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Tuberculosis

Drug resistance in Canada

2010

**Reported susceptibility results of the
Canadian Tuberculosis Laboratory
Surveillance System**

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For more information, copies of this report or other related reports please contact:

Tuberculosis Prevention and Control

Community Acquired Infections Division
Centre for Communicable Diseases and Infection Control
Infectious Disease Prevention and Control Branch
Public Health Agency of Canada
100 Eglantine Driveway, Health Canada Building
A.L. 0603B, Tunney's Pasture
Ottawa, ON K1A 0K9

Telephone: (613) 941-0238

Facsimile: (613) 946-3902

Email: TB_1@phac-aspc.gc.ca

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The following text, figures and tables were prepared by:

Edward Ellis, MD, MPH, FRCPC
Manager
Tuberculosis Prevention and Control

Derek Scholten, MSc
Senior Epidemiologist
Tuberculosis Prevention and Control

Victor Gallant, MA
Epidemiologist
Tuberculosis Prevention and Control

Anna J. Zycki
Database Manager
Tuberculosis Prevention and Control

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► INTRODUCTION

Drug-resistant strains of tuberculosis (TB) pose a serious threat to TB prevention and control efforts. Although drug-resistant TB has not yet been identified as a major problem in Canada, the potential exists due to the increase and ease of international travel. In response, the Centre for Communicable Diseases and Infection Control (CCDIC), Tuberculosis Prevention and Control (TBPC) at the Public Health Agency of Canada in collaboration with the Canadian Tuberculosis Laboratory Technical Network (CTLTN) (see Appendix 1) and participating laboratories (representing all provinces and territories) established the Canadian Tuberculosis Laboratory Surveillance System (CTBLSS) to monitor TB drug resistance patterns in Canada.

Each year laboratories report to CCDIC-TBPC the results of anti-tuberculosis drug susceptibility testing for every patient for whom a culture grows or a bacterial isolate is received from another laboratory, within the previous calendar year. CCDIC-TBPC subsequently produces this annual report.

► METHODS

CCDIC-TBPC maintains the CTBLSS which contains drug susceptibility test results of *Mycobacterium tuberculosis* (MTB) and other TB species (*M. africanum*, *M. canetti*, *M. caprae*, *M. microti*, *M. pinnipedii* and *M. bovis*). It also contains MTB complex (MTBC) isolates as laboratories report identification of isolates either at the complex level (MTBC) or at the species level. Isolates identified as *Mycobacterium bovis* BCG are included in the CTBLSS but are excluded from this report. *M. bovis* BCG is intrinsically resistant to pyrazinamide (PZA) and the identity of the majority of these isolates can be inferred from the history of recent vaccination.

Data are collected either through manual completion of a standard reporting form (Appendix 2) or by electronic transmission. Information collected includes sex, year of birth, province/territory from which the specimen originated (province/territory of residence of patient), province/territory where the laboratory tests were conducted, and susceptibility results. Some provinces perform drug testing for other provinces/territories. For first-line susceptibility testing, British Columbia tests British Columbia and Yukon isolates; Alberta tests Alberta, Northwest Territories and Nunavut isolates, and Nova Scotia tests isolates for Nova Scotia and Prince Edward Island. All other provinces report susceptibility results for isolates originating in their province only. Four provinces conduct second-line testing: Alberta, Ontario, Quebec and the National Reference Centre for Mycobacteriology (NRCM) in Manitoba.

Every effort is made to eliminate duplicate specimen results or results from two specimens taken from the same person. In the event that a duplicate record is found and confirmed, only the most recent susceptibility result is included for analysis.

All isolates are routinely tested for resistance against first-line anti-tuberculosis drugs. Results in this report present resistance patterns to first-line drugs routinely tested for resistance, typically isoniazid (INH), rifampin (RMP), pyrazinamide (PZA) and ethambutol (EMB). However, not all isolates are tested for resistance to all drugs. For example some provinces do not routinely test for PZA. Therefore, the percentage of isolates showing resistance to a particular drug is expressed as the number of isolates resistant to the drug over the total number of isolates tested for sensitivity to that particular drug.

Resistance patterns that are described in this report include: a) mono-resistance – defined as resistance to one of the first line drugs (INH, RMP, EMB or PZA); b) poly- resistance – defined as resistance to two or more first-line drugs not including the isoniazid and

rifampin combination; c) multidrug-resistant tuberculosis (MDR-TB) – defined as TB that is resistant to at least the two best first-line anti-tuberculosis drugs, isoniazid and rifampin, but which does not meet the definition of extensively drug-resistant TB (XDR-TB); and finally d) extensively drug-resistant TB (XDR-TB) – defined as TB that is resistant to at least the two best first-line anti-tuberculosis drugs, isoniazid and rifampin, plus resistant to second-line drugs including any fluoroquinolone, and to at least one of three injectable second-line anti-tuberculosis drugs (amikacin, capreomycin and kanamycin).

All provinces/territories are asked to submit second-line testing results for all isolates showing resistance to both INH and RMP. Second-line drug testing varies between jurisdictions, but typically testing is done for amikacin (AK) or kanamycin (KM), capreomycin (CM), clofazimine (CF), ethionamide (ETH), ofloxacin (OFL), para-amino salicylic acid (PAS) and rifabutin (RBT).

Prior to 2007, all specimens received in the laboratories between January 1 and December 31 were included in the annual report. However, this resulted in delayed reporting of results for specimens that were received in the laboratory in late December but only grew MTB in January or early February. Thus, starting in 2007, any culture that grows MTB in a given year is included in the statistics for that calendar year; otherwise the result will be recorded in the subsequent year's set. For example, if a specimen was received on December 20, 2008 and the culture grew MTB only in January 2009 it would be counted in 2009.

All laboratories are now performing routine susceptibility testing of MTB or MTBC to first-line anti-tuberculosis drugs using fluorometric proportion method BACTEC® 960. In 2010, four of the laboratories conducted second-line anti-tuberculosis drug testing. Table A lists the first-line and second-line anti-tuberculosis drugs and the critical concentrations in *mg/L* used by the participating laboratories.

Table A: Critical concentrations for routine testing of anti-tuberculosis drugs

First-Line Anti-Tuberculosis Drugs			
Anti-tuberculosis drugs	Critical Concentrations* (mg/L)		Comments
	BACTEC® 460	BACTEC® 960†	
Isoniazid (INH)	0.1	0.1	When resistance to INH is found to 0.1 mg/L, tests are repeated with INH 0.4mg/L to determine the level of resistance. Regardless, the isolate will be reported as resistant using the 0.1 mg/L cut off level.
Rifampin (RMP)	2.0	1.0	
Ethambutol (EMB)	2.5	5.0	
Pyrazinamide (PZA)	100.0	100.0	Routine testing is not performed for isolates from British Columbia and Saskatchewan.
Second-Line Anti-Tuberculosis Drugs			
Anti-tuberculosis drugs	Critical Concentration (µg/ml) BACTEC® 960†		Comment
Amikacin (AK)	1		
Capreomycin (CM)	2.5		
Ethionamide (ETH)	5		
Kanamycin (KM)	2.5		
Linezolid (INN)	1		
Moxifloxacin (MOX)	0.25		
Oflloxacin (OFL)	2		
Para-amino salicylic acid (PAS)	4		
Rifabutin (RBT)	0.5		
Streptomycin (SM)	1		

* Critical concentrations: the lowest concentration of drug that will inhibit 95% of wild strains of MTB that have never been exposed to drugs while at the same time not inhibiting strains of MTB that have been isolated from patients who are not responding to therapy and that are considered resistant.

† Antimicrobial testing methodology with the new technology (BACTEC® 960) has been standardized and validated by multiple studies in reference laboratories and will be reflected in the new Clinical and Laboratory Standards Institute (CLSI) (publication anticipated in 2011)

All members of the CTLTN participate in the NRCM proficiency testing program. In addition to this national initiative, a number of laboratories also participate in other select external proficiency programs such as the College of American Pathologists, Quality Management Program – Laboratory Services, the United States Centers for Disease Control and Prevention Drug Susceptibility Testing or the New York State Department of Health. All testing methods including drug selection and concentrations are done in compliance with the recommended laboratory standards detailed in the CLSI document.¹

The information presented in this report represents the most up to date information available as of February 2011. The historic record is reviewed annually and adjustments are made to the tables as new/updated information becomes available.

► RESULTS

For 2010, drug sensitivity results for 1,290 isolates were reported to CCDIC-TBPC. Of these, 14 were *Mycobacterium bovis* (BCG) and were excluded from the analysis. For this report the results for 1,276 isolates were analysed. This represents a 4.1% decline from the number of isolates reported in 2009. Apart from testing all the isolates from Alberta, the Northwest Territories and Nunavut, Alberta also tested and reported on one isolate from British Columbia. Similarly Ontario tested three isolates from Quebec and one from Nunavut. Manitoba also tested one isolate from Nunavut (Table 1). Figure 1 provides a breakdown of the number of isolates reported by the province/territory of origin. Figure 2 provides an overview of the patterns of drug resistance across Canada for 2010.

Of the 1,276 isolates included for analysis, 112 (8.8%) were resistant to at least one of the first-line anti-tuberculosis drugs tested: INH, RMP, EMB or PZA. Eighty-eight (6.9%) of the isolates were monoresistant and of those 77 (87.5%) were resistant to INH. Please refer to figures 3 and 4 for a detailed breakdown of the different patterns of reported resistance for 2010.

Table 2 reports on the historical trends in drug resistance patterns between 2000 and 2010 and there has been little variation in the proportion of isolates showing resistance. Over the past 11 years, on average, 9.3% of isolates tested were resistant to at least one of the first-line drugs with a range from 8.0% in 2001 to 10.5% in 2003. The average annual percentage of reported MDR-TB was 1.2% and ranged from a low of 0.8% in 2007 to a high of 1.6% in 2005. For a full review of the 11-year trends see table 2 and figures 5 and 6.

For 2010, 18 isolates coming from six provinces (Alberta, British Columbia, Manitoba, Ontario, Quebec and Saskatchewan) were resistant to both INH and RMP. To rule out XDR-TB, these isolates were subsequently tested for resistance to second-line drugs. Of particular interest was the resistance shown to the three injectables (amikacin, capreomycin and kanamycin) and ofloxacin, the fluoroquinolone routinely reported to CCDIC-TBPC by the four laboratories doing second-line testing. Resistance to one of the injectables and the fluoroquinolone would identify the isolate as XDR-TB. The results of second-line testing, identified 17 MDR-TB isolates and one XDR-TB isolate. Table 3 lists the complete resistance profile for these isolates.

In Canada, since TB drug resistance surveillance started in 1998, 216 isolates have been classified as MDR-TB, representing 1.2% of all isolates tested during that period. A review of all the data in the CTBLSS identified five XDR-TB cases reported between 1998 and 2010. Table B provides a summary of the isolates that were tested and of those, the number and the percentage that were identified as MDR-TB and XDR-TB.

