Legionellosis in Ontario

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Introduction

This report provides an epidemiologic summary of legionellosis activity in Ontario, from January 1, 2018 to October 31, 2023, with a focus on trends in 2023. It includes the most current information available from Ontario's integrated Public Health Information System (iPHIS).

The current provincial confirmed case definition can be found in the Infectious Disease Protocol: Appendix 1 Case Definition and Disease Specific Information, Legionellosis.[1]
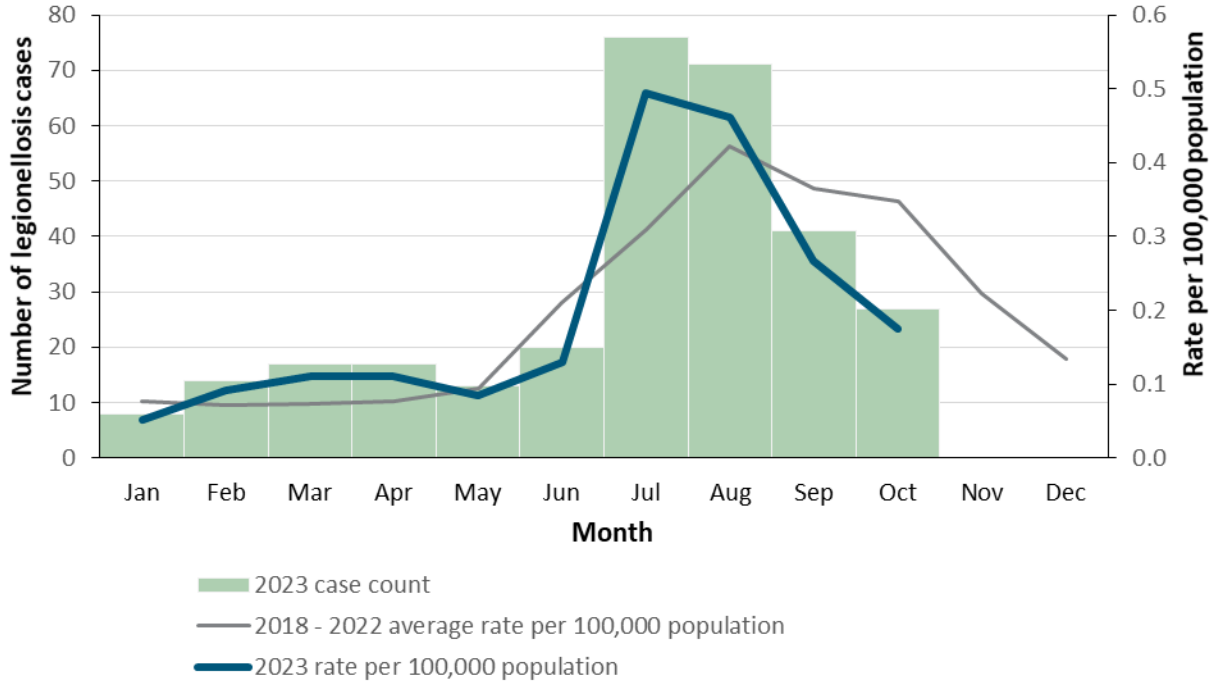
For additional information regarding legionellosis, including causes, symptoms, and testing, visit the Ontario Ministry of Health and Public Health Ontario webpages.

Highlights

- From January 1, 2023 to October 31, 2023, there have been a total of 304 confirmed cases of legionellosis reported in Ontario, which is similar to average number reported per year in the previous five years (Table 1).

- July 2023 saw the most cases reported in 2023 (n = 76, 0.5 cases per 100,000 population). This number was higher than the average number of cases reported in the same month between 2018 and 2022 (45 cases, 0.3 cases per 100,000 population) (Figure 1).

- Males (2.7 cases per 100,000 population) and adults in the 80+ age group (6.3 cases per 100,000 population) reported the highest rates of legionellosis to-date in 2023. On average, during the same period between 2018 and 2022, these two groups also had the highest rates by sex and age group respectively; Males had a rate of 2.9 cases per 100,000 population and adults in the 80+ age group had a rate of 5.7 cases per 100,000 population (Table 1).

