

Notifications of potentially waterborne diseases

This report presents information on how New Zealanders' health is affected by three potentially waterborne diseases (PWD): campylobacteriosis, giardiasis and cryptosporidiosis.

Key facts

- Children aged under four years experienced much higher notification rates for all waterborne diseases covered in this surveillance report.
- The age-standardised rate of campylobacteriosis notifications was 108.8 per 100,000 people in 2021, following a steady decline since 2008.
- The notification rate for cryptosporidiosis was 16.5 per 100,000 people, one of the lowest reported rates since 2001.
- Notification rates of giardiasis have remained similar to 2020 after the sharp decrease in notifications from 2019 to 2020.

Waterborne diseases and the environment

Campylobacteriosis is one of the most common infections caused by bacteria in humans, and whilst it is most notably a foodborne disease, evidence shows that outbreaks can also be attributed to water contamination (Wilson et al. 2008). *Campylobacter* normally inhabit the intestine of warm-blooded animals but can cause waterborne infections resulting from water contamination from fecal run-off from farms.

Other important waterborne enteric pathogens that can be transmitted via wastewater include *Cryptosporidium* and *Giardia* (Pitkänen 2013).

Cryptosporidiosis and giardiasis are infections caused by protozoal parasites and can also contaminate waterways and result in waterborne transmission of disease (Carmena 2010).

Waterborne diseases are often causative agents of gastroenteritis in humans. Although the infection can be self-limiting in most people, it can be lethal for immunocompromised individuals. Waterborne diseases can often remain in waterways outside of a human host for extended periods, making transmission through drinking and recreational water an increased risk.

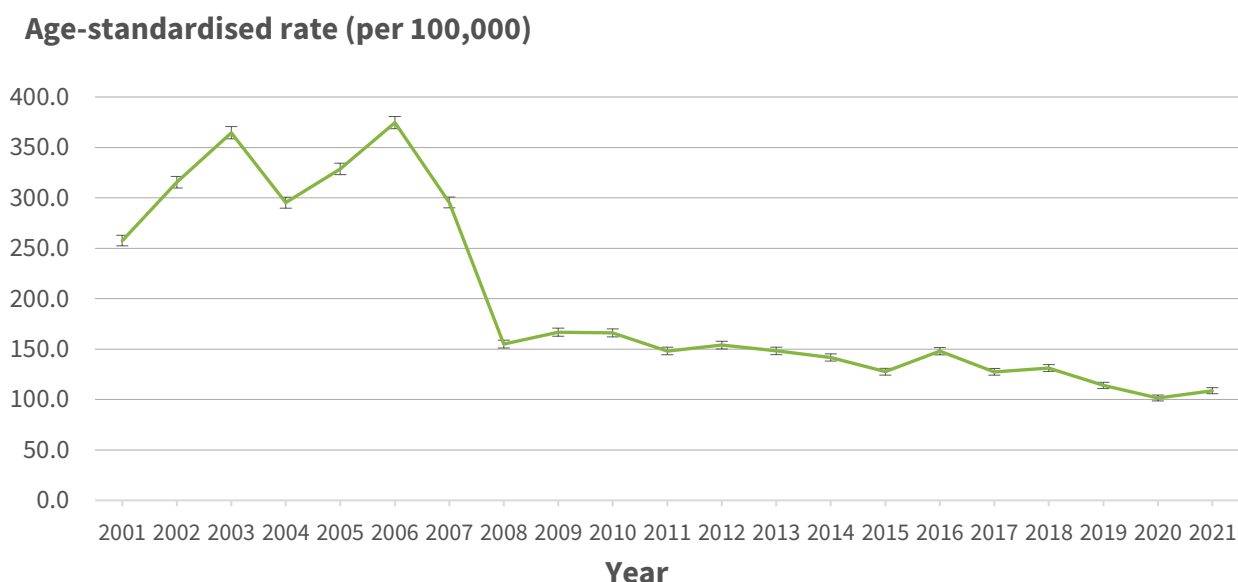
Potentially waterborne disease notification rates

The campylobacteriosis notification rate in 2021 was 108.8 per 100,000 people (5,720 notifications), a slight increase from 2020 (Figure 1), but still continuing a declining trend from 2009 onwards.

The minor elevation in the rate for 2016 is due to a campylobacteriosis outbreak in Havelock North.

The large decrease in the campylobacteriosis rate from 2008 onward has been attributed to the introduction of food safety regulations for poultry production in 2007 and 2008 (Duncan 2014). Consequently, the decline represents a drop in the number of food-related cases. It is unlikely to represent a change in the pattern of cases contracted through contact with contaminated water.

