

Notifications of potentially waterborne disease with untreated drinking water as a risk factor

This factsheet presents data on notifications of campylobacteriosis, giardiasis, and cryptosporidiosis, for which drinking untreated water during the incubation period was recorded as a risk factor. The rates at which risk factor information is included with notifications of potentially waterborne disease are also reported.

Key facts



In 2015–19, only three District Health Boards (DHBs) had sufficient risk factor information for campylobacteriosis notifications to allow a reliable calculation of the rate of cases where untreated drinking water was a risk factor. Twelve DHBs had enough data for cryptosporidiosis and eleven for giardiasis.



Throughout the 2010s, notifications submitted by the Auckland Regional Public Health Service (covering Waitematā, Auckland and Counties Manukau DHBs) consistently had much lower risk factor completion rates.



In 2019, there were 537 notifications of campylobacteriosis, 140 notifications of cryptosporidiosis, and 211 notifications of giardiasis with untreated drinking water recorded as a risk factor. However, these figures are highly likely to be underestimates.



In 2015–19, Hawke's Bay DHB had the highest notification rates of campylobacteriosis with untreated drinking water as a risk factor. Northland and Wairarapa DHBs had relatively high notification rates for cryptosporidiosis. Tairāwhiti DHB had the highest rate of giardiasis notifications by a considerable margin.

About waterborne diseases & risk factor information

Campylobacteriosis, cryptosporidiosis, and giardiasis are gastrointestinal diseases caused by infection with the *Campylobacter* bacteria, *Cryptosporidium* parasite, and *Giardia* parasite, respectively. Untreated drinking water is a common transmission source for giardiasis and cryptosporidiosis, while most cases of campylobacteriosis are instead contracted through food-borne infection – particularly raw chicken.

In August 2016, contamination of the drinking water supply for Havelock North led to a large campylobacteriosis outbreak in the Hawke's Bay region. 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).

Notifications of these diseases submitted by Public Health Units may also include risk factor information, which details possible sources from which the individual *could* have contracted the disease – but not the *confirmed* source. The rate at which risk factor information is included with notifications (the 'completion rate') varies greatly across New Zealand. To account for the data quality issues this causes, EHINZ uses a completion rate of 70% as an acceptable value that should be either matched or exceeded to allow sufficient data quality for use in our analyses.

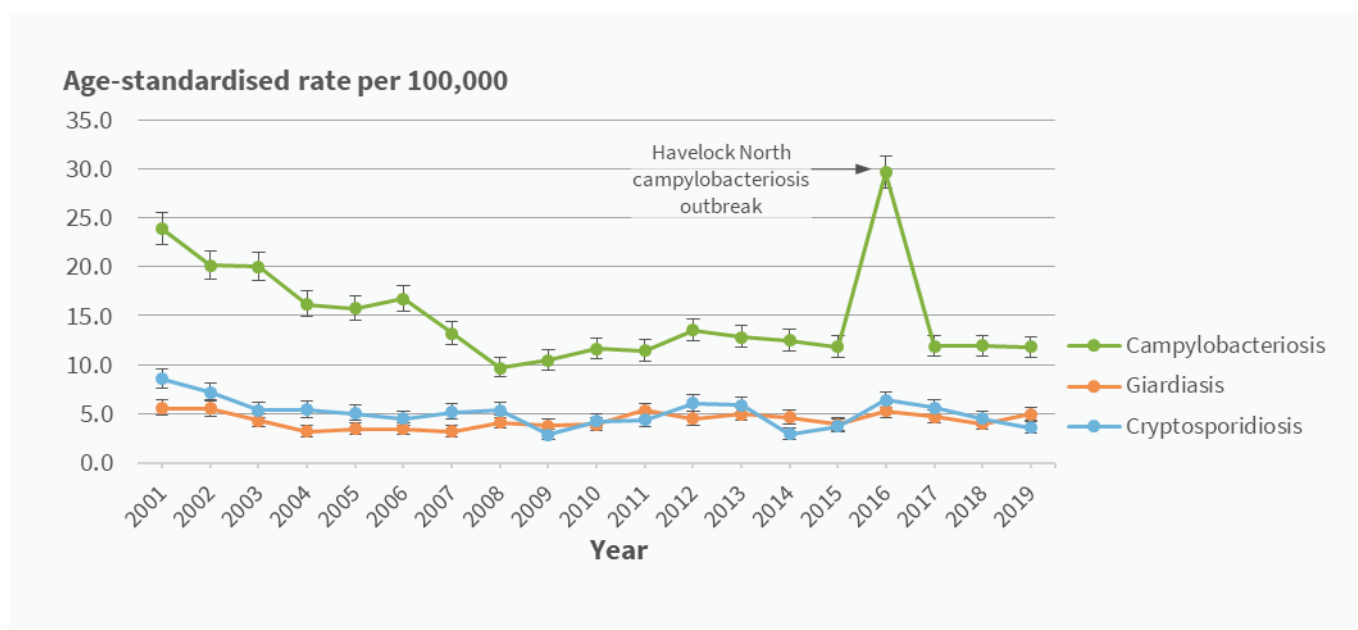
Rates of waterborne diseases with potential links to untreated drinking water remained fairly stable throughout the 2010s

