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Canada

Tuberculosis in Canada

2008 – 2018 Data

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GLOSSARY

AFR	African Region
AMR	American Region - Latin American
CNS	Central nervous system
CS	Correctional setting
CTBRS	Canadian Tuberculosis Reporting System
EMR	Eastern Mediterranean Region
ESRD	End-stage renal disease
EUR	European Region
FNIHB	First Nations and Inuit Health Branch
HIV	Human immunodeficiency virus
ICD	International Classification of Diseases
ISC	Indigenous Services Canada
LT	Long-term
PHAC	Public Health Agency of Canada
PR	Permanent resident
SEAR	South East Asian Region
TB	Tuberculosis
TR	Transplant-related
WHO	World Health Organization
WPR	Western Pacific Region
PE	Prince Edward Island
NS	Nova Scotia

GLOSSARY

NB	New Brunswick
NL	Newfoundland & Labrador
QC	Québec
ON	Ontario
SK	Saskatchewan
MB	Manitoba
AB	Alberta
BC	British Columbia
YT	Yukon Territory
NWT	Northwest Territories
NU	Nunavut

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CHAPTER 1

EXECUTIVE SUMMARY

Purpose of this report

This report provides the descriptive epidemiology of active tuberculosis (TB) disease in Canada from 2008 to 2018 with a specific focus on 2018, including the incidence of drug-resistant TB disease. Treatment outcomes, including the success rate of TB treatment from 2007 to 2017, are also examined.

Context

The Public Health Agency of Canada (PHAC) and Health Canada are collaborating with provincial and territorial governments and other federal departments and agencies to reduce the incidence of TB in Canada to no more than one case per 100,000 population by 2035 as per the *End TB Strategy* of the WHO for countries that were already reporting an incidence of less than 10 TB cases per 100,000 population in 2015 and/or earlier (1).

Methods

PHAC and provincial and territorial ministries of health monitor incident active TB disease through the Canadian Tuberculosis Reporting System (CTBRS), a national case-based surveillance system that collects and maintains non-nominal data on people diagnosed with incident active TB disease. Provincial and territorial public health authorities voluntarily submit data annually to the CTBRS regarding cases of TB that meet the surveillance case definition.

CTBRS data elements include:

- Diagnostic classification (respiratory *versus* non-respiratory)
- Demographic data (age, sex, ethnicity, country of birth and place of residence at time of diagnosis)
- Clinical information, e.g. medical co-morbidity (HIV, diabetes, end-stage renal disease, abnormal chest X-ray, transplant-related immunosuppression and corticosteroid use)
- Selected social determinants of health (e.g. housing and substance abuse)
- Other potential risk factors (e.g. contact with active TB disease and travel history to a high burden TB country)

Results

Active TB incidence in Canada has remained relatively unchanged over the past decade: 4.9 cases per 100,000 population in 2008 (*n*=1,642) versus 4.8 cases per 100,000 population in 2018 (*n*=1,797).

The rate of TB incidence in males has remained consistently higher than in females over the past decade. In 2018, there were 5.2 cases per 100,000 in males and 4.5 cases per 100,000 in females. Individuals aged 75 years and older had the highest rates with more pronounced gender differences: 7.5 cases per 100,000 in females and 13.0 per 100,000 in males.

Although Ontario (ON), Québec (QC), British Columbia (BC), Alberta (AB) and Manitoba (MB) together accounted for almost 90.0% (*n*=1,610) of the cases reported in 2018, the highest incidence of active TB disease (148.5 cases per 100,000 population) was reported in Nunavut (NU). The incidence rate in NU was also the highest in 2017, and was 45.0% higher than the rate in 2018 due to outbreaks experienced in some communities in the region. Among other jurisdictions, MB had the second highest rate of incident active TB disease (13.8 cases per 100,000), which was over ten times lower than the rate in NU. The overall trend of reported cases of incident active TB disease in other Canadian Territories remained low.

Most cases (73.1%; *n*=1,313) observed in 2018 were in individuals born outside of Canada (an incidence rate of 14.8 cases per 100,000). In comparison, the incidence rate for individuals born in Canada was 1.5 per 100,000. Indigenous populations remained as the group most affected by TB with rates as high as 194.3 cases per 100,000 in Inuit populations and 19.8 per 100,000 in First Nations populations living on reserve.

The majority of cases were diagnosed with respiratory TB, which accounted for over three-quarters (*n*=1,369) of cases, of which pulmonary TB was predominant (88.8%; *n*=1,215). TB of the peripheral lymph nodes was the most frequent diagnosis (53.8%; *n*=226) among cases with non-respiratory TB (*n*=420).

Risk factors for developing active TB disease were inconsistently reported. Of all risk factors reported, completion rate of HIV status was the highest; HIV status was reported in 1,203 (66.9%) cases among which 3.5% were HIV-positive.

Mono-, poly-, multi-drug resistant (MDR) and extensively drug resistant (XDR) TB (**Table 32**) was detected in 8.3% (*n*=121), 0.3% (*n*=5), 1.4% (*n*=21) and 0.07% (*n*=1) respectively of the 1,459 individual isolates subjected to susceptibility testing.

Surveillance data on the outcome of TB treatment in 2017 suggested a success rate of 80.3% (*n*=1,484) and an overall fatality rate of 4.9% (*n*=90). Approximately two thirds (*n*=145) of the remaining 216 cases were still following their respective prescribed treatments at the time of data collection while the other third (*n*=71) was lost to follow-up.

Conclusion

From 2008 to 2018, the annual incidence of active TB disease in Canada remained unchanged. The majority of reported cases were in individuals born outside Canada; however, Inuit and First Nations communities continued to be disproportionately affected. Achieving TB elimination as per the End TB Strategy of the WHO, which Canada has endorsed, will require a multi-pronged, collaborative approach, as noted in the 2018 Chief Public Health Officer (CPHO) report on eliminating TB in Canada[1]. The approach necessitates the continued collaboration and coordination of TB surveillance and programmatic areas, and sustained engagement with communities by all levels of government national, to tailor interventions that help address inequities and improve the monitoring, prevention, diagnosis, and treatment of TB. In particular, the effective and ongoing linkage of TB surveillance and programmatic responses can help to: (i) identify the factors associated with the persistence of TB outbreaks in Canada and the predictors of active TB disease in individuals migrating to Canada; (ii) inform the tailoring of programmatic interventions/strategies to address TB and social inequities for specific groups, and (iii) monitor the progress of these efforts and evaluate their effectiveness.

As noted in the 2018 CPHO report on TB, the solutions to this complex disease will be driven by the communities themselves, with sustained support from many players, including governments, academics, experts and other stakeholders.

[1] https://www.canada.ca/content/dam/phac-aspc/documents/corporate/publications/chief-public-health-officer-reports-state-public-health-canada/eliminating-tuberculosis/PHAC_18-086_TB_Report_E_forwebcoding.pdf

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CHAPTER 2

INTRODUCTION

Tuberculosis (TB) is the leading infectious cause of mortality and one of the top ten causes of death worldwide (2). The WHO estimates that the diagnosis and successful treatment of TB have saved 58 million lives during the last decade; however, persistent gaps in detection and treatment remain. Of the estimated ten million people who developed active TB disease in 2018, the WHO estimates that only 70% were officially reported to national authorities.

In 2015, the *End TB Strategy* of the WHO recommended a 90% global reduction in TB incidence rates and a 95% reduction in TB-related deaths by 2035 (1). This major commitment to end the global burden of TB includes multiple key priorities, such as government stewardship and accountability. Adapting the *Strategy's* targets to the specific needs of each country will require ongoing monitoring and evaluation. In *Towards TB elimination: An action framework for low-incidence countries*, the WHO provided guidance on how to reduce active TB rates toward elimination levels (defined as 0.1 cases per 100,000 individuals) for countries, including Canada, which was among those that were already reporting an incidence of less than 100 TB cases per million in 2015 and/or earlier (3).

When looked at as a whole, Canada meets the criteria of a low-incidence country for TB disease because its national TB rate has not exceeded 5.0 cases per 100,000 population in the last decade. However, in some Canadian population subgroups and specific regions, the TB incidence rate is consistently higher than the global low-incidence threshold average of ten or fewer TB cases per 100,000 persons (4).

This report provides a descriptive overview of TB cases in Canada in 2018 stratified by age, sex, country of birth, place of residence, diagnostic classification and various risk factors. The report also provides a comparative overview of data collected from Canadian jurisdictions on an annual basis from 2008 to 2018.

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CHAPTER 3

METHODS

PHAC nationally receives reports of new and re-treatment cases of active TB in partnership with provincial and territorial health authorities. The Canadian Tuberculosis Reporting System (CTBRS) provides the reporting forms, protocol and electronic platform to systematically collect and transfer non-nominal data about cases that meet the established surveillance case definition. Data submitted include limited demographic and clinical information, as well as details about treatment outcomes.

The CTBRS provides an electronic platform for data transfer from participating jurisdictions to PHAC; however, six of the 13 Canadian jurisdictions submit paper reports (see Appendix A for CTBRS Case Reporting Form). Data received in paper form are collated and entered into the CTBRS electronic database.

The following data elements are recorded for all participating jurisdictions:

- Age
- Sex
- Country of birth
- Indigenous identity (Inuit, First Nations, or Métis)
- Place of residence at the time of diagnosis
- Immigration status and country of birth
- Diagnostic classification (respiratory or non-respiratory)
- TB history (new or re-treatment case)
- Case ascertainment method
- Risk factors, including HIV, contact with an active TB case, diabetes mellitus type 1 or 2, end-stage renal disease, homelessness, living in a correctional setting, long-term corticosteroid use, substance abuse, an abnormal chest x-ray, transplant-related immunosuppression and travel to a high-incidence TB country

Active cases are defined as new or re-treatment cases confirmed through a clinical diagnosis or laboratory test as per **Table 1**, with the diagnostic classification based on the International Classification of Diseases (ICD) (5), which categorizes active TB into respiratory and non-respiratory, as illustrated in **Table 2**.

Table 1: CTBRS case definition and diagnostic criteria as per the Canadian Tuberculosis Standards

CTBRS CASE DEFINITION	**New TB Case**	No documented evidence or adequate history of previously active TB
	Re-treatment TB case	The following criteria must be met: • Documented evidence or adequate history of previously active TB that was declared cured or treatment completed by current standards; and • At least six months have passed since the last day of previous treatment; and • Diagnosed with a subsequent episode of TB that meets the case definition for active TB
		OR
		The following criteria must be met: • Documented evidence or adequate history of previously active TB that cannot be declared cured or treatment completed by current standards; and • Inactive for six months or longer after the last day of previous treatment; and • Diagnosed with a subsequent episode of TB that meets the active TB case definition
CTRBS CASE DIAGNOSTIC	**Clinical Case of TB**	Microbiological confirmation of active TB is absent, but the following criteria are present: • Signs or symptoms clinically compatible with active TB • Diagnostic imaging findings compatible with active TB • Pathologic evidence of active TB • Post-mortem evidence of active TB • Favourable response to a therapeutic trial of anti-TB drugs
	Laboratory confirmed TB Case	Culture-positive to *Mycobacterium TB* complex (excluding *Mycobacterium bovis* BCG strain)
		OR
		Positive nucleic acid amplification test to *Mycobacterium TB* complex (excluding *Mycobacterium bovis* BCG strain) PLUS Clinical findings consistent with TB disease

Table 2: CTBRS diagnostic classification as defined in the Canadian Tuberculosis Standards (6)

Case description	First level description	Second level description	ICD codes (5)	
			ICD-9	ICD-10
RESPIRATORY TB CASE	**Primary**	• Tuberculous pleurisy in primary progressive TB • Primary respiratory TB	• 010 • 010.0 - 010.1 • 010.8 - 010.9	• A15 • A15.1 - A15.3 • A15.6 - A15.7

	Pulmonary	• Tuberculosis of the lungs and conducting airways:
		  • Tuberculous fibrosis of the lung
		  • Tuberculous bronchiectasis
		  • Tuberculous pneumonia
		  • Tuberculous pneumothorax
		  • Isolated tracheal or bronchial TB
		  • Tuberculous laryngitis
			• 011
			• 011.0 - 011.9
				• A15.0
				• A15.5
				• A16
				• A16.0 - A16.9

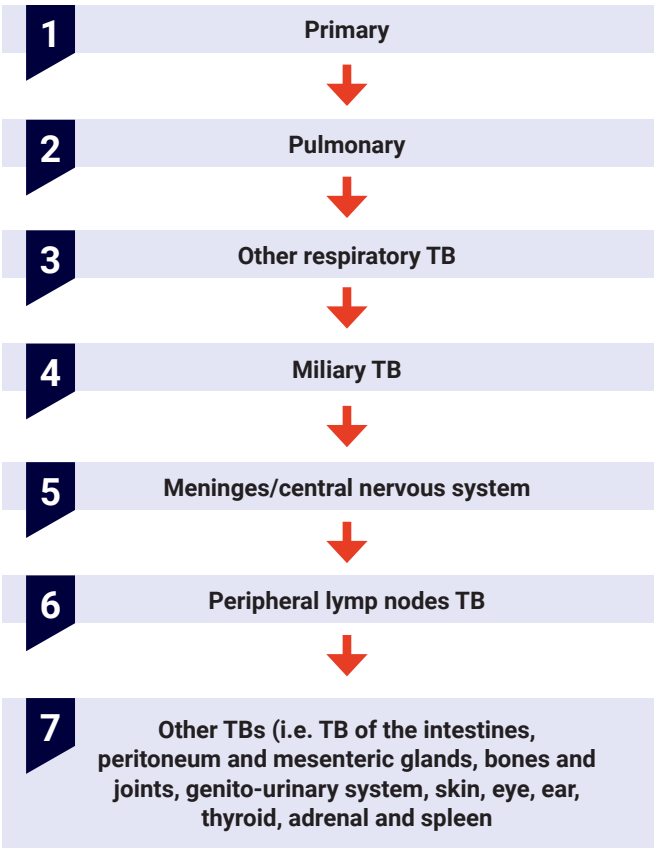
	Other respiratory	• Tuberculous pleurisy (non-primary),
		• TB disease located within
		  • intrathoracic lymph nodes
		  • mediastinum
		  • nasopharynx
		  • nose (septum)
		  • sinus (any nasal)
			• 012
			• 012.0 - 012.3
			• 012.8
				• A15
				• A15.8
				• A15.9

NON-RESPIRATORY TB CASE	**Miliary**	• TB disseminated throughout the body	• 018 • 018.8 • 018.9	• A19 • A19.0 - A19.2 • A19.8 - A19.9
	Central nervous system (CNS) and meninges	• TB of CNS and meninges	• 013 • 013.0 - 013.3 • 013.8 - 013.9	• A17 • A17.1 • A17.8 - A17.9
	Peripheral lymph nodes	• TB of peripheral lymph nodes	• 017.2	• A18.2

	Other non-respiratory	• TB located in:
		  • intestines
		  • peritoneum and mesenteric glands
		  • bones and joints
		  • genito-urinary system
		  • skin
		  • eye
		  • ear
		  • thyroid
		  • adrenal
		  • spleen
		  • esophagus
			• 014
			• 014.0 - 014.1
			• 014.8
			• 015
			• 015.0 - 015.2
			• 015.5 - 015.9
			• 016
			• 016.0
			• 016.4
			• 016.7
			• 016.9
			• 017
			• 017.0 - 017.1
			• 017.3 - 017.8
				• A18
				• A18.0
				• A18.3 - A18.8

For TB cases with multiple diagnostic sites, the placement of the case into a disease group was determined using the hierarchy presented in **Figure 1**.

Figure 1: Diagnostic classification hierarchy when multiple types of TB are diagnosed in one individual



Example:

A case diagnosed with TB of the peripheral lymph nodes (scrofula, scrofulous abscess, tuberculous adenitis: ICD-9 17.2) and infiltrative TB of the lung (pulmonary; ICD-9 11.0) would be classified as pulmonary TB.

Data were cleaned and analysed using *SAS Enterprise Guide 7.1* (Cary, North Carolina, United States [US]) and *Microsoft Excel 2010* (Redmond, Washington, US). Population denominators for the Canadian-born population were derived by subtracting the population born outside Canada from the total Canadian population using Statistics Canada data. Incidence rates in the Canadian populations, including those born outside Canada, were based on population estimates derived from the Canadian census. Current and historical incidence rates for First Nations populations with status were based on population projections from the department of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) and Indigenous Services Canada (ISC).

Statistical analyses were limited to descriptive statistics. No statistical methods were applied to account for missing data. Chi-squared-tests or Fisher-Irwin tests were used to conduct comparative analyses between proportions as recommended by Campbell (2007) and Richardson (2011) (7, 8).

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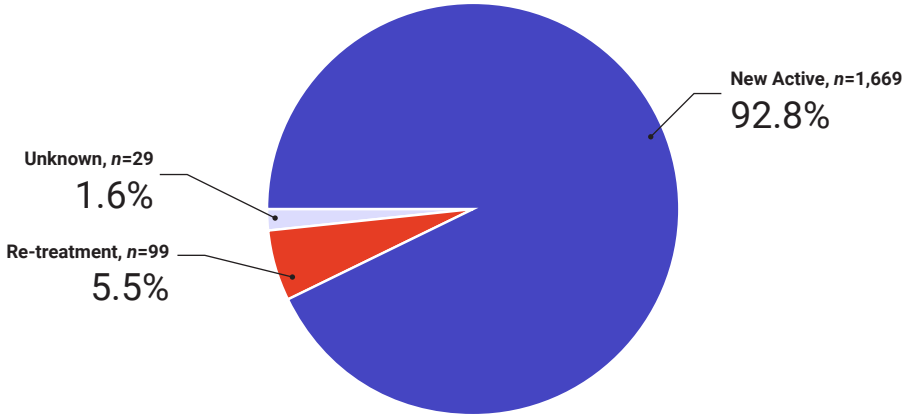
CHAPTER 4

RESULTS

Diagnostic characteristics and demographic profile

The number of TB cases reported annually to the CTBRS increased from 1,642 in 2008 to 1,797 in 2018. However, the corresponding rates of incident active TB disease remained relatively unchanged during this period, fluctuating between 4.6 and 5.0 cases per 100,000 population, with the lowest rate reported in 2014 and 2015 and the highest in 2017. Of the 1,797 cases reported in 2018, 92.8% (*n*=1,669) were new active cases and 5.5% (*n*=99) were re-treatment cases (**Figure 2**).

Figure 2: Reported cases of incident (new and re-treatment) active TB, CTBRS: 2018

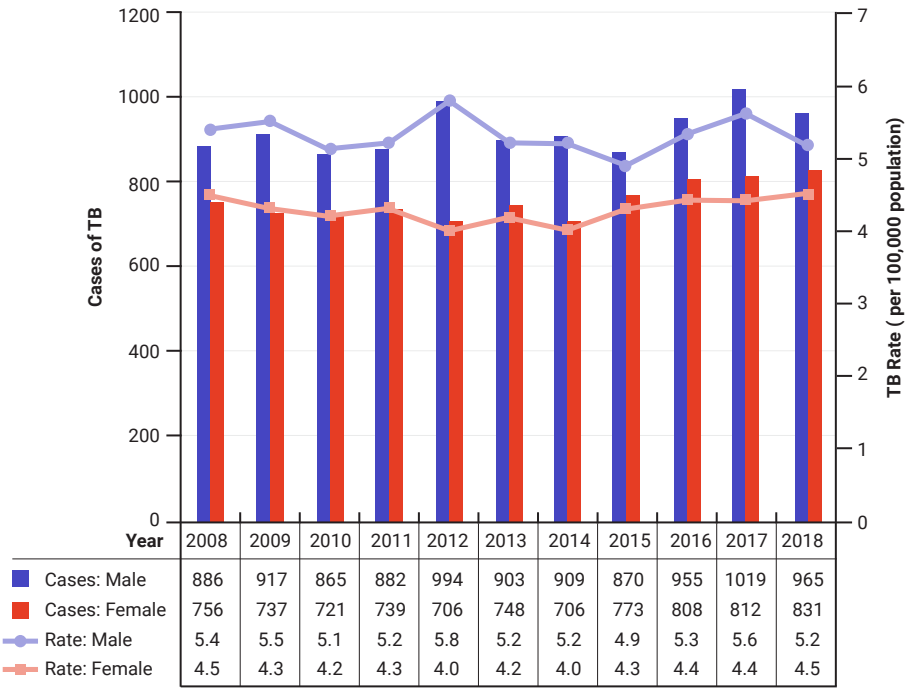


> Over 94.0% of cases of incident active TB disease reported in 2018 were in individuals 15 years of age or older.

