Te Whatu Ora
Health New Zealand

Tāmaki Makaurau – Notifiable Disease and Health Indicators Monitoring Report

2022

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Auckland Regional Public Health Service
Ratonga Hauora-ā-Iwi o Tāmaki Makaurau

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About Auckland Regional Public Health Service

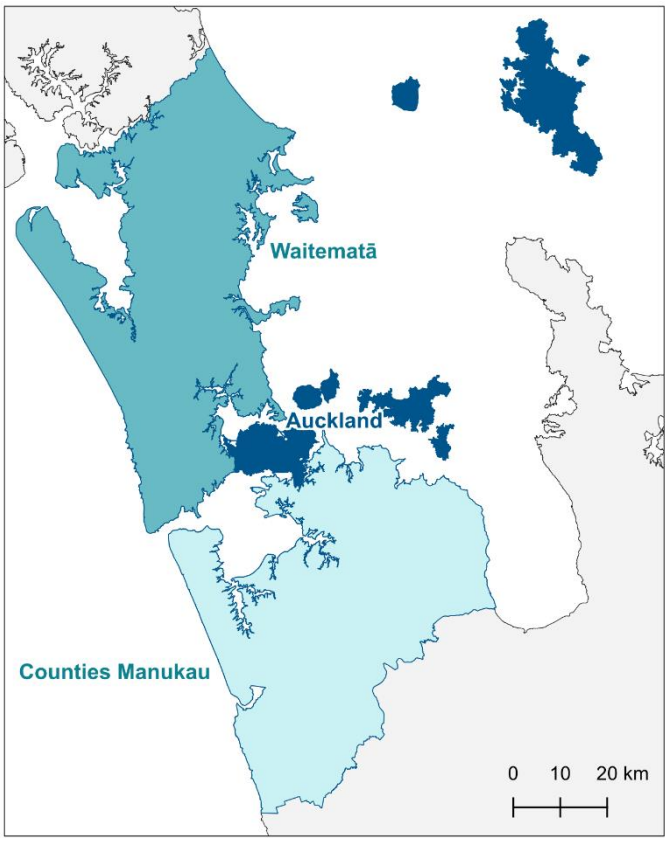

Figure 1: ARPHS geographical area, 1 January 2022

ARPHS is a public health service and has been a part of the National Public Health Service within Te Whatu Ora – Health New Zealand since July 2022.

ARPHS is responsible for preventing disease and improving the health of the people across the three Tāmaki Makaurau Auckland region health districts (formerly District Health Boards) in Tāmaki Makaurau Auckland: Te Toka Tumai Auckland, Waitematā and Counties Manukau.

ARPHS works alongside whānau, iwi, communities and organisations to create and support healthier communities and to reduce or eliminate the cause and spread of infectious diseases. This involves collective efforts to improve the wider determinants that affect people's health, like housing or transport.

ARPHS has a statutory role under the Aotearoa New Zealand (NZ) Public Health and Disability Act 2000 to improve, promote and protect the health of people and communities in the Auckland region. The Medical Officer of Health has an enforcement and regulatory role under the Health Act 1956 and other legislative designations to protect the health of the community.

For more information visit **www.arphs.health.nz**.

Executive summary

Context

Across the health sector in Aotearoa New Zealand, 2022 represented a year of change. The year commenced with the country's borders still closed to international travellers as part of ongoing public health measures in response to coronavirus-19 (COVID-19), dominated by the Delta variant in late 2021. With the new year came a new, more transmissible variant of COVID-19, Omicron, which by February had replaced Delta as the predominant circulating variant in NZ.[1] Late February saw case numbers reach more than 20,000 cases per day in NZ, which signalled the peak of COVID-19 cases for the country.[2]

With COVID-19 vaccination coverage at high levels amongst the community, and the virus also endemic locally, COVID-19 border restrictions were eased in early 2022, with the international border opening to New Zealanders from Australia and the rest of the world in February and March, respectively.[3] Along with this easing of restrictions was the removal of the Managed Isolation and Quarantine requirement, which saw travellers from most countries isolating in hotel accommodation for between seven and fourteen days. Border travel was further expanded to certain visa holders in April before opening fully to travellers from Australia and other visa-waiver countries in July and, finally, the rest of the world in October 2022. This relaxing of restrictions resulted in monthly border crossings increasing

[1] Ministry of Health. (2023). *COVID-19: variants*. Retrieved 4 July 2023, from https://www.health.govt.nz/covid-19-novel-coronavirus/covid-19-response-planning/covid-19-variants.

[2] Te Whatu Ora. (2023). *COVID-19 in New Zealand.* Retrieved 4 July 2023, from https://covid19.health.nz/advice/covid-19-data?_ga=2.103386115.2069545266.1688423772-708002700.1687467531.

[3] Beehive.govt.nz. (2022). *Border to reopen in stages from 27 February.* Retrieved 4 July 2023, from https://www.beehive.govt.nz/release/border-reopen-stages-27-february.

from just 4,000 in January to nearly 400,000 in December 2022.[4] The impact of this increase in arrivals to the country on disease notifications is discussed below.

Healthcare in New Zealand also saw major changes, with the Pae Ora (Healthy Futures) bill coming into force on 1 July 2022 to establish a national health system led by Te Whatu Ora – Health New Zealand. Along with this was the establishment of Te Aka Whai Ora - Māori Health Authority, Te Pou Hauora Tūmatanui - Public Health Agency and the National Public Health Service. With the disestablishment of the former district health boards came four new health regions, with ARPHS shifting from an Auckland regional service to a Northern region service, with a reach as far north as Cape Reinga and as far south as the Bombay Hills. Work is ongoing to establish the Northern region public health service, therefore this report includes data from the Tāmaki Makaurau Auckland region only for this year.

Notifiable diseases

Compared to 2020 and 2021, notifiable disease surveillance in many instances reflected a return to pre-pandemic levels in 2022. While COVID-19 represented the vast majority of cases reported to ARPHS in 2022 (over 99%), by February the requirement for public health units to investigate and contact trace individual cases had been removed, thus allowing for a return to 'business as usual' approach to disease notifications. This was particularly important with the re-opening of NZ's international borders and the expected increase in diseases associated with overseas travel.

The re-opening of borders also brought a disease not before seen in NZ, mpox (formerly monkeypox). Usually endemic in West and Central Africa, reports of the disease in countries across Europe and North America began to increase in early May 2022, with the World Health Organisation declaring a Public Health Emergency of International Concern in late July.[5] Cases associated with the outbreak were due to the milder West African clade and primarily reported among men who have sex with men. The Auckland region saw its first case in July, with community spread and further importations leading to a peak in October followed by a steep drop in cases in late 2022 due to the global rollout of the mpox vaccine (with the vaccine available in New Zealand in 2023).

Excluding COVID-19, the disease categories with the highest burden of cases across the region include the enteric diseases, environmental diseases and vaccine-preventable diseases, with these categories accounting for over 90% of cases in 2022. The highest case numbers were observed for campylobacteriosis, which accounted for nearly 50% of

[4] Stats NZ. (2023). *Border crossings take off in 2022*. Retrieved 4 July 2023, from https://www.stats.govt.nz/news/border-crossings-take-off-in-2022/.

5 World Health Organisation. (2022). *Mpox (monkeypox) outbreak*. Retrieved 4 July 2023, from https://www.who.int/emergencies/situations/monkeypox.

all non-COVID cases reported to ARPHS, while the highest numbers of hospitalisations and deaths were due to invasive pneumococcal disease.

Several diseases exhibited numbers well below pre-pandemic levels, including mosquito-borne diseases; several enteric diseases such as cryptosporidiosis, giardia, hepatitis A, shigellosis and typhoid fever; hazardous substances injury; meningococcal disease, pertussis and acute rheumatic fever. On the other hand, diseases such as campylobacteriosis, VTEC/STEC infection, yersiniosis, lead absorption, legionellosis, invasive pneumococcal disease and tuberculosis disease were all back to, and in some cases exceeded, pre-COVID levels.

Of note is the record number of lead absorption and legionellosis cases, with 2022 representing the highest case numbers for both diseases within the last ten years. The rise in lead absorption cases may be explained by increased awareness of and testing for lead poisoning, while the rise in legionellosis cases has not yet been determined. Also of note is invasive pneumococcal disease, which in 2022 was associated with a significant number of hospitalisations and deaths. The highest rates of the disease occurred in Māori and Pacific Peoples, with many cases also living in areas of high socioeconomic deprivation.

Diseases with the highest incidence rates among Māori included meningococcal disease and acute rheumatic fever, with both diseases predominantly impacting tamariki Māori and rangatahi Māori. Rates of disease were highest among Pacific Peoples for typhoid fever, hazardous substances injury, lead absorption and invasive pneumococcal disease, with many of these also particularly affecting Pasifika children and young adults.

Diseases with a higher incidence in the Auckland region compared to the rest of New Zealand included lead absorption, legionellosis, mpox, rheumatic fever and tuberculosis disease, with Aucklanders experiencing these diseases at more than twice the rate of other New Zealanders. Of note, the rate of new tuberculosis cases reported in the Auckland region was nearly four times the rate of new cases for the rest of New Zealand. This disease, which is more common in immigrant and Asian populations, requires a significant proportion of ARPHS' resources due to its significant public health implications and often prolonged duration of treatment.

Outbreaks

This year saw the fewest outbreak notifications in the Auckland region since 2010. Outbreaks due to COVID-19 were only recorded until February 2022. Following this responsibility for investigating and managing individual cases and outbreaks shifted to other organisations.

As with previous years, enteric outbreaks represented the majority of outbreak notifications and cases, with most occurring in early childhood education centres and residential aged

care facilities. In comparison, non-enteric outbreaks tended to be smaller and within household setting.

Health indicators

New to the report this year is a snapshot of Aucklanders' health compared to the rest of the country. This section examines trends in physical activity, nutrition and obesity using data from the New Zealand Health Survey.

The most recent edition of the New Zealand Health Survey (2017 to 2020) shows:

- a third of adults and under half of children in the Auckland region met daily fruit and vegetable intake guidelines.
- consumption of fruit and vegetables among adults increased with age, while an inverse relationship was seen between childhood vegetable intake and socioeconomic deprivation.
- nearly two-thirds of adults and almost three in 10 children in the region were overweight or obese, with the proportion of obesity increasing with age group and socioeconomic deprivation among children and adults, respectively.
- less than half of Auckland's adults and children reported regular physical activity, with Māori adults and male children (of all ethnicity) having the highest activity rates compared to their peers.

Summary

ARPHS continues to see high rates of potentially avoidable diseases such as mosquito-borne illnesses, typhoid fever, hepatitis A, lead absorption, legionellosis, meningococcal disease, invasive pneumococcal disease and rheumatic fever.

Many of these infections are preventable through simple hygiene and protective measures, such as washing hands regularly and avoiding mosquito bites, while others can be prevented through immunisation with effective (and in some cases free) vaccines.

In particular, the high rates of invasive pneumococcal disease and acute rheumatic fever in Māori and Pasifika children represents significant health inequities that warrant further action from the health sector and government.

Significant efforts are underway to improve immunisation across Aotearoa, including an announcement in 2022 to fund Bexsero (meningococcal B vaccine) for children under 5 years and adults who meet certain criteria. People aged 13 to 25 who are entering or in their first year of living in specified close living situations were also confirmed as being eligible to receive two doses of Bexsero and one dose of MenQuadfi (meningococcal ACWY vaccine). We would encourage primary care to consider active recall and catch-up for all eligible populations based on the **Priority Child Immunisation Policy Statement**.

Further research could be considered around the recorded rises in 2022 in legionellosis and lead absorption cases and the decrease in hazardous substance injuries. It is possible these new trends in the data are due to changes in testing and/or reporting, however, we recommend these be further investigated to determine the causes.

Contents

Abbreviations and acronyms

AIDS	Acquired immunodeficiency syndrome
ARPHS	Auckland Regional Public Health Service
CFR	Case fatality rate
COVID-19	Coronavirus disease 2019
DHB	District Health Board
ECEC	Early childhood education centre
ESR	Institute of Environmental Science and Research
HAT	Healthy Auckland Together
Hib	Haemophilus influenzae type B
HIV	Human immunodeficiency virus
MoH	Ministry of Health - Manatū Hauora
NDCMS	Notifiable Diseases and Case Management System
NOS	Not otherwise specified
NEC	Not elsewhere classified
NFD	Not further defined
NZ	Aotearoa New Zealand
NZDep	New Zealand Deprivation Index
NZHS	New Zealand Health Survey
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
Stats NZ	Statistics New Zealand
TB	Tuberculosis
VPD	Vaccine-preventable disease
VTEC/STEC	Verotoxin-producing *Escherichia coli* / Shiga toxin-producing *Escherichia coli*
WHO	World Health Organisation

1. Introduction

Purpose

The overarching purpose of the Tāmaki Makaurau – Notifiable Disease and Health Indicators Monitoring Report is to outline the burden of disease and highlight inequities across the region.

The objectives of this report are to:

- Monitor trends in disease and health states, risks and protective behaviours.
- Provide information to support healthy public policy.
- Enable collaboration with communities to address their health needs.
- Provide suggestions around improvements to clinical practice, research and policy to address public health issues.

Scope

This report covers notifiable diseases, outbreaks and health indicators for people who live, work and travel within the Waitematā, Te Toka Tumai Auckland and Counties Manukau health districts (**Figure 1**). Future editions of this report will include data from Te Tai Tokerau – Northland as the Northern Region – Notifiable Disease and Health Indicators Monitoring Report.

Report structure

The executive summary provides an overview of notifiable diseases, outbreaks and health indicators for the Auckland region for 2022 along with considerations for health practitioners, researchers and policymakers.

The body of this report provides the following information:

- Section 2 outlines the methods behind this report, including basic terms and definitions, the disease notification process and data sources.
- Section 3 presents disease notifications for the Auckland region for 2022, including general trends and comparisons to the rest of NZ where indicated.
- Section 4 describes outbreaks within the Auckland region for 2022.
- Section 5 presents key adult and child health indicators for the Auckland region for 2017-2020 with trends and comparisons to the rest of NZ where indicated.

2. Methods

Notification process

Health practitioners and laboratories are required to report (notify) actual and suspected cases of notifiable diseases. These diseases are listed in Schedules 1 and 2 of the *Health Act 1956* (**Appendix 1**).[6]

Notifications may be received from clinicians working in hospitals, general practices, urgent care centres or hospital and community laboratories (Figure 2). Notifications are promptly investigated and subsequently classified as confirmed, probable, suspected, under investigation or 'not a case' based on nationally determined case definitions published in the Ministry of Health - Manatū Hauora (MoH) *Communicable Disease Control Manual* (CDC Manual).[1] These classifications help determine whether public health action is required to manage the case and reduce the risk to others.

Case and contact management is managed through ARPHS's independent Notifiable Diseases and Case Management System (NDCMS) and the National Contact Tracing Solution (NCTS). The MoH oversees national disease surveillance through the national notifiable disease database, EpiSurv, which is administered by the Institute of Environmental Science and Research (ESR) and informs regional and national disease control measures.

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[6] Ministry of Health. (2022). *Notifiable diseases*. Retrieved 11 May 2023, from https://www.health.govt.nz/our-work/diseases-and-conditions/notifiable-diseases.

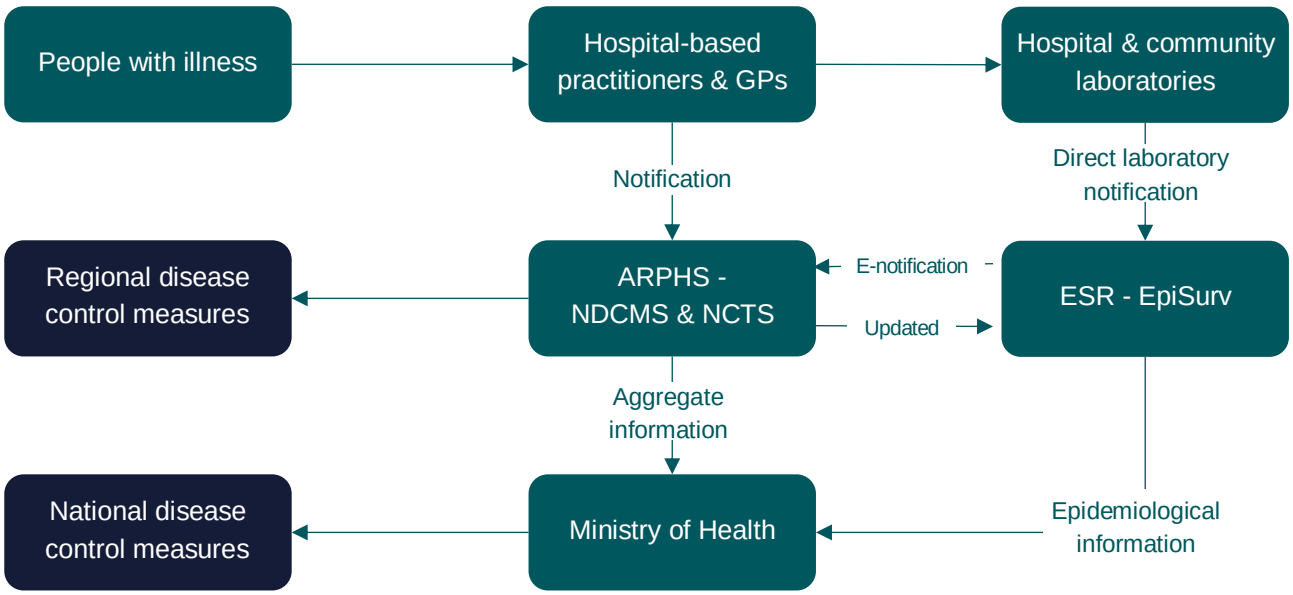


Figure 2: Notifiable disease process for ARPHS

Basic terms and definitions

'Notifications' refers to all instances of a disease as notified by laboratories and healthcare practitioners, regardless of the case classification. 'Cases' refers to only those notifications classified as confirmed, probable, or in some cases suspected, as per the MoH CDC Manual.

Unless cited otherwise, disease definitions and descriptions are sourced from the MoH CDC Manual and patient information webpages.[7,8]

Data sources

Disease notification and outbreak information is provided for January to December 2022 based on data extracted from EpiSurv and NDCMS. Information is presented for the Auckland region (Waitematā, Te Toka Tumai Auckland and Counties Manukau health districts) and the rest of NZ as indicated.

Unless otherwise specified, cases, notifications, hospitalisations and deaths are presented as counts. Hospitalisations are defined as any hospital assessment or treatment lasting three hours or more, excluding triage and waiting time.[9] Deaths refer to cases who died during the case investigation process and this may include instances where someone died with a notifiable disease but it was not identified as the cause of death. Some enteric

[7] Ministry of Health. (2012). *Communicable Disease Control Manual*. Wellington: Ministry of Health.

[8] Ministry of Health. (2016). *Diseases and illnesses*. Retrieved 11 May 2023, from https://www.health.govt.nz/your-health/conditions-and-treatments/diseases-and-illnesses.

[9] Ministry of Health. (2022). *Appendix B: National Collections Glossary*. Retrieved 13 June 2023, from https://www.health.govt.nz/system/files/documents/pages/appendix_b_national_collections_glossary_2022.pdf.

diseases, such as campylobacteriosis, giardiasis and yersiniosis, are not fully investigated by ARPHS. Hospitalisations and deaths for these diseases are therefore not included in this report.

Incidence is expressed as crude rates, defined as the number of cases for a defined population based on estimated resident population statistics as at 30 Jun 2022 (**Appendix 2**).[10] Incidence rates for the Auckland region are calculated using the combined population of the Waitematā, Te Toka Tumai Auckland and Counties Manukau health districts. This figure is slightly larger than the unitary authority population due to the Counties Manukau district covering some parts of Waikato District Council. Incidence rates for the rest of NZ are calculated using the combined population of the remaining 17 health districts. Caution must be applied when interpreting rates for diseases with case numbers below 20, as these rates tend to have poor reliability.[11]

Age groups comply with agreed national reporting age group categories. Simplified categories are used, except where this obscures meaningful differences. Age-specific rates for infants (0-1 year) and young children (1-4 years) are extrapolated from Te Whatu Ora population estimates using a 2018 base.

Unless otherwise specified, ethnicity refers to prioritised ethnicity (Māori, Pacific, Asian, Other) as per the HISO 10001:2017 Ethnicity Data Protocols.[12] Ethnic group-specific incidence rates are based on subnational ethnic population projections using a 2018 base and are presented as crude rates (**Appendix 2**).[13] Level 2 ethnicity (total response) is included in some instances to provide greater detail around ethnicity of cases. As total response ethnicity allows up to three responses per person, totals may add up to more than 100%.

Risk and protective factors are obtained through phone and in-person interviews with cases and are presented where relevant. As cases may report more than one risk factor, totals may add up to more than 100%.

Overseas travel history is presented for diseases usually acquired outside NZ. This may be listed as ‘source country’, ‘travel history’, or ‘last country visited’ depending on the information available for each disease.

[10] Stats NZ. (2022). *Subnational population estimates (DHB, DHB constituency), by age and sex, at 30 June 1996-2022 (2015 boundaries)*. Retrieved 6 June 2023, from https://nzdotstat.stats.govt.nz/wbos/Index.aspx?DataSetCode=TABLECODE7509.

[11] Centres for Disease Control and Prevention. (2023). *Suppression of Rates and Counts*. Retrieved 2 August 2023, from https://www.cdc.gov/cancer/uscs/technical_notes/stat_methods/suppression.htm.

[12] Ministry of Health. (2017). *HISO 10001:2017 Ethnicity Data Protocols.* Wellington: Ministry of Health.

[13] Te Whatu Ora. (2023). *Populations web tool*. Retrieved 8 June 2023, from https://tewhatuora.shinyapps.io/populations-web-tool/.

Socioeconomic deprivation data is provided for selected diseases using NZDep2018 analysis of 2018 census variables.[14] District-specific incidence rates are calculated using estimated resident population statistics as at 30 Jun 2022 (**Appendix 2**).

Exotic mosquito surveillance data is sourced from biosecurity logging records as collected by ARPHS health protection staff and external contractors.

Health indicator data is sourced from the New Zealand Health Survey (NZHS) and presented for the Auckland region compared to the rest of NZ.[15] Due to the availability of regional data and the impact of COVID-19 on survey collection, pooled data is presented for the 2017 to 2020 survey periods.

Limitations

ARPHS is unable to include iwi affiliation data in this report as this information has not historically been collected by the health districts in Auckland. In June 2022 the MoH established an **Iwi Affiliation Data Project** which aims to set up systems and processes for collecting this information to improve equity of health outcomes for Māori.[16] ARPHS looks forward to including iwi affiliation data in future editions once available.

Outbreaks do not include information around the age or ethnicity of individual cases, however, age ranges are provided where relevant.

Hospitalisations, deaths, risk factors and protective factors are manually recorded using case interviews and electronic medical records and as such may not reflect the true extent of the disease or exposure. ARPHS ceased routine interviews of campylobacteriosis, cryptosporidiosis, giardiasis and yersiniosis cases in 2017. Thus, information on hospitalisations, deaths and risk factors is not available for these diseases.

[14] University of Otago. (n.d). *Socioeconomic Deprivation Indexes: NZDep and NZiDep, Department of Public Health.* Retrieved 1 July 2023, from https://www.otago.ac.nz/wellington/departments/publichealth/research/hirp/otago020194.html.

[15] Ministry of Health. (2021). *Regional Results 2017–2020: New Zealand Health Survey.* Retrieved 23 June 2023, from https://www.health.govt.nz/publication/regional-results-2017-2020-new-zealand-health-survey.

[16] Ministry of Health. (2022). HISO 10094:2022 Māori Descent and Iwi Affiliation Data Protocols. Wellington: Ministry of Health.

3. Notifiable diseases

Key points

- In 2022, the vast majority of notifications received were for COVID-19, of which there were 681,817 cases in the Auckland region, with 15,481 hospitalisations (2.3% of cases) and 617 deaths (CFR 0.1%).
- Excluding COVID-19:
  - ARPHS received a total of 4,392 disease notifications. Of these 3,703 (84.3%) were found to be 'true' cases.
  - There were 712 hospitalisations and 38 deaths, with a hospitalisation rate of 19.2% and case fatality rate (CFR) of 1.0%.
  - Enteric diseases had the largest number of cases (2,993 cases), representing over 80% of all notifiable diseases for 2022.
  - Vaccine-preventable diseases (VPDs) had the highest number and rate of hospitalisations, with 214 cases out of 218 'true cases' (98.2%) hospitalised. VPDs also had the highest number of deaths (17 deaths, CFR 7.8%).

Table 1: Total notifications and cases by disease area, Auckland region 2022

Disease area	Total notifications	True cases (%)	Rate per 100,000	Hospitalisations (%)	Deaths (%)
Bloodborne diseases	111	7 (6.3)	0.4	4 (57.1)	0
Hepatitis B	23	4 (17.4)	0.2	3 (75.0)	0
Hepatitis C	88	3 (3.4)	0.2	1 (33.3)	0

Disease area	Total notifications	True cases (%)	Rate per 100,000	Hospitalisations (%)	Deaths (%)
Vector-borne diseases	29	23 (79.3)	1.3	17 (73.9)	0
Chikungunya fever	3	2 (66.7)	0.1	0	0
Dengue fever	12	12 (100.0)	0.7	9 (75.0)	0
Malaria	6	6 (100.0)	0.3	5 (83.3)	0
Murine typhus	5	3 (60.0)	0.2	3 (100.0)	0
Rickettsial disease[1]	3	0	-	-	-
Ross River virus	0	0	-	-	-
Zika virus infection	0	0	-	-	-
Zoonotic diseases	16	11 (68.8)	0.6	8 (72.7)	1 (9.1)
Brucellosis	0	0	-	0	0
Hydatid disease	2	1 (50.0)	0.1	1 (100.0)	0
Leptospirosis	10	8 (80.0)	0.5	7 (87.5)	1 (12.5)
Q fever	2	0	-	-	-
Taeniasis	2	2 (100.0)	0.1	0	0
Enteric diseases	3,189	2,993 (93.9)	174.0	225 (7.5)	2 (0.1)
Botulism	0	0	-	-	-
Campylobacteriosis	1,726	1,725 (99.9)	100.3	*	*
Cholera	4	0	-	-	-
Cryptosporidiosis	135	135 (100.0)	7.8	*	*
Gastroenteritis – unknown cause	2	1 (50.0)	0.1	0	0
Gastroenteritis / foodborne intoxication	20	15 (75.0)	0.9	9 (60.0)	0
Giardiasis	211	210 (99.5)	12.2	*	*
Hepatitis A	44	21 (47.7	1.2	17 (81.0)	0
Hepatitis NOS	8	2 (25.0)	0.1	2 (100.0)	0
Listeriosis	9	9 (100.0)	0.5	9 (100.0)	2 (22.2)
Listeriosis – perinatal	2	2 (100.0)	0.1	2 (100.0)	0
Paratyphoid fever	8	8 (100.0)	0.5	7 (87.5)	0
Salmonellosis	220	205 (93.2)	11.9	85 (41.5)	0
Shigellosis	82	34 (41.5)	2.0	13 (38.2)	0

Disease area	Total notifications	True cases (%)	Rate per 100,000	Hospitalisations (%)	Deaths (%)
Toxic shellfish poisoning	2	1 (50.0)	0.1	0	0
Typhoid fever	18	17 (94.4)	1.0	15 (88.2)	0
VTEC/STEC infection	276	187 (67.8)	10.9	66 (35.3)	0
Yersiniosis	422	422 (100.0)	24.5	*	*
Environmental diseases	277	248 (89.9)	14.4	115 (46.2)	10 (4.0)
Chemical poisoning from the environment	16	12 (75.0)	0.7	12 (100.0)	0
Hazardous substances injury	9	9 (100.0)	0.5	9 (100.0)	0
Lead absorption	132	132 (100.0)	7.7	4 (3.0)	0
Legionellosis	120	96 (80.0)	5.6	90 (93.8)	10 (10.4)
Vaccine-preventable diseases	496	218 (44.0)	12.7	214 (98.2)	17 (7.8)
Diphtheria	21	0	-	-	-
Haemophilus influenzae type b	39	0	-	-	-
Invasive pneumococcal disease	208	202 (97.1)	11.7	202 (100.0)	16 (7.9)
Measles	68	0	-	-	-
Meningococcal disease	17	15 (88.2)	0.9	15 (100.0)	1 (6.7)
Mumps	104	0	-	-	-
Pertussis	36	1 (2.8)	0.1	1 (100.0)	0
Rubella	3	0	-	-	-
Other[2]	274	203 (74.1)	11.8	129 (63.5)	8 (0.1)
COVID-19	-	681,817	39,702	15,481 (2.3)	617 (0.1)
Leprosy	0	0	-	-	-
Mpox	45	27 (60.0)	1.6	3 (11.1)	0
Rheumatic fever (initial attack)	42	35 (83.3)	2.0	35 (100.0)	0
Rheumatic fever (recurrent)	6	3 (50.0)	0.2	3 (100.0)	0
TB disease (new case)	174	131 (75.3)	7.6	83 (63.4)	8 (6.1)

Disease area	Total notifications	True cases (%)	Rate per 100,000	Hospitalisations (%)	Deaths (%)
TB disease (relapse or reactivation)	4	3 (75.0)	0.2	2 (66.7)	0
TB infection (on preventive treatment)	3	1 (33.3)	0.1	0	0
Total[2]	**4,392**	**3,703 (84.3)**	**215.3**	**716 (19.3)**	**38 (1.0)**

Source: EpiSurv, Stats NZ

*Not routinely investigated by ARPHS

[1]Excluding murine typhus

[2]Totals do not include COVID-19

In 2022, ARPHS received a total of 4,392 disease notifications (excluding COVID-19, Table 1). Of these, 3,703 (84.3%) met the criteria for a confirmed, probable or suspected case while 689 (15.7%) were classified as 'not a case'.

Enteric diseases had:

- the largest number of cases, representing over 80% of total cases for 2022. This was largely due to campylobacteriosis which had 1,725 cases.
- the highest incidence of disease, with a rate of 174.0 cases per 100,000 population.
- the highest proportion of confirmed or probable cases among total notifications, with 2,993 out of 3,189 (93.9%) notifications meeting the definition of a case.

The latter point is likely due to the method of notification, with most enteric diseases notified by the laboratory following a positive result rather than on clinical suspicion. In comparison, only 44.0% of VPD notifications (which includes rare but often notified diseases such as measles and mumps) were found to be cases.

Hepatitis B and C (included under blood-borne diseases) had the lowest proportion of actual cases, with only seven of 111 (6.3%) notifications meeting the criteria for a confirmed or probable case. This was mainly due to a change in direct laboratory notifications for hepatitis C which resulted in ARPHS receiving a larger number of notifications; reflective of increased testing to achieve the World Health Organisational goal to eliminate hepatitis C by 2030.. Mostly acute hepatitis B and C infection are required to be investigated and require public health action, while chronic infections are classified as 'not a case'.

Overall, there were 712 hospitalisations and 38 deaths associated with notifiable diseases (excluding COVID-19) in the Auckland region. This equates to an overall hospitalisation rate of 19.2% and CFR of 1.0% for 2022. VPDs had the highest rate of hospitalisations,

with 98.2% of confirmed or probable cases admitted to hospital during their illness. VPDs also had the greatest number of deaths (17 deaths, CFR 7.8%), while zoonotic diseases had the highest CFR (9.1%).

No notifications were received for anthrax, arboviral diseases (other than dengue and chikungunya fevers), *Cronobacter* species invasive disease, cysticercosis, decompression sickness, highly pathogenic avian influenza, Middle East respiratory syndrome (MERS), non-seasonal influenza, plague, poliomyelitis, primary amoebic meningoencephalitis, rabies, severe acute respiratory syndrome (SARS), tetanus, trichinosis or viral haemorrhagic fevers (other than dengue and chikungunya fevers). These diseases are rarely notified in the Auckland region, with no cases recorded in the past five years. For clarity these diseases are not discussed further in this report.

3.1 Blood-borne diseases

Blood-borne diseases refers to viral and bacterial infections that can be spread through contact with infected blood and body fluids. Notifiable blood-borne infections in NZ include hepatitis B, hepatitis C and HIV infection. For HIV reporting, refer to '**Section 3.8 - Diseases under surveillance by other organisations**'.

Table 2: Blood-borne infections in the Auckland region 2022 (monitored by APRHS)

Disease	Total notifications	Total cases (%)	Rate per 100,000	Hospitalisations (%)	Deaths (%)
Hepatitis B	23	4 (17.4)	0.2	3 (75.0)	0
Hepatitis C	88	3 (3.4)	0.2	1 (33.3)	0
Total	**111**	**7 (6.3)**	**0.4**	**4 (57.1)**	**0**

Source: EpiSurv, Stats NZ

In 2022, ARPHS received a total of 111 notifications for bloodborne diseases (Table 2). Of these, only seven (6.3%) met the criteria for a confirmed or probable case. Hepatitis B had the highest number of cases, with four cases reported in 2022 compared to three for hepatitis C.

3.1.1 Hepatitis B

Hepatitis B is an infectious liver disease caused by the hepatitis B virus. Transmission occurs largely through contact with blood or other body fluids of an infected person, such as through sexual contact, body piercing and tattooing. Perinatal mother-to-infant transmission is now uncommon in NZ.

Acute infection often involves a mild illness with fever, jaundice, anorexia and abdominal discomfort. Only acute cases of hepatitis B are notifiable.

While most adults recover fully, some people may continue to carry the virus for several years and may develop liver damage and liver cancer. An estimated 1–2% of the NZ population are chronic carriers of hepatitis B.

For surveillance purposes, only cases of acute hepatitis B are notifiable ('incident' cases).

- There were four acute hepatitis B cases in the Auckland region in 2022.
- There were three hospitalisations and no deaths.
- The incidence rate for the Auckland region was 0.2 cases per 100,000. For the rest of NZ it was 0.2 cases per 100,000.

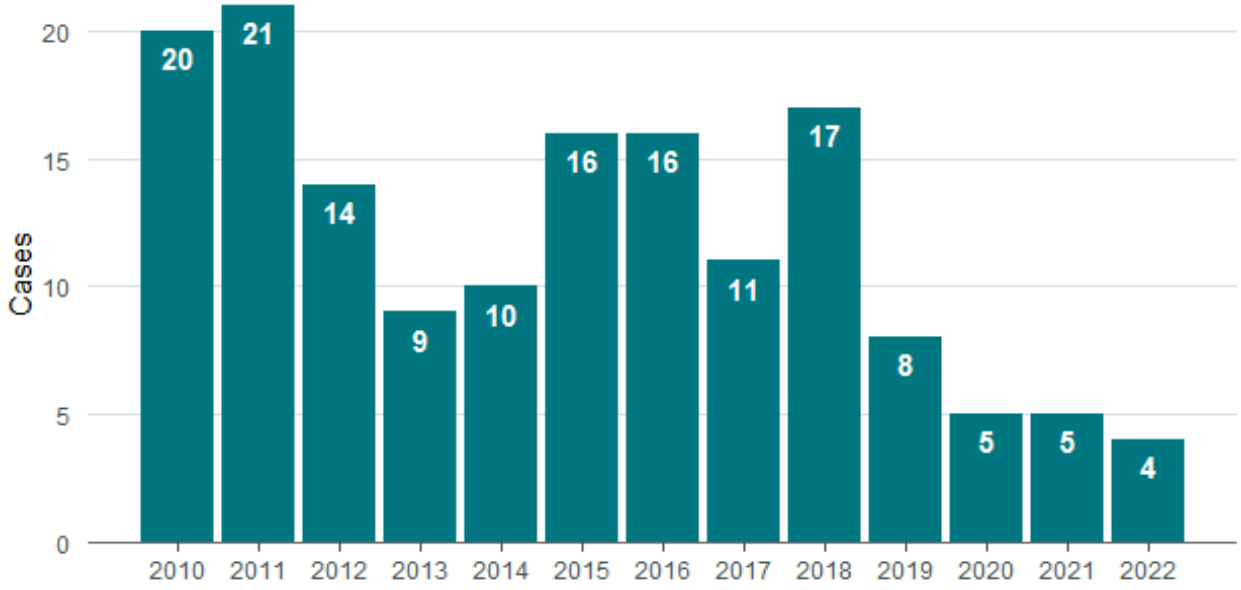


Figure 3: Acute hepatitis B cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 2 shows the number of acute hepatitis B cases in the Auckland region between 2010 and 2022. Case numbers in 2022 were slightly lower than previous years, with five cases each in 2021 and 2020. Prior to COVID-19, there were around 10-20 new cases per year.

Table 3 shows the risk factors associated with developing acute hepatitis B in 2022. These included household contact with a confirmed case, sexual contact with a confirmed case, body piercing or tattooing within the previous 12 months and previous injecting drug use.

Table 3: Risk factors associated with acute hepatitis B in the Auckland region 2022

Risk factor	Cases	Percent
Household contact with a case	1	25%
Sexual contact with a case	1	25%
Body piercing or tattoos	1	25%

Risk factor	Cases	Percent
History of injecting drug use	1	25%

Source: EpiSurv

3.1.2 Hepatitis C

Hepatitis C is an infectious liver disease caused by the hepatitis C virus. Transmission occurs largely through exposure to an infected person's blood, such as through sharing contaminated injecting equipment or during sexual contact with a confirmed case.

Acute infection is often asymptomatic but may involve a mild illness with jaundice and anorexia. It is estimated up to 40% of infected individuals remain undiagnosed due to lack of awareness of exposure and lack of symptoms.

Without successful treatment, infected individuals may develop liver cirrhosis, liver cancer or liver failure. Hepatitis C is the leading cause of liver transplantation in NZ.

For surveillance purposes, only cases of acute hepatitis C are notifiable ('incident' cases).

- There were three acute hepatitis C cases in the Auckland region in 2022.
- There was one hospitalisation and no deaths.
- The incidence rate for the Auckland region was 0.2 cases per 100,000. For the rest of NZ it was 0.4 cases per 100,000.

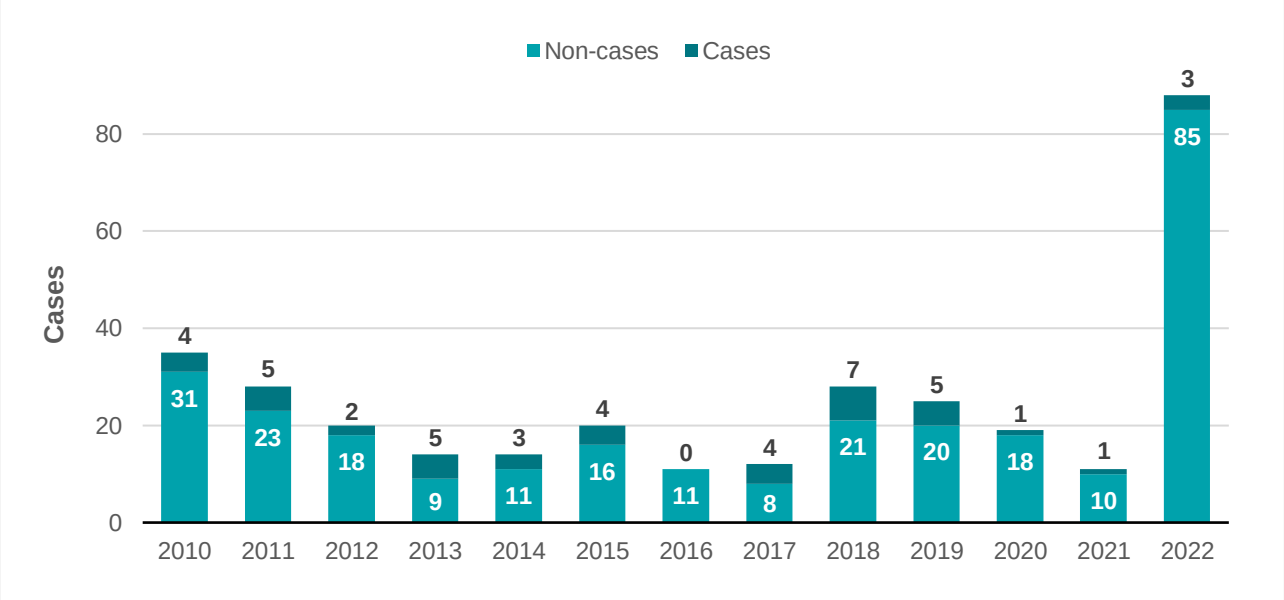


Figure 4: Total acute hepatitis C notifications in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 4 shows the total number of acute hepatitis C notifications in the Auckland region between 2010 and 2022 (including both cases and non-cases). Case numbers were

slightly above previous years, with three cases reported in 2022 compared to one each in 2021 and 2020. Prior to COVID-19 there were usually four to five cases reported per year.

The sharp rise in notifications in 2022 was due to a change in the direct laboratory notification process which resulted in ARPHS being notified of all positive hepatitis C screening results. In previous years, ARPHS was only notified of a positive hepatitis C result when there was evidence of seroconversion to hepatitis C within 12 months of the date of testing. This change resulted in the proportion of confirmed and probable cases falling to 3.4% of notifications compared to an average of 17.4% of notifications between 2010 and 2021.

Table 4 shows the risk factors associated with developing acute hepatitis C in 2022. The most common risk factor was a history of injecting drug use followed by overseas travel within the previous six months, sexual contact with a confirmed case and body piercing or tattooing within the previous 12 months. Of note, more than one risk factor may be identified per case.

Table 4: Risk factors associated with acute hepatitis C in the Auckland region 2022

Risk factor	Cases	Percent
History of injecting drug use	2	66.7%
Overseas travel	1	33.3%
Sexual contact with a case	1	33.3%
Body piercing or tattoos	1	33.3%

Source: EpiSurv

3.2 Vector-borne diseases

Vector-borne diseases are human illnesses caused by parasites, viruses and bacteria that are transmitted by living organisms capable of transmitting infectious pathogens.[17] These diseases account for around 17% of all infectious diseases worldwide and cause over 700,000 deaths per year. Vectors involved in human disease transmission include mosquitoes, ticks, fleas, aquatic snails and sandflies, among others.

Mosquito-borne viral infections such as dengue fever, chikungunya fever, Zika virus infection, Japanese encephalitis and yellow fever are often referred to as 'arboviral' or arthropod-borne viral infections. Arboviral infections may also be tick-borne.

NZ does not currently harbour the exotic mosquito species required for ongoing transmission of malaria, dengue fever and other arboviral diseases, therefore all cases notified within the Auckland region thus far were acquired overseas. Routine surveillance of potential entry points at Auckland International Airport and Ports of Auckland is undertaken to prevent species of concern becoming established in the region.

Table 5: Vector-borne diseases in the Auckland region 2022

Disease	Total notifications	Total cases (%)	Rate per 100,000	Hospitalisations (%)	Deaths (%)
Chikungunya fever	3	2 (66.7)	0.1	0	0
Dengue fever	12	12 (100.0)	0.7	9 (75.0)	0
Malaria	6	6 (100.0)	0.3	5 (83.3)	0
Murine typhus	5	3 (60.0)	0.2	3 (100.0)	0
Rickettsial disease[1]	3	0	-	-	-
Ross River virus	0	0	-	-	-

[17] World Health Organisation. (2020). *Vector-borne diseases.* Retrieved 29 May, 2023, from https://www.who.int/news-room/fact-sheets/detail/vector-borne-diseases

Disease	Total notifications	Total cases (%)	Rate per 100,000	Hospitalisations (%)	Deaths (%)
Zika virus infection	0	0	-	-	-
Total	**29**	**23 (79.3)**	**1.3**	**17 (73.9)**	**0**

Source: EpiSurv, Stats NZ

[1]Excluding murine typhus

In 2022, ARPHS received a total of 29 notifications for vector-borne diseases (Table 5). Of these, 23 (79.3%) met the criteria for a confirmed or probable case.

Dengue fever and malaria had the highest number of cases, with 12 and six cases, respectively. There were no cases of rickettsial disease (other than murine typhus), Ross River virus infection or Zika virus infection reported in 2022.

The three cases of murine typhus were the only vector-borne disease cases to be acquired in NZ. The rest were acquired overseas.

The most common source country for vector-borne diseases was India, with five cases of dengue fever and two cases of chikungunya fever reporting travel to this country during their exposure period.

3.2.1 Chikungunya fever

Chikungunya fever is an arboviral infection that is spread through the bite of an infected mosquito, mainly *Aedes aegypti* and *Aedes albopictus*. There is no person-to-person transmission.

Symptoms often include a flu-like illness with high fevers, chills, muscle aches, headache, rash, nausea and vomiting. Pain or inflammation of the small joints of the hands and feet may also be present. These symptoms can persist for several weeks or months.

A. aegypti and *A. albopictus* mosquitoes are not currently established in NZ and are considered exotic species. Thus, all recent cases of chikungunya fever have occurred among recent overseas travellers. There is no vaccine or drug prophylaxis available to prevent chikungunya fever; protecting against mosquito bites when in endemic areas is crucial.

- There were two chikungunya fever cases in the Auckland region in 2022.
- There were no hospitalisations or deaths.
- The incidence rate for the Auckland region was 0.1 cases per 100,000. For the rest of NZ it was 0 cases per 100,000.

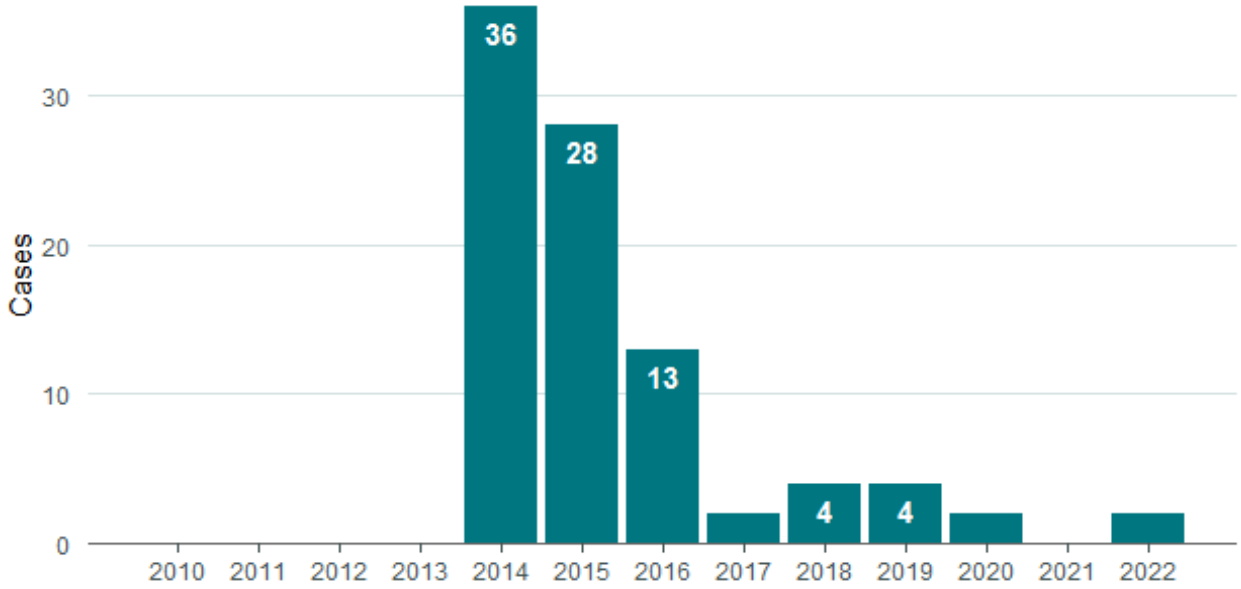


Figure 5: Chikungunya cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 5 shows the number of chikungunya fever cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were similar to 2021 and 2020 and slightly fewer than pre-COVID levels.

Both cases of chikungunya fever were acquired in India. As shown in Table 6, protective measures taken by both cases to prevent mosquito bites included staying in accommodation with insect screens or air-conditioners, while only one case reported using long-sleeved clothes. Neither case reported using insect repellent or bed nets to protect against mosquito bites.