In 2019, there were 537 notifications of campylobacteriosis, 140 notifications of cryptosporidiosis, and 211 notifications of giardiasis with untreated drinking water recorded as a risk factor.

Rates of campylobacteriosis with untreated drinking water recorded as a risk factor initially declined from 2001 to 2008 and were largely stable through the 2010s – the 2016 Havelock North outbreak notwithstanding (Figure 1). The lower rates after 2007/08 may be partly due to the introduction of food safety regulations for poultry production between 2007–08 (Duncan, 2014). For more information, see the '[potentially waterborne diseases](#)' factsheet.

Between 2001 and 2019, notification rates of both cryptosporidiosis and giardiasis where drinking untreated water was recorded as a risk factor remained mostly unchanged.

Figure 1: Notification rates of potentially waterborne diseases with untreated drinking as a risk factor, 2001–19



Source: ESR 2020

Notifications with untreated drinking water recorded as a risk factor are comparatively rare

In 2019, notifications of potentially waterborne diseases where drinking untreated water was listed as a risk factor made up around 10% of all notifications of the three potentially waterborne diseases reported here (Table 1). However, fewer than half of all notifications were provided complete with risk factor information, so it is likely that more notified cases were connected to untreated water than are counted below.

Table 1: Breakdown of notifications by risk factor information, 2019

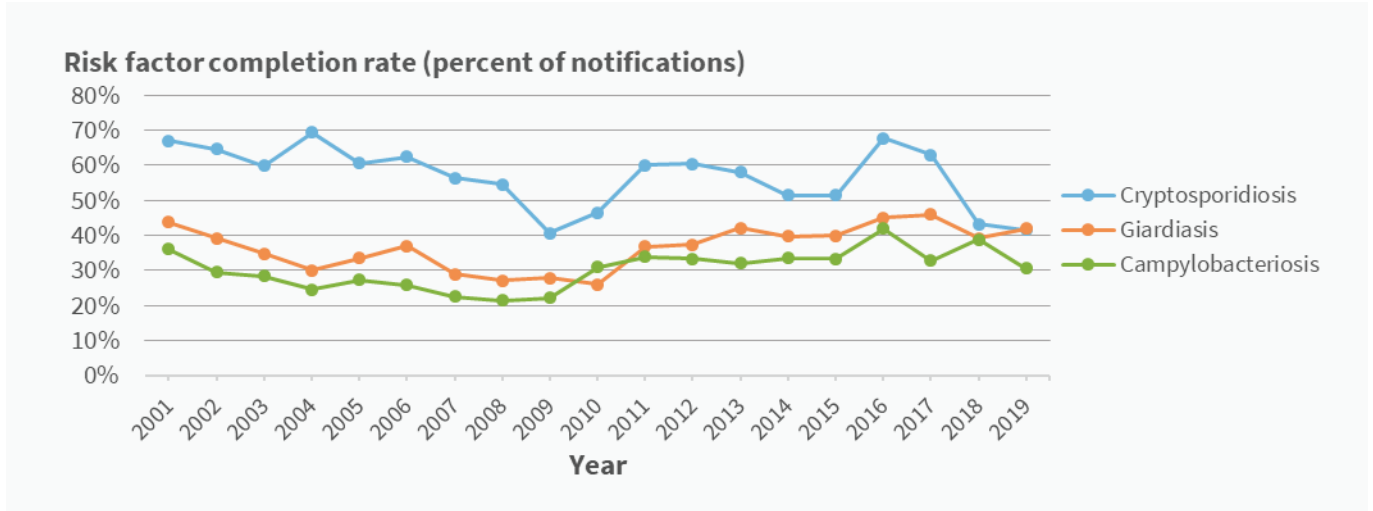
Disease	Untreated drinking water as a risk factor?			Risk factor completion rates			Percent of all notifications with untreated water as a risk factor
	Yes	No	No data	Total notifications	Complete notifications	Completion rate	
Campylobacteriosis	537	1,239	4,033	5,809	1,776	30.6%	9.2%
Giardiasis	211	447	912	1,570	658	41.9%	13.4%
Cryptosporidiosis	140	270	575	1,551	410	41.6%	14.2%
Total	888	1,956	5,520	8,364	2,844	34.0%	10.6%

