# Notifications of waterborne diseases with untreated drinking water as a risk factor

This surveillance report presents information on notifications of campylobacteriosis, giardiasis, and cryptosporidiosis with untreated drinking water as a risk factor. The percentage of cases with risk factor information reported is also included.

## Key facts

- In 2023, there were 419 notifications of campylobacteriosis, 90 notifications of cryptosporidiosis, and 88 notifications of giardiasis, where untreated drinking water was recorded as a risk factor. However, these figures are highly likely to be underestimates.
- In 2019–23, none of the twenty health districts had sufficient risk factor information for campylobacteriosis notifications to allow a reliable calculation of a crude rate of disease where untreated drinking water was a risk factor. Five districts had enough data for cryptosporidiosis and four for giardiasis.
- Similar to previous time periods, very little risk factor information was collected in the Auckland region (specifically Waitematā, Auckland and Counties Manukau districts) during 2019-23.

## 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 campylobacteriosis cases are 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 as many as 8,320 of the town's 14,000 residents may have become ill with campylobacteriosis (ESR 2017, Gilpin et al 2020).

Notifications of these diseases submitted to ESR by Public Health Units should also include risk factor information.This information includes details of possible sources from which the individual could have contracted the disease – but not the confirmed source.

The percentage of notifications that had completed risk factor information (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 matched or exceeded to allow sufficient data quality for use in our analyses.

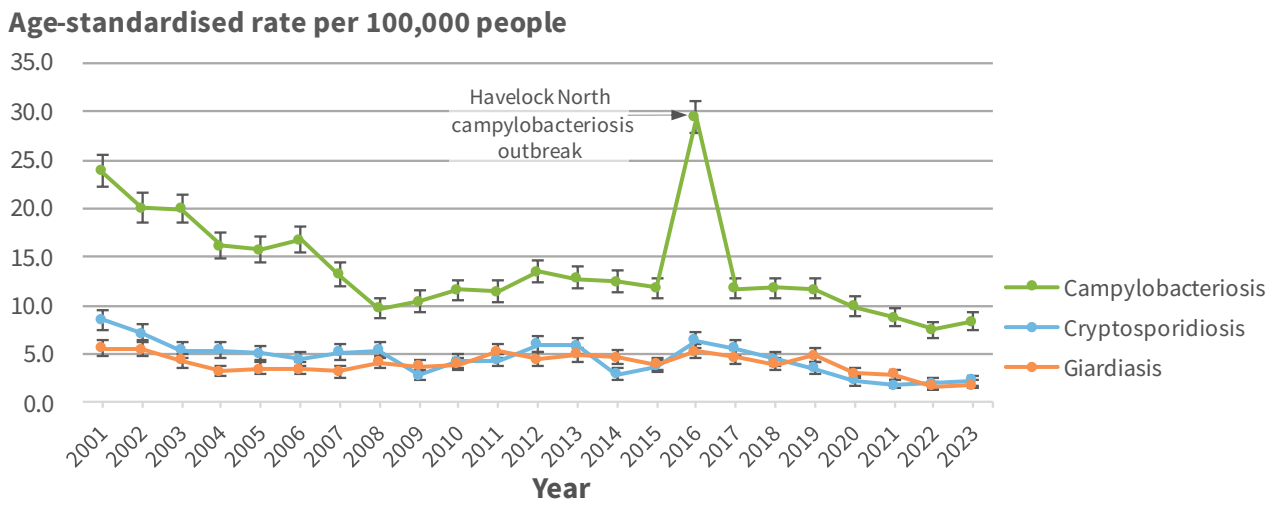
## Declining rates of disease do not tell the whole story

In 2021, there were 419 notifications of campylobacteriosis, 90 notifications of cryptosporidiosis, and 88 notifications of giardiasis where untreated drinking water was 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 and beyond – the 2016 Havelock North outbreak notwithstanding (Figure 1).

Meanwhile, notification rates of cryptosporidiosis and giardiasis, where drinking untreated water was recorded as a risk factor, mainly remained unchanged. The COVID-19 pandemic appears to have had a negligible effect on rates, if any – though this may reflect the generally poor state of risk factor recording.