Table 6: Protective factors associated with chikungunya fever in the Auckland region 2022

Protective factor	Always	Rarely	Never
Wearing long-sleeved shirts and trousers	0	1	1
Use of insect repellent	0	0	2
Use of bed nets	0	0	2
Screened or air-conditioned accommodation	2	0	0

Source: EpiSurv

3.2.2 Dengue fever

Dengue fever is an arboviral infection that is spread through the bite of an infected mosquito, mainly *Aedes aegypti* and *Aedes albopictus*. There are four types of the virus that cause dengue (DEN 1-4). Infection by one type gives immunity to that type but does not give immunity

against the other types. There is no person-to-person transmission.

Symptoms of dengue fever include fever, headache, myalgia, arthralgia, rash, anorexia, vomiting and abdominal pain. Dengue haemorrhagic fever can occur when a person who has previously had one type of dengue fever becomes infected by another type. Symptoms are similar to classical dengue, followed several days later by bleeding manifestations and shock.

Dengue fever is endemic in many countries across Asia, South America and Africa. No vaccine or specific treatment is available, so travellers should ensure they take precautions to prevent mosquito bites. All recent cases of dengue in NZ have occurred among recent overseas travellers.

- There were 12 dengue fever cases in the Auckland region in 2022.
- There were nine hospitalisations and no deaths.
- The incidence rate for the Auckland region was 0.7 cases per 100,000. For the rest of NZ it was 0.2 cases per 100,000.

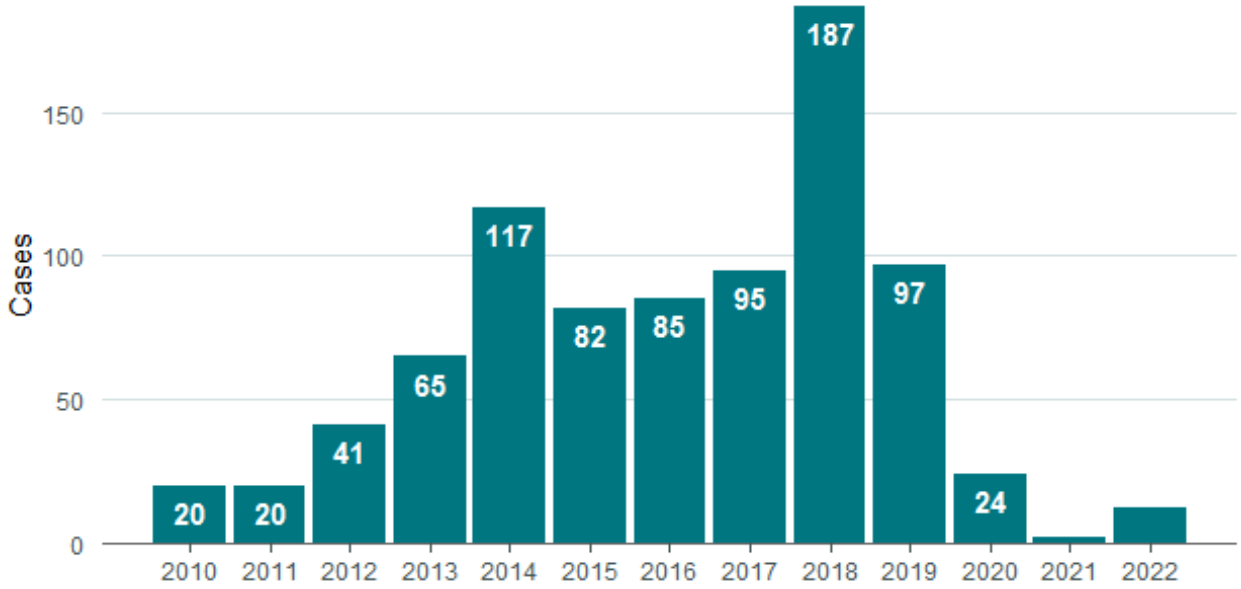


Figure 6: Dengue fever cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 6 shows the number of dengue fever cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were higher than 2021, when only two cases were reported, but lower than 2020 when 24 cases were reported. Cases were significantly lower for these years compared to pre-COVID years, when there were often over 50 cases per year.

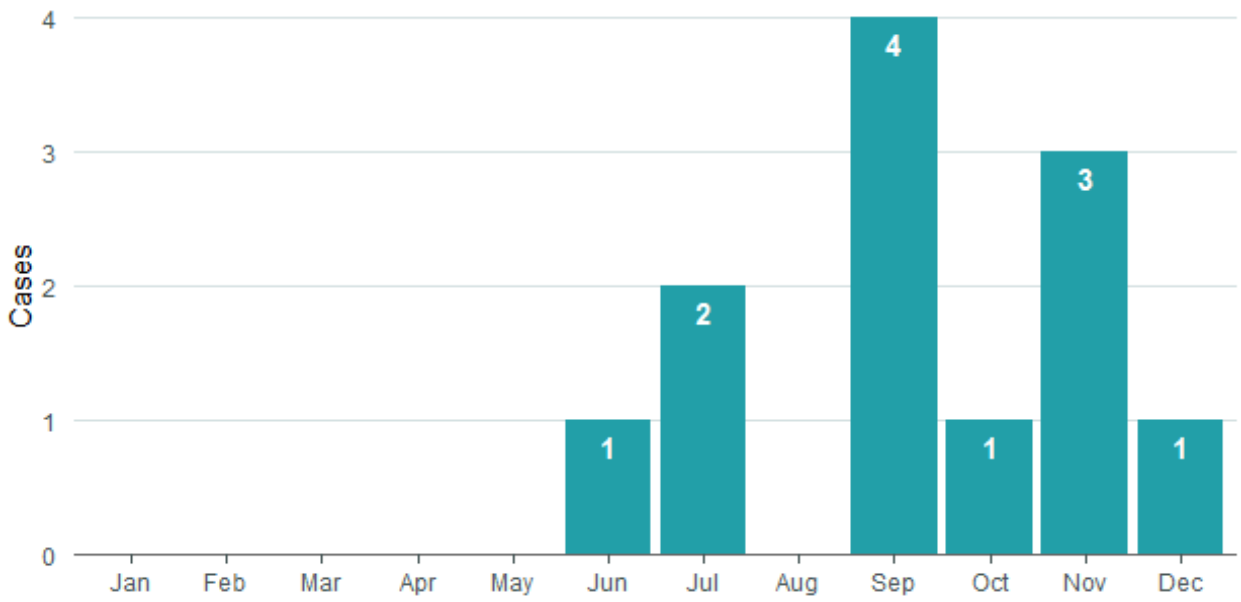


Figure 7: Dengue fever cases in the Auckland region 2022 by month

Source: EpiSurv

As shown in Figure 7, cases were more common in the latter half of 2022 following the reopening of NZ's international borders. Cases were highest among the '20 to 29' and '30 to 39' age groups, with 1.2 and 1.8 cases per 100,000 population, respectively (Table 7).

Table 7: Age-specific incidence rates for dengue fever in the Auckland region 2022

Age group	Total	Rate per 100,000
Age under 1	0	-
1 to 4	0	-
5 to 9	1	0.9
10 to 14	0	-
15 to 19	0	-
20 to 29	3	1.2
30 to 39	5	1.8
40 to 49	1	0.4
50 to 59	1	0.5
60 to 69	1	0.6
Age 70+	0	-
Total	**12**	**0.7**

Source: EpiSurv, Stats NZ

Ethnic group-specific incidence rates for dengue fever were highest in Asian peoples, with 2.3 cases per 100,000 population (Table 8). Of these, five identified as Indian ethnicity (Table 9).

Table 8: Ethnic group-specific incidence rates for dengue fever in the Auckland region 2022

Ethnicity	Total	Rate per 100,000
Māori	0	-
Pacific Peoples	0	-
Asian	11	2.3
European and Other	1	0.1
Total	**12**	**0.7**

Source: EpiSurv, Stats NZ

Table 9: Detailed ethnicity count of dengue fever cases in the Auckland region 2022

Detailed ethnicity	Cases
Indian	5
Asian NFD	1
Chinese	1
European NFD	1
Filipino	1
Nepalese	1
Southeast Asian NFD	1
Vietnamese	1
Total	**12**

Source: EpiSurv, Stats NZ

Table 10 shows the serotypes of dengue fever cases for 2022 and the last country visited by the case before arriving in NZ. The most common serotype was 2A (three positive cases), followed by 3A (two positive cases). The most common country associated with dengue fever was India, with five cases departing for NZ from this country. No cases were acquired in NZ.

Table 10: Serotypes of disease cases in the Auckland region 2022 by last country visited

Serotype	Last country visited	Cases
Type 3A	India	2
Type 1	Thailand	1
Type 1A	Nepal	1
Type 1A	Philippines	1
Type 2A	India	1
Type 2A	Philippines	1
Type 2A	Vietnam	1

Serotype	Last country visited	Cases
Not recorded	India	2
Not recorded	Nepal	1
Not recorded	Singapore	1
Total	-	**12**

Source: EpiSurv

As shown in Table 11, protective measures taken by the cases to prevent mosquito bites include wearing long-sleeved clothes, using insect repellent and staying in accommodation with insect screens or air-conditioners. Only one case reported using bed nets, while several cases reported not using any mosquito precautions. More than one protective factor may be identified per case.

Table 11: Protective factors associated with dengue fever in the Auckland region 2022

Protective factor	Always	Occasionally	Rarely	Never	Unknown
Wearing long-sleeved shirts and trousers	3	3	0	5	1
Use of insect repellent	4	1	1	6	0
Use of bed nets	0	1	0	11	0
Screened or air-conditioned accommodation	5	2	0	5	0

Source: EpiSurv

3.2.3 Malaria

Malaria is an acute febrile illness caused by *Plasmodium* parasites. Transmission usually occurs through the bite of an infected female Anopheles mosquito but may rarely occur through transfusion of infected blood and sharing of contaminated intravenous equipment.

Symptoms include high fever, rigors, sweats, headache, nausea, vomiting, diarrhoea, coughing, arthralgia, abdominal and back pain. Infection with P. falciparum can be severe, involving neurological symptoms, pulmonary oedema, renal failure, severe anaemia and death.

All cases of malaria in NZ to date have occurred in people with recent overseas travel. There are no Anopheles species of mosquitoes in NZ, so there is no risk of local mosquito-borne transmission.

- There were six malaria cases in the Auckland region in 2022.
- There were five hospitalisations and no deaths.
- The incidence rate for the Auckland region was 0.3 cases per 100,000. For the rest of NZ it was also 0.3 cases per 100,000.

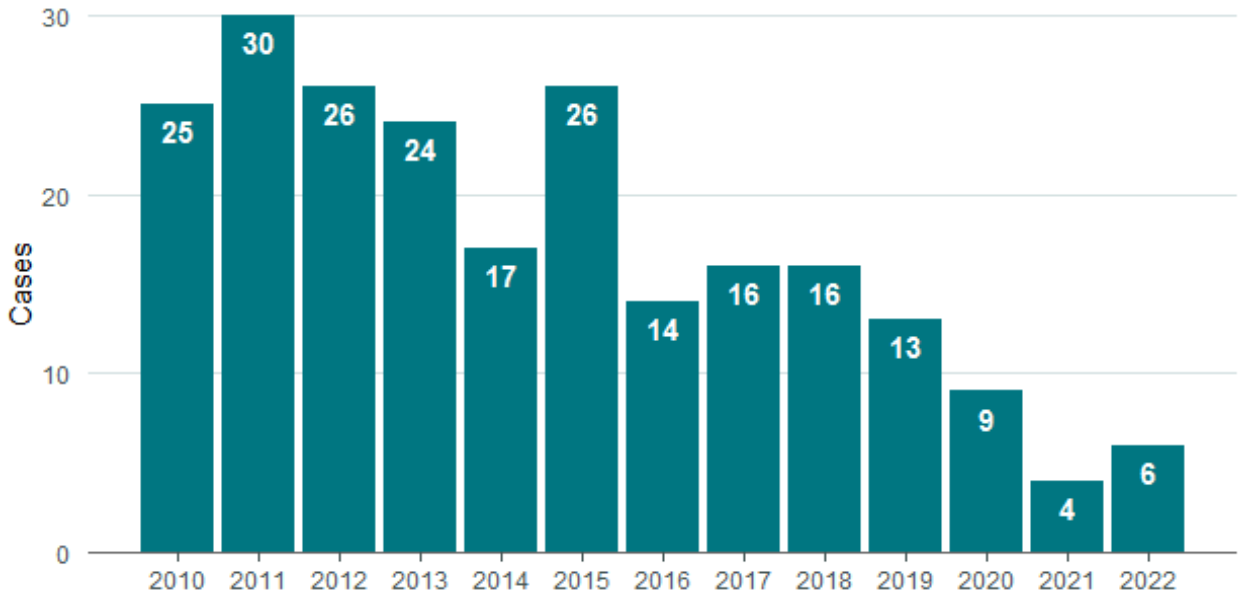


Figure 8: Malaria cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 8 shows the number of malaria cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were slightly above 2021 but fewer than 2020 numbers, with four and nine cases reported for these years, respectively. This is slightly fewer than pre-COVID years, when cases averaged around 20 per year.

As with dengue fever, malaria cases were more common in the latter half of 2022, coinciding with the reopening of the country's international borders (Figure 9).

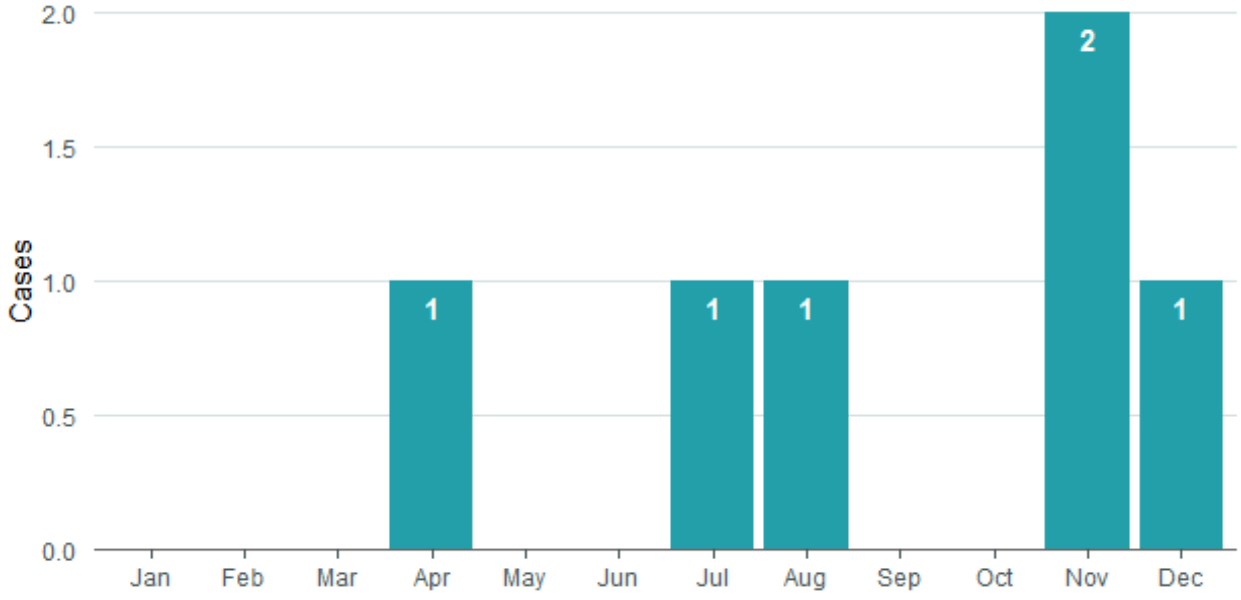


Figure 9: Malaria cases in the Auckland region 2022 by month

Source: EpiSurv

Tables 12 and 13 show the age and ethnic group distribution of malaria cases for 2022. Cases were highest among the '30 to 39' and '70+' age groups, with 0.7 and 0.6 cases per 100,000 population, respectively. Ethnic group-specific incidence rates were highest among European and Other followed by Pacific Peoples.

Table 12: Age-specific incidence rates for malaria in the Auckland region 2022

Age group	Total	Rate per 100,000
Age under 1	0	-
1 to 4	0	-
5 to 9	0	-
10 to 14	0	-
15 to 19	0	-
20 to 29	1	0.4
30 to 39	2	0.7
40 to 49	1	0.4
50 to 59	1	0.5
60 to 69	0	-
Age 70+	1	0.6
Total	**6**	**0.3**

Source: EpiSurv, Stats NZ

Table 13: Ethnic group-specific incidence rates for malaria in the Auckland region 2022

Ethnicity	Total	Rate per 100,000
Māori	0	-
Pacific Peoples	1	0.4
Asian	0	-
European and Other	5	0.6
Total	**6**	**0.3**

Source: EpiSurv, Stats NZ

Source countries included Papua New Guinea, Uganda and Nigeria, with three, two and one case, respectively (Table 14). No cases were acquired in NZ.

Table 14: Source countries of malaria cases in the Auckland region 2022

Country acquired	Count
Papua New Guinea	3
Uganda	2
Nigeria	1

Country acquired	Count
Total	6

Source: EpiSurv

3.2.4 Murine typhus

Murine typhus is a rickettsial disease caused by Rickettsia typhi bacteria. R. typhi is the only rickettsial species endemic in NZ.

Transmission occurs through a bite from an arthropod vector, usually fleas and ticks, which carry the bacteria. Symptoms may include fever, headache, malaise, lymphadenopathy, myalgia, photophobia, cough and a macular or haemorrhagic rash.

Murine typhus was previously known as *Rickettsia mooseri* or 'shop' typhus.

- There were three murine typhus cases in the Auckland region in 2022.
- There were three hospitalisations and no deaths.
- The incidence rate for the Auckland region was 0.2 cases per 100,000. For the rest of NZ it was 0 cases per 100,000.

Figure 10 shows the number of murine typhus cases in the Auckland region between 2010 and 2022. No cases were observed in 2021 and only one case in 2020, with overall notifications decreasing over the past 12 years.

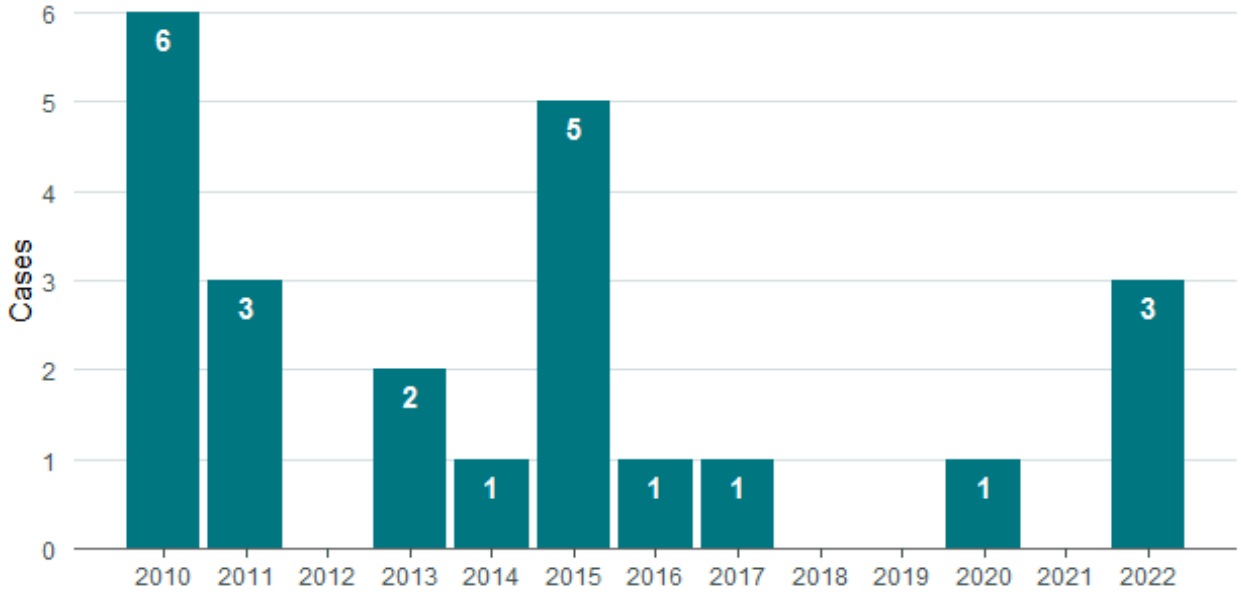


Figure 10: Murine typhus cases in the Auckland region 2010 to 2022

Source: EpiSurv

The three cases reported in 2022 were from the same household and thought to be acquired from feral cats associated with the house. None of the cases reported recent overseas travel.

3.2.5 Rickettsial disease

Rickettsial disease refers to a group of infections caused by *Rickettsia* bacteria. Transmission occurs through a bite from an arthropod vector, usually fleas and ticks, which carry the bacteria.

Rickettsial disease generally presents with fever, headache and malaise, with lymphadenopathy, myalgia, photophobia, cough and a macular or haemorrhagic rash may also be present. Some cases may have an inoculation eschar (black ulcer or papule) at the bite wound. Complications may include bronchitis, pneumonia, delirium, deafness and hepatosplenomegaly.

Each *Rickettsia* species is associated with a different spectrum of clinical features, geographical distribution, insect vector (tick, louse, flea, mite or chigger), seasonal incidence and other epidemiological factors.

Rickettsia typhi, the causative agent of murine typhus, is endemic in some parts of NZ. *Rickettsia felis* has been detected in fleas in the North Island but has not been associated with any human cases of Rickettsial disease.

Rickettsial disease refers to infections other than murine typhus, i.e. those caused by species other than *Rickettsia typhi* (see Murine typhus for infections caused by *R. typhi*).

There were no cases of rickettsial disease in the Auckland region in 2022. While three suspected cases were notified to ARPHS, none met the definition for a confirmed or probable case. The last case in the Auckland region was reported in 2019.

3.2.6 Ross River virus infection

Ross River virus infection is an arboviral infection caused by Ross River virus. Transmission occurs through a bite from an infected mosquito and person-to-person transmission has not been documented.[18]

Infection is often asymptomatic, with some individuals developing a flu-like illness characterised by fever, chills, headache, myalgias and rash. Most people recover completely in a few weeks.

Ross River fever is the most common mosquito-borne infection in Australia. It is also found in Papua New Guinea and other islands in the South Pacific but is not found in NZ.

There were no cases of Ross River virus infection notified in 2022. The last case in the Auckland region was reported in 2019.

[18] Community and Public Health. (2022). *Ross River Fever*. Christchurch: Community and Public Health (CDHB).

3.2.7 Zika virus infection

Zika is an arthropod-borne viral infection caused by the Zika virus. Transmission typically occurs through the bite of an infected mosquito, although transmission between sexual partners has also been documented. Pregnant women may transmit the disease to their unborn babies which can result in severe birth defects such as microcephaly.

While most infections are asymptomatic, some individuals may experience a mild fever, arthralgia, myalgia, headache, conjunctivitis and rash. Guillain-Barré syndrome may occur in some cases.

Zika virus is found in parts of Africa, southern Asia, the Pacific and the Americas. The mosquito species that spread Zika virus, mainly *Aedes* spp., are not normally found in NZ.

There were no cases of Zika virus infection notified in 2022. The last case in the Auckland region was reported in 2019.

3.2.8 Exotic mosquito interceptions

NZ has 16 established species of mosquito: 13 native and three introduced.[19] Exotic mosquitoes, i.e. those that are not yet established in NZ, are considered high-risk insects due to their ability to spread diseases such as malaria, dengue fever, chikungunya fever and Zika virus infection.[20] International travel and climate change enable exotic mosquitoes to spread to new territories. Mosquito-borne diseases are spreading globally, with a wet, humid, warmer climate enabling new regions to be established with various mosquito species.[21] Establishment of high-risk exotic mosquitoes in NZ would increase the risk of outbreaks of these diseases, therefore careful monitoring is required.

Common practices to prevent the introduction of exotic mosquitoes into NZ include spraying aircraft with insecticides, unsealing freight cargo in designated inspection zones and conducting exotic mosquito surveillance at international ports. ARPHS conducts mosquito surveillance at Ports of Auckland, Auckland International Airport and Whenuapai airbase as well as transitional (quarantine) facilities as required.

One exotic mosquito interception occurred in Auckland in 2022, involving detection of *Aedes aegypti* larvae at Auckland International Airport. This was the same species as intercepted in 2021 (Figure 11).

[19] Southern Monitoring Services Ltd. (n.d.). *New Zealand Mosquitoes.* Retrieved 14 April, 2023, from https://www.smsl.co.nz/NZBEL/New+Zealand+Mosquitoes.html.

[20] EHINZ. (2022). *High-risk insects caught at New Zealand's border.* Retrieved 14 April, 2023, from https://www.ehinz.ac.nz/indicators/border-health/high-risk-pests-caught-at-new-zealands-border/.

[21] Rocklöv, J., & Dubrow, R. (2020). *Climate change: an enduring challenge for vector-borne disease prevention and control.* Nature Immunology, 21(5), 479-483. doi:10.1038/s41590-020-0648-y.

Routine surveillance at Ports of Auckland detected only the established introduced species *Culex quinqeufasciatus* and *Aedes notoscriptus*, and the native mosquito species *Culex pervigilans*.

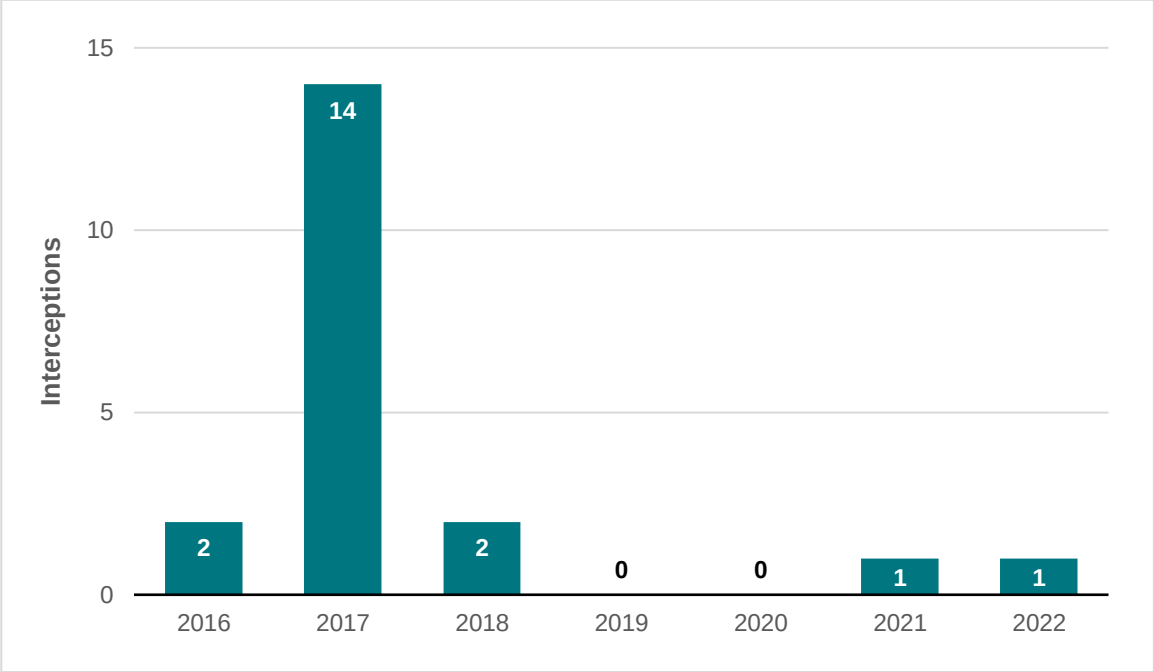


Figure 11: Aedes aegypti interceptions in the Auckland Region 2016 to 2022

Source: ARPHS Biosecurity Logging Master

3.3 Zoonotic diseases

Zoonotic diseases are infectious diseases that can be passed from animals to humans. Many of NZ's zoonotic diseases are also enteric, including campylobacteriosis, cryptosporidiosis, giardiasis and salmonellosis. These diseases are covered in the Enteric diseases section of this report.

Some zoonotic infections occur primarily in certain groups or occupations, such as leptospirosis and brucellosis in meat processors, farmers and veterinarians. Other zoonotic infections, such as Q fever, are not endemic to NZ so are often acquired overseas.

Table 15: Zoonotic illnesses in the Auckland region 2022

Disease	Total notifications	Total cases (%)	Rate per 100,000	Hospitalisations (%)	Deaths (%)
Brucellosis	0	0	-	0	0
Hydatid disease	2	1 (50.0)	0.1	1 (100.0)	0
Leptospirosis	10	8 (80.0)	0.5	7 (87.5)	1 (12.5)
Q fever	2	0	-	-	-
Taeniasis	2	2 (100.0)	0.1	0	0
Total	**16**	**11**	**0.6**	**8 (72.7)**	**1 (9.1)**

Source: EpiSurv, Stats NZ

In 2022, ARPHS received a total of 16 notifications for vector-borne diseases (Table 15). Of these, 11 (68.8%) met the criteria for a confirmed or probable case.

Leptospirosis and taeniasis had the highest number of cases, with eight and two cases, respectively. No cases of brucellosis or Q fever were reported in 2022.

3.3.1 Brucellosis

Brucellosis is a zoonotic infection caused by the bacterium *Brucella*. Humans may become infected through contact with or ingestion of milk products from infected animals. Human-to-human transmission has been reported but is very rare.

Brucellosis is often asymptomatic, but may involve an acute illness with fever, arthralgia, headache, malaise, anorexia, constipation, respiratory tract symptoms and hepatosplenomegaly. Complications may include testicular inflammation, endocarditis, meningitis and encephalitis.

In NZ, brucellosis generally occurs among farmers, veterinarians and abattoir workers. Internationally, ingestion of unpasteurised goat milk is the most common risk factor.

There were no cases of brucellosis notified in 2022. The last case in the Auckland region was reported in 2021.

3.3.2 Hydatid disease

Hydatid disease is a parasitic infection caused by the tapeworm *Echinococcus granulosus*. It is also known as hydatidosis or cystic echinococcosis. Transmission is through ingestion of food or water containing tapeworm eggs, or through contact with infected animals, particularly dogs and farm animals. There is no person-to-person transmission.

Hydatid disease involves the development of cysts in the liver, lung, spleen, brain, heart or kidney. Affected individuals asymptomatic for years and only develop symptoms when the cysts begin to affect surrounding tissues. Symptoms may include anorexia, weight loss and lethargy, with liver cysts causing abdominal pain, nausea and vomiting and lung cysts causing chronic cough, shortness of breath and chest pain. Rupture of a cyst may produce a life-threatening allergic reaction.

- There was one case of hydatid disease in the Auckland region in 2022.
- There was one hospitalisation and no deaths.
- The incidence rate for the Auckland region was 0.1 cases per 100,000. For the rest of NZ it was 0 cases per 100,000.

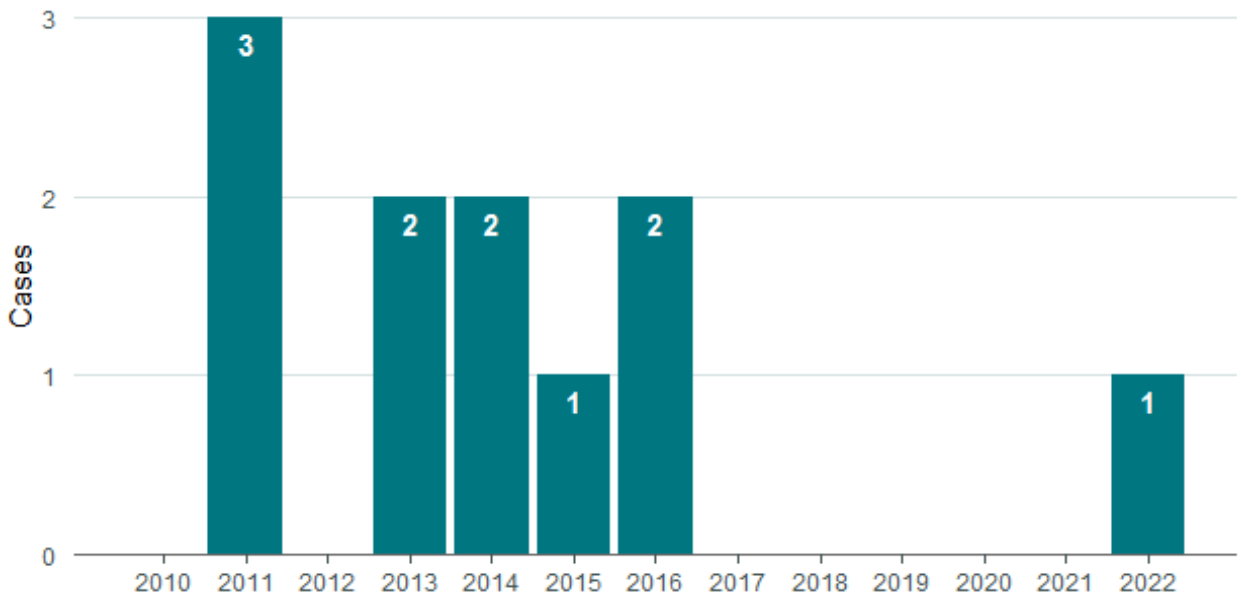


Figure 12: Hydatid disease cases in the Auckland region 2010 to 2022

Source: EpiSurv

This case likely acquired the infection in Afghanistan. As shown in Figure 12, this was the first case reported in the Auckland region since 2016. Between 2011 and 2016 there were 10 cases reported.

3.3.3 Leptospirosis

Leptospirosis is a zoonotic infection caused by *Leptospira* bacteria. Transmission is mainly via contact with urine or organs from infected animals or contact with soil and water contaminated by animals. Person-to-person transmission is very rare.

Symptoms include fever, chills, headache, cough, myalgia, nausea, diarrhoea and abdominal pain. Severe disease may involve jaundice, renal failure, pneumonitis and meningitis.

Leptospirosis is endemic worldwide, with higher incidence in tropical countries. Most cases in NZ have worked in the meat-processing industry or have had recent farm contact. Other risk factors include recreational water activities, such as rafting or kayaking, and contact with floodwaters.

- There were eight leptospirosis cases in the Auckland region in 2022.
- There were seven hospitalisations and one death.
- The incidence rate for the Auckland region was 0.5 cases per 100,000. For the rest of NZ it was 1.2 cases per 100,000.

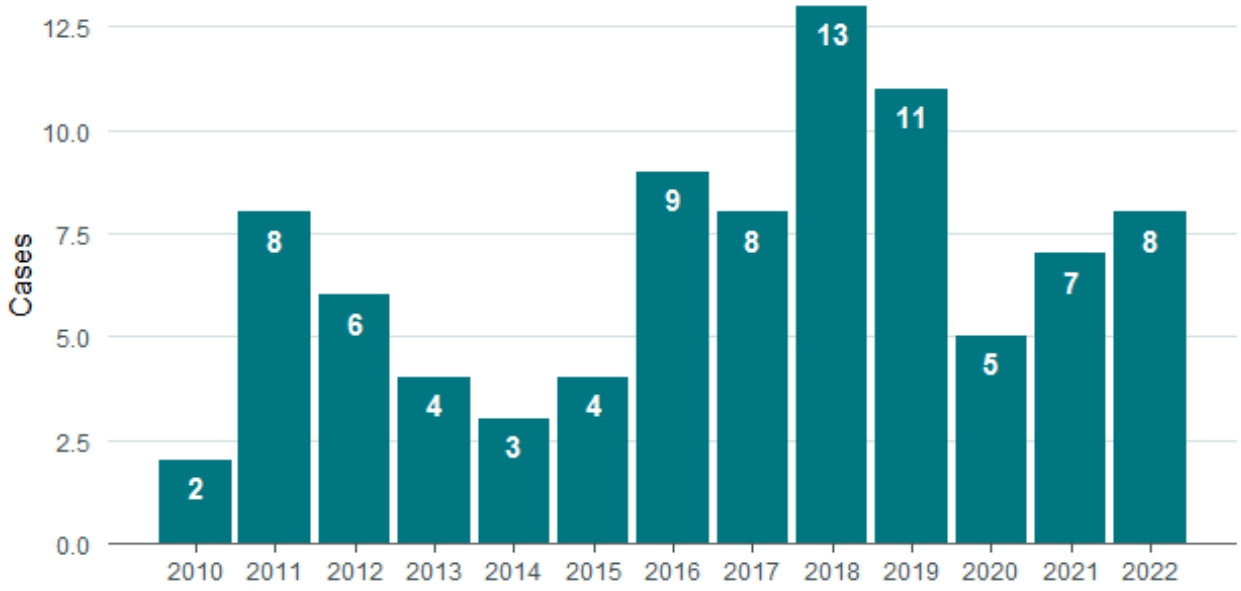


Figure 13: Leptospirosis cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 13 shows the number of leptospirosis cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were slightly higher than 2021 and 2020 and more similar to pre-COVID years.

In 2022, cases occurred throughout the year with no obvious seasonal pattern (Figure 14).

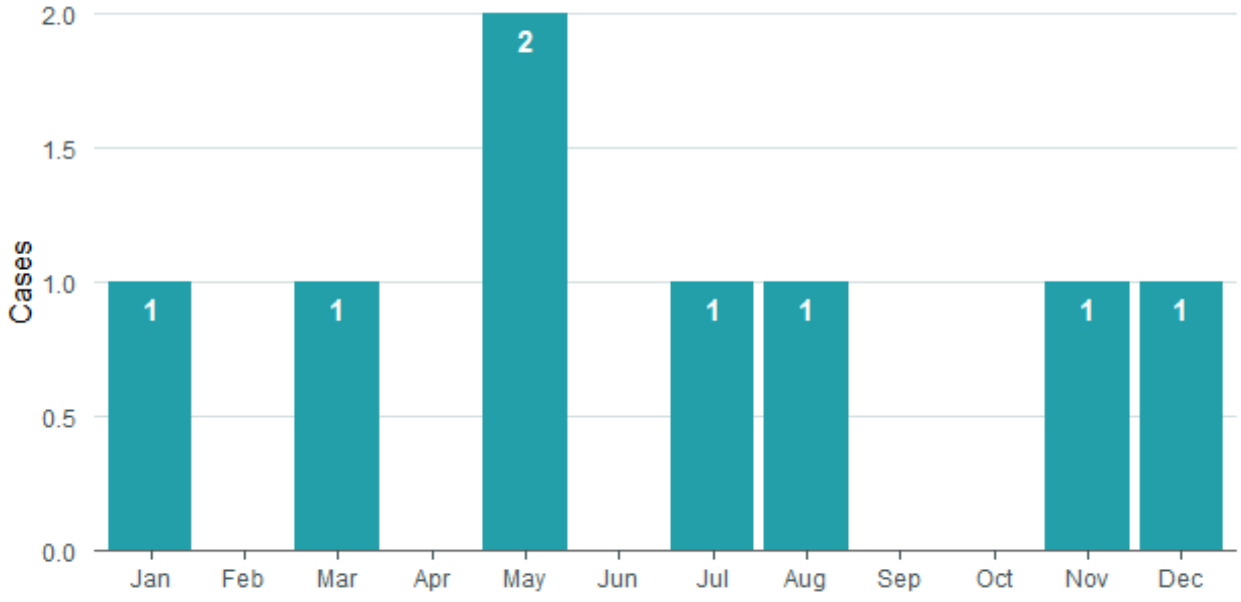


Figure 14: Leptospirosis cases in the Auckland region 2022 by month

Source: EpiSurv

Table 16 shows the age and sex distribution of leptospirosis cases for 2022. Cases were highest among the '20 to 29' and '50 to 59' year age groups and no children were affected. The ratio of females to males was 1:7.

Table 16: Leptospirosis cases in the Auckland region by age group and sex 2022

Age group	Female	Male	Total	Rate per 100,000
Age under 1	0	0	0	-
1 to 4	0	0	0	-
5 to 9	0	0	0	-
10 to 14	0	0	0	-
15 to 19	0	0	0	-
20 to 29	1	1	2	0.8
30 to 39	0	1	1	0.4
40 to 49	0	1	1	0.4
50 to 59	0	2	2	0.9
60 to 69	0	1	1	0.6
Age 70+	0	1	1	0.6
Total	**1**	**7**	**8**	**0.5**

Source: EpiSurv, Stats NZ

Ethnic group-specific incidence rates were highest among European and Other followed by Māori, with 0.8 and 0.5 cases per 100,000 population, respectively (Table 17).

Table 17: Ethnic group-specific incidence rates for leptospirosis in the Auckland region 2022

Ethnicity	Total	Rate per 100,000
Māori	1	0.5
Pacific Peoples	1	0.4
Asian	0	-
European and Other	6	0.8
Total	**8**	**0.5**

Source: EpiSurv, Stats NZ

Table 18 shows the risk factors associated with developing leptospirosis in 2022. The most common risk factor was exposure to farm or wild animals (seven cases) followed by occupational exposure (three cases). More than one risk factor may be identified per case.

The most common occupation associated with developing leptospirosis was farmer (Table 19).

Table 18: Risk factors associated with leptospirosis in the Auckland region 2022

Risk factor	Cases	Percent
Exposure to farm or wild animals	7	87.5%

Risk factor	Cases	Percent
Occupational exposure	3	37.5%
Exposure to streams, rivers & lakes	2	25.0%
No risk factors recorded	1	12.5%

Source: EpiSurv

Occupation	Count
Farmer and farm manager	2
Dairy cattle farmer	1
Earthmoving plant operator	1
Labourer	1
Retired	1
Specialist managers	1
Not stated	1

Source: EpiSurv

3.3.4 Q fever

Q fever is a zoonotic infection caused by the bacterium *Coxiella burnetii*. Transmission generally occurs through inhalation of contaminated aerosols or dust generated by placental tissues, body fluids or excreta of infected animals. The bacteria may also be transmitted through direct contact with infected animals or other contaminated matter.

While often asymptomatic, Q fever may cause an acute febrile illness accompanied by headache, weakness and myalgia. Chronic infection may be characterised by pneumonia, subacute endocarditis, hepatitis, granulomatous lesions and post Q-fever fatigue syndrome.

Q fever is most often an occupational disease affecting farmers, veterinarians and abattoir workers. *C. burnetii* is not endemic in NZ, therefore all cases to date have been in recent overseas travellers. Q fever was once considered part of the genus Rickettsia but is now classified as a separate genus and a separate notifiable disease.

There were no cases of Q fever in the Auckland region in 2022. While two suspected cases were notified to ARPHS, none met the definition for a confirmed or probable case. The last case in the Auckland region was reported in 2019.

3.3.5 Taeniasis

Taeniasis refers to intestinal infection by adult tapeworms of the genus *Taenia*. Transmission occurs through consumption of raw or undercooked pork or beef that contains tapeworm cysts.

Most infections are asymptomatic, although some individuals may experience nervousness, insomnia, anorexia, weight loss, abdominal pain and digestive disturbances.

Tapeworm segments may migrate out of the anus and be seen on clothing or in the faeces.

Adult tapeworms may live in the human intestine, growing up to eight metres in length and shedding eggs for up to 25 years. Consumption of *T. solium* eggs via contaminated food or water may lead to invasion of brain, muscle and skin by larval cysts ('cysticercosis').

- There were two taeniasis cases in the Auckland region in 2022.
- There were no hospitalisations or deaths.
- The incidence rate for the Auckland region was 0.1 cases per 100,000. For the rest of NZ it was 0 cases per 100,000.

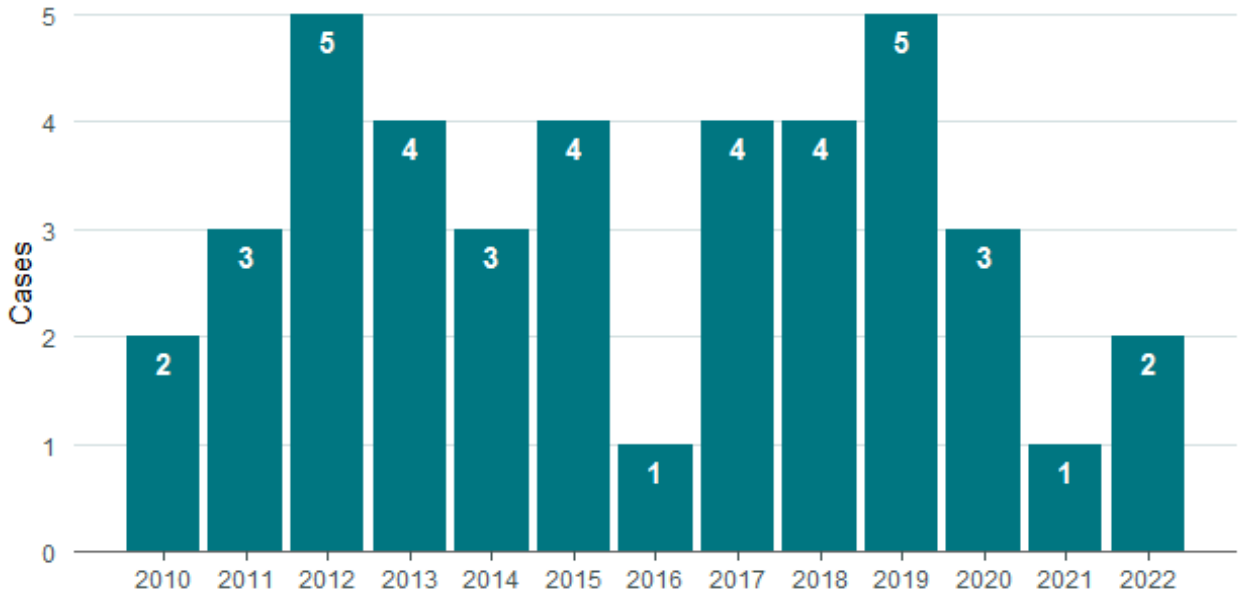


Figure 15: Taeniasis cases in the Auckland region 2010 to 2022

Source: EpiSurv

As shown in Figure 15, case numbers were only slightly fewer than pre-COVID levels, with one case in 2021 and three cases in 2020, compared to five cases in 2019.

3.4 Enteric diseases

Enteric diseases refer to a group of illnesses that affect the gastrointestinal system. These may be caused by viruses, bacteria, parasites or toxins. While the term 'enteric' is often used interchangeably with 'food and waterborne', not all enteric diseases are caused primarily by food and water, with direct person-to-person spread and animal or farm contact representing common routes of transmission.

Enteric illnesses often cause diarrhoea, vomiting, abdominal cramps and fever. As these diseases are often mild and self-limiting, it is estimated only a small proportion of people seek medical care for their illness. For most enteric diseases, identifying the pathogen or agent responsible for the disease is only possible through laboratory testing. Therefore, it is likely that many enteric diseases are under-reported.

Table 19: Enteric diseases in the Auckland region 2022

Disease	Total notifications	Total cases (%)	Rate per 100,000	Hospitalisations (%)	Deaths (%)
Botulism	0	0	-	-	-
Campylobacteriosis	1,726	1,725 (99.9)	100.3	*	*
Cholera	4	0	-	-	-
Cryptosporidiosis	135	135 (100.0)	7.8	*	*
Gastroenteritis – unknown cause	2	1 (50.0)	0.1	0	0
Gastroenteritis / foodborne intoxication	20	15 (75.0)	0.9	9 (60.0)	0
Giardiasis	211	210 (99.5)	12.2	*	*
Hepatitis A	44	21 (47.7	1.2	17 (81.0)	0
Hepatitis NOS	8	2 (25.0)	0.1	2 (100.0)	0

Disease	Total notifications	Total cases (%)	Rate per 100,000	Hospitalisations (%)	Deaths (%)
Listeriosis	9	9 (100.0)	0.5	9 (100.0)	2 (22.2)
Listeriosis – perinatal	2	2 (100.0)	0.1	2 (100.0)	0
Paratyphoid fever	8	8 (100.0)	0.5	7 (87.5)	0
Salmonellosis	220	205 (93.2)	11.9	85 (41.5)	0
Shigellosis	82	34 (41.5)	2.0	13 (38.2)	0
Toxic shellfish poisoning	2	1 (50.0)	0.1	0	0
Typhoid fever	18	17 (94.4)	1.0	15 (88.2)	0
VTEC/STEC infection	276	187 (67.8)	10.9	66 (35.3)	0
Yersiniosis	422	422 (100.0)	24.5	*	*
Total	**3,189**	**2,993 (93.9)**	**174.1**	**225 (7.5)**	**2 (0.1)**

Source: EpiSurv, Stats NZ

*Not routinely investigated by ARPHS

In 2022, ARPHS received a total of 3,189 notifications for enteric diseases (Table 16). Of these, 2,993 (93.9%) met the criteria for a confirmed or probable case.