Table B: Total number of isolates tested and number and percentage identified as MDR-TB and XDR-TB: Canada – 1998-2010

Year	Total number of Isolates	MDR-TB (%)	XDR-TB (%)
1998	1,461	18 (1.2)	0 (-)
1999	1,415	18 (1.3)	0 (-)
2000	1,490	15 (1.0)	0 (-)
2001	1,475	15 (1.0)	0 (-)
2002	1,419	20 (1.4)	1 (0.07)
2003	1,407	20 (1.4)	1 (0.07)
2004	1,378	12 (0.9)	0 (-)
2005	1,336	22 (1.7)	0 (-)
2006	1,389	15 (1.1)	1 (0.07)
2007	1,267	11 (0.9)	0 (-)
2008	1,356	15 (1.1)	1 (0.07)
2009	1,331	18 (1.4)	0 (-)
2010	1,276	17 (1.3)	1 (0.08)
TOTAL	18,000	216 (1.2)	5 (0.03)

Since data collection began in 1998, the majority of the MDR-TB isolates have originated from British Columbia, Ontario and Quebec. Table C presents the provincial/territorial distribution of these cases.

Table C: Provincial/territorial breakdown of identified MDR-TB and XDR-TB isolates, 1998-2010

Province/Territory*	Total number of Isolates	MDR-TB isolates	XDR-TB isolates
Alberta	1,458	14 (6.5)	0 (-)
British Columbia	3,306	38 (17.6)	0 (-)
Manitoba	1,407	10 (4.6)	2 (40.0)
New Brunswick	111	0 (-)	0 (-)
Newfoundland and Labrador	101	0 (-)	0 (-)
Northwest Territories	127	0 (-)	0 (-)
Nova Scotia	92	0 (-)	0 (-)
Nunavut	379	1 (0.5)	0 (-)
Ontario	7,303	128 (59.3)	3 (60.0)
Prince Edward Island	16	0 (-)	0 (-)
Quebec	2,909	23 (10.6)	0 (-)
Saskatchewan	761	2 (0.9)	0 (-)
Yukon	30	0 (-)	0 (-)
Total	18,000	216 (100.0)	5 (100.0)

*Province/territory of origin for the isolate.

Demographic information on individual patients from whom the isolates originated is limited in this laboratory-based surveillance system with only information on age and sex available. Age was known for 1,274 of the isolates tested, with 35% of the isolates coming from individuals between the ages 25 and 44. For isolates showing any resistance, 46% were from individuals between the ages of 25 and 44; 47% of the MDR-TB isolates were from individuals between 15 and 24. Sex was reported for 1,264 of the isolates with 57% being male. Of the isolates for which sex was reported, 58% of those isolates showing any resistance originated from males; 60% of the MDR-TB originated from males (Table 4).

For a complete review of the resistance patterns for all the isolates originating from each province/territory refer to tables 5 through 17. All isolates reported from Newfoundland and Labrador, Prince Edward Island, and Yukon, were susceptible to all first-line drugs tested. For the remaining provinces/territories some resistance was reported.

► DISCUSSION

Susceptibility results were reported for 1,276 isolates in 2010. The proportion of the total number of isolates tested which demonstrated any type of drug resistance was 8.8%. The proportion of isolates classified as MDR-TB was 1.3%. Over the past 11 years, this proportion has remained stable at around 1.2% of isolates tested. As of February 2011, the CTBLSS has reported five XDR-TB cases, one in each of 2002, 2003, 2006, 2008 and 2010. Additionally, a journal article identified a sixth Canadian case diagnosed in 1997 with a highly drug-resistant strain of *M. bovis*, which met the criteria for XDR-TB².

Seventy percent of the reported laboratory TB isolates in Canada in 2010 originated from British Columbia, Ontario and Quebec which have consistently reported the majority of isolates and MDR-TB in the 13 years of data collection. Since the initiation of this laboratory-based surveillance system the Atlantic Provinces, Northwest Territories and Yukon have not reported any MDR-TB isolates.

Extensively drug-resistant tuberculosis is a growing international concern. Because XDR-TB isolates are resistant to the best first- and some of the best second-line drugs, treatment options are seriously limited. In order to continue surveillance of XDR-TB in Canada, all isolates resistant to both INH and RMP should be routinely tested for resistance to second-line antibiotics.

Compared with international reports, results observed to date in this surveillance system show that, for Canada, the rates of drug-resistant TB are relatively low. In the latest report of the global TB drug resistance surveillance project jointly conducted by the World Health Organization (WHO) and the International Union Against Tuberculosis and Lung Disease (IUATLD),³ the global population weighted percentage was 17% for any resistance among new cases, 35% for previously treated cases and 20% for all cases combined.

The number of incident MDR-TB cases reported for 2006 in the WHO/IUATLD drug resistance report was 4.8% (95% CLs, 4.6% – 6.0%) of the total number of estimated incident TB cases in 2006 in 185 countries³.

► LIMITATIONS

Typically, only isolates with MDR-TB or other extensive resistance patterns will receive drug sensitivity testing to select second-line drugs. Other isolates may be resistant to a fluoroquinolone, because of widespread use for respiratory infections, but not be MDR-TB. This limits the understanding of the emergence of second-line resistance within Canada.

More epidemiological information on the TB cases from which the isolates were submitted is desirable to examine more critically the drug resistance patterns in Canada. However, this information is difficult to collect as isolates are often submitted to the laboratories with only the sex and year of birth of the individual. As well, no differentiation can be made between primary and secondary/acquired drug resistance from the data. The annual *Tuberculosis in Canada* reports (<http://www.phac-aspc.gc.ca/tbpc-latb/surv-eng.php>) includes additional drug resistance data for each reported TB case.

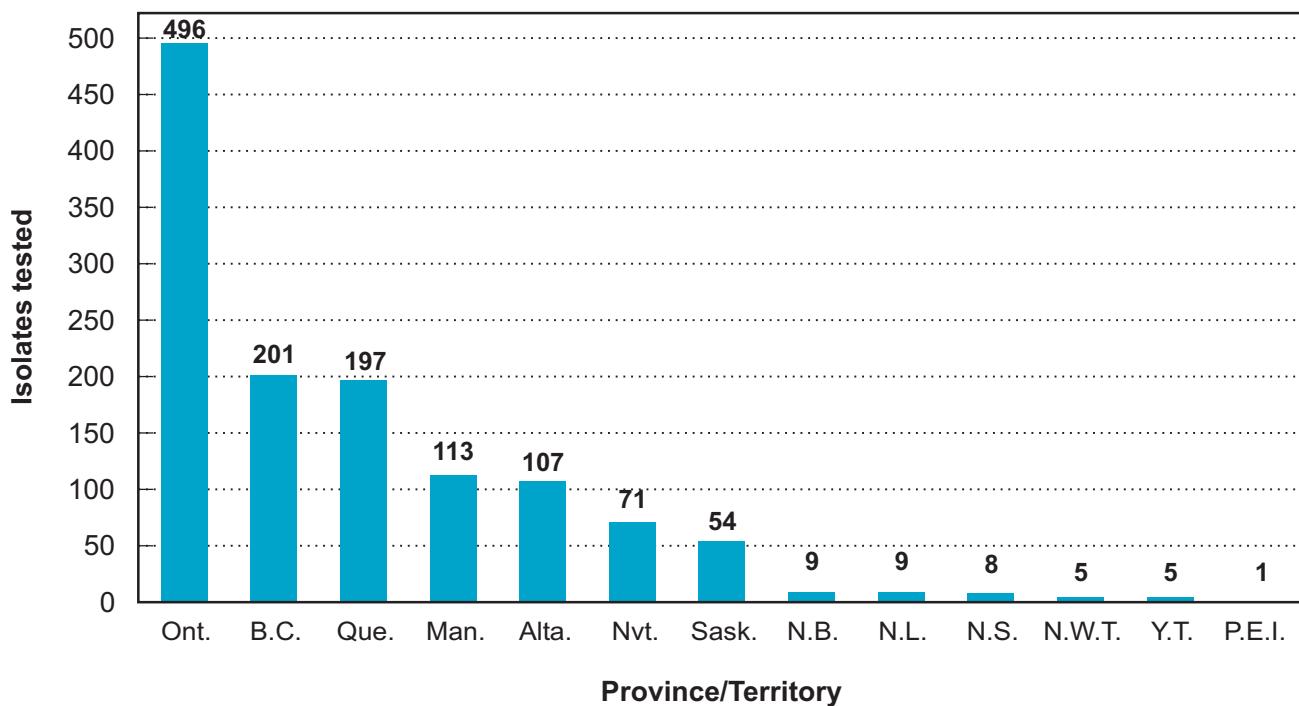
► CONCLUSIONS

With growing worldwide concern regarding resistance and with the emergence of extensively drug-resistant tuberculosis, the Canadian Tuberculosis Laboratory Surveillance System is vital in providing important input into tuberculosis control and prevention strategies for the management of TB drug resistance in Canada. The surveillance data collected to date indicate that the presence of TB drug resistance in this country is below the global average.

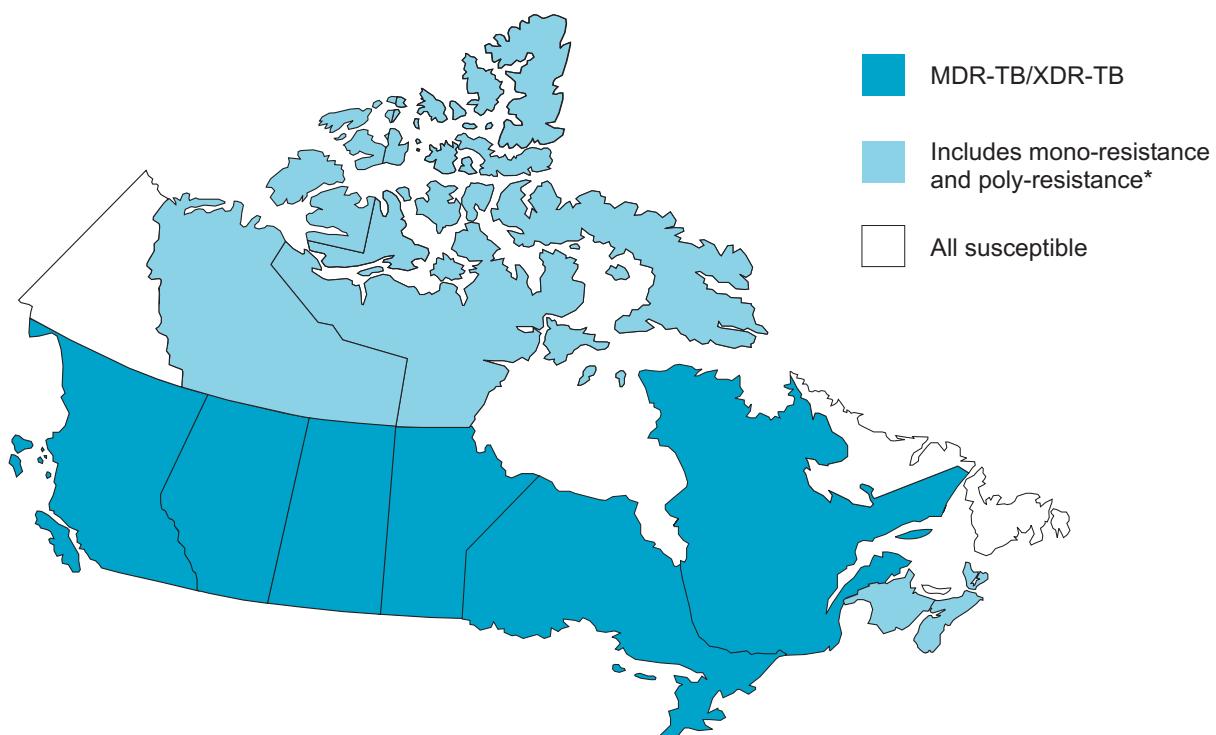
► REFERENCES

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2. Long R, Nobert E, Chomyc S, van Embden J, McNamee C, Rey Duran R, Talbot J, Fanning A. Transcontinental spread of multidrug-resistant *Mycobacterium bovis*. American Journal of Respiratory and Critical Care Medicine 1999;159: 2014-2017.
3. The WHO/IUALTD Global Project on Anti-tuberculosis drug Resistance Surveillance 2002-2007. *Anti-Tuberculosis Drug Resistance in the World: Fourth Global Report* (WHO/HTM/TB/2008.394) Geneva: World Health Organization, 2008.

