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Year in review

Year in review: health protection in NSW, 2012

Health Protection NSW

Health protection involves the prevention and control of threats to health from communicable diseases and the environment. In New South Wales (NSW) in 2012 these functions were carried out by a range of groups, among them Health Protection NSW's Communicable Diseases and Environmental Health Branches, the NSW Ministry of Health's Population and Public Health Division, Public Health Units, clinicians, Local Health District services, local government, other government agencies, and communities.

In this report we highlight the major health outcomes and achievements related to Health Protection NSW's activities in 2012, including some examples of health protection projects done in the field (Boxes 1–6). The health outcomes described in this report are measured mainly through routine surveillance data that are derived from notifications of selected diseases provided by doctors, hospitals and laboratories to Public Health Units under the NSW *Public Health Act 2010*.

Tables 1–6 show disease-specific data on notifiable conditions reported by: year of onset of illness; month of onset of illness; Local Health District; and age group and sex. Note that the degree to which notification data reflect the true incidence of disease varies and is subject to a range of caveats.[1]

Surveillance

Vaccine-preventable diseases

In 2012 there were:

- no **haemophilus influenzae type b** notifications in children aged less than 5 years for the first time since 1993
- 5824 **pertussis** notifications (including one death in a 7-week old infant), a marked decrease from the record numbers in 2011 (>13 000)
- 172 **measles** notifications, of which two were imported from overseas, 169 were found to be linked to an imported case (measles virus D8), while another was locally acquired but presumably acquired from an imported case not identified through surveillance (measles virus B3). Most cases were notified by South Western Sydney and Western Sydney Local Health Districts. People of Pacific Islander ethnicity and Aboriginal people were disproportionately affected. There were 58 notifications in children aged less than 5 years, with 37 notifications in infants aged less than 1 year (too young to be vaccinated)
- 66 **meningococcal disease** notifications, the lowest number since the introduction of the meningococcal C vaccine in 2003. Of these, 43 were due to serogroup B (65%), five were due to serogroup Y (8%), four were due to serogroup W135 (6%), two were due to serogroup C (3%), and 12 were of an unknown serogroup (18%). The two cases of meningococcal C disease were reported in young adults who were not vaccinated. Meningococcal notifications have been declining for more than a decade
- 105 **mumps** notifications, an increase from the 67 reported in 2011. The highest notifications were in metropolitan areas and in under-vaccinated persons aged 30–34 years ($n = 27$), followed by those aged 35–39 years ($n = 15$)
- 566 **invasive pneumococcal disease** notifications, a slight increase compared with 529 in 2011. Serotype 19A was identified as the cause of infection in 33% of cases in children aged less than 5 years and 17% of the remainder of the cases where typing was available.

Bloodborne viruses

In 2012 there were:

- 2328 **total hepatitis B** case notifications, an 8% decrease compared with 2011 ($n = 2525$) and the lowest recorded number in 20 years (total notifications are mainly of people whose time of infection is unknown). Fifty-four percent of cases were male and 30% were aged between 25 and 34 years

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Box 1. NSW Denominator Data Project

Positive laboratory results for notifiable conditions are reported by each pathology service to the local Public Health Unit. This provides information about the number of new cases of disease. Data on the level of testing is useful to indicate whether an apparent increase in notification is due to increased testing. The NSW Denominator Data Project began in January 2012 to collect the total number of tests performed per month (the denominator data) for selected notifiable conditions with significant public health implications from 14 public and private laboratories in NSW. The data for sexually transmitted infections (HIV, chlamydia and gonorrhoea), vectorborne infections (Ross River and Barmah Forest viruses), pertussis and enteric diseases are reported in a web-based secure site per laboratory. The reported data are interpreted per laboratory (to account for various testing methods) and collated to give monthly aggregated data per condition. Comparison with notifications provides an indication of a trend in incidence to enable timely public health action. As no demographic information is provided, the data cannot be used to indicate specific rates for age, sex or geographic location. The positivity rate for all conditions in 2012 ranged from 0.1% (shigellosis) to 5.7% (chlamydia infection). Notifications for chlamydia and gonorrhoea were correlated with testing, while the incidence of enteric conditions suggests that seasonal factors rather than testing patterns influence notification rates.

Box 2. Backyard tattooists: risky business for all involved

The growth in the popularity of body art, coupled with the ease of buying body art equipment over the internet, has contributed to an apparent increase in skin penetration procedures done at home by 'backyard tattooists'. Unsterile skin penetration runs the risk of spreading viral, bacterial, and other infections. During 2012, the North Coast Public Health Unit (PHU) responded to six complaints about backyard tattooists. The complaints included two from parents whose children had been tattooed by other children without the parents' knowledge, one from a mother concerned that her child's tattoos were performed by an adult tattoo operator without the mother's knowledge, and three from concerned registered tattoo parlours. In response, staff from the PHU visited, inspected or wrote to the alleged backyard tattooists, informing them of the health risks and legal implications, and involving council or police assistance where necessary. The PHU also issued a media release warning of the potential risks of backyard tattoos, and contributed an article to the Department of Education and Communities' regional weekly electronic newsletter for primary and secondary school staff across the North Coast.

Box 3. Sydney cruise ship health surveillance and inspection

Sydney Harbour is the busiest cruise ship destination in Australia with over 200 voyages arriving in 2012, bringing half a million people to the city. With this come public health risks: cases of infectious diseases on cruise ships are commonplace and outbreaks of respiratory disease and gastroenteritis occur. In response, the South Eastern Sydney Public Health Unit (PHU) has developed two public health programs: the Cruise Ship Health Surveillance Program and the Vessel Inspection Program. These programs aim to monitor disease occurrence, increase preventive action and offer operational public health advice to international vessels entering the Port of Sydney. During the period 2006–2011, the Cruise Ship Health Surveillance Program was involved in the investigation of 45 outbreaks of disease onboard cruise ships entering Sydney; 30 of these outbreaks were caused by gastroenteritis and almost half of these were confirmed to be due to norovirus. Of 15 outbreaks of respiratory disease, influenza was confirmed in seven. Environmental inspection of vessels occurs routinely or as part of an outbreak investigation. A Vessel Inspection Manual has been written by staff of the PHU to provide guidance on inspection items including the potable water supply system; the medical facilities including vaccine storage; recreational water facilities; childcare facilities; collection, storage and disposal of waste; skin penetration procedures; pest control strategies; general infection control standards; and ventilation systems. A website has been developed to provide advice to passengers, crew and their agents and to present monthly reports of the proportion of acute respiratory disease and acute gastroenteritis reported by cruise ships. The Environmental Health Vessel Inspection Manual and a 5-year report of the Cruise Ship Health Surveillance Program are available at: http://www.seslhd.health.nsw.gov.au/Public_Health/CruiseShipProgram/default.asp

- 28 **newly-acquired hepatitis B** case notifications, a 7% decrease compared with 2011 ($n = 30$). Eighty-six percent of cases were male
- 3292 **total hepatitis C** case notifications, similar to the number reported in 2011 ($n = 3326$). Sixty-four percent of cases were male and 34% were aged between 30 and 39 years
- 47 **newly-acquired hepatitis C** case notifications, an 8% decrease compared with 2011 ($n = 51$). Sixty-six percent of cases were male

Box 4. Avian influenza in Hunter New England

An outbreak of low pathogenicity H9N2 at a Hunter New England turkey farm in April 2012 was the first such outbreak detected in Australian poultry. Eight human contacts were provided with seasonal influenza vaccination and placed under surveillance until 7 days after last poultry exposure. All remained well and baseline serology demonstrated no evidence of influenza A infection. Antivirals were not used. All birds were destroyed.

Enhanced surveillance by the Department of Primary Industries subsequently identified low pathogenicity H9N2 in a second turkey flock in Hunter New England. There was no significant poultry illness and repeat testing confirmed clearance of the virus from the flock. Six human contacts were encouraged to have seasonal influenza vaccination through their general practitioner and were monitored; none developed significant illness. Nose and throat swabs collected from two contacts with mild upper respiratory symptoms were positive for rhinovirus and enterovirus. Serology was not collected and antivirals were not used. No clear pathway of transmission between farms was identified and the same virus was later identified in water birds in the region.

In November, highly pathogenic H7N7 was detected in poultry on an egg farm in the region. Seven close human contacts were monitored and the offer of antiviral prophylaxis was accepted by one. Nose and throat swabs from a contact with upper respiratory symptoms tested negative for influenza and other respiratory pathogens by polymerase chain reaction. No other illness developed. All birds were destroyed.

The need for modified public health responses to low pathogenicity avian influenza outbreaks (rather than adopting high pathogenicity avian influenza protocols), with a limited role for serology and questionable value of antivirals during these outbreaks, were important lessons arising from the management of these avian influenza outbreaks.

Box 5. Public health emergency preparedness exercises

Sourcing ciprofloxacin for 200 people? Identifying the cause of a mysterious illness affecting children in the state's southwest? These fictional scenarios, considered as part of discussion exercises focused on an intentional release of anthrax spores (August 2012) and a contaminated consumer product (December 2012), are one of the best ways to test response arrangements, build relationships and identify planning gaps. In 2012 Health Protection NSW and the Office of the Chief Health Officer launched a series of exercises focused on public health responses to major incidents or emergencies. Health Protection NSW, the NSW Ministry of Health, Public Health Unit staff, and colleagues from other health specialities (e.g. pharmaceutical services, microbiology and toxicology) were brought together to tackle some of the trickier aspects of the myriad of incidents managed by public health services. The discussions, while always entertaining, also contribute to a common understanding of the tools and strategies we have at our disposal.

In the spirit of strengthening NSW Health's ability to deal with major emergencies and natural disasters, the Office of the Chief Health Officer led the development of a pilot specialised public health commander course. Following a competitive tender process, the course was developed in consultation with key public health practitioners and delivered to 21 participants over 3 days in June 2012. The aim of the course was to enhance the ability of senior NSW public health professionals to effectively lead teams during responses to emergencies or major incidents. The course enabled participants to interact with a range of existing emergency management tools and processes that are available for use in both emergency situations and day-to-day operations. The course also reinforced existing emergency management concepts and arrangements, including how to apply an incident control system.

- 409 cases of **newly-diagnosed HIV infection**, a 24% increase compared with 2011 ($n = 330$). The increase was across most at-risk groups. Most new HIV infections were reported to be male homosexually-acquired (81%), with other risk exposure categories reported as heterosexual contact (14%) and injecting drug use (2%). The proportion of people with newly-diagnosed homosexually-acquired HIV infection who reported having an HIV test in the year prior to diagnosis decreased slightly from 42% in 2011 to 40% in 2012, while the proportion of those who reported no previous HIV test prior to diagnosis rose from 14% in 2011 to 17% in 2012.

Box 6. Investigating Legionnaires' disease clusters in western Sydney

From February to April 2012, 14 cases of Legionnaires' disease due to *Legionella pneumophila* serogroup 1 were reported in Western Sydney and Nepean Blue Mountains residents. This was around twice the number of cases usually seen in this period. The cases had onset in three clustered periods: early February, mid-March and late April. There were several locations in western Sydney that more than one case had visited during the incubation period of the illness common to each of the clusters. In collaboration with environmental health officers from local councils, all known cooling towers within 500 m of places that cases had visited were inspected, and water samples were taken. Public Health Unit (PHU) and council environmental health officers also searched for and tested other potential sources of *L. pneumophila*, such as unregistered cooling towers, untreated water irrigation systems, car washes, fountains and misting systems. The environmental investigation did not identify the source of infection, however notification rates returned to the normal level after April. A review of weather patterns showed that during the incubation period prior to each cluster of cases the conditions were particularly humid and cloudy. From late April to the end of May there were no further days of complete cloud cover and high humidity. The PHU hypothesises that the periods of complete cloud cover and high humidity may have allowed *L. pneumophila* to survive longer in an aerosol and travel further than usual.

Sexually transmissible infections

In 2012 there were:

- 21 291 **chlamydia** case notifications, a 4% increase compared with 2011 ($n = 20\,570$). Fifty-six percent of cases were female and 58% were aged between 15 and 24 years
- 4127 **gonorrhoea** case notifications, a 43% increase compared with 2011 ($n = 2882$). Eighty-one percent of cases were male and 39% were aged between 20 and 29 years
- 498 **infectious syphilis** case notifications, a 19% increase compared with 2011 ($n = 418$). Almost all cases (96%) were male and 30% were aged between 40 and 49 years
- 29 **lymphogranuloma venereum** (LGV) case notifications, a 19% decrease from the 36 in 2011. All cases were male, and 35% were aged between 30 and 39 years. The number of LGV notifications has decreased since 2010 following an outbreak early in that year. The outbreak in NSW occurred in the global context of increased European rates of LGV infection in men who have sex with men.[2]

Enteric diseases

In 2012 there were:

- 7669 **enteric disease** case notifications, a 6% increase compared with the average annual count for the previous 5 years
- 2955 **salmonellosis** case notifications, a 15% decrease compared with 2011 and similar to the average annual count for the previous 5 years
- 61 **outbreaks of probable foodborne disease** affecting 662 people, an increase compared with 47 outbreaks affecting 797 people in 2011
- 803 **outbreaks of probable viral gastroenteritis in institutions** affecting 13 842 people, an increase compared with 525 notifications affecting 9071 people in 2011. The increase was likely related to the emergence of a new variant of norovirus GII.4 (known as Sydney 2012)[3]
- 13 point-source outbreaks of ***Salmonella* Typhimurium infection** affecting 162 people, most likely associated with the consumption of sauces and desserts prepared with raw eggs.

Respiratory diseases

In 2012 there were:

- 61 **Legionnaires' disease** case notifications due to *Legionella pneumophila* infection, compared with 60 cases in 2011. Public health investigations did not identify any common sources for these cases. *L. pneumophila* cases peaked in February 2012 with 12 cases reported. Notifications due to *L. longbeacheae* infection decreased (29 compared with 38 cases in 2011)
- 7999 notifications of **influenza,** an increase compared with 5773 notifications in 2011. Approximately 78% of laboratory-confirmed influenza was influenza A, with the influenza A(H3N2) strain predominating (97%). The incidence of influenza B increased later in the season and accounted for 21% of laboratory-confirmed influenza cases overall. While laboratory-confirmed influenza notifications are likely to represent only a small proportion of cases in the community, other indicators of increased influenza activity in 2012 were: an increase from June to September of people presenting to emergency departments with influenza-like illness (well above the normal expected range); and a marked increase in the number of reported outbreaks of respiratory illness in aged-care and other residential care facilities. The increase in morbidity due to influenza is most likely because the predominant strain (influenza A (H3N2)/Victoria/361/2011) was different to the strain in the 2012 influenza vaccine
- 471 notifications of **tuberculosis**, a decrease from the 523 cases reported in 2011
- three cases of **multi-drug resistant tuberculosis** (MDR-TB). Five cases per year were reported in 2010 and 2011.

Table 1. Disease notifications by year of onset of illness, NSW, 2003–2012

Condition	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Adverse event after immunisation	219	187	107	72	243	259	128	232	359	251	2057
Anthrax	0	0	0	1	0	0	0	1	0	0	2
Arboviral infection	1020	1139	1077	1917	1498	1846	1411	1598	1190	1238	13 934
Barmah Forest virus infection	451	400	449	642	574	530	358	264	458	347	4473
Ross River virus infection	492	696	574	1221	841	1153	909	1087	579	603	8155
Other	77	43	54	54	83	163	144	247	153	288	1306
Blood lead level ≥ 10 ug/dl[a]	319	277	206	269	242	239	176	232	269	575	2804
Botulism	0	1	0	0	0	0	0	0	2	0	3
Brucellosis	3	7	3	9	4	1	4	2	6	4	43
Chlamydia trachomatis infection	7773	10 001	11 267	12 056	12 463	14 029	15 000	18 269	20 604	21 332	142 794
Chlamydia (congenital)	23	28	46	39	31	44	50	37	34	41	373
Chlamydia (STI)	7750	9973	11 221	12 017	12 432	13 985	14 950	18 232	20 570	21 291	142 421
Cholera	0	1	0	3	2	2	3	2	0	2	15
Creutzfeldt-Jakob disease	0	6	8	10	9	8	11	8	10	7	77
Cryptosporidiosis	203	353	849	778	544	486	1463	349	359	685	6069
Foodborne illness (NOS)[b]	1071	550	309	507	763	667	902	927	797	662	7155
Gastroenteritis (institutional)	3583	12784	1395	10641	10488	10135	11876	7651	9071	13842	91466
Giardiasis	1028	1232	1449	1722	1945	1783	2099	2300	2376	2008	17 942
Gonorrhoea	1324	1428	1571	1730	1382	1330	1653	2301	2882	4127	19 728
Haemolytic uraemic syndrome	5	9	11	11	13	17	4	3	4	10	87
H. influenzae type b	6	5	7	11	7	9	6	6	4	2	63
Hepatitis A	123	137	83	95	65	69	98	83	57	42	852
Hepatitis B	2688	2625	2654	2451	2556	2489	2620	2561	2525	2328	25 497
Hepatitis B – newly acquired	74	53	56	52	56	45	37	35	30	28	466
Hepatitis B – other	2614	2572	2598	2399	2500	2444	2583	2526	2495	2300	25 031
Hepatitis C	4829	4496	4188	4187	4044	3653	3787	3763	3326	3292	39 565
Hepatitis C – newly acquired	123	57	43	56	64	26	41	38	51	47	546
Hepatitis C – other	4706	4439	4145	4131	3980	3627	3746	3725	3275	3245	39 019
Hepatitis D	12	14	13	14	11	13	9	9	12	5	112
Hepatitis E	6	8	7	10	8	14	17	14	21	10	115
HIV infection – newly diagnosed	413	406	394	367	386	324	331	307	330	409	3667
Influenza	862	938	1415	678	2059	1855	12 846	1606	5773	7999	36 031
Influenza – Type A	769	793	1132	487	1703	833	12 570	1416	4034	6250	29 987
Influenza – Type B	55	118	262	181	184	1002	162	145	1629	1712	5450
Influenza – Type A&B	*NN*	*NN*	10	2	2	3	12	36	29	34	128
Influenza – Type NOS	38	27	11	8	170	17	102	9	81	3	466
Legionellosis (Legionnaires' disease)	60	80	88	78	104	90	93	97	104	99	893
Legionella longbeachae	37	26	23	22	29	52	64	49	38	29	369
Legionella pneumophila	23	52	64	56	73	38	28	39	60	61	494
Legionnaires' disease – other	0	2	1	0	2	0	1	9	6	9	30
Leprosy	2	5	1	1	5	4	1	1	3	0	23
Leptospirosis	39	40	35	17	9	17	18	23	39	21	258
Listeriosis	28	30	25	26	22	34	27	26	21	39	278
Lymphogranuloma venereum (LGV)	0	1	2	1	0	3	4	57	36	29	133
Malaria	120	100	203	138	96	115	91	122	77	70	1132
Measles	18	12	5	60	4	39	19	26	90	172	445
Meningococcal disease	202	149	140	106	112	81	96	75	72	66	1099
Meningococcal – serogroup B	100	81	73	54	76	49	57	49	43	43	625
Meningococcal – serogroup C	45	24	16	12	9	9	7	5	2	2	131
Meningococcal – serogroup W135	2	5	8	5	2	5	5	4	4	4	44
Meningococcal – serogroup Y	5	3	3	1	5	4	3	3	4	5	36
Meningococcal – other	46	33	37	29	17	13	20	12	18	12	237
Meningococcal – conjunctivitis	4	3	3	5	3	1	4	2	1	0	26
Mumps	36	65	111	155	323	77	40	40	67	105	1019
Pertussis	2769	3565	5797	4909	2097	8755	12 550	9350	13 178	5824	68 794
Pneumococcal disease (invasive)	801	903	642	562	519	547	476	500	529	566	6045
Psittacosis	87	81	121	94	35	40	22	17	21	15	533
Q fever	287	220	143	176	204	167	140	146	137	116	1736
Rotavirus	*NN*	*NN*	*NN*	*NN*	*NN*	*NN*	*NN*	1380	1061	1754	4195
Rubella	24	18	10	37	9	17	7	13	17	10	162
Congenital rubella	1	1	0	0	1	0	0	0	0	0	3
Rubella – other	23	17	10	37	8	17	7	13	17	10	159
Salmonella infection	1848	2124	2148	2027	2493	2250	2727	3761	3480	2955	25 813
Shigellosis	59	96	134	72	71	109	151	116	131	123	1062
Syphilis	784	754	550	619	822	843	938	822	815	841	7788
Congenital syphilis	3	1	9	4	5	3	0	0	3	0	28
Infectious syphilis[c]	242	294	241	230	458	428	530	421	418	498	3760
Syphilis – other	539	459	300	385	359	412	408	401	394	343	4000
Tetanus	1	1	1	2	2	1	2	1	1	1	13
Tuberculosis[d]	373	432	435	463	454	496	507	528	523	471	4682
Typhoid	15	38	27	35	34	43	47	31	45	43	358
Verotoxin-producing *Escherichia coli* infections	3	5	16	10	23	19	21	10	10	13	130

Onset of illness: the earlier of patient-reported onset date, specimen date or date of notification.
[a]From May 2012, blood lead was notifiable by a blood lead level of or above 10 μg/dL (previously defined by a blood lead level of or above 15 μg/dL).
[b]Foodborne illness cases are only those notified as part of an outbreak.
[c]Includes primary, secondary, less than 1-year duration and newly-acquired syphilis.
[d]Tuberculosis data based on year of diagnosis.
NOS: not otherwise specified.
NN: not notifiable for that year.
No cases of the following conditions have been notified since 1991: plague, diphtheria, granuloma inguinale, lyssavirus, poliomyelitis, rabies, smallpox, typhus, viral haemorrhagic fever, yellow fever.
Source: Notifiable Conditions Information Management System, NSW Health.