Sex and age

The incidence of active TB disease remained slightly higher in men than in women over the past decade, although the difference has not been statistically significant (p>0.05). In 2018, the incidence in men was 5.2 per 100,000 population compared to 4.5 per 100,000 population for women (**Figure 3**).

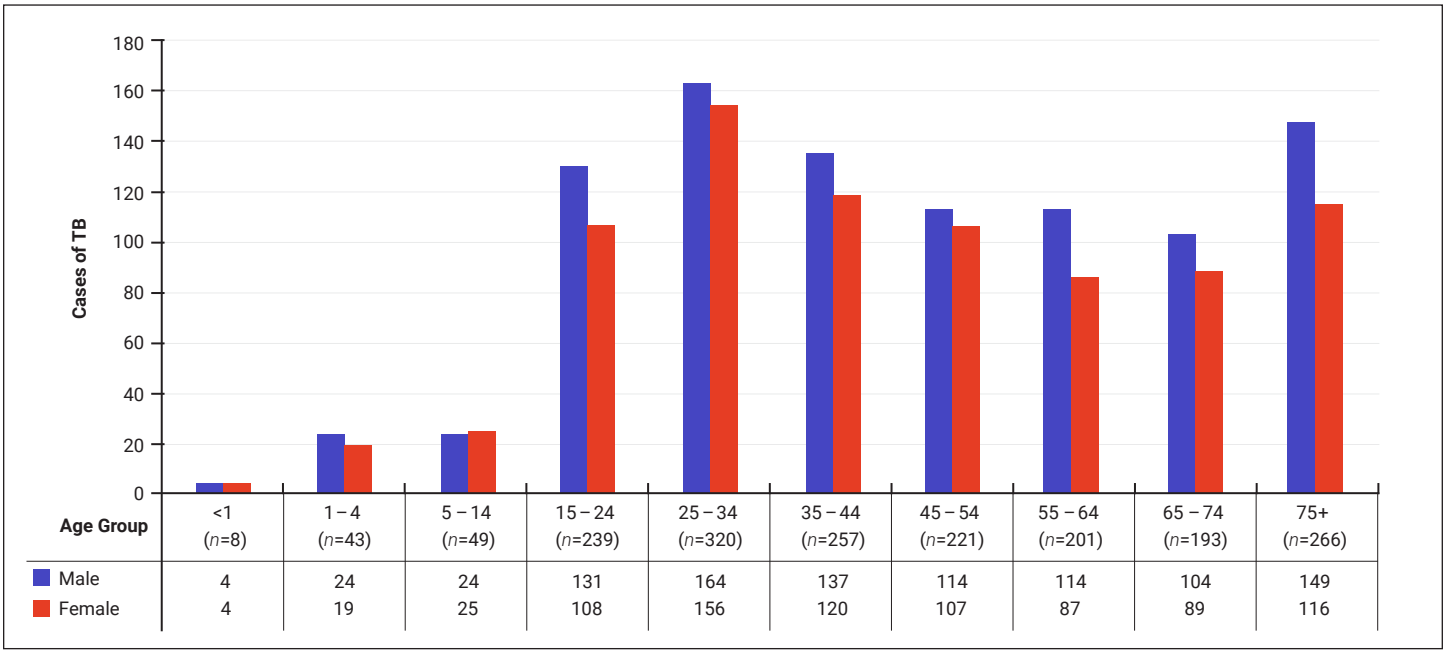
Figure 3: Reported number and rate (per 100,000 population) of incident active TB disease, CTBRS: 2008 – 2018



Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Cases: Male	886	917	865	882	994	903	909	870	955	1019	965
Cases: Female	756	737	721	739	706	748	706	773	808	812	831
Rate: Male	5.4	5.5	5.1	5.2	5.8	5.2	5.2	4.9	5.3	5.6	5.2
Rate: Female	4.5	4.3	4.2	4.3	4.0	4.2	4.0	4.3	4.4	4.4	4.5

Over 94.0% of cases of incident active TB disease reported in 2018 were in individuals 15 years of age or older (**Figure 4**). Children less than 15 years of age accounted for fewer cases (**Figure 4**); a pattern that has been consistent over the past decade (**Table 3**).

Figure 4: Reported cases of incident active TB disease by sex and age group, CTBRS: 2018



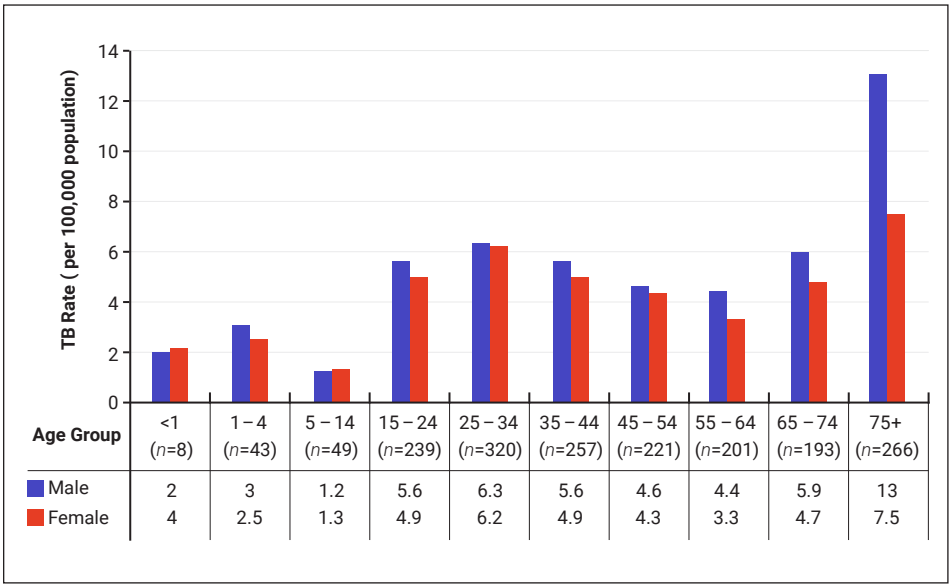
Similar to previous years, the distribution of reported cases across different age groups was bimodal. Individuals aged 25 to 34 years accounted for the largest proportion of cases at 17.8% (*n*=320) (**Table 3**), followed by those 75 years of age or older, which accounted for 14.8% (*n*=266).

Table 3: Distribution of cases of incident active TB disease across different age groups over time, CTBRS: 2008 – 2018

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Age	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
<1	8 (0.5%)	10 (0.6%)	9 (0.6%)	13 (0.8%)	9 (0.5%)	13 (0.8%)	11 (0.7%)	10 (0.6%)	8 (0.5%)	17 (0.9%)	8 (0.4%)
1-4	30 (1.8%)	33 (2.0%)	27 (1.7%)	33 (2.0%)	50 (2.9%)	38 (2.3%)	33 (2.0%)	40 (2.4%)	41 (2.3%)	39 (2.1%)	43 (2.4%)
5-14	50 (3.0%)	46 (2.8%)	39 (2.5%)	40 (2.5%)	54 (3.2%)	61 (3.7%)	33 (2.0%)	46 (2.8%)	41 (2.3%)	66 (3.6%)	49 (2.7%)
15-24	204 (12.4%)	232 (14.0%)	201 (12.7%)	216 (13.3%)	239 (14.1%)	209 (12.7%)	196 (12.1%)	196 (11.9%)	229 (13.0%)	247 (13.5%)	239 (13.3%)
25-34	298 (18.1%)	297 (18.0%)	282 (17.8%)	297 (18.3%)	296 (17.4%)	269 (16.3%)	288 (17.8%)	281 (17.1%)	342 (19.4%)	315 (17.2%)	320 (17.8%)
35-44	281 (17.1%)	294 (17.8%)	272 (17.2%)	251 (15.5%)	269 (15.8%)	244 (14.8%)	241 (14.9%)	247 (15.0%)	245 (13.9%)	269 (14.7%)	257 (14.3%)
45-54	231 (14.1%)	232 (14.0%)	214 (13.5%)	224 (13.8%)	234 (13.8%)	238 (14.4%)	222 (13.7%)	212 (12.9%)	204 (11.6%)	216 (11.8%)	221 (12.3%)
55-64	166 (10.1%)	177 (10.7%)	176 (11.1%)	168 (10.4%)	155 (9.1%)	189 (11.4%)	198 (12.3%)	187 (11.4%)	195 (11.1%)	195 (10.6%)	201 (11.2%)
65-74	170 (10.4%)	142 (8.6%)	149 (9.4%)	173 (10.7%)	178 (10.5%)	169 (10.2%)	162 (10.0%)	174 (10.6%)	188 (10.7%)	197 (10.8%)	193 (10.7%)
>75+	204 (12.4%)	191 (11.5%)	217 (13.7%)	206 (12.7%)	216 (12.7%)	221 (13.4%)	231 (14.3%)	250 (15.2%)	270 (15.3%)	270 (14.7%)	266 (14.8%)

Rates of occurrence in men were marginally higher in all age groups, except for children under one year of age and five to 14 years of age (**Figure 5**). The largest discrepancy was seen in the oldest age group (75 years and older), where there were 13.0 cases per 100,000 population for males compared to (p>0.05) 7.5 per 100,000 for females.

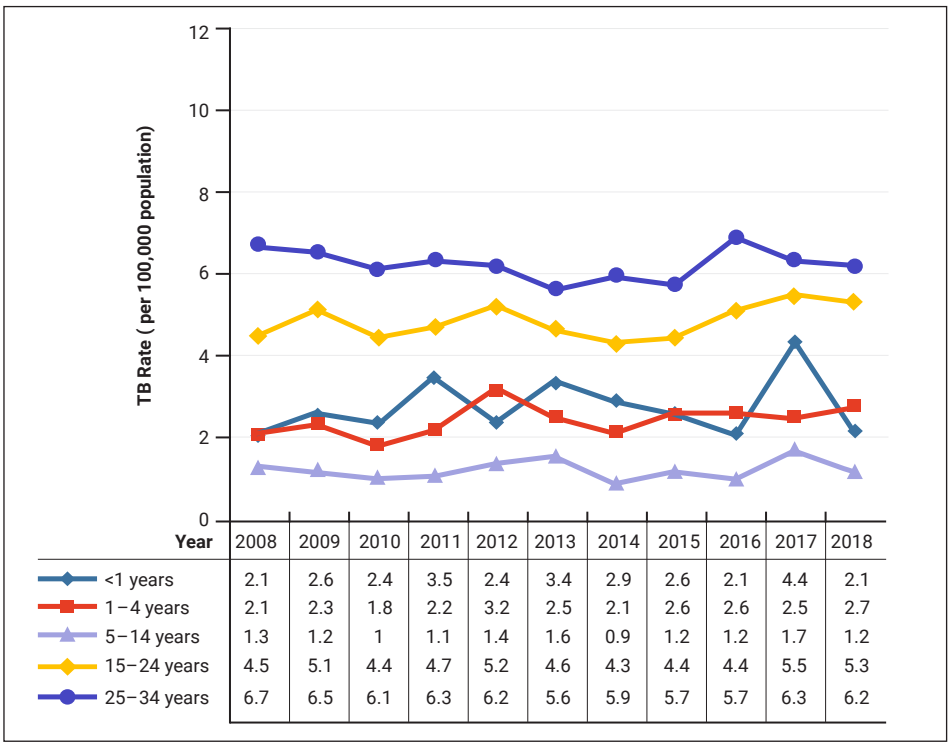
Figure 5: Rate of reported incident active TB disease (per 100,000 population) by sex and age group, CTBRS: 2018



Age Group	<1 (*n*=8)	1 – 4 (*n*=43)	5 – 14 (*n*=49)	15 – 24 (*n*=239)	25 – 34 (*n*=320)	35 – 44 (*n*=257)	45 – 54 (*n*=221)	55 – 64 (*n*=201)	65 – 74 (*n*=193)	75+ (*n*=266)
Male	2	3	1.2	5.6	6.3	5.6	4.6	4.4	5.9	13
Female	4	2.5	1.3	4.9	6.2	4.9	4.3	3.3	4.7	7.5

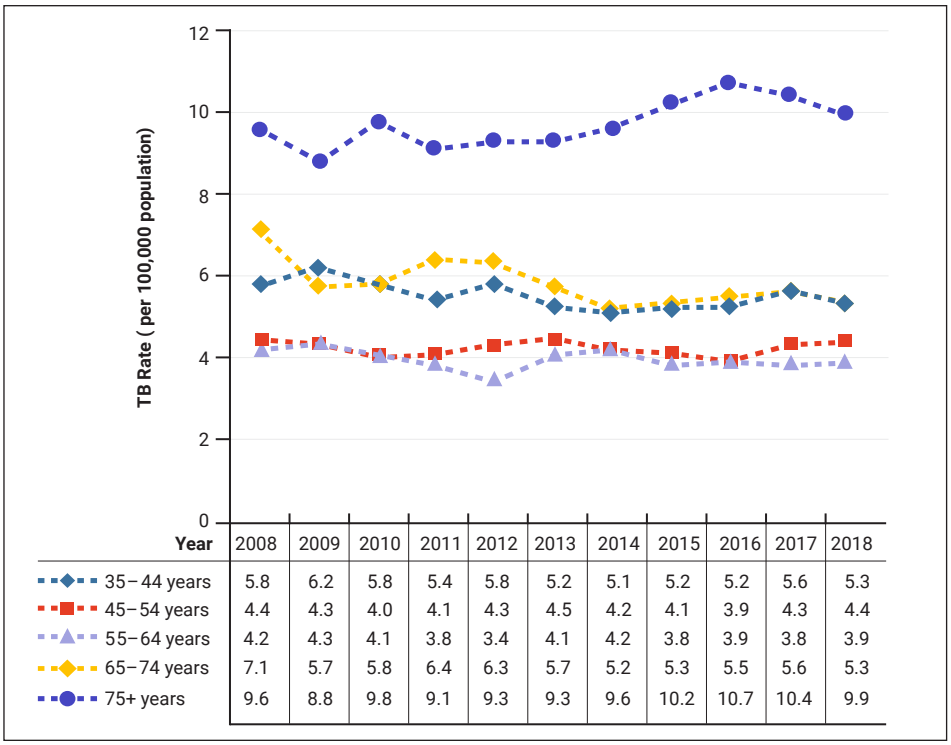
Over the past decade, active TB incidence remained relatively stable in all age groups. Cases aged 75 years and older had the highest ($p<0.05$) rates ranging from 8.8 to 10.7 cases per 100,000 population (**Figure 6**) during the past decade.

Figure 6A: Rate of reported incident active TB disease over time by age group, CTBRS: 2008-2018— Less than 35 years of age



Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
<1 years	2.1	2.6	2.4	3.5	2.4	3.4	2.9	2.6	2.1	4.4	2.1
1–4 years	2.1	2.3	1.8	2.2	3.2	2.5	2.1	2.6	2.6	2.5	2.7
5–14 years	1.3	1.2	1	1.1	1.4	1.6	0.9	1.2	1.2	1.7	1.2
15–24 years	4.5	5.1	4.4	4.7	5.2	4.6	4.3	4.4	4.4	5.5	5.3
25–34 years	6.7	6.5	6.1	6.3	6.2	5.6	5.9	5.7	5.7	6.3	6.2

Figure 6B: Rate of reported incident active TB disease over time by age group, CTBRS: 2008-2018— 35 years of age and older

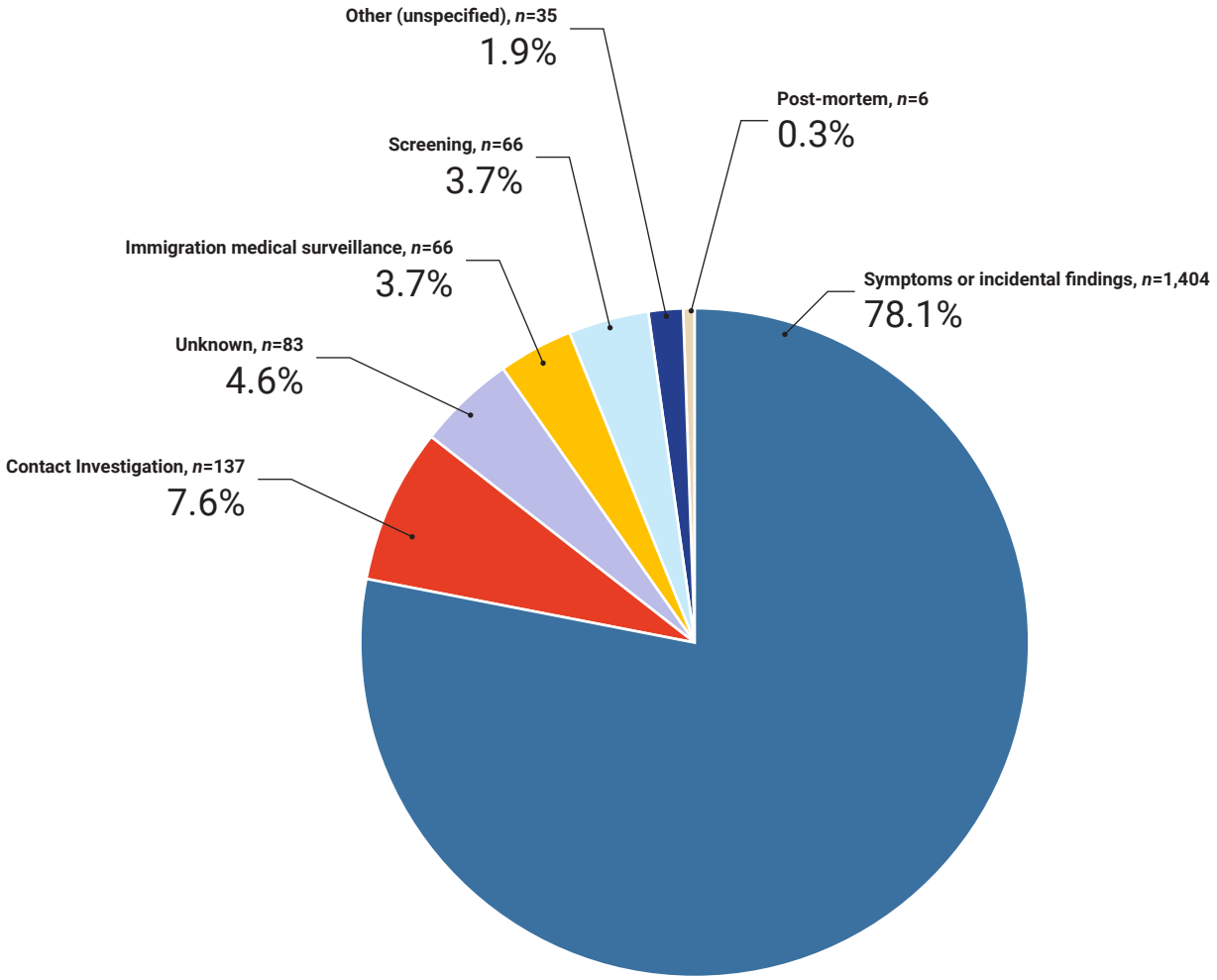


Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
35–44 years	5.8	6.2	5.8	5.4	5.8	5.2	5.1	5.2	5.2	5.6	5.3
45–54 years	4.4	4.3	4.0	4.1	4.3	4.5	4.2	4.1	3.9	4.3	4.4
55–64 years	4.2	4.3	4.1	3.8	3.4	4.1	4.2	3.8	3.9	3.8	3.9
65–74 years	7.1	5.7	5.8	6.4	6.3	5.7	5.2	5.3	5.5	5.6	5.3
75+ years	9.6	8.8	9.8	9.1	9.3	9.3	9.6	10.2	10.7	10.4	9.9

