoster virus infection (unspecified)

Notifications of unspecified VZV infections are laboratory specimens that are positive for VZV but have not been followed up by the local health authority and distinguished clinically as either chickenpox or shingles. Although varying by jurisdiction (Figure 60), VZV (unspecified) accounted for 62% of all VZV notifications in 2009, an increase compared with 52% of the total in 2008.

Figure 60: Proportion of total notifications for varicella-zoster virus unspecified, chickenpox and shingles, 2009, by state or territory*



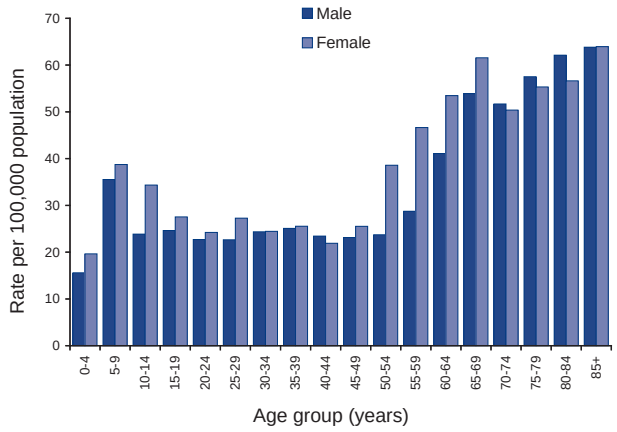
* Excluding New South Wales.

There were 6,977 notifications of VZV infections (unspecified) based on laboratory diagnoses compared with 4,415 in 2008, with a rate of 47.2 notifications per 100,000 population. The high proportion of unspecified VZV infection compared with chickenpox or shingles is attributable to the varying capacity of jurisdictions to follow-up on laboratory notifications to determine the clinical presentation of each case. The highest rates were reported from

Queensland (3,835 notifications, 87.0 per 100,000 population), Western Australia (866, 38.7 per 100,000) and Victoria (1,847, 34.0 per 100,000).

The age and sex distribution of unspecified VZV are shown in Figure 61.

Figure 61: Notification rate for varicella-zoster virus unspecified, Australia,* 2009, by age group and sex



* Excluding New South Wales.

Chickenpox

Chickenpox is a highly contagious infection spread by air-borne transmission of droplets from the upper respiratory tract or from the vesicle fluid of the skin lesions of chickenpox or shingles infections. Chickenpox is usually a mild disease of childhood, however complications occur in approximately 1% of cases. It is more severe in adults and in individuals of any age with impaired immunity, in whom complications, disseminated disease, and fatal illness can occur.[12]

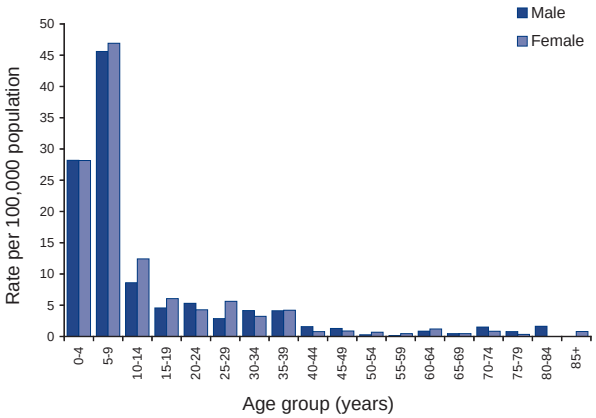
In 2009, there were a total of 1,599 notifications of chickenpox reported compared with 1,795 in 2008 and, a rate of 10.8 notifications per 100,000 population. The highest rates were reported from the Northern Territory (87 notifications, 38.7 per 100,000 population) and South Australia (475, 29.3 per 100,000) reflecting the increased case ascertainment in these jurisdictions due to their practice of following up VZV notifications.

Sixty-four per cent of notifications (1,028) occurred in children aged less than 10 years. The highest rates were in the 5–9 years age group (627 notifications, 46.2 per 100,000 population; Figure 62). In 2009, the rate for children aged less than 4 years (28.2 per 100,000) was approximately half of the 2008 rate (59.0 per 100,000).

Indigenous status was recorded for 98% (1,569) of notifications, the majority of which 82% (1,305) were non-Indigenous.

Of the 1,599 notifications for chickenpox, information on vaccination was available for 30% (543/1,790) and 80% (432/543) of these were unvaccinated.

Figure 62: Notification rate for chickenpox, Australia,* 2009, by age group and sex



* Excluding New South Wales.

Shingles

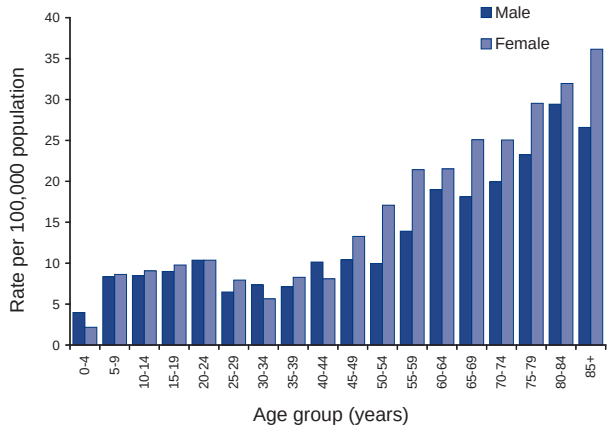
Shingles occurs most commonly with increasing age (> 50 years), impaired immunity, and a history of chickenpox in the first year of life. Reactivation of VZV causing shingles is thought to be due to a decline in cellular immunity to the virus, and in the majority of cases presents clinically as a unilateral vesicular rash in a dermatomal distribution. Associated symptoms may include headache, photophobia, malaise, and an itching, tingling, or severe pain in the affected dermatome. In the majority of patients shingles is an acute and self-limiting disease however, complications develop in approximately 30% of cases, the most common of which is chronic severe pain or post-herpetic neuralgia.[21]

There were 2,659 notifications of shingles reported to NNDSS in 2009, an increase when compared with 2,309 in 2008, and a rate of 18.0 notifications per 100,000 population. The highest rates were in South Australia (1,045, 64.4 per 100,000) and the Northern Territory (112, 49.8 per 100,000).

There were more female notifications (1,470; 55.3%) than males (1,187; 44.7%), which was similar to 2008. The highest rates were in the 85 years or over age group (126, 32.9 per 100,000; Figure 63).

Indigenous status was recorded for 81% (2,166) of notifications, the majority of which 97%, (2,102/2,166) were non-Indigenous.

Figure 63: Notification rate for shingles, Australia,* 2009, by age group and sex



* Excluding New South Wales.

Vectorborne diseases

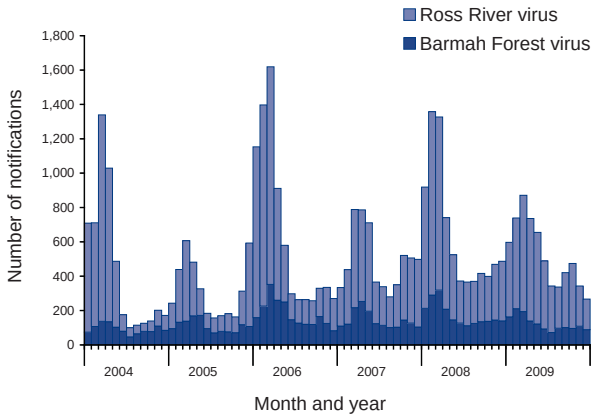
A disease that is transmitted to humans or other animals by an insect or other arthropod is known as a vectorborne disease. Vectors of human disease of most concern in Australia are typically mosquitoes that are able to transmit viruses or parasites to humans.

During 2009, there were 8,232 notifications of mosquito-borne diseases reported to NNDSS (3.5% of total notifications). This was a 7% decrease in the number of notifications compared with 2008 (8,876). The notifiable mosquito-borne diseases include those caused by the alphaviruses (Barmah Forest virus and Ross River virus), flaviviruses (dengue, Murray Valley encephalitis, Kunjin, Japanese encephalitis and yellow fever) and malaria. Yellow fever is reported under quarantinable diseases. Geographical location rates for vectorborne disease notifications represent the place of residence rather than the place of acquisition of infection, although in many instances this may be the same. Further information about these vectorborne diseases can be found in the National Arbovirus and Malaria Advisory Committee Annual (NAMAC) annual report 2008–09.[68]

Alphaviruses

Alphaviruses are single-stranded RNA viruses that cause disease epidemics characterised by fever, rash and polyarthritis. There are a variety of mosquito vectors for Barmah Forest virus (BFV) and Ross River virus (RRV), which facilitate the transmission of these viruses in diverse environments (freshwater habitats, coastal regions, salt marshes, floodwaters, established wetlands and urban areas).[69] In Australia, BFV and RRV are the alphaviruses of major public health significance, accounting for 76% (6,272 notifications) of the total mosquito-borne disease notifications for 2009. Between 2004 and 2009, notifications ranged annually for BFV from 1,100 (2004) to 2,133 (2006), and for RRV from 2,538 (2005) to 5,652 (2008) (Figure 64).