Table 2. Incidence rate of disease notifications by year of onset of illness (per 100 000 population), NSW, 2003–2012

Condition	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Adverse event after immunisation	3.3	2.8	1.6	1.1	3.5	3.7	1.8	3.2	5	3.4
Anthrax	0	0	0	0	0	0	0	0	0	0
Arboviral infection	15.4	17	15.9	28.1	21.7	26.4	20	22.4	16.5	17.1
Barmah Forest virus infection	6.8	6	6.6	9.4	8.3	7.6	5.1	3.7	6.4	4.8
Ross River virus infection	7.4	10.4	8.5	17.9	12.2	16.5	12.9	15.2	8	8.3
Other	1.2	0.6	0.8	0.8	1.2	2.3	2	3.5	2.1	4
Blood lead level ≥ 10 ug/dl[a]	4.8	4.1	3	3.9	3.5	3.4	2.5	3.2	3.7	7.9
Botulism	0	0	0	0	0	0	0	0	0	0
Brucellosis	0	0.1	0	0.1	0.1	0	0.1	0	0.1	0.1
Chlamydia trachomatis infections	116.4	149.1	166.8	176.9	181.1	201.1	212.2	255.7	285.7	292.7
Chlamydia (congenital)	0.3	0.4	0.7	0.6	0.5	0.6	0.7	0.5	0.5	0.6
Chlamydia (STI)	116.1	148.7	166.1	176.3	180.6	200.5	211.5	255.2	285.2	292.1
Cholera	0	0	0	0	0	0	0	0	0	0
Creutzfeldt-Jakob disease	0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1
Cryptosporidiosis	3	5.3	12.6	11.4	7.9	7	20.7	4.9	5	9.4
Foodborne illness (NOS)[b]	16.1	8.2	4.6	7.4	11.1	9.5	12.7	13	11.1	9.1
Giardiasis	15.4	18.4	21.4	25.3	28.2	25.6	29.7	32.2	32.9	27.6
Gonorrhoea	19.8	21.3	23.3	25.4	20.1	19.1	23.4	32.2	40	56.6
Haemolytic uraemic syndrome	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0	0.1	0.1
H. influenzae type b	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0
Hepatitis A	1.8	2	1.2	1.4	0.9	1	1.4	1.2	0.8	0.6
Hepatitis B	40.3	39.1	39.3	36	37.1	35.6	37	35.9	35	32
Hepatitis B – newly acquired	1.1	0.8	0.8	0.8	0.8	0.6	0.5	0.5	0.4	0.4
Hepatitis B – other	39.2	38.3	38.5	35.2	36.3	35	36.5	35.4	34.6	31.6
Hepatitis C	72.3	67	61.9	61.4	58.7	52.4	53.6	52.6	46.1	45.1
Hepatitis C – newly acquired	1.8	0.8	0.6	0.8	0.9	0.4	0.6	0.5	0.7	0.6
Hepatitis C – other	70.5	66.2	61.3	60.6	57.8	52	53	52.1	45.4	44.5
Hepatitis D	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.1
Hepatitis E	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.1
HIV infection – newly diagnosed	6.2	6	5.8	5.4	5.6	4.6	4.6	4.3	4.6	5.6
Influenza	12.9	14	21	9.9	29.9	26.5	181.7	22.4	80	109.8
Influenza – Type A	11.5	11.8	16.8	7.1	24.7	11.9	177.8	19.8	55.9	85.8
Influenza – Type B	0.8	1.8	3.9	2.7	2.7	14.4	2.3	2	22.6	23.5
Influenza – Type A&B	0	0	0.1	0	0	0	0.2	0.5	0.4	0.5
Influenza – Type NOS	0.6	0.4	0.2	0.1	2.5	0.2	1.4	0.1	1.1	0
Legionellosis (Legionnaires' disease)	0.9	1.2	1.2	1.1	1.5	1.2	1.3	1.3	1.4	1.3
Legionella longbeachae	0.6	0.4	0.3	0.3	0.4	0.7	0.9	0.7	0.5	0.4
Legionella pneumophila	0.3	0.8	0.9	0.8	1.1	0.5	0.4	0.5	0.8	0.8
Legionnaires' disease – other	0	0	0	0	0	0	0	0.1	0.1	0.1
Leprosy	0	0.1	0	0	0.1	0.1	0	0	0	0
Leptospirosis	0.6	0.6	0.5	0.2	0.1	0.2	0.3	0.3	0.5	0.3
Listeriosis	0.4	0.4	0.4	0.4	0.3	0.5	0.4	0.4	0.3	0.5
Lymphogranuloma venereum	0	0	0	0	0	0	0.1	0.8	0.5	0.4
Malaria	1.8	1.5	3	2	1.4	1.6	1.3	1.7	1.1	1
Measles	0.3	0.2	0.1	0.9	0.1	0.6	0.3	0.4	1.2	2.4
Meningococcal disease	3.1	2.2	1.9	1.6	1.5	1.2	1.4	1.1	1	1
Meningococcal – serogroup B	1.5	1.2	1.1	0.8	1.1	0.7	0.8	0.7	0.6	0.6
Meningococcal – serogroup C	0.7	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0	0
Meningococcal – serogroup W135	0	0.1	0.1	0.1	0	0.1	0.1	0.1	0.1	0.1
Meningococcal – serogroup Y	0.1	0	0	0	0.1	0.1	0	0	0.1	0.1
Meningococcal – other	0.7	0.5	0.5	0.4	0.2	0.2	0.3	0.2	0.2	0.2
Meningococcal – conjunctivitis	0.1	0	0	0.1	0	0	0.1	0	0	0
Mumps	0.5	1	1.6	2.3	4.7	1.1	0.6	0.6	0.9	1.4
Pertussis	41.5	53.2	85.8	72	30.5	125.5	177.5	130.9	182.7	79.9
Pneumococcal disease (invasive)	12	13.5	9.5	8.2	7.5	7.8	6.7	7	7.3	7.8
Psittacosis	1.3	1.2	1.8	1.4	0.5	0.6	0.3	0.2	0.3	0.2
Q fever	4.3	3.3	2.1	2.6	3	2.4	2	2	1.9	1.6
Rotavirus	*NN*	*NN*	*NN*	*NN*	*NN*	*NN*	*NN*	19.3	14.7	24.1
Rubella	0.3	0.3	0.1	0.5	0.1	0.2	0.1	0.2	0.2	0.1
Congenital rubella	0	0	0	0	0	0	0	0	0	0
Rubella – other	0.3	0.3	0.1	0.5	0.1	0.2	0.1	0.2	0.2	0.1
Salmonella infection	27.7	31.7	31.8	29.7	36.2	32.3	38.6	52.6	48.3	40.5
Shigellosis	0.9	1.4	2	1.1	1	1.6	2.1	1.6	1.8	1.7
Syphilis	11.7	11.2	8.1	9.1	12	12	13.3	11.5	11.3	11.5
Congenital syphilis	0	0	0.1	0.1	0.1	0	0	0	0	0
Infectious syphilis[c]	3.6	4.4	3.6	3.4	6.7	6.1	7.5	5.9	5.8	6.8
Syphilis – other	8.1	6.8	4.4	5.6	5.2	5.9	5.8	5.6	5.5	4.7
Tetanus	0	0	0	0	0	0	0	0	0	0
Tuberculosis[d]	5.6	6.4	6.4	6.8	6.6	7.1	7.2	7.4	7.3	6.5
Typhoid	0.2	0.6	0.4	0.5	0.5	0.6	0.7	0.4	0.6	0.6
Verotoxin-producing *Escherichia coli* infections	0	0.1	0.2	0.1	0.3	0.3	0.3	0.1	0.1	0.2

Onset of illness: the earlier of patient-reported onset date, specimen date or date of notification.
[a]From May 2012, blood lead was notifiable by a blood lead level of or above 10 μg/dL (previously defined by a blood lead level of or above 15 μg/dL).
[b]Foodborne illness cases are only those notified as part of an outbreak.
[c]Includes primary, secondary, less than 1-year duration and newly-acquired syphilis.
[d]Tuberculosis data based on year of diagnosis.
NOS: not otherwise specified.
NN: not notifiable for that year.
No cases of the following conditions have been notified since 1991: plague, diphtheria, granuloma inguinale, lyssavirus, poliomyelitis, rabies, smallpox, typhus, viral haemorrhagic fever, yellow fever.
Source: Notifiable Conditions Information Management System, NSW Health.

Table 3. Disease notifications by month of onset of illness, NSW, 2012

Condition	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Adverse event after immunisation	7	26	50	33	28	22	16	12	21	15	13	8	251
Arboviral infection	104	157	152	177	131	61	62	51	67	104	92	80	1238
Barmah Forest virus infection	22	44	40	30	28	21	20	16	23	37	36	30	347
Ross River virus infection	45	80	83	115	80	23	23	16	26	37	40	35	603
Other	37	33	29	32	23	17	19	19	18	30	16	15	288
Blood lead level ≥ 10 ug/dl[a]	31	58	45	38	61	51	36	44	36	103	46	26	575
Brucellosis	1	0	0	0	1	0	1	0	0	0	1	0	4
Chlamydia trachomatis infections	1875	2052	1995	1576	1992	1599	1690	1833	1544	1859	1867	1450	21 332
Chlamydia (congenital)	3	4	5	2	4	5	5	5	1	3	3	1	41
Chlamydia (STI)	1872	2048	1990	1574	1988	1594	1685	1828	1543	1856	1864	1449	21 291
Cholera	0	0	0	1	0	0	0	1	0	0	0	0	2
Creutzfeldt-Jakob disease	1	0	1	1	0	1	0	1	1	1	0	0	7
Cryptosporidiosis	43	76	95	109	78	47	48	27	15	28	47	72	685
Foodborne illness (NOS)[b]	36	39	133	121	47	70	9	40	38	33	36	60	662
Gastroenteritis (institutional)	332	566	948	853	1620	1097	1209	2477	1976	1029	1102	633	13842
Giardiasis	173	234	252	195	202	150	120	116	143	140	156	127	2008
Gonorrhoea	322	370	298	312	369	356	351	364	321	415	377	272	4127
Haemolytic uraemic syndrome	0	3	0	0	1	3	1	0	1	0	0	1	10
H. influenzae type b	0	0	0	0	0	0	2	0	0	0	0	0	2
Hepatitis A	0	5	6	4	4	1	2	2	3	6	6	3	42
Hepatitis B	185	227	198	159	207	201	188	227	191	202	176	167	2328
Hepatitis B – newly acquired	3	2	3	2	1	3	2	1	2	1	2	6	28
Hepatitis B – other	182	225	195	157	206	198	186	226	189	201	174	161	2300
Hepatitis C	247	314	345	238	276	266	237	318	274	264	285	228	3292
Hepatitis C – newly acquired	5	6	2	3	6	2	3	9	0	8	1	2	47
Hepatitis C – other	242	308	343	235	270	264	234	309	274	256	284	226	3245
Hepatitis D	1	1	0	1	0	0	0	0	0	2	0	0	5
Hepatitis E	1	0	0	2	1	0	1	0	1	2	2	0	10
HIV infection – newly diagnosed	26	38	48	23	32	29	37	38	37	46	29	26	409
Influenza	48	66	121	97	332	1965	2420	1675	786	265	133	91	7999
Influenza – Type A	32	43	96	82	291	1844	2176	1215	269	87	56	59	6250
Influenza – Type B	15	23	24	12	37	114	242	456	514	172	76	27	1712
Influenza – Type A&B	1	0	1	3	4	7	2	3	3	6	1	3	34
Influenza – Type NOS	0	0	0	0	0	0	0	1	0	0	0	2	3
Legionellosis (Legionnaires' disease)	11	15	8	14	10	6	10	3	4	3	9	6	99
Legionella longbeachae	4	2	1	1	6	2	3	2	2	1	3	2	29
Legionella pneumophila	7	12	6	10	4	4	3	1	2	2	6	4	61
Legionnaires' disease – other	0	1	1	3	0	0	4	0	0	0	0	0	9
Leptospirosis	2	3	3	5	1	4	0	0	1	0	1	1	21
Listeriosis	6	2	2	4	3	3	1	2	3	4	0	9	39
Lymphogranuloma venereum	0	3	0	1	0	1	2	4	3	5	4	6	29
Malaria	7	5	1	7	5	5	10	8	6	7	6	3	70
Measles	0	0	0	5	6	11	27	44	59	18	2	0	172
Meningococcal disease	2	2	3	10	6	7	13	7	7	4	3	2	66
Meningococcal – serogroup B	1	1	2	7	4	6	9	3	4	3	2	1	43
Meningococcal – serogroup C	0	0	0	0	0	0	1	0	0	0	1	0	2
Meningococcal – serogroup W135	1	0	0	0	0	0	0	0	2	1	0	0	4
Meningococcal – serogroup Y	0	0	0	1	0	0	1	2	0	0	0	1	5
Meningococcal – other	0	1	1	2	2	1	2	2	1	0	0	0	12
Mumps	6	7	3	8	23	20	9	14	3	4	2	6	105
Pertussis	867	682	514	446	564	374	402	439	363	427	431	315	5824
Pneumococcal disease (invasive)	22	10	24	35	70	76	63	85	59	44	44	34	566
Psittacosis	1	3	2	3	0	0	0	2	2	2	0	0	15
Q fever	17	10	11	12	7	5	4	9	8	15	10	8	116
Rotavirus	55	70	65	33	50	63	96	299	530	320	127	46	1754
Rubella	4	0	0	1	0	1	1	3	0	0	0	0	10
Salmonella infection	329	327	360	245	197	123	153	198	190	271	260	302	2955
Shigellosis	22	7	13	7	5	11	12	8	5	13	15	5	123
Syphilis	78	77	60	73	71	67	82	78	78	61	70	46	841
Infectious syphilis[c]	45	44	20	43	42	44	44	48	52	38	50	28	498
Syphilis – other	33	33	40	30	29	23	38	30	26	23	20	18	343
Tetanus	0	0	0	0	0	0	0	0	0	0	1	0	1
Typhoid	5	7	4	3	7	1	2	1	1	5	1	6	43
Verotoxin-producing *Escherichia coli* infections	2	1	0	3	1	1	1	0	1	1	1	1	13

Onset of illness: the earlier of patient-reported onset date, specimen date or date of notification.

[a]From May 2012, blood lead was notifiable by a blood lead level of or above 10 μg/dL (previously defined by a blood lead level of or above 15 μg/dL).

[b]Foodborne illness cases are only those notified as part of an outbreak.

[c]Includes primary, secondary, less than 1-year duration and newly-acquired syphilis.

NOS: not otherwise specified.

No cases of the following conditions have been notified since 1991: plague, diphtheria, granuloma inguinale, lyssavirus, poliomyelitis, rabies, smallpox, typhus, viral haemorrhagic fever, yellow fever.

Source: Notifiable Conditions Information Management System, NSW Health.

Table 4. Disease notifications by Local Health District of residence, NSW, 2012 (based on onset of illness)

Condition	Sydney	Central Coast	Far West	Hunter New England	Illawarra Shoalhaven	Mid North Coast	Murrum-bidgee	Nepean Blue Mountains	North Sydney	Northern NSW	South Eastern Sydney	South Western Sydney	Southern NSW	Western Sydney	Western NSW	Justice Health	Other[f]	Overseas	Total
Adverse event after immunisation	5	15	1	52	12	2	27	10	25	8	12	17	16	34	14	0	1	0	251
Arboviral	39	49	22	248	45	94	133	37	76	271	36	43	23	25	94	1	0	2	1238
Barmah Forest virus infections	1	9	3	69	19	53	13	4	3	148	1	3	5	2	14	0	0	0	347
Ross River virus infections	7	26	19	155	10	34	118	20	11	100	1	7	12	6	76	1	0	0	603
Other	31	14	0	24	16	7	2	13	62	23	34	33	6	17	4	0	0	2	288
Blood lead level ≥ 10 ug/dl[a]	12	7	167	47	9	0	70	28	9	10	24	46	5	32	108	0	1	0	575
Brucellosis	0	0	0	2	0	0	0	0	0	1	0	1	0	0	0	0	0	0	4
Chlamydia trachomatis infections	2154	1039	91	3071	1096	516	736	890	1745	944	3615	1998	394	1953	832	177	29	52	21 332
Chlamydia (congenital)	2	0	0	7	0	3	1	2	2	0	0	7	3	9	5	0	0	0	41
Chlamydia (STI)	2152	1039	91	3064	1096	513	735	888	1743	944	3615	1991	391	1944	827	177	29	52	21 291
Cholera	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2
Creutzfeldt-Jakob disease	0	0	0	3	1	0	0	0	0	0	0	1	0	0	2	0	0	0	7
Cryptosporidiosis	65	32	0	83	23	11	14	24	129	28	139	31	9	69	28	0	0	0	685
Giardiasis	177	70	6	243	107	30	52	105	366	17	370	125	44	183	111	1	0	1	2008
Gonorrhoea	890	62	33	260	101	23	39	121	300	74	1318	377	20	412	47	16	4	30	4127
Haemolytic uraemic syndrome	1	0	0	0	0	1	0	1	3	0	0	2	0	1	1	0	0	0	10
H. influenzae type b	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2
Hepatitis A	6	0	0	0	0	1	0	0	5	1	7	8	1	10	2	0	0	1	42
Hepatitis B	387	29	5	67	45	27	38	32	295	13	319	458	13	530	40	23	2	5	2328
Hepatitis B – newly acquired	0	1	0	10	0	0	0	2	0	4	5	4	0	0	2	0	0	0	28
Hepatitis B – other	387	28	5	57	45	27	38	30	295	9	314	454	13	530	38	23	2	5	2300
Hepatitis C	299	167	39	347	175	101	137	129	156	178	259	423	97	307	181	289	3	5	3292
Hepatitis C – newly acquired	4	1	0	17	0	2	0	2	0	3	10	0	0	0	4	4	0	0	47
Hepatitis C – other	295	166	39	330	175	99	137	127	156	175	249	423	97	307	177	285	3	5	3245
Hepatitis D	1	0	0	0	0	0	0	0	0	0	0	1	0	3	0	0	0	0	5
Hepatitis E	3	1	0	0	0	0	0	0	0	0	2	1	0	3	0	0	0	0	10
HIV infection – newly diagnosed	112	10	2	14	9	3	5	5	23	5	148	30	8	26	7	1	0	0	409
Influenza	491	133	29	1134	260	119	278	373	1029	460	1147	861	260	1221	181	7	9	7	7999
Influenza – Type A	379	106	24	903	225	91	229	291	756	357	827	693	231	984	134	7	8	5	6250
Influenza – Type B	112	27	4	229	34	28	48	81	273	100	296	167	28	235	47	0	1	2	1712
Influenza – Type A&B	0	0	0	1	1	0	1	1	0	2	24	1	1	2	0	0	0	0	34
Influenza – Type NOS	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3
Legionellosis (Legionnaires' disease)	4	2	1	8	5	1	9	5	14	3	12	5	1	23	5	0	1	0	99
Legionella longbeachae	0	1	1	1	4	1	4	0	5	0	0	2	1	6	3	0	0	0	29
Legionella pneumophila	4	1	0	2	1	0	4	4	9	1	12	3	0	17	2	0	1	0	61
Legionnaires' disease – other	0	0	0	5	0	0	1	1	0	2	0	0	0	0	0	0	0	0	9
Leptospirosis	0	0	0	5	1	1	4	0	0	5	2	0	1	0	2	0	0	0	21
Listeriosis	2	1	0	1	5	0	1	2	7	0	11	7	0	2	0	0	0	0	39
Lymphogranuloma venereum	13	0	0	0	0	0	0	0	0	0	12	3	0	1	0	0	0	0	29
Malaria	8	2	0	8	4	2	5	3	2	2	5	4	2	20	2	0	0	1	70
Measles	2	0	0	0	5	3	0	2	2	0	1	126	0	30	0	1	0	0	172
Meningococcal disease	2	4	0	9	7	4	3	4	3	2	6	7	3	8	3	0	1	0	66
Meningococcal – serogroup B	1	2	0	7	5	3	2	3	3	1	3	5	2	3	2	0	1	0	43
Meningococcal – serogroup C	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2
Meningococcal – serogroup W135	0	1	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	4
Meningococcal – serogroup Y	1	0	0	0	0	0	0	1	0	0	1	0	1	0	1	0	0	0	5
Meningococcal – other	0	1	0	1	2	1	0	0	0	1	1	1	0	4	0	0	0	0	12
Mumps	16	3	1	2	4	0	1	5	21	3	23	13	0	10	3	0	0	0	105
Pertussis	253	235	10	596	440	158	375	396	601	329	507	455	249	770	450	0	0	0	5824
Pneumococcal disease (invasive)	34	28	4	63	45	10	26	41	59	22	64	62	19	57	30	0	0	2	566
Psittacosis	0	2	0	1	0	0	0	2	1	0	1	3	0	1	4	0	0	0	15
Q fever	0	0	0	36	11	8	6	0	2	26	0	4	9	0	14	0	0	0	116
Rotavirus	125	51	1	300	91	11	55	113	213	72	169	180	11	240	119	0	1	2	1754
Rubella	2	0	0	0	0	0	1	0	1	0	1	2	0	3	0	0	0	0	10
Salmonella infection	250	134	13	331	141	140	136	115	387	176	359	312	59	290	94	6	7	5	2955
Shigellosis	19	5	1	4	3	4	1	5	22	4	30	15	1	6	2	0	0	1	123
Syphilis	179	30	3	36	31	1	9	27	55	16	246	79	7	95	25	0	0	2	841
Infectious syphilis[c]	127	9	2	18	11	1	3	13	34	8	213	23	1	26	7	0	0	2	498
Syphilis – other	52	21	1	18	20	0	6	14	21	8	33	56	6	69	18	0	0	0	343
Tetanus	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Tuberculosis[d]	68	2	0	16	15	5	5	14	53	5	64	75	2	139	3	2	1	2	471
Typhoid	3	0	0	1	0	1	2	1	7	1	8	9	1	9	0	0	0	0	43
Verotoxin-producing *Escherichia coli* infections	0	1	0	8	0	0	0	0	0	1	0	1	1	0	1	0	0	0	13

