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Drug resistance in Canada

2009

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

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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, Tuberculosis Prevention and Control (TBPC) 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 TBPC the previous year's results of anti-tuberculosis drug susceptibility testing for every patient for whom a culture grows or for whom a bacterial isolate is received. TBPC subsequently produces this annual report. This report presents 2009 drug susceptibility data for TB isolates from across Canada as of March, 2010.

► METHODS

TBPC maintains the CTBLSS which contains drug susceptibility test (DST) results of *Mycobacterium tuberculosis* (MTB) and other TB species (*M. africanum*, *M. canetti*, *M. caprae*, *M. microti*, *M. pinnipedii* or *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 of residence of patient), province/territory where the tests were performed, 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 laboratories 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 no 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) monoresistance which is resistance to only one of the first line drugs (INH, RMP, EMB, or PZA); b) polyresistance defined as resistance to two or more first-line drugs not including the isoniazid and

rifampin combination; c) multidrug-resistant tuberculosis (MDR-TB) is resistance to at least isoniazid and rifampin; and finally d) extensively drug-resistant TB (XDR-TB), defined as resistance to at least rifampin and isoniazid and further resistance to any fluoroquinolone, and to at least one of three injectable second-line drugs (amikacin, capreomycin and kanamycin).

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

Prior to 2007, all specimens received in the laboratories between the 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 lab in late December but only grew in January or early February. Thus starting in 2007 any culture that grows or isolate received by a lab as of December 31 is submitted and counted 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, 2009 and the culture grows only in January 2010 it would be considered a 2010 isolate and reported in the following year's report. With this approach the majority of results will be ready by January 31 of each subsequent year.

Laboratories perform routine susceptibility testing of MTB or MTBC to first-line anti-tuberculous drugs using either the radiometric proportion method Bactec® 460 or the fluorometric proportion method MGIT® 960. Manitoba, New Brunswick, Newfoundland and Labrador, Nova Scotia, Ontario, Quebec and Saskatchewan use MGIT® 960. All other provinces/territories used Bactec® 460. In 2009, for the labs conducting second line testing, Bactec® 460 or agar proportion method was used. 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	MGIT® 960†	
Isoniazid (INH)	0.1	0.1	When resistance to INH is found at the 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, Saskatchewan.
Second-Line Anti-Tuberculosis Drugs			
Anti-tuberculosis drugs	Critical Concentrations* (mg/L)		Comments
	2.0	1.0	
Streptomycin (SM)			Routine testing is performed for isolates from British Columbia, Alberta and Saskatchewan. There is also a high concentration for SM which is 6.0 mg/L in BACTEC® 460.
	Concentrations Tested‡ (mg/L)		
Amikacin (AK)	1.0		
Capreomycin (CM)	1.25		
Ethionamide (ETA)	2.5		
Kanamycin (KM)	5.0		
Para-amino salicylic acid (PAS)	4.0		
Ofloxacin (OFL)	2.0		
Rifabutin (RBT)	0.5		

* 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.

† MGIT® 960 concentrations are pending approval from the Clinical and Laboratory Standards Institute (CLSI).

‡ Most of the second-line drugs were not used at the time of the development of the Proportion Method and the definition of the critical concentrations. For the current report we are using the “concentrations tested” and suggest caution to be exercised when interpreting results. Concentrations are for the BACTEC® 460.

All members of the CTLTN participate in the NRCM (National Microbiology Laboratory) proficiency testing program. In addition to this national initiative, a number of laboratories also participate in other select external proficiency programs such as College of American Pathologists, Quality Management Program – Laboratory Services, United States Centers for Disease Control and Prevention Drug Susceptibility Testing or 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 Clinical and Laboratory Standards Institute document.¹

The information presented in this report represents the most up to date information available as of March, 2010 for the years 1999 to 2009. The historic record is reviewed annually and adjustments are made to the tables as new/updated information becomes available. For previous years reports please refer to: <http://www.phac-aspc.gc.ca/tbpc-latb/surv-eng.php>.

► RESULTS

For 2009, 1,334 unique reports were received. Of these, thirteen were *Mycobacterium bovis* (BCG) and were excluded from the analysis. The results for 1,321 isolates are included in the final report. This represents a 2.5% decline from the number of isolates reported on in 2008. Apart from testing all the isolates from Alberta, the Northwest Territories and Nunavut, Alberta also tested and reported the results for one isolate from Ontario and five isolates from Saskatchewan. Likewise, Manitoba tested one isolate from Nunavut along with all of those from Manitoba (Table 1).

Of the 1,321 isolates included for analysis, 125 (9.5%) were resistant to at least one of the first-line anti-tuberculosis drugs tested: INH, RMP, EMB or PZA. Ninety-six (7.3%) of the isolates were monoresistant and of those 83 (86.5%) were resistant to INH. Of all the isolates tested, 112 (8.5%) demonstrated some resistance to INH. Eighteen isolates (1.4%) were MDR- TB. In 2009 there was no XDR-TB identified (Table 2).

All isolates originating from New Brunswick, Newfoundland and Labrador, Nova Scotia, Prince Edward Island, and Yukon were susceptible to all first-line anti-tuberculous drugs. For the remaining provinces some resistance was reported (Tables 5-17). 2009 was the first time since reporting began that MDR-TB was identified in Saskatchewan.

Demographic information on individual patients from whom the isolates originated is limited in this laboratory-based surveillance system with only the age and sex available. The age was known for 1,316 of the isolates tested with 38% between the ages of 25 and 44. For isolates showing any resistance, 47% were from individuals between the ages of 25 and 44; 50% of the MDR-TB isolates were from individuals between 15 and 24. Sex was reported for 1,288 of the isolates with 58% being male. Of the isolates for which sex was reported, 63% of those isolates showing any resistance were male; 71% of the MDR-TB were male (Table 4).

In Canada, between 1999 and 2009, 181 isolates have been classified as MDR-TB representing 1.2% of all data in the CTBLSS for those years. A retrospective review of all the data in the CTBLSS identified four XDR-TB cases reported between 1998, when DST data collection was started and 2009. 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 between 1999 and 2009.

The majority of the MDR-TB cases have originated from Ontario and British Columbia which is not surprising given that the majority of the tested isolates originate from these two provinces. Table C presents the provincial/territorial distribution of these cases.

Table B: Total number of isolates tested and number and percentage identified as MDR-TB and XDR-TB: Canada – 1999-2009

Year	Total number of Isolates	MDR-TB (%)	XDR-TB (%)
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	1,321	18 (1.4)	0 (-)
TOTAL	15,253	181 (1.2)	4 (0.02)

Table C: Provincial/territorial breakdown of identified MDR-TB and XDR-TB isolates, 1999-2009

Province	MDR-TB (%)	XDR-TB (%)
Alberta	10 (5.5)	0 (-)
British Columbia	35 (19.3)	0 (-)
Manitoba	7 (3.9)	1 (25.0)
Nunavut	1 (0.6)	0 (-)
Ontario	107 (59.1)	3 (75.0)
Quebec	20 (11.0)	0 (-)
Saskatchewan	1 (0.6)	0 (-)
TOTAL	181 (100)	4 (100.0)

► DISCUSSION

Susceptibility results were reported for 1,321 isolates in 2009. The percentage of isolates demonstrating any type of drug resistance was 9.5%. The proportion of isolates classified as MDR-TB increased slightly from 1.1% in 2008 to 1.4% in 2009. The average annual percentage of reported MDR-TB since 1998 was 1.2%. As of March 2010, the CTBLSS has reported 4 XDR-TB cases, 1 in each of 2002, 2003, 2006 and 2008. Additionally, a fifth Canadian case was identified, being diagnosed in 1997 with a highly drug-resistant strain of *M. bovis*, which met the criteria for XDR-TB².

Sixty-eight percent of the reported laboratory TB isolates in Canada in 2009 originated from British Columbia, Ontario and Quebec which have consistently reported the majority of isolates and MDR-TB. 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. As of September 2009, 57 countries, including Canada, have reported the presence of XDR-TB cases. Because XDR-TB is resistant to the best first- and second-line drugs, treatment options are seriously limited. In order to continue surveillance of XDR-TB in Canada, all MDR-TB isolates will be routinely tested for resistance to second-line antibiotics.

