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Tuberculosis

Drug resistance in Canada

2003

Reported susceptibility results of the Canadian Tuberculosis Laboratory Surveillance System

Canada

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Tuberculosis Prevention and Control
Community Acquired Infections Division
Centre for Infectious Disease Prevention and Control
Public Health Agency of Canada
3439, Building 6
Tunney's Pasture, Ottawa, Ontario K1A 0K9

Internal Postal Address: 0603B

Telephone: (613) 941-0238
Facsimile: (613) 946-3902

This report can also be accessed on the internet at:

http://www.phac-aspc.gc.ca/

The following text, figures and tables were prepared by:

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

Louis Sauvé
Surveillance Officer
Tuberculosis Prevention and Control

Melissa Phypers, MSc
Senior Epidemiologist
Tuberculosis Prevention and Control

Merrilyn Allegakone
Tuberclosis Database Manager
Tuberculosis Prevention and Control

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INTRODUCTION

Tuberculosis Prevention and Control (TBPC) at the Centre for Infectious Disease Prevention and Control, in collaboration with the Canadian Tuberculosis Laboratory Technical Network and participating laboratories (representing all provinces and territories) in the Canadian Tuberculosis Laboratory Surveillance System (CTBLSS) (Appendix 2), established a laboratory-based national surveillance system in 1998 to monitor tuberculosis (TB) drug resistance patterns in Canada.

Laboratories report their results on anti-tuberculous drug susceptibility testing to TBPC for every patient that they receive a specimen or an isolate from each calendar year. TBPC subsequently produces an annual report. This report presents 2003 and adjusted 2002 (to reflect duplicate removal and late reporting) drug susceptibility data for TB isolates across Canada as of March 10, 2004.

METHODOLOGY

TBPC maintains a computerized database containing drug susceptibility test results of *Mycobacterium tuberculosis* (MTB) and MTB complex (MTBC) isolates. Isolates identified as *M.bovis* BCG are included in the CTBLSS but are excluded from this report. Results of susceptibility testing for second-line anti-tuberculous drugs, although reported, are also not included in this report. Data are collected either through manual completion of a standard reporting form (Appendix 3) or by electronic transmission. Information collected includes sex, year of birth, province/territory from which the report originates, province/territory from which the specimen originates and susceptibility results. TBPC makes every effort to eliminate duplicate specimens; only the most recent susceptibility results for a given patient in the current reporting year are included for analysis.

Newfoundland and Labrador identifies the species and tests all isolates for drug resistance in Newfoundland. Some provinces identify the species and test their own isolates and those of other provinces/territories (British Columbia: British Columbia and Yukon Territory isolates; Alberta: Alberta and Northwest Territories isolates; Quebec: Quebec and New Brunswick isolates; Ontario: Ontario and Nunavut isolates; Nova Scotia: Nova Scotia and Prince Edward Island isolates). Saskatchewan tests for drug resistance on all MTBC isolates. Other provinces and territories report results at the species level.

Laboratories generally perform routine susceptibility testing of MTB or MTBC to first-line anti-tuberculous drugs using the radiometric proportion method (Bactec®). Saskatchewan uses MGIT® 960 and all others use Bactec® 460. Table A lists the first-line anti-tuberculosis drugs and the concentrations in mg/L used by the participating laboratories.

As noted in Table A, the number and specific first-line anti-tuberculous drugs that are subject to routine susceptibility testing differ among the provinces and territories. Accordingly, the number of isolates included in the descriptive analyses varies.

Table A: Minimal inhibitory concentrations for routine testing of first-line anti-tuberculosis drugs		
Anti-TB drugs	**MIC (mg/L)**	**Comments**
Isoniazid (INH)	0.1	
Rifampin (RMP)	2.0	
Ethambutol (EMB)	2.5	British Columbia uses an MIC of 4.0 mg/L.
Streptomycin (SM)	2.0	Routine testing is not performed for isolates from Quebec, Nova Scotia, New Brunswick, Prince Edward Island.
Pyrazinamide (PZA)	100.0	Routine testing is not performed for isolates from British Columbia, Saskatchewan and the Yukon Territory.

In 2003, a total of nine laboratories participated in the proficiency for anti-microbial susceptibility testing of *M. tuberculosis* to anti-tuberculous first line drugs conducted by the National Reference Centre for Mycobacteriology. Six strains of *M. tuberculosis* were submitted for testing. Participant results are presented in Appendix 2.

RESULTS

Of the 1,379 isolates in 2003 included for analysis, 173 (12.5%) were resistant to one or more first-line anti-tuberculous drug(s). Resistance to INH was the most common type of drug resistance (9.3%). Twenty isolates (1.5%) were multi-drug resistant tuberculosis (MDR-TB) strains (defined as resistance to at least INH and RMP), of which seven isolates demonstrated resistance to four or five first-line anti-tuberculous drugs tested. Reporting of MDR-TB isolates was from British Columbia, Alberta, Manitoba, Ontario and Quebec. Five provinces and territories (Yukon Territory, Northwest Territories, Nunavut, Nova Scotia and Prince Edward Island,) reported that all isolates tested were susceptible to all the first-line anti-tuberculous drugs.

Demographic information on the individual patients from whom the isolates originated is limited in this laboratory-based surveillance system. Of the 1,354 isolates for which the year of birth and sex reporting was complete, 37% were between the ages 25 and 44. Males accounted for 53% of all the isolates and 57% of the drug resistant isolates.

DISCUSSION

The number of reported TB isolates in 2003 was relatively unchanged from the previous year (1,420 in 2002 to 1379 in 2003 isolates). In addition, the percentage of isolates demonstrating any type of drug resistance was also unchanged between the two reporting years (12.6% in 2002 to 12.5% in 2003) and the proportion of isolates classified as MDR-TB was identical (1.5%) in both years. Overall, levels of TB drug resistance have shown no significant difference since the inception of this reporting system in 1998.

Over 75% of the reported laboratory TB isolates in Canada in 2003 originated from three provinces. Ontario, Quebec and British Columbia have consistently reported the majority of isolates and MDR-TB in the six years of data collection. Since the initiation of this laboratory-based surveillance system Saskatchewan, the Atlantic Provinces, the Yukon and Northwest Territories have not reported any MDR-TB isolates.

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), the median prevalence of TB drug resistance among the participating countries was 1.1% for new cases and 7% for previously treated cases (as compared with 12.5% overall in Canada). The median prevalence of MDR-TB was 10.2% for new cases and 18.4% for previously treated cases (as compared with 1.5% overall in Canada).[1]

LIMITATIONS

Sensitivity testing for first-line anti-TB drugs is not uniform across the country. Therefore, there are limitations in interpreting the data, particularly the percentage of isolates that are resistant to SM and PZA.

More epidemiological information on the TB cases from which the isolates were submitted would be desirable to critically examine drug resistance patterns in Canada. Demographic information is sparse; only sex and year of birth are routinely reported in this surveillance system. As well, no differentiation can be made between primary and secondary/acquired drug resistance from the data.

CONCLUSIONS

With growing worldwide concern regarding TB drug resistance, 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 prevalence of TB drug resistance in this country is similar to that in the overall global situation.

REFERENCE

1. The WHO/IUATLD Global Project on Anti-tuberculosis Drug Resistance Surveillance (1999-2002). *Anti-tuberculosis drug resistance in the world*. Report No. 3. (WHO/CDS/TB/2000.278). Geneva: World Health Organization, 2004.

