

# Notifications of potentially waterborne disease with recreational water contact as a risk factor

This factsheet presents data on notifications of campylobacteriosis, giardiasis, and cryptosporidiosis with contact with recreational water during the incubation period 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 recreational water contact was a risk factor. Twelve DHBs had enough risk factor data for both cryptosporidiosis and giardiasis.



Throughout the 2010s, the three DHBs covered by the Auckland Regional Public Health Service (Waitematā, Auckland and Counties Manakau) consistently had far lower risk factor completion rates for all three diseases reported here than any other DHB.



For 2015–19, West Coast DHB had the highest notification rates of campylobacteriosis with recreational water as a risk factor, while Tairāwhiti DHB had the highest rates of giardiasis notifications. Due to a combination of low completion rates and high statistical uncertainty, there was no clear candidate for the DHB with the highest cryptosporidiosis rate.



In 2019, there were 146 notifications of campylobacteriosis, 39 notifications of cryptosporidiosis, and 120 notifications of giardiasis with contact with recreational water recorded as a risk factor. Because fewer than 50% of all notifications included risk factor information, these figures are highly likely to be underestimates.

## 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. Contact with contaminated recreational water is one possible source of transmission for these diseases. Other transmission sources include contact with drinking water, farm animals, sick animals, faecal matter, other symptomatic people, and eating contaminated food.

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, EHZNZ 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.

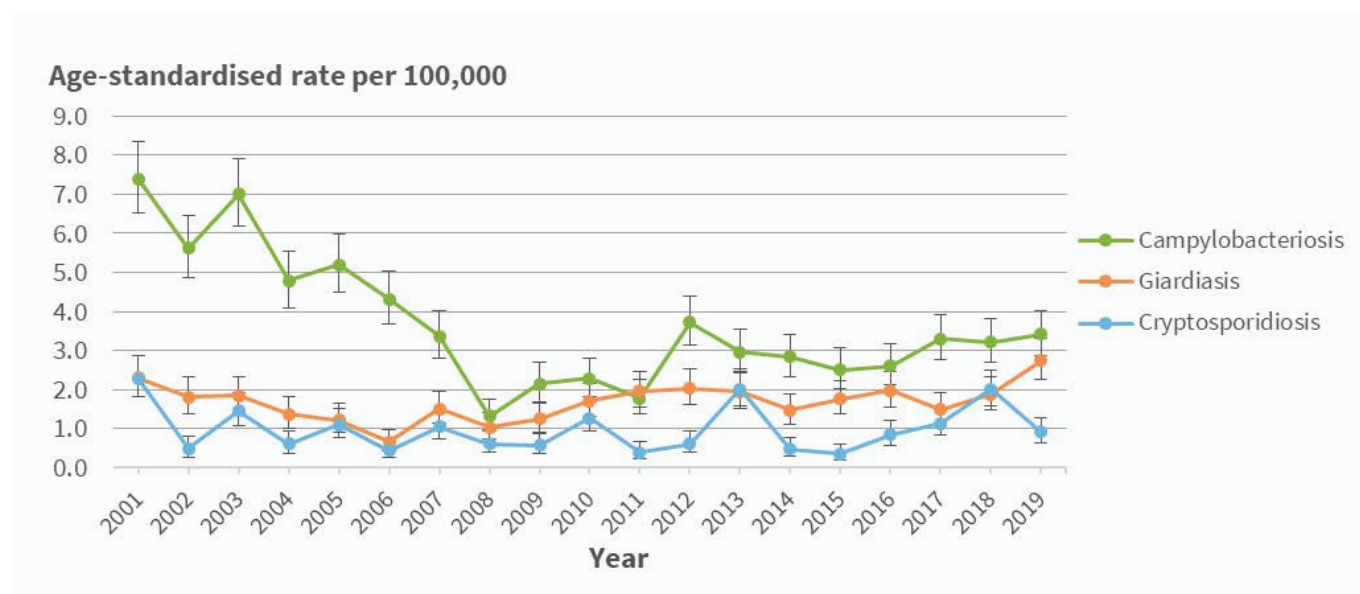
## Rates of potentially waterborne diseases connected with recreational water remained fairly stable throughout the 2010s

In 2019, there were 146 notifications of campylobacteriosis, 39 notifications of cryptosporidiosis, and 120 notifications of giardiasis with contact with recreational water recorded as a risk factor.

