

Invasive Meningococcal Disease in British Columbia Annual Epidemiological Report – 2023

Invasive meningococcal disease (IMD) refers to infection by the bacterium *Neisseria meningitidis* in a normally sterile site, such as in the blood or brain.^a There are twelve serogroups of *Neisseria meningitidis*; invasive disease is most commonly associated with serogroups A, B, C, W, and Y.^b IMD caused by certain serogroups is vaccine-preventable. In British Columbia (BC), children are offered meningococcal serogroup C vaccine at 2 and 12 months and adolescents are offered the quadrivalent vaccine (which protects against serogroups A, C, Y, and W) in Grade 9 as part of BC's routine immunization programs.^c Individuals at higher risk of disease are also eligible to receive the quadrivalent vaccine. This report describes the epidemiology of IMD in BC in 2023 as well as trends over the past ten years.

Summary

From 2014 to 2023, an average of 14 IMD cases per year were reported in BC with incidence ranging from 0.08 per 100,000 population (2022) to 0.54 per 100,000 population (2018) (Figure 1). Following a period of heightened activity in 2017-2019, which encompassed the 2017 serogroup W outbreak in Interior Health, incidence has declined. Rates have been relatively stable from 2021-2023 and remain below pre-pandemic levels observed in 2014-2019.

In 2023, there were seven confirmed cases of IMD in BC (0.13 per 100,000 population). All cases occurred among adults ranging in age from 23 to 82 years (median 51 years). Males accounted for 57.1% of cases while females accounted for 42.9% of cases. There was one death (serogroup unknown) for a case fatality ratio of 14.3%.

Approximately half of IMD cases (n=3) in 2023 reported travelling outside of BC in the ten days prior to symptom onset (i.e., the incubation period) and two of the three travelled outside of Canada. All cases were sporadic with no reported epidemiologic links to known cases. The majority of IMD cases (n=6) in 2023 reported no risk factors for IMD.^d

Of the seven confirmed IMD cases in 2023, the serogroup was identified for six cases. None of the cases with known immunization status reported being immunized against the serogroup that caused their disease; however, based on reported risk factors and age, none were eligible for publicly-funded meningococcal vaccines that protect against the applicable serogroup.

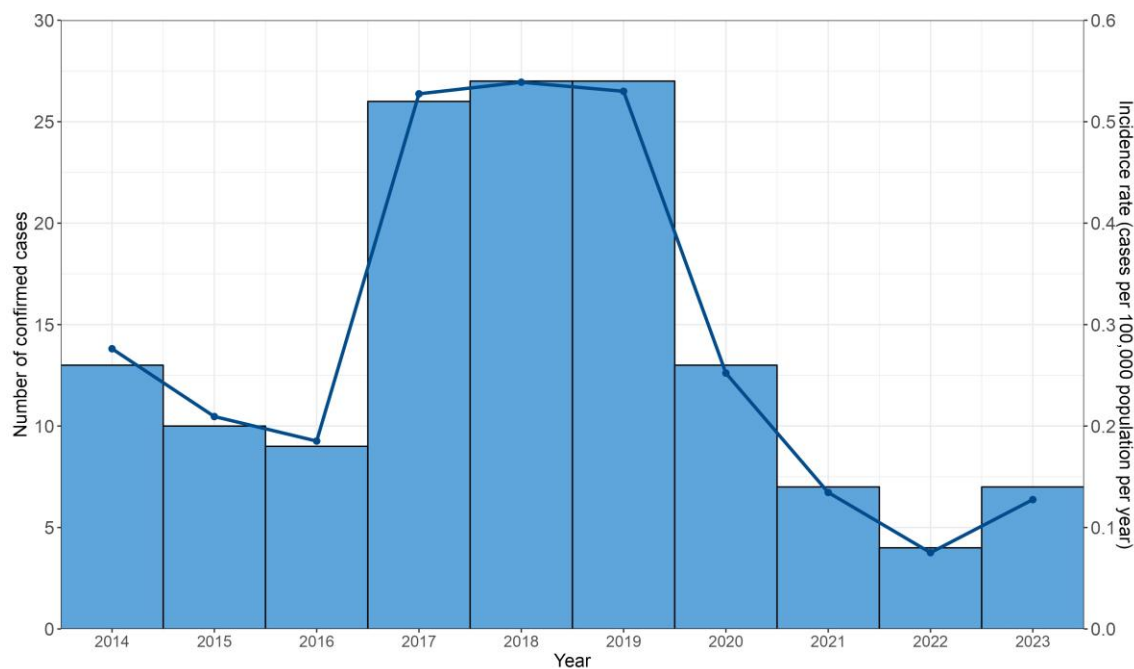
^a BC Centre for Disease Control. Communicable Disease Control Manual. <http://www.bccdc.ca/health-professionals/clinical-resources/communicable-disease-control-manual/communicable-disease-control>