Campylobacteriosis had the highest number of cases (1,725 cases), followed by yersiniosis (422 cases) and giardiasis (210 cases).

The greatest number of hospitalisations was observed with salmonellosis and verotoxin-producing *Escherichia coli* / Shiga toxin-producing *Escherichia coli* (VTEC/STEC), with 85 and 66 hospitalisations, respectively. However, the highest hospitalisation rate was seen for hepatitis Not Otherwise Specified (NOS) and listeriosis, with all 11 cases (100%) admitted to hospital.

Only two deaths were recorded, with both occurring due to non-perinatal listeriosis (CFR 22.2%).

No cases of botulism or cholera were reported in 2022.

3.4.1 Botulism

Botulism is a rare infection caused by neurotoxins from *Clostridium botulinum* bacteria. The bacteria are found throughout the environment in soil, dust and honey and some marine environments. Transmission occurs through ingesting or inhaling bacterial spores, or by consuming food containing the botulinum toxin. The bacteria may also infect open wounds.

Infants usually become unwell through consuming *C. botulinum* spores in food or soil and may experience constipation and poor feeding in the early stages of infection. Adults and older children generally become ill through eating contaminated food and may experience nausea, vomiting and diarrhoea. For both age groups, progressive muscle weakness, breathing difficulties and death will occur if the condition is left untreated.

There were no cases of botulism in the Auckland region notified in 2022. The last case in NZ was reported in 2021.

3.4.2 Campylobacteriosis

Campylobacteriosis is a common gastrointestinal infection caused by the bacterium *Campylobacter*. Transmission occurs through ingesting contaminated food, consuming faecally-contaminated water or through direct contact with infected farm or domestic animals. Person-to-person contamination is uncommon.

Symptoms begin within several days of ingesting the bacteria and include abdominal pain, fever and watery or bloody diarrhoea. Hospitalisation and death from campylobacter is rare.

Campylobacteriosis is the most frequently notified disease in NZ, with cases generally peaking in spring and summer.

- There were 1,725 campylobacteriosis cases in the Auckland region in 2022.
- Hospitalisations and deaths from campylobacteriosis are not recorded by ARPHS, so this data is not included.
- The incidence rate for the Auckland region was 100.3 cases per 100,000. For the rest of NZ it was 89.5 cases per 100,000.

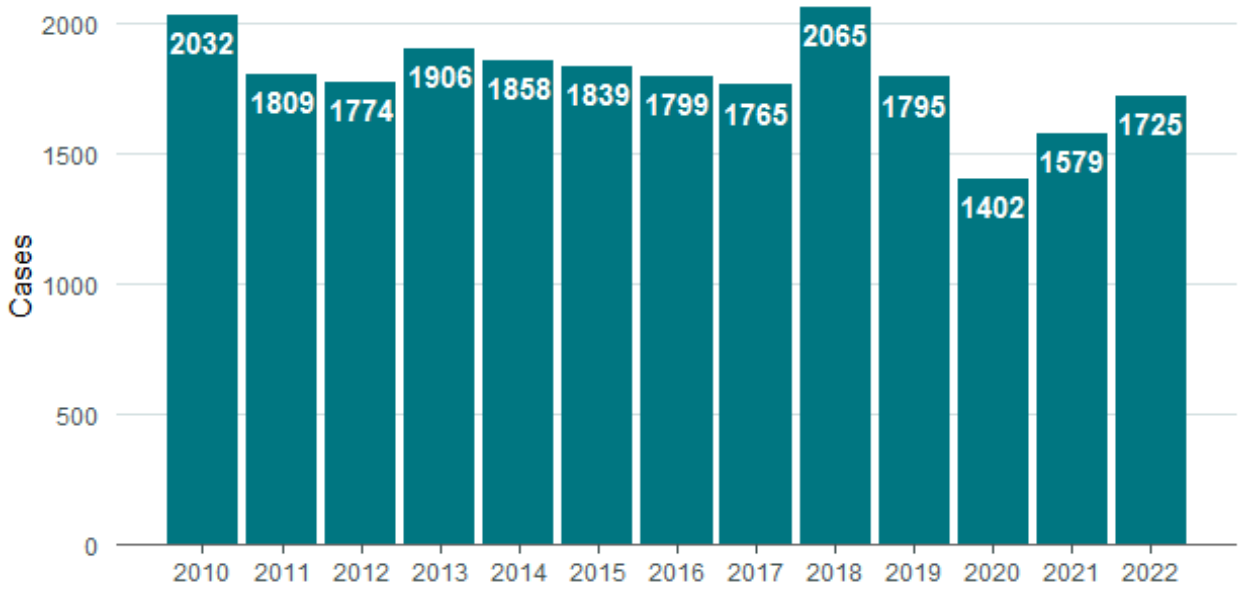


Figure 16: Campylobacteriosis cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 16 shows the number of campylobacteriosis cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were slightly above 2020 and 2021 and represented a return to pre-COVID levels.

In 2022, cases were more common over the spring and summer months, with a peak of 294 cases in December (Figure 17). This followed the usual seasonal pattern for campylobacteriosis cases, following some anomalies during the COVID years.

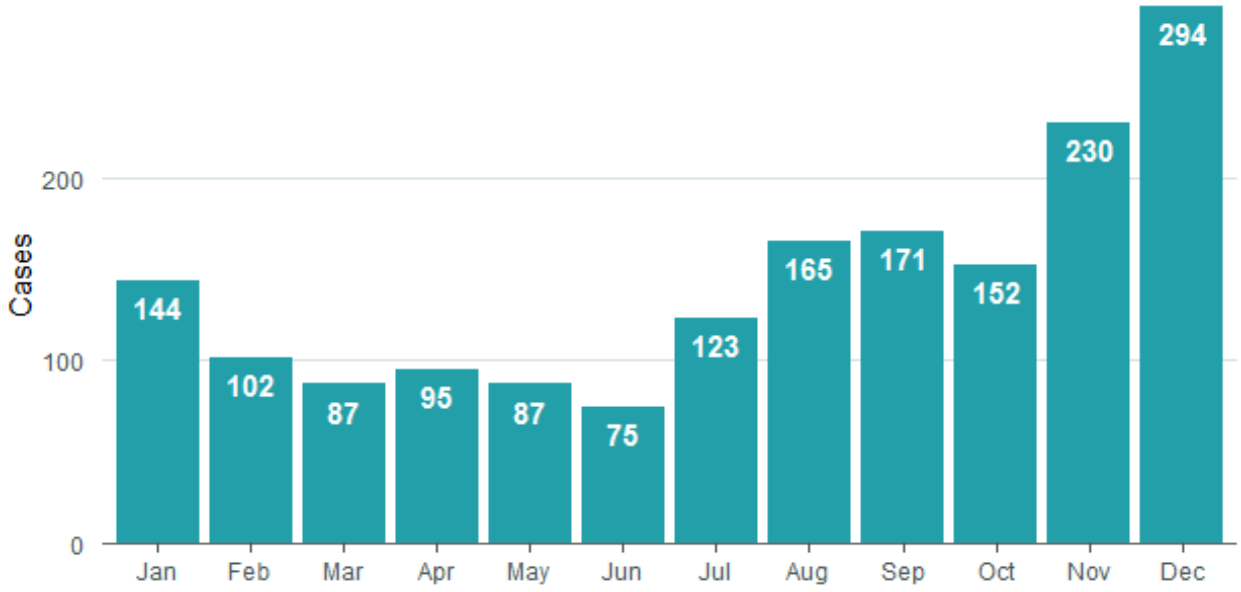


Figure 17: Campylobacteriosis cases in the Auckland region 2022 by month

Source: EpiSurv

Table 20: Age-specific incidence rates for campylobacteriosis in the Auckland region 2022

Age group	Total	Rate per 100,000
Age under 1	20	94.3
1 to 4	136	160.3
5 to 9	75	66.6
10 to 14	66	57.0
15 to 19	99	92.2
20 to 29	261	106.0
30 to 39	191	69.7
40 to 49	197	88.1
50 to 59	205	95.4
60 to 69	231	141.4
Age 70+	244	156.3
Total	**1,725**	**100.3**

Source: EpiSurv, Stats NZ

Tables 20 and 21 show the age and ethnic group distribution of campylobacteriosis cases for 2022. Cases were highest among the '1 to 4' and '70+' age groups, with 160.3 and 156.3 cases per 100,000 population, respectively. Ethnic group-specific incidence rates for campylobacteriosis were highest among European and Other followed by Asian, with 122.9 and 52.3 cases per 100,000 population, respectively.

Table 21: Ethnic group-specific incidence rates for campylobacteriosis in the Auckland region 2022

Ethnicity	Total	Rate per 100,000
Māori	103	49.6
Pacific Peoples	95	39.1
Asian	255	52.3
European and Other	958	122.9
Unknown	314	-
Total	**1,725**	**100.4**

Source: EpiSurv, Stats NZ

Routine interviews with cases of campylobacteriosis acquired in the Auckland region ceased in 2017, therefore information on associated risk factors is not available for this disease.

3.4.3 Cholera

Cholera is a gastrointestinal infection caused by toxigenic strains of the bacterium *Vibrio cholerae*. Transmission is via ingestion of contaminated food or water, with direct person-to-person transmission being rare.

There are over 200 serogroups of *V. cholerae*, however only toxigenic strains of serogroups O1 and O139 are associated with clinical cholera. Symptoms include watery diarrhoea and vomiting, which can lead to profound dehydration and death if untreated.

Cholera is not endemic in NZ, but occasional imported cases occur, mainly in travellers from Asia.

There were no cases of cholera in the Auckland region in 2022. While four suspected cases were notified to ARPHS, none met the definition for a confirmed or probable case. The last case in the Auckland region was reported in 2018.

3.4.4 Cryptosporidiosis

Cryptosporidiosis is a gastrointestinal infection caused by the protozoan *Cryptosporidium*. Transmission is via ingestion of contaminated water or food or contact with the faeces of an infected person or animal.[22]

Symptoms may include profuse watery diarrhoea, abdominal pain, nausea and vomiting, weight loss and mild fever. Asymptomatic carriage is common.

Cryptosporidiosis may be prevented through hand hygiene and appropriate treatment of drinking water.

- There were 135 cryptosporidiosis cases in the Auckland region in 2022.
- Hospitalisations and deaths from cryptosporidiosis are not recorded by ARPHS, so this data is not included.
- The incidence rate for the Auckland region was 7.8 cases per 100,000. For the rest of NZ it was 9.3 cases per 100,000.

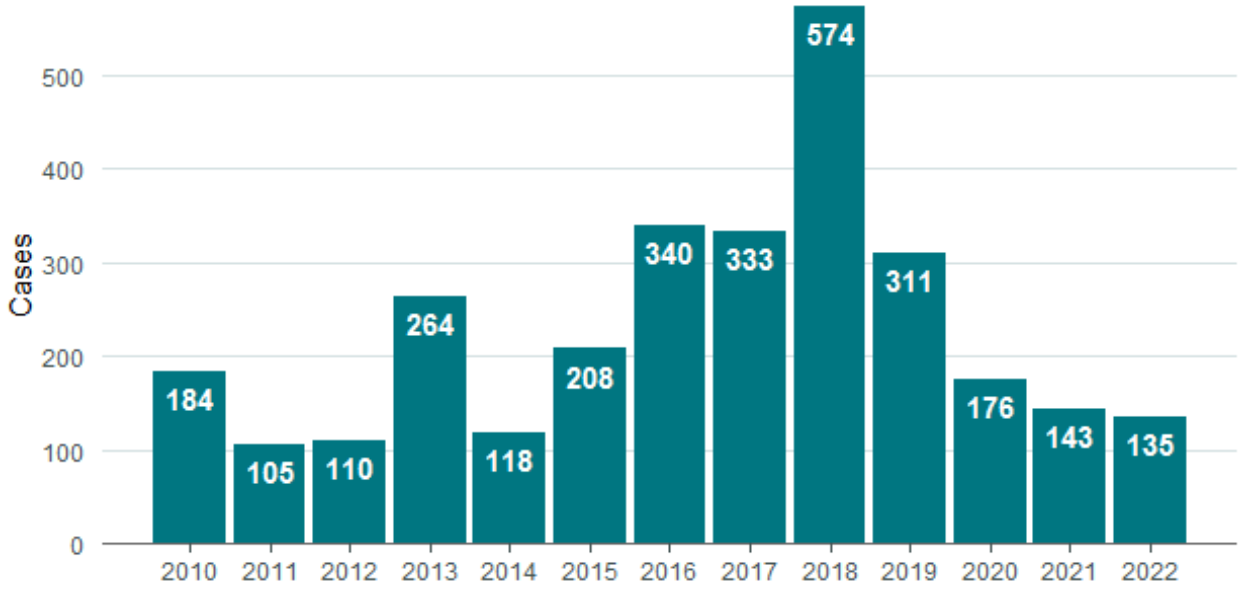


Figure 18: Cryptosporidiosis cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 18 shows the number of cryptosporidiosis cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were slightly fewer than 2021 and 2020 levels and significantly lower than pre-COVID levels, with around 150 cases each year for 2020-22 compared to over 300 per year for 2016-19.

[22] Ministry of Health. (2023). *Cryptosporidium and Giardia - HE1212.* Retrieved 11 May, 2023, from https://healthed.govt.nz/products/cryptosporidium-and-giardia.

In 2022, cases were more common in late winter and spring, with a peak of 28 cases in October (Figure 19).

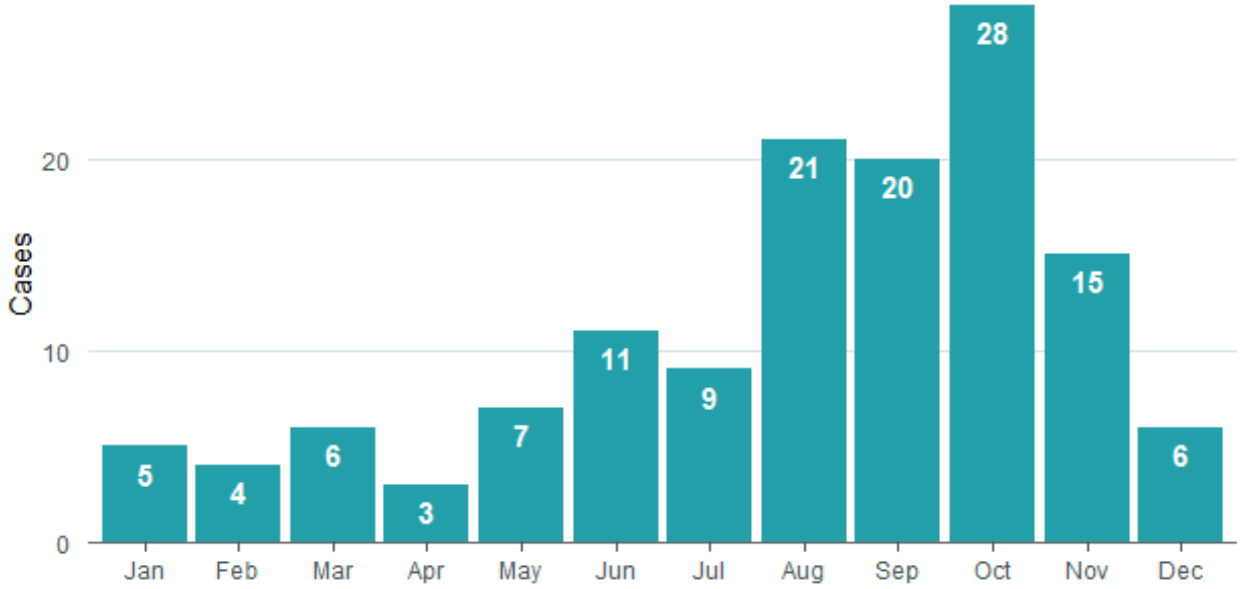


Figure 19: Cryptosporidiosis cases in the Auckland region 2022 by month

Source: EpiSurv

Table 22: Age-specific incidence rates for cryptosporidiosis in the Auckland region 2022

Age group	Total	Rate per 100,000
Age under 1	2	9.4
1 to 4	15	17.7
5 to 9	14	12.4
10 to 14	12	10.4
15 to 19	7	6.5
20 to 29	28	11.4
30 to 39	27	9.8
40 to 49	15	6.7
50 to 59	3	1.4
60 to 69	6	3.7
Age 70+	6	3.8
Total	**135**	**7.8**

Source: EpiSurv, Stats NZ

Tables 22 and 23 show the age and ethnic group distribution of cryptosporidiosis cases for 2022. Cases were highest among the ‘1 to 4’ and ‘5 to 9’ age groups, with 17.7 and 12.4 cases per 100,000 population, respectively. Ethnic group-specific incidence rates for cryptosporidiosis were highest among European and Other followed by Asian peoples.

Table 23: Ethnic group-specific incidence rates for cryptosporidiosis in the Auckland region 2022

Ethnicity	Total	Rate per 100,000
Māori	11	5.3
Pacific Peoples	3	1.2
Asian	17	3.5
European and Other	84	10.8
Unknown	20	-
Total	**135**	**7.8**

Source: EpiSurv, Stats NZ

Routine interviews with cases of cryptosporidiosis acquired in the Auckland region ceased in 2017, therefore information on associated risk factors is not available for this disease.

3.4.5 Gastroenteritis – unknown cause

Gastroenteritis refers to vomiting and/or diarrhoea due to inflammation of the gastrointestinal tract. Acute gastroenteritis, which involves sudden onset of symptoms, is often caused by ingestion of toxins, viruses, bacteria, parasites or chemicals. Transmission is usually via ingestion of contaminated food or water or through direct contact with infected stool.

Single cases of acute gastroenteritis are notifiable if there is a suspected common source, the case is in a high-risk category (e.g. food handlers, early childhood service workers or other people at increased risk of spreading the infection) or where there the cause is of public health importance. 'Gastroenteritis – unknown cause' is used when no specific cause has been found.

- There was one reported case of 'gastroenteritis - unknown cause' in the Auckland region in 2022.
- There were no hospitalisations or deaths.
- The incidence rate for the Auckland region was 0.1 cases per 100,000. For the rest of NZ it was 3.5 cases per 100,000.

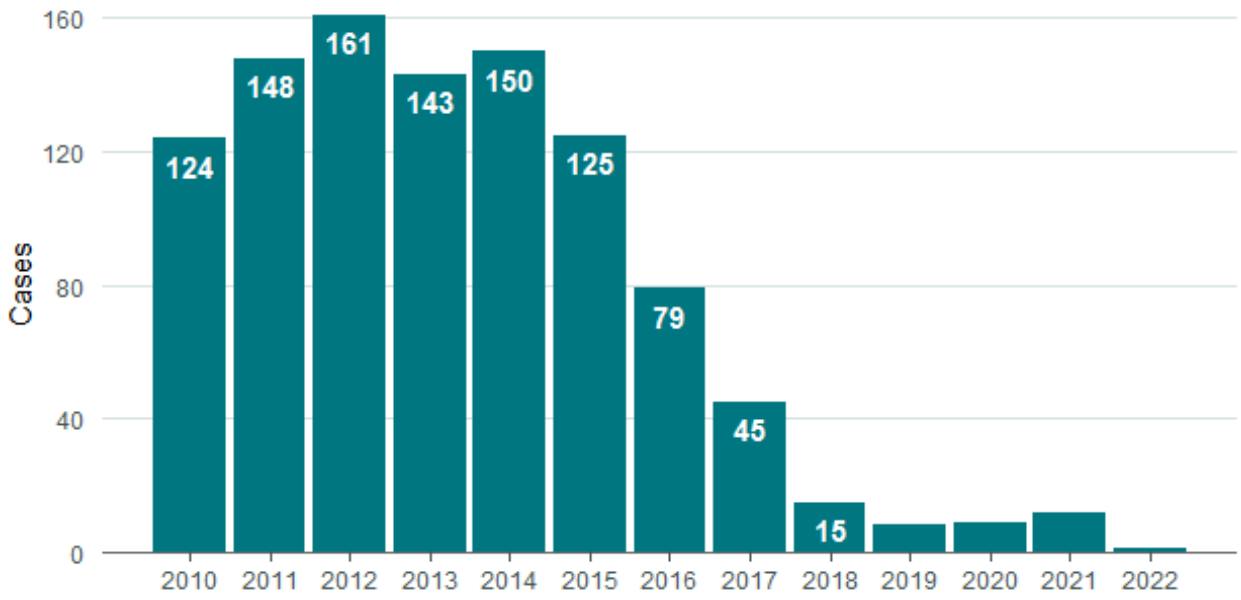


Figure 20: Gastroenteritis - unknown cause cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 20 shows the number of 'gastroenteritis – unknown cause' cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were slightly lower than for 2021 and 2020, with 11 cases reported in 2021 and 10 in 2020 compared to only one case for 2022. Cases have fallen significantly over the past 10 years.

3.4.6 Gastroenteritis/foodborne intoxication

Gastroenteritis/foodborne intoxication refers to cases of acute gastroenteritis where the cause is known but not otherwise classified, including cases of chemical and toxic food poisoning.[23] Transmission is usually through ingestion of contaminated food or water, although some infections may be spread through direct contact with infected stool.

Toxic food poisoning includes gastrointestinal illnesses due to *Bacillus cereus*, ciguatera fish poisoning, *Clostridium botulinum* (botulism), *Clostridium perfringens*, enteropathogenic *E. coli* (EPEC), enterotoxigenic *E. coli* (ETEC), histamine (scombroid) poisoning, *Staphylococcus aureus* and *Vibrio parahaemolyticus*.

Symptoms include sudden onset vomiting and/or diarrhoea, as well as neurological, dermatological, musculoskeletal and/or cardiovascular symptoms depending on the cause. Histamine (scombroid) poisoning and ciguatera poisoning may both result from consumption of

[23] ESR. (2017). *Enteric Disease*. Wellington: ESR.

certain fish species, although histamine poisoning has a much more rapid onset (10-60 minutes) compared to ciguatera poisoning (1-48 hours).[24,25]

- There were 15 gastroenteritis/foodborne intoxication cases in the Auckland region in 2022.
- There were nine hospitalisations and no deaths.
- The incidence rate for the Auckland region was 0.9 cases per 100,000. For the rest of NZ it was 3.2 cases per 100,000.

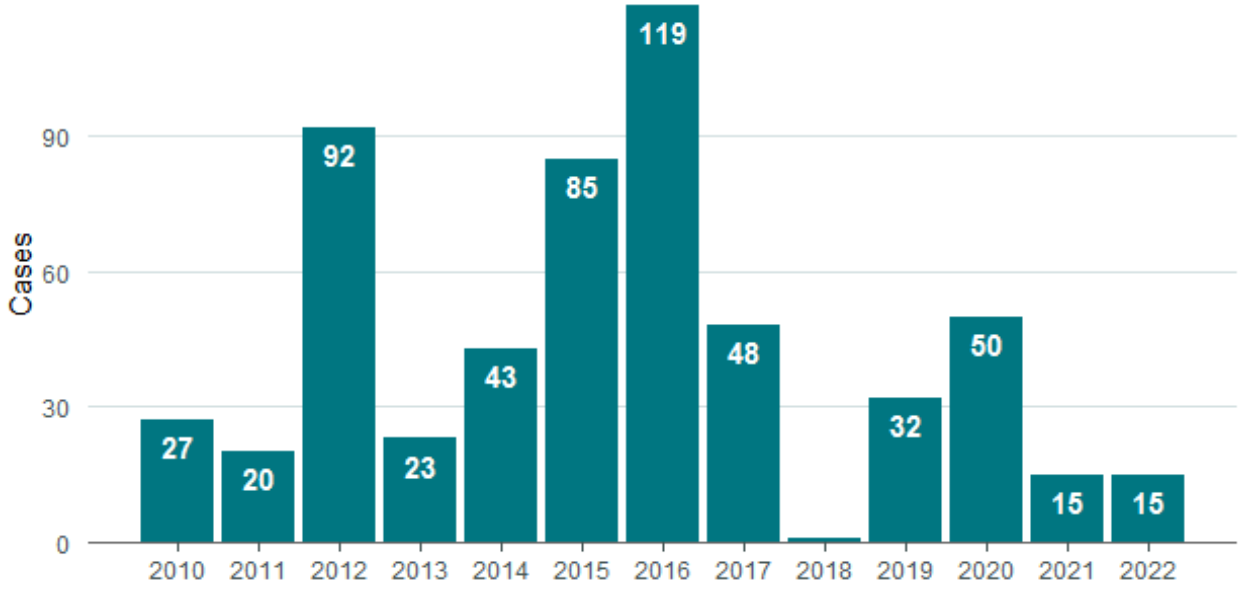


Figure 21: Gastroenteritis/foodborne intoxication cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 21 shows the number of gastroenteritis/foodborne intoxication cases in the Auckland region between 2010 and 2022. Case numbers for 2022 and 2021 were well fewer than 2020 levels and slightly fewer than pre-COVID levels, with up to 120 cases reported in previous years.

In 2022, there was no particular seasonal pattern, with cases recorded throughout the year (Figure 22).

[24] Oakley, A. (2004). *Scombroid fish poisoning.* Retrieved 12 May 2023, from https://dermnetnz.org/topics/scombroid-fish-poisoning.

[25] Regional Public Health. (2023). *Ciguatera Fish Poisoning.* Retrieved 12 May, 2023, from https://www.rph.org.nz/public-health-topics/illness-and-disease/ciguatera-fish-poisoning/ciguatera-fish-poisoning-factsheet.pdf.

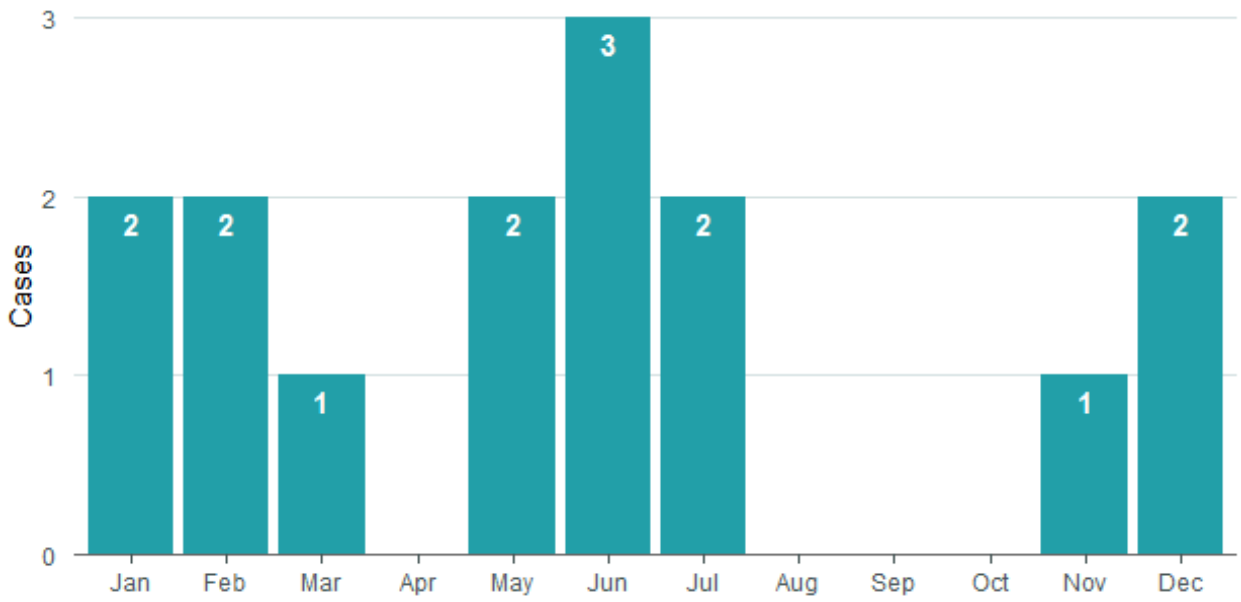


Figure 22: Gastroenteritis/foodborne intoxication cases in the Auckland region 2022 by month

Source: EpiSurv

Table 24: Age-specific incidence rates for gastroenteritis/foodborne intoxication in the Auckland region 2022

Age group	Cases	Rate per 100,000
Age under 1	0	-
1 to 4	0	-
5 to 9	0	-
10 to 14	0	-
15 to 19	0	-
20 to 29	3	1.2
30 to 39	3	1.1
40 to 49	2	0.9
50 to 59	4	1.9
60 to 69	1	0.6
Age 70+	2	1.3
Total	**15**	**0.9**

Source: EpiSurv, Stats NZ

Tables 24 and 25 show the age and ethnic group distribution of gastroenteritis/foodborne intoxication cases for 2022. Cases were highest among the '20 to 29' and '70 and over' age groups, with 1.2 and 1.3 cases per 100,000 population, respectively. Ethnic group-specific incidence rates for gastroenteritis/foodborne intoxication were highest among Pacific Peoples followed by Māori, with 3.3 and 1.9 cases per 100,000 population, respectively.

Table 25: Ethnic group-specific incidence rates for gastroenteritis/foodborne intoxication in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	4	1.9
Pacific Peoples	8	3.3
Asian	0	-
European and Other	2	0.3
Unknown	1	-
Total	**15**	**0.9**

Source: EpiSurv, Stats NZ

Table 26: Ethnic group-specific incidence rates for gastroenteritis/foodborne intoxication in the Auckland region 2022

Type	Cases
Vibrio parahaemolyticus	14
Vibrio fluvialis	1
Histamine (scombroid) poisoning	1
Total	**15**

Source: EpiSurv

Table 26 shows the gastroenteritis/foodborne intoxication cases by type. There were 14 cases of *Vibrio parahaemolyticus*, one case of *Vibrio fluvialis* and one case of histamine (scombroid) poisoning. Although not listed as a notifiable disease, *Vibrio* is managed as a notifiable enteric pathogen as documented in the CDC Manual.

The most common risk factor was consumption of raw or cooked seafood (14 cases) followed by consumption of food from food premises (café, restaurant or takeaway, 4 cases, Table 27). Only one case reported overseas travel during their exposure period.

Table 27: Risk factors associated with gastroenteritis/foodborne intoxication in the Auckland region 2022

Risk factor	Cases	Percent
Consumption of raw or cooked seafood	14	93.3%
Consumption of food from a food premises	4	26.7%
Consumption of non-habitual water supply	1	6.7%
Contact with sewage, vomit or faeces	1	6.7%
Contact with recreational water (swimming pools, spa pools and waterways)	1	6.7%
Overseas travel	1	6.7%
No risk factors recorded	2	13.3%

Source: EpiSurv

3.4.7 Giardiasis

Giardiasis is a gastrointestinal infection caused by the parasite *Giardia*. Transmission is via ingestion of contaminated water or food or contact with the faeces of an infected person or animal.[26]

Symptoms include diarrhoea, abdominal cramps, bloating, flatulence, nausea, weight loss and malabsorption. Asymptomatic carriage is common.

Children aged one to four have the highest incidence rate for giardiasis in NZ. Giardia may be prevented through hand hygiene and appropriate treatment of drinking water.

- There were 210 giardiasis cases in the Auckland region in 2022.
- Hospitalisations and deaths from giardiasis are not recorded by ARPHS, so this data is not included.
- The incidence rate for the Auckland region was 12.2 cases per 100,000. For the rest of NZ it was 10 cases per 100,000.

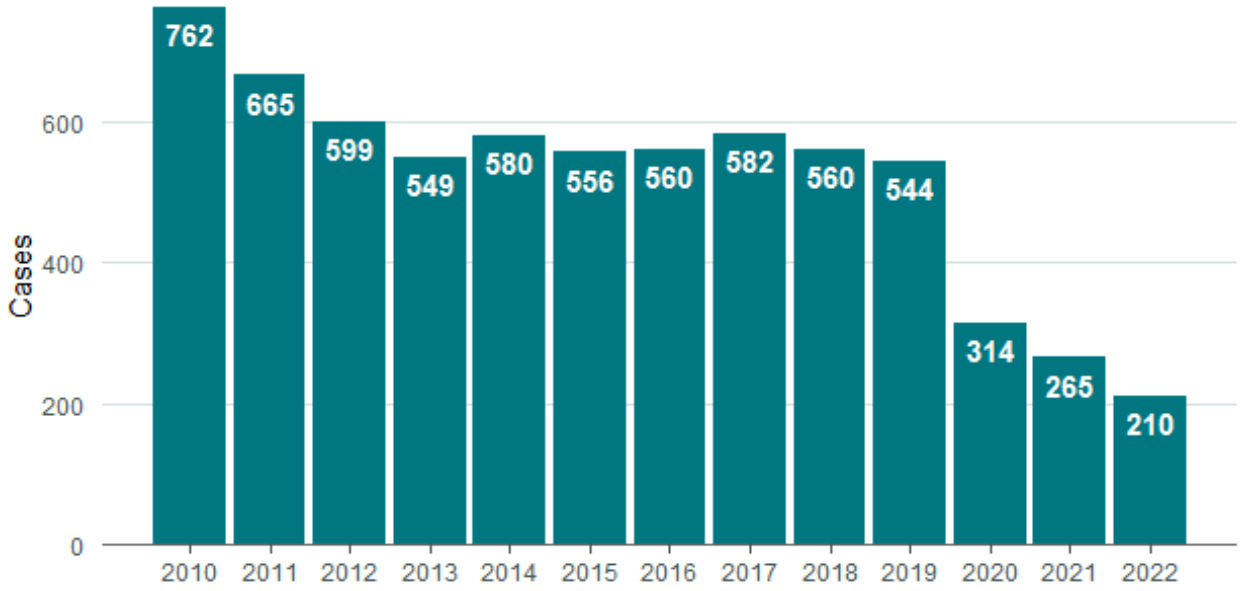


Figure 23: Giardiasis cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 23 shows the number of giardiasis cases in the Auckland region between 2010 and 2022. Case numbers were slightly lower in 2022 compared to 2021 and 2020, and significantly lower than pre-COVID levels, with over 500 cases per year reported between 2010 and 2019. This may be related to improved hand hygiene practices as a result of messaging around COVID-19 prevention.

[26] Ministry of Health. (2023). *Cryptosporidium and Giardia - HE1212.* Retrieved 11 May, 2023, from https://healthed.govt.nz/products/cryptosporidium-and-giardia.

In 2022, cases were more common later in the year, with a peak of 29 cases in November and 30 cases in December (Figure 24).

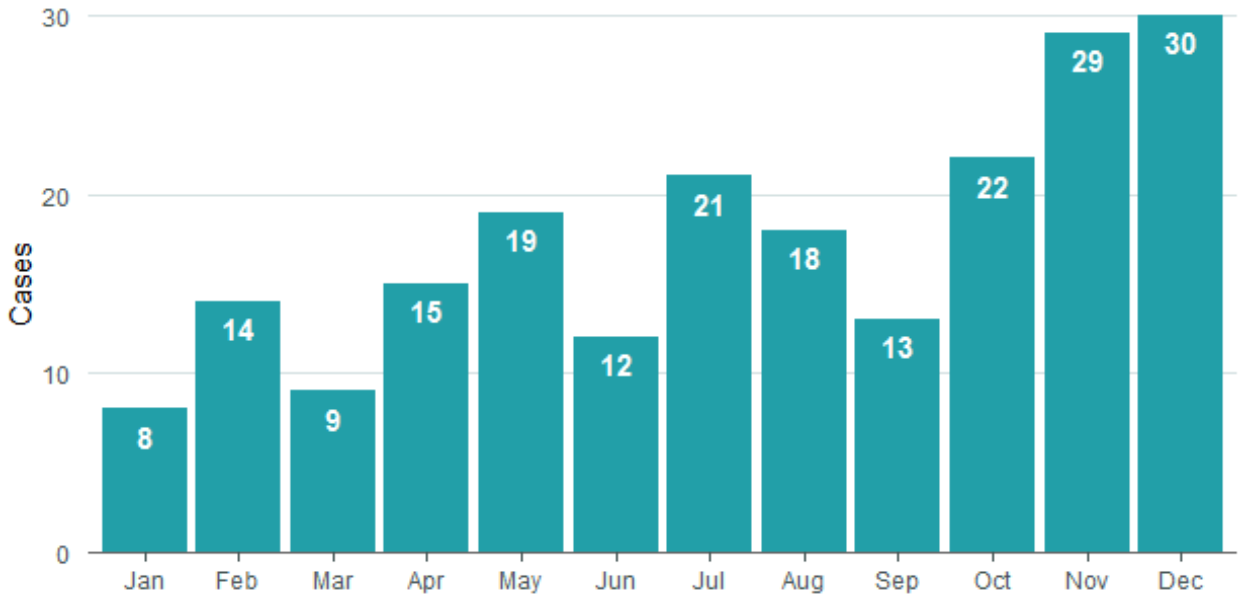


Figure 24: Giardiasis cases in the Auckland region 2022 by month

Source: EpiSurv

Table 28: Age-specific incidence rates for giardiasis in the Auckland region 2022

Age group	Cases	Rate per 100,000
Age under 1	2	9.4
1 to 4	30	35.4
5 to 9	14	12.4
10 to 14	2	1.7
15 to 19	3	2.8
20 to 29	24	9.7
30 to 39	53	19.3
40 to 49	20	8.9
50 to 59	23	10.7
60 to 69	25	15.3
Age 70+	14	9.0
Total	**210**	**12.2**

Source: EpiSurv, Stats NZ

Tables 28 and 29 show the age and ethnic group distribution of giardiasis cases for 2022. Cases were highest among the '1 to 4' and '30 to 39' age groups, with 35.4 and 19.3 cases per 100,000 population, respectively. Ethnic group-specific incidence rates were

highest among European and Other, with 16 cases per 100,000 population, followed by Māori with 8.2 cases per 100,000.

Table 29: Ethnic group-specific incidence rates for giardiasis in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	17	8.2
Pacific Peoples	6	2.5
Asian	29	6
European and Other	125	16
Unknown	33	-
Total	**210**	**12.2**

Source: EpiSurv, Stats NZ

Routine interviews with cases of giardiasis acquired in the Auckland region ceased in 2017, therefore information on associated risk factors is not available for this disease.

3.4.8 Hepatitis A

Hepatitis A is an infectious liver disease caused by the hepatitis A virus. Transmission occurs largely via the faecal-oral route, although foodborne and blood-borne transmission may occur.

Infection often involves a prodromal illness followed by jaundice and abdominal discomfort. Children are often asymptomatic or present with atypical symptoms. While most people recover completely, complications such as liver failure and death may occur.

The incidence of hepatitis A in NZ has decreased sharply since the 1960s, and currently about half the cases notified have a history of overseas travel. A vaccine is available for those travelling in high-risk areas.

- There were 21 hepatitis A cases in the Auckland region in 2022.
- There were 17 hospitalisations and no deaths.
- The incidence rate for the Auckland region was 1.2 cases per 100,000. For the rest of NZ it was 0.9 cases per 100,000.

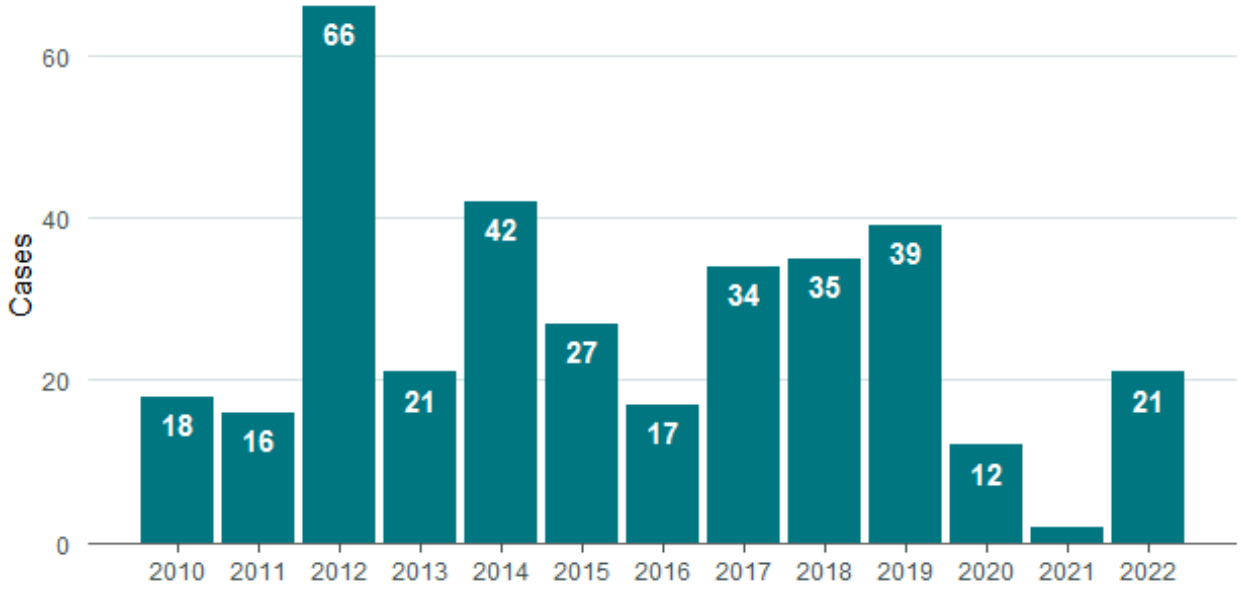


Figure 25: Hepatitis A cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 25 shows the number of hepatitis A cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were well above previous years, with 21 cases in 2022 compared to only two cases in 2021 and 12 in 2020. Pre-COVID levels were higher, with over 30 cases per year reported between 2017 and 2019.

In 2022, cases were more common in the latter half of the year, with 18 cases recorded between August and December (Figure 26).

Four Auckland region cases were linked to an outbreak involving imported frozen berries, with 35 cases reported nationally between 28 June 2022 and 31 December 2022.

All cases were genomically linked and seven cases did not recall consuming berries. An investigation by NZ Food Safety concluded the source of the outbreak was likely to be frozen berries imported from Serbia. The outbreak continued into 2023, with four further cases identified before the outbreak was declared over in July 2023.

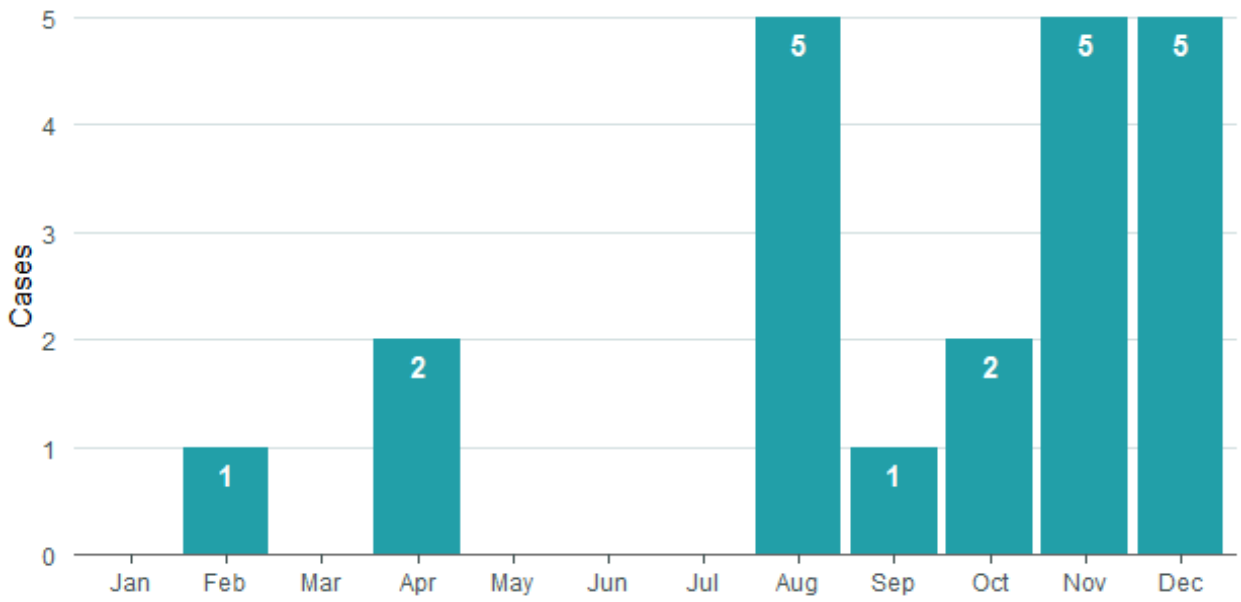


Figure 26: Hepatitis A cases in the Auckland region 2022 by month

Source: EpiSurv

Table 30: Age-specific incidence rates for hepatitis A in the Auckland region 2022

Age group	Cases	Rate per 100,000
Age under 1	0	-
1 to 4	0	-
5 to 9	1	0.9
10 to 14	1	0.9
15 to 19	1	0.9
20 to 29	10	4.1
30 to 39	8	2.9
40 to 49	0	-
50 to 59	0	-
60 to 69	0	-
Age 70+	0	-
Total	**21**	**1.2**

Source: EpiSurv, Stats NZ

Tables 30 and 31 show the age and ethnic group distribution of hepatitis A cases for 2022. Cases were highest among the '20 to 29' and '30 to 39' age groups, with 4.1 and 2.9 cases per 100,000 population, respectively. Ethnic group-specific incidence rates were highest among Asian peoples and European and Other, with 2.7 and 0.9 cases per 100,000 population, respectively. Among the 13 Asian cases, 10 identified as being of Indian ethnicity (Table 32).

Table 31: Ethnic group-specific incidence rates for hepatitis A in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	0	-
Pacific Peoples	0	-
Asian	13	2.7
European and Other	7	0.9
Unknown	1	-
Total	**21**	**1.2**

Source: EpiSurv, Stats NZ

Table 32: Detailed ethnicity count of hepatitis A cases in the Auckland region 2022

Detailed ethnicity (total response)	Cases
Indian	10
NZ European	5
Other European NFD	2
African NFD	1
Asian NFD	1
Filipino	1
Other Asian NFD	1
South African NFD	1
Southeast Asian NFD	1

Source: EpiSurv

Table 33: Recent travel history of hepatitis A cases in the Auckland region 2022

Travel history	Cases
India	10
South Africa	2
Bulgaria	1
Canada	1
France	1
Germany	1
Pakistan	1
Rwanda	1
Singapore	1
Turkey	1
United Arab Emirates	1
No overseas travel reported	6

Source: EpiSurv

Table 33 shows the countries visited by hepatitis A cases during their exposure period. The most commonly visited country was India (10 cases) followed by South Africa (two cases). Six of the 21 cases did not record any overseas travel during their exposure period.

The most common risk factor for developing hepatitis A was overseas travel (15 cases) followed by consumption of contaminated food and drink (two cases, Table 34). Only three cases (14.2%) had been immunised with an appropriate vaccine before the onset of their disease.

Table 34: Risk factors associated with hepatitis A in the Auckland region 2022

Risk factor	Cases	Percent
Overseas travel	15	71.4%
Consumption of contaminated food or drink	2	9.5%
Household contact with a confirmed case	1	4.8%
Sexual contact with a confirmed case	1	4.8%

Source: EpiSurv

3.4.9 Hepatitis not otherwise specified

Hepatitis not otherwise specified (NOS) refers to infections caused by hepatitis D (also known as Delta hepatitis), hepatitis E and hepatitis G.

Hepatitis D may occur as an acute co-infection with hepatitis B or as a super-infection in people with chronic hepatitis B infection. Hepatitis E is an enteric infection with a similar course to hepatitis A. Hepatitis G is usually associated with chronic hepatitis B or hepatitis C infection or human immunodeficiency virus (HIV).

Infection usually involves an acute illness with variable symptoms including fever, malaise, anorexia and nausea with jaundice. Hepatitis G has no recognised disease sequelae.