**Figure 1: Notification rates of potentially waterborne diseases with untreated drinking as a risk factor, 2001–23**




Source: ESR 2024

## Notifications with untreated drinking water recorded as a risk factor are rare – because of incomplete record-keeping

In 2023, notifications of disease where drinking untreated water was listed as a risk factor comprised around 10% or less out of all notifications of the three diseases reported here (Table 1). However, most notifications (66.1%) were provided without any risk factor information.

About one in four notifications with risk factor information included untreated drinking water as a risk factor. It is, therefore, very likely that far more notified cases will be connected to untreated water than are counted below.

If the 'no data' notifications are apportioned out using the same 'yes/no' ratio of the completed notifications, there would be an additional 1,234 instances of campylobacteriosis, 120 of cryptosporidiosis and 171 of giardiasis with a potential link to untreated drinking water in 2023.

**Table 1: Breakdown of notifications by risk factor status, 2023**

| Disease | Notifications with untreated water as a risk factor | | | | | Risk factor completion | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | No | Total stated | Unknown/ missing | Total cases | Completion rate (%)[1] | Percentage with reported untreated water contact (among total stated) | Percentage with reported untreated water contact (among total) |
| Campylobacteriosis | 419 | 1,358 | 1,777 | 3,998 | 5,775 | 30.8% | 23.6% | 7.3% |
| Cryptosporidiosis | 90 | 292 | 382 | 388 | 770 | 49.6% | 23.6% | 11.7% |
| Giardiasis | 88 | 245 | 333 | 476 | 809 | 41.2% | 26.4% | 10.9% |
| **Total** | **597** | **1,895** | **2,492** | **4,862** | **7,354** | **33.9%** | **24.0%** | **8.1%** |

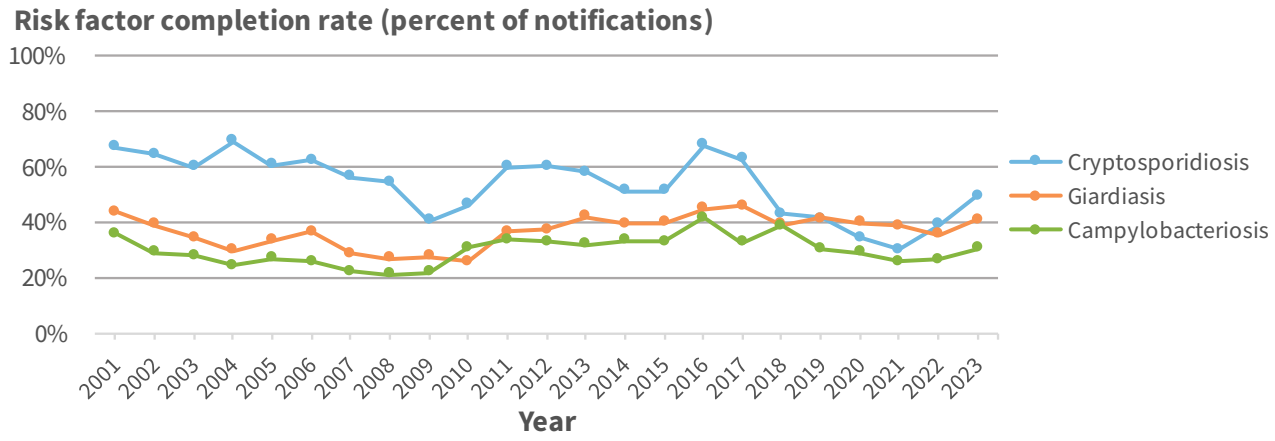
[1] Completion rate = percentage of notifications with risk factor information provided.

Source: ESR 2024

## Risk factor completion rates remain low

Risk factor completion rates for the three diseases have generally been low, with completion rates for giardiasis and campylobacteriosis notifications being consistently lower than 50% (Figure 2). The COVID-19 pandemic may have affected completion rates (for example, through stretched public health workforce and resources), as risk factor completion rates were particularly low for all three diseases in 2020–2022. There were small improvements in the risk factor completion rates for all three diseases in 2023.