► **Figure 1**
Reported *Mycobacterium tuberculosis* isolates in Canada by province/territory: 2010

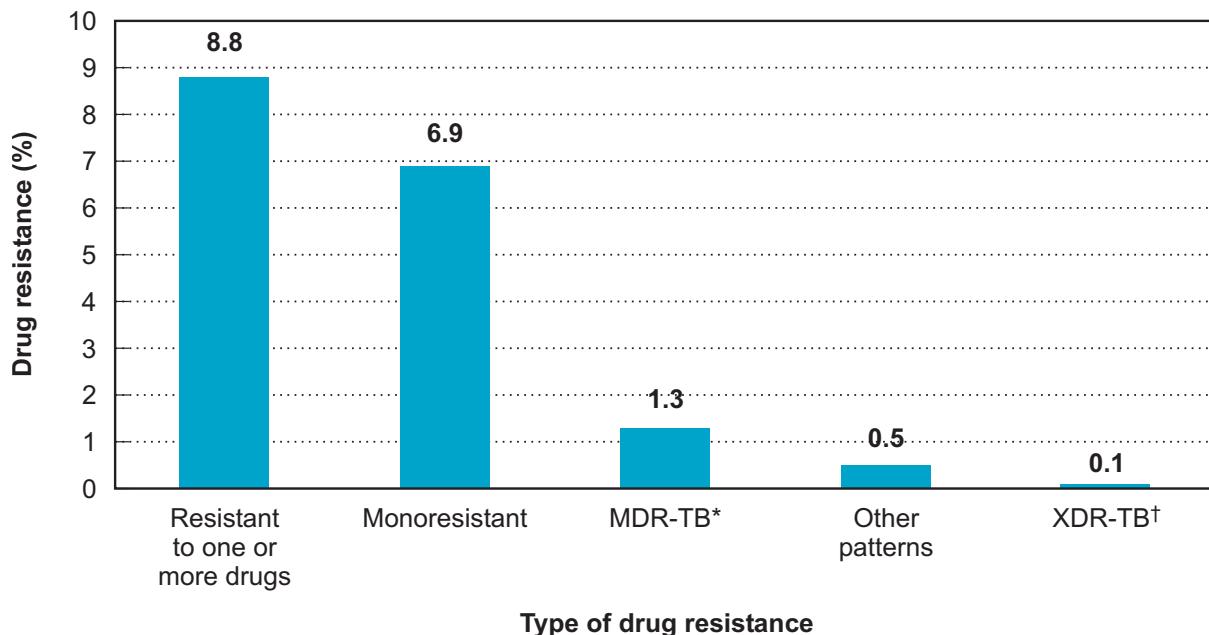


► **Figure 2**
Reported TB drug resistance in Canada by province/territory: 2010



* Does not include MDR-TB or XDR-TB.

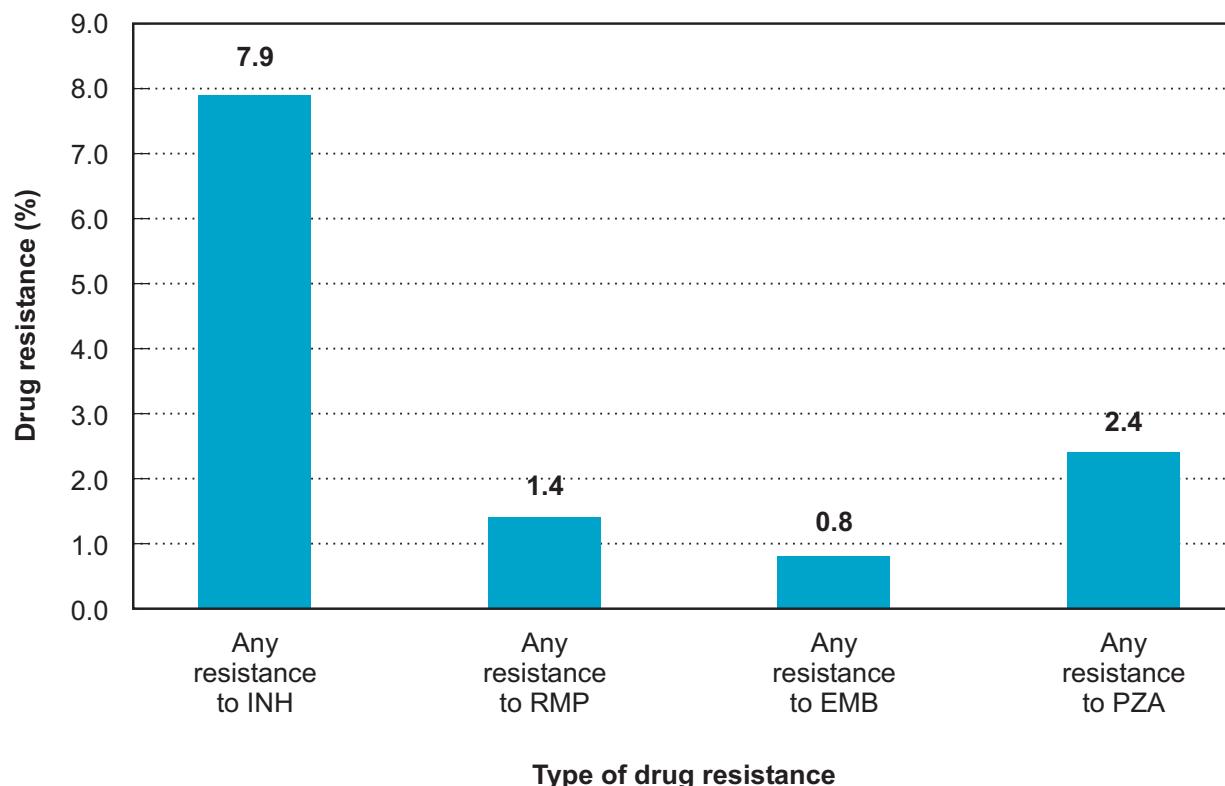
► **Figure 3**
Overall pattern of reported TB drug resistance in Canada: 2010



* Multidrug-resistant TB (MDR-TB) is TB that is resistant to at least isoniazid and rifampin, but which does not meet the definition of XDR-TB.

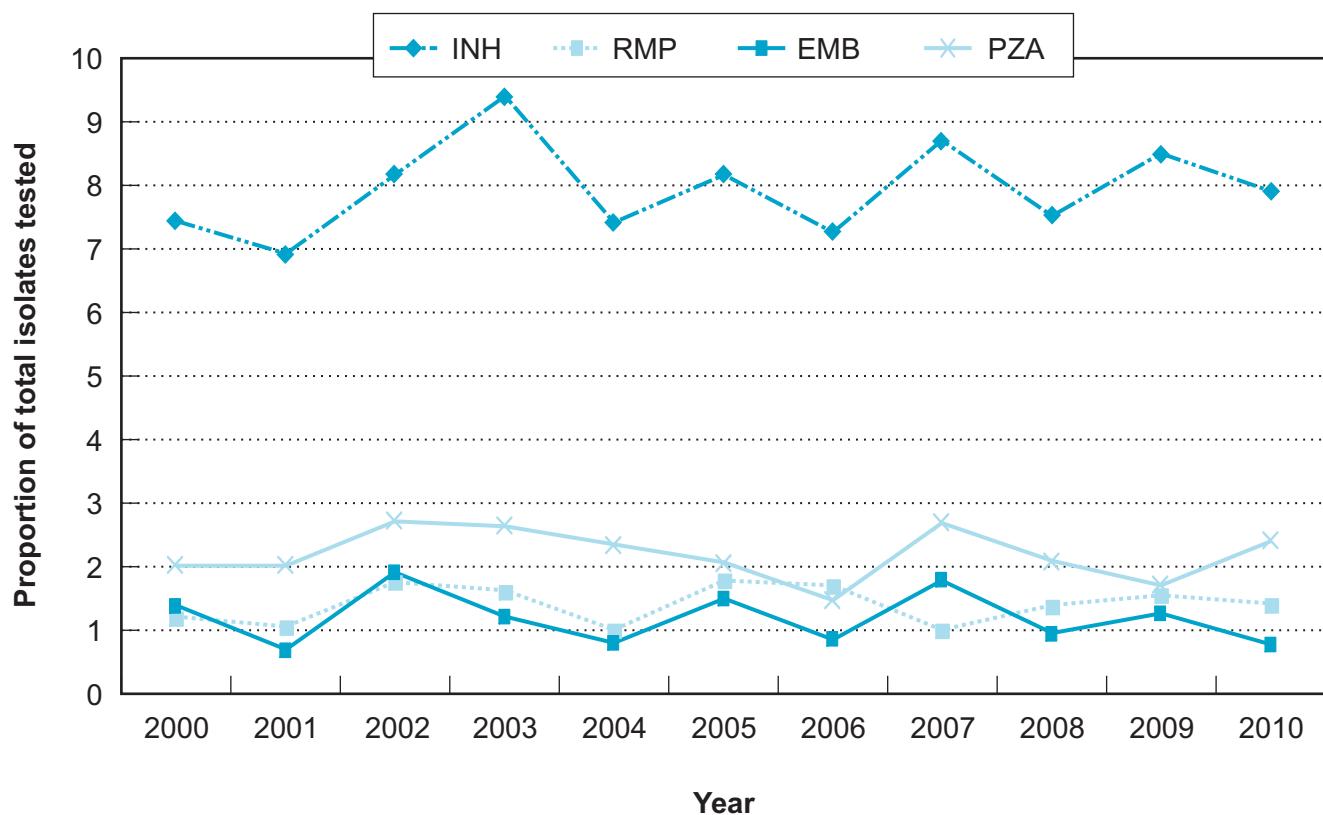
† Extensively drug-resistant TB (XDR-TB) is TB that is resistant to at least the two best first-line drugs, isoniazid and rifampin, plus resistant to second-line drugs including any fluoroquinolone and at least one of three injectables (amikacin, capreomycin and kanamycin).