Figure 1: Campylobacteriosis notification rate, 2001–2021



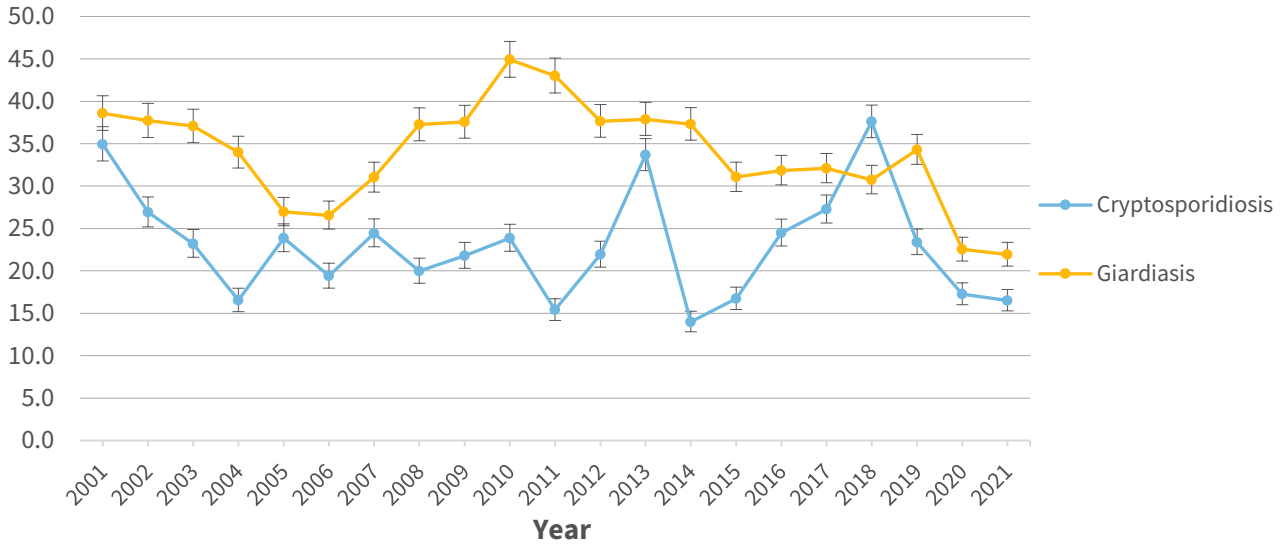
Note: The 95% confidence intervals for this graph are displayed as vertical bars.
Source: ESR 2023

In 2021, the age-standardised notification rate for cryptosporidiosis was 16.5 per 100,000 people (702 notifications). The notification rate for cryptosporidiosis has been fairly volatile, with an increase in notification rates between 2014 (14.0 per 100,000) and 2018 (37.6 per 100,000). There was a subsequent decline between 2018 and 2021. As a result, the rate in 2021 is under half that of just three years previously, with the rate in 2018 being the highest rate of notifications in the last 20 years of data (Figure 2).

There was a notable drop in the rate of giardiasis between 2019 and 2020 after a period of no real change. The age-standardised rate fell from 34.3 to 22.5 per 100,000 people, which is the largest year-to-year difference on record. The number of cases underpinning the rate fell from 1,570 to 1,080. In 2021, the rates of giardiasis (21.9 per 100,000 people) remained relatively unchanged from the previous year, with 1,034 cases. magnitude of the change suggests it may be partly due to reductions in access to healthcare (and cases going unreported as a result) during periods of elevated COVID-19 restrictions during the year.

Figure 2: Cryptosporidiosis and giardiasis notification rates, 2001–2021

Age-standardised rate per 100,000

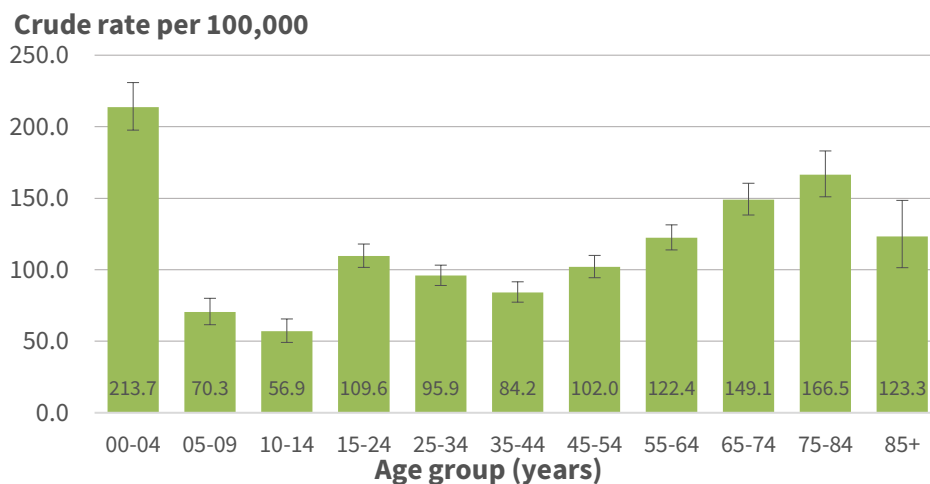


Note: The 95% confidence intervals for this graph are displayed as vertical bars.
Source: ESR 2023

