

Positive testing rates of selected notifiable conditions for NSW residents, 2013

Introduction

Surveillance of notifiable infectious diseases 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 may be due to increased testing rather than increased incidence.

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 for sexually transmitted infections (chlamydia and gonorrhoea), vector borne infections (Ross River and Barmah Forest), pertussis, enteric diseases, and HIV are reported each month from 14 public and private laboratories. These laboratories account for 88% of the total notifications for the selected conditions in NSW

The data is collated to give monthly aggregated data per condition. Comparison with notifications of positive case reports may help to inform whether an apparent increase in notification for a condition is a result of increased testing, and to provide an indication of a trend in incidence to enable timely public health action.

Methods

The laboratory denominator data is submitted by staff from the 14 laboratories quarterly to a web-based password protected secure site to ensure confidentiality of the information. No demographic information is provided. The reported denominator data is interpreted per laboratory to account for various testing methods with the summary test information collated to provide monthly aggregated data (Appendix 1).

Under the NSW Public Health Act, pathology laboratories are required to report certain conditions to Public Health. Overall positive result data was taken from these reports to NSW Health for people resident in NSW diagnosed with one of 10 selected notifiable conditions. Data on the 10 notifiable conditions were analysed for the period between 1 January and 31 December 2013, based on the specimen date, for the selected conditions. The positive notification rate (per 1,000 tests performed) for all reported conditions was defined as the total number of notifications (regardless of source of notification) divided by the number of tests reported from the 14 participating laboratories. HIV was not included in the analysis due to complexities in the notification process of excluding repeat positive tests.

Results

The total number of tests reported in 2013 was higher for chlamydia, gonorrhoea, HIV, and parasitic enteric conditions (cryptosporidiosis and giardiasis) compared to 2012, but was lower for Ross River virus, Barmah Forest virus infections, and bacterial enteric conditions (salmonellosis and shigellosis). Testing for pertussis was 30% lower in 2013 compared with 2012.

The positive notification rate for included conditions ranged from 52.7 for chlamydia to 0.8% for shigellosis (Table 2). There was a significant increase in positivity for Barmah Forest virus infection (36.2 per 1,000 tests in 2013 compared to 25.3 per 1,000 tests in 2012), and significant decreases noted in positivity of pertussis (22.5 per 1,000 tests in 2013 compared to 39.4 per 1,000 tests in 2012) and chlamydia (52.7 per 1,000 tests in 2013 compared to 56.4 per 1,000 tests in 2012). Notifications for chlamydia and gonorrhoea were correlated with testing, while notification rates of enteric conditions showed a seasonal trend rather than impacts of testing patterns.

Table 2: Number and positive notification rate of tests performed for 10 selected notifiable conditions at 14 participating laboratories for 2012 and 2013

Condition	Test	2012		2013	
		Number of tests	Positive notification rate (per 1,000 tests)	Number of tests	Positive notification rate (per 1,000 tests)
Chlamydia	C trachomatis NAT	377,745	56.4	395,131	52.7
Gonorrhoea	N gonorrhoea NAT & culture	459,751	9.0	491,080	8.6
HIV#	Serology	422,482	NA	444,551	NA
Ross River virus infection	Serology	18,171	33.1	15,237	33.1
Barmah Forest virus infection##	Serology	13,981	25.3	11,978	36.2
Pertussis	NAT, serology, culture	147,272	39.4	102,646	22.5
Salmonellosis	NAT, culture	193,444	15.2	188,060	18.3
Shigellosis			0.7		0.8
Cryptosporidiosis	Antigen, microscopy	157,554	4.3	167,224	6.6
Giardiasis			12.8		13.2