Rates of campylobacteriosis with recreational water contact initially declined from 2001 to 2008 but increased slightly during the 2010s. The decline in campylobacteriosis rates 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 cryptosporidiosis and giardiasis with recreational water contact recorded as a risk factor remained mostly unchanged. The spike in cryptosporidiosis rates in 2013 is likely connected to a spike in the rate of all cryptosporidiosis cases that year, rather than an increase related to recreational water specifically.

**Figure 1: Notification rates of potentially waterborne diseases with recreational water contact as a risk factor, 2001–19**



Source: ESR 2020

## Notifications where recreational water is listed as a risk factor are a minority

In 2019, notifications of potentially waterborne diseases where recreational water contact is listed as a risk factor made up less than five percent of all notifications (Table 1).

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

Disease	Contact with recreational water as a risk factor?			Risk factor completion rates		
	Yes	No	No data	Complete notifications	Completion rate	Percent of complete notifications with rec. water contact
Campylobacteriosis	146	1,748	3,917	1,894	32.6%	2.5%
Giardiasis	120	601	857	721	45.7%	4.0%
Cryptosporidiosis	39	417	529	456	46.3%	7.6%
<b>Total</b>	<b>305</b>	<b>2,766</b>	<b>5,303</b>	<b>3,071</b>	<b>36.7%</b>	<b>3.6%</b>

Source: ESR 2020

## Risk factor completion rates are low and are not improving

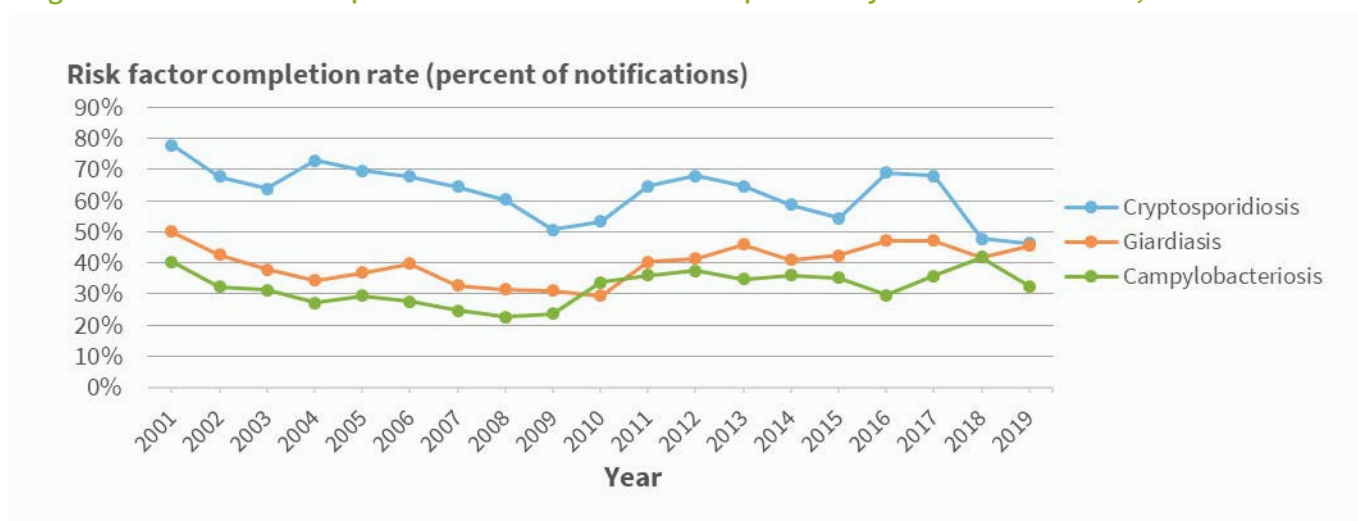
Risk factor completion rates for all three diseases reported here have decreased between 2001–19. As of 2019, fewer than half of all notifications were provided complete with risk factor information.