Young children have the highest notified rates of all waterborne diseases

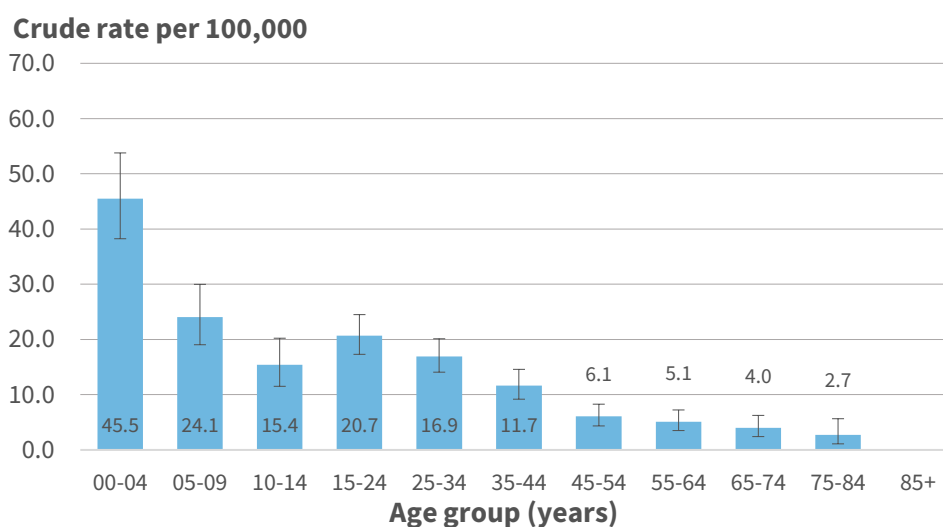
Continuing the pattern of previous years, in 2021, the highest notification rates for campylobacteriosis, giardiasis and cryptosporidiosis occurred in children aged 0–4 years (Figures 3a-c). Young children often have higher levels of risk exposure for potentially waterborne disease (PWD) through being less disciplined in managing their hand and food hygiene practices (e.g. handwashing) and by having less developed immune systems (Sinclair, Jones and Gerba 2009).

Figure 3a: Notification rates for campylobacteriosis, by age group, 2021



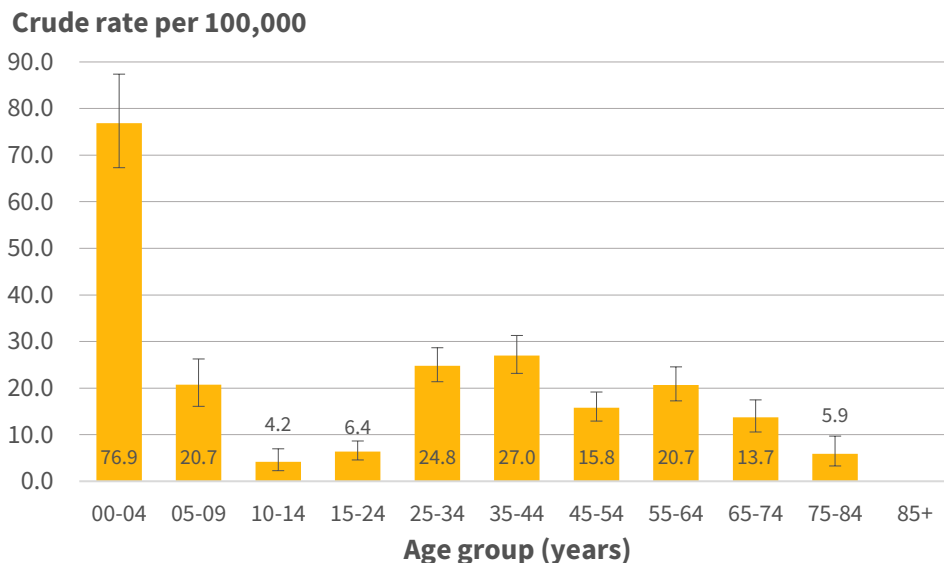
Note: 95% confidence intervals have been presented as vertical bars.
Source: ESR 2023

Figure 3b: Notification rates for cryptosporidiosis, by age group, 2021



Note: 95% confidence intervals have been presented as vertical bars.
Source: ESR 2023

