Notifications of campylobacteriosis, giardiasis and cryptosporidiosis with untreated drinking water as a risk factor, 2001–2016

HIGHLIGHTS

- **In 2016, there were 1466 campylobacteriosis notifications, 222 giardiasis notifications and 242 cryptosporidiosis notifications with a reported risk factor of drinking untreated water.**
- **Since 2001, completion rates for risk factor information for potentially water-borne diseases have generally been low, particularly for campylobacteriosis. In 2012–16, only one District Health Board (DHB) had risk factor information about untreated drinking water for at least 70% of notifications of campylobacteriosis. For giardiasis, this standard was met by 11 DHBs, while for cryptosporidiosis, this standard was met by 13 DHBs.**
- **In 2012–16, the following District Health Boards (DHBs) had high rates of campylobacteriosis, giardiasis and/or cryptosporidiosis with a risk factor of drinking untreated water: Hawke's Bay, West Coast, Wairarapa, Tairawhiti, Northland and Waikato DHBs.**

How water-borne diseases relate to environmental health

Untreated drinking water is one of the main sources of transmission for giardiasis and cryptosporidiosis, although it is less important for campylobacteriosis due to the large numbers of cases contracted through food-borne infection (particularly raw chicken). However in August 2016, contamination of the drinking water supply for Havelock North led to a large campylobacteriosis outbreak in the Hawke's Bay. This outbreak involved 964 notified cases, although it is estimated 5,500 of the town's 14,000 residents became ill with campylobacteriosis (ESR, 2017).

This factsheet presents data on notifications for campylobacteriosis, giardiasis and cryptosporidiosis with a reported risk factor of drinking untreated water. Additional data is available in the Appendices. The following factsheets are also available: all notifications of these diseases, and for notifications with a risk factor of contact with recreational water.

Data for this indicator

Data for this indicator are for 2001–2016, and come from the EpiSurv surveillance database from ESR. Risk factor information, about whether the case consumed untreated surface water, bore water or rain water during the incubation period, was collected by Public Health Units (PHUs). Notifications have excluded cases where the person was overseas during the incubation period.

The data in this factsheet should be interpreted with caution, for several reasons. Firstly, the completion rates for the risk factor information tend to be lower than a minimum quality standard of 70% of cases, which limits analysis of notification rates. Information is therefore presented about completion rates of risk factor information, as well as notification rates for cases consuming untreated drinking water. Secondly, even if someone reported drinking untreated water during the incubation period, it does not mean that contaminated drinking-water was the confirmed source of infection. Thirdly, notifications only include those people who visited a GP or hospital for treatment, and notification rates are therefore likely to underestimate the true rate of disease in the population. 95% confidence intervals show the imprecision due to random variation, but not due to underreporting.

Almost 2000 notifications of potentially water-borne diseases reported consuming untreated water in 2016

In 2016, there were 1930 notifications of campylobacteriosis, giardiasis and cryptosporidiosis that reported drinking untreated water during the incubation period (Table 1). This comprised:

- 1466 campylobacteriosis notifications
- 222 giardiasis notifications
- 242 cryptosporidiosis notifications.

This represented 30–50% of all notifications where risk factor information was reported.

However, risk factor information was collected for only 42% of campylobacteriosis notifications (and 33% if Hawke's Bay DHB was excluded), 45% of giardiasis notifications, and 68% of cryptosporidiosis notifications. Risk factor completion rates varied substantially by DHB.