**Figure 2: Risk factor completion rates for notifications of potentially waterborne disease, 2001–23**




Source: ESR 2024

## Completion rates vary by health district

In 2019–23, most health districts (formerly district health boards) had fewer complete notifications than during the pre-COVID period EHINZ last reported on (2015–19). Table 2 below sets out the completion rate for each period, arranged by public health service (PHS) (formerly public health units) and health district.

Public health services are responsible for reporting risk factor information. The three districts covered by the Auckland Regional Public Health Service (ARPHS) – that is, Waitematā, Auckland, and Counties Manukau, all had much less risk factor information included in their notifications than any other district. The PHS associated with each district is included in the table below.

## Table 2: Risk factor completion rates in 2019–23 compared to 2015–19, by PHS and health district

| Primary PHS | District | Campylobacteriosis | | Cryptosporidiosis | | Giardiasis | |
|---|---|---|---|---|---|---|---|
| | | 2015–19 | 2019–23 | 2015–19 | 2019–23 | 2015–19 | 2019–23 |
| **Ngā Tai Ora – Public Health Northland** | Northland | 71.8% | 60.2% | 77.1% | 67.4% | 76.5% | 68.1% |
| **Auckland Regional Public Health Service** | Waitematā | 6.7% | 1.6% | 19.4% | 0.3% | 3.3% | 0.2% |
| | Auckland | 5.4% | 1.7% | 16.0% | 1.1% | 2.4% | 0.3% |
| | Counties Manukau* | 6.6% | 1.3% | 21.1% | 0.6% | 4.9% | 0.0% |
| **Waikato Public Health** | Waikato | 19.7% | 34.9% | 75.4% | 45.7% | 75.7% | 56.1% |
| **Toi Te Ora Public Health** | Lakes | 50.4% | 45.6% | 78.6% | 78.1% | 88.1% | 86.3% |
| | Bay of Plenty | 49.3% | 40.8% | 86.6% | 78.3% | 86.1% | 76.5% |
| **Hauora Tairāwhiti Public Health** | Tairāwhiti | 35.1% | 34.6% | 62.1% | 37.8% | 70.0% | 53.3% |
| **Hawke's Bay Public Health** | Hawke's Bay | 63.6% | 47.2% | 54.9% | 41.5% | 44.2% | 48.1% |
| **Taranaki Public Health** | Taranaki | 26.5% | 13.5% | 85.2% | 79.6% | 84.8% | 78.2% |
| **MidCentral Public Health Service** | MidCentral | 83.6% | 60.4% | 82.0% | 67.6% | 80.2% | 67.9% |
| | Whanganui | 55.0% | 43.7% | 80.6% | 52.8% | 75.0% | 50.0% |
| **Regional Public Health** | Capital and Coast** | 54.6% | 52.4% | 73.3% | 57.3% | 66.4% | 55.2% |
| | Hutt Valley | 57.0% | 51.8% | 76.1% | 51.9% | 63.4% | 52.9% |
| | Wairarapa | 52.2% | 53.3% | 84.7% | 77.1% | 63.6% | 55.9% |
| **Nelson Marlborough Public Health Service** | Nelson Marlborough | 43.8% | 28.1% | 81.7% | 57.1% | 82.4% | 61.8% |
| **Community and Public Health** | West Coast | 79.2% | 69.9% | 87.5% | 73.1% | 90.9% | 84.2% |
| | Canterbury | 39.6% | 33.7% | 36.7% | 31.6% | 35.2% | 34.4% |
| | South Canterbury | 38.3% | 21.8% | 40.0% | 19.8% | 42.3% | 18.8% |
| **Public Health South** | Southern | 46.4% | 35.0% | 62.2% | 47.4% | 70.0% | 44.4% |
| **New Zealand** | | **35.8%** | **28.7%** | **52.6%** | **39.5%** | **42.5%** | **40.0%** |