► **Figure 4**
Reported TB drug resistance in Canada by type of first-line drug: 2010

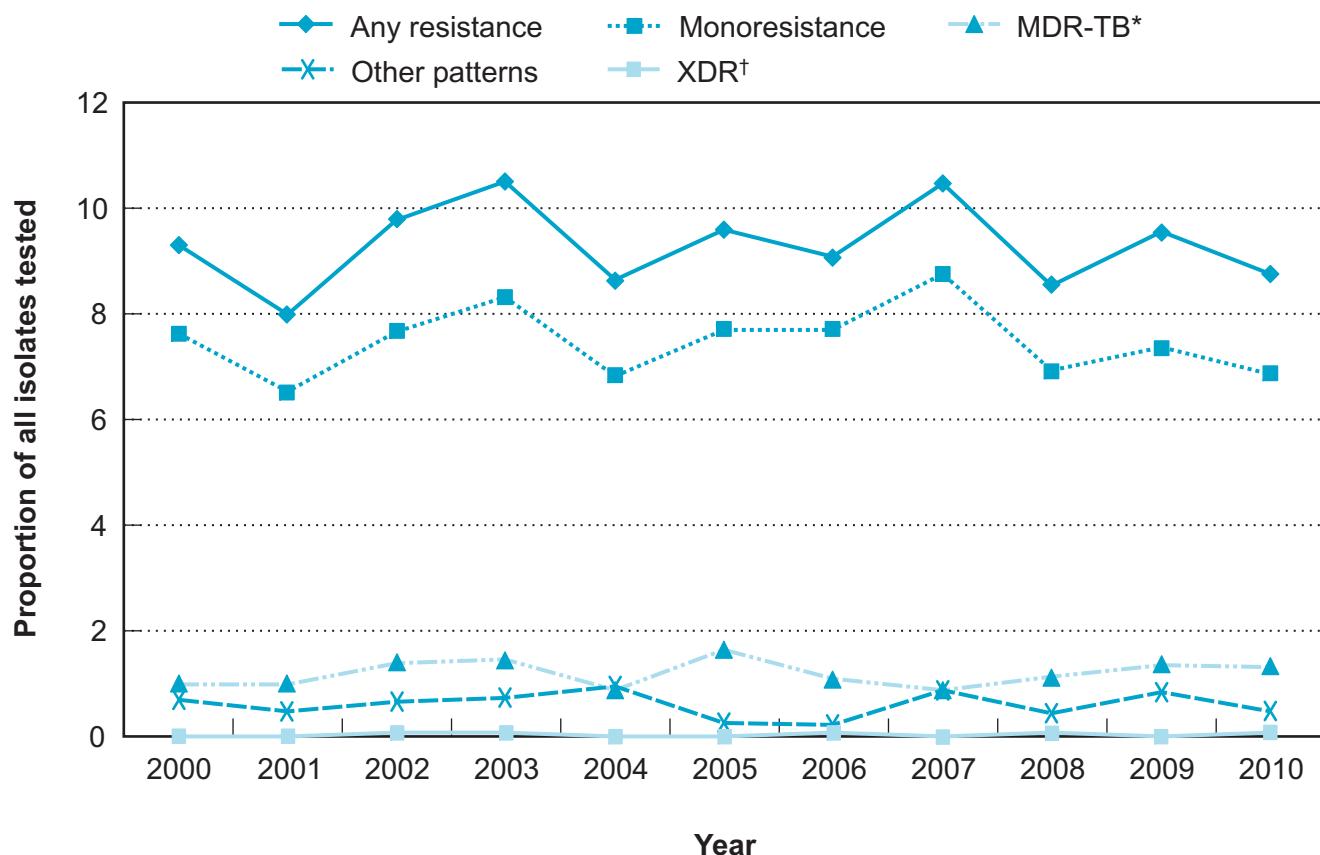


► **Figure 5**

Any resistance by type of first-line drug as a proportion of isolates tested: 2000-2010



► Figure 6
Overall pattern of reported TB drug resistance as a proportion of isolates tested: 2000-2010



* Multidrug-resistant TB (MDR-TB) is TB that is resistant to at least isoniazid and rifampin, but which does not meet the definition of XDR-TB.

† Extensively drug-resistant TB (XDR-TB) is TB that is resistant to at least the two best first-line drugs, isoniazid and rifampin, plus resistant to second-line drugs including any fluoroquinolone and at least one of three injectables (amikacin, capreomycin and kanamycin).

**Table 1. Reported *Mycobacterium tuberculosis* isolates by “reporting” and “originating” province/territory,
Canada – 2010**

Reporting province	Originating Province/Territory										B.C.	Y.T.	N.W.T.	Nvt.
	CANADA	N.L.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Y.T.	N.W.T.	Nvt.
Number of isolates	1,276	9	1	8	9	197	496	113	54	107	201	5	5	71
N.L.	9	9	0	0	0	0	0	0	0	0	0	0	0	0
N.S.	9	0	1	8	0	0	0	0	0	0	0	0	0	0
N.B.	9	0	0	0	9	0	0	0	0	0	0	0	0	0
Que.	194	0	0	0	0	194	0	0	0	0	0	0	0	0
Ont.	500	0	0	0	0	3	496	0	0	0	0	0	0	1
Man.	114	0	0	0	0	0	0	113	0	0	0	0	0	1
Sask.	54	0	0	0	0	0	0	0	54	0	0	0	0	0
Alta.	182	0	0	0	0	0	0	0	0	107	1	0	5	69
B.C.	205	0	0	0	0	0	0	0	0	200	5	0	0	0

Table 2. Overall pattern of reported TB drug resistance in Canada – 2000-2010

	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)	2010 Total (%)
Total number of isolates	1,490 (100.0)	1,475 (100.0)	1,419 (100.0)	1,407 (100.0)	1,378 (100.0)	1,336 (100.0)	1,389 (100.0)	1,267 (100.0)	1,356 (100.0)	1,331 (100.0)	1,276 (100.0)
Isolates susceptible	1,351 (90.7)	1,357 (92.0)	1,280 (90.2)	1,260 (89.6)	1,259 (91.4)	1,208 (90.4)	1,263 (90.9)	1,134 (89.5)	1,240 (91.4)	1,204 (90.5)	1,164 (91.2)
Any resistance*											
INH	110 (7.4)	102 (6.9)	115 (8.1)	132 (9.4)	102 (7.4)	109 (8.2)	101 (7.3)	110 (8.7)	102 (7.5)	113 (8.5)	101 (7.9)
RMP	18 (1.2)	16 (1.1)	24 (1.7)	23 (1.6)	14 (1.0)	24 (1.8)	24 (1.7)	13 (1.0)	19 (1.4)	21 (1.6)	18 (1.4)
EMB	21 (1.4)	10 (0.7)	26 (1.8)	17 (1.2)	11 (0.8)	20 (1.5)	12 (0.9)	23 (1.8)	13 (1.0)	17 (1.3)	10 (0.8)
PZA	25 (2.1)	23 (2.1)	29 (2.6)	29 (2.1)	23 (2.1)	22 (2.1)	16 (1.5)	27 (2.7)	22 (2.1)	18 (1.7)	25 (2.4)
Resistance to one or more drugs											
Monoresistance	139 (9.3)	118 (8.0)	139 (9.8)	148 (10.5)	119 (8.6)	128 (9.6)	126 (9.1)	133 (10.5)	116 (8.6)	127 (9.5)	112 (8.8)
Multidrug-resistance (MDR-TB)†	114 (7.7)	96 (6.5)	109 (7.7)	117 (8.3)	94 (6.8)	103 (7.7)	107 (7.7)	111 (8.8)	94 (6.9)	98 (7.4)	88 (6.9)
Other patterns	10 (0.7)	7 (0.5)	9 (0.6)	10 (0.7)	13 (0.9)	3 (0.2)	3 (0.2)	11 (0.9)	6 (0.4)	11 (0.8)	6 (0.5)
XDR-TB‡	0 (-)	0 (-)	1 (0.1)	1 (0.1)	0 (-)	0 (-)	1 (0.1)	0 (-)	1 (0.1)	0 (-)	1 (0.1)

* Not all isolates were tested for resistance to all drugs; percentage reflects the total number of isolates actually tested.

† Multidrug-resistant TB (MDR-TB) is TB that is resistant to at least isoniazid and rifampin but which does not meet the definition of XDR-TB.

‡ Extensively drug-resistant TB (XDR-TB) is TB that is resistant to at least isoniazid and rifampin plus resistance to any fluoroquinolone and at least one of three injectable second-line drugs: amikacin, capreomycin and kanamycin.

Table 3. Reported MDR-TB and XDR-TB isolates by province/territory, Canada – 2010

	CANADA	N.L.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Y.T.	N.W.T.	Nvt.
Originating Province/Territory														
Total number isolates tested	1,276	9	1	8	9	197	496	113	54	107	201	5	5	71
Total number of MDR-TB isolates*	17	0	0	0	0	1	10	1	1	3	1	0	0	0
INH & RMP	1	0	0	0	0	0	0	1	0	0	0	0	0	0
INH & RMP & RBT	2	0	0	0	0	0	1	0	1	0	0	0	0	0
INH & RMP & SM & RBT	1	0	0	0	0	0	1	0	0	0	0	0	0	0
INH & RMP & PZA & SM & RBT	2	0	0	0	0	0	0	0	0	0	1	1	0	0
INH & RMP & ETH & RBT & PAS	1	0	0	0	0	0	1	0	0	0	0	0	0	0
INH & RMP & SM & OFL & ETH & RBT	1	0	0	0	0	0	1	0	0	0	0	0	0	0
INH & RMP & PZA & SM & ETH & RBT	1	0	0	0	0	0	1	0	0	0	0	0	0	0
INH & RMP & EMB & PZA & SM & ETH	1	0	0	0	0	1	0	0	0	0	0	0	0	0
INH & RMP & EMB & SM & AK & CM	1	0	0	0	0	0	1	0	0	0	0	0	0	0
INH & RMP & EMB & PZA & SM & RBT	1	0	0	0	0	0	0	0	0	1	0	0	0	0
INH & RMP & EMB & PZA & SM & ETH & RBT	1	0	0	0	0	0	1	0	0	0	0	0	0	0
INH & RMP & EMB & SM & RBT & PAS	1	0	0	0	0	0	1	0	0	0	0	0	0	0
INH & RMP & EMB & SM & OFL & ETH	1	0	0	0	0	1	0	0	0	0	0	0	0	0
Total number of XDR-TB isolates†	1	0	0	0	0	0	0	1	0	0	0	0	0	0
INH & RMP & EMB & PZA & OFL & ETH & RBT & KM	1	0	0	0	0	0	1	0	0	0	0	0	0	0

* Multidrug-resistant TB (MDR-TB) is TB that is resistant to at least isoniazid and rifampin but which does not meet the definition of XDR-TB.
 † Extensively drug-resistant TB (XDR-TB) is TB that is resistant to at least isoniazid and rifampin plus resistance to any fluoroquinolone and at least one of three injectable second-line drugs: amikacin, capreomycin and kanamycin.