Completion rates for cryptosporidiosis declined intermittently between 2001 and 2019, dropping substantially from 77.7% to 46.3%, the lowest rate for 19 years.

Completion rates for giardiasis declined from a high of 50.0% in 2001 to a low of 29.4% in 2010, recovering into the 40–50% range in 2011, where it has remained since.

Completion rates for campylobacteriosis notifications also fell from a high of 40.3% in 2001 to a low of 22.7% in 2008. The completion rate rose back into the 30–40% range in 2010 and stayed fairly stable in that band thereafter (Figure 2).

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



Source: ESR 2020

## Trends in completion rates vary 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.

Five DHBs lacked enough risk factor information to ensure adequate data quality for all three diseases in 2015–19: Waitematā, Auckland, Counties Manakau, Hawke's Bay, and Canterbury. Of these, only Canterbury DHB's completion rates did not improve for any disease from 2010–14 to 2015–19.

However, the reader 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, Waitematā, Auckland, and Counties Manakau, 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**

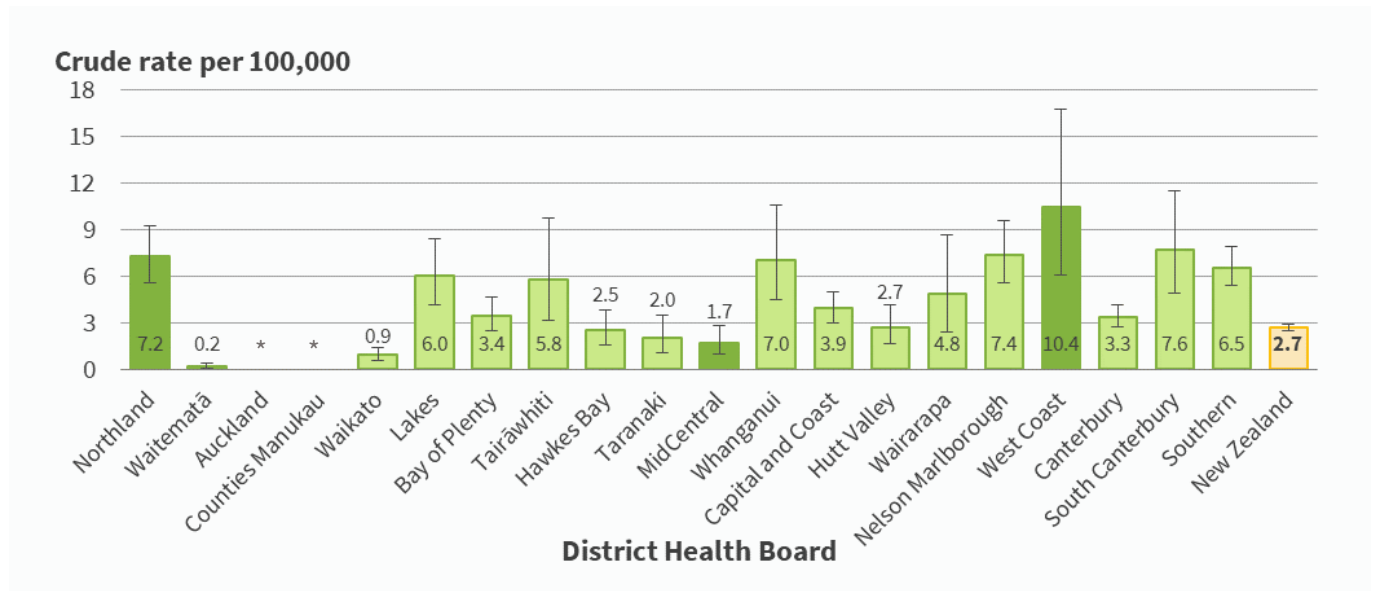
DHB (associated PHU)	Campylobacteriosis		Cryptosporidiosis		Giardiasis	
	2010–14	2015–19	2010–14	2015–19	2010–14	2015–19
Northland (Ngā Tai Ora – Public Health Northland)	69.2%	77.3%	70.6%	84.9%	72.9%	81.8%
Waitematā (Auckland Regional Public Health Service)	0.3%	7.0%	0.9%	17.3%	0.1%	3.2%
Auckland (ARPHS)	0.2%	5.6%	1.4%	15.1%	0.4%	2.2%
Counties Manukau (ARPHS/Waikato Public Health Unit)	0.2%	7.0%	8.0%	18.9%	0.6%	4.7%