Diagnostic method

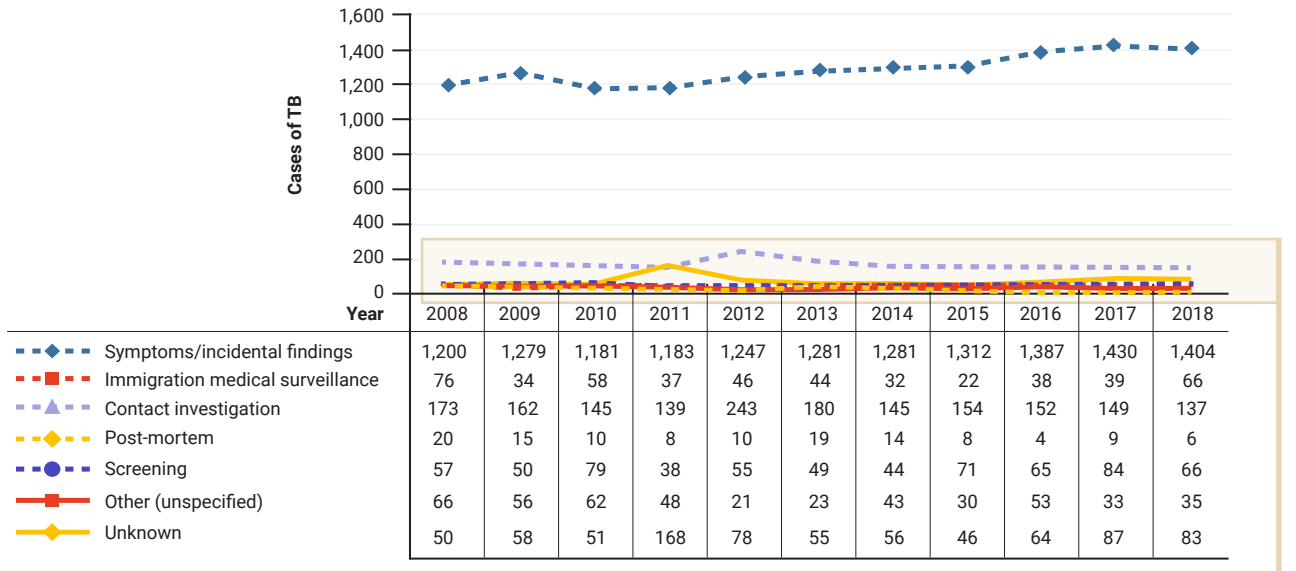
The majority (78.1%; *n*=1,404) of incident active TB cases reported in 2018 were detected through reported symptoms or incidental findings consistent with active TB disease. Contact investigation (7.6%; *n*=137), screening (3.7%; *n*=66), immigration medical surveillance (3.7%; *n*=66) and post-mortem analysis (0.3%, *n*=6) were the detection methods used to identify the remaining cases. About 1.9% (*n*=35) of the cases were detected by methods not captured in the current case report form, and the information related to the detection method was missing for 4.6% (*n*=83) of the cases (**Figure 7**).

Figure 7: Reported cases of incident active TB disease by method of detection, CTBRS: 2018

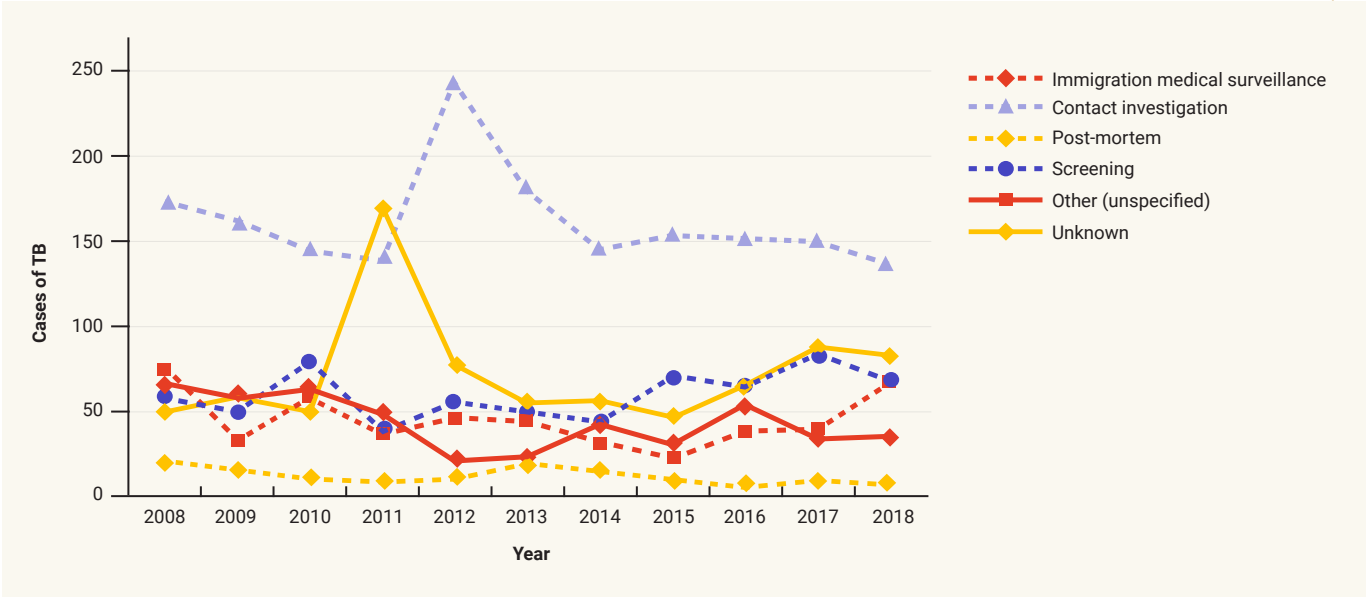


The percentage of reported cases identified through reported symptoms (i.e. investigation with a health care professional) and incidental findings increased from 73.0% (*n*=1,200 of a total 1,642 cases) in 2008 to 78.1% (*n*=1,404) in 2018. In contrast, the percentage of reported cases identified through contact investigation (**Figure 8**) decreased from 10.5% (*n*=173) to 7.6% (*n*=137) during the same time period. Details on case ascertainment for specific jurisdictions over time can be found in **Appendix C — Section I**.

Figure 8: Reported cases of incident active TB disease by method of detection, CTBRS: 2008 – 2018



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Symptoms/incidental findings	1,200	1,279	1,181	1,183	1,247	1,281	1,281	1,312	1,387	1,430	1,404
Immigration medical surveillance	76	34	58	37	46	44	32	22	38	39	66
Contact investigation	173	162	145	139	243	180	145	154	152	149	137
Post-mortem	20	15	10	8	10	19	14	8	4	9	6
Screening	57	50	79	38	55	49	44	71	65	84	66
Other (unspecified)	66	56	62	48	21	23	43	30	53	33	35
Unknown	50	58	51	168	78	55	56	46	64	87	83



Type of tuberculosis

As in previous years, the majority (67.6%; n=1,215) of cases reported in 2018 across all Canadian jurisdictions were diagnosed with pulmonary TB (**Tables 4 and 5**) with a significantly higher proportion of cases identified in males (55.6%; n= 675) than in females (44.4%; n=539)[2].

Table 4: Reported cases of incident active TB disease by main diagnostic sites, CTBRS: 2018

	Diagnostic Sites	Male	Female	Total
		n(%)	n(%)	n(%)
RESPIRATORY TB CASE	Primary	20 (1.1%)	20 (1.1%)	40 (2.2%)
	Pulmonary	675 (37.6%)	539 (30.0%)	1,215 (67.6%)
	Pleurisy	49 (2.7%)	22 (1.2%)	71 (4.0%)
	Intrathoracic lymph nodes	9 (0.5%)	12 (0.7%)	21 (1.2%)
	Other respiratory	12 (0.7%)	10 (0.6%)	22 (1.2%)
	Subtotal	**765 (42.6%)**	**603 (33.6%)**	**1,369 (76.2%)**
NON-RESPIRATORY TB	Miliary	8 (0.4%)	6 (0.3%)	14 (0.8%)
	CNS and meninges	13 (0.7%)	11 (0.6%)	24 (1.3%)
	Peripheral lymph nodes	98 (5.5%)	128 (7.1%)	226 (12.6%)
	Intestines, peritoneum mesenteric glands	18 (1.0%)	19 (1.1%)	37 (2.1%)
	Bones and joints	18 (1.0%)	18 (1.0%)	36 (2.0%)
	Genito-urinary system	5 (0.3%)	7 (0.4%)	12 (0.7%)
	Other specified organs [3]	9 (0.5%)	10 (0.6%)	19 (1.1%)
	Other non-respiratory	26 (1.4%)	26 (1.4%)	52 (2.9%)
	Subtotal	**195 (10.9%)**	**225 (12.5%)**	**420 (23.4%)**
UNKNOWN	Diagnostic site unknown	**5 (0.3%)**	**3 (0.2%)**	**8 (0.4%)**
Total TB cases reported in 2018		**965 (53.7%)**	**831 (46.2%)**	**1,797 (100%)**

Among non-respiratory cases (**Table 4**), TB of the peripheral lymph nodes accounted for the majority of cases (53.8%; *n*=226), followed by TB of the intestines, peritoneum and mesenteric glands (8.8%; *n*=37); bones and joints (8.6%; *n*=36); and central nervous system (CNS) and meninges (5.7%; *n*=24).

[2] Sex not provided for one individual who was diagnosed with pulmonary TB.

[3] Other specified organs refer to endocardium, myocardium, oesophagus, pericardium and thyroid gland.

Table 5: Diagnostic classification of reported incident cases of active TB disease across Canadian jurisdictions, CTBRS: 2018[4]

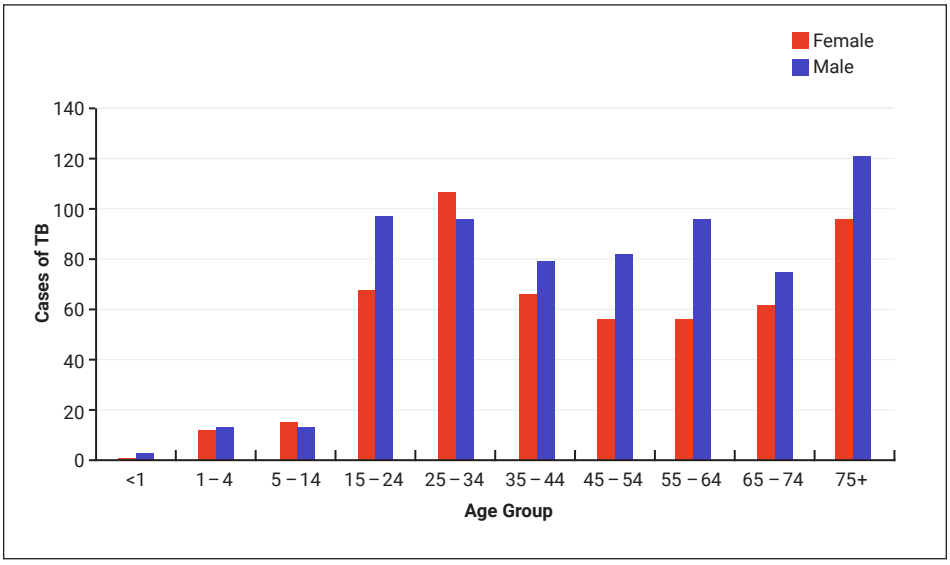
	Diagnostic sites	NL	PE	NS	NB	QC	ON	MB	SK	AB	BC	YT	NWT	NU	Total
RESPIRATORY TB CASE	Primary	0	0	0	0	1	9	18	6	4	0	0	0	2	40
	Pulmonary	26	1	4	3	199	437	123	49	115	202	3	3	50	1,215
	Pleurisy	0	0	0	0	2	29	8	5	18	9	0	0	0	71
	Intrathoracic lymph nodes	0	0	0	0	12	0	0	2	7		0	0	0	21
	Other respiratory	0	0	0	0	8	9	1	0	1	1	0	0	2	22
	Subtotal	**26**	**1**	**4**	**3**	**222**	**484**	**150**	**62**	**145**	**212**	**3**	**3**	**54**	**1,369**
NON-RESPIRATORY TB	Miliary	0	0	0	0	1	7	0	1	2	2	0	0	1	14
	CNS and meninges	0	0	0	0	1	8	3	1	9	2	0	0		24
	Peripheral lymph nodes	0	0	2	2	24	99	19	9	34	35	0	0	2	226
	Intestines, peritoneum mesenteric glands	1	0	0	0	9	10	4	2	9	2	0	0	0	37
	Bones and joints	0	0	1	0	7	16	6	1	4	1	0	0	0	36
	Genito-urinary system	0	0	0	0	5	7	0	0	0	0	0	0	0	12
	Other specified organs [5]	0	0	0	0	1	18	0	0	0	0	0	0	0	19
	Other non-respiratory	0	0	0	1	3	10	5	3	16	14	0	0	0	52
	Subtotal	**1**	**0**	**3**	**3**	**51**	**175**	**37**	**17**	**74**	**56**	**0**	**0**	**3**	**420**
Total TB cases reported in 2018		**27**	**1**	**7**	**6**	**273**	**659**	**187**	**79**	**219**	**268**	**3**	**3**	**57**	**1,789**

[4] Diagnostic classification was missing for eight cases.

[5] Other specified organs refer to endocardium, myocardium, oesophagus, pericardium and thyroid gland.

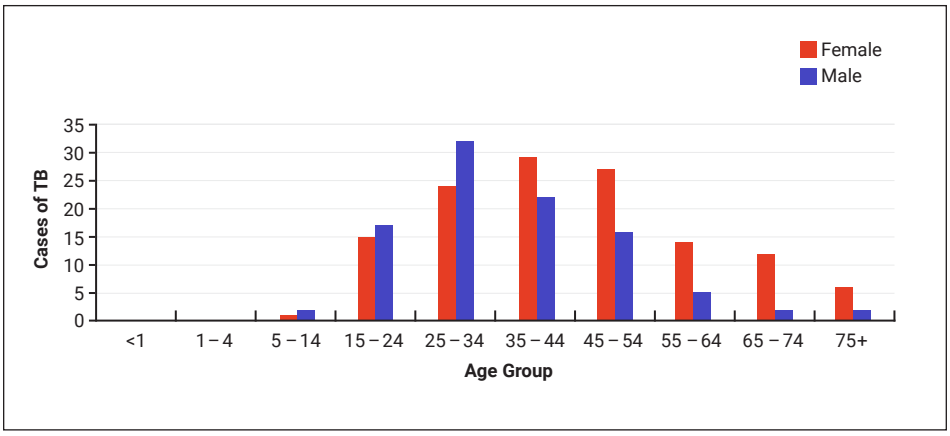
Pulmonary TB was identified frequently across all age groups over 15 years of age, with the greatest number of cases detected in those over age 74 years (**Figure 9**).

Figure 9: Reported cases of pulmonary TB (*n*=1,215) by age group, CTBRS: 2018[6]



TB in the peripheral lymph nodes was identified most frequently in the 25 to 34 year old age group with decreased frequencies at the extremes of the age groups (**Figure 10**).

Figure 10: Incident TB of peripheral lymph nodes (*n*=226) by age group, CTBRS: 2018



[6] Sex not identified for one individual aged 75 years or older.

Ethnicity and place of birth

About 73.1% (*n*=1,313) of incident active TB cases reported in 2018 were in individuals born outside Canada, 3.1% (*n*=56) of cases provided no information on place of birth and the remaining 23.8% (*n*=428) were Canadians by birth (**Table 6**). Pulmonary TB was the most common diagnosis regardless of place of birth (**Table 6**). The ratio of respiratory TB to non-respiratory was three to one (3:1) among TB cases in individuals born outside Canada reported in 2018 and nine to one (9:1) among Canadian-born cases (**Table 6**).

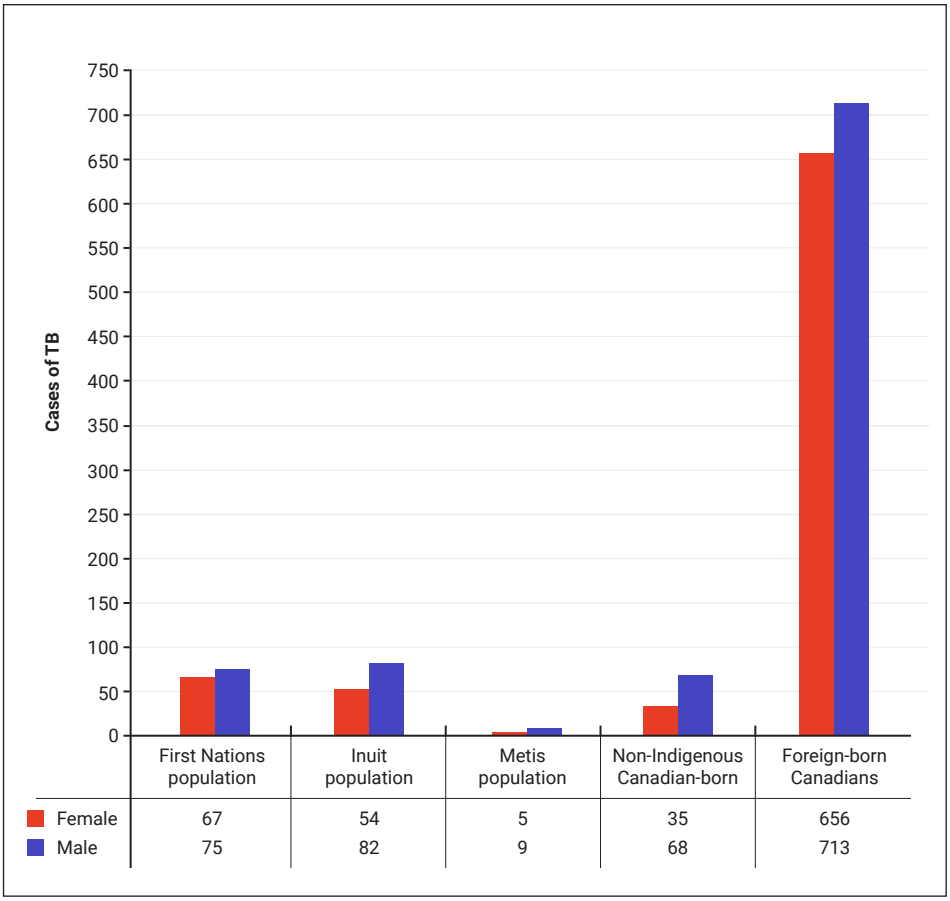
Table 6: Reported cases of incident active TB disease by place of birth, CTBRS: 2018

	Diagnostic Sites	Canadian-born		Born outisde Canada		Unknown		Total	
		n	(%)	n	(%)	n	(%)	n	(%)
RESPIRATORY TB CASE	Primary	20	(1.1%)	10	(0.6%)	10	(0.6%)	40	(2.2%)
	Pulmonary	343	(19.1%)	840	(46.7%)	28	(1.6%)	1,211	(67.4%)
	Pleurisy	12	(0.7%)	58	(3.2%)	3	(0.2%)	73	(4.1%)
	Intrathoracic lymph nodes	2	(0.1%)	19	(1.1%)	0	(0.0%)	21	(1.2%)
	Other respiratory	4	(0.2%)	16	(0.9%)	2	(0.1%)	22	(1.2%)
	Subtotal	**381**	**(21.2%)**	**943**	**(52.5%)**	**43**	**(2.4%)**	**1,367**	**(76.1%)**
NON-RESPIRATORY TB	Miliary	4	(0.2%)	9	(0.5%)	1	(0.1%)	14	(0.8%)
	CNS and meninges	6	(0.3%)	18	(1.0%)	0	(0.0%)	24	(1.3%)
	Peripheral lymph nodes	18	(1.0%)	205	(11.4%)	3	(0.2%)	226	(12.6%)
	Intestines, peritoneum mesenteric glands	4	(0.2%)	33	(1.8%)	0	(0.0%)	37	(2.1%)
	Bones and joints	2	(0.1%)	30	(1.7%)	4	(0.2%)	36	(2.0%)
	Genito-urinary system	2	(0.1%)	10	(0.6%)	0	(0.0%)	12	(0.7%)
	Other specified organs [7]	1	(0.1%)	18	(1.0%)	0	(0.0%)	19	(1.1%)
	Other non-respiratory	5	(0.3%)	44	(2.4%)	3	(0.2%)	52	(2.9%)
	Subtotal	**42**	**(2.3%)**	**367**	**(20.4%)**	**11**	**(0.6%)**	**420**	**(23.4%)**
UNKNOWN	Diagnostic site unknown	**5**	**(0.3%)**	**3**	**(0.2%)**	**2**	**(0.1%)**	**10**	**(0.6%)**
Total TB cases reported in 2018		**428**	**(23.8%)**	**1,313**	**(73.1%)**	**56**	**(3.1%)**	**1,797**	**(100%)**

[7] Other specified organs refer to endocardium, myocardium, oesophagus, pericardium and thyroid gland.