Figure 64: Notifications of Barmah Forest and Ross River virus infections, Australia, 2004 to 2009, by month and year of diagnosis



Barmah Forest virus infection

There were 1,486 notifications of BFV infections notified to NNDSS in 2009, which accounted for 18% of total mosquito-borne disease notifications for the reporting period. Fifty-four per cent of BFV notifications were reported from Queensland (799 notifications) and 24% from New South Wales (359 notifications). BFV notifications during 2009 were 0.9 times the mean for the previous 5 years.

Cases were reported in all jurisdictions. The highest rates of BFV notifications were reported by the Northern Territory (52.0 notifications per 100,000 population) and Queensland (18.1 notifications per 100,000 population). Cases were reported in all jurisdictions. The national BFV notification rate in 2009 was 6.8 notifications per 100,000 population, compared with 9.8 notifications per 100,000 population in 2008. Overall, 55% of BFV notifications reported to NNDSS were males.

Ross River virus infection

There were 4,786 notifications of RRV infections reported to NNDSS in 2009, which accounted for 58% of the total mosquito-borne disease notifications received during this period. The majority of notifications in 2009 were from Queensland (45%,

2,154 notifications) and New South Wales (19%, 912 notifications).

The highest rates of RRV notifications were reported by the Northern Territory (189.9 notifications per 100,000 population) and Queensland (48.9 notifications per 100,000 population). Cases were reported in all jurisdictions. The national RRV notification rate for 2009 was 21.9 notifications per 100,000 population compared with 26.4 notifications per 100,000 population in 2008. Overall, 47% of RRV notifications reported to NNDSS were males.

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 virus (MVEV), Kunjin virus (KUNV), Japanese encephalitis virus (JEV) and dengue viruses (DENV).

The Sentinel Chicken Programme is a surveillance scheme involving New South Wales, the Northern Territory, Victoria and Western Australia. Chicken flocks are located in strategic locations and are regularly tested for antibodies to MVEV and KUNV. This program is designed to provide early warning of flavivirus activity (excluding DENV and JEV).[70] A sentinel chicken surveillance report was published as part of the NAMAC annual report 2008–09.[68]

Murray Valley encephalitis virus infection

During 2009, 4 notifications of MVEV were reported to NNDSS. The 2 MVEV notifications from Western Australia involved a resident of Broome (March 2009) and a resident of Port Hedland (May 2009). Both these cases survived their illness but have long term neurological deficits.[71] The 2 MVEV notifications from the Northern Territory both died as a result of their illness. The 1st case was a long term resident from the Batchelor area (March 2009) and the other was a Queensland resident holidaying at Channel Point (May 2009). Health warnings were given both before and after the cases, with warnings based on vector numbers, rainfall, historical risk periods and/or detections of seroconversions in sentinel chicken flocks. During 2008, 4 notifications of MVEV were reported to NNDSS.

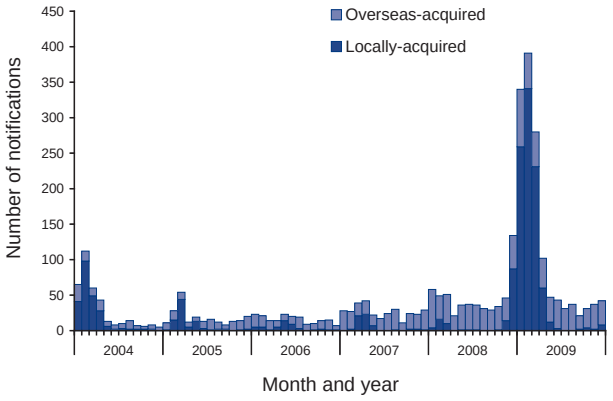
Kunjin virus infection

There were 2 notifications of KUNV reported to NNDSS in 2009, one from Queensland and one from the Northern Territory compared with 1 notification in 2008 from Queensland.

Dengue virus infection

There were 1,402 notifications of DENV infection reported to NNDSS in 2009 (Figure 65), of which 66% were locally acquired (922 notifications) and 34% (480 notifications) were acquired overseas. The number of cases reported in 2009 was a 150% increase in the number of cases reported in 2008 (562).

Figure 65: Notifications of dengue virus infection, Australia, 2004 to 2009, by month and year of diagnosis



Local transmission in Australia is restricted to areas of northern Queensland where the key mosquito vector, *Aedes aegypti*, is present. Dengue is not endemic to Queensland, but outbreaks occur when the virus is imported via international travellers or residents returning home from overseas. Queensland reported 1,036 notifications of DENV in 2009 (74% of all DENV notifications). Locally-acquired cases represented 66% (922) of the total number of dengue notifications in 2009. These were attributed to outbreaks of locally-acquired dengue, involving all 4 serotypes, in north Queensland.

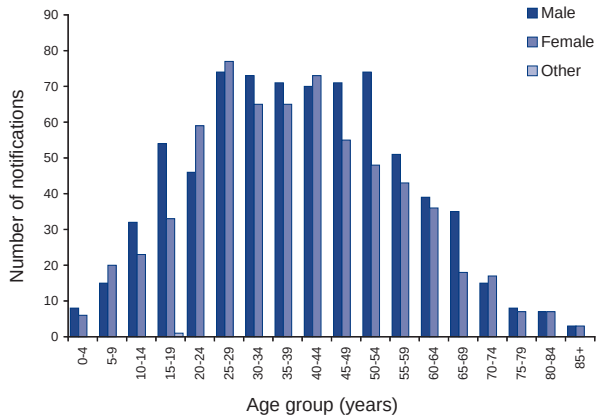
One dengue associated death was reported in March 2009. The last time death due to dengue fever was reported was in early 2004, when 2 deaths were reported in Australia. The latter were the first deaths attributed to dengue in over 100 years.[72]

In 2009, the largest number (99) of dengue notifications was in the 40–44 years age group and 53% were males (Figure 66).

Japanese encephalitis virus infection

There were no notifications of JEV reported to the NNDSS in 2009 compared with 1 notification of JEV in New South Wales in 2008. This case was in a man who had recently travelled to Japan and was the first JEV notification in Australia since 2004.

Figure 66: Notifications of dengue, Australia, 2009, by age group and sex



Arbovirus infections (NEC)

In 2009, there were 26 notifications of arbovirus infection (not elsewhere classified or NEC). There were 23 notifications in Queensland and three in Victoria. Overall, 58% of NEC notifications reported to NNDSS were males.

Malaria

Malaria is a serious acute febrile illness which can be transmitted from person to person through the bite of an infected mosquito. It is caused by a parasite called *Plasmodium* that includes 5 species – *vivax, falciparum, malariae*, *knowlesi* and *ovale*.[21] There were 526 notifications of malaria in Australia in 2009, compared with 529 in 2008 (Figure 67). There were no locally-acquired infections in 2009. Since Australia was declared malaria free in 1981 there have been 2 reported locally-transmitted outbreaks in 1986 and 2002 with a total of 15 cases. The majority of notifications in 2009 were reported by Queensland (35%, 185 notifications), Victoria (21%, 113 notifications), New South Wales (18%, 92 notifications), and Western Australia (16%, 82 notifications). Queensland reported that 51 of 185 notifications (28%) were acquired in Papua New Guinea.

The largest number (59) of malaria notifications was in the 20–24 years age group and 71% of malaria notifications were for males (Figure 68).

The infecting *Plasmodium* species was reported for 96% of malaria notifications in 2009 (Table 17). Of these 526 notifications, *P. falciparum* (42%) and *P. vivax* (48%) were the predominant species. New South Wales notified the first case of a fifth species, *Plasmodium knowlesi*, acquired in Indonesian Borneo.[73]

Zoonoses

Zoonoses are 'those diseases and infections which are naturally transmitted between vertebrate animals and man'.[74] Approximately 60%–70% of emerging human infectious diseases are zoonoses[75,76] and

Figure 67: Notifications of malaria (imported cases), Australia, 2004 to 2009, by state or territory and month and year of diagnosis