- There were two hepatitis NOS cases in the Auckland region in 2022. Both cases tested positive for the hepatitis E virus.
- There were two hospitalisations and no deaths.
- The incidence rate for the Auckland region was 0.1 cases per 100,000. For the rest of NZ it was 0 cases per 100,000.

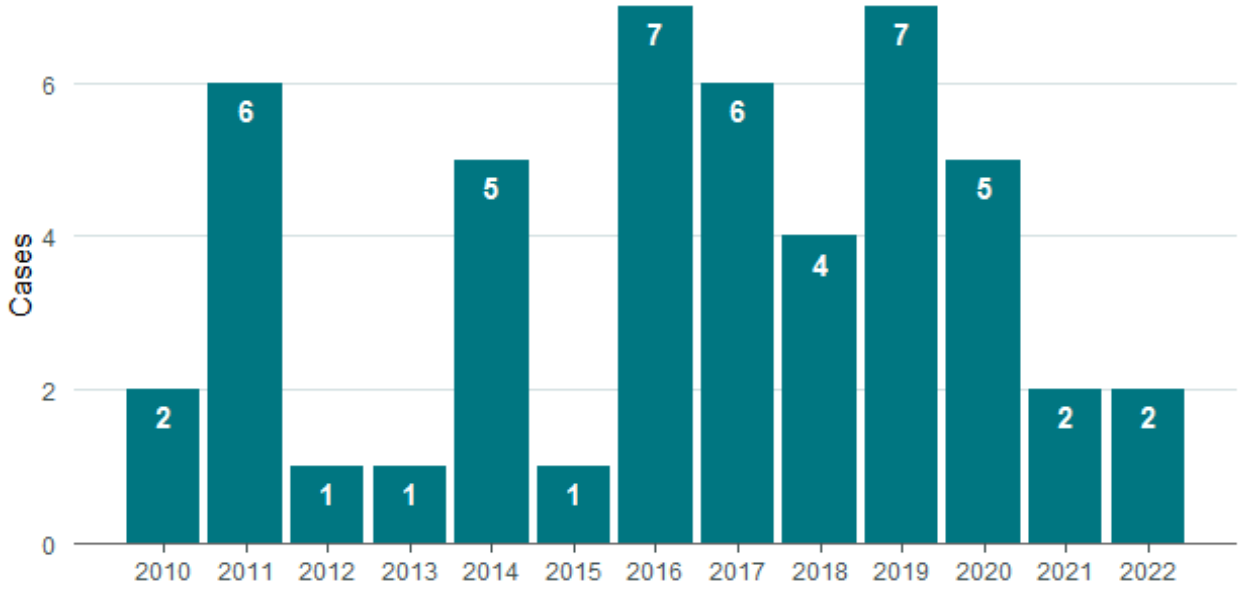


Figure 27: Hepatitis NOS cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 27 shows the number of hepatitis NOS cases in the Auckland region between 2010 and 2022. Case numbers were slightly lower in 2022 and 2021 than for pre-COVID years, with two cases in 2022 and 2021 compared to seven cases in 2019 and five cases in 2020.

Both cases in 2022 occurred in the second half of the year when the borders had reopened, with one case reporting recent travel to India and the other reporting no recent overseas travel.

3.4.10 Listeriosis

Listeriosis is an infection caused by the bacterium *Listeria monocytogenes*. Unlike most pathogens, Listeria can multiply in refrigerated foods. Transmission generally occurs via ingestion of contaminated foods such as milk, cheese, vegetables, meat products or shellfish.

Symptoms include diarrhoea, fever, myalgia and vomiting. The elderly and immunosuppressed may present with septicaemia, meningitis or abscesses, while infections during pregnancy may lead to stillbirth, premature delivery and newborn septicaemia or meningitis.

While most cases of listeriosis are sporadic, outbreaks have occurred in NZ.

- There were nine listeriosis cases in the Auckland region in 2022.
- There were nine hospitalisations and two deaths.
- The incidence rate for the Auckland region was 0.5 cases per 100,000. For the rest of NZ it was 0.4 cases per 100,000.

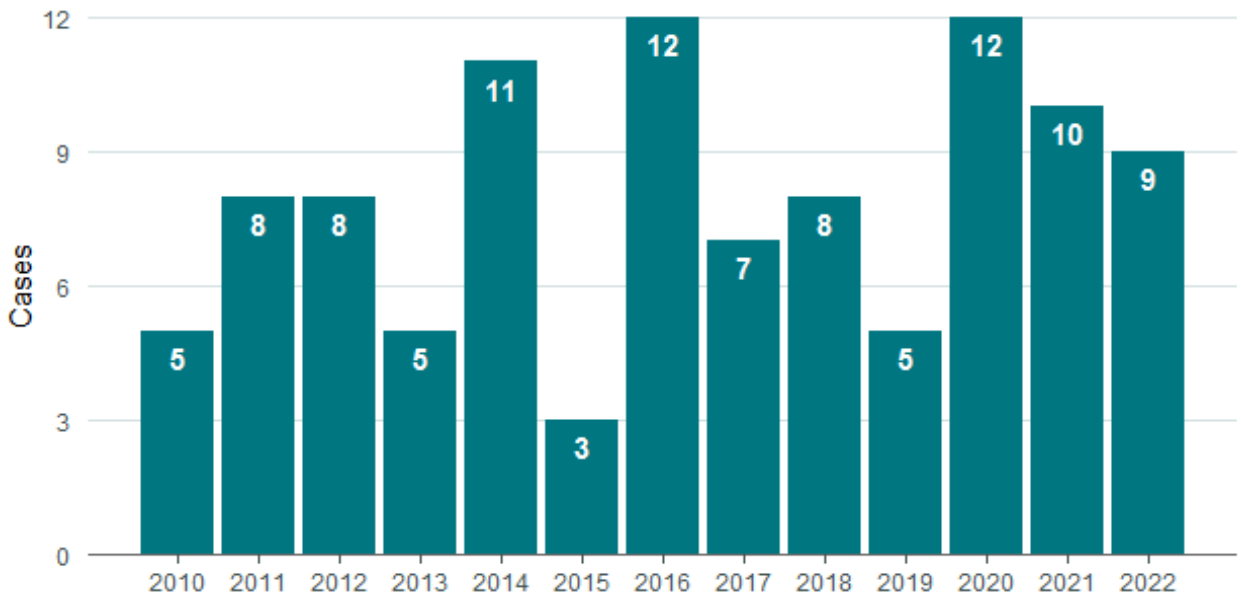


Figure 28: Listeriosis cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 28 shows the number of listeriosis cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were similar to previous years, with nine cases for 2022 compared to 10 cases for 2021 and 12 cases for 2020. Listeria numbers in 2022 do not appear to have been impacted by COVID-19 related public health measures, with similar levels compared to pre-pandemic years.

Table 35: Listeriosis cases in the Auckland region by age group and sex 2022

Age group	Female	Male	Cases	Rate per 100,000
Age under 1	1	0	1	4.7
1 to 4	0	0	0	-
5 to 9	0	0	0	-
10 to 14	0	0	0	-
15 to 19	0	0	0	-
20 to 29	0	0	0	-
30 to 39	0	0	0	-
40 to 49	1	0	1	0.4
50 to 59	0	0	0	-
60 to 69	1	1	2	1.2
Age 70+	5	0	5	3.2
Total	**8**	**1**	**9**	**0.5**

Source: EpiSurv, Stats NZ

Tables 35 and 36 show the age, sex and ethnic group distribution of listeria cases for 2022. Cases were highest among the ‘under 1’ and ‘70+’ age groups, with 4.7 and 3.2 cases per 100,000 population, respectively. The ratio of female to male cases was 8:1, with the majority of cases for 2022 occurring in females over the age of 70. Ethnic group-specific incidence rates for listeriosis were highest among Asian people, with 0.8 and 0.5 cases per 100,000 population.

Table 36: Ethnic group-specific incidence rates for listeriosis in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	1	0.5
Pacific Peoples	0	-
Asian	4	0.8
European and Other	4	0.5
Total	**9**	**0.5**

Source: EpiSurv, Stats NZ

3.4.11 Listeriosis (perinatal)

- There were two cases of perinatal listeriosis in the Auckland region in 2022 (Figure 29).
- There were two hospitalisations and no deaths.

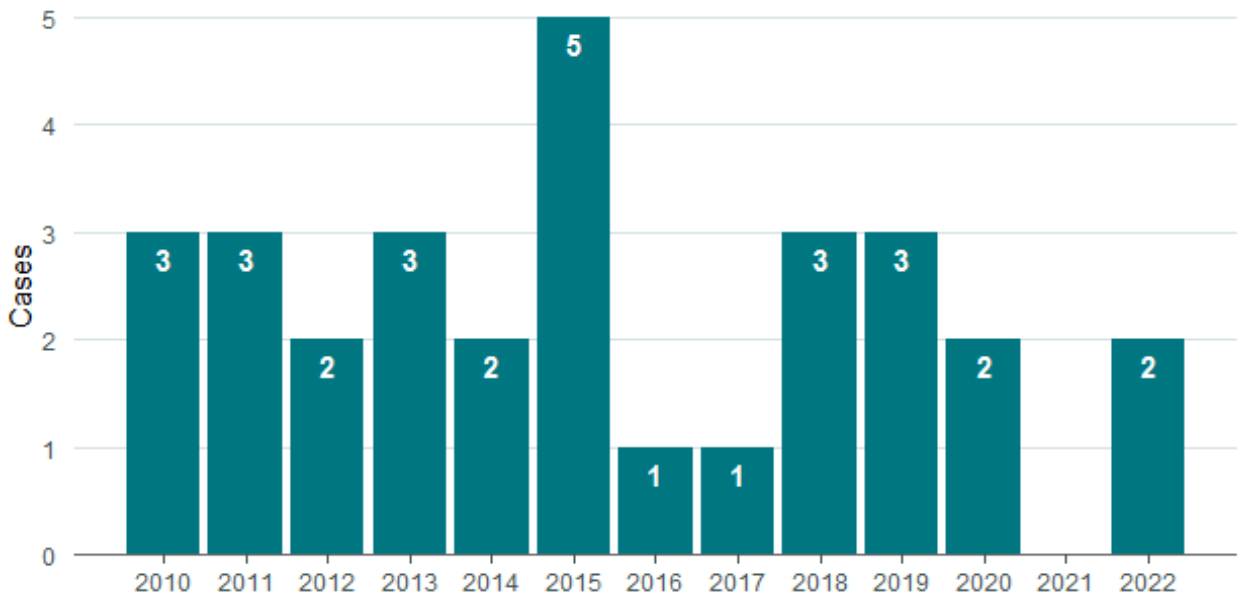


Figure 29: Perinatal listeriosis cases in the Auckland region 2010 to 2022

Source: EpiSurv

3.4.12 Paratyphoid fever

Paratyphoid fever is an enteric illness caused by the bacterium *Salmonella enterica*, serotypes Paratyphi A, Paratyphi B, or Paratyphi C. Transmission occurs through ingestion of food and water contaminated by faeces and urine of infected persons.

Symptoms of paratyphoid fever are similar to typhoid fever, although the illness tends to be shorter and less severe. It often manifests as acute gastroenteritis. *Salmonella* Paratyphi B var Java does not cause enteric fever and produces a less serious disease than other Paratyphi variants, therefore infections caused by this biovar are notified and managed as salmonellosis cases.

Most cases of paratyphoid fever notified in NZ are associated with overseas travel, although local cases have arisen due to consumption of sewage-contaminated shellfish.

- There were eight paratyphoid fever cases in the Auckland region in 2022.
- There were seven hospitalisations and no deaths.
- The incidence rate for the Auckland region was 0.5 cases per 100,000. For the rest of NZ it was 0.1 cases per 100,000

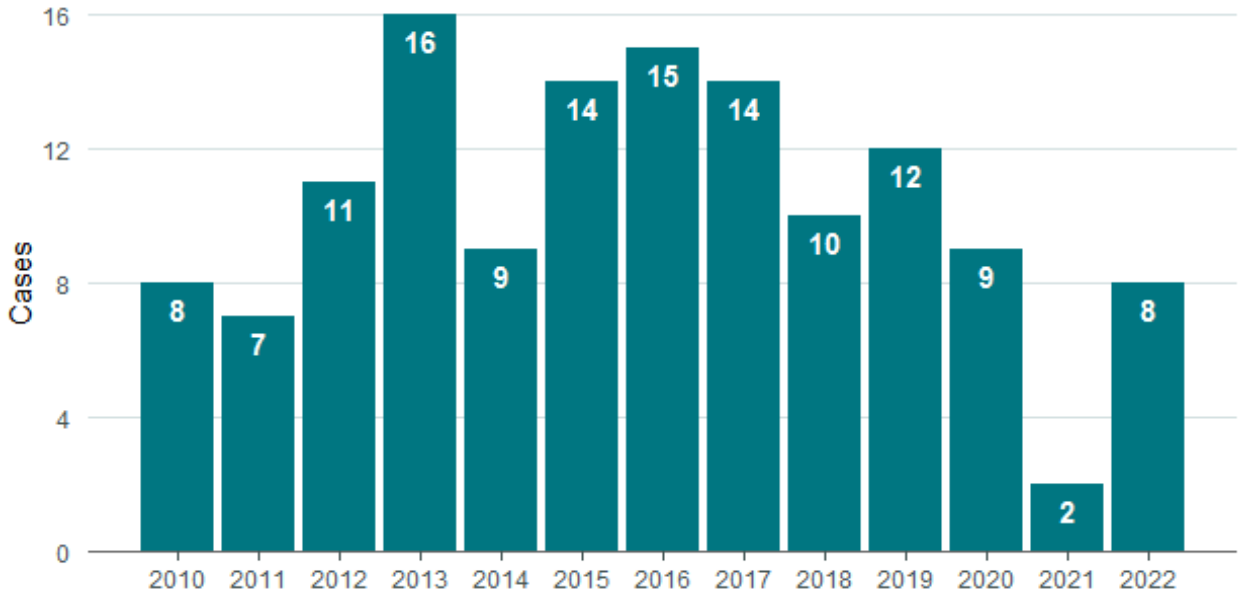


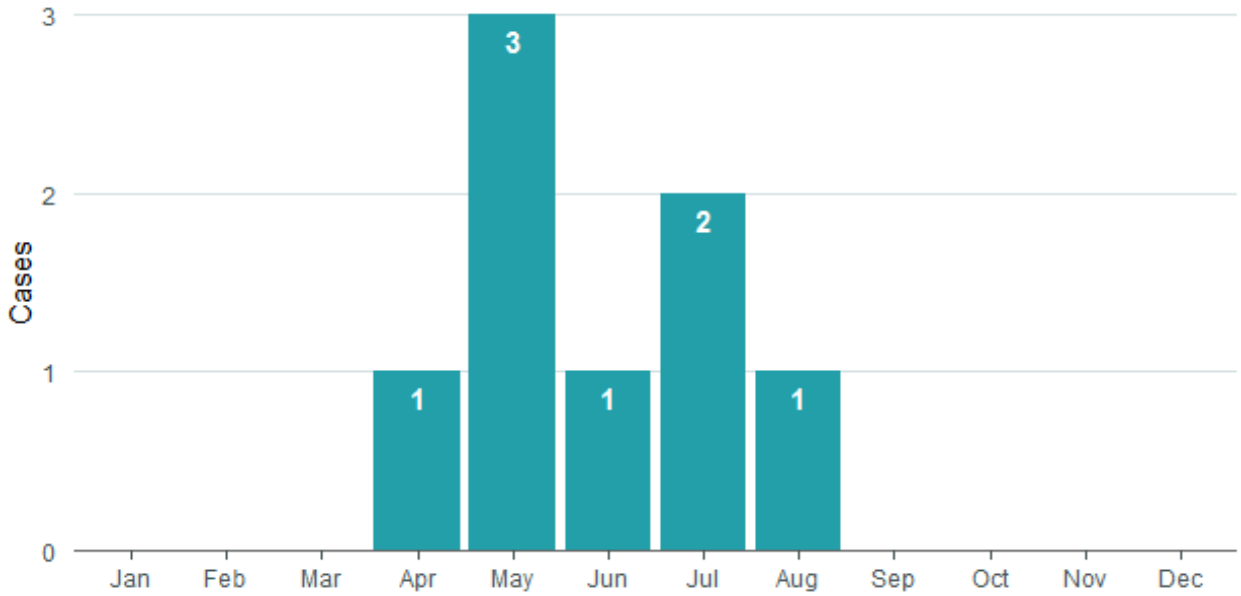
Figure 30: Paratyphoid fever cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 30 shows the number of paratyphoid cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were above 2021 levels and similar to 2020, with eight, two and nine cases, respectively. Cases were slightly fewer than pre-pandemic levels, with over 10 cases per year reported between 2015 and 2019.

In 2022, cases were more common over the autumn and winter months, with a peak of three cases in May (Figure 31).

Figure 31: Paratyphoid fever cases in the Auckland region 2022 by month



Source: EpiSurv

Table 37: Age-specific incidence rates for paratyphoid fever in the Auckland region 2022

Age group	Cases	Rate per 100,000
Age under 1	0	-
1 to 4	1	1.2
5 to 9	0	-
10 to 14	0	-
15 to 19	0	-
20 to 29	1	0.4
30 to 39	4	1.5
40 to 49	1	0.4
50 to 59	1	0.5
60 to 69	0	-
Age 70+	0	-
Total	**8**	**0.5**

Source: EpiSurv, Stats NZ

Tables 37 and 38 show the age and ethnic group distribution of paratyphoid fever cases for 2022. Cases were highest among the '1 to 4' and '30 to 39' age groups, with 1.2 and 1.5 cases per 100,000 population, respectively. All cases were among Asian people, with an ethnic group-specific incidence rate of 1.6 cases per 100,000 population.

Table 38: Ethnic group-specific incidence rates for paratyphoid fever in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	0	-
Pacific Peoples	0	-
Asian	8	1.6
European and Other	0	-
Total	**8**	**0.5**

Source: EpiSurv, Stats NZ

All cases were thought to have acquired their infection overseas, with India the most common source country with seven cases followed by Pakistan with one case (Table 39). All cases were due to *Salmonella enterica* serotype Paratyphi A.

Table 39: Paratyphoid fever cases in the Auckland region 2022 by last country visited

Last country visited	Cases
India	7
Pakistan	1
Total	**8**

Source: EpiSurv

3.4.13 Salmonellosis

Salmonellosis is an enteric illness caused by *Salmonella* bacteria. Transmission typically occurs through ingestion of contaminated food and water, for example undercooked meat, imported foodstuffs and cross-contaminated raw fruits and vegetables. Transmission may also occur through direct contact with an infected animal or through person-to-person spread.

Salmonellosis may present as acute gastroenteritis, with abdominal pain, diarrhoea (occasionally bloody), fever, nausea and vomiting.

Infections due to *Salmonella* Typhi and Paratyphi are notified and managed separately to non-typhoidal salmonellosis.

- There were 205 salmonellosis cases in the Auckland region in 2022.
- There were 85 hospitalisations and no deaths.
- The incidence rate for the Auckland region was 11.9 cases per 100,000. For the rest of NZ it was 12.6 cases per 100,000

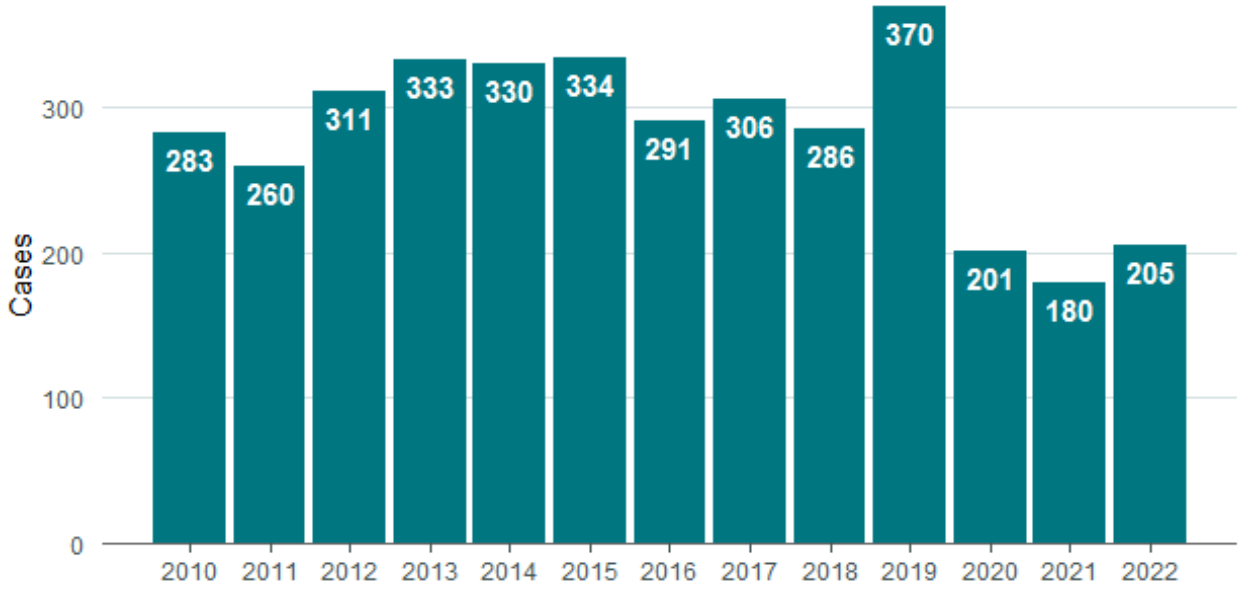


Figure 32: Salmonellosis cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 32 shows the number of salmonellosis cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were similar to 2021 and 2020, and well below that of pre-COVID years, with around 200 cases each year for 2020-2022 compared to 300 per year before the pandemic.

In 2022, cases were slightly more common during the warmer months compared to winter, with a peak of 23 cases in September and 22 cases in April 2022 (Figure 33).

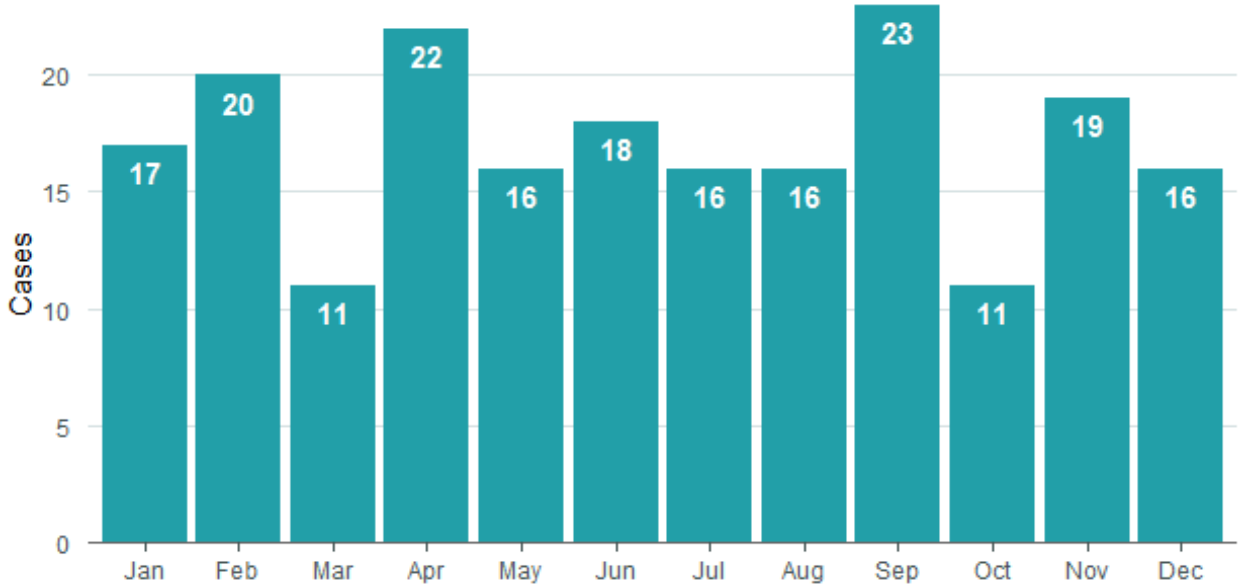


Figure 33: Salmonellosis cases in the Auckland region 2022 by month

Source: EpiSurv

Table 40: Age-specific incidence rates for salmonellosis in the Auckland region 2022

Age group	Cases	Rate per 100,000
Age under 1	6	28.3
1 to 4	27	31.8
5 to 9	23	20.4
10 to 14	4	3.5
15 to 19	7	6.5
20 to 29	25	10.2
30 to 39	21	7.7
40 to 49	21	9.4
50 to 59	25	11.6
60 to 69	26	15.9
Age 70+	20	12.8
Total	**205**	**11.9**

Source: EpiSurv, Stats NZ

Tables 40 and 41 show the age and ethnic group distribution of salmonellosis cases for 2022. Cases were highest among the ‘under 1’ and ‘1 to 4’ age groups, with 28.3 and 31.8 cases per 100,000 population, respectively. Ethnic group-specific incidence rates were highest among European and Other followed by Māori, with 13.8 and 11.1 cases per 100,000 population, respectively.

Table 41: Ethnic group-specific incidence rates for salmonellosis in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	23	11.1
Pacific Peoples	20	8.2
Asian	53	10.9
European and Other	108	13.8
Unknown	1	-
Total	**205**	**11.9**

Source: EpiSurv, Stats NZ

Table 42 shows risk factors associated with developing salmonellosis in 2022. The most common risk factor was overseas travel (22.4% of cases), followed by consumption of food from food premises (18.0%) and attendance at school or preschool (12.7%). Of note, more than one risk factor may be identified per case, therefore totals will add up to more than 100%.

Table 42: Risk factors associated with salmonellosis in the Auckland region 2022

Risk factor	Cases	Percent
Overseas travel	46	22.4%
Consumption of food from food premises	37	18.0%
Attendance at school or preschool	26	12.7%
Contact with a person with similar symptoms	14	6.8%
Contact with farm animals	13	6.3%
Contact with recreational water (swimming pools, spa pools and waterways)	13	6.3%
Contact with sewage, vomit or faeces	12	5.9%
Consumption of untreated water	11	5.4%
Consumption of non-habitual water supply	11	5.4%
Contact with sick animals	4	2.0%
Consumption of raw milk or milk products	1	0.5%
No risk factors recorded	13	6.3%

Source: EpiSurv

Further detail on overseas travel is provided in Table 43. Of those who reported recent overseas travel, Fiji was the most common country last visited followed by Indonesia and Australia. There were 144 cases with no recent travel, 15 with unknown travel history and one with recent overseas travel but no country recorded.

Table 43: Salmonellosis cases in the Auckland region 2022 by last country visited

Last country visited	Cases	Percent
Fiji	17	8.3%
Indonesia	8	3.9%
Australia	5	2.4%
Cook Islands	3	1.5%
India	3	1.5%
Philippines	2	1.0%
Singapore	2	1.0%
Egypt	1	0.5%
French Polynesia	1	0.5%
Samoa	1	0.5%
Thailand	1	0.5%
Vietnam	1	0.5%
No recent overseas travel	144	70.2%
Unknown	16	7.8%

Last country visited	Cases	Percent
Total	**205**	**100.0%**

Source: EpiSurv

The most common *Salmonella* variant was *Salmonella enterica* serotype Typhimurium, followed by *Salmonella* Enteritidis (Table 44).

Table 44: Salmonellosis cases in the Auckland region 2022 by variant

Type	Cases	Type	Cases
Salmonella Aberdeen	2	*Salmonella* Litchfield	1
Salmonella Agona	4	*Salmonella* Minnesota	1
Salmonella Anatum	1	*Salmonella* Mississippi	2
Salmonella Apeyeme	1	*Salmonella* Muenchen	1
Salmonella Bareilly	4	*Salmonella* Paratyphi B var Java	3
Salmonella Bovismorbificans	13	*Salmonella* Pensacola	4
Salmonella Brandenburg	4	*Salmonella* Poona	1
Salmonella Corvallis	1	*Salmonella* Potsdam	1
Salmonella enterica subsp. houtenae	1	*Salmonella* Sandiego	1
Salmonella Enteritidis	24	*Salmonella* Stanley	7
Salmonella Give	2	*Salmonella* Thompson	6
Salmonella Hvittingfoss	2	Salmonella Typhimurium	52
Salmonella Infantis	2	*Salmonella* Typhimurium (presumptive)	32
Salmonella Javiana	2	*Salmonella* Virchow	3
Salmonella Sandiego	1	*Salmonella* Weltevreden	2
Salmonella Kintambo	1	Not recorded	23

Source: EpiSurv

3.4.14 Shigellosis

Shigellosis is an enteric infection caused by *Shigella* bacteria. Transmission occurs through consuming contaminated food or water, or through direct contact with the faeces of an infected person. It can also be transmitted through sexual contact, particularly between men who have sex with men. Shigellosis has a high secondary attack rate among contacts and is a common cause of enteric outbreaks.

Shigellosis generally causes an acute diarrhoeal illness with fever, abdominal cramps and blood or mucus in the stool.

Shigella comprises four species or serogroups: group A (*S. dysenteriae*), group B (*S. flexneri*), group C (*S. boydii*) and group D (*S. sonnei*). *S. dysenteriae* type 1 can spread in epidemics and is associated with serious disease and complications, while *S. flexneri* can cause reactive arthritis and *S. sonnei* is generally associated with mild illness.

- There were 34 shigellosis cases in the Auckland region in 2022.
- There were 13 hospitalisations and no deaths.
- The incidence rate for the Auckland region was 2.0 cases per 100,000. For the rest of NZ it was 1.0 case per 100,000

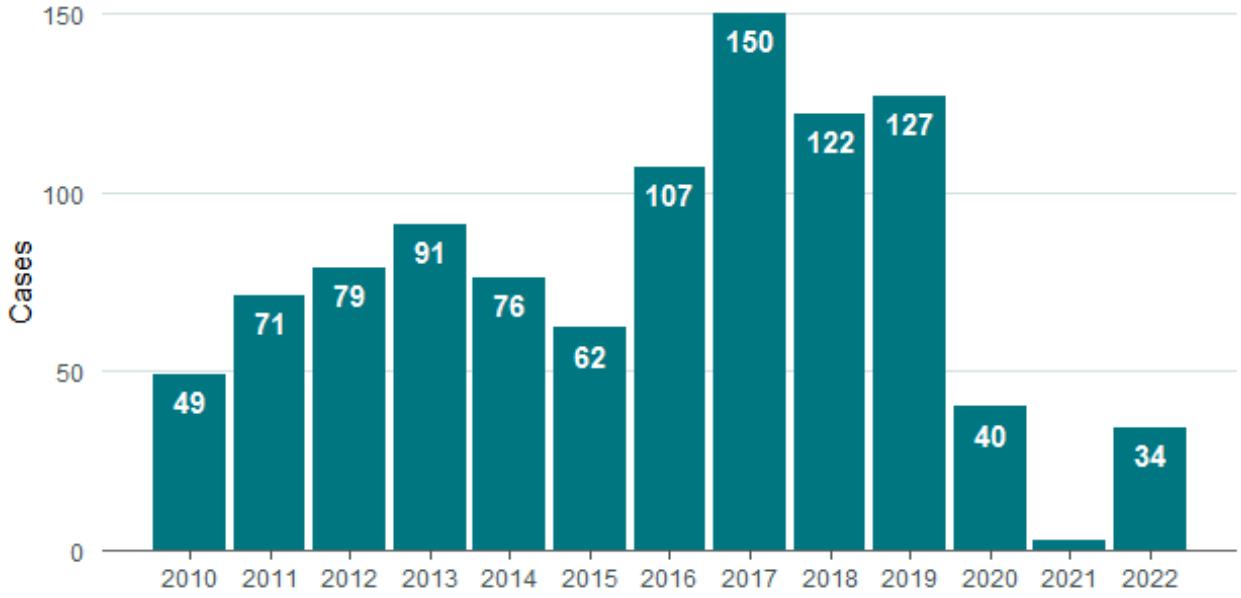


Figure 34: Shigellosis cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 34 shows the number of shigellosis cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were significantly higher than 2021 and similar to 2020, with only three cases reported for 2021 (compared to 34 for 2022 and 40 for 2020). Cases remained well below pre-COVID levels, with over 100 cases per year reported between 2016 and 2019.

In 2022, cases were more common in the second half of the year, with a peak of 7 cases in December 2022 (Figure 35).

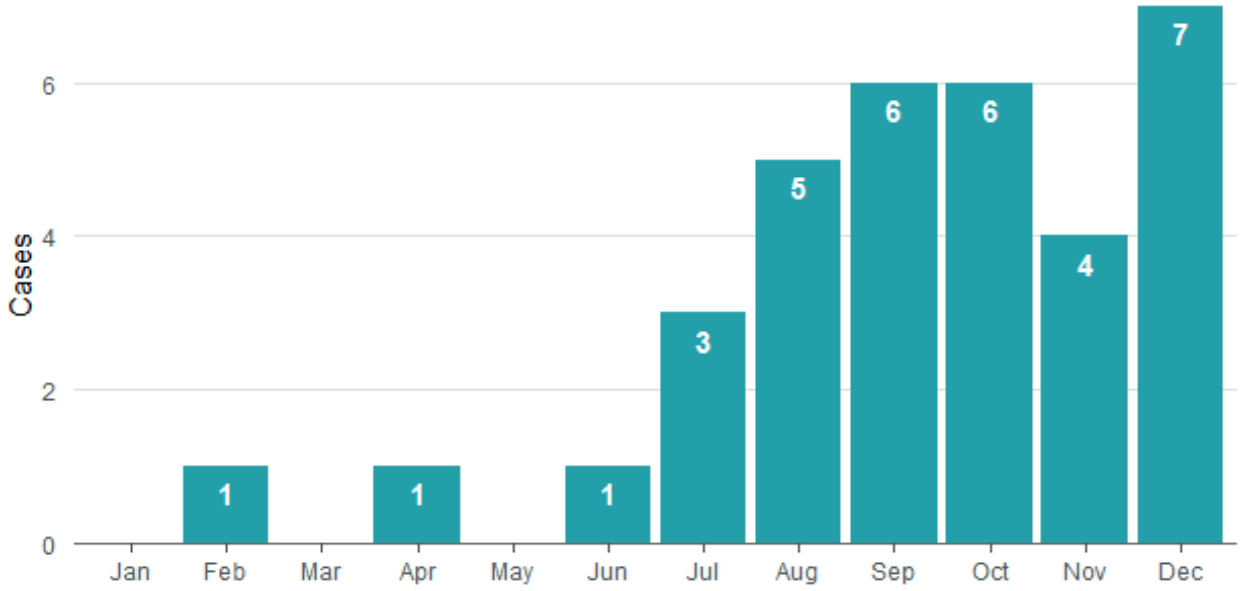


Figure 35: Shigellosis cases in the Auckland region 2022 by month

Source: EpiSurv

Table 45: Age-specific incidence rates for shigellosis in the Auckland region 2022

Age group	Cases	Rate per 100,000
Age under 1	0	-
1 to 4	6	7.1
5 to 9	1	0.9
10 to 14	0	-
15 to 19	0	-
20 to 29	5	2
30 to 39	5	1.8
40 to 49	5	2.2
50 to 59	5	2.3
60 to 69	5	3.1
Age 70+	2	1.3
Total	**34**	**2**

Source: EpiSurv, Stats NZ

Tables 45 and 46 show the age and ethnic group distribution of shigellosis cases for 2022. Cases were highest among the '1 to 4' and '‘60 to 69' age groups, with 7.1 and 3.1 cases per 100,000 population, respectively. Ethnic group-specific incidence rates were highest among European and Other followed by Māori, with 2.6 and 1.9 cases per 100,000 population, respectively.

Table 46: Ethnic group-specific incidence rates for shigellosis in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	4	1.9
Pacific Peoples	3	1.2
Asian	7	1.4
European and Other	20	2.6
Total	**34**	**2**

Source: EpiSurv, Stats NZ

Table 47 shows risk factors associated with developing shigellosis in 2022. The most common risk factors were overseas travel (17 cases) and contact with a person with similar symptoms (six cases). Table 48 provides further detail on the travel history of shigellosis cases during their exposure period. The most commonly visited country was Fiji followed by India and Australia, with six, four and two cases, respectively. There were 17 cases with no overseas travel reported.

Table 47: Risk factors associated with shigellosis in the Auckland region 2022

Risk factor	Cases	Percent
Overseas travel	17	50.0%
Contact with a person with similar symptoms	6	17.6%
Consumption of food from a food premises	5	14.7%
Attendance at school or preschool	3	8.8%
Consumption of non-habitual water supply	2	5.9%
Contact with recreational water (swimming pools, spa pools and waterways)	2	5.9%
Sexual contact (men who have sex with men)	2	5.9%
Consumption of untreated water	1	2.9%
Contact with sewage, vomit or faeces	1	2.9%
Contact with farm animals	1	2.9%
Contact with sick animals	1	2.9%

Source: EpiSurv

Table 48: Travel history of shigellosis cases in the Auckland region 2022

Travel history	Cases
Fiji	6
India	4
Australia	2
Canada	1
Colombia	1

Travel history	Cases
England	1
Indonesia	1
Malaysia	1
Peru	1
Russia	1
United Arab Emirates	1
No overseas travel reported	17

Source: EpiSurv

3.4.15 Toxic shellfish poisoning

Toxic shellfish poisoning refers to a group of illnesses caused by toxins produced by microscopic algae.[27] Transmission occurs via ingestion of bivalve shellfish, such as mussels and oysters, that contain high levels of these toxins.

There are four main types of poisoning in NZ: paralytic shellfish poisoning, amnesic shellfish poisoning, diarrhetic shellfish poisoning and neurotoxic shellfish poisoning. Most cases involve diarrhoea, vomiting and abdominal cramps, although respiratory and neurological symptoms are also possible. Paralytic and amnesic shellfish poisoning can both be fatal.

- There was one case of suspected toxic shellfish poisoning in the Auckland region in 2022.
- There were no hospitalisations or deaths.
- The incidence rate for the Auckland region was 0.1 cases per 100,000. For the rest of NZ it was 0 cases per 100,000.

Only three cases of suspected toxic shellfish poisoning have been reported in the Auckland region since 2010, with two cases reported in 2021 and one in 2022. Prior to this, the last probable case was reported in 2005.

3.4.16 Typhoid fever

Typhoid fever is an enteric illness caused by *Salmonella enterica* serotype Typhi bacteria. Transmission occurs through ingestion of food and water contaminated by the faeces and urine of infected persons. Direct person-to-person transmission is uncommon.

[27] Ministry for Primary Industries. (2022). *What is toxic shellfish poisoning?* Retrieved 11 May, 2023, from https://www.mpi.govt.nz/fishing-aquaculture/recreational-fishing/where-unsafe-to-collect-shellfish/what-toxic-shellfish-poisoning/.

Symptoms include insidious onset of fever, headache, malaise, anorexia, dry cough, rose spots, abdominal pain, constipation or diarrhoea. Untreated, the infection may lead to intestinal perforation/haemorrhage, relapse or death.

Most cases of typhoid fever notified in NZ are associated with overseas travel, although chronic carriage of *S.* Typhi may occur and act as a source of infection.

- There were 17 typhoid fever cases in the Auckland region in 2022.
- There were 15 hospitalisations and no deaths.
- The incidence rate for the Auckland region was 1.0 case per 100,000. For the rest of NZ it was 0.1 cases per 100,000

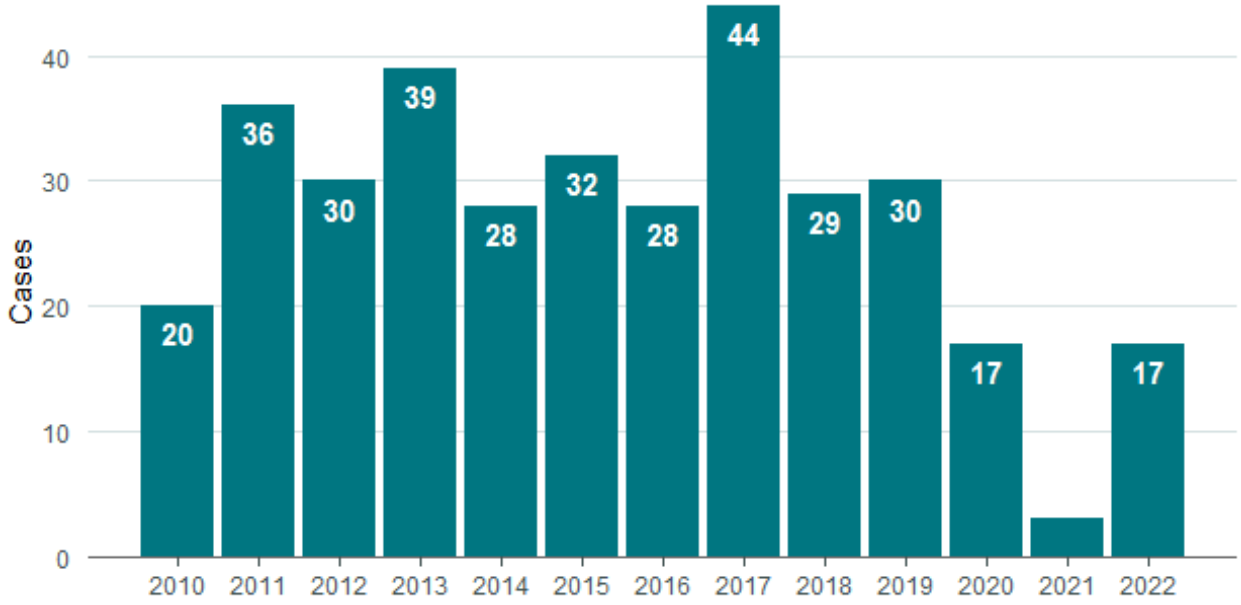


Figure 36: Typhoid fever cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 36 shows the number of typhoid fever cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were above 2021 and similar to 2020 levels, with only three cases reported for 2021 compared to 17 each for 2020 and 2022. Cases had not yet returned to pre-COVID levels, with around 30 cases reported each year prior to the pandemic.

In 2022, cases were more common in the latter half of the year, with a peak of five cases in December 2022 (Figure 37).

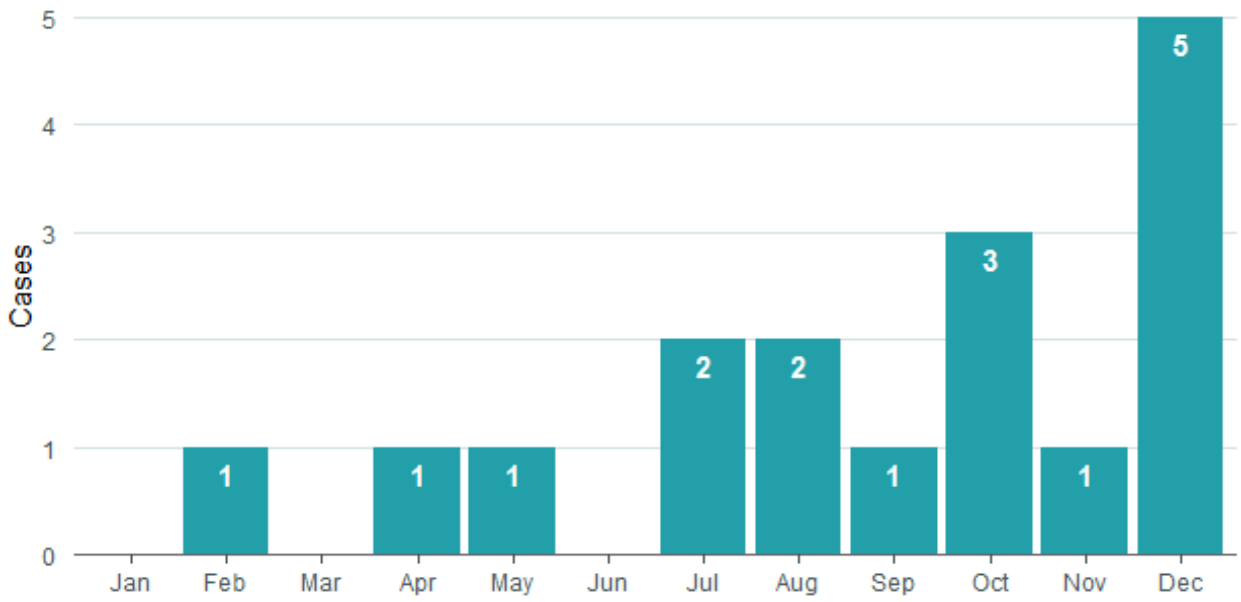


Figure 37: Typhoid fever cases in the Auckland region 2022 by month

Source: EpiSurv

Table 49: Age-specific incidence rates for typhoid fever in the Auckland region 2022

Age group	Cases	Rate per 100,000
Age under 1	0	-
1 to 4	1	1.2
5 to 9	2	1.8
10 to 14	3	2.6
15 to 19	0	-
20 to 29	1	0.4
30 to 39	6	2.2
40 to 49	3	1.3
50 to 59	1	0.5
60 to 69	0	-
Age 70+	0	-
Total	**17**	**1**

Source: EpiSurv, Stats NZ

Tables 49 and 50 shows the age and ethnic group distribution of typhoid fever cases for 2022. Cases were highest among the '10 to 14' and '30 to 39' age groups, with 2.6 and 2.2 cases per 100,000 population, respectively. Ethnic group-specific incidence rates were highest among Pacific Peoples and Asian peoples, with 2.5 and 2.3 cases per 100,000 population, respectively. Of the six cases among Pacific Peoples, four identified as Samoan, one as Cook Islands Māori and one as Fijian (except Fiji Indian/Indo-Fijian, Table

50). Of the 11 cases among Asian peoples, nine identified as Indian, one as Asian not further defined (NFD) and one as Asian not elsewhere classified (NEC).

Table 50: Ethnic group-specific incidence rates for typhoid fever in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	0	-
Pacific Peoples	6	2.5
Asian	11	2.3
European and Other	0	-
Total	**17**	**1**

Source: EpiSurv, Stats NZ

Table 51: Detailed ethnicity count of typhoid fever cases in the Auckland region 2022

Detailed ethnicity	Cases
Indian	9
Samoan	4
Cook Islands Māori	1
Fijian (except Fiji Indian/Indo-Fijian)	1
Other Asian NEC	1
Other Asian NFD	1

Source: EpiSurv

The most common risk factor for acquiring typhoid fever was overseas travel, with 13 cases reporting travel outside NZ during their exposure period (Table 52). The most common source country for typhoid fever was India, with nine cases thought to have acquired their infection in this country.

Table 52: Source countries of typhoid fever cases in the Auckland region 2022

Source countries	Cases
India	9
Fiji	1
Nepal	1
Pakistan	1
Samoa	1
No overseas travel reported	4

Source: EpiSurv

3.4.17 VTEC/STEC infection

Verotoxin-producing E. coli (VTEC) (also known as Shiga toxin-producing E. coli (STEC) infection is a gastrointestinal illness caused by certain strains of *Escherichia coli* bacteria.

Transmission often occurs through consumption of contaminated drinking water, contact with farm animals and consumption of raw milk. Person-to-person spread in households and early childhood services has also been reported.

Many infections manifest as an acute onset diarrhoeal illness with or without blood or mucus in the stool. Infection with some serotypes, notably O157:H7, is associated with a higher frequency of bloody diarrhoea and hospitalisation than other serotypes. Antibiotic treatment is not recommended for VTEC/STEC infection as it can increase the risk of complications such as haemolytic uraemic syndrome and thrombotic thrombocytopaenic purpura (most commonly seen in children and the elderly).

- There were 187 VTEC/STEC infection cases in the Auckland region in 2022.
- There were 66 hospitalisations and no deaths.
- The incidence rate for the Auckland region was 10.9 cases per 100,000. For the rest of NZ it was 14.8 cases per 100,000.