^b Public Health Agency of Canada. Invasive Meningococcal Disease. <https://www.canada.ca/en/public-health/services/immunization/vaccine-preventable-diseases/invasive-meningococcal-disease/health-professionals.html>

^c BC Centre for Disease Control. BC Immunization Manual. http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Epid/CD%20Manual/Chapter%20%20-%20Imms/Part_1_Schedules.pdf

^d The following medical conditions put individuals at increased risk for IMD: functional or anatomic asplenia; congenital immunodeficiencies; acquired complement deficiency due to receipt of the terminal complement inhibitor eculizumab (Soliris®); hematopoietic stem cell transplant (HSCT); solid organ or islet cell transplant; and HIV infection.

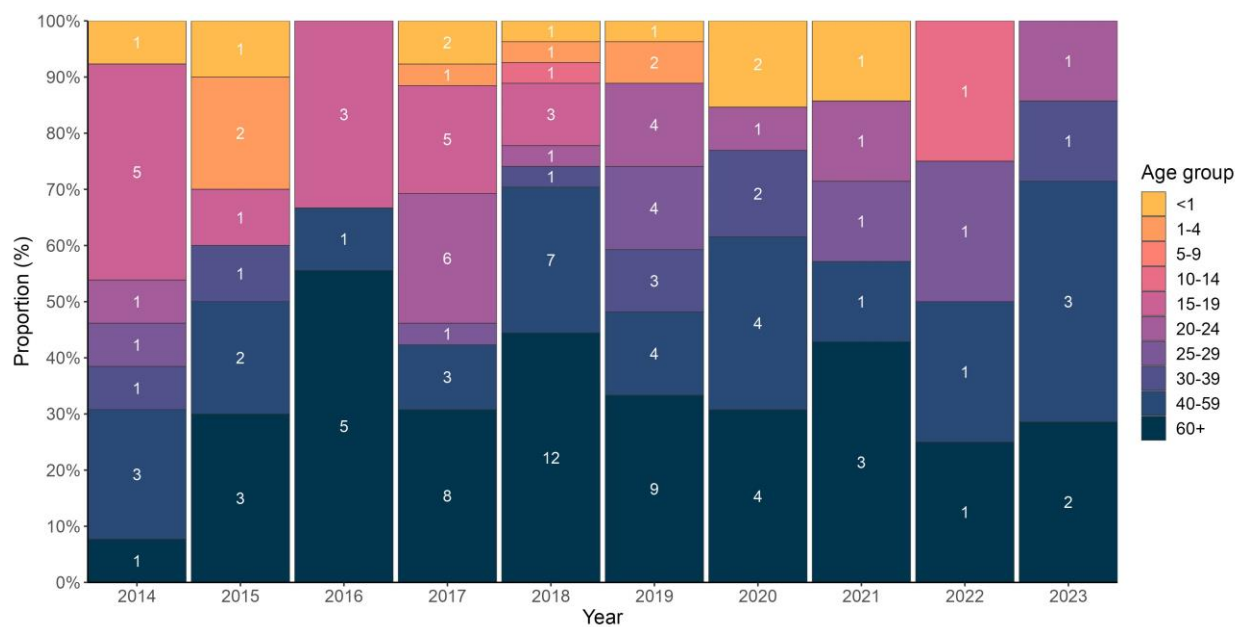
Figure 1. Number of confirmed IMD cases and incidence rates by year in British Columbia, 2014-2023



Age

The median age of cases in 2023 was 51 years, which is higher than the median of 43 years observed in 2014 to 2022. As seen in Figure 2, adults aged 20 years and above accounted for the majority of annual cases over the past ten years. In the past ten years, no cases have been reported in children aged 5 to 9 years, and in 2023, no cases were reported in children or adolescents aged 19 years or under.