Source: ESR 2020

Risk factor completion rates are low and are not improving

Risk factor completion rates for all three diseases reported here have either declined or stayed mainly unchanged between 2001–19. As of 2019, fewer than half of all notifications were provided complete with risk factor information.

Figure 2: Risk factor completion rates in notifications of potentially waterborne disease, 2001–19



Source: ESR 2020

Trends in completion rates varied by DHB

There was no consistent pattern of change across DHBs when contrasting completion rates for the 2015–19 period to those of the first half of the past decade (2010–14). Table 2 below sets out the completion rate for each period, arranged by DHB.

Readers should recall Public Health Units, not DHBs, collect risk factor information. The PHU connection may be why the three DHBs covered by the Auckland Regional Public Health Service (ARPHS) – that is, Waitemātā, Auckland, and Counties Manukau, all have comparably low completion rates for each disease. The PHU(s) associated with each DHB is included in the table below.

Table 2: Risk factor completion rates in 2010–14 compared to 2015–19, by DHB and disease

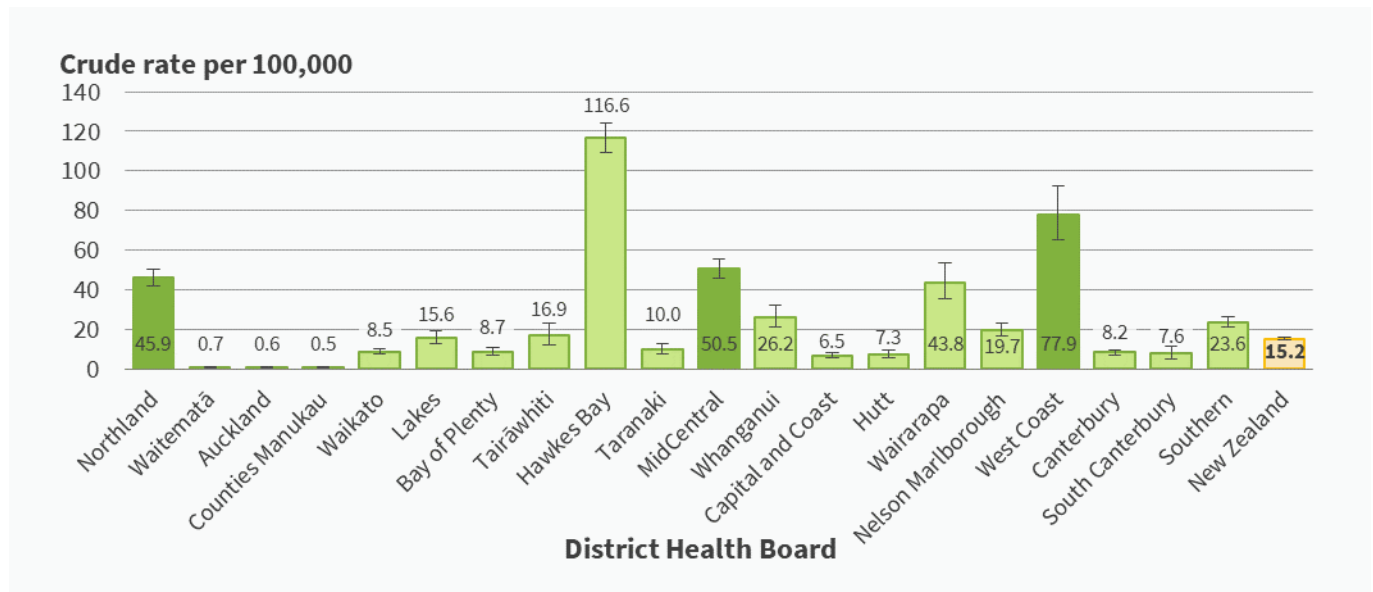
DHB (associated PHU)	Campylobacteriosis		Cryptosporidiosis		Giardiasis	
	2010–14	2015–19	2010–14	2015–19	2010–14	2015–19
Northland (Ngā Tai Ora – Public Health Northland)	67.5%	71.8%	65.0%	77.1%	73.4%	76.5%
Waitematā (Auckland Regional Public Health Service)	0.3%	6.7%	0.9%	19.4%	0.0%	3.3%
Auckland (ARPHS)	0.2%	5.4%	0.0%	16.0%	0.2%	2.4%
Counties Manukau (ARPHS/Waikato Public Health Unit)	0.2%	6.6%	7.5%	21.1%	0.2%	4.9%
Waikato (Waikato Public Health Unit)	27.8%	19.7%	57.7%	75.4%	60.3%	75.7%
Lakes (Toi Te Ora Public Health)	57.3%	50.4%	75.8%	78.6%	80.1%	88.1%