Figure 1
Reported TB drug resistance in Canada by province/territory – 2003

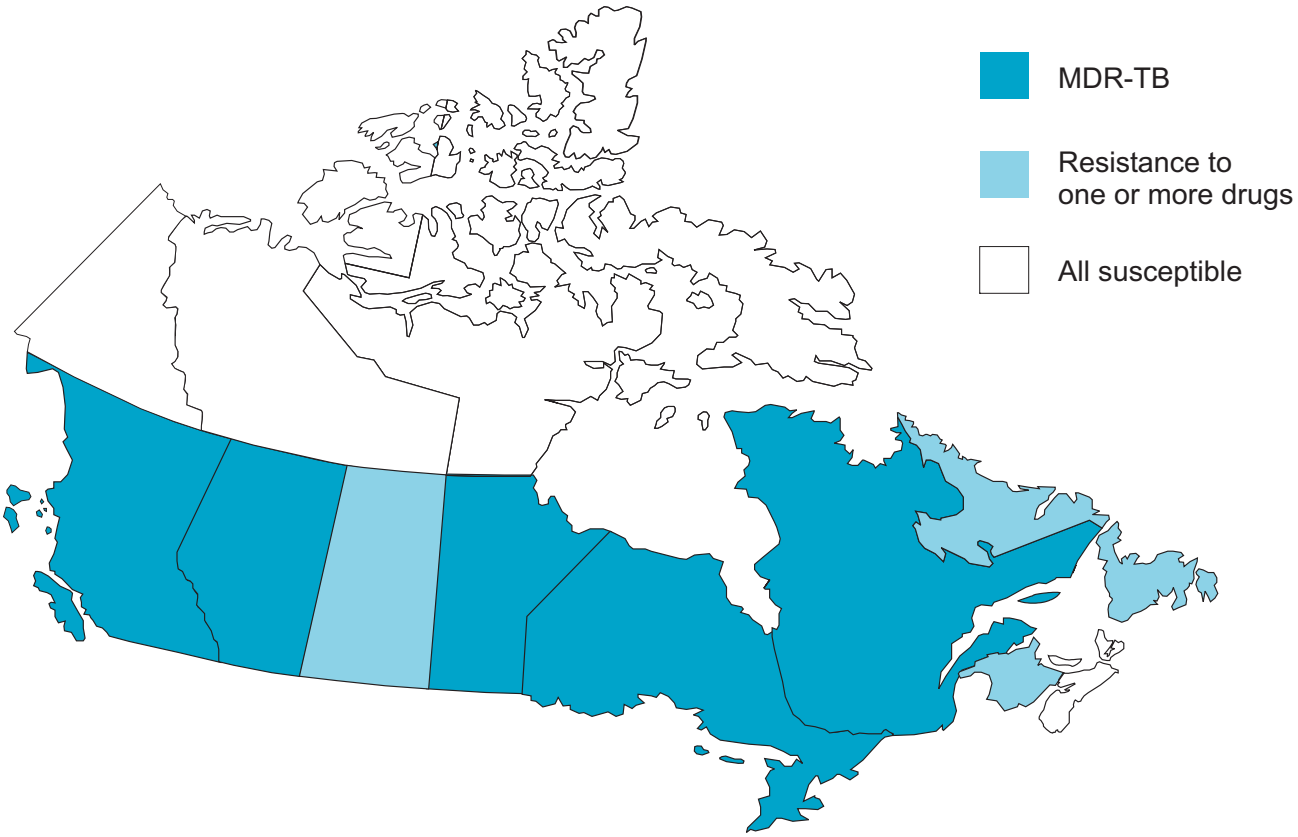


Figure 2
Reported MTB isolates in Canada by province/territory – 2003

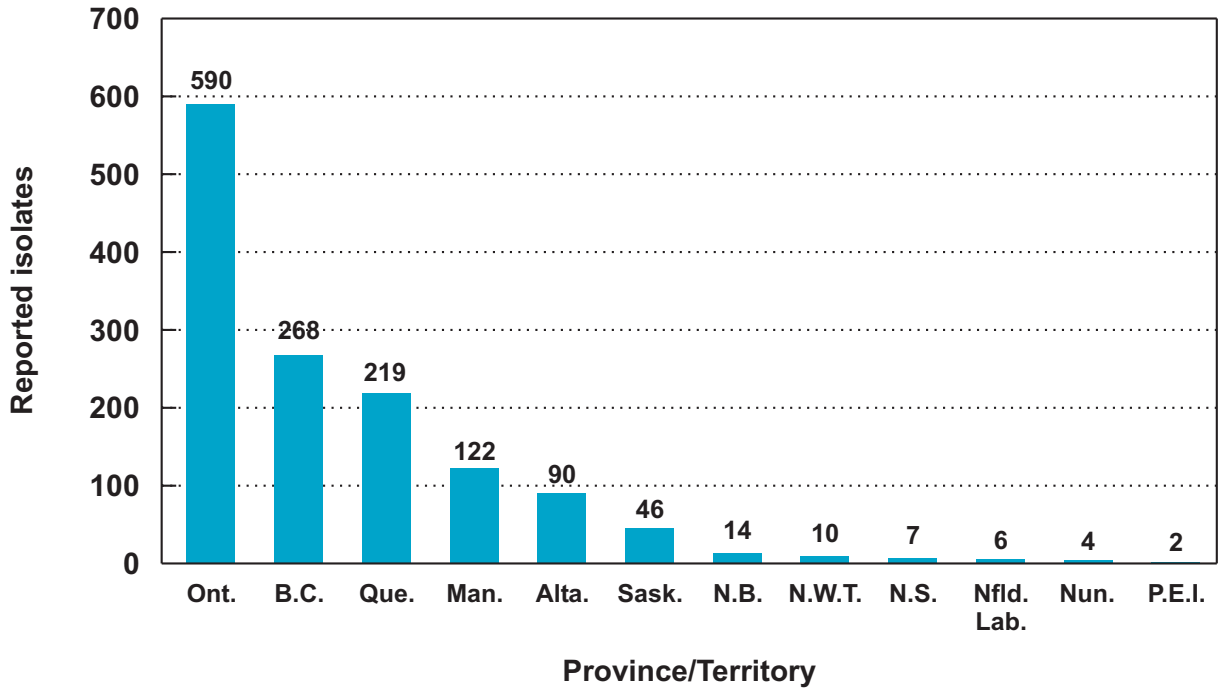


Figure 3
Overall pattern of reported TB drug resistance in Canada – 2003

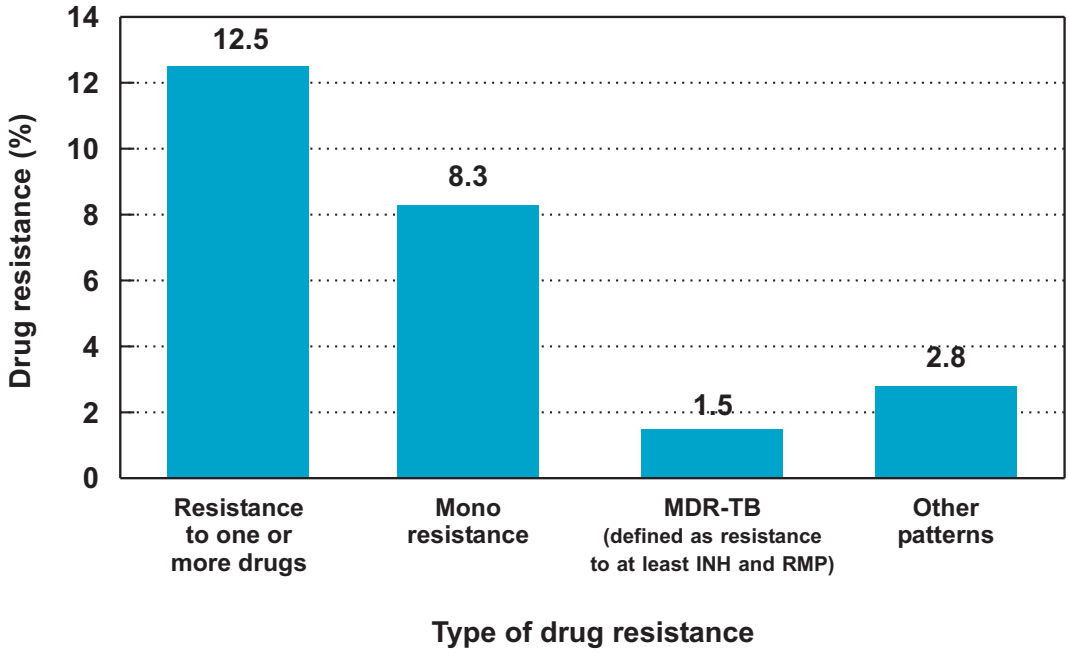
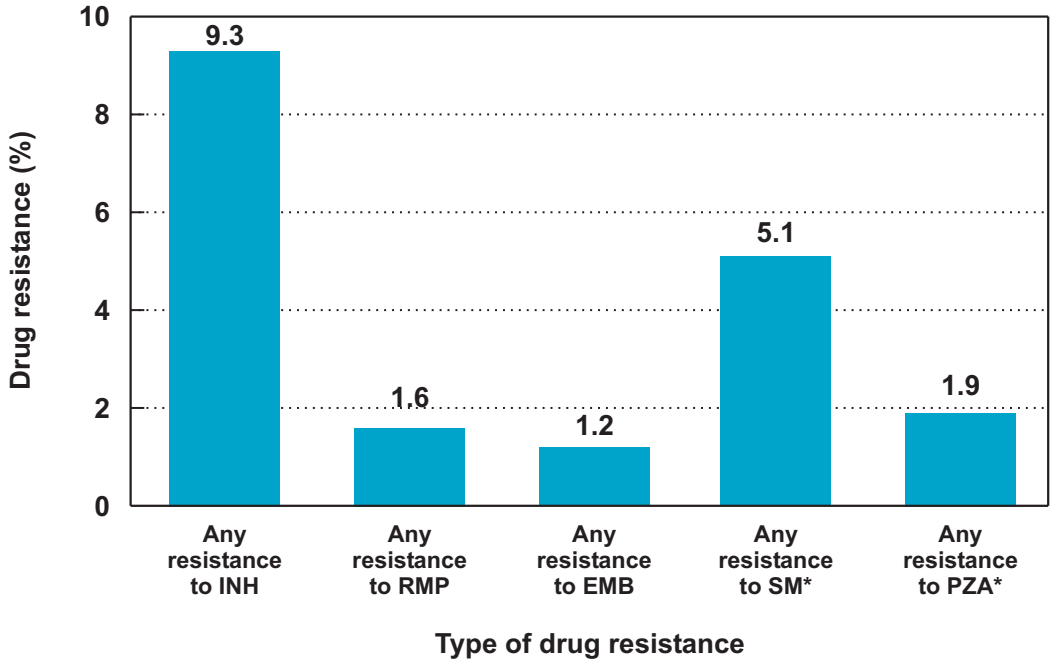


Figure 4
Reported TB drug resistance in Canada by type of drug – 2003



* SM and PZA are not part of routine first-line drug testing in some provinces/territories.