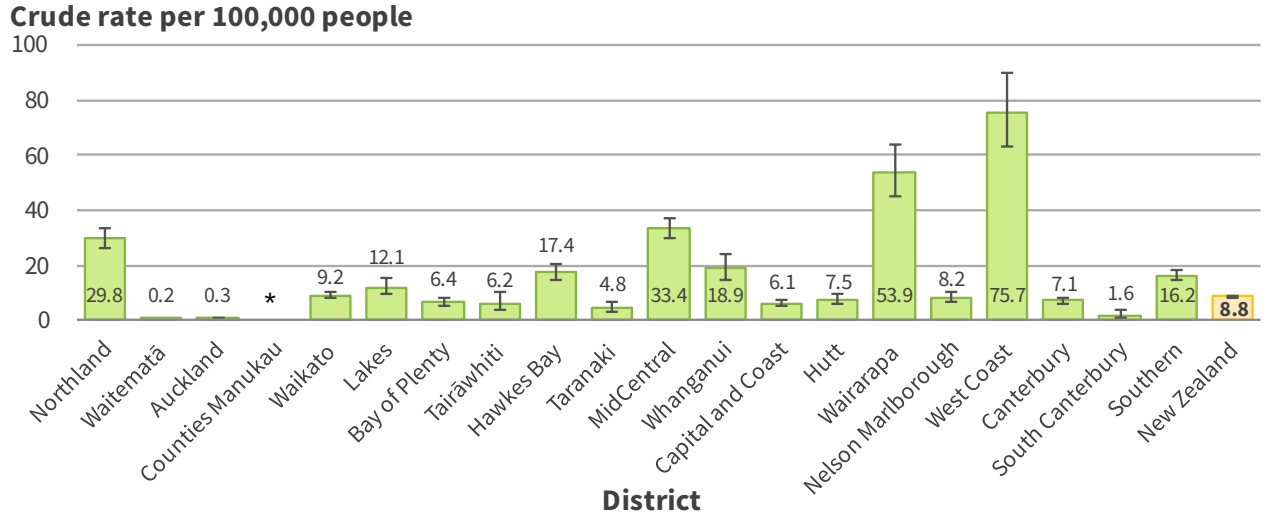
Notes: * and **: these districts have very small geographical overlaps between two PHS. Counties Manukau district is partially within the area of Waikato PHS, and Capital and Coast district has a small element within the region of MidCentral PHS.

Source: ESR 2024

## Campylobacteriosis notification and completion rates

In 2019–23, no health district had the minimum 70% completion rate of risk factor information required for robust calculation of rates in the population. Therefore, notification rates should be treated with extreme caution. Nonetheless, West Coast and Wairarapa districts had somewhat high rates of campylobacteriosis notifications with untreated drinking water as a risk factor (Figure 3).

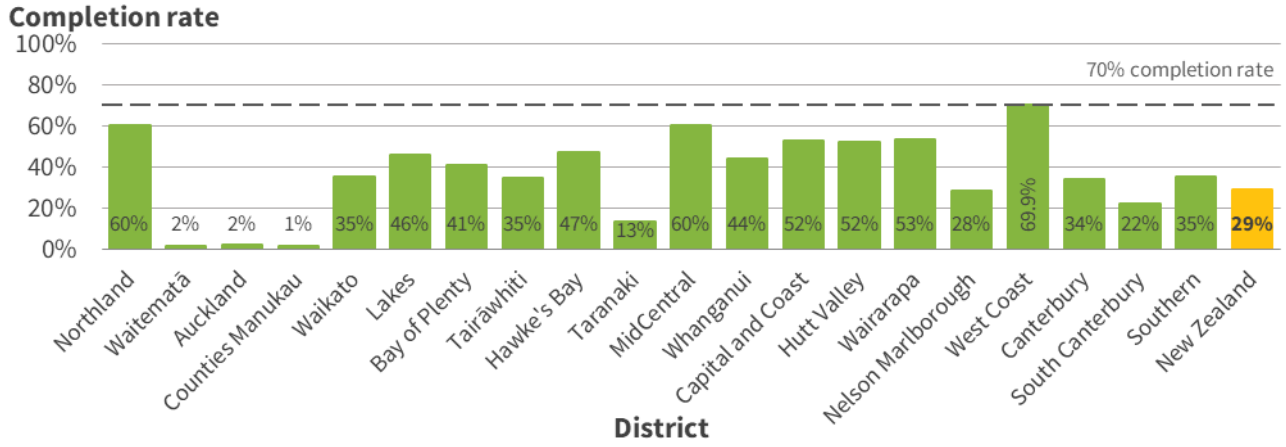
**Figure 3: Notification rates of campylobacteriosis with untreated drinking water as a risk factor, by health district, 2019–23**