Bay of Plenty (Toi Te Ora Public Health)	62.2%	49.3%	84.7%	86.6%	79.0%	86.1%
Tairāwhiti (Hauora Tairāwhiti)	5.0%	35.1%	5.3%	62.1%	18.6%	70.0%
Hawke's Bay (Hawke's Bay Public Health Unit)	2.7%	63.6%	76.2%	54.9%	6.4%	44.2%
Taranaki (Taranaki Public Health)	64.1%	26.5%	89.0%	85.2%	82.5%	84.8%
MidCentral (MidCentral Public Health Service)	87.2%	83.6%	91.6%	82.0%	83.5%	80.2%
Whanganui (MidCentral Public Health Service)	52.2%	55.0%	81.6%	80.6%	73.5%	75.0%
Capital and Coast (Regional Public Health/MidCentral PHS)	39.3%	54.6%	70.4%	73.3%	55.6%	66.4%
Hutt Valley (Regional Public Health)	35.7%	57.0%	78.7%	76.1%	60.8%	63.4%
Wairarapa (Regional Public Health)	49.6%	52.2%	87.3%	84.7%	67.9%	63.6%
Nelson Marlborough (Nelson Marlborough Public Health Service)	41.2%	43.8%	85.9%	81.7%	78.9%	82.4%
West Coast (Community and Public Health)	54.4%	79.2%	76.9%	87.5%	41.7%	90.9%
Canterbury (Community and Public Health)	43.3%	39.6%	47.4%	36.7%	36.9%	35.2%
South Canterbury (Community and Public Health)	59.1%	38.3%	50.6%	40.0%	54.6%	42.3%
Southern (Public Health South)	55.3%	46.4%	81.1%	62.2%	79.7%	70.0%
New Zealand	32.7%	35.8%	55.4%	52.6%	36.0%	42.4%

Source: ESR 2020

Campylobacteriosis notification rates were highest in Hawke's Bay DHB

The Havelock North outbreak of 2016 is the sure cause of Hawke's Bay's elevated rate in contrast to other DHBs, as it resulted in an abnormally large number of notifications that were submitted complete with risk factor information. In 2015–19, only three DHBs had enough risk factor information for a reliable calculation of the rate of disease where drinking untreated water was a risk factor – Northland, MidCentral, and West Coast (Figure 3). Consequently, the rate for Hawke's Bay DHB, while already elevated, may still be an underestimate.

