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Year in review

Year in review: communicable disease surveillance, NSW, 2009

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In this issue we present a review of notifiable diseases reported in New South Wales (NSW) residents in 2009. Conditions have been grouped into four categories (bloodborne viruses and sexually transmissible infections; enteric diseases; respiratory diseases; and vaccine-preventable diseases), with significant trends highlighted. Outbreaks of some diseases, notably chlamydia, cryptosporidiosis, H1N1 influenza and pertussis are discussed. For greater detail, refer to Tables 1–5, which show disease-specific data for notifications reported by: year of onset of illness; month of onset of illness; area health service; and age group and sex.

Notifiable conditions

Bloodborne viruses and sexually transmissible infections

Highlights in 2009 included:

- **Human immunodeficiency virus (HIV) infection:** 328 cases were notified, reflecting a stable rate of infections in NSW. HIV infection continues to largely affect men who have sex with men, although in 2009 there was a small increase in the number of notifications of heterosexual people. Notifications associated with injecting drug use remained low, accounting for 3% of cases.
- **Hepatitis C:** 3951 cases were notified, similar to previous years. As hepatitis C infections are largely asymptomatic and cause chronic infections, caution should be used in interpreting these data as they may be influenced by changes in testing rather than in the incidence of the disease.
- **Chlamydia:** 14 998 cases were notified in 2009, the highest on record. Cases were most common in young adults, with more females than males notified in this age group likely reflecting higher screening rates in women.
- **Infectious syphilis:** 508 cases were notified, reflecting an ongoing outbreak, largely among men who have sex with men and who reside in inner Sydney.
- **Gonorrhoea:** 1653 notifications, mainly in men, were reported in 2009. Although this largely affected men who have sex with men, towards the end of 2009 there was a modest increase in the number of notifications in women.

Comment

The number of notifications of sexually transmissible infections continues to increase in NSW. Although this may in part be due to increased awareness and testing for these conditions, it demonstrates the continuing importance of prevention programs. The increases in sexually transmissible infections may threaten the current stability of the HIV epidemic in NSW.[1]

Note that because of the chronic nature of hepatitis B and hepatitis C infection, repeat testing and repeat case notifications are common for these conditions. Recent improvements in methods for cleaning data have resulted in the identification of duplicate notifications of hepatitis B and hepatitis C cases. This has led to the reduction in the number of case notifications for previous years, particularly before 2005.

Enteric diseases

There were 6575 notifications of enteric disease in 2009, an increase of 39% compared with the average of the previous 5 years. This was largely due to an increase in notifications of cryptosporidiosis and shigellosis.

- There was a 147% increase of notifications of cryptosporidiosis (1484 notifications), compared to the annual average of 600 for the period 2004–2008. This was attributed to a large outbreak at the beginning of the year, associated with contaminated swimming pools.[2]
- There was a 63% increase in notifications of shigellosis (155 notifications) compared to the previous 5-year average of 95 notifications. Of these, 55% were seen in south-east Sydney. The majority (98%) of notifications in

CONTENTS – See back page

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Table 1. Disease notifications by year of onset of illness[a], NSW, 1992–2009

Condition	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Adverse event after immunisation	31	23	40	28	56	70	95	16	42	111	178	219	187	107	71	239	256	124
Anthrax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Arboviral infection	341	655	380	534	1225	1803	777	1217	975	1181	660	1020	1143	1086	1918	1501	1848	1411
Barmah Forest virus[b]	6	25	39	271	172	185	134	249	197	395	395	451	401	449	643	575	530	360
Ross River virus[b]	324	598	331	236	1031	1597	581	952	748	717	182	492	699	581	1221	843	1154	911
Other[b]	11	32	10	27	22	21	62	16	30	69	83	77	43	56	54	83	164	140
Blood lead level ≥ 15 µg/dL[b]	Not notifiable until December 1996					710	874	691	984	513	516	338	303	234	298	292	262	206
Botulism	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
Brucellosis[b]	2	4	4	2	1	3	3	2	1	1	2	3	7	3	10	4	1	5
Chancroid[b]	Not notifiable until December 1998							1	0	0	0	0	0	0	0	0	0	0
Chlamydia trachomatis infection								2466	3502	4490	5811	7776	10 005	11 266	12 055	12 461	14 039	14 998
Congenital chlamydia[b]	Not notifiable until August 1998							14	18	16	15	23	28	46	39	31	44	51
Chlamydia – other[b]	Not notifiable until August 1998							2452	3484	4474	5796	7753	9977	11 220	12 016	12 430	13 995	14 947
Cholera[b]	0	1	0	1	3	1	1	2	0	1	1	0	1	0	3	2	2	3
Creutzfeldt–Jakob disease[b]	Not notifiable until April 2004											6	8	11	9	8	11	
Cryptosporidiosis[b]	Not notifiable until December 1996					157	1127	121	134	195	305	203	353	849	778	544	485	1460
Foodborne illness (NOS)[e]	253	106	213	270	211	255	201	151	147	56	41	1071	550	309	507	763	667	902
Gastroenteritis (institutional)	406	443	296	1359	554	939	738	673	697	775	1752	3583	12 784	1395	10 641	10 488	9246	11 876
Giardiasis[b]	Not notifiable until August 1998							1091	979	967	863	1028	1233	1448	1725	1946	1783	2100
Gonorrhoea[b]	491	382	357	428	522	636	1054	1286	1061	1361	1521	1327	1430	1576	1738	1385	1331	1653
Haemolytic uraemic syndrome	Not notifiable until December 1996					3	6	11	9	2	7	5	9	11	11	13	17	4
H. influenzae serotype b	217	124	61	29	13	17	11	13	8	7	10	6	5	7	11	7	9	6
Hib epiglottitis[b]	57	32	21	6	2	5	1	2	2	1	1	0	3	0	1	1	1	0
Hib meningitis[b]	103	53	17	11	4	3	3	3	1	1	1	0	0	2	0	2	2	0
Hib septicaemia[b]	26	24	12	8	3	1	4	6	4	2	3	1	2	4	6	2	3	4
Hib infection NOS[b]	31	15	11	4	4	8	3	2	1	3	5	5	0	1	4	2	3	2
Hepatitis A[b]	899	579	583	612	956	1422	925	415	198	197	149	123	137	83	95	65	69	98
Hepatitis B	3145	3569	3945	3948	3439	3096	2880	3375	3773	3991	3396	2729	2676	2720	2492	2608	2549	2684
Hepatitis B – acute viral[b]	111	95	73	61	43	53	58	72	99	91	88	74	53	56	53	56	45	36
Hepatitis B – other[b]	3034	3474	3872	3887	3396	3043	2822	3303	3674	3900	3308	2655	2623	2664	2439	2552	2504	2648
Hepatitis C	3862	5847	7717	6678	6712	6599	6917	7949	7638	7307	6231	4902	4607	4325	4337	4177	3757	3951
Hepatitis C – acute viral[b]	25	21	14	31	18	19	111	103	215	273	143	123	58	43	56	65	25	40
Hepatitis C – other[b]	3837	5826	7703	6647	6694	6580	6806	7846	7423	7034	6088	4779	4549	4282	4281	4112	3732	3911
Hepatitis D[b]	8	12	19	19	9	11	3	13	12	11	9	12	14	15	15	11	14	9
Hepatitis E[b]	0	1	2	0	3	6	4	7	9	6	6	6	8	7	10	8	14	17
HIV infection[b]	693	589	503	536	449	423	404	378	352	343	395	412	404	392	366	388	323	327
Influenza										244	1010	861	1008	1410	615	1918	1810	11 308
Influenza – Type A[b]	Not notifiable until December 2000									216	768	767	795	1053	421	1488	743	11 298
Influenza – Type B[b]	Not notifiable until December 2000									27	241	55	160	279	150	180	969	10
Influenza – Type A&B[b]	Not notifiable until December 2003									0	0	0	26	64	35	43	81	0
Influenza – Type NOS[b]	Not notifiable until December 2000									1	1	39	27	14	9	207	17	0
Legionellosis	104	66	60	75	74	33	46	41	41	68	44	60	80	89	78	105	89	94
Legionella longbeachae[b]	14	13	8	16	30	9	19	12	12	29	21	37	27	24	22	29	51	64
L. pneumophila[b]	80	34	30	35	34	18	22	22	26	38	22	23	51	64	56	74	37	28
Legionnaires' disease – other	10	19	22	24	10	6	5	7	3	1	1	0	2	1	0	2	1	2
Leprosy	7	5	3	3	2	0	0	1	2	4	0	2	5	1	1	4	4	0
Leptospirosis[b]	21	16	14	6	33	33	50	56	54	66	39	39	40	35	17	9	17	18
Listeriosis[b]	13	12	10	14	22	23	28	22	18	13	11	28	30	25	26	22	34	26
Lymphogranuloma venereum (LGV)[b]	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	1	3
Malaria[b]	110	173	184	96	202	173	158	174	232	157	105	121	100	205	140	98	115	92
Measles	804	2345	1483	596	191	273	119	32	36	31	8	18	12	5	60	4	39	19
Measles – lab confirmed	76	459	301	138	35	98	19	13	22	18	6	14	11	4	48	4	34	18
Measles – other	728	1886	1182	458	156	175	100	19	14	13	2	4	1	1	12	0	5	1
Meningococcal disease	121	153	142	113	161	218	184	218	249	232	213	198	146	137	102	109	80	92
Meningococcal – serogroup B[b]	3	7	7	23	36	53	55	95	93	90	105	100	81	73	54	76	49	57
Meningococcal – serogroup C[b]	4	6	9	8	35	55	55	60	64	38	54	45	24	16	13	9	9	7
Meningococcal – serogroup W135[b]	0	0	0	1	0	2	4	4	4	2	2	2	5	8	5	2	5	5
Meningococcal – serogroup Y[b]	0	1	1	0	1	0	7	1	7	2	2	5	3	3	1	5	4	3
Meningococcal – other	114	139	125	81	89	108	63	58	81	100	50	46	33	37	29	17	13	20
Mumps[b]	23	13	11	14	27	29	39	33	91	28	29	35	65	111	155	323	77	40
Paratyphoid[b,d]	8	9	11	12	15	5	9	5	14	11	13	22	10	0	0	0	0	0
Pertussis	217	1534	1405	1369	1156	4245	2309	1416	3694	4438	2013	2772	3566	5807	4920	2099	8756	12 570
Pneumococcal disease (invasive)[b]	Not notifiable until December 2000									444	862	802	906	641	566	523	549	481
Psittacosis[b]	Not notifiable until December 2000									38	155	88	81	121	94	35	40	22
Q fever[b]	212	403	267	200	287	257	236	164	131	142	308	287	220	143	176	205	167	140
Rubella	324	1186	233	2375	636	153	78	46	191	58	35	24	18	10	37	9	17	7
Congenital rubella[b]	0	2	4	1	5	0	0	1	0	0	0	1	1	0	0	1	0	0
Rubella – other[b]	324	1184	229	2374	631	153	78	45	191	58	35	23	17	10	37	8	17	7
Salmonella infection[b,d]	802	980	1101	1366	1224	1698	1812	1438	1401	1644	2099	1838	2136	2175	2061	2554	2262	2734
Shigellosis[b]	Not notifiable until December 2000									134	85	59	96	135	75	71	109	156
Syphilis	867	725	954	829	659	507	607	567	568	542	641	841	1030	840	889	1083	1035	1063
Congenital syphilis	1	0	2	6	3	3	0	3	2	1	1	3	1	6	4	4	3	0
Infectious syphilis[b,c]	3	6	29	131	72	57	45	86	79	65	126	243	291	240	231	453	428	508
Syphilis – other[b]	863	719	923	692	584	447	562	478	487	476	514	595	738	594	654	626	604	555
Tetanus	2	5	4	0	1	3	3	1	3	0	0	1	1	1	2	2	1	2
Tuberculosis[b]	389	389	391	443	409	421	381	482	446	416	447	386	430	452	465	467	490	480
Typhoid[b]	20	28	25	27	30	27	18	32	28	31	26	15	37	27	35	34	42	47
Verotoxin-producing *Escherichia coli* infections[b]	Not notifiable until December 1996					0	2	0	1	1	6	3	5	16	10	23	19	20

[a]Onset: the earlier of patient reported onset date, specimen date or date of notification. [b]Laboratory-confirmed cases only. [c]Includes syphilis primary, syphilis secondary, syphilis < 1 y duration and syphilis newly acquired. [d]From 2005, all paratyphoid recorded as salmonellosis. [e]Foodborne illness cases are only those notified as part of an outbreak. NOS: not otherwise specified. No case of the following diseases have been notified since 1991: plague[b], diphtheria[b], granuloma inguinale[b], lyssavirus[b], poliomyelitis[b], rabies, smallpox, typhus[b], viral haemorrhagic fever, yellow fever. 2009 influenza data: cases reported to public health units; contain 50 laboratory notifications from either interstate residents or overseas travellers.

Table 2. Disease notifications by month of onset of illness[a], NSW, 2009

Condition	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Adverse event after immunisation	13	15	20	15	14	8	8	4	9	7	6	5	124
Anthrax	0	0	0	0	0	0	0	0	0	0	0	0	0
Arboviral infection	108	95	137	194	255	144	88	84	83	100	60	63	1411
Barmah Forest virus[b]	35	39	41	36	46	22	18	23	26	23	25	26	360
Ross River virus[b]	46	41	78	149	203	109	58	50	49	71	26	31	911
Other[b]	27	15	18	9	6	13	12	11	8	6	9	6	140
Blood lead level ≥ 15 µg/dL[b]	13	17	37	20	15	16	15	14	12	16	11	20	206
Botulism	0	0	0	0	0	0	0	0	0	0	0	0	0
Brucellosis[b]	0	0	1	0	1	0	0	1	0	1	1	0	5
Chancroid[b]	0	0	0	0	0	0	0	0	0	0	0	0	0
Chlamydia trachomatis infection	1172	1300	1251	1231	1379	1272	1158	1212	1323	1215	1316	1169	14 998
Congenital chlamydia[b]	4	6	3	3	3	5	5	7	4	4	4	3	51
Chlamydia – other[b]	1168	1294	1248	1228	1376	1267	1153	1205	1319	1211	1312	1166	14 947
Cholera[b]	2	0	0	1	0	0	0	0	0	0	0	0	3
Creutzfeldt–Jakob disease[b]	0	3	1	1	2	0	2	1	0	0	0	1	11
Cryptosporidiosis[b]	117	407	410	208	94	48	31	16	18	12	50	49	1460
Foodborne illness (NOS)[e]	146	86	95	44	22	38	8	129	115	98	79	42	902
Gastroenteritis (institutional)	396	482	421	332	349	613	747	1626	3689	2430	549	242	11 876
Giardiasis[b]	128	219	262	189	188	179	140	153	163	136	171	172	2100
Gonorrhoea[b]	123	136	165	145	130	102	102	122	135	151	152	190	1653
Haemolytic syndrome	1	0	0	0	0	2	0	0	0	0	0	1	4
H. influenzae serotype b	0	2	2	0	0	2	0	0	0	0	0	0	6
Hib epiglottitis[b]	0	0	0	0	0	0	0	0	0	0	0	0	0
Hib meningitis[b]	0	0	0	0	0	0	0	0	0	0	0	0	0
Hib septicaemia[b]	0	1	1	0	0	2	0	0	0	0	0	0	4
Hib infection NOS[b]	0	1	1	0	0	0	0	0	0	0	0	0	2
Hepatitis A[b]	6	5	11	9	8	7	5	10	8	8	8	13	98
Hepatitis B	218	211	264	214	214	228	229	189	256	241	198	222	2684
Hepatitis B – acute viral[b]	4	2	3	3	2	3	2	2	3	4	3	5	36
Hepatitis B – other[b]	214	209	261	211	212	225	227	187	253	237	195	217	2648
Hepatitis C	320	363	375	309	391	325	296	288	353	297	329	305	3951
Hepatitis C – acute viral[b]	3	3	1	2	8	2	4	1	6	3	5	2	40
Hepatitis C – other[b]	317	360	374	307	383	323	292	287	347	294	324	303	3911
Hepatitis D[b]	2	1	0	1	1	2	1	0	0	0	1	0	9
Hepatitis E[b]	0	4	4	0	3	1	1	1	2	0	1	0	17
HIV infection[b]	27	32	23	33	25	25	25	18	35	27	27	30	327
Influenza	37	12	15	28	160	2914	6975	976	108	36	29	18	11 308
Influenza – Type A(H1)[b]	0	0	0	0	0	17	4	0	0	0	0	1	22
Influenza – Type A(H3)[b]	0	0	0	0	4	358	253	17	1	0	0	0	633
Influenza – Type A(Untyped)[b]	35	12	14	26	84	1121	3394	329	40	20	15	11	5101
Influenza – Type (H1N1)[b]	1	0	0	0	72	1417	3322	630	65	15	14	6	5542
Influenza – Type B[b]	1	0	1	2	0	1	2	0	2	1	0	0	10
Legionellosis	5	7	7	13	12	8	10	7	7	12	4	2	94
Legionella longbeachae[b]	3	3	5	6	7	5	10	5	5	11	3	1	64
L. pneumophila[b]	2	4	1	7	5	2	0	2	2	1	1	1	28
Legionnaires' disease – other	0	0	1	0	0	1	0	0	0	0	0	0	2
Leprosy	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptospirosis[b]	0	2	3	2	4	2	1	1	2	1	0	0	18
Listeriosis[b]	1	2	4	1	4	2	3	2	2	2	2	1	26
Lymphogranuloma venereum (LGV)[b]	0	0	1	0	0	0	0	1	0	0	0	1	3
Malaria[b]	12	11	2	5	14	10	10	9	7	5	3	4	92
Measles	3	3	1	1	1	0	1	0	2	3	4	0	19
Measles – lab confirmed	3	3	1	1	1	0	1	0	2	3	3	0	18
Measles – other	0	0	0	0	0	0	0	0	0	0	1	0	1
Meningococcal disease	10	2	4	10	4	12	15	11	6	6	8	4	92
Meningococcal – serogroup B[b]	8	1	3	5	4	7	9	5	5	1	7	2	57
Meningococcal – serogroup C[b]	1	1	0	1	0	0	1	1	0	1	0	1	7
Meningococcal – serogroup W135[b]	0	0	1	1	0	0	1	0	0	2	0	0	5
Meningococcal – serogroup Y[b]	0	0	0	0	0	1	0	2	0	0	0	0	3
Meningococcal – other	1	0	0	3	0	4	4	3	1	2	1	1	20
Mumps[b]	3	1	4	5	4	4	3	3	3	4	4	2	40
Pertussis	1982	1625	1887	1326	1250	833	606	643	595	623	629	571	12 570
Pneumococcal disease (invasive)[b]	13	20	27	36	47	54	74	60	53	52	23	22	481
Psittacosis[b]	2	3	2	2	4	2	3	3	1	0	0	0	22
Q fever[b]	17	15	14	11	14	11	9	7	14	9	11	8	140
Rubella	1	0	0	3	1	0	0	2	0	0	0	0	7
Congenital rubella[b]	0	0	0	0	0	0	0	0	0	0	0	0	0
Rubella – other[b]	1	0	0	3	1	0	0	2	0	0	0	0	7
Salmonella infection[b,d]	372	376	377	250	169	130	101	101	131	175	259	293	2734
Shigellosis[b]	19	17	21	19	18	12	9	10	6	8	8	9	156
Syphilis	94	107	100	100	94	78	89	83	98	58	88	74	1063
Congenital syphilis	0	0	0	0	0	0	0	0	0	0	0	0	0
Infectious syphilis[b,c]	47	53	47	46	45	42	38	34	50	26	43	37	508
Syphilis – other[b]	47	54	53	54	49	36	51	49	48	32	45	37	555
Tetanus	0	1	1	0	0	0	0	0	0	0	0	0	2
Tuberculosis[b]	50	35	33	45	37	52	38	37	49	43	29	32	480
Typhoid[b]	5	4	5	4	3	1	5	3	1	3	4	9	47
Verotoxin-producing *Escherichia coli* infections[b]	4	4	1	1	1	2	1	0	1	0	2	3	20

[a]Onset: the earlier of patient reported onset date, specimen date or date of notification. [b]Laboratory-confirmed cases only. [c]Includes syphilis primary, syphilis secondary, syphilis < 1 y duration and syphilis newly acquired. [d]Includes all paratyphoid cases. [e]Foodborne illness cases are only those notified as part of an outbreak. NOS: not otherwise specified. No case of the following diseases have been notified since 1991: plague[b], diphtheria[b], granuloma inguinale[b], lyssavirus[b], poliomyelitis[b], rabies, smallpox, typhus[b], viral haemorrhagic fever, yellow fever. 2009 influenza data: cases reported to public health units; contain 50 laboratory notifications from either interstate residents or overseas.