Onset of illness: the earlier of patient-reported onset date, specimen date or date of notification.
[a]From May 2012, blood lead was notifiable by a blood lead level of or above 10 μg/dL (previously defined by a blood lead level of or above 15 μg/dL).
[b]Foodborne illness cases are only those notified as part of an outbreak.
[c]Includes primary, secondary, less than 1-year duration and newly-acquired syphilis.
[d]Tuberculosis data based on year of diagnosis.
[e]Includes disease notifications with unknown Local Health District.
NOS: not otherwise specified.
No cases of the following conditions have been notified since 1991: plague, diphtheria, granuloma inguinale, lyssavirus, poliomyelitis, rabies, smallpox, typhus, viral haemorrhagic fever, yellow fever.
Source: Notifiable Conditions Information Management System, NSW Health.

Table 5. Incidence rate of disease notifications by Local Health District of residence (per 100 000 population), NSW, 2012 (based on onset of illness)

Condition	Sydney	Central Coast	Far West	Hunter New England	Illawarra Shoalhaven	Mid North Coast	Murrum-bidgee	Nepean Blue Mountains	North Sydney	Northern NSW	South Eastern Sydney	South Western Sydney	Southern NSW	Western Sydney	Western NSW
Adverse event after immunisation	0.8	4.7	3.2	5.9	3.1	0.9	9.3	2.9	2.9	2.7	1.4	1.9	8	3.9	5.2
Arboviral	6.7	15.2	71.3	28.1	11.6	44.3	46	10.5	9	91.9	4.2	4.8	11.5	2.9	34.8
Barmah Forest virus infections	0.2	2.8	9.7	7.8	4.9	25	4.5	1.1	0.4	50.2	0.1	0.3	2.5	0.2	5.2
Ross River virus infections	1.2	8.1	61.6	17.6	2.6	16	40.8	5.7	1.3	33.9	0.1	0.8	6	0.7	28.1
Other	5.3	4.3	0	2.7	4.1	3.3	0.7	3.7	7.3	7.8	4	3.7	3	2	1.5
Blood lead level ≥ 10 ug/dl[a]	2	2.2	541	5.3	2.3	0	24.2	8	1.1	3.4	2.8	5.2	2.5	3.7	39.9
Brucellosis	0	0	0	0.2	0	0	0	0	0	0.3	0	0.1	0	0	0
Chlamydia trachomatis infections	366.1	322.5	294.8	347.8	281.5	242.9	254.3	253.7	204.4	320	425.7	224.3	195.8	226.7	307.2
Chlamydia (congenital)	0.3	0	0	0.8	0	1.4	0.3	0.6	0.2	0	0	0.8	1.5	1	1.8
Chlamydia (STI)	365.8	322.5	294.8	347	281.5	241.5	254	253.1	204.2	320	425.7	223.5	194.3	225.7	305.4
Cholera	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0
Creutzfeldt-Jakob disease	0	0	0	0.3	0.3	0	0	0	0	0	0	0.1	0	0	0.7
Cryptosporidiosis	11	9.9	0	9.4	5.9	5.2	4.8	6.8	15.1	9.5	16.4	3.5	4.5	8	10.3
Giardiasis	30.1	21.7	19.4	27.5	27.5	14.1	18	29.9	42.9	5.8	43.6	14	21.9	21.2	41
Gonorrhoea	151.3	19.2	106.9	29.4	25.9	10.8	13.5	34.5	35.1	25.1	155.2	42.3	9.9	47.8	17.4
Haemolytic uraemic syndrome	0.2	0	0	0	0	0.5	0	0.3	0.4	0	0	0.2	0	0.1	0.4
H. influenzae type b	0	0	0	0	0	0	0	0	0	0	0.1	0	0.5	0	0
Hepatitis A	1	0	0	0	0	0.5	0	0	0.6	0.3	0.8	0.9	0.5	1.2	0.7
Hepatitis B	65.8	9	16.2	7.6	11.6	12.7	13.1	9.2	34.6	4.5	37.6	51.4	6.5	61.5	14.7
Hepatitis B – newly acquired	0	0.3	0	1.1	0	0	0	0.6	0	1.4	0.6	0.4	0	0	0.7
Hepatitis B – other	65.8	8.7	16.2	6.5	11.6	12.7	13.1	8.6	34.6	3.1	37	51	6.5	61.5	14
Hepatitis C	50.8	51.8	126.3	39.3	45	47.5	47.3	36.8	18.3	60.3	30.5	47.5	48.2	35.6	66.9
Hepatitis C – newly acquired	0.7	0.3	0	1.9	0	0.9	0	0.6	0	1	1.2	0	0	0	1.5
Hepatitis C – other	50.1	51.5	126.3	37.4	45	46.6	47.3	36.2	18.3	59.3	29.3	47.5	48.2	35.6	65.4
Hepatitis D	0.2	0	0	0	0	0	0	0	0	0	0	0.1	0	0.3	0
Hepatitis E	0.5	0.3	0	0	0	0	0	0	0	0	0.2	0.1	0	0.3	0
HIV infection – newly diagnosed	19	3.1	6.5	1.6	2.3	1.4	1.7	1.4	2.7	1.7	17.4	3.4	4	3	0.4
Influenza	83.4	41.3	94	128.4	66.8	56	96	106.3	120.5	155.9	135.1	96.6	129.2	141.7	66.9
Influenza – Type A	64.4	32.9	77.8	102.3	57.8	42.8	79.1	82.9	88.5	121	97.4	77.8	114.8	114.2	49.5
Influenza – Type B	19	8.4	13	25.9	8.7	13.2	16.6	23.1	32	33.9	34.9	18.7	13.9	27.3	17.4
Influenza – Type A&B	0	0	0	0.1	0.3	0	0.3	0.3	0	0.7	2.8	0.1	0.5	0.2	0
Influenza – Type NOS	0	0	3.2	0.1	0	0	0	0	0	0.3	0	0	0	0	0
Legionellosis (Legionnaires' disease)	0.7	0.6	3.2	0.9	1.3	0.5	3.1	1.4	1.7	1	1.4	0.5	0.5	2.7	1.8
Legionella longbeachae	0	0.3	3.2	0.1	1	0.5	1.4	0	0.6	0	0	0.2	0.5	0.7	1.1
Legionella pneumophila	0.7	0.3	0	0.2	0.3	0	1.4	1.1	1.1	0.3	1.4	0.3	0	2	0.7
Legionnaires' disease – other	0	0	0	0.6	0	0	0.3	0.3	0	0.7	0	0	0	0	0
Leptospirosis	0	0	0	0.6	0.3	0.5	1.4	0	0	1.7	0.2	0	0.5	0	0.7
Listeriosis	0.3	0.3	0	0.1	1.3	0	0.3	0.6	0.8	0	1.3	0.8	0	0.2	0
Lymphogranuloma venereum	2.2	0	0	0	0	0	0	0	0	0	1.4	0.3	0	0.1	0
Malaria	1.4	0.6	0	0.9	1	0.9	1.7	0.9	0.2	0.7	0.6	0.4	1	2.3	0.7
Measles	0.3	0	0	0	1.3	1.4	0	0.6	0.2	0	0.1	14.1	0	3.5	0
Meningococcal disease	0.4	1.2	0	1	1.8	1.9	1	1.2	0.4	0.6	0.7	0.8	1.5	0.9	1.1
Meningococcal – serogroup B	0.2	0.6	0	0.8	1.3	1.4	0.7	0.9	0.4	0.3	0.4	0.6	1	0.3	0.7
Meningococcal – serogroup C	0	0	0	0	0	0	0.3	0	0	0	0.1	0	0	0	0
Meningococcal – serogroup W135	0	0.3	0	0.1	0	0	0	0	0	0	0	0.1	0	0.1	0
Meningococcal – serogroup Y	0.2	0	0	0	0	0	0	0.3	0	0	0.1	0	0.5	0	0.4
Meningococcal – other	0	0.3	0	0.1	0.5	0.5	0	0	0	0.3	0.1	0.1	0	0.5	0
Mumps	2.7	0.9	3.2	0.2	1	0	0.3	1.4	2.5	1	2.7	1.5	0	1.2	1.1
Pertussis	43	73	32.4	67.5	113	74.4	129.6	112.9	70.4	111.5	59.7	51.1	123.8	89.4	166.2
Pneumococcal disease (invasive)	5.8	8.7	13	7.1	11.6	4.7	9	11.7	6.9	7.5	7.5	7	9.4	6.6	11.1
Psittacosis	0	0.6	0	0.1	0	0	0	0.6	0.1	0	0.1	0.3	0	0.1	1.5
Q fever	0	0	0	4.1	2.8	3.8	2.1	0	0.2	8.8	0	0.4	4.5	0	5.2
Rotavirus	21.2	15.8	3.2	34	23.4	5.2	19	32.2	24.9	24.4	19.9	20.2	5.5	27.9	43.9
Rubella	0.3	0	0	0	0	0.3	0	0	0.1	0	0.1	0.2	0	0.3	0
Salmonella infection	42.5	41.6	42.1	37.5	36.2	65.9	47	32.8	45.3	59.7	42.3	35	29.3	33.7	34.7
Shigellosis	3.2	1.6	3.2	0.5	0.8	1.9	0.3	1.4	2.6	1.4	3.5	1.7	0.5	0.7	0.7
Syphilis	30.4	9.3	9.7	4	7.9	0.5	3.1	7.7	6.5	5.4	29	8.9	3.5	11	9.2
Infectious syphilis[c]	21.6	2.8	6.5	2	2.8	0.5	1	3.7	4	2.7	25.1	2.6	0.5	3	2.6
Syphilis – other	8.8	6.5	3.2	2	5.1	0	2.1	4	2.5	2.7	3.9	6.3	3	8	6.6
Tetanus	0	0	3.2	0	0	0	0	0	0	0	0	0	0	0	0
Tuberculosis[d]	11.6	0.6	0.0	1.8	3.9	2.4	1.7	4.0	6.2	1.7	7.5	8.4	1.0	16.1	1.1
Typhoid	0.5	0	0	0.1	0	0.5	0.7	0.3	0.8	0.3	0.9	1	0.5	1	0
Verotoxin-producing *Escherichia coli* infections	0	0.3	0	0.9	0	0	0	0	0	0.3	0	0.1	0.5	0	0.4

Onset of illness: the earlier of patient-reported onset date, specimen date or date of notification.
[a]From May 2012, blood lead was notifiable by a blood lead level of or above 10 μg/dL (previously defined by a blood lead level of or above 15 μg/dL).
[b]Foodborne illness cases are only those notified as part of an outbreak.
[c]Includes primary, secondary, less than 1-year duration and newly-acquired syphilis.
[d]Tuberculosis data based on year of diagnosis.
NOS: not otherwise specified.
No cases of the following conditions have been notified since 1991: plague, diphtheria, granuloma inguinale, lyssavirus, poliomyelitis, rabies, smallpox, typhus, viral haemorrhagic fever, yellow fever.
Source: Notifiable Conditions Information Management System, NSW Health.

Table 6. Disease notifications by age group and sex of the case, NSW, 2012 (based on onset of illness)

Condition	0–4 yrs		5–24 yrs		25–44 yrs		45–64 yrs		65+ yrs		Total		Total
	F	M	F	M	F	M	F	M	F	M	F	M	
Adverse event after immunisation	46	55	55	33	11	4	22	8	14	3	148	103	251
Arboviral infection	2	6	94	79	227	237	213	219	73	84	611	626	1238
Barmah Forest virus infection	0	3	19	18	64	47	68	78	17	33	168	179	347
Ross River virus infection	2	2	32	37	111	121	106	95	52	42	305	298	603
Other	0	1	43	24	52	69	39	46	4	9	138	149	288
Blood lead level ≥ 10ug/dl[a]	50	50	4	85	8	227	13	114	3	20	78	496	575
Brucellosis	0	0	0	1	0	1	0	1	1	0	1	3	4
Chlamydia trachomatis infections	35	21	8171	4301	3341	4357	219	774	4	66	12 000	9525	21 557
Chlamydia (congenital)	26	14	1	0	0	0	0	0	0	0	27	14	41
Chlamydia (STI)	9	7	8170	4301	3341	4357	219	774	4	66	12 000	9511	21 543
Cholera	0	2	0	0	0	0	0	0	0	0	0	2	2
Creutzfeldt-Jakob disease	0	0	0	0	0	0	2	0	3	2	5	2	7
Cryptosporidiosis	131	162	114	73	99	64	20	7	6	9	370	315	685
Giardiasis	217	301	167	188	387	327	133	127	93	63	998	1006	2008
Gonorrhoea	1	0	340	764	355	2023	76	529	7	29	780	3345	4127
Haemolytic uraemic syndrome	0	3	0	2	3	1	1	0	0	0	4	6	10
H. influenzae type b	0	0	0	1	0	0	0	0	0	1	0	2	2
Hepatitis A	1	2	11	7	6	6	3	3	1	2	22	20	42
Hepatitis B	2	0	140	155	575	660	258	348	57	103	1033	1266	2328
Hepatitis B – newly acquired	0	0	1	3	2	12	1	6	0	3	4	24	28
Hepatitis B – other	2	0	139	152	573	648	257	342	57	100	1029	1242	2300
Hepatitis C	5	3	117	221	587	1070	385	739	89	66	1184	2100	3292
Hepatitis C – newly acquired	0	0	4	5	11	16	1	10	0	0	16	31	47
Hepatitis C – other	5	3	113	216	576	1054	384	729	89	66	1168	2069	3245
Hepatitis D	0	0	0	1	0	1	1	2	0	0	1	4	5
Hepatitis E	0	0	0	0	3	4	1	2	0	0	4	6	10
HIV infection – newly diagnosed	0	0	9	43	18	237	9	85	0	7	36	372	409
Influenza	748	830	954	917	1095	649	659	602	844	675	4304	3678	7999
Influenza – Type A	611	683	602	545	875	525	554	501	744	591	3389	2849	6250
Influenza – Type B	137	146	351	371	217	119	102	97	93	72	901	806	1712
Influenza – Type A&B	0	1	1	1	1	4	3	4	7	12	12	22	34
Influenza – Type NOS	0	0	0	0	2	1	0	0	0	0	2	1	3
Legionellosis (Legionnaires' disease)	0	0	1	0	3	4	15	24	22	30	41	58	99
Legionella longbeachae	0	0	1	0	1	2	8	4	5	8	15	14	29
Legionella pneumophila	0	0	0	0	2	2	5	19	14	19	21	40	61
Legionnaires' disease – other	0	0	0	0	0	0	2	1	3	3	5	4	9
Leptospirosis	0	0	1	1	2	7	2	6	1	1	6	15	21
Listeriosis	3	1	0	0	3	0	2	3	17	10	25	14	39
Lymphogranuloma venereum	0	0	0	3	0	16	0	9	0	1	0	29	29
Malaria	1	0	6	13	6	20	6	14	1	3	20	50	70
Measles	27	31	31	39	21	20	3	0	0	0	82	90	172
Meningococcal disease	11	12	8	13	0	4	6	6	3	3	28	38	66
Meningococcal – serogroup B	8	11	4	7	0	2	3	5	1	2	16	27	43
Meningococcal – serogroup C	0	0	0	1	0	1	0	0	0	0	0	2	2
Meningococcal – serogroup W135	0	1	0	0	0	0	1	1	0	1	1	3	4
Meningococcal – serogroup Y	0	0	1	0	0	1	1	0	2	0	4	1	5
Meningococcal – other	3	0	3	5	0	0	1	0	0	0	7	5	12
Mumps	3	2	10	10	22	41	8	5	3	1	46	59	105
Pertussis	581	600	1430	1298	575	296	404	284	208	145	3199	2623	5824
Pneumococcal disease (invasive)	36	30	20	20	52	44	51	80	110	122	269	297	566
Psittacosis	0	0	0	0	2	0	4	6	0	3	6	9	15
Q fever	0	1	1	12	4	23	15	44	1	15	21	95	116
Rotavirus	358	402	225	267	86	72	63	56	144	78	876	876	1754
Rubella	1	2	1	0	3	2	0	1	0	0	5	5	10
Salmonella infection	331	357	375	429	362	332	221	207	184	150	1473	1476	2955
Shigellosis	3	5	16	14	19	24	15	16	4	6	58	65	123
Syphilis	0	0	6	58	52	351	31	229	32	80	121	719	841
Infectious syphilis[c]	0	0	2	42	13	246	3	173	1	17	19	478	498
Syphilis – other	0	0	4	16	39	105	28	56	31	63	102	241	343
Tetanus	0	0	0	0	0	0	0	0	1	0	1	0	1
Tuberculosis[d]	6	5	33	29	122	104	41	52	16	62	218	252	471
Typhoid	1	1	7	10	8	13	1	2	0	0	17	26	43
Verotoxin-producing *Escherichia coli* infections	0	0	2	2	2	0	2	3	0	2	6	7	13

Onset of illness: the earlier of patient-reported onset date, specimen date or date of notification.

