Positive testing rates of selected notifiable conditions for NSW residents, 2012

Background

Positive laboratory results for notifiable conditions are reported by each pathology service to the local public health unit, and entered into the Notifiable Conditions Information Management System (NCIMS). This provides information about the number of new cases of disease.

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 selected public and private laboratories in NSW. The data for sexually transmitted infections (chlamydia and gonorrhoea), vector borne infections (Ross River and Barmah Forest), pertussis, enteric diseases, and HIV was reported by each participant laboratory. A web-based password protected secure site was used to collate the data and to ensure confidentiality of the information provided.

The reported denominator data was interpreted per laboratory (to account for various testing methods) and collated to give monthly aggregated data per condition to indicate the rate of testing in the population. 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 collection of monthly aggregated denominator data from 14 laboratories across NSW for the selected conditions began in January 2012. These laboratories account for at least 87% of the total notifications for these conditions. The laboratory denominator data is a summary of tests performed for NSW residents for the selected notifiable conditions (Table 1). Notification data was analysed for the period between 1 January 2012 and 31 December 2012, based on the specimen date, for the selected conditions. The notifications, total number of tests performed and positivity rate (per 1,000 tests performed) for all reported conditions were calculated. HIV was not included in the analysis due to complexities in the notification process of excluding repeat positive tests

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

Notifiable conditions	Tests performed and collected
Sexually transmitted infections	
Chlamydia	screening for *Chlamydia trachomatis* using NAT (single or combo)
Gonorrhoea	screening for *Neissera gonorrhoeae* using NAT (single or combo) and/or culture
Blood borne virus	
HIV	serology (not confirmatory testing)
Vaccine preventable diseases	
Pertussis	screening for *Bordetella pertussis* 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 Salmonellosis	faecal specimens examined for *Shigella* and *Salmonella* by culture or NAT
Parasitic enteric conditions	
Giardiasis Cryptosporidiosis	faecal specimens examined by OCP screening and/or antigen testing

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

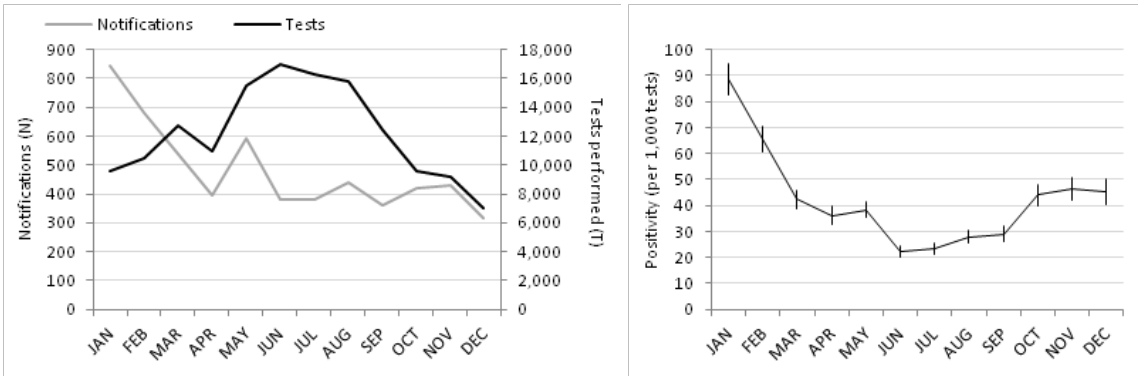
Results

The overall number of tests conducted throughout NSW in 2012 was high, with all conditions recording a positive test proportion of less than 6%, with some as low as less than 0.1%. The condition with the highest positivity rate was chlamydia infection which had 58 positive notifications for every 1,000 tests performed in 2012, while the lowest positivity rate was seen for shigellosis which had less than one positive notification for every 1,000 tests performed in 2012 (appendix A).

