

ENHANCED EPIDEMIOLOGICAL SUMMARY

Nontuberculous Mycobacteria Disease in Ontario, January 1, 2020 to December 31, 2020

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Purpose

This report presents information on specimens tested for nontuberculous mycobacteria (NTM) at Public Health Ontario (PHO) Laboratory from January 1, 2020 to December 31, 2020. This report aims to describe the characteristics of individuals by NTM microbiological disease states, identify the most frequent NTM species, and measure the rates of NTM disease in Ontario.

Background

NTMs are ubiquitous environmental organisms that can be found in both natural (e.g. soil and untreated fresh and salt water) and human-made (e.g. heater and water cooler devices, swimming pools, showers) reservoirs.¹ Individuals are continuously exposed to NTMs; however those with existing lung disease, as well as elderly or immunocompromised individuals, are most at risk of developing NTM disease. The most common form of NTM disease in humans is pulmonary infection.² Non-pulmonary NTM infections can occur as well, affecting mostly skin, lymph nodes, soft tissue and joints.³

NTM species comprise all members of the genus *Mycobacterium* excluding *Mycobacterium tuberculosis* complex, *Mycobacterium ulcerans* and *Mycobacterium leprae*.⁴ More than 170 species of NTM have been identified, with *Mycobacterium avium*, *Mycobacterium xenopi*, *Mycobacterium gordonae* and *Mycobacterium intracellulare* historically being the most commonly identified species in Ontario.²

NTM infections are not reportable diseases in Ontario, unless they are identified as part of an outbreak.² Monitoring laboratory testing data for circulating NTM species is necessary to understand the epidemiology and burden of this disease.

NTM disease case definition

Confirmation of NTM lung disease requires clinical, radiological and microbiological examinations.² At the Public Health Ontario Laboratory we do not have access to the individual's clinical and radiological information. Therefore, microbiological criteria for assigning a NTM disease state were adapted from guidelines jointly created by the following organizations: American Thoracic Society, Infectious Diseases Society of America, European Respiratory Society, and European Society of Clinical Microbiology and Infectious Diseases.⁵

In brief, this definition assigns a disease state based on the presence of NTM species identified, frequency of isolation and type of specimen source(s) found to be positive for NTM species. Six NTM microbiological disease states were assigned in this report: standard, strict, uncertain, non-pulmonary, indeterminate and negative (see Table A1). The standard disease state is the main category which meets the minimum requirements for confirmed NTM disease (two positive sputum for the same species within 24 months; one positive bronchial wash or bronchoalveolar lavage; or one positive lung biopsy sample). The strict disease state requires the fulfilling of more stringent criteria than the standard definition in terms of frequency of NTM identification and specimen sources that yielded positive results. Therefore, individuals assigned in the strict disease state are a subgroup of individuals in the standard disease state. The other three positive disease states (uncertain, non-pulmonary, and indeterminate) show presence of NTM species but do not meet the standard definition for different reasons. The negative disease state is assigned to individuals who have been tested for NTM species with no laboratory evidence of NTM species in their respiratory or non-respiratory specimens.

NTM testing at Public Health Ontario Laboratory

To diagnose NTM pulmonary infection, the recommended specimen sources include: sputum, tracheal aspirate, bronchoalveolar lavage, bronchial washing, esophageal brushing and lung tissue.⁵ To increase the likelihood of identifying whether an NTM species is associated with disease in an individual, recommendations are to collect three sputum specimens early in the morning on the same day, one hour apart and shipped to Public Health Ontario Laboratory for testing. A smear is prepared and visualized under fluorescence microscopy to look for mycobacteria. All cultured isolates of *Mycobacterium* are identified to species level using methods outlined in Table A3. Details about specimen collection and testing are described in Public Health Ontario's Specimen Collection and Handling protocol.⁶

Highlights

- Among individuals tested for NTM species in 2020, 12.1% were classified in standard microbiological disease state, 6.9% in strict disease state and 8.2% in uncertain disease state. The rate of standard NTM disease was 19.0 per 100,000 population.
- Individuals assigned to the standard and strict disease states were predominantly in the 70-79 age group. Specifically, the 70-79 age group comprises 28.5% of individuals in standard disease state and 30.3% of individuals in strict disease state.
- Individuals assigned to the standard and strict disease states were more likely to be females at 53.4% and 55.7%, respectively.
- Of individuals assigned to standard and strict disease state, individuals residing within the jurisdiction of Toronto Public Health comprised the highest proportions at 55.0% and 56.2%, respectively, followed by the jurisdiction of York Region Public Health at 15.8% and 17.1%. Similarly, rates of NTM disease among individuals assigned to standard disease rate were the highest in the health region of Toronto at 49.8 per 100,000 population, followed by Central East at 17.0 per 100,000 population.
- The most common NTM species identified among individuals assigned to standard and strict diseases states were *Mycobacterium avium* identified in 69.2% of individuals in the standard disease state, and 73.1% of individuals in the strict disease state. The second most common NTM species were *Mycobacterium intracellulare* identified in 6.4% of individuals in standard disease state and *Mycobacterium abscessus* identified in 7.1% of individuals in strict disease state.

Results

Table 1. Number and percentage of specimens positive and tested for NTM species by specimen category, Ontario, January 1, 2020 to December 31, 2020

Specimen category	Positive for at least one NTM species	Tested
Pulmonary	8,412 (20.3%)	41,471
Sterile non-pulmonary	88 (1.3%)	6,558
Other	202 (3.4%)	5,871
Total	8,702 (16.1%)	53,900

Note: One individual may have more than one specimen tested. Specimen sources included for each specimen category are detailed in Table A2.

Data source: Public Health Ontario Laboratory Information Management System

Table 2. Number and percentage of individuals by NTM disease state, Ontario, January 1, 2020 to December 31, 2020

NTM disease state	Number of individuals (%)
Standard	2,824 (12.1%)
Strict	1,602 (6.9%)
Uncertain	1,899 (8.2%)
Non-pulmonary	55 (0.2%)
Indeterminate	7 (<0.1%)
Negative	18,503 (79.5%)
Total	23,288 (100%)

Note: More than one microbiological disease state was assigned for an individual if two different NTM species were identified, the same NTM species was identified from pulmonary and sterile non-pulmonary specimen sources. In addition, individuals with a strict disease state are a subset of individuals with the standard disease state, and therefore not included in the total.