Waikato (Waikato Public Health Unit)	31.9%	26.0%	65.4%	84.7%	62.8%	81.6%
Lakes (Toi Te Ora Public Health)	57.5%	51.8%	80.6%	94.0%	85.0%	89.1%
Bay of Plenty (Toi Te Ora Public Health)	63.8%	50.5%	91.0%	90.1%	87.9%	89.1%
Tairāwhiti (Hauora Tairāwhiti)	15.1%	38.0%	47.4%	68.2%	21.4%	78.4%
Hawke's Bay (Hawke's Bay Public Health Unit)	2.7%	23.6%	78.8%	59.8%	8.8%	45.7%
Taranaki (Taranaki Public Health)	71.9%	26.8%	94.5%	86.6%	93.4%	84.8%
MidCentral (MidCentral Public Health Service)	88.4%	84.7%	91.6%	90.0%	81.8%	84.0%
Whanganui (MidCentral Public Health Service)	56.0%	54.3%	89.5%	85.1%	77.9%	76.5%
Capital and Coast (Regional Public Health/MidCentral PHS)	41.6%	56.1%	77.0%	79.2%	60.1%	70.3%
Hutt Valley (Regional Public Health)	37.8%	58.3%	81.5%	79.3%	65.9%	65.6%
Wairarapa (Regional Public Health)	50.4%	53.3%	87.3%	84.7%	65.4%	69.3%
Nelson Marlborough (Nelson Marlborough Public Health Service)	43.8%	49.7%	85.9%	91.5%	79.3%	87.3%
West Coast (Community and Public Health)	57.6%	83.8%	87.2%	91.7%	45.8%	81.8%
Canterbury (Community and Public Health)	50.7%	42.3%	63.0%	42.3%	45.4%	40.7%
South Canterbury (Community and Public Health)	80.0%	46.6%	72.2%	50.0%	78.4%	48.5%
Southern (Public Health South)	58.2%	49.2%	84.9%	66.2%	84.9%	72.6%
<b>New Zealand</b>	<b>35.6%</b>	<b>34.9%</b>	<b>62.0%</b>	<b>56.4%</b>	<b>39.2%</b>	

Source: ESR 2020

## Campylobacteriosis notification rates were highest in West Coast DHB

In 2015–19, only three DHBs had enough risk factor information for a reliable calculation of the rate of disease where recreational water contact was a risk factor – Northland, MidCentral, and West Coast. Of these, West Coast DHB had the highest notification rate: 10.4 notifications per 100,000 persons (Figure 3).