Table 1: Number of notifications by reported drinking untreated water, 2016

Disease	Drinking untreated water						Percent of notifications with risk factor information collected
	Yes	No	Total (stated)	Percent with risk factor (among total stated)	Unknown	Total	
Campylobacteriosis	1466	1534	3000	48.9%	4173	7173	42%
(excl. Hawke's Bay)	*555*	*1349*	*1904*	*29.1%*	*3946*	*5850*	*33%*
Giardiasis	222	400	622	35.7%	757	1379	45%
Cryptosporidiosis	242	410	652	37.1%	310	962	68%
Total	**1930**	**2344**	**4274**	**45.1%**	**5240**	**9514**	**45%**

Source: EpiSurv data, ESR

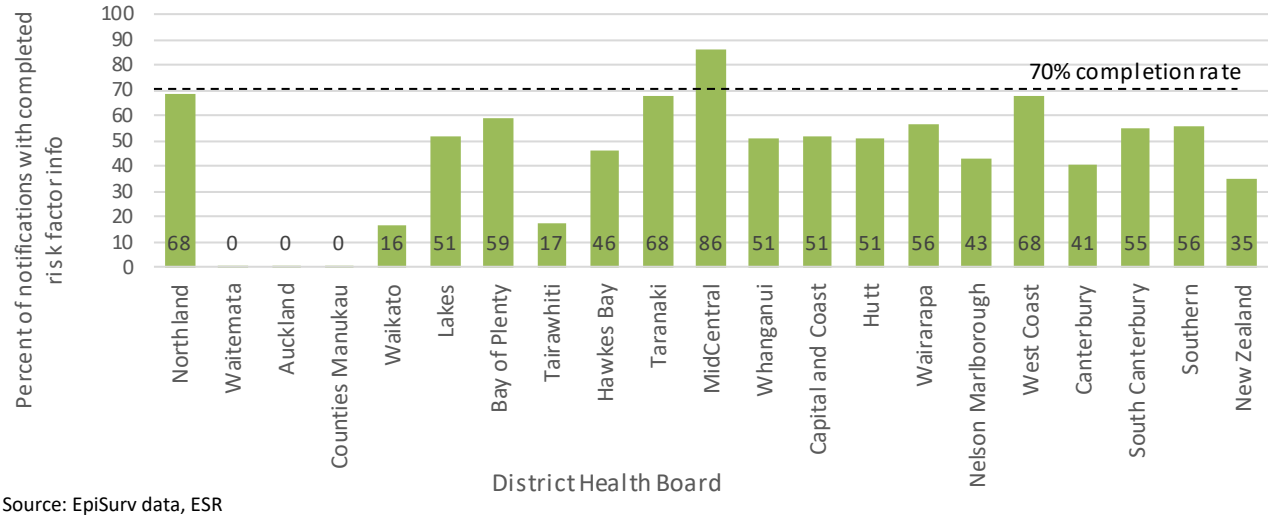
Untreated drinking water as a risk factor

This section presents notification data by disease and District Health Board, for the risk factor of drinking untreated water. Some DHBs have reasonable data quality levels, which enables relatively robust notification rates to be calculated by DHB.

Campylobacteriosis notifications had low completion rates for untreated drinking water information

Completion rates for risk factor information for campylobacteriosis notifications were generally low in 2012–16 (Figure 13). Only one DHB had at least 70% completion of risk factor information (MidCentral DHB, 86% completion rate), followed by Taranaki, Northland and West Coast (68% completion rate).

Figure 13 : Completion rate for campylobacteriosis notifications (percent of notifications with completed risk factor information about drinking untreated water, %), by DHB, 2012–16