Table 4. Reported TB drug resistance by sex and age group, Canada – 2010

Age Group		Isolates	Any Resistance	MDR-TB	XDR-TB
		Number (%)	Number (%)	Number (%)	Number (%)
Total		1,276 (100.0)	112 (100.0)	17 (100.0)	1 (100.0)
0-4	Males	5 (0.4)	0 (0.0)	0 (0.0)	0 (0.0)
	Females	2 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)
	Unknown	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)
	Total	8 (0.6)	0 (0.0)	0 (0.0)	0 (0.0)
5-14	Males	7 (0.5)	0 (0.0)	0 (0.0)	0 (0.0)
	Females	16 (1.2)	1 (0.9)	0 (0.0)	0 (0.0)
	Unknown	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	Total	23 (1.8)	1 (0.9)	0 (0.0)	0 (0.0)
15-24	Males	92 (7.2)	4 (3.6)	1 (5.9)	0 (0.0)
	Females	67 (5.3)	4 (3.6)	2 (11.8)	0 (0.0)
	Unknown	1 (0.1)	1 (0.9)	1 (5.9)	0 (0.0)
	Total	160 (12.5)	9 (8.0)	4 (23.5)	0 (0.0)
25-34	Males	118 (9.2)	11 (9.8)	4 (23.5)	0 (0.0)
	Females	113 (8.9)	16 (14.3)	3 (17.6)	0 (0.0)
	Unknown	4 (0.3)	2 (1.8)	1 (5.9)	0 (0.0)
	Total	235 (18.4)	29 (25.9)	8 (47.1)	0 (0.0)
35-44	Males	125 (9.8)	12 (10.7)	3 (17.6)	0 (0.0)
	Females	89 (7.0)	10 (8.9)	0 (0.0)	0 (0.0)
	Unknown	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)
	Total	215 (16.8)	22 (19.6)	3 (17.6)	0 (0.0)
45-54	Males	105 (8.2)	9 (8.0)	0 (0.0)	0 (0.0)
	Females	60 (4.7)	3 (2.7)	0 (0.0)	0 (0.0)
	Unknown	1 (0.1)	1 (0.9)	0 (0.0)	0 (0.0)
	Total	166 (13.0)	13 (11.6)	0 (0.0)	0 (0.0)
55-64	Males	95 (7.4)	10 (8.9)	0 (0.0)	0 (0.0)
	Females	54 (4.2)	6 (5.4)	1 (5.9)	0 (0.0)
	Unknown	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	Total	149 (11.7)	16 (14.3)	1 (5.9)	0 (0.0)
65-74	Males	67 (5.3)	10 (8.9)	0 (0.0)	0 (0.0)
	Females	61 (4.8)	2 (1.8)	0 (0.0)	0 (0.0)
	Unknown	1 (0.1)	1 (0.9)	0 (0.0)	0 (0.0)
	Total	129 (10.1)	13 (11.6)	0 (0.0)	0 (0.0)
75+	Males	105 (8.2)	6 (5.4)	1 (5.9)	0 (0.0)
	Females	81 (6.3)	3 (2.7)	0 (0.0)	1 (100.0)
	Unknown	3 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)
	Total	189 (14.8)	9 (8.0)	1 (5.9)	1 (100.0)
Unknown	Males	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)
	Females	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)
	Unknown	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	Total	2 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)
Total	Males	720 (56.4)	62 (55.4)	9 (52.9)	0 (0.0)
	Females	544 (42.6)	45 (40.2)	6 (35.3)	1 (100.0)
	Unknown	12 (0.9)	5 (4.5)	2 (11.8)	0 (0.0)

Table 5. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Alberta - 2000-2010

	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)	2010 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	104 (100.0)	91 (100.0)	108 (100.0)	92 (100.0)	96 (100.0)	129 (100.0)	104 (100.0)	98 (100.0)	134 (100.0)	159 (100.0)	107 (100.0)
Isolates susceptible	95 (91.3)	82 (90.1)	100 (92.6)	78 (84.8)	84 (87.5)	115 (89.1)	95 (91.3)	92 (93.9)	123 (91.8)	145 (91.2)	96 (89.7)
Isolates resistant to one or more drugs	9 (8.7)	9 (9.9)	8 (7.4)	14 (15.2)	12 (12.5)	14 (10.9)	9 (8.7)	6 (6.1)	11 (8.2)	14 (8.8)	11 (10.3)
Monoresistance											
INH	7 (6.7)	7 (7.7)	7 (6.5)	11 (12.0)	9 (9.4)	10 (7.8)	8 (7.7)	6 (6.1)	8 (6.0)	12 (7.5)	6 (5.6)
RMP	5 (4.8)	7 (7.7)	7 (6.5)	9 (9.8)	7 (7.3)	10 (7.8)	7 (6.7)	5 (5.1)	8 (6.0)	8 (5.0)	6 (5.6)
EMB	—	—	—	—	—	—	—	—	—	—	—
PZA	1 (1.0)	—	—	—	—	—	—	—	—	—	—
INH & EMB	1 (1.0)	—	—	—	—	—	—	—	—	—	—
INH & PZA	1 (1.0)	2 (2.2)	1 (0.9)	2 (2.2)	1 (1.0)	—	—	—	—	1 (0.7)	2 (1.3)
INH & EMB & PZA	—	—	—	—	—	—	—	—	—	1 (0.7)	1 (0.6)
MDR-TB†											
INH & RMP & EMB	—	—	—	—	1 (1.1)	—	—	—	—	—	—
INH & RMP & ETH	—	—	—	—	—	—	—	—	—	—	—
INH & RMP & SM	—	—	—	—	—	—	—	—	—	—	—
INH & RMP & EMB & PZA	—	—	—	—	—	—	—	—	—	—	—
INH & RMP & EMB & SM	—	—	—	—	—	—	—	—	—	—	—
INH & RMP & EMB & SM & OFL	—	—	—	—	—	—	—	—	—	—	—
INH & RMP & EMB & AK & RBT	—	—	—	—	—	—	—	—	—	—	—
INH & RMP & PZA & SM & RBT	—	—	—	—	—	—	—	—	—	—	—
INH & RMP & EMB & PZA & SM & RBT	—	—	—	—	—	—	—	—	—	—	1 (0.9)
INH & RMP & EMB & PZA & SM & RBT & OFL & ETH	—	—	—	—	—	—	—	—	—	—	1 (0.9)

* Includes *M. africanum* isolate: 2 in 2007, 2009 and 3 in 2010; *M. bovis*: 2 in 2009.

† Multidrug-resistant TB (MDR-TB) is TB that is resistant to at least isoniazid and rifampin but which does not meet the definition of XDR-TB (see methods section for definition of XDR-TB).

Table 6. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, British Columbia – 2000-2010

	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)	2010 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	277 (100.0)	331(100.0)	259 (100.0)	291 (100.0)	263 (100.0)	204 (100.0)	275 (100.0)	231 (100.0)	254 (100.0)	239 (100.0)	201 (100.0)
Isolates susceptible	253 (91.3)	305 (92.1)	236 (91.1)	264 (90.7)	237 (90.1)	182 (89.3)	257 (93.5)	210 (90.9)	230 (90.6)	215 (90.0)	182 (90.5)
Isolates resistant to one or more drugs	24 (8.7)	26 (7.8)	23 (8.8)	27 (9.3)	26 (9.9)	22 (10.8)	18 (5.8)	21 (9.1)	24 (9.4)	24 (10.0)	19 (9.5)
Monoresistance											
INH	17 (6.1)	18 (5.4)	20 (7.2)	20 (6.9)	17 (6.5)	17 (8.3)	16 (5.8)	17 (7.4)	21 (8.3)	23 (9.6)	18 (9.0)
RMP	15 (5.4)	17 (5.1)	15 (5.8)	19 (6.5)	13 (4.9)	11 (5.4)	7 (2.5)	13 (5.6)	18 (7.1)	22 (9.2)	16 (8.0)
EMB	1 (0.4)	1 (0.3)	2 (0.8)	—	—	2 (1.0)	6 (2.2)	—	3 (1.2)	1 (0.4)	—
PZA†	—	—	2 (0.8)	1 (0.3)	1 (0.4)	4 (2.0)	3 (1.1)	4 (1.7)	—	—	1 (0.5)
Other Patterns											
INH & EMB	2 (0.7)	—	1 (0.4)	1 (0.3)	7 (2.7)	1 (0.5)	—	2 (0.9)	—	1 (0.4)	—
INH & PZA	—	—	—	1 (0.4)	1 (0.3)	1 (0.4)	1 (0.5)	—	2 (0.9)	—	1 (0.4)
RMP & PZA	—	—	—	—	—	2 (0.8)	—	—	—	—	—
MDR-TB‡											
INH & RMP	5 (1.8)	8 (2.4)	2 (0.8)	6 (2.1)	2 (0.8)	4 (2.0)	2 (0.7)	2 (0.9)	3 (1.2)	—	1 (0.5)
INH & RMP & EMB	—	3 (0.9)	—	—	—	—	1 (0.4)	—	1 (0.4)	—	—
INH & RMP & PZA	1 (0.4)	—	1 (0.4)	—	1 (0.4)	—	—	—	—	—	—
INH & RMP & SM	—	—	—	1 (0.3)	—	—	—	—	—	—	—
INH & RMP & AK	1 (0.4)	2 (0.6)	—	1 (0.3)	—	—	—	—	—	—	—
INH & RMP & PZA & AK	—	—	—	—	—	—	—	—	2 (0.8)	—	—
INH & RMP & PZA & SM	—	—	—	—	—	—	1 (0.5)	—	—	—	—
INH & RMP & EMB & SM	1 (0.4)	—	—	—	—	—	—	—	—	—	—

continued...

Table 6. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, British Columbia – 2000-2010 (continued)

	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)	2010 Total (%)
INH & RMP & SM & ETH	1 (0.4)	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & ETH	–	–	–	1 (0.3)	–	–	–	–	–	–	–
INH & RMP & EMB & SM & ETH	–	–	–	–	–	1 (0.5)	–	–	–	–	–
INH & RMP & EMB & SM & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & EMB & PZA & SM	–	1 (0.3)	1 (0.4)	1 (0.3)	–	1 (0.5)	–	–	–	–	–
INH & RMP & EMB & PZA & ETH	–	1 (0.3)	–	1 (0.3)	1 (0.4)	–	–	–	–	–	–
INH & RMP & PZA & SM & RBT	–	–	–	–	–	–	–	–	–	–	1 (0.5)
INH & RMP & EMB & PZA & SM & ETH	1 (0.4)	–	–	1 (0.3)	–	–	–	–	–	–	–
INH & RMP & EMB & SM & ETH & PAS	–	–	–	–	1 (0.5)	1 (0.4)	–	–	–	–	–
INH & RMP & EMB & PZA & SM & OFL & ETH & PAS	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & EMB & PZA & KM & CM & ETH	–	–	–	–	–	–	–	–	1 (0.4)	–	–

* Includes *M. bovis* isolates: 1 in 2002, 2003, 2006 and 2007; *M. africanum* 1 in 2008 and 2009.

† Routine testing for PZA not conducted.

‡ Multidrug-resistant TB (MDR-TB) is TB that is resistant to at least isoniazid and rifampin but which does not meet the definition of XDR-TB (see methods section for definition of XDR-TB).