Table 3. Disease notifications by area health service of residence, crude rates per 100 000 population, NSW, 2009 (based on onset of illness[a])

Condition	Greater Southern[f]		Greater Western[f]			Hunter/New England[f]		North Coast[f]	
	Albury	Goulburn	Broken Hill	Dubbo	Bathurst	Newcastle	Tamworth	Port Macquarie	Lismore
Adverse event after immunisation	5.5	5.5	0.0	2.8	0.5	1.5	1.1	0.3	1.3
Anthrax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Arboviral infection	27.3	10.6	95.2	45.9	11.4	56.1	43.0	77.1	109.8
Barmah Forest virus[b]	1.1	4.6	18.1	0.9	1.1	15.0	7.7	27.9	39.1
Ross River virus[b]	25.5	5.1	77.1	45.0	10.3	39.7	33.1	47.5	67.6
Other[b]	0.7	0.9	0.0	0.0	0.0	1.3	2.2	1.6	3.0
Blood lead level ≥ 15 µg/dL[b]	3.3	0.4	34.0	27.7	2.3	8.0	0.5	0.6	3.0
Botulism	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brucellosis[b]	0.0	0.0	0.0	0.9	0.0	0.0	1.1	0.0	0.0
Chancroid[b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chlamydia trachomatis infection	217.9	163.0	335.6	237.5	188.4	290.7	221.3	136.5	259.1
Congenital chlamydia[b]	0.7	0.0	0.0	0.9	0.0	0.6	0.0	0.0	0.3
Chlamydia – other[b]	217.2	163.0	335.6	236.5	188.4	290.0	221.3	136.5	258.8
Cholera[b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Creutzfeldt–Jakob disease[b]	0.0	0.4	0.0	0.0	0.0	0.5	0.0	0.3	0.0
Cryptosporidiosis[b]	11.4	6.9	2.2	41.1	21.8	19.8	23.1	17.5	25.7
Giardiasis[b]	23.3	25.0	18.1	41.1	26.4	35.4	32.5	10.7	4.1
Gonorrhoea[b]	8.5	3.7	29.4	2.8	5.7	12.0	2.7	11.4	9.9
Haemolytic uraemic syndrome	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
H. influenzae serotype b	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Hib epiglottitis[b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hib meningitis[b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hib septicaemia[b]	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Hib infection NOS[b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hepatitis A[b]	25.1	9.7	0.0	6.7	4.0	26.8	24.2	20.9	64.8
Hepatitis B	8.8	7.4	38.5	12.4	5.7	11.1	9.3	7.4	4.1
Hepatitis B – acute viral[b]	0.0	0.0	0.0	0.0	0.5	1.6	0.0	1.3	0.6
Hepatitis B – other[b]	8.8	7.4	38.5	12.4	5.1	9.5	9.3	6.0	3.4
Hepatitis C	47.3	44.5	65.7	66.0	46.5	53.4	40.8	51.2	69.3
Hepatitis C – acute viral[b]	1.4	0.4	2.2	2.8	0.0	1.3	0.0	0.0	0.0
Hepatitis C – other[b]	45.8	44.1	63.5	63.1	46.5	52.1	40.8	51.2	69.3
Hepatitis D[b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Hepatitis E[b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HIV infection[b]	0.7	2.7	4.5	0.9	1.1	2.5	0.5	1.6	1.3
Influenza	168.4	157.9	45.3	141.7	83.2	180.6	135.2	72.4	218.0
Influenza – Type A(H1)[b]	0.3	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Influenza – Type A(H3)[b]	0.7	14.8	4.5	6.7	8.6	2.5	2.7	1.3	0.6
Influenza – Type A(Untyped)[b]	60.3	25.0	11.3	58.4	19.5	95.5	29.8	22.5	78.6
Influenza – Type (H1N1)[b]	106.9	117.5	29.4	76.6	55.1	82.3	102.7	48.5	138.7
Influenza – Type B[b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Legionellosis	0.0	0.0	2.2	1.9	1.7	1.6	1.1	0.3	1.3
Legionella longbeachae[b]	0.0	0.0	2.2	0.0	1.1	1.1	0.5	0.3	1.3
L. pneumophila[b]	0.0	0.0	0.0	1.9	0.5	0.3	0.5	0.0	0.0
Legionnaires' disease – other	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Leprosy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Leptospirosis[b]	0.0	1.3	0.0	0.0	0.5	0.5	1.6	0.3	1.3
Listeriosis[b]	0.0	0.0	0.0	0.9	0.0	0.5	0.0	0.0	0.0
Lymphogranuloma venereum (LGV)[b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Malaria[b]	3.3	1.3	0.0	1.9	1.7	1.3	0.5	1.3	0.3
Measles	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Measles – lab confirmed	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Measles – other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Meningococcal disease	0.3	0.9	2.2	2.8	1.1	1.5	2.7	0.6	1.3
Meningococcal – serogroup B[b]	0.3	0.9	0.0	1.9	1.1	1.1	2.2	0.6	1.3
Meningococcal – serogroup C[b]	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0
Meningococcal – serogroup W135[b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Meningococcal – serogroup Y[b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Meningococcal – other	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Mumps[b]	0.3	0.0	0.0	0.9	0.0	0.3	0.5	0.0	1.0
Pertussis	203.9	171.4	131.5	278.6	225.1	209.6	124.7	180.0	278.7
Pneumococcal disease (invasive)[b]	2.9	5.1	2.2	3.8	7.4	10.5	8.2	3.0	4.4
Psittacosis[b]	0.3	0.4	0.0	0.0	1.7	0.0	1.1	0.3	0.0
Q fever[b]	1.8	5.5	11.3	10.5	5.7	4.0	8.8	4.3	8.9
Rubella	0.0	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Congenital rubella[b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rubella – other[b]	0.0	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Salmonella infection[b,d]	31.8	33.4	31.7	36.3	19.5	32.2	42.5	36.4	58.3
Shigellosis[b]	1.4	0.9	2.2	0.0	0.0	0.6	1.1	0.3	3.4
Syphilis	1.4	7.4	102.1	6.7	9.1	6.5	5.5	3.3	6.1
Congenital syphilis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Infectious syphilis[b,c]	1.4	0.9	0.0	0.9	1.1	2.6	0.0	0.3	1.3
Syphilis – other[b]	0.0	6.5	102.1	5.7	8.0	3.8	5.5	3.0	4.8
Tetanus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tuberculosis[b]	2.2	2.3	0.0	0.0	0.0	2.5	0.5	1.0	2.4
Typhoid[b]	0.7	0.0	0.0	0.0	0.5	0.3	0.0	0.0	0.3
Verotoxin-producing *Escherichia coli* infections[b]	0.0	0.0	0.0	0.0	0.0	1.6	0.5	0.3	0.3

[a]Year of onset: the earlier of patient reported onset date, specimen date or date of notification.[b]Laboratory-confirmed cases only.[c]Includes syphilis primary, syphilis secondary, syphilis < 1 y duration and syphilis newly acquired.[d]Includes all paratyphoid cases.[f]Area health service further divided into the geographical region covered by their component public health unit (PHU).[g]Rate is based on a denominator of 8000 people.[h]Includes cases with unknown PHU.NOS: not otherwise specified.No case of the following diseases have been notified since 1991: plague[b], diphtheria[b], granuloma inguinale[b], lyssavirus[b], poliomyelitis[b], rabies, smallpox, typhus[b], viral haemorrhagic fever, yellow fever.2009 influenza data: cases reported to PHUs; contain 50 laboratory notifications from either interstate residents or overseas.

Table 3. (Continued)

Condition	Northern Sydney/ Central Coast[f]		South Eastern Sydney/ Illawarra[f]		Sydney South West[f]		Sydney West[f]		Justice Health
	Gosford	Hornsby	Wollongong	Randwick	Camperdown	Liverpool	Penrith	Parramatta	
Adverse event after immunisation	4.4	1.0	2.3	1.7	0.8	0.3	1.2	2.3	0.0
Anthrax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Arboviral infection	12.7	5.1	8.6	4.8	3.8	2.3	4.3	3.3	0.0
Barmah Forest virus[b]	5.7	0.1	2.6	0.2	0.1	0.3	0.0	0.0	0.0
Ross River virus[b]	6.0	1.4	3.4	1.8	1.5	1.0	2.8	0.9	0.0
Other[b]	0.9	3.5	2.6	2.7	2.1	0.9	1.5	2.3	0.0
Blood lead level ≥ 15 µg/dL[b]	0.9	1.7	3.6	1.1	1.4	2.1	3.1	1.4	0.0
Botulism	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brucellosis[b]	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Chancroid[b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chlamydia trachomatis infection	213.3	132.5	184.0	334.5	251.0	150.1	172.4	158.8	2275.0
Congenital chlamydia[b]	0.9	0.1	1.0	0.1	0.7	0.7	2.8	1.8	0.0
Chlamydia – other[b]	212.4	132.4	183.0	334.4	250.3	149.4	169.6	156.9	2275.0
Cholera[b]	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Creutzfeldt–Jakob disease[b]	0.0	0.0	0.7	0.0	0.0	0.1	0.3	0.0	0.0
Cryptosporidiosis[b]	22.0	29.6	9.7	26.4	21.3	12.0	32.6	18.8	0.0
Giardiasis[b]	26.5	40.2	26.2	48.5	31.7	18.9	34.1	26.2	12.5
Gonorrhoea[b]	11.8	15.2	8.6	71.4	54.3	22.1	9.3	15.4	62.5
Haemolytic uraemic syndrome	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0
H. influenzae serotype b	0.0	0.0	0.0	0.1	0.0	0.0	0.6	0.1	0.0
Hib epiglottitis[b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hib meningitis[b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hib septicaemia[b]	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Hib infection NOS[b]	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
Hepatitis A[b]	13.0	12.2	55.5	12.3	5.5	8.4	10.8	25.0	12.5
Hepatitis B	12.7	35.2	12.8	54.8	72.4	60.3	16.1	70.7	825.0
Hepatitis B – acute viral[b]	0.3	0.0	0.7	0.5	0.0	0.7	0.3	0.2	25.0
Hepatitis B – other[b]	12.4	35.2	12.0	54.3	72.4	59.6	15.8	70.5	800.0
Hepatitis C	56.8	22.8	47.1	60.6	63.9	55.0	46.2	37.2	5338.0
Hepatitis C – acute viral[b]	0.0	0.1	0.0	0.3	0.1	0.2	0.0	0.2	175.0
Hepatitis C – other[b]	56.8	22.7	47.1	60.2	63.7	54.8	46.2	37.0	5163.0
Hepatitis D[b]	0.3	0.0	0.0	0.0	0.1	0.0	0.0	0.2	50.0
Hepatitis E[b]	0.3	0.2	0.0	0.3	1.0	0.1	0.0	0.5	0.0
HIV infection[b]	1.6	4.6	0.7	13.4	15.5	2.2	0.9	2.6	0.0
Influenza	76.9	136.0	91.2	125.6	200.2	164.6	265.6	165.0	387.5
Influenza – Type A(H1)[b]	0.0	0.4	0.0	0.7	0.5	0.2	0.2	0.6	0.0
Influenza – Type A(H3)[b]	1.6	6.8	6.0	11.8	16.4	11.3	18.9	8.0	0.0
Influenza – Type A(Untyped)[b]	50.7	77.3	60.2	62.2	73.5	71.4	126.0	89.7	0.0
Influenza – Type (H1N1)[b]	24.5	51.0	24.9	50.5	109.7	81.3	119.9	66.4	387.5
Influenza – Type B[b]	0.0	0.3	0.0	0.2	0.0	0.1	0.5	0.0	0.0
Legionellosis	1.6	1.2	3.9	1.5	1.0	0.4	2.4	1.3	0.0
Legionella longbeachae[b]	0.6	0.9	3.1	1.1	0.7	0.3	0.6	0.9	0.0
L. pneumophila[b]	0.9	0.2	0.7	0.2	0.3	0.1	1.8	0.3	0.0
Legionnaires' disease – other	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Leprosy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Leptospirosis[b]	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Listeriosis[b]	0.0	0.3	0.2	0.3	0.7	1.0	0.0	0.2	0.0
Lymphogranuloma venereum (LGV)[b]	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
Malaria[b]	0.9	1.0	0.2	1.0	0.5	1.6	0.0	2.2	0.0
Measles	0.0	0.3	0.2	0.3	1.3	0.2	0.0	0.1	0.0
Measles – lab confirmed	0.0	0.3	0.2	0.3	1.2	0.2	0.0	0.1	0.0
Measles – other	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Meningococcal disease	0.9	0.8	2.6	2.5	1.4	0.8	1.5	0.7	0.0
Meningococcal – serogroup B[b]	0.3	0.4	1.8	0.7	0.7	0.4	1.2	0.3	0.0
Meningococcal – serogroup C[b]	0.0	0.1	0.0	0.2	0.0	0.2	0.0	0.1	0.0
Meningococcal – serogroup W135[b]	0.0	0.0	0.5	0.2	0.0	0.0	0.0	0.1	0.0
Meningococcal – serogroup Y[b]	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Meningococcal – other	0.3	0.1	0.2	1.0	0.7	0.1	0.0	0.1	0.0
Mumps[b]	0.3	0.8	0.5	1.0	1.0	0.3	0.0	0.5	0.0
Pertussis	213.3	135.7	364.6	134.0	112.3	123.1	297.0	146.7	12.5
Pneumococcal disease (invasive)[b]	11.5	5.2	7.8	7.7	6.9	7.2	5.5	6.3	0.0
Psittacosis[b]	0.6	0.2	0.0	0.1	0.1	0.1	1.8	0.1	0.0
Q fever[b]	0.0	0.3	2.8	0.1	0.0	0.2	0.0	0.0	12.5
Rubella	0.0	0.2	0.0	0.1	0.1	0.0	0.0	0.1	0.0
Congenital rubella[b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rubella – other[b]	0.0	0.2	0.0	0.1	0.1	0.0	0.0	0.1	0.0
Salmonella infection[b,d]	29.3	46.8	25.1	49.5	41.9	32.7	42.5	36.5	25.0
Shigellosis[b]	0.6	2.3	0.5	7.4	3.8	0.9	0.3	1.9	0.0
Syphilis	8.6	7.7	7.6	37.9	37.2	14.5	9.0	10.7	75.0
Congenital syphilis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Infectious syphilis[b,c]	1.9	3.7	1.3	29.2	23.9	2.5	3.4	3.4	0.0
Syphilis – other[b]	6.7	4.0	6.2	8.6	13.2	11.9	5.5	7.3	75.0
Tetanus	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Tuberculosis[b]	0.6	7.4	3.9	9.4	12.5	10.2	3.7	14.6	0.0
Typhoid[b]	0.0	0.8	0.2	0.5	0.7	0.9	0.3	1.7	0.0
Verotoxin-producing *Escherichia coli* infections[b]	1.2	0.0	0.0	0.1	0.0	0.1	0.3	0.0	0.0

[a]Year of onset: the earlier of patient reported onset date, specimen date or date of notification. [b]Laboratory-confirmed cases only. [c]Includes syphilis primary, syphilis secondary, syphilis < 1 y duration and syphilis newly acquired. [d]Includes all paratyphoid cases. [f]Area health service further divided into the geographical region covered by their component public health unit (PHU). [g]Rate is based on a denominator of 8000 people. [h]Includes cases with unknown PHU. NOS: not otherwise specified. No case of the following diseases have been notified since 1991: plague[b], diphtheria[b], granuloma inguinale[b], lyssavirus[b], poliomyelitis[b], rabies, smallpox, typhus[b], viral haemorrhagic fever, yellow fever. 2009 influenza data: cases reported to PHUs; contain 50 laboratory notifications from either interstate residents or overseas.