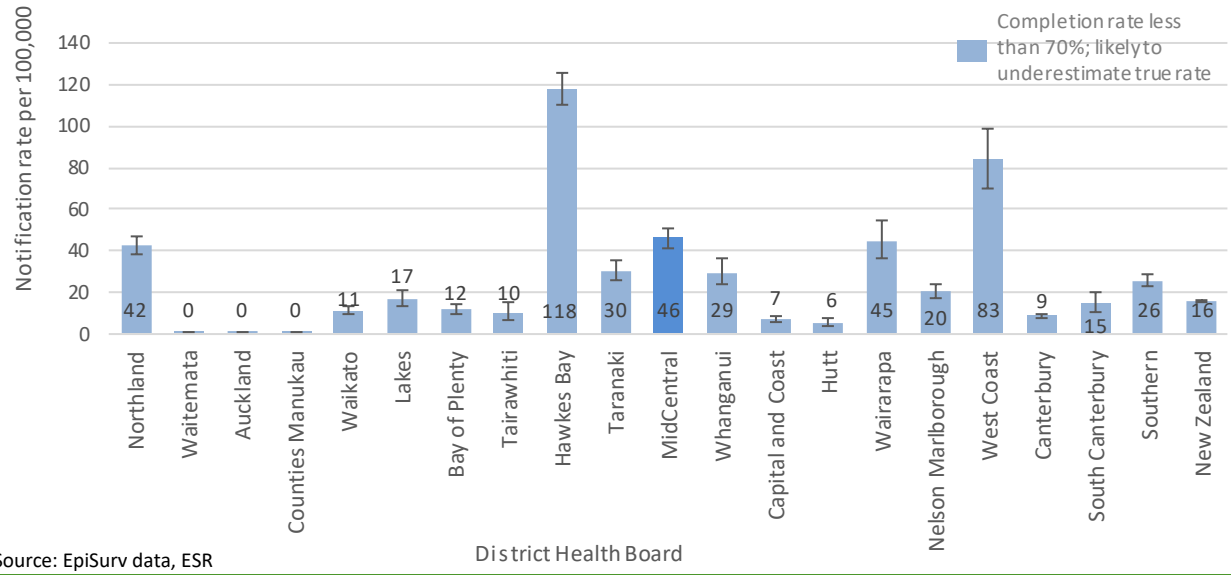


Source: EpiSurv data, ESR

Highest rates of campylobacteriosis with a risk factor of untreated water were in Hawke's Bay and West Coast DHBs

In 2012–16, Hawke's Bay DHB had the highest notification rate for campylobacteriosis with a risk factor of untreated water, largely driven by the outbreak in 2016 (when many cases were notified and had risk factor information collected) (Figure 14). Other DHBs with higher notification rates over this time period included West Coast, MidCentral, Northland and Wairarapa DHBs. Most DHBs had relatively low completion rates, so the notification rates for these DHBs are likely to be underestimated.

Figure 14: Notification rate of campylobacteriosis with a risk factor of drinking untreated water, by DHB, 2012–16 (crude rate per 100,000)



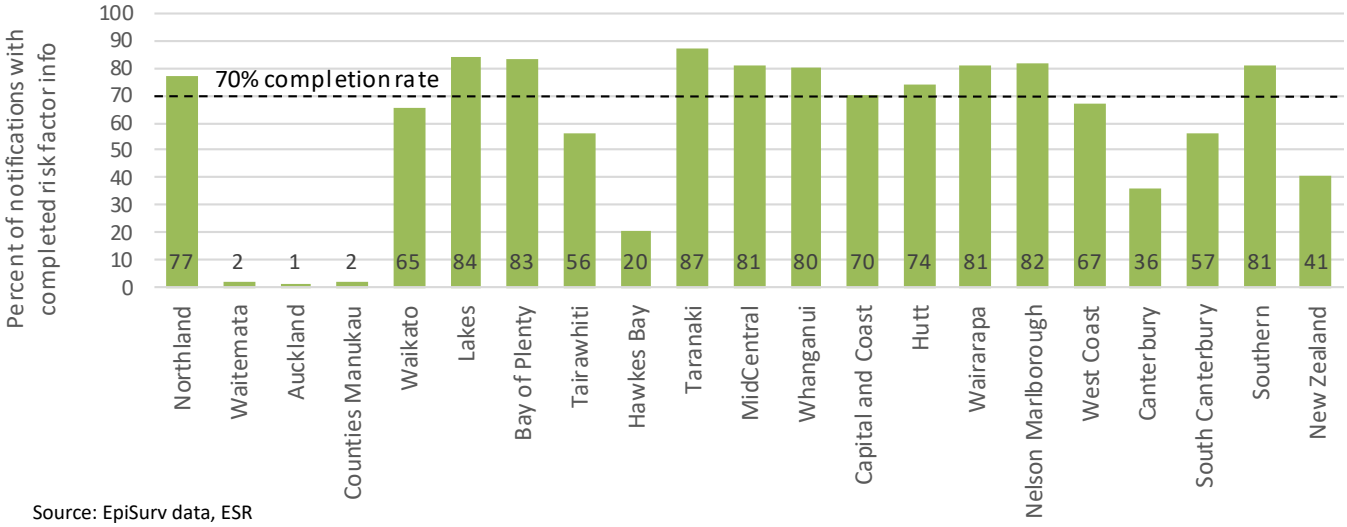
Source: EpiSurv data, ESR

Untreated drinking water as a risk factor

Giardiasis notifications had reasonable completion rates for risk factor information in many DHBs