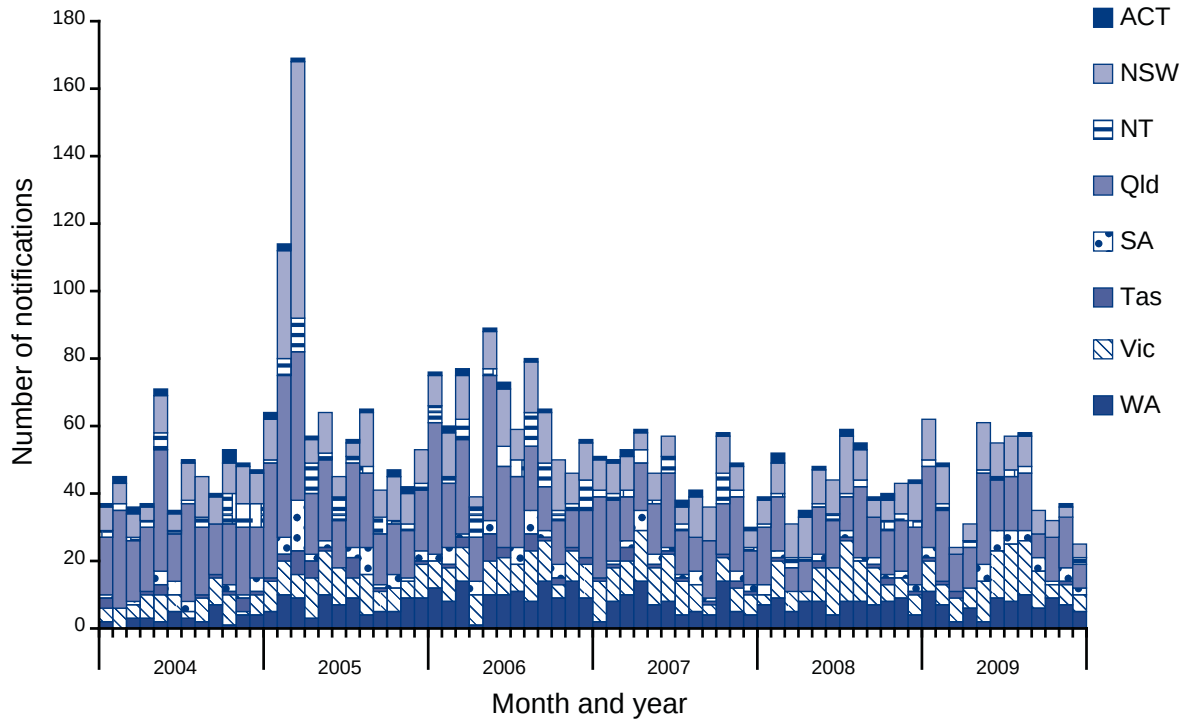
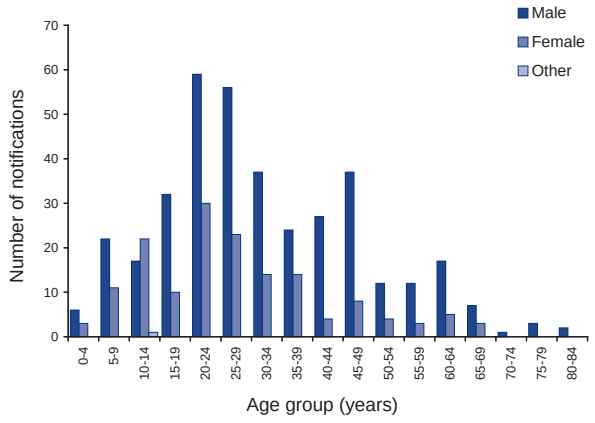


Table 17: Notifications of malaria, Australia, 2009, by parasite type and state or territory

Parasite type	State or territory									Type (%)
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust	
Plasmodium falciparum	2	43	2	74	13	4	33	47	219	42
Plasmodium knowlesi	0	1	0	0	0	0	0	0	1	0
Plasmodium malariae	0	1	1	2	1	0	3	1	9	2
Plasmodium ovale	0	4	0	3	0	0	2	3	12	2
Plasmodium vivax	1	41	9	91	15	1	71	24	253	48
Plasmodium species	0	0	0	15	1	0	2	2	20	4
Mixed *P. falciparum* and other species*	0	1	2	0	2	0	2	5	11	2
Mixed other species*	0	1	0	0	0	0	0	0	1	0
Total	3	92	14	185	32	5	113	82	526	

* New South Wales, South Australia, Tasmania, Victoria, Western Australia and the Northern Territory report mixed species infections per notified case. Queensland and the Australian Capital Territory report 1 notification for each species in a mixed infection.

Figure 68: Notifications of malaria, Australia, 2009, by age group and sex



more than 70% of emerging zoonoses originate from wildlife.[75] An emerging zoonosis is defined by WHO as 'a zoonosis that is newly recognised or newly evolved, or that has occurred previously but shows an increase in incidence or expansion in geographical, host or vector range'.[77]

The zoonoses notifiable to the NNDSS included in this chapter are anthrax, Australian bat lyssavirus or lyssavirus (unspecified) infection, brucellosis, leptospirosis, ornithosis, Q fever, and tularaemia. During 2009, 552 notifications of these zoonotic diseases were made to the NNDSS. Of these, Queensland accounted for 48% (263 notifications) and New South Wales 33% (183 notifications) of the zoonotic diseases. Notification numbers were generally higher in males (78%, 552 notifications). There were only 12 notifications (2%) of zoonotic disease cases aged less than 15 years and 19 notifications (3%) in cases over the age of 70 years.

Several zoonoses notifiable to the NNDSS are included under other headings in this report. A zoonotic infection can be acquired directly from an animal or indirectly via an insect vector, the environment or contaminated food. For example, *Salmonella* and *Campylobacter* infections are typically acquired from contaminated food and are listed under the gastrointestinal diseases section.

Anthrax

Anthrax is primarily a disease of herbivores; humans and carnivores are incidental hosts.[21] Anthrax has a low incidence in animals, and occurs only sporadically in Australia.[78] It can be an occupational hazard for veterinarians, and agriculture, wildlife and industry livestock workers who handle infected animals or by-products.

No cases of anthrax were reported to NNDSS in 2009. Over the previous 10 years, only 2 human cases of anthrax were reported in Australia in 2006 and 2007,[79,80] both of which were cutaneous anthrax. Australia has never recorded a human case of inhalational or gastrointestinal anthrax.

In 2009, 5 anthrax incidents were reported in livestock. Three occurred in New South Wales, where cases have been known to occur in the past, and two in north-eastern Victoria. In all instances, properties were subject to the recommended protocol of quarantine, disposal of carcasses, and vaccination and tracing of at-risk animals and their products. During 2009, an 'animal side' immunochromatographic test was used as a rapid anthrax screening test in Victoria to investigate sudden ruminant deaths. The results of this testing were consistent with confirmatory laboratory-based testing.[78]

Australian bat lyssavirus, rabies and lyssavirus (unspecified) infections

Classical rabies virus does not occur in Australia, although a related virus called Australian bat lyssavirus was identified in 1996 and is present in some Australian bats and flying foxes.[81] No notifications of either Australian bat lyssavirus infection (ABL), rabies or lyssavirus (unspecified) infections were reported to the NNDSS during 2009.

Only 2 known cases of ABL infection in humans have been reported in Australia, in 1996 and 1998. Both cases occurred after close contact with an infected bat and both were fatal.[82,83] Surveillance indicates that ABL infection may have been present in Australian bats for at least 15 years prior to its first detection. Sick and injured bats and changes in bat ecology pose an increased public health risk.[84] Bat testing conducted by the Australian Wildlife Health Network between January and December 2009 yielded 12 ABL detections compared with no detections in bats during 2008.[85]

Brucellosis

Brucellosis is mainly an occupational disease for farm workers, veterinarians, and abattoir workers who work with infected animals or their tissues.[21] However, the most common source of human infection in Queensland, which reported 69% of cases, is infected feral pigs and inadequate measures by feral pig hunters to prevent brucellosis infection.[86]

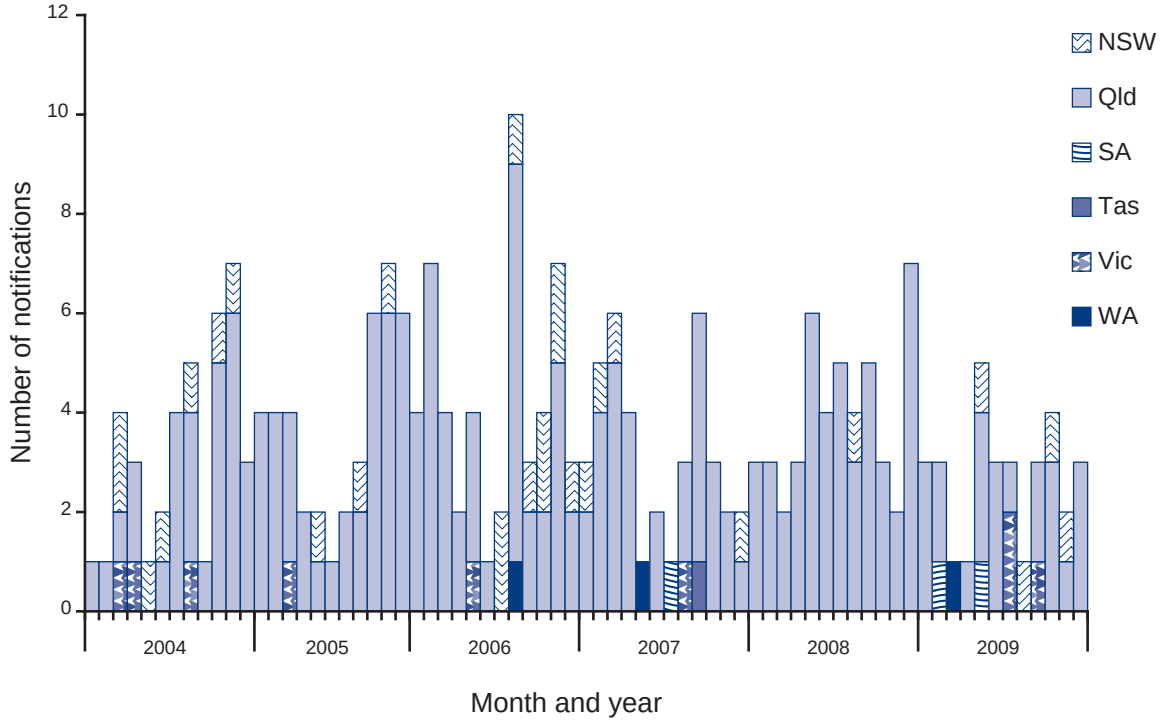
Several *Brucella* species can infect both animals and humans. Infections that can cause illness in humans include *Brucella melitensis* from sheep and goats, *Brucella suis* from pigs and *Brucella abortus* from cattle.