Figure 5
Any resistance to first-line anti-TB drugs in Canada – 1998-2003

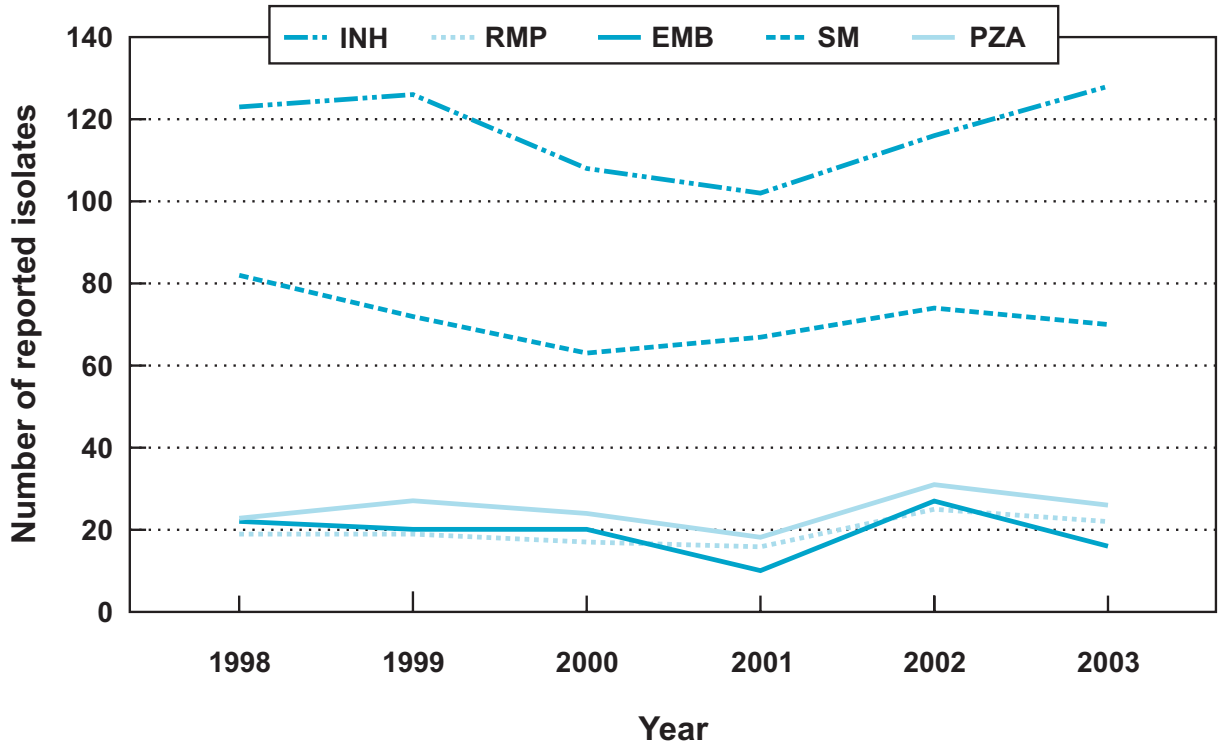


Figure 6
Overall pattern of reported TB drug resistance in Canada – 1998-2003

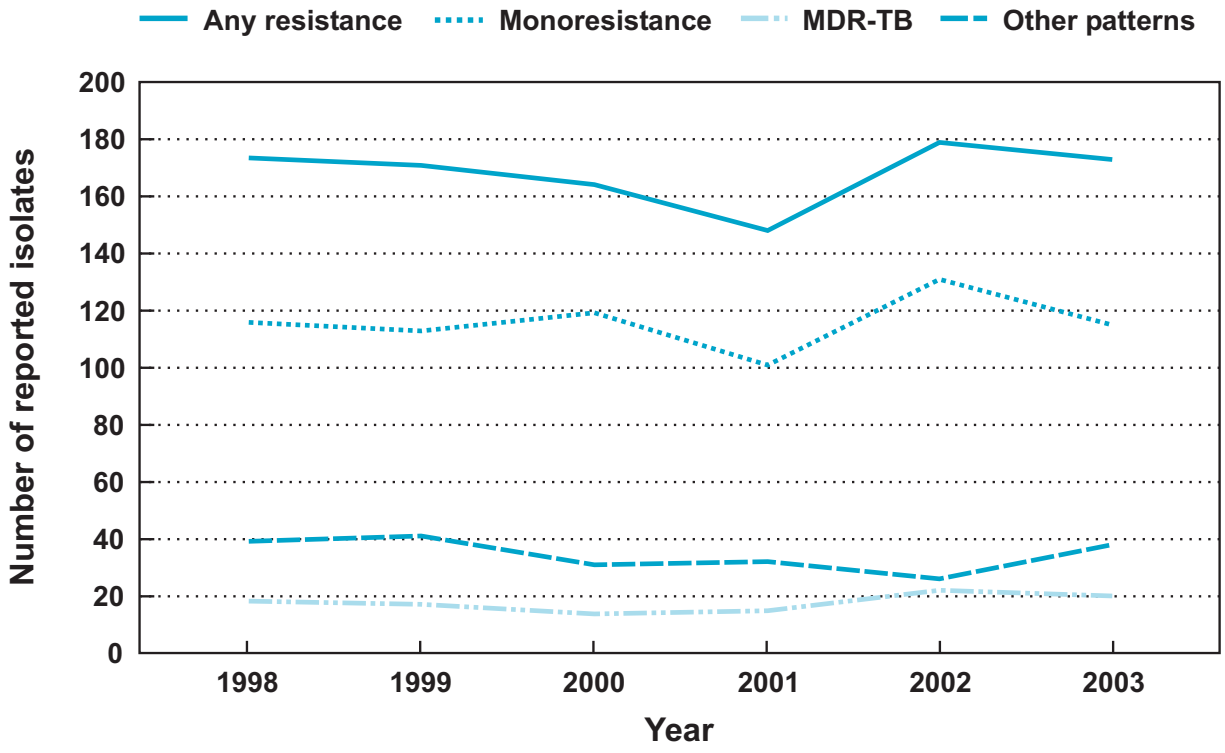


Table 1. Overall pattern of reported TB drug resistance in Canada – 1998-2003

	1998 Total (%)	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)
Total number of isolates tested	**1,461 (100.0)**	**1,415 (100.0)**	**1,491 (100.0)**	**1,475 (100.0)**	**1,420 (100.0)**	**1,379 (100.0)**
Isolates susceptible	1,288 (88.2)	1,243 (87.8)	1,323 (88.7)	1,327 (90)	1,241 (87.4)	1,206 (87.5)
Any resistance to INH	123 (8.4)	127 (9)	111 (7.4)	102 (6.9)	116 (8.2)	128 (9.3)
Any resistance to RMP	19 (1.3)	20 (1.4)	18 (1.2)	16 (1.1)	25 (1.8)	22 (1.6)
Any resistance to EMB	22 (1.5)	20 (1.4)	21 (1.4)	10 (0.7)	27 (1.9)	16 (1.2)
Any resistance to SM	82 (5.6)	72 (5.1)	65 (4.4)	68 (4.6)	74 (5.2)	70 (5.1)
Any resistance to PZA	23 (1.6)	27 (1.9)	24 (1.6)	20 (1.4)	31 (2.2)	26 (1.9)
Resistance to one or more drugs	173 (11.8)	172 (12.2)	168 (11.3)	148 (10)	179 (12.6)	173 (12.5)
Monoresistance	116 (7.9)	113 (8)	121 (8.1)	101 (6.8)	131 (9.2)	115 (8.3)
MDR-TB*	18 (1.2)	18 (1.3)	15 (1)	15 (1)	22 (1.5)	20 (1.5)
Other patterns	39 (2.7)	41 (2.9)	32 (2.1)	32 (2.2)	26 (1.8)	38 (2.8)

* MDR-TB is defined as resistance to at least INH and RMP.