**Figure 3: Notification rates of campylobacteriosis with recreational water contact as a risk factor, by DHB, 2015–19**

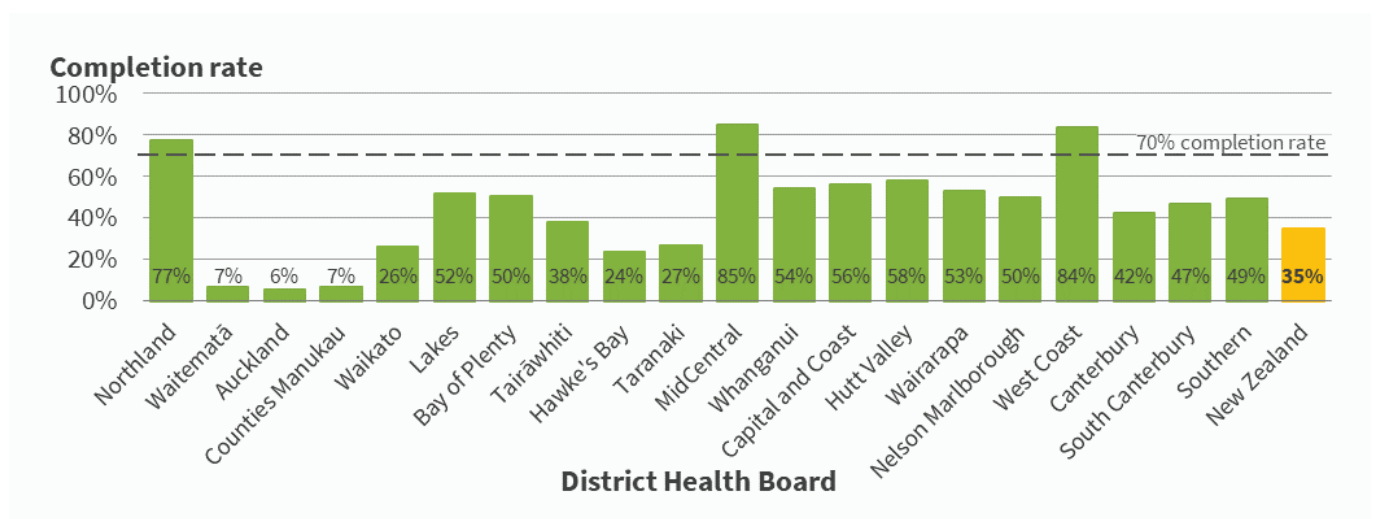


**Note:** An asterisk (\*) indicates a suppressed rate due to a low number of notifications (<5). Owing to varying risk factor completion rates, readers should use caution when comparing rates between DHBs. Bars with a light fill indicate DHBs where completion rates were lower than 70%. The statistical 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

During this period, MidCentral DHB had the highest completion rates for risk factor information among campylobacteriosis notifications, followed closely by West Coast DHB (Figure 4). The worst completion rates were all in the Auckland region, specifically Waitematā, Auckland, and Counties Manakau DHBs.

