

ENHANCED EPIDEMIOLOGICAL SUMMARY

Gonorrhoea in Ontario: Focus on 2022

Published: January 2024

Purpose

The purpose of this annual report is to summarize data on trends over time, age and sex, geography, site of infection, testing, and antimicrobial susceptibility testing for confirmed cases of gonorrhoea in Ontario, with a focus on cases reported in 2022. This report includes the most current information available from Ontario's integrated Public Health Information System (iPHIS) as of **September 18, 2023**. Cases meeting the provincial confirmed [gonorrhoea](#) case definition are included in this report.

Surveillance data for gonorrhoea reported between 2020 and 2022 should be interpreted with caution due to changes in the availability of health care, health seeking behaviour, public health follow-up, and case entry during the COVID-19 pandemic.

Highlights

Trends over Time

- The provincial incidence of laboratory-confirmed gonorrhoea infections increased between 2013 and 2022, with the exception of marked decreases in 2020 and 2021.
 - Observed decreases in the incidence of gonorrhoea in both 2020 and 2021 likely reflect the impacts of the COVID-19 pandemic and should be interpreted with caution.
- Between 2013 and 2022, males consistently accounted for over 60.0% of all gonorrhoea cases reported in Ontario (average: 68.5%; range: 62.7%-73.3%).
- In each of the last 10 years between 2013 and 2022, the annual incidence rate of gonorrhoea was 1.8 to 2.9 times higher among males compared to females ([Figure 1](#)).

Age and Sex

- In 2022, the highest incidence rate of gonorrhoea infections was reported among males aged 30-34 years, followed by males aged 25-29 years, and males aged 35-39 years.
- The highest incidence of gonorrhoea infections among females was among those aged 20-24 years ([Figure 2](#)).

Geography

- The public health unit with the highest annual incidence rates between 2018 and 2021 was Northwestern Health Unit. In 2022, Toronto Public Health had the highest incidence rate per 100,000 population (176.0) followed closely by Northwestern Health Unit (175.4). Toronto Public Health had the second highest annual incidence rate of gonorrhoea in 2018 and 2019.
- Chatham-Kent Public Health had the third highest incidence rate of gonorrhoea in Ontario in 2022 (111.9 cases per 100,000 population). This represents an increase of over 460% from their 2018 reported incidence rate (19.9 cases per 100,000 population) ([Table A1](#)).

Site of Infection

- In 2022, the vast majority (92.4%; 2,662/2,880) of gonorrhoea infections among females were detected in specimen collected from urogenital sites only.
- In 2022, among males, 51.6% (4,231/8,203) of gonorrhoea infections involved urogenital sites only and 42.1% (3,452/8,203) involved extra-genital sites, with pharyngeal being the most common (41.7%; 1,438/3,452) followed by rectal (35.8%; 1,237/3,452) ([Table 2](#)).

Testing

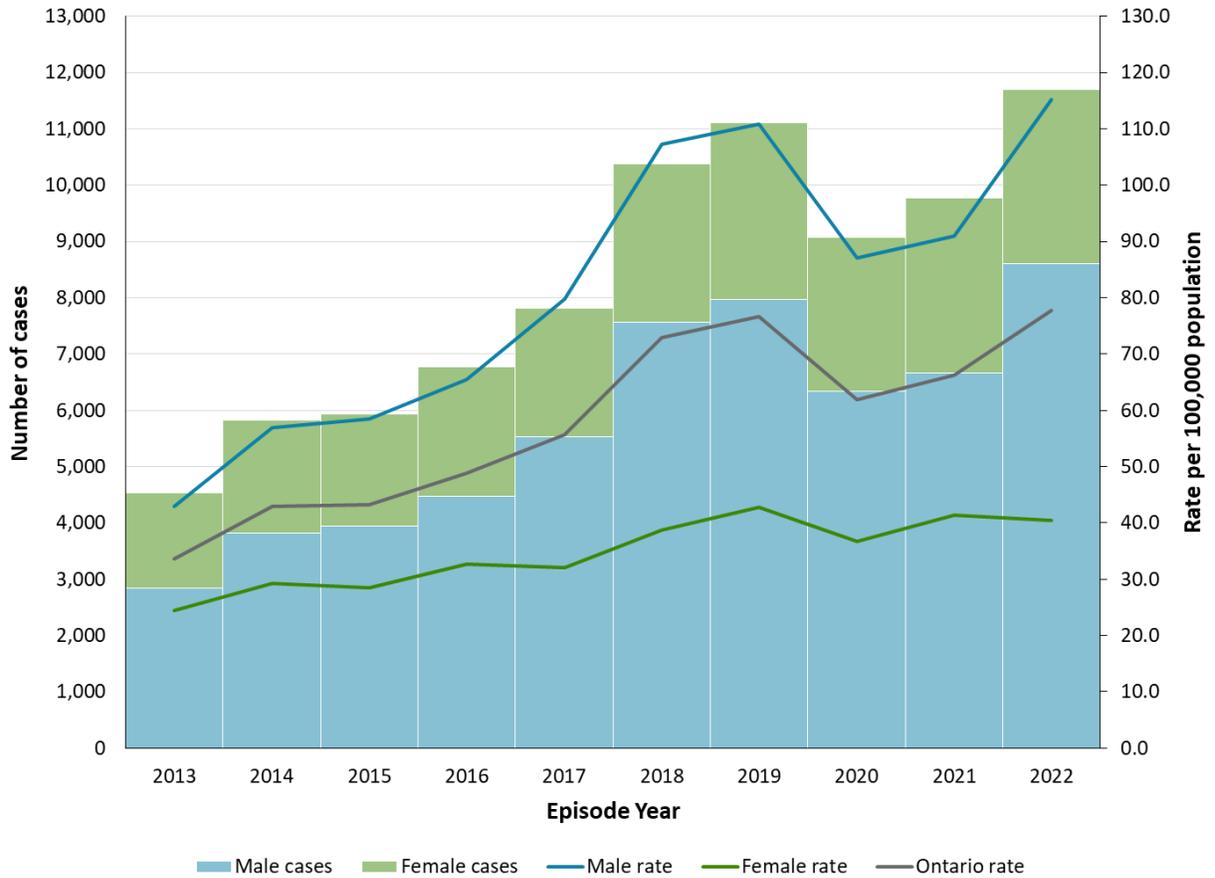
- Between 2013 and 2022, an average of 267,192 specimens (range: 211,786-356,905) were tested annually for gonorrhoea by Public Health Ontario (PHO) using nucleic acid amplification tests (NAATs). During this time period, the overall test positivity increased from 0.8% in 2013 to 3.0% in 2022 ([Figure 4](#)).
- Between 2013 and 2017, an average of 31,191 specimens (range: 25,875-39,442) were tested annually for gonorrhoea by PHO using culture. In April 2018, PHO began accepting rectal and pharyngeal specimens for NAAT. As a result, the number of cultures submitted for testing decreased by 94.0% from 39,442 tests in 2017 to 2,351 in 2022 ([Figure 5](#)).