[a]From May 2012, blood lead was notifiable by a blood lead level of or above 10 μg/dL (previously defined by a blood lead level of or above 15 μg/dL).

[b]Foodborne illness cases are only those notified as part of an outbreak.

[c]Includes primary, secondary, less than 1-year duration and newly-acquired syphilis.

[d]Tuberculosis data based on year of diagnosis.

NOS: not otherwise specified.

No cases of the following conditions have been notified since 1991: plague, diphtheria, granuloma inguinale, lyssavirus, poliomyelitis, rabies, smallpox, typhus, viral haemorrhagic fever, yellow fever.

Source: Notifiable Conditions Information Management System, NSW Health.

Vectorborne diseases

In 2012 there were:

- 603 **Ross River virus infection** notifications, an increase from 579 in 2011
- 347 **Barmah Forest virus infection** notifications, a 24% decrease compared with the 458 notifications in 2011
- 208 **dengue fever** case notifications, a 50% increase compared with the 139 notifications in 2011. The majority of the cases in 2012 were linked to international travel; Indonesia was the most commonly reported exposure site (40%), followed by Thailand (21%), India (7%) and the Philippines (5%). While there currently is no local transmission of dengue fever in NSW, it is the most common mosquitoborne viral disease of humans worldwide and represents a major international public health concern
- 70 **malaria** case notifications, compared with 77 in 2011. All were acquired overseas. Travel to India was the most commonly reported exposure site (19%), followed by Sudan and Pakistan (both 10%)
- no confirmed cases of **flavivirus infections**, **Kunjin virus infections** or **Murray Valley encephalitis virus infections** notified
- two confirmed cases of **Chikungunya**, both acquired outside Australia (India and Kenya); this is a decrease from the 10 cases notified in 2011.

Table 7. Proportion of Aboriginal and non-Aboriginal children fully immunised in NSW, for three age groups, December 2011 and December 2012

Age group (years)	Non-Aboriginal children		Aboriginal children	
	2011 (%)	2012 (%)	2011 (%)	2012 (%)
1	91.8	91.4	87.2	85.6
2	92.6	92.3	92.9	92.7
5	89.8	91.6	84.9	92.7

Source: Australian Childhood Immunisation Register.

Zoonotic diseases

In 2012 there was:

- a slight decrease in **Q fever** case notifications (116 compared with 137 in 2011). Q fever was the most commonly notified zoonotic disease in 2012
- a slight decrease in **brucellosis** infections (four compared with six in 2011). Two cases were overseas-acquired and two infections were in hunters of feral pigs in Northern NSW.

Prevention activities

Immunisation

In 2012 NSW Health:

- **maintained high immunisation coverage rates for children at 1, 2 and 5 years of age** (Table 7). While coverage rates for Aboriginal and non-Aboriginal children are comparable at 2 and 5 years of age, coverage for Aboriginal children is less at 1 year of age and Aboriginal children are more likely to be vaccinated late at any age
- funded a pilot program to employ Aboriginal Health Workers to work collaboratively with existing services to promote **timely vaccination of Aboriginal children** through targeted interventions
- developed an **immunisation awareness campaign** to inform the community and providers about the importance of ensuring that children are fully vaccinated on time
- successfully implemented the **transition from Prevenar 7 to Prevenar 13** vaccine for children at 2, 4 and 6 months of age, and a supplementary program for children who had commenced Prevenar 7 vaccination to provide greater protection against pneumococcal disease
- introduced a more focused **pertussis control strategy** by offering new mothers free pertussis vaccine in the maternity unit after the birth of their child or via their general practitioner (GP) within 2 weeks post-birth
- increased immunisation coverage rates for adolescents in the **NSW School-Based Vaccination Program** for vaccines offered to students in Years 7 and 10 (Table 8)

Table 8. Proportion of eligible students in Years 7 and 10 who received human papillomavirus (HPV), hepatitis B (HepB), diphtheria-tetanus-pertussis (dTpa) and varicella (Vz) vaccine at school, NSW, 2011 and 2012

Vaccine	Year 7						Year 10	
	Dose 1		Dose 2		Dose 3		Dose 1	
	2011 (%)	2012 (%)	2011 (%)	2012 (%)	2011 (%)	2012 (%)	2011 (%)	2012 (%)
HPV	81	86	76	83	71	73	–	–
HepB	68	69	63	63	–	–	–	–
dTpa	77	81	–	–	–	–	66	67
Vz	45	50	–	–	–	–	–	–

Source: NSW School Immunisation Program.

- facilitated the provision of free **seasonal influenza vaccine** to people at high risk of severe influenza complications. The NSW Health Population Health Survey estimated that 31% of all respondents (95% CI: 28–33%) interviewed during August and September 2012 had received a seasonal influenza vaccine in the previous 12 months; vaccine uptake was similar to the estimate for the same period in the previous year (33% [95% CI: 31–35%]). For respondents aged 65 years and over (one of the identified high-risk groups), the estimated vaccination rate was 72% (95% CI: 69–76%), which is similar to previous years.

Disease control

In 2012 Health Protection NSW:

- initiated a range of control measures to contain the **measles** outbreak, including sending letters to health care providers, issuing media alerts, developing measles alert posters and other materials for health care facilities and local GPs, and holding free local vaccination clinics in areas with high rates of measles infections
- continued an **influenza** prevention campaign that focused on three key respiratory disease prevention messages: *Cover your face when you cough or sneeze*; *Wash your hands*; and *Stay at home if you're sick so you don't infect others*. The campaign included distribution of *The Spread of Flu is Up to You* campaign posters; vaccination and pregnancy brochures; and infection control signage to health care facilities, aged-care facilities and a range of other sectors
- with local Public Health Units and an expert subcommittee of the NSW Tuberculosis Advisory Committee, continued to develop and implement strategies to eliminate transmission of **tuberculosis in Aboriginal communities** in NSW. This work involves better understanding barriers to early presentation to health services and non-compliance with treatment for latent tuberculosis infection, and investigation of strategies to raise awareness and increase early diagnosis of tuberculosis. The Northern NSW and Mid North Coast Local Health Districts have employed two Aboriginal Community Engagement Consultants to work directly with local Aboriginal communities on awareness-raising and prevention activities
- continued the **NSW Arbovirus Surveillance Program**, which included testing for both alphaviruses (Barmah Forest, Ross River and Sindbis virus) and flaviviruses (Alfuy, Edge Hill, Kokobera and Stratford) in mosquitoes trapped at 20 coastal, inland and metropolitan locations, and testing of chickens for antibody seroconversion to Murray Valley encephalitis virus and Kunjin virus at 10 sites in inland NSW from November 2011 to April 2012. During the 2011–2012 season inland areas had seen considerable arboviral activity with 67 isolates from mosquitoes and 15 seroconversions for Murray Valley encephalitis virus in chickens. Inland areas have also seen extremely high numbers of mosquitoes due to excessive precipitation and flooding. Coastal and Sydney metropolitan areas had low vector abundance and minimal arboviral activity
- issued statewide media releases in January, March and December, warning about the increased risk of **mosquitoborne infections** and how to prevent them. In addition, advice on mosquito control in flood-affected areas was provided to councils and the general public in March. These were supplemented by the information on the Ministry of Health website, development of guiding principles for environmental health officers, distribution of *Fight the Bite* posters and brochures, radio advertising and a range of local media messaging by public health officials.

Drinking water

In 2012 Health Protection NSW:

- together with local Public Health Units, helped more than 30 local water utilities develop **risk-based drinking water management systems**, consisting of documents, procedures and other supporting information for the safe supply of drinking water. These systems allow water utilities to document current practices that fulfil *Australian Drinking Water Guidelines*[4] requirements, identify any gaps, conduct risk assessment workshops, identify critical control points (e.g. filtration and disinfection), and develop operational procedures for critical control points
- developed **guidelines** jointly with the NSW Office of Water (*NSW Guidelines for Drinking Water Management Systems*)[5] and the NSW Food Authority (*NSW Guidelines for Water Carters*)[6] **to assist water suppliers** to comply with the requirements of the NSW *Public Health Act 2010* for all suppliers of drinking water to develop, by 1 September 2014, a management system based on the Framework for Management of Drinking Water Quality (*Australian Drinking Water Guidelines 2011*)[7]
- rebuilt the **NSW Drinking Water Database**, which holds the results of drinking water monitoring across regional NSW, to improve data management and reporting
- reviewed multiple applications for water recycling
- continued to **regulate major water utilities** (Hunter Water Corporation, Sydney Water Corporation and Sydney Catchment Authority), **monitor compliance of utilities** with the NSW *Fluoridation of Public Water Supplies Act 1957*, and oversee more than 100 regional water utilities.

Aboriginal health

NSW Housing for Health

In 2012:

- Housing for Health[8,9] projects were underway in Broken Hill, Tibooburra, Purfleet/Taree, Box Ridge/Coraki, Walhallow, Cabbage Tree Island and

Toomelah/Boggabilla. NSW Health, in partnership with other state and Commonwealth agencies, has been delivering Housing for Health projects in the **Aboriginal community housing** sector across NSW since 1998. Housing for Health aims to test and repair or replace health hardware (mainly plumbing or electrical items) so that houses are safe and occupants have the ability to carry out evidence-based healthy living practices (such as washing people and clothes). The Program has surveyed and serviced over 2826 houses in 86 Aboriginal communities over the period 1998–2012. Over 81 000 items relating specifically to improved health and safety have been fixed, benefiting approximately 12 100 people
- integrated projects (i.e. Housing for Health projects run together with the Aboriginal Housing Office housing upgrade projects) were underway in Toomelah/Boggabilla, and preparations began for a project in Murrin Bridge.

Aboriginal Communities Water and Sewerage Program

In 2012:
- seven new Aboriginal communities began receiving **improved water and sewerage services** (bringing the total to 41 communities, and over 4000 people receiving improved water and sewerage services under the Program). Regional Public Health Units worked with communities, the NSW Office of Water, local water utilities and service providers to implement Risk-Based Water and Sewerage Management Plans. The Aboriginal Communities Water and Sewerage Program[10] is a joint partnership between the NSW Government and the NSW Aboriginal Land Council. It aims to ensure adequate operation, maintenance and monitoring of water supplies and sewerage systems in over 60 Aboriginal communities in NSW. NSW Health is involved in the development and roll-out of the Program across the state.

The Aboriginal Environmental Health Officer Training Program

In 2012 there were:
- 11 **Aboriginal environmental health officer trainees** participating in the Program
- 12 graduate Aboriginal environmental health officers from the Program
- nine Training Program partnerships under 50/50 funding agreements:
  - four partnerships with Public Health Units
  - four three-way partnerships with Public Health Units and Local Government
  - one partnership with Local Government.

Heat

In November 2012, when a period of unseasonably hot weather coincided with a number of major events in Sydney, the NSW Heatwave Sub Plan was activated for the first time. NSW Health worked closely with the NSW Police Force and other agencies to ensure the public were provided with clear and consistent advice on how to minimise the risk of heat-related illness.

Implementation of Public Health Regulation 2012

In 2012 Health Protection NSW:
- developed supporting resources including forms, information sheets, fact sheets and audit tools to assist in the implementation of the ***Public Health Act 2010*** and the ***Public Health Regulation 2012***, both of which commenced on 1 September 2012
- held **forums at 11 localities** across the state to brief Local Government environmental health officers on the regulatory changes, and their implementation and enforcement methodology. Specific case studies were developed through a steering committee for presentation and study at the forums. Local Government feedback was positive, providing advice for improvements.

Asbestos

In 2012 Health Protection NSW:
- participated in the **Heads of Asbestos Coordination Authority**, a state-based interagency group that has been developing programs including a statewide plan for asbestos, a model asbestos policy for local councils, and a comprehensive public awareness campaign. Through this membership it also provides input into the newly formed Commonwealth Asbestos Safety and Eradication Agency.

Air quality

In 2012 Health Protection NSW:
- supported **two environmental studies in the Hunter Valley** to help define the types of exposure of the community to particulate air pollution and determine the distribution and relative contribution of various sources to this pollution. This information will inform programs to reduce community exposure
- supported the Chief Health Officer's **Air Pollution Expert Advisory Committee**, which provides independent advice on the scientific basis for management of the health effects of air pollution.

Conclusion

Communicable diseases and the environment pose many potential threats to human health. These potential threats are dealt with through a combination of four goals:
- **preventing production of the threat** (through, for example, immunisation, regulation of drinking water and working with planning agencies to ensure planning approvals address potential health threats)
- **early identification of the threat** (through surveillance systems such as the disease and exposure notification, and arbovirus surveillance systems)

- **reducing the level of the threat** (through strategies such as outbreak control, immunisation, and identification and treatment of the causes of diseases)
- **effective communication** (with the community, with appropriate health professionals, with other government agencies such as the NSW Environment Protection Authority and NSW Department of Planning, and with other jurisdictions, to respond to threats and reduce exposures).

Effective health protection for the NSW population is dependent on our success in achieving these four goals. That success is dependent on the skills, experience and advocacy of health protection workers across the state in identifying, responding to and communicating health threats to the NSW population.

Increasing international travel also increases the risk of importing enteric diseases such as hepatitis A, typhoid and paratyphoid, and other vaccine-preventable diseases such as measles and diphtheria. This underlines the need to maintain high vaccination coverage rates for all NSW children, and for all people planning travel, to ensure they have received all their routine vaccines, as well as specific travel vaccines such as hepatitis A and typhoid for some destinations.

Steady migration to Australia of people from countries with a high burden of tuberculosis necessitates maintenance of specialised tuberculosis services accessible across NSW for early detection, expert treatment and screening activities.

Acknowledgments

Protecting the health of the community is a collaborative effort, involving Public Health Units, clinicians, laboratory scientists, affected communities, and other government and community-based organisations. We thank all those involved for the role they played in NSW in 2012.

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Meningococcal disease in NSW, 1991–2011: trends in relation to meningococcal C vaccination

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Abstract: Aim: To review the epidemiology of invasive meningococcal disease in NSW for the period 1991–2011, in particular since the introduction of the meningococcal C vaccination program in 2003. **Methods:** We undertook a descriptive analysis of NSW notifications of invasive meningococcal disease for the period 2003–2011, and explored long-term changes in the epidemiology of invasive meningococcal disease over the period 1991–2011. **Results:** In the period 2003–2011, there were 1009 notifications of invasive meningococcal disease in NSW, an average annual rate of 1.6 per 100 000 population. Notification rates were highest in the 0–4 and 15–19-year age groups (8.5 and 3.6 per 100 000 population respectively). In the period 1991–2011, invasive meningococcal disease notifications increased between 1991 and 2000, peaking at 3.8 notifications per 100 000 population in 2000. Notifications have decreased since that time to 1.0 per 100 000 population in 2011, most markedly for serogroup C disease since the introduction of the meningococcal C vaccination program in 2003. Meningococcal C notifications reduced from 54 in 2002 (0.8 per 100 000 population) to two in 2011 (0.03 per 100 000 population). Meningococcal C deaths have also decreased, from nine in 2002 to zero in 2011. The greatest reduction in meningococcal C notifications has been in those aged 1–19 years, the target group for the vaccination program. Meningococcal B notifications have also decreased over the study period, however serogroup B remains the predominant serogroup for invasive meningococcal disease in NSW. **Conclusion:** Notification rates of invasive meningococcal disease have decreased in NSW since 2000. Rates of serogroup C disease have decreased since the introduction of the meningococcal C vaccination program in 2003. Most of the burden of invasive meningococcal disease in NSW is now due to serogroup B disease.

Invasive meningococcal disease (IMD) is caused by the bacteria *Neisseria meningitidis*. There are several serogroups of *N. meningitidis*. Serogroup B disease is the most common in Australia; other less common serogroups are A, C, W135 and Y. Disease due to serogroups A, C, W135 and Y is vaccine-preventable. There is no licensed vaccine for serogroup B disease.

The meningococcal C conjugate vaccine protects against serogroup C disease. In 2003, the Australian Government commenced a national meningococcal C vaccination program with the aim of vaccinating all people aged 1–19 years. Since 2003, the meningococcal C conjugate vaccine has been included in free routine vaccination for all children at 12 months of age. Until June 2006, this was supplemented by a vaccination 'catch-up' program through general practice and school-based vaccination programs for those born between 1984 and 2001.[1]

Uptake of the meningococcal C conjugate vaccine through routine infant vaccination is high. Coverage for 24-month olds has remained at over 90% since first calculated for NSW in 2006.[2] Data on the uptake of the general practitioner-based catch-up program is not available. A NSW Health evaluation of the school-based catch-up program in 2003–2004 indicated that 76% of high school students and 76% of primary school students were vaccinated (unpublished data).

In addition to the serogroup C conjugate vaccine, quadrivalent meningococcal conjugate and polysaccharide vaccines against serogroups A, C, W135 and Y are available

but are not recommended for routine use. A single dose of a quadrivalent meningococcal conjugate vaccine is recommended for people in certain situations, such as travellers who intend visiting areas where epidemics of serogroup A, W135 or Y disease are frequent (e.g. sub-Saharan Africa), for pilgrims to the Hajj in Saudi Arabia, and for laboratory workers who frequently handle *N. meningitidis*. The vaccines are also recommended for close contacts of cases with disease caused by serogroup A, W135 or Y and for people with high-risk medical conditions.[3] Quadrivalent meningococcal conjugate vaccines are preferred to polysaccharide meningococcal vaccines due to their greater duration of induced immunity.[4]

The epidemiology of IMD notifications in NSW for the period 1991–2002 has been reported previously.[5,6] To explore changes in IMD epidemiology, particularly in relation to the introduction of the serogroup C vaccination program in 2003, this report presents an overview of the epidemiology of IMD in NSW for the period 1991–2011, and presents new data for the period 2003–2011.

Methods

In NSW, a case of IMD is defined according to national guidelines (Box 1). Hospitals and laboratories are required to notify cases of IMD to Public Health Units under the NSW *Public Health Act 2010* (and previously under the NSW *Public Health Act 1991*). Public Health Units investigate all notified cases of IMD to collect risk information and implement control measures to prevent secondary cases of disease. Confirmed and probable cases of IMD are entered into the NSW Notifiable Conditions Information Management System (NCIMS), a statewide database of notifiable conditions that is maintained by NSW Health. Notifications of confirmed and probable cases of IMD with onset between 1 January 1991 and 31 December 2011 are presented in this report. Annual notification rates were calculated using Australian Bureau of Statistics mid-year estimated resident populations, obtained through the NSW Health Outcomes Information and Statistical Toolkit (HOIST). Cases were analysed by year of onset, gender, age group, disease syndrome (meningitis and/or septicaemia, based on presence of *N. meningitidis* in diagnostic specimens), serogroup and disease outcome.

Analyses were performed using SAS (version 9.2, SAS Institute, Cary, NC, USA) and Microsoft Excel 2007.

Results

Trends in IMD notifications, 1991–2011

There was a sustained increase in annual notification rates in the period 1991–2000, followed by a sustained decrease in the period 2000–2011. The notification rate decreased by 74% from a peak of 3.8 per 100 000 population in 2000

Box 1. Surveillance case definition for invasive meningococcal disease, Australia

CONFIRMED CASE

A confirmed case requires either:

1. Laboratory definitive evidence

OR

2. Laboratory suggestive evidence AND clinical evidence

Laboratory definitive evidence

1. Isolation of *Neisseria meningitidis* from a normally sterile site

OR

2. Detection of specific meningococcal DNA sequences in a specimen from a normally sterile site by nucleic acid amplification testing

Laboratory suggestive evidence

1. Detection of Gram-negative diplococci in Gram stain of specimen from a normally sterile site or from a suspicious skin lesion

OR

2. High titre IgM or significant rise in IgM or IgG titres to outer membrane protein antigens of *Neisseria meningitidis*

Clinical evidence (for a confirmed case)

Disease which in the opinion of the treating clinician is compatible with invasive meningococcal disease.

PROBABLE CASE

A probable case requires clinical evidence only.