Figure 3c: Notification rates for giardiasis, by age group, 2021

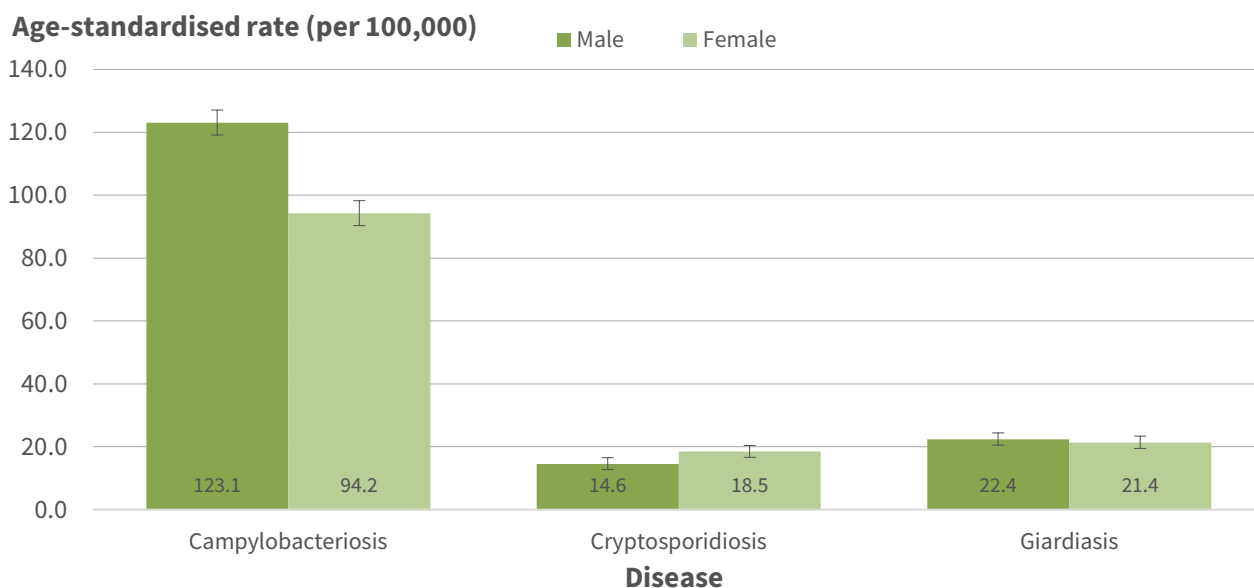


Note: 95% confidence intervals have been presented as vertical bars.
Source: ESR 2023

Campylobacteriosis notifications are higher in males

In 2021, the age-standardised notification rate for campylobacteriosis were higher for males than females. , Females had a slightly higher rate for cryptosporidiosis than males (Figure 4). Rates of giardiasis were relatively similar for both males and females.

Figure 4: Notification rates for campylobacteriosis, cryptosporidiosis, and giardiasis, by sex, 2021



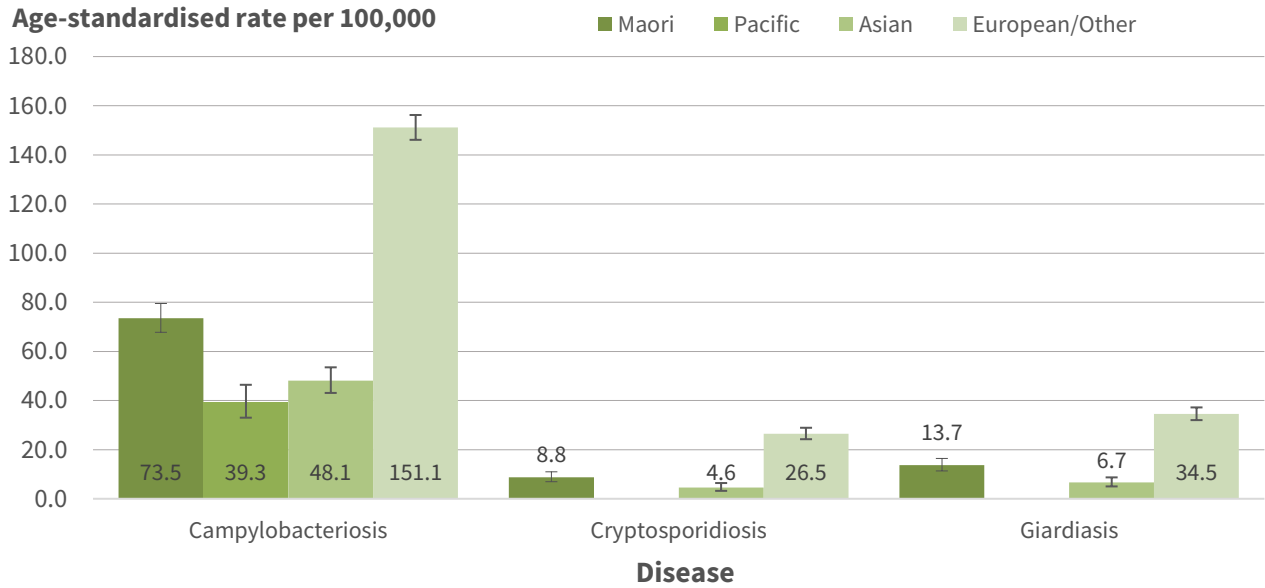
Note: 95% confidence intervals have been presented as vertical bars.