- In 2023 to date, Region of Waterloo reported the highest rates of cumulative confirmed legionellosis cases (4.6 cases per 100,000 population) (Figure 2) followed by Brant County (3.8 cases per 100,000 population) and Haldimand-Norfolk (3.2 cases per 100,000). Other nearby public health units were also among those with the highest rates.

- In 2023, percent positivity peaked at the end of July at 8.4%, after which the trend generally declined (Figure 3). During October 2023, percent positivity averaged 2.2% throughout the month, indicating a return to baseline and the end of the seasonal peak. Overall, the percent positivity trends seen are similar to the trends in confirmed cases presented in Figure 1.

- The percentage of cases this year that were reported as hospitalized was 63.5% compared to 74.9% in the five previous years. The percentage of fatal legionellosis cases was 3.6% compared to 6.0% in the previous years (Table 2). The proportion of cases with a fatal outcome reported was highest among those ≥80 years of age. The proportions of cases admitted to hospital and those with a fatal outcome reported in 2023 should be interpreted with lags in data reporting in mind.

Trends

Figure 1: Confirmed legionellosis case counts and rates per 100,000 population by month in Ontario (January 1, 2023 to October 31, 2023) compared to average rates per 100,000 population for the previous five years (January 1, 2018 to December 31, 2022)

Data Source: Ontario. Ministry of Health. Integrated Public Health Information System (iPHIS) [database]. Toronto, ON: King's Printer for Ontario [extracted 2023 November 13].

Table 1: Confirmed legionellosis cases and rate (per 100,000 population) by sex* and age group in Ontario: current year (January 1, 2023 to October 31, 2023) compared to the average of the previous five years (January 1, 2018 to October 31, 2022)**
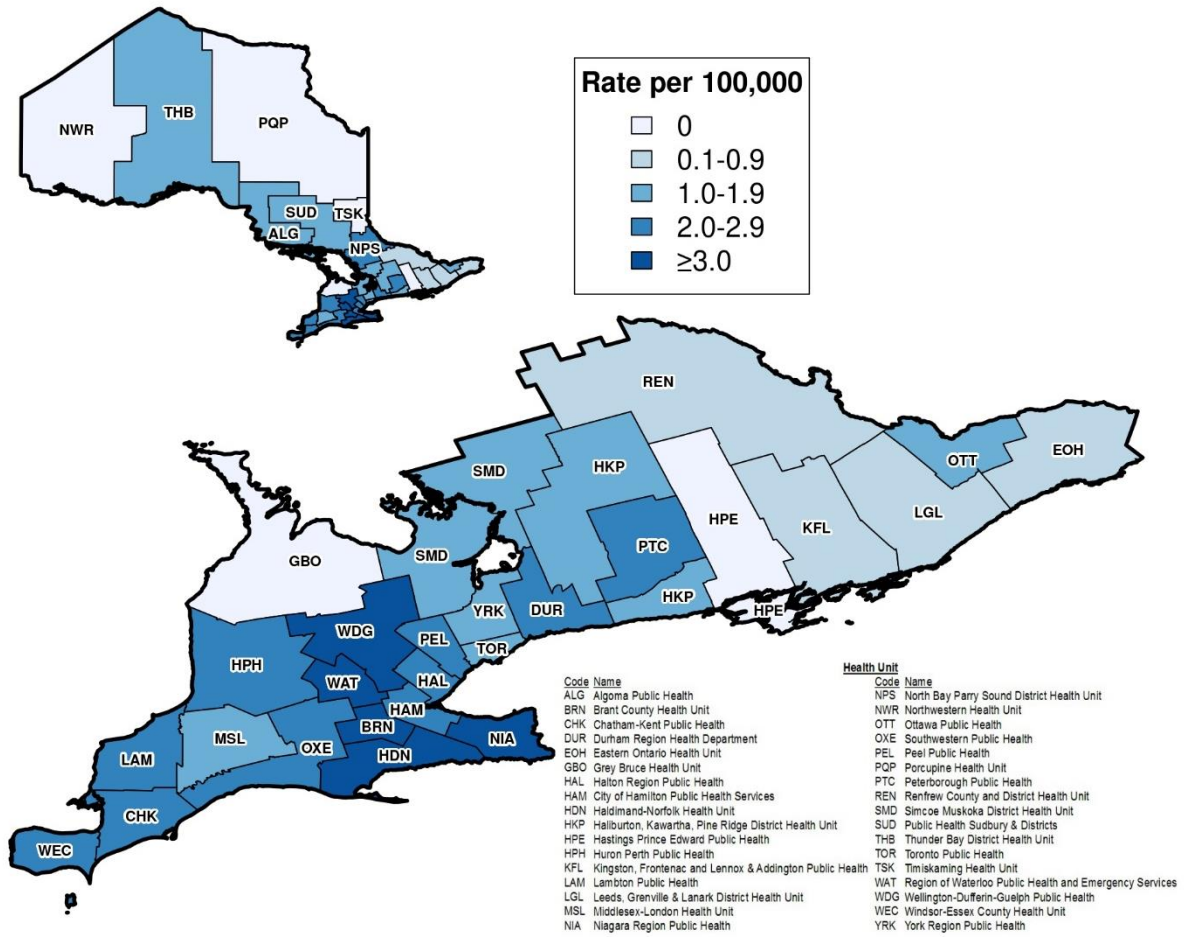
Sex and age group (years)	Total number of cases reported between January 1, 2023 to October 31, 2023	Rate per 100,000 population between January 1, 2023 to October 31, 2023	Average number of cases reported annually between January 1, 2018 to October 31, 2022	Average annual rate per 100,000 population between January 1, 2018 to October 31, 2022
Female	102	1.3	93.6	1.3
Male	202	2.7	207.2	2.9
Other/Did not specify	0	N/A	0.2	N/A
0 – 19	1	<0.1	0.8	<0.1
20 – 39	15	0.3	15.4	0.4
40 – 59	77	2.0	98.6	2.5
60 – 79	165	5.2	148.8	5.1
≥80	45	6.3	37.4	5.7
Unknown	1	N/A	0	N/A
Total	**304**	**2.0**	**301**	**2.0**