Cases who self-identified as Indigenous accounted for 16.3% (*n*=293) of all incident active TB cases reported in 2018. First Nations (*n*=143) and Inuit (*n*=136) accounted for the majority, and male cases slightly outnumbered female cases (**Figure 11**). This male/female pattern is consistent with that observed among non-Indigenous populations. It is important to note that not all jurisdictions reported on the Indigenous identity of cases.

Figure 11: Reported cases of incident active TB disease in different population subgroups, CTBRS: 2018[8]



	First Nations population	Inuit population	Metis population	Non-Indigenous Canadian-born	Foreign-born Canadians
Female	67	54	5	35	656
Male	75	82	9	68	713

[8] The information on the sex of one First Nations individual was not available.

The majority of cases reported among First Nations individuals (**Table 7**) were residents of Manitoba (MB: 49.7%; n=71), Saskatchewan (SK: 25.2%; *n*=36) and Ontario (ON: 11.2%; *n*=16). Almost two-thirds (*n*=89) of these cases occurred among individuals living on reserve, corresponding to an incidence rate on reserve of 19.8 cases per 100,000 population, with the highest rate (64.7 cases per 100,000) recorded in MB, and the lowest (8.9 cases per 100,000) in AB (p<0.05; **Table 7**)[9].

Table 7: Rate (per 100,000 population) of incident active TB disease Canadian-born population subgroups, CTBRS: 2018[10]

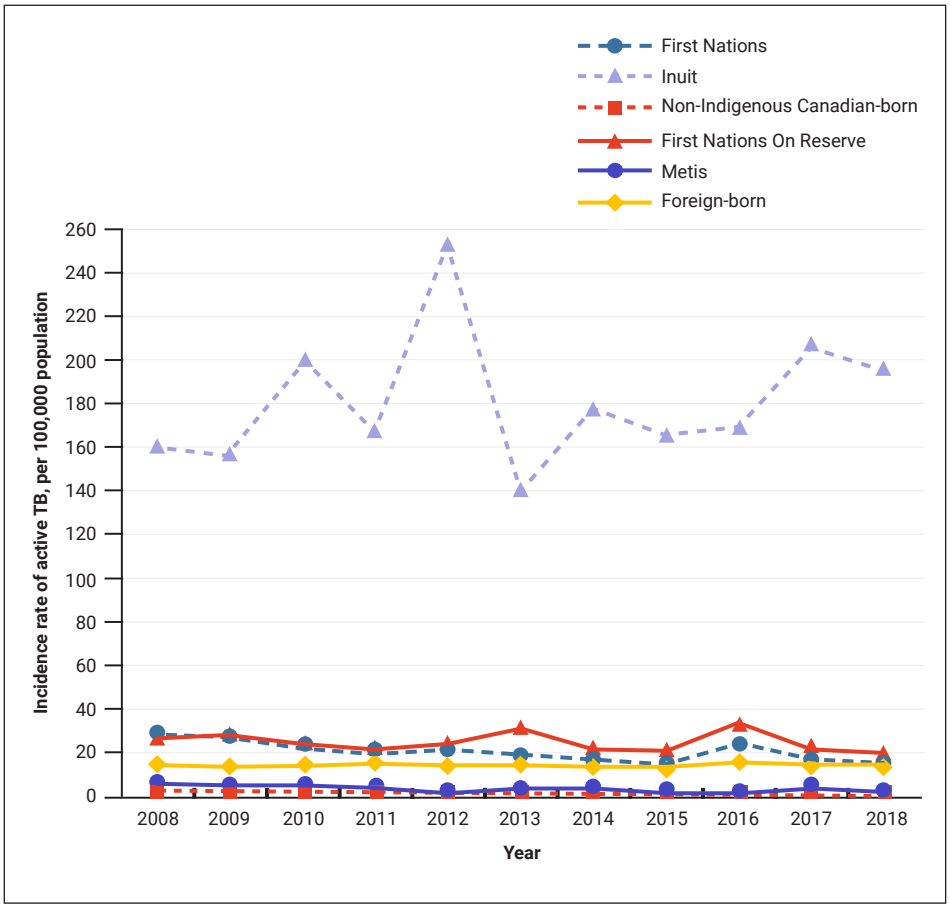
	First Nations population						Inuit population		Metis population		Total Indigenous		Non-Indigenous Canadian-born	
	On reserve		Off reserve		Total First Nations									
	n	(Rate)	n	(Rate)	n	(Rate)	n	(Rate)	n	(Rate)	n	(Rate)	n	(Rate)
NL	0	-	0	-	0	-	28	(400.0)	0	-	28	(75.7)	1	-
NB	0	-	1	-	1	-	0	-	0	-	1	-	0	-
QC	1	-	0	-	2	-	49	(326.7)	0	-	51	(26.7)	38	(0.5)
ON	3	-	10	(8.5)	16	(5.8)	3	-	0	-	19	(4.7)	36	(0.4)
MB	61	(64.7)	10	(15.1)	71	(49.7)	0	-	0	-	71	(29.5)	8	(1.0)
SK	17	(21.8)	19	(23.3)	36	(27.1)	0	-	13	(20.3)	49	(24.9)	2	-
AB	7	(8.9)	6	(11.8)	13	(8.3)	0	-	1	-	14	(4.8)	17	(0.6)
YT	0	-	0	-	1	-	0	-	0	-	1	-	0	-
NWT	0	-	0	-	3	-	0	-	0	-	3	-	0	-
NU	0	-	0	-	0	-	56	(169.7)	0	-	56	(169.7)	1	-
Total	**89**	**(19.8)**	**46**	**(11.6)**	**143**	**(15.4)**	**136**	**(194.3)**	**14**	**(2.8)**	**293**	**(19.6)**	**103**	**(0.4)**

[9] NL, PE, NS and NU reported no cases among First Nations individuals.

[10] For 2016-2018, Indigenous origin of BC cases were not reported.

Inuit communities had the highest ($p<0.05$) incidence rates of active TB in 2018 (**Table 7**). With a total of 28 active TB cases in a population of 2,676 people, Nunatsiavut in northern Labrador had the highest incidence rate, followed by Nunavik in northern QC with 49 cases out of a population of 13,817. The rate in NU was 169.7 cases per 100,000 population. No cases among the Inuit in the Inuvialuit Settlement Region of the Northwest Territories (NWT) were reported. Slightly more than 90.0% (*n*=13) of cases of incident active TB disease reported in 2018 by the Canadian Métis population originated in SK. The rate in the Métis populations across Canada was the lowest among Indigenous communities, with the exception of the Métis community in SK, where incident active TB was reported at a rate of over 20 cases per 100,000 population (**Table 7**).

Figure 12: Rate of incident active TB disease in Canadian-born populations, CTBRS: 2008-2018[11]



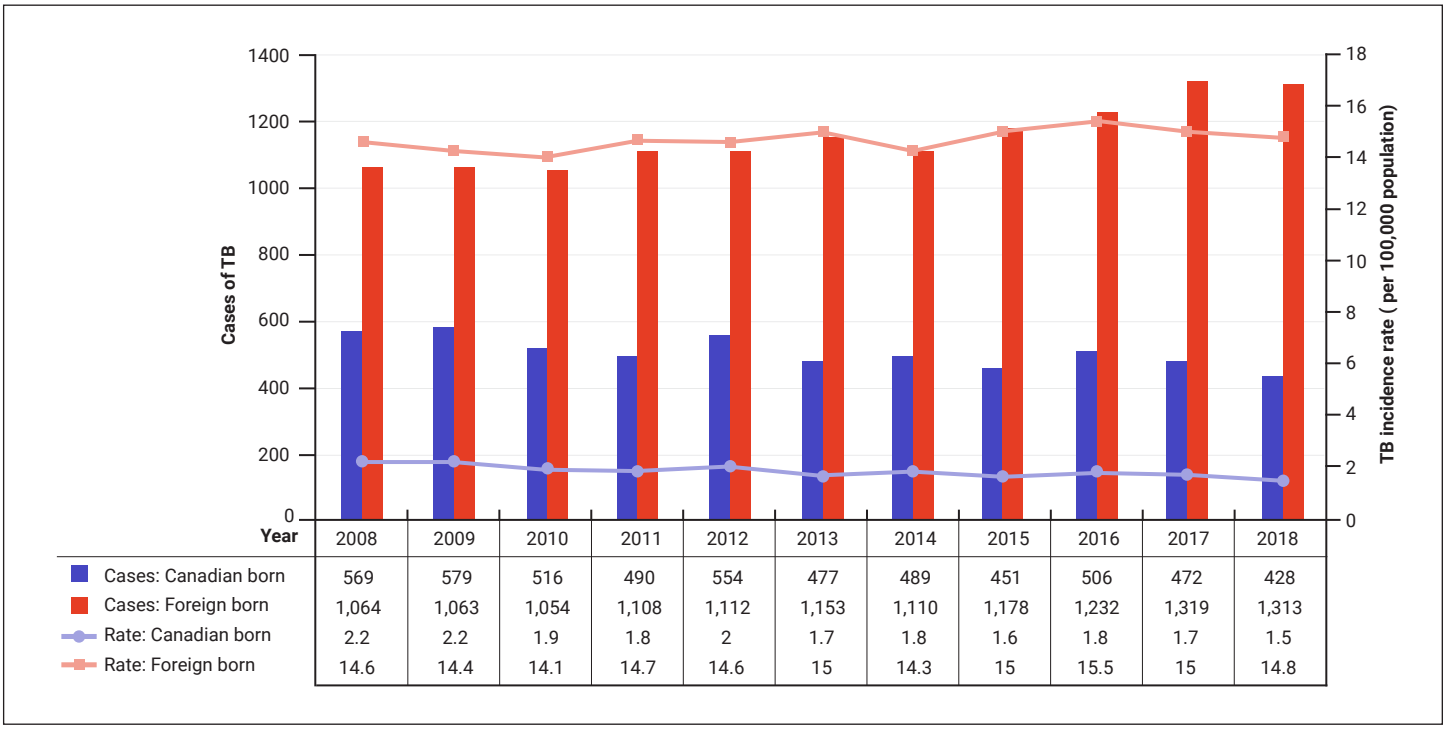
[11] For 2016-2018, Indigenous origin of BC cases were not reported.

Table 8: Reported cases and rate (per 100,000) of incident active TB disease in different population subgroups over time, CTBRS: 2008 – 2018

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
First Nations (On & Off reserve)	Cases	232	228	191	178	208	207	183	157	209	154	143
	(Rate)	(28.2)	(27.0)	(22.2)	(19.2)	(21.2)	(20.5)	(18.1)	(15.2)	(23.8)	(17.1)	(15.4)
First Nations with status - on reserve	Cases	119	122	109	99	113	148	106	101	149	98	89
	(Rate)	(26.8)	(27.0)	(23.7)	(21.2)	(23.8)	(30.8)	(21.7)	(20.4)	(33.9)	(22.0)	(19.8)
Inuit	Cases	88	88	114	105	161	92	119	112	113	142	136
	(Rate)	(160.0)	(157.1)	(200.0)	(166.7)	(251.6)	(139.4)	(177.6)	(164.7)	(168.7)	(205.8)	(194.3)
Métis	Cases	27	25	26	21	11	18	19	12	10	18	14
	(Rate)	(6.1)	(5.4)	(5.4)	(4.4)	(2.2)	(3.5)	(3.6)	(2.2)	(2.1)	(3.7)	(2.8)
Overall Indigenous	Cases	347	341	331	304	380	317	321	281	332	314	293
	(Rate)	(26.2)	(25.0)	(23.6)	(20.8)	(24.4)	(20.0)	(20.0)	(17.1)	(23.4)	(21.5)	(19.6)
Non-Indigenous Canadian-born	Cases	222	238	185	186	174	159	168	167	140	125	103
	(Rate)	(0.9)	(1.0)	(0.7)	(0.7)	(0.7)	(0.6)	(0.6)	(0.6)	(0.5)	(0.5)	(0.4)
Individuals born outside Canada	Cases	1,064	1,063	1,054	1,108	1,112	1,153	1,110	1,178	1,232	1,319	1,313
	(Rate)	(14.6)	(14.4)	(14.1)	(14.7)	(14.6)	(15.0)	(14.3)	(15.0)	(15.5)	(15.0)	(14.8)

Over the last decade, TB incidence in the Inuit population increased from 160.0 cases to 194.3 cases per 100,000 population. In contrast, TB incidence in both the First Nations and the Métis populations decreased by 46.8% and 54.1% respectively (**Table 8** and **Figure 12**). The corresponding rate in individuals born outside Canada remained stable over the same time period (**Table 8** and **Figure 13**). These findings may underestimate TB incidence among Indigenous communities, because Indigenous identity for BC cases was not available.

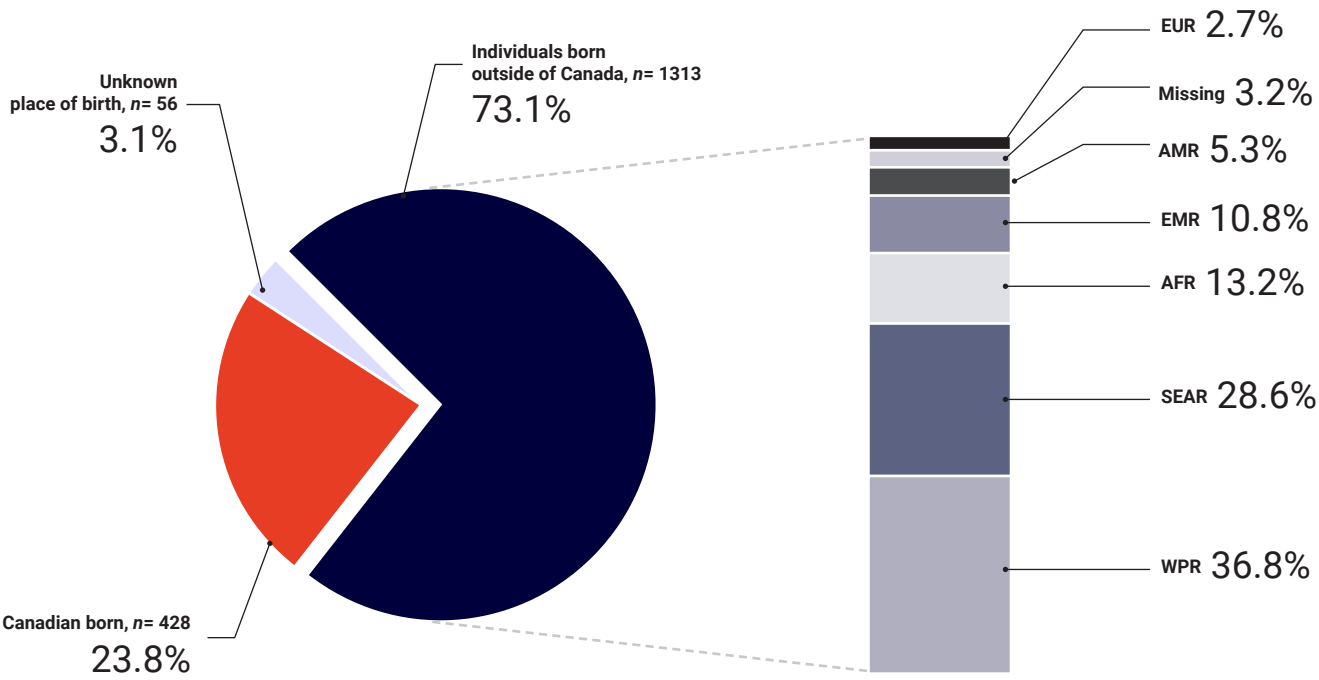
Figure 13: Reported cases and rate (per 100,000) of incident active TB disease over time by place of birth, CTBRS: 2008 – 2018



Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Cases: Canadian born	569	579	516	490	554	477	489	451	506	472	428
Cases: Foreign born	1,064	1,063	1,054	1,108	1,112	1,153	1,110	1,178	1,232	1,319	1,313
Rate: Canadian born	2.2	2.2	1.9	1.8	2	1.7	1.8	1.6	1.8	1.7	1.5
Rate: Foreign born	14.6	14.4	14.1	14.7	14.6	15	14.3	15	15.5	15	14.8

The distribution by region of birth (using the WHO regional delimitation[12]) of cases reported in 2018 is presented in **Figure 14**. Among individuals born outside Canada, those from the Western Pacific Region (WPR: 36.8%; *n*= 483) and the South East Asia Region (SEAR: 28.6%; *n*=375) were predominant; followed by those from the African (AFR: 13.2%; *n*=173) and Eastern Mediterranean (EMR: 10.3%; *n*=135) regions. The American (AMR) and European (EUR) regions were the least represented with only 5.3% (*n*=70) and 2.7% (*n*=35) of cases, respectively.