Table 2. Reported MTB isolates by "reporting" and "originating" province/territory, Canada – 2003

Reporting Province	CANADA	Originating Province/Territory												
		Nfld. Lab.	P.E.I	N.S.	N.B.	Que	Ont.	Man.	Sask.	Alta.	B.C.	Yukon	N.W.T	Nun.
Number of isolates	**1,379**	**6**	**2**	**7**	**14**	**219**	**590**	**122**	**46**	**90**	**268**	**1**	**10**	**4**
Nfld. Lab.	6	6	-	-	-	-	-	-	-	-	-	-	-	-
N.S.	9	-	2	7	-	-	-	-	-	-	-	-	-	-
N.B.	14	-	-	-	14	-	-	-	-	-	-	-	-	-
Que.	219	-	-	-	-	219	-	-	-	-	-	-	-	-
Ont.	593	-	-	-	-	-	590	-	-	-	-	-	-	3
Man.	122	-	-	-	-	-	-	122	-	-	-	-	-	-
Sask.	42	-	-	-	-	-	-	-	42	-	-	-	-	-
Alta.	104	-	-	-	-	-	-	-	4	90	-	-	10	-
B.C.	269	-	-	-	-	-	-	-	-	-	268	1	-	-
Nun.	1	-	-	-	-	-	-	-	-	-	-	-	-	1

Table 3. Reported MDR-TB* isolates by province/territory, Canada – 2003

	CANADA	Originating Province/Territory												
		Nfld. Lab	P.E.I	N.S.	N.B.	Que	Ont.	Man.	Sask.	Alta.	B.C.	Yukon	N.W.T	Nun.
Total number of isolates tested	**1,379**	**6**	**2**	**7**	**14**	**219**	**590**	**122**	**46**	**90**	**268**	**1**	**10**	**4**
Total number of MDR-TB* isolates	20	-	-	-	-	1	12	1	-	1	5	-	-	-
INH & RMP	7	-	-	-	-	1	3	1	-	1	1	-	-	-
INH, RMP & SM	2	-	-	-	-	-	1	-	-	-	1	-	-	-
INH, RMP & EMB	1	-	-	-	-	-	1	-	-	-	-	-	-	-
INH, RMP & PZA	3	-	-	-	-	-	2	-	-	-	1	-	-	-
INH, RMP, EMB & PZA	2	-	-	-	-	-	1	-	-	-	1	-	-	-
INH, RMP, SM, EMB & PZA	5	-	-	-	-	-	4	-	-	-	1	-	-	-

* MDR-TB is defined as resistance to at least INH and RMP.

Table 4. Reported TB drug resistance by gender and age group, Canada – 2003

Age Group		Number of Isolates	Any Resistance	MDR-TB*
		No. (%)	No. (%)	No. (%)
Total		**1,379 (100)**	**173 (100)**	**20 (100)**
0-4	Males	2 (0.1)	- (0.0)	- (0.0)
	Females	9 (0.7)	2 (1.2)	- (0.0)
	Unknown	- (0.0)	- (0.0)	- (0.0)
	Total	**11 (0.8)**	**2 (1.2)**	**- (0.0)**
5-14	Males	4 (0.3)	- (0.0)	- (0.0)
	Females	8 (0.6)	- (0.0)	- (0.0)
	Unknown	- (0.0)	- (0.0)	- (0.0)
	Total	**12 (0.9)**	**- (0.0)**	**- (0.0)**
15-24	Males	75 (5.4)	10 (5.8)	- (0.0)
	Females	76 (5.5)	15 (8.7)	4 (20.0)
	Unknown	3 (0.2)	- (0.0)	- (0.0)
	Total	**154 (11.2)**	**25 (14.5)**	**4 (20.0)**
25-34	Males	126 (9.1)	21 (12.1)	6 (30.0)
	Females	135 (9.8)	20 (11.6)	3 (15.0)
	Unknown	14 (1.0)	- (0.0)	- (0.0)
	Total	**275 (19.9)**	**41 (23.7)**	**9 (45.0)**
35-44	Males	131 (9.5)	19 (11.0)	2 (10.0)
	Females	99 (7.2)	13 (7.5)	1 (5.0)
	Unknown	3 (0.2)	- (0.0)	- (0.0)
	Total	**233 (16.9)**	**32 (18.5)**	**3 (15.0)**
45-54	Males	118 (8.6)	17 (9.8)	- (0.0)
	Females	53 (3.8)	6 (3.5)	- (0.0)
	Unknown	6 (0.4)	1 (0.6)	- (0.0)
	Total	**177 (12.8)**	**24 (13.9)**	**- (0.0)**
55-64	Males	76 (5.5)	8 (4.6)	1 (5.0)
	Females	61 (4.4)	4 (2.3)	1 (5.0)
	Unknown	3 (0.2)	- (0.0)	- (0.0)
	Total	**140 (10.2)**	**12 (6.9)**	**2 (10.0)**
65-74	Males	88 (6.4)	11 (6.4)	2 (10.0)
	Females	55 (4.0)	6 (3.5)	- (0.0)
	Unknown	6 (0.4)	- (0.0)	- (0.0)
	Total	**149 (10.8)**	**17 (9.8)**	**2 (10.0)**
75+	Males	110 (8)	12 (6.9)	- (0.0)
	Females	83 (6)	7 (4)	- (0.0)
	Unknown	10 (0.7)	- (0.0)	- (0.0)
	Total	**203 (14.7)**	**19 (11.0)**	**- (0.0)**
Unknown	Males	6 (0.4)	- (0.0)	- (0.0)
	Females	8 (0.6)	- (0.0)	- (0.0)
	Unknown	11 (0.8)	1 (0.6)	- (0.0)
	Total	**25 (1.8)**	**1 (0.6)**	**- (0.0)**
Total	**Males**	**736 (53.4)**	**98 (56.6)**	**11 (55.0)**
	Females	**587 (42.6)**	**73 (42.2)**	**9 (45.0)**
	Unknown	**56 (4.1)**	**2 (1.2)**	**0 (0.0)**

* MDR-TB is defined as resistance to at least INH and RMP.

Table 5. Reported results for routine drug susceptibility testing of MTB isolates to first-line anti-tuberculosis drugs, Alberta – 1998-2003

	1998 Total (%)	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)
Total number of isolates tested for INH, RMP, SM, EMB and PZA	**119 (100.0)**	**118 (100.0)**	**104 (100.0)**	**91 (100.0)**	**108 (100.0)**	**90 (100.00)**
Isolates susceptible	**107 (89.9)**	**111 (94.1)**	**92 (88.5)**	**79 (86.8)**	**94 (87.0)**	**74 (82.2)**
Isolates resistant to one or more drugs	**12 (10.1)**	**7 (5.9)**	**12 (11.5)**	**12 (13.2)**	**14 (13.0)**	**16 (17.8)**
Monoresistance	**9 (7.6)**	**6 (5.1)**	**7 (6.7)**	**8 (8.8)**	**12 (11.1)**	**10 (11.1)**
INH	4 (3.4)	2 (1.7)	2 (1.9)	5 (5.5)	6 (5.6)	5 (5.6)
EMB	- (0.0)	- (0.0)	1 (1.0)	- (0.0)	- (0.0)	- (0.0)
SM	5 (4.2)	4 (3.4)	3 (2.9)	3 (3.3)	6 (5.6)	3 (3.3)
PZA	- (0.0)	- (0.0)	1 (1.0)	- (0.0)	- (0.0)	2 (2.2)
MDR-TB*	**1 (0.8)**	**- (0.0)**	**- (0.0)**	**- (0.0)**	**- (0.0)**	**1 (1.1)**
INH & RMP	- (0.0)	- (0.0)	- (0.0)	- (0.0)	- (0.0)	1 (1.1)
INH, SM, EMB, RMP & PZA	1 (0.8)	- (0.0)	- (0.0)	- (0.0)	- (0.0)	- (0.0)
Other Patterns	**2 (1.7)**	**1 (0.8)**	**5 (4.8)**	**4 (4.4)**	**2 (1.9)**	**5 (5.6)**
INH & SM	1 (0.8)	1 (0.8)	3 (2.9)	2 (2.2)	1 (0.9)	4 (4.5)
INH, SM & EMB	- (0.0)	- (0.0)	1 (1.0)	- (0.0)	- (0.0)	1 (1.1)
INH, SM & PZA	1 (0.8)	- (0.0)	1 (1.0)	2 (2.2)	1 (0.9)	- (0.0)

* MDR-TB is defined as resistance to at least INH and RMP.