Table 4. Disease notifications by area health service of residence, NSW, 2009 (based on onset of illness[a])

Condition	Greater Southern[f]		Greater Western[f]			Hunter/New England[f]		North Coast[f]	
	Albury	Goulburn	Broken Hill	Dubbo	Bathurst	Newcastle	Tamworth	Port Macquarie	Lismore
Adverse event after immunisation	15	12	0	3	1	9	2	1	4
Anthrax	0	0	0	0	0	0	0	0	0
Arboviral infection	74	23	42	48	20	336	78	229	320
Barmah Forest virus[b]	3	10	8	1	2	90	14	83	114
Ross River virus[b]	69	11	34	47	18	238	60	141	197
Other[b]	2	2	0	0	0	8	4	5	9
Blood lead level ≥ 15 µg/dL[b]	9	1	15	29	4	48	1	2	9
Botulism	0	0	0	0	0	0	0	0	0
Brucellosis[b]	0	0	0	1	0	0	2	0	0
Chancroid[b]	0	0	0	0	0	0	0	0	0
Chlamydia trachomatis infection	589	351	148	248	328	1740	401	405	755
Congenital chlamydia[b]	2	0	0	1	0	4	0	0	1
Chlamydia – other[b]	587	351	148	247	328	1736	401	405	754
Cholera[b]	0	0	0	0	0	0	0	0	0
Creutzfeldt–Jakob disease[b]	0	1	0	0	0	3	0	1	0
Cryptosporidiosis[b]	31	15	1	43	38	119	42	52	75
Giardiasis[b]	63	54	8	43	46	212	59	32	12
Gonorrhoea[b]	23	8	13	3	10	72	5	34	29
Haemolytic uraemic syndrome	0	0	0	0	0	1	0	0	0
H. influenzae serotype b	0	0	0	0	0	2	0	0	0
Hib epiglottitis[b]	0	0	0	0	0	0	0	0	0
Hib meningitis[b]	0	0	0	0	0	0	0	0	0
Hib septicaemia[b]	0	0	0	0	0	2	0	0	0
Hib infection NOS[b]	0	0	0	0	0	0	0	0	0
Hepatitis A[b]	6	1	1	0	0	9	1	2	4
Hepatitis B	24	16	17	13	10	67	17	22	12
Hepatitis B – acute viral[b]	0	0	0	0	1	10	0	4	2
Hepatitis B – other[b]	24	16	17	13	9	57	17	18	10
Hepatitis C	128	96	29	69	81	320	74	152	202
Hepatitis C – acute viral[b]	4	1	1	3	0	8	0	0	0
Hepatitis C – other[b]	124	95	28	66	81	312	74	152	202
Hepatitis D[b]	0	0	0	0	0	0	0	0	1
Hepatitis E[b]	0	0	0	0	0	0	0	0	0
HIV infection[b]	2	6	2	1	2	15	1	5	4
Influenza	455	340	20	148	145	1081	245	215	635
Influenza – Type A(H1)[b]	1	1	0	0	0	1	0	0	0
Influenza – Type A(H3)[b]	2	32	2	7	15	15	5	4	2
Influenza – Type A(Untyped)[b]	163	54	5	61	34	572	54	67	229
Influenza – Type (H1N1)[b]	289	253	13	80	96	493	186	144	404
Influenza – Type B[b]	0	0	0	0	0	0	0	0	0
Legionellosis	0	0	1	2	3	10	2	1	4
Legionella longbeachae[b]	0	0	1	0	2	7	1	1	4
L. pneumophila[b]	0	0	0	2	1	2	1	0	0
Legionnaires' disease – other	0	0	0	0	0	1	0	0	0
Leprosy	0	0	0	0	0	0	0	0	0
Leptospirosis[b]	0	3	0	0	1	3	3	1	4
Listeriosis[b]	0	0	0	1	0	3	0	0	0
Lymphogranuloma venereum (LGV)[b]	0	0	0	0	0	0	0	0	0
Malaria[b]	9	3	0	2	3	8	1	4	1
Measles	0	0	0	0	0	1	0	0	0
Measles – lab confirmed	0	0	0	0	0	1	0	0	0
Measles – other	0	0	0	0	0	0	0	0	0
Meningococcal disease	1	2	0	3	2	9	4	2	4
Meningococcal – serogroup B[b]	1	2	0	2	2	7	4	2	4
Meningococcal – serogroup C[b]	0	0	0	1	0	0	0	0	0
Meningococcal – serogroup W135[b]	0	0	0	0	0	0	0	0	0
Meningococcal – serogroup Y[b]	0	0	0	0	0	0	0	0	0
Meningococcal – other	0	0	0	0	0	2	0	0	0
Mumps[b]	1	0	0	1	0	2	1	0	3
Pertussis	551	369	58	291	392	1255	226	534	812
Pneumococcal disease (invasive)[b]	8	11	1	4	13	63	15	9	13
Psittacosis[b]	1	1	0	0	3	0	2	1	0
Q fever[b]	5	12	5	11	10	24	16	13	26
Rubella	0	1	0	0	0	1	0	0	0
Congenital rubella[b]	0	0	0	0	0	0	0	0	0
Rubella – other[b]	0	1	0	0	0	1	0	0	0
Salmonella infection[b,d]	86	72	14	38	34	193	77	108	170
Shigellosis[b]	4	2	1	0	0	4	2	1	10
Syphilis	4	16	45	7	16	39	10	10	18
Congenital syphilis	0	0	0	0	0	0	0	0	0
Infectious syphilis[b,c]	4	2	0	1	2	16	0	1	4
Syphilis – other[b]	0	14	45	6	14	23	10	9	14
Tetanus	0	0	0	0	0	0	0	0	0
Tuberculosis[b]	6	5	0	0	0	15	1	3	7
Typhoid[b]	2	0	0	0	1	2	0	0	1
Verotoxin-producing *Escherichia coli* infections[b]	0	0	0	0	0	10	1	1	1

[a]Year of onset:the earlier of patient reported onset date, specimen date or date of notification. [b]Laboratory-confirmed cases only. [c]Includes syphilis primary, syphilis secondary, syphilis <1 y duration and syphilis newly acquired. [d]Includes all paratyphoid cases. [f]Area health service further divided into the geographical region covered by their component public health unit (PHU). [g]Rate is based on a denominator of 8000 people. [h]Includes cases with unknown PHU. NOS: not otherwise specified. No case of the following diseases have been notified since 1991: plague[b], diphtheria[b], granuloma inguinale[b], lyssavirus[b], poliomyelitis[b], rabies, smallpox, typhus[b], viral haemorrhagic fever, yellow fever. 2009 influenza data: cases reported to PHUs; contain 50 laboratory notifications from either interstate residents or overseas.

Table 4. (Continued)

Condition	Northern Sydney/ Central Coast[f]		South Eastern Sydney/ Illawarra[f]		Sydney South West[f]		Sydney West[f]		Justice Health	Total[h]
	Gosford	Hornsby	Wollongong	Randwick	Camperdown	Liverpool	Penrith	Parramatta		
Adverse event after immunisation	14	9	9	14	5	3	4	19	0	124
Anthrax	0	0	0	0	0	0	0	0	0	0
Arboviral infection	40	42	33	39	22	20	14	27	0	1411
Barmah Forest virus[b]	18	1	10	2	1	3	0	0	0	360
Ross River virus[b]	19	12	13	15	9	9	9	8	0	911
Other[b]	3	29	10	22	12	8	5	19	0	140
Blood lead level ≥ 15 µg/dL[b]	3	14	14	9	8	18	10	12	0	206
Botulism	0	0	0	0	0	0	0	0	0	0
Brucellosis[b]	0	1	0	1	0	0	0	0	0	5
Chancroid[b]	0	0	0	0	0	0	0	0	0	0
Chlamydia trachomatis infection	668	1090	702	2665	1437	1281	555	1283	182	14 998
Congenital chlamydia[b]	3	1	4	1	4	6	9	15	0	51
Chlamydia – other[b]	665	1089	698	2664	1433	1275	546	1268	182	14 947
Cholera[b]	0	2	0	0	0	0	0	1	0	3
Creutzfeldt–Jakob disease[b]	0	0	3	0	0	1	1	0	0	11
Cryptosporidiosis[b]	69	244	37	211	122	103	105	152	0	1460
Giardiasis[b]	83	331	100	387	182	162	110	212	1	2100
Gonorrhoea[b]	37	125	33	569	311	189	30	125	5	1653
Haemolytic uraemic syndrome	0	0	0	2	0	0	0	1	0	4
H. influenzae serotype b	0	0	0	1	0	0	2	1	0	6
Hib epiglottitis[b]	0	0	0	0	0	0	0	0	0	0
Hib meningitis[b]	0	0	0	0	0	0	0	0	0	0
Hib septicaemia[b]	0	0	0	1	0	0	0	1	0	4
Hib infection NOS[b]	0	0	0	0	0	0	2	0	0	2
Hepatitis A[b]	1	12	7	16	2	17	2	15	0	98
Hepatitis B	40	290	49	437	415	515	52	572	66	2684
Hepatitis B – acute viral[b]	1	0	3	4	0	6	1	2	2	36
Hepatitis B – other[b]	39	290	46	433	415	509	51	570	64	2648
Hepatitis C	178	188	180	483	366	470	149	301	427	3951
Hepatitis C – acute viral[b]	0	1	0	3	1	2	0	2	14	40
Hepatitis C – other[b]	178	187	180	480	365	468	149	299	413	3911
Hepatitis D[b]	1	0	0	0	1	0	0	2	4	9
Hepatitis E[b]	1	2	0	3	6	1	0	4	0	17
HIV infection[b]	5	38	3	107	89	19	3	21	0	327
Influenza	241	1119	348	1001	1146	1404	531	2146	31	11 308
Influenza – Type A(H1)[b]	0	4	0	6	3	2	2	2	0	22
Influenza – Type A(H3)[b]	5	56	23	94	94	97	153	26	0	633
Influenza – Type A(Untyped)[b]	159	636	230	496	421	610	1018	289	0	5101
Influenza – Type (H1N1)[b]	77	420	95	403	628	694	969	214	31	5542
Influenza – Type B[b]	0	3	0	2	0	1	4	0	0	10
Legionellosis	5	10	15	12	6	4	8	11	0	94
Legionella longbeachae[b]	2	8	12	9	4	3	2	8	0	64
L. pneumophila[b]	3	2	3	2	2	1	6	3	0	28
Legionnaires' disease – other	0	0	0	1	0	0	0	0	0	2
Leprosy	0	0	0	0	0	0	0	0	0	4
Leptospirosis[b]	0	2	0	0	0	0	0	1	0	18
Listeriosis[b]	0	3	1	3	4	9	0	2	0	26
Lymphogranuloma venereum (LGV)[b]	0	0	0	3	0	0	0	0	0	3
Malaria[b]	3	9	1	8	3	14	0	18	0	92
Measles	0	3	1	3	8	2	0	1	0	19
Measles – lab confirmed	0	3	1	3	7	2	0	1	0	18
Measles – other	0	0	0	0	1	0	0	0	0	1
Meningococcal disease	2	7	10	20	8	7	4	6	0	92
Meningococcal – serogroup B[b]	1	4	7	6	4	4	4	3	0	57
Meningococcal – serogroup C[b]	0	1	0	2	0	2	0	1	0	7
Meningococcal – serogroup W135[b]	0	0	2	2	0	0	0	1	0	5
Meningococcal – serogroup Y[b]	0	1	0	2	0	0	0	0	0	3
Meningococcal – other	1	1	1	8	4	1	0	1	0	20
Mumps[b]	1	7	2	8	6	3	0	4	0	40
Pertussis	668	1116	1391	1068	643	1050	956	1185	1	12 570
Pneumococcal disease (invasive)[b]	36	43	30	62	40	62	18	51	0	481
Psittacosis[b]	2	2	0	1	1	1	6	1	0	22
Q fever[b]	0	3	11	1	0	2	0	0	1	140
Rubella	0	2	0	1	1	0	0	1	0	7
Congenital rubella[b]	0	0	0	0	0	0	0	0	0	0
Rubella – other[b]	0	2	0	1	1	0	0	1	0	7
Salmonella infection[b,d]	92	385	96	395	240	279	137	295	2	2734
Shigellosis[b]	2	19	2	59	22	8	1	16	0	156
Syphilis	27	64	29	302	213	124	29	87	6	1063
Congenital syphilis	0	0	0	0	0	0	0	0	0	0
Infectious syphilis[b,c]	6	31	5	233	137	22	11	28	0	508
Syphilis – other[b]	21	33	24	69	76	102	18	59	6	555
Tetanus	0	0	0	0	0	1	0	0	0	2
Tuberculosis[b]	2	61	15	75	72	87	12	118	0	480
Typhoid[b]	0	7	1	4	4	8	1	14	0	47
Verotoxin-producing *Escherichia coli* infections[b]	4	0	0	1	0	1	1	0	0	20

[a]Year of onset:the earlier of patient reported onset date, specimen date or date of notification. [b]Laboratory-confirmed cases only. [c]Includes syphilis primary, syphilis secondary, syphilis < 1 y duration and syphilis newly acquired. [d]Includes all paratyphoid cases. [f]Area health service further divided into the geographical region covered by their component public health unit (PHU). [g]Rate is based on a denominator of 8000 people. [h]Includes cases with unknown PHU. NOS: not otherwise specified. No case of the following diseases have been notified since 1991: plague[b], diphtheria[b], granuloma inguinale[b], lyssavirus[b], poliomyelitis[b], rabies, smallpox, typhus[b], viral haemorrhagic fever, yellow fever. 2009 influenza data: cases reported to PHUs; contain 50 laboratory notifications from either interstate residents or overseas.

Table 5. Disease notifications by age group and sex of the case, NSW, 2009 (based on onset of illness[a])

Condition	0–4 years		5–24 years		25–44 years		45–64 years		≥65 years		Total		Total[e]
	F	M	F	M	F	M	F	M	F	M	F	M	
Adverse event after immunisation	20	27	31	10	16	2	8	5	2	2	77	46	124
Anthrax	0	0	0	0	0	0	0	0	0	0	0	0	0
Arboviral infection	1	2	86	75	252	247	281	293	72	101	692	718	1411
Barmah Forest virus[b]	1	1	22	15	51	65	69	87	23	26	166	194	360
Ross River virus[b]	0	1	50	47	178	154	191	174	45	70	464	446	911
Other[b]	0	0	14	13	23	28	21	32	4	5	62	78	140
Blood lead level ≥ 15 µg/dL[b]	9	11	3	36	3	71	3	57	3	10	21	185	206
Botulism	0	0	0	0	0	0	0	0	0	0	0	0	0
Brucellosis[b]	0	0	1	0	1	0	0	3	0	0	2	3	5
Chancroid[b]	0	0	0	0	0	0	0	0	0	0	0	0	0
Chlamydia trachomatis infection	29	26	5656	2957	2545	3017	178	506	8	35	8416	6541	14 998
Congenital chlamydia[b]	23	21	5	1	1	0	0	0	0	0	29	22	51
Chlamydia – other[b]	6	5	5651	2956	2544	3017	178	506	8	35	8387	6519	14 947
Cholera[b]	0	0	0	1	0	0	2	0	0	0	2	1	3
Creutzfeldt–Jakob disease[b]	0	0	0	0	0	0	1	1	7	2	8	3	11
Cryptosporidiosis[b]	267	329	214	209	231	119	42	22	17	8	771	687	1460
Giardiasis[b]	249	334	175	235	402	318	142	120	67	48	1035	1056	2100
Gonorrhoea[b]	1	1	161	322	119	804	31	192	2	14	314	1333	1653
Haemolytic uraemic syndrome	1	0	2	0	0	0	0	0	1	0	4	0	4
H. influenzae serotype b	1	1	1	0	1	1	0	1	0	0	3	3	6
Hib epiglottitis[b]	0	0	0	0	0	0	0	0	0	0	0	0	0
Hib meningitis[b]	0	0	0	0	0	0	0	0	0	0	0	0	0
Hib septicaemia[b]	0	1	1	0	1	1	0	0	0	0	2	2	4
Hib infection NOS[b]	1	0	0	0	0	0	0	1	0	0	1	1	2
Hepatitis A[b]	2	4	21	18	13	16	8	10	4	2	48	50	98
Hepatitis B	1	5	194	219	694	753	268	401	59	64	1216	1442	2684
Hepatitis B – acute viral[b]	0	1	1	4	9	14	1	5	0	1	11	25	36
Hepatitis B – other[b]	1	4	193	215	685	739	267	396	59	63	1205	1417	2648
Hepatitis C	6	3	190	180	722	1375	412	905	79	55	1409	2518	3951
Hepatitis C – acute viral[b]	2	1	6	9	10	10	0	2	0	0	18	22	40
Hepatitis C – other[b]	4	2	184	171	712	1365	412	903	79	55	1391	2496	3911
Hepatitis D[b]	0	0	0	2	0	5	1	0	1	0	2	7	9
Hepatitis E[b]	0	1	2	5	1	6	1	1	0	0	4	13	17
HIV infection[b]	0	0	7	23	24	186	5	70	0	9	36	288	327
Influenza	704	920	2178	2516	1465	1239	874	665	242	249	5487	5612	11 308
Influenza – Type A(H1)[b]	0	1	5	2	6	2	3	0	1	0	15	5	22
Influenza – Type A(H3)[b]	47	60	114	119	67	46	53	36	26	28	307	290	633
Influenza – Type A(Untyped)[b]	332	445	1034	1184	623	542	358	261	132	130	2484	2564	5101
Influenza – Type (H1N1)[b]	325	413	1023	1208	768	648	459	367	83	91	2677	2747	5542
Influenza – Type B[b]	0	1	2	3	1	1	1	1	0	0	4	6	10
Legionellosis	0	0	1	2	4	7	14	20	16	30	35	59	94
Legionella longbeachae[b]	0	0	0	1	3	6	10	12	12	20	25	39	64
L. pneumophila[b]	0	0	1	1	1	1	3	8	4	9	9	19	28
Legionnaires' disease – other	0	0	0	0	0	0	1	0	0	1	1	1	2
Leprosy	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptospirosis[b]	0	0	0	3	1	4	1	7	1	1	3	15	18
Listeriosis[b]	2	2	0	0	3	0	5	2	3	9	13	13	26
Lymphogranuloma venereum (LGV)[b]	0	0	0	0	0	2	0	1	0	0	0	3	3
Malaria[b]	0	1	14	14	11	29	5	15	0	3	30	62	92
Measles	1	1	3	6	6	2	0	0	0	0	10	9	19
Measles – lab confirmed	1	1	2	6	6	2	0	0	0	0	9	9	18
Measles – other	0	0	1	0	0	0	0	0	0	0	1	0	1
Meningococcal disease	10	19	15	23	9	3	5	5	2	1	41	51	92
Meningococcal – serogroup B[b]	10	12	9	15	6	1	1	2	1	0	27	30	57
Meningococcal – serogroup C[b]	0	1	1	1	2	1	1	0	0	0	4	3	7
Meningococcal – serogroup W135[b]	0	3	0	1	0	0	1	0	0	0	1	4	5
Meningococcal – serogroup Y[b]	0	0	0	1	0	0	0	1	1	0	1	2	3
Meningococcal – other	0	3	5	5	1	1	2	2	0	1	8	12	20
Mumps[b]	1	3	2	10	5	7	6	3	1	2	15	25	40
Pertussis	1379	1438	2799	2403	1492	843	908	615	397	261	6975	5560	12 570
Pneumococcal disease (invasive)[b]	32	43	17	17	33	40	54	66	86	93	222	259	481
Psittacosis[b]	0	0	0	0	3	5	3	6	0	5	6	16	22
Q fever[b]	0	1	5	11	10	32	11	57	3	9	29	110	140
Rubella	1	0	0	0	2	3	0	1	0	0	3	4	7
Congenital rubella[b]	0	0	0	0	0	0	0	0	0	0	0	0	0
Rubella – other[b]	1	0	0	0	2	3	0	1	0	0	3	4	7
Salmonella infection[b,d]	320	321	359	390	313	293	224	209	173	122	1389	1335	2734
Shigellosis[b]	4	7	12	6	14	72	7	23	5	6	42	114	156
Syphilis	1	0	18	54	120	431	50	253	49	83	238	821	1063
Congenital syphilis	0	0	0	0	0	0	0	0	0	0	0	0	0
Infectious syphilis[b,c]	0	0	2	39	19	300	3	138	1	6	25	483	508
Syphilis – other[b]	1	0	16	15	101	131	47	115	48	77	213	338	555
Tetanus	0	0	0	0	0	1	0	1	0	0	0	2	2
Tuberculosis[b]	1	2	41	52	102	108	47	53	18	55	209	270	480
Typhoid[b]	2	4	4	6	10	11	5	4	0	1	21	26	47
Verotoxin-producing *Escherichia coli* infections[b]	1	0	1	4	1	2	4	2	3	1	10	9	20

[a]Year of onset: the earlier of patient reported onset date, specimen date or date of notification. [b]Laboratory-confirmed cases only. [c]Includes syphilis primary, syphilis secondary, syphilis < 1 y duration and syphilis newly acquired. [d]Includes all paratyphoid cases. [e]Includes cases with unknown age and sex and people who identify as transgender. NOS: not otherwise specified. F: female. M: male. Institutional gastrointestinal outbreaks and foodborne illness are excluded from the Table as complete demographic data are not routinely collected. 2009 influenza data: cases reported to public health units; contain 50 laboratory notifications from either interstate residents or overseas. No case of the following diseases have been notified since 1991: plague[b], diphtheria[b], granuloma inguinale[b], lyssavirus[b], poliomyelitis[b], rabies, smallpox, typhus[b], viral haemorrhagic fever, yellow fever.

this area were male. Shigellosis in Sydney has been associated with men who have sex with men.[3]
- Salmonellosis (including infections caused by *Salmonella* Paratyphi) was the most frequently reported condition, with 2681 notifications, an increase of 20% compared to the previous 5-year average. An increase in *S.* Typhimurium 170 was seen nationwide and the cause of this increase was not identified.
- Of the 68 foodborne outbreaks seen in 2009, 24 (35%) were linked to *Salmonella*.

Comment

The outbreak of cryptosporidiosis reinforces the importance of keeping swimming pools free of infectious pathogens through awareness among patrons of not swimming within 2 weeks of experiencing diarrhoea, and pool operators maintaining high sanitary standards.