For giardiasis notifications, completion rates for information about drinking untreated water were relatively good for most DHBs in 2012–16 (Figure 15). Over half of the DHBs (11 out of 20) had risk factor information about drinking untreated water for at least 70% of giardiasis notifications.

Figure 15 : Completion rate for giardiasis notifications (percent of notifications with completed risk factor information about drinking untreated water, %), by DHB, 2012–16

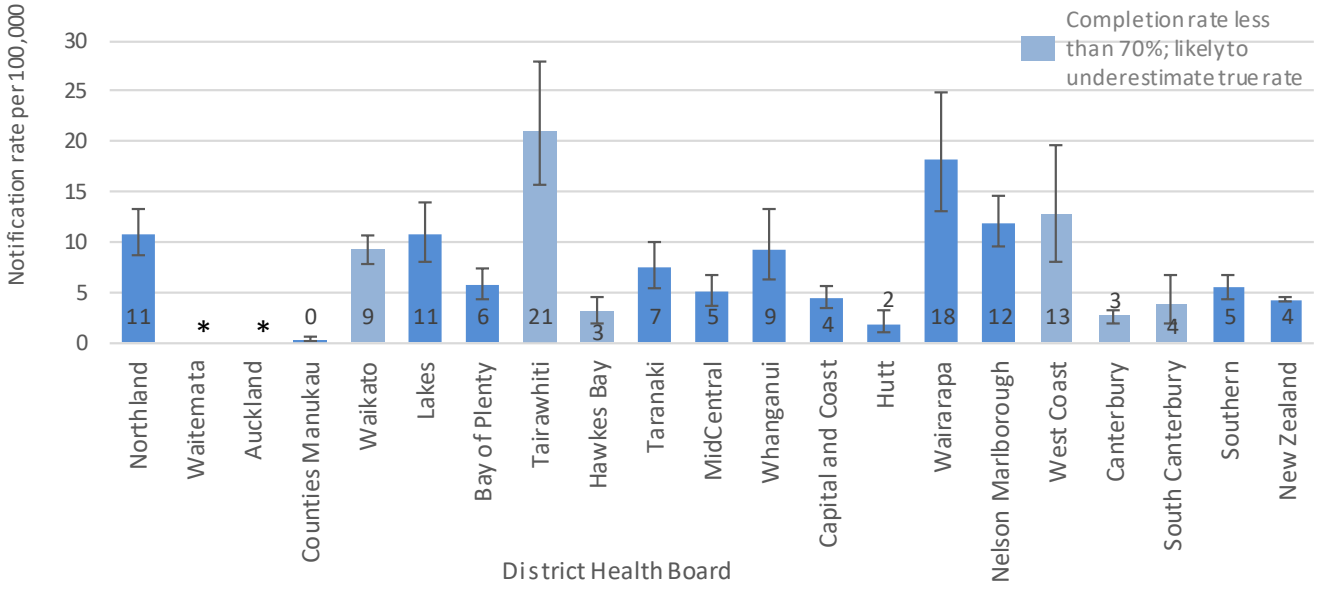


Source: EpiSurv data, ESR

Higher giardiasis notification rates with a risk factor of drinking untreated water in Tairawhiti and Wairarapa DHBs

Notification rates for giardiasis with a risk factor of drinking untreated water were higher in Tairawhiti, Wairarapa, West Coast, Nelson Marlborough, Lakes and Northland DHBs (Figure 16). The Tairawhiti DHB estimate, although based on a low completion rate (56%), was higher than normal due to likely ascertainment bias.