Table 6. Reported results for routine drug susceptibility testing of MTB isolates to first-line anti-tuberculosis drugs, British Columbia – 1998-2003

	1998 Total (%)	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)
Total number of isolates tested for INH, RMP, SM and EMB**	**237 (100.0)**	**244 (100.0)**	**277 (100.0)**	**331 (100.0)**	**259 (100.0)**	**268 (100.0)**
Isolates susceptible	212 (89.5)	224 (91.8)	245 (88.4)	296 (89.4)	228 (88.0)	239 (89.2)
Isolates resistant to one or more drugs	25 (10.5)	20 (8.2)	32 (11.6)	35 (10.6)	31 (12)	29 (10.8)
Monoresistance	17 (7.2)	15 (6.1)	23 (8.3)	22 (6.6)	25 (9.7)	17 (6.3)
INH	14 (5.9)	11 (4.5)	13 (4.7)	12 (3.6)	12 (4.6)	11 (4.1)
EMB	- (0.0)	1 (0.4)	1 (0.4)	- (0.0)	2 (0.8)	1 (0.4)
RMP	1 (0.4)	1 (0.4)	1 (0.4)	1 (0.3)	- (0.0)	- (0.0)
SM	2 (0.8)	2 (0.8)	8 (2.9)	9 (2.7)	8 (3.1)	5 (1.9)
PZA	- (0.0)	- (0.0)	- (0.0)	- (0.0)	- (0.0)	- (0.0)
MDR-TB*	2 (0.8)	1 (0.4)	5 (1.8)	8 (2.4)	2 (0.8)	5 (1.9)
INH & RMP	- (0.0)	- (0.0)	- (0.0)	4 (1.2)	- (0.0)	1 (0.4)
INH, RMP & EMB	- (0.0)	- (0.0)	1 (0.4)	- (0.0)	- (0.0)	- (0.0)
INH, RMP & SM	1 (0.4)	- (0.0)	2 (0.7)	2 (0.6)	- (0.0)	1 (0.4)
INH, RMP & PZA	- (0.0)	- (0.0)	- (0.0)	- (0.0)	- (0.0)	1 (0.4)
INH , RMP, EMB & PZA	- (0.0)	- (0.0)	- (0.0)	- (0.0)	1 (0.4)	1 (0.4)
INH, RMP, SM & EMB	1 (0.4)	1 (0.4)	2 (0.7)	1 (0.3)	- (0.0)	- (0.0)
INH, RMP, SM, EMB & PZA	- (0.0)	- (0.0)	- (0.0)	1 (0.3)	1 (0.4)	1 (0.4)
Other Patterns	6 (2.5)	4 (1.6)	4 (1.4)	5 (1.5)	4 (1.5)	7 (2.6)
INH & EMB	1 (0.4)	1 (0.4)	- (0.0)	- (0.0)	- (0.0)	- (0.0)
INH & SM	5 (2.1)	2 (0.8)	2 (0.7)	5 (1.5)	3 (1.2)	6 (2.2)
INH & PZA	- (0.0)	- (0.0)	- (0.0)	- (0.0)	1 (0.4)	1 (0.4)
INH, SM & EMB	- (0.0)	1 (0.4)	2 (0.7)	- (0.0)	- (0.0)	- (0.0)

* MDR-TB is defined as resistance to at least INH and RMP.

** Routine testing for PZA not conducted

Table 7. Reported results for routine drug susceptibility testing of MTB isolates to first-line anti-tuberculosis drugs, Manitoba – 1998-2003

	1998 Total (%)	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)
Total number of isolates tested for INH, RMP, EMB, SM and PZA**	**106 (100.0)**	**100 (100.0)**	**102 (100.0)**	**110 (100.0)**	**114 (100.0)**	**122 (100.0)**
Isolates susceptible	**98 (92.5)**	**89 (89.0)**	**94 (92.2)**	**101 (91.8)**	**106 (93.0)**	**114 (93.4)**
Isolates resistant to one or more drugs	**8 (7.5)**	**11 (11.0)**	**8 (7.8)**	**9 (8.2)**	**8 (7.0)**	**8 (6.6)**
Monoresistance	**4 (3.8)**	**6 (6.0)**	**6 (5.9)**	**6 (5.5)**	**4 (3.5)**	**7 (5.7)**
INH	2 (1.9)	3 (3.0)	6 (5.9)	2 (1.8)	3 (2.6)	3 (2.5)
SM**	2 (1.9)	3 (3.0)	- (0.0)	4 (3.6)	- (0.0)	3 (2.5)
PZA***	- (0.0)	- (0.0)	- (0.0)	- (0.0)	1 (0.9)	1 (0.8)
MDR-TB*	**2 (1.9)**	**2 (2.0)**	**- (0.0)**	**2 (1.8)**	**3 (2.6)**	**1 (0.8)**
INH & RMP	- (0.0)	1 (1.0)	- (0.0)	1 (0.9)	1 (0.9)	1 (0.8)
INH, EMB, RMP & PZA	- (0.0)	- (0.0)	- (0.0)	- (0.0)	1 (0.9)	- (0.0)
INH, EMB & RMP	1 (0.9)	- (0.0)	- (0.0)	- (0.0)	- (0.0)	- (0.0)
INH, SM, EMB, RMP & PZA	1 (0.9)	- (0.0)	- (0.0)	1 (0.9)	1 (0.9)	- (0.0)
INH, SM, RMP & PZA	- (0.0)	1 (1.0)	- (0.0)	- (0.0)	- (0.0)	- (0.0)
Other Patterns	**2 (1.9)**	**3 (3.0)**	**2 (2.0)**	**1 (0.9)**	**1 (0.9)**	**- (0.0)**
INH & PZA	- (0.0)	- (0.0)	- (0.0)	- (0.0)	1 (0.9)	- (0.0)
INH & SM	2 (1.9)	1 (1.0)	2 (2.0)	1 (0.9)	- (0.0)	- (0.0)
INH, SM & EMB	- (0.0)	1 (1.0)	- (0.0)	- (0.0)	- (0.0)	- (0.0)
INH, SM & PZA	- (0.0)	1 (1.0)	- (0.0)	- (0.0)	- (0.0)	- (0.0)

* MDR-TB is defined as resistance to at least INH and RMP

** Routine testing for SM not conducted for 2002.

*** Includes *M. bovis* isolates: 1 for 2002

Table 8. Reported results for routine drug susceptibility testing of MTB isolates to first-line anti-tuberculosis drugs, New Brunswick – 1998-2003

	1998 Total (%)	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	**10 (100.0)**	**12 (100.0)**	**9 (100.0)**	**10 (100.0)**	**10 (100.0)**	**14 (100.0)**
Isolates susceptible	**9 (90.0)**	**12 (100.0)**	**9 (100.0)**	**10 (100.0)**	**9 (90.0)**	**13 (92.9)**
Isolates resistant to one or more drugs	**1 (10.0)**	**- (0.0)**	**- (0.0)**	**- (0.0)**	**1 (10.0)**	**1 (7.1)**
Monoresistance	**1 (10.0)**	**- (0.0)**	**- (0.0)**	**- (0.0)**	**1 (10.0)**	**1 (7.1)**
INH	1 (10.0)	- (0.0)	- (0.0)	- (0.0)	1 (10.0)	1 (7.1)

* Routine testing for SM not conducted.