Source: ESR 2023

People of European/Other ethnicity have the highest notification rates

People of European/Other ethnicity had the highest age-standardised notification rate for all three PWDs in 2021 (Figure 5).

Figure 5: Notification rates of campylobacteriosis, cryptosporidiosis, and giardiasis, by ethnic group, 2021



Note: 95% confidence intervals have been presented as vertical bars.

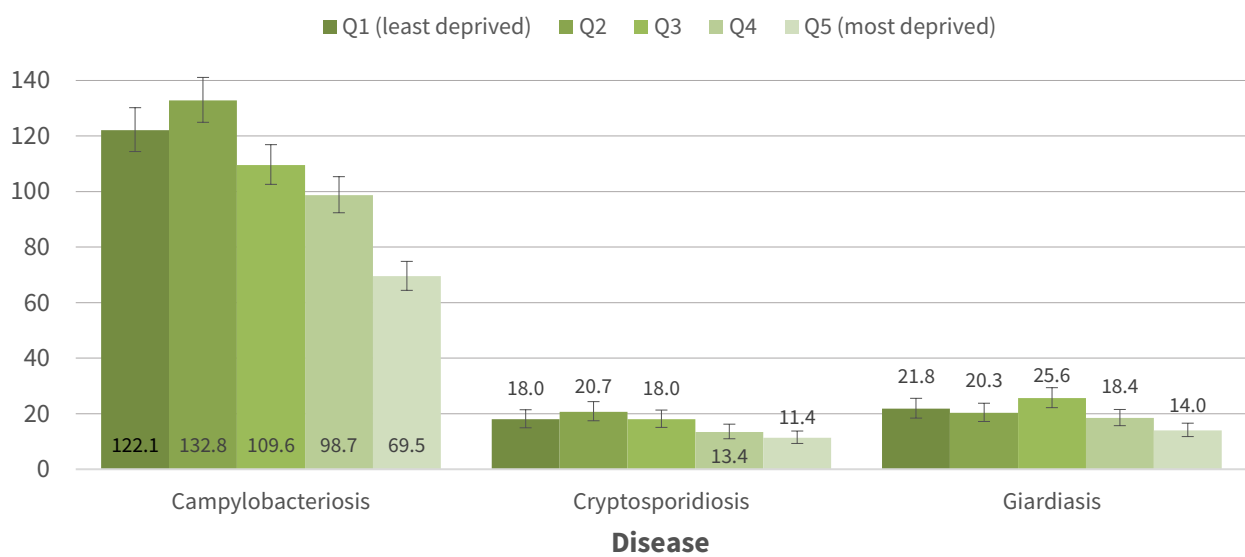
Source: ESR 2023

The least deprived areas had the highest notification rates

In 2021, less deprived areas had higher notification rates of campylobacteriosis compared to the more deprived areas (Figure 6). Cryptosporidiosis and giardiasis notification rates did not appear to vary greatly between the different deprivation quintiles. This may be due to people living in more deprived areas finding it more challenging to access healthcare than people in less deprived areas, resulting in greater under-reporting of cases among the former group (Ministry of Health 2023).

Figure 6: Notification rates of campylobacteriosis, cryptosporidiosis, and giardiasis, by NZDep2018 quintile, 2021

Age-standardised rate (per 100,000)