In 2009, 32 notifications of brucellosis were reported to the NNDSS; a national notification rate of 0.1 notifications per 100,000 population, compared with 0.2 notifications per 100,000 population in 2008. Queensland reported 22 notifications, with New South Wales reporting four, Victoria three, South Australia two, and Western Australia one. There has been little change in the number of notifications of brucellosis over the last 6 years (Figure 69). In 2009, the majority of notifications were male (27) and aged between 15 and 49 years (25) in 2009.

Species data were available for 38% of notifications (12) of which eight were *B. suis* (all from Queensland). There were 4 imported cases of *B. melitensis* (Egypt, Saudi Arabia, Turkey and Kenya).

Bovine brucellosis (*B. abortus*) was eradicated from the Australian cattle herd in 1989 and is considered to be an exotic animal disease in Australia.[78] Caprine and ovine brucellosis (caused by *B. melitensis*) has never been reported in Australian sheep or goats.[78] Swine brucellosis (caused by *B. suis*) is confined to some areas of Queensland, where it occurs in feral pigs, with human cases predominantly seen in recreational feral pig hunters.[86] Swine brucellosis was not detected in any of Queensland's domestic piggeries during 2009.[78]

Figure 69: Notifications of brucellosis, selected jurisdictions, 2004 to 2009, by state or territory and month and year of diagnosis



Leptospirosis

Leptospirosis is caused by spirochaetes of the genus, *Leptospira,* which is found in the genital tract and renal tubules of domestic and wild animals. In affected areas, where there is exposure to infected urine of domestic and wild animals, this disease can be an occupational and recreational hazard (such as swimming or wading in contaminated water).[21]

Between 2004 and 2009 leptospirosis notifications ranged from 108 (2007) to 177 (2004) annually, with 146 notifications in 2009 (0.7 notifications per 100,000 population). Cases were reported in all jurisdictions except for South Australia and Tasmania (Figure 70). In 2009, the majority of notifications were from Queensland (110 notifications, 2.5 notifications per 100,000 population). Eighty-seven per cent of leptospirosis cases were male (127 notifications) and 82% of all cases were aged between 15 and 54 years (120 notifications).

The World Health Organization/Food and Agriculture Organization/World Organization of Animal Health Collaborating centre for reference and research on leptospirosis provided an annual surveillance report of leptospirosis cases in 2009. The most frequently identified leptospirosis serovars in 2009 were Arborea, Zanoni and Australis. Serovar Arborea was the most frequently reported during 2009, accounting for 29% (43) of all notifications and was a 79% increase on Arborea notifications reported in 2008 (24).[87] The last reported death in Australia attributed to leptospirosis was reported in 2002.[88]

Ornithosis

Ornithosis is caused by infection with the bacterium *Chlamydophila psittaci* and is transmitted to humans by exposure to waterfowl, seabirds, shore birds, pigeons and doves and many psittacine birds. Birds can become carriers of the disease without becoming symptomatic. The mode of transmission to humans is by inhaling bacteria, usually from contaminated dried faeces, nasal or eye secretions and dust from infected birds.[21] Person-to-person transmission is rare.

In 2009, 65 ornithosis infections were notified to NNDSS, giving a national rate of 0.3 notifications per 100,000 population. This was lower than the 2008 rate of 0.5 notifications per 100.000 population. Between 2004 and 2009, the annual number of ornithosis notifications has decreased from 239 to 65 respectively (Figure 71). The annual number of notifications in 2009 represents the lowest total number of ornithosis notifications since 2001.

Victoria had the highest number of notifications (38 notifications, 0.7 per 100,000 population). Notifications were also received from New South Wales (22), South Australia (3) and Western Australia (2). Sixty-five per cent of the notifications in 2009 were male (42 notifications) compared with 2008, where the minority of cases were male

Figure 70: Notifications of leptospirosis, Australia, 2004 to 2009 by state or territory and month and year of onset

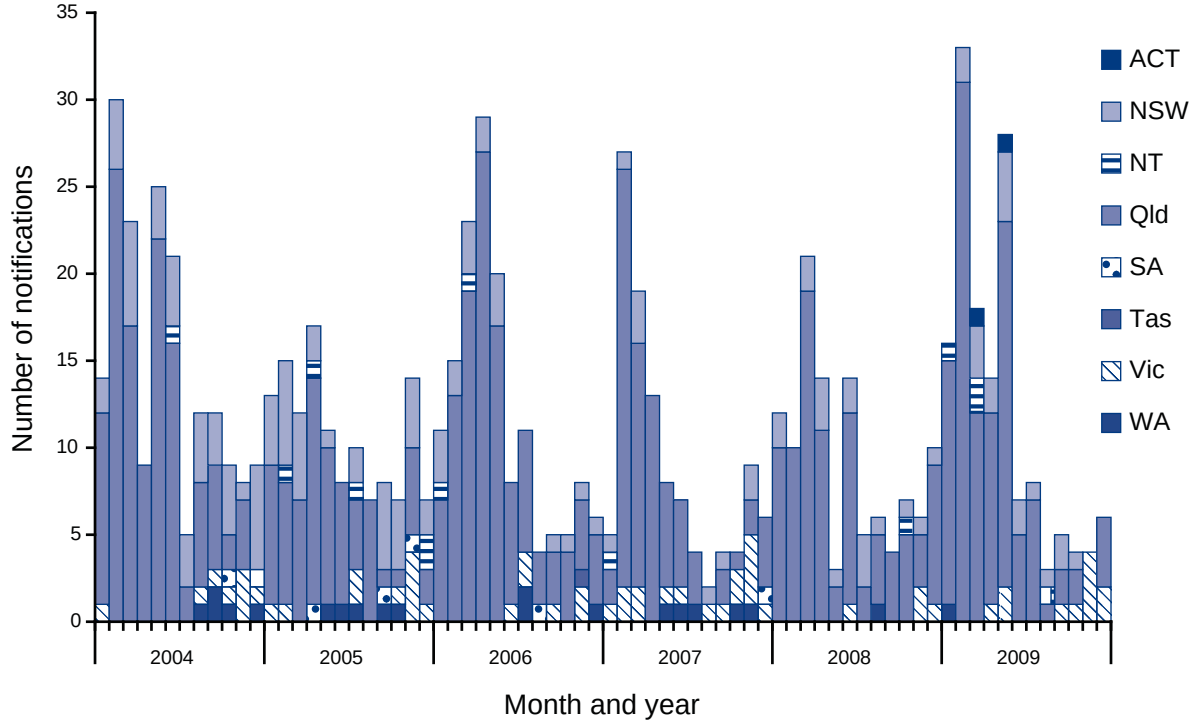
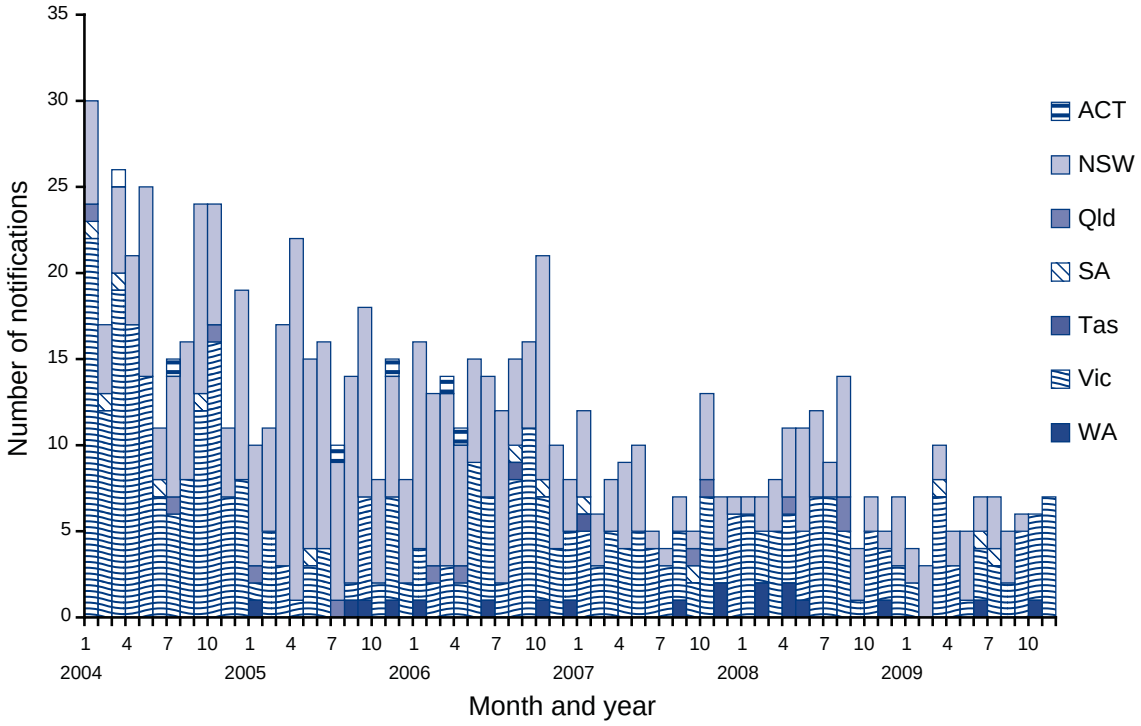


Figure 71: Notifications of ornithosis, Australia (except Northern Territory), 2004 to 2009, by state or territory and month and year of diagnosis



(47%). All notifications were aged 10 years or older and 75% of notifications were aged 40 years or over (Figure 72).