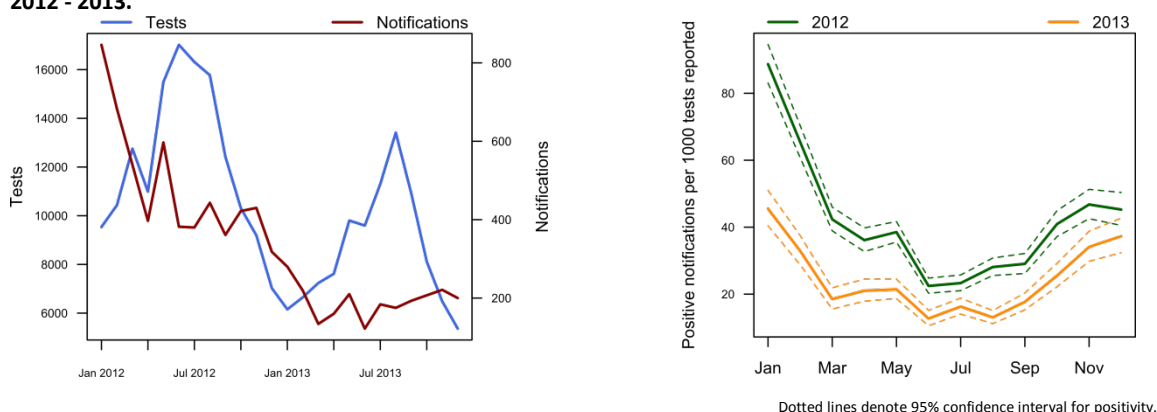
HIV notifications were excluded due to the complexity of the notifications process and exclusion of repeat tests.

Notifications for Barmah Forest virus infection for the period October 2012 – July 2013 should be interpreted with caution due to known false positive readings from the only available commercial IgM assay.

Vaccine Preventable Disease - Pertussis

The total number of tests for pertussis was calculated using a combination of serology, NAT and culture. Historically there has been a pattern of more pertussis diagnosis in summer months, but more pertussis testing occurring in winter. The number of tests in 2013 (102,646) declined significantly compared with 2012 (147,272). The positive notification rate also declined to 22.5 per 1,000 tests (range 13.0 to 45.5 per 1,000 tests) in 2013 compared with 39.4 per 1,000 tests (range 22.4 to 88.6 per 1,000 tests) in 2012 (Figure 1).

Figure 1: Comparison of pertussis notifications, tests performed, and positive notification rate per 1,000 tests - NSW 2012 - 2013.



Sexually Transmitted Infections – Chlamydia and Gonorrhoea

The total number of tests for chlamydia and gonorrhoea was calculated using NAT screening, with additional cultures performed for gonorrhoea. The positive notification rate for chlamydia was the highest among the diseases analysed in this period, with 52.7 positive tests notified across NSW per 1000 tests performed by the 14 laboratories in 2013 but was significantly lower compared with 2012 (56.7 per 1,000 tests) (Figure 2). For gonorrhoea, 8.6 positive tests were notified across NSW for every 1,000 tests performed by the 14 laboratories in 2013, similar to 2012 when 9.0 positive tests were notified for every 1,000 tests performed (Figure 3). Overall, positive notification rates declined over the period.

Figure 2: Comparison of chlamydia notifications, tests performed, and positive notification rate per 1,000 tests - NSW, 2012 –2013.