Clinical evidence (for a probable case)

A probable case requires:

1. The absence of evidence for other causes of clinical symptoms

AND EITHER

2. Clinically compatible disease including haemorrhagic rash

OR

3. Clinically compatible disease AND close contact with a confirmed case within the previous 60 days

The national case definition was revised and endorsed by Communicable Diseases Network Australia in October 2007.
Source: Communicable Diseases Network Australia. Meningococcal disease case definition, implemented July 2010. Available at: http://www.health.gov.au/internet/main/publishing.nsf/content/cda-surveil-nndss-casedefs-cd_mening.htm

Table 1. Notifications of invasive meningococcal disease by year, annual rate per 100 000 population, and case fatality rate, NSW, 1991–2011

Year	Notified cases	Annual rate	Notified deaths	Case fatality rate (%)
1991	128	2.2	3	2.3
1992	121	2.0	8	6.6
1993	153	2.5	11	7.2
1994	142	2.3	15	10.6
1995	113	1.8	7	6.2
1996	161	2.6	7	4.3
1997	218	3.5	7	3.2
1998	184	2.9	17	9.2
1999	217	3.4	14	6.5
2000	249	3.8	14	5.6
2001	232	3.5	7	3.0
2002	213	3.2	17	8.0
2003	198	3.0	13	6.6
2004	146	2.2	5	3.4
2005	137	2.0	9	6.6
2006	102	1.5	6	5.9
2007	109	1.6	5	4.6
2008	80	1.1	3	3.8
2009	92	1.3	4	4.3
2010	74	1.0	5	6.8
2011	71	1.0	4	5.6
Total	**3140**	**2.3**	**181**	**5.8**

Source: Notifiable Conditions Information Management System, NSW Health.

down to 1.0 per 100 000 population in 2011 (Table 1). The decrease in notifications occurred for both serogroup B and C disease (Figure 1). Serogroup B notifications peaked in 2002 at 1.6 per 100 000 population; serogroup C notifications peaked in 2000 at 1.0 per 100 000 population. Notifications of serogroups W135 and Y remained low and stable over this period, with an average of three serogroup W135 notifications and three serogroup Y notifications per year. The proportion of cases for which serogroup information is recorded has steadily increased over time, from 0% in 1991 to 74.6% in 2011, and the apparent increase in notifications of serogroup B and C disease from 1991 to 2000 partly reflects the increasing availability of serogroup information.

Notifications of IMD, 2003–2011

In the period 2003–2011, there were 1009 notifications of IMD in NSW, an average annual rate of 1.6 notifications per 100 000 population. A total of 879 (87.1%) were confirmed cases, while 130 (12.9%) were probable cases. This average notification rate is substantially lower than in the previous study period 1991–2002 (2.8 per 100 000 population). Characteristics of notified cases in the period 2003–2011 are shown in Table 2.

The highest rates of IMD occurred among children aged less than 5 years of age, who accounted for 33.5% of notifications (8.5 per 100 000 population). Within this group, children aged under 12 months were at highest risk (17.9 notifications per 100 000 population). A second smaller peak in the notification rate was seen in the

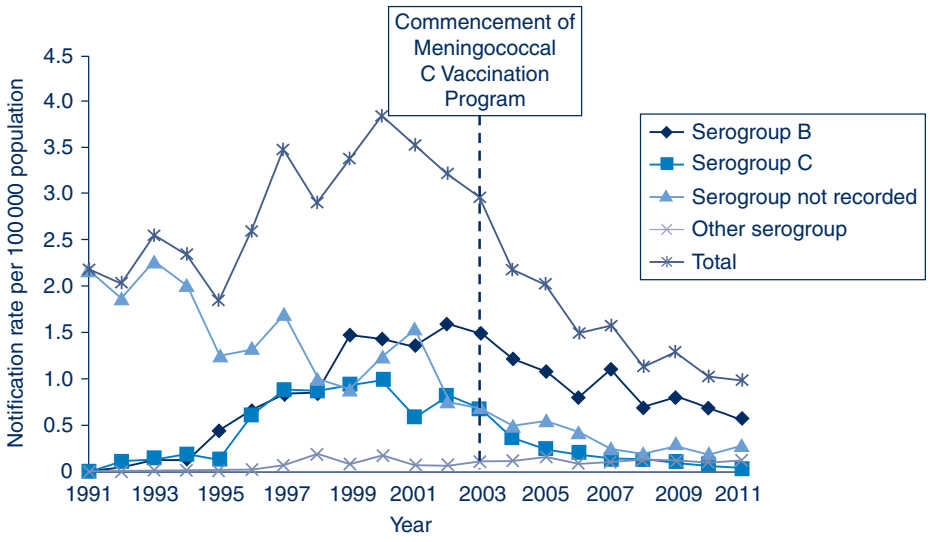

Figure 1. Notifications of invasive meningococcal disease by serogroup and year of onset, NSW, 1991–2011
Source: Notifiable Conditions Information Management System, NSW Health.

Table 2. Characteristics of cases of invasive meningococcal disease notified in NSW, 2003–2011

Case characteristics	Cases	% total	Average annual rate per 100 000	Notified deaths	Case fatality rate (%)
Gender					
Female	491	48.7	1.6	26	5.3
Male	518	51.3	1.7	28	5.4
Age group (years)					
<1	142	14.1	17.9	13	9.2
1	82	8.1	10.4	0	0.0
2–4	114	11.3	4.8	2	1.8
5–9	68	6.7	1.7	1	1.5
10–14	47	4.7	1.1	1	2.1
15–19	150	14.9	3.6	5	3.3
20–24	98	9.7	2.3	3	3.1
25–44	129	12.8	0.7	8	6.2
45–64	115	11.4	0.8	12	10.4
65–74	31	3.1	0.7	5	16.1
75–84	25	2.5	0.8	3	12.0
85+	8	0.8	0.8	1	12.5
Syndrome					
Meningitis	276	27.4	0.45	4	1.4
Septicaemia	464	46.0	0.75	40	8.6
Both meningitis and septicaemia	169	16.7	0.27	9	0.9
Other/Unknown	100	9.9	0.16	1	1.0
Serogroup					
B	580	57.5	0.9	28	4.8
C	130	12.9	0.2	13	10.0
W135	40	4.0	0.1	5	12.5
Y	31	3.1	0.0	2	6.5
Unknown, untypable	228	22.6	0.4	6	2.6
Total	1009		1.6	54	5.4

[a]Not stated, overseas, correctional facility.
Source: Notifiable Conditions Information Management System, NSW Health.

15–19 and 20–24-year age groups (3.6 and 2.3 notifications per 100 000 population, respectively). The age distribution of cases is similar to the previous study period.

Deaths

In the period 1991–2011, whether the person with IMD died was recorded for 55% of notifications; cases with missing information regarding death were assumed not to have died. There were 181 notified deaths due to IMD in the period, which represents 5.8% of cases. Since 1991, annual case fatality rates have fluctuated between 2.3% and 10.6% (Table 1). In the period 2003–2011, there were 54 notified deaths due to IMD, which represents 5.4% of notifications for this period (Table 2). The proportion of cases who died was significantly higher for serogroup C compared to serogroup B disease (RR 2.1, 95% CI 1.1–3.9), for cases presenting with septicaemia compared to meningitis (RR 5.9, 95% CI 2.2–16.4), and for cases aged 45 years and over compared to younger cases (RR 3.0, 95% CI 1.7–5.0). There was no significant association between death and gender. These patterns are similar to those observed in the previous study period.

Serogroup C disease

Notifications of serogroup C disease have decreased dramatically since the introduction of the meningococcal C vaccination program in 2003, from 54 in 2002 (0.8 per 100 000 population) to two in 2011 (0.03 per 100 000 population). Notifications of deaths due to serogroup C disease have also decreased, from nine in 2002 (the year before the vaccination program started) to zero in 2011. The proportion of serotyped cases of IMD that are serogroup C also decreased, from 33.1% in 2002 to 3.9% in 2011. In the same period, the proportion of serotyped cases that were serogroup B increased from 64.4% to 80.4%, and other serogroups from 2.5% to 15.7%.

The decline in serogroup C disease has occurred across all age groups. Immediately after the introduction of the

meningococcal C vaccination program, notifications of serogroup C disease for 1–19-year olds (the target age group of the vaccination program) dropped dramatically, from 30 cases in 2002 to four cases in 2004, with less than five notifications per year since that time. There has also been a gradual decline in notifications in age groups not targeted in the vaccination program, from one case in 2002 to no cases in 2011 in children less than 12 months of age, and from 23 cases in 2002 to two cases in 2011 in those aged 20 years and over. Similarly, the proportion of serotyped cases that are serogroup C has decreased over time across all age groups. This decrease is most marked for 1–19-year olds, but is apparent even in unvaccinated children less than 12 months of age (Figure 2). Across the entire study period, the proportion of serotyped notifications that are serogroup C was lower in children under 12 months of age than for the older age groups.

Since the commencement of the meningococcal C vaccination program in 2003, meningococcal C vaccination status has been recorded for 89 (68.5%) serogroup C notifications. There have been two notifications of serogroup C disease in vaccinated individuals, a 2-year old child in 2008, and a 9-year old child in 2009.

Discussion

Notifications of cases of IMD have become rare in NSW. Children aged under 5 years continue to be at highest risk of IMD, in particular children aged under 12 months, with young adults aged 15–24 years also at elevated risk. IMD notifications in NSW increased between 1991 and 2000, and have decreased since this time.

The greatest reduction in notifications and deaths has been for serogroup C disease since the introduction of the meningococcal C vaccination program in 2003. The marked decrease in serogroup C disease in 1–19-year olds in 2003 and 2004 most likely reflects the impact of the vaccination program in the target age group. There was also a reduction in serogroup C notifications in other age groups not targeted in the vaccination program. This partly reflects the movement of vaccinated young adults into the older age group, but may also suggest protection through herd immunity as a consequence of the vaccination program. There have been only two notifications of serogroup C disease in vaccinated individuals, suggesting vaccine failure is uncommon. It is important to continue to collect information about the vaccination status of cases in order to monitor the effectiveness of the vaccine and appropriateness of the vaccination policy.

The epidemiology of IMD at a national level has been described elsewhere.[7–9] Nationally, notification rates for IMD have decreased from 3.1 per 100 000 population in 2002 to 1.1 per 100 000 population in 2011.[10] The dramatic reduction in rates of notifications of serogroup C disease in NSW between 2002 and 2011 is comparable to rates observed nationally[8] and in other countries where meningococcal C vaccination programs have been introduced.[11–14] NSW, Australian and international data consistently indicate there has been no evidence of serogroup replacement following mass meningococcal C immunisation programs.[15]

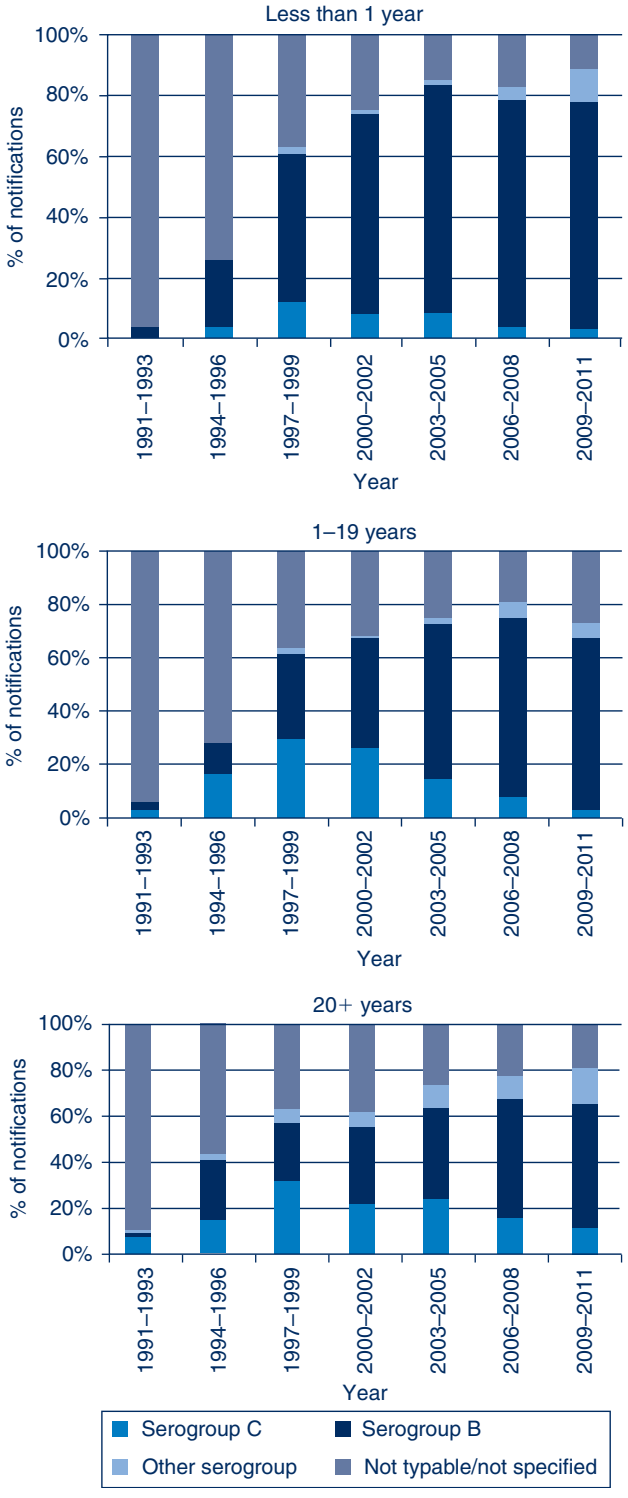

Figure 2. Notifications of invasive meningococcal disease by age, serogroup and year of onset, NSW, 1991–2011
Source: Notifiable Conditions Information Management System, NSW Health.

Serogroup B remains the predominant serogroup for IMD in NSW and now accounts for 80% of cases. Research is underway to develop a vaccine for serogroup B disease,[16] which would substantially reduce the burden of IMD in Australia and worldwide. Although the proportion of annual IMD notifications due to serogroup B disease has increased over time, the actual number of serogroup B notifications has declined since 2000. This decrease is not likely to be related to the meningococcal C vaccination program but may reflect a natural drift in the virulence of meningococcal B strains in the community.[6] Notifications for serogroups Y and W135 have remained low and stable.

Although notifications for IMD have reduced greatly, reducing deaths and disability remain key challenges in the management of IMD. IMD remains one of the leading infectious causes of death in children in Australia. Moreover, overseas studies indicate that 9% of children who survive IMD are left with major physical, cognitive and/or psychological disabilities,[17] and 50% of survivors of adolescent IMD experience major long-term sequelae including skin scarring, mobility difficulty, and speech and hearing problems.[18] Structured review of the management of individual IMD cases has been used to identify areas for improvement in the medical, laboratory and public health management of IMD cases[19] and has the potential to improve outcomes for people with IMD.

Conclusion

This study used routinely collected surveillance data to describe the epidemiology of IMD in NSW, and to examine trends in relation to the introduction of the meningococcal C vaccination program. The incidence of meningococcal C has decreased substantially since the introduction of the meningococcal C vaccination program. A key challenge for reducing the burden of IMD is to control serogroup B disease.

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Oral health promotion in NSW

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A healthy mouth is essential for general health and well-being, enabling individuals to communicate effectively, and to eat and enjoy a variety of foods. It is important for overall quality of life, self-esteem and social confidence.[1] The cost of oral disease to individuals and society extends beyond the oral health burden alone; there is, for example, lost productivity due to absenteeism from work and school, and reduced quality of life.[2]

Dental caries and periodontal diseases have historically been considered among the most important global oral health burdens;[3] these are largely preventable and reversible if identified and treated early.[4] Changes in health behaviour can help prevent oral diseases: reducing the frequency of sugary food and drink intake; modifying alcohol consumption; ceasing tobacco use; drinking fluoridated tap water; brushing teeth and gums twice a day with a fluoride toothpaste; and visiting a dentist regularly. Promoting health behaviour change is not straightforward. Social and economic disadvantage strongly influence health behaviour[5] and oral health status closely follows social gradients in the same way social gradients are linked to general health status.[6] This highlights the need for an approach that considers not only the individual but their context, and promotes an environment where individuals can take control of their own health and wellbeing.

Although overall improvements have occurred, oral health inequalities remain a major public health challenge globally.[7] There are subpopulations within the community that will need additional focus to ensure disparities in oral health status are reduced. Aboriginal and Torres Strait Islander people, older people, adults and children with special needs, children in out-of-home care, and those in rural/remote communities where access to services is limited, are priority groups in NSW.[8]

While advances in clinical techniques have made dental treatment more effective, treatment approaches alone will never eradicate oral diseases.[9] A mix of complementary public health approaches incorporating disease prevention and health promotion is required that focus on creating supportive environments that help to sustain good health, and assisting individuals and communities to avoid oral disease.[9]

In NSW, oral health promotion is organised through the NSW Oral Health Promotion Network (the Network), established by the Centre for Oral Health Strategy, NSW Ministry of Health. The Network comprises oral health promotion coordinators, or their representatives, from each Local Health District (LHD) in NSW, as well as other key representatives from policy, academia, professional associations, industry, and the community. The objective of the Network is to ensure that oral health promotion efforts in NSW are collaborative, well coordinated, evidence based, and continuously delivered in an effective and efficient manner.

Oral Health 2020: A Strategic Framework for Dental Health in NSW[8] sets the platform for oral health action in NSW into the next decade. It articulates the need for shared responsibility and a partnership approach to improve the oral health of the NSW population. The development of the framework was influenced by a range of state and national oral health programs, funding initiatives, reviews and reports including the NSW Ministerial Taskforce on Dental Health, the report of the National Advisory Council on Dental Health, and Commonwealth initiatives such as the Child Dental Benefits Schedule, and the Dental National Partnership Agreement.

Oral Health 2020 has a major focus on prevention of oral disease and includes the following priority areas: water fluoridation; integrated health promotion; primary and tertiary service delivery; workforce; professional education; and data, research and evaluation. The following case studies describe three NSW initiatives that illustrate oral health promotion in action. These initiatives add value to existing prevention programs, such as water fluoridation – a cost-effective measure for reducing dental caries[10] that reaches 96% of the Australian population[11] and one of the few public health interventions that reduces disparities in oral health between socioeconomic groups[12] – and the Early Childhood Oral Health Program,[13] which aims to improve the health and wellbeing of children in NSW by integrating oral health into general health interventions provided by child health professionals.

The case studies described here also capitalise on a broader health promotion agenda. The correlation between general health, lifestyle behaviours and increased risk of dental caries, periodontal disease, oral infections, oral cancer, and other oral conditions warrants an integrated approach to

health care provision.[14] Key risk factors including poor diet, smoking, alcohol, and poor hygiene can contribute to a wide range of both general and oral health complications. Oral health promotion in NSW thus uses the common risk factor approach; incorporating oral health promotion into general health promotion initiatives that target a range of chronic diseases (e.g. obesity, diabetes, cancer, cardiovascular disease and respiratory disease). For example, programs such as the NSW Healthy Children Initiative[15] provide a platform for key oral health messages, such as choosing water as a drink, promoting breastfeeding, and reducing consumption of sugary drinks and food.

The paper on the *Bila Muuji Oral Health Promotion Partnership* by Meihubers describes an integrated program serving Aboriginal communities in western and northwestern NSW. It explains the process used to identify local priorities, the range of strategies used and the oral health promotion successes achieved in the rural and remote communities of NSW where this program is delivered. The paper highlights the importance of active involvement of local staff who work with communities in the planning and implementation of Aboriginal health promotion programs. The coordinated effort, across a range of community settings and over several years, has raised the profile of oral health in the participating communities and resulted in the activities becoming embedded in the routine business of local Aboriginal Community Controlled Health Organisation, health, and community staff. The program is now shifting focus to young adults and people with chronic disease.

Targeting smoking has become an important role for oral health professionals. Tobacco smoking is the single greatest cause of premature death and is a leading preventable cause of morbidity in NSW.[16] In *Models of smoking cessation brief interventions in oral health*, Dawson, Noller and Skinner review different approaches to smoking cessation brief interventions used by oral health professionals in Australia and internationally. This paper also introduces the evaluation of the NSW Health policy directive, *Smoking cessation brief intervention at the chairside: role of public oral health/dental services,* which mandates clinicians within public dental services to undertake chairside smoking cessation brief interventions.[17] The review and the results of the forthcoming evaluation will inform the development of a best practice model for smoking cessation brief interventions for oral health professionals in NSW.