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

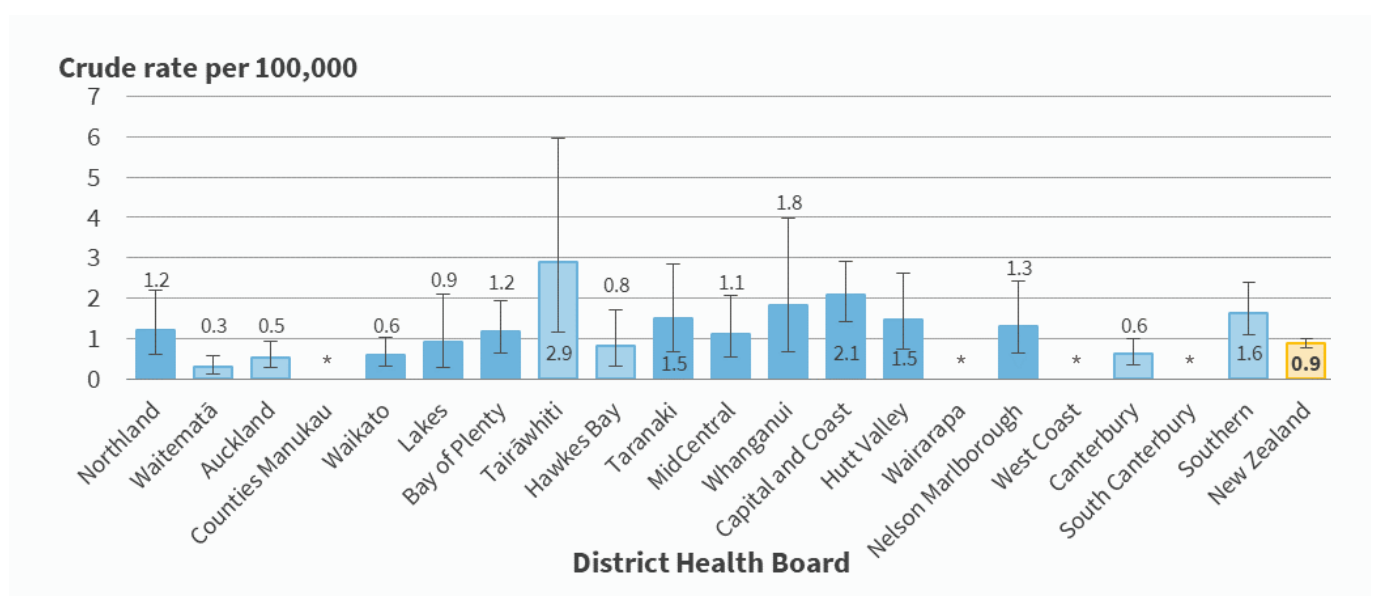


**Source:** ESR 2020

## Cryptosporidiosis notification rates may have been highest in Tairāwhiti DHB

Tairāwhiti DHB appears to have had the highest notification rate for cryptosporidiosis with recreational water contact as a risk factor in 2015–19: 2.9 per 100,000 (Figure 5). However, this is based on a risk factor completion rate of 68% and the rate has a high degree of statistical uncertainty, so it may not be a reliable estimate of the actual rate of disease.