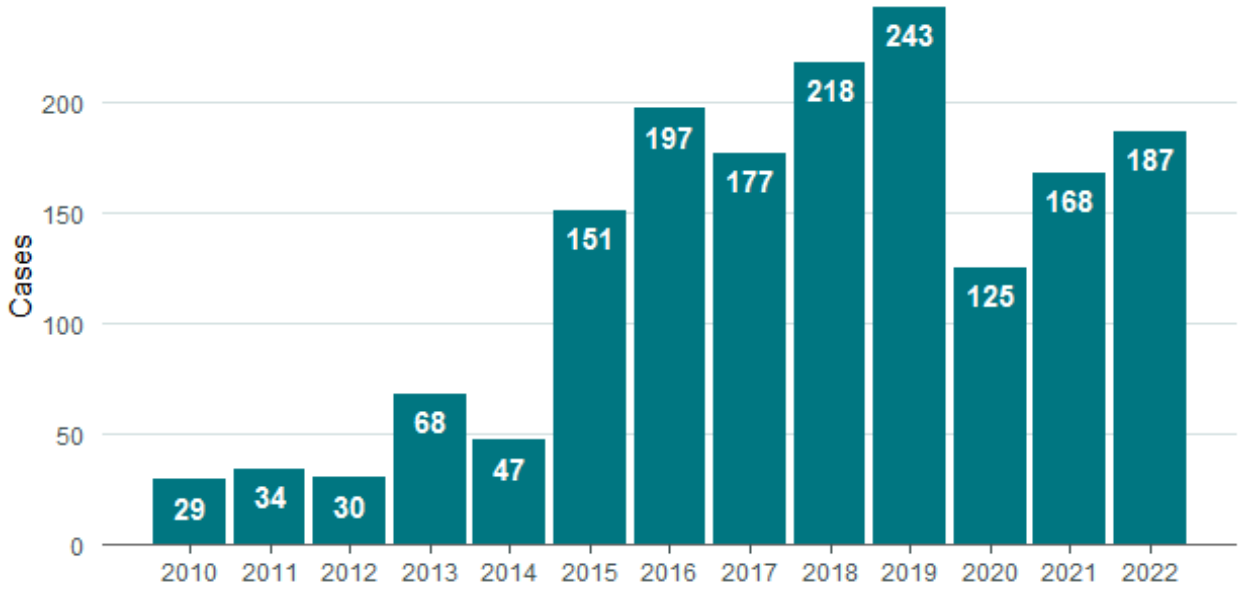


Figure 38: VTEC/STEC infection cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 38 shows the number of VTEC/STEC infection cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were slightly higher than 2021 and 2020 and had almost returned to pre-COVID levels.

In 2022, cases were more common in the first half of the year, with a peak of 25 cases in February 2022 (Figure 39).

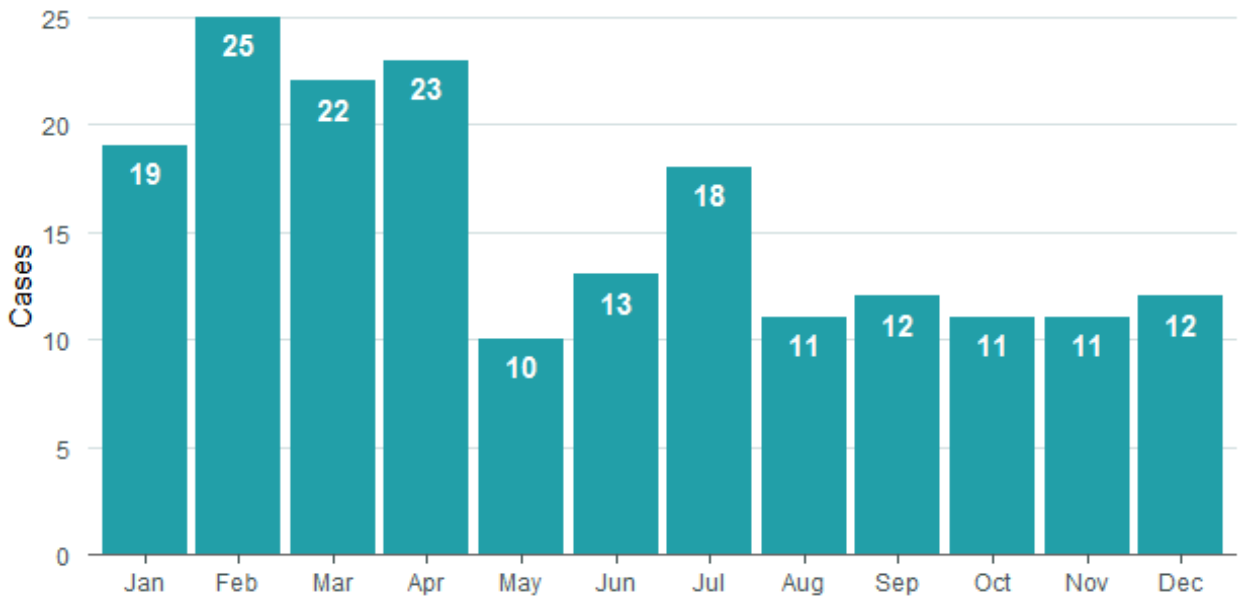


Figure 39: VTEC/STEC infection cases in the Auckland region 2022 by month

Source: EpiSurv

Table 53: Age-specific incidence rates for VTEC/STEC infection in the Auckland region 2022

Age group	Cases	Rate per 100,000
Age under 1	4	18.9
1 to 4	26	30.6
5 to 9	16	14.2
10 to 14	13	11.2
15 to 19	5	4.7
20 to 29	28	11.4
30 to 39	15	5.5
40 to 49	14	6.3
50 to 59	22	10.2
60 to 69	21	12.9
Age 70+	23	14.7
Total	**187**	**10.9**

Source: EpiSurv, Stats NZ

Tables 53 and 54 show the age and ethnic group distribution of VTEC/STEC infection cases for 2022. Cases were highest among the ‘under 1’ and ‘1 to 4’ age groups, with 18.9 and 30.6 cases per 100,000 population, respectively. Ethnic group-specific incidence rates were highest among European and Other followed by Pacific Peoples, with 16.3 and 7.4 cases per 100,000 population, respectively.

Table 54: Ethnic group-specific incidence rates for VTEC/STEC infection in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	14	6.7
Pacific Peoples	18	7.4
Asian	27	5.5
European and Other	127	16.3
Unknown	1	-
Total	**187**	**10.9**

Source: EpiSurv, Stats NZ

In 2022, the most common risk factors associated with developing VTEC/STEC infection were consumption of poultry (107 cases), consumption of raw vegetables or fruit (97 cases) and contact with animals (93 cases). No risk factors were recorded for 19 of the 187 cases. For many VTEC/STEC cases, the source of infection cannot be determined.

Only 12 cases reported overseas travel, with information on the last country visited shown in Table 55. The most common countries last visited were Fiji and Indonesia, with two cases each. There were 154 cases who reported no recent overseas travel and 21 cases with unknown travel history.

Table 55: VTEC/STEC infection cases in the Auckland region 2022 by last country visited

Last country visited	Cases	Percent
Fiji	2	1.1%
Indonesia	2	1.1%
Australia	1	0.5%
India	1	0.5%
Mexico	1	0.5%
Republic of Korea	1	0.5%
Samoa	1	0.5%
South Africa	1	0.5%
Turkey	1	0.5%
United Kingdom	1	0.5%
No recent overseas travel	154	82.4%
Unknown	21	11.2%
Total	**187**	**100.0%**

Source: EpiSurv

In 2022, 74 cases (40%) were positive for the *E. coli* O157 and O26 serotypes that are associated with complications such as haemolytic uraemic syndrome (Table 56).

Table 56: VTEC/STEC infection cases in the Auckland region 2022 by serotype

Strain	Cases
E. coli O157:H7	60
E. coli O26:H11	9
E. coli O128:H2	7
E. coli O157	5
E. coli O91:H14	3
E. coli O103:H25	3
E. coli O38:H26	2
E. coli O111:H8	2
E. coli O146:H21	2
E. coli O176:H4	2
E. coli O2:H6	1
E. coli O8:H8	1
E. coli O88:H8	1
E. coli O91:H21	1
E. coli O93:H28	1
E. coli O103:H2	1
E. coli O104:H7	1
E. coli O111:H2	1
E. coli O112:H9	1
E. coli O153:H2	1
E. coli O174:H21	1
E. coli O183:H18	1
Not recorded	80

Source: EpiSurv

3.4.18 Yersiniosis

Yersiniosis is a bacterial infection caused by *Yersinia pseudotuberculosis* or *Yersinia enterocolitica*. Transmission mostly occurs through ingestion of contaminated food, including pork and dairy products, fruit, vegetables and tofu, although ingestion of untreated water, contact with infected animals and person-to-person spread has also been observed.

Y. pseudotuberculosis typically causes mesenteric adenitis and septicaemia while *Y. enterocolitica* causes enteric disease. In children under 5 years old, *Y. enterocolitica* typically causes diarrhoea, vomiting, fever and occasionally abdominal pain, while older children and adults often report abdominal pain as the predominant symptom.

An outbreak of yersiniosis due to *Y. pseudotuberculosis* occurred in NZ in 2014, with over 220 cases and no confirmed source.[28]

- There were 422 yersiniosis cases in the Auckland region in 2022.
- Hospitalisations and deaths from yersiniosis were not recorded by ARPHS, so this data is not included.
- The incidence rate for the Auckland region was 24.5 cases per 100,000. For the rest of NZ it was 19.2 cases per 100,000.

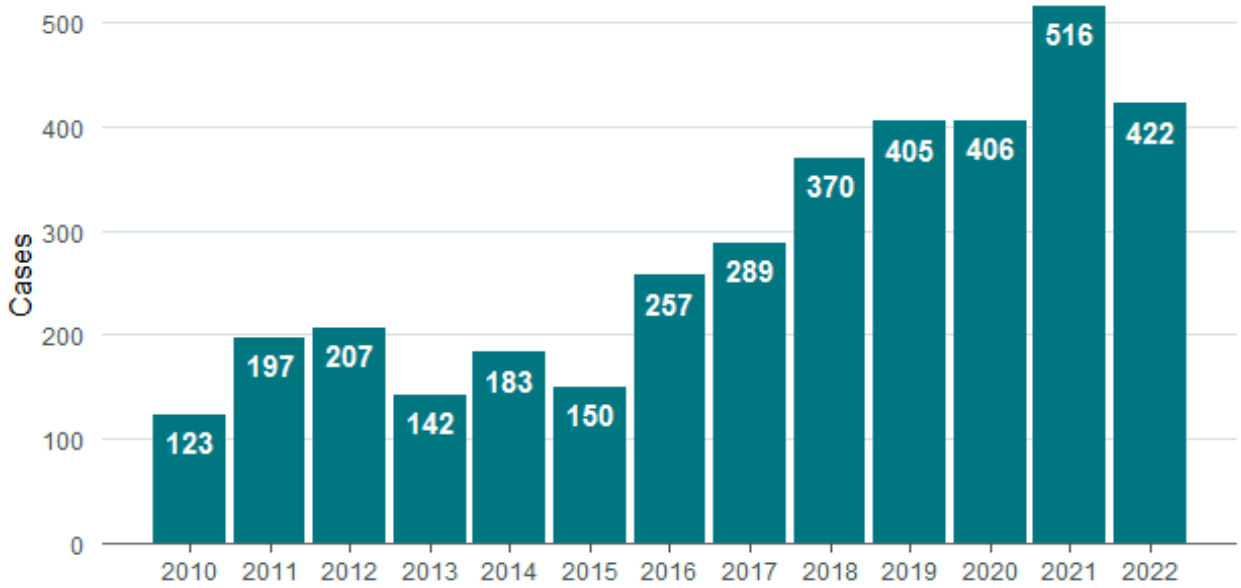


Figure 40: Yersiniosis cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 40 shows the number of yersiniosis cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were slightly fewer than the previous year, with 422 cases reported in 2022 compared to 516 in 2021. Yersiniosis levels do not appear to have been impacted by the COVID-19 pandemic, with numbers increasing steadily from 150 in 2015 to more than 400 in recent years.

There was no definite seasonal pattern for 2022, with 50 cases recorded in May, 48 cases in February and 44 cases in October (Figure 41).

[28] Williamson, D. A., Baines, S. L., Carter, G. P., da Silva, A. G., Ren, X., Sherwood, J., et al. (2016). Genomic insights into a sustained national outbreak of Yersinia pseudotuberculosis. *Genome Biology and Evolution, 8*(12), 3806-3814. doi:10.1093/gbe/evw285.

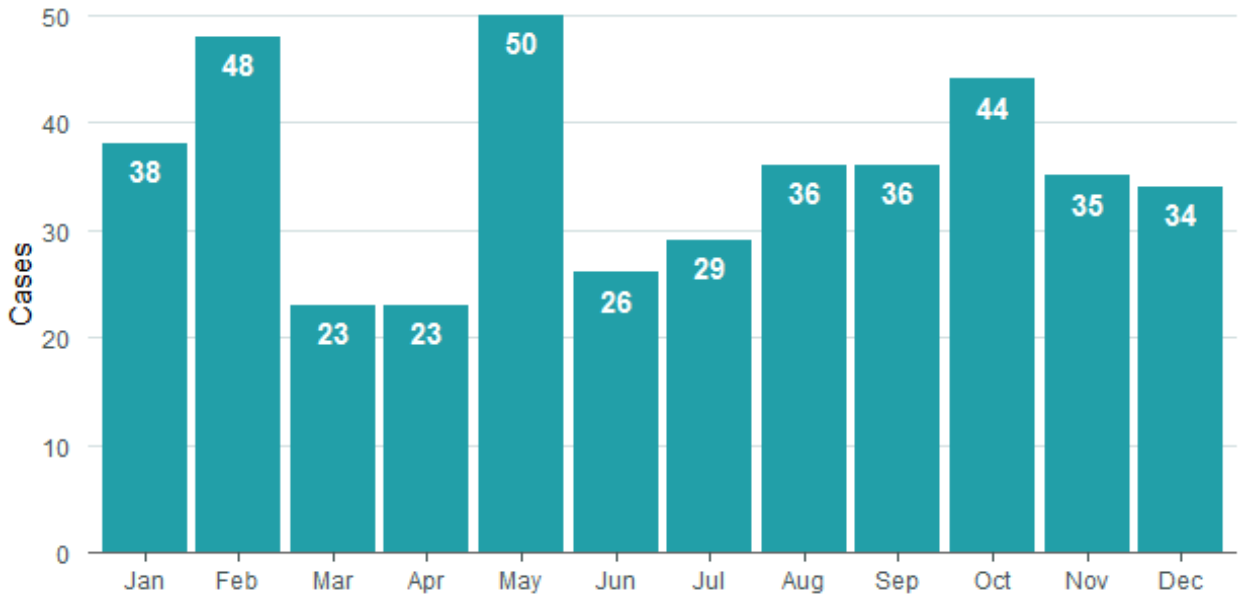


Figure 41: Yersiniosis cases in the Auckland region 2022 by month

Source: EpiSurv

Table 57: Age-specific incidence rates for yersiniosis in the Auckland region 2022

Age group	Cases	Rate per 100,000
Age under 1	16	75.4
1 to 4	49	57.7
5 to 9	19	16.9
10 to 14	13	11.2
15 to 19	20	18.6
20 to 29	55	22.3
30 to 39	77	28.1
40 to 49	46	20.6
50 to 59	35	16.3
60 to 69	48	29.4
Age 70+	44	28.2
Total	**422**	**24.5**

Source: EpiSurv, Stats NZ

Tables 57 and 58 show the age and ethnic group distribution of yersiniosis cases for 2022. Cases were highest among the ‘under 1’ and ‘1 to 4’ age groups, with 75.4 and 57.7 cases per 100,000 population, respectively. Ethnic group-specific incidence rates were highest among Asian peoples followed by European and Other, with 31.4 and 19.2 cases per 100,000 population, respectively. Of the 153 cases among Asian people, 99 were of Chinese ethnicity (Table 59).

Table 58: Ethnic group-specific incidence rates for yersiniosis in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	28	13.5
Pacific Peoples	34	14
Asian	153	31.4
European and Other	150	19.2
Unknown	57	-
Total	**422**	**24.6**

Source: EpiSurv, Stats NZ

Table 59: Detailed ethnicity count of yersiniosis cases in the Auckland region 2022

Detailed ethnicity (total response)	Cases
NZ European	132
Chinese	99
Māori	28
Other Asian NFD	20
European NFD	17
Samoan	16
Indian	14
Southeast Asian NFD	12
Tongan	10
Asian NFD	5
Cook Islands Māori	3
Fijian	3
Middle Eastern NFD	3
Filipino	2
Other European NFD	2
Other*	10
Unknown	57

Source: EpiSurv

*Other consists of 10 ethnicities with one case each

Routine interviews with cases of yersiniosis acquired in the Auckland region ceased in 2017, therefore information on associated risk factors is not available for this disease.

3.5 Environmental diseases

Environmental illnesses occur when people are exposed to toxins or substances in the environment that cause disease. These health hazards may be found in people's home, work or recreational environments.

Environmental illnesses can be difficult to diagnose as they often present with non-specific symptoms or exacerbate an existing health problem. They may occur from short-term exposure to a substance, such as accidental ingestion of a cleaning product, or through long-term exposure, such as lead absorption.

Legionellosis is included in this section as it is transmitted to humans from an environmental source (e.g. water and soil).

Table 60: Environmental diseases in the Auckland region 2022

Disease	Total notifications	Total cases (%)	Rate per 100,000	Hospitalisations (%)	Deaths (%)
Chemical poisoning from the environment	16	12 (75.0)	0.7	12 (100.0)	0
Hazardous substances injury	9	9 (100.0)	0.5	9 (100.0)	0
Lead absorption	132	132 (100.0)	7.7	4 (3.0)	0
Legionellosis	120	96 (80.0)	5.6	90 (93.8)	10 (10.4)
Total	**277**	**248 (89.9)**	**14.5**	**115 (46.4)**	**10 (4.0)**

Source: EpiSurv, Stats NZ

In 2022, ARPHS received a total of 277 notifications for environmental diseases (Table 60). Of these, 248 (89.9%) met the criteria for a confirmed or probable case.

Lead absorption and legionellosis had the highest number of cases, with 132 cases and 96 cases, respectively.

The highest number of hospitalisations was observed with legionellosis, with 90 cases (93.8%) hospitalised. However, the highest hospitalisation rate was seen for chemical poisoning from the environment and hazardous substances injury, with all 21 cases (100%) admitted to hospital.

10 deaths were recorded, all among legionellosis cases, with a CFR of 10.4%.

3.5.1 Chemical poisoning from the environment

Poisoning arising from chemical contamination of the environment refers to any adverse health effect related to contamination of air, land or waterways from chemical products.[29,30]

Examples include health effects following agrichemical spray drift events, skin effects following oil spills, cyanotoxin-related illness and unintentional carbon monoxide poisoning.[31]

- There were 12 cases of chemical poisoning from the environment in the Auckland region in 2022.
- There were 12 hospitalisations and no deaths.
- The incidence rate for the Auckland region was 0.7 cases per 100,000.

[29] Better Health Channel. (2014). *Chemicals and spray drift.* Retrieved 11 May, 2023, from https://www.betterhealth.vic.gov.au/health/healthyliving/chemicals-and-spray-drift#causes-of-chemical-spray-drift.

[30] Ministry of Health. (2019). The Investigation and Surveillance of Poisoning and Hazardous-substance Injuries: Guidelines for public health units (4th edn). Wellington: Ministry of Health.

[31] EHINZ. (2021). *Hazardous Substances Disease and Injury Reporting Tool: A User's Guide for Public Health Units User's Guide for PHUs*. Wellington: EHINZ. Retrieved from https://www.ehinz.ac.nz/assets/Other/HSDIRT-Users-Guide-2021_Dec.pdf.

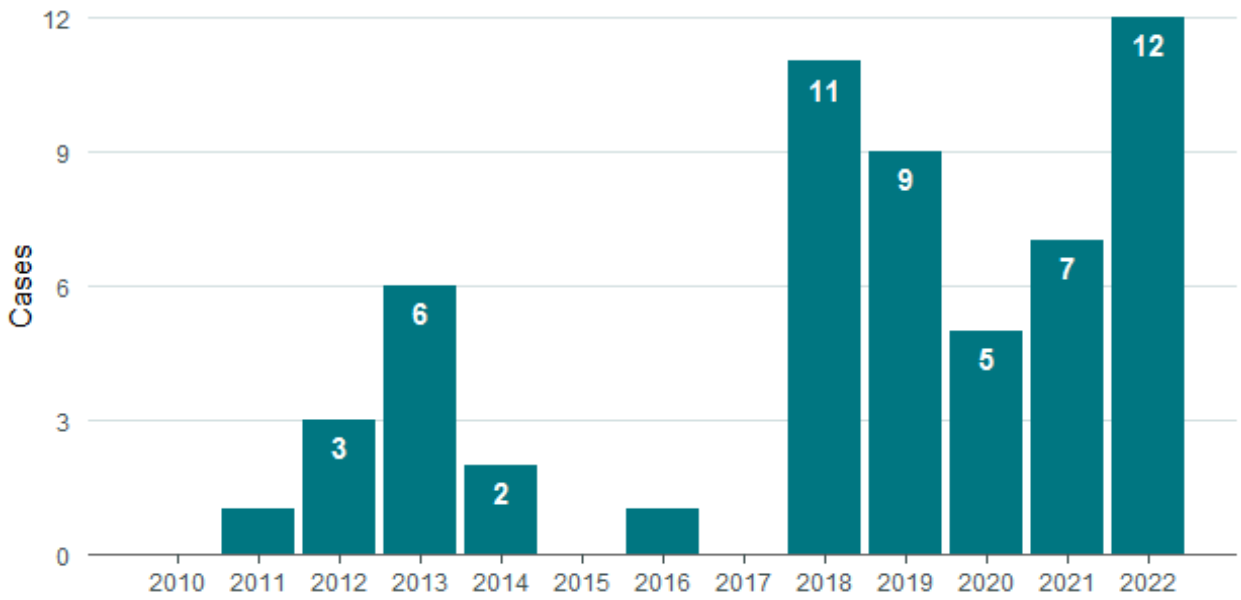


Figure 42: Chemical poisoning from the environment cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 42 shows the number of chemical poisoning from the environment cases in the Auckland region between 2010 and 2022. Case numbers over the past five years have been relatively stable, with between five and 12 cases reported per year.

Table 61: Chemical poisoning from the environment cases in the Auckland region by age group and sex 2022

Age group	Female	Male	Cases	Rate per 100,000
Age under 1	0	0	0	-
1 to 4	0	0	0	-
5 to 9	0	2	2	1.8
10 to 14	0	0	0	-
15 to 19	1	1	2	1.9
20 to 29	0	0	0	-
30 to 39	0	2	2	0.7
40 to 49	0	0	0	-
50 to 59	2	3	5	2.3
60 to 69	0	0	0	-
Age 70+	1	0	1	0.6
Total	**4**	**8**	**12**	**0.7**

Source: EpiSurv, Stats NZ

Tables 61 and 62 show the age, sex and ethnic group distribution of chemical poisoning from the environment cases for 2022. Cases were highest among the '15 to 19' and '50 to 59' age groups, with 1.9 and 2.3 cases per 100,000 population, respectively. Ethnic group-

specific incidence rates were highest among European and Other followed by Pacific Peoples, with 1.3 and 0.8 cases per 100,000 population, respectively.

Table 62: Ethnic group-specific incidence rates for chemical poisoning from the environment in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	0	-
Pacific Peoples	2	0.8
Asian	0	-
European and Other	10	1.3
Total	**12**	**0.7**

Source: EpiSurv, Stats NZ

Eight of the 12 cases had a source, with four cases occurring due to exposure to petrol pump fumes in an enclosed area (Table 63).

Table 63: Chemical poisoning from the environment cases in the Auckland region in 2022 by source

Source	Cases
Petrol pump fumes in enclosed area	4
Accidental inhalation of toxic substance	1
Carbon monoxide poisoning	1
Propane inhalation	1
Swimming pool chemicals	1
Not specified	4
Total	**12**

Source: EpiSurv

3.5.2 Hazardous substances injury

Hazardous substances injury refers to any accidental injury caused by a substance with explosive, flammable, oxidative or corrosive properties, or one that is toxic to humans.[32]

Exposure to hazardous substances can occur through various pathways, including breathing in contaminated air and dust, ingesting contaminated water and food, skin exposure to chemicals and foetal exposure during pregnancy.[33]

[32] Hazardous Substances and New Organisms Act 1996.

[33] EHINZ. (n.d.). *About hazardous substances and health.* Retrieved 11 May 2023, from https://www.ehinz.ac.nz/indicators/hazardous-substances/about-hazardous-substances-and-health/.

This group includes, for example, children swallowing cleaning products or cosmetics, illness caused by exposure to chemicals such as solvents or chlorine, contact dermatitis from chemicals, fireworks burns or eye injuries and inhalation or 'huffing' butane.[34]

Some people are more at risk of disease and injuries from hazardous substances. This includes children under five years old and people who handle chemicals in the workplace.

- There were nine hazardous substances injury cases in the Auckland region in 2022.
- There were nine hospitalisations and no deaths.
- The incidence rate for the Auckland region was 0.5 cases per 100,000.

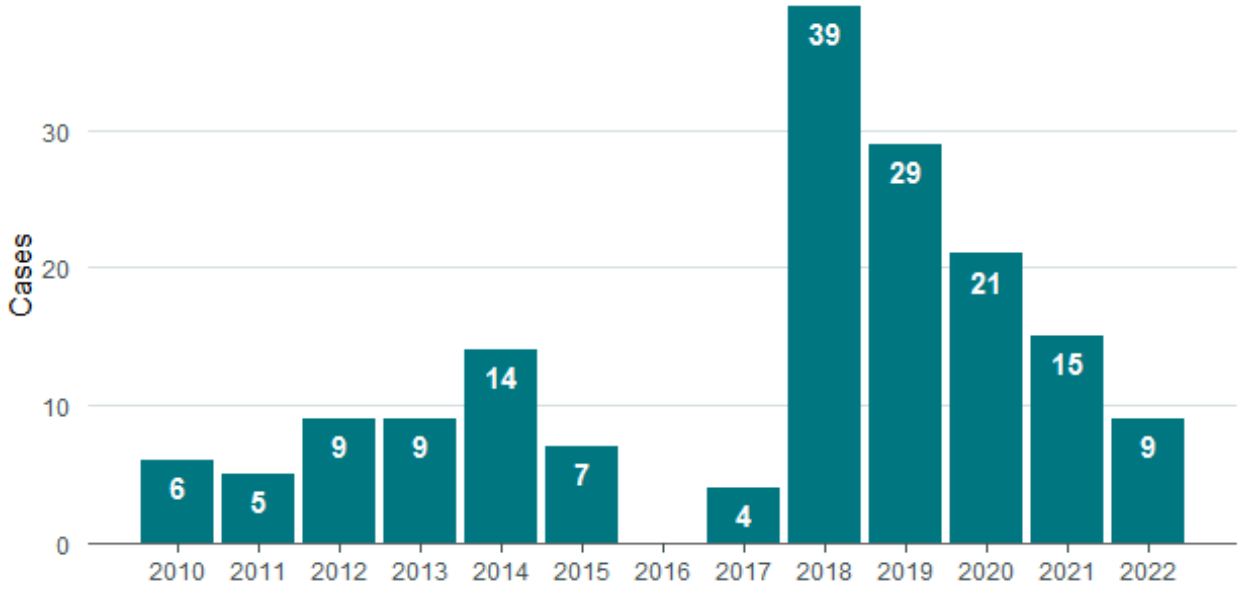


Figure 43: Hazardous substances injury cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 43 shows the number of hazardous substances injury cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were fewer than 2021 and 2020, with a significant decline in cases over the past five years.

Table 64: Hazardous substances injury cases in the Auckland region by age group and sex 2022

Age group	Female	Male	Cases	Rate per 100,000
Age under 1	0	0	0	-
1 to 4	0	4	4	4.7
5 to 9	0	1	1	0.9
10 to 14	0	0	0	-
15 to 19	0	0	0	-

[34] EHINZ. (2021). *Hazardous Substances Disease and Injury Reporting Tool: A User's Guide for Public Health Units User's Guide for PHUs*. Wellington: EHINZ. Retrieved from https://www.ehinz.ac.nz/assets/Other/HSDIRT-Users-Guide-2021_Dec.pdf.

Age group	Female	Male	Cases	Rate per 100,000
20 to 29	0	0	0	-
30 to 39	0	0	0	-
40 to 49	1	0	1	0.4
50 to 59	0	1	1	0.5
60 to 69	0	0	0	-
Age 70+	1	1	2	1.3
Total	**2**	**7**	**9**	**0.5**

Source: EpiSurv, Stats NZ

Tables 64 and 65 show the age, sex and ethnic group distribution of hazardous substances injury cases for 2022. Cases were highest among the '1 to 4' and '70+' age groups, with 4.7 and 1.3 cases per 100,000 population, respectively. The ratio of females to males was 2:7, with the majority of cases occurring in young boys. Ethnic group-specific incidence rates were highest among Pacific Peoples followed by Māori, with 1.2 and 1.0 cases per 100,000 population, respectively.

Table 65: Ethnic group-specific incidence rates for hazardous substances injury in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	2	1.0
Pacific Peoples	3	1.2
Asian	0	-
European and Other	4	0.5
Total	**9**	**0.5**

Source: EpiSurv, Stats NZ

Of the nine cases reported, seven occurred in the home, one occurred in the workplace and one was unknown (Table 66). Seven cases were due to chemical poisoning, one due to corrosive burns and one due to skin or eye contact. All except for one (potassium hydroxide) were caused by household chemicals. All five cases in children under 15 were due to household chemicals.

Table 66: Hazardous substances injury cases in the Auckland region in 2022 by substance, type of injury and exposure setting

Substance	Type of injury	Setting	Cases
Nail polish remover	Poisoning	Home	1
Dishwashing tablet	Poisoning	Home	1
Potassium hydroxide	Poisoning	Work	1

Substance	Type of injury	Setting	Cases
Mould killer	Poisoning	Home	1
Bleach	Poisoning	Home	1
Outdoor cleaner	Poisoning	Home	1
Laundry powder	Skin or eye contact	Home	1
Hair bleach	Corrosive burns	Home	1
Drain cleaner	Poisoning	Unknown	1

Source: EpiSurv

3.5.3 Lead absorption

Lead poisoning can occur from exposure to lead-based paint, lead pipes, homemade fishing sinkers, Kohl eye makeup, lead-lighting, recreational shooting and battery manufacturing processes.

Symptoms include anorexia, nausea, constipation or diarrhoea, abdominal pain, weight loss, mood changes, memory impairment, sleep disturbance, headache, tingling hands and hypertension. At very high lead levels, brain damage and death may occur. Lead poisoning in pregnancy may cause premature birth or low birth weight, while high lead levels in childhood may lead to developmental issues.

The highest blood lead levels in adults occur in industrial workplaces, while the main source of non-occupational exposure is from restoring and cleaning older houses. In NZ, blood lead levels greater than or equal to 0.48 µmol/L are notifiable under the *Health Act 1956*.

- There were 132 lead absorption cases in the Auckland region in 2022.
- There were four hospitalisations and no deaths.
- The incidence rate for the Auckland region was 7.7 cases per 100,000. For the rest of NZ it was 3.3 cases per 100,000.

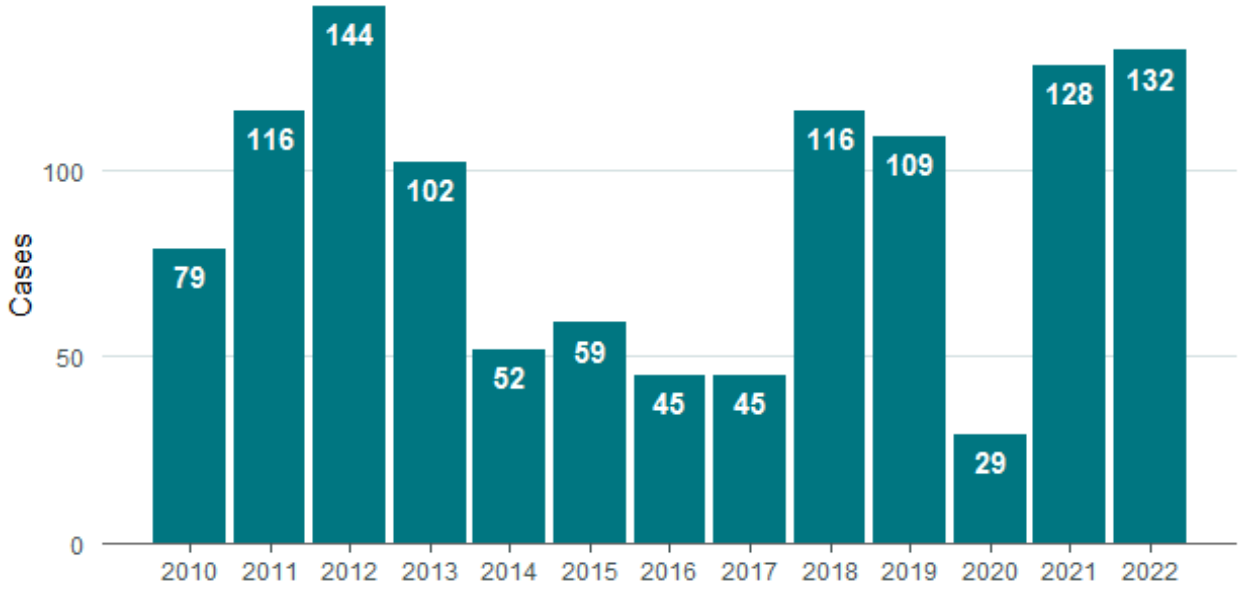


Figure 44: Lead absorption cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 44 shows the number of lead absorption cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were similar to 2021 and significantly higher than 2020 when there were only 29 cases reported. This may have been due to limited access to testing through general practitioners and occupational health programs as a result of COVID-19 lockdowns.

Table 67: Lead absorption cases in the Auckland region by age group and sex 2022

Age group	Female	Male	Cases	Rate per 100,000
Age under 1	1	0	1	4.7
1 to 4	2	1	3	3.5
5 to 9	1	1	2	1.8
10 to 14	0	2	2	1.7
15 to 19	0	0	0	-
20 to 29	0	11	11	4.5
30 to 39	0	14	14	5.1
40 to 49	1	24	25	11.2
50 to 59	2	31	33	15.4
60 to 69	4	28	32	19.6
Age 70+	1	8	9	5.8
Total	**12**	**120**	**132**	**7.7**

Source: EpiSurv, Stats NZ

Tables 67 and 68 show the age, sex and ethnic group distribution of lead absorption cases for 2022. Cases were highest among the ‘60 to 69’ and ‘50 to 59’ age groups, with 19.6

and 15.4 cases per 100,000 population, respectively. The ratio of females to males was 1:10, with over 80% of cases occurring in males aged between 20 and 69. Ethnic group-specific incidence rates were highest among Pacific Peoples followed by European and Other, with 14.4 and 8.8 cases per 100,000 population, respectively.

Table 68: Ethnic group-specific incidence rates for lead absorption in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	14	6.7
Pacific Peoples	35	14.4
Asian	13	2.7
European and Other	69	8.8
Unknown	1	-
Total	**132**	**7.7**

Source: EpiSurv, Stats NZ

Table 69: Risk factors associated with lead absorption in the Auckland region 2022

Risk factor	Cases	Percent
Exposed through occupation	72	54.5%
Lives in pre-1970s building	22	16.7%
Exposed through hobby	12	9.1%
Ingested contaminated soil or dirt	2	1.5%
No risk factors recorded	34	25.8%

Source: EpiSurv

Table 69 shows risk factors associated with lead absorption in 2022. The most common risk factor was occupational exposure (54.5% of cases) followed by living in a pre-1970s dwelling (16.7% of cases). A further 9.1% were exposed through a hobby, while 1.5% were thought to have developed the condition after ingesting contaminated soil or dirt.

Of the 72 cases with an occupational exposure, 25 worked as metal engineering process workers, 11 as fabrication engineering trades workers, 11 as painting trades workers and two as radiator fitters (Table 70). The highest individual blood lead level was in a construction trades worker (1.12 µmol/L), while the occupation with the highest average blood lead level was painting trades workers (0.84 µmol/L).

Table 70: Occupational lead absorption cases by average blood lead level

Occupation	Count	Average blood lead level
Metal engineering process worker	25	0.76
Fabrication engineering trades worker	11	0.36

Occupation	Count	Average blood lead level
Painting trades worker	11	0.84
Radiator fitter	2	0.35
Automotive and engineering trades workers	1	0.53
Construction trades worker	1	1.12
Sculptor	1	0.80
Light technician	1	0.68
Glass processing worker	1	0.48
Fitter-welder	1	0.71
Bricklayer	1	0.36
Technicians and trades workers	1	0.52
Interior decorator	1	0.79
Response not identifiable	1	0.66
Occupation not stated	13	0.60
Total	**72**	**0.64**

Source: EpiSurv

3.5.4 Legionellosis

Legionellosis refers to a group of infections caused by Legionella bacteria. Transmission is through inhalation of water or dust particles carrying the bacteria. No person-to-person transmission has been documented.

Legionella infections include a mild febrile illness known as Pontiac fever, a more severe illness with pneumonia known as Legionnaire's disease, and extra-pulmonary disease involving the skin, joints, pericardium and other organs. Infections may arise sporadically or in outbreaks, with older people, smokers, chronic disease sufferers and the immunocompromised at highest risk. Legionnaire's disease is the most common manifestation reported worldwide, while the other forms are likely under-recognised and under-reported.

Most cases of legionellosis in NZ are caused by *L. longbeachae* and *L. pneumophila*. *L longbeachae* is typically present in soil, whereas *L. pneumophila* is generally found in water, where it thrives in temperatures between 25 and 45°C. Sources where temperatures allow the bacteria to thrive include hot-water tanks, cooling towers, and evaporative condensers of large air-conditioning systems, such as those commonly found in hotels and large office buildings.

- There were 96 legionellosis cases in the Auckland region in 2022.
- There were 90 hospitalisations and 10 deaths.
- The incidence rate for the Auckland region was 5.6 cases per 100,000. For the rest of NZ it was 2.8 cases per 100,000.

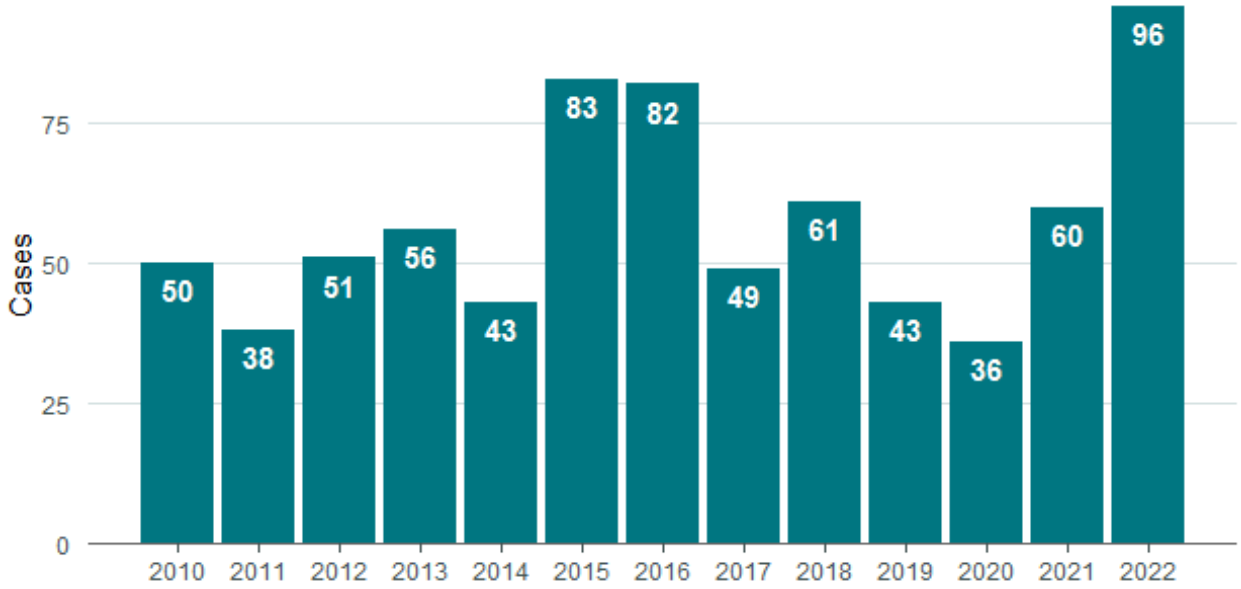


Figure 45: Legionellosis cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 45 shows the number of legionellosis cases in the Auckland region between 2010 and 2022. A record number of cases were reported in 2022, with 96 cases compared to 60 cases in 2021 and 36 in 2020. Of note, a further 24 legionellosis notifications were deemed 'not a case' in 2022 as many met the clinical, but not laboratory, criteria for a confirmed case. This is particularly true for *L. longbeachae* which is frequently diagnosed through a positive urinary antigen test but is not currently considered sufficient laboratory evidence for a confirmed case. In many instances, ARPHS carried out a full investigation of the case as this was deemed to require a public health response. Therefore, case numbers for 2022 are likely an underestimate, particularly for *L. longbeachae* cases, and do not necessarily reflect the full reality of ARPHS' operational response. In 2022, cases were more common over winter and summer, with 13 cases reported in November and 11 cases in June, October and December (Figure 46). *Legionella pneumophila* was the predominant species, particularly during winter, with *L. longbeachae* generally occurring during the warmer months.

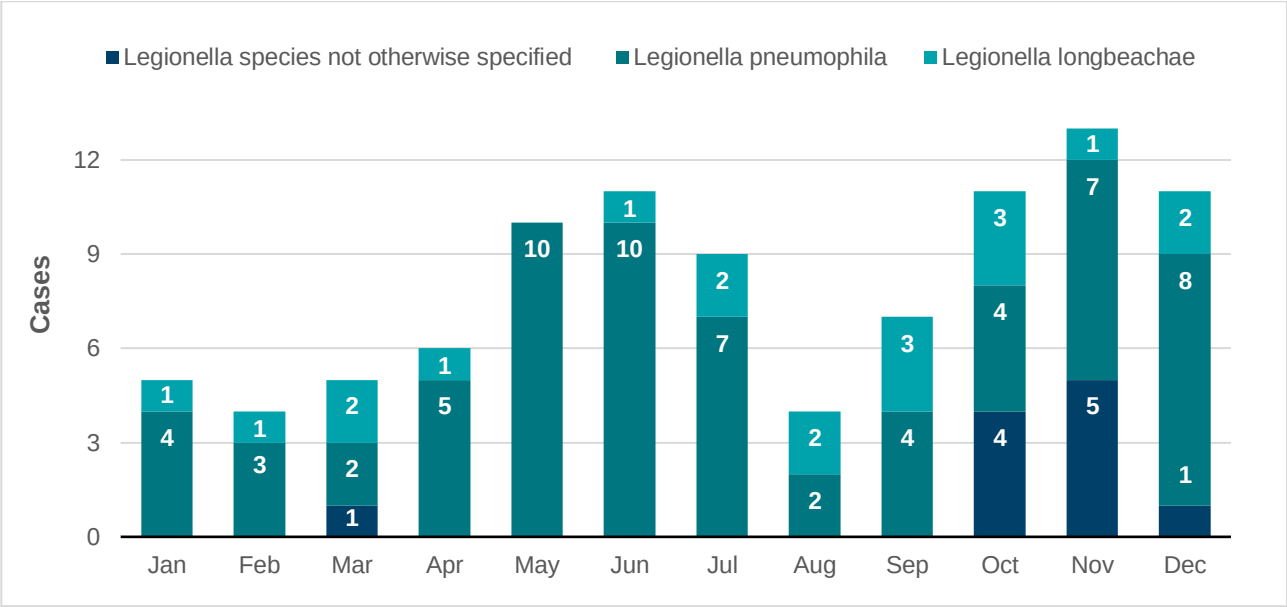


Figure 46: Legionellosis cases in the Auckland region 2022 by month and species

Source: EpiSurv

Table 71: Legionellosis cases in the Auckland region by age group and sex 2022

Age group	Female	Male	Cases	Rate per 100,000
Age under 1	0	0	0	-
1 to 4	0	0	0	-
5 to 9	0	0	0	-
10 to 14	1	0	1	0.9
15 to 19	0	0	0	-
20 to 29	0	0	0	-
30 to 39	1	3	4	1.5
40 to 49	0	4	4	1.8
50 to 59	4	6	10	4.7
60 to 69	11	16	27	16.5
Age 70+	21	29	50	32.0
Total	**38**	**58**	**96**	**5.6**

Source: EpiSurv, Stats NZ

Tables 71 and 72 show the age, sex and ethnic group distribution of legionellosis cases for 2022. Cases were highest among the '60 to 89' and '70+' age groups, with 16.5 and 32.0 cases per 100,000 population, respectively. Ethnic group-specific incidence rates were highest among European and Other followed by Māori, with 7.7 and 5.3 cases per 100,000 population, respectively.

Table 72: Ethnic group-specific incidence rates for legionellosis in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	11	5.3
Pacific Peoples	10	4.1
Asian	14	2.9
European and Other	60	7.7
Unknown	1	-
Total	**96**	**5.6**

Source: EpiSurv, Stats NZ

Table 73 shows risk factors associated with developing legionellosis in 2022. The most common risk factors were exposure to an environmental source (e.g. hot water systems, air conditioning, cooling towers, spa pools and compost), accounting for 46.9% of cases, followed by immunosuppression or a debilitating condition, accounting for 42.7% cases.

Table 73: Risk factors associated with legionellosis in the Auckland region 2022

Risk factor	Cases	Percent
Exposure to environmental source	45	46.9%
Immunosuppression or debilitating condition	41	42.7%
Current cigarette smoker	14	14.6%
Overseas travel	8	8.3%
No risk factors recorded	2	2.1%

Source: EpiSurv

3.6 Vaccine-preventable diseases

VPDs are infectious diseases caused by viruses or bacteria that can be prevented with vaccines. Infections caused by these diseases can often result in hospitalisations and even deaths. Some VPDs are covered in other sections of this report, including hepatitis B and tuberculosis (TB).

Table 74: Vaccine-preventable diseases in the Auckland region 2022

Disease	Total notifications	Total cases (%)	Rate per 100,000	Hospitalisations (%)	Deaths (%)
Diphtheria	21	0	-	-	-
Haemophilus influenzae type b	39	0	-	-	-
Invasive pneumococcal disease	208	202 (97.1)	11.7	202 (100.0)	16 (7.9)
Measles	68	0	-	-	-
Meningococcal disease	17	15 (88.2)	0.9	15 (100.0)	1 (6.7)
Mumps	104	0	-	-	-
Pertussis	36	1 (2.8)	0.1	1 (100.0)	0
Rubella	3	0	-	-	-
Total	**496**	**218**	**12.7**	**218 (100.0)**	**17 (7.8)**

Source: EpiSurv, Stats NZ

In 2022, ARPHS received a total of 496 notifications for VPDs (Table 74). Of these, 218 (44.0%) met the criteria for a confirmed or probable case.

The vast majority of cases were due to invasive pneumococcal disease and meningococcal disease, with 202 cases and 15 cases, respectively. Invasive pneumococcal disease had 202 (100.0%) hospitalisations and 16 deaths (CFR 7.9%), while meningococcal disease had 15 (100.0%) hospitalisations and one death (CFR 6.7%).

In 2022, there were no cases of toxigenic diphtheria, invasive *Haemophilus influenzae* type b disease, measles, mumps or rubella recorded.

3.6.1 Diphtheria

Diphtheria is caused by toxin-producing strains of the bacterium *Corynebacterium diphtheriae*. Diphtheria-like illness may result from infection with toxigenic *Corynebacterium ulcerans*.

Transmission occurs through contact with respiratory droplets or infected skin of a case or carrier or, more rarely, contaminated articles. Unpasteurised milk has also been identified as a source of infection.

Infection primarily involves the respiratory tract or skin but can also include septic arthritis, conjunctivitis, and vaginal and external auditory canal infections. The disease has a 5 to 10% CFR.