Figure 2. Number and proportion of annual IMD cases by age group in British Columbia, 2014-2023



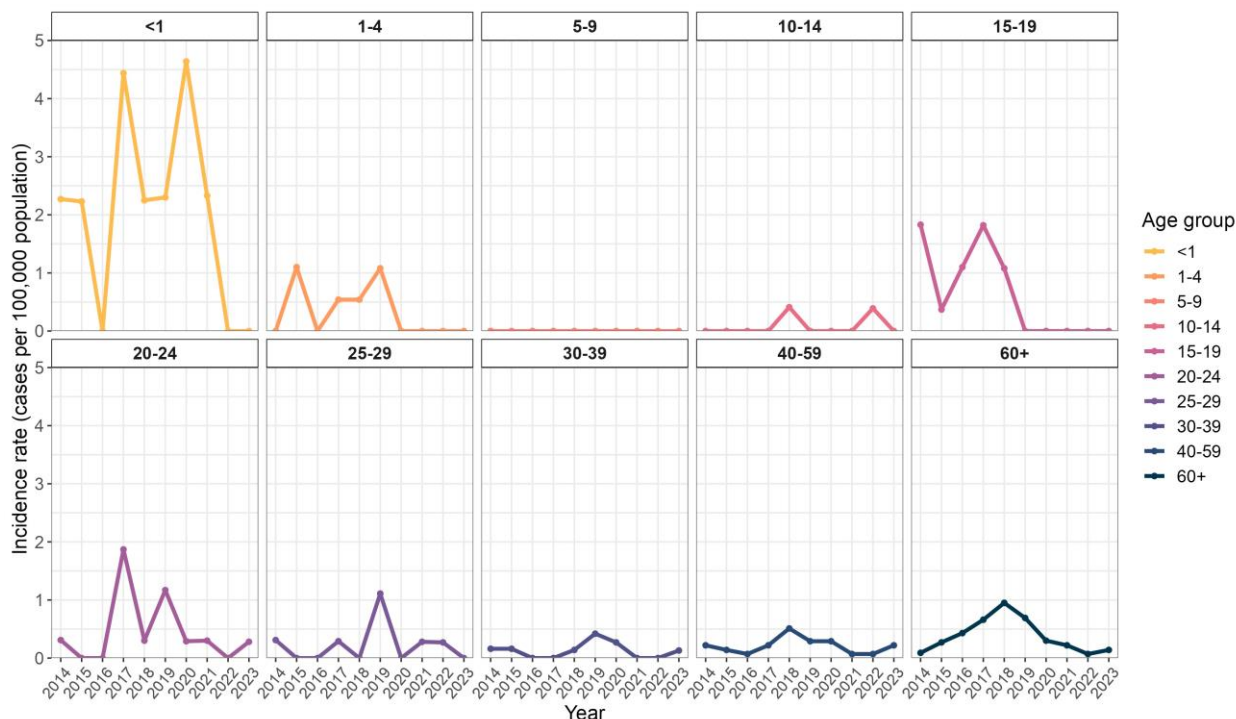
As shown in Table 1, average annual incidence from 2014 to 2022 was highest for infants less than one year of age (mean 2.28 per 100,000 population), although the number of annual cases was low with 0 to 2 cases per year (Figure 2). Incidence in this age group has declined to zero in recent years, with no cases reported since 2021 (Figure 3). Of all age groups, children aged 5 to 9 years had the lowest average annual incidence from 2014 to 2022 with no cases reported in the past ten years.