Data source: Public Health Ontario Laboratory Information Management System

Table 3. Number and percentage of individuals tested by NTM disease states and age group, Ontario, January 1, 2020 to December 31, 2020

Age group	Standard	Strict	Uncertain	Non-pulmonary	Indeterminate	Negative	Total
0 to 19	31 (1.1%)	23 (1.4%)	35 (1.8%)	3 (5.5%)	0 (0.0%)	595 (3.2%)	664 (2.9%)
20 to 39	238 (8.4%)	114 (7.1%)	271 (14.3%)	10 (18.2%)	1 (14.3%)	2,522 (13.6%)	3,042 (13.1%)
40 to 59	459 (16.3%)	232 (14.5%)	389 (20.5%)	11 (20.0%)	1 (14.3%)	4,744 (25.6%)	5,604 (24.1%)
60 to 69	725 (25.7%)	420 (26.2%)	441 (23.2%)	16 (29.1%)	3 (42.9%)	4,234 (22.9%)	5,419 (23.3%)
70 to 79	805 (28.5%)	485 (30.3%)	438 (23.1%)	9 (16.4%)	1 (14.3%)	3,962 (21.4%)	5,215 (22.4%)
80+	565 (20.0%)	327 (20.4%)	321 (16.9%)	6 (10.9%)	1 (14.3%)	2,410 (13.0%)	3,303 (14.2%)
Unknown	1 (<0.1%)	1 (<0.1%)	4 (0.2%)	0 (0.0%)	0 (0.0%)	36 (0.2%)	41 (0.2%)
Total	2,824 (100%)	1,602 (100%)	1,899 (100%)	55 (100%)	7 (100%)	18,503 (100%)	23,288 (100%)

Note: Age was calculated as the difference between the date of the earliest specimen tested in 2020 and the individual's birth date.

Data source: Public Health Ontario Laboratory Information Management System

Table 4. Number and percentage of individuals tested for NTM species by disease states and sex, Ontario, January 1, 2020 to December 31, 2020

Sex	Standard	Strict	Uncertain	Non-pulmonary	Indeterminate	Negative	Total
Female	1,507 (53.4%)	892 (55.7%)	903 (47.6%)	24 (43.6%)	5 (71.4%)	8,555 (46.2%)	10,994 (47.2%)
Male	1,285 (45.5%)	696 (43.4%)	958 (50.4%)	31 (56.4%)	2 (28.6%)	9,667 (52.2%)	11,943 (51.3%)
Unknown	32 (1.1%)	14 (0.9%)	38 (2.0%)	0 (0.0%)	0 (0.0%)	281 (1.5%)	351 (1.5%)
Total	2,824 (100%)	1,602 (100%)	1,899 (100%)	55 (100%)	7 (100%)	18,503 (100%)	23,288 (100%)

Data source: Public Health Ontario Laboratory Information Management System

Table 5. Number and percentage of individuals in the standard and strict disease states by public health unit and region, Ontario, January 1, 2020 to December 31, 2020

Public health unit	Standard	Strict	All disease states
Northwestern Health Unit	1 (<0.1%)	1 (<0.1%)	172 (0.7%)
Thunder Bay District Health Unit	8 (0.3%)	6 (0.4%)	270 (1.2%)
TOTAL NORTH WEST	9 (0.3%)	7 (0.4%)	442 (1.9%)
Algoma Public Health	13 (0.5%)	6 (0.4%)	223 (1.0%)
North Bay Parry Sound District Health Unit	9 (0.3%)	7 (0.4%)	195 (0.8%)
Porcupine Health Unit	2 (<0.1%)	0 (0.0%)	131 (0.6%)

Public health unit	Standard	Strict	All disease states
Public Health Sudbury & Districts	19 (0.7%)	10 (0.6%)	415 (1.8%)
Timiskaming Health Unit	4 (0.1%)	1 (<0.1%)	62 (0.3%)
TOTAL NORTH EAST	47 (1.7%)	24 (1.5%)	1,026 (4.4%)
Ottawa Public Health	57 (2.0%)	16 (1.0%)	618 (2.7%)
Eastern Ontario Health Unit	5 (0.2%)	2 (0.1%)	119 (0.5%)
Hastings Prince Edward Public Health	20 (0.7%)	9 (0.6%)	238 (1.0%)
Kingston, Frontenac, and Lennox & Addington Public Health	16 (0.6%)	6 (0.4%)	507 (2.2%)
Leeds, Grenville & Lanark District Health Unit	12 (0.4%)	6 (0.4%)	128 (0.5%)
Renfrew County and District Health Unit	4 (0.1%)	3 (0.2%)	51 (0.2%)
TOTAL EASTERN	114 (4.0%)	42 (2.6%)	1,661 (7.1%)
Durham Region Health Department	58 (2.1%)	36 (2.2%)	964 (4.1%)
Haliburton, Kawartha, Pine Ridge District Health Unit	24 (0.8%)	13 (0.8%)	354 (1.5%)
Peel Public Health	169 (6.0%)	89 (5.6%)	2,689 (11.5%)
Peterborough Public Health	23 (0.8%)	13 (0.8%)	328 (1.4%)
Simcoe Muskoka District Health Unit	43 (1.5%)	21 (1.3%)	832 (3.6%)
York Region Public Health	445 (15.8%)	274 (17.1%)	2,213 (9.5%)

Public health unit	Standard	Strict	All disease states
TOTAL CENTRAL EAST	762 (27.0%)	446 (27.8%)	7,380 (31.7%)
Toronto Public Health	1,554 (55.0%)	900 (56.2%)	7,767 (33.4%)
TOTAL TORONTO	1,554 (55.0%)	900 (56.2%)	7,767 (33.4%)
Chatham-Kent Public Health	11 (0.4%)	4 (0.2%)	84 (0.4%)
Grey Bruce Health Unit	6 (0.2%)	5 (0.3%)	179 (0.8%)
Huron Public Health	3 (0.1%)	0 (0.0%)	54 (0.2%)
Lambton Public Health	4 (0.1%)	0 (0.0%)	117 (0.5%)
Middlesex-London Health Unit	21 (0.7%)	9 (0.6%)	513 (2.2%)
Perth Public Health	3 (0.1%)	1 (<0.1%)	52 (0.2%)
Southwestern Public Health	10 (0.4%)	5 (0.3%)	193 (0.8%)
Windsor-Essex County Health Unit	32 (1.1%)	13 (0.8%)	487 (2.1%)
TOTAL SOUTH WEST	90 (3.2%)	37 (2.3%)	1,679 (7.2%)
Brant County Health Unit	12 (0.4%)	8 (0.5%)	151 (0.6%)
City of Hamilton Public Health Services	100 (3.5%)	58 (3.6%)	830 (3.6%)
Haldimand-Norfolk Health Unit	7 (0.2%)	6 (0.4%)	124 (0.5%)
Halton Region Public Health	55 (1.9%)	37 (2.3%)	825 (3.5%)