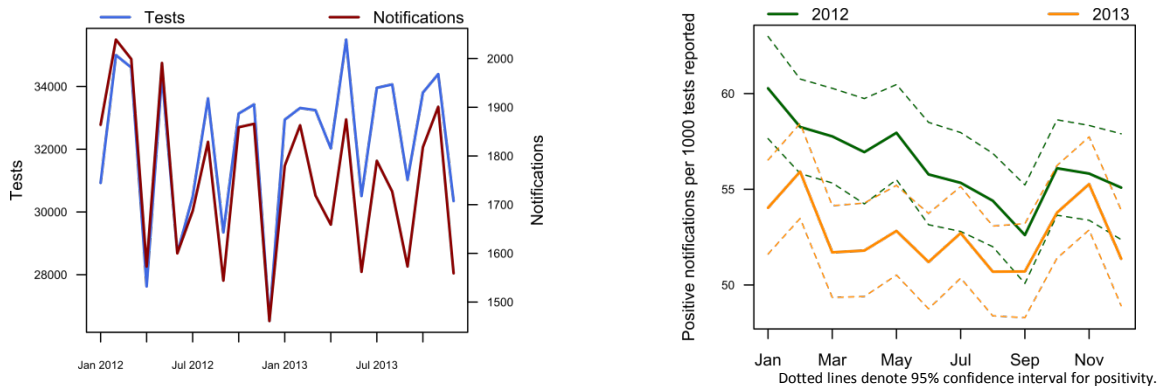
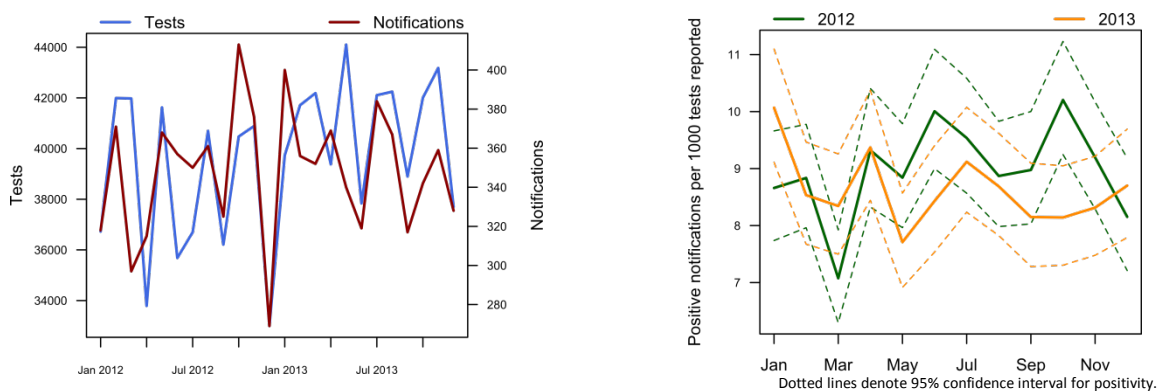


Figure 3: Comparison of gonorrhoea notifications, tests performed, and positive notification rate per 1,000 tests - NSW, 2012- 2013



Vector Borne Disease – Ross River Virus and Barmah Forest virus infections

The number of tests for Ross River virus (RRV) and Barmah Forest virus (BFV) were similar as testing is predominantly done in combination. There was a decline in testing for both infections in 2013 (15,237 RRV tests, 11,978 BFV tests) compared with 2012 (18,171 RRV tests, 13,981 BFV tests). There was a seasonal trend in testing and positivity in both 2012 and 2013, with more testing and notifications during summer and autumn.

For RRV infection, compared to the previous year, there was a significant increase in positivity in May 2013 without a corresponding increase in testing (Figure 4). For BFV infection, an increase in notifications from October 2012 was noted (Figure 5) which had also been reported nationally. The increase continued into 2013 and has been attributed to false positive results from the only available commercial IgM assay. This assay was adjusted in mid 2013, and a subsequent decline in notifications has been noted. Due to this issue, 2013 data for BFV should be interpreted with caution.

Figure 4: Comparison of Ross River notifications, tests performed, and positive notification rate per 1,000 tests - NSW, 2012- 2013.