Age-specific rates in 2023 were lower than the 2014-2022 average in all age groups excluding 5 to 9-year-olds, 30 to 39-year-olds, and 40 to 59-year-olds where the rates were the same or comparable (Table 1). The highest age-specific rate in 2023 was in 20 to 24-year-olds (0.28 per 100,000 population) followed by 40 to 59-year-olds (0.22 per 100,000 population), however, annual counts were low (range 1 to 3 cases). Since peaking in 2018, there has been a declining trend in incidence among adults aged 60+ years, although the rate increased slightly in 2023 compared to 2022 (Figure 3).

Table 1. Age-specific IMD incidence rates in 2023 compared to 2014-2022, British Columbia

Age group	Incidence (cases per 100,000 population)	
	2014-2022 mean	2023
<1	2.28	0
1-4	0.36	0
5-9	0	0
10-14	0.09	0
15-19	0.69	0
20-24	0.47	0.28
25-29	0.25	0
30-39	0.13	0.13
40-59	0.21	0.22
60+	0.41	0.14

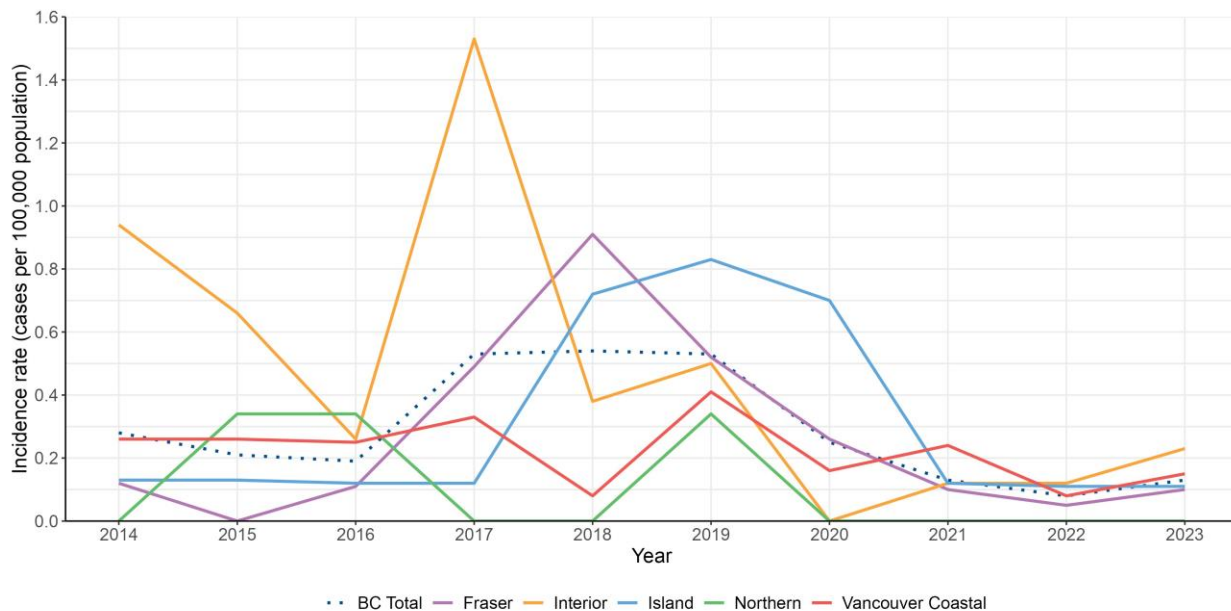
Figure 3. Annual IMD incidence rates by age group in British Columbia, 2014-2023



Geography

Over the past ten years, trends at the health authority level have varied with Interior, Fraser, and Island observing peaks of activity in 2017, 2018, and 2019, respectively (Figure 4). In late 2017, BC experienced an increase in serogroup W disease with an outbreak among adolescents in Interior Health.^e In Northern and Vancouver Coastal, rates have fluctuated but have remained at or below approximately 0.40 per 100,000 population from 2014 to 2023. Compared to 2022, incidence increased slightly in 2023 in all health authorities excluding Island where the rate was similar. Interior observed the highest incidence in 2023 (0.23 per 100,000 population), while rates were comparable in Fraser, Island, and Vancouver Coastal (range 0.10 to 0.15 per 100,000 population). No cases were reported in Northern Health in 2023.