Note: * - The rate for these districts is suppressed due to a lack of notifications that declared untreated water a risk factor (<5 over the five-year period). Due to varying risk factor completion rates, rates and any comparisons should be treated with extreme caution. Bars with a light fill indicate health districts where completion rates were lower than 70%. Waitematā and Auckland districts have a 2% completion rate and should not be considered reliable estimates.
Source: ESR 2024

While Figure 3 suggests Waitematā, Auckland, and Counties Manukau had very low rates of campylobacteriosis linked to untreated water, Figure 4 shows that almost none of the notifications for those districts (2% or less) included risk factor data.

**Figure 4: Risk factor completion rates for notifications of campylobacteriosis, 2019–23**

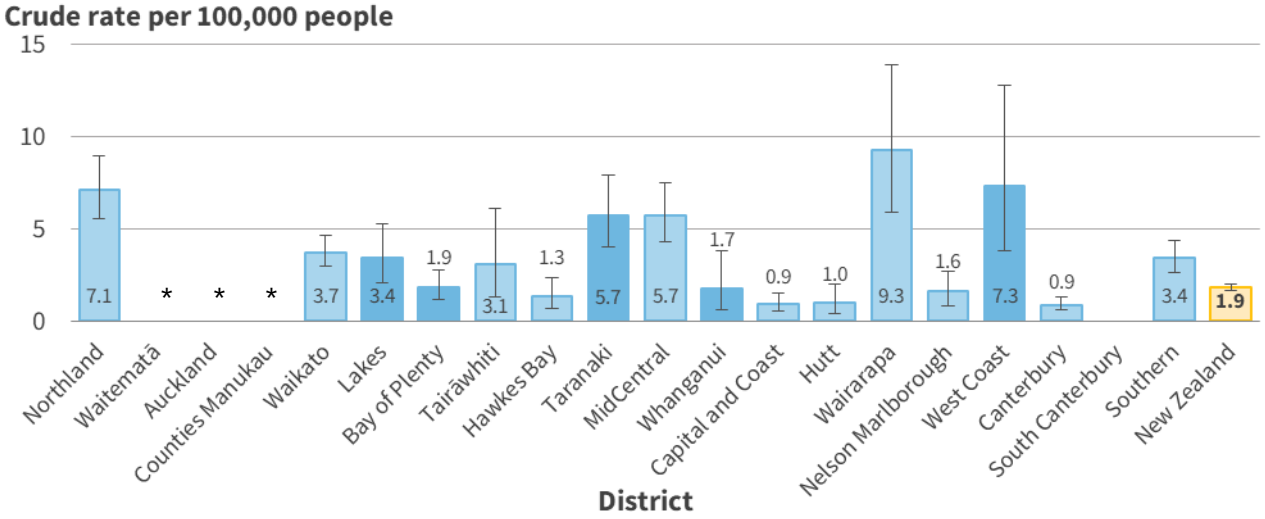



Source: ESR 2024

## Cryptosporidiosis notification and completion rates

Wairarapa, West Coast, and Northland health districts had relatively high cryptosporidiosis notification rates with untreated drinking water as a risk factor in 2019–2023 (Figure 5). However, varying completion rates of risk factor information by health district make it difficult to draw other conclusions from the data.