Figure 16: Notification rate of giardiasis with risk factor of drinking untreated water, by DHB, 2012–16 (crude rate per 100,000)



Note: An asterisk (*) shows the rate has been suppressed due to counts less than five.

Source: EpiSurv data, ESR

Untreated drinking water as a risk factor

Cryptosporidiosis notifications had good completion rates for risk factor information in most DHBs

Completion rates for risk factor information about drinking untreated water for cryptosporidiosis notifications were good for most DHBs in 2012–16 (Figure 17). Many DHBs had this risk factor information for 85–90% of cryptosporidiosis notifications, which improves the reliability of notification rates in these DHBs.

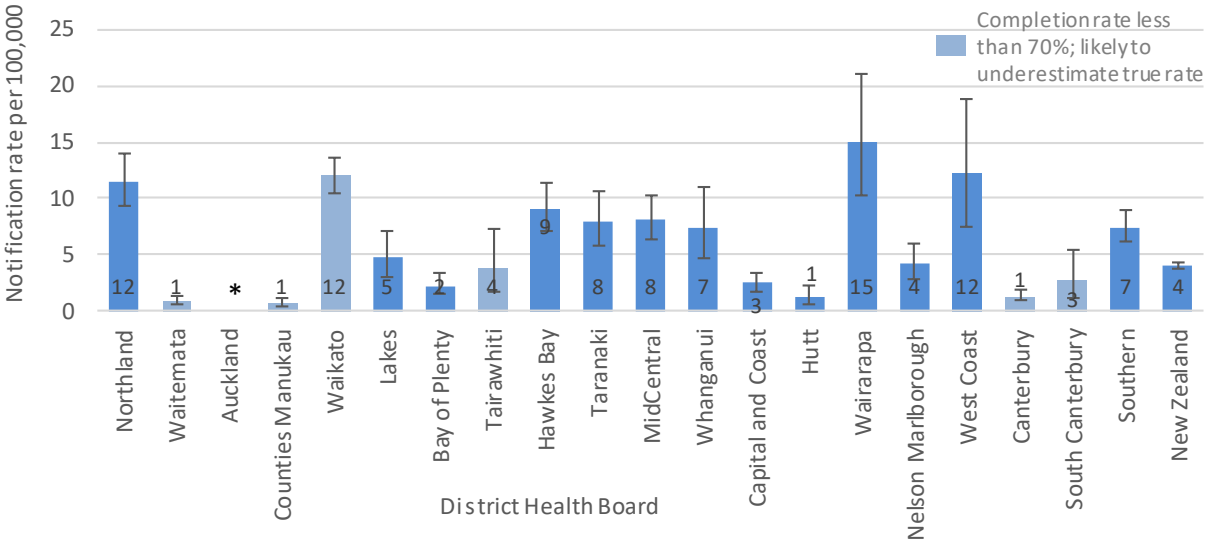
Figure 17: Completion rate for cryptosporidiosis notifications (percent of notifications with completed risk factor information about drinking untreated water, %), by DHB, 2012–16

Source: EpiSurv data, ESR

Wairarapa, West Coast, Northland and Waikato DHBs had the highest cryptosporidiosis notification rates with a risk factor of drinking untreated water

The highest notification rate for cryptosporidiosis with a risk factor of drinking untreated water was in Wairarapa DHB, followed by West Coast, Northland and Waikato DHBs (Figure 18). The Waikato DHB estimate was based on a lower completion rate (63%), so is likely to be underestimated.

Figure 18: Notification rate of cryptosporidiosis with a risk factor of drinking untreated water, by DHB, 2012–16 (crude rate per 100,000)



Note: An asterisk (*) shows the rate has been suppressed due to counts less than five.
Source: EpiSurv data, ESR

For more DHB data for 2016, and data for national trends over time, see the Appendices.