Figure 4. Annual IMD incidence rates by health authority in British Columbia, 2014-2023



Laboratory typing

Neisseria meningitidis is classified into twelve serogroups based on the polysaccharide capsule with each serogroup having distinct epidemiology.^b *Neisseria meningitidis* isolates from normally sterile sites (e.g. blood) are submitted to the BCCDC Public Health Laboratory and National Microbiology Laboratory for serogrouping. From 2014 to 2023, all IMD cases in BC were serogrouped excluding one case in 2023. During this time period, serogroup W caused the majority of IMD (50.3%; n=72) followed by serogroup B (25.2%; n=36) and serogroup Y (19.6%; n=28); only 6 cases of serogroup C (4.2%) were reported during this period (Figure 5). Incidence of serogroups B and Y were generally low with rates stable between 0 and 0.13 per 100,000 population (Figure 6). Conversely, incidence of serogroup W spiked in 2017-2019 with increased activity of the sequence type (ST)-11 clonal complex strain; the spread of this hypervirulent strain has been observed across several Canadian jurisdictions.^f The lowest rate each year was typically observed for serogroup C.

^e BC Centre for Disease Control. 2017 Annual Summary of Reportable Diseases. <http://www.bccdc.ca/health-professionals/data-reports/communicable-diseases/cd-annual-report-archives>

^f Tsang RS, Hoang L, Tyrrell GJ, Minion J, Van Caesele P, Kus JV, Lefebvre B, Haldane D, Garceau R, German G, Zahariadis G, Hanley B. Increase in ST-11 serogroup W *Neisseria meningitidis* invasive meningococcal disease in Canada, 2016–2018. *Can Commun Dis Rep* 2019;45(6):164–9. <https://doi.org/10.14745/ccdr.v45i06a04>

In 2023, there were four serogroup C cases and one each of serogroup B and serogroup Y; one case had an unknown serogroup and no serogroup W cases were reported. Compared to previous years, there was an increase in serogroup C in 2023 with the number of cases (n=4) accounting for the majority of all serogroup C cases reported from 2014 to 2023 (n=6). Prior to 2023, the last serogroup C case was reported in 2017. Serogroup-specific incidence was also highest for serogroup C in 2023 with the rate increasing from 0 per 100,000 population (2018 to 2022) to 0.07 per 100,000 population, while incidence was the same for serogroups B and Y (0.02 cases per 100,000 population) in 2023 (Figure 6).

Figure 5. Number of confirmed IMD cases by serogroup and year in British Columbia, 2014-2023^a