Because of an effective vaccine, toxigenic diphtheria is now extremely rare in NZ, however it can still be brought back into the country through travel.

There were no cases of diphtheria toxin producing *Corynebacteria* in the Auckland region in 2022. While 21 suspected cases were notified to ARPHS, none met the definition for a confirmed or probable case. The last case in the Auckland region was reported in 2017.

3.6.2 Haemophilus influenzae type B invasive disease

Invasive disease due to *Haemophilus influenzae* type b (Hib) may manifest as bacteraemia, meningitis, epiglottitis, cellulitis, septic arthritis, pneumonia, empyema, pericarditis or osteomyelitis.

Transmission occurs via droplet inhalation of or direct contact with respiratory tract secretions.

Hib was once the most common cause of life-threatening bacterial infection in children under five years old. However, the addition of Hib vaccine to the national immunisation schedule in 1994 reduced the incidence significantly.

There were no cases of *Haemophilus influenzae* type B invasive disease in the Auckland region in 2022. While 39 suspected cases were notified to ARPHS, none met the definition for a confirmed or probable case. The last case in the Auckland region was reported in 2020.

3.6.3 Invasive pneumococcal disease

Invasive pneumococcal disease involves detection of *Streptococcus pneumoniae* bacteria (also known as pneumococcus) in a normally sterile site. Depending on the site of infection, the main presenting condition is meningitis, pneumonia or septicaemia.

Up to 25% of the population carry the bacteria asymptomatically at the back of the nasopharynx. The risk of invasive disease is higher in infants, the elderly and those with immune deficiency states. *S. pneumoniae* is the most common cause of community-acquired pneumonia in all ages and a common cause of bacterial meningitis in children.

Invasive pneumococcal disease was added to the notifiable disease schedule primarily for the purposes of surveillance – in particular to monitor the effect of introducing the pneumococcal vaccine for children in June 2008 and the incidence of disease in the community. This epidemiological information, along with information on the distribution of serotypes from laboratory-based surveillance, helps inform future immunisation policy.

Local public health action is not expected in response to individual notifications of this disease.

- There were 202 invasive pneumococcal disease cases in the Auckland region in 2022.
- There were 202 hospitalisations and 16 deaths.
- The incidence rate for the Auckland region was 11.7 cases per 100,000. For the rest of NZ it was 9.3 cases per 100,000

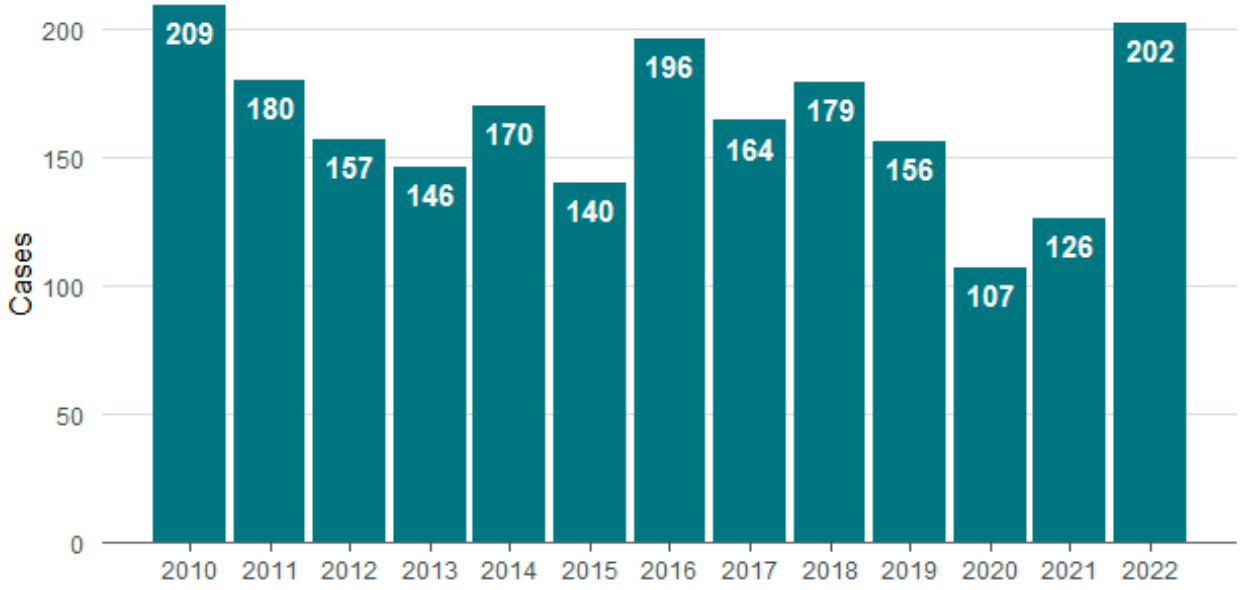


Figure 47: Invasive pneumococcal disease cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 47 shows the number of invasive pneumococcal disease cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were significantly higher than 2021 and 2020 and represented the greatest number of cases since 2010.

In 2022, cases were more common over winter and spring, with a peak of 28 cases in June and 29 cases in September (Figure 48).

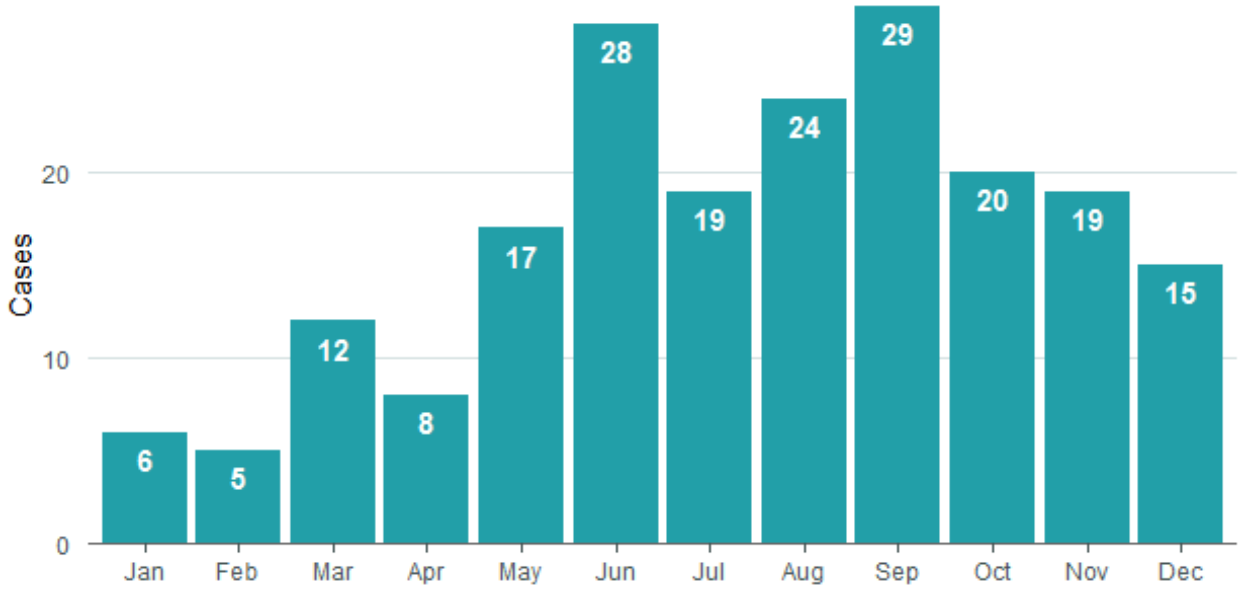


Figure 48: Invasive pneumococcal disease cases in the Auckland region 2022 by month

Source: EpiSurv

Table 75: Age-specific incidence rates for invasive pneumococcal disease in the Auckland region 2022

Age group	Cases	Rate per 100,000
Age under 1	12	56.6
1 to 4	30	35.4
5 to 9	0	-
10 to 14	3	2.6
15 to 19	3	2.8
20 to 29	14	5.7
30 to 39	18	6.6
40 to 49	22	9.8
50 to 59	16	7.4
60 to 69	27	16.5
Age 70+	57	36.5
Total	**202**	**11.7**

Source: EpiSurv

Tables 75 and 76 show the age and ethnic group distribution of invasive pneumococcal disease cases for 2022. Cases were highest among the ‘under 1’ and ‘70+’ age groups, with 56.6 and 36.5 cases per 100,000 population, respectively. Ethnic group-specific

incidence rates were highest among Pacific Peoples followed by Māori, with 29.3 and 18.8 cases per 100,000 population, respectively.

Table 76: Ethnic group-specific incidence rates for invasive pneumococcal disease in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	39	18.8
Pacific Peoples	71	29.3
Asian	23	4.7
European and Other	63	8.1
Unknown	6	-
Total	**202**	**11.8**

Source: EpiSurv

In 2022, 47% of all invasive pneumococcal disease cases occurred in Auckland's most deprived areas (deprivation deciles 8, 9 and 10, Figure 49).

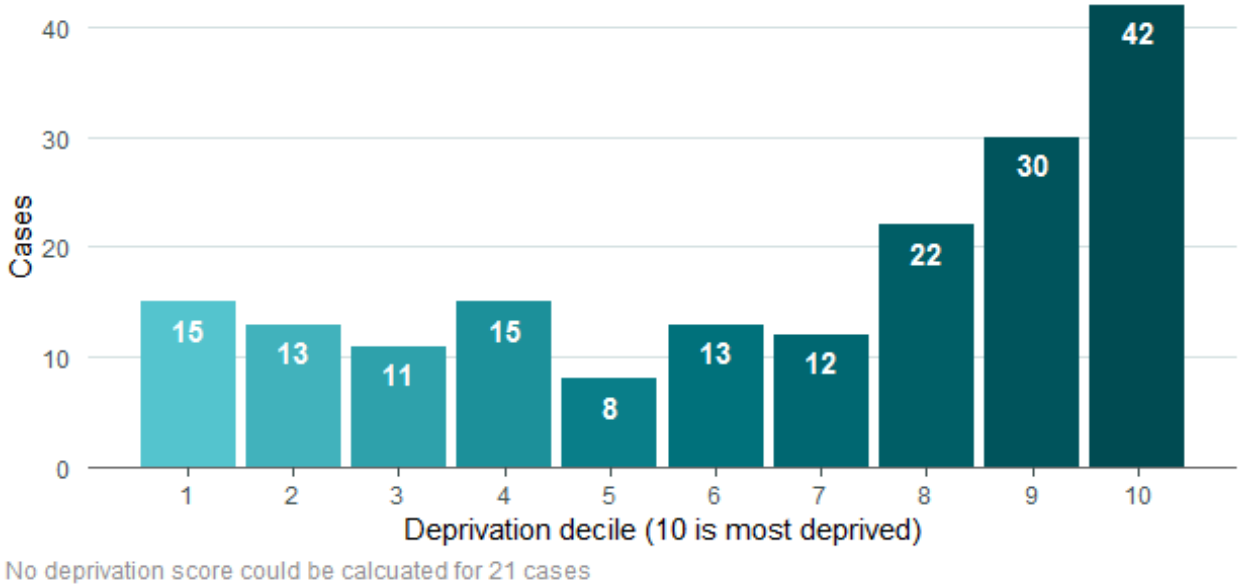


Figure 49: Invasive pneumococcal disease cases in the Auckland region 2022 by deprivation index

Source: EpiSurv

Immunisation against pneumococcal disease was first introduced to NZ in 2008 as a 7-valent pneumococcal conjugate vaccine (PCV7). In 2011 this was replaced by a 10-valent vaccine (PCV10), and in 2014 a 13-valent vaccine (PCV13 was introduced). NZ returned to using PCV10 between 2017 and 2022, with PCV13 being reinstated in December 2022.

Following the introduction of PCV10 in 2011, PCV10-preventable cases of invasive pneumococcal disease declined, reaching a low of three cases in 2021 (Table 77). Similarly, after the PCV13 vaccine was introduced in 2014, PCV13-preventable cases

decreased year on year from 2014 to 2017, when its use was discontinued in favour of PCV10.

Since 2017, the proportion of PCV10-preventable cases has continued to drop while the proportion of PCV13-preventable cases has increased, mainly due to a rise in the 19A serotype (Figure 50). Furthermore, the proportion of cases not preventable by either vaccine has steadily climbed, peaking at 76.9% in 2019. In 2022, the proportion of cases not preventable by PCV10 or PCV13 was 58.0%.

This information provides reassurance that the vaccination campaign against invasive pneumococcal disease has been successful in reducing the prevalence of vaccine-susceptible variants. However, the majority of cases seen within the Auckland region are caused by the variants that are not covered by the available vaccines. Based on the current patterns, serotypes 8, 12F, 19A and 22F would be appropriate candidates for future pneumococcal vaccines.

Table 77: Serotypes of IPD isolated in the Auckland region 2012 – 2022

*Blue rows indicate serotypes contained in PCV10; teal rows indicate additional serotypes contained in PCV13.

Serotype	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
1	2	0	0	0	0	0	1	0	1	0	0	**56**
3	7	5	17	7	10	9	7	7	9	6	12	**115**
4	13	7	6	2	8	6	2	2	1	0	1	**79**
5	0	0	0	0	1	0	0	0	0	0	0	**1**
6A	2	1	0	1	0	1	1	0	0	0	0	**10**
6B	1	2	0	1	1	0	2	3	1	0	3	**26**
6C	3	3	14	12	8	4	5	5	2	4	7	**76**
6D	0	0	0	0	1	0	0	0	0	0	0	**1**
7A	0	2	0	0	0	0	0	0	0	0	0	**8**
7C	0	0	1	2	2	2	1	1	0	2	1	**12**
7F	8	20	22	13	14	13	11	3	2	0	0	**116**
8	8	3	4	3	11	14	12	14	14	12	28	**128**
9 Non-typable	1	1	0	0	0	0	0	1	0	0	0	**4**
9N	4	3	3	3	7	4	5	6	2	3	4	**52**
9V	6	3	5	2	1	2	1	1	0	0	1	**41**
10 Non-typable	2	0	0	0	0	0	0	0	0	0	0	**2**
10A	2	1	1	0	2	1	5	3	0	2	0	**26**
11A	3	2	4	1	4	6	3	3	4	3	2	**49**
12F	0	3	1	1	2	7	25	16	12	7	1	**78**
13	2	0	1	1	1	0	0	2	1	0	0	**8**

Serotype	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
14	5	5	0	0	2	2	0	1	0	0	0	**38**
15 Non-typable	2	2	1	0	0	0	0	0	0	0	0	**5**
15A	0	0	1	1	4	4	3	1	0	0	0	**14**
15B	3	1	5	6	4	4	2	4	2	7	4	**46**
15C	0	0	1	1	1	2	1	1	1	0	0	**8**
16 Non-typable	0	2	4	0	0	0	0	0	0	0	0	**6**
16F	0	0	0	0	6	3	3	5	3	5	5	**30**
17 Non-typable	0	0	0	0	0	0	0	0	0	0	0	**1**
17F	1	2	0	1	2	1	2	2	0	1	1	**15**
18A	0	0	0	0	0	1	0	0	0	0	1	**3**
18C	2	4	4	1	1	0	0	0	0	0	1	**22**
18F	0	0	0	0	0	0	1	0	1	0	0	**2**
19A	28	27	31	33	40	24	21	17	20	44	65	**381**
19F	11	5	6	9	3	2	4	3	3	3	2	**72**
20	2	2	0	1	0	1	0	0	0	0	1	**12**
21	0	0	0	0	2	0	1	3	0	0	0	**7**
22 Non-typable	0	0	0	0	0	0	0	0	0	0	0	**1**
22A	0	0	0	0	0	0	0	0	0	0	0	**1**
22F	10	15	16	6	15	7	12	13	6	5	10	**139**
23A	2	2	4	10	4	8	9	5	3	5	4	**61**
23B	3	2	2	2	5	3	7	6	4	3	10	**48**
23F	3	2	1	2	2	0	1	0	1	0	0	**34**
24 Non-typable	1	0	0	0	1	0	0	0	0	0	0	**2**
29	0	0	0	0	0	0	0	0	0	0	1	**1**
31	1	0	0	1	1	2	3	2	0	0	2	**13**
33 Non-typable	0	0	0	2	3	1	3	2	1	0	0	**12**
33F	1	2	2	2	7	4	2	0	0	3	1	**25**
34	0	1	2	1	4	1	4	2	0	2	1	**19**
35 No factor sera	0	0	0	0	0	0	0	0	0	0	0	**4**
35 Non-typable	1	2	5	0	0	0	0	0	0	0	0	**13**
35B	0	0	0	4	1	1	1	1	3	0	2	**13**
35F	0	0	0	0	0	2	1	0	1	1	0	**5**
37	0	0	0	0	1	0	1	0	2	0	0	**4**
38	1	0	1	1	0	5	2	1	0	0	0	**14**

Serotype	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
42	0	0	0	0	0	1	0	0	0	0	0	**1**
Non-typable	0	0	1	1	2	2	3	3	1	0	0	**15**
Not stated	16	14	4	6	12	14	11	17	6	8	31	**151**
Total	**157**	**146**	**170**	**140**	**196**	**164**	**179**	**156**	**107**	**126**	**202**	**2126**

Source: EpiSurv

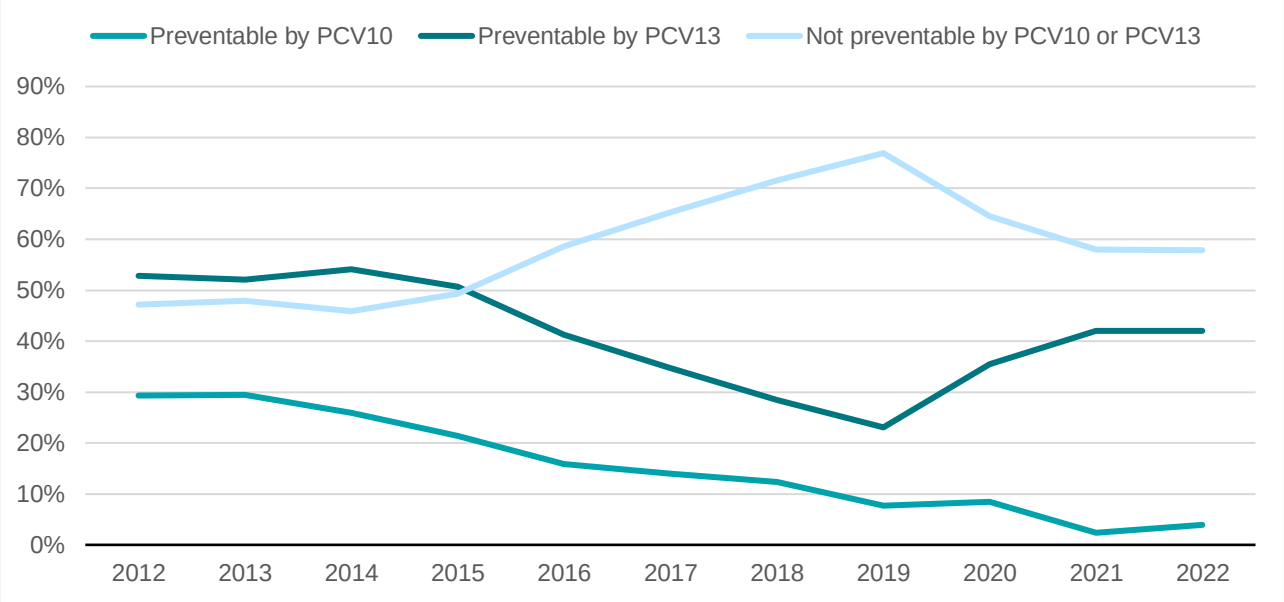


Figure 50: Percentage of IPD cases preventable by PCV10 and PCV13 in the Auckland region 2010-2022

Source: EpiSurv

3.6.4 Measles

Measles is a viral infection characterised by fever, cough, coryza, conjunctivitis, Koplik's spots (white buccal lesions) and a generalised maculopapular rash. Measles is spread through the air by breathing, coughing and sneezing, or through contact with infected saliva (i.e. kissing, sharing food and drink).

Up to 30% of cases will develop complications, with children under the age of five and adults over the age of 20 at highest risk. Complications include ear infections, diarrhoea, pneumonia, encephalitis, miscarriage, premature labour and low birthweight babies.

In 2017, NZ was verified by the World Health Organization (WHO) as having eliminated endemic measles. However, outbreaks have continued to occur due to international travel and historically low immunisation rates. The most recent outbreak in NZ occurred in 2019 with over 2,000 cases and 700 hospitalisations. Prevention of further outbreaks relies on improving coverage with measles-mumps-rubella (MMR) vaccination.

There were no cases of measles in the Auckland region in 2022. While 68 suspected cases were notified to ARPHS, none met the definition for a confirmed or probable case. The last case in the Auckland region was reported in 2020.

3.6.5 Meningococcal disease

Meningococcal disease refers to a group of invasive diseases caused by *Neisseria meningitidis* bacteria. The disease involves detection of the bacteria in a normally sterile site such as cerebrospinal fluid (meningococcal meningitis), blood (meningococcal septicaemia) or, rarely, pericardial or synovial fluid. Meningococcal conjunctivitis (bacteria in the lining of the eye) is also considered an indication for public health action because of the high immediate risk of invasive disease.

The bacteria are transmitted through respiratory secretions during close or prolonged contact, such as coughing, sneezing, kissing or sharing eating utensils. Up to 15% of the population carry the bacteria asymptomatically at the back of the nasopharynx. The risk of invasive disease is higher in babies and young children, teenagers and young adults, immunocompromised people, smokers and those living in overcrowded and/or shared living situations.

Meningococcal bacteria can be classified into groups A, B, C, W and Y, with most cases in NZ caused by group B. Vaccines are available and funded for select at-risk groups.

- There were 15 meningococcal disease cases in the Auckland region in 2022.
- There were 15 hospitalisations and one death.
- The incidence rate for the Auckland region was 0.9 cases per 100,000. For the rest of NZ it was 1.4 cases per 100,000.

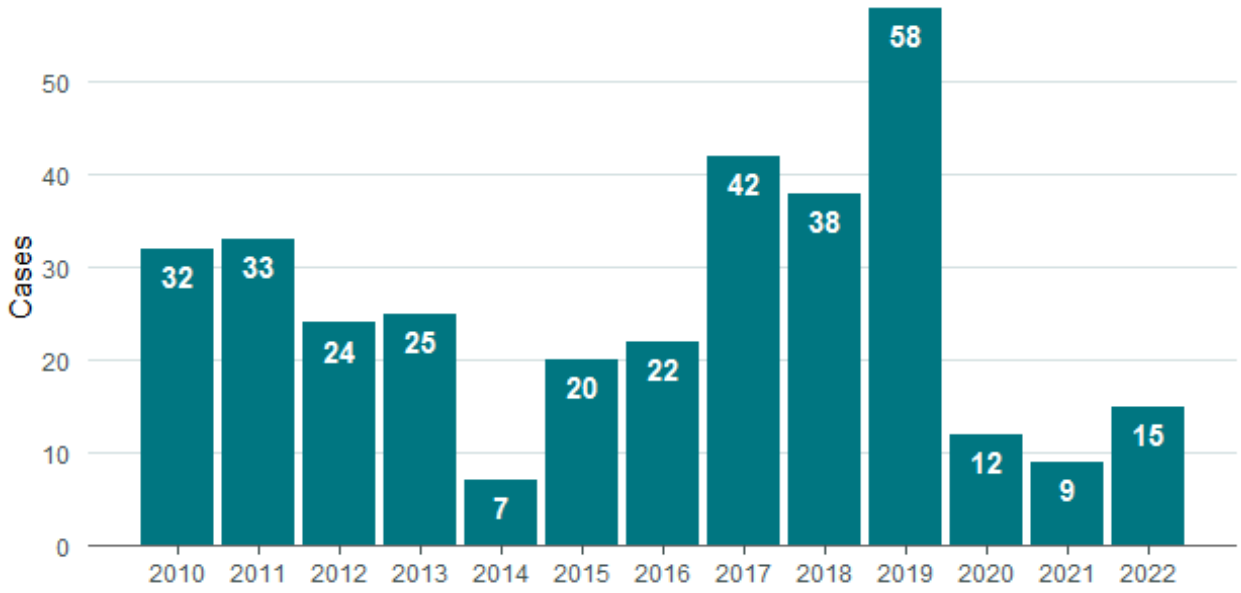


Figure 51: Meningococcal disease cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 51 shows the number of meningococcal disease cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were slightly above 2021 and 2020, although significantly fewer than pre-COVID levels, with 15 cases in 2022 compared to 58 cases in 2019.

In 2022, cases were more common over winter, with seven cases between June and August 2022 (Figure 52).

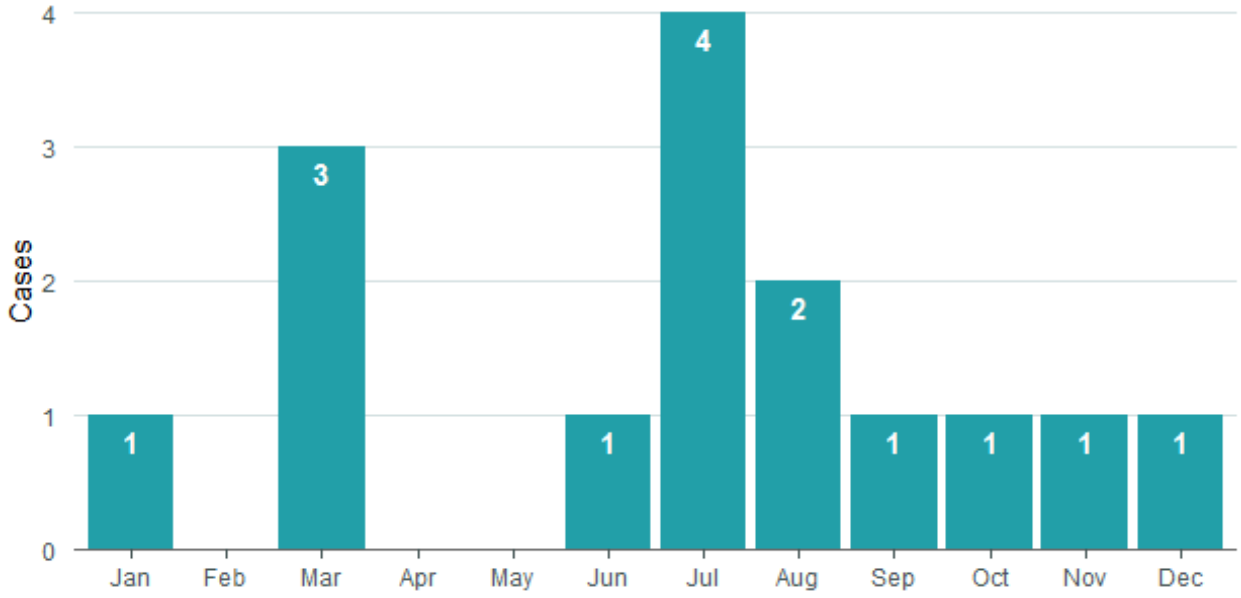


Figure 52: Meningococcal disease cases in the Auckland region 2022 by month

Source: EpiSurv

Table 78: Age-specific incidence rates for meningococcal disease in the Auckland region 2022

Age group	Cases	Rate per 100,000
Age under 1	7	33.0
1 to 4	2	2.4
5 to 9	1	0.9
10 to 14	1	0.9
15 to 19	0	-
20 to 29	1	0.4
30 to 39	1	0.4
40 to 49	0	-
50 to 59	1	0.5
60 to 69	1	0.6
Age 70+	0	-
Total	**15**	**0.9**

Source: EpiSurv, Stats NZ

Tables 78 and 78 show the age and ethnic group distribution of meningococcal disease cases for 2022. Cases were highest among the ‘under 1’ and ‘1 to 4’ age groups, with 33.0 and 2.4 cases per 100,000 population, respectively. Ethnic group-specific incidence rates were highest among Māori followed by Pacific Peoples, with 2.4 and 2.1 cases per 100,000 population, respectively.

Table 79: Ethnic group-specific incidence rates for meningococcal disease in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	5	2.4
Pacific Peoples	5	2.1
Asian	3	0.6
European and Other	2	0.3
Total	**15**	**0.9**

Source: EpiSurv, Stats NZ

In 2022, the majority of cases were due to group B, subtype P1.7-12,14, which is consistent with previous years (Table 80).

Table 80: Meningococcal disease cases in the Auckland region by group and PorA subtype

Subtype	B	W	Not groupable	Unknown	Total
P1.7-12,14	5	0	1	0	**6**
P1.5,2	1	1	0	0	**2**
P1.7-2,4	2	0	0	0	**2**
P1.22,14	1	0	0	0	**1**
Not recorded	0	0	1	3	**4**
Total	**9**	**1**	**2**	**3**	**15**

Source: EpiSurv

3.6.6 Mumps

Mumps is a viral infection that causes swelling in the glands and around the face. Mumps is spread through the air by breathing, coughing and sneezing, or through contact with infected saliva (i.e. kissing, sharing food and drink). People with the illness may also experience jaw pain, fever and headache, although a third of infected people may be asymptomatic.

Complications of mumps include hearing loss, pancreatitis, encephalitis, meningitis, mastitis, orchitis and oophoritis.

Prior to the introduction of the measles-mumps-rubella (MMR) vaccine in NZ in 1990, mumps epidemics occurred every three to five years. The most recent outbreak in the Auckland region

occurred in 2017-18, with over 1,300 cases recorded. Everyone in NZ born in 1969 onwards is eligible for free MMR vaccination.

There were no cases of mumps in the Auckland region in 2022. While 104 suspected cases were notified to ARPHS, none met the definition for a confirmed or probable case. The last case in the Auckland region was reported in 2020.

3.6.7 Pertussis

Pertussis (whooping cough) is a bacterial infection that causes a long coughing illness. Transmission usually occurs through respiratory, oral or nasal secretions, such as from coughing or sneezing, but may occur through indirect spread via contaminated objects.

Infection often involves a blocked or runny nose, fever, sneezing and coughing fits. The cough may be followed by vomiting, cyanosis or apnoea and a 'whoop' sound may be heard between these fits.

Pertussis infection can be very serious for babies and children, particularly those who are too young to be fully immunised. Other high-risk people include those with immune deficiency states, chronic respiratory conditions or congenital heart diseases.

All babies in NZ can be immunised against pertussis as part of their free childhood immunisations. Pregnant women should also be immunised as this protects the baby until it is old enough to be vaccinated.

- There was one case of pertussis in the Auckland region in 2022.
- There was one hospitalisation and no deaths.
- The incidence rate for the Auckland region was 0.1 cases per 100,000. For the rest of NZ it was 0.3 cases per 100,000.

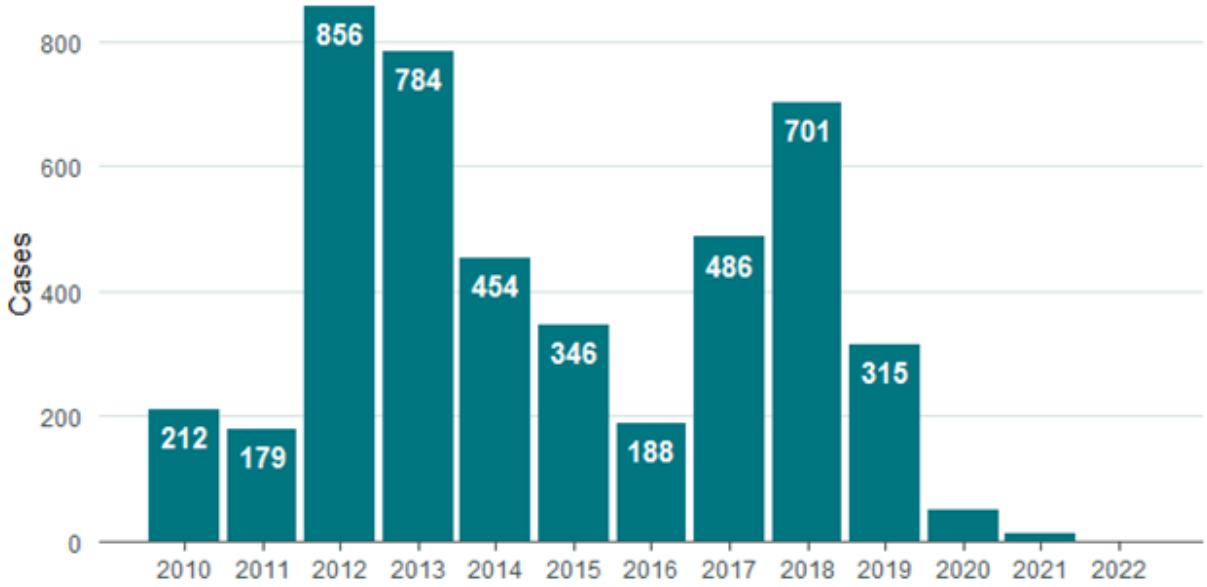


Figure 53: Pertussis cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 53 shows the number of pertussis cases in the Auckland region between 2010 and 2022. Case numbers were slightly lower than 2021 and 2020, when there were 12 and 51 cases, respectively. These numbers are significantly lower than pre-COVID years when there were regularly several hundred cases per year.

3.6.8 Rubella

Rubella (also known as German measles) is a viral infection characterised by a generalised maculopapular rash and fever. Some people may also experience arthralgia, arthritis, lymphadenopathy or conjunctivitis. Transmission occurs through contact with respiratory droplets, such as through coughing and sneezing.

Up to 50% of people with rubella have no symptoms, while most others will only have symptoms for a few days. However, if caught during pregnancy, the virus can lead to serious birth defects, stillbirth or miscarriage.

Rubella immunisation was introduced into NZ in 1970, with the last large outbreak occurring in 1995-1996. The measles-mumps-rubella vaccine is free for all children and non-immune pregnant women.

There were no cases of rubella in the Auckland region in 2022. While three suspected cases were notified to ARPHS, none met the definition for a confirmed or probable case. The last case in the Auckland region was reported in 2019.

3.7 Notifiable diseases not elsewhere classified

'Notifiable diseases not elsewhere classified' refers to notifiable diseases that are otherwise unable to be grouped. This includes COVID-19, mpox (monkeypox), rheumatic fever and the mycobacterial diseases leprosy and TB.

Table 81: Notifiable diseases not otherwise classified in the Auckland region 2022

Disease	Total notifications	Total cases (%)	Rate per 100,000	Hospitalisations (%)	Deaths (%)
COVID-19	-	681,817	39,702	15,481 (2.3)	617 (0.1)
Leprosy	0	0	-	-	-
Mpox	45	27 (60.0)	1.6	3 (11.1)	0
Rheumatic fever (initial attack)	42	35 (83.3)	2.0	35 (100.0)	0
Rheumatic fever (recurrent)	6	3 (50.0)	0.2	3 (100.0)	0
TB disease (new case)	174	131 (75.3)	7.6	83 (63.4)	8 (6.1)
TB disease (relapse or reactivation)	4	3 (75.0)	0.2	2 (66.7)	0
TB infection (on preventive treatment)	3	1 (33.3)	0.1	0	0
Total*	**274**	**203 (74.1)**	**11.8**	**129 (63.5)**	**8 (0.1)**

Source: EpiSurv, Stats NZ

*Excluding COVID-19

In 2022, ARPHS received a total of 274 notifications for notifiable diseases not elsewhere classified, excluding COVID-19 (Table 81). Of these, 203 (74.1%) met the criteria for a confirmed or probable case.

COVID-19 represented the majority of notifications, with 681,817 cases, 15,481 hospitalisations and 617 deaths.

Of cases other than COVID-19, 66.5% were due to tuberculosis (TB), with 135 cases across three disease categories (new case, relapse or reactivation, on preventive treatment).

While most hospitalisations occurred for TB (85 cases hospitalised), the highest rate of hospitalisation was seen for rheumatic fever, with all 41 cases (100%) hospitalised. There were 8 deaths, all due to TB (CFR 6.1%).

There were no cases of leprosy recorded in 2022.

3.7.1 COVID-19

COVID-19 is a viral infection caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2 coronavirus). Coronaviruses are a large family of viruses that cause illnesses such as the common cold.[35] Other recent diseases caused by coronaviruses include severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS). Like these, SARS-CoV-2 likely originated in animals and recently came to infect humans.

A COVID-19 pandemic was declared by WHO on 11 March 2020. The virus has since undergone genetic mutations over time, with some of the newer variants spreading more easily than the original virus.

SARS-CoV-2 is transmitted through contact with respiratory particles (large droplets or smaller aerosols) via breathing, speaking, coughing or sneezing. While most people with COVID-19 experience a mild flu-like illness, older people, ethnic minorities and those with underlying medical conditions are at higher risk of severe illness from the virus. Some people who have had the virus suffer health impacts longer than a few weeks or months. This is commonly referred to as ‘long COVID’.

- There were 681,817 cases of COVID-19 in the Auckland region in 2022.
- There were 15,481 hospitalisations, including 484 intensive care unit visits.
- There were 617 deaths.
- The incidence rate for the Auckland region was 39,637 cases per 100,000. For the rest of NZ it was 41,710 cases per 100,000. In 2022, Aucklanders contracted

[35] Te Whatu Ora - Health New Zealand. (2022). *What is COVID-19.* Retrieved 11 May, 2023, from https://covid19.govt.nz/prepare-and-stay-safe/about-covid-19/what-is-covid-19.

COVID-19 at a similar rate to other New Zealanders, compared to 2021 when they were around 13 times more likely to develop the disease than other New Zealanders.

Table 82: COVID-19 cases in the Auckland region 2020 to 2022

Year	Cases
2020	1,068
2021	10,474
2022	681,817

Source: EpiSurv

Table 82 shows the number of COVID-19 cases in the Auckland region between 2020 and 2022. Case numbers for 2022 were significantly higher than 2021 and 2020, which is largely attributed to the arrival of the much more infectious Omicron variant combined with the reopening of NZ's international borders.

January 2022 saw the lowest COVID-19 cases for the year before numbers rapidly increased following the establishment of Omicron in the community (Figure 54).[36]

Significant changes to testing and reporting were introduced in February 2022, with individuals required to perform rapid antigen tests (RATs) at home and self-report a positive test to the Ministry of Health. The requirement for vaccinated NZ citizens to undergo managed isolation and quarantine upon returning to the country was also removed at this time.

Cases in the Auckland region peaked in March 2022, with approximately 175,000 cases reported during this month. Around this time indoor and outdoor gathering limits were relaxed and vaccine requirements were lifted in most workplaces, businesses and venues.

April saw the border reopen to fully vaccinated Australian citizens, followed by other visa-waiver holders and non-vaccinated Australians from July 2022. A spike in cases was recorded around this time, with 84,000 new cases in the Auckland region for July.

Auckland region cases reached their second lowest level in September, with 18,000 new cases recorded for the month. The country fully reopened its borders to all international travellers in October, and by December monthly border crossings had increased to nearly

[36] Auckland Policy Commons. (n.d.). *Covid-19 Timeline 2022.* Retrieved 24 July 2023, from https://www.policycommons.ac.nz/covid-19-policy-resources/covid-19-timeline/covid-19-timeline-2022/.

400,000 for the country. At this time Auckland region cases had reached 54,000 for the month.[37]

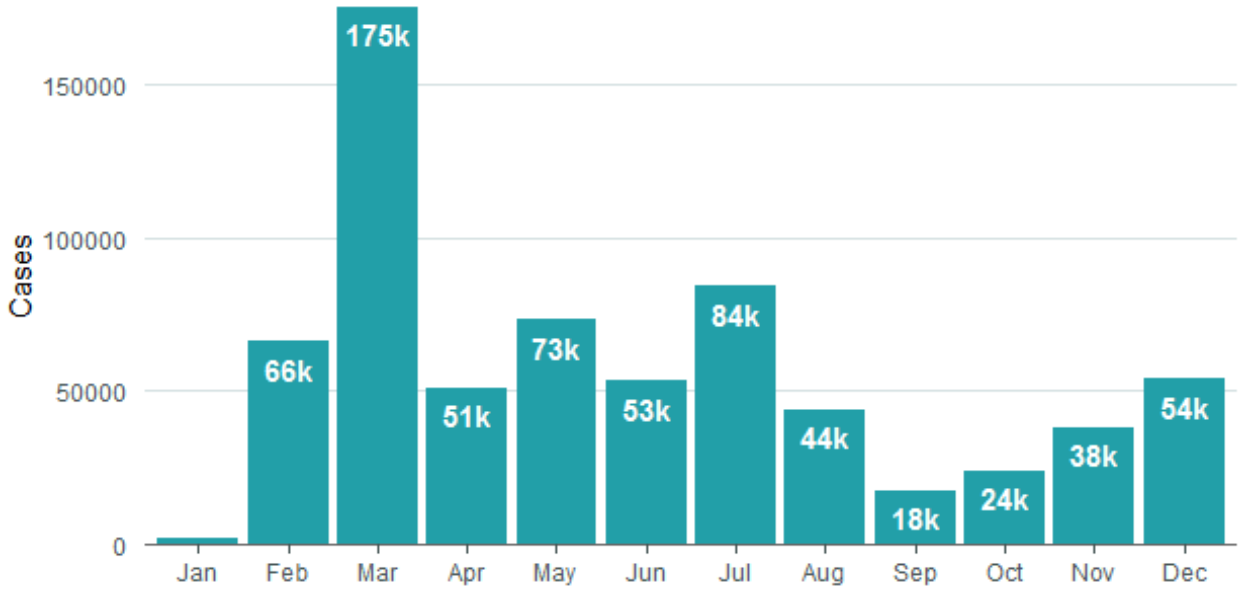


Figure 54: COVID-19 cases in the Auckland region 2022 by month

Source: EpiSurv

Table 83: Age-specific incidence rates for COVID-19 in the Auckland region 2022

Age group	Cases	Rate per 100,000
Age under 1	5,386	25,386
1 to 4	21,477	25,307
5 to 9	34,266	30,445
10 to 14	41,502	35,845
15 to 19	47,112	43,865
20 to 29	125,670	51,037
30 to 39	129,441	47,217
40 to 49	103,626	46,346
50 to 59	82,345	38,321
60 to 69	50,864	31,134
Age 70+	40,128	25,700

[37] Stats NZ. (2023). *Border crossings take off in 2022*. Retrieved 4 July 2023, from https://www.stats.govt.nz/news/border-crossings-take-off-in-2022/.

Age group	Cases	Rate per 100,000
Total	**681,817**	**39,636**

Source: EpiSurv, Stats NZ

Rates of COVID-19 were highest among the '20 to 29', '30 to 39' and '40 to 49' age groups, with the lowest rates observed for children aged under 10 years (Table 83). This pattern differs from 2021, when higher rates were seen for those aged under 30 years compared to those in older age groups.

Table 84 shows the ethnic group-specific incidence rates for COVID-19 in 2022. Information around ethnicity was unavailable for over 20% of cases, therefore this data may not necessarily reflect the true incidence among each population group.

The highest incidence of COVID-19 was seen for European and Other, with just over 35,000 cases per 100,000 population. Pacific Peoples had the second lowest rate, with over 31,000 cases per 100,000 population, followed by Asian with over 30,000 cases per 100,000 population.

The lowest incidence of COVID-19 was observed among Māori, with around 23,000 cases per 100,000 population. However, this pattern differs markedly from 2021 when Māori experienced significantly higher rates of disease compared to other ethnic groups, therefore it is likely this figure underestimates the true burden of disease in this group.

Table 84: Ethnic group-specific incidence rates for COVID-19 in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	48,273	23,267.5
Pacific Peoples	75,591	31,151.0
Asian	146,396	30,037.3
European and Other	273,621	35,088.2
Unknown	137,936	-
Total	**681,817**	**39,702.4**

Source: EpiSurv, Stats NZ

Figure 55 shows the changes in circulating variants and subvariants of COVID-19 in NZ for 2022. While the Delta variant was the predominant strain at the beginning of 2022, this was soon replaced by the more transmissible variant, Omicron, and its associated subvariants BA.1 and BA.2. Subvariants BA.4 and BA.5 emerged towards the middle of the year, followed by XBB, XBB.1.5, CH.1.1 and the recombinant subvariants. By the end of 2022, the most common subvariant was CH.1.1.

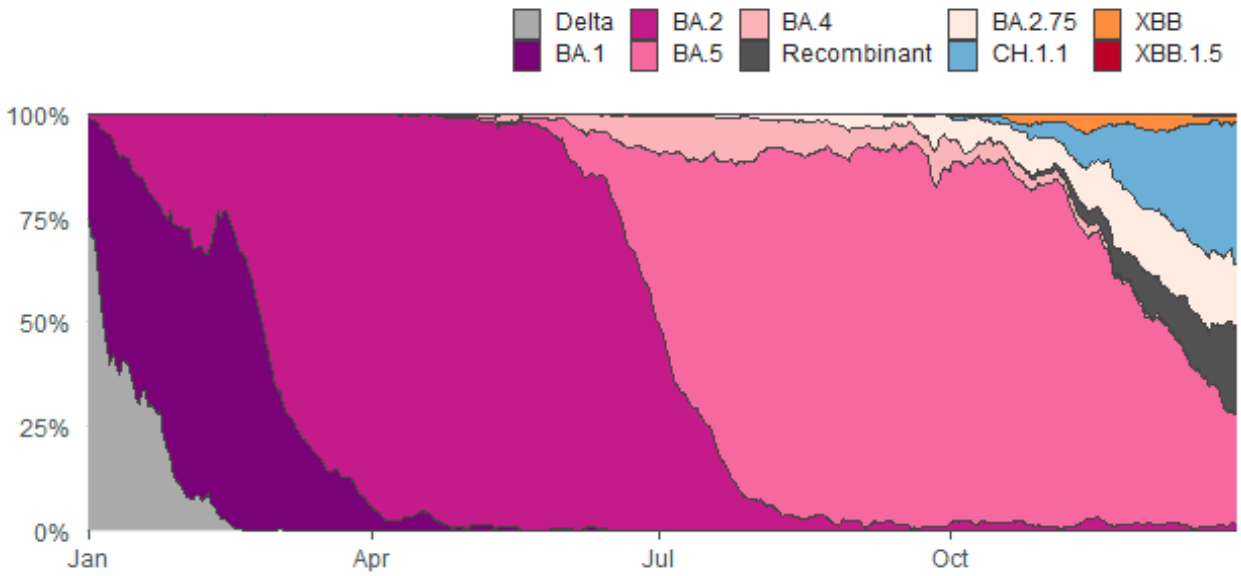


Figure 55: COVID-19 cases in New Zealand by variant 2022

Source: github.com/ESR-NZ/nz-sars-cov2-variants

3.7.2 Leprosy

Leprosy, also known as Hansen's disease, is a chronic disease caused by the bacterium *Mycobacterium leprae*. Transmission most likely occurs through close contact with an infected person's respiratory secretions or skin lesions. Transplacental transmission is thought to be responsible for cases under one year of age.

The disease is characterised by anaesthetic (numb) skin lesions and nerve enlargements, with the most severe forms involving widespread papules and nodules around the face and ears as well as peripheral neuropathy in one or more nerves.

All cases of leprosy in NZ have occurred in individuals who have contracted the disease overseas.

There were no cases of leprosy notified in 2022. The last case in the Auckland region was reported in 2021.

3.7.3 Mpox

Mpox (formerly monkeypox) is an infection caused by the mpox virus. The disease is endemic in Central and West Africa, where transmission to humans is typically from rodents and certain species of monkey. However, the virus may also be spread via close contact with skin lesions, body fluids, respiratory droplets and contaminated materials.

Infection often involves a prodrome with fever, aches and lymphadenopathy, followed by a characteristic centrifugal rash with lesions appearing on the face and moving to the distal extremities. The rash progresses through four stages from macules to papules, vesicles then pustules, followed by scabbing.

There are two clades of mpox, Clades I and II. The CFR for Clade II is around 1%, while for Clade I this is around 10%. A global outbreak due to Clade IIb was declared in May 2022, with cases reported in all WHO regions.[38] In late 2022, WHO recommended a change in name to 'mpox' to avoid racist and stigmatising language associated with the former name.