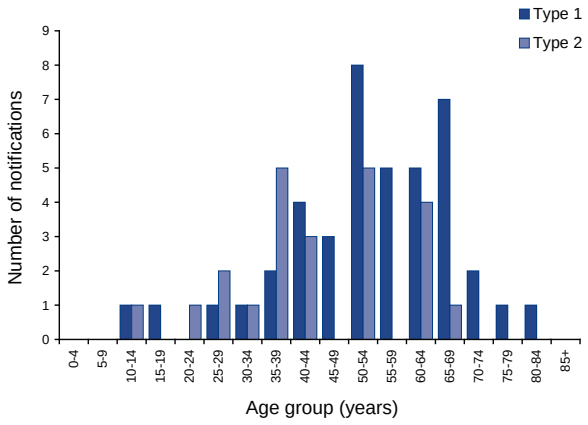
People at risk of contracting ornithosis include bird owners, pet shop employees, veterinarians, poultry-processing workers, zoo workers and taxidermists. Older adults and pregnant women may experience a more severe illness.[89]

Q fever

Q fever is caused by infection with the bacterium, *Coxiella burnetii*. Primary reservoirs of these bacteria are cattle, sheep and goats. These organisms are resistant to heat, drying and many common disinfectants, which enable the bacteria to survive for long periods in the environment. The mode of transmission to humans is most commonly by the airborne route through inhalation of contaminated dust. It can also occur though direct contact with infected animals and other contaminated material. Humans are often very susceptible to the disease, and very few organisms may be required to cause infection. Person-to-person transmission is rare.[21]

In 2009, 309 notifications of Q fever were reported to the NNDSS, representing a national rate of 1.4 notifications per 100,000 population (Figure 73). Between 1991 and 2001, and prior to the introduction of the National Q Fever Management Program, Q fever notification rates ranged between 2.5–4.9 notifications per 100,000 population. The

Figure 72: Notifications of ornithosis, Australia 2009, by age group and sex

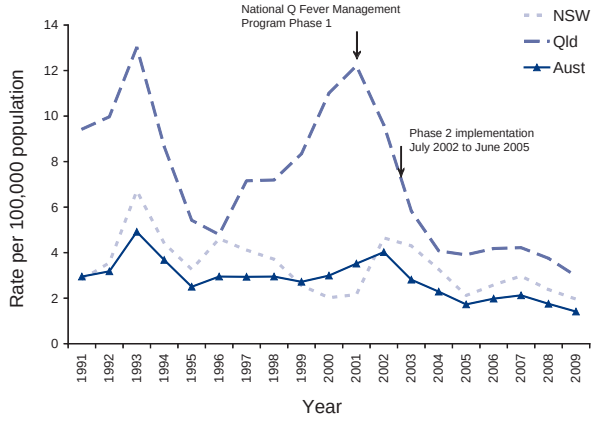


national notification rate for Q fever was lower in 2009 than in 2008 (1.4 and 1.8 notifications per 100,000 population, respectively). Between 2004 and 2009, the annual number of Q fever notifications ranged from 460 to 309 respectively.

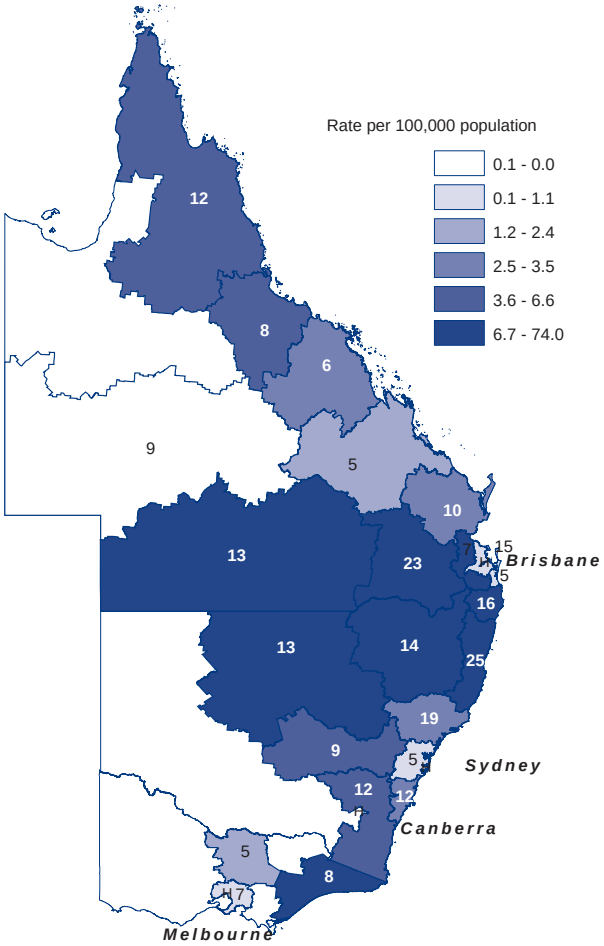
In 2009, the highest notification rates were from Queensland (131 notifications, 3.0 notifications per 100,000 population) and New South Wales (139 notifications, 2.0 notifications per 100,000 population). On a regional basis, the Central West Statistical Division of Queensland had the highest notification rate of 73 notifications per 100,000 population (Map 4). (Note: a small number of cases also occurred in South Australia, the Northern Territory, Victoria and Western Australia).

Seventy-five per cent of notifications reported to the NNDSS were male (232). As in 2008, the highest age specific rates of Q fever for males was in the 55–59 years age group (32 notifications, 5.0 notifications per 100,000 population), and for females was in the 60–64 years age groups (2.1 notifications per 100,000 population). There were 4 notifications reported in people aged less than 15 years.

Figure 73: Notification rate for Q fever, Australia, New South Wales and Queensland, 1991 to 2009



Map 4: Notification rates for Q fever in Queensland, New South Wales and Victoria, by Statistical Division of residence



The Australian Government has facilitated the availability of the Q fever vaccine. Adults at risk of Q fever infection, including abattoir workers, farmers, veterinarians, stockyard workers, shearers and animal transporters should be considered for vaccination. The administration of the Q fever vaccine requires pre-vaccination screening test to exclude those recipients with a previous (unrecognised) exposure to the organism. A Q fever vaccine may cause an adverse reaction in a person who has already been exposed to the bacterium. Vaccine is not recommended for children under 15 years of age.[12]

Tularaemia

Tularaemia is caused by infection with the bacterium *Francisella tularensis*. The most common modes of transmission are through arthropod bites, handling infected animals, inhalation of infectious aerosols or exposure to contaminated food or water. Small mammals such as rodents, rabbits and hares are often the reservoir host.[26]

There were no notifications of tularaemia in 2009, and there has never been a case notified in Australia.

Other bacterial infections

Legionellosis, leprosy, meningococcal infection and tuberculosis were notifiable in all states and territories in 2009 and classified as 'other bacterial infections' in the NNDSS. A total of 1,919 notifications were included in this group in 2009, which accounted for less than 1% of all the notifications to NNDSS, an increase in cases and a similar proportion as in 2008 (1,771 notifications and 1% of total).

Legionellosis

Legionellosis, caused by the bacterium *Legionella,* can take the form of either Legionnaires' disease, a severe form of infection of the lungs or Pontiac fever, a milder influenza-like illness. The species that are most commonly associated with human disease in Australia are *L. pneumophila* and *L. longbeachae*. *Legionella* bacteria are found naturally in low levels in the environment. In the absence of effective environmental treatment *Legionella* organisms can breed to high numbers in air conditioning cooling towers, hot water systems, showerheads, spa pools, fountains or potting mix.

Infections caused by any *Legionella* species are notifiable, provided they meet the national surveillance case definition.[90] There were 302 notifications of

legionellosis reported in 2009, giving a national rate of 1.4 notifications per 100,000 population. This was an 11% increase from the 272 notifications reported in 2008 (1.3 notifications per 100,000 population). State and territory notification rates ranged from 0.9 notifications per 100,000 population in Victoria to 2.7 notifications per 100,000 population in South Australia, with no cases reported in Tasmania in 2009.

Data on the causative species were available for 94% (285) of cases: 57% (171) were *L. longbeachae,* 37% (112) were identified as *L. pneumophila* and 1 (1%) case each of *L. micdad*ei and *L. bozemanii* were reported (Table 18).