The numerous foodborne outbreaks emphasise the need for vigilance in the maintenance of safe food-handling practices.

Respiratory diseases

Highlights in 2009 included:
- The emergence and outbreak of pandemic (H1N1) 2009 influenza which involved the most intensive public health response of recent years. Unpublished serological studies suggest that around 16% of the community had acquired the virus. People aged less than 65 years were much more likely to have acquired the infection than older people, with up to 35% of adolescents aged 12–17 years estimated to have acquired the infection. Once the pandemic was established in Australia, testing was only recommended where it would change clinical management or for surveillance purposes. In NSW, over 5000 cases were confirmed by laboratory testing. This underestimates the true incidence of disease. The outbreak peaked in mid-July, with approximately 1300 people presenting to emergency departments each week with influenza-like illnesses. In total 54 people died with confirmed pandemic (H1N1) influenza, although infection may have contributed to other deaths as well. Compared with previous outbreaks of seasonal influenza, pandemic (H1N1) 2009 caused much more illness in people under 60 years of age.[4]
- The number of cases of legionellosis remained steady in 2009 with 94 notifications. The last 2 years have seen more *Legionella longbeachae* than *L. pneumophilia* cases, a reversal of the historical distribution.

Comment

The emergence and substantial impact of pandemic (H1N1) influenza in 2009 reinforces the need for vigilance in the detection of emerging infections and for preparedness to manage such outbreaks. NSW Health continues to review the lessons learnt from the response to the pandemic to inform the revision of pandemic response plans for future implementation.

Vaccine-preventable diseases

Highlights in 2009 included:
- In 2009, 12 578 notifications of pertussis were reported in NSW following a significant increase in 2008 (8759), and compared with 2100 notifications in 2007. While epidemics of pertussis occur every 3 to 5 years, notifications in 2008 and 2009 far exceeded previous epidemics. In 2009 the number of notifications increased in children aged less than 5 years (from 1206 notifications in 2008 to 2826 notifications in 2009); of these 86% had complete immunisation status. The highest increase in this age group was for those aged 3 years, which may reflect waning immunity following the primary course of immunisation at 2, 4 and 6 months of age and prior to receiving a booster dose at 4 years of age. In addition, the greater number of notifications in the 2009 epidemic compared with past epidemics may reflect more widespread use by laboratories of nucleic acid testing for pertussis, which is more sensitive than other methods for diagnosis.[5]
- Notifications of meningococcal disease have generally been declining in the past 10 years. A vaccine for serogroup C disease was added to the National Immunisation Program (in 2003) for children at 12 months of age. The vaccine was provided free to all children aged 1–19 years through schools and other programs. The greatest reduction in notifications over the subsequent years has been for meningococcal disease due to serogroup C, with seven cases reported in 2009. Notifications for other serogroups (B, W 135 and Y) have remained relatively stable.[6]
- There continued to be a decline in the rates of measles, mumps and rubella.

Comment

The outbreak of pertussis highlights the challenge of increasing vaccination rates among adolescents and young adults, as well as the importance of promoting and maintaining high vaccination rates in infants and their carers (Tables 1–5).

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Review of the 2008–2009 pertussis epidemic in NSW: notifications and hospitalisations

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Abstract: In 2008 and 2009 increased numbers of pertussis notifications were reported in NSW. During the epidemic period, the pertussis notification rate was 2.7 times higher than the previous 5-year average. Rates of pertussis notifications and hospitalisations were highest among infants aged less than 1 year across all years studied. Compared to previous years, the notification rate for children aged 1–4 years increased dramatically and was particularly striking for children aged 3 years with notifications exceeding those for infants in 2009. Changes in testing practices during the epidemic period, including a significant increase in the use of polymerase chain reaction, may account for some of the relative increase in size of the 2008–2009 outbreak compared with previous outbreak years.

Pertussis is a notifiable condition under the New South Wales (NSW) *Public Health Act 1991* by doctors, hospitals, laboratories, schools and child-care facilities. During 2008 and 2009, an increase in pertussis notifications was reported to the NSW Department of Health. A range of public health control measures were implemented in NSW in response to the outbreak to help protect infants at greatest risk of severe disease. This paper describes notification and hospitalisation data over the epidemic period.

Pertussis, or whooping cough, is a bacterial infection of the respiratory tract caused by *Bordetella pertussis*. Pertussis usually begins with symptoms similar to a cold, with a runny nose, tiredness and sometimes a mild fever. A cough then develops, usually in bouts (paroxysms), followed by a deep gasp (or whoop). Pertussis affects people of all ages, however, infants are at greatest risk of severe disease, complications, hospitalisation and death.[1] Parents, siblings and close contacts are the most important sources of pertussis infection to infants.[2]

Control of pertussis is problematic because of its high degree of communicability and because immunity, whether from immunisation or infection, wanes after approximately 6–10 years, resulting in renewed susceptibility to infection. In NSW, periodic epidemics of pertussis occur at intervals of 3–4 years, on a background of endemic circulation.[3]

The current NSW immunisation schedule for pertussis includes a primary course of diphtheria-tetanus-acellular pertussis (DTPa) vaccine at 2, 4 and 6 months of age with a booster dose at 4 years of age. Several modifications to this immunisation schedule have occurred since the vaccine's introduction. In 1997, DTPa vaccines replaced diphtheria-tetanus-whole cell pertussis (DTPw) vaccines for booster doses and from 1999 for all doses. Prior to September 2003, an 18-month booster was included in the schedule, however this was removed based on evidence that three doses of acellular pertussis vaccine in the first year of life provide adequate protection until the age of 6 years.[4] From the beginning of 2004, an adolescent/adult formulated booster (dTpa) replaced the use of the adult diphtheria-tetanus vaccine (dT) at 15–17 years. The latter change was prompted by a shift in notifications to this age group following the introduction of the booster dose at 4–5 years in 1994.[5] From 2003, dTpa was also recommended for use in adults who were in contact with young infants (e.g. new parents, childcare and healthcare staff), but was not funded under the National Immunisation Program.

The coverage of pertussis vaccination in the community at 12 and 24 months of age has substantially increased in NSW during the last decade. The Australian Bureau of Statistics (ABS) found coverage with three doses of DTPw at 12–23 months of age was recorded at 87% and at 60% for four doses of DTPw at 24 months during 1995.[6] The national immunisation coverage annual report, while using different survey methods, found that coverage had risen to 92% for three doses of DTPa at 12 months and 95% for the reduced schedule of three doses of DTPa at 24 months in March 2008.[7]

Due to the abovementioned changes in pertussis vaccination within the National Immunisation Program, and changes in vaccine coverage, several cohorts of people with different vaccination histories now exist within the population. In NSW, epidemics occurred in 1993–1994,

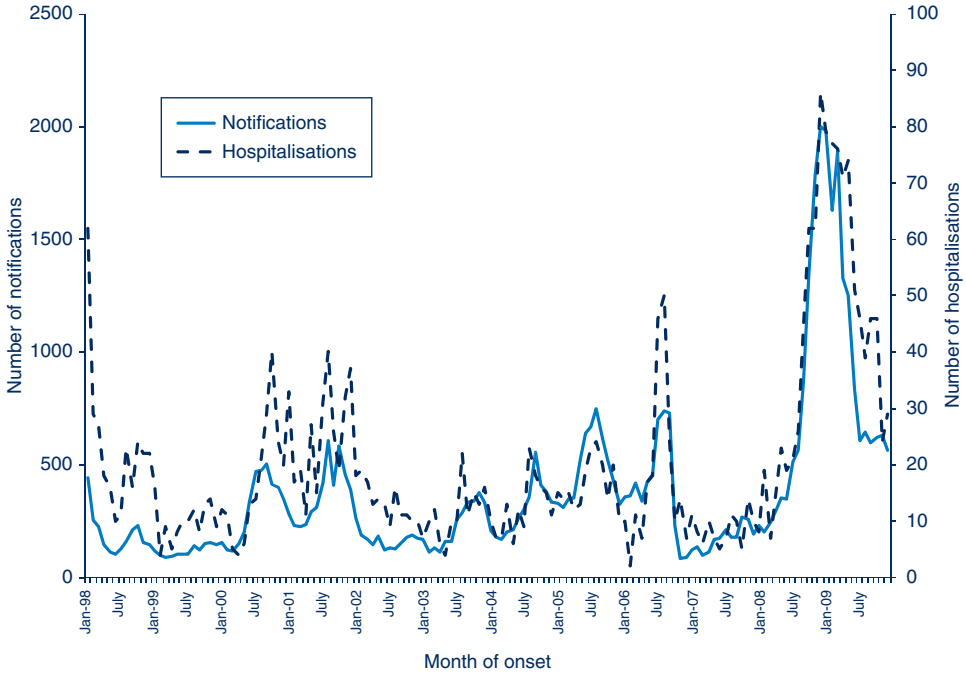

Figure 1. Number of pertussis notifications and hospitalisations by month of onset, NSW, 1998–2009.
Sources: NSW Notifiable Diseases Database and NSW Inpatient Statistics Collection, NSW Department of Health.

1997–1998 and 2000–2002, with successive upward shifts in the age distribution of cases.[8] The most recent epidemic in 2005 was dominated by cases in adults whose disease was largely diagnosed by serology.[9]

In this paper we review the epidemiology of pertussis cases notified in NSW since 1998.

Method

NSW notification data

Pertussis notification data from the NSW Notifiable Diseases Database were reviewed for cases with a date of onset between 1 January 1998 and 31 December 2009. Vaccination status and morbidity and mortality outcomes for notified cases were obtained through follow-up by NSW public health units. All rates were calculated using ABS population estimates for the relevant year. Rates are presented as annual rates per 100 000 total population or in age groups, as appropriate.

Systems for the diagnosis and counting of cases of pertussis have changed over time. From 1 January 2007, the manufacturer of a widely used commercial Bordetella IgA assay changed the recommended cut-off titres for a commonly used serological test used across NSW. From 1 January 2009, NSW ceased collecting data about suspected cases of pertussis in accordance with national surveillance protocols.[10]

NSW hospitalisations

Pertussis hospitalisations were obtained from the NSW Inpatients Statistics Collection with an admission date between 1 January 1998 and 31 December 2009. All rates were calculated using ABS population estimates for the relevant year. Rates are presented as annual rates per 100 000 total population or population in age groups, as appropriate. Eligible hospitalisations were those with an International Classification of Diseases, tenth revision (IDC-10-AM) code of A37 (whooping cough) or a subcode, listed in the principal diagnosis or in any other diagnosis. Medians are used to describe the length of stay per admission episode as these data are not distributed normally.

Results

Pertussis notification and hospitalisation trends

There were 54 380 notifications of pertussis with dates of onset between 1 January 1998 and 31 December 2009 (an average of 4532 notifications per year). Peaks in notifications were reported in 2001 (4439 cases; 68 per 100 000 population), 2005 (5811 cases; 86 per 100 000 population) and most recently in 2008 (8759 cases; 125 per 100 000 population) and 2009 (12 547 cases; 178 per 100 000 population) (Figure 1). Notifications in the 2008–2009 epidemic period exceeded previous outbreak years and were 2.7 times higher than the previous 5-year average.

There were 2919 hospital separations coded as pertussis in NSW between 1 January 1998 and 31 December 2009 (2274 (78%) with a principal diagnosis of pertussis). As with the notifications, periodic epidemics of pertussis can be observed. The highest numbers of annual hospitalisations occurred in 2001 (307 cases; 4.7 per 100 000 population), 2006 (216 cases; 3.2 per 100 000 population) and most

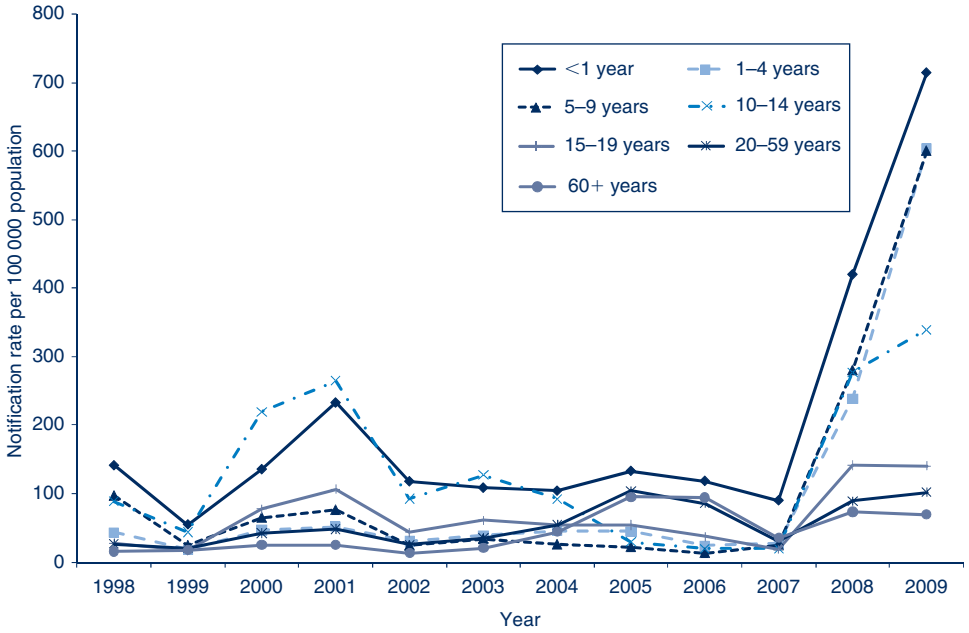

Figure 2. Age-specific pertussis notification rates by age group, NSW, 1998–2009.
Sources: NSW Notifiable Diseases Database and ABS population estimates (HOIST), NSW Department of Health.

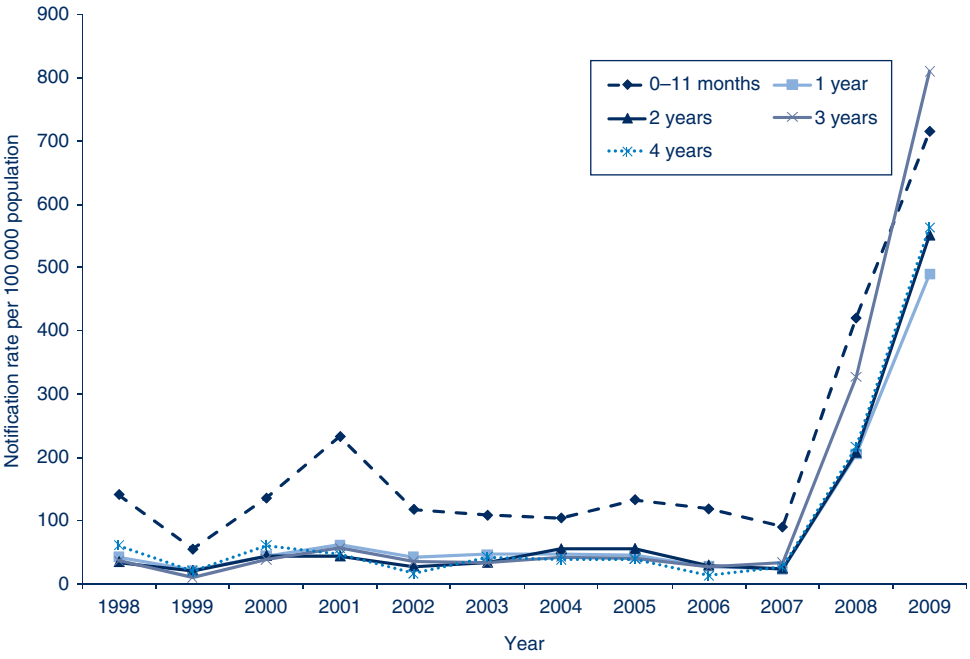

Figure 3. Age-specific pertussis notification rates in infants aged less than 5 years, NSW, 1998–2009.
Sources: NSW Notifiable Diseases Database and ABS population estimates (HOIST), NSW Department of Health.

recently in 2008 (393 cases; 5.6 per 100 000 population) and 2009 (659 cases; 9.4 per 100 000 population). During the 2008–2009 epidemic, the hospitalisation rate for pertussis was 3.1 times higher than the previous 5-year average.

Age distribution

Age-specific notification rates are shown in Figures 2 and 3. The pertussis notification rate was highest among infants aged less than 1 year in the majority of years studied (annual average rate of 165 per 100 000 population). In 2001, the highest age-specific notification rate was for young people aged 10–14 years (2650 per 100 000 population). Notifications in young people aged 10–14 years peaked again during the 2008 (277 per 100 000 population) and 2009 (339 per 100 000 population) epidemic period. Notification rates for adults aged greater than 20 years

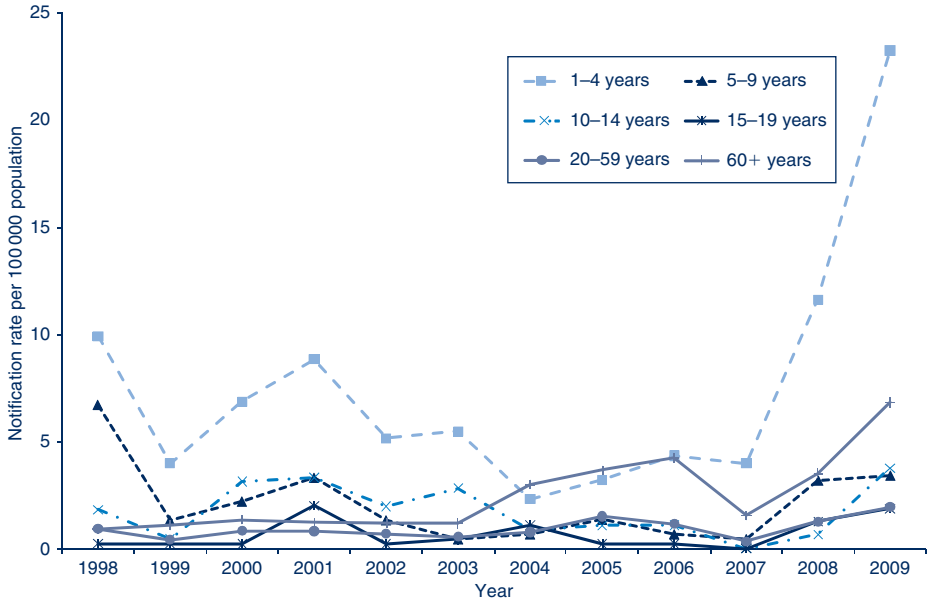

Figure 4. Age-specific pertussis hospitalisation rates, NSW, 1998–2009 by age group, excluding infants aged less than 1 year.
Sources: NSW Inpatient Statistics Collection and ABS population estimates (HOIST), NSW Department of Health.