Pertussis

The total number of tests for pertussis was calculated using a combination of serology, NAT and culture. In 2012, there was an increase in testing over winter months. However, this increase was not reflected in the notification rate for pertussis resulting in a decrease in the positivity rate for this period (Figure 1). Higher notification rates between January and April are consistent with the end of the previous epidemic year.

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



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. In 2012, the positivity rate for chlamydia was the highest among diseases analysed as part of this study, with 58 positive tests notified for every 1,000 tests performed (Figure 2). Gonorrhoea recorded 8 positive tests for every 1,000 tests performed (Figure 3). The stable positivity rate seen in both chlamydia and gonorrhoea over the 12 months, suggests that positive notifications of infection are highly correlated with testing.

Figure 2: Comparison of chlamydia notifications, tests performed, and positive rate per 1,000 tests - NSW residents, 2012

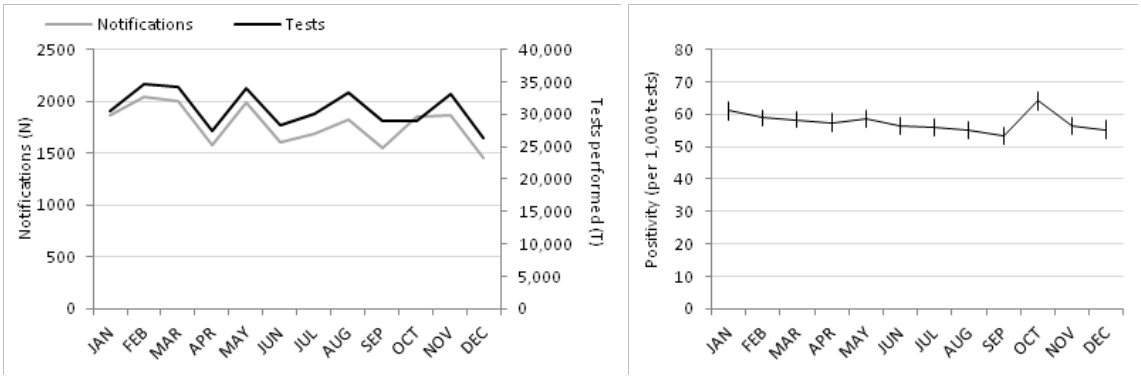
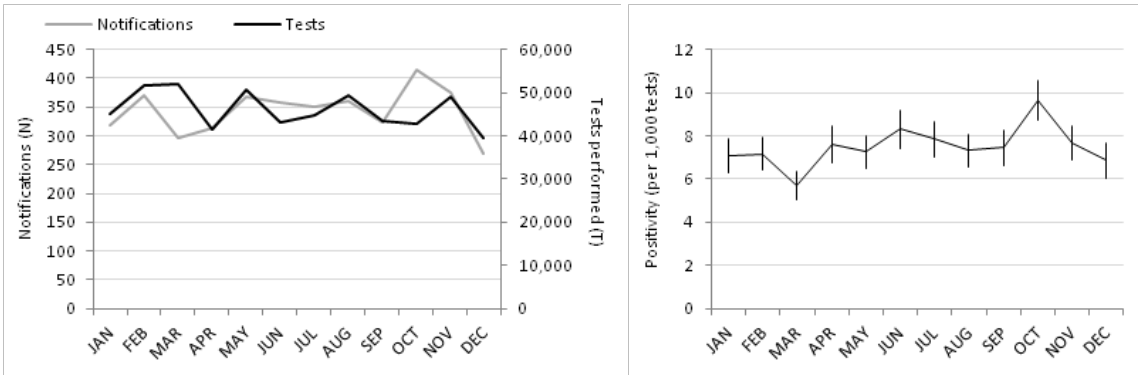


Figure 3: Comparison of gonorrhoea notifications, tests performed, and positive rate per 1,000 tests - NSW residents, 2012



Vector Borne Disease - Ross River virus and Barmah Forest virus infections

The number of total tests for Ross River virus and for Barmah Forest virus are similar as testing is predominantly done simultaneously. In 2012, there was a seasonal trend in testing, with more tests being done during the start of the year. This pattern is mirrored by notifications, although for Ross River infections to a greater extent, so showing a higher positivity rate for this period (Figure 4). A small number of Barmah Forest infections were notified making fluctuations in apparent positivity rate difficult to interpret (Figure 5).