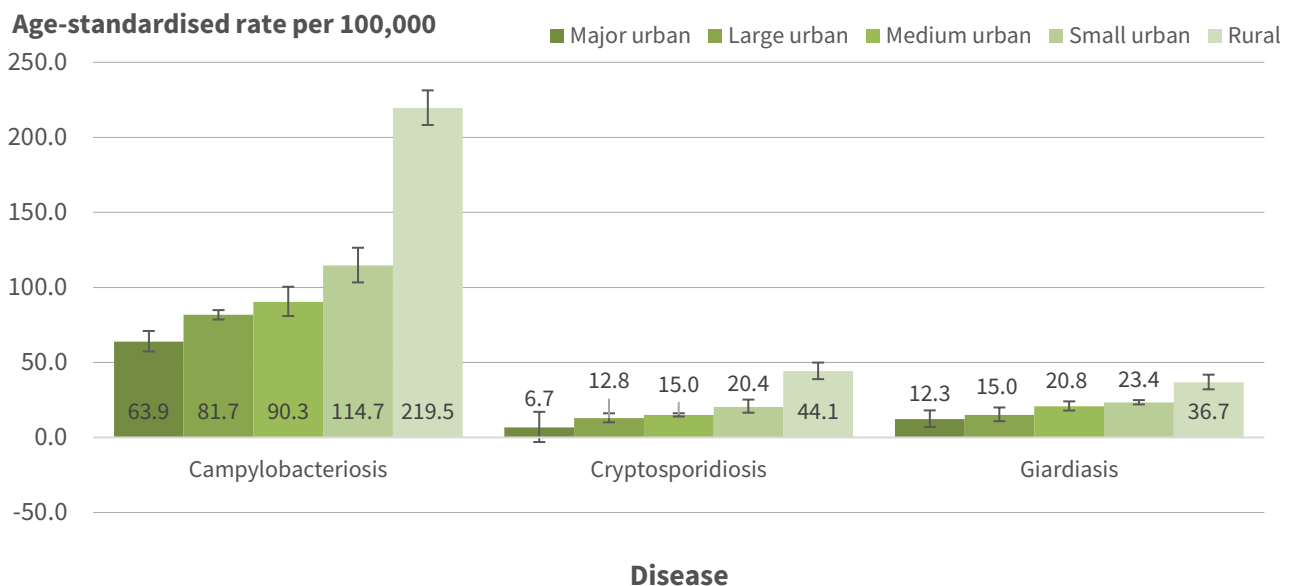
Note: 95% confidence intervals have been presented as vertical bars.

Source: ESR 2023

People living in rural areas have higher notification rates of PWD

For all three diseases, people living in rural areas continued to have higher notification rates of PWDs than people living in more urbanised areas during 2021 (Figure 7). In particular, the cryptosporidiosis notification rate was nearly four times as high in rural areas than in large urban areas, and over six times the notification rate in major urban areas. The campylobacteriosis notification rates in rural areas were nearly four times higher than in major urban areas and over twice that of large urban areas.

Figure 7: Notification rates of campylobacteriosis, cryptosporidiosis, and giardiasis, by IUR, 2021



Note: 95% confidence intervals have been presented as vertical bars.

Source: ESR 2023

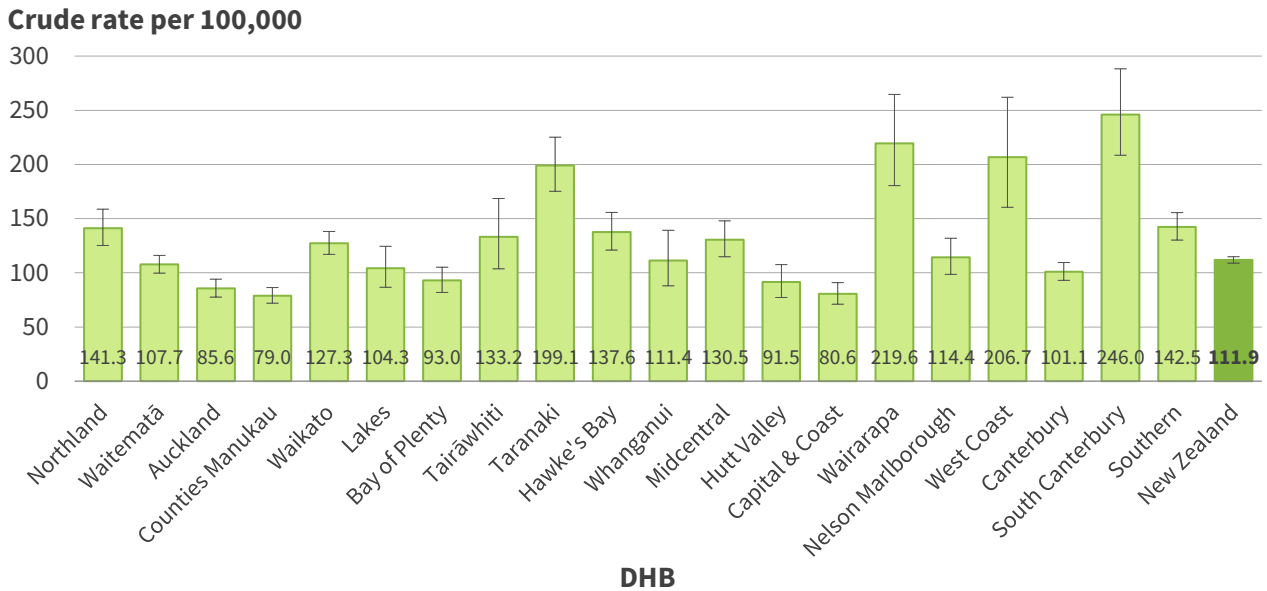
Rates of waterborne disease by district

In 2021, high rates could be found in South Canterbury (246.0 per 100,000 people), Wairarapa (219.6 per 100,000 people), West Coast (206.7 per 100,000 people), and Taranaki (199.1 per 100,000) districts. Lower rates of campylobacteriosis notifications were in the Auckland (85.6 per 100,000 people), Counties Manukau (79.0 per 100,000 people), and Capital & Coast (80.6 per 100,000 people) districts (Figure 8).