Antimicrobial Susceptibility

- Between 2018 and 2022 a total of 5,742 isolates had antimicrobial susceptibility testing completed by PHO. The vast majority of samples were susceptible to azithromycin (98.57%), cefixime (99.86%), and ceftriaxone (99.97%) ([Table 3-Table 5](#)).

Trends over Time

Figure 1. Gonorrhoea cases and rate (per 100,000 population) by year and sex*: Ontario, 2013-2022



Data sources: Cases: Integrated Public Health Information System (iPHIS) [database]. Population Estimates: Statistics Canada.

Note: *Excludes cases that did not identify as male or female.

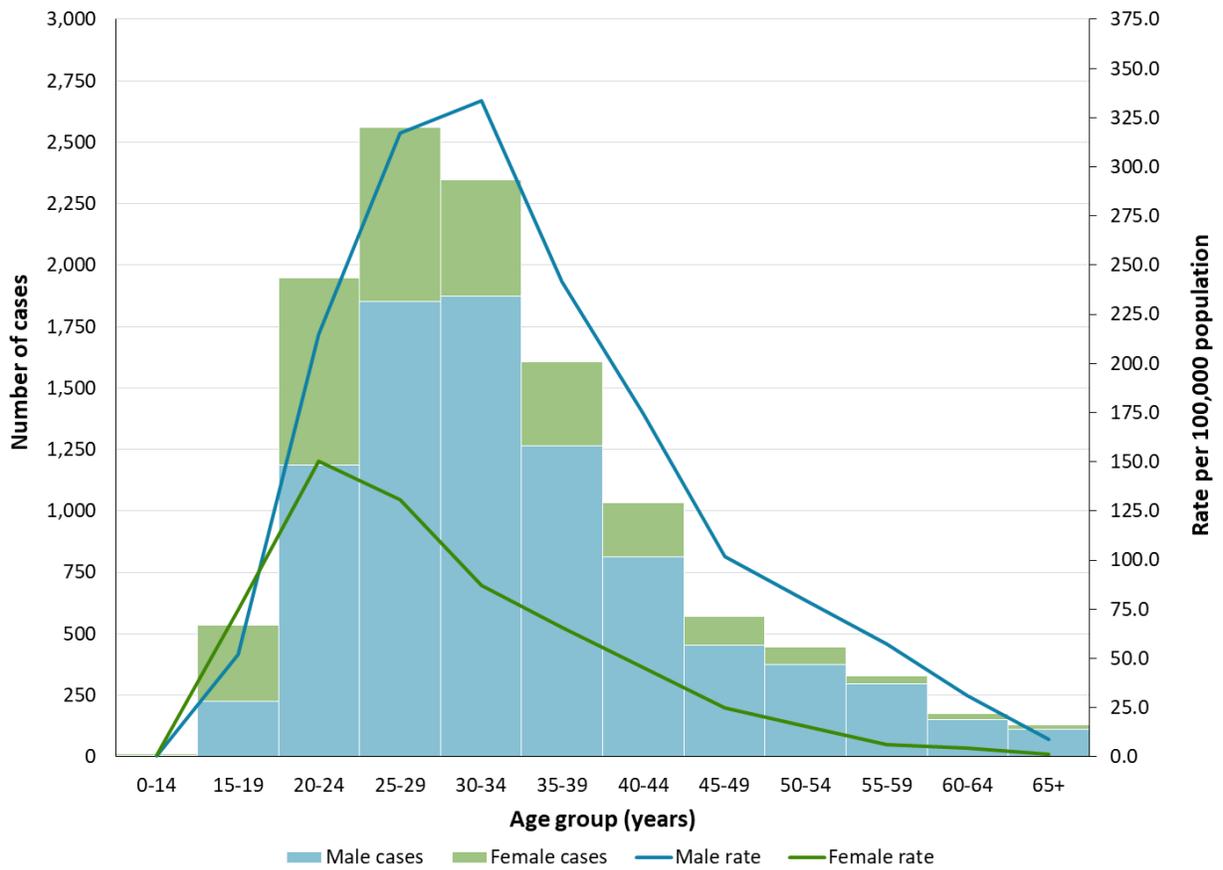
Age and Sex