Table 7. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Manitoba – 2000-2010

	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)	2010 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	102 (100.0)	110 (100.0)	113 (100.0)	122 (100.0)	94 (100.0)	119 (100.0)	85 (100.0)	116 (100.0)	106 (100.0)	113 (100.0)	113 (100.0)
Isolates susceptible	94 (92.1)	105 (95.5)	106 (93.8)	117 (95.9)	121 (99.2)	92 (97.9)	113 (95.0)	75 (88.2)	111 (95.7)	99 (93.3)	99 (87.6)
Isolates resistant to one or more drugs	8 (7.8)	5 (4.5)	7 (6.2)	5 (4.1)	1 (0.8)	2 (2.1)	6 (5.0)	10 (11.7)	5 (4.3)	7 (6.6)	14 (12.4)
Monoresistance	8 (7.8)	3 (2.7)	4 (3.5)	4 (3.3)	1 (0.8)	2 (2.1)	6 (5.0)	9 (10.6)	4 (3.4)	5 (4.7)	11 (9.7)
INH	8 (7.8)	3 (2.7)	3 (2.7)	3 (2.5)	—	2 (2.1)	6 (5.0)	8 (9.4)	4 (3.4)	4 (3.8)	10 (8.8)
PZA	—	—	1 (0.9)	1 (0.8)	1 (0.8)	—	—	1 (1.2)	—	2 (1.8)	1 (0.9)
Other Patterns	—	—	1 (0.9)	—	—	—	—	1 (1.2)	—	2 (1.8)	1 (0.9)
INH & PZA	—	—	1 (0.9)	—	—	—	—	—	—	1 (0.9)	1 (0.9)
INH & EMB	—	—	—	—	—	—	—	1 (1.2)	—	1 (0.9)	—
MDR†	—	2 (1.8)	1 (0.9)	1 (0.8)	—	—	—	—	—	1 (0.9)	—
INH & RMP	—	1 (0.9)	1 (0.9)	—	—	—	—	—	—	—	1 (0.9)
INH & RMP & EMB	—	—	—	—	—	—	—	—	—	—	—
INH & RMP & RBT	—	—	—	—	1 (0.8)	—	—	—	—	—	—
INH & RMP & PZA & SM & RBT	—	—	—	—	—	—	—	—	—	1 (0.9)	—
INH & RMP & EMB & PZA & SM	—	1 (0.9)	—	—	—	—	—	—	—	—	—
INH & RMP & PZA & SM & CM	—	—	—	—	—	—	—	—	—	—	—
XDR-TB‡	—	—	1 (0.9)	—	—	—	—	—	—	—	1 (0.9)
INH & RMP & EMB & PZA & OFL & ETH & RBT & KM	—	—	—	—	—	—	—	—	—	—	1 (0.9)
INH & RMP & EMB & PZA & CM & OFL & ETH & RBT	—	—	1 (0.9)	—	—	—	—	—	—	—	—

* Includes *M. bovis* isolates: 1 in 2002, 2003, 2006 and 2007; *M. africanum*: 1 in 2008.

† Multidrug-resistant TB (MDR-TB) is TB that is resistant to at least isoniazid and rifampin but which does not meet the definition of XDR-TB.

‡ Extensively drug-resistant TB (XDR-TB) is TB that is resistant to at least isoniazid and rifampin plus resistance to any fluoroquinolone and at least one of three injectable second-line drugs: amikacin, capreomycin and kanamycin.

Table 8. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, New Brunswick – 2000-2010

	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)	2010 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	9 (100.0)	10 (100.0)	10 (100.0)	14 (100.0)	11 (100.0)	5 (100.0)	3 (100.0)	5 (100.0)	3 (100.0)	10 (100.0)	9 (100.0)
Isolates susceptible	9 (100.0)	10 (100.0)	9 (90.0)	13 (92.9)	10 (90.9)	4 (80.0)	3 (100.0)	5 (100.0)	3 (100.0)	10 (100.0)	7 (77.8)
Isolates resistant to one or more drugs	–	–	1 (10.0)	1 (7.1)	1 (9.1)	1 (20.0)	–	–	–	–	2 (22.2)
Monoresistance	–	–	1 (10.0)	1 (7.1)	1 (9.1)	1 (20.0)	–	–	–	–	2 (22.2)
INH	–	–	1 (10.0)	1 (7.1)	1 (9.1)	–	–	–	–	–	2 (22.2)
PZA	–	–	–	–	–	1 (20.0)	–	–	–	–	–

* Includes 1 *M. africanum* isolate for 2007.

Table 9. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Newfoundland and Labrador – 2000-2010

	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)	2010 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA	11 (100.0)	9 (100.0)	4 (100.0)	6 (100.0)	8 (100.0)	6 (100.0)	11 (100)	5 (100.0)	5 (100.0)	10 (100.0)	9 (100.0)
Isolates susceptible	11 (100.0)	9 (100.0)	4 (100.0)	4 (66.7)	8 (100.0)	5 (83.3)	11 (100)	5 (100.0)	5 (100.0)	10 (100.0)	9 (100.0)
Isolates resistant to one or more drugs	–	–	–	2 (33.3)	–	1 (16.7)	–	–	–	–	–
Monoresistance	–	–	–	2 (33.3)	–	1 (16.7)	–	–	–	–	–
INH	–	–	–	1 (16.7)	–	1 (16.7)	–	–	–	–	–
RMP	–	–	–	1 (16.7)	–	–	–	–	–	–	–

Table 10. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Northwest Territories – 2000-2010

	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)	2010 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA	8 (100.0)	6 (100.0)	3 (100.0)	11 (100.0)	9 (100.0)	6 (100.0)	4 (100.0)	14 (100.0)	13 (100.0)	10 (100.0)	5 (100.0)
Isolates susceptible	8 (100.0)	6 (100.0)	3 (100.0)	11 (100.0)	9 (100.0)	6 (100.0)	3 (75.0)	14 (100.0)	13 (100.0)	9 (90.0)	4 (80.0)
Isolates resistant to one or more drugs	–	–	–	–	–	–	1 (25.0)	–	–	1 (10.0)	1 (20.0)
Monoresistance	–	–	–	–	–	–	1 (25.0)	–	–	1 (10.0)	1 (20.0)
INH	–	–	–	–	–	–	1 (25.0)	–	–	–	1 (20.0)
RMP	–	–	–	–	–	–	–	–	–	1 (10.0)	–

Table 11. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Nova Scotia – 2000-2010

	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)	2010 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	4 (100.0)	7 (100.0)	10 (100.0)	7 (100.0)	9 (100.0)	7 (100.0)	8 (100.0)	5 (100.0)	3 (100.0)	7 (100.0)	8 (100.0)
Isolates susceptible	4 (100.0)	7 (100.0)	9 (90.0)	7 (100.0)	9 (100.0)	6 (85.7)	8 (100.0)	5 (100.0)	3 (100.0)	7 (100.0)	5 (62.5)
Isolates resistant to one or more drugs	–	–	1 (10.0)	–	1 (14.3)	–	–	–	–	–	3 (37.5)
Monoresistance	–	–	1 (10.0)	–	1 (14.3)	–	–	–	–	–	2 (25.0)
INH	–	–	–	–	–	–	–	–	–	–	1 (12.5)
PZA	–	–	1 (10.0)	–	1 (14.3)	–	–	–	–	–	1 (12.5)
Other Patterns	–	–	–	–	–	–	–	–	–	–	1 (12.5)
INH & PZA	–	–	–	–	–	–	–	–	–	–	1 (12.5)

* Includes 1 *M. bovis* isolate for 2010.

Table 12. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Nunavut – 2000-2010

	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)	2010 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA	29 (100.0)	31 (100.0)	22 (100.0)	4 (100.0)	16 (100.0)	27 (100.0)	37 (100.0)	24 (100.0)	51 (100.0)	50 (100.0)	71 (100.0)
Isolates susceptible	28 (96.6)	30 (96.8)	22 (100.0)	4 (100.0)	16 (100.0)	27 (100.0)	37 (100.0)	24 (100.0)	51 (100.0)	49 (98.0)	70 (98.6)
Isolates resistant to one or more drugs	1 (3.4)	1 (3.2)	—	—	—	—	—	—	—	—	1 (2.0)
Monoresistance	1 (3.4)	—	—	—	—	—	—	—	—	—	1 (1.4)
INH	1 (3.4)	—	—	—	—	—	—	—	—	—	1 (2.0)
MDR-TB*	—	1 (3.2)	—	—	—	—	—	—	—	—	—
INH & RMP	—	1 (3.2)	—	—	—	—	—	—	—	—	—

* Multidrug-resistant TB (MDR-TB) is TB that is resistant to at least isoniazid and rifampin but which does not meet the definition of XDR-TB (see methods section for definition of XDR-TB).

Table 13. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Ontario – 2000-2010

	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)	2010 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	599 (100.0)	588 (100.0)	586 (100.0)	592 (100.0)	599 (100.0)	553 (100.0)	567 (100.0)	538 (100.0)	479 (100.0)	488 (100.0)	496 (100.0)
Isolates susceptible	535 (89.3)	534 (90.8)	517 (88.2)	526 (88.9)	539 (90.0)	487 (88.1)	504 (88.9)	466 (86.6)	427 (88.6)	428 (87.7)	456 (91.9)
Isolates resistant to one or more drugs	64 (10.7)	54 (9.2)	69 (11.8)	66 (11.1)	60 (10.0)	66 (11.9)	63 (11.1)	72 (13.4)	52 (10.9)	60 (12.3)	40 (8.1)
Monoresistance											
INH	50 (8.3)	46 (7.8)	49 (8.4)	47 (7.9)	49 (8.2)	51 (9.2)	49 (8.6)	61 (11.3)	40 (8.4)	44 (9.0)	29 (5.8)
RMP	—	—	—	1 (0.2)	—	—	1 (0.2)	1 (0.2)	—	39 (7.8)	27 (5.4)
EMB	1 (0.2)	1 (0.2)	1 (0.2)	—	—	—	—	1 (0.2)	1 (0.2)	1 (0.2)	—
PZA	12 (2.0)	9 (1.5)	5 (0.9)	4 (0.7)	3 (0.5)	7 (1.3)	9 (1.6)	9 (1.7)	6 (1.3)	4 (0.8)	2 (0.4)
Other Patterns											
INH & EMB	5 (0.8)	5 (0.8)	4 (0.7)	1 (1.2)	4 (0.7)	2 (0.4)	3 (0.5)	4 (0.7)	4 (0.8)	5 (1.0)	1 (0.2)
INH & PZA	3 (0.5)	3 (0.5)	3 (0.5)	5 (0.8)	3 (0.5)	2 (0.4)	3 (0.5)	1 (0.2)	2 (0.4)	3 (0.6)	—
EMB & RMP	—	2 (0.3)	—	1 (0.2)	1 (0.2)	—	—	2 (0.4)	—	—	1 (0.2)
EMB & PZA	—	—	—	—	—	—	—	—	—	—	—
INH & EMB & PZA	—	—	1 (0.2)	1 (0.2)	—	—	—	1 (0.2)	—	—	—
MDR-TB†											
INH & RMP	9 (1.5)	3 (0.5)	16 (2.7)	11 (1.9)	7 (1.2)	13 (2.4)	10 (1.8)	7 (1.3)	7 (1.5)	11 (2.3)	10 (2.0)
INH & RMP & PZA	1 (0.2)	—	—	1 (0.2)	2 (0.3)	—	2 (0.4)	—	—	1 (0.2)	—
INH & RMP & EMB	—	—	1 (0.2)	—	—	—	—	—	—	—	—
INH & RMP & SM	2 (0.3)	1 (0.2)	1 (0.2)	—	—	—	—	—	—	—	—
INH & RMP & RBT	2 (0.3)	—	1 (0.2)	—	—	3 (0.5)	1 (0.2)	—	—	—	1 (0.2)
INH & RMP & ETH	—	—	—	—	—	—	—	—	—	—	—
INH & RMP & EMB & SM	—	1 (0.2)	—	—	—	—	—	—	—	—	—
INH & RMP & EMB & RBT	—	—	—	—	—	—	2 (0.4)	1 (0.2)	1 (0.2)	2 (0.4)	—
INH & RMP & PZA & SM	1 (0.2)	—	—	1 (0.2)	—	—	—	—	—	—	—
INH & RMP & PZA & RBT	—	—	—	2 (0.3)	—	—	—	—	—	—	—
INH & RMP & SM & RBT	—	—	1 (0.2)	—	—	2 (0.4)	—	—	—	3 (0.6)	1 (0.2)
INH & RMP & ETH & RBT	—	—	1 (0.2)	1 (0.2)	—	1 (0.2)	—	1 (0.2)	—	1 (0.2)	—
INH & RMP & CM & RBT	—	—	—	—	—	—	—	—	—	—	—
INH & RMP & EMB & SM & RBT	—	—	1 (0.2)	—	—	2 (0.4)	—	—	—	—	—
INH & RMP & EMB & SM & ETH	1 (0.2)	—	—	—	—	—	—	—	—	—	—