**Figure 5: Notification rates of cryptosporidiosis with recreational water contact as a risk factor, by DHB, 2015–19**

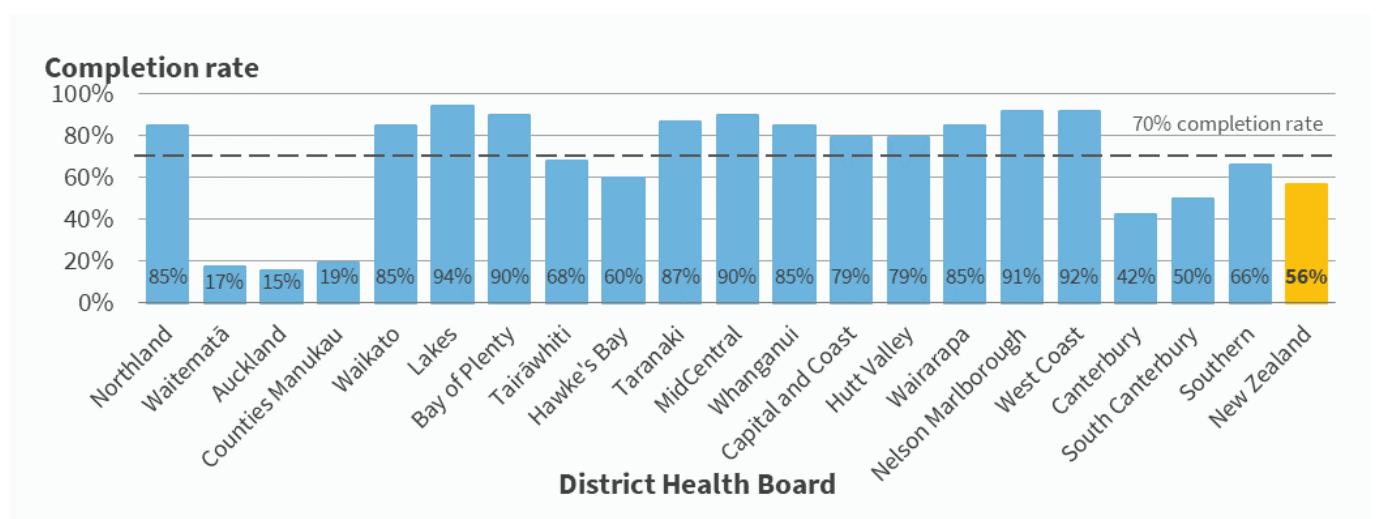


**Note:** An asterisk (\*) indicates a suppressed rate due to a low number of notifications (<5). Owing to varying risk factor completion rates, readers should use caution when comparing rates between DHBs. Bars with a light fill indicate DHBs where completion rates were lower than 70%. The statistical 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 cryptosporidiosis notifications were generally reasonable, with 12 out of 20 DHBs exceeding a completion rate of 70% between 2015–19 (Figure 6). Lakes DHB had the highest rate by a small margin (94%), with four other DHBs also having completion rates of 90% or more. 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**

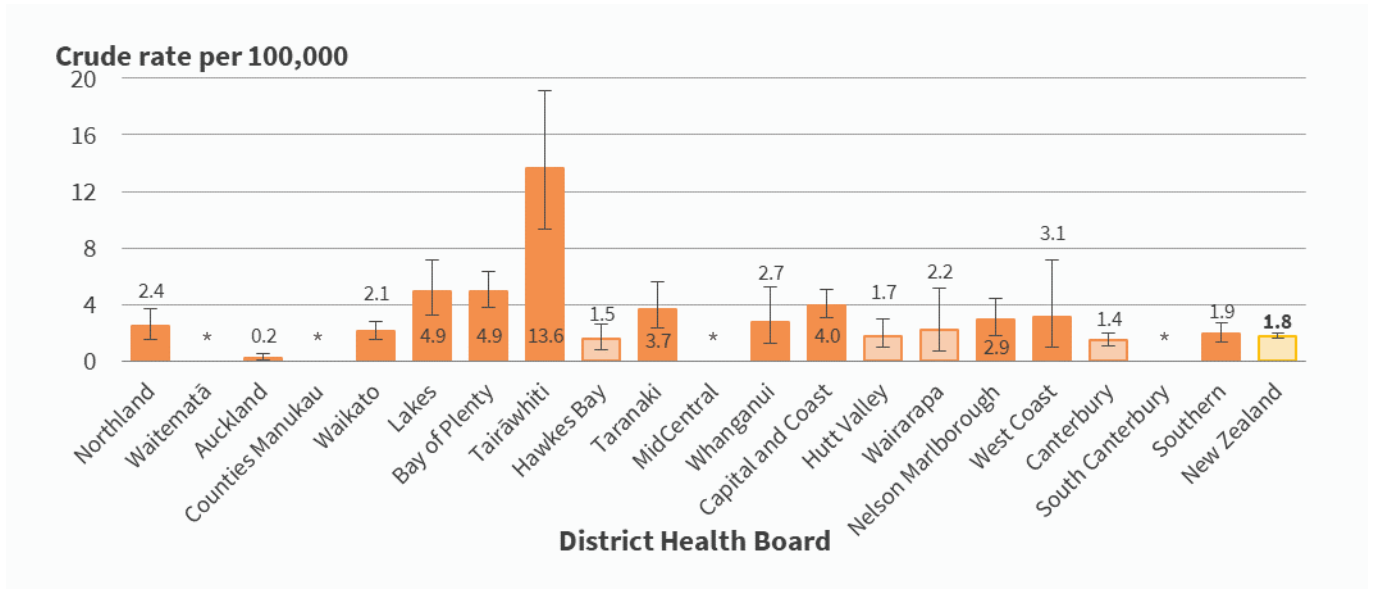


**Source:** ESR 2020

## Giardiasis notification rates were highest in Tairāwhiti DHB

In 2015–19, Tairāwhiti DHB had the highest notification rate for giardiasis with recreational water contact as a risk factor, with a crude rate of 13.6 notifications per 100,000 persons, substantially more than any other DHB (Figure 7).