- There were 27 mpox cases in the Auckland region in 2022.
- There were three hospitalisations and no deaths.
- The incidence rate for the Auckland region was 1.6 cases per 100,000. For the rest of NZ it was 0.4 cases per 100,000.

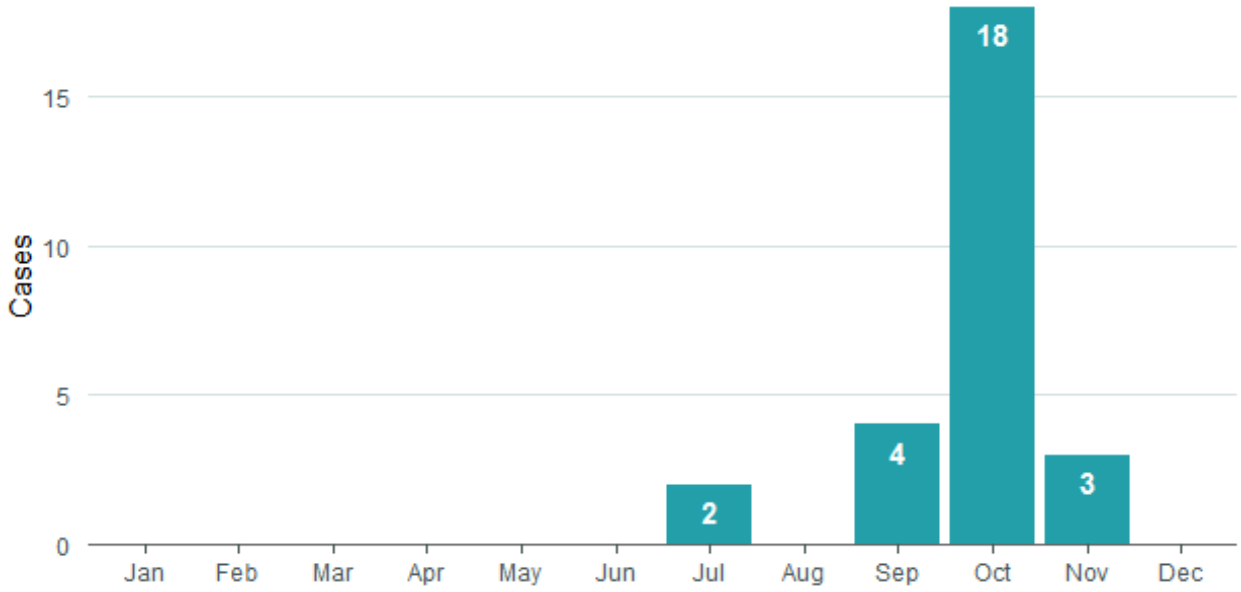


Figure 56: Mpox cases in the Auckland region 2022 by month

Source: EpiSurv

Before 2022 there had never been a case of mpox reported in the Auckland region. Following the declaration of a global outbreak of mpox by the WHO in May 2022, Auckland saw a steady influx of cases from July, peaking in October 2022 with 18 cases (Figure 56). Numbers dropped considerably in November, largely due to the successful rollout of the mpox vaccine in Europe and North America which improved herd immunity and significantly slowed transmission of the disease.

Table 85: Mpox cases in the Auckland region by age group and sex 2022

Age group	Female	Male	Cases
Age under 19	0	0	0
20 to 29	0	5	5
30 to 39	0	14	14

[38] World Health Organisation. (2022). *WHO recommends new name for monkeypox disease*. Retrieved 8 June 2023, from https://www.who.int/news/item/28-11-2022-who-recommends-new-name-for-monkeypox-disease.

Age group	Female	Male	Cases
40 to 69	0	8	8
Age 70+	0	0	0
Total	**0**	**27**	**27**

Source: EpiSurv, Stats NZ

Tables 85 and 86 show the age and ethnic group distribution of mpox cases for 2022. All 27 cases occurred in males between the age of 20 and 69, with the highest numbers observed for males aged 30 to 39. Age groups 40 to 49, 50 to 59 and 60 to 69 have been merged to protect confidentiality.

Ethnic group-specific incidence rates were highest among European and Other followed by Māori, with 2.3 and 1.9 cases per 100,000 population, respectively.

Table 86: Ethnic group-specific incidence rates for mpox in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	4	1.9
Pacific Peoples	2	0.8
Asian	3	0.6
European and Other	18	2.3
Total	**27**	**1.6**

Source: EpiSurv, Stats NZ

Table 87 provides further detail on the travel history of mpox cases during their exposure period. 21 cases were considered to be due to community spread, with no recent travel reported.

Table 87: Recent travel history of mpox cases in the Auckland region 2022

Travel history	Cases
Overseas travel reported	14
No overseas travel reported	21

Source: EpiSurv

3.7.4 Rheumatic fever

Rheumatic fever is an autoimmune consequence of a throat infection caused by Streptococcus pyogenes (also known as Group A Streptococcus or GAS). While most ‘strep throat’ infections

resolve on their own, a small number of people will develop rheumatic fever if the infection remains untreated.[39]

Acute infection usually develops several weeks following a sore throat and may include fever, rash (erythema marginatum), subcutaneous nodules, arthritis/arthralgia or unusual jerky movements (chorea). Even one attack of rheumatic fever can lead to rheumatic heart disease, which involves permanent scarring of the heart valves.

The incidence of rheumatic fever in NZ is higher than in comparable countries, with Māori and Pacific children and young people at the highest risk of disease.

Recurrent rheumatic fever (any episode of acute rheumatic fever after the first) is reported separately as it is an indicator of the quality of services and healthcare for people who have had an initial attack.

- There were 38 cases of rheumatic fever (initial attack) and three cases of recurrent rheumatic fever in the Auckland region in 2022.
- All cases were hospitalised and there were no deaths.
- The incidence rate for rheumatic fever (initial attack) in the Auckland region was 2.0 cases per 100,000. For the rest of NZ it was 0.7 cases per 100,000.

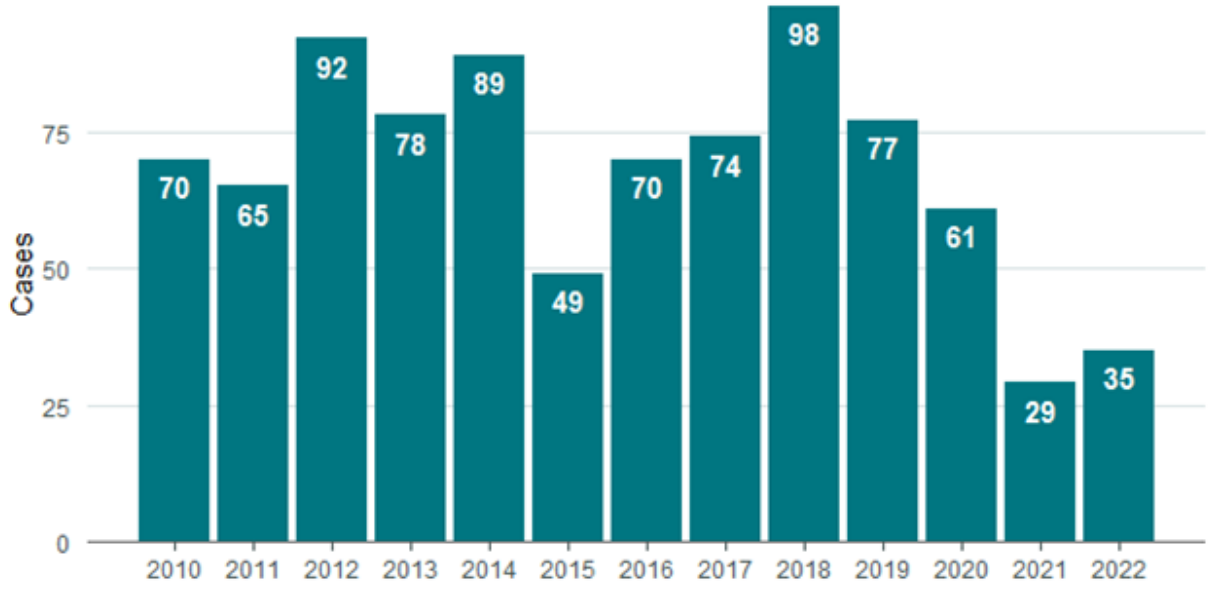


Figure 57: Rheumatic fever (initial attack) cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 57 shows the number of rheumatic fever (initial attack) cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were slightly above 2021 but significantly lower than 2020 and pre-COVID years.

[39] Te Whatu Ora. (2022). *Rheumatic Fever*. Retrieved 29 May 2023, from https://www.tewhatuora.govt.nz/keeping-well/health-info-for-public/diseases-and-conditions/rheumatic-fever/.

In 2022, cases were more common in late winter and early spring, with six cases reported for August and September and five for October (Figure 58).

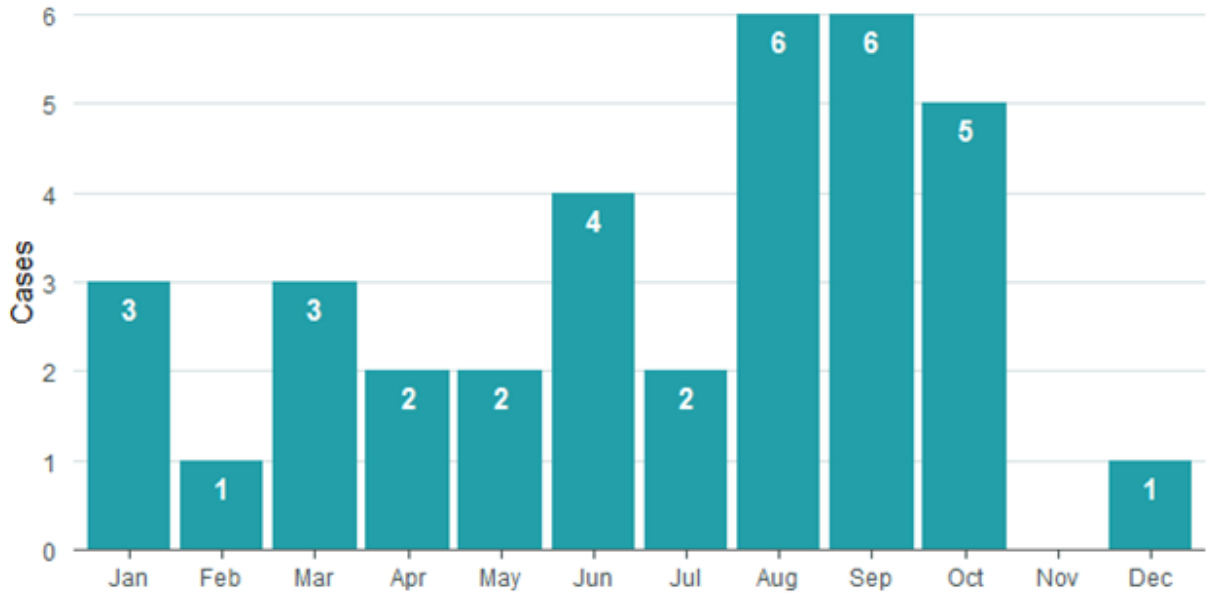


Figure 58: Rheumatic fever (initial attack) cases in the Auckland region 2022 by month

Source: EpiSurv

Table 88: Rheumatic fever (initial attack) cases in the Auckland region 2022 by age group

Age group	Cases	Rate per 100,000
Age under 1	0	-
1 to 4	0	-
5 to 9	14	12.4
10 to 14	11	9.5
15 to 19	0	-
20 to 29	7	2.8
30 to 39	2	0.7
40 to 49	1	0.4
50 to 59	0	-
60 to 69	0	-
Age 70+	0	-
Total	**35**	**2.0**

Source: EpiSurv, Stats NZ

Tables 88 and 89 show the age and ethnic group distribution of rheumatic fever (initial attack) cases for 2022. Cases were highest among the '5 to 9' and '10 to 14' age groups, with 12.4 and 9.5 cases per 100,000 population, respectively.

Ethnic group-specific incidence rates were highest among Māori followed by Pacific Peoples, with 9.2 and 6.6 cases per 100,000 population, respectively. Of the Pacific cases, 15 identified as Samoan, three as Tongan, one as Cook Islands Māori and one as Tuvalu Islander (Table 90).

Table 89: Ethnic group-specific incidence rates for rheumatic fever (initial attack) in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	19	9.2
Pacific Peoples	16	6.6
Asian	0	-
European and Other	0	-
Total	**35**	**2.0**

Source: EpiSurv, Stats NZ

Table 90: Detailed ethnicity counts for rheumatic fever (initial attack) in the Auckland region 2022

Detailed ethnicity (total response)	Cases
Māori	19
Samoan	15
Tongan	3
Cook Islands Māori	1
Chinese	1
Indian	1
Tuvalu Islander	1

Source: EpiSurv

Table 91: Incidence rates for rheumatic fever (initial attack) in the Auckland region 2022 by health district

District	Cases	Rate per 100,000
Auckland	5	1.0
Counties Manukau	24	4.0
Waitematā	6	0.9
Total	**35**	**2.0**

Source: EpiSurv, Stats NZ

The incidence rate for cases in the Counties Manukau health district was 4.0 per 100,000 population, with 68.6% of cases residing in this area (Table 91). Figure 59 shows the rheumatic fever (initial attack) cases for the Auckland region by deprivation index. In 2022, 74.3% of cases occurred in Auckland's most deprived areas (deciles 8, 9 and 10).

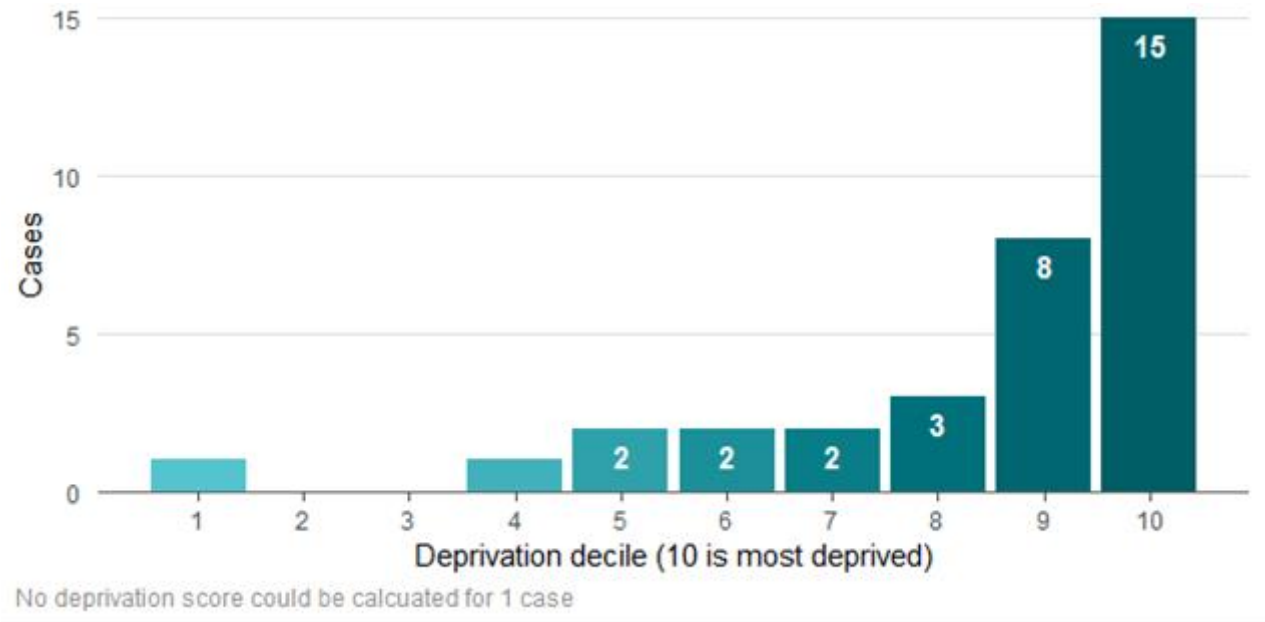


Figure 59: Rheumatic fever (initial attack) cases by deprivation index in the Auckland region 2022

Source: EpiSurv, Stats NZ

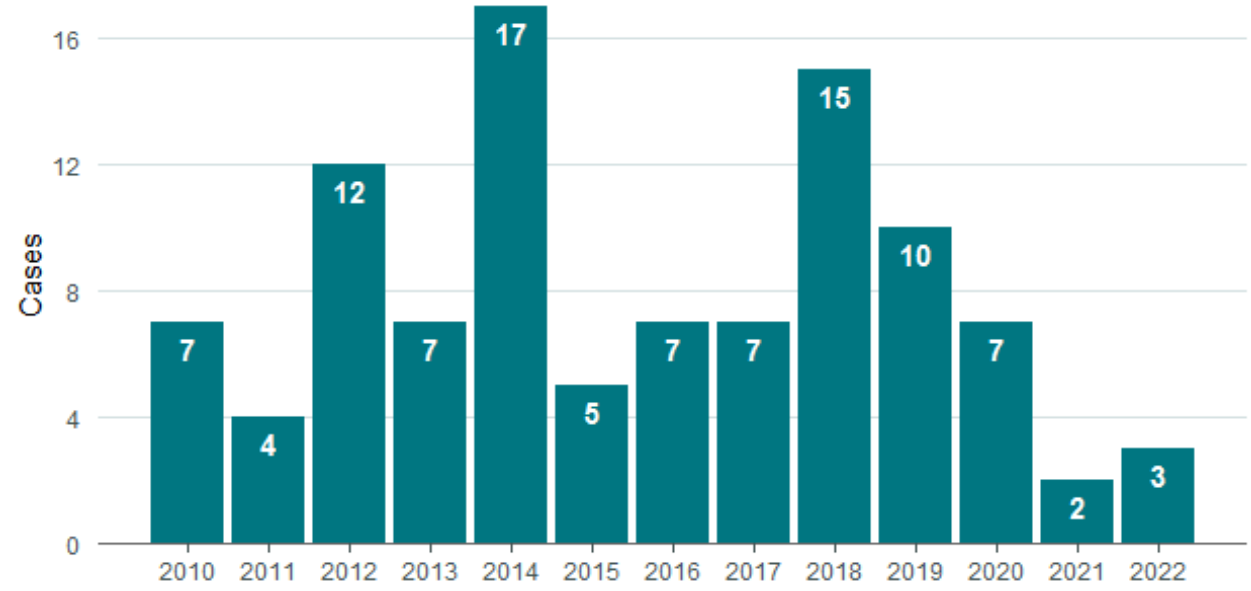


Figure 60: Recurrent rheumatic fever cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 60 shows the number of recurrent rheumatic fever cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were slightly higher than 2021 but well fewer than 2020 and pre-COVID levels.

Table 92: Age-specific incidence rates for recurrent rheumatic fever in the Auckland region 2022

Age group	Cases	Rate per 100,000
Age under 1	0	-
1 to 4	0	-

Age group	Cases	Rate per 100,000
5 to 9	0	-
10 to 14	1	0.9
15 to 19	1	0.9
20 to 29	1	0.4
30 to 39	0	-
40 to 49	0	-
50 to 59	0	-
60 to 69	0	-
Age 70+	0	-
Total	**3**	**0.2**

Source: EpiSurv, Stats NZ

Tables 92 and 93 show the age and ethnic group distribution of recurrent rheumatic fever cases for 2022. Cases were highest among the '10 to 14' and '15 to 19' age groups, with 0.9 cases per 100,000 population for both groups. Ethnic group-specific incidence rates were highest among Māori followed by Pacific Peoples, with 1.0 and 0.4 cases per 100,000 population, respectively.

Table 93: Ethnic group-specific incidence rates for recurrent rheumatic fever in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	2	1.0
Pacific Peoples	1	0.4
Asian	0	-
European and Other	0	-
Total	**3**	**0.2**

Source: EpiSurv, Stats NZ

3.7.5 Tuberculosis disease

TB is a bacterial infection caused by *Mycobacterium tuberculosis* complex, including *M. tuberculosis* or *M. bovis*. TB is spread through the air when a person with active TB disease of the lungs or throat coughs, sneezes or spits.[40] When other people breathe in these germs, they can become infected. Most people are exposed to TB through people they spend a lot of time

[40] NSW Health. (2022). *Tuberculosis.* Retrieved 25 July 2023, from https://www.health.nsw.gov.au/Infectious/factsheets/Pages/tuberculosis.aspx.

with, such as a family member or friend. Only 20-30% of people who are exposed to the bacteria will become infected.

In some situations, an initial TB infection can progress to active TB within 6 months – usually children under five years or immunocompromised people. In most people with TB infection, the body's defences control the germs which can stay alive in a dormant or inactive state. This is known as latent TB infection. People with latent TB infection are not infectious and cannot spread TB to others.

In some people (around 10% of those infected), TB bacteria overcome the body's immune defences, resulting in progression from latent TB infection to active TB disease. Around half of these people will develop active TB disease within two years, while the other half will develop active disease many years later. Risk factors for progression include ageing, chronic illnesses including HIV, immunosuppression and stressful events.

Active TB disease most commonly affects the lungs, but can also affect the brain, lymph nodes, bones, joints and kidneys. Only people with TB disease of the lungs or throat are infectious to others. Symptoms of active TB disease include cough, haemoptysis, fevers, night sweats, weight loss, lethargy, anorexia and pain or swelling in the affected area.

Active TB disease is treated with a combination of antibiotics for at least six months. Those with TB disease of the lungs and throat are isolated until they are no longer infectious. Those with latent TB infection may be offered a course of preventive treatment.

For surveillance purposes, TB disease is classified into four groups: new case, relapse or reactivation, latent TB infection (LTBI) or old disease on preventive treatment. 'New case' refers to active TB in a person who has never been treated for TB before or has active disease from a new genotype. 'Relapse or reactivation' refers to active TB in a person whose tuberculosis has been non-infectious or quiescent following full, partial or no treatment. LTBI refers to a person with a positive Mantoux test, Mantoux conversion or positive interferon-gamma release assay (IGRA) test with no evidence of active disease. Old disease on preventive treatment refers to a person who may have had active disease in the past, and treatment is given preventatively because there is concern about the possibility of relapse.

- There were 131 new TB cases reported in the Auckland region in 2022.
- In addition, there were three cases of TB relapse or reactivation and one case of TB disease on preventive treatment.
- There were 85 hospitalisations and eight deaths.
- The incidence rate for new TB cases in the Auckland region was 7.6 cases per 100,000. For the rest of NZ it was 2.0 cases per 100,000.

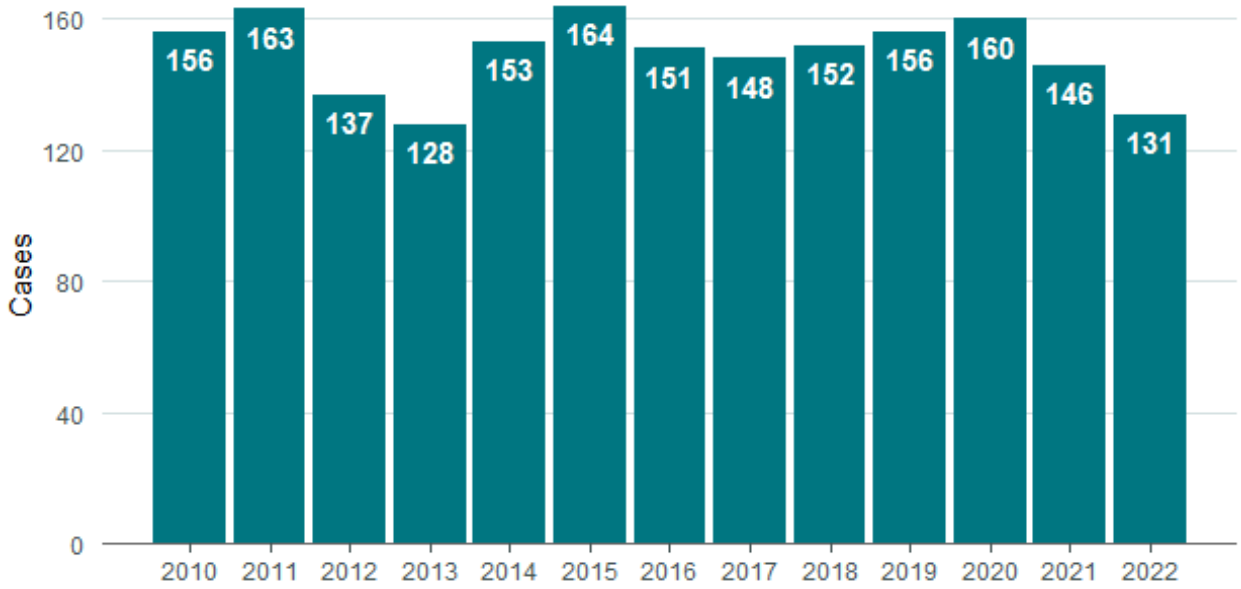


Figure 61: New TB cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 61 shows the number of new TB cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were slightly fewer than 2021 and 2020, and only slightly fewer than pre-COVID levels, with an average of 150 cases reported per year for the preceding 12 years.

Table 94: Tuberculosis type for new Auckland region cases in 2022

TB type	Cases
Pulmonary*	76
Extrapulmonary	55
Total	**131**

Source: EpiSurv

Includes 26 cases with extrapulmonary disease

In 2022, 50 (38.2%) cases were pulmonary only, 55 (42.0%) were extrapulmonary only and 26 (19.8%) were both (Table 94).

Table 95: Age-specific incidence rates for new TB cases in the Auckland region 2022

Age group	Cases	Rate per 100,000
Age under 1	0	-
1 to 4	3	3.5
5 to 9	0	-
10 to 14	1	0.9
15 to 19	1	0.9

Age group	Cases	Rate per 100,000
20 to 29	19	7.7
30 to 39	33	12.0
40 to 49	22	9.8
50 to 59	13	6.0
60 to 69	16	9.8
Age 70+	23	14.7
Total	**131**	**7.6**

Source: EpiSurv, Stats NZ

Tables 95 and 96 show the age and ethnic group distribution of new TB cases for 2022. Cases were highest among the '30 to 39' and '70+' age groups, with 12.0 and 14.7 cases per 100,000 population, respectively.

Ethnic group-specific incidence rates were highest among Asian followed by Pacific Peoples, with 20.7 and 4.9 cases per 100,000 population, respectively. Detailed ethnicity information is shown in Table 97, with the most commonly reported ethnicities being Indian (36 cases), Filipino (27 cases) and Chinese (12 cases).

Of the 131 new TB cases, 115 (87.8 %) were born outside of NZ. The most common countries of birth were India (36 cases), Philippines (27 cases) and China (12 cases, Table 98).

Table 96: Ethnic group-specific incidence rates for new TB in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	7	3.4
Pacific Peoples	12	4.9
Asian	101	20.7
European and Other	10	1.3
Unknown	1	-
Total	**131**	**7.6**

Source: EpiSurv, Stats NZ

Table 97: Detailed ethnicity counts for TB in the Auckland region 2022

Detailed ethnicity (total response)	Cases
Indian	36
Filipino	27
Chinese	12

Detailed ethnicity (total response)	Cases
Māori	7
Samoan	6
Vietnamese	5
Afghani	4
Indonesian	3
Tuvalu Islander	3
Fijian (except Fiji Indian/Indo-Fijian)	2
Korean	2
NZ European	2
Southeast Asian NFD	2
Sri Lankan NFD	2
Thai	2
Tongan	2
Zimbabwean	2
Cook Islands Māori	1
Other*	17

Source: EpiSurv, Stats NZ

*Other consists of 17 ethnicities with one case each

Table 98: Birth countries of new TB cases in the Auckland region 2022

Birth country	Cases	Percent
India	36	27.4%
Philippines	27	20.6%
China	12	9.2%
Vietnam	5	3.8%
Afghanistan	4	3.1%
Indonesia	3	2.3%
Zimbabwe	3	2.3%
Fiji	2	1.5%
Malaysia	2	1.5%
Samoa	2	1.5%
South Africa	2	1.5%
South Korea	2	1.5%
Sri Lanka	2	1.5%

Birth country	Cases	Percent
Thailand	2	1.5%
Other*	11	8.3%
New Zealand	16	12.2%
Total	**131**	**100.0%**

Source: EpiSurv

*Other consists of 11 countries with one case each

Table 99 shows the ethnic group distribution of NZ-born new TB cases for 2022. For new TB cases born in NZ (16 cases, 12.2%), the largest proportion of notifications occurred among Māori (43.8%), followed by Pacific Peoples (37.5%), those in the European and Other ethnic groups (12.5%) and a small proportion in the Asian ethnic group (6.3%). Incidence rates were highest among Māori (3.4 cases per 100,000 population) and Pacific Peoples (2.5 per 100,000), followed by European and Other (0.3 per 100,000) and Asian (0.2 per 100,000) ethnic groups.

Table 99: Ethnic group specific incidence rates for New Zealand-born new TB cases in the Auckland region 2022

Ethnicity	Cases	Rate per 100,000
Māori	7	3.4
Pacific Peoples	6	2.5
Asian	1	0.2
European and Other	2	0.3
Total	**16**	**0.9**

Source: EpiSurv

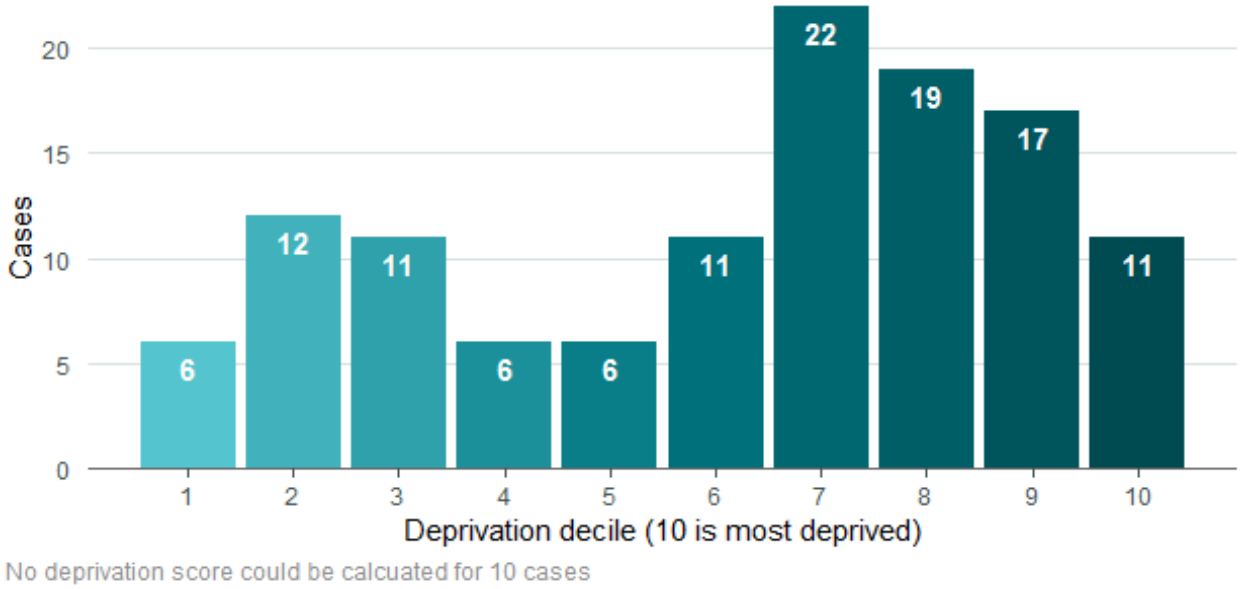


Figure 62: New TB cases in the Auckland region 2022 by NZ deprivation index

Source: EpiSurv, Stats NZ

The NZ Deprivation Index distribution of new TB cases is shown Figure 62. There remains a clear clustering of cases in more deprived areas, with 60% of cases occurring in deprivation deciles 7, 8, 9, and 10.

Of the 131 new cases in 2022, 12.2% were known to be a contact of a confirmed case either in NZ or overseas, while 72.5% had no known contact (Table 100). The remainder of cases (15.3%) were reported as unknown.

Table 100: New TB cases in the Auckland region 2022 by contact exposure

Contact status	Cases
Contact with confirmed case in NZ	6
Contact with confirmed case overseas	10
No known contact	95
Unknown	20
Total	**131**

Source: EpiSurv

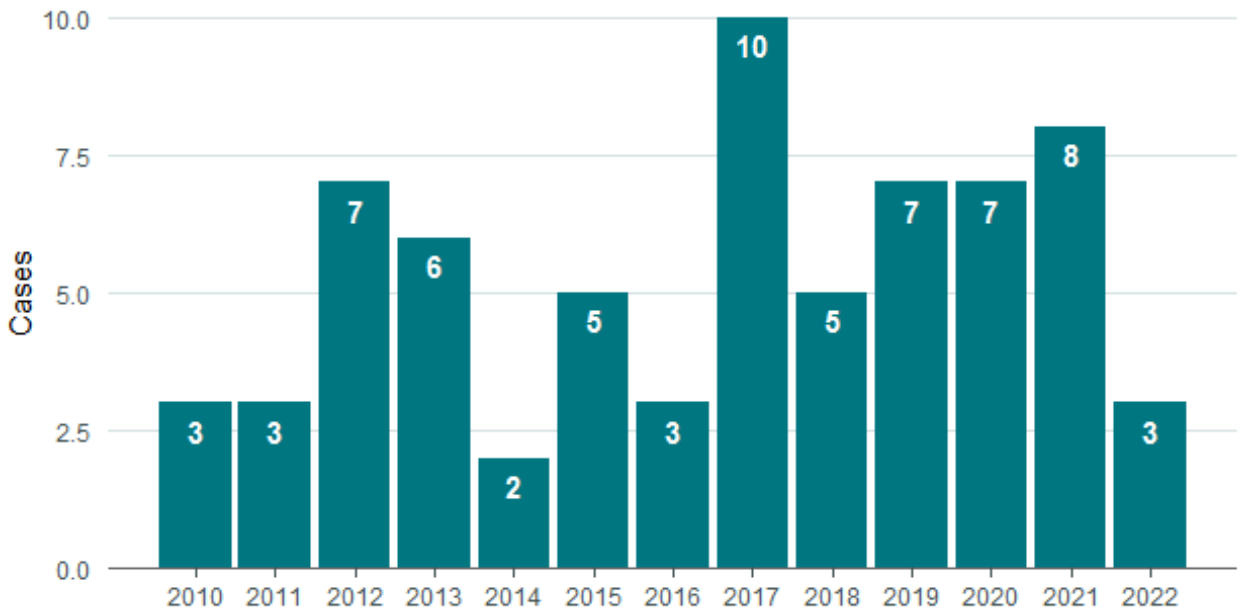


Figure 63: TB relapse or reactivation cases in the Auckland region 2010 to 2022

Source: EpiSurv

Figure 63 shows the number of TB relapse or reactivation cases in the Auckland region between 2010 and 2022. Case numbers for 2022 were slightly fewer than 2021 and 2020, with three cases for 2022 compared to eight cases for 2021 and seven cases for 2020.

3.8 Diseases under surveillance by other organisations

3.8.1 Acquired immunodeficiency syndrome

Acquired immunodeficiency syndrome (AIDS) describes the late stage of the spectrum of disease caused by HIV. In NZ, both AIDS and HIV are notifiable conditions. The number of people developing AIDS in NZ has declined since the mid-1990s as a result of improved treatments for people with HIV infection.

While HIV can be diagnosed using laboratory testing, AIDS is a clinical diagnosis. A person with HIV infection is said to have developed AIDS when one or more of a list of 25 AIDS-defining illnesses first develop.

Surveillance for HIV/AIDS is undertaken by the AIDS Epidemiology Group, Department of Preventive and Social Medicine at the University of Otago's Dunedin School of Medicine. For 2022 reporting please refer to **AIDS Epidemiology Group** on the University of Otago website.

3.8.2 Creutzfeldt-Jakob Disease

Creutzfeldt-Jakob Disease (CJD) is a rapidly progressive and universally fatal neurodegenerative disease. It is one of several human types of transmissible spongiform encephalopathies, a group of diseases caused by infectious protein particles known as prions.

Sporadic CJD accounts for up to 85% of cases and occurs at an incidence of 1-2 per million per year. Other forms of the disease include familial CJD (around 15% of cases), variant CJD (associated with bovine spongiform encephalopathy or 'mad cow disease') and iatrogenic CJD (typically transmitted via hormones or tissue from affected individuals).

There have been no cases of variant CJD recorded in NZ. The NZ CJD Registry, AIDS Epidemiology

Suspected and actual cases of CJD are required to be notified to the Medical Officer of Health, however, surveillance for this disease is undertaken by the New Zealand CJD Registry at the Dunedin School of Medicine. For 2022 reporting, please refer to the **NZ CJD Registry** on the University of Otago website.

3.8.3 Human immunodeficiency virus

Human immunodeficiency virus (HIV) is a viral infection that acts by depleting the body's normal immunological defence mechanisms. AIDS is the late stage of the spectrum of HIV disease.

Transmission occurs through direct contact with an infected person's blood or body fluids. HIV infections in NZ are mostly concentrated in men who have sex with men (MSM), heterosexually infected individuals from sub-Saharan Africa and South-East Asia and those who share contaminated injecting equipment.

HIV became notifiable in NZ in 2017.

Surveillance for HIV/AIDS is undertaken by the AIDS Epidemiology Group, Department of Preventive and Social Medicine at the University of Otago's Dunedin School of Medicine. For 2022 reporting please refer to **AIDS Epidemiology Group** on the University of Otago website.

3.8.4 Gonorrhoea

Gonorrhoea is a sexually transmitted infection caused by the bacterium Neisseria gonorrhoeae. Transmission is mostly through unprotected sex, although infected women can transmit the bacteria to their babies during childbirth.

Gonorrhoea is asymptomatic in around 50 percent of females and 5 percent of males. Symptoms include pelvic pain, abnormal vaginal or penile discharge, inter-menstrual bleeding, sore testicles, irritation of the inside of the penis, pain when urinating and rectal pain or bleeding. Babies who acquire the infection during childbirth may develop conjunctivitis.

Untreated infections can result in pelvic inflammatory disease, chronic pelvic pain, ectopic pregnancy and infertility. Treatment generally involves a course of antibiotics, although antimicrobial resistance in gonorrhoea has increased in recent years.

Surveillance for gonorrhoea is undertaken by ESR. For surveillance purposes, only laboratory-confirmed gonorrhoea is notifiable in NZ. For 2022 reporting please refer to **Sexually Transmitted Infection (STI) surveillance** on the ESR website.

3.8.5 Syphilis

Syphilis is a sexually transmitted infection caused by the bacterium Treponema pallidum. Transmission is mostly through unprotected sex, although infected women can transmit the bacteria to their babies during pregnancy.

The symptoms of syphilis depend on the stage of infection (primary, secondary and tertiary). Primary syphilis is characterised by an ulcer at the site of infection which may take up to 6 weeks to heal. The secondary stage is characterised by a rash on the palms and soles, lymphadenopathy, fever, hair loss, myalgia, arthralgia, headaches and lethargy and may persist for up to 6 months. Some people will progress to tertiary (late stage) syphilis after several years which can lead to multi-organ damage. Transmission during pregnancy may result in intrauterine foetal death, stillbirth or congenital syphilis.

Syphilis rates have been increasing in NZ since 2012, both in men who have sex with men (MSM) and in heterosexual men and women.

Surveillance for syphilis is undertaken by ESR. For 2022 reporting please refer to **Sexually Transmitted Infection (STI) surveillance** on the ESR website.

4. Outbreaks

Key points

- There were 103 outbreaks notified in the Auckland region in 2022, with a total of 1,426 associated cases. This represents the fewest outbreaks notified in any year since 2010.
- Enteric outbreaks were more commonly reported than non-enteric outbreaks (92 versus 11 outbreaks, respectively) and had a higher total number of cases (1,219 versus 207 cases, respectively). The median number of cases per outbreak was 10 for enteric outbreaks and four for non-enteric outbreaks.
- The most common outbreak settings were Early Childhood Education Centres (ECECs) (58 outbreaks), residential aged care facilities (16 outbreaks) and households (13 outbreaks).
- Norovirus was the most common cause of enteric outbreaks, representing around 40% of outbreaks and 20% of total cases.
- COVID-19 was the most common cause of non-enteric outbreaks, representing around 4% of outbreaks and 13% of total cases. COVID-19 outbreaks were only recorded by ARPHS until early February 2022. Responsibility for case and contact management was taken on by other health services once case numbers began to rise rapidly in February due to the Omicron strain.

Outbreaks are defined as localised increases in the occurrence of disease in excess of normally expected levels.[41] Disease outbreaks are often related to contaminated food or water, or to illness spread from person-to-person. Occasionally they will occur due to

[41] Hawke's Bay District Health Board. (n.d.). *Communicable Disease and Outbreaks*. https://www.ourhealthhb.nz/community-services/health-protection/communicable-disease-and-outbreaks/#diseaseoutbreaks.

environmental factors, such as *Legionella* bacteria, hazardous substances or lead poisoning.

Suspected outbreaks should be notified if there are two or more cases of any notifiable condition linked to a common source.

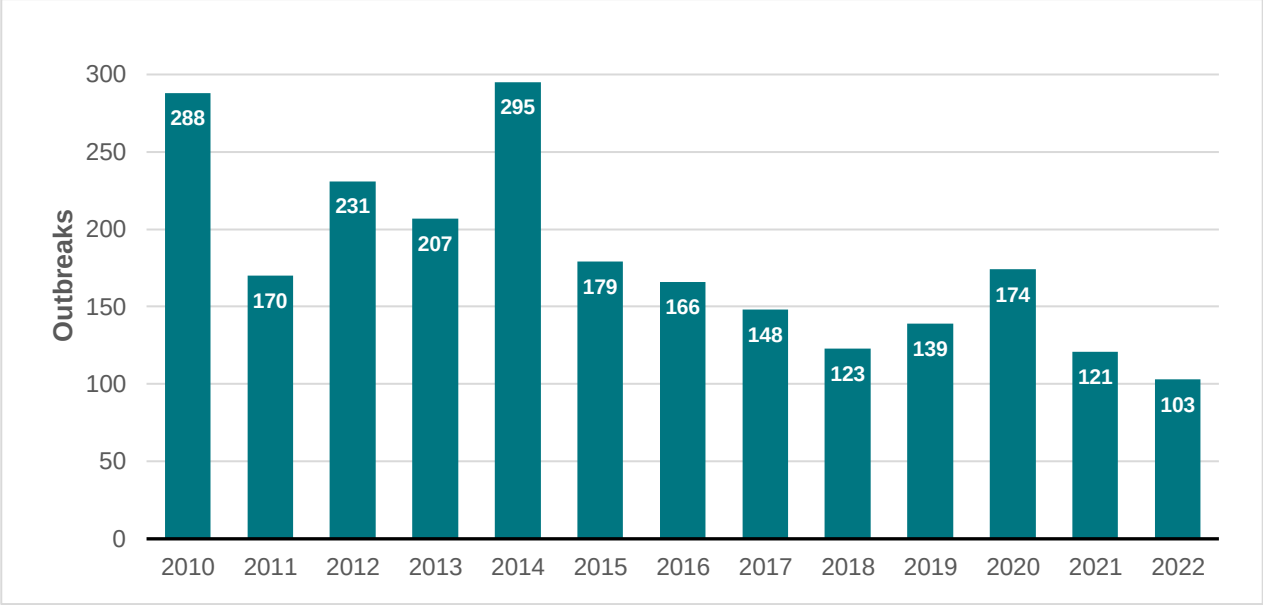


Figure 64: Outbreak notifications in the Auckland region 2010 – 2022

Source: EpiSurv (ARPHS Outbreak Surveillance Report)

ARPHS identified or received notifications for 103 outbreaks throughout 2022. This is the lowest number of outbreak notifications received by ARPHS in any year since 2010 (Figure 64).

Outbreaks typically follow a seasonal pattern, with more notifications received over early spring and summer. Notifications during the warmer months are usually for enteric outbreaks. This is possibly due to an increase in outdoor gatherings involving consumption of non-commercially prepared foods such as salads, raw seafood and barbecued meat. In these situations, illness may occur through poor food storage and hygiene practices, or through inadequate cooking of food.

The pattern observed in 2022 was slightly different, with outbreak notifications peaking during late autumn and rising again in late spring (Figure 65). May, June and November had the highest number of outbreak notifications, with 26, 14 and 13 outbreaks, respectively. March and August had the fewest outbreaks reported, with one and two outbreaks, respectively.

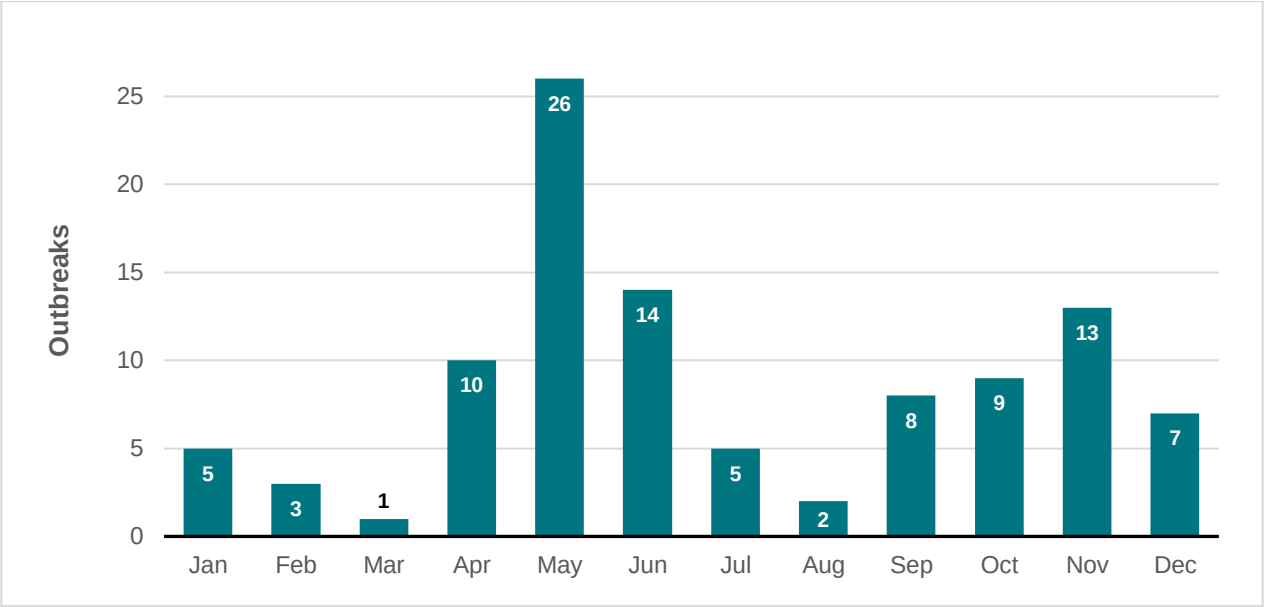


Figure 65: Outbreak notifications in the Auckland region 2022 by month

Source: EpiSurv (ARPHS Outbreak Surveillance Report)

Table 101: Outbreaks and associated cases by pathogen or condition, Auckland region 2022

	Outbreaks		Cases		
Pathogen or condition	Total	% of outbreaks (n=103)[1]	Total	% of cases	Median cases per outbreak (n=1426)
Enteric	92	89.3	1219	85.5	10
Norovirus	42	40.8	724	50.8	14
Sapovirus	6	5.8	85	6.0	16.5
Astrovirus	3	2.9	105	7.4	40
Shigella spp.	2	1.9	4	0.3	2
Campylobacter spp.	2	1.9	12	0.8	6
Salmonella spp.[2]	2	1.9	4	0.3	2
Adenovirus	1	1.0	23	1.6	23
Histamine fish poisoning	1	1.0	2	0.1	2
Rotavirus	1	1.0	17	1.2	17
VTEC/STEC infection	1	1.0	2	0.1	2
Pathogen not identified	38	36.9	418	29.3	8.5
Non-enteric	11	10.7	207	14.5	4
COVID-19	4	3.9	182	12.8	16.5
TB	2	1.9	6	0.4	3
Lead absorption	2	1.9	6	0.4	3

Pathogen or condition	Outbreaks		Cases		
	Total	% of outbreaks (n=103)[1]	Total	% of cases	Median cases per outbreak (n=1426)
Influenza-like illness	1	1.0	6	0.4	6
Chemical poisoning from the environment	1	1.0	4	0.3	4
Murine typhus	1	1.0	3	0.2	3

Source: EpiSurv (ARPHS Outbreak Surveillance Report)

[1]More than one agent was reported in seven outbreaks, therefore group totals are greater than the total number of outbreaks and cases

[2]Includes non-typhoidal Salmonella species only

A causal agent was identified in 63.1% (65/103) of outbreaks, involving 70.7% (1008/1426) of all outbreak-associated cases (Table 101). In seven of these outbreaks, two or more causal agents were identified. No specific pathogen or condition was identified in the remaining 38 outbreaks (418 cases), all of which were recorded as gastroenteritis.