continued...

Table 13. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Ontario – 2000-2010 (continued)

	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)	2010 Total (%)
INH & RMP & EMB & PZA & RBT	–	–	1 (0.2)	1 (0.2)	–	–	–	1 (0.2)	–	–	–
INH & RMP & EMB & PZA & SM	–	–	–	1 (0.2)	–	1 (0.2)	–	–	–	–	–
INH & RMP & PZA & OFL & CIPROFLOXACIN	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & ETH & RBT	–	–	–	–	–	–	1 (0.2)	–	–	–	–
INH & RMP & SM & ETH & RBT	1 (0.2)	–	4 (0.7)	–	–	1 (0.2)	–	–	–	1 (0.2)	–
INH & RMP & SM & OFL & RBT	–	–	–	1 (0.2)	–	1 (0.2)	–	–	–	–	–
INH & RMP & SM & OFL & ETH	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & ETH & RBT & PAS	–	–	–	–	–	–	–	–	–	–	1 (0.2)
INH & RMP & AK & CM & RBT	–	–	–	–	1 (0.2)	–	–	–	–	–	–
INH & RMP & OFL & ETH & RBT	–	–	–	1 (0.2)	–	–	–	–	–	–	–
INH & RMP & CM & ETH & RBT	–	–	–	1 (0.2)	–	–	–	–	–	–	–
INH & RMP & EMB & SM & ETH & RBT	–	1 (0.2)	–	–	–	–	–	1 (0.2)	–	–	–
INH & RMP & EMB & PZA & SM & ETH	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & EMB & PZA & SM & RBT	–	–	–	–	–	–	–	–	–	1 (0.2)	–
INH & RMP & EMB & SM & AK & CM	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & SM & ETH & RBT	–	–	–	–	1 (0.2)	–	1 (0.2)	1 (0.2)	1 (0.2)	1 (0.2)	–
INH & RMP & PZA & EMB & ETH & RBT	1 (0.2)	–	1 (0.2)	–	–	–	2 (0.4)	–	–	–	–
INH & RMP & SM & OFL & ETH & RBT	–	–	–	–	–	–	–	–	–	1 (0.2)	–
INH & RMP & OFL & ETH & RBT & PAS	–	–	–	–	–	1 (0.2)	–	–	–	–	–
INH & RMP & PZA & EMB & SM & ETH & RBT	1 (0.2)	(2 (0.3))	1 (0.2)	–	–	1 (0.2)	–	–	–	–	1 (0.2)
INH & RMP & PZA & EMB & SM & OFL & RBT	–	–	–	–	–	1 (0.2)	–	–	–	–	–
INH & RMP & EMB & SM & KM & RBT & PAS	–	–	–	–	–	–	–	–	–	–	1 (0.2)
INH & RMP & PZA & EMB & SM & ETH & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & EMB & SM & CM & ETH & RBT	–	–	–	–	–	–	–	–	–	–	–

continued...

Table 13. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Ontario – 2000-2010 (continued)

	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)	2010 Total (%)
INH & RMP & EMB & PZA & SM & AK & CM & RBT	–	–	1 (0.2)	–	–	–	–	–	–	–	–
INH & RMP & EMB & PZA & SM & ETH & RBT & PAS	–	–	–	–	–	–	–	–	–	–	1 (0.2)
XDR-TB[†]	–	–	–	1 (0.2)	–	–	1 (0.2)	–	1 (0.2)	–	–
INH & RMP & EMB & SM & AK & CM & ETH & OFL & RBT	–	–	–	1 (0.2)	–	–	–	–	–	–	–
INH & RMP & AK & CM & OFL & ETH & RBT	–	–	–	–	–	–	1 (0.2)	–	–	–	–
INH & RMP & EMB & PZA & CM & OFL & RBT & PAS	–	–	–	–	–	–	–	–	1 (0.2)	–	–

* Includes *M. bovis* isolates: 1 *M. bovis* isolate for 2002, 2003, 2004; 2 for 2000, 2001, 2005, 2010; and 4 for 2006.

† Multidrug-resistant TB (MDR-TB) is TB that is resistant to at least isoniazid and rifampin but which does not meet the definition of XDR-TB.

‡ Extensively drug-resistant TB (XDR-TB) is TB that is resistant to at least isoniazid and rifampin plus resistance to any fluoroquinolone and at least one of three injectable second-line drugs: amikacin, capreomycin and kanamycin.

Table 14. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Prince Edward Island – 2000-2010

	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)	2010 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	3 (100.0)	2 (100.0)	1 (100.0)	2 (100.0)	1 (100.0)	1 (100.0)	–	–	–	1 (100.0)	1 (100.0)
Isolates susceptible	3 (100.0)	1 (50.0)	1 (100.0)	2 (100.0)	1 (100.0)	1 (100.0)	–	–	–	1 (100.0)	1 (100.0)
Isolates resistant to one or more drugs	–	1 (50.0)	–	–	–	–	–	–	–	–	–
Monoresistance	–	1 (50.0)	–	–	–	–	–	–	–	–	–
PZA	–	1 (50.0)	–	–	–	–	–	–	–	–	–

* Includes 1 *M. bovis* isolate for 2001.

**Table 15. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs,
Quebec – 2000-2010**

	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)	2010 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	278 (100.0)	221 (100.0)	247 (100.0)	219 (100.0)	207 (100.0)	226 (100.0)	201 (100.0)	200 (100.0)	210 (100.0)	171 (100.0)	197 (100.0)
Isolates susceptible	249 (89.6)	202 (91.4)	222 (89.9)	187 (85.4)	190 (91.8)	207 (91.6)	173 (86.1)	177 (88.5)	188 (90.0)	156 (91.2)	179 (90.9)
Isolates resistant to one or more drugs	29 (10.4)	19 (8.6)	25 (10.1)	32 (14.6)	17 (8.2)	19 (8.4)	28 (13.9)	23 (11.5)	22 (10.5)	15 (8.8)	18 (9.1)
Monoresistance											
INH	28 (10.1)	18 (8.1)	23 (9.3)	31 (14.2)	15 (7.2)	18 (8.0)	26 (12.9)	17 (8.5)	19 (9.0)	9 (5.3)	16 (8.1)
RMP	19 (6.8)	14 (6.3)	13 (5.3)	25 (11.4)	11 (5.3)	14 (6.2)	21 (10.4)	12 (6.0)	15 (7.1)	7 (4.1)	11 (5.6)
EMB	–	–	1 (0.4)	–	–	1 (0.5)	1 (0.5)	–	–	–	–
PZA	–	–	–	–	–	–	–	–	–	–	–
Other Patterns											
INH & EMB	0 (0)	0 (0)	1 (0.4)	0 (0)	1 (0.5)	0 (0)	0 (0)	4 (2.0)	4 (1.9)	2 (1.2)	5 (2.5)
INH & PZA	–	–	1 (0.4)	–	1 (0.5)	–	–	1 (0.5)	1 (0.5)	–	1 (0.5)
MDR-TB†											
INH & RMP & SM	1 (0.4)	1 (0.5)	1 (0.4)	1 (0.5)	1 (0.5)	1 (0.4)	2 (1.0)	2 (1.0)	2 (1.0)	6 (3.5)	1 (0.5)
INH & RMP & ETH	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & RBT	–	–	–	–	1 (0.5)	–	–	–	–	–	–
INH & RMP & EMB & ETH	–	–	–	–	–	–	1 (0.5)	1 (0.5)	–	–	–
INH & RMP & EMB & RBT	–	–	–	–	–	–	–	–	–	1 (0.6)	–
INH & RMP & SM & RBT	–	1 (0.5)	–	–	–	–	–	–	1 (0.5)	2 (1.2)	–
INH & RMP & EMB & SM & RBT	–	–	–	–	–	–	–	1 (0.5)	–	–	–
INH & RMP & EMB & ETH & RBT	–	1 (0.4)	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & EMB & RBT	–	–	–	–	–	–	1 (0.4)	–	–	1 (0.6)	–
INH & RMP & EMB & PZA & SM & RBT	–	–	–	–	–	–	–	1 (0.5)	–	–	1 (0.5)
INH & RMP & EMB & PZA & SM & ETH	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & EMB & SM & ETH & PAS	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & EMB & PZA & SM & CM	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & SM & KM & ETH	–	–	–	–	–	–	–	–	–	1 (0.6)	–
INH & RMP & PZA & SM & AK & KM & CM	–	–	–	–	–	–	–	–	1 (0.5)	–	–

* Includes *M. bovis* isolates: 1 in 2001, 2002, 2003, 2007, 2009; and 2 in 2002, 2004, 2006, 2010; *M. caprae*: 1 in 2002, 2006; *M. africanum*: 1 in 2003, 2005, 2006, 2008; 2 in 2007, 3 in 2009; and 4 in 2010.

† Multidrug-resistant TB (MDR-TB) is TB that is resistant to at least isoniazid and rifampin but which does not meet the definition of XDR-TB (see methods section for definition of XDR-TB).