Public health unit	Standard	Strict	All disease states
Niagara Region Public Health	17 (0.6%)	8 (0.5%)	494 (2.1%)
Region of Waterloo Public Health and Emergency Services	38 (1.3%)	20 (1.2%)	558 (2.4%)
Wellington-Dufferin Guelph Public Health	19 (0.7%)	9 (0.6%)	334 (1.4%)
TOTAL CENTRAL WEST	248 (8.8%)	146 (9.1%)	3,316 (14.2%)
Unknown	0 (0.0%)	0 (0.0%)	17 (<0.1%)
TOTAL ONTARIO	2,824 (100%)	1,602 (100%)	23,288 (100%)

Note: Public health unit was assigned based on individual's postal code of residence if available, and submitter's postal code otherwise.

Data source: Public Health Ontario Laboratory Information Management System

Table 6. Number and percentage of individuals assigned to the standard and strict disease states by NTM species/subspecies, Ontario, January 1, 2020 to December 31, 2020

NTM species/subspecies	Standard	Strict
<i>M. abscessus</i>	164 (5.8%)	114 (7.1%)
subspecies <i>abscessus</i>	95 (3.4%)	66 (4.1%)
subspecies <i>bolletii</i>	1 (<0.1%)	1 (<0.1%)
subspecies <i>massiliense</i>	52 (1.8%)	38 (2.4%)
subspecies unassigned	16 (0.6%)	9 (0.6%)
<i>M. avium</i>	1,954 (69.2%)	1,171 (73.1%)
<i>M. chimaera</i>	39 (1.4%)	18 (1.1%)
<i>M. fortuitum</i>	98 (3.5%)	53 (3.3%)
<i>M. goodii</i>	117 (4.1%)	26 (1.6%)
<i>M. intracellulare</i>	182 (6.4%)	101 (6.3%)
<i>M. xenopi</i>	123 (4.4%)	63 (3.9%)
Other NTM species	147 (5.2%)	56 (3.5%)
Total	2,824 (100%)	1,602 (100%)

Note: Includes NTM species/subspecies based on the frequency and clinical importance. *M. abscessus* subspecies are not included in the total.

Data source: Public Health Ontario Laboratory Information Management System

Table 7. Number and percentage of individuals in the standard disease state by NTM species and age group, Ontario, January 1, 2020 to December 31, 2020

Age group	<i>M. abscessus</i>	<i>M. avium</i>	<i>M. chimaera</i>	<i>M. fortuitum</i>	<i>M. gordonae</i>	<i>M. intracellulare</i>	<i>M. xenopi</i>	Other NTM species	Total
0 to 19	12 (7.3%)	15 (0.8%)	1 (2.6%)	0 (0.0%)	1 (0.9%)	1 (0.5%)	0 (0.0%)	1 (0.7%)	31 (1.1%)
20 to 39	31 (18.9%)	153 (7.8%)	2 (5.1%)	3 (3.1%)	12 (10.3%)	7 (3.8%)	6 (4.9%)	24 (16.3%)	238 (8.4%)
40 to 59	18 (11.0%)	321 (16.4%)	10 (25.6%)	23 (23.5%)	24 (20.5%)	20 (11.0%)	18 (14.6%)	25 (17.0%)	459 (16.3%)
60 to 69	32 (19.5%)	508 (26.0%)	11 (28.2%)	26 (26.5%)	26 (22.2%)	37 (20.3%)	42 (34.1%)	43 (29.3%)	725 (25.7%)
70 to 79	51 (31.1%)	555 (28.4%)	8 (20.5%)	27 (27.6%)	28 (23.9%)	66 (36.3%)	39 (31.7%)	31 (21.1%)	805 (28.5%)
80+	20 (12.2%)	401 (20.5%)	7 (17.9%)	19 (19.4%)	26 (22.2%)	51 (28.0%)	18 (14.6%)	23 (15.6%)	565 (20.0%)
Unknown	0 (0.0%)	1 (<0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (<0.1%)
Total	164 (100%)	1,954 (100%)	39 (100%)	98 (100%)	117 (100%)	182 (100%)	123 (100%)	147 (100%)	2,824 (100%)

Note: Includes NTM species based on the frequency and clinical importance.

Data source: Public Health Ontario Laboratory Information Management System

Table 8. Number and percentage of individuals in the standard disease state by NTM species and sex, Ontario, January 1, 2020 to December 31, 2020

Sex	<i>M. abscessus</i>	<i>M. avium</i>	<i>M. chimaera</i>	<i>M. fortuitum</i>	<i>M. gordonae</i>	<i>M. intracellulare</i>	<i>M. xenopi</i>	Other NTM species	Total
Female	102 (62.2%)	1,051 (53.8%)	17 (43.6%)	47 (48.0%)	46 (39.3%)	114 (62.6%)	63 (51.2%)	67 (45.6%)	1,507 (53.4%)
Male	62 (37.8%)	881 (45.1%)	22 (56.4%)	50 (51.0%)	70 (59.8%)	65 (35.7%)	57 (46.3%)	78 (53.1%)	1,285 (45.5%)
Unknown	0 (0.0%)	22 (1.1%)	0 (0.0%)	1 (1.0%)	1 (0.9%)	3 (1.6%)	3 (2.4%)	2 (1.4%)	32 (1.1%)
Total	164 (100%)	1,954 (100%)	39 (100%)	98 (100%)	117 (100%)	182 (100%)	123 (100%)	147 (100%)	2,824 (100%)

Note: Includes NTM species based on the frequency and clinical importance.