Untreated drinking water as a risk factor

DATA SOURCES

Data for this indicator come from the EpiSurv notifications surveillance database, from ESR. The following diseases were used: campylobacteriosis, giardiasis and cryptosporidiosis. People who were overseas during the incubation period were excluded from analysis. Notifications only cover those people who visited a GP or hospital for treatment, and are therefore likely to underestimate the true rate of disease in the population.

Risk factor information has been presented in factsheets for the risk factors of untreated water and contact with recreational water. Public Health Units are responsible for collecting risk factor information for each case, including whether the person:

- consumed untreated surface water, bore water or rain water during the incubation period
- came in contact with recreational water (a river, lake or sea), during the incubation period.

This risk factor information does not necessarily identify the confirmed source of infection, only whether a risk factor was present. Multiple risk factors can be present for a single case.

In some DHBs, high notification numbers mean that risk factor information is not collected for all cases. For this reason, this factsheet presents DHB-level information on the completion rate for risk factor information (ie the percentage of notifications that had risk factor information), as well as the notification rate for diseases where the case reported the risk factor. Given that many of the notification rates are based on incomplete information (low completion rates), the notification rates should be treated with caution, and in most cases, as an underestimate.

Rates have been presented per 100,000 population (or 100,000 population per year, when multiple years of data have been combined). 95% confidence intervals have been presented as error bars on graphs. The confidence intervals represent the imprecision in the data due to random variation; however they do not take into account systematic errors such as under-reporting.

See the metadata for more information about this indicator.

RELATED INDICATORS

Related environmental health indicators for recreational water and drinking-water quality respectively, available from the EHINZ website (www.ehinz.ac.nz), include:

- Notifications of potentially water-borne diseases (campylobacteriosis, giardiasis and cryptosporidiosis)
- Notifications of campylobacteriosis, giardiasis and cryptosporidiosis with recreational water as a risk factor
- Number and density of livestock in New Zealand
- Number and density of dairy cattle in New Zealand
- Suitability for swimming at coastal beaches
- Suitability for swimming at freshwater beaches
- Estimated number of people with access to safe drinking water supplies

REFERENCES

ESR. (2017). *Notifiable Diseases in New Zealand: Annual Report 2016.* Porirua: Institute of Environmental Science and Research. https://surv.esr.cri.nz/PDF_surveillance/AnnualRpt/AnnualSurv/2016/2016AnnualNDReportFinal.pdf (Accessed 18 April 2018)

For more information, please contact Kylie Mason on ehnz@massey.ac.nz

APPENDIX A: NOTIFICATIONS BY RISK FACTOR INFORMATION, BY YEAR

Campylobacteriosis notifications, 2001–2016

Table A1: Campylobacteriosis notifications with risk factor information about drinking untreated water, 2001–2016

Year	Number of campylobacteriosis notifications by risk factor (drinking untreated water)					Percent of notifications reporting drinking untreated water (among total stated)	Percent of notifications with completed risk factor information
	Yes	No	Total (stated)	Unknown	Total		
2001	870	2,656	3,526	6,237	9,763	24.7%	36%
2002	743	2,821	3,564	8,569	12,133	20.8%	29%
2003	773	3,319	4,092	10,343	14,435	18.9%	28%
2004	627	2,307	2,934	8,994	11,928	21.4%	25%
2005	612	3,083	3,695	9,862	13,557	16.6%	27%
2006	657	3,372	4,029	11,539	15,568	16.3%	26%
2007	538	2,271	2,809	9,686	12,495	19.2%	22%
2008	381	1,015	1,396	5,121	6,517	27.3%	21%
2009	414	1,139	1,553	5,469	7,022	26.7%	22%
2010	478	1,734	2,212	4,949	7,161	21.6%	31%
2011	478	1,708	2,186	4,285	6,471	21.9%	34%
2012	560	1,702	2,262	4,539	6,801	24.8%	33%
2013	543	1,582	2,125	4,500	6,625	25.6%	32%
2014	526	1,671	2,197	4,355	6,552	23.9%	34%
2015	512	1,475	1,987	3,991	5,978	25.8%	33%
2016	1,466	1,534	3,000	4,173	7,173	48.9%	42%