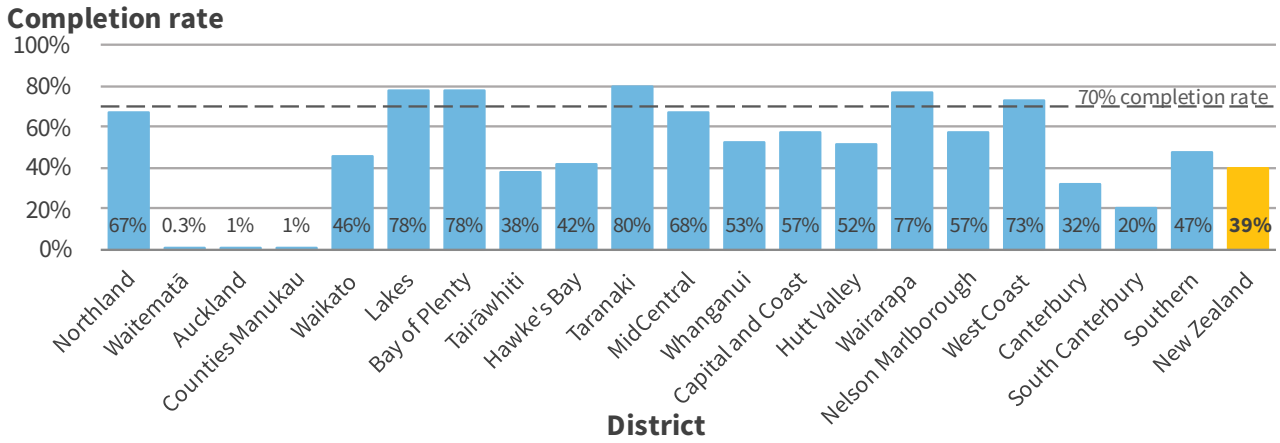
**Figure 5: Notification rates of cryptosporidiosis with untreated drinking water as a risk factor, by district, 2019–23**




Note: * - The crude rates for Waitematā, Auckland, Counties Manukau and South Canterbury are suppressed due to a lack of notifications that declared untreated water a risk factor (<5 over the five-year period). Due to varying risk factor completion rates, use caution when comparing rates between health districts. Bars with a light fill indicate health districts where completion rates were lower than 70%.
Source: ESR 2024

Risk factor completion rates for cryptosporidiosis notifications were somewhat higher than for campylobacteriosis notifications, with 5 out of 20 health districts having a completion rate of at least 70% in 2019–23 (Figure 6). As above, the districts within the Auckland region had almost no risk factor information collected for cryptosporidiosis notifications (1% of notifications or less).

**Figure 6: Risk factor completion rates for notifications of cryptosporidiosis, 2019–23**

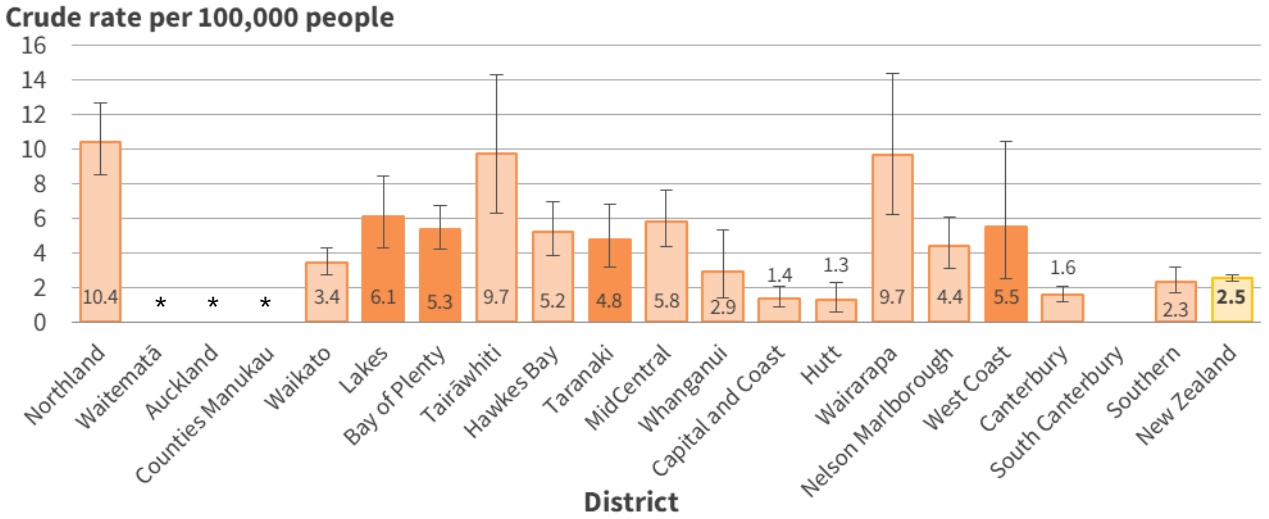



Source: ESR 2024

## Giardiasis notification and completion rates

In 2019–23, Northland, Tairāwhiti and Wairarapa health districts had relatively high notification rates for giardiasis with untreated drinking water recorded as a risk factor (Fig 7).