The results observed to date in this surveillance system are consistent with international data. 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; was 35% for previously treated cases; and was 20% for all cases, combined.

The global estimated number of incident MDR-TB cases as reported for 2006 in the WHO/IUALTD drug resistance report was 4.8% (95% CIs, 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 selected 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 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/surve-eng.php>) include additional drug resistance data for each reported TB case.

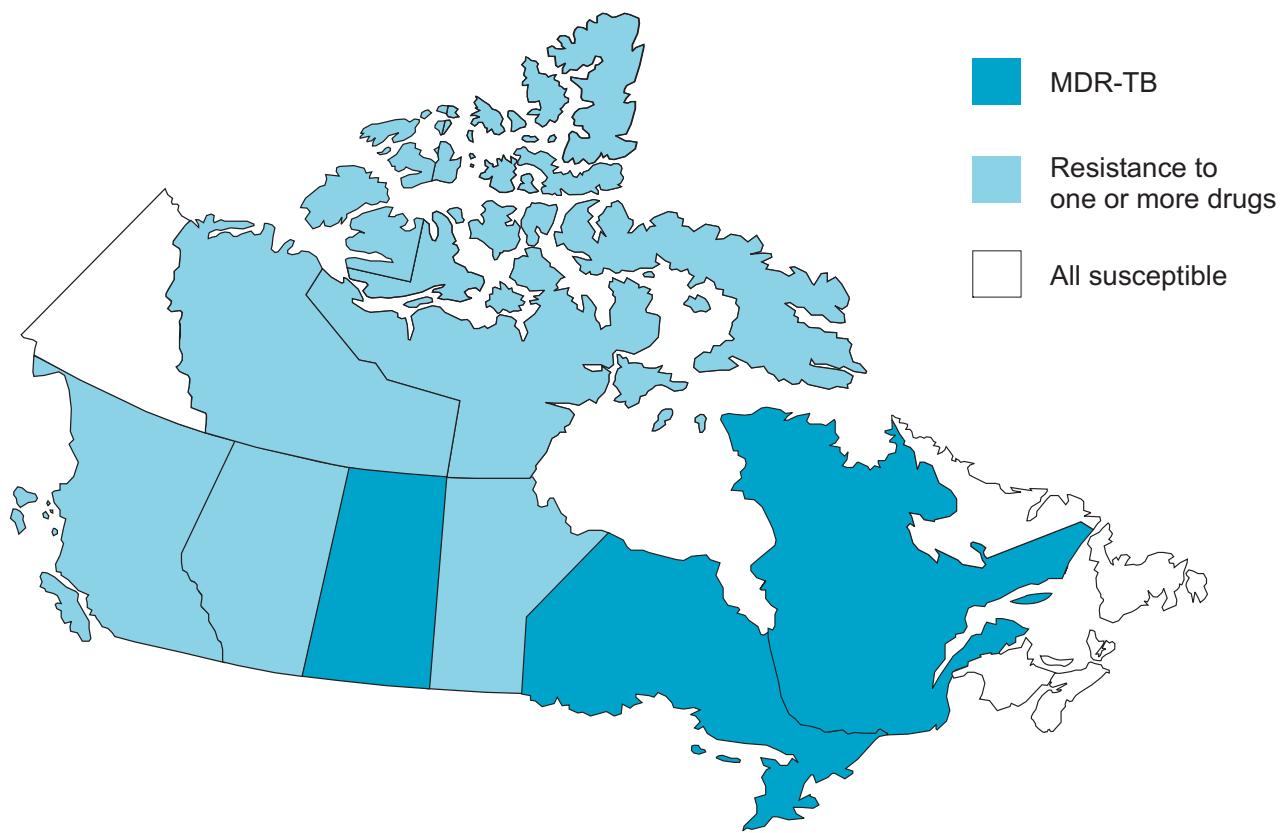
► CONCLUSIONS

With growing worldwide concern regarding resistance and with the emergence of extensively drug-resistant tuberculosis, this surveillance system is vital in providing the necessary data in a timely fashion to monitor trends in 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.

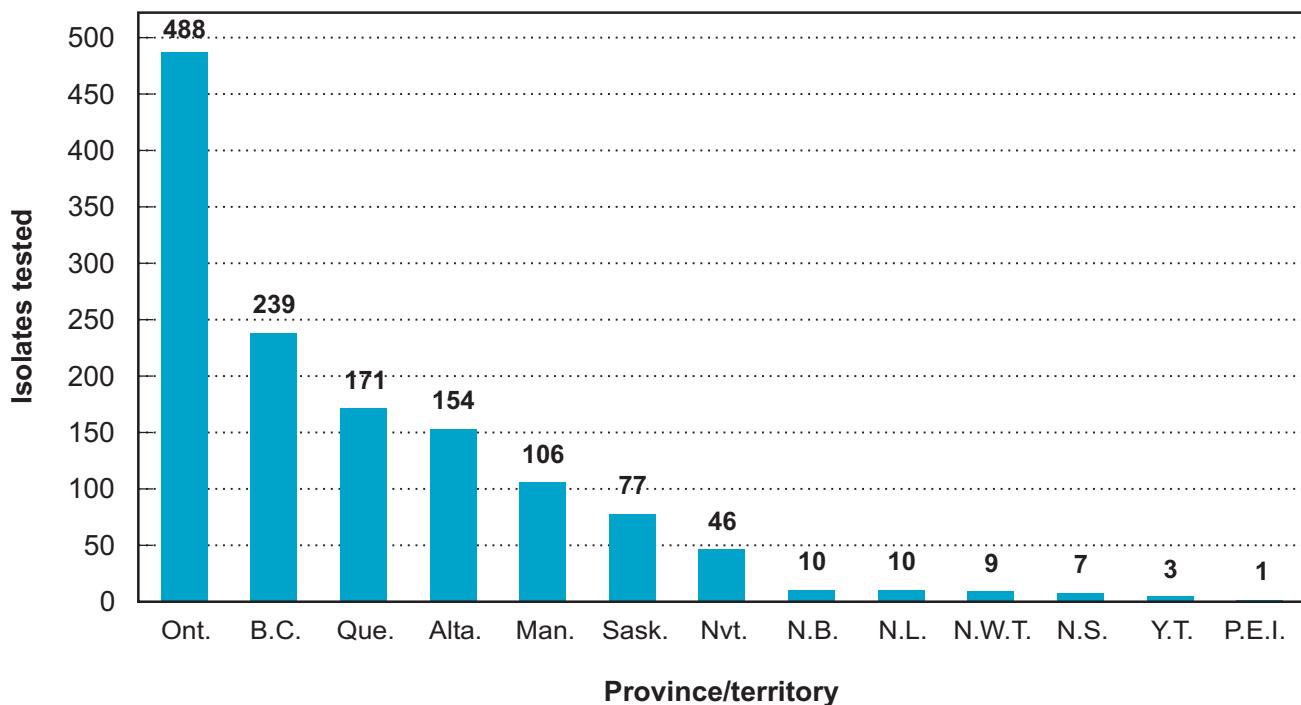
► REFERENCES

1. National Committee for Laboratory Standards. *Susceptibility testing of mycobacteria, Nocardiae, and other aerobic actinomycetes: approved standard M24-A*. Wayne PA, National Committee for Clinical Laboratory Standards, 2003.
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.