Table 1. Gonorrhoea cases by age group and sex: Ontario, 2022 (n=11,739)

Demographic characteristic	2022
Mean age (years)	33.6
Median age and inter-quartile range (years)	31.5 (25.9-39.0)
Age group	n (%)
<20 years	550 (4.7%)
20 – 29 years	4,534 (38.6%)
30 – 39 years	3,967 (33.8%)
40 – 49 years	1,606 (13.7%)
50 – 59 years	779 (6.6%)
60 – 69 years	251 (2.1%)
70+ years	52 (0.4%)
Unknown	0 (0.0%)
Sex	n (%)
Male	8,608 (73.3%)
Female	3,083 (26.3%)
Transgender	45 (0.4%)
Other	2 (<0.1%)
Unknown	1 (<0.1%)

Data source: iPHIS

Figure 2. Gonorrhoea cases and rate (per 100,000 population) by age group and sex*: Ontario, 2022

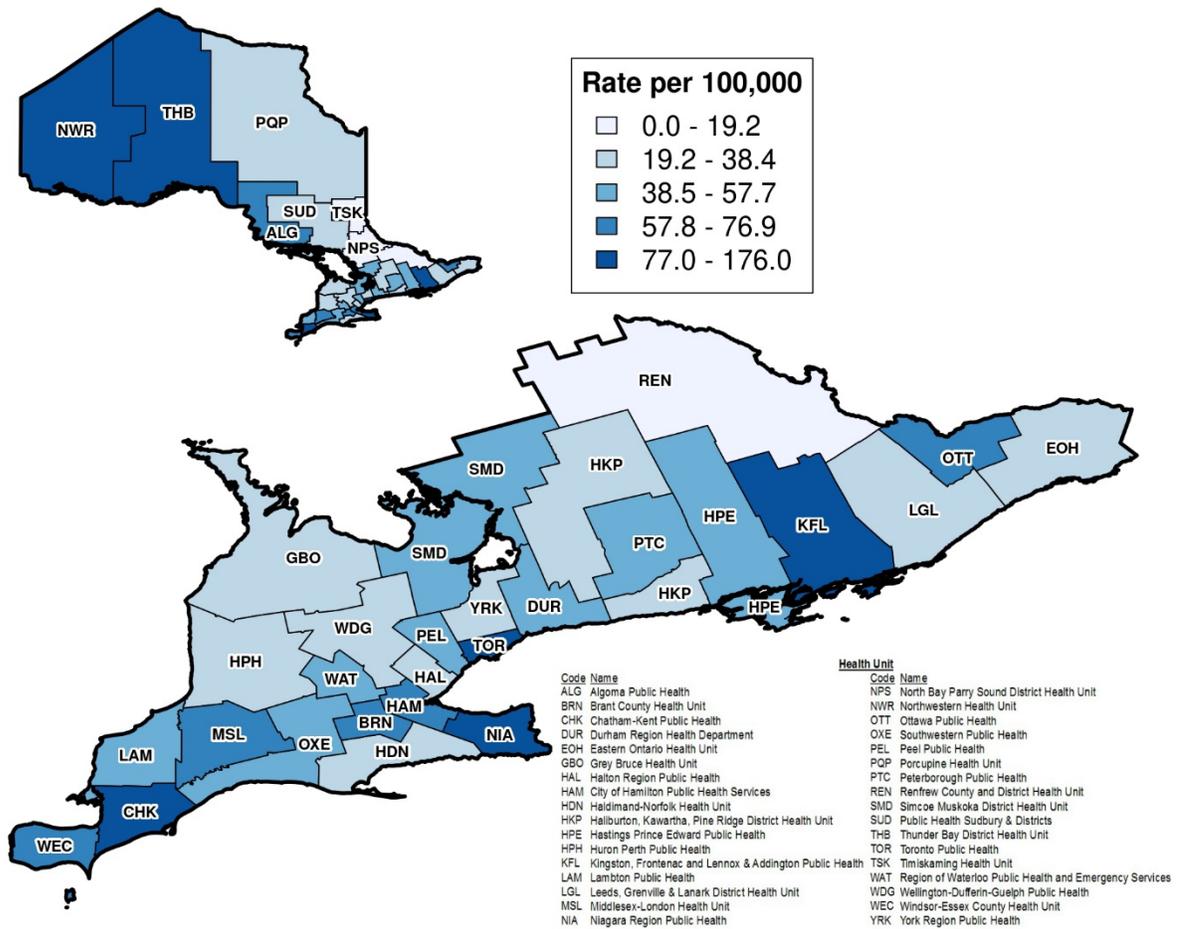


Data sources: iPHIS; Statistics Canada.