Taranaki (49.8 per 100,000 people) and South Canterbury (38.6 per 100,000 people) districts had the highest rates of cryptosporidiosis, while the Counties Manukau (6.3 per 100,000 people) and Nelson/Marlborough districts (6.1 per 100,000 people) had the lowest rates (Figure 9).

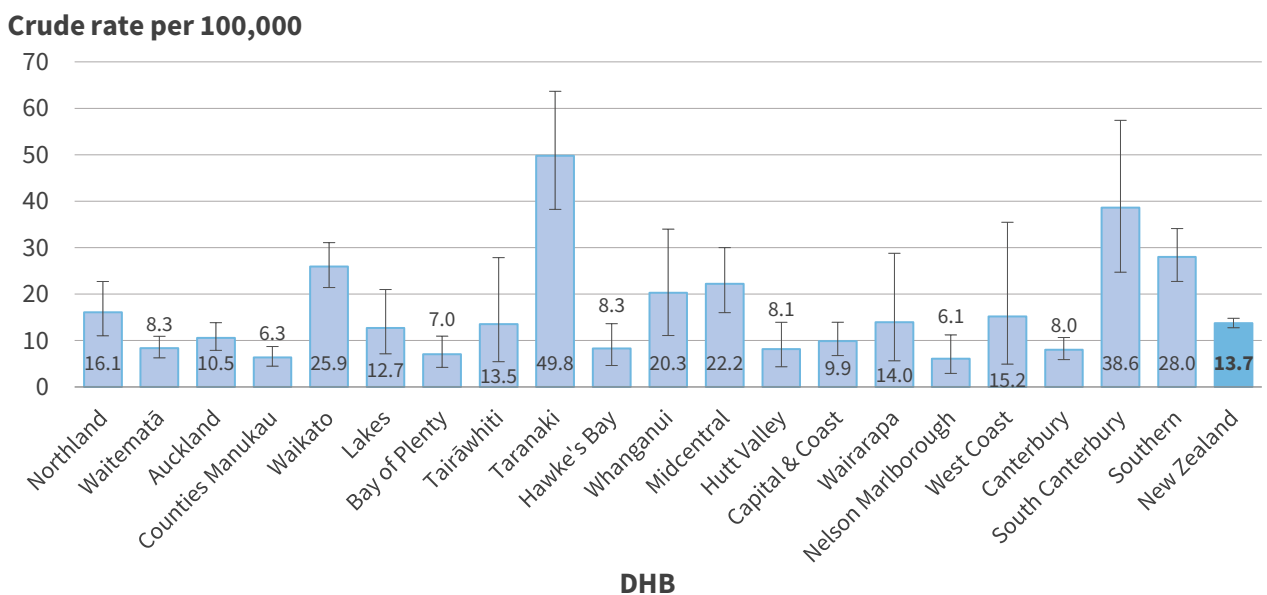
Giardiasis rates were also broadly similar across most districts, with some elevated rates occurring across the central North Island and the Wairarapa districts (Figure 10). The Tairāwhiti district had the most elevated rate of notifications at 52.1 per 100,000 people.

Figure 8: Campylobacteriosis notification rates by district, 2021



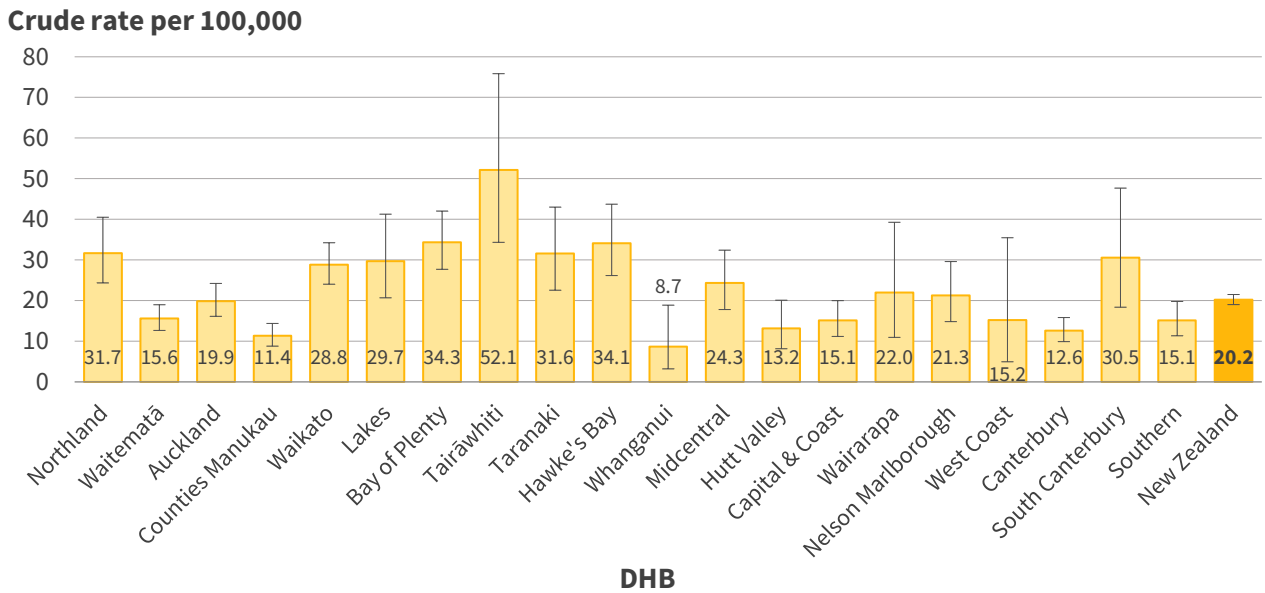
Note: The 95% confidence intervals for this graph are presented as vertical bars.
Source: ESR 2023