Data source: Public Health Ontario Laboratory Information Management System

Table 9. Number and percentage of individuals in the standard disease state by NTM species, public health unit and region, Ontario, January 1, 2020 to December 31, 2020

Public health unit	<i>M. abscessus</i>	<i>M. avium</i>	<i>M. chimaera</i>	<i>M. fortuitum</i>	<i>M. gordonae</i>	<i>M. intracellulare</i>	<i>M. xenopi</i>	Other NTM species	All NTM species
Northwestern Health Unit	0 (0.0%)	1 (<0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (<0.1%)
Thunder Bay District Health Unit	1 (0.6%)	5 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.5%)	0 (0.0%)	1 (0.7%)	8 (0.3%)
TOTAL NORTH WEST	1 (0.6%)	6 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.5%)	0 (0.0%)	1 (0.7%)	9 (0.3%)
Algoma Public Health	0 (0.0%)	10 (0.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (1.1%)	1 (0.8%)	0 (0.0%)	13 (0.5%)
North Bay Parry Sound District Health Unit	0 (0.0%)	7 (0.4%)	1 (2.6%)	0 (0.0%)	0 (0.0%)	1 (0.5%)	0 (0.0%)	0 (0.0%)	9 (0.3%)
Porcupine Health Unit	0 (0.0%)	1 (<0.1%)	1 (2.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (<0.1%)
Public Health Sudbury & Districts	3 (1.8%)	9 (0.5%)	0 (0.0%)	0 (0.0%)	3 (2.6%)	4 (2.2%)	0 (0.0%)	0 (0.0%)	19 (0.7%)
Timiskaming Health Unit	0 (0.0%)	1 (<0.1%)	0 (0.0%)	0 (0.0%)	1 (0.9%)	2 (1.1%)	0 (0.0%)	0 (0.0%)	4 (0.1%)
TOTAL NORTH EAST	3 (1.8%)	28 (1.4%)	2 (5.1%)	0 (0.0%)	4 (3.4%)	9 (4.9%)	1 (0.8%)	0 (0.0%)	47 (1.7%)
Ottawa Public Health	5 (3.0%)	16 (0.8%)	2 (5.1%)	2 (2.0%)	10 (8.5%)	8 (4.4%)	0 (0.0%)	14 (9.5%)	57 (2.0%)

Public health unit	<i>M. abscessus</i>	<i>M. avium</i>	<i>M. chimaera</i>	<i>M. fortuitum</i>	<i>M. goodnae</i>	<i>M. intracellulare</i>	<i>M. xenopi</i>	Other NTM species	All NTM species
Eastern Ontario Health Unit	1 (0.6%)	1 (<0.1%)	0 (0.0%)	1 (1.0%)	1 (0.9%)	0 (0.0%)	0 (0.0%)	1 (0.7%)	5 (0.2%)
Hastings Prince Edward Public Health	3 (1.8%)	14 (0.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (1.6%)	1 (0.7%)	20 (0.7%)
Kingston, Frontenac, and Lennox & Addington Public Health	1 (0.6%)	10 (0.5%)	2 (5.1%)	1 (1.0%)	0 (0.0%)	2 (1.1%)	0 (0.0%)	0 (0.0%)	16 (0.6%)
Leeds, Grenville & Lanark District Health Unit	0 (0.0%)	9 (0.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (1.1%)	0 (0.0%)	1 (0.7%)	12 (0.4%)
Renfrew County and District Health Unit	0 (0.0%)	1 (<0.1%)	0 (0.0%)	0 (0.0%)	1 (0.9%)	0 (0.0%)	1 (0.8%)	1 (0.7%)	4 (0.1%)
TOTAL EASTERN	10 (6.1%)	51 (2.6%)	4 (10.3%)	4 (4.1%)	12 (10.3%)	12 (6.6%)	3 (2.4%)	18 (12.2%)	114 (4.0%)
Durham Region Health Department	9 (5.5%)	34 (1.7%)	2 (5.1%)	1 (1.0%)	1 (0.9%)	5 (2.7%)	5 (4.1%)	1 (0.7%)	58 (2.1%)
Haliburton, Kawartha, Pine Ridge District Health Unit	6 (3.7%)	11 (0.6%)	0 (0.0%)	0 (0.0%)	1 (0.9%)	1 (0.5%)	3 (2.4%)	2 (1.4%)	24 (0.8%)
Peel Public Health	15 (9.1%)	95 (4.9%)	2 (5.1%)	5 (5.1%)	8 (6.8%)	19 (10.4%)	12 (9.8%)	13 (8.8%)	169 (6.0%)

Public health unit	<i>M. abscessus</i>	<i>M. avium</i>	<i>M. chimaera</i>	<i>M. fortuitum</i>	<i>M. goodnae</i>	<i>M. intracellulare</i>	<i>M. xenopi</i>	Other NTM species	All NTM species
Peterborough Public Health	3 (1.8%)	5 (0.3%)	0 (0.0%)	0 (0.0%)	1 (0.9%)	5 (2.7%)	5 (4.1%)	4 (2.7%)	23 (0.8%)
Simcoe Muskoka District Health Unit	5 (3.0%)	26 (1.3%)	1 (2.6%)	0 (0.0%)	1 (0.9%)	4 (2.2%)	3 (2.4%)	3 (2.0%)	43 (1.5%)
York Region Public Health	28 (17.1%)	315 (16.1%)	1 (2.6%)	21 (21.4%)	28 (23.9%)	13 (7.1%)	19 (15.4%)	20 (13.6%)	445 (15.8%)
TOTAL CENTRAL EAST	66 (40.2%)	486 (24.9%)	6 (15.4%)	27 (27.6%)	40 (34.2%)	47 (25.8%)	47 (38.2%)	43 (29.3%)	762 (27.0%)
Toronto Public Health	60 (36.6%)	1,195 (61.2%)	22 (56.4%)	58 (59.2%)	42 (35.9%)	62 (34.1%)	55 (44.7%)	60 (40.8%)	1,554 (55.0%)
TOTAL TORONTO	60 (36.6%)	1,195 (61.2%)	22 (56.4%)	58 (59.2%)	42 (35.9%)	62 (34.1%)	55 (44.7%)	60 (40.8%)	1,554 (55.0%)
Chatham-Kent Public Health	1 (0.6%)	2 (0.1%)	0 (0.0%)	2 (2.0%)	2 (1.7%)	4 (2.2%)	0 (0.0%)	0 (0.0%)	11 (0.4%)
Grey Bruce Health Unit	0 (0.0%)	6 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	6 (0.2%)
Huron Public Health	0 (0.0%)	2 (0.1%)	0 (0.0%)	0 (0.0%)	1 (0.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (0.1%)
Lambton Public Health	0 (0.0%)	1 (<0.1%)	0 (0.0%)	1 (1.0%)	0 (0.0%)	2 (1.1%)	0 (0.0%)	0 (0.0%)	4 (0.1%)
Middlesex-London Health Unit	1 (0.6%)	11 (0.6%)	1 (2.6%)	0 (0.0%)	0 (0.0%)	5 (2.7%)	1 (0.8%)	2 (1.4%)	21 (0.7%)