Note: *Excludes cases that did not identify as male or female.

Geography

Figure 3. Rate of gonorrhoea cases by public health unit: Ontario, 2022



Data sources: iPHIS; Statistics Canada.

Note: Data available in [Appendix A: Table A1](#).

Site of Infection

Table 2. Gonorrhoea cases by site of infection and sex*: Ontario, 2022

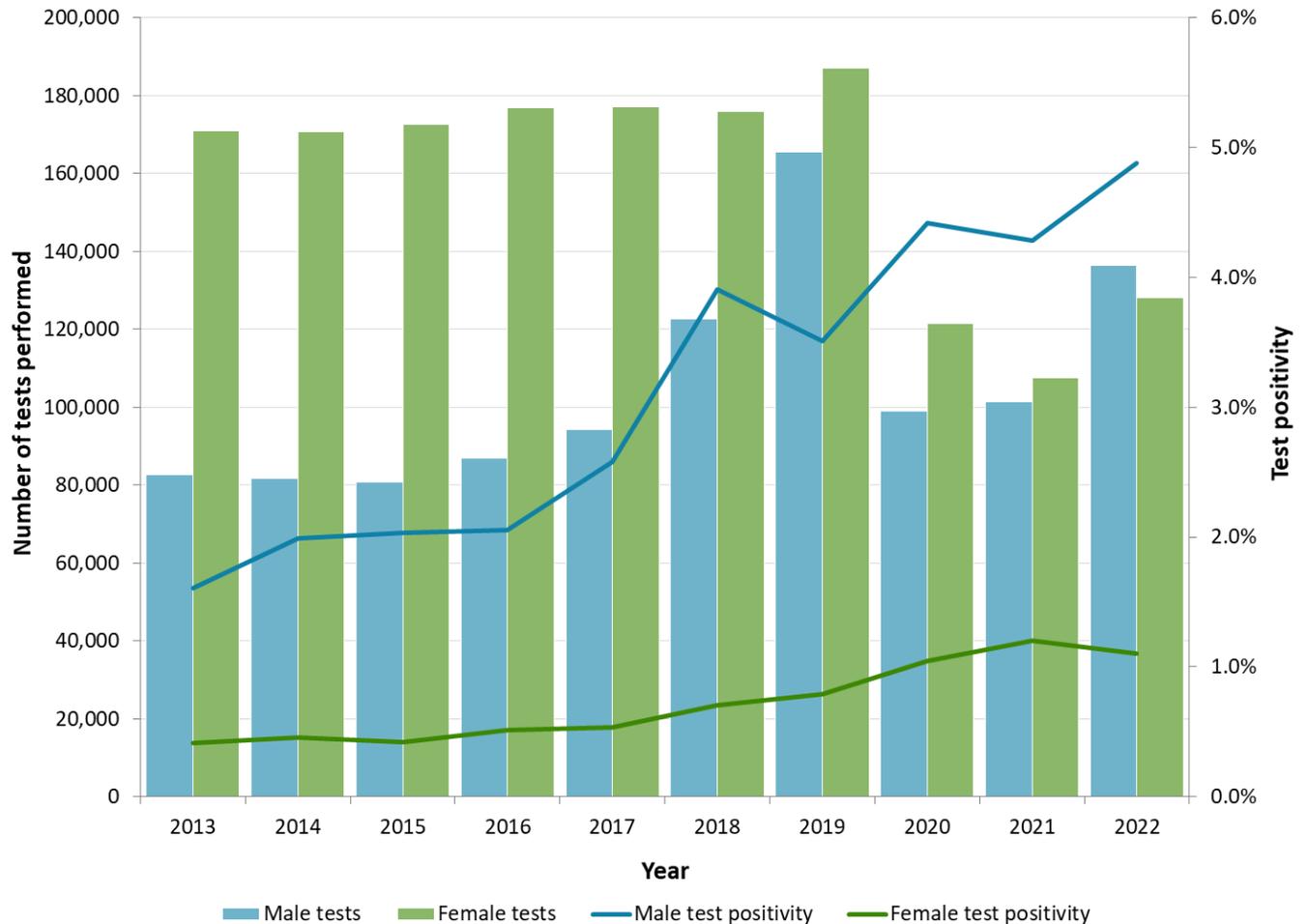
Site of infection	Male n (%)	Female n (%)	Total n (%)
Urogenital only**	4,231 (51.6%)	2,662 (92.4%)	6,893 (62.2%)
Extra-genital only	3,452 (42.1%)	134 (4.7%)	3,586 (32.4%)
Rectal	1,237 (35.8%)	9 (6.7%)	1,246 (34.7%)
Pharyngeal	1,438 (41.7%)	119 (88.8%)	1,557 (43.4%)
Rectal and pharyngeal	777 (22.5%)	6 (4.5%)	783 (21.8%)
Urogenital and extra-genital	520 (6.3%)	84 (2.9%)	604 (5.4%)
Total†	8,203 (100.0%)	2,880 (100.0%)	11,083 (100.0%)

Data source: iPHIS

Note: *Excludes cases that did not identify as male or female. **Includes urethral, urine, vaginal (females only), and cervical (females only). †Includes only cases with a urogenital and/or extra-genital site of infection entered in iPHIS. Excludes 608 cases (among males and females) that had a site of infection that was not a urogenital and/or extra-genital site (n=350) or had no site of infection entered in iPHIS (n=258).