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

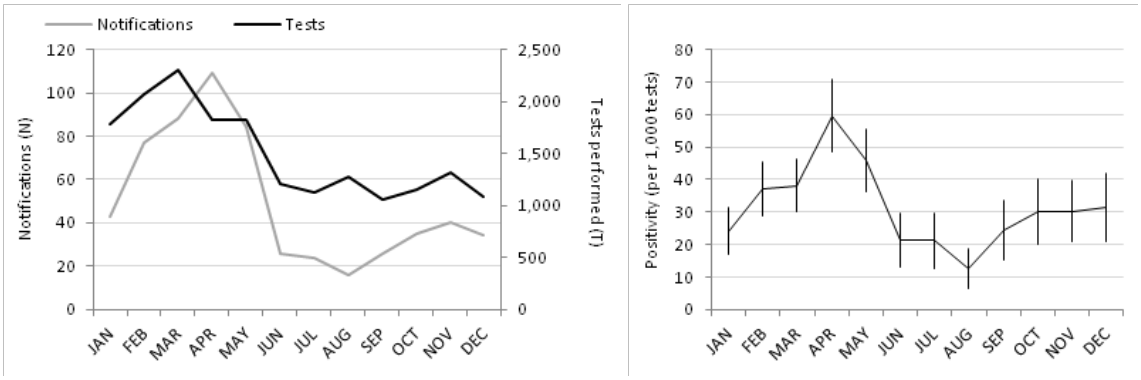
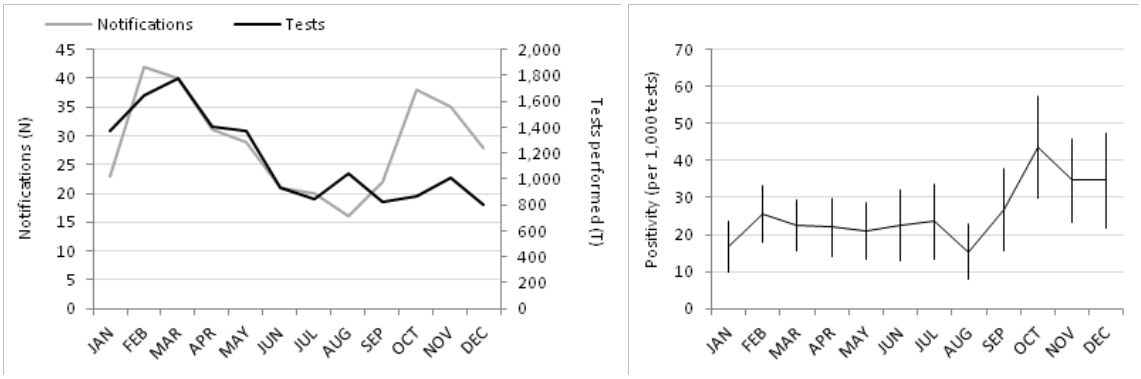


Figure 5: Comparison of Barmah Forest notifications, tests performed, and positive rate per 1,000 tests - NSW residents, 2012



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 2012, the total numbers of monthly tests were stable, while the notifications for cryptosporidiosis were seasonal, with high notifications in March to June and low notifications seen in August to October; this is also reflected in the positivity rate (Figure 6). The same trend can be seen for giardiasis but to a lesser extent (Figure 7).