In *An evaluation of dental information sessions provided to childcare educators in NSW in 2010–2011*, Noller describes the evaluation results of one component of the NSW Little Smiles Program: dental information sessions provided to childcare educators in NSW to promote oral health and assist with accreditation requirements. Although participants' confidence in the key areas covered by the training increased, the dental information sessions were not sustainable as implemented; more cost-effective methods are required. The case study articulates future directions for strengthening the oral health skills and knowledge of childcare educators.

Conclusion

Oral health promotion has an exciting future that will require a strong partnership model between the NSW Ministry of Health, local health and education service providers, and the tertiary education and community service sectors, to address the oral health promotion priority actions in *Oral Health 2020*. It will also be important for NSW to continue the strong partnerships already established with oral health promotion practitioners in other Australian jurisdictions, through the National Oral Health Promotion Steering Group and the new *National Oral Health Plan*, which is currently in development. The three case studies presented here provide insights that will support future oral health promotion efforts in NSW.

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The Bila Muuji Oral Health Promotion Partnership

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Abstract: In western NSW in 2006, a group of Aboriginal Community Controlled Health Organisations identified oral health as a priority need in their regions, considering the lack of regular dental services, poor access to oral health information, and high dental disease rates. A regional oral health promotion program was developed and implemented under the guidance of a regional coordinator who supports local staff in oral health promotion activities such as school-based toothbrushing and the provision of oral health information to targeted groups (e.g. young mothers and carers) and staff of chronic disease programs. The program's strength in its planning and continuity is due to many factors, one of the main being the active involvement of local Aboriginal Community Controlled Health Organisation staff in its genesis, planning and implementation. Combined with strong management support, local partnerships and regional coordination, the program continues to provide collaborative approaches to community-based oral health promotion programs.

Bila Muuji Aboriginal Health Service Incorporated (Bila Muuji) is a regional grouping of Aboriginal Community Controlled Health Organisations (ACCHOs) in western New South Wales (NSW). It was established in 1995 and now has seven active member ACCHOs in the locations of Bourke, Brewarrina, Gongolgong, Walgett, Coonamble, Wellington and Orange. Bila Muuji means 'river friends' and Bila Muuji's vision is to provide collective support to its members and to identify and address shared issues impacting on Aboriginal communities across the region.

In 2006 Bila Muuji members identified poor oral health and lack of access to dental services and advice as major priorities for western NSW Aboriginal communities. There were very few dental practitioners in the region, and patchy activity in oral health promotion programs. The more remote towns of Bourke, Brewarrina, Gongolgong, Walgett and Coonamble had no fluoride in their water supplies. Health checks conducted in 2004 by the then Far West Area Health Service found that in some remote Bila Muuji communities, 5–6-year old children had on average 7.56 primary (or baby) teeth affected by dental caries (decay) (unpublished data). This was eight times greater than the state average for that age group.[1] The percentage of 5–6-year olds with no caries in their primary teeth was as low as 5.6% compared with the state average of 69%.[1] Caries in the permanent (adult) teeth of children in the 11–13-year age group was up to five times the state average (unpublished data).

While there were no oral health data specific to the adult population in the majority of the Bila Muuji communities, a national survey of adult oral health conducted in 2004–06 found that the Indigenous adult population had 2.3 times more untreated caries than the non-Indigenous adult population, and 57% of Indigenous adults had one or more teeth affected compared with 25% of non-Indigenous adults.[2]

Aboriginal and Torres Strait Islander people have also been identified as a priority population in the recently developed *Oral Health 2020: A Strategic Framework for Dental Health in NSW*.[3]

Oral health promotion program from the ground up

In 2006, Bila Muuji members developed a service plan to address the poor oral health status and low level of dental services in the region. This plan identified the need for a regional dentist position and a regional oral health promotion program. Due to limited availability of statewide funds, the regional dentist position was not funded however funds were made available for the oral health promotion program – including a full-time coordinator – through the Centre for Oral Health Strategy, NSW Ministry of Health. In 2008 a formal partnership was established with the then Greater Western Area Health Service (GWAHS) to support the program.

The first step was to work with frontline staff within the ACCHOs. If the Bila Muuji Oral Health Promotion Program was going to have strength and longevity it had to be embedded within the communities, with ongoing support and commitment from staff at the ACCHOs.

Consultation workshops

Two workshops were organised in 2008 with the overall aim being to identify and implement oral health promotion priorities and activities across the Bila Muuji region.

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Participants were largely Aboriginal Health Workers and oral health staff from Bila Muuji member organisations, with some GWAHS staff also in attendance.

The first workshop was held in Sydney at the Centre for Oral Health Strategy. Information sessions were provided on dental diseases and their causes, principles of prevention of dental diseases, examples of oral health promotion programs, and approaches to oral health promotion both on an individual and a community level. Representatives from the dental profession and dental industry delivered the presentations and participants were given opportunities to share information on oral health and related issues from their communities. At the end of the workshop participants were given a formal task to identify oral health problems in their community, using a task sheet that guided them through the necessary steps. Then, in discussion with co-workers and others, they were asked to identify oral health promotion activities to help address these problems.

At the second workshop held 3 months later, the participants shared the knowledge they had gained regarding oral health problems in their communities and some of the factors impacting on the planning and implementation of oral health promotion activities.

Results of the workshops

There were several common issues identified within the participants' communities:

- a general lack of knowledge about ways to prevent dental disease
- lack of dental services
- high consumption of sweet drinks in baby bottles, particularly cola drinks
- the importance of encouraging the drinking of water, and for school children to have water bottles filled with fresh water while at school
- poor access to dental information resources
- the importance of maintaining communication networks.

Some of the activities that had been initiated by participants, in association with relevant health personnel, in their communities included:

- supervised toothbrushing with fluoride toothpaste at school breakfast clubs and in preschools
- providing oral health information and advice to young mothers' programs
- incorporating oral health checks into Healthy for Life programs and organising appropriate follow-up dental care.

At the second workshop participants used their knowledge and experiences to work together on an implementation plan for the regional oral health promotion program, guided by Bila Muuji's oral health advisor who had been working with Bila Muuji since 2006 to improve oral health services in the region.

Planning

The oral health promotion implementation plan identified certain target groups such as children aged under 5 years, school-aged children, young adults, people with chronic disease, and the elderly. The plan detailed aims, strategies, measures, necessary resources and funding, and identified those with responsibility for the various activities. These activities included: instituting school-based daily toothbrushing programs; delivering oral health information sessions to the target groups; training ACCHO health staff in 'See My Smile', a program designed to assist non-dental workers to identify early signs of dental caries in young children; encouraging the drinking of water by distributing water bottles at schools and by providing sippy cups to young families; and providing oral health information to the staff of chronic disease programs.

Partnerships

The partnership with the then GWAHS enabled the employment of a regional coordinator for the program. GWAHS provided some funding for the position, as well as administrative support and office space in Dubbo for the coordinator. Bila Muuji received further funds from the Centre for Oral Health Strategy to fully fund the position. In 2009 Bila Muuji developed a Memorandum of Understanding with Charles Sturt University. This included a scholarship scheme whereby Bila Muuji would support selected undergraduate Bachelor of Oral Health students, with the intention of introducing the students to oral health issues in rural Aboriginal communities, and encouraging them to work in these areas upon graduation.

Regional coordination

In 2009 a regional oral health promotion coordinator was appointed. The position was based in Dubbo, with travel to the Bila Muuji communities on a regular basis to support and progress the activities already established by the ACCHO staff. The existence of a well-developed implementation plan was of assistance to the coordinator, giving direction and providing insight into the issues faced in the communities. Added strength in the plan was its 'ownership' by Bila Muuji members.

Guided by the priorities identified in the oral health promotion plan, the regional oral health promotion activities initially focused on children aged 0–5 years, young mothers/carers, and school-aged children. The young children and mothers/carers were accessed largely through young mothers' groups and preschools. Working with ACCHO staff in each location, the regional coordinator provided oral health information and resources relevant to these groups on a regular basis, and also supported the ACCHO staff to take the lead in future programs such as school-based toothbrushing programs.

The toothbrushing programs are for all children attending the schools, Aboriginal and non-Aboriginal, though the targeted schools have a large percentage of Aboriginal children in attendance. The coordinator and local staff provided guidance and resources for the toothbrushing programs including printed information about program protocols, toothpaste, toothbrushes and toothbrush holders. A professionally produced support manual for school teachers is currently near completion.

Activities: continuing

The oral health promotion activities of the Bila Muuji regional oral health promotion program are supported by evidence-based literature.[4] These interventions continue and have become embedded in the routine activities of local ACCHO, health, and community staff. The program is now shifting focus to young adults and people with chronic disease, and formal evaluations of the programs are being planned. These will examine issues such as participation rates in the programs, appropriateness of information and interventions, staff involvement, improvements in oral health practices, and areas for overall program improvement.

Conclusion

Improvements in oral health will occur slowly, provided there is sustained community-based effort and support from all sectors. Oral health and health practitioners are not necessarily able to influence the social determinants of health that impact on the lives of Aboriginal people in rural and remote communities. However, through coordinated efforts and understanding they can continue to provide appropriate interventions that will contribute to oral health improvement. In the case of the Bila Muuji oral health promotion program, its acceptance and growth in communities has been driven by the inclusion of local staff from the beginning, and the active participation of partners such as the Local Health District. Annual workshops provide ongoing professional support and updates to staff, most of whom participated in the initial workshops in 2008. The profile of oral health has been raised and coordination with other health and community program areas has increased. The importance of working with local community staff, in a meaningful sense, cannot be stressed enough.

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Models of smoking cessation brief interventions in oral health

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Abstract: The links between tobacco smoking, and periodontal disease and oral cancer make the inclusion of smoking cessation interventions at dental visits an important prevention strategy in oral health services. The 5As (Ask, Advise, Assess, Assist, Arrange), which utilises a stages of change model, is the most commonly recognised framework for the provision of smoking cessation brief interventions and is advocated widely. While the popularity of the 5As continues, increasingly evidence suggests that staged-based interventions in smoking cessation may not be the best approach. Lack of time and expertise are also cited by health professionals as barriers to undertaking brief interventions and thus abbreviated forms of the 5As have been advocated. In 2009, NSW Health introduced a mandatory policy for public dental services in NSW to conduct smoking cessation brief interventions at the chairside based on a three-step approach, which is currently being evaluated. Given the debate and the pending evaluation results, this paper reviews models of smoking cessation brief interventions, to contribute to achieving a best practice model for public oral health in NSW.

Tobacco (smoking) is recognised as a leading preventable cause of morbidity and premature mortality. Smoking greatly increases the risk of many cancers and is a major cause of chronic obstructive pulmonary disease and cardiovascular disease.[1] As such, smoking continues to impose a significant burden on the health system and the economy and remains an important public health challenge. While smoking rates in Australia have decreased substantially in recent years they remain unacceptably high, particularly among Aboriginal people and people from low socioeconomic and other disadvantaged groups.[2] Further reducing smoking is a key commitment of the NSW Government; robust targets have been set in order to combat chronic disease and rising health care costs.[3]

The causal links between tobacco smoking, and periodontal disease and oral cancer are well understood within the field of oral health.[4] The inclusion of smoking cessation services in dental visits is therefore an important prevention strategy, and oral health professionals are well positioned to give cessation advice.[5] In NSW, access to adult public dental care is for concession card holders only.[6] The populations cared for by public oral health professionals are amongst the most disadvantaged groups in the community and have higher rates of smoking than the general population.[3] As a result, smoking cessation is an issue of particular relevance to public dental services.

The World Health Organization (WHO) recommends that brief opportunistic interventions should be undertaken by all health professionals in the course of their routine work.[7] Health professionals are well placed to deliver cessation advice to smokers because they are considered an important source of credible information[8] and smokers also expect to receive quitting advice from health professionals.[9,10] While the evidence base is stronger for some professional disciplines than others, it has been suggested that involvement of health professionals in smoking cessation should be based on factors such as access to smokers and level of brief intervention training, rather than their discipline *per se*.[4] Moreover, the cumulative effect of smoking cessation interventions by more than one type of health professional has the potential to substantially increase readiness to quit and quitting in the population.[11]

Given time is a limited commodity for health professionals, brief interventions are considered a suitable approach.[5] The United Kingdom's (UK) National Institute for Health and Clinical Excellence deems that brief interventions for smoking cessation are cost effective and recommends that all health professionals should refer people who smoke to an intensive support service.[12]

In a systematic review of physician advice for smoking cessation, Stead et al. found that a brief advice intervention is likely to increase the quit rate by 1–3%.[13] While this is a

Box 1. The 5As smoking cessation brief intervention[7,14]

Ask about and record smoking status
Advise smokers of the benefit of stopping in a personalised and appropriate way
Assess motivation to quit (using stages of change[a] model)
Assist smokers in their quit attempt
Arrange follow up

[a]Stages of change is a model for assessing an individual's readiness to change a variety of behaviours, including tobacco smoking. According to the theory, cessation is a process rather than a discrete event and smokers may cycle through the stages of being ready to quit, quitting and relapsing. Key questions to ask include: "How do you feel about your smoking at the moment?" and "Are you ready to quit now?" Interventions can then be tailored to an individual's stage of change.

modest effect for the individual, there is potential for substantial population benefit. In order to translate this into public health benefit, the frequency with which smokers are identified and offered advice and support needs to increase.[13]

The 5As (Ask, Advise, Assess, Assist, Arrange) (Box 1) is the framework most commonly referred to with regard to smoking cessation brief interventions and is considered by many authorities as the gold standard. Originally developed as part of the United States (US) Department of Health's Clinical Practice Guideline in 2000 and then updated in 2008, the model proposes that smokers should be given a brief intervention to address smoking at every health consultation.[14]

In 2002 WHO Europe[7] developed evidence-based recommendations on the treatment of tobacco dependence informed by a number of authoritative reviews and guidelines (including the US Department of Health's Clinical Practice Guideline, 2000), and these reflect the 5As approach. In the UK, guidance around smoking cessation brief interventions proposes similar steps.[12] In Australia, the Royal Australian College of General Practitioners (RACGP) adopted the 5As as standard practice in 2004.[15]

While the 5As approach remains popular, there is growing evidence that suggests the use of stage-based (stages of change) interventions in smoking cessation may not be the best approach. Stage-based models of behaviour change propose that interventions that consider an individual's readiness to change will be more effective than a 'one size fits all' model.[16] A systematic review of stage-based interventions for influencing smoking behaviour found that despite their widespread, uncriticised use in promoting smoking cessation there is limited evidence for their effectiveness.[16] West suggests that the use of the stages of change model is likely to lead to effective interventions not being offered to people who might have responded otherwise, because the approach fails to acknowledge that behaviour change can arise from a response to a trigger, even in apparently unmotivated individuals.[17] Similarly, Aveyard et al. found that when smoking cessation treatment has been offered routinely to patients, a much higher proportion accept than would be predicted by surveys of smoker's willingness to quit immediately.[18]

In New Zealand, this evidence has been taken into account and a three-step approach has been adopted in the form of ABC (Ask, Brief Advice, Cessation Support), which states that all people who smoke should be advised to stop smoking and supported to stop, regardless of whether or not they are interested in quitting.[19] More recently the RACGP, in their smoking cessation guide for health professionals, have reviewed the 5A approach to shift the emphasis away from the stages of change model because there is limited evidence to support it.[20]

Although the 5As remain the most widely accepted model for smoking cessation brief interventions internationally, in practice, there are limitations. Lack of time and expertise are consistently reported by health professionals as barriers to providing smoking cessation interventions.[21–23] In response to this, abbreviated forms of the 5As have been adopted. The American Dental Hygienists Association has advocated the use of a three-step approach (Ask, Advise, Refer), theorising that a referral to a tobacco Quitline could replace the need for oral health professionals to assist and provide follow-up to patients who smoke.[24] A study comparing this approach with the 5As found little conclusive evidence as to which approach was more effective.[24] Trotter and Worcester found that Australian dentists are willing to ask and advise patients about smoking, but are less inclined to provide assistance or follow-up to help patients quit, and are more likely to be opportunistic rather than systematic in their approach to prevention.[25] A lack of protocols or guidelines for best practice smoking cessation interventions was identified in one study as an important systemic barrier within the private dental profession.[26]

The NSW Health policy directive (released in 2009), *Smoking cessation brief intervention at the chairside: role of public oral health/dental services*[27] sets out the minimum requirements for public oral health staff to ask about and record smoking status, and to provide and record cessation advice and referral as appropriate. This model follows a 3As approach (Ask, Approach, Advise) (Box 2) but still advocates undertaking a stages of change assessment. Developed under the auspices of the NSW Oral Health Promotion Network, the policy is accompanied by a comprehensive training package which has been rolled out in public dental services across NSW. The Australian Schedule of Dental Services and Glossary,[28] which is the

Box 2. The 3As smoking cessation brief intervention[27]

Ask about and record smoking status
Approach smokers about their interest in quitting (using stages of change[a] model)
Advise of NSW Quitline and refer as appropriate

[a]Stages of change is a model for assessing an individual's readiness to change a variety of behaviours, including tobacco smoking. According to the theory, cessation is a process rather than a discrete event and smokers may cycle through the stages of being ready to quit, quitting and relapsing. Key questions to ask include: "How do you feel about your smoking at the moment?" and "Are you ready to quit now?" Interventions can then be tailored to an individual's stage of change.

universally accepted coding system for dental treatment in Australia, currently has no item number for provision of smoking cessation advice. Item number 191 was therefore introduced alongside the policy to record 'smoking cessation advice given' in the Information System for Oral Health (ISOH), an integrated database to support service delivery in NSW public dental clinics. This item number could potentially be used as a measure of how the policy is being implemented.

A policy implementation evaluation is currently being undertaken by the Centre for Oral Health Strategy, NSW Ministry of Health. The evaluation will review the delivery of the training package and the implementation of the policy, with a particular focus on the factors that mediate policy utilisation and outcomes. While the evaluation does not have the capacity to tell us how effective the 3As approach is compared with the 5As, it will offer important insights into the previously unexplored area of chairside smoking cessation interventions in public oral health in NSW.

Review of the literature indicates that smoking cessation interventions in health care are varied, but tend to follow either a three- or five-step model. However, as there is little in the way of conclusive evidence demonstrating the effectiveness of one intervention over the other it is difficult to draw a definitive conclusion about what a best practice model should look like. As illustrated in this paper, there are several factors to consider in constructing an intervention model that is both theoretically sound and practically useful, but in order to have any significant impact on population quit rates interventions need to be implemented with high frequency. As clinical time priorities are often a constraint for oral health professionals, keeping interventions brief and simple is critical and the literature suggests that less emphasis should be placed on the staged approach. The results from the pending evaluation should provide insight into the tensions and realities of delivering chairside smoking cessation interventions and further contribute to refining a best practice model that is relevant to public oral health in NSW.

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An evaluation of dental information sessions provided to childcare educators in NSW in 2010–2011

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Abstract: Childcare services provide ideal settings to promote good oral health and help reduce tooth decay in young children. This paper reports the results of an evaluation of the dental information session component of the NSW Little Smiles Program provided by public oral health service professionals to childcare educators in NSW in 2010–2011. The evaluation sought to determine if a face-to-face information session provided to childcare educators by oral health professionals: (i) can improve the confidence of childcare educators to reach national quality standards that relate to oral health; and (ii) is an appropriate model to use. In 2010–2011, 163 dental information sessions were provided to 1716 participants from over 526 childcare centres across NSW. Results showed that a dental information session can improve the confidence of childcare educators to assist their service to reach the required national quality standards for oral hygiene and diet-related oral health issues. Further evaluation is required to determine if oral health can be embedded in the daily practice of childcare services and other options need to be explored to deliver the sessions in a more cost-effective way.