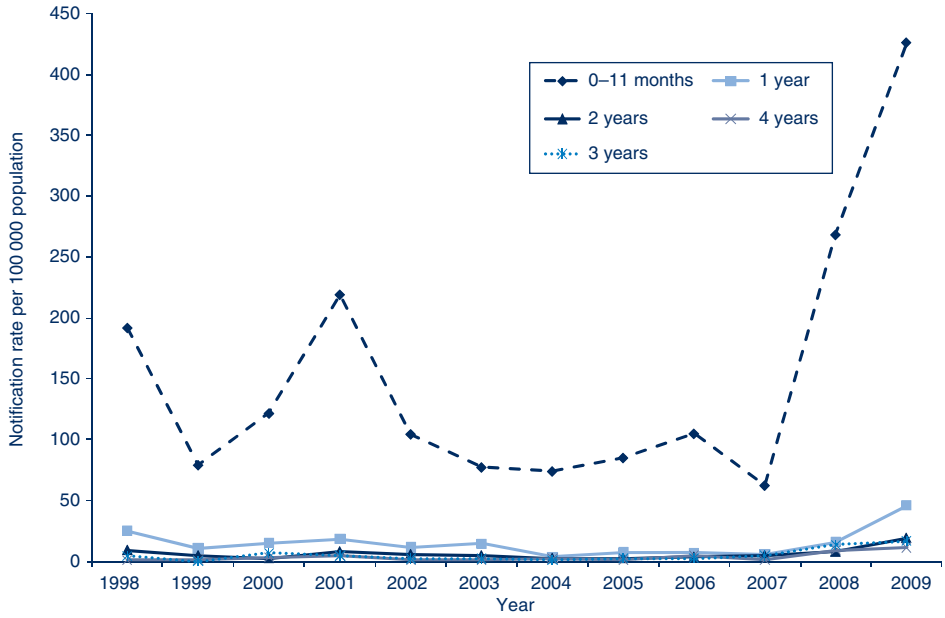

Figure 5. Pertussis hospitalisation rates in infants aged less than 5 years, NSW, 1998–2009.
Sources: NSW Inpatient Statistics Collection and ABS population estimates (HOIST), NSW Department of Health.

have remained relatively stable over time with a peak reported in 2005–2006 and again during the 2008–2009 epidemic (Figure 2).

There were 4033 notifications in children aged 0–5 years (453 per 100 000 population), including 1008 aged less than 1 year (570 per 100 000 population) during 2008–2009. Of the children aged less than 1 year, 41% were in infants aged less than 3 months. During the most recent epidemic in 2008–2009, the notification rate for children aged 1–4 years increased dramatically and in disproportion to patterns from previous years. This was particularly striking for children aged 3 years with notifications in this age group exceeding those in infants aged less than 1 year in 2009 (Figure 3).

The age-specific pertussis hospitalisation rates over the analysed period are shown in Figures 4 and 5. The pertussis

Table 1. Pertussis notification and hospitalisation rates, NSW by area health service,[a] 2003–2007 and 2008–2009

	Average notification rate per 100 000 2003–2007	Average notification rate per 100 000 2008–2009	Average hospitalisation rate per 100 000 2003–2007	Average hospitalisation rate per 100 000 2008–2009
Northern Sydney/Central Coast Area Health Service				
North Sydney	56.3	129.6	0.8	2.1
Central Coast	36.8	170.8	0.7	4.3
Sydney South West Area Health Service				
Central Sydney	60.8	98.0	0.7	2.7
South West Sydney	44.5	95.9	4.1	15.5
South Eastern Sydney/Illawarra Area Health Service				
South East Sydney	75.8	127.6	1.0	2.5
Illawarra	41.3	276.5	0.7	4.8
Sydney West Area Health Service				
Wentworth	65.0	246.7	1.4	6.3
Western Sydney	68.9	167.2	1.7	3.8
Greater Western Area Health Service				
Far West	45.5	126.3	2.6	6.7
Mid West	26.6	149.7	1.5	3.6
Macquarie	144.1	228.4	3.2	5.3
Greater Southern Area Health Service				
Greater Murray	63.7	158.7	1.2	3.8
Southern	54.1	132.6	0.3	0.6
Hunter/New England Area Health Service				
Hunter	62.7	145.7	0.8	3.2
New England	45.6	85.9	2.1	4.1
North Coast Area Health Service				
Mid North Coast	22.8	127.5	1.6	5.0
Northern Rivers	40.3	285.1	1.5	7.4
NSW	**56.6**	**152.1**	**2.4**	**7.5**

[a]Area health service further divided into the geographical region covered by their component public health unit.
Sources: NSW Notifiable Diseases Database and NSW Inpatient Statistics Collection and ABS population estimates (HOIST), NSW Department of Health.

hospitalisation rate was highest among infants aged less than 1 year in all years studied, with an annual average of 151.6 per 100 000 population. Hospitalisation rates for children aged 1–19 years were relatively low in the early part of this decade and remained low until the current epidemic in 2008–2009. The 2008–2009 hospitalisation rates for infants aged less than 1 year and children aged 1–4 years were 4.3 and 4.5-fold higher respectively than the previous 5-year average for each age group. In contrast to children, the hospitalisation rate among adults aged 60 years and over has steadily increased, rising from 1.1 per 100 000 population in 1999 to a peak of 6.8 per 100 000 population in 2009. The 2008–2009 hospitalisation rate for adults aged 60 years and over was 1.8-fold higher than the previous 5-year average for this age group.

Vaccination status

Of the 2340 cases aged 1–4 years in 2008–2009, 230 (10%) were not vaccinated, 30 (1%) reported receiving one to two doses, 1666 (71%) three doses, 65 (3%) four dose and 349 (15%) had unknown doses recorded.

Area health service distribution

An increase in pertussis notifications was reported during the second half of 2008. The outbreak was first reported from the Sydney West and North Coast Area Health Services (AHSs), but by the end of 2008 an increase was being reported from all AHSs in NSW.

Over the epidemic period, the average notification rate varied across geographical areas (from 86 per 100 000 population in rural New England to 285 per 100 000 population in Northern Rivers). As with other years, the highest age-specific rates were reported from cases aged less than 1 year across all areas. A similar pattern of variation was observed in the hospitalisation data, however those AHSs with the highest notification rates did not always have the highest hospitalisation rates (Table 1).

Method of diagnosis

During 2008 and 2009, there was a change in testing practices for the diagnosis of pertussis in NSW (Figure 6). Prior to 2008, serology was the most common method of diagnosis

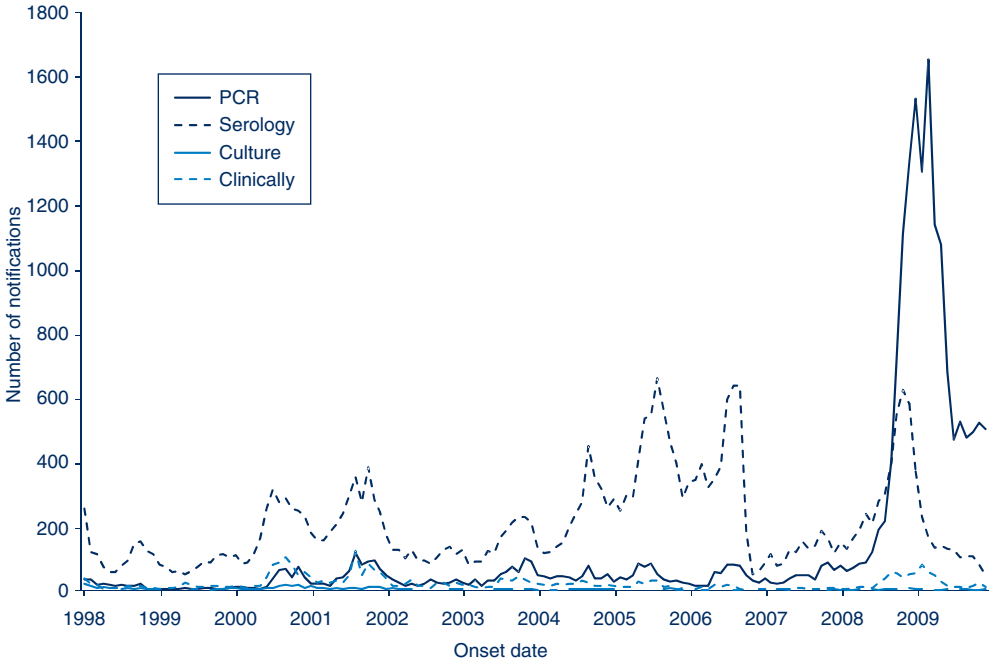

Figure 6. Pertussis notifications by clinical diagnosis compared with three methods of laboratory testing, NSW, 1998–2009.
Source: NSW Notifiable Diseases Database, NSW Department of Health.

in NSW, accounting for 85% of notifications between 2005 and 2007 (92% for persons aged 20 years and over). Over the epidemic period 26% of notifications were diagnosed by serology (78% of these in persons aged 20 years and over).

For children aged 0–5 years, identification by polymerase chain reaction (PCR) increased from 67% of notifications in 2005–2007 to 90% in 2008–2009. The increase in notifications by PCR occurred across all ages in those aged 0–5 years but was greatest for those aged 3 years (from 44% in 2005–2007 to 87% notifications in 2008–2009).

Severe morbidity and mortality

In 2008 two deaths were reported in adults, and in 2009 one death was reported in an infant. During the 2008–2009 epidemic period, the overall median length of stay per hospital admission was 3 days. The median length of stay was longest in infants and elderly people (Table 2). For infants aged less than 1 year, the median length of stay decreased with increasing age. Intensive care unit admissions were more common in very young infants and elderly people (Table 2). One in 13 infants less than 2 months of age hospitalised with pertussis required an intensive care unit admission during their stay.

Discussion

Pertussis notifications increased significantly in 2008 and 2009 and were 2.7 times higher than the previous 5-year average in NSW. While the increase was initially reported from two AHSs (Sydney West and North Coast), all AHSs reported similar increases, with a peak in notifications during December 2008 and January 2009. Similarly, the hospitalisation rate for pertussis was 3.9 times higher than the previous 5-year average. A slight increase was also reported in hospitalised cases aged more than 60 years. As with notification data, hospitalisation rates during the epidemic period varied by age group with high rates reported from children aged 1–4 years. This finding was in contrast to previous outbreak years.

Notifications for those aged 10–14 and 15–19 years increased during 2008–2009, although not to the extent reported in other age groups. In previous years, following the introduction of the adolescent booster dose in 2004, notifications for those aged 10–14 and 15–19 years declined. The increase in notifications for these age groups during 2008–2009 may be the result of a proportion of children in this age group who did not receive the booster dose; this is the subject of further investigation.

As with previous outbreak years, the highest age-specific rates were reported from infants aged less than 1 year. Notification rates also increased in children aged 1–4 and 5–9 years during the 2008–2009 epidemic, and was striking for children aged 3–4 years. For children aged 0–5 years the biggest change in notifications was from those aged 0–11 months (from 48% of notifications in 2005–2007 to 25% in 2008–2009) and 3 years (from 14% of notifications in 2005–2007 to 25% in 2008–2009). The increase in notifications in children aged 3 years may be associated with waning immunity between the primary three doses and first booster as a result of changes in vaccination policy and removal of the 18-month booster in 2003.

When comparing the relative size of the 2008–2009 epidemic with previous epidemics, some caution must be applied as the

Table 2. Number of hospitalisations, admissions to ICU and median length of hospital stay for pertussis, by age group, NSW, 2008–2009

Age group	Hospital admissions	Median length of stay (days)	ICU admission	
	n	*n*	*n*	% total cases
0–1 month	207	4	16	8
2–3 months	251	3	15	6
4–5 months	87	2	3	3
6–11 months	58	2	4	7
1–4 years	123	2	3	2
5–9 years	29	1	0	–
10–19 years	35	2	1	3
20–59 years	124	2	2	2
60 years and over	138	6	6	4
All ages	**1052**	**3**	**50**	**5**

Source: NSW Inpatient Statistics Collection, NSW Department of Health.

apparent size of the 2008–2009 epidemic may also have been in part due to the use of more sensitive diagnostic tests. A shift to PCR testing, which is considered more sensitive than serology early in the illness, enabled the identification of cases that may otherwise have been undiagnosed. The increase in PCR testing occurred across all age groups and was greatest among adults aged 20 years and above (8% in 2005–2007 compared to 50% in 2008–2009). Among cases aged 0–5 years, the greatest increase was noted for children aged 3 years. Further analysis of notification data for this age group will need to be undertaken to assess the possible effects of changes in immunisation policy in NSW.

To help protect infants and children during the epidemic, NSW Health advised parents and general practitioners that the first dose of DTPa vaccine (usually given at 2 months) could be given as early as 6 weeks of age and that the scheduled fourth dose (usually given at 4 years) could be administered from the age of 3 years and 6 months, to provide earlier protection against pertussis.[11] In addition, NSW Health provided free (dTpa) vaccine for all new parents, grandparents and other adults who regularly care for infants aged less than 1 year.

Conclusion

This review of pertussis notifications and hospitalisations during the 2008–2009 epidemic identified epidemiological differences compared to previous outbreak years. The age distribution of cases, specifically those aged 0–4 years, will require further investigation to determine the impact of changes to immunisation policy on pertussis notifications. The range of public health control measures that were implemented in NSW in response to the epidemic will require further evaluation.

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Epi*Review*: Tuberculosis in NSW, 2008

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Abstract: Aim: To describe the epidemiology of tuberculosis cases notified in NSW in 2008. **Method:** Data on tuberculosis cases resident in NSW that were reported in 2008 were extracted from the Notifiable Diseases Database. Demographic, microbiological, clinical and other characteristics of cases were described. Incidence rates per 100 000 were calculated. **Results:** In 2008, 498 tuberculosis cases were notified in NSW (7.1 cases per 100 000 population). Most cases were newly diagnosed ($n = 479$, 96%). The lung was the most common site of disease ($n = 304$, 61%). Eight of 269 tested cases (1.6%) had a HIV-tuberculosis co-infection. One case had multidrug-resistant tuberculosis. Most cases reported past residence ($n = 429$, 86%) or birth ($n = 378$, 76%) in a country with a high incidence of tuberculosis. **Conclusion:** The incidence of tuberculosis in NSW increased slightly in 2008. Most cases had links to countries with a high tuberculosis incidence.

Tuberculosis (TB) is caused by infection with *Mycobacterium tuberculosis*.[1] Globally in 2008, there were an estimated 9.6 to 13.3 million prevalent cases of TB.[2] Of the estimated 5.7 million new TB infections in 2008, approximately 55% lived in Asia.[2] In Australia, TB control continues to be a challenge, despite relatively low incidence rates when compared to many countries.[3] In New South Wales (NSW), the incidence of TB was between 5.6 and 6.8 cases per 100 000 population between 2003 and 2007.[4]

Most people with *M. tuberculosis* infection harbour the bacterium without symptoms (latent infection). When people acquire a TB infection, they have about a 10% chance of developing active disease in their lifetime; approximately half of those who develop TB do so within 2 years of infection.[5] People with active pulmonary TB may be infectious to others and transmission can occur when TB bacilli are expelled into the air by coughing, sneezing or talking. Two to four weeks of treatment with appropriate multidrug therapy, usually including the antibiotics isoniazid, rifampicin, pyrazinamide and ethambutol renders most people non-infectious.[5]

Multidrug-resistant tuberculosis (MDR-TB) occurs when the organism causing disease is resistant to at least isoniazid and rifampicin.[6] Globally, the proportion of all TB cases that are MDR-TB increased from 1.7% between 1997 and 2002[6] to 5.3% in the period 2002–2007.[7] Of an estimated 500 000 cases worldwide in 2007, approximately 258 000 (52%) lived in India, China and Bangladesh.[2] In Australia in 2007, 2.8% of TB cases were MDR-TB.[8]

In NSW, TB is a notifiable disease under the NSW *Public Health Act 1991* and laboratories, doctors and hospitals must report all cases to their local public health unit. Staff in public health units or chest clinics enter case details into the Notifiable Diseases Database (NDD), a confidential database maintained by the Communicable Diseases Branch of the NSW Department of Health.

This report reviews the demographic, microbiological, clinical and other characteristics of patients notified with TB in NSW in 2008.

Methods

In this report the term 'TB cases' is used to refer to people who have been notified with active TB disease. All TB cases are assigned the reporting year based on the year in which the diagnostic, clinical and public health actions occurred. Information about cases with a reporting year of 2008 was extracted from the NDD for analysis.

Incidence rates per 100 000 population (IR) were calculated using the Australian Bureau of Statistics (ABS) estimated mid-year NSW population for 2008 from the Health Outcomes Statistical Toolkit (HOIST).[9] Estimates for resident populations by country of birth were sourced from 2006 ABS census data.[10] Cases were categorised into countries and regions of birth using ABS standards.[11] High incidence countries were defined as countries with an incidence of over 60 cases per 100 000 population, according to the World Health Organization.[12]

Pulmonary TB was defined as TB in a patient who had disease affecting the lung (not including the pleura), either with or without involvement of other sites. A new case of

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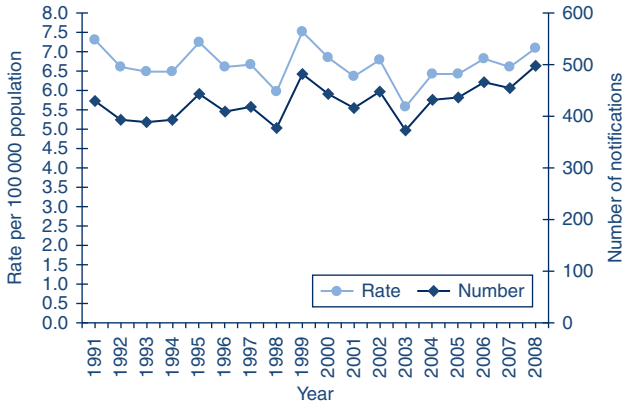

Figure 1. Annual number and rate per 100 000 population of notified tuberculosis cases, NSW, 1991–2008.
Source: Notifiable Diseases Database, Communicable Diseases Branch, NSW Department of Health.

TB was a person who had not been treated for TB previously. A case of MDR-TB was defined as a person with infection with an organism that demonstrated resistance to at least isoniazid and rifampicin.[13]

Results

In 2008, 498 TB cases were notified in NSW and the incidence rate was 7.1 cases per 100 000 population. The highest TB incidence was reported in 1999 (IR = 7.5, $n = 481$) and the lowest was in 2003 (IR = 5.6, $n = 373$) (Figure 1).

Demographic characteristics

In 2008, the incidence of TB was higher among people living in the Sydney metropolitan area (IR = 11.1) than in the rest of NSW (Table 1). The area health services with the highest TB incidence were Sydney West (IR = 13.3) and Sydney South West (IR = 12.3).

The incidence of TB was slightly greater in males compared to females (Table 1). The age specific rates (per 100 000 population) peaked in those aged 20–24 years (IR = 13.7), 30–34 years (IR = 13.1) and over 75 years (IR = 8.7).

Five TB cases occurred in Aboriginal men aged between 19 and 59 years (Table 1). Four resided in remote areas. Being immunocompromised ($n = 2$), having household contacts with TB ($n = 3$), and a history of homelessness ($n = 1$) were identified as risk factors for these men. One case was detected through occupational screening, and four through presentation to health care providers. There have been no notifications of TB in Aboriginal children residing in NSW since 2003.

The crude incidence of TB infection in Aboriginal Australians (3.1) and non-Aboriginal Australian-born people (1.3) in NSW is similar to or lower than the combined rate for all Australian states and territories (6.9 and 0.9 respectively in 2007).

Site of infection

In 2008, the lung was the most common principal site of disease in TB cases ($n = 304$, 61%), followed by lymphatic tissue ($n = 97$, 19%) (Table 2).

Case classification

Most TB cases in 2008 in NSW were newly diagnosed ($n = 479$, 96%) (Table 2); of the 18 cases with previous diagnoses, four (36%) had been fully treated overseas and six (86%) had been fully treated in Australia.

Laboratory confirmation

Among the 376 cases (76%) with laboratory confirmed *M. tuberculosis*, 96% ($n = 362$) were confirmed by culture and 4% ($n = 14$) by only nucleic acid amplification tests (NAT) (Table 2).

For cases with pulmonary disease, culture of *M. tuberculosis* in sputum was most commonly used to confirm TB ($n = 225$, 74%). Forty percent ($n = 122$) of pulmonary cases were both direct sputum smear positive and culture or NAT positive.