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

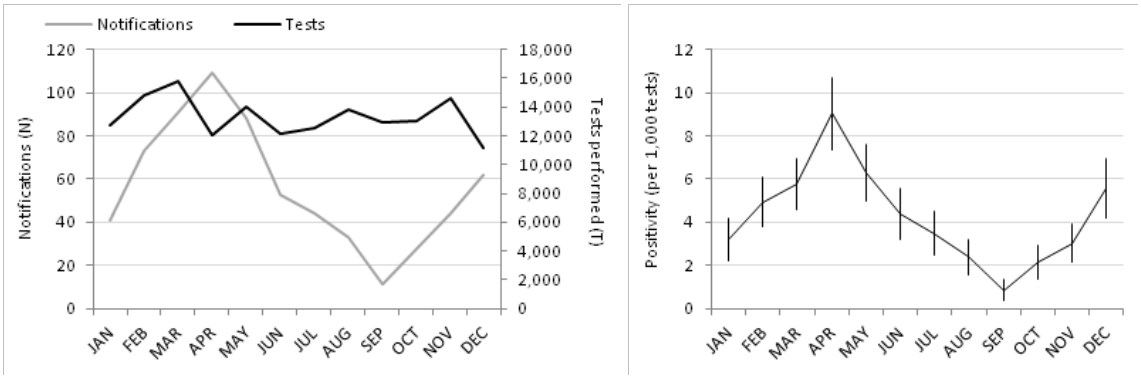
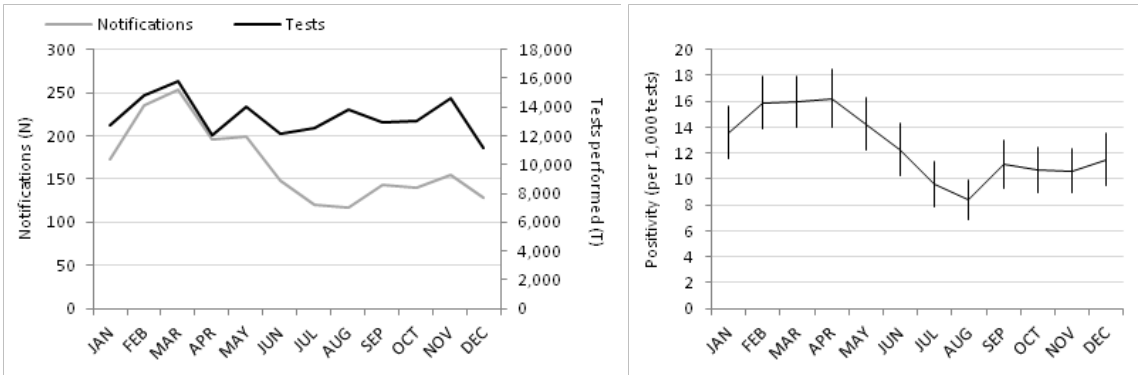


Figure 7: Comparison of giardiasis notifications, total number of faecal parasitic screening and antigen tests performed and positive rate per 1,000 tests - NSW residents, 2012



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 each month remained stable over the period. The notifications for salmonellosis were seasonal, with high notifications in summer months; this is also reflected in the positivity rate (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 residents, 2012