Giardiasis notifications, 2001–2016

Table A2: Giardiasis notifications with risk factor information about drinking untreated water, 2001–2016

Year	Number of giardiasis notifications by risk factor (drinking untreated water)					Percent of notifications reporting drinking untreated water (among total stated)	Percent of notifications with completed risk factor information
	Yes	No	Total (stated)	Unknown	Total		
2001	203	425	628	807	1,435	32.3%	44%
2002	198	356	554	858	1,412	35.7%	39%
2003	164	330	494	930	1,424	33.2%	35%
2004	124	276	400	934	1,334	31.0%	30%
2005	131	227	358	712	1,070	36.6%	33%
2006	132	258	390	666	1,056	33.8%	37%
2007	129	236	365	896	1,261	35.3%	29%
2008	160	243	403	1,086	1,489	39.7%	27%
2009	149	274	423	1,100	1,523	35.2%	28%
2010	160	314	474	1,348	1,822	33.8%	26%
2011	214	434	648	1,113	1,761	33.0%	37%
2012	184	392	576	968	1,544	31.9%	37%
2013	202	444	646	889	1,535	31.3%	42%
2014	193	419	612	929	1,541	31.5%	40%
2015	167	359	526	794	1,320	31.7%	40%
2016	222	400	622	757	1,379	35.7%	45%

Untreated drinking water as a risk factor

Cryptosporidiosis notifications, 2001–2016

Table A3: Cryptosporidiosis notifications with risk factor information about drinking untreated water, 2001–2016

Year	Number of cryptosporidiosis notifications by risk factor (drinking untreated water)					Percent of notifications reporting drinking untreated water (among total stated)	Percent of notifications with completed risk factor information
	Yes	No	Total (stated)	Unknown	Total		
2001	284	505	789	388	1,177	36.0%	67%
2002	241	356	597	326	923	40.4%	65%
2003	183	294	477	319	796	38.4%	60%
2004	185	210	395	174	569	46.8%	69%
2005	175	336	511	332	843	34.2%	61%
2006	156	277	433	261	694	36.0%	62%
2007	181	315	496	384	880	36.5%	56%
2008	190	207	397	329	726	47.9%	55%
2009	106	224	330	483	813	32.1%	41%
2010	153	265	418	483	901	36.6%	46%
2011	160	187	347	231	578	46.1%	60%
2012	222	271	493	324	817	45.0%	60%
2013	217	516	733	530	1,263	29.6%	58%
2014	113	166	279	263	542	40.5%	51%
2015	138	194	332	314	646	41.6%	51%
2016	242	410	652	310	962	37.1%	68%

APPENDIX B: NOTIFICATIONS BY RISK FACTOR INFORMATION, BY DISTRICT HEALTH BOARD

Campylobacteriosis notifications, 2016

Table B1: Campylobacteriosis notifications with risk factor information about drinking untreated water, by District Health Board, 2016

District Health Board	Number of campylobacteriosis notifications by risk factor (drinking untreated water)					Percent of notifications reporting drinking untreated water (among total stated)	Percent of notifications with completed risk factor information
	Yes	No	Total (stated)	Unknown	Total		
Northland	105	84	189	80	269	55.6%	70%
Waitemata	1	0	1	752	753	100.0%	0%
Auckland	6	0	6	500	506	100.0%	1%
Counties Manukau	4	0	4	486	490	100.0%	1%
Waikato	19	63	82	474	556	23.2%	15%
Lakes	16	40	56	68	124	28.6%	45%
Bay of Plenty	21	90	111	117	228	18.9%	49%
Tairawhiti	11	17	28	46	74	39.3%	38%
Hawkes Bay	911	185	1,096	227	1,323	83.1%	83%
Taranaki	7	21	28	205	233	25.0%	12%
MidCentral	107	143	250	37	287	42.8%	87%
Whanganui	23	26	49	53	102	46.9%	48%
Capital and Coast	30	184	214	148	362	14.0%	59%
Hutt	10	102	112	70	182	8.9%	62%
Wairarapa	20	13	33	35	68	60.6%	49%
Nelson Marlborough	20	57	77	84	161	26.0%	48%
West Coast	31	12	43	15	58	72.1%	74%
Canterbury	41	225	266	434	700	15.4%	38%
South Canterbury	4	64	68	80	148	5.9%	46%
Southern	79	208	287	262	549	27.5%	52%
New Zealand	**1,466**	**1,534**	**3,000**	**4,173**	**7,173**	**48.9%**	**42%**