Table 9. Reported results for routine drug susceptibility testing of MTB isolates to first-line anti-tuberculosis drugs, Newfoundland and Labrador – 1998-2003

	1998 Total (%)	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)
Total number of isolates tested for INH, RMP, EMB, SM and PZA	**8 (100.0)**	**9 (100.0)**	**11 (100.0)**	**9 (100.0)**	**4 (100.0)**	**6 (100.0)**
Isolates susceptible	**8 (100.0)**	**9 (100.0)**	**11 (100.0)**	**9 (100.0)**	**4 (100.0)**	**4 (66.7)**
Isolates resistant to one or more drugs	**- (0.0)**	**- (0.0)**	**- (0.0)**	**- (0.0)**	**- (0.0)**	**2 (33.3)**
Monoresistance	**- (0.0)**	**- (0.0)**	**- (0.0)**	**- (0.0)**	**- (0.0)**	**2 (33.3)**
INH	- (0.0)	- (0.0)	- (0.0)	- (0.0)	- (0.0)	1 (16.7)
RMP	- (0.0)	- (0.0)	- (0.0)	- (0.0)	- (0.0)	1 (16.7)

Table 10. Reported results for routine drug susceptibility testing of MTB isolates to first-line anti-tuberculosis drugs, Northwest Territories – 1998-2003

	1998 Total (%)	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)
Total number of isolates tested for INH, RMP, EMB, SM and PZA	**27 (100.0)**	**11 (100.0)**	**8 (100.0)**	**6 (100.0)**	**3 (100.0)**	**10 (100.0)**
Isolates susceptible	**27 (100.0)**	**11 (100.0)**	**8 (100.0)**	**6 (100.0)**	**3 (100.0)**	**10 (100.0)**

Table 11. Reported results for routine drug susceptibility testing of MTB isolates to first-line anti-tuberculosis drugs, Nova Scotia – 1998-2003

	1998 Total (%)	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	**9 (100.0)**	**8 (100.0)**	**4 (100.0)**	**7 (100.0)**	**10 (100.0)**	**7 (100.0)**
Isolates susceptible	**8 (88.9)**	**7 (87.5)**	**4 (100.0)**	**7 (100.0)**	**9 (90.0)**	**7 (100.0)**
Isolates resistant to one or more drugs	**1 (11.1)**	**1 (12.5)**	**- (0.0)**	**- (0.0)**	**1 (10.0)**	**- (0.0)**
Monoresistance	**1 (11.1)**	**1 (12.5)**	**- (0.0)**	**- (0.0)**	**1 (10.0)**	**- (0.0)**
INH	1 (11.1)	1 (12.5)	- (0.0)	- (0.0)	- (0.0)	- (0.0)
PZA	- (0.0)	- (0.0)	- (0.0)	- (0.0)	1 (10.0)	- (0.0)

* Routine testing for SM not conducted.

Table 12. Reported results for routine drug susceptibility testing of MTB isolates to first-line anti-tuberculosis drugs, Nunavut* – 1998-2003

	1998 Total (%)	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)
Total number of isolates tested for INH, RMP, SM, EMB and PZA* **	**N/A**	**15 (100.0)**	**29 (100.0)**	**31 (100.0)**	**22 (100.0)**	**4 (100.0)**
Isolates susceptible	**N/A**	**15 (100.0)**	**28 (96.6)**	**30 (96.8)**	**22 (100.0)**	**4 (100.0)**
Isolates resistant to one or more drugs	**N/A**	**- (0.0)**	**1 (3.4)**	**1 (3.2)**	**- (0.0)**	**- (0.0)**
Monoresistance	**N/A**	**- (0.0)**	**1 (3.4)**	**- (0.0)**	**- (0.0)**	**- (0.0)**
INH		- (0.0)	1 (3.4)	- (0.0)	- (0.0)	- (0.0)
MDR-TB**	**N/A**	**- (0.0)**	**- (0.0)**	**1 (3.2)**	**- (0.0)**	**- (0.0)**
INH & RMP		- (0.0)	- (0.0)	1 (3.2)	- (0.0)	- (0.0)

* Note: Nunavut began reporting in 1999.

** MDR-TB is defined as resistance to at least INH and RMP

*** Routine testing for SM not conducted when isolate tested by Quebec (n=13 for 1999, n=28 for 2000, n=30 for 2001 and n=11 for 2002)

Table 13. Reported results for routine drug susceptibility testing of MTB isolates to first-line anti-tuberculosis drugs, Ontario – 1998-2003

	1998 Total (%)	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)
Total number of isolates tested for INH, RMP, EMB, SM and PZA	**629 (100.0)**	**589 (100.0)**	**599 (100.0)**	**589 (100.0)**	**586 (100.0)**	**590 (100.0)**
Isolates susceptible	**538 (85.5)**	**489 (83.0)**	**519 (86.6)**	**521 (88.5)**	**492 (84.0)**	**506 (85.8)**
Isolates resistant to one or more drugs	**91 (14.5)**	**100 (17.0)**	**80 (13.4)**	**68 (11.5)**	**94 (16.0)**	**84 (14.2)**
Monoresistance	**55 (8.7)**	**57 (9.7)**	**52 (8.7)**	**44 (7.5)**	**61 (10.4)**	**46 (7.8)**
INH	34 (5.4)	34 (5.8)	23 (3.8)	20 (3.4)	30 (5.1)	24 (4.1)
EMB	4 (0.6)	- (0.0)	1 (0.2)	1 (0.2)	1 (0.2)	- (0.0)
SM	11 (1.7)	19 (3.2)	16 (2.7)	16 (2.7)	25 (4.3)	18 (3.1)
RMP	- (0.0)	- (0.0)	- (0.0)	- (0.0)	- (0.0)	1 (0.2)
PZA**	6 (1.0)	4 (0.7)	12 (2.0)	7 (1.2)	5 (0.9)	3 (0.5)
MDR-TB*	**11 (1.7)**	**13 (2.2)**	**9 (1.5)**	**3 (0.5)**	**16 (2.7)**	**12 (2.0)**
INH & RMP	2 (0.3)	3 (0.5)	1 (0.2)	- (0.0)	2 (0.3)	3 (0.5)
INH, RMP & EMB	- (0.0)	1 (0.2)	2 (0.3)	1 (0.2)	1 (0.2)	1 (0.2)
INH, RMP & SM	1 (0.2)	3 (0.5)	3 (0.5)	- (0.0)	2 (0.3)	1 (0.2)
INH, RMP & PZA	- (0.0)	1 (0.2)	- (0.0)	- (0.0)	- (0.0)	2 (0.3)
INH, RMP, EMB & PZA	- (0.0)	- (0.0)	- (0.0)	1 (0.2)	1 (0.2)	1 (0.2)
INH, RMP, SM & EMB	2 (0.3)	- (0.0)	2 (0.3)	- (0.0)	5 (0.9)	- (0.0)
INH, RMP, SM & PZA	- (0.0)	- (0.0)	1 (0.2)	- (0.0)	- (0.0)	- (0.0)
INH, RMP, SM, EMB & PZA	6 (1.0)	5 (0.8)	- (0.0)	1 (0.2)	5 (0.9)	4 (0.7)
Other Patterns	**25 (4.0)**	**30 (5.1)**	**19 (3.2)**	**21 (3.6)**	**17 (2.9)**	**26 (4.4)**
INH & EMB	2 (0.3)	4 (0.7)	2 (0.3)	- (0.0)	1 (0.2)	2 (0.3)
INH & PZA**	- (0.0)	- (0.0)	- (0.0)	2 (0.3)	- (0.0)	- (0.0)
INH & SM	20 (3.2)	20 (3.4)	14 (2.3)	16 (2.7)	13 (2.2)	18 (3.1)
SM & PZA	- (0.0)	- (0.0)	- (0.0)	- (0.0)	- (0.0)	1 (0.2)
EMB & RMP	- (0.0)	- (0.0)	2 (0.3)	- (0.0)	- (0.0)	- (0.0)
INH, SM & EMB	2 (0.3)	4 (0.7)	1 (0.2)	3 (0.5)	2 (0.3)	3 (0.5)
INH, SM & PZA	1 (0.2)	2 (0.3)	- (0.0)	- (0.0)	- (0.0)	1 (0.2)
INH, EMB & PZA	- (0.0)	- (0.0)	- (0.0)	- (0.0)	- (0.0)	1 (0.2)
INH, SM, EMB & PZA	- (0.0)	- (0.0)	- (0.0)	- (0.0)	1 (0.2)	- (0.0)

* MDR-TB is defined as resistance to at least INH and RMP

** Includes 1 *M. Bovis* isolate for 1999, 2 *M. Bovis* isolates for 2000, 2 *M. Bovis* isolates for 2001, 1 *M. Bovis* isolate for 2002 and 1 *M. Bovis* isolate for 2003.

Table 14. Reported results for routine drug susceptibility testing of MTB isolates to first-line anti-tuberculosis drugs, Prince Edward Island – 1998-2003

	1998 Total (%)	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA*	**2 (100.0)**	**2 (100.0)**	**3 (100.0)**	**2 (100.0)**	**1 (100.0)**	**2 (100.0)**
Isolates susceptible	**2 (100.0)**	**2 (100.0)**	**3 (100.0)**	**1 (50.0)**	**1 (100.0)**	**2 (100.0)**
Isolates resistant to one or more drugs	**- (0.0)**	**- (0.0)**	**- (0.0)**	**1 (50.0)**	**- (0.0)**	**- (0.0)**
Monoresistance	**- (0.0)**	**- (0.0)**	**- (0.0)**	**1 (50.0)**	**- (0.0)**	**- (0.0)**
PZA**	- (0.0)	- (0.0)	- (0.0)	1 (50.0)	- (0.0)	- (0.0)

* Routine testing for SM not conducted.