Figure 3: Notification rates of campylobacteriosis with untreated drinking water as a risk factor, by DHB, 2015–19

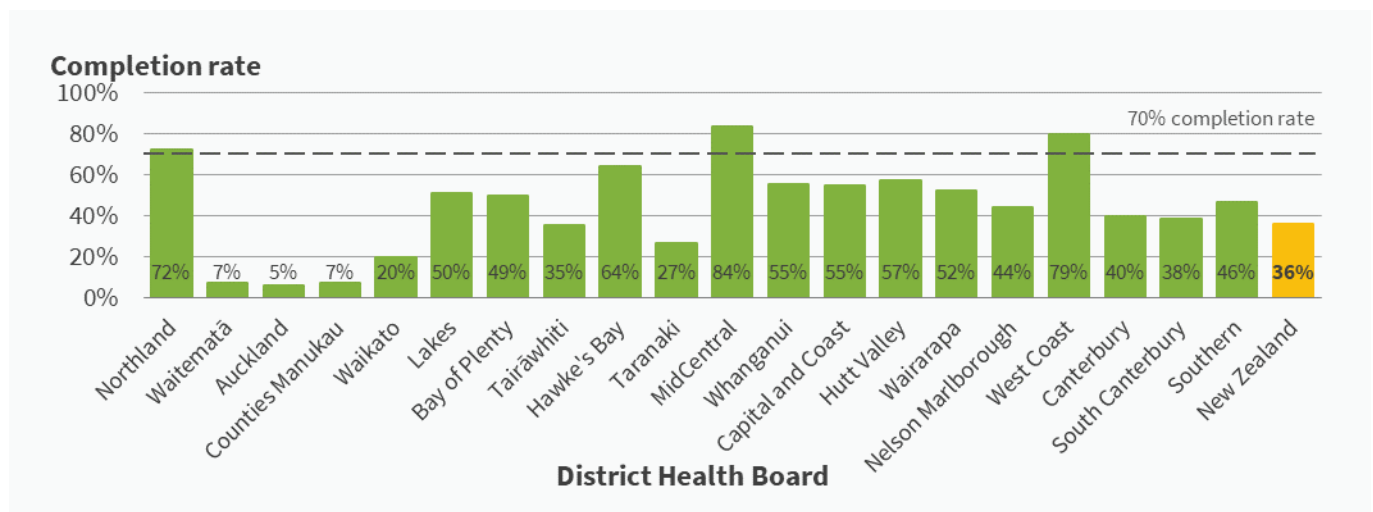


Note: Owing to varying risk factor completion rates, readers should use caution when comparing rates between DHBs. Bars with a light fill indicate DHBs where completion rates were lower than 70%. The statistical test for differences between rates in the above graph uses a multiple testing adjustment. Note that the adjusted values used for multiple testing may not be reflected in the graph.

Source: ESR 2020

MidCentral DHB had the highest completion rates for risk factor information among campylobacteriosis notifications (Figure 4). The worst completion rates were all in the Auckland region, specifically Waitematā, Auckland, and Counties Manukau DHBs.

Figure 4: Percent of campylobacteriosis notifications with completed risk factor information, by DHB, 2015–19