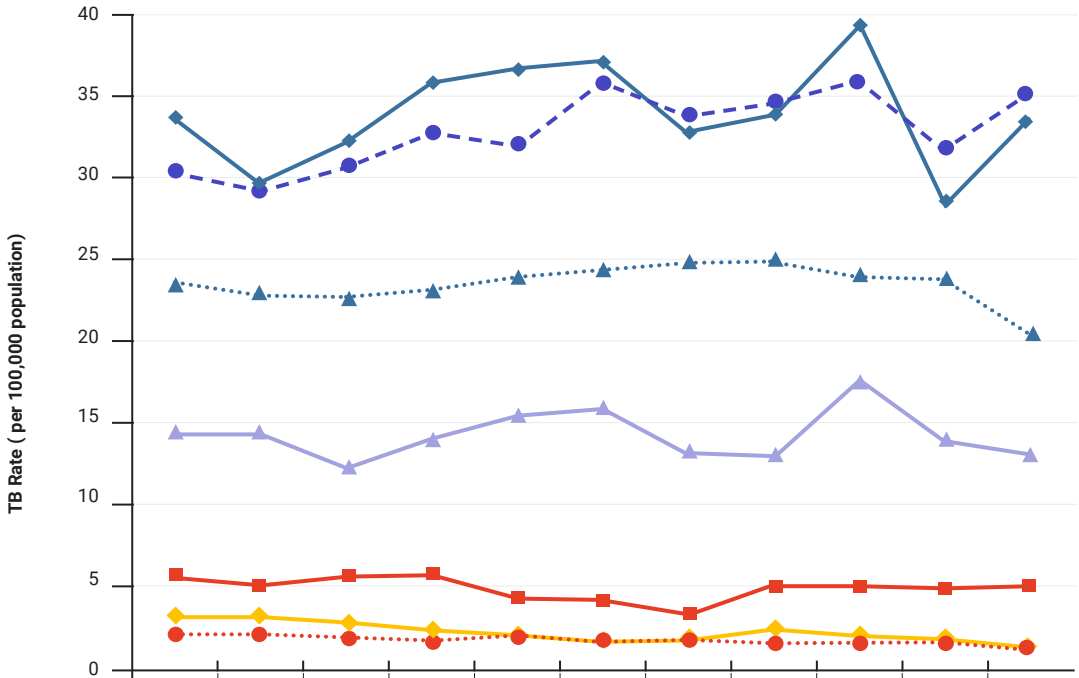
Figure 14: Reported cases of incident active TB disease by place of birth, CTBRS: 2018



[12] The WHO regional classification is detailed in Appendix D.

The corresponding incidence rates by region of birth is presented in **Figure 15** with SEAR (35.1 cases per 100,000 population) and AFR (33.7 cases per 100,000 population) topping the chart, followed by WPR (20.4 cases per 100,000 population) and EMR (13.1 cases per 100,000 population). These trends have remained virtually unchanged over the last 10 years, and it is paramount to highlight that individuals born outside Canada generally do not arrive in Canada with active TB disease as they are required to undergo Canadian immigration TB screening upon application for residency in Canada.

Figure 15: Rate of incident active TB disease over time by region of birth, CTBRS: 2008 – 2018



Year	2008 (n=1,064)	2009 (n=1,063)	2010 (n=1,054)	2011 (n=1,108)	2012 (n=1,112)	2013 (n=1,153)	2014 (n=1,110)	2015 (n=1,178)	2016 (n=1,232)	2017 (n=1,319)	2018 (n=1,313)
AFR	33.6	29.7	32.1	36.0	36.6	37.0	32.8	33.8	39.2	28.2	33.7
AMR	5.5	5.2	5.7	5.8	4.3	4.2	3.3	5.1	5.0	4.9	5.1
EMR	14.3	14.4	12.3	14.1	15.5	15.9	13.2	13.0	17.6	13.9	13.1
EUR	3.2	3.1	2.9	2.4	2.1	1.7	1.8	2.5	2.1	1.9	1.4
SEAR	30.2	29.2	30.6	32.7	31.9	35.8	33.7	34.5	35.8	31.6	35.1
WPR	23.5	22.9	22.7	23.3	23.9	24.4	24.8	24.9	24.0	23.8	20.4
Canada	2.2	2.2	1.9	1.8	2	1.7	1.8	1.6	1.8	1.7	1.5

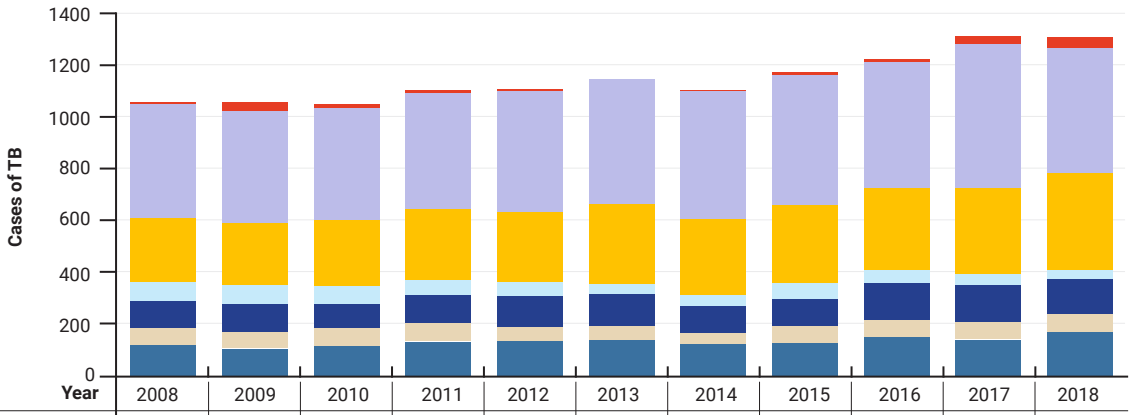
There was regional heterogeneity among incident active TB cases with respect to place of birth, and relatively more homogeneity in place of residence (**Table 9**). Approximately 98.9% (*n*=1,298) of cases in individuals born outside Canada were reported by ON (*n*=584), BC (*n*=234), AB (*n*=185), QC (*n*=183), MB (*n*=84) and SK (*n*=28).

Table 9: Reported cases of incident active TB in individuals born outside Canada by province of residence, CTBRS: 2018

	African Region		American Region		East-Mediterranian Region		European Region		South Eastern Asian Region		Western Pacific Region		Unknown		Overall	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
NL	0	(0.0%)	1	(1.4%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(0.1%)
PE	1	(0.6%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(0.1%)
NS	2	(1.2%)	0	(0.0%)	1	(0.7%)	0	(0.0%)	4	(1.1%)	0	(0.0%)	1	(2.4%)	8	(0.6%)
NB	2	(1.2%)	0	(0.0%)	1	(0.7%)	0	(0.0%)	0	(0.0%)	2	(0.4%)	0	(0.0%)	5	(0.4%)
QC	52	(30.1%)	31	(44.3%)	20	(14.8%)	4	(11.4%)	20	(5.3%)	46	(9.5%)	10	(23.8%)	183	(13.9%)
ON	57	(32.9%)	31	(44.3%)	72	(53.3%)	24	(68.6%)	206	(54.9%)	191	(39.5%)	3	(7.1%)	584	(44.5%)
MB	13	(7.5%)	0	(0.0%)	5	(3.7%)	1	(2.9%)	13	(3.5%)	40	(8.3%)	12	(28.6%)	84	(6.4%)
SK	3	(1.7%)	0	(0.0%)	4	(3.0%)	1	(2.9%)	5	(1.3%)	12	(2.5%)	3	(7.1%)	28	(2.1%)
AB	36	(20.8%)	0	(0.0%)	20	(14.8%)	2	(5.7%)	41	(10.9%)	83	(17.2%)	3	(7.1%)	185	(14.1%)
BC	7	(4.0%)	7	(10.0%)	12	(8.9%)	3	(8.6%)	86	(22.9%)	109	(22.6%)	10	(23.8%)	234	(17.8%)
Total	**173**	**(13.2%)**	**70**	**(5.3%)**	**135**	**(10.3%)**	**35**	**(2.7%)**	**375**	**(28.6%)**	**483**	**(36.8%)**	**42**	**(3.2%)**	**1,313**	**(100%)**

Incident cases of active TB disease reported in individuals born outside Canada between 2008 and 2018 numbered 12,706 (68.7%). Of these, 41.2% (*n*=5,231) were born in a WPR country, while those born in SEAR, AFR, EMR, AMR and EUR countries accounted for 25.3% (*n*=3,216), 11.9% (*n*=1,506), 10.1% (*n*=1,284) and 5.3% (*n*=679) and 4.8% (*n*=609), respectively (**Figure 16**).

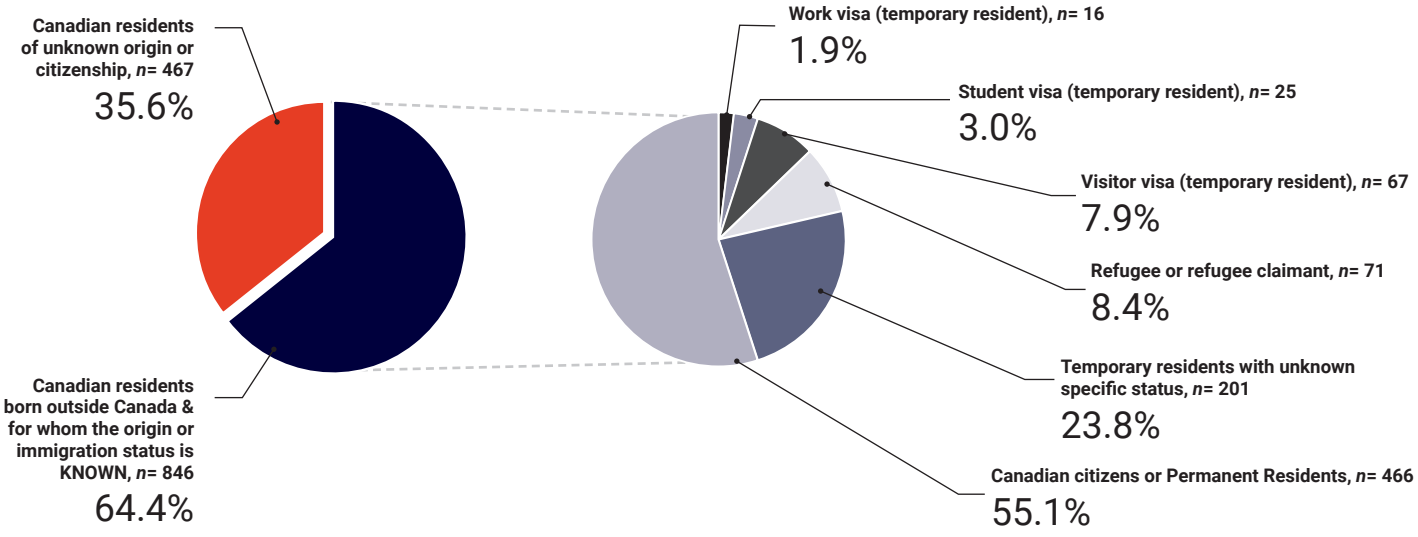
Figure 16: Reported incident cases of active TB disease in individuals born outside Canada, CTBRS: 2008 – 2018



Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Unknown	9	34	14	10	8	3	4	12	13	32	42
WPR	441	434	434	450	468	482	495	501	488	555	483
SEAR	246	241	255	275	271	308	293	302	317	333	375
EUR	74	74	69	58	52	41	44	63	53	46	35
EMR	106	108	93	108	120	124	104	103	141	142	135
AMR	65	62	69	71	53	52	42	64	64	67	70
AFR	123	110	120	136	140	143	128	133	156	144	173

Information on immigration status was available for 64.4% (*n*=846) of foreign-born TB cases in 2018. Of these, 55.1% (*n*=466) were Canadian citizens or permanent residents, and 35.5% (*n*=309) were temporary visa holders that included tourists or visitors, students and temporary workers (**Figure 17**). Refugees and refugee claimants accounted for 8.4% (*n*=71) of cases (**Figure 17**).

Figure 17: Citizenship and immigration status of foreign-born Canadian residents at the time of active TB disease diagnosis, CTBRS: 2018



In 2018, among foreign-born Canadian citizens or permanent residents diagnosed with active TB disease, 171 (36.7%) had arrived in Canada before the year 2000, 118 (25.3%) had arrived between 2000 and 2010, and the remaining 147 (31.5%) had arrived within the last decade (**Table 10**).

Table 10: Year of arrival in Canada of foreign-born Canadians and permanent residents diagnosed with incident active TB disease, CTBRS: 2018

	African Region		American Region		East-Mediterranian Region		European Region		South Eastern Asian Region		Western Pacific Region		Unknown		Overall	
Year of arrival	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**
2018	3	(0.6%)	0	(0.0%)	7	(1.5%)	0	(0.0%)	6	(1.3%)	4	(0.9%)	0	(0.0%)	**20**	**(4.3%)**
2017	1	(0.2%)	1	(0.2%)	4	(0.9%)	2	(0.4%)	11	(2.4%))	9	(1.9%)	0	(0.0%)	**28**	**(6.0%)**
2016	5	(1.1%)	2	(0.4%)	1	(0.2%)	1	(0.2%)	7	(1.5%)	10	(2.1%)	5	(1.1%)	**31**	**(6.7%)**
2015	1	(0.2%)	2	(0.4%)	2	(0.4%)	0	(0.0%)	9	(1.9%)	5	(1.1%)	0	(0.0%)	**19**	**(4.1%)**
2014	3	(0.6%)	0	(0.0%)	2	(0.4%)	0	(0.0%)	9	(1.9%)	5	(1.1%)	0	(0.0%)	**19**	**(4.1%)**
2013	5	(1.1%)	1	(0.2%)	4	(0.9%)	0	(0.0%)	6	(1.3%)	8	(1.7%)	0	(0.0%)	**24**	**(5.2%)**
2012	1	(0.2%)	3	(0.6%)	2	(0.4%)	0	(0.0%)	2	(0.4%)	3	(0.6%)	1	(0.2%)	**12**	**(2.6%)**
2011	0	(0.0%)	3	(0.6%)	2	(0.4%)	0	(0.0%)	4	(0.9%)	4	(0.9%)	0	(0.0%)	**13**	**(2.8%)**
2010	2	(0.4%)	2	(0.4%)	4	(0.9%)	0	(0.0%)	4	(0.9%)	7	(1.5%)	1	(0.2%)	**20**	**(4.3%)**
2000-2009	7	(1.5%)	5	(1.1%)	11	(2.4%)	0	(0.0%)	27	(5.8%)	47	(10.1%)	1	(0.2%)	**98**	**(21.0%)**
1990-1999	2	(0.4%)	6	(1.3%)	4	(0.9%)	1	(0.2%)	30	(6.4%)	38	(8.2%)	3	(0.6%)	**84**	**(18.0%)**
1980-1989	0	(0.0%)	2	(0.4%)	2	(0.4%)	0	(0.0%)	3	(0.6%)	27	(5.8%)	3	(0.6%)	**37**	**(7.9%)**
1979 & later	2	(0.4%)	5	(1.1%)	3	(0.6%)	6	(1.3%)	10	(2.1%)	21	(4.5%)	3	(0.6%)	**50**	**(10.7%)**
unknown	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	4	(0.9%)	7	(1.5%)	0	(0.0%)	**11**	**(2.4%)**
Total	**32**	**(6.9%)**	**32**	**(6.9%)**	**48**	**(10.3%)**	**10**	**(2.1%)**	**132**	**(28.3%)**	**195**	**(41.8%)**	**17**	**(3.6%)**	**466**	**(100%)**

Forty-one cases of incident active TB disease were diagnosed in 2018 among student and work visa holders. The majority (65.9%; *n*=27) of these diagnoses occurred within three years of arrival to Canada (**Table 11**).

Table 11: Year of arrival in Canada of students and temporary workers diagnosed with incident active TB disease, CTBRS: 2018

	African Region		American Region		East-Mediterranian Region		European Region		South Eastern Asian Region		Western Pacific Region		Unknown		Overall	
Year of arrival	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**
2018	1	(2.4%)	0	(0.0%)	1	(2.4%)	0	(0.0%)	4	(9.8%)	0	(0.0%)	0	(0.0%)	**6**	**(14.6%)**
2017	2	(4.9%)	1	(2.4%)	0	(0.0%)	1	(2.4%)	5	(12.2%)	3	(7.3%)	0	(0.0%)	**12**	**(29.3%)**
2016	4	(9.8%)	1	(2.4%)	0	(0.0%)	0	(0.0%)	3	(7.3%)	1	(2.4%)	1	(2.4%)	**9**	**(22.0%)**
2015	1	(2.4%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	3	(7.3%)	0	(0.0%)	1	(2.4%)	**4**	**(9.8%)**
2014	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	2	(4.9%)	0	(0.0%)	**2**	**(4.9%)**
2013	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	**1**	**(2.4%)**
2012	1	(2.4%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(2.4%)	0	(0.0%)	0	(0.0%)	**3**	**(7.3%)**
2011	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(2.4%)	0	(0.0%)	**1**	**(2.4%)**
2000-2009	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(2.4%)	2	(4.9%)	0	(0.0%)	**3**	**(7.3%)**
Total	**9**	**(22.0%)**	**2**	**(4.9%)**	**1**	**(2.4%)**	**1**	**(2.4%)**	**17**	**(41.5%)**	**9**	**(22.0%)**	**2**	**(4.9%)**	**41**	**(100%)**

Similarly, 70.4% (*n*=50) of refugees or refugee claimants, and 82.1% (*n*=55) visitor's visa holders diagnosed with incident active TB disease in 2018 had arrived in Canada within the three years prior to diagnosis, respectively (**Tables 12 & 13**).

Table 12: Year of arrival in Canada of refugees and refugee claimants diagnosed with incident active TB disease, CTBRS: 2018

	African Region		American Region		East-Mediterranian Region		European Region		South Eastern Asian Region		Western Pacific Region		Unknown		Overall	
Year of arrival	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**
2018	12	(16.9%)	2	(2.8%)	3	(4.2%)	1	(1.4%)	6	(8.5%)	0	(0.0%)	0	(0.0%)	**24**	**(33.8%)**
2017	10	(14.1%)	6	(8.5%)	3	(4.2%)	0	(0.0%)	1	(1.4%)	2	(2.8%)	0	(0.0%)	**22**	**(31.0%)**
2016	1	(1.4%)	1	(1.4%)	1	(1.4%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(1.4%)	**4**	**(5.6%)**
2015	3	(4.2%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(1.4%)	0	(0.0%)	**4**	**(5.6%)**
2014	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(1.4%)	0	(0.0%)	**1**	**(1.4%)**
2013	0	(0.0%)	0	(0.0%)	1	(1.4%)	0	(0.0%)	2	(0.0%)	0	(0.0%)	0	(0.0%)	**3**	**(4.2%)**
2011	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(1.4%)	0	(0.0%)	0	(0.0%)	**1**	**(1.4%)**
2000-2009	2	(2.8%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(1.4%)	1	(1.4%)	0	(0.0%)	**4**	**(5.6%)**
1990-1999	1	(1.4%)	0	(0.0%)	1	(1.4%)	0	(0.0%)	1	(1.4%)	1	(1.4%)	0	(0.0%)	**4**	**(5.6%)**
1980-1989	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	4	(5.6%)	0	(0.0%)	**4**	**(5.6%)**
Total	**29**	**(40.9%)**	**9**	**(12.7%)**	**9**	**(12.7%)**	**1**	**(1.4%)**	**12**	**(16.9%)**	**10**	**(14.1%)**	**1**	**(1.4%)**	**71**	**(100%)**

Table 13: Year of arrival in Canada of visitor visa holders diagnosed with incident active TB disease, CTBRS: 2018

	African Region		American Region		East-Mediterranian Region		European Region		South Eastern Asian Region		Western Pacific Region		Overall	
Year of arrival	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**
2018	0	(0.0%)	2	(3.0%)	1	(1.5%)	0	(0.0%)	10	(14.9%)	3	(4.5%)	**16**	**(23.9%)**
2017	1	(1.5%)	1	(1.5%)	1	(1.5%)	0	(0.0%)	16	(23.9%)	11	(16.4%)	**30**	**(44.8%)**
2016	0	(0.0%)	1	(1.5%)	0	(0.0%)	0	(0.0%)	6	(9.0%)	2	(3.0%)	**9**	**(13.4%)**
2015	2	(3.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	2	(3.0%)	1	(1.5%)	**5**	**(7.5%)**
2012	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	2	(3.0%)	**2**	**(3.0%)**
2011	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	2	(3.0%)	0	(0.0%)	**2**	**(3.0%)**
2000-2009	1	(1.5%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	2	(3.0%)	**3**	**(4.5%)**
Total	**4**	**(6.0%)**	**4**	**(6.0%)**	**2**	**(3.0%)**	**0**	**(0.0%)**	**36**	**(53.7%)**	**21**	**(31.3%)**	**67**	**(100%)**

In contrast, no such discernable trend was detected for individuals identified as temporary residents with unknown immigration status (*n*=201), nor for individuals for whom information on citizenship (or origin) was missing (*n*=467). For the former, only 25.4% (*n*=51) were diagnosed within three years following arrival in Canada (**Table 14**), and 17.1% (*n*=80) for the latter (**Table 15**).