Clinical outcomes

Of 498 cases, 358 (72%) completed treatment and eight (2%) were considered cured (negative cultures at completion of treatment). As shown in Table 3, the remainder died, moved overseas while on treatment or had not completed treatment at the time of analysis. Two cases had interrupted treatment; one had intolerance to the treatment (abnormal liver function) and the other defaulted from treatment after moving overseas.

HIV co-infection

In 2008, eight of the 269 (54%) TB cases tested for HIV infection were positive for HIV (Figure 2). Between 1.4% and 1.8% TB cases were HIV positive between 2005 and 2008. All these cases with co-infection were male and were born in Oceania ($n = 3$), South East-Asia ($n = 3$), Africa ($n = 1$) and South Asia ($n = 1$). The proportion of cases tested for HIV in 2008 was greater compared to previous years in NSW and the proportion tested in Australia in 2007 (42%).[3]

Drug resistance

In NSW in 2008, MDR-TB was reported in one woman; she was aged in her twenties, born in Southern Asia and arrived in Australia within a year of her diagnosis. The infecting organism was resistant to isoniazid, pyrazinamide, rifampicin, streptomycin and clofazimine. Fifteen

Table 1. Characteristics of notified tuberculosis cases, NSW, 2004–2008

	2004			2005			2006			2007			2008		
	n	%	Rate[a]	*n*	%	Rate[a]	*n*	%	Rate[a]	*n*	%	Rate[a]	*n*	%	Rate[a]
Place of residence[b]															
Sydney Metropolitan	371	*86*	10.1	373	*85*	10.1	415	*89*	11.2	397	*87*	10.6	425	*85*	11.1
Outer Sydney	40	*9*	2.6	36	*8*	2.3	32	*7*	2	35	*8*	2.2	44	*9*	2.8
Other NSW	15	*3*	1	21	*5*	1.4	16	*3*	1	19	*4*	1.2	25	*5*	1.6
Overseas/Unknown	6	*1*		7	*2*		2	*0*		3	*1*		4	*1*	
Sex															
Male	219	*51*	6.5	218	*50*	6.4	248	*53*	7.3	246	*54*	7.2	281	*56*	8.1
Female	212	*49*	6.2	219	*50*	6.4	217	*47*	6.3	208	*46*	6	217	*44*	6.2
Transgender	1	*0*		0	*0*		0	*0*		0	*0*		0	*0*	
Age group (years)															
0–4	6	*1*	1.4	12	*3*	2.8	7	*2*	1.6	7	*2*	1.6	2	*0*	0.4
5–9	0	*0*	0	3	*1*	0.7	1	*0*	0.2	6	*1*	1.4	5	*1*	1.2
10–14	1	*0*	0.2	2	*0*	0.4	9	*2*	2	8	*2*	1.8	11	*2*	2.4
15–19	16	*3*	3.3	10	*2*	2.2	11	*2*	2.4	20	*4*	4.4	31	*6*	6.6
20–24	50	*12*	10.9	47	*11*	10.3	51	*11*	10.8	46	*10*	9.7	66	*13*	13.7
25–34	100	*23*	10.3	113	*26*	11.7	99	*21*	10.3	126	*28*	13	127	*26*	13.1
35–44	83	*19*	8.1	62	*14*	6.1	71	*15*	7.1	54	*12*	5.4	72	*14*	7
45–54	46	*11*	5.2	62	*14*	6.7	63	*14*	6.7	68	*15*	7.2	53	*11*	5.5
55–64	30	*7*	4.3	41	*9*	5.6	54	*12*	7.2	41	*9*	5.4	56	*11*	7.1
65–74	50	*12*	10.6	34	*8*	7.1	35	*8*	7.3	34	*7*	7	35	*7*	7
75+	50	*12*	6.6	51	*12*	6.6	64	*14*	14.5	44	*10*	9.7	40	*8*	8.7
Aboriginal or Torres Strait Islander	3	*1*	2.1	2	*0*	1.4	4	*1*	2	3	*1*	2	5	*100*	3.1
Total	**432**	***100***	**6.4**	**437**	***100***	**6.4**	**465**	***100***	**6.8**	**454**	***100***	**6.6**	**498**	***100***	**7.1**

[a]Rates per 100 000 population are calculated by the corresponding year's population mid-year estimates.
[b]Residence by area health service (AHS) as follows: *Sydney Metropolitan* = Sydney South West AHS, the Northern Sydney region of Northern Sydney/Central Coast AHS, the South East Sydney region of South East Sydney and Illawarra AHS and the Eastern region of Sydney West AHS. *Outer Sydney* = Western region of Sydney West AHS, the Central Coast region of Northern Sydney/Central Coast AHS, Illawarra region of South East Sydney and Illawarra AHS and the Hunter region of Hunter and New England AHS. *Other NSW* = New England region of Hunter and New England AHS, North Coast AHS, Greater Southern AHS, Greater Western AHS and Justice Health.
NB: In 2004 there was one transgender case included in the total but not the sex breakdown.
Source: Notifiable Diseases Database, Communicable Diseases Branch, NSW Department of Health.

MDR-TB cases were identified in NSW between 2003 and 2007, an average of 3.8 cases annually.

In 2008, 20 (4%) TB cases had organisms that were resistant to isoniazid only. These people were born in South East Asia ($n = 6$), North East Asia ($n = 5$), Australia ($n = 3$), South and Central Asia ($n = 2$), Europe ($n = 2$), Africa ($n = 1$) and the Americas ($n = 1$). Monoresistance to rifampicin was found in one case, and to pyrazinamide in two cases. Three cases had infection with organisms resistant to two of four first-line drugs (not isoniazid and rifampicin).

Risk factors

The most commonly reported risk factor for TB among cases reported in NSW in 2008 was past residence in a high incidence country ($n = 429$, 86%). Most common risk factors were: being born in a high incidence country ($n = 386$, 78%); having household or close contacts with TB ($n = 85$, 17%); and being immunosuppressed ($n = 73$, 15%) (Table 4).

There was no evidence of transmission of TB within a health-care setting in NSW in 2008. Consistent with previous years, some TB cases had worked in the health care industry at some time and had resided previously in high incidence countries (Table 5).

Risk factors for Australian-born cases

Sixty-one notified cases (12%) were born in Australia. The median age of onset of TB in these cases was 52 years (range 0–93 years) and 41 (67%) were men. The most

Table 2. Main site of infection, case classification and means of laboratory confirmation of notified tuberculosis cases, NSW, 2004–2008

Case characteristics	2004		2005		2006		2007		2008	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Main site										
Lung	262	*61*	252	*58*	278	*60*	221	*49*	242	*49*
Lung plus other site	n/a	*n/a*	n/a	*n/a*	n/a	*n/a*	47	*10*	62	*12*
Lymphatics only	92	*21*	97	*22*	88	*19*	79	*17*	97	*19*
Pleura only	19	*4*	21	*5*	28	*6*	37	*8*	28	*6*
Bone/Joint only	15	*3*	16	*4*	21	*5*	20	*4*	11	*2*
Kidney-genito-urinary only	14	*3*	13	*3*	10	*2*	13	*3*	10	*2*
Miliary only	2	*0*	0	*0*	1	*0*	0	*0*	0	*0*
Brain/CNS only	8	*2*	11	*3*	10	*2*	6	*1*	10	*2*
Gastrointestinal only	7	*2*	6	*1*	11	*2*	14	*3*	12	*2*
Other only	13	*3*	19	*4*	18	*4*	19	*4*	24	*5*
Unknown/Not reported	0	*0*	2	*0*	0	*0*	0	*0*	2	*0*
Case classification										
New active	413	*96*	423	*97*	438	*94*	436	*96*	479	*96*
Cases with a previous diagnosis	19	*4*	12	*3*	27	*6*	17	*4*	18	*4*
Following treatment in Australia	7	*2*	7	*2*	2	*0*	4	*1*	7	*1*
Following treatment overseas	12	*3*	5	*1*	25	*5*	13	*3*	11	*2*
Unknown/Not reported	0	*0*	2	*0*	0	*0*	1	*0*	1	*0*
Laboratory confirmed (total)	312	*72*	333	*76*	347	*75*	334	*74*	376	*76*
Culture	296	*69*	310	*71*	320	*69*	320	*71*	362	*96*
PCR only[a]	16	*4*	23	*5*	27	*6*	14	*3*	14	*4*
Clinical only	120	*28*	104	*24*	118	*25*	120	*26*	122	*24*
***Pulmonary cases only*[b]**	262	61	252	58	278	60	266	59	304	61
Direct smear results[c]										
Direct smear positive	110	*42*	116	*46*	111	*40*	112	*42*	127	*42*
Direct smear negative	142	*54*	116	*46*	153	*55*	135	*51*	192	*63*
Not reported	10	*4*	20	*8*	14	*5*	19	*7*	14	*5*
***Pulmonary cases only*[b]**										
Culture results[c]										
Culture positive	204	*78*	190	*75*	221	*79*	201	*76*	225	*74*
Culture negative	49	*19*	42	*17*	43	*15*	43	*16*	65	*21*
Not reported	9	*3*	20	*8*	14	*5*	22	*8*	14	*5*
Total number of cases	**432**	***100***	**437**	***100***	**465**	***100***	**454**	***100***	**498**	***100***

[a]For 2004–2006, cases which were confirmed by PCR only were not identified – cases may have also been confirmed by culture.
[b]Pulmonary cases refer to the number of cases where the primary site of disease is lung.
[c]For direct smear results and culture results the proportion shown is of pulmonary cases only.
Source: Notifiable Diseases Database, Communicable Diseases Branch, NSW Department of Health.

common risk factors for Australian-born TB cases were: having a household member with TB ($n = 18$, 29.5%); immunosuppression ($n = 16$, 26.2%); and previous residence in a high incidence country ($n = 14$, 23.0%) (Table 6). Twenty-five (41%) Australian-born TB cases had multiple risk factors.

Australian-born cases with no identified risk factors ($n = 10$, 16%) were similar to all Australian-born cases; their median age at onset was 52 and 70% were men.

Risk factors for overseas-born cases

Most TB cases were born overseas ($n = 437$, 88%). Apart from being born overseas, the most common risk factors for these cases were having a household contact with TB ($n = 67$, 15.3%) and an immunosuppressive health status ($n = 57$, 13.0%).

Eighty-eight percent (386) of cases born overseas were born in a high TB incidence country. The median age of onset of cases born in high incidence countries was 32 years

(range 7–90 years); 56% ($n = 216$) were men. The median length of stay in Australia prior to disease onset was 4 years (range 0–50 years). The remaining 12% of cases ($n = 51$) were born in Australia or overseas in countries other than those with a high incidence of TB, most commonly New Zealand ($n = 6$) and Fiji ($n = 6$). The median age of onset for these cases was 51 years (range 1–88 years) and 49% ($n = 24$) were men. The median length of stay in Australia prior to onset was 17 years (range 0–62 years).

Table 3. Clinical outcome of tuberculosis cases, NSW, 2007–2008

Outcome	2007		2008[a]	
	n	%	*n*	%
Treatment success	392	*86*	366	*74*
Completed	*378*	*83*	*358*	*72*
Cured[b]	*14*	*3*	*8*	*2*
Defaulted	11	*2*	10	*2*
Died of TB	1	*0*	2	*0*
Failure[c]	0	*0*	0	*0*
Treatment interrupted[d]	0	*0*	2	*0*
Unknown outcome	0	*0*	0	*0*
Died of other cause during treatment	20	*4*	20	*4*
Transferred overseas	22	*5*	24	*5*
Incomplete – still undergoing treatment	7	*2*	74	*15*
Total number of cases	**454**	***100***	**498**	***100***

[a]Outcome of 2008 cases is preliminary data – to be confirmed mid-2010.
[b]Bacteriologically confirmed cure of smear or culture positive pulmonary cases.
[c]Treatment completed but case not cured.
[d]Treatment interrupted for two months or more, but completed.
Source: Notifiable Diseases Database, Communicable Diseases Branch, NSW Department of Health.

Country of birth

The incidence of TB among people born in Southern and Central Asia increased from 68.1 to 146.0 cases per 100 000 population over the 5-year period to 2008 in NSW. Incidence rates among people born in other areas of Asia have remained steady (Figure 3). By sub-region, incidence was highest in people born in Central and Western Africa (IR = 200.4), Central Asia (IR = 147.5) and Southern Asia (IR = 145.9). TB notification rates in other areas were relatively stable between 2004 and 2008 (Figure 4).

Compared to TB cases reported in 2007 (who arrived between 2003 and 2007), there was an increase of 37 cases who were born in Afghanistan, Nepal, Vietnam and India in 2008 (who arrived between 2004 and 2008) (Table 7). Between 2005 and 2008, the number of visas granted and permanent arrivals to Australia from Afghanistan and Nepal (in Southern Asia) more than doubled but was relatively stable from Vietnam (in South East Asia) (Chief Medical Officer, Department of Immigration and Citizenship, pers. comm.).

Contact tracing

Contact tracing resulting from the follow up of the 498 cases of TB in NSW in 2008 identified 2712 people at risk of TB infection. Of those who underwent appropriate further investigations (including a tuberculin skin test), 18 (0.8%) had active TB infections. Six percent ($n = 125$)

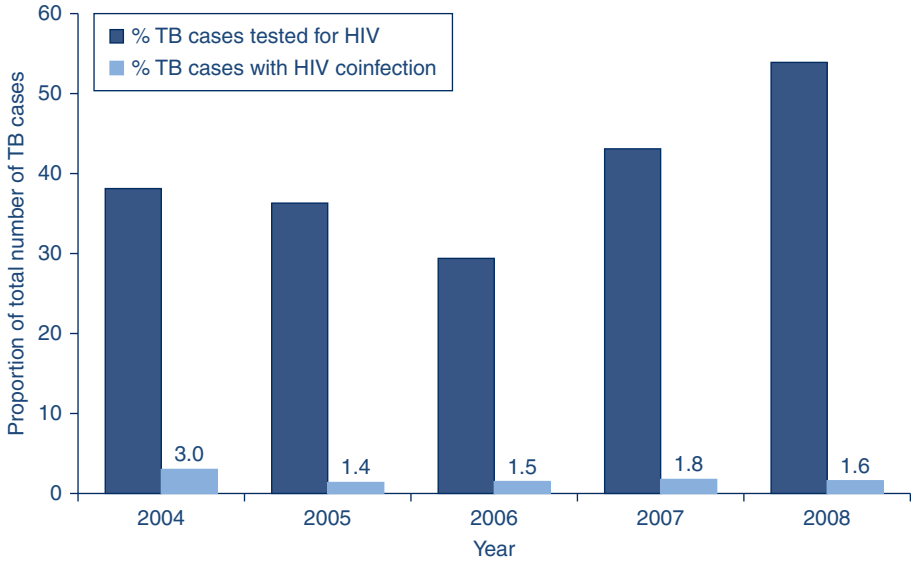

Figure 2. Proportion of tuberculosis cases tested for HIV and proportion of all notified tuberculosis cases with HIV infection, NSW, 2004–2008.
Source: Notifiable Diseases Database, Communicable Diseases Branch, NSW Department of Health.

of assessed contacts were prescribed preventive therapy (Table 8).

Discussion

Most TB disease in NSW occurred in people who were born in countries with a high incidence of TB. The highest incidence in NSW was among people living in the Sydney metropolitan area, reflecting settlement patterns of migrants as most initially settle in metropolitan areas.[14] The median age of onset of TB among people born in high incidence countries was 20 years lower than for Australian-born cases. Disease in people born overseas tends to be acquired in high incidence countries prior to arrival in Australia and transmission to Australian-born people remains minimal.[15,16]

Although the incidence of TB in NSW increased slightly in 2008, it has remained steady over the last decade despite sustained migration from high incidence countries.[2] High treatment success, absence of treatment failures and low rates of relapse of cases initially treated in Australia demonstrate strong control aspects of the TB program.

The increased rate of TB in 2008 in NSW is likely due to an increased number of cases among newly arrived people from Afghanistan, Nepal, Vietnam and India, possibly related to changing migration patterns. While the precise

Table 4. Reported risk factors for notified tuberculosis cases, NSW, 2007–2008

Risk factor	2007		2008	
	n	%	*n*	%
Past residence in a high incidence country	400	88	429	86
Born in a high incidence country	336	74	386	78
Immunosuppressive health status/Therapy	63	14	73	15
Household member or close contact with TB	65	14	85	17
Previous TB diagnosis	25	6	28	6
Ever worked in health industry	32	7	42	8
Currently or recently residing in a residential institution	14	3	15	3
Child's parent/s born in high incidence country[a]	10	2	21	4
Currently or recently residing in a homeless shelter	5	1	11	2
Currently or previously employed in a residential institution	15	3	11	2
Other	0	0	34	7
Nil (2008 only)			21	4
Number of cases	**454**		**498**	

[a]Refers to children under the age of 15 who were born in Australia but whose parents were born in a high incidence country.
NB: The countries cited as being high incidence could not be verified and it is possible there is some misclassification of this field.
Source: Notifiable Diseases Database, Communicable Diseases Branch, NSW Department of Health.

Table 5. Notified tuberculosis cases in health care workers, NSW, 2004–2008

Risk factor	2004		2005		2006		2007		2008	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Ever worked in HCF – total	21	*5*	40	*9*	31	*7*	32	*7*	42[a]	*8*
Ever worked in HCF – born overseas	18	*4*	32	*7*	27	*6*	27	*6*	37	*7*
Length of stay in Australia <3 years	10	*2*	10	*2*	12	*3*	10	*2*	16	*3*
Length of stay in Australia ≥3 years	8	*2*	20	*5*	15	*3*	17	*4*	21	*4*
Currently working/worked in last 12 months in HCF	14	*3*	25	*6*	19	*4*	26	*6*	18	*4*
By occupation										
Medical/Nursing	13	*3*	21	*5*	17	*4*	18	*4*	16	*3*
Allied Health including Dental	1	*0*	1	*0*	1	*0*	3	*1*	0	*0*
Other[b]	1	*0*	3	*1*	1	*0*	5	*1*	2	*0*
Total number of cases	**432**	*100*	**437**	*100*	**465**	*100*	**454**	*100*	**498**	*100*

HCF = health care facility.
[a]7/498 with blank for risk factor ever worked in health[b], pharmacist, psychologist.
Source: Notifiable Diseases Database, Communicable Diseases Branch, NSW Department of Health.

Table 6. Distribution of risk factors reported by notified tuberculosis cases, by country of birth, NSW, 2008

Risk factor	Australian-born cases		Overseas-born cases		Total
	n	*%*	*n*	*%*	*n*
Household member or close contact with TB	18	*29.5*	67	*15.3*	85
Past residence in a high incidence country[a]	14	*23*	415	*95*	429
Immunosuppressive health status/therapy	16	*26.2*	57	*13*	73
Currently or ever residing in a homeless shelter	2	*3.3*	9	*2.1*	11
Currently or previously employed in a residential institution	2	*3.3*	9	*2.1*	11
Currently or recently residing in a residential institution	3	*4.9*	12	*2.7*	15
Ever worked in health industry	5	*8.2*	37	*8.5*	42
Child's parent/s born in high incidence country[b]	5	*8.2*	n/a	*n/a*	n/a
Previous TB diagnosis	4	*6.6*	24	*5.5*	28
Other risk factor	5	*8.2*	29	*6.6*	34
Born in a high incidence country[c]	n/a	*n/a*	386	*88.3*	383
No risk factors identified	10	*16.4*	11	*2.5*	21
Identification method					
Clinical presentation	49	*80.3*	368	*84.2*	417
Contact tracing	7	*11.5*	16	*3.7*	23
Screening	1	*1.6*	46	*10.5*	47
Other/Unknown	4	*6.6*	7	*1.6*	11
Total	**61**	***100***	**437**	***100***	**498**

[a]Country of residence is a yes/no field so specific countries are not documented. It is possible there is some misclassification of the country of residence as high incidence.
[b]Refers to children under the age of 15 who were born in Australia but whose parents were born in a high incidence country.
[c]The specific country of birth was documented and classification was based on this data.
Source: Notifiable Diseases Database, Communicable Diseases Branch, NSW Department of Health.