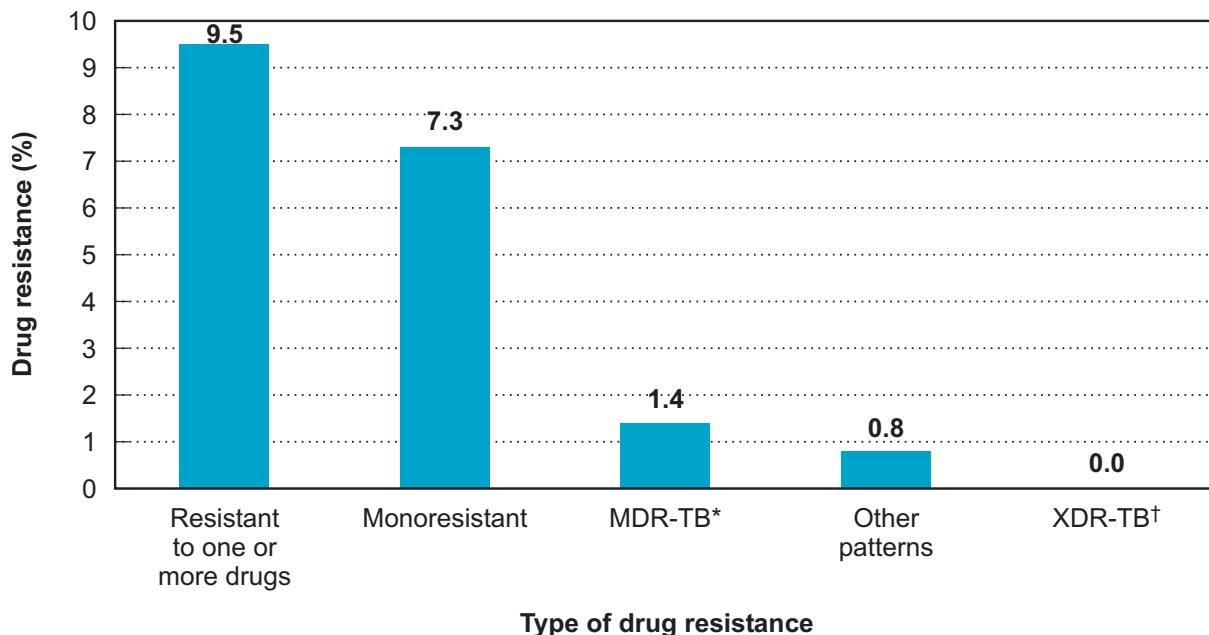
► **Figure 1**
Reported TB drug resistance in Canada by province/territory – 2009



► **Figure 2**
Reported *Mycobacterium tuberculosis* isolates in Canada by province/territory– 2009



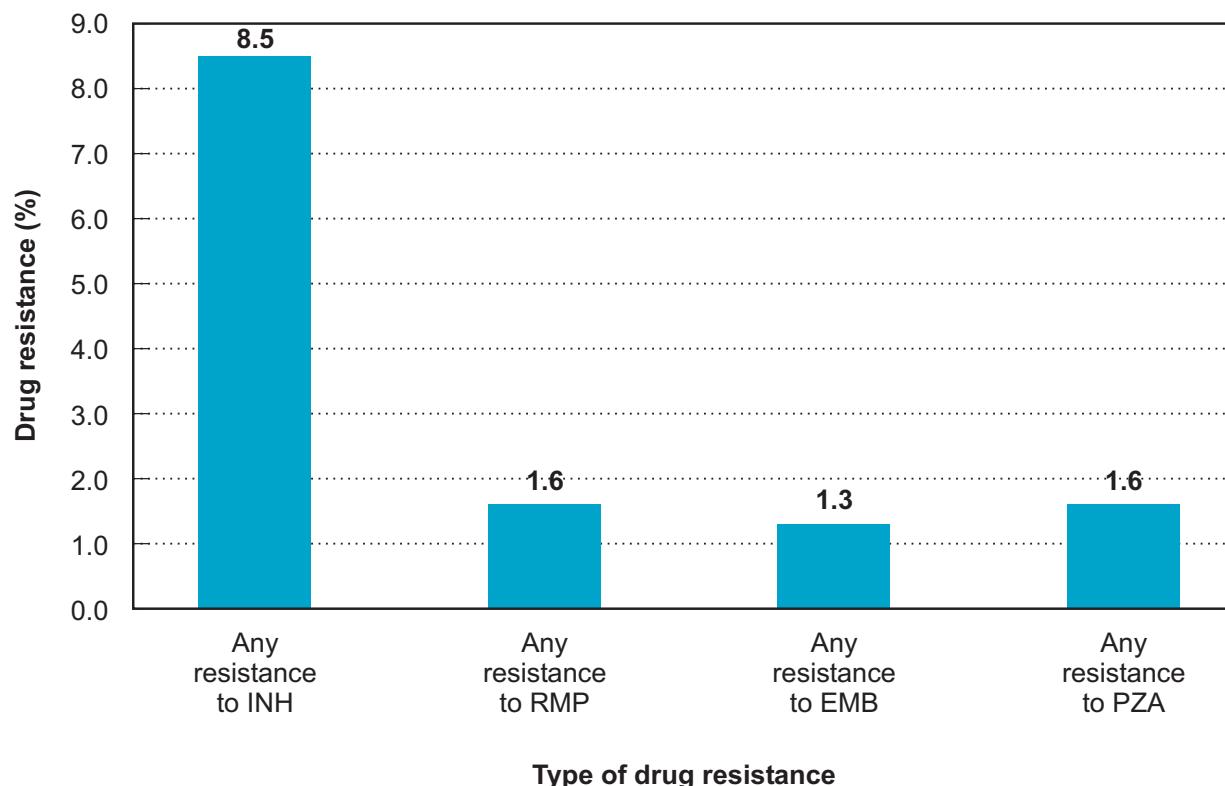
► **Figure 3**
Overall pattern of reported TB drug resistance in Canada – 2009



* Multidrug-resistance TB (MDR-TB) is resistance to at least isoniazid and rifampin.

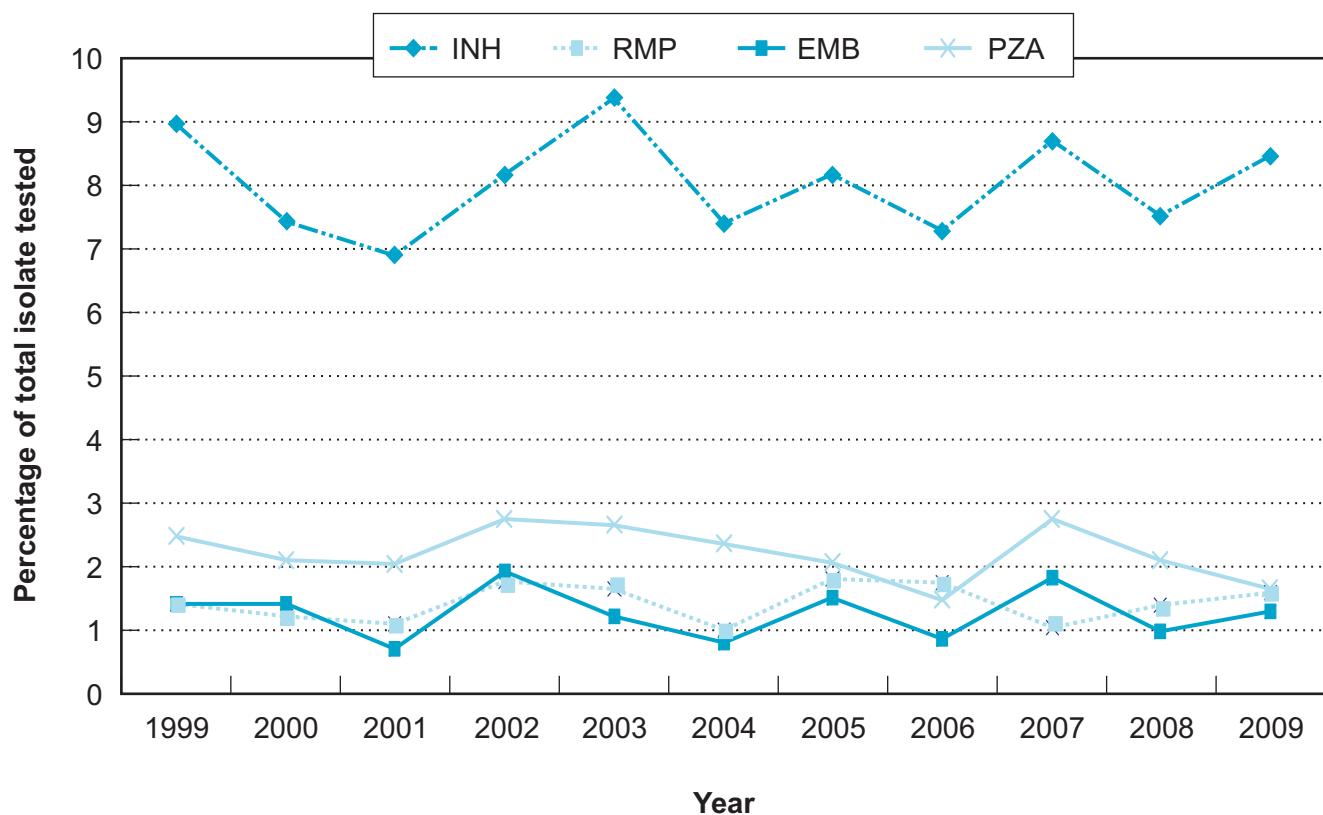
† Extensively drug-resistant TB (XDR-TB) is MDR-TB plus resistance to any fluoroquinolone and at least 1 of 3 injectable second-line drugs: amikacin, capreomycin and kanamycin.