** Includes M. bovis isolates: 1 for 2001

Table 15. Reported results for routine drug susceptibility testing of MTB isolates to first-line anti-tuberculosis drugs, Québec – 1998-2003

	1998 Total (%)	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)
Total number of isolates tested for INH, RMP, EMB and PZA	**264 (100.0)**	**268 (100.0)**	**278 (100.0)**	**221 (100.0)**	**247 (100.0)**	**219 (100.0)**
Isolates susceptible	**231 (87.5)**	**236 (88.1)**	**249 (89.6)**	**202 (91.4)**	**222 (89.9)**	**187 (85.4)**
Isolates resistant to one or more drugs	**33 (12.5)**	**32 (11.9)**	**29 (10.4)**	**19 (8.6)**	**25 (10.1)**	**32 (14.6)**
Monoresistance	**28 (10.6)**	**28 (10.4)**	**28 (10.1)**	**18 (8.1)**	**23 (9.3)**	**31 (14.2)**
INH	9 (3.4)	17 (6.3)	19 (6.8)	14 (6.3)	13 (5.3)	25 (11.4)
RMP	- (0.0)	1 (0.4)	- (0.0)	- (0.0)	1 (0.4)	- (0.0)
SM**	13 (4.9)	- (0.0)	- (0.0)	- (0.0)	- (0.0)	- (0.0)
PZA***	6 (2.3)	10 (3.7)	9 (3.2)	4 (1.8)	9 (3.6)	6 (2.7)
MDR-TB*	**2 (0.8)**	**2 (0.7)**	**1 (0.4)**	**1 (0.5)**	**1 (0.4)**	**1 (0.5)**
INH & RMP	- (0.0)	1 (0.4)	- (0.0)	1 (0.5)	- (0.0)	1 (0.5)
INH, RMP & EMB	1 (0.4)	- (0.0)	1 (0.4)	- (0.0)	1 (0.4)	- (0.0)
INH, RMP & SM	1 (0.4)	- (0.0)	- (0.0)	- (0.0)	- (0.0)	- (0.0)
INH, RMP, EMB & PZA	- (0.0)	1 (0.4)	- (0.0)	- (0.0)	- (0.0)	- (0.0)
Other Patterns	**3 (1.1)**	**2 (0.7)**	**- (0.0)**	**- (0.0)**	**1 (0.4)**	**- (0.0)**
INH & SM	2 (0.8)	- (0.0)	- (0.0)	- (0.0)	- (0.0)	- (0.0)
INH & EMB	- (0.0)	- (0.0)	- (0.0)	- (0.0)	1 (0.4)	- (0.0)
INH & PZA	1 (0.4)	2 (0.7)	- (0.0)	- (0.0)	- (0.0)	- (0.0)

* MDR-TB is defined as resistance to at least INH and RMP

** Routine testing for SM not conducted in Quebec effective January 1, 1999 (NT = not tested)

*** Includes *M. Bovis* isolates: 1 for 1999, 2 for 2000, 1 for 2001, and 1 for 2003.

Table 16. Reported results for routine drug susceptibility testing of MTB isolates to first-line anti-tuberculosis drugs, Saskatchewan – 1998-2003

	1998 Total (%)	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)
Total number of isolates tested for INH, RMP, SM and EMB*	**49 (100.0)**	**40 (100.0)**	**64 (100.0)**	**68 (100.0)**	**56 (100.0)**	**46 (100.0)**
Isolates susceptible	**47 (95.9)**	**39 (97.5)**	**58 (90.6)**	**65 (95.6)**	**51 (91.1)**	**45 (97.8)**
Isolates resistant to one or more drugs	**2 (4.1)**	**1 (2.5)**	**6 (9.4)**	**3 (4.4)**	**5 (8.9)**	**1 (2.2)**
Monoresistance	**1 (2.0)**	**- (0.0)**	**4 (6.3)**	**2 (2.9)**	**4 (7.1)**	**1 (2.2)**
INH	1 (2.0)	- (0.0)	2 (3.1)	2 (2.9)	3 (5.4)	1 (2.2)
EMB	- (0.0)	- (0.0)	1 (1.6)	- (0.0)	1 (1.8)	- (0.0)
SM	- (0.0)	- (0.0)	1 (1.6)	- (0.0)	- (0.0)	- (0.0)
Other Patterns	**1 (2.0)**	**1 (2.5)**	**2 (3.1)**	**1 (1.5)**	**1 (1.8)**	**- (0.0)**
INH & EMB	- (0.0)	- (0.0)	1 (1.6)	- (0.0)	1 (1.8)	- (0.0)
INH & SM	1 (2.0)	1 (2.5)	1 (1.6)	1 (1.5)	- (0.0)	- (0.0)

* Routine testing for PZA not conducted.

Table 17. Reported results for routine drug susceptibility testing of MTB isolates to first-line anti-tuberculosis drugs, Yukon Territory – 1998-2003

	1998 Total (%)	1999 Total (%)	2000 Total (%)	2001 Total (%)	2002 Total (%)	2003 Total (%)
Total number of isolates tested for INH, RMP, SM and EMB*	**1 (100.0)**	**- (0.0)**	**3 (100.0)**	**1 (100.0)**	**- (0.0)**	**1 (100.0)**
Isolates susceptible	**1 (100.0)**	**- (0.0)**	**3 (100.0)**	**1 (100.0)**	**- (0.0)**	**1 (100.0)**

* Routine testing for PZA not conducted.

▶Appendix 1

Proficiency panel results for anti-microbial susceptibility testing of *M. tuberculosis* to first-line drugs

Antibiotic	Strains A & B	Strain C	Strain D	Strain E	Strain F
SM 2.0 µg/ml	Sensitive 7/7 (100% consensus)	Resistant 7/7 (100% consensus)	Resistant 6/7 (86% consensus)	Sensitive 7/7 (100% consensus)	Sensitive 7/7 (100% consensus)
INH 0.1 µg/ml	Sensitive 9/9 (100% consensus)	Resistant 9/9 (100% consensus)	Resistant 8/9 (89% consensus)	Resistant 9/9 (100% consensus)	Sensitive 9/9 (100% consensus)
RMP 2.0 µg/ml	Sensitive 9/9 (100% consensus)	Sensitive 9/9 (100% consensus)	Sensitive 9/9 (100% consensus)	Sensitive 9/9 (100% consensus)	Sensitive 9/9 (100% consensus)
EMB 2.5 µg/ml	Sensitive 9/9 (100% consensus)	Resistant 9/9 (100% consensus)	Resistant 8/9 (89% consensus)	Sensitive 9/9 (100% consensus)	Sensitive 9/9 (100% consensus)
PZA 100 µg/ml	Resistant 6/6 (100% consensus)	Resistant 5/7 (71% consensus)	Resistant 4/7 (57% consensus)	Resistant 5/6 (83% consensus)	Sensitive 5/6 (83% consensus)

Phase I: Susceptibility testing of *M. tuberculosis* – Comments

Eight laboratories are using the radiometric BACTEC TB460 system. One laboratory is using the MGIT 960 system. All laboratories are testing appropriate concentrations of first line drugs.

Streptomycin: Most laboratories that test streptomycin (7 out of 9) are accurately identifying sensitivity and resistance. Current NCCLS approved guidelines (1) consider streptomycin as a second-line drug and suggest the laboratory director should consult with pulmonary/infectious disease specialist and TB control officer to decide if streptomycin should be routinely tested based on the following:

1. Patient population
2. Prevalence of drug resistance
3. Use in community
4. Availability and timeliness of testing if resistance or intolerance is encountered

Isoniazid*:* Most laboratories accurately identified sensitivity and resistance to INH at 0.1 µg/ml. Resistance and sensitivity to INH at 0.4 µg/ml was accurately reported for laboratories testing the higher concentration of INH. Currently, 3 out of 9 laboratories are testing the higher concentration of INH. NCCLS (1) recommends testing a higher concentration of INH when resistance is encountered. Although clinicians may not agree on the usefulness of this data, information of the level of resistance can be provided and used at their discretion. When an isolate exhibits resistance to 0.1 µg/ml and sensitivity to 0.4 µg/ml, NCCLS recommends the following comment to be added to the report: *"These test results indicate low-level resistance to INH. Some experts believe that patients infected with strains exhibiting this level of INH resistance may benefit from continuing therapy with INH. A specialist in the treatment of tuberculosis should be consulted concerning the appropriate therapeutic regimen and dosages."*

Ethambutol: Most laboratories correctly identified ethambutol sensitivity and resistance. One laboratory reported conflicting results between radiometric and agar proportion with strains C/D.