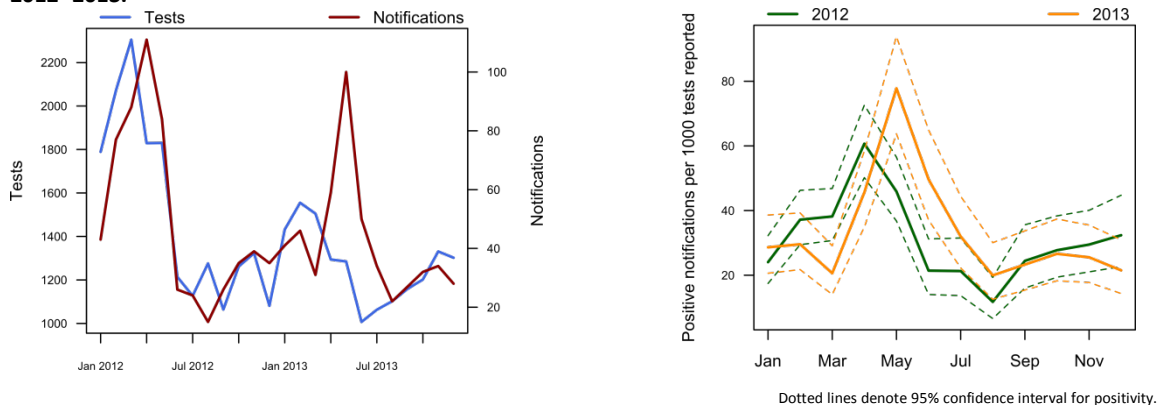
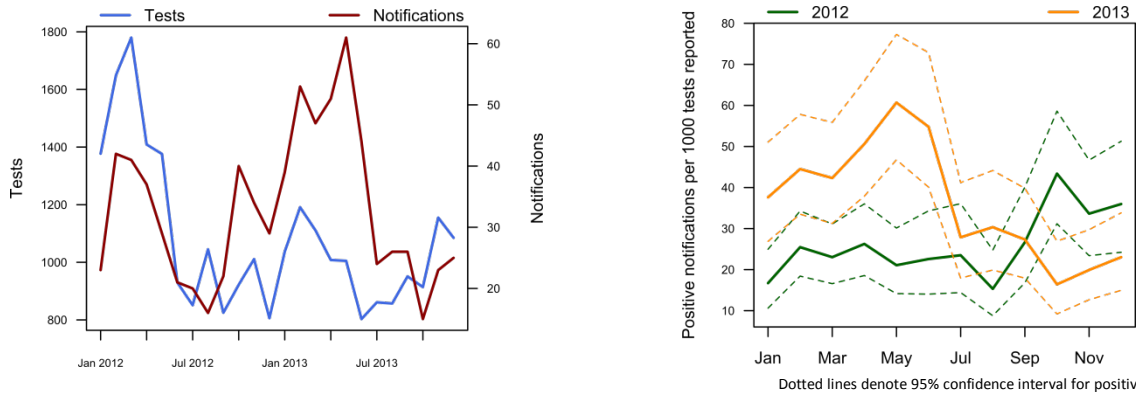


Figure 5: Comparison of Barmah Forest notifications, tests performed, and positive notification rate per 1,000 tests[#] - NSW, 2012- 2013.



[#] Positivity results for Barmah Forest Virus should be interpreted with caution. An issue with false positive rates in the only available commercial IgM assay was noted in October 2012 and the assay adjusted in mid 2013.

Parasitic Enteric Diseases – Cryptosporidiosis and Giardiasis

Cryptosporidiosis and giardiasis are screened using the same test, so the denominator was the same for both conditions. In 2013, the total numbers of tests per month were stable across the period, while the notifications for both diseases varied with higher notifications in the summer months. There were significant spikes in notifications and positivity rates for both diseases during February 2013 (Figures 6 and 7).

Figure 6: Comparison of cryptosporidiosis notifications, number of faecal parasitic screening and antigen tests performed and positive notification rate per 1,000 tests - NSW, 2012- 2013.

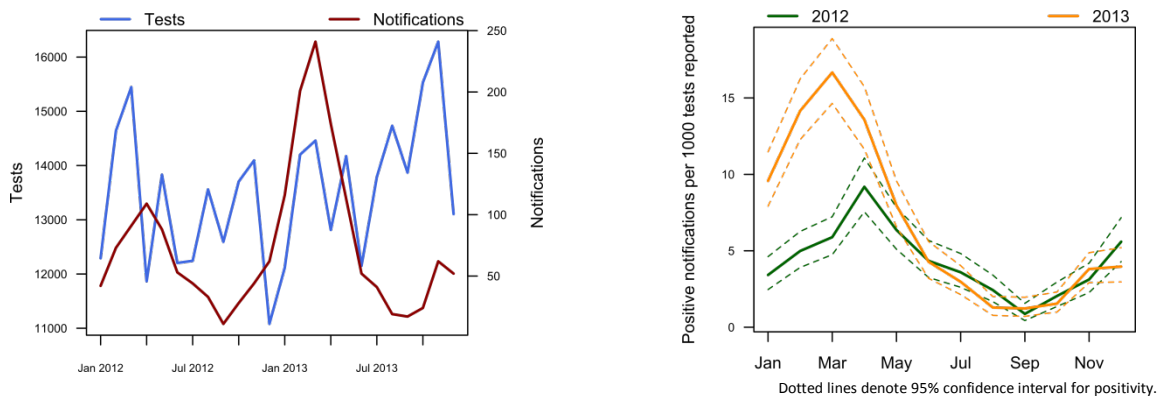
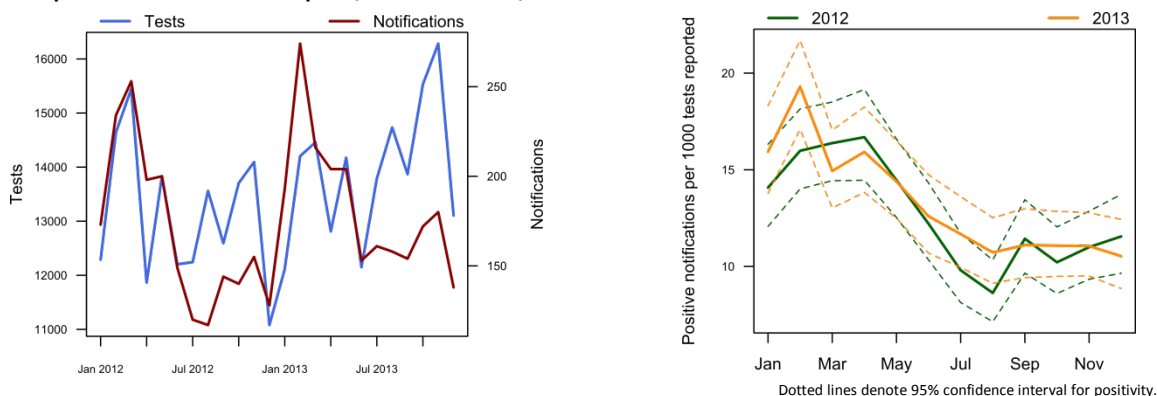