Public health unit	<i>M. abscessus</i>	<i>M. avium</i>	<i>M. chimaera</i>	<i>M. fortuitum</i>	<i>M. goodii</i>	<i>M. intracellulare</i>	<i>M. xenopi</i>	Other NTM species	All NTM species
Perth Public Health	0 (0.0%)	2 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.7%)	3 (0.1%)
Southwestern Public Health	1 (0.6%)	3 (0.2%)	0 (0.0%)	1 (1.0%)	2 (1.7%)	1 (0.5%)	0 (0.0%)	2 (1.4%)	10 (0.4%)
Windsor-Essex County Health Unit	1 (0.6%)	10 (0.5%)	2 (5.1%)	2 (2.0%)	1 (0.9%)	7 (3.8%)	1 (0.8%)	8 (5.4%)	32 (1.1%)
TOTAL SOUTH WEST	4 (2.4%)	37 (1.9%)	3 (7.7%)	6 (6.1%)	6 (5.1%)	19 (10.4%)	2 (1.6%)	13 (8.8%)	90 (3.2%)
Brant County Health Unit	0 (0.0%)	10 (0.5%)	1 (2.6%)	0 (0.0%)	0 (0.0%)	1 (0.5%)	0 (0.0%)	0 (0.0%)	12 (0.4%)
City of Hamilton Public Health Services	5 (3.0%)	64 (3.3%)	1 (2.6%)	1 (1.0%)	8 (6.8%)	9 (4.9%)	8 (6.5%)	4 (2.7%)	100 (3.5%)
Haldimand-Norfolk Health Unit	1 (0.6%)	3 (0.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (1.1%)	0 (0.0%)	1 (0.7%)	7 (0.2%)
Halton Region Public Health	4 (2.4%)	36 (1.8%)	0 (0.0%)	1 (1.0%)	1 (0.9%)	7 (3.8%)	4 (3.3%)	2 (1.4%)	55 (1.9%)
Niagara Region Public Health	5 (3.0%)	7 (0.4%)	0 (0.0%)	1 (1.0%)	0 (0.0%)	3 (1.6%)	0 (0.0%)	1 (0.7%)	17 (0.6%)
Region of Waterloo Public Health and Emergency Services	2 (1.2%)	24 (1.2%)	0 (0.0%)	0 (0.0%)	3 (2.6%)	5 (2.7%)	3 (2.4%)	1 (0.7%)	38 (1.3%)

Public health unit	<i>M. abscessus</i>	<i>M. avium</i>	<i>M. chimaera</i>	<i>M. fortuitum</i>	<i>M. goodnae</i>	<i>M. intracellulare</i>	<i>M. xenopi</i>	Other NTM species	All NTM species
Wellington-Dufferin Guelph Public Health	3 (1.8%)	7 (0.4%)	0 (0.0%)	0 (0.0%)	1 (0.9%)	5 (2.7%)	0 (0.0%)	3 (2.0%)	19 (0.7%)
TOTAL CENTRAL WEST	20 (12.2%)	151 (7.7%)	2 (5.1%)	3 (3.1%)	13 (11.1%)	32 (17.6%)	15 (12.2%)	12 (8.2%)	248 (8.8%)
Unknown	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
TOTAL ONTARIO	164 (100%)	1,954 (100%)	39 (100%)	98 (100%)	117 (100%)	182 (100%)	123 (100%)	147 (100%)	2,824 (100%)

Note: Includes NTM species based on the frequency and clinical importance.

Data source: Public Health Ontario Laboratory Information Management System

Table 10. Number and percentage of individuals in the strict disease state by NTM species and age group, Ontario, January 1, 2020 to December 31, 2020

Age group	<i>M. abscessus</i>	<i>M. avium</i>	<i>M. chimaera</i>	<i>M. fortuitum</i>	<i>M. gordonae</i>	<i>M. intracellulare</i>	<i>M. xenopi</i>	Other NTM species	Total
0 to 19	8 (7.0%)	13 (1.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.0%)	0 (0.0%)	1 (1.8%)	23 (1.4%)
20 to 39	24 (21.1%)	74 (6.3%)	1 (5.6%)	1 (1.9%)	3 (11.5%)	3 (3.0%)	2 (3.2%)	6 (10.7%)	114 (7.1%)
40 to 59	13 (11.4%)	172 (14.7%)	5 (27.8%)	10 (18.9%)	1 (3.8%)	11 (10.9%)	9 (14.3%)	11 (19.6%)	232 (14.5%)
60 to 69	23 (20.2%)	303 (25.9%)	3 (16.7%)	16 (30.2%)	7 (26.9%)	23 (22.8%)	23 (36.5%)	22 (39.3%)	420 (26.2%)
70 to 79	35 (30.7%)	351 (30.0%)	6 (33.3%)	18 (34.0%)	6 (23.1%)	40 (39.6%)	18 (28.6%)	11 (19.6%)	485 (30.3%)
80+	11 (9.6%)	257 (21.9%)	3 (16.7%)	8 (15.1%)	9 (34.6%)	23 (22.8%)	11 (17.5%)	5 (8.9%)	327 (20.4%)
Unknown	0 (0.0%)	1 (<0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (<0.1%)
Total	114 (100%)	1,171 (100%)	18 (100%)	53 (100%)	26 (100%)	101 (100%)	63 (100%)	56 (100%)	1,602 (100%)

Note: Includes NTM species based on the frequency and clinical importance.