Testing

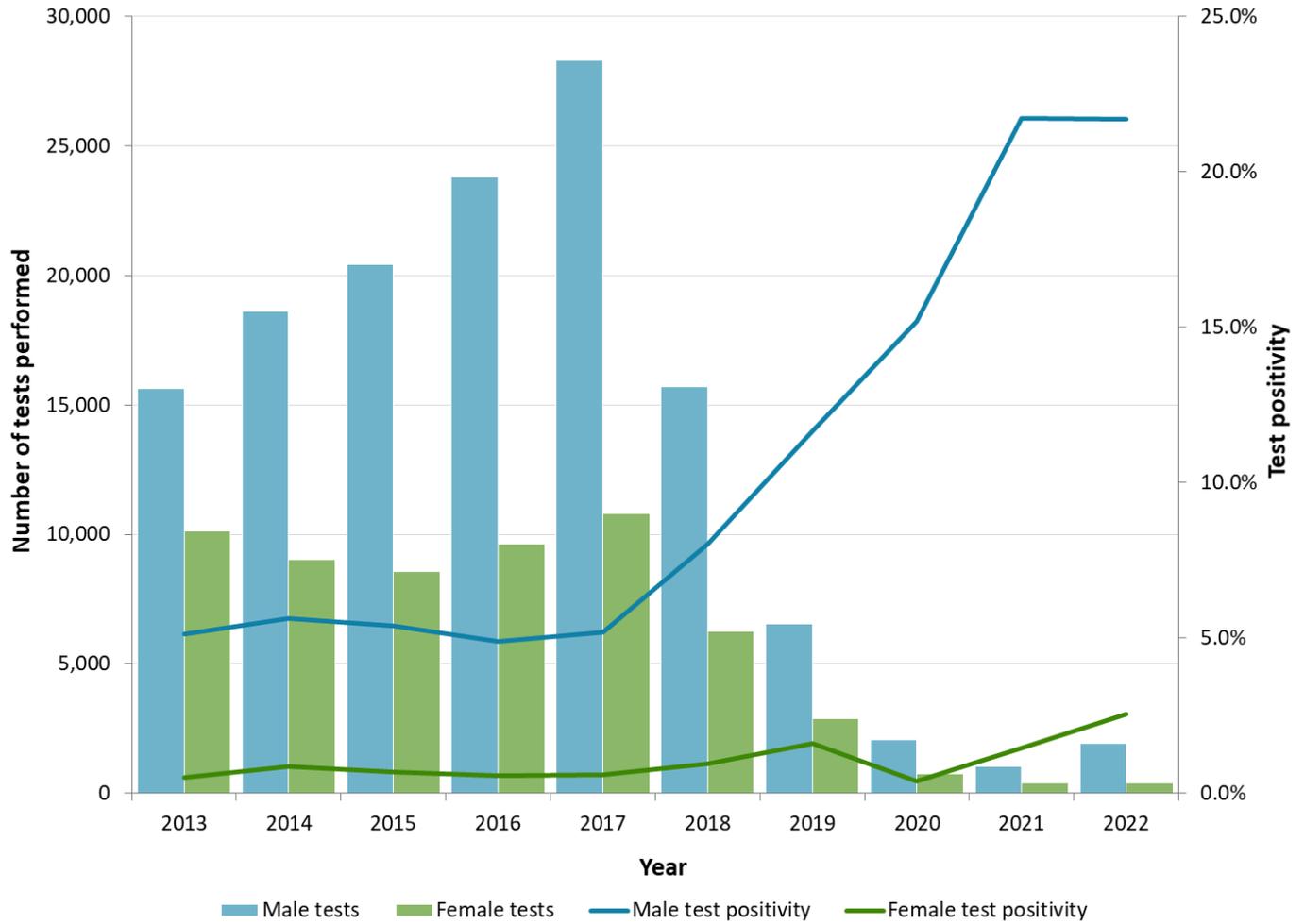
Figure 4. Number of nucleic acid amplification tests (NAATs) performed by Public Health Ontario (PHO) and test positivity for *N. gonorrhoeae* by year and sex*: Ontario, 2013-2022



Data source: PHO Laboratory Information Management System (LIMS).

Note: *Excludes cases that did not identify as male or female. Includes all NAATs performed on cervical, urethral, vaginal, urine, rectal, pharyngeal specimens and a small number of other sites; rectal and pharyngeal specimens accepted for NAAT since April 2018.

Figure 5. Number of culture tests performed by PHO and test positivity for *N. gonorrhoeae* by year and sex*: Ontario, 2013-2022



Data source: PHO LIMS

Note: *Excludes cases that did not identify as male or female. Rectal and pharyngeal specimens accepted for NAAT since April 2018; as a result, the number of cultures submitted for testing has decreased.