Historically, there have been differences in the geographic distribution of *L. longbeachae* and *L. pneumophila*, with *L. longbeachae* making up the majority of notifications from South Australia and Western Australia, while *L. pneumophila* has been the most common infecting species in the eastern States (Queensland, New South Wales and Victoria). However, in 2009 *L. longbeachae* was also notified more frequently than *L. pneumophila* in the eastern States of Queensland and New South Wales.

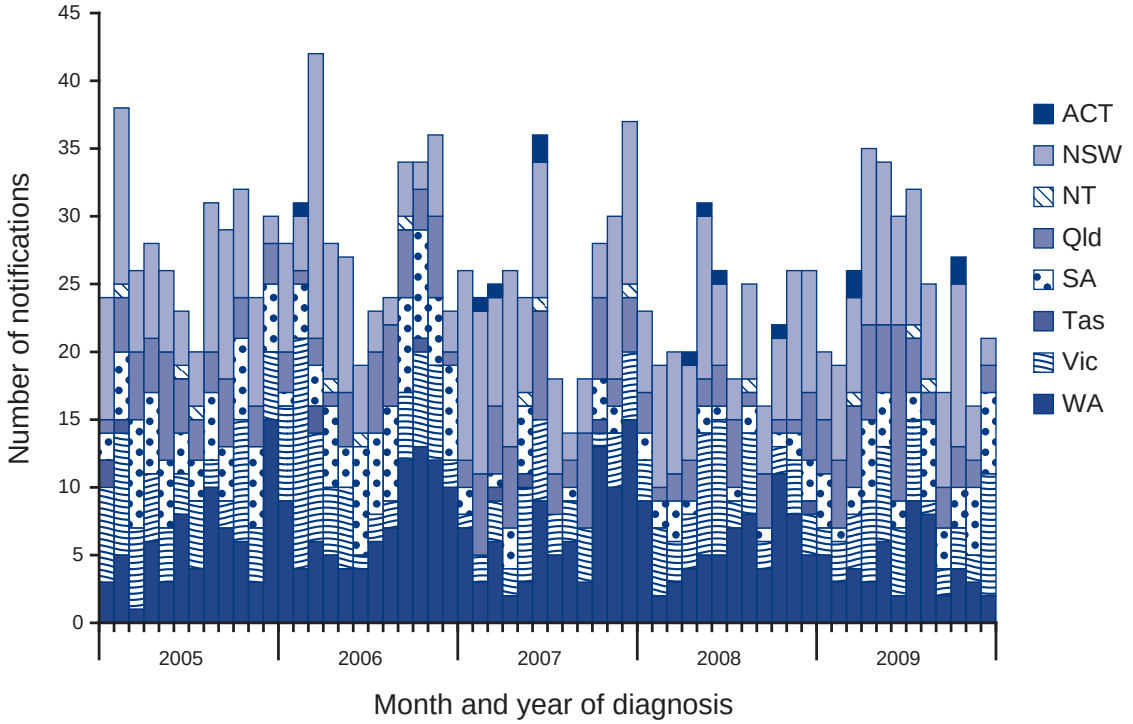
In 2009, diagnoses of legionellosis were highest in April (35 notifications, 12%) and May (34 notifications, 11%) (Figure 74). *L. pneumophila* occurred most frequently in the autumn months, with 45 cases reported over the period March to May 2009 (Figure 75). Twenty cases of *L. pneumophila* were reported in April 2009, the largest number of cases diagnosed in a month since 23 cases were reported in March 2006. *L. longbeachae* cases peaked in winter 2009, with 55 cases reported over the period June to August 2009, including 22 cases in July.

Males accounted for 61% (184) of legionellosis notifications in 2009, with a male to female ratio of 1.6:1. There were no notifications in people under the age of 16 years. The notification rate was highest in the 75–79 years age group (6 per 100,000 population, 33 notifications). The highest age and sex-specific rates were observed in men aged 75–79 years (9.5 per 100,000, 24 notifications) and women aged 70–74 years (4.5 per 100,000 population, 16 cases, Figure 76).

An infecting species analysis by age group showed that 84% (144/171) of *L. longbeachae* notifications were in persons aged 45 years or older, with the highest rate in the 65–69 years age group (3.2 per 100,000 population, 28 notifications). The proportion of *L. pneumophila* infections in persons 45 years or older was also 84% (94/112), with the highest rate in the 70–74 years age group (2.6 per 100,000 population, 18 notifications).

Mortality data were available for 44% (133/302) of notifications. There were 10 reported deaths due to legionellosis in Australia in 2009, which was an increase from 5 reported deaths in 2008. Those who died ranged in age between 62 and 82 years (median

Figure 74: Notifications of legionellosis, Australia, 2005 to 2009, by state or territory and month and year of diagnosis



72 years); 7 deaths were in males and 3 deaths were in females. There were 6 deaths associated with *L. pneumophila* infection and 4 deaths associated with *L. longbeachae* (Table 18). Mortality data should be interpreted with caution given the large proportion of cases without outcome details and the variability across jurisdictions in reporting death to the NNDSS.

Leprosy

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 amongst migrants from leprosy-endemic countries and occasional locally-acquired cases in Indigenous communities. Trends in leprosy notifications in Indigenous and non-Indigenous Australians are shown in Figure 77.

In 2009, 3 leprosy notifications (1 male and 2 females) were received, compared with 11 in 2008. There were 2 notifications in Queensland and one in Victoria. One notification was identified as an Indigenous Australian. The cases were aged 13, 21 and 28 years.

Figure 75: Notifications of legionellosis, Australia, 2005 to 2009, by infecting species, and month and year of diagnosis

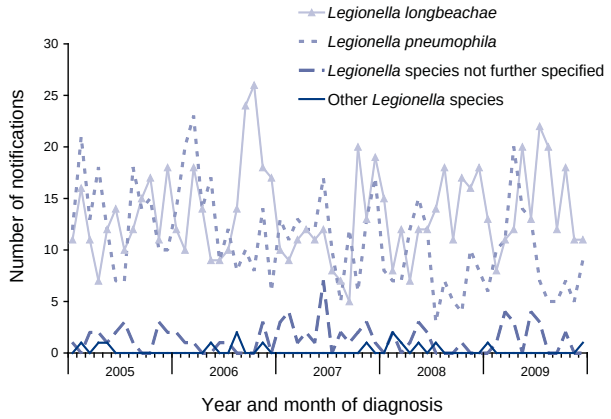


Figure 76: Notification rates for legionellosis, Australia, 2009, by sex and age group

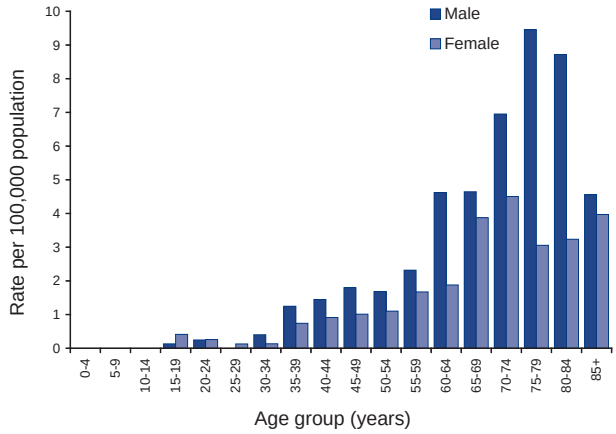


Figure 77: Notifications of leprosy, Australia, 1992 to 2009, by Indigenous status and year of diagnosis

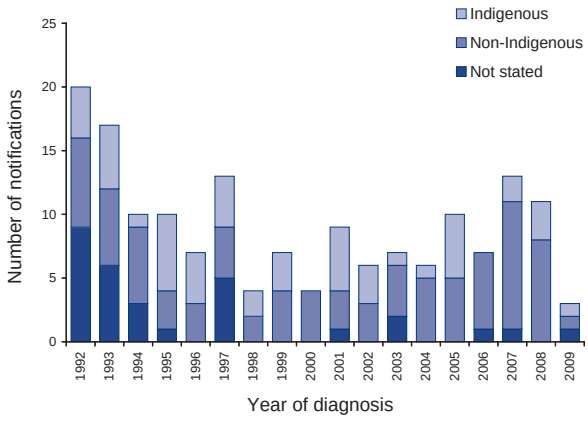


Table 18: Notifications of legionellosis, Australia, 2009, by species and state or territory

Species	State or territory								Aust	Total %
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA		
*Legionella pneumophila**	0	28	0	24	21	0	32	7	112	37.1
Legionella longbeachae†	0	64	3	28	23	0	10	43	171	56.6
Legionella micdadei	0	0	0	0	0	0	1	0	1	0.3
Legionella bozemanii	0	0	0	0	0	0	1	0	1	0.3
Unknown species	4	2	0	4	0	0	6	1	17	5.6
Total	4	94	3	56	44	0	50	51	302	100.0

* Four deaths.

† Six deaths.

Invasive meningococcal disease

Meningococcal disease is caused by the bacterium *Neisseria meningiditis* and becomes invasive when bacteria enter a normally sterile site, usually the blood (septicaemia), cerebrospinal fluid (meningitis) or both. The bacterium is carried by about 10% of the population without causing disease, and is transmitted via respiratory droplets. It occasionally causes a rapidly progressive serious illness, most commonly in previously healthy children and young adults. There are 13 known serogroups of the meningococcus. Globally, serogroups A, B, C, W135 and Y most commonly cause disease.[21] Historically, *N. meningitidis* serogroups B and C have been the major cause of invasive meningococcal disease (IMD) in Australia. There has been a marked decrease in rates of IMD due to *N. meningitidis* serogroup C infections following the introduction of the National Meningococcal C Vaccination Program in 2003.