Figure 9: Cryptosporidiosis notification rates by district, 2021



Note: The 95% confidence intervals for this graph are presented as vertical bars.
Source: ESR 2023

Figure 10: Giardiasis notification rates by district, 2021



Note: The 95% confidence intervals for this graph are presented as vertical bars.
Source: ESR 2023

Data for this indicator

This indicator analyses the most recent from EpiSurv notification data provided by the Institute for Environmental Science and Research (ESR) to EHINZ in January 2023

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 likely to underestimate the actual rate of disease in the population. Risk factor data for cases that reported contact with untreated drinking water or recreational water are available in separate surveillance reports.

'Crude rates' presented in this factsheet do not consider varying age distributions when comparing between populations, whilst 'Age-standardised' rates take into account the effect of varying age distributions.

For additional information, see the [Metadata](#) sheet.

References

Amin S, Mahmood H, Zorab H. 2023. *Campylobacteriosis*. [\(PDF\) Campylobacteriosis \(researchgate.net\)](#) (Accessed 9 February 2024).

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.

Carmena, D. 2010. *Waterborne transmission of Cryptosporidium and Giardia: detection, surveillance and implications for public health*. URL: [\(PDF\) Waterborne transmission of Cryptosporidium and Giardia: detection, surveillance and implications for public health \(researchgate.net\)](#) (Accessed 9 February 2024).

ESR. 2023 Notifiable diseases EpiSurv data extraction. Porirua: Institute of Environmental Science and Research Limited. (personal communication with ESR Senior Analysts)

Ministry of Health. 2023. Annual Data Explorer 2022/23: New Zealand Health Survey [Data File]. URL: <https://minhealthnz.shinyapps.io/nz-health-survey-2022-23-annual-data-explorer/> (Accessed 19/02/2024).

Pitkänen T. 2013. *Review of Campylobacter spp. in drinking and environmental waters*. [Review of Campylobacter spp. in drinking and environmental waters - ScienceDirect](#) (Accessed 9 February 2024).

Sinclair R, Jones E, Gerba C. 2009. Viruses in recreational water-borne disease outbreaks: a review. *Journal of Applied Microbiology* 107(6): 1769–1780.

Wilson D, Gabriel E, Leatherbarrow A, Cheesbrough J, Gee S, Bolton E, Fox A, Fearnhead P, Hart C, Diggle P. 2008. *Tracing the source of campylobacteriosis*. URL: [Tracing the Source of Campylobacteriosis | PLOS Genetics](#) (Accessed 9 February 2024).

Explore geographic data on interactive dashboards:

[Water domain dashboard](#)

[EHINZ dashboard](#)

Previous surveillance reports:

[2022](#)

[2020](#)

[2018](#)

Other related topics include:

[Waterborne diseases related to drinking-water](#)

[Waterborne diseases related to recreational water](#)

[Access to safe drinking-water](#)

[Faecal indicator bacteria at recreational bathing sites](#)

Disclaimer

Environmental Health Intelligence NZ – Rapu Mātauranga Hauora mo te Taiao - Aotearoa, makes no warranty, express or implied, nor assumes any legal liability or responsibility for the accuracy, correctness, completeness or use of any information that is available in this surveillance report.

Author

The author of this report is Jack Turnbull, ehinz@massey.ac.nz

Citation

Environmental Health Intelligence. 2024. *Potentially waterborne diseases*. [Surveillance Report]. Wellington: Environmental Health Intelligence NZ, Massey University.

[Visit the EHINZ website](#)

[Subscribe to our newsletter](#)