Giardiasis notifications, 2016

Table B2: Giardiasis notifications with risk factor information about drinking untreated water, by District Health Board, 2016

District Health Board	Number of giardiasis notifications by risk factor (drinking untreated water)					Percent of notifications reporting drinking untreated water (among total stated)	Percent of notifications with completed risk factor information
	Yes	No	Total (stated)	Unknown	Total		
Northland	26	17	43	12	55	60.5%	78%
Waitemata	1	16	17	171	188	5.9%	9%
Auckland	1	10	11	158	169	9.1%	7%
Counties Manukau	4	11	15	168	183	26.7%	8%
Waikato	29	43	72	33	105	40.3%	69%
Lakes	8	25	33	5	38	24.2%	87%
Bay of Plenty	10	37	47	6	53	21.3%	89%
Tairawhiti	44	17	61	11	72	72.1%	85%
Hawkes Bay	14	22	36	31	67	38.9%	54%
Taranaki	8	22	30	7	37	26.7%	81%
MidCentral	12	15	27	7	34	44.4%	79%
Whanganui	9	5	14	2	16	64.3%	88%
Capital and Coast	9	56	65	29	94	13.8%	69%
Hutt		20	20	8	28	0.0%	71%
Wairarapa	1	5	6	3	9	16.7%	67%
Nelson Marlborough	17	8	25	7	32	68.0%	78%
West Coast	4	1	5	1	6	80.0%	83%
Canterbury	9	35	44	68	112	20.5%	39%
South Canterbury	1	8	9	7	16	11.1%	56%
Southern	15	27	42	23	65	35.7%	65%
New Zealand	**222**	**400**	**622**	**757**	**1,379**	**35.7%**	**45%**

Untreated drinking water as a risk factor

Cryptosporidiosis notifications, 2016

Table B3: Cryptosporidiosis notifications with risk factor information about drinking untreated water, by District Health Board, 2016

District Health Board	Number of cryptosporidiosis notifications by risk factor (drinking untreated water)					Percent of notifications reporting drinking untreated water (among total stated)	Percent of notifications with completed risk factor information
	Yes	No	Total (stated)	Unknown	Total		
Northland	55	34	89	17	106	61.8%	84%
Waitemata	23	52	75	55	130	30.7%	58%
Auckland	3	45	48	36	84	6.3%	57%
Counties Manukau	16	42	58	30	88	27.6%	66%
Waikato	36	35	71	44	115	50.7%	62%
Lakes	6	8	14	3	17	42.9%	82%
Bay of Plenty	6	8	14	0	14	42.9%	100%
Tairawhiti	6	3	9	3	12	66.7%	75%
Hawkes Bay	8	5	13	10	23	61.5%	57%
Taranaki	18	20	38	5	43	47.4%	88%
MidCentral	20	22	42	11	53	47.6%	79%
Whanganui	6	9	15	5	20	40.0%	75%
Capital and Coast	7	44	51	5	56	13.7%	91%
Hutt	2	7	9	2	11	22.2%	82%
Wairarapa	4	11	15	3	18	26.7%	83%
Nelson Marlborough	11	8	19	2	21	57.9%	90%
West Coast	1	1	2	0	2	50.0%	100%
Canterbury	1	28	29	58	87	3.4%	33%
South Canterbury		6	6	9	15	0.0%	40%
Southern	13	22	35	12	47	37.1%	74%
New Zealand	**242**	**410**	**652**	**310**	**962**	**37.1%**	**68%**