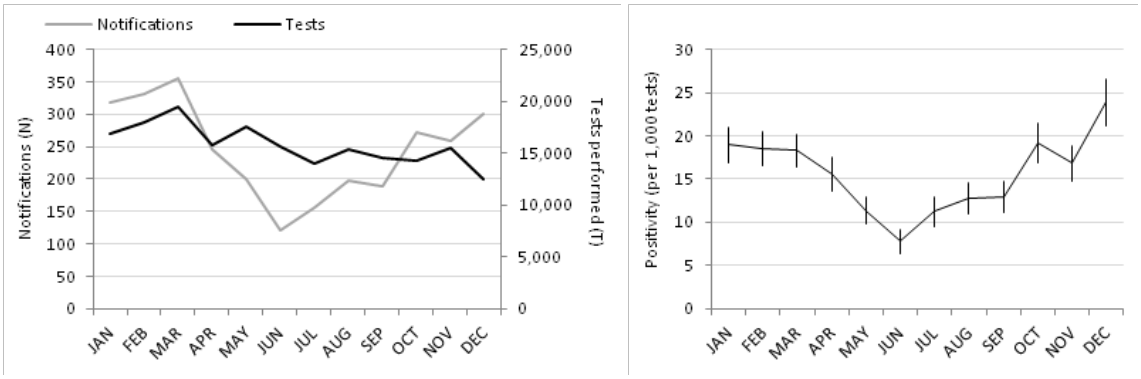
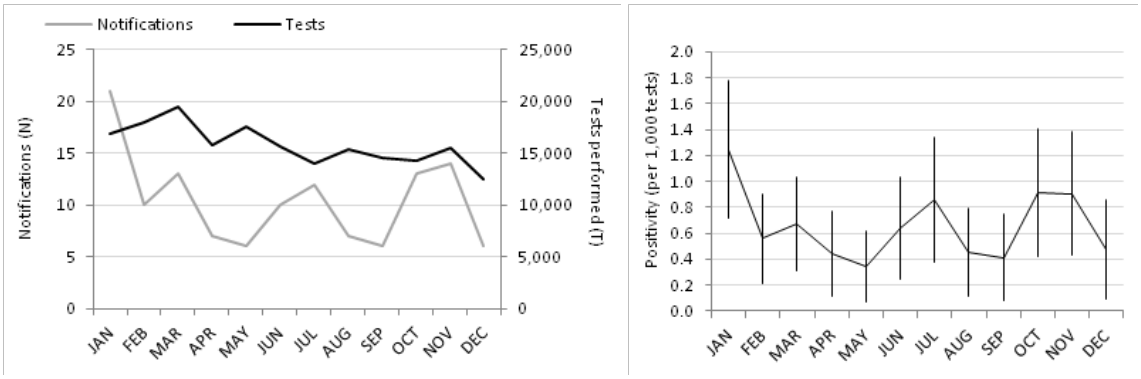


Figure 9: Comparison of shigellosis notifications, total number of faecal NAT and cultures performed and positivity rate per 1,000 tests - NSW residents, 2012



Blood Borne Virus - HIV

In 2012, 391,088 HIV screening tests were reported in NSW from the 14 laboratories. Testing rates were similar throughout the year with an average of 32,000 tests undertaken each month (Appendix 1). Further analysis of positivity rates was not possible due to the impact of repeat testing for HIV.

Discussion

There is current national interest in the use of laboratory denominator data for further understanding of notifiable conditions and to better inform the public health response. Although some denominator data is collected in other jurisdictions, this is limited to particular conditions and only periodic (quarterly, biannual or annual). The NSW Denominator Data Project - based on continuous monthly collection of data - aimed to provide timely information to aid interpretation of notification data trends.

The project has shown that the positivity rate for all conditions in 2012 ranged from 0.1% (shigellosis) to 6% (chlamydia infection). The mirrored pattern of testing and notifications, and subsequent stable positivity rate noted for sexually transmitted infections, suggest (as with other similar studies) that chlamydia and gonorrhoea notifications have good correlation with testing. Whereas constant 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.

This project is subject to several limitations. Firstly, the data was only collected from 14 participating laboratories, however these labs accounted for at least 87% of the total notifications for the selected conditions. Secondly, the analysis only included 12 months of data limiting the ability to interpret long term trends, and analysis of age-specific rates or specific rates per geographic area could not be calculated as data provided did not include age, sex, or postcode. Lastly, there may also be some duplication for conditions where more than one method of testing is used (pertussis, gonorrhoea and enteric conditions).

Overall the project has shown potential value in use of testing data for interpretation of notification data. For example, one aim of the *NSW HIV Strategy 2012-2015* is to increase the testing rate to reduce the time to diagnosis, and the HIV denominator data is proving useful in monitoring this rate.

Requests for enhanced data may result from the preliminary analysis of the core denominator data. To determine the feasibility of enhancing the project, consideration will be given to participating laboratories experience with providing the monthly testing data. Any additional requests by Health Protection NSW should consider data extraction and collation processes of each laboratory, and implications for data analysis and public health response.