Figure 7: Comparison of giardiasis notifications, total number of faecal parasitic screening and antigen tests performed and positive notification rate per 1,000 tests - NSW, 2012- 2013.



Bacterial Enteric Diseases - Salmonellosis and Shigellosis

Salmonellosis and shigellosis are screened using the same test, so the denominator was the same for both conditions. Similar to the parasitic enteric conditions, the total number of tests remained stable over the period. The notifications for salmonellosis followed a seasonal pattern, with high notifications and positivity rates in summer months (Figure 8). The relatively small number of shigellosis notifications shows little change over time (Figure 9).

Figure 8: Comparison of salmonellosis notifications, total number of faecal NAT and cultures performed and positive rate per 1,000 tests - NSW, 2012- 2013.

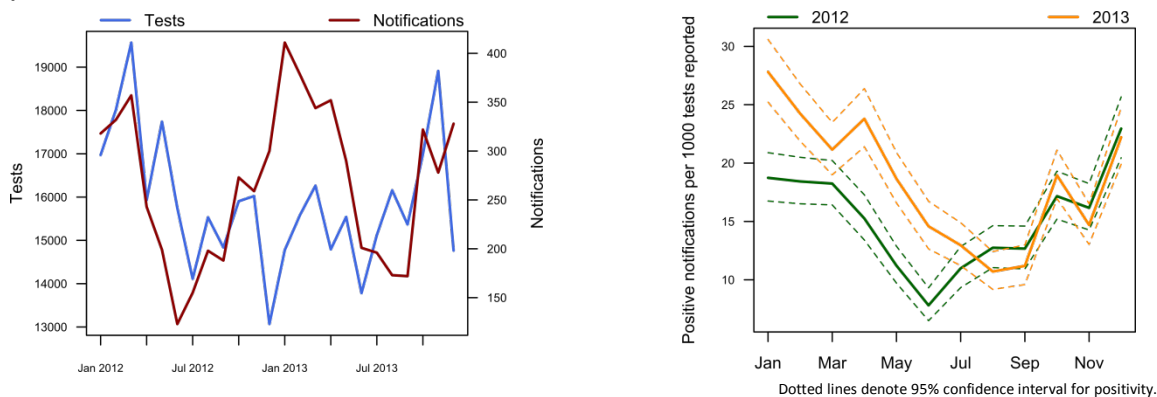
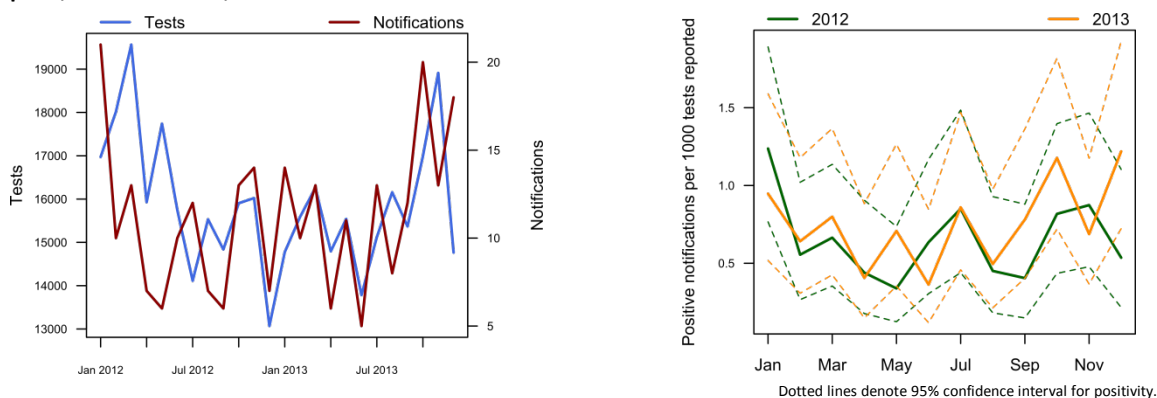