► **Figure 4**
Reported TB drug resistance in Canada by type of drug – 2009

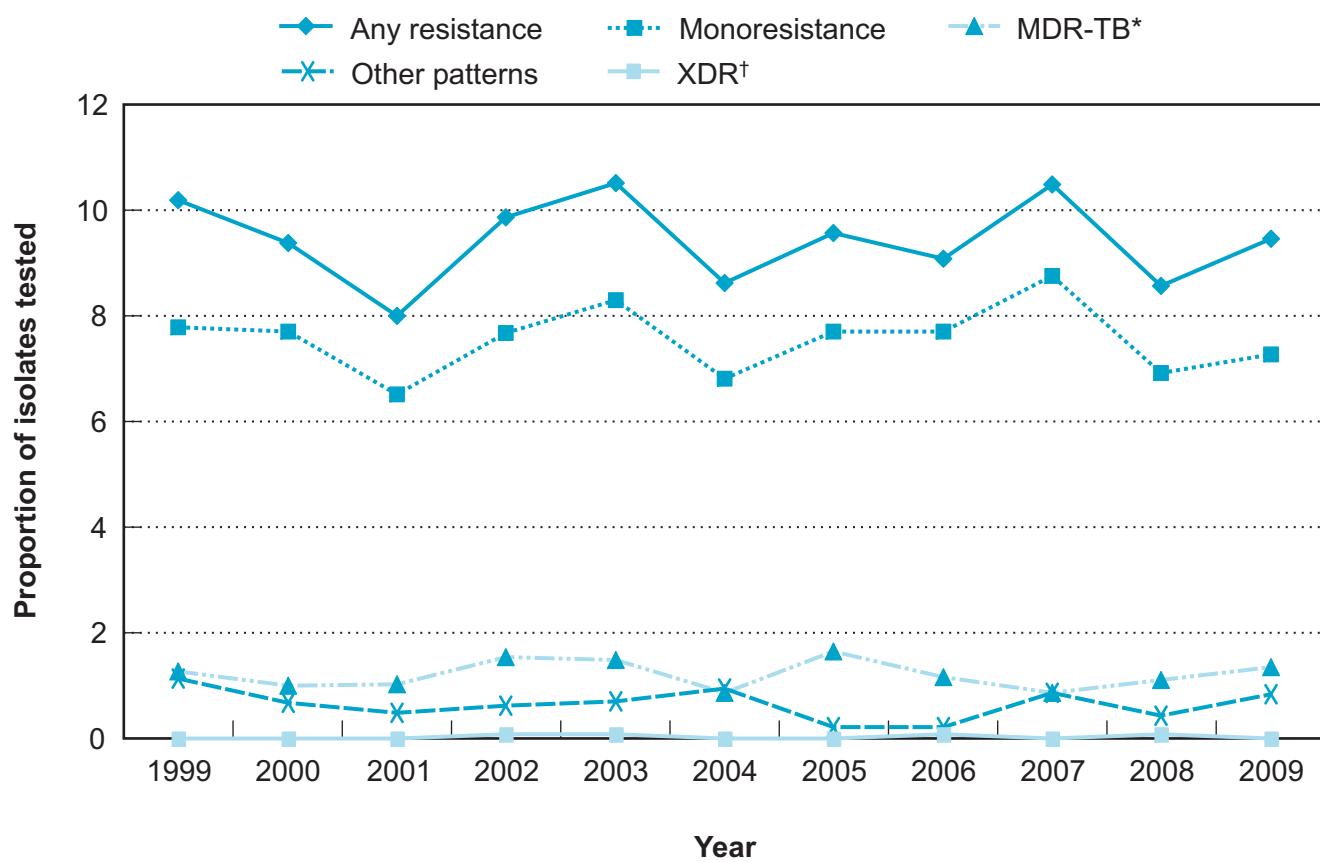


► **Figure 5**

Any resistance by type of drug as a percentage of isolates tested: 1999-2009



► Figure 6
Overall pattern of reported TB drug resistance as a percentage of isolates tested – 1999-2009



* Multidrug-resistance TB (MDR-TB) is resistance to at least isoniazid and rifampin.

† Extensively drug-resistant TB (XDR-TB) is MDR-TB plus resistance to any fluoroquinolone and at least 1 of 3 injectable second-line drugs: amikacin, capreomycin, and kanamycin.

**Table 1. Reported *Mycobacterium tuberculosis* isolates by “reporting” and “originating” province/territory,
Canada – 2009**

Reporting province	Originating Province/Territory													
	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	1,321	10	1	7	10	171	488	106	77	154	239	3	9	46
N.L.	10	10	0	0	0	0	0	0	0	0	0	0	0	0
N.S.	8	0	1	7	0	0	0	0	0	0	0	0	0	0
N.B.	10	0	0	0	10	0	0	0	0	0	0	0	0	0
Que.	171	0	0	0	0	171	0	0	0	0	0	0	0	0
Ont.	494	0	0	0	0	0	487	0	0	0	0	0	0	7
Man.	107	0	0	0	0	0	0	106	0	0	0	0	0	1
Sask.	72	0	0	0	0	0	0	0	72	0	0	0	0	0
Alta.	207	0	0	0	0	0	1	0	5	154	0	0	9	38
B.C.	242	0	0	0	0	0	0	0	0	239	3	0	0	0

Table 2. Overall pattern of reported TB drug resistance in Canada – 1999-2009

	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)
Total number of isolates	1,415 (100.0)	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)	1,321 (100.0)
Isolates susceptible	1,271 (89.8)	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)	1,196 (90.5)
Any resistance*											
INH	127 (9.0)	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)	112 (8.5)
RMP	20 (1.4)	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)
EMB	20 (1.4)	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)
PZA	29 (2.5)	25 (2.1)	23 (2.1)	29 (2.6)	29 (2.6)	23 (2.1)	22 (2.1)	16 (1.5)	27 (2.7)	22 (2.1)	17 (1.6)
Resistance to one or more drugs											
Monoresistance	110 (7.8)	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)	96 (7.3)
MDR-TB†	18 (1.3)	15 (1.0)	15 (1.0)	20 (1.4)	20 (1.4)	12 (0.9)	22 (1.6)	15 (1.1)	11 (0.9)	15 (1.1)	18 (1.4)
Other patterns	16 (1.1)	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)
XDR-TB‡	0 (-)	0 (-)	0 (-)	1 (0.1)	1 (0.1)	0 (-)	0 (-)	1 (0.1)	0 (-)	1 (0.1)	0 (-)

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

† MDR-TB is defined as resistance to at least rifampin and isoniazid.

‡ XDR-TB is defined as resistance to at least rifampin and isoniazid and further resistance to any fluoroquinolone, and to at least one of three injectable second-line drugs (amikacin, capreomycin and kanamycin).