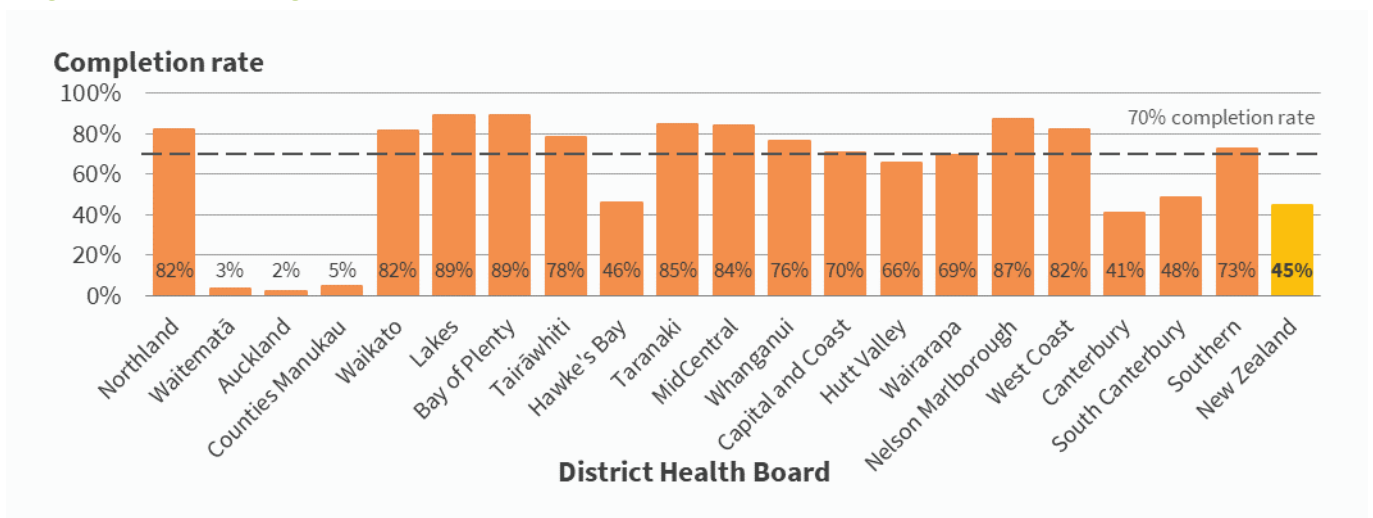
**Figure 7: Notification rates of giardiasis with recreational water contact as a risk factor, by DHB, 2015–19**



**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 12 out of 20 DHBs. Bay of Plenty and Lakes DHBs tied for the highest completion rate, at 89% each (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 came in contact with recreational water (a river, lake, or sea) during the incubation period. Multiple risk factors can exist for a single case. 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 or more values are statistically significant at the 5% level or less. 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. 2020. Notifiable diseases EpiSurv data extraction. Porirua: Institute of Environmental Science and Research Limited. (personal communication with ESR Senior Analysts).

## Other related topics include:

[Suitability for swimming](#)

[Waterborne diseases related to drinking water](#)

[Agricultural activity](#)

## Author

The author of this factsheet is Patrick Hipgrave

## Citation

Environmental Health Indicators. 2021. Notifications of potentially waterborne diseases with recreational water as a risk factor [Factsheet]. Wellington: Environmental Health Intelligence NZ, Massey University.

## Further information

For descriptive information about the data