Antimicrobial Susceptibility

Antimicrobial susceptibility testing for *N. gonorrhoeae* at PHO is done by determining the minimum inhibitory concentration (MIC) of antibiotics (i.e., the lowest concentration [$\mu\text{g/mL}$] that prevents growth of an isolate of *N. gonorrhoeae*). A breakpoint is then used to determine if the isolate is susceptible (i.e., MIC below breakpoint) or non-susceptible (i.e., MIC above breakpoint) to an antibiotic. Refer to the [Data Caveats](#) for further details.

Table 3. Number and percentage of *N. gonorrhoeae* isolates that were susceptible and non-susceptible to azithromycin tested at PHO: Ontario, 2018-2022

MIC Interpretation*	2018 n (%)	2019 n (%)	2020 n (%)	2021 n (%)	2022 n (%)
Susceptible	2,078 (98.6%)	1,428 (98.5%)	716 (97.9%)	662 (98.7%)	776 (99.2%)
Non-susceptible	30 (1.4%)	22 (1.5%)	15 (2.1%)	9 (1.3%)	6 (0.8%)
Total	2,108	1,450	731	671	782

Data source: PHO LIMS

Note: *MIC breakpoint $\leq 1.0 \mu\text{g/mL}$. See [Appendix B](#) for the number and percentage of *N. gonorrhoeae* isolates tested at PHO by year and azithromycin MIC.

Table 4. Number and percentage of *N. gonorrhoeae* isolates that were susceptible and non-susceptible to cefixime tested at PHO: Ontario, 2018-2022

MIC Interpretation*	2018 n (%)	2019 n (%)	2020 n (%)	2021 n (%)	2022 n (%)
Susceptible	2,106 (99.9%)	1,444 (99.6%)	731 (100.0%)	671 (100.0%)	782 (100.0%)
Non-susceptible	2 (0.1%)	6 (0.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Total	2,108	1,450	731	671	782

Data source: PHO LIMS

Note: * MIC breakpoint = $\leq 0.25 \mu\text{g/mL}$. See [Appendix B](#) for the number and percentage of *N. gonorrhoeae* isolates tested at PHO by year and cefixime MIC.

Table 5. Number and percentage of *N. gonorrhoeae* isolates that were susceptible and non-susceptible to ceftriaxone tested at PHO: Ontario, 2018-2022

MIC Interpretation*	2018 n (%)	2019 n (%)	2020 n (%)	2021 n (%)	2022 n (%)
Susceptible	2,106 (99.9%)	1,450 (100.0%)	731 (100.0%)	671 (100.0%)	782 (100.0%)
Non-susceptible	2 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Total	2,108	1,450	731	671	782

Data source: PHO LIMS

Note: *MIC breakpoint = ≤ 0.25 $\mu\text{g/mL}$. See [Appendix B](#) for the number and percentage of *N. gonorrhoeae* isolates tested at PHO by year and ceftriaxone MIC.

Technical Notes

Data Sources

CASE DATA

- 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 **September 18, 2023**.
- 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.

LABORATORY DATA

- Data on the results of nucleic acid amplification tests (NAAT) and culture testing were extracted from the PHO Laboratory Information System (LIMS) on **August 9, 2023**.
- Antimicrobial susceptibility data were extracted from LIMS on **August 17, 2023**.

ONTARIO POPULATION DATA

- Ontario population estimates were sourced from Statistics Canada: Population estimates 2001-2022: Table 1 annual population estimates by age and sex for July 1, 2001 to 2022, health regions, Ontario [unpublished data table]. Ottawa, ON: Government of Canada; 2023 [received March 13, 2023].

Data Caveats

IPHIS

- Data reported between 2020 and 2022 should be interpreted with caution. Both testing and iPHIS data entry practices were impacted by the COVID-19 pandemic.
- These data only represent laboratory-confirmed cases of gonorrhea 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, which may depend on severity of illness, clinical practices, and changes in laboratory testing and reporting behaviours.
- Only gonorrhea cases meeting the confirmed case classification as listed in the Ontario MOH surveillance [case definitions](#) are included in the reported case counts. Provincial surveillance case definitions are available online under the Infectious Diseases Protocol 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](#)" and its associated [appendix](#) provide more detailed information on this topic.

- Cases of gonorrhoea 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.
- Case counts by geography are based on the diagnosing health unit (DHU). DHU refers to the case's public health unit of residence at the time of illness onset or report to public health.
 - Cases for which the DHU was reported as MOHLTC (to signify a case that is not a resident of Ontario) were excluded from this analysis.
- Cases for which the Disposition Status was reported as ENTERED IN ERROR, DOES NOT MEET DEFINITION, DUPLICATE-DO NOT USE, or any variation on these values, were excluded from this analysis.
- The following values for sex are derived from the data entered in the Gender field of iPHIS: MALE, FEMALE, TRANSGENDER, OTHER, UNKNOWN. Counts or rates presented as 'Total' include all of these values; however, for sex-specific rates or proportions, only Male and Female counts are included as denominators are not available for the other values.
 - Note: Cases reported as Transgender include both transgender males and transgender females as it is not possible to further distinguish based on iPHIS data.
- The potential for duplicate case records exists because duplicate sets were not identified and excluded unless they were already resolved at either the local or provincial level prior to data extraction from iPHIS.
- Extra-genital infections of gonorrhoea are reported based on the body site of the positive laboratory specimen. Note, however, that not all cases of gonorrhoea have a body site entered in iPHIS.