Data source: Public Health Ontario Laboratory Information Management System

Table 11. Number and percentage of individuals in the strict disease state by NTM species and sex, Ontario, January 1, 2020 to December 31, 2020

Sex	<i>M. abscessus</i>	<i>M. avium</i>	<i>M. chimaera</i>	<i>M. fortuitum</i>	<i>M. gordonae</i>	<i>M. intracellulare</i>	<i>M. xenopi</i>	Other NTM species	Total
Female	68 (59.6%)	653 (55.8%)	10 (55.6%)	26 (49.1%)	10 (38.5%)	71 (70.3%)	29 (46.0%)	25 (44.6%)	892 (55.7%)
Male	46 (40.4%)	506 (43.2%)	8 (44.4%)	27 (50.9%)	16 (61.5%)	28 (27.7%)	34 (54.0%)	31 (55.4%)	696 (43.4%)
Unknown	0 (0.0%)	12 (1.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (2.0%)	0 (0.0%)	0 (0.0%)	14 (0.9%)
Total	114 (100%)	1,171 (100%)	18 (100%)	53 (100%)	26 (100%)	101 (100%)	63 (100%)	56 (100%)	1,602 (100%)

Note: Includes NTM species based on the frequency and clinical importance.

Data source: Public Health Ontario Laboratory Information Management System

Table 12. Number and rate (per 100,000 population) of individuals in the standard disease state by sex and health region, Ontario, January 1, 2020 to December 31, 2020

Region	Female	Male	Total
Central East	421 (18.5)	327 (14.8)	762 (17.0)
Central West	135 (9.4)	111 (7.9)	248 (8.7)
Eastern	62 (6.3)	52 (5.5)	114 (5.9)
North East	20 (7.1)	27 (9.8)	47 (8.4)
North West	5 (4.2)	4 (3.4)	9 (3.8)
South West	37 (4.3)	52 (6.2)	90 (5.3)
Toronto	827 (51.9)	712 (46.6)	1,554 (49.8)
Total	1,507 (20.0)	1,285 (17.6)	2,824 (19.0)

Note: Rate is calculated based on the number of individuals in the standard disease state divided by population for each region and sex combination, multiplied by 100,000. Individuals with unknown sex (n=32) were included in totals only.

Data source: Public Health Ontario Laboratory Information Management System; Ontario population, Statistics Canada 2021⁷

Table 13. Number and rate (per 100,000 population) of individuals in the standard disease state by the three most common NTM species and health region, Ontario, January 1, 2020 to December 31, 2020

Region	<i>M. abscessus</i>	<i>M. avium</i>	<i>M. intracellulare</i>	Other NTMs	All NTMs
Central East	66 (1.5)	486 (10.8)	47 (1.0)	163 (3.6)	762 (17.0)
Central West	20 (0.7)	151 (5.3)	32 (1.1)	45 (1.6)	248 (8.7)
Eastern	10 (0.5)	51 (2.6)	12 (0.6)	41 (2.1)	114 (5.9)
North East	3 (0.5)	28 (5.0)	9 (1.6)	7 (1.3)	47 (8.4)
North West	1 (0.4)	6 (2.5)	1 (0.4)	1 (0.4)	9 (3.8)
South West	4 (0.2)	37 (2.2)	19 (1.1)	30 (1.8)	90 (5.3)
Toronto	60 (1.9)	1,195 (38.3)	62 (2.0)	237 (7.6)	1,554 (49.8)
Total	164 (1.1)	1,954 (13.1)	182 (1.2)	524 (3.5)	2,824 (19.0)

Note: Rate is calculated based on the number of individuals in the standard disease state divided by population for each region and NTM species combination, multiplied by 100,000. The three NTM species included in this table were selected based on importance and frequency.

Data source: Public Health Ontario Laboratory Information Management System; Ontario population, Statistics Canada 2021⁷

Technical notes

Data Sources

- Data were extracted from Public Health Ontario Laboratory Information Management System March 1, 2021 for testing completed from January 1, 2018 to December 31, 2020.
- Ontario population statistics were used to calculate rates and were obtained from Statistics Canada.⁷

Methods

- *Mycobacterium* test results were extracted from the Public Health Ontario Laboratory Information Management System for all individuals tested from 2018 to 2020.
- Results were assigned for specimens based on culture and subsequent identification methods. A positive result was assigned for a specimen if at least one NTM species was identified; an indeterminate result was assigned for a specimen with positive NTM result but the species was unable to be confirmed; and a negative result was assigned for a specimen if no NTM was identified. If a specimen was positive for *M. tuberculosis* complex, *M. ulcerans* or *M. leprae*, but not for any NTM species, a negative result was assigned.
- Specimens were classified into pulmonary, sterile non-pulmonary and other categories based on the specimen source. A pulmonary category was assigned if the specimen was collected from the respiratory tract. A sterile non-pulmonary category was assigned for specimens isolated from a normally sterile non-respiratory tract site.⁸ The remaining specimen sources were assigned to the 'other' category. Specimens classified as 'other' were not used for further disease state assignment, as they did not meet the specimen source criteria defined in case definition (Table A1). The list of specimen sources and categories is detailed in Table A2.
- Unique individuals were determined using health card number or first name, last name and date of birth. In instances where there were multiple demographic records for an individual, the information associated with the first specimen in 2020 was used to assign date, age, sex, public health unit and region. If age, sex or public health unit were missing, then the individual was categorized as "unknown" for that demographic.
- Only individuals tested in 2020 were included in this analysis. However, individuals that were positive in 2020, had previous test results assessed for the past 24 months.
- Individuals were assigned to one or more of the NTM disease states (Table A1) based on the frequency of identification of the same NTM species/subspecies and the specimen source criteria identified in the case definition.

Data caveats

- Public Health Ontario Laboratory does not have clinical or radiological information to ascertain an individual's disease state. As such, individuals with uncertain or indeterminate disease states are likely colonized with NTM rather than infected.³
- This report includes only individuals tested at Public Health Ontario Laboratory. Public Health Ontario Laboratory covers the majority of NTM testing in Ontario, however a small number of other laboratories perform NTM testing. When these samples are positive, they are submitted to Public Health Ontario for additional testing. As Public Health Ontario does not receive negative samples from these other laboratories, positivity in this report may be higher than true positivity.
- Individuals were assigned up to eight disease states, with 95.2% (20,418/21,452) of individuals having only one disease state. Individuals were counted multiple times in the following scenarios:
 - Different NTM species were identified in the same individual.
 - The same species was identified from pulmonary and sterile non-pulmonary specimens in the same individual.
 - Individuals assigned to strict disease state also met the criteria for standard disease state.
- The recommended specimen collection practice for *Mycobacterium* testing at Public Health Ontario includes three sputum specimens, collected early in the morning of the same day.² Instances where fewer than three sputum specimens were submitted may have affected disease state assignment.