Table 3. Reported MDR-TB isolates by province/territory, Canada - 2009

	CANADA	N.L.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Y.T.	N.W.T.	Nvt.
Total number isolates tested	1,321	10	1	7	10	171	488	106	77	154	239	3	9	46
Total number of MDR-TB isolates*	18	0	0	0	0	6	11	0	1	0	0	0	0	0
INH & RMP	1	0	0	0	0	0	1	0	0	0	0	0	0	0
INH & RMP & SM	1	0	0	0	0	0	0	0	1	0	0	0	0	0
INH & RMP & EMB & RBT	3	0	0	0	0	1	2	0	0	0	0	0	0	0
INH & RMP & EMB & PZA & RBT	1	0	0	0	0	1	0	0	0	0	0	0	0	0
INH & RMP & EMB & SM& ETA & RBT	1	0	0	0	0	1	0	0	0	0	0	0	0	0
INH & RMP & SM & RBT	3	0	0	0	0	2	1	0	0	0	0	0	0	0
INH & RMP & ETA & RBT	2	0	0	0	0	1	1	0	0	0	0	0	0	0
INH & RMP & SM & ETA & RBT	1	0	0	0	0	0	1	0	0	0	0	0	0	0
INH & RMP & SM & OFL & ETA & RBT	1	0	0	0	0	0	1	0	0	0	0	0	0	0
INH & RMP & EMB & SM & OFL & ETA & RBT	1	0	0	0	0	1	0	0	0	0	0	0	0	0
INH & RMP & EMB & PZA & SM & RBT	1	0	0	0	0	1	0	0	0	0	0	0	0	0
INH & RMP & PZA & SM & ETA & RBT	1	0	0	0	0	1	0	0	0	0	0	0	0	0
INH & RMP & PZA & SM & KM & CM	1	0	0	0	0	1	0	0	0	0	0	0	0	0

* MDR-TB is resistance to at least rifampin and isoniazid. First and second-line resistance are reported. Second-line drugs include: CM = capreomycin; ETA= ethionamide; KM = kanamycin; OFL = ofloxacin; RBT = rifabutin.

Table 4. Reported TB drug resistance by sex and age group, Canada – 2009

Age Group		Isolates	Any Resistance	MDR-TB	XDR-TB
		Number (%)	Number (%)	Number (%)	Number (%)
Total		1,321 (100.0)	125 (100.0)	18 (100.0)	0 (0.0)
0-4	Males	3 (0.2)	1 (0.8)	0 (0.0)	0 (0.0)
	Females	6 (0.5)	0 (0.0)	0 (0.0)	0 (0.0)
	Unknown	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)
	Total	10 (0.8)	1 (0.8)	0 (0.0)	0 (0.0)
5-14	Males	12 (0.9)	0 (0.0)	0 (0.0)	0 (0.0)
	Females	9 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)
	Unknown	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)
	Total	22 (1.7)	0 (0.0)	0 (0.0)	0 (0.0)
15-24	Males	111 (8.4)	17 (13.6)	8 (44.4)	0 (0.0)
	Females	76 (5.8)	7 (5.6)	1 (5.6)	0 (0.0)
	Unknown	3 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)
	Total	190 (14.4)	24 (19.2)	9 (50.0)	0 (0.0)
25-34	Males	123 (9.3)	17 (13.6)	1 (5.6)	0 (0.0)
	Females	128 (9.7)	14 (11.2)	2 (11.1)	0 (0.0)
	Unknown	4 (0.3)	1 (0.8)	0 (0.0)	0 (0.0)
	Total	255 (19.3)	32 (25.6)	3 (16.7)	0 (0.0)
35-44	Males	140 (10.6)	18 (14.4)	2 (11.1)	0 (0.0)
	Females	95 (7.2)	7 (5.6)	0 (0.0)	0 (0.0)
	Unknown	5 (0.4)	2 (1.6)	0 (0.0)	0 (0.0)
	Total	240 (18.2)	27 (21.6)	2 (11.1)	0 (0.0)
45-54	Males	110 (8.3)	12 (9.6)	0 (0.0)	0 (0.0)
	Females	69 (5.2)	6 (4.8)	1 (5.6)	0 (0.0)
	Unknown	6 (0.5)	3 (2.4)	0 (0.0)	0 (0.0)
	Total	185 (14.0)	21 (16.8)	1 (5.6)	0 (0.0)
55-64	Males	84 (6.4)	4 (3.2)	1 (5.6)	0 (0.0)
	Females	46 (3.5)	5 (4.0)	1 (5.6)	0 (0.0)
	Unknown	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)
	Total	131 (9.9)	9 (7.2)	2 (11.1)	0 (0.0)
65-74	Males	64 (4.8)	0 (0.0)	0 (0.0)	0 (0.0)
	Females	51 (3.9)	1 (0.8)	0 (0.0)	0 (0.0)
	Unknown	1 (0.1)	1 (0.8)	0 (0.0)	0 (0.0)
	Total	116 (8.8)	2 (1.6)	0 (0.0)	0 (0.0)
75+	Males	95 (7.2)	3 (2.4)	0 (0.0)	0 (0.0)
	Females	66 (5.0)	3 (2.4)	0 (0.0)	0 (0.0)
	Unknown	6 (0.5)	2 (1.6)	0 (0.0)	0 (0.0)
	Total	167 (12.6)	8 (6.4)	0 (0.0)	0 (0.0)
Unknown	Males	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	Females	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	Unknown	5 (0.4)	1 (0.8)	1 (5.6)	0 (0.0)
	Total	5 (0.4)	1 (0.8)	1 (5.6)	0 (0.0)
Total		742 (56.2)	72 (57.6)	12 (66.7)	0 (0.0)
		546 (41.3)	43 (34.4)	5 (27.8)	0 (0.0)
		33 (2.5)	10 (8.0)	1 (5.6)	0 (0.0)

Table 5. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Alberta – 1999-2009

	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	117 (100.0)	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)	154 (100.0)
Isolates susceptible	114 (97.4)	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)	142 (92.2)
Isolates resistant to one or more of the first line drugs	3 (2.6)	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)	12 (7.8)
Monoresistance	3 (2.6)	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)	10 (6.5)
INH	3 (2.6)	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)	7 (4.5)
RMP	–	–	–	–	–	–	–	–	–	–	1 (0.6)
EMB	–	1 (1.0)	–	–	–	–	–	–	–	–	–
PZA	–	1 (1.0)	–	–	2 (2.2)	2 (2.1)	–	1 (1.0)	1 (1.0)	–	2 (1.3)
Other Patterns	–	2 (1.9)	2 (2.2)	1 (0.9)	2 (2.2)	1 (1.0)	–	–	–	1 (0.7)	2 (1.4)
INH & EMB	–	1 (1.0)	–	–	1 (1.1)	–	–	–	–	1 (0.7)	1 (0.7)
IH & PZA	–	1 (1.0)	2 (2.2)	1 (0.9)	1 (1.1)	1 (1.0)	–	–	–	–	1 (0.7)
MDR-TB†	–	–	–	1 (1.1)	2 (2.1)	4 (3.1)	1 (1.0)	–	–	–	–
INH & RMP	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & EMB	–	–	–	–	–	–	1 (0.8)	–	–	–	–
INH & RMP & EMB & PZA	–	–	–	–	–	–	1 (0.8)	–	–	–	–
INH & RMP & EMB & SM	–	–	–	–	–	–	–	1 (1.0)	–	–	1 (0.7)
INH & RMP & EMB & PZA & SM	–	–	–	–	–	–	1 (0.8)	–	–	–	–
INH & RMP & ETA	–	–	–	–	1 (1.1)	–	–	–	–	–	–
INH & RMP & SM	–	–	–	–	–	–	1 (0.8)	–	–	–	–
INH & RMP & EMB & SM & OFL	–	–	–	–	–	1 (1.0)	–	–	–	–	–
INH & RMP & EMB & AK & RBT	–	–	–	–	–	1 (1.0)	–	–	–	–	–

* Includes *M. africanum* isolate: 3 in 2004, 2 in 2007 and 2009, and 1 in 2001 and 2003; *M. bovis*: 2 in 2009, 1 in 2001, 2003 and 2004; *M. caprae*: 1 in 2008
† MDR-TB is defined as resistance to at least rifampin and isoniazid. First and second-line resistance are reported. Second-line drugs include: AK = amikacin; ETA = ethionamide; KM = kanamycin; OFL = ofloxacin; RBT = rifabutin.