LABORATORY INFORMATION MANAGEMENT SYSTEM

- The laboratory data only represent tests performed at PHO. These data do not include testing performed at community laboratories throughout the province that conduct a large proportion of testing for gonorrhoea in Ontario.
 - Data do not represent unique individuals and instead represent all isolates, meaning that an individual who is tested for *N. gonorrhoeae* from more than one site (e.g. pharyngeal and rectal) and/or on more than one occasion in a calendar year will have all tests captured in these data. This is true for all negative and positive tests.
- Test positivity is calculated as the number of specimens positive for *N. gonorrhoeae* divided by the total number of specimens tested for *N. gonorrhoeae*.
- Rectal and pharyngeal specimens have been accepted for NAAT since April 2018. This may have contributed to the increase in NAATs completed in 2019.
- Antimicrobial susceptibility testing (AST) requires isolation of *N. gonorrhoeae* from culture. As culture is not the primary diagnostic method for *N. gonorrhoeae* infection, these data only represents a small subset of all *N. gonorrhoeae* infections in Ontario. PHO may not receive all *N. gonorrhoeae* isolates cultured in other laboratories for AST.

- On December 1, 2021, PHO implemented the Roche assay for NAAT, which made it no longer possible to request only *C. trachomatis* or *N. gonorrhoeae* testing. Therefore, any impacts to NAAT testing after this date would have an impact on the testing of both *C. trachomatis* and *N. gonorrhoeae*.
- Login date was used to assign year of test.
- Demographic information are obtained from paper requisitions accompanying the patient specimen and is thus subject to transcription errors.
- The MIC of one antibiotic cannot be compared to the MIC of another antibiotic. PHO uses the breakpoints outlined in the Performance Standards for Antimicrobial Susceptibility Testing from the Clinical and Laboratory Standards Institute (CLSI).
 - The breakpoint for azithromycin was not established by CLSI until 2019; prior to this, susceptibility was inferred using an epidemiological cut-off value.
- Since the introduction of NAAT for *N. gonorrhoeae* testing in Ontario, the percentage of cases with culture testing has greatly decreased. Since AST relies on culture, the AST results presented in this report represent a small proportion (<20%) of cases in Ontario and may not be generalizable to all gonorrhea infections.

Appendix A

Table A1. Gonorrhoea case counts and rate (per 100,000 population) by public health unit: Ontario, 2018-2022

Public Health Unit	2018	2019	2020	2021	2022
Algoma Public Health	24 (20.6)	23 (19.6)	18 (15.3)	120 (102.2)	88 (74.2)
Brant County Health Unit	81 (54.3)	115 (75.9)	106 (69.0)	103 (65.6)	112 (69.7)
Chatham-Kent Public Health	21 (19.9)	88 (83.0)	97 (90.7)	79 (73.1)	122 (111.9)
City of Hamilton Public Health Services	469 (82.8)	503 (87.6)	477 (81.8)	534 (90.9)	420 (70.4)
Durham Region Health Department	368 (53.7)	500 (71.6)	404 (56.6)	368 (50.5)	403 (54.1)
Eastern Ontario Health Unit	41 (19.4)	23 (10.8)	37 (17.1)	29 (13.3)	78 (35.1)
Grey Bruce Health Unit	36 (21.0)	39 (22.5)	30 (17.0)	76 (42.3)	49 (26.8)
Haldimand-Norfolk Health Unit	30 (25.6)	24 (20.2)	29 (24.2)	34 (27.8)	26 (20.9)
Haliburton, Kawartha, Pine Ridge District Health Unit	44 (23.4)	44 (23.2)	53 (27.7)	71 (36.7)	53 (27.0)
Halton Region Health Department	229 (39.2)	217 (36.3)	170 (27.9)	208 (33.7)	227 (36.2)
Hastings Prince Edward Public Health	33 (19.5)	35 (20.5)	80 (46.3)	86 (49.3)	70 (39.5)
Huron Perth Health Unit	44 (30.7)	72 (49.8)	48 (32.8)	47 (31.7)	34 (22.6)
Kingston, Frontenac, Lennox & Addington Public Health	64 (31.1)	80 (38.5)	257 (122.8)	183 (87.1)	196 (91.7)
Lambton Public Health	65 (49.5)	62 (46.9)	51 (38.5)	88 (66.4)	53 (39.5)
Leeds, Grenville and Lanark District Health Unit	30 (17.0)	30 (16.9)	31 (17.2)	47 (25.8)	58 (31.5)
Middlesex-London Health Unit	199 (40.3)	288 (57.3)	343 (67.2)	421 (81.6)	335(63)
Niagara Region Public Health	297 (62.9)	390 (81.6)	338 (70.2)	426 (87.6)	424 (85.5)
North Bay Parry Sound District Health Unit	41 (31.8)	42 (32.5)	30 (23.1)	32 (24.4)	22 (16.4)