Tooth decay is the single most common chronic childhood condition and early childhood caries is a significant public health problem affecting preschool children.[1] It crosses all socioeconomic boundaries[2] and is associated with limited exposure to fluoride, early intake of sugary foods, drinks and snacks, and may occur in young children who are given pacifying bottles of juice, milk or formula, or soft drink or cordial to drink for prolonged periods during the day or overnight.[3,4] Severe tooth decay in young children causes pain, problems with sleep and may impede growth.[5] Tooth decay in young children is a disease of disadvantage. About 20% of Australian 4-year old children examined in public dental clinics in 2000 had 90% of the tooth decay for that age group.[6] The most recent New South Wales (NSW) Child Dental Health Survey in 2007 showed that by the time they started school almost 40% of children aged 5 and 6 years had experienced some decay in their deciduous (baby) teeth.[7]

Settings such as childcare centres are ideal locations in which to provide oral health promotion interventions[8] and there is evidence that effective collaboration between parents, directors of childcare centres, and health professionals has the potential to improve the breadth and effectiveness of health promotion education.[9] Data from the Australian Bureau of Statistics suggest that in 2011, 35% of NSW children aged 0–5 years attended some form of formal care.[10]

In 2005 the National Childcare and Accreditation Council produced the Quality Improvement and Accreditation System *Quality Practice Guidelines* for childcare facilities. This document detailed the quality areas and principles that facilities were assessed against for accreditation purposes. In terms of oral health, facilities were required to have in place practices that met Quality Area 6: Health, Nutrition and Wellbeing; Principle 6.3: Staff encourage children to follow simple rules of hygiene. This could be met by putting in place: (i) a dental care policy that was based on advice from recognised health authorities; and (ii) procedures that helped children understand the importance of healthy teeth and learning to become responsible for their own personal hygiene and dental care practices.[11]

Historically, childcare service providers in NSW met this standard by requesting a visit by oral health professionals from public dental services to provide oral health education to children at their centre. However, this strategy was not sustainable as it was human resource intensive and there is no evidence that providing one-off dental hygiene instruction to young children will result in long-term behavioural change.[12] This resulted in the development of the NSW Little Smiles Program.

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This paper reports the results of an evaluation of the dental information session component of the NSW Little Smiles Program provided by public oral health service professionals to childcare educators in NSW in 2010–2011. The evaluation sought to answer two questions:

- Can a face-to-face dental information session improve the confidence of childcare educators to reach the required national quality standards for oral hygiene and diet-related oral health issues in childcare facilities?
- Is a face-to-face dental information session an appropriate model to use?

Methods

The NSW Little Smiles Program (the Program) was developed in 2008 by the Centre for Oral Health Strategy (COHS), NSW Ministry of Health. It focuses on providing childcare educators with basic oral health information required to meet the National Childcare and Accreditation Council assessment standards for oral hygiene and diet-related oral health issues. The Program consists of a NSW Little Smiles Dental Health Resource Package for Childcare Professionals ('resource package'),[13] and a dental information session ('session').

The development of the Program was guided by the NSW Little Smiles Advisory Committee, consisting of a range of oral health and childcare professionals with expertise in oral health and the quality standards required for accreditation of childcare facilities.

In March 2010 the NSW Chief Dental Officer sent a letter to all 3300 childcare services (preschool and long daycare) listed on a database provided by the then NSW Department of Community Services. The letter described the contents of the resource package and offered recipients the opportunity to receive, free of charge, the resource package and/or a dental information session by completing a *yes/no* form and faxing it back to COHS.

Over 1600 childcare services requested a resource package (around 50% of services on the database) and over 526 requested an information session. COHS provided Local Health District (LHD) Oral Health Promotion Coordinators (or representatives) with information necessary for the organisation and delivery of the sessions (e.g. details of the childcare services within their LHD that requested a session, and a USB containing: guidelines and a checklist for the sessions; a PowerPoint presentation; notes for presenters and participants; evaluation forms; and a sample certificate of attendance). Different methods were used by LHDs to organise and deliver the sessions: in some cases one person took sole responsibility for every task, while in others the workload was shared by oral health professionals, dental assistants, and administrative staff.

Sessions were held either during working hours or after hours, depending on approval from childcare centre management. Staff conducting sessions after hours were paid overtime, travel time and, where appropriate, for accommodation and meals. Some LHDs used a 'host' centre to conduct the sessions. The 'host' centre provided the venue for a number of childcare educators from different centres to attend the sessions. The sessions took up to 2 hours and provided basic oral health information about teeth, tooth decay, prevention, and how to refer to and access public dental services.

Before each session began participants were asked to complete a pre-confidence questionnaire, using a Likert scale, to determine their confidence in a number of areas of oral health: explaining why baby teeth are important; causes of tooth decay; how to prevent tooth decay; identifying tooth decay in young children; why oral health is an important issue for childcare staff; providing dental referral advice to parents; and using the resource package. The same questionnaire was provided after the session to determine increases in confidence. Participants were also provided with an evaluation form to complete at the end of the session to rate the organisation, content and delivery of the session. Additionally, a take home package was provided to session attendees, containing participants' notes and a copy of the resource package if they had not already received one.

Results

A total of 163 sessions were provided to 1716 participants from over 526 childcare services across NSW. One LHD did not provide information about the number of childcare services that received the sessions, and three LHDs did not participate in providing the sessions (Table 1).

The organisation and delivery of sessions varied due to staffing and structures across LHDs. There were several challenges involved in the organisation process and session delivery, such as costs for session presenters (e.g. travel, accommodation, meals, paid overtime) and small attendance numbers or failure to attend by childcare workers (for various reasons); consequently, some of the sessions were uneconomical.

Of the 1716 participants, 1401 (82%) completed the session evaluation form. The majority of survey respondents reported that the organisation, content and delivery of the session were either 'very good' (>30%) or 'excellent' (>50%) (Table 2). Comments included:

- small groups allowed for discussion and clarification
- sessions were well organised, professionally executed, and well aimed at the target group as a refresher course
- presenters were approachable and made it easy to ask questions
- information was presented in a clear and easy to understand manner.

Table 1. Dental information sessions provided by Local Health Districts as part of the NSW Little Smiles Program, 2010–2011

Local Health District[a]	Participants *(n)*	Information sessions *(n)*	Childcare services *(n)*
Far West	0	0	0
Hunter New England	96	9	22
Southern NSW and Murrumbidgee	552	79	103
Northern NSW and Mid North Coast	0	0	0
Northern Sydney and Central Coast	611	31	145
South Eastern Sydney and Illawarra Shoalhaven	46	2	20
Sydney and South Western Sydney	252	22	176
Western NSW	39	6	Not provided
Western Sydney and Nepean Blue Mountains	120	14	60
Total	**1716**	**163**	**>526**

[a]At the time of the evaluation Area Health Services were transferring to Local Health Districts. This table represents the names of the Local Health Districts but have been combined to represent how they participated in the evaluation as Area Health Services.

Table 2. Participants' views on conduct of dental information sessions provided as part of the NSW Little Smiles Program, 2010–2011

	No response	Poor	Fair	Good	Very good	Excellent
Organisation	14	1	26	156	485	719
	(1.0%)	(0.1%)	(1.9%)	(11.1%)	(34.6%)	(51.3%)
Content	1	2	16	120	453	809
	(0.1%)	(0.1%)	(1.1%)	(8.6%)	(32.4%)	(57.7%)
Session delivery	4	2	19	123	455	798
	(0.2%)	(0.1%)	(1.4%)	(8.8%)	(32.5%)	(57.0%)

$N = 1401$

The information that participants found most useful related to baby teeth (e.g. using bottles, dummies and cups), the tooth decay process, and toothbrushing techniques. Suggested session improvements included: a more hands-on and interactive presentation with practical demonstrations; and more handouts, brochures for parents, samples of resources and oral hygiene products, and a list of public dental clinics in the area.

Ninety-three percent of all participants ($n = 1590$) completed the confidence level questionnaires. There were increases in the proportion of participants who felt 'very confident' in all areas assessed (Table 3), with between 30% and 40% more participants stating that they felt 'very confident' for each area, after the session.

Discussion

The approach of integrating oral health into childcare services by providing an in-service oral health training program is supported by the Australian Community Services and Health Industry Skills Council[14] and the American Academy of Pediatric Dentistry (AAPD) policy on childcare centres.[15] One of the AAPD policy statements encourages childcare centres to provide in-service training programs for personnel regarding oral hygiene concepts, proper nutrition choices, the links between diet and tooth decay, and responses to traumatic injuries and their dental consequences.

This evaluation found that participants of the face-to-face dental information session component of the NSW Little Smiles Program increased their confidence in all areas covered by the sessions and the program was well received.

About 16% of the childcare services in NSW from urban and rural areas participated in this study, however the 1716 participants represented an average of nine participants per session. Although an assessment of the fidelity of the program delivery is beyond the scope of this study, for sessions to be more cost-effective greater numbers of participants per session would be beneficial. This could be achieved by offering Continuing Professional Development points to childcare educators as an incentive to boost session attendance or considering other options such as online training, which has been shown to be comparable to face-to-face instruction in terms of participant outcomes.[16] Online education does not involve extensive travel

Table 3. Pre and post confidence level results, dental information sessions delivered as part of the NSW Little Smiles Program, 2010–2011

Topic		Not confident	Some confidence	Confident	Very confident	No response
Use the *NSW Little Smiles Dental Health Resource Package for Childcare Professionals*	pre	555 (34.9%)	502 (31.6%)	354 (22.3%)	122 (7.7%)	57 (3.6%)
	post	7 (0.4%)	106 (6.7%)	774 (48.7%)	615 (38.7%)	88 (5.5%)
	Difference	**34.5% ↓**	**24.9% ↓**	**26.4% ↑**	**31.0% ↑**	**1.9% ↑**
Identify why oral health is an important issue for childcare staff	pre	107 (6.7%)	593 (37.3%)	607 (38.2%)	241 (15.2%)	42 (2.6%)
	post	1 (0.1%)	51 (3.2%)	714 (44.9%)	786 (49.4%)	38 (2.4%)
	Difference	**6.6% ↓**	**34.1% ↓**	**6.7% ↑**	**34.2% ↑**	**0.2% ↓**
Explain why 'baby' teeth are important	pre	217 (13.6%)	677 (42.6%)	480 (30.2%)	167 (10.5%)	49 (3.1%)
	post	4 (0.3%)	48 (3.0%)	697 (43.8%)	807 (50.8%)	34 (2.1%)
	Difference	**13.3% ↓**	**39.6% ↓**	**13.6% ↑**	**40.3% ↑**	**1.0% ↓**
Identify tooth decay in young children	pre	225 (14.2%)	689 (43.3%)	466 (29.3%)	155 (9.7%)	55 (3.5%)
	post	3 (0.2%)	71 (4.5%)	730 (45.9%)	730 (45.9%)	56 (3.5%)
	Difference	**14.0% ↓**	**38.8% ↓**	**16.6% ↑**	**36.2% ↑**	**0.0%**
Provide dental referral advice to parents	pre	447 (28.1%)	611 (38.5%)	371 (23.3%)	119 (7.5%)	42 (2.6%)
	post	16 (1.0%)	124 (7.8%)	736 (46.3%)	637 (40.1%)	77 (4.8%)
	Difference	**27.1% ↓**	30.6% ↓	**23.0% ↑**	**32.6%↑**	**2.2% ↑**
Explain the causes of tooth decay in young children	pre	206 (13.0%)	649 (40.8%)	505 (31.8%)	151 (9.5%)	79 (5.0%)
	post	9 (0.6%)	59 (3.7%)	702 (44.2%)	792 (49.8%)	28 (1.8%)
	Difference	**12.3% ↓**	**37.1% ↓**	**12.4% ↑**	**40.3% ↑**	**3.2% ↓**
Explain how to prevent tooth decay in young children	pre	133 (8.4%)	646 (40.6%)	569 (35.8%)	170 (10.7%)	72 (4.5%)
	post	2 (0.1%)	49 (3.1%)	680 (42.8%)	705 (44.3%)	154 (9.7%)
	Difference	**8.3% ↓**	**37.5% ↓**	**7.0% ↑**	**33.6% ↑**	**5.2% ↑**

N = 1590
Difference in level of confidence pre- and post-session; ↓ = reduction; ↑ = increase.

and accommodation costs, or travel time, and allows learners to participate no matter where they are located geographically.

A 2010 Canadian study[17] examined the effectiveness of oral health capacity-building workshops provided to service providers and community members who work with infants and preschool children. The results showed that, prior to the workshop, many of the study participants were unfamiliar with the recommended age of a first dental visit, how to assess caries risk, and how to identify early stages of decay. Self-reported data 1 month later suggested that participants changed behaviours as a result of what they learned. Non-dental professionals were used in delivering the workshop, suggesting that health professionals without formal dental training, but who possess health promotion skills, can share basic oral health information that can lead to improved awareness and knowledge of oral health among service providers and community members. Using non-dental professionals to train childcare educators could be considered to reduce the costs of delivering the NSW Little Smiles sessions.

A limitation to this evaluation is that there is no information about longer-term impacts and outcomes of the sessions (e.g. retention of knowledge/confidence over time, changes in practice in childcare settings, or changes in oral health status). Subsequent to the implementation of any changes to improve the organisation and session delivery of these training sessions, future evaluation of the program should include such measures.

Since the establishment of the NSW Little Smiles Program in 2008, a National Quality Framework for long day care, family day care, outside school hours care and preschools (education and care services) has been developed. The National Quality Framework, which is underpinned by the Education and Care Services National Law[18] and Education and Care Services National Regulations,[19] sets the National Quality Standards and regulatory framework for education and care services.[20]

The National Quality Standard for oral health falls under Quality Area 2: Children's health and safety; Standard 2.1: Each child's health is promoted; Element 2.1.3: Effective hygiene practices are promoted and implemented.

> Learning about healthy lifestyles, including nutrition, personal hygiene (such as dental hygiene and ear care), physical fitness, emotions and social

> relationships, is integral to children's wellbeing and self-confidence. As children become more independent, they can take greater responsibility for their own health, hygiene and personal care and they become aware of their own and others' safety and wellbeing. (p. 47)

Since this evaluation COHS and the NSW Department of Education and Communities have partnered to increase the oral health skills and knowledge of NSW TAFE students in the unit of competency, *Ensure the Health and Safety of Children* (CHCCN301C),[21] which is applicable to a number of childrens' services courses. The following progress has been made:

- An oral health resource has been developed and will be provided by TAFE teachers to students across NSW in 2014.
- In September 2013 a submission was presented to the National Skills Standards Council, which is responsible for developing and maintaining the national standards that regulate the vocational education and training sector, requesting the strengthening of oral health skills and knowledge in CHCCN301C.
- CHCCN301C has been superseded by CHCECE002,[22] which has produced significant changes to Element 3: Implement effective hygiene and health practices; and Performance Criterion 3.2: Support children to learn personal hygiene practices. Students must now be able to demonstrate knowledge of how children's oral health impacts on their general health and well-being, including signs of tooth decay. These changes, endorsed by the Ministerial Council for Tertiary Education and Employment, require all Industry Skills Councils to transition their training packages by December 2015.

These changes: (i) complement the requirements of *Oral Health 2020: A Strategic Framework for Dental Health in NSW*[23] to "encourage non-dental professionals to undertake relevant modules in oral health"; and (ii) will result in students having appropriate oral health knowledge and skills once they enter the childcare workforce.

Conclusion

Currently, in Australia all childcare services must address oral health in their licensing regulations. This evaluation showed that participation in an education strategy can increase childcare educators' confidence in areas of competence pertaining to oral health issues that meet national quality standards for education and care services. This, and the strengthening of oral health skills and knowledge for childcare services students, can strategically increase the oral health platform in education and care services in NSW. Further long-term evaluation is required to determine if the information has transferred to embedding oral health into policy and daily practice and if this can make a difference to the oral health status of children in care. In addition, other options need to be pursued to provide this information in a more cost-effective way.

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Listeriosis surveillance in Australia

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Listeriosis is a foodborne disease that can cause severe illness manifesting as gastroenteritis or invasive disease. While it accounts for a fraction of all notified foodborne illness in New South Wales, all cases are hospitalised and outcomes are potentially serious. Listeriosis follows ingestion of the bacterium *Listeria monocytogenes*, found in soil, water and decaying vegetation, and commonly present on the surface of unwashed vegetables and in some processed foods. Food manufacturers are required to manage *L. monocytogenes* within production facilities. The majority of infections can therefore be prevented with good food hygiene practices, and by people at risk of listeriosis avoiding potentially contaminated foods.

Invasive listeriosis

Of the two forms, invasive listeriosis is more commonly recognised, tending to occur in high-risk groups (i.e. immunocompromised patients, and pregnant women and their foetuses). In older adults and the immunocompromised, septicaemia and meningitis are the most common clinical presentations, and case fatality is approximately 20%.[1] Pregnant women typically experience only a mild flu-like illness, however infection during pregnancy can lead to spontaneous abortion, stillbirth or pre-term delivery. Infants may be born with septicaemia, or may develop meningitis in the neonatal period, even if the mother is asymptomatic at delivery. The case fatality rate for foetuses or infants may be as high as 50% for infections acquired *in utero*.[2]

Non-invasive gastroenteritis

Listeriosis may present as gastrointestinal illness with fever.[3] This type of infection can occur in healthy adults and is usually self-limiting.[3,4] It can be difficult to recognise because pathology laboratories rarely test faecal specimens for *L. monocytogenes*.

One of the earliest recorded outbreaks of gastrointestinal listeriosis was in 1994 in Illinois (45 cases). Most cases presented with fever (72%) and gastroenteritis (79%) and four were hospitalised. The outbreak was traced to chocolate milk contaminated with *L. monocytogenes* served at a picnic.[4] A larger outbreak of gastrointestinal listeriosis in northern Italy in 1997 affected around 1600 students and teachers; 292 children were hospitalised.[3] The primary schools and university involved were supplied by a single caterer, and the outbreak was traced to tinned corn served in a salad.

In 2009, Australia experienced a multi-jurisdictional outbreak of 36 cases of listeriosis, which included 22 gastrointestinal cases. The outbreak was linked to contaminated chicken wraps served primarily by an airline. All gastrointestinal cases reported suffering from fever and diarrhoea.[5]

Surveillance in Australia

The 2009 Australian outbreak of listeriosis identified a need for nationally standardised rapid subtyping of *Listeria* isolates, and centralised collection and analysis of epidemiological data. This system is now coordinated by OzFoodNet (a nationally funded network of epidemiologists who investigate foodborne diseases) with molecular typing of *L. monocytogenes* isolates performed at public health laboratories. These data, combined with questionnaire data from patients in a web-based database, allow rapid epidemiological interrogation and identification of the cause of multi-jurisdictional clusters.

Laboratory confirmation of listeriosis requires "isolation or detection of *L. monocytogenes* from a site that is normally sterile, including foetal gastrointestinal contents". This case definition does not include isolation of the bacteria from faeces, thus national statistics only report cases of invasive disease.[6]

The national approach to *Listeria* surveillance has markedly improved Australia's ability to detect and investigate clusters of invasive listeriosis; surveillance for gastrointestinal listeriosis remains a challenge.

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Invasive pneumococcal disease

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Invasive pneumococcal disease (IPD) is caused by the bacterium *Streptococcus pneumoniae* and is a major cause of illness in children and adults worldwide. The bacterium is transmitted between people via respiratory droplets. Many people carry *S. pneumoniae* harmlessly in their throats but the bacterium occasionally spreads from the upper respiratory tract to other parts of the respiratory tract to cause non-invasive disease (including otitis media) or enters the bloodstream to cause invasive disease (including pneumonia, meningitis or septicaemia).[1] In Australia, only invasive disease is notifiable under public health law.