Table 6. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, British Columbia – 1999-2009

	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	244 (100.0)	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)
Isolates susceptible	226 (92.6)	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)
Isolates resistant to one or more of the first line drugs	18 (7.4)	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)
Monoresistance											
INH	15 (6.1)	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)
RMP	13 (5.3)	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)
EMB	1 (0.4)	1 (0.4)	1 (0.3)	2 (0.8)	—	—	2 (1.0)	6 (2.2)	—	3 (1.2)	1 (0.4)
PZA†	1 (0.4)	1 (0.4)	—	2 (0.8)	1 (0.3)	1 (0.4)	4 (2.0)	3 (1.1)	4 (1.7)	—	—
Other Patterns											
INH & EMB	2 (0.8)	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)	4 (1.5)	—	—	—	—
RMP & PZA	—	—	—	—	—	—	2 (0.8)	—	—	—	—
MDR-TB‡											
INH & RMP	1 (0.4)	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)	—
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 & EMB & PZA	—	—	1 (0.3)	—	—	—	—	—	—	2 (0.8)	—
INH & RMP & PZA & SM	—	—	—	—	—	—	—	—	—	—	—
INH & RMP & EMB & SM	—	1 (0.4)	—	—	—	—	1 (0.5)	—	—	—	—

continued...

Table 6. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, British Columbia – 1999-2009 (continued)

	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)
INH & RMP & SM & ETA	–	1 (0.4)	–	–	1 (0.3)	–	–	–	–	–	–
INH & RMP & PZA & ETA	–	–	–	–	–	–	1 (0.5)	–	–	–	–
INH & RMP & EMB & SM & ETA	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & EMB & SM & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & EMB & PZA & SM	1 (0.4)	–	1 (0.3)	1 (0.4)	1 (0.3)	–	1 (0.5)	–	–	–	–
INH & RMP & EMB & PZA & ETA	–	–	1 (0.3)	–	1 (0.3)	1 (0.4)	–	–	–	–	–
INH & RMP & EMB & PZA & SM & ETA	–	–	–	1 (0.4)	–	1 (0.3)	–	–	–	–	–
INH & RMP & EMB & SM & ETA & PAS	–	–	–	–	–	–	1 (0.5)	1 (0.4)	1 (0.4)	–	–
INH & RMP & EMB & PZA & SM & OFL & ETA & PAS	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & EMB & PZA & SM & CM & ETA	–	–	–	–	–	–	–	–	–	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.

‡ MDR-TB is defined as resistance to at least rifampin and isoniazid. First and second-line resistance are reported. Second-line drugs include:: CM = Capreomycin; ETA= ethionamycin; KM = kanamycin; OFL = ofloxacin; RBT = rifabutin.

Table 7. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Manitoba – 1999-2009

	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	100 (100.0)	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)	106 (100.0)
Isolates susceptible	92 (92.0)	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)
Isolates resistant to one or more drugs	8 (8.0)	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)
Monoresistance	4 (4.0)	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)
INH	4 (4.0)	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)
PZA	—	—	—	1 (0.9)	1 (0.8)	1 (0.8)	—	—	1 (1.2)	—	1 (0.9)
Other Patterns	2 (2.0)	—	—	1 (0.9)	—	—	—	—	1 (1.2)	—	2 (1.8)
INH & PZA	1 (1.0)	—	—	1 (0.1)	—	—	—	—	—	—	1 (0.9)
INH & EMB	1 (1.0)	—	—	—	—	—	—	—	1 (1.2)	—	1 (0.9)
MDR-TB†	2 (2.0)	—	2 (1.8)	1 (0.9)	1 (0.8)	—	—	—	—	1 (0.9)	—
INH & RMP	1 (1.0)	—	1 (0.9)	1 (0.1)	—	—	—	—	—	—	—
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	1 (1.0)	—	—	—	—	—	—	—	—	—	—
XDR-TB‡	—	—	—	1 (0.9)	—	—	—	—	—	—	—
INH & RMP & EMB & PZA & CM & OFL & ETA & RBT	—	—	—	1 (0.1)	—	—	—	—	—	—	—

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

† MDR-TB is defined as resistance to at least rifampin and isoniazid. First and second-line resistance are reported. Second-line drugs include: CM = capreomycin; ETA = ethionamide; OFL = ofloxacin; RBT = rifabutin.

‡ XDR-TB defined as resistance to at least rifampin and isoniazid and further resistance to any fluoroquinolone, and to 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 – 1999-2009

	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	12 (100.0)	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)
Isolates susceptible	12 (100.0)	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)
Isolates resistant to one or more drugs	–	–	–	1 (10.0)	1 (7.1)	1 (9.1)	1 (20.0)	–	–	–	–
Monoresistance	–	–	–	1 (10.0)	1 (7.1)	1 (9.1)	1 (20.0)	–	–	–	–
INH	–	–	–	1 (10.0)	1 (7.1)	1 (9.1)	–	–	–	–	–
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 – 1999-2009

	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA	9 (100.0)	11 (100.0)	9 (100.0)	4 (100.0)	6 (100.0)	8 (100.0)	6 (100.0)	11 (100.0)	5 (100.0)	5 (100.0)	10 (100.0)
Isolates susceptible	9 (100.0)	11 (100.0)	9 (100.0)	4 (100.0)	4 (66.7)	8 (100.0)	5 (83.3)	11 (100.0)	5 (100.0)	5 (100.0)	10 (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 – 1999-2009

	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA	11 (100.0)	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)	9 (100.0)
Isolates susceptible	11 (100.0)	8 (100.0)	6 (100.0)	3 (100.0)	11 (100.0)	9 (100.0)	6 (100.0)	3 (66.7)	14 (100.0)	13 (100.0)	8 (88.9)
Monoresistance	–	–	–	–	–	–	–	1 (33.3)	–	–	1 (11.1)
INH	–	–	–	–	–	–	–	1 (33.3)	–	–	–
RMP	–	–	–	–	–	–	–	–	–	–	1 (11.1)

Table 11. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Nova Scotia – 1999-2009

	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA	8 (100.0)	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)
Isolates susceptible	7 (87.5)	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)
Isolates resistant to one or more drugs	1 (12.5)	–	–	1 (10.0)	–	–	1 (14.3)	–	–	–	–
Monoresistance	1 (12.5)	–	–	1 (10.0)	–	–	1 (14.3)	–	–	–	–
INH	1 (12.5)	–	–	–	–	–	–	–	–	–	–
PZA	–	–	–	1 (10.0)	–	–	1 (14.3)	–	–	–	–

Table 12. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Nunavut – 1999-2009

	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA	15 (100.0)	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)	46 (100.0)
Isolates susceptible	15 (100.0)	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)	45 (97.8)
Isolates resistant to one or more drugs	–	1 (3.4)	1 (3.2)	–	–	–	–	–	–	–	–
Monoresistance	–	1 (3.4)	–	–	–	–	–	–	–	–	–
INH	–	1 (3.4)	–	–	–	–	–	–	–	–	1 (2.2)
MDR-TB*	–	–	1 (3.2)	–	–	–	–	–	–	–	1 (2.2)
INH & RMP	–	–	1 (3.2)	–	–	–	–	–	–	–	–

* MDR-TB is defined as resistance to at least rifampin and isoniazid.