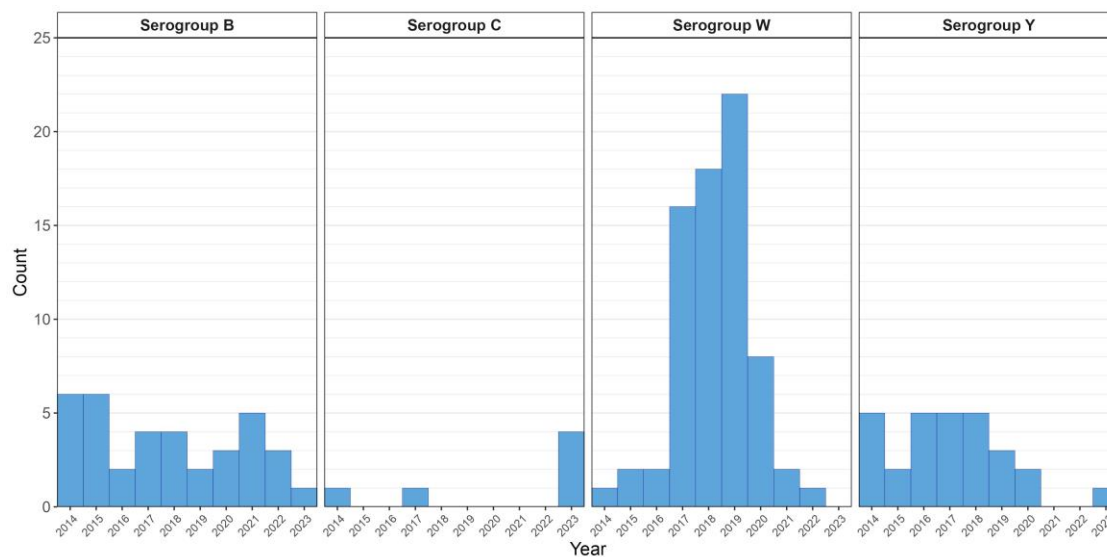
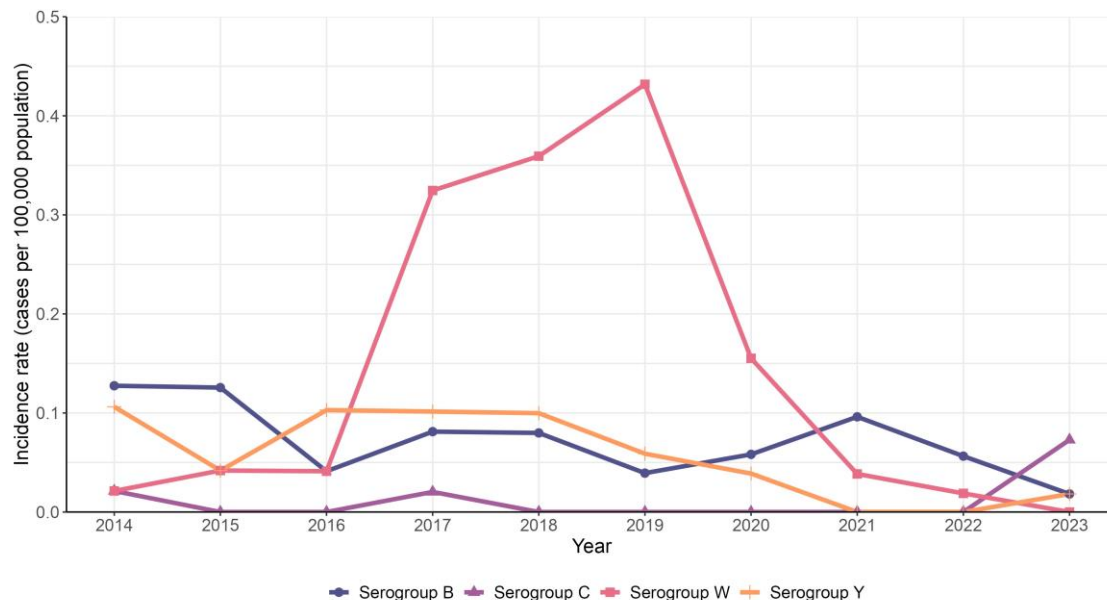


Figure 6. Serogroup-specific IMD incidence rates in British Columbia, 2014-2023^a



^a Excludes one case in 2023 with an unknown serogroup

Over the past decade, serogroup W was the predominant serogroup in all age groups that had cases, excluding 10 to 14-year-olds and 25 to 29-year-olds (Figure 7). Cases were evenly distributed between serogroups B and Y in 10 to 14-year-olds, while serogroup B was predominant in 25 to 29-year olds. In 2023, the rate of serogroup B in 20 to 24-year-olds (0.28 per 100,000 population) was higher than the 2014-2022 average (0.07 per 100,000 population), while it was lower or the same across all other age groups (Table 2). Rates of serogroup C in adults aged 40 to 59 years and 60+ years were higher in 2023 compared to 2014-2022.

Figure 7. Serogroup distribution of IMD cases by age group in British Columbia, 2014-2023