Data Source: Ontario. Ministry of Health. Integrated Public Health Information System (iPHIS) [database]. Toronto, ON: King's Printer for Ontario [extracted 2023 November 13].

*This report uses the terminology sex to reference the reported values for the gender field in iPHIS. Three values for sex are derived from the data entered in iPHIS: Male, Female, and Did Not Specify Male or Female. Information from all three fields are combined when presenting total counts or rates. For sex specific rates, only male and female data are presented.

**For the previous five years (2018-2022), only data for confirmed legionellosis cases reported January 1 – October 31 are presented, for comparability to the current year to-date.
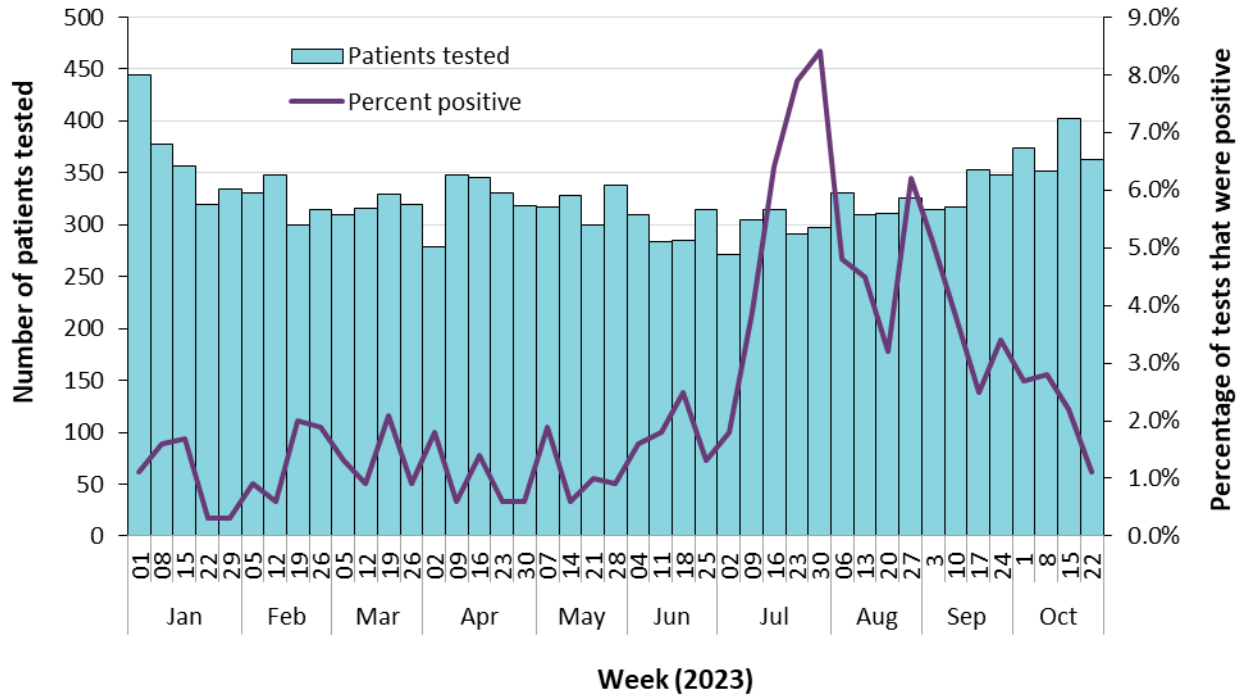
Figure 2: Cumulative rate of confirmed legionellosis cases reported in the current year (January 1, 2023 to October 31, 2023) by public health unit: Ontario