Table 13. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Ontario – 1999-2009

	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	589 (100.0)	599 (100.0)	588 (100.0)	592 (100.0)	599 (100.0)	553 (100.0)	567 (100.0)	538 (100.0)	479 (100.0)	488 (100.0)	
Isolates susceptible	508 (86.2)	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)
Isolates resistant to one or more drugs	81 (14.8)	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)
Monoresistance											
INH	58 (9.8)	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)
RMP	–	–	–	–	43 (7.3)	42 (7.1)	46 (7.7)	44 (8.0)	39 (6.9)	50 (9.3)	33 (6.9)
EMB	–	1 (0.2)	1 (0.2)	1 (0.2)	–	–	–	–	1 (0.2)	1 (0.2)	1 (0.2)
PZA	4 (0.7)	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)
Other Patterns											
INH & EMB	10 (1.7)	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)
INH & PZA	8 (1.4)	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)	–	2 (0.3)	–	1 (0.2)	1 (0.2)	–	–	2 (0.4)	–	–
EMB & PZA	–	2 (0.3)	–	–	–	–	–	–	–	–	–
INH & EMB & PZA	–	–	–	–	1 (0.2)	1 (0.2)	–	–	1 (0.2)	–	–
MDR-TB†											
INH & RMP	13 (2.2)	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)
INH & RMP & PZA	2 (0.3)	1 (0.2)	–	–	1 (0.2)	2 (0.3)	–	2 (0.4)	–	–	1 (0.2)
INH & RMP & EMB	–	–	–	–	1 (0.2)	1 (0.2)	–	–	–	–	–
INH & RMP & SM	3 (0.5)	2 (0.3)	–	–	1 (0.2)	–	–	–	–	–	–
INH & RMP & RBT	–	–	–	–	1 (0.2)	–	–	3 (0.5)	1 (0.2)	–	–
INH & RMP & ETA	1 (0.2)	–	–	–	1 (0.2)	1 (0.2)	–	–	1 (0.2)	–	–
INH & RMP & ETA & RBT	–	–	–	–	1 (0.2)	–	–	–	1 (0.2)	–	–
INH & RMP & CM & RBT	–	–	–	–	1 (0.2)	–	–	1 (0.2)	–	1 (0.2)	–
INH & RMP & SM & RBT	–	–	–	–	1 (0.2)	–	–	2 (0.4)	–	3 (0.6)	1 (0.2)
INH & RMP & PZA & SM	–	1 (0.2)	–	–	–	1 (0.2)	–	–	–	–	–
INH & RMP & PZA & RBT	–	–	–	–	2 (0.3)	–	–	–	–	–	–
INH & RMP & EMB & SM	–	1 (0.2)	–	–	–	–	–	–	–	–	–

continued...

Table 13. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Ontario – 1999-2009 (continued)

	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)
INH & RMP & EMB & RBT	–	–	–	–	–	–	–	2 (0.4)	1 (0.2)	1 (0.2)	2 (0.4)
INH & RMP & EMB & SM & RBT	–	–	1 (0.2)	–	–	–	–	–	–	–	–
INH & RMP & EMB & SM & ETA	–	–	–	–	–	–	–	–	–	–	1 (0.2)
INH & RMP & EMB & SM & ETA & RBT	–	–	–	–	1 (0.2)	–	1 (0.2)	–	–	–	–
INH & RMP & SM & OFL & RBT	–	–	–	–	–	–	–	1 (0.2)	–	–	–
INH & RMP & AK & CM & RBT	–	–	–	–	–	–	–	1 (0.2)	–	–	–
INH & RMP & PZA & ETA & RBT	–	–	–	–	–	–	–	1 (0.2)	–	–	–
INH & RMP & PZA & SM & ETA & RBT	–	–	–	–	–	–	–	1 (0.2)	–	–	–
INH & RMP & OFL & ETA & RBT	–	–	–	–	–	–	–	–	1 (0.2)	–	–
INH & RMP & OFL & ETA & RBT & PAS	–	–	–	–	–	–	–	1 (0.2)	–	–	1 (0.2)
INH & RMP & SM & OFL & ETA	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & CM & ETA & RBT	–	–	–	–	–	–	1 (0.2)	–	–	–	–
INH & RMP & EMB & PZA & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & OFL & CIPRO	1 (0.2)	–	–	1 (0.2)	–	–	–	–	–	–	–
INH & RMP & EMB & PZA & SM	3 (0.5)	–	–	–	1 (0.2)	–	1 (0.2)	–	–	–	–
INH & RMP & SM & ETA & RBT	–	–	–	4 (0.7)	–	–	1 (0.2)	–	–	–	1 (0.2)
INH & RMP & SM & OFL & ETA & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & EMB & PZA & SM & ETA	3 (0.5)	–	1 (0.2)	–	1 (0.2)	–	1 (0.2)	–	–	–	1 (0.2)
INH & RMP & EMB & PZA & SM & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & SM & ETA & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & SM & ETA & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & SM & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & SM & ETA & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & EMB & ETA & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & EMB & SM & ETA & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & EMB & SM & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & EMB & SM & ETA & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & EMB & SM & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & EMB & SM & ETA & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & EMB & SM & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & EMB & SM & ETA & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & EMB & SM & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & SM & ETA & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & SM & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & AK & CM & ETA & RBT	–	–	–	–	–	–	–	–	–	–	–

continued...

Table 13. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Ontario – 1999-2009 (continued)

	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)
INH & RMP & EMB & PZA & SM & AK & CM & RBT	–	–	–	1 (0.2)	–	–	–	–	–	–	–
XDR-TB[‡]	–	–	–	1 (0.2)	–	–	1 (0.2)	–	–	1 (0.2)	–
INH & RMP & EMB & PZA & SM & AK & CM & ETA & OFL & RBT	–	–	–	1 (0.2)	–	–	–	–	–	–	–
INH & RMP & AK & CM & OFL & ETA & 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 1999, 2000, 2001, 2009, 2005; and 4 for 2006.

† MDR-TB is defined as resistance to at least rifampin and isoniazid. First and second-line resistance are reported. Second-line drugs include: AK = amikacin; CM = capreomycin; CIPRO = ciprofloxacin; ETA = ethionamide; KM = kanamycin; OFL = ofloxacin; RBT = rifabutin.

‡ XDR-TB defined as resistance to at least rifampin and isoniazid and further resistance to any fluoroquinolone, and to 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 – 1999-2009

	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	2 (100.0)	3 (100.0)	2 (100.0)	1 (100.0)	2 (100.0)	1 (100.0)	1 (100.0)	0	0	0	1 (100.0)
Isolates susceptible	2 (100.0)	3 (100.0)	1 (50)	1 (100.0)	2 (100.0)	1 (100.0)	1 (100.0)	0	0	0	1 (100.0)
Isolates resistant to one or more drugs	–	–	1 (50)	–	–	–	–	–	–	–	–
Monoresistance	–	–	1 (50)	–	–	–	–	–	–	–	–
PZA	–	–	1 (50)	–	–	–	–	–	–	–	–

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

**Table 15. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs,
Quebec – 1999-2009**

	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	268 (100.0)	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)
Isolates susceptible	236 (88.1)	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)
Isolates resistant to one or more drugs	32 (11.9)	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)
Monoresistance	28 (10.4)	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)
INH	17 (6.3)	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)
RMP	1 (0.4)	–	–	1 (0.4)	–	–	–	1 (0.5)	1 (0.5)	–	–
EMB	–	–	–	–	–	–	–	–	–	–	–
PZA	10 (3.7)	9 (3.2)	4 (1.8)	9 (3.6)	6 (2.7)	4 (1.9)	4 (1.8)	4 (2.0)	4 (2.0)	4 (1.9)	2 (1.2)
Other Patterns	2 (0.7)	0 (0)	0 (0)	1 (0.4)	0 (0)	1 (0.5)	0 (0)	0 (0)	4 (2.0)	4 (2.0)	–
INH & EMB	–	–	–	1 (0.4)	–	–	–	–	–	3 (1.5)	–
INH & PZA	2 (0.7)	–	–	–	–	–	–	–	–	1 (0.5)	1 (0.5)
MDR-TB†	2 (0.7)	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)
INH & RMP & SM	1 (0.4)	–	–	–	–	–	–	–	–	–	–
INH & RMP & ETA	–	–	–	–	–	1 (0.5)	–	–	–	–	–
INH & RMP & RBT	–	–	–	–	–	–	1 (0.5)	–	–	–	–
INH & RMP & EMB & ETA	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & EMB & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & SM & RBT	–	–	–	–	–	1 (0.5)	–	–	–	–	–
INH & RMP & ETA & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & EMB & SM & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & EMB & ETA & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & ETA & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & EMB & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & EMB & SM & ETA & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & ETA & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & EMB & SM & ETA & RBT	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & SM & CM & ETA	1 (0.4)	–	–	–	–	–	–	–	–	–	1 (0.6)
INH & RMP & PZA & SM & KM & CM & ETA	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & PZA & SM & AK & KM & CM	–	–	–	–	–	–	–	–	–	1 (0.5)	–

* Includes *M. bovis* isolates: 1 in 1998, 1999, 2001, 2002, 2003, 2007, 2009 and 2 in 2002, 2004, 2006, *M. africanum*: 1 in 2003, 2005, 2006, 2008; 2 in 2007; and 3 in 2009.