In 2009, there were 259 notifications of IMD, a 9% decrease from 285 cases in 2008, and the lowest number of notifications since 1996. Since 2004, notification rates have decreased from 2.0 cases per 100,000 population to 1.2 per 100,000 in 2009.

Males accounted for 54% (139) of IMD notifications in 2009, with a male to female ratio of 1.2:1. Notifications peaked in July. Ninety-six per cent of notified cases (248) met the national case definition as 'confirmed' and the remaining 4% (11) were classified as 'probable', based on clinical symptoms alone.

Eighty-six per cent of IMD notifications (224) in 2009 had serogroup data available of which 88% (1977) were caused by serogroup B organisms, 6% (14) serogroup C (Figure 78), 2% (5) serogroup W135, 4% (8) serogroup Y, and the remaining 16% were either unknown or untypeable (Table 19). In comparison, in 2008 of 285 notifications, 77% (220) were caused by serogroup B organisms, 7% (21) were serogroup C, 3% (8) serogroup W135, 2% (8) were serogroup Y, and 10% (28) were either unknown or untypeable.

The highest age-specific IMD notification rate in 2009 was in children aged 0–4 years (6.4 per 100,000 population). Of the notifications reported in this age group, 81% were serogroup B. Although there is no vaccine available to protect against serogroup B disease, the rate for IMD due to serogroup B organisms has also declined in most age groups over the period 2004 to 2009 (Figure 79). The highest rate for sero-

Figure 78: Notifications of invasive meningococcal disease, Australia, 2004 to 2009, by serogroup and month and year of diagnosis

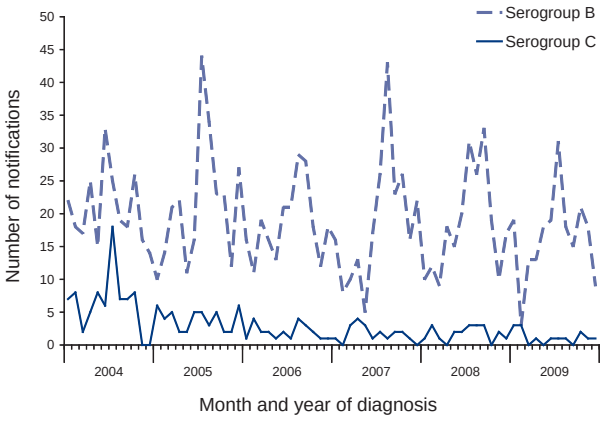


Figure 79: Notification rate for serogroup B invasive meningococcal disease, Australia, 2004 to 2009, by select age group and year of diagnosis

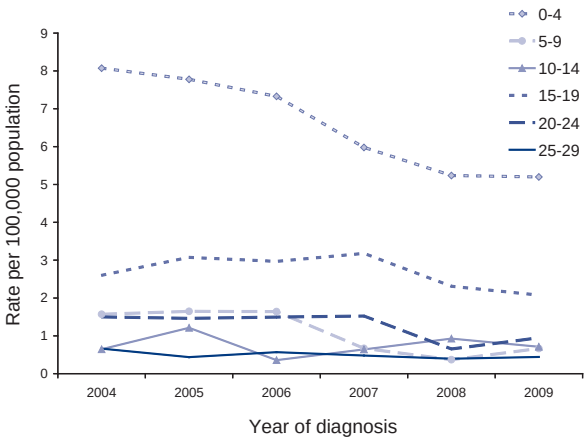


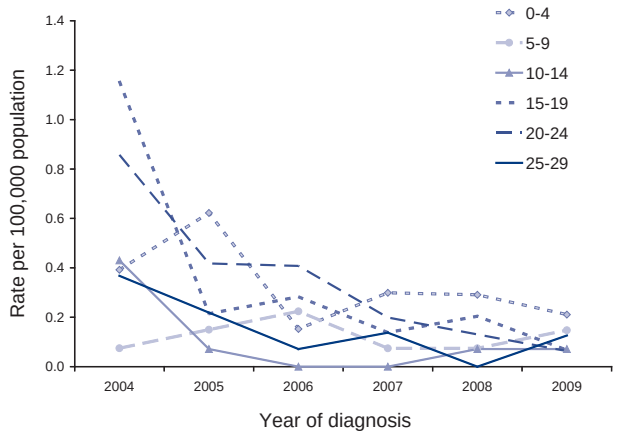
Table 19: Notifications of invasive meningococcal disease, Australia, 2009 by serogroup and state or territory

Serogroup	State or territory									Total (%)
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust	
Serogroup B	2	58	5	50	0	3	35	24	197	76.1
Serogroup C	0	8	1	2	0	0	1	2	14	5.4
W135	0	5	0	0	0	0	0	0	5	1.9
Y	0	3	0	1	0	0	1	1	8	3.1
Unknown or untyped serogroup	0	22	0	7	22	0	5	1	35	13.5
Total	2	96	6	60	22	3	42	28	259	100.0

group B infection in 2009 was 5.2 per 100,000 population in the 0–4 years age group (74 notifications), representing a 36% decline from 2004 (103 notifications, 8.1 per 100,000). There was a corresponding 56% decline in the 5–9 years age group from 1.6 per 100,000 (21 notifications) in 2004 to 0.7 per 100,000 (9 notifications) in 2009.

Notification rates for IMD due to serogroup C infections remained low in most age groups in 2009 (Figure 80). Since 2004, the largest decline has been in the 15–19 years age group, with 0.1 notifications per 100,000 population (1 notification) in 2009 compared with 1.2 per 100,000 (16 notifications) in 2004; a decline of 92%. Similarly, the rate in the 20–24 years age group fell from 0.9 per 100,000 (12 notifications) to 0.1 per 100,000 (1 notification) over the same period; a 89% decline.

Figure 80: Notification rate for serogroup C invasive meningococcal disease, Australia, 2004 to 2009, by select age group



Mortality data for IMD were available for 98 of the 259 (38%) notifications reported to the NNDSS in 2009. Of these, there were 10 deaths due to IMD (6 serogroup B, 1 serogroup C and 1 serogroup W135). This was an increase from 8 deaths in 2008 (mortality data were provided to the NNDSS for 51% of notifications in 2008). Mortality data should be interpreted with caution given the low level of completeness and the variability across jurisdictions in reporting death as an outcome in NNDSS.

Laboratory based meningococcal disease surveillance

The Australian Meningococcal Surveillance Program (AMSP) was established in 1994 for the purpose of monitoring and analysing isolates of *N. meningitidis* from cases of IMD in Australia. The program is undertaken by a network of reference laboratories in each state and territory, using standardised methodology to determine the phenotype (serogroup, serotype and serosubtype) and the susceptibility of *N. meningitidis* to a core group of antibiotics. The results of laboratory surveillance in 2009 have yet to be published.

Tuberculosis

Tuberculosis (TB) is an infection caused by the bacterium *Mycobacterium tuberculosis*. TB is transmitted by airborne droplets produced by people with pulmonary or respiratory tract TB during coughing or sneezing. 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 2009, 1,335 TB notifications were received by NNDSS; a rate of 6.2 cases per 100,000 population. In 2008, there were 1,203 notifications (5.6 per 100,000). TB notification rates were higher than the national average in the Australian Capital Territory (6.5 per 100,000), New South Wales (6.9 per 100,000), the Northern Territory (12.5 per 100, 000) and Victoria (7.7 per 100,000. The lowest rate occurred in Tasmania (1.8 per 100,000).

Further details and analysis of TB notifications can be found in the tuberculosis annual report series to be published in *CDI*.