Enteric outbreaks accounted for 89.3% of outbreaks identified in 2022 and accounted for 85.5% of associated cases, while non-enteric outbreaks accounted for 10.7% of outbreaks and 14.5% of cases.

Norovirus was the most common causal agent (40.8%, 42/103) and had the highest percentage of associated cases (50.8%, 724/1426). The most frequently reported non-enteric condition was COVID-19, which accounted for 10.7% of outbreaks and 12.8% of associated cases. The pathogen or condition with the highest median cases per outbreak was astrovirus, with a median number of 40 cases per outbreak.

The largest outbreak for this year was a COVID-19 outbreak reported in late January that was associated with a wedding event. This outbreak involved 147 confirmed cases.

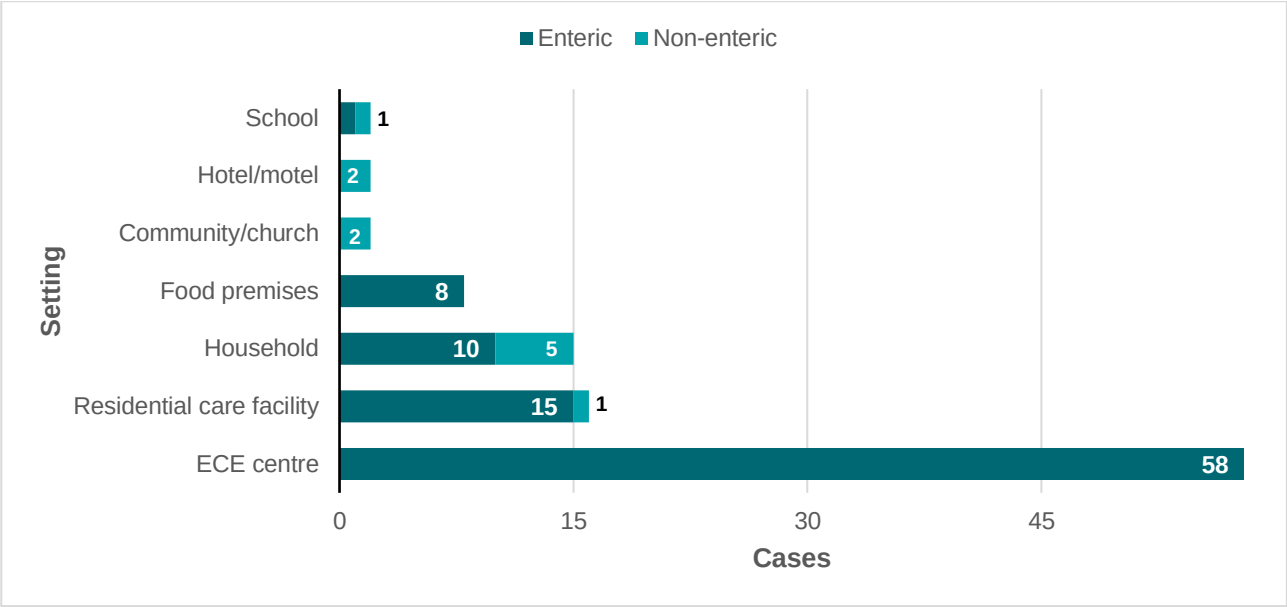


Figure 66: Outbreak notifications in the Auckland region 2022 by setting

Source: EpiSurv (ARPHS Outbreak Surveillance Report)

The most common exposure settings were ECECs with 58 enteric outbreaks, followed by residential care facilities with 15 enteric outbreaks and one non-enteric outbreak (Figure 66). The number of outbreaks in residential care facilities was much lower than in previous years.

There were 15 outbreaks in the household setting (10 enteric and five non-enteric), eight outbreaks in food premises (all enteric), 2 outbreaks in community or church settings (both non-enteric), 2 outbreaks in hotel or motel settings (both non-enteric) and two outbreaks in schools (one enteric and one non-enteric).

4.1 Enteric outbreaks

- ARPHS received notifications for 92 enteric outbreaks in 2022, representing a total of 1,219 cases (Figure 66).
- A causative agent was identified in 65 outbreaks, with multiple pathogens identified in seven outbreaks.

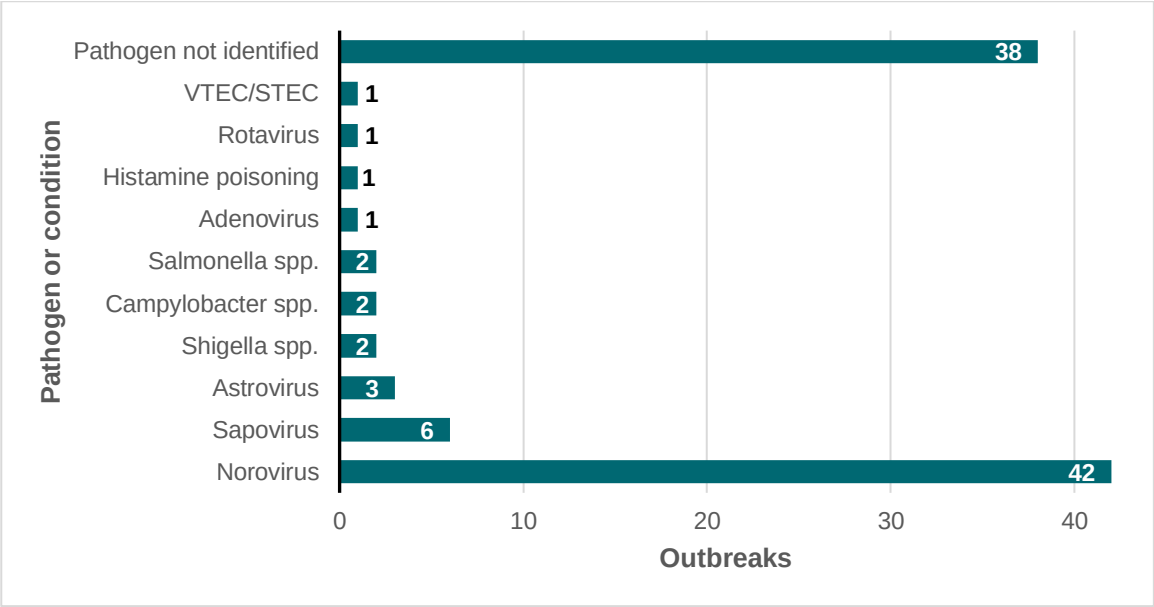


Figure 67: Enteric outbreak notifications in the Auckland region 2022 by pathogen/condition

Source: EpiSurv (ARPHS Outbreak Surveillance Report)

Norovirus represented the greatest number of outbreaks and cases, with 42 outbreaks and 724 total cases (Figure 67). The median number of cases per norovirus outbreak was 14.

Astrovirus represented the highest median number of cases per outbreak, with three outbreaks and 105 total cases. The median number of cases per astrovirus outbreak was 40.

Shigellosis, salmonellosis, histamine poisoning and VTEC/STEC infection were associated with the fewest cases per outbreak, with a median number of cases per outbreak of two.

The most common exposure settings were ECECs followed by residential care facilities and food premises (Table 102).

Table 102: Enteric outbreak-associated cases by causative agent and setting, Auckland region 2022

	Settings				
Pathogen or condition[1]	ECEC	Residential care facility	Food premises	Household	School
Norovirus	453	214	33	7	17
Sapovirus	85	0	0	0	0
Astrovirus	105	0	0	0	0
Shigella spp.	0	0	0	4	0
Campylobacter spp.	0	7	0	0	5
Salmonella spp.[2]	0	0	0	4	0

Pathogen or condition[1]	Settings				
	ECEC	Residential care facility	Food premises	Household	School
Adenovirus	23	0	0	0	0
Histamine fish poisoning	0	0	2	0	0
Rotavirus	17	0	0	0	0
VTEC/STEC infection	0	0	0	2	0
Pathogen not identified	373	21	13	11	0
Total	**1053**	**242**	**48**	**28**	**17**

Source: EpiSurv (ARPHS Outbreak Surveillance Report)

[1]Outbreaks with multiple pathogens are listed under each pathogen separately

[2]Includes non-typhoidal Salmonella species only

4.1.1 Norovirus

- 42 outbreaks with norovirus identified as a causative agent were notified in 2022, with a combined total of 724 cases (median 14 cases per outbreak).
- Six outbreaks involved co-infection with another species, including three with sapovirus, two with astrovirus and one with *Campylobacter*.

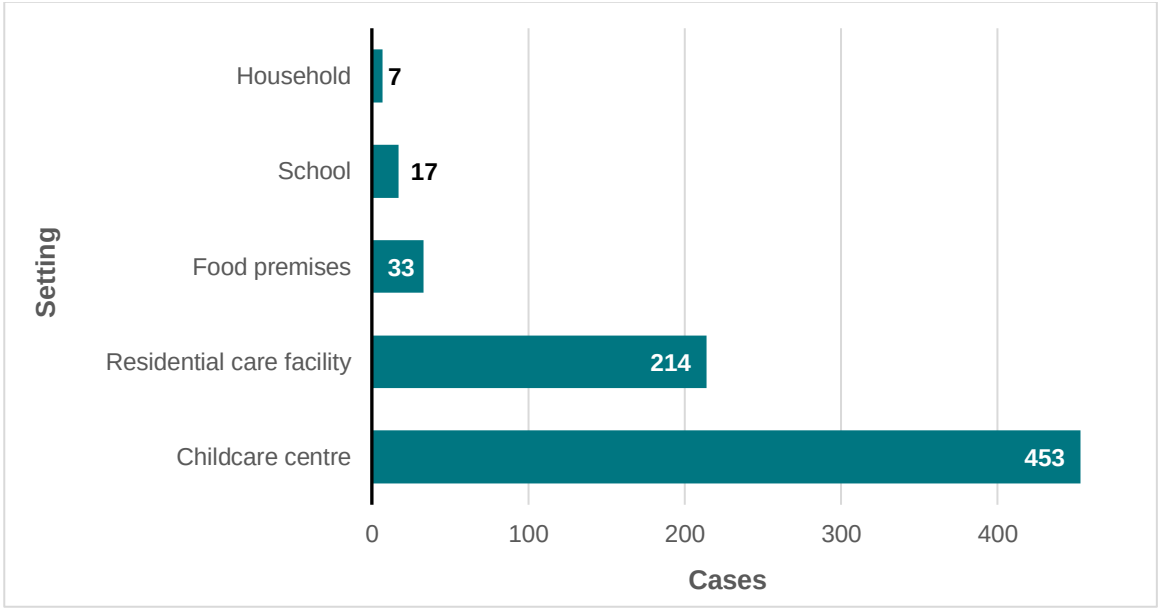


Figure 68: Norovirus outbreak cases in the Auckland region 2022 by exposure setting

Source: EpiSurv (ARPHS Outbreak Surveillance Report)

There were 33 norovirus outbreaks linked to ECECs, with a total of 453 confirmed or probable cases (median 16.5 cases per outbreak, Figure 68). Five outbreaks involved co-infection with another pathogen, including three with sapovirus and two with astrovirus detected via sampling. In most cases, both children and staff members became unwell with symptoms of gastroenteritis, with cases ranging in age from 0 to 61 years.

There were 11 outbreaks involving aged residential care facilities, with a total of 214 confirmed or probable cases (median 16 cases per outbreak). One outbreak involved co-infection with campylobacter.

There were five norovirus outbreaks linked to food premises, with a total of 33 confirmed or probable cases (median seven cases per outbreak). Two outbreaks were thought to be foodborne, with one potentially due to contaminated oysters, while the others were thought to be linked to an asymptomatic food handler. All outbreaks were referred to the Ministry for Primary Industries for investigation and follow-up.

An outbreak involving seven cases from a single household was reported, with the source thought to be a young child who most likely acquired the infection at an ECEC. Another outbreak was reported following a school event, with 17 confirmed and probable cases and no identified source.

4.1.2 Gastroenteritis - pathogen not identified

- There were 38 outbreaks reported in 2022 for which no causative agent could be identified. These had a combined total of 418 probable cases (median 8.5 cases per outbreak).
- Exposure settings included ECECs (29 outbreaks and 373 cases), residential care facilities (four outbreaks and 21 cases), household settings (three outbreaks and 13 cases) and food premises (two outbreaks and 11 cases).

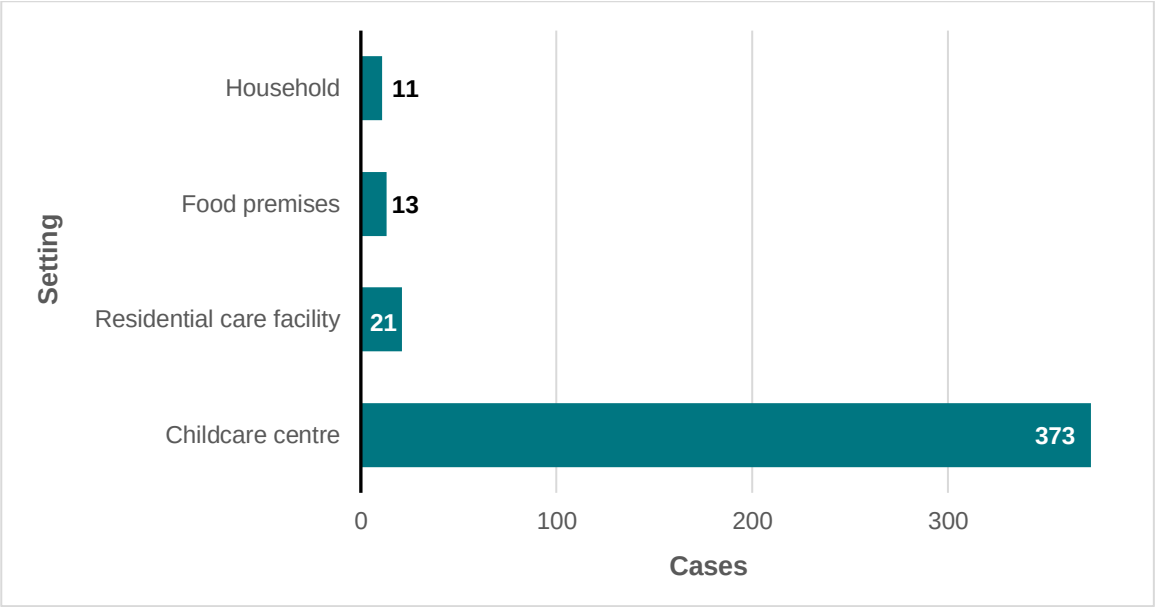


Figure 69: Outbreak cases with no identified pathogen in the Auckland region 2022 by exposure setting

Source: EpiSurv (ARPHS Outbreak Surveillance Report)

ECECs were the most common exposure settings with 89.2% of cases, followed by residential care facilities (5.0%), food premises (3.1%) and households (2.6%, Figure 69).

Of the three household outbreaks, one was a suspected giardia infection affecting a family of four. The infection was suspected to have been acquired at the youngest child's ECEC, where there had been a confirmed case several weeks prior.

The second household outbreak involved a couple who became unwell shortly after consuming a shared takeaway meal, although there was insufficient evidence to link their illness to the food premises involved.

The third household outbreak involved five probable cases, some of whom dined at the same restaurant, although there was insufficient information to class this as a foodborne outbreak.

The first food premises outbreak involved 11 cases at a work function and was thought to be due to cross contamination by an infected food handler.

The second food premises outbreak involved two cases and was thought to be due to undercooked chicken from a takeaway shop.

4.1.3 Sapovirus

- Six outbreaks due to sapovirus were reported, with a total of 85 confirmed or probable cases (median 16.5 cases per outbreak).

- All were linked to ECECs, with three involving norovirus as a secondary pathogen and one involving adenovirus.
- Cases ranged in age from 0 to 25 years, with both children and staff affected.

4.1.4 Astrovirus

- Three outbreaks with astrovirus as a causative agent were reported, with a total of 105 confirmed or probable cases (median 40 cases per outbreak).
- The outbreaks were all linked to ECECs, with children and staff affected (age range 0 to 61 years).
- The larger outbreaks (56 cases and 40 cases respectively) both had norovirus as a secondary pathogen.

4.1.5 Shigellosis

- Two outbreaks due to Shigella were reported, with a total of four confirmed or probable cases.
- The first involved two infants from the same household, with no definitive source of infection identified.
- The second involved adults across two households who likely acquired their infection through imported, non-commercially prepared tuna.

4.1.6 Campylobacteriosis

- Two outbreaks with Campylobacter as a causative agent were reported, with a total of 12 confirmed or probable cases.
- The first outbreak was linked to a residential care facility and involved seven confirmed or probable cases, with one case testing positive for both Campylobacter spp. and norovirus.
- The second outbreak involved a five-person household and was thought to be due to a contaminated rainwater supply.

4.1.7 Non-typhoidal *Salmonella* spp.

- Two outbreaks with *Salmonella* spp. as a causative agent were reported, with a total of four confirmed or probable cases.
- The first involved an elderly couple who both tested positive for *Salmonella* Enteritidis infection. No definitive source of the infection was identified.
- The second outbreak involved a couple who acquired paratyphoid fever while travelling in India. Both were hospitalised, with blood cultures revealing *Salmonella* Paratyphi A infection.

4.1.8 Adenovirus

- One outbreak due to adenovirus was reported, with 23 confirmed or probable cases. The outbreak was linked to an ECEC and involved sapovirus as a secondary pathogen.

4.1.9 Histamine (scombroid) fish poisoning

- One outbreak of suspected scombroid poisoning was reported, involving a couple who developed flushing, diarrhoea, rash and palpitations within an hour of consuming fish and chips from a takeaway shop.
- They experienced symptoms for up to four hours which settled after taking antihistamines. They were not aware of the species of fish consumed.

4.1.10 Rotavirus

- One outbreak due to rotavirus was reported, with 17 confirmed or probable cases.
- The outbreak involved children at an ECEC with an age range of one to four years.

4.1.11 VTEC/STEC infection

- One outbreak due to VTEC/STEC was reported, with two confirmed cases in children from the same household.
- One child was hospitalised and no definitive source of the infection was identified.

4.2 Non-enteric outbreaks

- ARPHS received notifications for 11 non-enteric outbreaks in 2022, representing a total of 207 cases.
- COVID-19 represented the greatest number of outbreaks and cases, with four outbreaks and 182 associated cases (median 16.5 cases per outbreak).

There were two outbreaks notified for TB and lead absorption, each with a total of six cases (Figure 70). One outbreak was notified for influenza-like illness (six cases), chemical poisoning from the environment (four cases) and murine typhus (three cases).

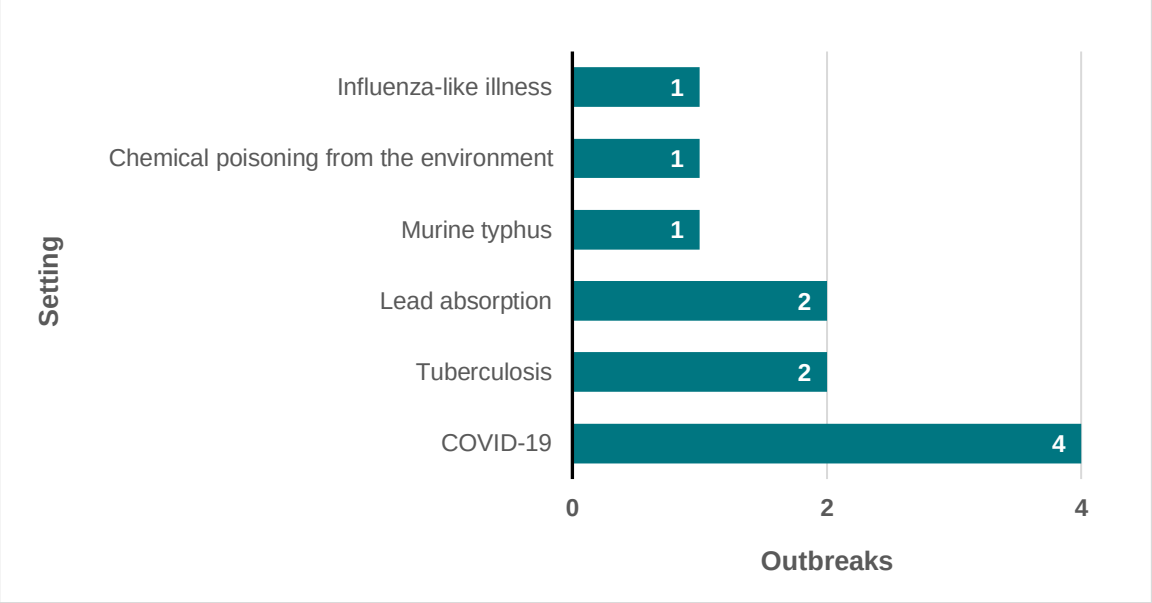


Figure 70: Non-enteric outbreaks in the Auckland region 2022 by condition

Source: EpiSurv (ARPHS Outbreak Surveillance Report)

The most common exposure setting was the community, with 174 cases from two COVID-19 outbreaks. For non-COVID-19 outbreaks, the most common exposure setting was the household, with a total of 15 cases from five outbreaks (Table 103).

Table 103: Non-enteric outbreak-associated cases by causative agent and setting, Auckland region 2022

	Settings				
Condition	Community	Household	Hotel	Residential care facility	School
COVID-19	174	0	8	0	0
TB	0	2	0	0	4
Lead absorption	0	6	0	0	0

Condition	Settings				
	Community	Household	Hotel	Residential care facility	School
Influenza-like illness	0	0	0	6	0
Chemical poisoning from the environment	0	4	0	0	0
Murine typhus	0	3	0	0	0
Total	**174**	**15**	**8**	**6**	**4**

Source: EpiSurv (ARPHS Outbreak Surveillance Report)

4.2.1 COVID-19

- COVID-19 outbreaks were managed by ARPHS until early February when cases began to rise rapidly due to the arrival of the Omicron strain in NZ.
- At this time, operations shifted away from individual case and contact management towards exposure events in medium to high-risk settings, with external agencies managing individual cases.
- Between 1 January and 3 February 2022, four outbreaks due to COVID-19 were notified. These had a total of 182 cases (median 16.5 cases), with outbreak settings including managed isolation and quarantine facilities, a church and a wedding.
- While other outbreaks will have occurred beyond 3 February 2022, by this point of the epidemic ARPHS was only actively encouraging certain types of institutions to get in touch to receive support for outbreak management. This included marae and places of worship, as both settings often included people more at risk of serious illness from COVID-19.
- By this stage many institutions were receiving specific guidance from other government departments or health services (e.g. Ministry of Education or health districts) around outbreak management.

4.2.2 Tuberculosis

- Two outbreaks of TB were notified in 2022.
- The first involved four adolescents, with transmission likely occurring in the school setting. Two cases were hospitalised and there were no deaths.
- The second outbreak involved an adult and infant from the same household who were both hospitalised. No deaths were reported.

4.2.3 Lead absorption

- Two outbreaks of lead absorption were notified in 2022.

- These outbreaks involved two separate households, one affecting an adult and two children and the other affecting three children.
- Both outbreaks were related to home renovations in older properties.

4.2.4 Influenza-like illness

- Influenza-like illness outbreaks are not usually notifiable, however, between 2020 and early 2022 ECECs, residential care and healthcare facilities were encouraged to report any respiratory outbreaks as a method of COVID-19 surveillance.
- One outbreak of influenza-like illness was notified in early 2022 before the request to notify these outbreaks was removed. This outbreak involved three residents and three staff from an aged residential care facility, with no hospitalisations or deaths reported. All tested negative for COVID-19, although no causative agent was identified.

4.2.5 Chemical poisoning from the environment

- One outbreak of chemical poisoning from the environment was notified in 2022.
- This outbreak affected four members of a six-person household, with all four hospitalised due to their symptoms.
- Although multiple agencies were involved in the investigation, no causative agent could be identified.

4.2.6 Murine typhus

- One outbreak of murine typhus was notified in 2022.
- This outbreak involved three members of a single household and was thought to be due to contact with flea-infested feral cats.
- All three cases were hospitalised and no deaths were reported.

5. Health indicators

Key points

- Between 2017 and 2020, 42% of children and 30% of adults living in the Auckland region met the fruit and vegetable intake guidelines. Younger adults were less likely to meet the guidelines compared to older adults, while children living in the most deprived areas were less likely to meet the guidelines compared to those living in the least deprived areas.
- Nearly two thirds of adults and a third of children in the Auckland region were overweight or obese. Adults in the most deprived areas were more likely to be overweight or obese than those in the least deprived areas, while the proportion of obese children increased with age.
- Less than 50% of adults in the Auckland region met the recommended level of physical activity. Māori adults were most likely to meet the guidelines while Asian adults were the least likely. 43% of children used active transport to get to school, with male children more likely to use an active mode compared to female children.

ARPHS is a partner to Healthy Auckland Together (HAT), a coalition committed to improving the environment of Auckland in order to make it a place where all people can live a full and healthy life.[42] HAT is focussed on three goals: improving nutrition, increasing physical activity and reducing obesity. These goals have a priority focus on equitable outcomes for Māori, Pacific and lower socio-economic communities.

[42] Healthy Auckland Together. (2019). *The Healthy Auckland Scorecard.* Auckland: Healthy Auckland Together.

This section presents key health indicators for adults aged 15 years and older and children aged 0-14 years using pooled data from the 2017–2020 editions of the New Zealand Health Survey (NZHS).

5.1 Nutrition

Food and nutrition play a key role in maintaining health and preventing disease.[43] Nutrition choices are often influenced by where we live, our income, and the food and drink that's available and promoted in our local environments.

Nutrition information from the NZHS is used to develop, monitor and improve health and nutrition policies and services at both a national and local level.

For the 2017-2020 surveys, the recommended intake of vegetables and fruit was defined as eating at least three servings of vegetables each day and at least two servings of fruit each day.[44] In 2020 the MoH updated the Eating and Activity Guidelines with recommended numbers of servings for each age and gender, including additional servings for pregnant and breastfeeding women.[45]

5.1.1 Adult nutrition

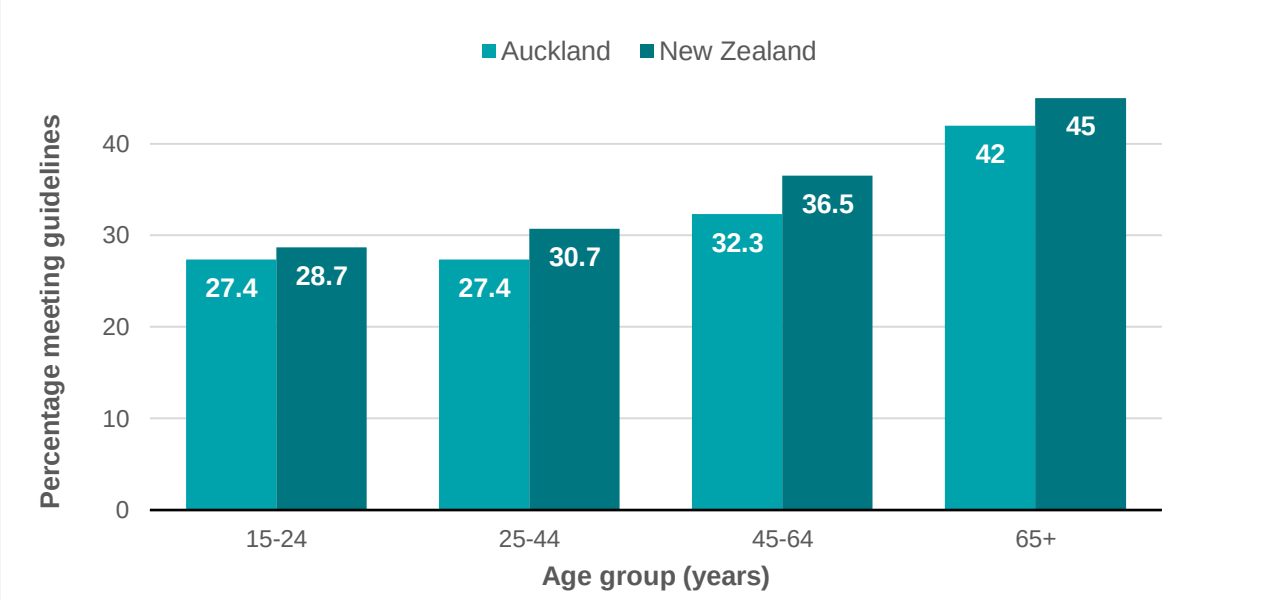


Figure 71: Percentage of adults meeting fruit and vegetable intake by age group

[43] Ministry of Health. (2010). The New Zealand Health Survey: Objectives and Topic Areas August 2010. Wellington: Ministry of Health.

[44] Ministry of Health. (2020). Eating and Activity Guidelines for New Zealand Adults: Updated 2020. Wellington: Ministry of Health

[45] Ministry of Health. (2022). *Annual Update of Key Results 2021/22: New Zealand Health Survey.* Retrieved 27 June 2023, from https://www.health.govt.nz/publication/annual-update-key-results-2021-22-new-zealand-health-survey.

Between 2017 and 2020, less than a third (30.3%) of Auckland adults met both the fruit and vegetable intake guidelines. Figure 71 shows that 27% of Aucklanders aged 15-24 years ate the recommended daily servings of fruit and vegetables compared to 42% of those aged over 65. Fruit and vegetable consumption was consistently lower for adults in the Auckland region compared to those in the rest of NZ across all age groups.

5.1.2 Child nutrition

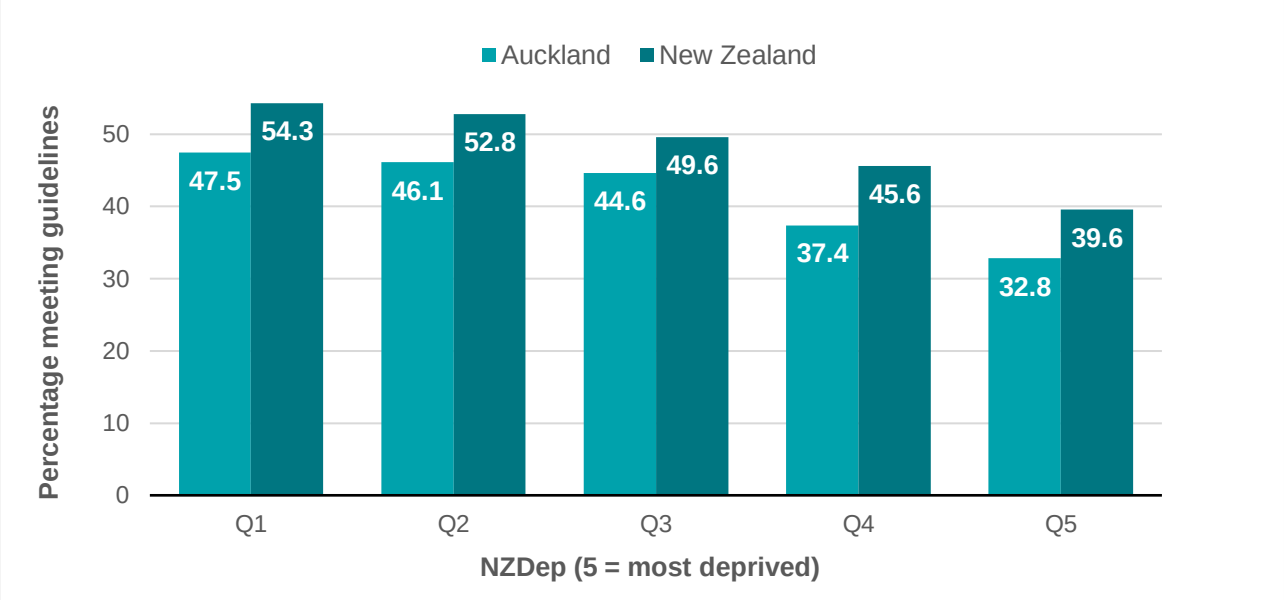


Figure 72: Percentage of children meeting vegetable intake guidelines by socioeconomic deprivation quintiles

Figure 72 compares child vegetable intakes between quintiles. Between 2017 and 2020, 41.5% percent of Auckland children met the vegetable intake guidelines compared to 48.1% of NZ children. Less than a third (32.8%) of those in the most deprived areas of Auckland (Quintile 5) ate the recommended daily servings of fruit and vegetables compared with 47.5% of those in the least deprived (Quintile 1). Vegetable consumption was consistently lower for children in the Auckland region compared to the rest of NZ.

5.2 Obesity

Overweight and obesity are major risk factors for illnesses such as heart disease, stroke, type 2 diabetes, cancer, osteoarthritis and depression.[46]

NZHS is the official source for measuring the prevalence of obesity in NZ. It collects data on the body mass index (BMI) of a representative sample of children aged two to 14 years old, as well as adults aged 15 years and older.

5.2.1 Adult obesity

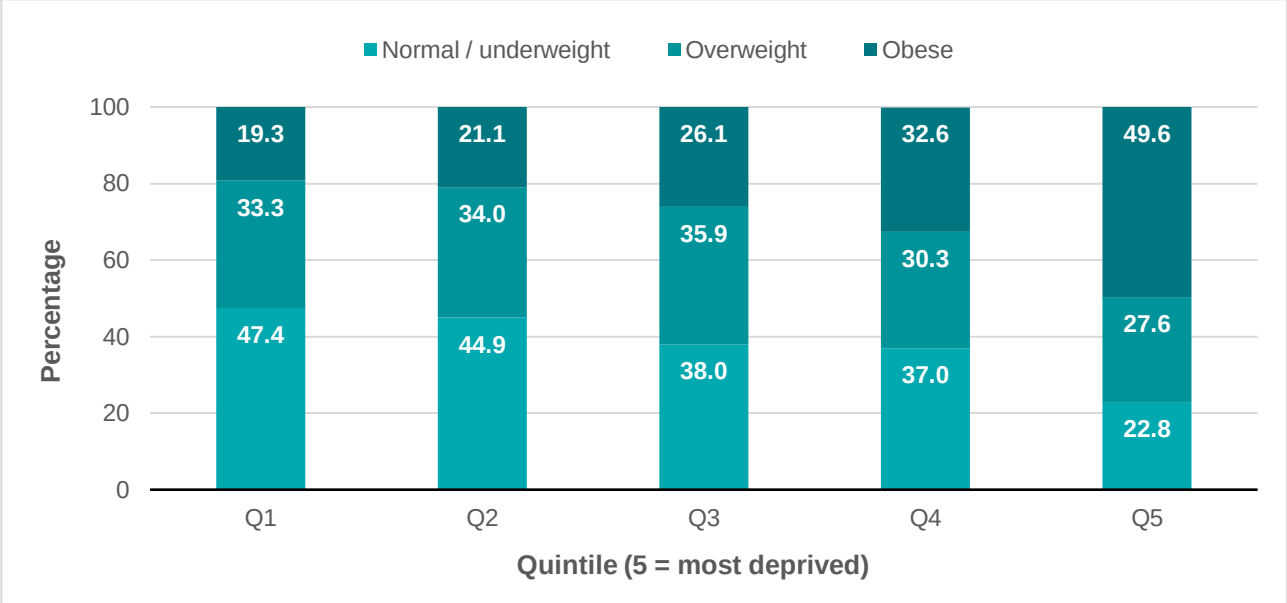


Figure 73: BMI distribution of Auckland adults by socioeconomic deprivation quintiles

Figure 73 shows the BMI distribution of Auckland adults by socioeconomic deprivation quintile for 2017-2020. Nearly two thirds (61.7%) of adults in the Auckland region were overweight or obese during this period, while 36.4% were considered to be a healthy weight.

Adults in the most deprived areas were more likely to be overweight or obese than those who reside in the least deprived areas of Auckland. Nearly half (49.6%) of adults in the most deprived quintile were overweight or obese between 2017 and 2020, compared with only 19.3% in the least deprived quintile.

The proportion of adults with a normal weight decreased from just under half (47.4 percent) for the least deprived areas to 22.8% for the most deprived areas.

[46] Healthy Auckland Together. (2019). *The Healthy Auckland Scorecard.* Auckland: Healthy Auckland Together.

5.2.2 Childhood obesity

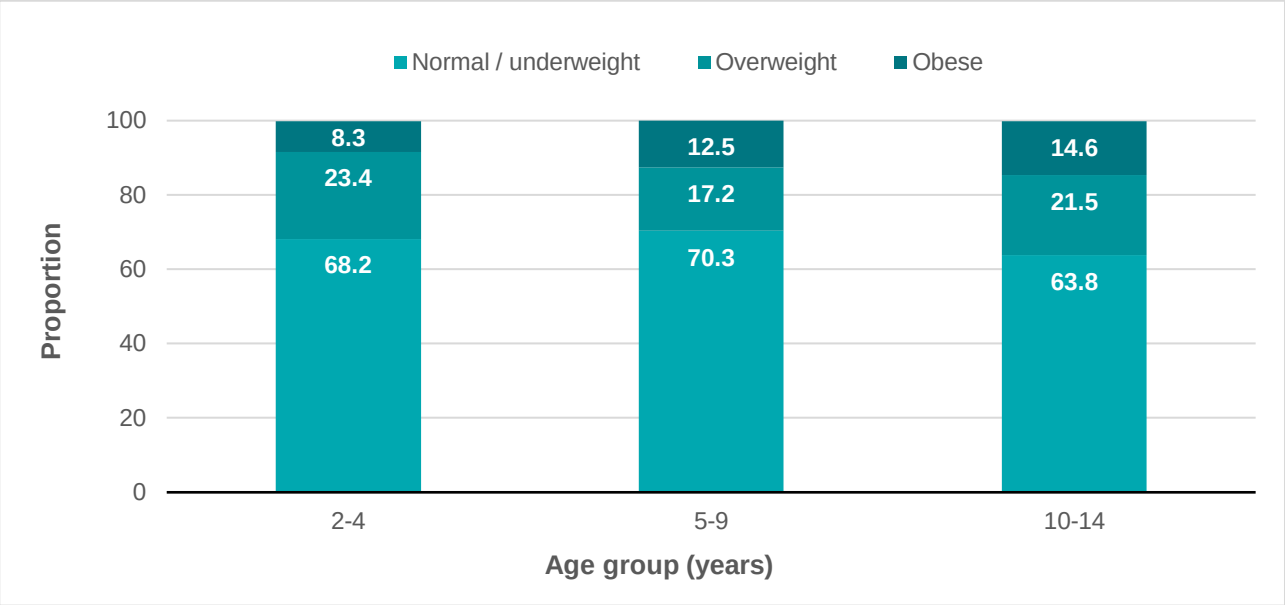


Figure 74: BMI distribution of Auckland children 2017-2020 by age group

Between 2017 and 2020, almost three in 10 (29.7%) children in the Auckland region were considered overweight or obese (Figure 74). The proportion of obese children in the Auckland region was 12.3% compared to 10.8% for the rest of NZ.

The proportion of obese children was higher amongst older children, with 14.6% of 10 to 14 year olds considered obese compared to only 8.3% of two to four year olds.

5.3 Physical activity

Physical activity plays a key role in maintaining a healthy weight and lifestyle. Regular activity is proven to reduce the risk of heart disease, stroke, diabetes and some cancers, as well as improving overall quality of life and wellbeing.[47] Childhood physical activity is not only important for physical health but also cognitive development, attention, behaviour and mental health.[48]

Physical activity can refer to recreational exercise, active transport or energy expended at work. Activity levels are largely influenced by the layout of our neighbourhoods, the quality of our parks, the safety of our suburbs and our transport options.[49]

5.3.1 Adult physical activity

Figure 75: Percentage of adults meeting physical activity guidelines by ethnicity

The Eating and Activity Guidelines for New Zealand Adults recommends two and a half hours of moderate, or one and a quarter hours of vigorous physical activity per week for adults.

Between 2017 to 2020, under half (43.7%) of adults in the Auckland region met this recommendation compared to 52.9% of adults for the rest of NZ (Figure 75). Activity levels varied between ethnic groups, with 38.2% of Asian people meeting the guidelines compared to 39.2% of Pacific Peoples, 47.8% of European and Other and 49.1% of Māori

[47] World Health Organisation. (2022). *Physical activity*. Retrieved 28 June 2023, from https://www.who.int/news-room/fact-sheets/detail/physical-activity.

[48] American Psychological Association. (2020). *How and why to get children moving now.* Retrieved 28 June 2023, from https://www.apa.org/topics/covid-19/children-exercise-strategies.

[49] Healthy Auckland Together. (2019). *The Healthy Auckland Scorecard.* Auckland: Healthy Auckland Together.

adults. Adults in the Auckland region in every ethnicity group were less likely to meet the recommendation compared to those in the rest of NZ.

5.3.2 Child physical activity

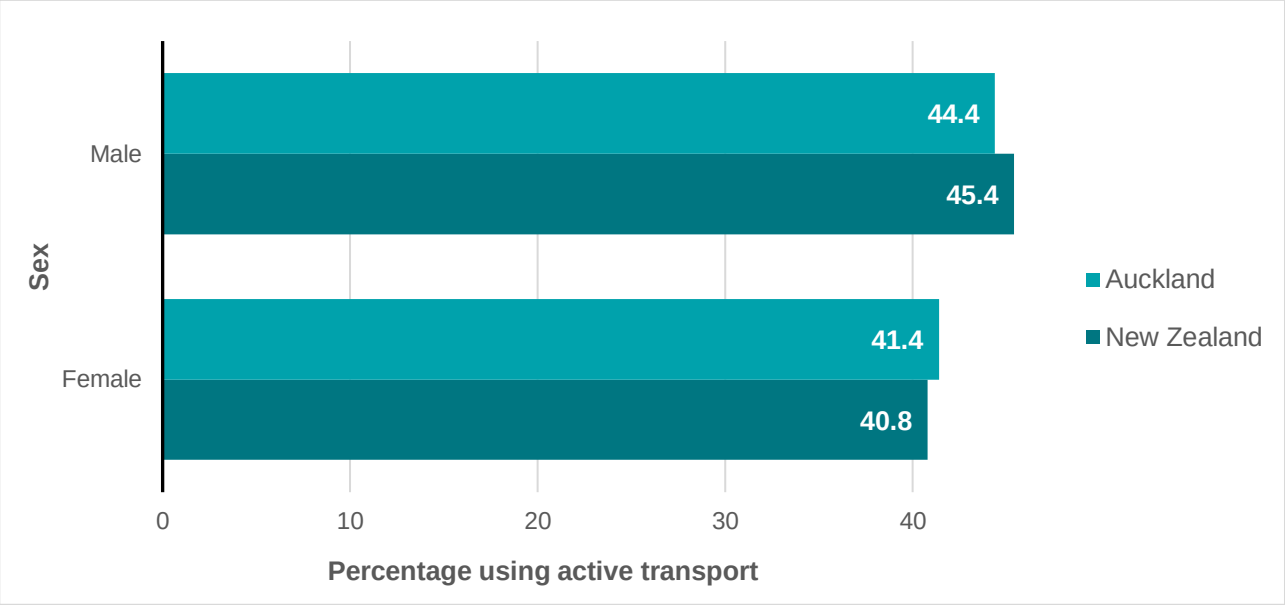


Figure 76: Percentage of children using active transport to school in the Auckland region and NZ 2017-2020 by sex

The NZHS asks whether children aged five to 14 years usually use active modes of transport (walking, cycling, scootering, skating etc) to get to school.

Between 2017 and 2020, 42.9% of children in the Auckland region used active transport compared to 43.1% for the rest of NZ (Figure 76). Male children were more likely than female children to use an active mode, with 44.4% of males in the Auckland region using active transport compared to 40.8% for females.

6. Appendices

Appendix 1: List of notifiable diseases

Table 104: Notifiable Infectious Diseases Under the Health Act 1956

Section A – Infectious Diseases Notifiable to a Medical Officer of Health and Local Authority	
Acute gastroenteritis	Campylobacteriosis
Cholera	Cryptosporidiosis
Giardiasis	Hepatitis A
Legionellosis	Listeriosis
Meningoencephalitis - primary amoebic	Salmonellosis
Shigellosis	Typhoid and paratyphoid fever
Yersiniosis	

Section B – Infectious Diseases Notifiable to Medical Officer of Health	
Anthrax	Arboviral diseases
Brucellosis	COVID-19
Creutzfeldt-Jakob disease (CJD) and other spongiform encephalopathies	*Cronobacter* species
Diphtheria	Haemophilus influenzae b
Hepatitis B	Hepatitis C
Hepatitis (viral) not otherwise specified	Hydatid disease
Highly Pathogenic Avian Influenza (including HPAI subtype H5N1)	Invasive pneumococcal disease
Leprosy	Leptospirosis
Malaria	Measles
Middle East Respiratory Syndrome (MERS)	Monkeypox
Mumps	*Neisseria meningitidis* invasive disease
Non-seasonal influenza (capable of being transmitted between human beings)	Novel coronavirus capable of causing severe respiratory illness
Pertussis	Plague
Poliomyelitis	Q fever
Rabies and other lyssaviruses	Rheumatic fever
Rickettsial diseases	Rubella
Severe Acute Respiratory Syndrome (SARS)	Tetanus
Tuberculosis (all forms)	Verotoxin/Shiga toxin-producing Escherichia
Viral haemorrhagic fevers	Yellow fever

Section C- Infectious Diseases Notifiable to Medical Officer of Health without Identifying Information of Patient or Deceased Person	
Acquired Immunodeficiency Syndrome (AIDS)	Human Immunodeficiency Virus (HIV) infection
Gonorrhoeal infection	Syphilis

Diseases Notifiable to Medical Officer of Health (Other than Notifiable Infectious Diseases)	
Cysticercosis	Decompression sickness
Lead absorption equal to or in excess of 0.24µ mol/l (5µg/dl)	Poisoning arising from chemical contamination of the environment

Taeniasis	Trichinosis

Source: MoH

Appendix 2: Population denominator tables

Table 105: ARPHS total population estimates by sex and age, as at 30 Jun 2022

Age	Female	Male	Total
<01	10,370	10,846	21,214
01-04	41,480	43,384	84,856
05-09	54,790	57,760	112,550
10-14	55,930	59,850	115,790
15-19	52,160	55,240	107,400
20-24	55,770	58,410	114,190
25-29	65,720	66,330	132,050
30-34	72,850	72,040	144,880
35-39	65,400	63,850	129,260
40-44	58,010	57,780	115,800
45-49	54,350	53,450	107,800
50-54	56,980	55,070	112,060
55-59	52,260	50,570	102,830
60-64	46,390	44,040	90,450
65-69	37,950	34,990	72,940
70-74	30,160	28,340	58,500
75-79	22,580	20,010	42,600
80-84	16,410	13,180	29,610
85+	15,670	9,790	25,460
Total	**865,300**	**855,000**	**1,720,200**

Source: Stats NZ

Table 106: ARPHS total population estimates by sex and health district, as at 30 Jun 2022

District	Female	Male	Total
Waitematā	320,600	312,900	633,500
Auckland	241,600	240,000	481,600
Counties Manukau	303,100	302,100	605,100
Total	**865,300**	**855,000**	**1,720,200**

Source: Stats NZ

Table 107: ARPHS population projections for 2022by sex and prioritised ethnic group

District	Female	Male	Total
Māori	104,500	103,000	207,500
Pacific	122,300	120,300	242,700
Asian	247,600	239,700	487,300
Other	389,900	389,900	779,700
Total	**864,300**	**852,900**	**1,717,200**

Source: Te Whatu Ora