† MDR-TB is defined as resistance to at least rifampin and isoniazid. First and second-line resistance are reported. Second-line drugs include: AK = Amikacin; CM = capreomycin; ETA = ethionamycin; KM = kanamycin; RBT = rifabutin.

Table 16. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Saskatchewan – 1999-2009

	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	40 (100.0)	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)
Isolates susceptible	39 (97.5)	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)
Isolates resistant to one or more drugs	1 (2.5)	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)
Monoresistance	1 (2.5)	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)
INH	1 (2.5)	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)
EMB	–	1 (1.6)	–	1 (1.8)	–	–	–	–	–	–	–
MDR-TB†	–	–	–	–	–	–	–	–	–	–	–
INH & RMP & SM	–	–	–	–	–	–	–	–	–	–	–
Other Patterns	–	1 (1.6)	1 (1.5)	1 (1.8)	–	–	–	–	–	–	–
INH & EMB	–	1 (1.6)	–	1 (1.8)	–	–	–	–	–	–	–

* Routine testing for PZA not conducted.

† MDR-TB is defined as resistance to at least rifampin and isoniazid.

Table 17. Reported results for routine drug susceptibility testing of MTB isolates to anti-tuberculosis drugs, Yukon – 1999-2009

	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)	2004 Total (%)	2005 Total (%)	2006 Total (%)	2007 Total (%)	2008 Total (%)	2009 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)
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)

* 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 Mycobacteriology Provincial Laboratory of Public Health
	Dr. Lourens Robberts, PhD Clinical Microbiologist Provincial Laboratory of Public Health
	Dr. Marie Louie, MD FRCPC Associate Medical Director Provincial Laboratory of Public Health
British Columbia (British Columbia and Yukon Territory)	Dr. Mabel Rodrigues, PhD Section Head TB/Mycobacteriology BCCDC Public Health Microbiology & Reference Laboratory
	Dr. Patrick Tang Medical Microbiologist BCCDC Public Health Microbiology & Reference Laboratory
	Dr. Judy L. Isaac-Renton Director, Laboratory Services BCCDC Public Health Microbiology & Reference Laboratory
Manitoba	Assunta Rendina, MLT Charge Technologist, Mycobacteriology 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
	Dr. Glenna Hardy Medical Microbiologist Department of Laboratory Medicine Saint John Regional Hospital

New Brunswick (cont'd)

Dr. Anne O'Brien,
Clinical Head
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)

Evelyn Smith
Supervisor, Bacteriology
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
Dept. of Pathology & Laboratory Medicine
Queen Elizabeth II Health Sciences Centre

Dr David Haldane
Director of Special Pathogens and Microbiology
Queen Elizabeth II Health Sciences Centre

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

Ontario

Pamela Chedore, MLT
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Ontario Agency for Health Protection and
Promotion

Dr. Frances Jamieson
Medical Microbiologist
Central Public Health Lab
Ontario Agency for Health Protection and
Promotion

Ontario (cont'd)	Mr. Nicholas Paul Manager Direct Services Central Public Health Lab Ontario Agency for Health Protection and Promotion
Quebec	Louise Thibert, MSc Head, Mycobacteriology and Aerobic Actinomycetes Laboratoire de santé publique du Québec Institut national de santé publique du Québec
	Dr. Anne-Marie Bourgeault, director Laboratoire de santé publique du Québec Institut national de santé publique du Québec
Saskatchewan	<p><i>North:</i> Colleen Foster Clinical Microbiology Royal University Hospital Saskatoon, Saskatchewan</p> <p>Dr. J. Blondeau Department Head Microbiology/Mycobacteriology Royal University Hospital Saskatoon, Saskatchewan</p> <p><i>South:</i> Elaine Schweitzer Clinical Services/Microbiology Saskatchewan Health Provincial Laboratory</p> <p>Dr. Paul Levett Microbiologist Saskatchewan Health Provincial Laboratory</p> <p>Dr. Greg Horsman Director Laboratory and Disease Control Services Saskatchewan Health Provincial Laboratory</p>
Federal	Joyce Wolfe, ART Head, Mycobacteriology National Microbiology Laboratory Canadian Science Centre for Human & Animal Health National Reference Centre of Mycobacteriology

► Appendix 2



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**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**

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Date Rec'd at TBPC:	Y / A	M	D / J														
Date de réception au LATB:																	
TBPC Number: Numéro du LATB:																	
Specie: Espèce :	<input type="checkbox"/> M. tuberculosis (may include M. africanum or M. microti) (peut inclure M. africanum et M. microti)			<input type="checkbox"/> M. bovis			<input type="checkbox"/> M. BCG bovis			<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? → 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 UNE SEULE SOUCHE 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 : <input type="text"/>							(see code list) (voir liste de codes)							PROV / TERR CODES PROV / TERR		
2	Province / territory from which specimen originated: Province / territoire d'où provient l'échantillon : <input type="text"/>							(see code list) (voir liste de codes)							10 = NFLD / TN	46 = MAN	
3	Patient's date of birth: Date de naissance du patient : <input type="text"/> Y / A <input type="text"/> M <input type="text"/> D / J (CCYY/MM/DD) (SSAA/MM/JJ)							<input type="checkbox"/> Unknown Inconnu							11 = PEI / IPÉ	47 = SASK	
4	Patient's gender: Sexe du patient : <input type="checkbox"/> Male Masculin <input type="checkbox"/> Female Féminin <input type="checkbox"/> Unknown Inconnu														12 = NS / NÉ	48 = ALTA / ALB	
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 Agents Antituberculeux			Sensitive Sensible				Resistant Résistant	Other (specify) Autre (préciser)									
SM (Streptomycin) (Streptomycine)			<input type="checkbox"/> mg / L	<input type="checkbox"/> <input type="checkbox"/>													
INH (Isoniazid) (Isoniazide)			<input type="checkbox"/> mg / L	<input type="checkbox"/> <input type="checkbox"/>													
RMP (Rifampin) (Rifampicine)			<input type="checkbox"/> mg / L	<input type="checkbox"/> <input type="checkbox"/>													
EMB (Ethambutol)			<input type="checkbox"/> mg / L	<input type="checkbox"/> <input type="checkbox"/>													
PZA (Pyrazinamide)			<input type="checkbox"/> mg / L	<input type="checkbox"/> <input type="checkbox"/>													
2nd line drugs (specify) Antibiotiques de 2 ^e ligne (préciser)			Concentration			Sensitive Sensible	Resistant Résistant	Other (specify) Autre (préciser)									
1.			<input type="checkbox"/> mg / L			<input type="checkbox"/> <input type="checkbox"/>											
2.			<input type="checkbox"/> mg / L			<input type="checkbox"/> <input type="checkbox"/>											
3.			<input type="checkbox"/> mg / L			<input type="checkbox"/> <input type="checkbox"/>											
4.			<input type="checkbox"/> mg / L			<input type="checkbox"/> <input type="checkbox"/>											
5.			<input type="checkbox"/> mg / L			<input type="checkbox"/> <input type="checkbox"/>											
6.			<input type="checkbox"/> mg / L			<input type="checkbox"/> <input type="checkbox"/>											
6	Comments - Commentaires																