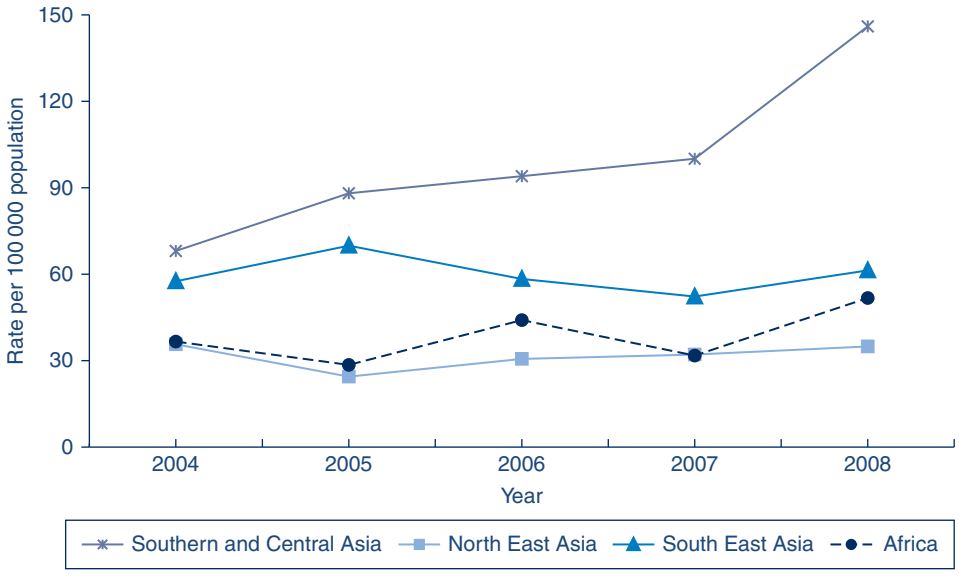

Figure 3. Rate per 100 000 population of notified tuberculosis cases by region of birth, NSW, 2004–2008.
Source: Notifiable Diseases Database, Communicable Diseases Branch, NSW Department of Health.

number of newly arrived migrants to NSW and of temporary visas granted is unknown, nationally, the number of visas granted and permanent arrivals from these countries increased substantially in 2008.

The National Tuberculosis Advisory Committee has recommended that all TB cases should be routinely offered HIV testing[3] as risk factor assessment does not reliably predict HIV infection in TB patients.[17] The

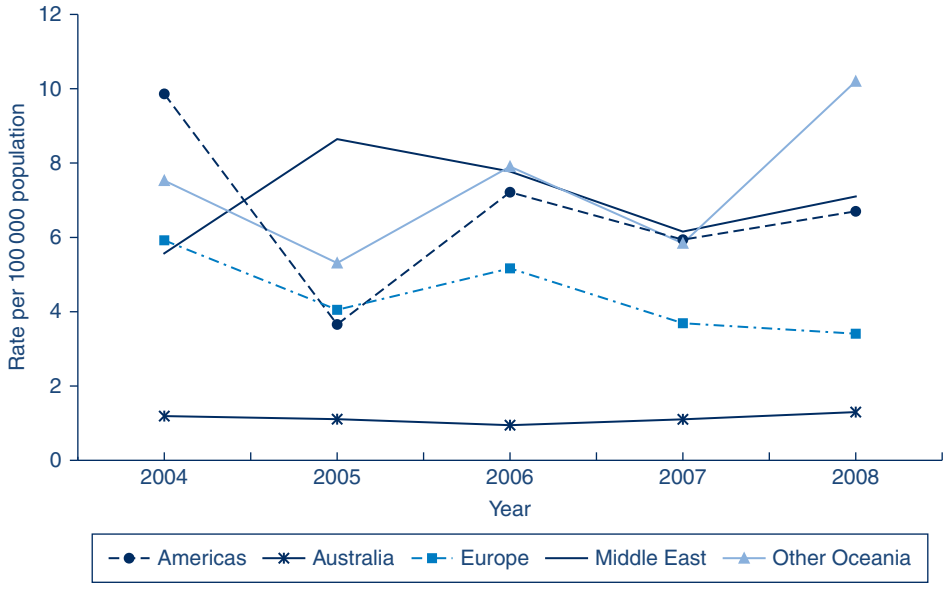

Figure 4. Rate per 100 000 population of notified tuberculosis cases by region of birth, NSW, 2004–2008.
Source: Notifiable Diseases Database, Communicable Diseases Branch, NSW Department of Health.

Table 7. Number of notified tuberculosis cases born in selected countries, NSW, 2007–2008

Country of birth	2007[a]	2008[b]	Increase in 2008[b] from 2007[a]	
	n	*n*	*n*	%
Afghanistan	2	10	8	3.6
Nepal	11	22	11	4.4
Vietnam	6	14	8	3.3
India	49	59	10	1.7

[a]Cases with a report year in 2007 who arrived in Australia between 2003 and 2007.
[b]Cases with a report year in 2008 who arrived in Australia between 2004 and 2008.

Table 8. Outcomes of contact tracing of notified tuberculosis cases, NSW, 2007–2008

Contact tracing outcomes	2007		2008	
	n	%	*n*	%[a]
Contacts identified	2725	–	2712	–
Contacts screened	2345	*86*[a]	2195	*81*[a]
Contacts with active TB	28	*1*[b]	18	*1*[b]
Contacts TST +ve on initial screen	783	*33*[b]	779	*35*[b]
Contacts TST +ve with risk factors for exposure/BCG	673	*29*[b]	658	*30*[b]
Contacts with TST conversion	80	*3*[b]	66	*3*[b]
Contacts on preventive therapy	136	*6*[b]	125	*6*[b]

[a]Percentage of all contacts identified.
[b]Percentage of all contacts screened.
Source: Notifiable Diseases Database, Communicable Diseases Branch, NSW Department of Health.

proportion of TB cases in NSW tested for HIV infection has increased annually to just over 50% in 2008. Knowing the HIV status of TB cases in NSW may become increasingly important as the risk of HIV has the potential to increase in some injecting drug-using populations[18] and the Papua New Guinea–Torres Strait Islands cross-border region.[8,19]

A threat to tuberculosis control in Australia is the increasing incidence of MDR-TB in surrounding countries and regions. Treatment for MDR-TB is more complex and lengthy, and is often associated with poorer outcomes than for drug-sensitive TB. It is estimated that approximately 2% of TB cases in India and Vietnam have MDR-TB,[7] and up to 7% of new cases in China have MDR-TB.[20] Considering the number of migrants from these countries to Australia, the risk of increased numbers of MDR-TB cases is significant.

Conclusion

This report demonstrates that the incidence of TB in NSW has remained stable over recent years. TB remains a disease that mostly affects people born in countries with a high incidence of TB and there is little evidence of local transmission. Central to the success of the NSW TB program is the continued effective collaboration with stakeholders in NSW, other Australian states and

territories and neighbouring countries in the management of TB.

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Waterborne diseases among Aboriginal people

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Aboriginal people in many communities in New South Wales (NSW) have, until now, not enjoyed the same access to water and sewerage services as the rest of the NSW population. Evidence from international studies shows that lack of these services leads to poorer health.[1]

Adequate quality and quantity of water are essential for drinking, food preparation and cooking, washing, waste removal, cultivation and recreation and, therefore, for health. A study of the global burden of disease found that poor water supply, sanitation, personal and domestic hygiene were responsible for 5.3% of total deaths and 6.8% of total disability-adjusted life years (DALYs) in 1990.[2] There are a number of communicable diseases that result from poor water quality and quantity and they can be classified according to transmission route (Table 1).[3]

Since Aboriginality is poorly reported on deaths data by health care workers (identification is currently estimated at 76.6%)[4] it is difficult to determine the number of Aboriginal deaths from the diseases caused by poor water quality and quantity in NSW. However, the Australian Institute of Health and Welfare has found that Aboriginal infants in Australia are 7.9 times more likely to die of infectious and parasitic diseases (which would include waterborne diseases) than non-Aboriginal infants. Furthermore, Aboriginal children aged 1–14 years are five times more likely to suffer from these diseases than non-Aboriginal children.[5]

After NSW became a British colony, Aboriginal people were made to live together in locations on the edges of, or remote from, towns. These communities became known as 'reserves' and, after the *Aboriginal Land Rights Act* was enacted in 1983, became the responsibility of the Local Aboriginal Land Councils. The Local Aboriginal Land Councils were responsible for all services on the reserves including maintenance of the water and sewerage infrastructure. Although the Act was intended as an act of reconciliation, the newly created Local Aboriginal Land Councils were given responsibilities for which they were ill-prepared, including the maintenance of water sewerage infrastructure.

With the evidence that Aboriginal people are more likely to suffer from infectious and parasitic diseases and that water quality in certain Aboriginal communities in NSW is often inadequate, a broad alliance of NSW Government departments and non-government organisations prepared a case for the NSW Government to address the issue. In 2008, the NSW Government committed $250 million of funding over 25 years for the upgrade, maintenance and operation of the water and sewerage infrastructure on specific Aboriginal communities. This program is currently being implemented and will require ongoing participation from the NSW Department of Health and regional public health units to ensure the interests of the communities are considered.

Table 1. Classification of water-related diseases by transmission route

Category	Disease example
Waterborne	Typhoid
	Infectious hepatitis A
Water-washed (caused by lack of water, poor personal hygiene	Trachoma, scabies
and lack of proper human waste disposal)	Shigella dysentery
Water-based (caused by aquatic organisms that spend part	Schistosomiasis
of their life cycle in the water and another part as	Guinea worm (nematode)
parasites of animals)	
Water-related insect vectors	Malaria, trypanosomiasis, Murray Valley and
a. Water-biting	Ross River viruses
b. Water-breeding	Onchocerciasis

Source: Adapted from White GF, Bradley DJ, White AU. Drawers of water: domestic water use in East Africa. Chicago: University of Chicago Press; 1972.

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Dental caries in children

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Dental caries is a common childhood health problem in New South Wales (NSW). It disproportionately affects children from low income, Aboriginal and migrant families, and children who live in rural and remote areas.[1] If left untreated, caries can significantly undermine child health and development, and may require treatment in hospital under general anaesthesia.[2]

Disease aetiology

Caries is a bacterial disease that is modified by diet. It requires the simultaneous presence of three factors: bacteria, fermentable carbohydrates and a susceptible tooth. A number of bacteria have been linked to caries, however, there is strong empirical evidence that *Streptococcus mutans* is the primary disease agent in caries development and progression.[3] Children are not born with *S. mutans* in their mouth but are exposed to the bacteria. Bacteria are mostly transmitted from the primary carer to child via activities such as tasting the child's food before the child eats.[2]

Bacteria in dental plaque metabolise sugars and starches, producing organic acids. Organic acids lower the pH in the mouth and promote the loss of essential minerals from the tooth surface, including fluoride, calcium and phosphate. Minerals are returned to the tooth surface once the neutral pH is restored (approximately 20 minutes after eating). If there is a frequent net loss of essential minerals from the tooth surface, over time the tooth structure will break down, creating a cavity.[3]

Implications of untreated caries for child health and development

Poor oral health and untreated dental caries in childhood can impede healthy growth and development. Advanced caries may lead to: suppressed growth due to dental pain and reluctance to eat; difficulty communicating with others due to impaired speech; low self-esteem due to bad breath and an unsightly smile; and poor educational outcomes due to dental pain, interrupted sleep, difficulty concentrating and hours of schooling lost.[2,4]

Risk factors

Dental caries in children is mostly preventable and can be reversed if detected at an early stage.[5] Key modifiable risk factors include: frequent consumption of high sugar foods and drinks; poor oral hygiene; high levels of *S. mutans* in the primary carer's mouth; and restricted access to a fluoridated water supply.[2] Consumption of fluoridated water protects against caries as fluoride assists with the replenishment of essential minerals to primary teeth, and, when ingested during the development of teeth, makes them resistant to decay-causing organic acids.[3]

Prevention

A number of strategies have been proven empirically to reduce the risk of dental caries in children, including:

- Fluoridating public water supplies. Water fluoridation is a safe, effective, cheap to administer, and equity-promoting population oral health strategy.
- Brushing with adult-strength fluoride toothpaste twice daily. Regular brushing with fluoride toothpaste is important for rural and remote communities that do not have access to fluoridated water. Parents and guardians should seek advice from a dental professional before introducing adult-strength toothpaste for children aged under 6 years.

10.1071/NB09043

- Curtailing the consumption of sugary foods and drinks between meals. Promoting tap water as a substitute for juices and soft drink is an important strategy, as is limiting the use of bottles containing sweet fluids, formula or milk, especially at night.
- Improving the oral health of pregnant women and recent mothers. Parents and carers with good oral health are less likely to pass *S. mutans* and other decay-causing bacteria to their young children.[2,3,6]

The NSW Early Childhood Oral Health Program

Research has indicated that use of dental services and exposure to oral health promotion are critical for the prevention and early identification of caries.[5] Despite this, visits to the dentist by Australian children aged from birth to 5 years remain infrequent and episodic, with attendance mainly occurring when the disease process is advanced.[4]

Primary health professionals, on the other hand, have more regular access to families with infants and young children, and can affect real health benefits through prevention and early identification of caries.[7]

The NSW Early Childhood Oral Health Program seeks to improve the health and wellbeing of children by:

- providing preventive oral health advice from pregnancy onwards for parents and child health professionals
- providing child health professionals with the skills and resources to integrate oral health risk assessments into child health checks
- establishing pathways for prompt and appropriate referrals from primary health professionals to dental clinics
- ensuring early management of dental disease by oral health professionals and family-centred service provision.

Key strategies of the Program include: the implementation of early childhood oral health guidelines for child health professionals in NSW; the development and broad dissemination of resources supporting prevention and early identification of dental disease in young children (e.g. the *Lift the Lip* resource and the version for Aboriginal people, *See My Smile*); and the development of education programs to assist child health professionals in providing parents and guardians with age-appropriate guidance to prevent caries in young children.

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Communicable Diseases Report, NSW, May and June 2010

Communicable Diseases Branch
NSW Department of Health

For updated information, including data and facts on specific diseases, visit www.health.nsw.gov.au and click on **Public Health** and then **Infectious Diseases**. The communicable diseases site is available at: http://www.health.nsw.gov.au/publichealth/infectious/index.asp.

Figure 3 and Tables 1 and 2 show reports of communicable diseases received through to the end of May and June 2010 in New South Wales (NSW).

Enteric infections

Typhoid

Three cases of typhoid fever were reported in NSW in May and June 2010. All cases reported a history of overseas travel to India during their exposure period. Eighteen cases have been reported in NSW so far this year. For the same period in 2009, 22 cases were reported.

Typhoid is caused by the bacteria *Salmonella* Typhi and is transmitted by the faecal-oral route, primarily by ingesting food or water contaminated by faeces or urine. The symptoms of typhoid fever may include fever, headache, general discomfort and lack of appetite; a dry cough and constipation or diarrhoea may also occur. Typhoid infections in NSW are usually acquired while people are travelling overseas to countries where they may ingest contaminated water or food.

Outbreaks of foodborne disease

Seven outbreaks of suspected foodborne disease were reported in May and June 2010. Data from public health investigations are available on four of these outbreaks which affected 35 people. *Salmonella* was the cause of three of the four outbreaks which were associated with foods including chicken curry, chicken kebab, hummus, tabouli, and chicken in cheese sauce. *Campylobacter jejuni* was the cause of the fourth outbreak, suspected to be associated with undercooked chicken.

Outbreaks of gastroenteritis in institutional settings

Eighty-four outbreaks of gastroenteritis in institutions were reported in May and June 2010, affecting 1275 people. Of these, 40 outbreaks occurred in aged-care facilities, 30 in child-care centres, nine in hospitals, two in schools, two in residential facilities and one at a naval base. Eighty-three outbreaks appear to have been caused by person-to-person spread of a viral illness and one was foodborne.

Viral gastroenteritis tends to peak in winter months, with up to 15 outbreaks per week reported in peak months.

Gastroenteritis in the community

The number of patients presenting with gastrointestinal illness to emergency departments in NSW increased slightly but remains within the usual range for this time of year (includes data from 56 NSW emergency departments) (Figure 1).

Respiratory infections

Legionnaires' disease

Seven cases of Legionnaires' disease caused by *L. pneumophila* were reported in NSW in May and June 2010. No common links between cases were identified through local public health unit investigations. Four cases occurred in residents of metropolitan Sydney and three in residents of regional NSW. To date this year, 40 cases of Legionnaires' disease (18 caused by *L. pneumophila*) have been reported in NSW. For the same period in 2009, 20 legionellosis cases (seven caused by *L. pneumophila*) were reported. For the same period in 2009, 52 cases were reported.

Influenza

The number of patients presenting with influenza-like illness in NSW remained low (includes information from 56 NSW emergency departments) (Figure 2).

Seasonal influenza vaccination for young children

The Australian Chief Medical Officer, Professor Jim Bishop, has advised that children aged from 6 months to less than 5 years of age can now be vaccinated against influenza using Vaxigrip® or Influvac® seasonal influenza vaccine. Seasonal influenza vaccination in this age group had been halted following reports of an increase in the rate of febrile convulsions in the 24 hours after vaccination with 2010 seasonal influenza vaccines.

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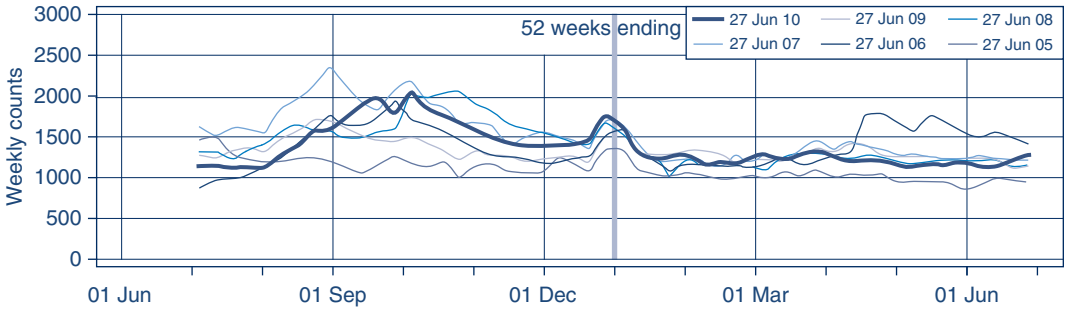

Figure 1. Total weekly counts of emergency department visits for gastrointestinal illness, for the 12 months to 27 June 2010 (thick line), compared with each of the 5 previous years (coloured lines) (includes data from 56 NSW emergency departments).