Table 14: Year of arrival in Canada of temporary residents with unknown immigration status diagnosed with incident active TB disease, CTBRS: 2018

	African Region		American Region		East-Mediterranian Region		European Region		South Eastern Asian Region		Western Pacific Region		Unknown		Overall	
Year of arrival	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**
2018	2	(1.0%)	0	(0.0%)	1	(0.5%)	0	(0.0%)	8	(4.0%)	11	(5.5%)	1	(0.5%)	**23**	**(11.4%)**
2017	5	(2.5%)	0	(0.0%)	0	(0.9%)	1	(0.5%)	8	(4.0%)	4	(2.0%)	0	(0.0%)	**18**	**(9.0%)**
2016	6	(3.0%)	0	(0.0%)	0	(0.2%)	0	(0.0%)	2	(1.0%)	2	(1.0%)	0	(0.0%)	**10**	**(5.0%)**
2015	5	(2.5%)	1	(0.5%)	3	(1.5%)	0	(0.0%)	5	(2.5%)	10	(5.0%)	0	(0.0%)	**24**	**(11.9%)**
2014	4	(2.0%)	0	(0.0%)	1	(0.5%)	0	(0.0%)	5	(2.5%)	7	(3.5%)	0	(0.0%)	**17**	**(8.5%)**
2013	2	(1.0%)	1	(0.5%)	1	(0.5%)	0	(0.0%)	4	(2.0%)	9	(4.5%)	0	(0.0%)	**17**	**(8.5%)**
2012	1	(0.5%)	0	(0.0%)	2	(1.0%)	0	(0.0%)	2	(1.0%)	5	(2.5%)	0	(0.0%)	**10**	**(5.0%)**
2011	2	(1.0%)	0	(0.0%)	1	(0.5%)	0	(0.0%)	0	(0.9%)	7	(3.5%)	0	(0.0%)	**10**	**(5.0%)**
2010	1	(0.5%)	0	(0.0%)	2	(1.0%)	0	(0.0%)	1	(0.5%)	3	(1.5%)	0	(0.0%)	**7**	**(3.5%)**
2000-2009	6	(3.0%)	0	(0.0%)	4	(2.0%)	1	(0.5%)	9	(4.5%)	17	(8.5%)	1	(0.5%)	**38**	**(18.9%)**
1990-1999	0	(0.4%)	0	(0.0%)	4	(2.0%)	1	(0.5%)	3	(1.5%)	4	(2.0%)	0	(0.0%)	**12**	**(6.0%)**
1980-1989	0	(0.0%)	0	(0.0%)	0	(0.4%)	0	(0.0%)	3	(1.5%)	3	(1.5%)	1	(0.5%)	**7**	**(7.9%)**
1979 & later	1	(0.5%)	0	(0.0%)	1	(0.5%)	0	(0.0%)	1	(0.5%)	5	(2.5%)	0	(0.6%)	**8**	**(4.0%)**
Total	**35**	**(17.4%)**	**2**	**(1.0%)**	**20**	**(10.0%)**	**3**	**(1.5%)**	**51**	**(25.4%)**	**87**	**(43.3%)**	**3**	**(1.5%)**	**201**	**(100%)**

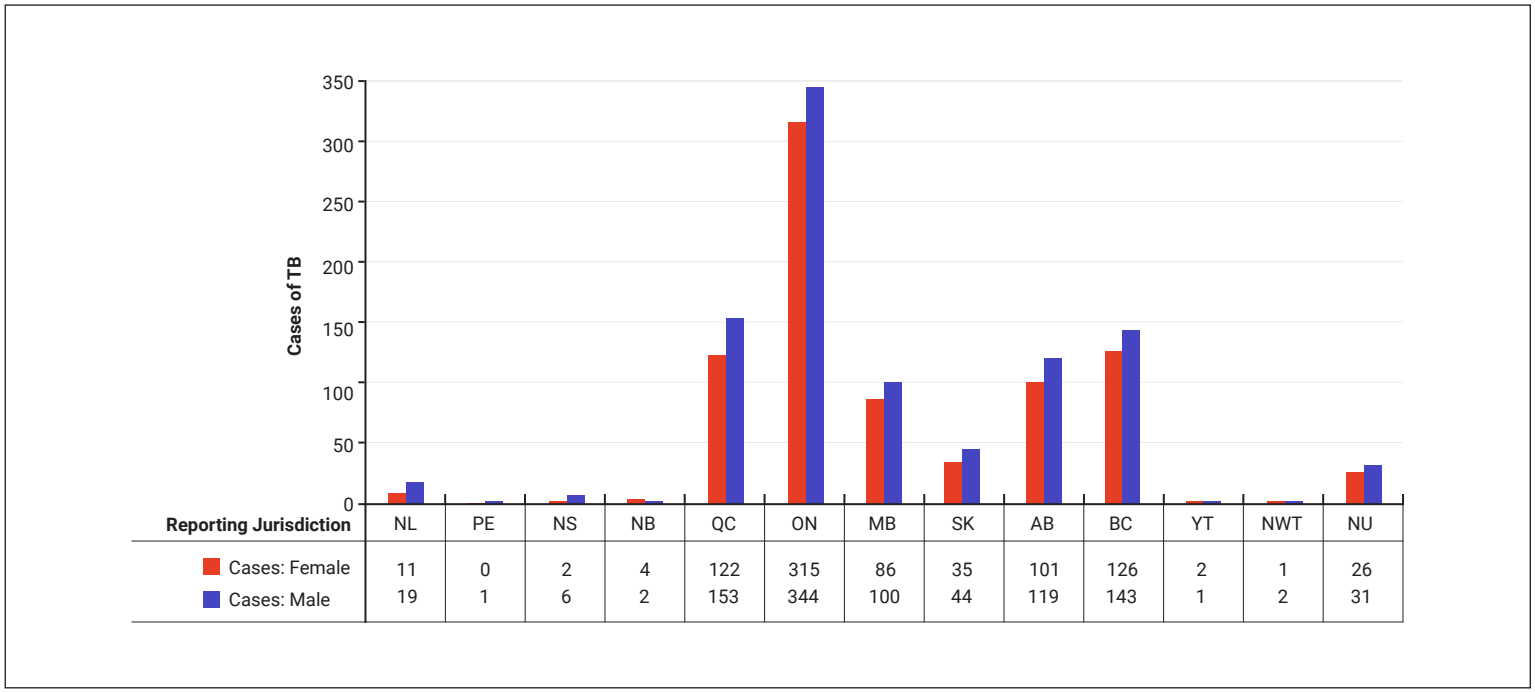
Table 15: Year of arrival in Canada of residents with unknown origin (or citizenship status) and diagnosed with incident active TB disease, CTBRS: 2018

	African Region		American Region		East-Mediterranian Region		European Region		South Eastern Asian Region		Western Pacific Region		Unknown		Overall	
Year of arrival	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**
2018	4	(0.9%)	2	(0.4%)	3	(0.6%)	0	(0.0%)	8	(1.7%)	5	(1.1%)	0	(0.0%)	**22**	**(4.7%)**
2017	6	(1.3%)	0	(0.0%)	5	(1.1%)	0	(0.0%)	13	(2.8%)	9	(1.9%)	1	(0.2%)	**34**	**(7.3%)**
2016	4	(0.9%)	0	(0.0%)	3	(0.6%)	1	(0.2%)	11	(2.4%)	4	(0.9%)	1	(0.2%)	**24**	**(5.1%)**
2015	6	(1.3%)	0	(0.0%)	4	(0.9%)	0	(0.0%)	4	(0.9%)	9	(1.9%)	0	(0.0%)	**23**	**(4.9%)**
2014	3	(0.6%)	1	(0.2%)	3	(0.6%)	1	(0.2%)	5	(1.1%)	9	(1.9%)	0	(0.0%)	**22**	**(4.7%)**
2013	4	(0.9%)	2	(0.4%)	1	(0.2%)	0	(0.0%)	3	(0.6%)	7	(1.5%)	0	(0.0%)	**17**	**(3.6%)**
2012	4	(0.9%)	0	(0.0%)	1	(0.2%)	1	(0.2%)	5	(1.1%)	7	(1.5%)	0	(0.0%)	**18**	**(3.9%)**
2011	3	(0.6%)	0	(0.0%)	0	(0.0%)	1	(0.2%)	3	(0.6%)	7	(1.5%)	0	(0.0%)	**14**	**(3.0%)**
2010	3	(0.6%)	0	(0.0%)	1	(0.2%)	0	(0.0%)	3	(0.6%)	4	(0.9%)	0	(0.0%)	**11**	**(2.4%)**
2000-2009	17	(3.6%)	3	(0.6%)	9	(1.9%)	3	(0.6%)	28	(6.0%)	28	(6.0%)	0	(0.0%)	**89**	**(19.1%)**
1990-1999	4	(0.9%)	1	(0.2%)	10	(2.1%)	1	(0.2%)	11	(2.4%)	23	(4.9%)	1	(0.2%)	**51**	**(10.9%)**
1980-1989	1	(0.2%)	3	(0.6%)	4	(0.9%)	2	(0.4%)	13	(2.8%)	22	(4.7%)	1	(0.2%)	**46**	**(9.9%)**
1979 & later	1	(0.2%)	6	(1.3%)	3	(0.6%)	9	(1.9%)	5	(1.1%)	12	(2.6%)	1	(0.2%)	**36**	**(7.7%)**
Unknown	4	(0.9%)	3	(0.6%)	8	(1.7%)	1	(0.2%)	15	(3.2%)	15	(3.2%)	14	(3.0%)	**60**	**(12.8%)**
Total	**64**	**(13.7%)**	**21**	**(4.5%)**	**55**	**(11.8%)**	**20**	**(4.3%)**	**161**	**(34.5%)**	**161**	**(34.5%)**	**19**	**(4.1%)**	**467**	**(100%)**

Place of residence

Most incident active TB cases reported in 2018 (**Figure 18**) were from ON (*n*=659), followed by QC (*n*=275), BC (*n*=269), AB (*n*=220) and MB (*n*=187). The difference between the numbers of male and female cases in each jurisdiction was marginal or non-existent (**Figure 18**). This trend was also observed in the corresponding rates (**Figure 19**).

Figure 18: Reported incident cases of incident active TB disease across Canadian jurisdictions, CTBRS: 2018



Reporting Jurisdiction	NL	PE	NS	NB	QC	ON	MB	SK	AB	BC	YT	NWT	NU
Cases: Female	11	0	2	4	122	315	86	35	101	126	2	1	26
Cases: Male	19	1	6	2	153	344	100	44	119	143	1	2	31

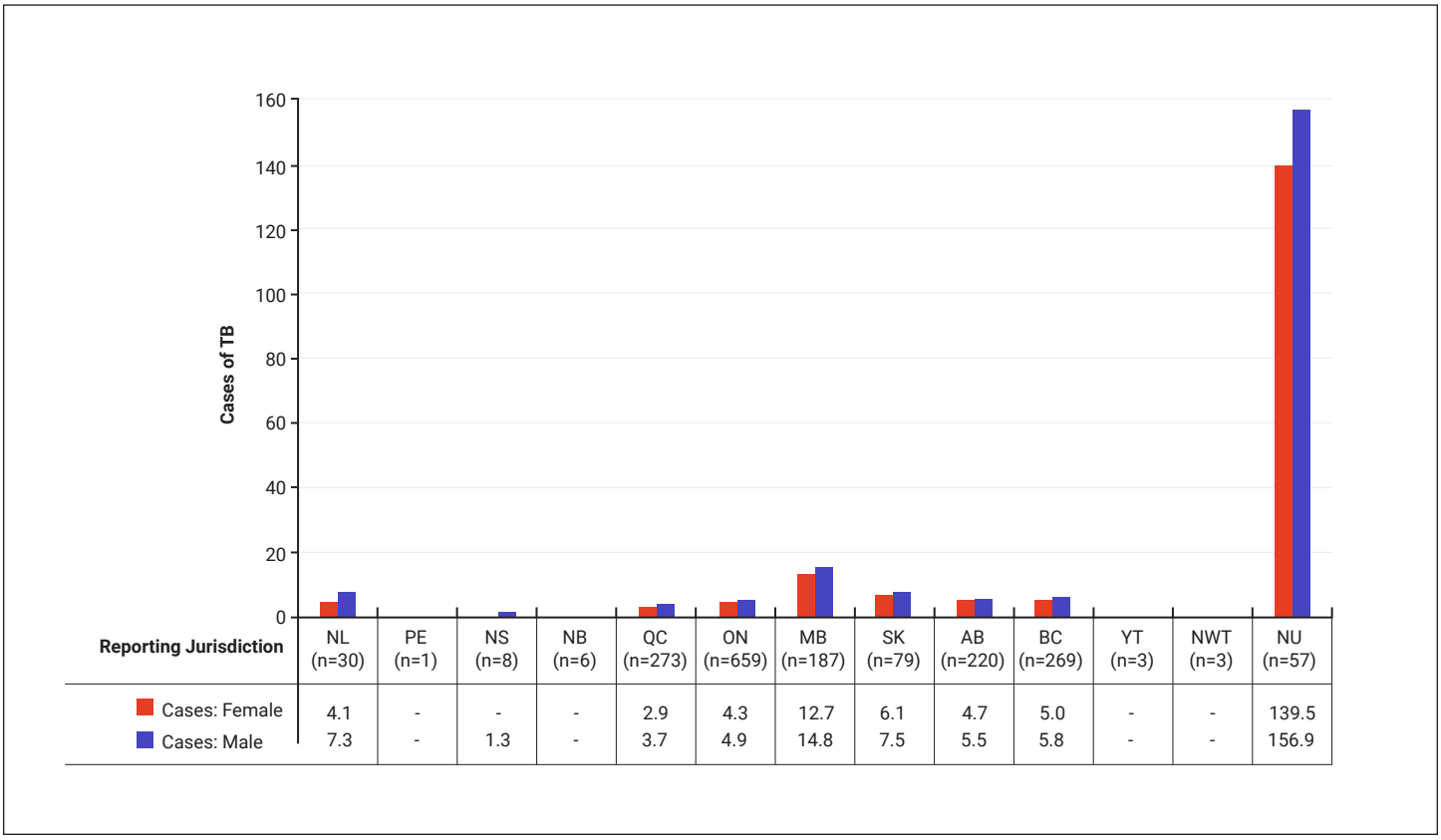
Similar to previous years, NU reported the highest rate (148.5 cases per 100,000) of incident active TB disease in Canada in 2018, although significantly lower (by 44.8%) than the year before (**Table 16**), when certain communities in the region experienced an outbreak. Manitoba had the second highest rate (13.8 cases per 100,000), followed by Saskatchewan (SK: 6.8 cases per 100,000), Newfoundland and Labrador (NL), BC and AB with rates ranging from 5.1 to 5.7 cases per 100,000 population.

Table 16: Geographic distribution of incident active TB cases and corresponding rates, CTBRS: 2008-2018

	2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018	
	n	(Rate)	n	(Rate)	n	(Rate)	n	(Rate)	n	(Rate)	n	(Rate)	n	(Rate)	n	(Rate)	n	(Rate)	n	(Rate)	n	(Rate)
NL	8	(1.6)	22	(4.3)	8	(1.5)	8	(1.5)	4	-	13	(2.5)	7	(1.3)	33	(6.2)	24	(4.5)	13	(2.5)	30	(5.7)
PE	0	-	1	-	1	-	3	-	1	-	0	-	3	-	3	-	4	-	0	-	1	-
NS	5	(0.5)	8	(0.9)	10	(1.1)	9	(1.0)	8	(0.8)	8	(0.9)	7	(0.7)	6	(0.6)	3	-	9	(0.9)	8	(0.8)
NB	5	(0.7)	11	(1.5)	10	(1.3)	5	(0.7)	5	(0.7)	3	-	5	(0.7)	6	(0.8)	12	(1.6)	8	(1.0)	6	(0.8)
QC	240	(3.1)	196	(2.5)	210	(2.6)	217	(2.7)	271	(3.4)	240	(3.0)	207	(2.5)	244	(3.0)	252	(3.1)	217	(2.6)	275	(3.3)
ON	598	(4.6)	629	(4.8)	643	(4.9)	658	(5.0)	618	(4.6)	634	(4.7)	585	(4.3)	597	(4.4)	641	(4.6)	676	(4.8)	659	(4.6)
MB	141	(11.8)	156	(12.9)	131	(10.7)	116	(9.4)	136	(10.9)	166	(13.1)	135	(10.6)	158	(12.2)	201	(15.3)	187	(14.0)	187	(13.8)
SK	97	(9.5)	90	(8.7)	81	(7.7)	83	(7.8)	89	(8.2)	86	(7.8)	88	(7.9)	70	(6.2)	91	(8.0)	94	(8.2)	79	(6.8)
AB	167	(4.6)	176	(4.8)	134	(3.6)	170	(4.5)	195	(5.0)	187	(4.7)	217	(5.3)	210	(5.1)	238	(5.7)	227	(5.3)	220	(5.1)
BC	300	(6.9)	294	(6.7)	241	(5.4)	261	(5.8)	286	(6.3)	257	(5.6)	269	(5.7)	264	(5.5)	239	(4.9)	288	(5.9)	269	(5.4)
YT	8	(24.2)	4	-	6	(17.3)	4	-	1	-	2	-	4	-	3	-	1	-	8	(20.2)	3	-
NWT	14	(32.3)	12	(27.8)	11	(25.4)	13	(29.9)	6	(13.7)	4	-	4	(9.1)	5	(11.3)	3	-	3	-	3	-
NU	59	(185.0)	55	(168.7)	100	(299.8)	74	(216.4)	80	(230.7)	51	(144.3)	84	(233.5)	44	(120.6)	54	(146.0)	101	(269.0)	57	(148.5)
Total	**1,642**	**(4.9)**	**1,654**	**(4.9)**	**1,586**	**(4.7)**	**1,621**	**(4.7)**	**1,700**	**(4.9)**	**1,651**	**(4.7)**	**1,615**	**(4.6)**	**1,643**	**(4.6)**	**1,763**	**(4.9)**	**1,831**	**(5.0)**	**1,797**	**(4.8)**

Five jurisdictions (New Brunswick - NB, NS, Prince Edward Island - PE, ON and QC) reported rates of incident active TB below the national average of 4.8 cases per 100,000 population (**Table 16**). In Newfoundland and Labrador (NL), the rate of incident active TB rose from 2.5 cases per 100,000 population in 2017 to 5.7 cases per 100,000 population in 2018, an increase of more than 100% ($p<0.05$; **Table 16**). A significant ($p<0.05$) increase in the rate of incident active TB, although of lesser magnitude, was observed in QC in 2018 (26.9%); while SK recorded a marginal decrease of 17.1% in the same year. The number of incident TB cases in YT has never exceeded eight in the last ten years and was only three in 2018 (**Table 16**). The pattern in other jurisdictions has remained virtually unchanged over time.