Data Sources: Ontario. Ministry of Health. Integrated Public Health Information System (iPHIS) [database]. Toronto, ON: King's Printer for Ontario [extracted 2023 November 13].

Testing

Figure 3: Number of patients tested for *Legionella* and percent positivity in Ontario, by week, January 1, 2023 to October 28, 2023*

Data Source: PHO Laboratory Information Management System
Note: Includes all *Legionella* testing methods. Patient was considered positive if a specimen was positive by any test method. Week was assigned based on received date; start dates of each week are presented in the x-axis.
*Data are provided by surveillance week and presented up to the most complete week in October 2023.

Severity

Table 2: Severe outcomes for confirmed legionellosis cases by sex* and age group in Ontario: current year (January 1, 2023 to October 31, 2023) compared to the average of the previous five years (January 1, 2018 to October 31, 2022)**

Sex and age group (years)	Current number (%) of cases hospitalized between January 1, 2023 to October 31, 2023	Average number (%) of cases hospitalized per year between January 1, 2018 to October 31, 2022	Current number (%) of cases with a fatal outcome between January 1, 2023 to October 31, 2023	Average number (%) of cases with a fatal outcome per year between January 1, 2018 to October 31, 2022
Female	67/102 (65.7)	67.4/93.6 (72.0)	5/102 (4.9)	4.6/93.6 (4.9)
Male	126/202 (62.4)	158/207.2 (76.3)	6/202 (3.0)	13.6/207.2 (6.6)
Other/Did not specify	N/A	N/A	N/A	N/A
0 – 19	1/1 (100.0)	0.6/0.8 (75.0)	0/1 (0.0)	0/0.8 (0.0)
20 – 39	8/15 (53.3)	11.6/15.4 (75.3)	0/15 (0.0)	0.8/15.4 (5.2)
40 – 59	42/77 (54.5)	72/98.6 (73.0)	0/77 (0.0)	2.4/98.6 (2.4)
60 – 79	108/165 (65.5)	113.4/148.8 (76.2)	7/165 (4.2)	10.2/148.8 (6.9)
≥80	34/45 (75.6)	27.8/37.4 (74.3)	4/45 (8.9)	4.8/37.4 (12.8)
Unknown	0/1 (0.0)	N/A	0/1 (0.0)	N/A
Total	**193/304 (63.5)**	**225.4/301 (74.9)**	**11/304 (3.6)**	**18.2/301 (6.0)**

Data Source: Ontario. Ministry of Health. Integrated Public Health Information System (iPHIS) [database]. Toronto, ON: King's Printer for Ontario [extracted 2023 November 13].

*This report uses the terminology sex to reference the reported values for the gender field in iPHIS. Three values for sex are derived from the data entered in iPHIS: Male, Female, and Did Not Specify Male or Female. Information from all three fields are combined when presenting total counts or rates. For sex specific rates, only male and female data are presented.

**For the previous five years (2018-2022), only data for confirmed legionellosis cases reported January 1 – October 31 are presented, for comparability to the current year to-date.