Appendices

Table A1. Disease state definitions

Disease State	Definition
Standard (pulmonary)	Two or more instances of isolation of the same NTM species from a sputum specimen or One or more instances of isolation of any NTM species from bronchial washing or lavage specimen (with or without sputum isolation) or Isolation of any NTM from a lung biopsy specimen
Strict (pulmonary)	Three or more instances of isolation of the same NTM species from sputum or Two or more instances of isolation of the same NTM species from bronchial washing or lavage specimen (with or without sputum isolation) or One instance of bronchial washing or lavage isolation plus at least one instance of sputum isolation of the same NTM species, or isolation of any NTM from a lung biopsy specimen
Uncertain (pulmonary)	One instance of single isolation of NTM species from sputum specimen
Non-pulmonary disease	One isolation of any NTM from a normally sterile non-pulmonary source
Indeterminate	Specimen positive for NTM by presence of NTM species was unable to be confirmed
Negative state	No <i>Mycobacterium</i> identified

Table A2. The list of pulmonary, sterile non-pulmonary and other categories by specimen source

Specimen Source	Specimen Category
Bronchial (aspirate, brush, wash)	Pulmonary
Bronchial Alveolar Lavage	Pulmonary
Lung (aspirate, tissue, wash)	Pulmonary
Sputum	Pulmonary
Tracheal	Pulmonary
Ascitic Fluid	Sterile non-pulmonary
Bile	Sterile non-pulmonary
Biopsy	Sterile non-pulmonary
Blood	Sterile non-pulmonary
Bone	Sterile non-pulmonary
Brain	Sterile non-pulmonary
Cardiac tissue	Sterile non-pulmonary
Cerebral Spinal Fluid	Sterile non-pulmonary
Elbow	Sterile non-pulmonary
Fluid, Joint	Sterile non-pulmonary
Heart Valve	Sterile non-pulmonary
Kidney	Sterile non-pulmonary
Liver	Sterile non-pulmonary
Lymph Node	Sterile non-pulmonary
Pancreas	Sterile non-pulmonary
Pancreatic fluid	Sterile non-pulmonary
Paracentesis	Sterile non-pulmonary
Pericardial	Sterile non-pulmonary
Peritoneal	Sterile non-pulmonary
Pleural Fluid	Sterile non-pulmonary
Spleen	Sterile non-pulmonary
Thorax	Sterile non-pulmonary
Vitreous Fluid	Sterile non-pulmonary
Anal	Other

Specimen Source	Specimen Category
Appendix	Other
Aspirate, Nasogastric	Other
Auger Suction	Other
Axilla	Other
Biopsy, Gastric	Other
Bowel	Other
Cervical	Other
Cornea	Other
Cyst	Other
Drainage	Other
Duodenal fluid	Other
Ear	Other
Endometrium	Other
Epiglottis	Other
Esophagus	Other
Foot	Other
Hand	Other
Lesion	Other
Mass	Other
Nasal Pharyngeal	Other
Neck	Other
Placenta	Other
Prostatic Fluid	Other
Rectal	Other
Scalp	Other
Seminal fluid	Other
Skin scraping	Other
Stool (Preserved & Unpreserved)	Other
Swab	Other
Tissue	Other
Urethra	Other

Specimen Source	Specimen Category
Urine	Other
Wound	Other

Table A3. The list of test methods included in this report.

Test description	Contribution to the report
Culture of respiratory/non-respiratory specimens and blood culture	Primary test. Considered for both positive and negative NTM specimens
PCR and sequence analysis	Provided further species-level identification of positive NTM specimens
Liquid or solid culture on an isolate followed by one of the PCR tests	Provided further species-level identification of positive NTM specimens
Matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-ToF MS)	Provided further species-level identification of positive NTM specimens
Line probe assay	Provided further species-level identification of positive NTM specimens

Note: Result of nucleic acid amplification tests directly from specimen were not considered for this report.

Table A4. Number and percentage of individuals assigned to the three most frequent NTM disease states by NTM complex and species, Ontario, January 1, 2020 to December 31, 2020

NTM species/NTM group	Standard	Strict	Uncertain	Total
<i>M. abscessus/chelonae</i> complex	190 (6.7%)	123 (7.7%)	106 (5.6%)	419 (6.6%)
<i>M. abscessus</i>	164 (5.8%)	114 (7.1%)	57 (3.0%)	335 (5.3%)
subspecies <i>abscessus</i>	95 (3.4%)	66 (4.1%)	26 (1.4%)	187 (3.0%)
subspecies <i>bolletii</i>	1 (0.0%)	1 (0.1%)	4 (0.2%)	6 (0.1%)
subspecies <i>massiliense</i>	52 (1.8%)	38 (2.4%)	21 (1.1%)	111 (1.8%)
subspecies unassigned	16 (0.6%)	9 (0.6%)	6 (0.3%)	31 (0.5%)
<i>M. chelonae</i>	23 (0.8%)	9 (0.6%)	46 (2.4%)	78 (1.2%)
<i>M. franklinii</i>	2 (0.1%)	0 (0.0%)	2 (0.1%)	4 (0.1%)
<i>M. immunogenum</i>	1 (0.0%)	0 (0.0%)	1 (0.1%)	2 (0.0%)
<i>M. smegmatis</i> complex	3 (0.1%)	0 (0.0%)	9 (0.5%)	12 (0.2%)
<i>M. goodii</i>	0 (0.0%)	0 (0.0%)	2 (0.1%)	2 (0.0%)
<i>M. mageritense</i>	3 (0.1%)	0 (0.0%)	6 (0.3%)	9 (0.1%)
<i>M. smegmatis</i>	0 (0.0%)	0 (0.0%)	1 (0.1%)	1 (0.0%)
<i>M. avium</i> complex	2,178 (77.1%)	1,291 (80.6%)	990 (52.1%)	4,459 (70.5%)
<i>M. arosiense</i>	0 (0.0%)	0 (0.0%)	1 (0.1%)	1 (0.0%)
<i>M. avium</i>	1,954 (69.2%)	1,171 (73.1%)	835 (44.0%)	3,960 (62.6%)
<i>M. chimaera</i>	39 (1.4%)	18 (1.1%)	53 (2.8%)	110 (1.7%)
<i>M. colombiense</i>	0 (0.0%)	0 (0.0%)	6 (0.3%)	6 (0.1%)
<i>M. intracellulare</i>	182 (6.4%)	101 (6.3%)	89 (4.7%)	372 (5.9%)
<i>M. marseillense</i>	3 (0.1%)	1 (0.1%)	1 (0.1%)	5 (0.1%)
<i>M. vulneris</i>	0 (0.0%)	0 (0.0%)	5 (0.3%)	5 (0.1%)
<i>M. fortuitum</i> complex	101 (3.6%)	53 (3.3%)	160 (8.4%)	314 (5.0%)