Considerations for enhanced data may include basic demographics such as age, sex, or geographic location. Inclusion of demographic data would allow for analysis of testing data by risk groups and inform development of prevention and public health response initiatives.

To complete the data, the few NSW and interstate laboratories which provide notifications but are not currently involved will be invited to participate. The conditions selected will also be reviewed to determine if any should be excluded or included.

Now that the monthly collection of denominator data from the participating laboratories has been established, we recommend the ongoing analysis of aggregate data be undertaken with regular de-identified reports provided to participating laboratories, and local health district public health units to evaluate and inform public health response for communicable disease control in NSW.

Appendix 1: Table of notifications, total number of tests performed and positivity rate (number of positive tests in every 1000 tests performed)

Notifiable Condition		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	2012
Pertussis	N	844	682	540	396	595	382	380	441	360	422	428	317	5,787
	T	9,537	10,433	12,755	10,991	15,494	17,018	16,315	15,770	12,428	9,592	9,193	7,026	146,552
	P	88.5	65.4	42.3	36.0	38.4	22.4	23.3	28.0	29.0	44.0	46.6	45.1	39.5
	(95% CI)	(82.5,94.5)	(60.5,70.3)	(38.8,45.9)	(32.5,39.6)	(35.3,41.5)	(20.2,24.7)	(20.9,25.6)	(25.4,30.6)	(26.0,32.0)	(39.8,48.2)	(42.1,51.0)	(40.2,50.1)	(38.5,40.5)
Chlamydia	N	1,864	2,039	1,997	1,571	1,990	1,599	1,689	1,829	1,544	1,856	1,865	1,453	21,296
	T	30,552	34,631	34,226	27,326	33,995	28,386	30,150	33,247	29,022	28,939	33,074	26,290	369,838
	P	61.0	58.9	58.3	57.5	58.5	56.3	56.0	55.0	53.2	64.1	56.4	55.3	57.6
	(95% CI)	(58.2,63.8)	(56.3,61.4)	(55.8,60.9)	(54.6,60.3)	(56.0,61.1)	(53.6,59.1)	(53.3,58.7)	(52.5,57.5)	(50.5,55.9)	(61.2,67.1)	(53.8,58.9)	(52.4,58.1)	(56.8,58.4)
Gonorrhoea	N	318	371	297	314	368	357	350	361	324	414	376	270	4,120
	T	44,944	51,725	51,933	41,321	50,680	43,030	44,606	49,350	43,451	42,868	49,012	39,394	552,314
	P	7.1	7.2	5.7	7.6	7.3	8.3	7.8	7.3	7.5	9.7	7.7	6.9	7.5
	(95% CI)	(6.3,7.9)	(6.4,7.9)	(5.1,6.4)	(6.8,8.4)	(6.5,8.0)	(7.4,9.2)	(7.0,8.7)	(6.6,8.1)	(6.6,8.3)	(8.7,10.6)	(6.9,8.4)	(6.0,7.7)	(7.2,7.7)
Barmah Forest	N	23	42	40	31	29	21	20	16	22	38	35	28	345
	T	1,377	1,649	1,780	1,409	1,376	930	851	1,045	825	872	1,011	806	13,931
	P	16.7	25.5	22.5	22.0	21.1	22.6	23.5	15.3	26.7	43.6	34.6	34.7	24.8