Technical Notes

Data Souces

- The data for this report were based on information entered in the Ontario Ministry of Health (MOH) integrated Public Health Information System (iPHIS) database **as of 9 a.m., November 13, 2023**.

- Testing and percent positivity data was obtained from PHO's Laboratory Information Management System **as of November 9, 2023.**

- Population estimates used to calculate rates for total cases, total hospital admissions and total deaths were calculated using the Ontario 2018, 2019, 2020, and 2021 population estimates[2], sourced from Statistics Canada, and the Ontario 2022 and 2023 population projections[3], sourced from the Ontario Ministry of Finance.

Data Caveats for iPHIS

- iPHIS is a dynamic disease reporting system that allows ongoing updates to previously entered data. As a result, data extracted from iPHIS represent a snapshot at the time of extraction and may differ from previous or subsequent reports.

- These data only represent laboratory-confirmed cases of legionellosis reported to public health and recorded in iPHIS. As a result, all case counts are subject to varying degrees of underreporting due to a variety of factors, such as disease awareness and medical care seeking behaviours, that may depend on severity of illness, clinical practices, and changes in laboratory testing and reporting behaviours.

- Only legionellosis cases meeting the confirmed case classification as listed in the Ontario Ministry of Health (MOH) surveillance case definitions are included in the reported case counts.

  - Provincial surveillance case definitions available online under the Infectious Diseases Protocol[1] are the most current.

  - Changes to provincial surveillance case definitions and disease classifications have occurred over the years and thus may impact the analysis of trends over time. Cases are classified in iPHIS based on the Ontario MOH surveillance case definitions in use at the time the case was identified.

  - PHO's technical report "Factors Affecting Reporting Diseases in Ontario: Case Definition Changes and Associated Trends 1991-2016"[4] and its associated appendix provide more detailed information on this topic.

- Cases are reported based on the Episode Date, which is an estimate of the onset date of disease for a case. In order to determine this date, the following hierarchy exists in iPHIS: Onset Date > Specimen Collection Date > Lab Test Date > Reported Date.

  - For example: If an Onset Date exists, it will be used as the Episode Date. If Onset Date is not available, then the next available date in the hierarchy (i.e., Specimen Collection Date) will be used, and so on.

- Duplicate case records may be included if they were not identified and resolved at either the local or provincial level prior to data extraction from iPHIS.

- Hospitalized legionellosis cases were determined based on a reported intervention type description of "Hospitalization" or "ICU" and a reported intervention start date on or after the case's episode date.

- Fatal legionellosis cases were determined based on a case outcome description of "Fatal" and the type of death not being reported as "Reportable disease was unrelated to cause of death."

- Cases for which the Diagnosing Heath Unit (DHU) was reported as MOHLTC (to signify a case that is not a resident of Ontario) were excluded from this analysis.

References

1. Ontario. Ministry of Health. Ontario infectious disease protocol, 2022. Appendix 1: case definition and disease-specific information. Disease: Legionellosis. Effective: May 2022 [Internet]. Toronto, ON: King's Printer for Ontario; 2022 [modified 2022 Apr; cited 2023 Aug 31]. Available from: https://www.health.gov.on.ca/en/pro/programs/publichealth/oph_standards/docs/legionellosis_chapter.pdf

2. Statistics Canada. Population estimates 2001-2021: table 1 - annual population estimates by age and sex for July 1, 2001 to 2021, health regions, Ontario [unpublished data table]. Ottawa, ON: Government of Canada; 2022 [received 2022 Mar 25]

3. Population Reporting. Population projections public health unit, 2021-2046 [data file]. Toronto, ON: Ministry of Finance [producer]; Toronto, ON: Ontario. Ministry of Health, IntelliHealth Ontario [distributor]; [data extracted 2022 Jan 13]

4. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Appendix: factors affecting case definition changes in Ontario, 1991-2016 [Internet]. Toronto, ON: King's Printer for Ontario; 2018 [cited 2023 Aug 31]. Available from: https://www.publichealthontario.ca/-/media/Documents/A/2018/appendix-factors-reportable-diseases-ontario-1991-2016.pdf?rev=b261bd175c184250a8e22df0f1866902&sc_lang=en

Citation

Ontario Agency for Health Protection and Promotion (Public Health Ontario). Legionellosis in Ontario. Toronto, ON: King's Printer for Ontario; 2023.

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