NTM species/NTM group	Standard	Strict	Uncertain	Total
<i>M. farcinogenes</i>	0 (0.0%)	0 (0.0%)	1 (0.1%)	1 (0.0%)
<i>M. fortuitum</i>	98 (3.5%)	53 (3.3%)	144 (7.6%)	295 (4.7%)
<i>M. peregrinum</i>	0 (0.0%)	0 (0.0%)	7 (0.4%)	7 (0.1%)
<i>M. porcinum</i>	2 (0.1%)	0 (0.0%)	3 (0.2%)	5 (0.1%)
<i>M. senegalense</i>	1 (0.0%)	0 (0.0%)	5 (0.3%)	6 (0.1%)
<i>M. simiae</i> complex	27 (1.0%)	15 (0.9%)	53 (2.8%)	95 (1.5%)
<i>M. interjectum</i>	1 (0.0%)	1 (0.1%)	0 (0.0%)	2 (0.0%)
<i>M. kubicae</i>	0 (0.0%)	0 (0.0%)	1 (0.1%)	1 (0.0%)
<i>M. lentiflavum</i>	21 (0.7%)	12 (0.7%)	47 (2.5%)	80 (1.3%)
<i>M. palustre</i>	0 (0.0%)	0 (0.0%)	2 (0.1%)	2 (0.0%)
<i>M. simiae</i>	5 (0.2%)	2 (0.1%)	3 (0.2%)	10 (0.2%)
<i>M. terrae</i> complex	2 (0.1%)	1 (0.1%)	7 (0.4%)	10 (0.2%)
<i>M. arupense</i>	0 (0.0%)	0 (0.0%)	3 (0.2%)	3 (0.0%)
<i>M. kumamotoense</i>	1 (0.0%)	0 (0.0%)	3 (0.2%)	4 (0.1%)
<i>M. nonchromogenicum</i>	1 (0.0%)	1 (0.1%)	0 (0.0%)	2 (0.0%)
<i>M. terrae</i>	0 (0.0%)	0 (0.0%)	1 (0.1%)	1 (0.0%)
Other NTM species	323 (11.4%)	119 (7.4%)	574 (30.2%)	1,016 (16.1%)
<i>M. asiaticum</i>	1 (0.0%)	1 (0.1%)	1 (0.1%)	3 (0.0%)
<i>M. canariensis</i>	1 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.0%)
<i>M. cosmeticum</i>	0 (0.0%)	0 (0.0%)	1 (0.1%)	1 (0.0%)
<i>M. eburneum/talmoniae</i>	1 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.0%)
<i>M. elephantis</i>	0 (0.0%)	0 (0.0%)	1 (0.1%)	1 (0.0%)
<i>M. gastri</i>	1 (0.0%)	0 (0.0%)	1 (0.1%)	2 (0.0%)
<i>M. gordonae</i>	117 (4.1%)	26 (1.6%)	282 (14.8%)	425 (6.7%)

NTM species/NTM group	Standard	Strict	Uncertain	Total
<i>M. llatzerense</i>	0 (0.0%)	0 (0.0%)	1 (0.1%)	1 (0.0%)
<i>M. iranicum</i>	0 (0.0%)	0 (0.0%)	1 (0.1%)	1 (0.0%)
<i>M. kansasii</i>	22 (0.8%)	12 (0.7%)	17 (0.9%)	51 (0.8%)
<i>M. malmoense</i>	2 (0.1%)	2 (0.1%)	2 (0.1%)	6 (0.1%)
<i>M. mantenii</i>	0 (0.0%)	0 (0.0%)	1 (0.1%)	1 (0.0%)
<i>M. mucogenicum</i>	15 (0.5%)	5 (0.3%)	30 (1.6%)	50 (0.8%)
<i>M. mucogenicum-phocaicum</i>	14 (0.5%)	3 (0.2%)	51 (2.7%)	68 (1.1%)
<i>M. neoaurum</i>	3 (0.1%)	2 (0.1%)	9 (0.5%)	14 (0.2%)
<i>M. obuense</i>	1 (0.0%)	1 (0.1%)	7 (0.4%)	9 (0.1%)
<i>M. paragordoniae</i>	14 (0.5%)	1 (0.1%)	38 (2.0%)	53 (0.8%)
<i>M. phlei</i>	1 (0.0%)	0 (0.0%)	3 (0.2%)	4 (0.1%)
<i>M. scrofulaceum</i>	1 (0.0%)	1 (0.1%)	3 (0.2%)	5 (0.1%)
<i>M. shimoidei</i>	2 (0.1%)	0 (0.0%)	0 (0.0%)	2 (0.0%)
<i>M. szulgai</i>	3 (0.1%)	2 (0.1%)	1 (0.1%)	6 (0.1%)
<i>M. triviale</i>	0 (0.0%)	0 (0.0%)	1 (0.1%)	1 (0.0%)
<i>M. vaccae</i>	1 (0.0%)	0 (0.0%)	1 (0.1%)	2 (0.0%)
<i>M. xenopi</i>	123 (4.4%)	63 (3.9%)	122 (6.4%)	308 (4.9%)
Total	2,824 (100%)	1,602 (100%)	1,899 (100%)	6,325 (100%)

Data source: Public Health Ontario Laboratory Information Management System

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