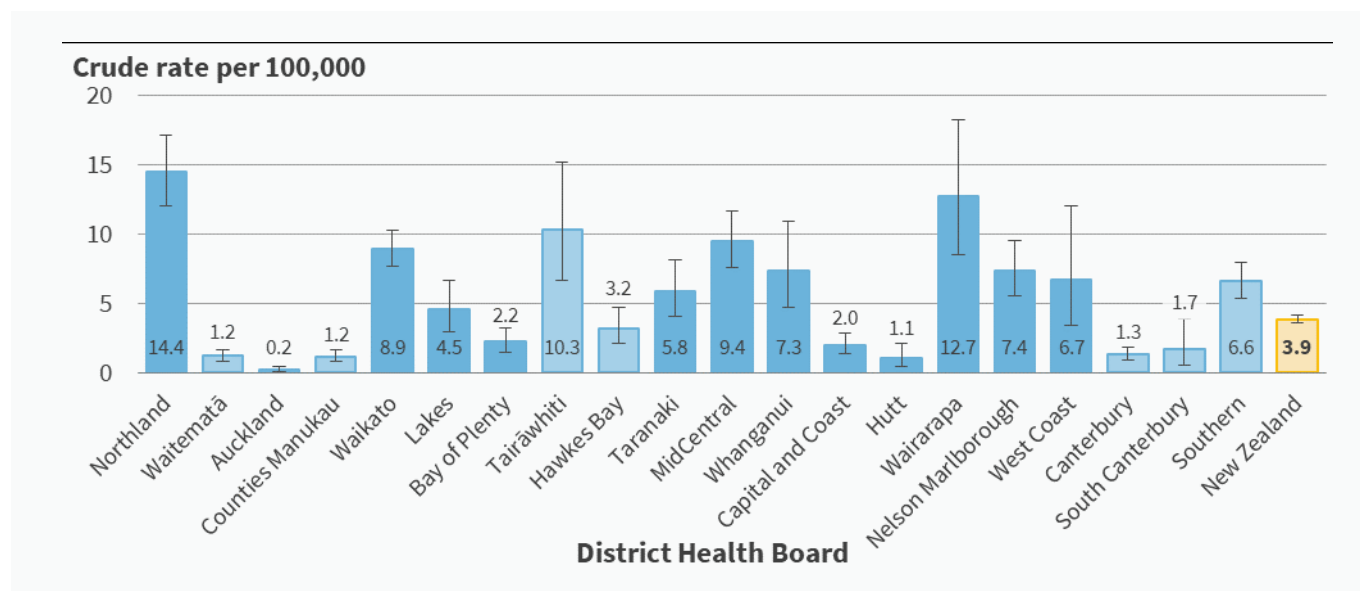


Source: ESR 2020

Cryptosporidiosis notification rates were higher in Northland and Wairarapa DHBs

Northland and Wairarapa DHBs had higher notification rates than most other DHBs in 2015–2019. However, the level of statistical uncertainty (as indicated by the error bars in Figure 5) prevents declaring either one to have had the highest rates of all.

Figure 5: Notification rates of cryptosporidiosis with untreated drinking water as a risk factor, by DHB, 2015–19

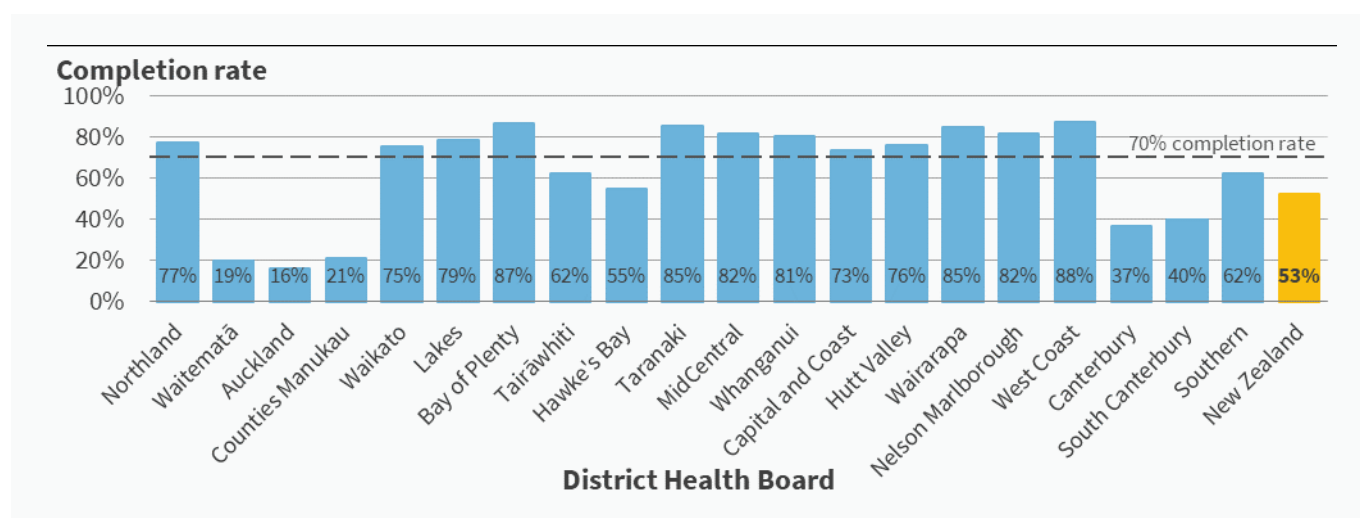


Note: Owing to varying risk factor completion rates, readers should use caution when comparing rates between DHBs. Bars with a light fill indicate DHBs where completion rates were lower than 70%. The statistical test for differences between rates in the above graph uses a multiple testing adjustment. Note that the adjusted values used for multiple testing may not be reflected in the graph.