Figure 9: Comparison of shigellosis notifications, total number of faecal NAT and cultures performed and positivity rate per 1,000 tests - NSW, 2012- 2013.



Discussion

The NSW Denominator Data Project, based on ongoing collection of testing data, aims to provide timely information to aid interpretation of trends in notification data. The data has shown that the positive notification rate for selected conditions in 2013 ranged from 52.7 per 1,000 tests for chlamydia to 0.8 per 1,000 tests for shigellosis. The similar pattern of testing and disease notifications, and subsequent stable positive testing rates noted for sexually transmitted infections, suggest (as with other similar studies) that chlamydia and gonorrhoea notifications are highly correlated with testing patterns.

In contrast, testing throughout the year of enteric conditions, both parasitic and bacterial, suggests that the incidence reflects seasonality in patterns of infection rather than changes to rates of testing. In 2013, while pertussis testing increased over winter months (likely in response to increased cough illness), positivity rates remained low. This indicates a true reduction of pertussis circulating in the community in 2013.

This analysis is subject to several limitations. Firstly, the testing data were collected from 14 participating laboratories and is not a total account of all testing in NSW. However, it is estimated that the laboratories included account for around 88% of the total notifications for the selected conditions. Secondly, the analysis only included 24 months of data, limiting the ability to interpret longer term trends. Thirdly, analysis of age-specific rates or specific rates per geographic area could not be calculated as demographic data including age, sex, or postcode was not collected. Lastly, there may be some duplication in test counts for conditions where more than one method of testing may be used (pertussis, gonorrhoea and enteric conditions). In addition, multiple tests could be conducted on an individual for a single condition.

Conclusion

Overall the project has shown value in interpretation of notification data and the impact of testing. For example, in understanding the impact that targeted testing campaigns may have on increased

testing and subsequent notifications for STIs. Further work is underway to enhance the usefulness of the NSW denominator data project including: consideration of adding some demographic data, addition of remaining NSW laboratories which are not currently involved in the project, and a review of the selected conditions.

Acknowledgements

Health Protection NSW would like to acknowledge the work of the following laboratories in providing data for the project:

Pathology North (Hunter Area Pathology Service, Pacific Laboratory Medicine Services, Royal North Shore Hospital, Central Coast); Pathology West; South Eastern Area Laboratory Services - North and Central, SEALS South; Sydney South West Pathology Services (SSWPS) (Concord Laboratory, Liverpool Laboratory, Royal Prince Alfred Hospital Laboratory); Children's Hospital Westmead; Douglass Hanly Moir Pathology; Healthscope; Laverty Pathology; SydPath.