PZA: Six out of 9 laboratories reported results for PZA. All laboratories accurately identified PZA mono-resistance in strains A/B. One laboratory misidentified PZA resistance in strain F. Based on the radiometric method, 5 out of 6 laboratories identified strain C as resistant and one laboratory identified the isolate as sensitive. One laboratory identified strains C/D as sensitive based on the amidase test. Strain D was identified as resistant by 4 laboratories and sensitive by 2 laboratories using the radiometric method. Strain E was reported as resistant by 5 out of 6 laboratories including the laboratory utilizing the amidase test.

- Strains C/D and E repeatedly produced resistance results with radiometric testing at the NRCM. Final percentage results (PZA/control) were generally 20-30%. The stains grew well in the acidic media and decreasing the inoculum also produced resistant results.
- Strains C/D and E produced positive 4 day pyrazinamidase results consistent with a functional enzyme and sensitivity to PZA (2).
- The complete *pncA* gene was sequenced for strains C/D and E. No mutations were found which is consistent with the pyrazinamidase result and sensitivity to PZA (3).
- The lack of a functional pyrazinamidase and mutations in the *pncA* gene have been correlated to PZA resistance (2, 3, 4, 5, 6), however not all PZA resistant strains display these characteristics (4). The percentage of PZA resistant isolates with *pncA* mutations can range from 40% to >90% and appears to be dependant upon geographical area (4, 5, 6, 7). Unknown mechanisms of PZA resistance exist and may be significant.
- The lack of pyrazinamidase activity and *pncA* mutations may confirm PZA resistance however the presence of pyrazinamidase activity and wild type pncA cannot confirm PZA sensitivity.

▶Appendix 2

Participating Laboratories of the Canadian Tuberculosis Laboratory Surveillance System (CTBLSS)

Alberta **(Alberta, Northwest Territories and Nunavut)**	*North*	Marguerite Lovgren Technical Supervisor National Centre for Streptococcus Provincial Laboratory of Public Health Dr. K. Kowalewska Mycobacteriology Program Director Provincial Laboratory of Public Health
	South	Cary Shandro Mycobacteriology Provincial Laboratory of Public Health (Microbiology) Edmonton, Alberta Dr. Peter Tilley Mycobacteriology Program Director Provincial Laboratory of Public Health Dr. Jutta Preiksaitis Director Provincial Laboratory of Public Health
British Columbia **(British Columbia and Yukon Territory)**		Dr. Mabel Rodrigues Section Supervisor Mycobacteriology BC Centre for Disease Control Dr. W.A. Black Medical Microbiologist BCCDC Laboratory Services Professor, Medical Microbiology, UBC Dr. Judy Isaac-Renton Director BCCDC Laboratory Services Professor, Medical Microbiology, UBC

Manitoba	Nancy Smart Senior Technologist Microbacteriology Joanne Lamarre Senior Technologist Microbacteriology Dr. Amin Kabani National Reference Centre for Mycobacteriology Federal Laboratories for Public Health Agency of Canada
New Brunswick **(see also Quebec)**	Phyllis Bennett Microbiology Laboratory Specialist Saint John Regional Hospital Dr. G. Hardy Medical Microbiologist Saint John Regional Hospital
Newfoundland and Labrador	Sandra B. March Newfoundland Public Health Labs L.A. Miller Centre for Health Services St. John's, Newfoundland Dr. S. Ratnam Director Newfoundland Public Health Labs L.A. Miller Centre for Health Services St. John's, Newfoundland
Northwest Territories **(see also Alberta and Quebec)**	Norine Fraley Supervisor – Bacteriology Stanton Territorial Health Authority Mr. Robin Greig Manager Therapeutic & Diagnostic Services Yellowknife, NWT

Nova Scotia **(Nova Scotia and Prince Edward Island)**	Carol Pelton – Chair Lab Tech II Microbiology Queen Elizabeth II Health Sciences Centre Halifax, NS Dr. David Haldane Director of Bacteriology and Special Pathogens Queen Elizabeth II Health Sciences Centre Halifax, NS Dr. K. Forward Head, Division of Microbiology Department of Pathology & Laboratory Medicine Queen Elizabeth II Health Sciences Centre Halifax, NS
Ontario	Pamela Chedore Head TB and Mycobacteriology Laboratory Central Public Health Laboratory Dr. Francis Jamieson Clinical Microbiologist Central Public Health Laboratory Joe Babu Regional Laboratory Hamilton General Hospital
Prince Edward Island **(see also Nova Scotia)**	Dr. L.P. Abbott Clinical Head Microbiology Dept. Lab Medicine Queen Elizabeth Hospital
Québec **(Quebec, New Brunswick, Northwest Territories and Nunavut)**	Louise Thibert Head Mycobacteriology Laboratoire de santé publique du Québec Institut national de santé publique du Québec Sainte-Anne-de-Bellevue, Québec Dr. Jean Joly Director Laboratoire de santé publique du Québec Institut national de santé publique du Québec Sainte-Anne-de-Bellevue, Québec

Saskatchewan	*North*	Colleen Foster TB Laboratory Clinical Microbiology Royal University Hospital M. Kanchana Director TB Laboratory Clinical Microbiology Royal University Hospital
	South	Evelyn Nagle Section Head, Bacteriology/Mycobacteriology Saskatchewan Health, Provincial Laboratory Dr. Greg Horsman Director Saskatchewan Health Laboratory and Disease Control Services Provincial Laboratory Regina, Saskatechwan
Federal		Dr. Edward Ellis Chief Tuberculosis Prevention and Control Centre for Infectious Disease Prevention and Control Dr. Amin Kabani National Reference Centre for Mycobacteriology Federal Laboratories for Public Health Agency of Canada Joyce Wolfe Head, Mycobacteriology Canadian Science Centre for Human and Animal Health

Appendix 3

Health Canada / Santé Canada

Serial No. - N° de série

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

FOR INTERNAL USE ONLY - POUR USAGE INTERNE SEULEMENT

Date Rec'd at TBPC: / Date de réception au LATB: Y / A | M | D / J

TBPC Number: / Numéro du LATB:

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

Specie: / Espèce :
- ☐ M. tuberculosis (may include M. africanum or M. microti) / (peut inclure M. africanum et M. microti)
- ☐ M. bovis
- ☐ M. BCG bovis
- ☐ MTB Complex (species unknown) / Complexe MTB (espèce inconnu)

Have susceptibility test results been previously reported for this patient? - Des résultats d'antibiogramme ont-ils déjà été fournis pour ce patient?

☐ No / Non ☐ 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 : ☐☐ (see code list) / (voir liste de codes)
2. Province / territory from which specimen originated: / Province / territoire d'où provient l'échantillon : ☐☐ (see code list) / (voir liste de codes)
3. Patient's date of birth: / Date de naissance du patient : Y / A | M | D / J (CCYY/MM/DD) / (SSAA/MM/JJ) ☐ Unknown / Inconnu
4. Patient's gender: / Sexe du patient : ☐ Male / Masculin ☐ Female / Féminin ☐ Unknown / Inconnu

PROV / TERR CODES PROV / TERR

10 =	NFLD / TN	46 =	MAN
11 =	PEI / IPÉ	47 =	SASK
12 =	NS / NÉ	48 =	ALTA / ALB
13 =	NB	59 =	BC / BC
24 =	QUÉ / Qc	60 =	YUK
35 =	ONT	61 =	NWT / TNO
		62 =	NUN

5. **LABORATORY RESULTS / RÉSULTATS DE LABORATOIRE**

Antituberculous Drugs / Agents Antituberculeux	**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) Sensitive / Sensible	Resistant / Résistant	Other (specify) / Autre (préciser)
SM (Streptomycin) / (Streptomycine)	mg / L	☐	☐	
INH (Isoniazid) / (Isoniazide)	mg / L	☐	☐	
RMP (Rifampin) / (Rifampicine)	mg / L	☐	☐	
EMB (Ethambutol)	mg / L	☐	☐	
PZA (Pyrazinamide)	mg / L	☐	☐	

2nd line drugs (specify) / Antibiotiques de 2e ligne (préciser)	**Concentration**	Sensitive / Sensible	Resistant / Résistant	Other (specify) / Autre (préciser)
1.	mg / L	☐	☐	
2.	mg / L	☐	☐	
3.	mg / L	☐	☐	
4.	mg / L	☐	☐	
5.	mg / L	☐	☐	
6.	mg / L	☐	☐	

6. **Comments - Commentaires**

HC/SC 9061 (07-2000)

Copy 1 (White) - Reporting Laboratory
Copie 1 (Blanche) - Laboratoire déclarant

Copy 2 (Yellow) - Tuberculosis Prevention and Control (TBPC)
Copie 2 (Jaune) - Lutte anti-tuberculeuse (LATB)