Source: ESR 2020

Risk factor completion rates for cryptosporidiosis notifications were generally reasonable, with 12 out of 20 DHBs exceeding a completion rate of 70% between 2015–19 (Figure 6). West Coast DHB had the highest rate by a small margin (88%). As before, the lowest completion rates were all for DHBs in the Auckland region.

Figure 6: Percent of cryptosporidiosis notifications with completed risk factor information, by DHB, 2015–19

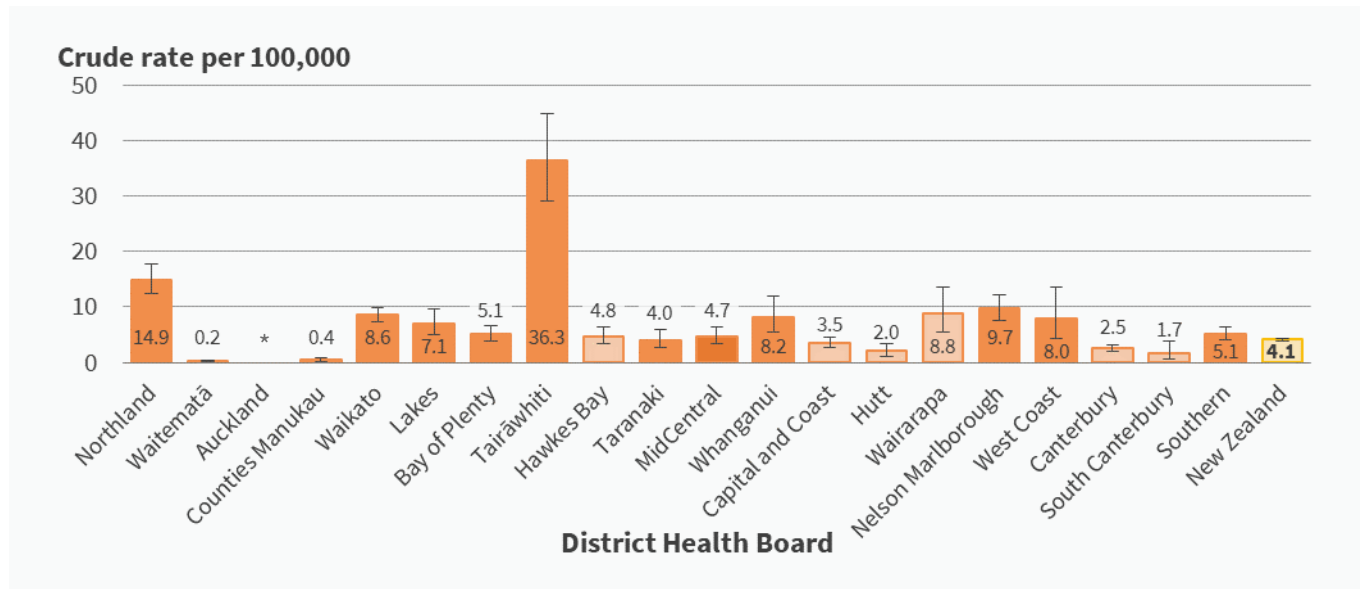


Source: ESR 2020

Giardiasis notification rates were highest in Tairāwhiti DHB

In 2015–19, Tairāwhiti DHB had the highest notification rate for giardiasis with untreated drinking water recorded as a risk factor, with a crude rate of 36.3 notifications per 100,000 persons, substantially more than any other DHB and more than double the next highest rate (Figure 7).