Appendix 1: Selected notifiable conditions and tests included in the denominator data project

Notifiable conditions	Tests performed and collected
Sexually transmitted infections	
Chlamydia	screening for <i>Chlamydia trachomatis</i> using NAT (single or combo)
Gonorrhoea	screening for <i>Neissera gonorrhoea</i> using NAT (single or combo) and/or culture
Blood borne virus/ Sexually transmitted infections	
HIV	serology (not confirmatory testing)
Vaccine preventable diseases	
Pertussis	screening for <i>Bordetella pertussis</i> using NAT, serology and/or culture
Vector borne diseases	
Ross River virus	serology (not confirmatory testing)
Barmah Forest virus	serology (not confirmatory testing)
Bacterial enteric conditions	
Shigellosis	faecal specimens examined for <i>Shigella</i> and <i>Salmonella</i> by culture or NAT
Salmonellosis	
Parasitic enteric conditions	
Giardiasis	
Cryptosporidiosis	faecal specimens examined by OCP screening and/or antigen testing

NAT: nucleic acid test; OCP: ova cysts and parasites

Appendix 2: Number of tests, notifications and positive notification rates per 1,000 tests for selected notifiable conditions in NSW, January to December 2013

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2013 Total
Cryptosporidium	Positive cases	116	201	240	174	113	52	41	19	17	24	62	52	1111
	Number of tests	12116	14202	14460	12812	14174	12149	13790	14733	13869	15530	16284	13105	167224
	Positive percent	9.6	14.2	16.6	13.6	8.0	4.3	3.0	1.3	1.2	1.5	3.8	4.0	6.6
Giardia	Positive cases	192	273	216	204	204	153	161	158	154	172	180	138	2205
	Number of tests	12116	14202	14460	12812	14174	12149	13790	14733	13869	15530	16284	13105	167224
	Positive percent	15.8	19.2	14.9	15.9	14.4	12.6	11.7	10.7	11.1	11.1	11.1	10.5	13.2
Salmonella	Positive cases	410	378	344	352	290	201	196	173	172	322	278	328	3444
	Number of tests	14776	15591	16263	14792	15543	13782	15124	16157	15367	16988	18913	14764	188060
	Positive percent	27.7	24.2	21.2	23.8	18.7	14.6	13.0	10.7	11.2	19.0	14.7	22.2	18.3
Shigella	Positive cases	14	10	13	6	11	5	13	8	12	20	13	18	143
	Number of tests	14776	15591	16263	14792	15543	13782	15124	16157	15367	16988	18913	14764	188060
	Positive percent	0.9	0.6	0.8	0.4	0.7	0.4	0.9	0.5	0.8	1.2	0.7	1.2	0.8
Ross River	Positive cases	41	46	31	59	100	50	34	22	27	32	34	28	504
	Number of tests	1432	1555	1505	1294	1285	1007	1063	1102	1159	1202	1331	1302	15237
	Positive percent	28.6	29.6	20.6	45.6	77.8	49.7	32.0	20.0	23.3	26.6	25.5	21.5	33.1
Barmah Forest	Positive cases	39	53	47	51	61	44	24	26	26	15	23	25	434
	Number of tests	1037	1191	1111	1008	1005	803	861	857	951	914	1155	1085	11978
	Positive percent	37.6	44.5	42.3	50.6	60.7	54.8	27.9	30.3	27.3	16.4	19.9	23.0	36.2
HIV	Number of tests	35557	37374	36764	36763	40891	35520	38500	37619	36284	38666	38868	31745	444551
Chlamydia	Positive cases	1780	1862	1719	1659	1875	1562	1789	1727	1573	1818	1901	1559	20824
	Number of tests	32943	33315	33246	32028	35496	30507	33959	34066	31022	33805	34396	30348	395131
	Positive percent	54.0	55.9	51.7	51.8	52.8	51.2	52.7	50.7	50.7	53.8	55.3	51.4	52.7
Gonorrhoea	Positive cases	400	356	352	369	340	319	384	367	318	342	359	328	4234
	Number of tests	39731	41713	42188	39377	44104	37835	42107	42245	38897	42005	43182	37696	491080
	Positive percent	10.1	8.5	8.3	9.4	7.7	8.4	9.1	8.7	8.2	8.1	8.3	8.7	8.6
Pertussis	Positive cases	280	219	134	160	210	122	184	175	193	207	221	200	2305
	Number of tests	6155	6650	7236	7616	9802	9597	11301	13410	10917	8116	6483	5363	102646
	Positive percent	45.5	32.9	18.5	21.0	21.4	12.7	16.3	13.0	17.7	25.5	34.1	37.3	22.5