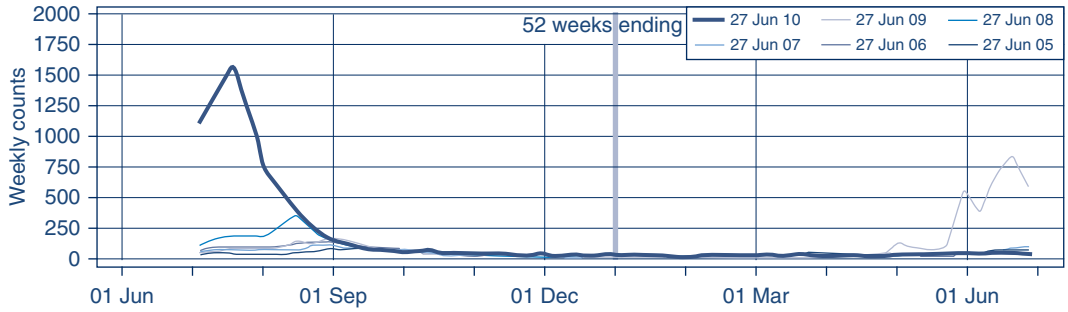

Figure 2. Total weekly counts of emergency department visits for influenza-like illness, for the 12 months to 27 June 2010 (thick line), compared with each of the 5 previous years (coloured lines) (includes data from 56 NSW emergency departments).

Epidemiological investigations have confirmed that the increase in rates of febrile convulsions has only been documented for the 2010 Fluvax® and Fluvax® Junior seasonal influenza vaccines. Investigations from New Zealand (where Vaxigrip® has been widely used during the 2010 influenza season) did not demonstrate any increase in rates of febrile convulsions; the analysis of Australian data for Influvac® also does not demonstrate any increase in rates of febrile convulsions.

As a result of these investigations it is recommended that children aged from 6 months to less than 5 years of age may be vaccinated with Vaxigrip® or Influvac® following a discussion of the risks and benefits of these vaccines with parents and guardians. This includes both children at risk of medical complications of influenza and healthy children. Vaccination of children in this age group with Fluvax® and Fluvax® Junior is not recommended due to the identified increase risk of febrile convulsions.

Further information can be found on the Australian Department of Health website: http://www.health.gov.au/

Vaccine-preventable diseases

Measles

Two cases of measles were reported in adults who had recently returned from overseas travel to Italy and Sri Lanka. One case was unimmunised and the other had an unknown vaccination history. There have been no reports of secondary transmission associated with these cases.

Eight cases of measles have been reported in NSW this year (seven of these had travelled overseas and one was a contact of a known case). In 2009, nine cases were reported in NSW for the corresponding period.

As previously reported, most cases of measles in NSW are seen in travellers who return with the infection from countries where measles is endemic and who are exposed to a known case. Many people who were born since 1966 and before the mid-80s are not immune to measles because they have neither acquired the measles infection nor received two doses of a measles vaccine. Measles vaccine is now routinely given to infants at 12 months and at 4 years, and this confers long-lasting immunity.

Meningococcal disease

Eight cases of meningococcal disease were reported in NSW in May and June 2010. The ages of the affected people ranged from 0 to 82 years (five were aged less than 5 years, one was aged 25–30 years and two were aged over 50 years). Five cases were female. Of the eight cases, four were due to serogroup B, one (an elderly woman with unknown vaccination status) was due to serogroup C, and for three clinically diagnosed cases the serogroup was unknown. For the same period in 2009, 16 cases were

reported. Twenty-nine cases and three deaths due to meningococcal disease have been reported so far in 2010. Forty-two cases were reported between January and June 2009.

A free vaccine is available for infants at 12 months of age. Consequently, serogroup C meningococcal disease is now mainly seen in adults and in unimmunised children. In NSW in 2009, 80% of cases of meningococcal disease (where serogroup was known) were caused by serogroup B, for which there is no vaccine.

Haemophilus influenza *type b invasive infection*

Two cases of *Haemophilus influenza* type b invasive infection (Hib) were reported in NSW in May and June 2010 (one an infant and one a child aged 3 years). Both cases were fully vaccinated for age; one case resided in regional NSW and the other in metropolitan Sydney. No other cases have been reported this year in NSW.

For the same period in 2009, two cases of Hib were reported in children aged less than 5 years and four cases in children aged over 5 years.

Since the introduction of a vaccine in 1993, invasive Hib infection has become rare. Hib disease is caused by infection with *Haemophilus influenzae* type b bacteria. Infection can cause meningitis, epiglottitis (severe swelling of the epiglottis at the back of the throat) and pneumonia. These conditions can develop quickly, and meningitis and epiglottitis can be fatal.

Sexually transmissible infections

Lymphogranuloma venereum

Six cases of lymphogranuloma venereum were reported in metropolitan Sydney in May and June 2010. The infections were acquired locally and all cases were men aged between 32 and 52 years. Sixteen cases have been reported to date in 2010. In 2009, three cases were reported.

Lymphogranuloma venereum is a rare sexually transmitted chlamydial infection that spreads through unprotected vaginal, anal or oral sexual contact, especially if there is trauma to the skin or mucous membranes. Men who have sex with men, especially those who have unprotected anal sex, are at greatest risk. The bacteria that cause lymphogranuloma venereum are rare types of chlamydia, however lymphogranuloma venereum infection is a more aggressive disease than common chlamydia infections. The infection is treated with an extended course of antibiotics.

Figure 3. Reports of selected communicable diseases, NSW, January 2004 to June 2010, by month of onset.
Preliminary data: case counts in recent months may increase because of reporting delays.
Laboratory-confirmed cases only, except for measles, meningococcal disease and pertussis.
BFV, Barmah Forest virus infection; RRV, Ross River virus infections; lab conf, laboratory confirmed;
Men Gp C and Gp B, meningococcal disease due to serogroup C and serogroup B infection;
other/unk, other or unknown serogroups.
NB: Multiple series in graphs are stacked, except gastroenteritis outbreaks.
NB: Outbreaks are more likely to be reported by nursing homes & hospitals than by other institutions.

NSW Population	
Male	50%
<5 y	7%
5–24 y	27%
25–64 y	53%
65+ y	13%
Rural	46%

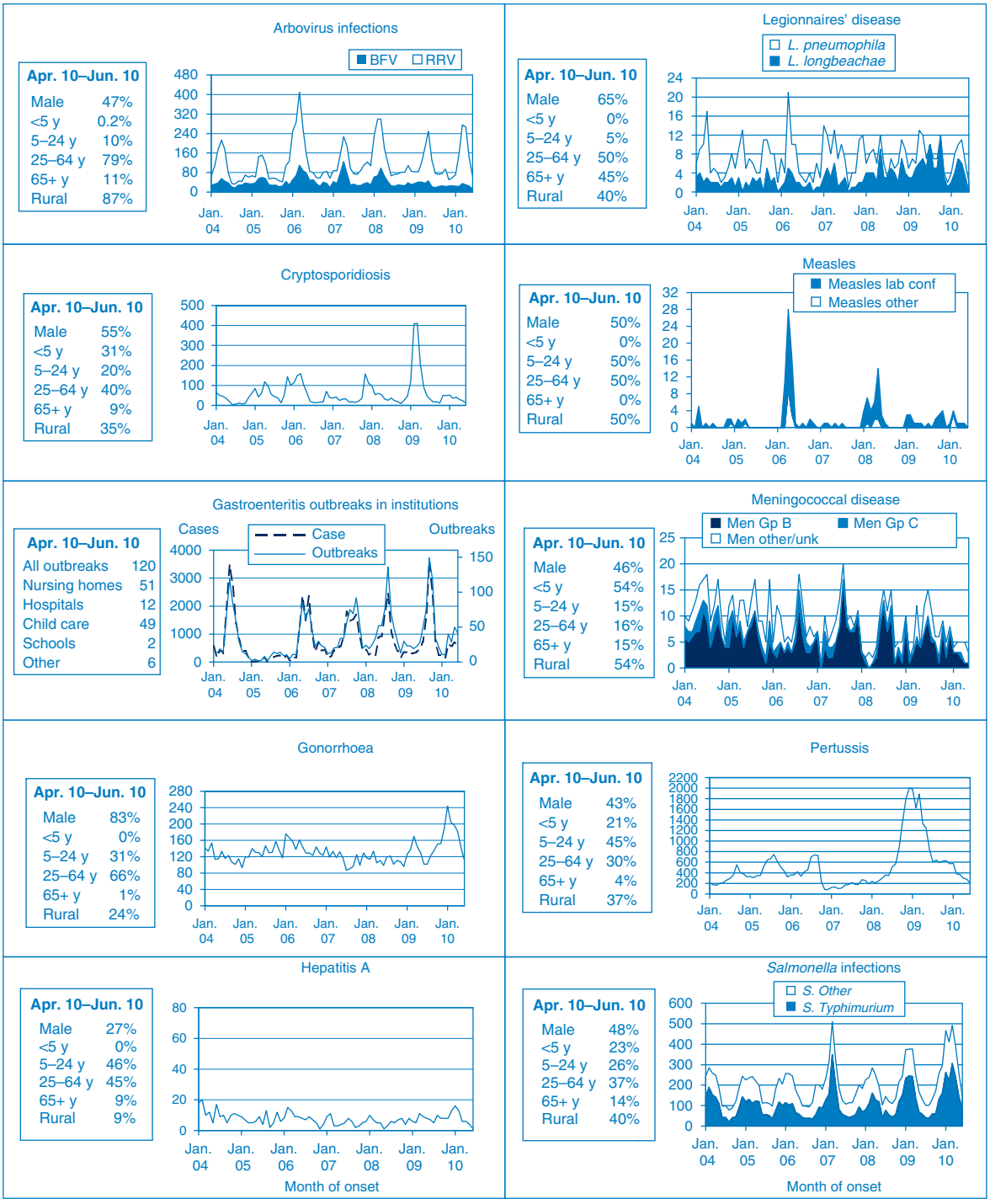

Table 1. Reports of notifiable conditions received in May 2010 by area health services

Condition	Area Health Service (2010)																			Total	
	Greater Southern		Greater Western			Hunter New England		North Coast		Northern Sydney Central Coast		South Eastern Sydney Illawarra		Sydney South West		Sydney West				For May[b]	Year to date[b]
	GMA	SA	FWA	MAC	MWA	HUN	NEA	MNC	NRA	CCA	NSA	ILL	SES	CSA	SWS	WEN	WSA	JHS			
Bloodborne and sexually transmitted																					
Chancroid[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Chlamydia (genital)[a]	55	35	10	35	41	165	42	29	61	63	125	97	258	101	111	60	146	16		1452	7616
Gonorrhoea[a]	1	–	–	–	3	12	1	7	6	2	12	2	61	16	6	4	13	–		146	1001
Hepatitis B – acute viral[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–		2	16
Hepatitis B – other[a]	3	1	1	2	3	6	1	3	2	6	29	3	37	26	39	9	41	10		222	1281
Hepatitis C – acute viral[a]	1	–	–	1	–	–	–	1	–	–	–	–	–	–	3	–	–	–		6	23
Hepatitis C – other[a]	16	12	1	7	16	31	7	10	26	15	17	12	40	53	34	21	17	24		361	2079
Hepatitis D – unspecified[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	1
Lymphogranuloma venereum	–	–	–	–	–	–	–	–	–	–	–	–	1	2	1	–	1	–		5	9
Syphilis	–	–	–	1	–	3	–	1	–	–	1	1	22	4	1	3	4	–		41	284
Vectorborne																					
Barmah Forest virus[a]	1	4	–	–	2	8	1	4	10	1	–	–	–	–	–	–	1	–		32	139
Ross River virus[a]	26	25	15	5	16	10	9	3	30	10	6	2	2	1	4	13	6	–		183	768
Arboviral infection (other)[a]	–	1	–	–	1	1	–	–	1	1	1	2	2	1	–	–	–	–		11	42
Malaria[a]	–	–	–	–	–	–	–	–	2	–	–	1	–	3	2	–	1	–		9	31
Zoonoses																					
Anthrax[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	1
Brucellosis[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	3
Leptospirosis[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–		1	8
Lyssavirus[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–
Psittacosis[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–
Q fever[a]	–	–	–	–	1	1	–	–	2	–	–	2	–	–	–	–	–	–		6	57
Respiratory and other																					
Blood lead level[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	61
Invasive pneumococcal infection[a]	–	–	–	–	1	6	–	–	3	1	6	1	7	4	3	2	4	–		38	148
Legionella longbeachae infection[a]	–	2	–	–	–	–	–	–	–	1	–	3	–	–	–	2	–	–		8	24
Legionella pneumophila infection[a]	–	–	–	–	–	–	–	–	–	–	–	–	1	1	1	–	1	–		4	19
Legionnaires' disease (other)[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	1
Leprosy	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	1
Meningococcal infection (invasive)[a]	–	–	–	1	–	–	–	–	1	1	–	–	–	–	1	–	1	–		5	25
Tuberculosis	–	–	–	–	–	2	–	–	–	–	–	2	7	3	2	1	–	–		17	131
Vaccine-preventable																					
Adverse event after immunisation	–	–	–	–	1	1	1	–	–	–	2	–	1	–	1	–	–	–		7	97
H. influenzae b infection (invasive)[a]	–	–	–	–	–	1	–	–	–	–	–	–	–	–	1	–	–	–		2	2
Measles	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–		2	8
Mumps[a]	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–		1	10
Pertussis	23	9	2	7	13	19	–	12	3	7	34	16	41	12	25	17	44	–		284	1992
Rubella[a]	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–		1	8
Tetanus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–
Enteric																					
Botulism	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–
Cholera[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–
Cryptosporidiosis[a]	4	–	–	–	1	1	1	1	–	–	7	–	1	3	2	2	1	–		24	185
Giardiasis[a]	12	7	–	6	6	20	8	5	1	5	37	11	37	–	3	10	13	1		182	1146
Haemolytic uraemic syndrome	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	3
Hepatitis A[a]	–	–	–	–	1	–	–	–	–	–	1	–	2	–	–	–	1	–		5	50
Hepatitis E[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–		2	7
Listeriosis[a]	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–		1	18
Rotavirus[a]	1	1	–	1	1	5	–	1	4	6	8	3	6	–	–	4	5	–		46	265
Salmonellosis[a]	8	5	2	2	2	21	11	7	32	10	44	11	37	35	51	16	37			332	2061
Shigellosis[a]	–	–	–	–	–	–	–	–	1	–	2	–	1	–	–	1	–	–		5	36
Typhoid[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	1	2	–	–	–		3	23
Verotoxin producing *E. coli*[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	8
Miscellaneous																					
Creutzfeldt–Jakob disease	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	5
Meningococcal conjunctivitis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–

[a]Laboratory-confirmed cases only. [b]Includes cases with unknown postcode.

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Table 2. Reports of notifiable conditions received in June 2010 by area health services

Condition	Area Health Service (2010)																		Total	
	Greater Southern		Greater Western			Hunter New England		North Coast		Northern Sydney Central Coast		South Eastern Sydney Illawarra		Sydney South West		Sydney West			For June[b]	Year to date[b]
	GMA	SA	FWA	MAC	MWA	HUN	NEA	MNC	NRA	CCA	NSA	ILL	SES	CSA	SWS	WEN	WSA	JHS		
Bloodborne and sexually transmitted																				
Chancroid[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Chlamydia (genital)[a]	64	40	23	19	43	247	30	50	42	75	102	85	197	5	3	56	118	8	1211	8827
Gonorrhoea[a]	2	–	2	–	1	18	1	2	8	3	13	4	76	–	–	2	16	–	148	1149
Hepatitis B – acute viral[a]	1	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	2	18
Hepatitis B – other[a]	4	1	4	1	2	1	–	8	2	2	15	5	25	2	2	8	50	1	133	1414
Hepatitis C – acute viral[a]	1	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	2	25
Hepatitis C – other[a]	8	15	5	11	14	39	1	5	20	14	11	23	44	19	19	14	18	–	283	2362
Hepatitis D – unspecified[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Lymphogranuloma vanereum	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	11
Syphilis	–	–	–	2	1	3	–	–	–	–	–	–	10	2	–	–	10	–	28	312
Vectorborne																				
Barmah Forest virus[a]	–	1	–	–	1	2	2	1	5	1	1	1	–	1	–	–	–	–	16	155
Ross River virus[a]	9	10	2	1	4	12	4	7	8	8	1	1	1	1	–	5	3	–	77	845
Arboviral infection (other)[a]	–	–	–	–	–	–	–	–	3	–	1	1	1	–	–	–	–	–	6	48
Malaria[a]	2	1	–	–	–	–	–	1	–	–	2	–	2	2	–	–	3	–	13	44
Zoonoses																				
Anthrax[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Brucellosis[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3
Leptospirosis[a]	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	1	9
Lyssavirus[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Psittacosis[a]	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	–	2	–
Q fever[a]	–	–	–	1	–	–	–	–	1	–	–	–	–	–	–	–	–	–	2	59
Respiratory and other																				
Blood lead level[a]	4	–	–	1	–	4	–	–	–	–	–	–	–	–	–	2	–	–	11	72
Invasive pneumococcal infection[a]	1	–	1	–	2	5	–	3	4	3	6	3	12	2	3	1	8	–	54	202
Legionella longbeachae infection[a]	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	2	26
Legionella pneumophila infection[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	2	21
Legionnaires' disease (other)[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Leprosy	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Meningococcal infection (invasive)[a]	–	–	–	–	–	–	–	–	–	2	–	–	–	–	1	–	–	–	3	28
Tuberculosis	–	–	–	–	–	1	–	–	–	–	1	–	1	1	–	1	1	–	6	137
Vaccine-preventable																				
Adverse event after immunisation	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–	2	99
H. influenzae b infection (invasive)[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Measles	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8
Mumps[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	10
Pertussis	22	1	5	3	6	19	3	7	3	4	48	12	34	9	7	30	55	–	268	2260
Rubella[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8
Tetanus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Enteric																				
Botulism	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cholera[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cryptosporidiosis[a]	–	1	–	–	–	–	–	2	2	–	1	–	5	4	1	–	4	–	20	205
Giardiasis[a]	3	5	–	2	7	10	1	1	1	6	19	5	34	2	–	9	19	–	124	1270
Haemolytic uraemic syndrome	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3
Hepatitis A[a]	–	–	–	–	–	–	–	–	–	–	1	–	1	–	1	–	–	–	3	53
Hepatitis E[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	8
Listeriosis[a]	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	1	19
Rotavirus[a]	2	2	–	–	–	10	–	–	3	2	14	1	8	–	–	3	9	–	54	319
Salmonellosis[a]	5	1	–	1	4	17	10	4	12	53	26	7	20	–	5	13	14	–	192	2253
Shigellosis[a]	–	–	–	–	–	–	–	–	–	–	5	–	1	–	–	–	–	–	6	42
Typhoid[a]	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	2	25
Verotoxin producing *E. coli*[a]	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	1	9
Miscellaneous																				
Creutzfeldt–Jakob disease	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	6
Meningococcal conjunctivitis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

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Contents

Special issue: Year in Review

157 **Year in review: communicable disease surveillance, NSW, 2009**

Presents the trends in reports of notifiable diseases among NSW residents for 2009.

Communicable Diseases Branch, NSW Department of Health

167 **Review of the 2008–2009 pertussis epidemic in NSW: notifications and hospitalisations**

Examines the epidemiology of pertussis in NSW since 1998. Pertussis epidemics are described providing a comparison for the most recent in 2008–2009.

Paula J. Spokes, Helen E. Quinn, Jeremy M. McAnulty

174 **Epi*Review*: Tuberculosis in NSW, 2008**

Reviews the demographic, microbiological, clinical and other characteristics of patients notified with tuberculosis in NSW in 2008.

April R. Roberts-Witteveen, Amanda J. Christensen and Jeremy M. McAnulty

Bug Breakfast in the *Bulletin*

183 **Waterborne diseases among Aboriginal people**

Patricia Morton, Gillian Barlow and Ross Bailie

184 **Dental caries in children**

Aaron W. Cashmore, Claire Phelan and Anthony S. Blinkhorn

Communicable Diseases Report, NSW

186 **May and June 2010**

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