Figure 7: Notification rates of giardiasis with untreated drinking water as a risk factor, by DHB, 2015–19

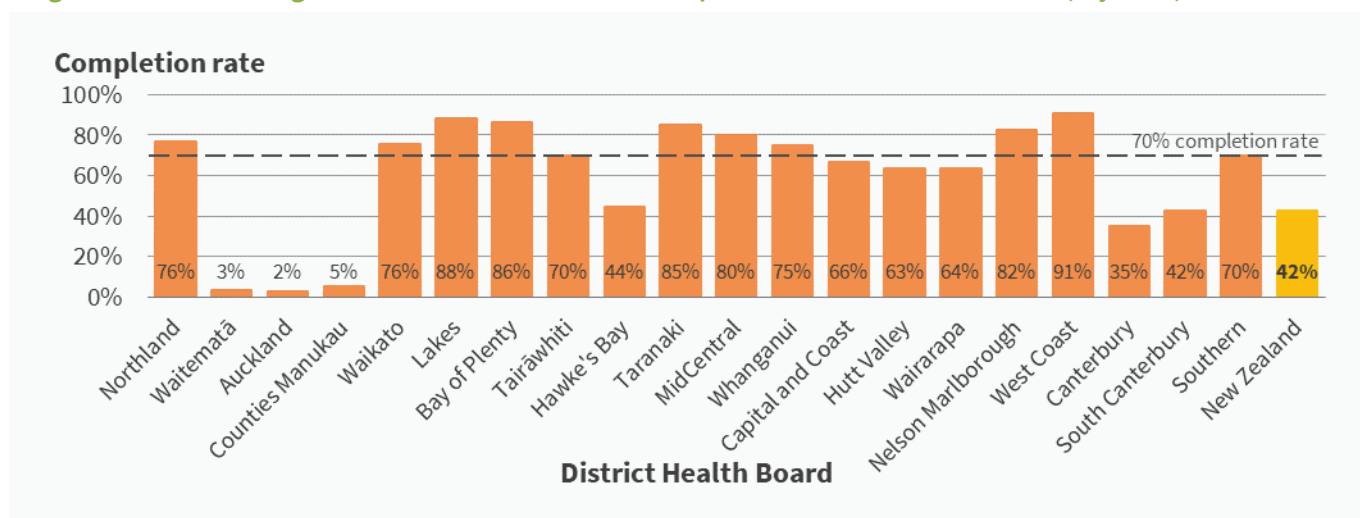


Note: An asterisk (*) indicates a suppressed rate due to a low number of notifications (<5). Owing to varying risk factor completion rates, readers should use caution when comparing rates between DHBs. Bars with a light fill indicate DHBs where completion rates were lower than 70%. The statistical test for differences between rates in the above graph uses a multiple testing adjustment. Note that the adjusted values used for multiple testing may not be reflected in the graph.

Source: ESR 2020

Risk factor completion rates for giardiasis were at adequate levels in 11 out of 20 DHBs, with the highest rate (91%) occurring in West Coast DHB (Figure 8). Once again, the lowest completion rates were found in Waitematā, Auckland, and Counties Manukau DHBs.

Figure 8: Percent of giardiasis notifications with completed risk factor information, by DHB, 2015–19



Source: ESR 2020

Data for this indicator

This factsheet presents EpiSurv notifications from the Institute for Environmental Science and Research (ESR). Notifications exclude cases where the person was overseas during the incubation period. Notifications only cover those who visited a GP or hospital for treatment and are therefore likely to underestimate the disease's true rate in the population.

Public Health Units are responsible for collecting risk factor information for each case, including whether the affected person consumed untreated surface water, bore water or rainwater during the incubation period. Multiple risk factors can exist for a single case, and risk factor information is not always collected for every case. 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.

All 95% confidence intervals have been presented as error bars on graphs. Unless otherwise stated, all differences mentioned in the text between two values are statistically significant at the 5% level or less. However, confidence intervals do not account for the completion rates in a given year or DHB, so should also be treated with caution. For additional information, see the metadata link below.

References

Duncan, G. 2014. Determining the health benefits of poultry industry compliance measures: the case of campylobacteriosis regulation in New Zealand. *New Zealand Medical Journal* 127(1391): 22–37.

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/2016/2016AnnualNDRReportFinal.pdf (Accessed 13 May 2020).

ESR. 2020. Notifiable diseases EpiSurv data extraction. Porirua: Institute of Environmental Science and Research Limited (Personal communication with ESR Senior Analysts).

Other related topics include:

[Access to safe drinking water](#)

[Waterborne diseases related to recreational water](#)

[Agricultural activity](#)

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Further information

For descriptive information about the data