Table 16. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Saskatchewan – 2000-2010

	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)	2010 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	63 (100.0)	68 (100.0)	56 (100.0)	46 (100.0)	34 (100.0)	75 (100.0)	58 (100.0)	60 (100.0)	81 (100.0)	77 (100.0)	54 (100.0)
Isolates susceptible	58 (92.1)	65 (95.6)	51 (91.1)	45 (97.8)	32 (94.1)	73 (97.3)	57 (98.3)	59 (98.3)	79 (97.5)	72 (93.5)	51 (94.4)
Isolates resistant to one or more drugs	5 (7.9)	3 (4.4)	5 (8.9)	1 (2.2)	2 (5.9)	2 (2.7)	1 (1.7)	1 (1.7)	2 (2.5)	5 (6.5)	3 (5.6)
Monoresistance	4 (6.3)	3 (4.4)	4 (7.1)	1 (2.2)	2 (5.9)	2 (2.7)	1 (1.7)	1 (1.7)	2 (2.5)	3 (3.9)	2 (3.7)
INH	2 (3.2)	3 (4.4)	3 (5.4)	1 (2.2)	2 (5.9)	2 (2.7)	1 (1.7)	1 (1.7)	2 (2.5)	3 (3.9)	2 (3.7)
EMB	1 (1.6)	–	1 (1.8)	–	–	–	–	–	–	–	–
Other Patterns	1 (1.6)	1 (1.5)	1 (1.8)	–	–	–	–	–	–	1 (1.3)	–
INH & EMB	1 (1.6)	–	1 (1.8)	–	–	–	–	–	–	1 (1.3)	–
MDR-TB†	–	–	–	–	–	–	–	–	–	1 (1.3)	1 (1.9)
INH & RMP & RBT	–	–	–	–	–	–	–	–	–	–	1 (1.9)
INH & RMP & SM	–	–	–	–	–	–	–	–	–	1 (1.3)	–

* Routine testing for PZA not conducted.

† Multidrug-resistant TB (MDR-TB) is TB that is resistant to at least isoniazid and rifampin but which does not meet the definition of XDR-TB (see methods section for definition of XDR-TB).

Table 17. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Yukon – 2000-2010

	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)	2010 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	3 (100.0)	1 (100.0)	–	1 (100.0)	3 (100.0)	2 (100.0)	2 (100.0)	2 (100.0)	7 (100.0)	3 (100.0)	5 (100.0)
Isolates susceptible	3 (100.0)	1 (100.0)	–	1 (100.0)	3 (100.0)	2 (100.0)	2 (100.0)	2 (100.0)	7 (100.0)	3 (100.0)	5 (100.0)

* Routine testing for PZA not conducted.

► Appendix 1

Participating Laboratories of the Canadian Tuberculosis Laboratory Surveillance System

Alberta (Alberta, Northwest Territories and Nunavut)	Cary Shandro Technologist Mycobacteriology Provincial Laboratory of Public Health
	Dr. Greg Tyrrell Medical Microbiologist Provincial Laboratory of Public Health
	Dr. Marie Louie, MD, FRCPC Medical Director Provincial Laboratory of Public Health
British Columbia (British Columbia and Yukon Territory)	Dr. Mabel Rodrigues, PhD Mycobacteriology/TB Laboratory Section Head British Columbia Centre for Disease Control (BCCDC) Public Health Microbiology & Reference Laboratory
	Dr. Patrick Tang, MD, PhD, FRCPC Medical Microbiologist BCCDC Public Health Microbiology & Reference Laboratory
	Dr. Judy L. Isaac-Renton, MD, DPH, FRCPC Director, Laboratory Services BCCDC Public Health Microbiology & Reference Laboratory
Manitoba	Assunta Rendina, MLT Charge Technologist, Mycobacteriology Diagnostics Services Manitoba
	Dr. Kanchana Manickam Clinical Microbiologist Diagnostics Services Manitoba
	Dr. Michelle Alfa Medical Director Diagnostics Services Manitoba
New Brunswick	Hope MacKenzie Microbiology Laboratory Department of Laboratory Medicine Saint John Regional Hospital

New Brunswick (cont'd)

Dr. Duncan Webster
Medical Microbiologist/Infectious Disease
Department of Laboratory Medicine
Saint John Regional Hospital

Dr. Marek Godlewski
Laboratory Director
Department of Laboratory Medicine
Saint John Regional Hospital

Newfoundland and Labrador

Sandra B. March, MSc ART
Clinical Microbiologist
Newfoundland & Labrador Public Health
Laboratory

Dr. Sam Ratnam
Director
Newfoundland & Labrador Public Health
Laboratory

Northwest Territories
(see also Alberta)

Sherrill Webber
Tech II, Microbiology
Stanton Territorial Hospital

Sean Davies
Laboratory Supervisor
Stanton Territorial Hospital

Cheryl Cooper
Manager
Therapeutic & Diagnostic Services
Stanton Territorial Hospital

Nova Scotia
(Nova Scotia and Prince Edward Island)

Cheryl Brine
Division of Medical Microbiology
Department of Pathology & Laboratory Medicine
Queen Elizabeth II Health Sciences Centre

Dr. David Haldane, M.B. Ch.B. FRCPC
Director Provincial Public Health Laboratory
Network and of Special Pathogens
Queen Elizabeth II Health Sciences Centre

Dr. Kevin Forward
Director
Department of Public Health
Pathology and Laboratory Medicine
Queen Elizabeth II Health Sciences Centre

Ontario

Pamela Chedore, MLT
Head, Mycobacteriology
Toronto Public Health Laboratory
Ontario Agency for Health Protection and Promotion

Dr. Frances Jamieson
Medical Microbiologist – TB and Mycobacteriology
Toronto Public Health Laboratory
Ontario Agency for Health Protection and Promotion

Mr. Garth Riley
Manager Direct Services
Toronto Public Health Laboratory
Ontario Agency for Health Protection and Promotion

Quebec

Hafid Soualhine, PhD
Mycobactériologie et Actinomycètes aérobies
Laboratoire de santé publique du Québec

Dr. Anne-Marie Bourgeault
Director
Laboratoire de santé publique du Québec
Institut national de santé publique du Québec

Saskatchewan

North: Nancy Hanson, MLT ART
Technologist, TB Laboratory
Royal University Hospital
Saskatoon, Saskatchewan

Dr. J. Blondeau
Department Head
Microbiology/Mycobacteriology
Royal University Hospital
Saskatoon, Saskatchewan

South: Dr. Christine Y. Turenne, PhD
Director, Bacteriology
Saskatchewan Disease Control Laboratory

Dr. Paul Levett, PhD, D(ABMM), F(CCM)
Assistant Clinical Director
Saskatchewan Health Provincial Laboratory

Dr. Greg Horsman, MD
Medical Director
Saskatchewan Health Provincial Laboratory

Federal

Joyce Wolfe, ART
Head, Mycobacteriology
National Microbiology Laboratory
Canadian Science Centre for Human &
Animal Health
National Reference Centre of Mycobacteriology

► Appendix 2



Public Health
Agency of Canada Agence de la santé
publique du Canada

The Canadian Tuberculosis Laboratory Surveillance System
**M. TUBERCULOSIS COMPLEX ANTIMICROBIAL
SUSCEPTIBILITY REPORTING FORM**

Système de surveillance des laboratoires de tuberculose au Canada
**RAPPORT SUR LA SENSIBILITÉ DES SOUCHES DU COMPLEXE
M. TUBERCULOSIS AUX ANTIMICROBIENS**

Unique Source Laboratory ID No.: Identificateur unique du laboratoire déclarant:		Date specimen / culture received at laboratory: Date de réception échantillon / culture au laboratoire:			Y / A	M	D / J
Species: <input type="checkbox"/> M. tuberculosis complex (species known)* Espèce : <input type="checkbox"/> Complexe M. tuberculose (espèce connue)*		<input type="checkbox"/> M. bovis <input type="checkbox"/> M. bovis BCG <input type="checkbox"/> MTB Complex (species unknown) Complexe MTB (espèce inconnue)					
Have susceptibility test results been previously reported for this patient? - Des résultats d'antibiogramme ont-ils déjà été fournis pour ce patient? <input type="checkbox"/> No Non <input type="checkbox"/> Yes Oui → What is the previous Unique Source Laboratory ID No.? Identificateur antérieur? <input type="checkbox"/> → What is the previous Form No.? (If known) N° de formulaire antérieur? (Si connu)							
Note: Only DRUG TESTING RESULTS OF ONE ISOLATE are to be reported. No subsequent drug testing results for the same patient are to be reported unless the sensitivity pattern changes.				Note: Ne fournir que les RÉSULTATS POUR UN SEUL ISOLAT par patient à moins d'un changement du profil de sensibilité.			
1	Province / territory from which this report originates: Province / territoire qui soumet ce rapport : (see code list) (voir liste de codes)				PROV / TERR CODES PROV / TERR		
2	Province / territory from which specimen originates: Province / territoire d'où provient l'échantillon : (see code list) (voir liste de codes)				10 = N.L. / T.N.-L. 46 = Man. 11 = P.E.I. / Î.-P.-É. 47 = Sask. 12 = N.S. / N.-É. 48 = Alta. / Alb. 13 = N.B. / N.-B. 59 = B.C. / C.-B. 24 = Que. / Qc 60 = Y.T. / Yn 35 = Ont. 61 = N.W.T. / T.N.-O. 62 = Nvt. / Nt		
3	Patient's date of birth: Date de naissance du patient :	Y / A	M	D / J	(CCYY/MM/DD) (SSAA/MM/JJ)	<input type="checkbox"/> Unknown Inconnu	
4	Patient's gender: Sexe du patient :	<input type="checkbox"/> Male Masculin	<input type="checkbox"/> Female Féminin	<input type="checkbox"/> Unknown Inconnu			
5	LABORATORY RESULTS RÉSULTATS DE LABORATOIRE		Concentration (if different from on file) Concentration (si autre que spécifiée)		Results (check appropriate box for every drug) Résultats (cocher la case pertinente pour chaque antibiotique)		
Antituberculous Drugs/Antituberculeux		mg / L		<input type="checkbox"/> Sensitive Sensible <input type="checkbox"/> Resistant Résistant	Other (specify) Autre (préciser)		
INH (Isoniazid/Isoniazide)		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
RMP (Rifampin/Rifampicine)		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
EMB (Ethambutol/Éthambutol)		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
PZA (Pyrazinamide)		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
2nd line drugs/Antituberculeux mineurs							
AK (Amikacin/Amikacine)		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
CM (Capreomycin/Capréomycine)		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
CIPRO (Ciprofloxacin/Ciprofloxacine)		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
CF (Clofazamine)		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
CS (Cycloserine/Cycloséristine)		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
ETH (Ethinoamide/Éthionamide)		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
KM (Kanamycin/Kanamycine)		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
LEV (Levofloxacin/Lévofoxacine)		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
MOX (Moxifloxacin/Moxifloxacine)		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
OFL (Ofloxacin/Oflloxacine)		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
PAS (Para-Aminosalicylic Acid/Acide Para-aminosalicylique)		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
RBT (Rifabutin/Rifabutine)		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
SM (Streptomycin/Streptomycine)		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
Other/Autre (specify/préciser)							
1.		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
2.		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
3.		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
4.		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
5.		mg / L		<input type="checkbox"/>	<input type="checkbox"/>		
6	Comments - Commentaires						

* include/inclus: M. tuberculosis, M. africanum, M. canetti, M. caprae, M. microti, M. pinnipedii.

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