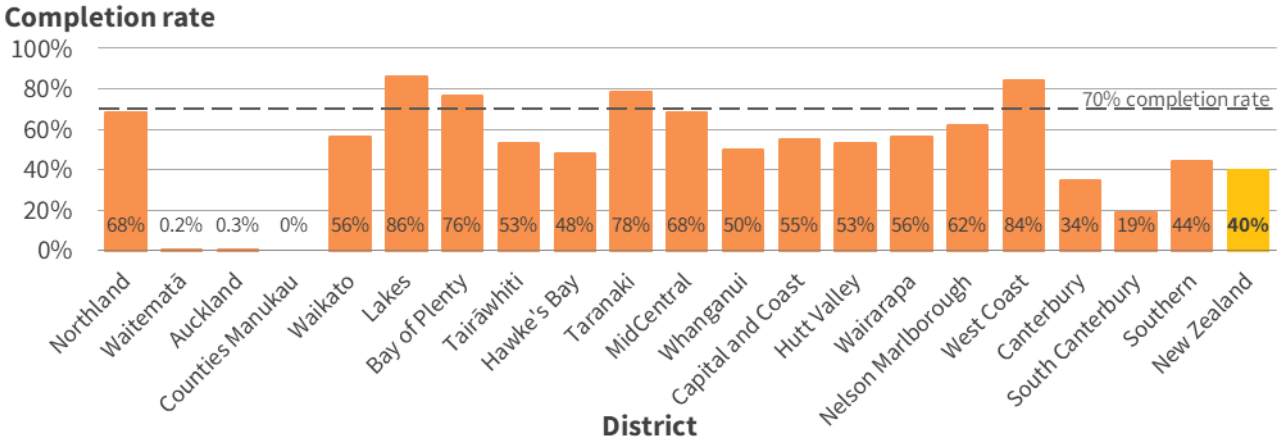
**Figure 7: Risk factor completion rates for notifications of giardiasis, 2019–23**




Note: * - The crude rates for Waitematā, Auckland, Counties Manukau and South Canterbury are suppressed due to a lack of notifications that declared untreated water a risk factor (<5 over the five-year period). 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%
Source: ESR 2024

Risk factor completion rates for giardiasis were at least 70% in only four out of 20 districts, with the highest rate (86%) occurring in Lakes district (Figure 8). Once again, the Waitematā, Auckland, and Counties Manukau districts provided far less risk factor information than others, leading to suppressed disease rates in those districts.

**Figure 8: Risk factor completion rates for notifications of giardiasis, 2019–23**




Source: ESR 2024

## Data for this indicator

This surveillance report presents EpiSurv notifications from the Institute for Environmental Science and Research (ESR). Notifications for campylobacteriosis, cryptosporidiosis and giardiasis are reported, with risk factor information based on whether the case consumed untreated surface water, bore water or rain water during the incubation period ('untreated' variable in EpiSurv). Notifications excluded cases where the person was overseas during the incubation period. EpiSurv notifications only cover those who visited a GP or hospital for treatment and are therefore likely to underestimate the actual rate of disease in the population.

Public Health Services are responsible for reporting risk factor information for each case. 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. Confidence intervals do not account for the completion rates (ie missing data) in a given year or district, so they should also be treated cautiously. For additional information, see the metadata link below.

For additional information, see the Metadata sheet.

## References

ESR. 2017. *Notifiable Diseases in New Zealand: Annual Report 2016*. Porirua: Institute of Environmental Science and Research. Porirua: Institute of Environmental Science and Research Limited

ESR. 2024. *Notifiable diseases EpiSurv data extraction*. Porirua: Institute of Environmental Science and Research Limited (Personal communication with ESR Senior Analysts).

Gilpin B; et al. 2020. A large scale waterborne Campylobacteriosis outbreak, Havelock North, New Zealand. *Journal of Infection.* 81:3, p390-395. https://doi.org/10.1016/j.jinf.2020.06.065. (accessed 17/10/2024)

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