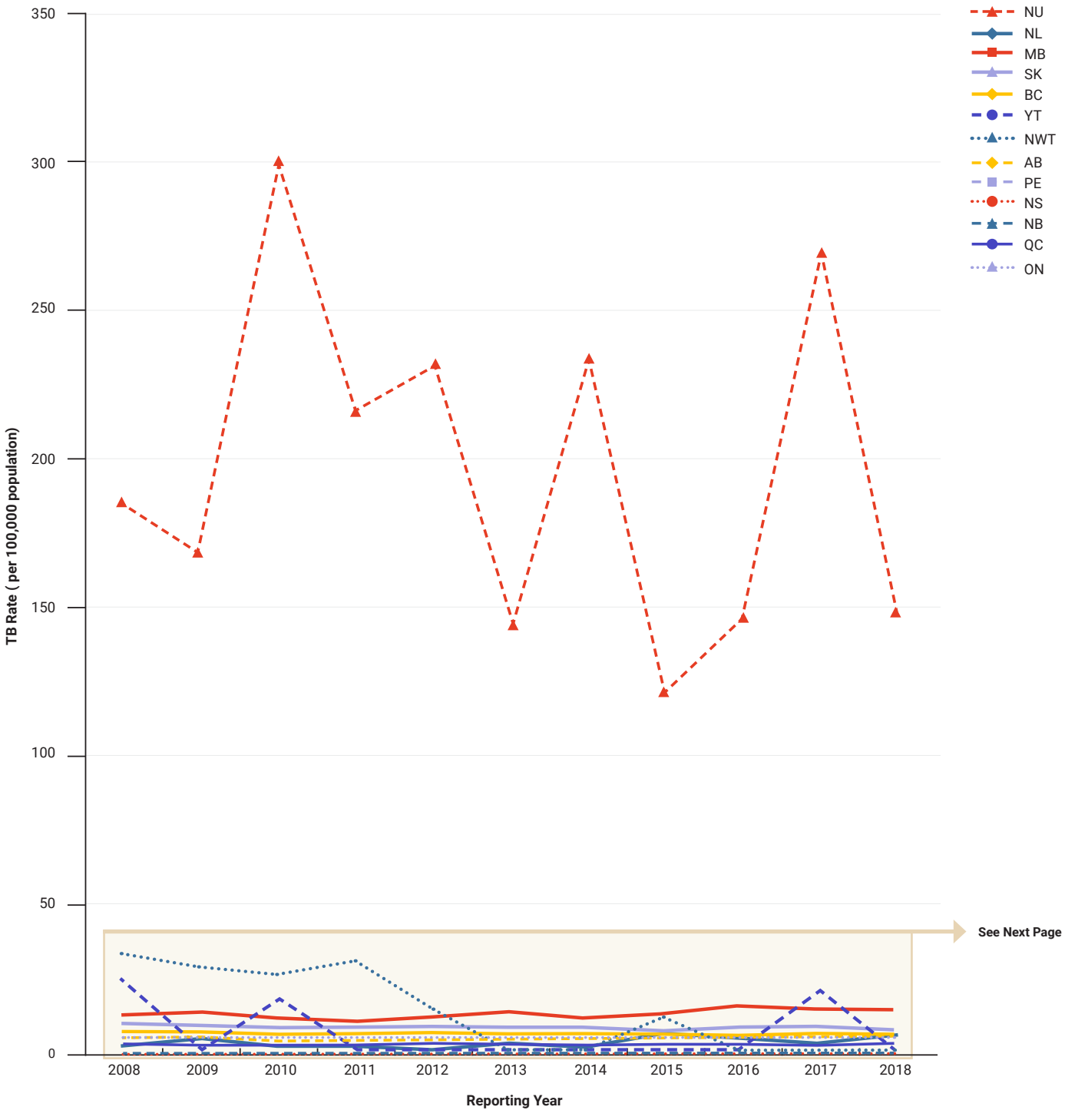
Figure 19: Rate of incident active TB disease in reporting Canadian jurisdictions, CTBRS: 2018[13]



Reporting Jurisdiction	NL (n=30)	PE (n=1)	NS (n=8)	NB (n=6)	QC (n=273)	ON (n=659)	MB (n=187)	SK (n=79)	AB (n=220)	BC (n=269)	YT (n=3)	NWT (n=3)	NU (n=57)
Cases: Female	4.1	-	-	-	2.9	4.3	12.7	6.1	4.7	5.0	-	-	139.5
Cases: Male	7.3	-	1.3	-	3.7	4.9	14.8	7.5	5.5	5.8	-	-	156.9

[13] Rate not calculated for provinces and territories reporting less than five cases per year.

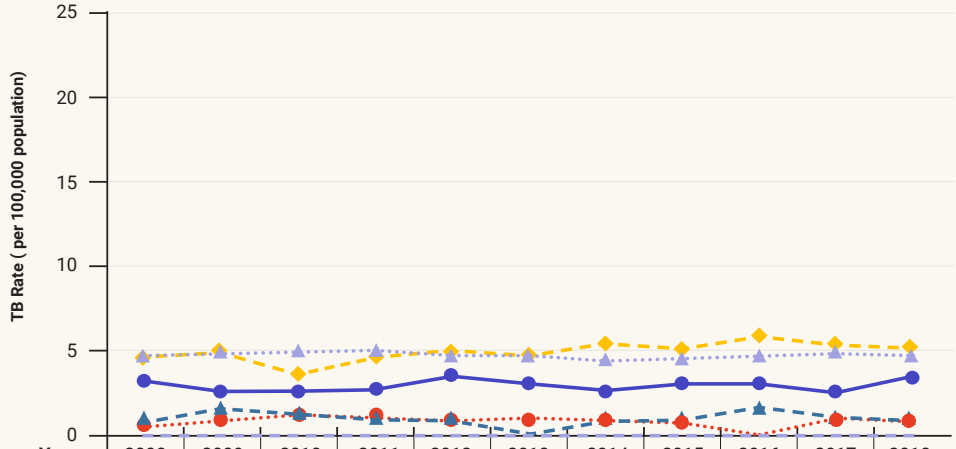
Figure 20: Rate of incident active TB disease (per 100,000 population) over time by reporting Canadian jurisdictions, CTBRS: 2008 – 2018



N.B.: Figure 21 is a reproduction of **Figure 20** excluding data from NU, to visually display the magnitude of differences observed in the TB rates for other jurisdictions.

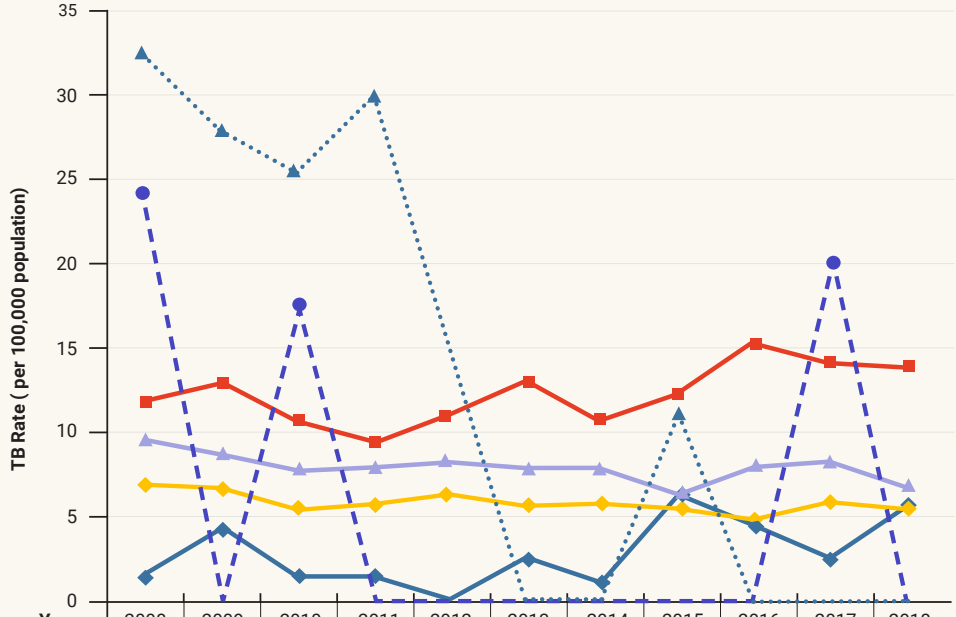
Figure 21: Rate of incident active TB disease (per 100,000 population) over time by reporting Canadian jurisdictions, CTBRS: 2008 – 2018

Figure 21A: Jurisdictions with active TB rate lower than the national average (PEI, NS, NB, QC, ON, and AB)



Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AB	4.6	4.8	3.6	4.5	5	4.7	5.3	5.1	5.7	5.3	5.1
PE	-	-	-	-	-	-	-	-	-	-	-
NS	0.5	0.9	1.1	1	0.8	0.9	0.7	0.6	-	0.9	0.8
NB	0.7	1.5	1.3	0.7	0.7	-	0.7	0.8	1.6	1	0.8
QC	3.1	2.5	2.6	2.7	3.4	3	2.5	3	3.1	2.6	3.3
ON	4.6	4.8	4.9	5	4.6	4.7	4.3	4.4	4.6	4.8	4.6

Figure 21B: Jurisdictions with active TB rate higher than the national average (NWT, YT, BC, SK, MB, and NL)



Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
NL	1.6	4.3	1.5	1.5	-	2.5	1.3	6.2	4.5	2.5	5.7
MB	11.8	12.9	10.7	9.4	10.9	13.1	10.6	12.2	15.3	14	13.8
SK	9.5	8.7	7.7	7.8	8.2	7.8	7.9	6.2	8	8.2	6.8
BC	6.9	6.7	5.4	5.8	6.3	5.6	5.7	5.5	4.9	5.9	5.4
YT	24.2	-	17.3	-	-	-	-	-	-	20.2	-
NWT	32.3	27.8	25.4	29.9	13.7	-	-	11.3	-	-	-

Co-morbidity

HIV/TB co-infection

Overall, of all the cases of active TB disease (*n*=1,797) reported in 2018, HIV test results were known for 1,203: 42 (3.5%) positive against 1,161 negative. The test was not offered to 52 TB cases and of the remaining 542 with unknown HIV status, one declined to undergo testing (**Table 17**). Ontario (*n*=18) and BC (*n*=9) were the place of residence for the majority of individuals co-infected with HIV, followed by SK (*n*=6), AB (*n*=5) and QC (*n*=4). None of the cases from PE, NB, YT and NWT tested positive for HIV (**Table 17**); whereas the same could not be said for NL, NS and MB since the information on HIV status was unknown for a number of their reported TB cases (**Table 17**).

Table 17: Jurisdictional distribution of HIV/TB co-infection among reported cases of incident active TB disease, CTBRS: 2018

	Reported diagnosis of HIV						Diagnosis of HIV unreported						Total TB cases reported	
	HIV positive		HIV negative		Total reported		HIV test not offered		Information not provided		Total unreported			
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
NL	0	(0.0%)	13	(43.3%)	13	**(43.3%)**	16	(53.3%)	1	(3.3%)	17	**(56.7%)**	30	(100%)
PE	0	(0.0%)	1	(100%)	1	**(100%)**	0	(0.0%)	0	(0.0%)	0	**(0.0%)**	1	(100%)
NS	0	(0.0%)	5	(62.5%)	5	**(62.5%)**	0	(0.0%)	3	(37.5%)	3	**(37.5%)**	8	(100%)
NB	0	(0.0%)	6	(100%)	6	**(100%)**	0	(0.0%)	0	(0.0%)	0	**(0.0%)**	6	(100%)
QC	4	(1.5%)	182	(66.2%)	186	**(67.6%)**	19	(6.9%)	70	(25.5%)	89	**(32.4%)**	275	(100%)
ON	18	(2.7%)	400	(60.7%)	418	**(63.4%)**	8	(1.2%)	233[14]	(35.4%)	241	**(36.6%)**	659	(100%)
MB	0	(0.0%)	66	(35.3%)	66	**(35.3%)**	0	(0.0%)	121	(64.7%)	121	**(64.7%)**	187	(100%)
SK	6	(7.6%)	0	(0.0%)	6	**(7.6%)**	0	(0.0%)	73	(92.4%)	73	**(92.4%)**	79	(100%)
AB	5	(2.3%)	212	(96.4%)	217	**(98.6%)**	1	(0.5%)	2	(0.9%)	3	**(1.4%)**	220	(100%)
BC	9	(3.3%)	216	(80.3%)	225	**(83.6%)**	7	(2.6%)	37	(13.8%)	44	**(16.4%)**	269	(100%)
YT	0	(0.0%)	3	(100%)	3	**(100%)**	0	(0.0%)	0	(0.0%)	0	**(0.0%)**	3	(100%)
NWT	0	(0.0%)	3	(100%)	3	**(100%)**	0	(0.0%)	0	(0.0%)	0	**(0.0%)**	3	(100%)
NU	0	(0.0%)	54	(94.7%)	54	**(94.7%)**	1	(1.8%)	2	(3.5%)	3	**(5.3%)**	57	(100%)
Total	**42**	**(2.3%)**	**1,161**	**(64.6%)**	**1,203**	**(66.9%)**	**52**	**(2.9%)**	**542**	**(30.2%)**	**594**	**(33.1%)**	**1,797**	**(100%)**

[14] One of these cases was offered the HIV test and s/he declined.

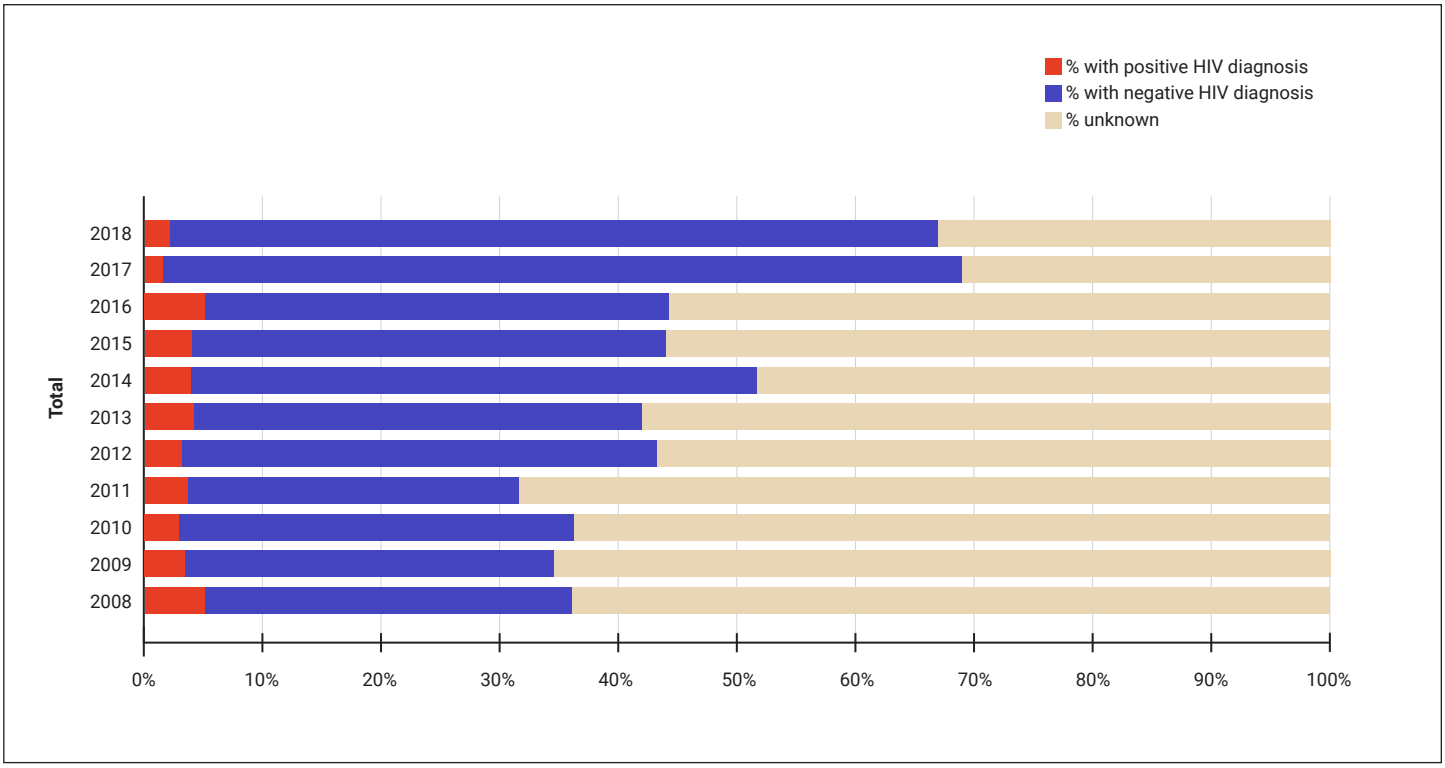
Data collection on the HIV status of reported active incident TB cases has greatly improved over the years, and the percentage of individuals who are offered HIV testing has been incrementally increasing (**Table 18**). The proportion of cases with available HIV status has progressively increased from 36.2% to almost 67.0% in the last decade (**Table 18**). In addition, the total number of HIV/TB co-infections rose from 28 in 2017 to 42 in 2018, a significant ($p<0.05$) 50% increase. HIV/TB co-infection decreased from 14.5% in the first half of the current decade to 3.5% in 2018 (**Table 18**). Jurisdictional summaries are available in Appendix C — Section II (**Figures 22A–22D**)

Table 18: Temporal distribution of HIV status of reported incident active TB cases, CTBRS: 2008 – 2018

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
HIV-positive	**n**	86	59	49	61	56	70	65	67	92	28	42
	(%)	(5.5%)	(3.6%)	(3.1%)	(3.8%)	(3.3%)	(4.2%)	(4.0%)	(4.1%)	(5.2%)	(1.5%)	(2.3%)
HIV-negative	**n**	508	516	528	454	682	625	772	659	691	1,237	1,161
	(%)	(30.9%)	(31.2%)	(33.3%)	(28.0%)	(40.1%)	(37.9%)	(47.8%)	(40.1%)	(39.2%)	(67.6%)	(64.6%)
Total reported	**n**	**594**	**575**	**577**	**515**	**738**	**695**	**837**	**726**	**783**	**1,265**	**1,203**
	(%)	**(36.2%)**	**(34.8%)**	**(36.4%)**	**(31.8%)**	**(43.4%)**	**(42.1%)**	**(51.8%)**	**(44.2%)**	**(44.4%)**	**(69.1%)**	**(66.9%)**
Test refused	**n**	2	4	3	3	71	2	4	7	6	3	1
	(%)	(0.1%)	(0.2%)	(0.2%)	(0.2%)	(4.2%)	(0.1%)	(0.2%)	(0.4%)	(0.3%)	(0.2%)	(0.1%)
Test not offered	**n**	15	31	27	61	61	74	39	53	47	57	52
	(%)	(0.9%)	(1.9%)	(1.7%)	(3.8%)	(3.6%)	(4.5%)	(2.4%)	(3.2%)	(2.7%)	(3.1	(2.9%)
Missing information	**n**	1,031	1,044	979	1,042	830	880	735	857	927	%)506	541
	(%)	(62.8%)	(63.1%)	(61.7%)	(64.3%)	(48.8%)	(53.3%)	(45.5%)	(52.2%)	(52.6%)	(27.6%)	(30.1%)
Total unreported	**n**	**1,048**	**1,079**	**1,009**	**1,106**	**962**	**956**	**778**	**917**	**980**	**566**	**594**
	(%)	**(63.8%)**	**(65.2%)**	**(63.6%)**	**(68.2%)**	**(56.6%)**	**(57.9%)**	**(48.2%)**	**(55.8%)**	**(55.6%)**	**(30.9%)**	**(33.1%)**
Total TB cases reported	**n**	**1,642**	**1,654**	**1,586**	**1,621**	**1,700**	**1,651**	**1,615**	**1,643**	**1,763**	**1,831**	**1,797**
	(%)	**(100%)**	**(100%)**	**(100%)**	**(100%)**	**(100%)**	**(100%)**	**(100%)**	**(100%)**	**(100%)**	**(100%)**	**(100%)**

Reporting of HIV/TB co-infection had improved incrementally: from 36.2% in 2008 to 66.9% in 2018.