	(95% CI)	(9.9,23.5)	(17.8,33.2)	(15.5,29.4)	(14.3,29.7)	(13.4,28.7)	(12.9,32.2)	(13.2,33.8)	(7.8,22.8)	(15.5,37.8)	(29.7,57.4)	(23.1,46.1)	(21.9,47.6)	(22.2,27.4)
Ross River	N	43	77	88	109	84	26	24	16	26	35	40	34	602
	T	1,789	2,071	2,305	1,829	1,830	1,214	1,127	1,276	1,064	1,157	1,323	1,081	18,066
	P	24.0	37.2	38.2	59.6	45.9	21.4	21.3	12.5	24.4	30.3	30.2	31.5	33.3
	(95% CI)	(16.9,31.2)	(28.9,45.5)	(30.2,46.2)	(48.4,70.8)	(36.1,55.7)	(13.2,29.6)	(12.8,29.8)	(6.4,18.7)	(15.0,33.8)	(20.2,40.3)	(20.9,39.6)	(20.9,42.0)	(30.7,36.0)
Cryptosporidiosis	N	41	73	91	109	88	53	44	33	11	28	44	62	677
	T	12,750	14,784	15,814	12,077	14,021	12,121	12,587	13,864	12,931	13,060	14,575	11,122	159,706
	P	3.2	4.9	5.8	9.0	6.3	4.4	3.5	2.4	0.9	2.1	3.0	5.6	4.2
	(95% CI)	(2.2,4.2)	(3.8,6.1)	(4.6,6.9)	(7.3,10.7)	(5.0,7.6)	(3.2,5.5)	(2.5,4.5)	(1.6,3.2)	(0.3,1.4)	(1.3,2.9)	(2.1,3.9)	(4.2,7.0)	(3.9,4.6)
Giardiasis	N	173	235	253	196	200	149	121	117	144	140	155	128	2,011
	T	12,750	14,784	15,814	12,077	14,021	12,121	12,587	13,864	12,931	13,060	14,575	11,122	159,706
	P	13.6	15.9	16.0	16.2	14.3	12.3	9.6	8.4	11.1	10.7	10.6	11.5	12.6
	(95% CI)	(11.5,15.6)	(13.9,17.9)	(14.0,18.0)	(14.0,18.5)	(12.3,16.2)	(10.3,14.3)	(7.9,11.3)	(6.9,10.0)	(9.3,13.0)	(8.9,12.5)	(9.0,12.3)	(9.5,13.5)	(12,13.1)
Salmonellosis	N	319	332	356	245	199	122	157	197	188	273	260	300	2,948
	T	16,835	17,907	19,410	15,756	17,574	15,593	13,969	15,349	14,523	14,213	15,457	12,534	189,120
	P	18.9	18.5	18.3	15.5	11.3	7.8	11.2	12.8	12.9	19.2	16.8	23.9	15.6
	(95% CI)	(16.9,21)	(16.5,20.5)	(16.4,20.2)	(13.6,17.5)	(9.8,12.9)	(6.4,9.2)	(9.5,13.0)	(11.0,14.6)	(11.1,14.8)	(16.9,21.5)	(14.8,18.9)	(21.2,26.6)	(15.0,16.2)
Shigellosis	N	21	10	13	7	6	10	12	7	6	13	14	6	125
	T	16,835	17,907	19,410	15,756	17,574	15,593	13,969	15,349	14,523	14,213	15,457	12,534	189,120
	P	1.2	0.6	0.7	0.4	0.3	0.6	0.9	0.5	0.4	0.9	0.9	0.5	0.7
	(95% CI)	(0.7,1.8)	(0.2,0.9)	(0.3,1.0)	(0.1,0.8)	(0.1,0.6)	(0.2,1.0)	(0.4,1.3)	(0.1,0.8)	(0.1,0.7)	(0.4,1.4)	(0.4,1.4)	(0.1,0.9)	(0.5,0.8)
HIV	T	32,671	35,297	35,610	28,882	35,912	31,789	32,283	33,806	30,407	31,774	35,178	27,479	391,088

N = Number of notified conditions (created on 19MAR2013 using specimen date). **T** = Number of tests performed (collected from the lab denominator database created 14MAR2013). Tests calculated from: Pertussis (culture, NAT and serology); Chlamydia (NAT); Gonorrhoea (culture and NAT); Barmah Forest virus (screen); Ross River virus (screen); Cryptosporidiosis and Giardia (Giardia/Crypto Ag); Salmonellosis and Shigellosis (NAT and MC&S). **P** = Number of positive tests notified per 1,000 tests performed (95% Confidence interval