Public Health Unit	2018	2019	2020	2021	2022
Northwestern Health Unit	158 (194.3)	191 (234.7)	179 (219.8)	114 (139.2)	144 (175.4)
Ottawa Public Health	899 (89.5)	731 (71.3)	488 (46.7)	595 (56.5)	819 (76.4)
Peel Public Health	865 (57.8)	925 (60.3)	774 (49.7)	711 (45.4)	870 (54.4)
Peterborough Public Health	65 (44.3)	66 (44.8)	46 (31.1)	39 (26.3)	68 (45.0)
Porcupine Health Unit	89 (104.6)	46 (53.9)	26 (30.6)	20 (23.6)	24 (28.2)
Public Health Sudbury & Districts	122 (59.8)	143 (69.9)	77 (37.5)	105 (51.0)	80 (38.3)
Region of Waterloo Public Health and Emergency Services	399 (68.9)	349 (58.9)	302 (49.9)	257 (42.1)	267 (42.1)
Renfrew County and District Health Unit	18 (16.8)	15 (13.9)	14 (12.9)	15 (13.7)	17 (15.4)
Simcoe Muskoka District Health Unit	205 (35.2)	201 (33.8)	119 (19.7)	264 (42.7)	280 (44.1)
Southwestern Public Health	36 (17.0)	49 (22.7)	51 (23.3)	78 (34.9)	107 (46.8)
Thunder Bay District Health Unit	178 (113.3)	192 (121.8)	221 (140.4)	212 (136.0)	161 (103.1)
Timiskaming Health Unit	3 (8.9)	1 (2.9)	3 (8.8)	2 (5.8)	2 (5.8)
Toronto Public Health	4,565 (156.4)	4,898 (165.3)	3,627 (121.5)	3,737 (126.4)	5,326 (176.0)
Wellington-Dufferin-Guelph Public Health	101 (33.2)	118 (38.3)	87 (27.8)	120 (37.9)	122 (37.9)
Windsor-Essex County Health Unit	183 (43.4)	211 (49.5)	183 (42.8)	251 (58.9)	277 (63.5)
York Region Public Health Services	433(37.3)	437 (36.9)	326 (27.2)	346 (28.6)	405 (33.1)
Total	10,435 (72.9)	11,148 (76.6)	9,122 (61.9)	9,818 (66.3)	11,739 (77.7)

Data sources: Cases: iPHIS; Statistics Canada

Appendix B

Table B1. Number and percentage of *N. gonorrhoeae* isolates tested at PHO by azithromycin MIC: Ontario, 2018-2022

Azithromycin MIC (µg/mL)	2018 n (%)	2019 n (%)	2020 n (%)	2021 n (%)	2022 n (%)
<=0.25	1,343 (63.7%)	859 (59.2%)	390 (53.4%)	375 (55.9%)	503 (64.3%)
0.5	279 (13.2%)	330 (22.8%)	234 (32.0%)	193 (28.8%)	191 (24.4%)
1.0	456 (21.6%)	239 (16.5%)	92 (12.6%)	94 (14.0%)	82 (10.5%)
2.0	16 (0.8%)	11 (0.8%)	6 (0.8%)	5 (0.8%)	1 (0.1%)
>=4.0	14 (0.7%)	11 (0.8%)	9 (1.2%)	4 (0.6%)	5 (0.6%)
Total	2,108	1,450	731	671	782

Data source: PHO LIMS

Table B2. Number and percentage of *N. gonorrhoeae* isolates tested at PHO by cefixime MIC: Ontario, 2018-2022

Cefixime MIC (µg/mL)	2018 n (%)	2019 n (%)	2020 n (%)	2021 n (%)	2022 n (%)
<=0.03	2,004 (95.1%)	1,328 (91.6%)	644 (88.1%)	620 (92.4%)	729 (93.2%)
0.06	68 (3.2%)	43 (3.0%)	22 (3.0%)	18 (2.7%)	26 (3.3%)
0.12	29 (1.4%)	48 (3.3%)	52 (7.1%)	28 (4.2%)	25 (3.2%)
0.25	5 (0.2%)	25 (1.7%)	13 (1.8%)	5 (0.8%)	2 (0.3%)
>=0.50	2 (0.1%)	6 (0.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Total	2,108	1,450	731	671	782

Data source: PHO LIMS

Table B3. Number and percentage of *N. gonorrhoeae* isolates tested at PHO by ceftriaxone MIC: Ontario, 2018-2022

Ceftriaxone MIC (µg/mL)	2018 n (%)	2019 n (%)	2020 n (%)	2021 n (%)	2022 n (%)
<=0.03	2,082 (98.8%)	1,418 (97.8%)	716 (98.0%)	659 (98.2%)	772 (98.7%)
0.06	21 (1.0%)	26 (1.8%)	13 (1.8%)	11 (1.6%)	8 (1.0%)
0.12	3 (0.1%)	6 (0.4%)	2 (0.3%)	1 (0.2%)	1 (0.1%)
0.25	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.1%)
>=0.50	2 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Total	2,108	1,450	731	671	782

Data source: PHO LIMS

Citation

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