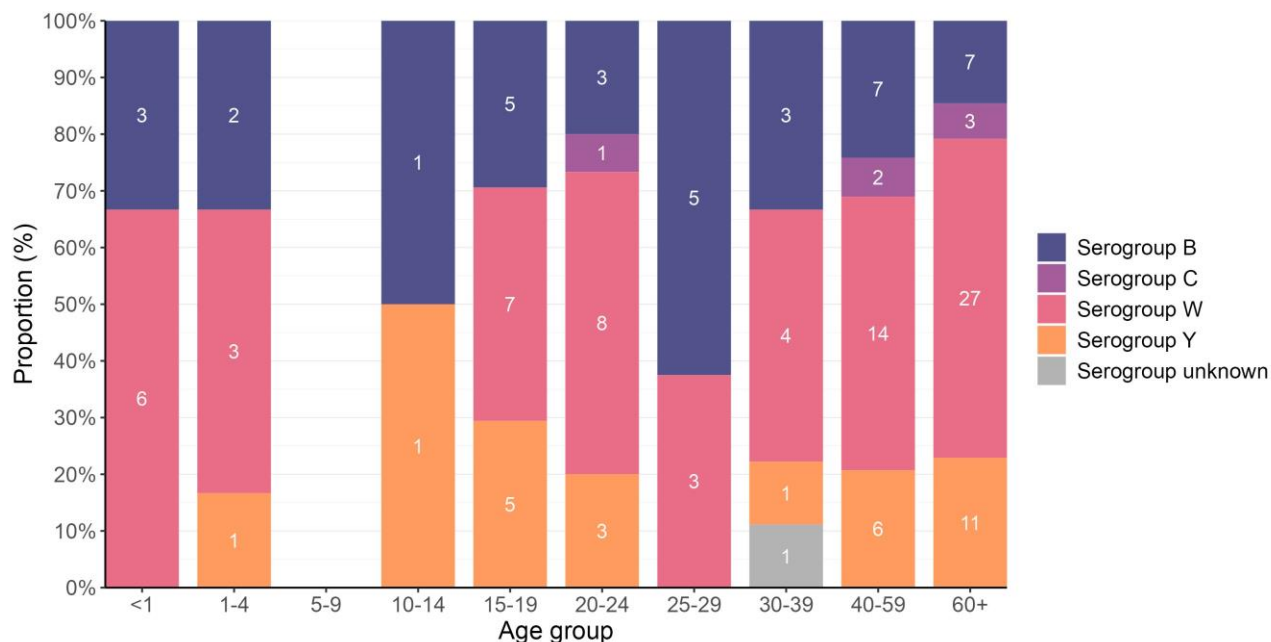


Table 2. Age and serogroup-specific IMD incidence rates in 2023 compared to 2014-2022, British Columbia⁹

Age group	Serogroup B		Serogroup C		Serogroup W		Serogroup Y	
	2014-2022 mean	2023	2014-2022 mean	2023	2014-2022 mean	2023	2014-2022 mean	2023
<1	0.76	0	0	0	1.52	0	0	0
1-4	0.12	0	0	0	0.18	0	0.06	0
5-9	0	0	0	0	0	0	0	0
10-14	0.05	0	0	0	0	0	0.05	0
15-19	0.20	0	0	0	0.28	0	0.20	0
20-24	0.07	0.28	0.03	0	0.27	0	0.10	0
25-29	0.16	0	0	0	0.10	0	0	0
30-39	0.05	0	0	0	0.06	0	0.02	0
40-59	0.06	0	0	0.15	0.11	0	0.04	0.07
60+	0.06	0	0.01	0.14	0.24	0	0.10	0

Acknowledgements

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Data Notes

- Data presented in this report are based on records in the invasive meningococcal disease enhanced surveillance Access database extracted on May 31, 2024. Case information is based on case report forms submitted to BCCDC by regional health authorities and laboratory reports from the BCCDC Public Health Laboratory and National Microbiology Laboratory. Data are subject to change.
- Denominators used to calculate rates are based on population estimates (2014-2022) and projections (2023) from BC Stats Population Estimates and PEOPLE projections updated December 2023.
- Only IMD cases who met the confirmed case classification and were BC residents at the time of case reporting are included in this report. Provincial surveillance definitions may change over time and can impact the analysis of trends. Current definitions for IMD can be found [here](#).
- Geographic breakdowns are based on the case's health region of residence at the time of case investigation. Additional information on BC regional health authorities can be found [here](#).
- Cases are reported based on episode date which is the date of symptom onset, if reported, otherwise the earliest of reported date, hospital admission date, specimen collection date, or death date.