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Abbreviations

7vPCV	7 valent pneumococcal conjugate vaccine
23vPPV	23 valent pneumococcal polysaccharide vaccine
ABL	Australian bat lyssavirus
ABS	Australian Bureau of Statistics
ACCESS	Australian Collaboration for Chlamydia Enhanced Surveillance
AFP	acute flaccid paralysis
AGSP	Australian Gonococcal Surveillance Programme
AIDS	acquired immune deficiency syndrome
AMSP	Australian Meningococcal Surveillance Programme
ANCJDR	Australian National Creutzfeldt-Jakob Disease Registry
ATAGI	Australian Technical Advisory Group on Immunisation
BFV	Barmah Forest virus
CDI	Communicable Diseases Intelligence
CDNA	Communicable Diseases Network Australia
CJD	Creutzfeldt-Jakob disease
DENV	dengue virus
EIA	enzyme inhibition assay
H1N1	influenza A(H1N1) pandemic 2009
Hib	*Haemophilus influenzae* type b
HIV	human immunodeficiency virus
HPAIH	highly pathogenic avian influenza in humans
HUS	haemolytic uraemic syndrome
IMD	invasive meningococcal disease
IPD	invasive pneumococcal disease
JEV	Japanese encephalitis virus
KUNV	Kunjin virus
MMR	measles-mumps-rubella vaccine
MVEV	Murray Valley encephalitis virus
NAMAC	National Arbovirus and Malaria Advisory Committee
NEC	not elsewhere classified
NIP	National Immunisation Program
NN	not notifiable
NNDSS	National Notifiable Diseases System
NPRL	National Polio Reference Laboratory
NSC	National Surveillance Committee
PCR	polymerase chain reaction
RNA	ribonucleic acid virus
RRV	Ross River virus
SARS	severe acute respiratory syndrome
SD	Statistical Division
SoNG	Series of National Guidelines
SSD	Statistical Subdivision
STEC	Shiga toxin-producing *Escherichia coli*
STI(s)	sexually transmissible infections(s)
TB	tuberculosis
VPD(s)	vaccine preventable disease(s)
VTEC	verotoxigenic *Escherichia coli*
VZV	Varicella-zoster virus
WHO	World Health Organization
WHOCC	World Health Organization Collaborating Centre for Reference and Research on Influenza
WPR	Western Pacific Region
WPV	wild-type polio virus

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Appendices

Appendix 1: Mid-year estimate of Australian population, 2009, by state or territory

	State or territory								
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aus
Males	174,487	3,517,707	116,684	2,203,712	801,487	247,942	2,689,782	1,135,244	10,888,385
Females	176,695	3,582,007	108,164	2,203,111	821,225	254,685	2,737,899	1,101,657	10,986,535
Total	351,182	7,099,714	224,848	4,406,823	1,622,712	502,627	5,427,681	2,236,901	21,874,920

Source: Australian Bureau of Statistics. Population by Age and Sex, Australian States and Territories, Estimated Resident Population By Single Year of Age, Australia. Canberra: Australian Bureau of Statistics; 2009. Report No.: 3201.0.[7]

Appendix 2: Mid-year estimate of Australian population, 2009, by state or territory and age

Age group	State or territory								
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aus*
0–4	23,058	451,548	18,472	304,237	96,417	33,205	346,739	149,790	1,423,608
5–9	20,629	440,537	17,625	285,751	94,254	30,812	325,640	140,621	1,356,035
10–14	21,294	451,099	16,760	296,596	100,898	33,562	336,462	148,121	1,404,996
15–19	24,155	480,422	16,730	309,425	107,799	34,706	364,910	155,481	1,493,798
20–24	30,306	502,865	18,187	316,099	112,913	31,145	405,673	164,471	1,581,787
25–29	30,751	513,319	20,190	317,629	107,629	28,727	401,364	164,619	1,584,403
30–34	26,782	489,605	18,542	296,220	100,201	28,327	377,842	154,174	1,491,830
35–39	27,281	519,020	18,626	327,459	111,616	33,250	406,483	167,562	1,611,487
40–44	24,659	483,559	16,457	307,840	112,989	33,500	384,684	162,456	1,526,360
45–49	25,069	508,821	16,105	315,670	118,111	37,606	384,775	163,245	1,569,605
50–54	22,999	465,704	14,277	285,765	111,319	35,875	352,953	149,350	1,438,428
55–59	20,863	421,682	12,209	261,574	103,406	33,885	317,282	133,967	1,305,071
60–64	17,485	381,364	8,716	236,730	94,230	31,126	284,833	115,151	1,169,759
65–69	11,654	288,240	5,484	172,901	69,792	23,491	213,912	83,461	869,039
70–74	8,502	231,684	2,998	129,878	57,169	18,189	172,827	64,847	686,136
75–79	6,347	187,971	1,710	99,257	47,705	14,490	141,217	49,721	548,443
80–84	4,984	148,998	1,060	76,174	39,969	10,997	111,342	37,213	430,743
85+	4,364	133,276	700	67,618	36,295	9,734	98,743	32,651	383,392
Total	351,182	7,099,714	224,848	4,406,823	1,622,712	502,627	5,427,681	2,236,901	21,874,920

Source: Australian Bureau of Statistics. Population by Age and Sex, Australian States and Territories, Estimated Resident Population By Single Year of Age, Australia. Canberra: Australian Bureau of Statistics; 2009. Report No.: 3201.0.[7]

Appendix 3: Indigenous status, National Notifiable Diseases Surveillance System, Australia, 2009, by notifiable disease*

Disease name	Aboriginal but not TSI origin	TSI but not Aboriginal origin	Aboriginal and TSI origin	Not Indigenous	Not stated	Blank/ missing	Total	% complete	Number complete	Number incomplete
Cholera	0	0	0	4	0	0	4	100.0	4	0
Donovanosis	0	1	0	0	0	0	1	100.0	1	0
Haemophilus influenzae type b	7	0	0	12	0	0	19	100.0	19	0
Tetanus	0	0	0	3	0	0	3	100.0	3	0
Syphilis – congenital	2	0	0	1	0	0	3	100.0	3	0
Murray Valley encephalitis virus infection	1	0	0	3	0	0	4	100.0	4	0
Meningococcal infection	25	1	3	223	7	0	259	97.3	252	7
Syphilis <2 year duration	108	12	5	1,112	53	1	1,291	95.8	1,237	54
Typhoid	1	0	0	110	3	2	116	95.7	111	5
Tuberculosis	23	3	0	1,247	76	6	1,355	93.9	1,273	82
Hepatitis E	0	0	0	31	2	0	33	93.9	31	2
Hepatitis A	8	0	0	513	40	2	563	92.5	521	42
Haemolytic uraemic syndrome	0	0	0	10	1	0	11	90.9	10	1
Hepatitis C (newly acquired)	47	1	1	310	41	1	401	89.5	359	42
Listeriosis	2	0	0	79	8	2	91	89.0	81	10
Hepatitis B (newly acquired)	13	1	0	197	26	1	238	88.7	211	27
Varicella zoster (chickenpox)	104	3	5	1,305	152	30	1,599	88.6	1,417	182
Pneumococcal disease (invasive)	174	2	4	1,154	191	34	1,559	85.6	1,334	225
Legionellosis	3	0	0	247	41	11	302	82.8	250	52
Measles	1	0	0	85	19	0	105	81.9	86	19
Varicella zoster (shingles)	59	3	2	2,102	411	82	2,659	81.5	2,166	493
Ornithosis	1	0	0	51	12	1	65	80.0	52	13
Malaria	1	7	0	404	111	3	526	78.3	412	114
Rubella	0	0	0	20	4	3	27	74.1	20	7
Syphilis >2 years or unspecified duration	226	31	6	757	359	6	1,385	73.6	1,020	365
Leptospirosis	7	1	1	98	39	0	146	73.3	107	39
Shigellosis	193	2	0	226	113	88	622	67.7	421	201
Leprosy	0	1	0	1	1	0	3	66.7	2	1

Appendix 3, *continued*: Indigenous status, National Notifiable Diseases Surveillance System, Australia, 2009, by notifiable disease*

Disease name	Aboriginal but not TSI origin	TSI but not Aboriginal origin	Aboriginal and TSI origin	Not Indigenous	Not stated	Blank/ missing	Total	% complete	Number complete	Number incomplete
STEC, VTEC	2	0	0	105	54	0	161	66.5	107	54
Brucellosis	1	0	0	20	11	0	32	65.6	21	11
Q fever	14	0	0	187	104	4	309	65.0	201	108
Gonococcal infection	2,798	165	36	2,236	2,097	727	8,059	65.0	5,235	2,824
Mumps	11	0	0	96	49	9	165	64.8	107	58
Hepatitis D	0	0	0	21	11	2	34	61.8	21	13
Dengue virus infection	39	45	6	721	564	27	1,402	57.8	811	591
Influenza (laboratory confirmed)	3,945	458	173	21,790	19,502	301	46,169	57.1	26,366	19,803
Kunjin virus infection	0	0	0	1	1	0	2	50.0	1	1
Salmonellosis	408	12	10	4,242	3,883	978	9,533	49.0	4,672	4,861
Chlamydial infection	4,376	678	226	25,407	25,532	6,441	62,660	49.0	30,687	31,973
Campylobacteriosis	222	9	10	7,567	7,636	529	15,973	48.9	7,808	8,165
Cryptosporidiosis	252	1	3	1,959	2,175	235	4,625	47.9	2,215	2,410
Pertussis	635	28	25	13,503	13,395	2,150	29,736	47.7	14,191	15,545
Arbovirus infection (NEC)	0	0	0	11	15	0	26	42.3	11	15
Hepatitis B (unspecified)	204	38	4	2,501	3,744	616	7,107	38.7	2,747	4,360
Ross River virus infection	134	12	3	1,644	2,722	271	4,786	37.5	1,793	2,993
Hepatitis C (unspecified)	465	5	14	3,344	6,283	970	11,081	34.5	3,828	7,253
Barmah Forest virus infection	39	4	2	388	995	58	1,486	29.1	433	1,053
Varicella zoster (unspecified)	129	27	7	1,553	5,059	202	6,977	24.6	1,716	5,261

* Indigenous status is usually obtained from medical notification and completeness varies by disease and by state and territory. This reflects differences in notification requirements (i.e. depending on the jurisdiction, some diseases are primarily or completely notified by pathology laboratories rather than clinicians) and the fact that it is not possible to follow-up all cases for diseases with a large volume of notifications and/or not requiring specific case-based public health action.

TSI Torres Strait Islander