Age is the most significant predictor of IPD, with children aged 2 years and under and adults aged 65 years and over being most at risk. Other risk factors include asplenia and other immunosuppressive conditions, having an underlying chronic condition such as diabetes, smoking, and environmental factors such as attending childcare. IPD is most common in winter and early spring.[1]

The clinical presentation of IPD depends on the particular syndrome but usually includes sudden onset of fever and malaise, with a headache also present with meningitis and breathing difficulties with pneumonia. Laboratory confirmation requires isolation of *S. pneumoniae* from a normally sterile site such as blood by culture or nucleic acid test. The case fatality rate for IPD even after antibiotic treatment is 10%, and is higher among the elderly and patients with underlying illnesses.[1]

There are over 90 serotypes of *S. pneumoniae*, each with type-specific immunity.[2]

Vaccination

From 2005 to 2011, the Australian Government funded a 7-valent pneumococcal conjugate vaccine (7vPCV) for children aged under 2 years. A 13-valent pneumococcal conjugate vaccine (13vPCV) replaced the 7vPCV on the National Immunisation Program in 2011. All children receive three doses, with Aboriginal and Torres Strait Islander children in Queensland, South Australia, Western Australia and the Northern Territory and medically at-risk children receiving a fourth dose. Additionally, a dose of a 23-valent pneumococcal polysaccharide vaccine (23vPPV) is recommended between the ages of 4 and 5 years for medically at-risk children. The polysaccharide vaccine has also been funded for all Aboriginal adults aged 50 years and over since 1999, and for all adults aged 65 years and over since 2005.[2] IPD vaccination rates in NSW are over 90% for children aged under 5 years but less than 60% for adults aged 65 years and over.[3]

Epidemiological trends

The notification rate of IPD in New South Wales (NSW) has decreased from 13.4 per 100 000 population in 2004 to 7.2 per 100 000 population in 2011, with the largest decrease coinciding with the introduction of the childhood vaccination program in 2005. Decreases in notification rates in children aged under 5 years have been the most marked, falling from 62.9 per 100 000 population in 2004 to 14.7 per 100 000 population in 2011.[3]

IPD notification rates are similar in other Australian jurisdictions except the Northern Territory, where in 2010 the notification rate was 24 per 100 000 population.[4] This reflects the higher incidence of IPD amongst Aboriginal and Torres Strait Islander people, who are more likely to have multiple risk factors for IPD.

Prior to 2005, almost all invasive disease was caused by serotypes included in the 7vPCV. Since the introduction of the childhood vaccination program, almost no disease is due to these serotypes, though increases have been seen in non-vaccine serotypes. Some cross-protection has occurred for 7vPCV-related serotypes such as 6A but not 19A, which has caused the majority of invasive disease since 2005 and is associated with increased penicillin resistance. The 13-valent pneumococcal conjugate vaccine includes 19A and its introduction has seen a further reduction in invasive disease and reduced penicillin resistance. Serotype and resistance monitoring efforts are ongoing.

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Communicable Diseases Report, NSW, April–June 2013

Communicable Diseases Branch
Health Protection NSW

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 1 and Table 2 show notifications of communicable diseases with onset between April and June 2013 in New South Wales (NSW).

Enteric infections

Outbreaks of suspected foodborne disease

There were 11 outbreaks of foodborne or suspected foodborne disease investigated by NSW Public Health Units (PHUs) in the second quarter of 2013. Three outbreaks were due to *Salmonella* Typhimurium, one was due to *S.* Zanzibar, one was due to *Listeria monocytogenes*, and one was due to norovirus. The remaining five outbreaks were due to unknown pathogens.

Only three outbreak investigations were able to provide sufficient evidence to identify the source of the infection. The first of these outbreaks was part of a large multi-jurisdictional outbreak of norovirus found in Tasmanian oysters in April 2013. Two groups of people (totalling eight from 10 people) reported vomiting and diarrhoea after eating these oysters in NSW. No specimens were tested but the symptoms were consistent with norovirus and the batches of oysters consumed were those thought to be contaminated in the outbreak. In the second outbreak, a PHU was notified of salmonellosis associated with a dinner party in a private residence in June 2013. Fourteen of the 17 attendees became unwell after eating a meal that contained raw egg béarnaise sauce. In addition, three people who did not attend the dinner party but who consumed leftover food that contained the béarnaise sauce also became unwell. Five of the cases tested positive for *S.* Typhimurium (MLVA 3-23-23-11-523). The person who cooked the meal, a chef, was provided with information on salmonellosis and the risks of using raw or minimally cooked eggs in food. In the third outbreak, a cluster of *L. monocytogenes* infections notified within an 8-day period prompted an investigation. All three cases were inpatients in hospitals within the same Local Health District during their incubation period. Food and menu histories revealed that the three cases had consumed profiteroles from the same external commercial supplier on the same day. Products from this supplier were then withdrawn from all NSW hospitals. The NSW Food Authority found that the supplier had previously had a profiterole test positive for *Listeria* (unspeciated); the positive test had not been reported at the time as it was not a requirement to do so. Two environmental swabs taken from the supplier's premises tested positive for *L. monocytogenes*. One of these samples was indistinguishable by MLVA from that found in the three cases. *L. innocua* was also found in swab samples at the factory site. In consultation with the NSW Food Authority, HealthShare NSW conducted a review of processes for approving suppliers of hospital food, including ensuring *Listeria* management plans were in place.

Viral gastrointestinal disease

There were 115 reported outbreaks of (suspected) viral gastrointestinal disease in institutions in the second quarter of 2013. Of these, 42 (37%) occurred in aged-care facilities, 56 (49%) occurred in childcare centres, 15 (13%) in hospitals, and one each in a school and a military institution. The outbreaks affected a total of 1612 people.

In 47% ($n = 54$) of all outbreaks, one or more stool specimens were laboratory tested to identify a possible cause of the outbreak. Norovirus was identified in 31% ($n = 17$) of these outbreaks. In one outbreak, *Salmonella* was detected alongside norovirus. *Giardia*, *Cryptosporidium* and *Clostridium difficile* were also each detected in single outbreaks; these were thought to be coincidental findings of pathogens during otherwise viral gastrointestinal outbreaks. Of the 54 outbreaks where one or more stool specimens were tested, 63% ($n = 34$) of all results were negative for any pathogens.

Respiratory infections

Influenza

Influenza continued to circulate at low levels for most of the second quarter of 2013 although activity rose markedly

during June, consistent with the start of the influenza season. There was evidence of co-circulation of influenza A(H1N1)pdm2009, influenza A(H3N2), and influenza B strains. The number of influenza cases notified in this quarter was much lower than for the same period in 2012, which had an earlier start to its influenza season.

For a more detailed report on respiratory activity in NSW see: http://www.health.nsw.gov.au/PublicHealth/Infectious/influenza_reports.asp.

Legionellosis

There were 17 cases of legionellosis due to *Legionella pneumophila* strains notified in the second quarter of 2013, similar to the number notified in the same period in 2012 ($n = 18$). There were no links between cases identified, and no likely environmental sources were found. There were also eight cases of legionellosis due to *L. longbeachae* strains, similar to the same period in 2012 ($n = 9$).

Vaccine-preventable diseases

Meningococcal disease

Six cases of meningococcal disease were notified in NSW in the second quarter of 2013 (three in April, one in May and two in June), a marked reduction from the 22 notified in the same period in 2012. The age of the cases ranged from 1 to 58 years, with four cases aged less than 5 years. Of the six notifications, five (83%) were due to serogroup B (for which there is no vaccine), and one was not able to be typed.

Immunisation against meningococcal C disease is recommended for all children at the age of 12 months, as well as people at high risk of disease.

Measles

There were nine measles notifications in NSW in the second quarter of 2013, a decline from the 22 reported in the same period in 2012. Cases ranged in age from 1 to 35 years. Five of the cases acquired the infection overseas (from either India, Thailand, Europe or Bali). Two further cases acquired the infection from close contacts of one of the cases returning from Thailand. The remaining two cases acquired the infection locally, however links to known cases were not identified.

Two doses of measles-containing vaccine are recommended for all children at 12 and 18 months age. All young adults planning international travel should ensure they are up to date with their measles vaccinations before they travel.

Pertussis

There were 504 pertussis cases notified in NSW during the second quarter of 2013. This is approximately one-third of the 1385 notifications for the same period in 2012 and represents the lowest number of notifications for a second quarter since the statewide epidemic in 2008. Most cases were in the 0–4 and 5–9-year age groups ($n = 109$ each), followed by the 10–14-year age group ($n = 69$).

Direct protection for young infants remains available through free vaccination for pertussis that is administered at 2, 4 and 6 months of age. The first dose can be provided as early as 6 weeks of age with a booster dose at 3½ to 4 years. Whooping cough vaccination is strongly recommended for adults in contact with young babies too young to be vaccinated. Women planning a pregnancy or in their third trimester should receive a whooping cough vaccine on prescription to protect their very young babies.

Sexually transmissible infections and bloodborne viruses

Chlamydia

There were 5089 cases of chlamydia notified in NSW during the second quarter of 2013. This number is 5% lower than the number notified in the first quarter ($n = 5339$), and similar to the second quarter of 2012 ($n = 5137$). Thirty-seven percent of the cases in the second quarter of 2013 were young women aged 15–24 years ($n = 1875$).

Gonorrhoea

There were 1044 cases of gonorrhoea notified during the second quarter of 2013, which is 5% lower than the number notified in the first quarter ($n = 1101$), and similar to the second quarter of 2012 ($n = 1026$). Of the 1044 cases, almost half were men aged between 20 and 34 years ($n = 508$).

Syphilis

There were 246 syphilis notifications in the second quarter of 2013, an increase of 23% from the same period last year ($n = 200$). Of the 246 syphilis notifications for this quarter, 138 (56%) notifications were classified as infectious syphilis. Thirty-seven percent of the cases in the second quarter of 2013 were men aged between 30 and 44 years ($n = 92$).

Lymphogranuloma venereum (LGV)

There were 10 cases of LGV in the second quarter of 2013. Although this is much higher than the number notified in the second quarter of 2012 ($n = 2$), it is the same as the average for the same period over the previous 3 years ($n = 10$). All cases in the second quarter of 2013 were men aged between 25 and 44 years.

HIV

There were 101 cases of newly diagnosed HIV infection notified in NSW residents during the second quarter of

2013, an increase from the same period in 2012 ($n = 84$) and from the average for the same period over the previous 4 years ($n = 82$). Similar to previous years, 80% of infections were reported to be homosexually acquired and 13% were heterosexually acquired (in people not from high HIV prevalence countries). The highest number of notifications was amongst people aged 20–29 years.

In the first half of 2013, more than one-third (39%) of the notifications were reported as recent HIV infection at time of diagnosis (defined as either a negative or indeterminate HIV antibody test or seroconversion illness in the previous 12 months), while 13% were advanced infections (AIDS and/or CD4<200 cells/μL). Of the 179 cases notified, 36% commenced treatment soon after diagnosis.

A summary of HIV notification data for the second quarter of 2013 is available at: http://www.health.nsw.gov.au/endinghiv/Documents/hiv-in-nsw-2nd-quarter-report-2013.pdf

Arboviral infections

Ross River virus

There were 197 cases of Ross River virus infection notified in the second quarter of 2013, a decrease compared with the same period in 2012 ($n = 218$). Ross River virus notifications were again highest in coastal regions, particularly along the north coast of NSW.

Barmah Forest virus

There were 133 cases of Barmah Forest virus infection notified in NSW in the second quarter of 2013, an increase compared with the same period in 2012 ($n = 80$). However, there continue to be concerns about false-positive laboratory reports for Barmah Forest Virus and so the figures for 2013 should be interpreted with caution.

Dengue virus

There were 70 cases of dengue virus infection notified in NSW in the second quarter of 2013, similar to the same period in 2012 ($n = 72$). All cases in the second quarter of 2013 were overseas-acquired infections, with 50% of all cases believed to have acquired dengue virus infection in Indonesia, followed by Thailand (19% of notified cases).

NSW Denominator Data Project

Notifications of positive laboratory results for notifiable conditions provide information about the number of new cases of disease. Data on the level of testing is useful to indicate whether an apparent increase in notification may be due to increased testing.

The NSW Denominator Data Project commenced in January 2012 to collect the total number of tests performed per month (the denominator data) for 10 selected notifiable conditions for which the testing rate might impact the notification rate. Data provided each month from 14 public and private laboratories in NSW are collated to give monthly aggregated data per condition. No demographic information is provided.

The positivity rate for the second quarter of 2013 ranged from 0.05% (shigellosis) to 5.6% (Ross River virus) (Table 1). Overall, the postivity rates were similar for the second quarter in 2013 as for the same period in 2012 – with the exception of Barmah Forest virus (up to 4.9% from 2.2% in 2012) and pertussis (down to 1.8% from 3.2% in 2012). Notifications for chlamydia and gonorrhoea were correlated with testing, while incidence of enteric conditions suggests that seasonal factors rather than testing patterns influence notification rates.

Table 1. Number and positivity (%) of tests performed for selected notifiable conditions, quarter 2 of 2012 and quarter 2 of 2013

Condition	Test	Quarter 2 of 2012		Quarter 2 of 2013	
		Number of tests	Positivity (%)	Number of tests	Positivity (%)
Chlamydia	*C. trachomatis* nucleic acid test (NAT)	90 668	5.69	98 031	5.19
Gonorrhoea	*Neisseria gonorrhoea* NAT, culture	111 095	0.94	121 316	0.85
HIV	Serology	96 583	–	105 174	Not reported
Ross River virus infection	Serology	4873	4.49	3586	5.58
Barmah Forest virus infection	Serology	3715	2.18	2816	4.94
Pertussis	NAT, serology, culture	43 503	3.16	27 015	1.82
Salmonellosis	NAT, culture	49 414	1.15	44 117	1.90
Shigellosis			0.05		0.05
Cryptosporidiosis	Antigen, microscopy	37 901	0.66	39 135	0.87
Giardiasis			1.44		1.44

Figure 1. Reports of selected communicable diseases, NSW, Jan 2005 to Jun 2013, 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.
NB: Multiple series in graphs are stacked, except gastroenteritis outbreaks.
NB: Outbreaks are more likely to be reported by nursing homes and 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 2. Notifications of scheduled medical conditions with an onset date from April to June 2013 by Local Health District, NSW

Condition	Local Health District																Total 2013		Total 2012	
	Murrumbidgee	Southern NSW	Western NSW	Far West	Hunter New England	Northern NSW	Mid North Coast	Central Coast	Northern Sydney	South Eastern Sydney	Illawarra Shoalhaven	Sydney	South Western Sydney	Western Sydney	Nepean Blue Mountains	Justice Health	Apr-Jun[b]	Year to date[b]	Apr-Jun[b]	Year to date[b]
Bloodborne and sexually transmissible																				
Chlamydia (genital)[a]	197	100	248	23	745	204	91	200	430	759	286	552	523	466	197	41	5089	10 428	5137	11 031
Gonorrhoea[a]	8	6	11	–	52	22	5	34	83	324	37	241	102	86	29	3	1044	2145	1026	2005
Hepatitis B – acute viral[a]	–	–	–	–	5	–	–	–	–	1	–	–	2	1	–	–	9	20	6	14
Hepatitis B – other[a]	10	4	8	1	19	2	10	8	83	74	7	85	115	127	6	6	565	1127	563	1161
Hepatitis C – acute viral[a]	–	–	1	–	1	–	–	–	–	3	–	–	–	–	–	–	5	17	11	24
Hepatitis C – other[a]	25	33	53	9	95	56	29	53	28	68	40	79	90	81	25	66	834	1644	767	1654
Hepatitis D – unspecified[a]	–	–	1	–	–	–	–	–	–	–	–	–	2	1	–	–	4	5	1	3
Lymphogranuloma venereum	–	–	1	–	–	–	–	–	2	3	–	3	–	–	–	–	10	19	2	5
Syphilis	2	1	2	–	8	6	–	–	15	64	5	76	36	23	8	–	246	496	200	394
Vectorborne																				
Barmah Forest virus[a]	–	2	3	1	32	64	22	3	1	–	1	–	1	–	3	–	133	268	80	185
Ross River virus[a]	11	7	10	2	48	58	45	5	2	1	2	1	–	1	4	–	197	313	218	427
Arboviral infection (other)[a]	3	1	–	–	15	14	2	–	8	14	4	1	–	6	3	–	71	136	70	170
Malaria[a]	–	–	–	–	1	1	1	–	1	1	1	1	1	5	–	–	13	39	17	30
Zoonoses																				
Brucellosis[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	3
Leptospirosis[a]	–	–	–	–	2	–	–	–	–	1	–	–	–	–	–	–	3	5	10	19
Psittacosis[a]	–	–	–	–	1	–	1	–	–	–	–	–	–	–	2	–	4	5	5	12
Q fever[a]	2	2	6	2	14	6	3	–	1	–	8	–	1	1	1	–	47	77	25	64
Respiratory and other																				
Blood lead level[a]	15	–	16	41	10	4	–	3	1	8	20	8	3	3	5	–	137	275	148	283
Influenza[a]	12	12	10	–	25	54	9	6	105	93	11	37	127	93	34	–	628	1023	2391	2623
Invasive pneumococcal infection[a]	6	5	10	–	22	3	1	6	7	17	9	9	13	15	12	–	135	199	184	241
Legionella longbeachae infection[a]	–	1	–	–	–	–	–	–	–	–	1	–	4	1	1	–	8	15	9	16
Legionella pneumophila infection[a]	–	–	–	–	1	–	1	–	5	2	1	–	3	2	2	–	17	30	18	43
Legionnaires' disease (other)[a]	–	–	–	–	1	–	–	1	–	–	–	–	–	–	–	–	2	4	3	5
Leprosy	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
Meningococcal infection (invasive)[a]	–	–	–	–	3	–	–	1	1	–	–	–	–	–	1	–	6	14	22	28
Tuberculosis	–	–	1	–	3	–	2	–	7	8	2	16	15	29	–	–	83	183	90	203
Vaccine-preventable																				
Adverse event after immunisation	7	13	3	–	19	9	2	4	11	9	11	3	7	14	3	–	117	374	84	167
H. influenzae b infection (invasive)[a]	–	–	1	–	–	–	–	–	–	1	–	–	–	–	–	–	2	4	–	–
Measles	–	–	–	–	–	–	–	–	3	1	–	3	–	2	–	–	9	10	22	22
Mumps[a]	–	–	–	–	–	2	–	–	19	2	1	1	2	5	2	–	34	59	51	67
Pertussis	52	37	20	–	51	11	14	6	58	45	26	33	54	50	46	–	504	1141	1385	3449
Rubella[a]	–	–	–	–	–	1	–	–	1	–	–	–	–	1	1	–	4	5	2	6
Tetanus	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	2	–	–
Enteric																				
Cholera[a]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1
Cryptosporidiosis[a]	8	2	21	–	30	14	5	14	60	46	11	24	14	24	19	–	292	884	234	449
Giardiasis[a]	14	11	19	–	71	4	14	25	104	109	33	54	33	44	24	–	559	1241	546	1203
Haemolytic uraemic syndrome	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	4	7
Hepatitis A[a]	–	–	–	–	–	–	–	–	–	3	–	2	1	5	–	–	11	40	9	20
Hepatitis E[a]	–	–	–	–	–	–	–	–	1	2	–	1	–	–	–	–	4	11	3	4
Listeriosis[a]	–	1	–	–	–	1	–	–	–	1	–	1	1	2	–	–	7	18	10	20
Rotavirus[a]	4	–	3	–	21	2	–	3	10	14	5	7	6	4	3	–	82	183	146	336
Salmonellosis[a]	31	30	30	6	127	41	22	31	119	102	39	63	72	84	43	–	842	1970	563	1567
Shigellosis[a]	–	–	1	–	–	4	–	–	2	5	–	3	3	2	–	–	20	58	23	64
Typhoid[a]	–	1	–	–	–	1	–	–	3	3	–	2	2	5	–	–	17	40	11	27
Verotoxin-producing *E. coli*[a]	–	–	1	–	2	1	–	–	–	–	1	–	1	–	–	–	6	16	5	8
Miscellaneous																				
Creutzfeldt–Jakob disease	1	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	2	6	1	2

[a]Laboratory-confirmed cases only. [b]Includes cases with unknown postcode. [b]Data for 'Adverse Event Following Immunisation' category refer to suspected cases only. These reports are referred to the Therapeutic Goods Administration (TGA) for assessment. Data on adverse events following immunisation is available online from the TGA Database of Adverse Event Notifications.
NB: Data are current and accurate as at the preparation date. The number of cases reported is, however, subject to change, as cases may be entered at a later date or retracted upon further investigation.
Data are reported by Local Health District of residence (geocoded to 2011 boundaries).
Source: Notifiable Conditions Information Management System, NSW Health.

NSW GOVERNMENT Health

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