Figure 22: Reporting rate (%) of HIV/TB co-infection (to the CTBRS) across Canadian jurisdictions over time, CTBRS: 2008 – 2018



Diabetes mellitus

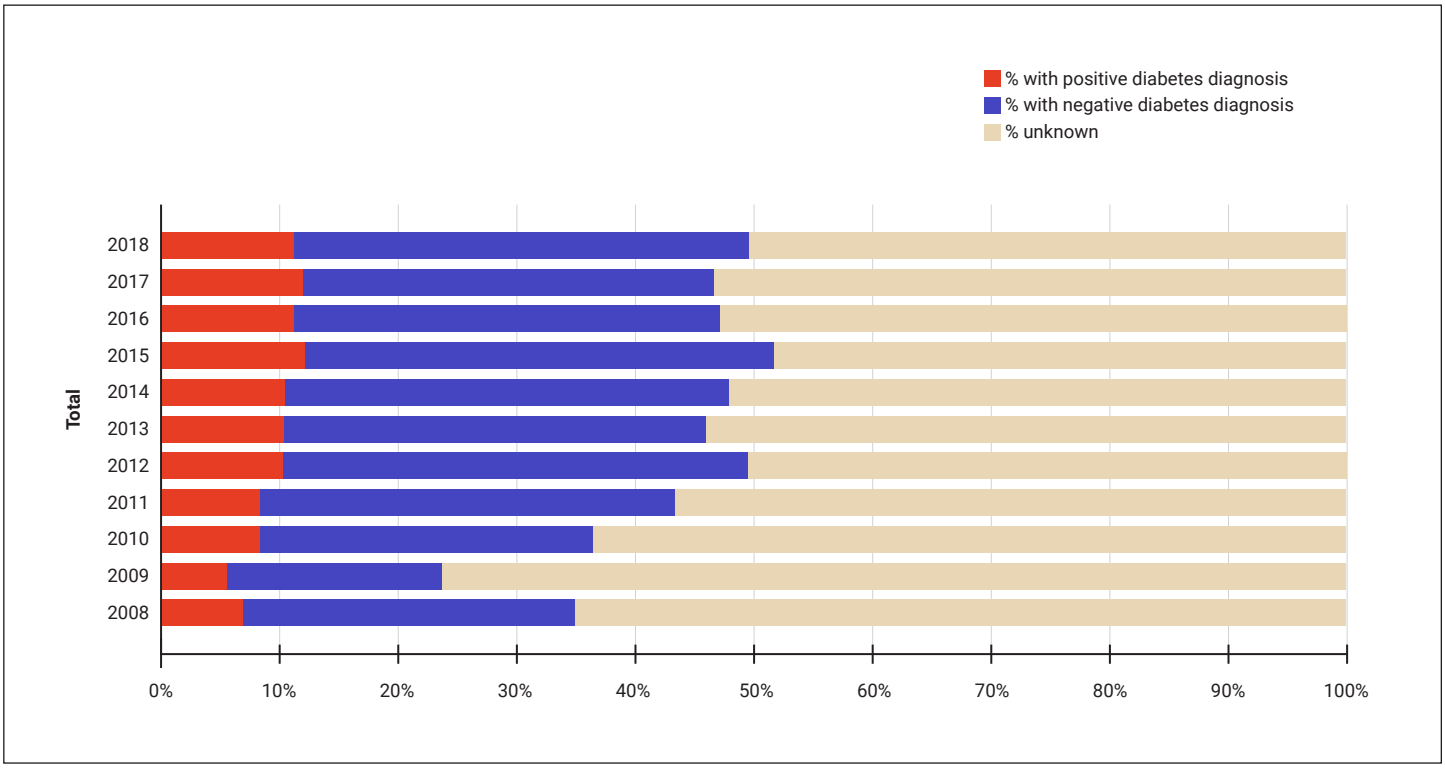
In 2018, 51.5% (*n*=925) of incident active TB cases in Canada had a diagnosis of either type I or II diabetes mellitus (**Table 20**). Reports on cases with both incident active TB disease and diabetes by the CTBRS cannot be viewed as representative because 48.5% of reported TB cases did not include information on diabetes status.

Table 19: Diagnosis of diabetes mellitus among reported cases of incident active TB disease, CTBRS: 2018

	Diagnosis of diabetes mellitus (DM) in reported TB cases						Total TB cases reported	
	DM-positive		DM-negative		Information not provided			
	n	(%)	n	(%)	n	(%)	n	(%)
NL	1	(3.3%)	29	(96.7%)	0	(0.0%)	**30**	**(1.7%)**
PE	0	(0.0%)	1	(100%)	0	(0.0%)	**1**	**(0.1%)**
NS	0	(0.0%)	7	(87.5%)	1	(12.5%)	**8**	**(0.4%)**
NB	0	(0.0%)	6	(100%)	0	(0.0%)	**6**	**(0.3%)**
QC	27	(9.8%)	223	(81.1%)	25	(9.1%)	**275**	**(15.3%)**
ON	104	(15.8%)	0	(0.0%)	555	(84.2%)	**659**	**(36.7%)**
MB	0	(0.0%)	0	(0.0%)	187	(100%)	**187**	**(10.4%)**
SK	4	(5.1%)	0	(0.0%)	75	(94.9%)	**79**	**(4.4%)**
AB	28	(12.7%)	189	(85.9%)	3	(1.4%)	**220**	**(12.2%)**
BC	36	(13.4%)	232	(86.2%)	1	(0.4%)	**269**	**(15.0%)**
YT	1	(33.3%)	2	(66.7%)	0	(0.0%)	**3**	**(0.2%)**
NWT	0	(0.0%)	3	(100%)	0	(0.0%)	**3**	**(0.2%)**
NU	0	(0.0%)	0	(0.0%)	57	(100%)	**57**	**(3.2%)**
Total	**201**	**(11.2%)**	**692**	**(38.5%)**	**1,004**	**(50.3%)**	**1,797**	**(100%)**

Overall, the proportion of cases diagnosed with both incident active TB and diabetes mellitus reported to the CTBRS has fluctuated very little since 2012 after gradual annual increases observed between 2008 and 2012 (**Figure 23**). Concurrently, a similar pattern has been recorded in the rate of reporting by jurisdictions on this parameter (**Figure 23A-23D** in Appendix C — Section II).

Figure 23: CTBRS reporting rate (%) of TB / diabetes mellitus co-morbidity across Canadian jurisdictions over time, 2008-2018



Note: The overall reporting rate on diabetes mellitus is still below 50.0%, which makes it challenging to interpret national levels.

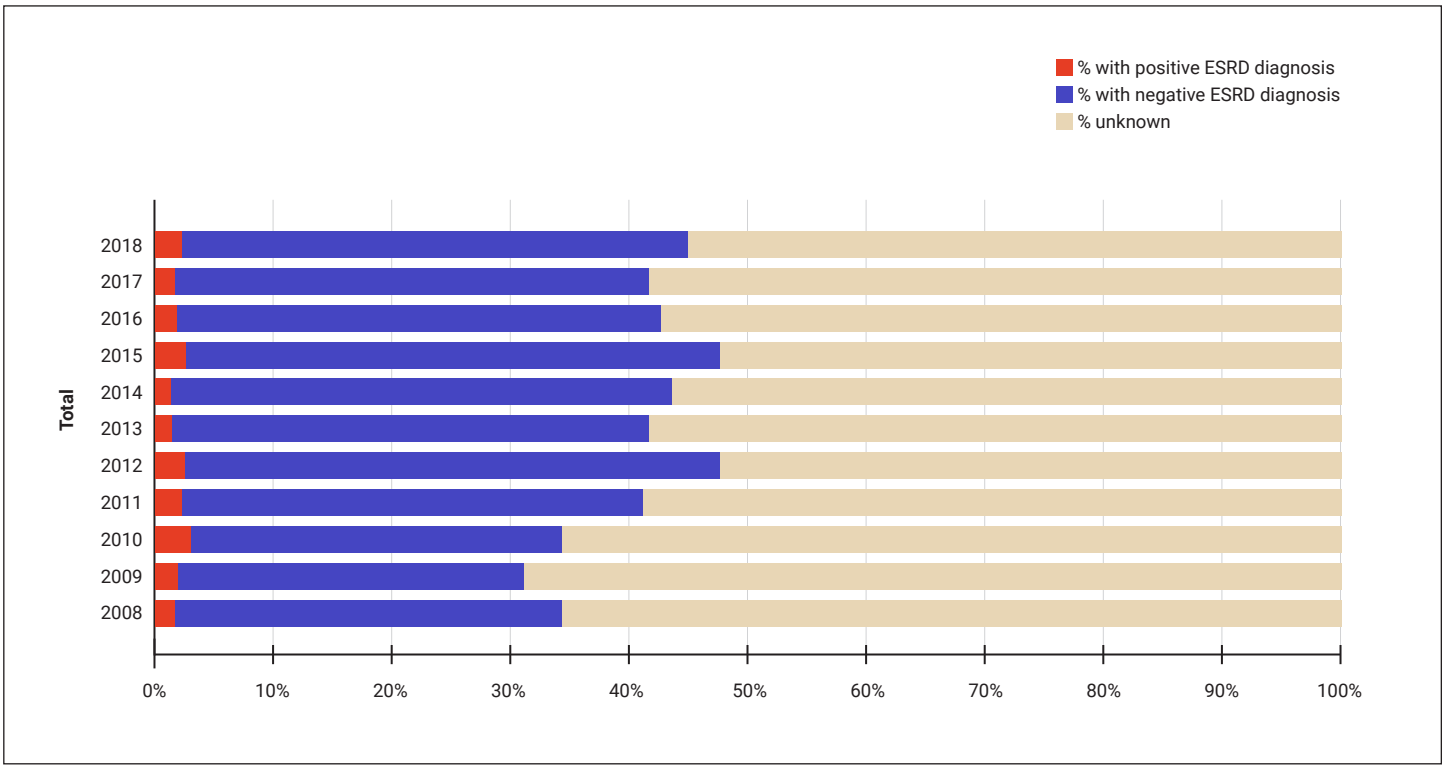
End-stage renal disease (ESRD)

In 2018, a diagnosis of ESRD was available for 44.9% (*n*=807) of all incident active TB cases reported to the CTBRS (**Table 20**). Of the 42 incident active TB cases with ESRD, 31 (73.8%) were residents of ON (*n*=20) and BC (*n*=11). The overall findings have followed a stable pattern for the past decade (**Figure 24** and **Figures 24A-24D** in Appendix C — Section II).

Table 20: Diagnosis of ESRD among reported incident active TB cases, CTBRS: 2018

	Diagnosis of ESRD in reported TB cases						Total TB cases reported	
	ESRD-positive		ESRD-negative		Information not provided			
	n	(%)	n	(%)	n	(%)	n	(%)
NL	0	(0.0%)	30	(100%)	0	(0.0%)	**30**	**(1.7%)**
PE	0	(0.0%)	1	(100%)	0	(0.0%)	**1**	**(0.1%)**
NS	0	(0.0%)	8	(100%)	0	(0.0%)	**8**	**(0.4%)**
NB	0	(0.0%)	6	(100%)	0	(0.0%)	**6**	**(0.3%)**
QC	5	(1.8%)	246	(89.5%)	24	(8.7%)	**275**	**(15.3%)**
ON	20	(3.0%)	0	(0.0%)	639	(97.0%)	**659**	**(36.7%)**
MB	0	(0.0%)	0	(0.0%)	187	(100%)	**187**	**(10.4%)**
SK	1	(1.3%)	0	(0.0%)	78	(98.7%)	**79**	**(4.4%)**
AB	5	(2.3%)	211	(95.9%)	4	(1.8%)	**220**	**(12.2%)**
BC	11	(4.1%)	257	(95.5%)	1	(0.4%)	**269**	**(15.0%)**
YT	0	(0.0%)	3	(100%)	0	(0.0%)	**3**	**(0.2%)**
NWT	0	(0.0%)	3	(100%)	0	(0.0%)	**3**	**(0.2%)**
NU	0	(0.0%)	0	(0.0%)	57	(100%)	**57**	**(3.2%)**
Total	**42**	**(2.3%)**	**765**	**(42.6%)**	**990**	**(55.1%)**	**1,797**	**(100%)**

Figure 24: Reporting rate (%) of ESRD/TB diagnoses across Canadian jurisdictions over time, CTBRS: 2008 – 2018



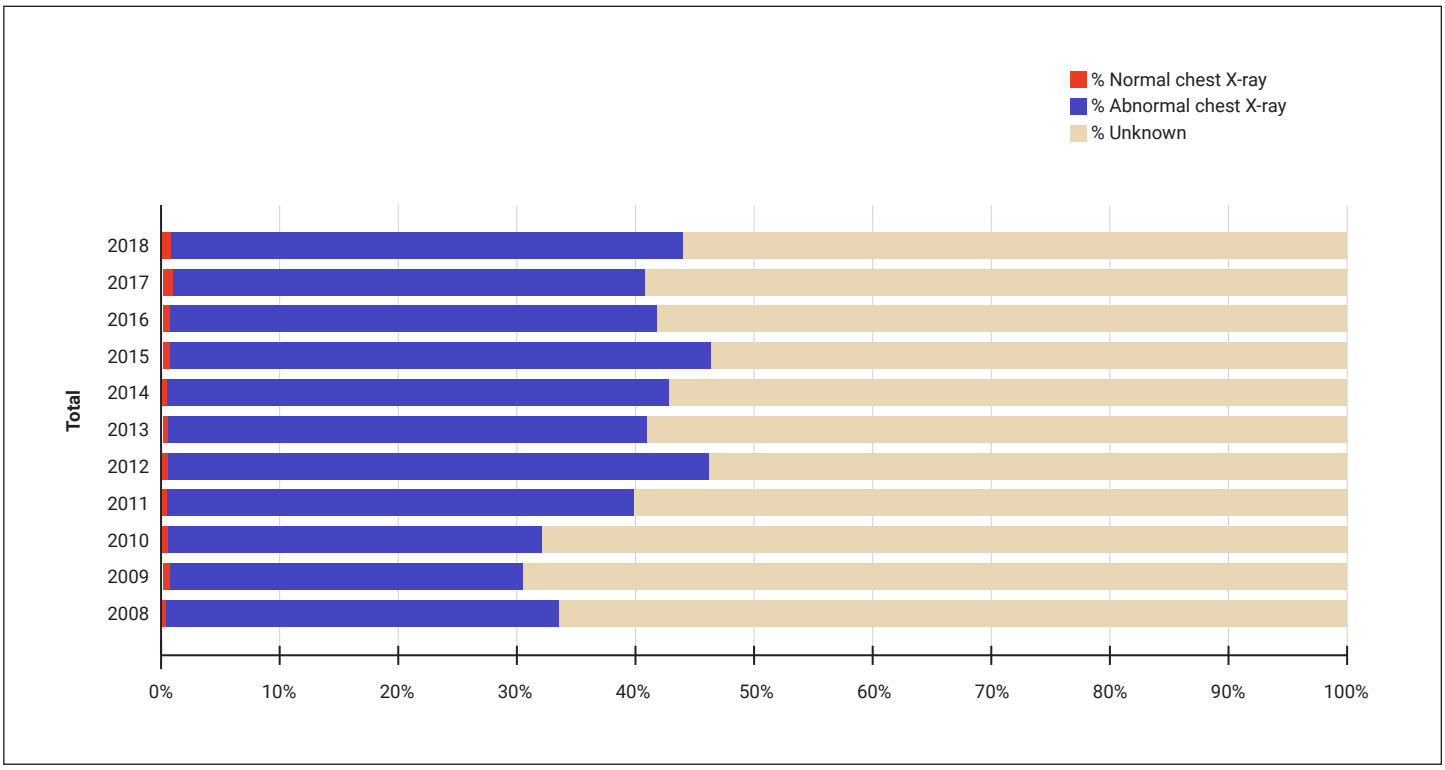
Previous abnormal chest X-ray

Only 32.8% (*n*=590) of reported incident TB cases in 2018 provided a response about abnormal chest x-ray prior to diagnosis (**Table 21 and Figure 25**). Although interpreting this data at the national level is challenging, it has value for jurisdictions with representative samples and high response rates, such as BC and QC (**Table 21** and **Figures 25A-D** in Appendix C — Section II).

Table 21: Prior abnormal chest X-ray diagnosis in reported cases of incident active TB disease, CTBRS: 2018

	Prior chest X-Ray diagnosis in reported TB cases						Total TB cases reported	
	Abnormal X-Ray		Normal X-ray		Information not provided			
	n	(%)	n	(%)	n	(%)	n	(%)
NL	6	(20.0%)	23	(76.7%)	1	(3.3%)	**30**	**(1.7%)**
PE	0	(0.0%)	1	(100%)	0	(0.0%)	**1**	**(0.1%)**
NS	0	(0.0%)	6	(75.0%)	2	(25.0%)	**8**	**(0.4%)**
NB	1	(16.7%)	3	(50.0%)	2	(33.3%)	**6**	**(0.3%)**
QC	48	(17.5%)	154	(56.0%)	73	(26.5%)	**275**	**(15.3%)**
ON	17	(2.6%)	1	(0.2%)	641	(97.3%)	**659**	**(36.7%)**
MB	0	(0.0%)	0	(0.0%)	187	(100%)	**187**	**(10.4%)**
SK	0	(0.0%)	0	(0.0%)	79	(100%)	**79**	**(4.4%)**
AB	32	(14.5%)	24	(10.9%)	164	(74.5%)	**220**	**(12.2%)**
BC	2	(0.7%)	266	(98.9%)	1	(0.4%)	**269**	**(15.0%)**
YT	0	(0.0%)	3	(100%)	0	(0.0%)	**3**	**(0.2%)**
NWT	1	(33.3%)	2	(66.7%)	0	(0.0%)	**3**	**(0.2%)**
NU	0	(0.0%)	0	(0.0%)	57	(100%)	**57**	**(3.2%)**
Total	**107**	**(6.0%)**	**483**	**(26.9%)**	**1,207**	**(67.2%)**	**1,797**	**(100%)**

Figure 25: Reporting rate (%) of prior abnormal chest x-ray diagnosis across Canadian jurisdictions over time, CTBRS: 2008 – 2018



Transplant-related immunosuppression

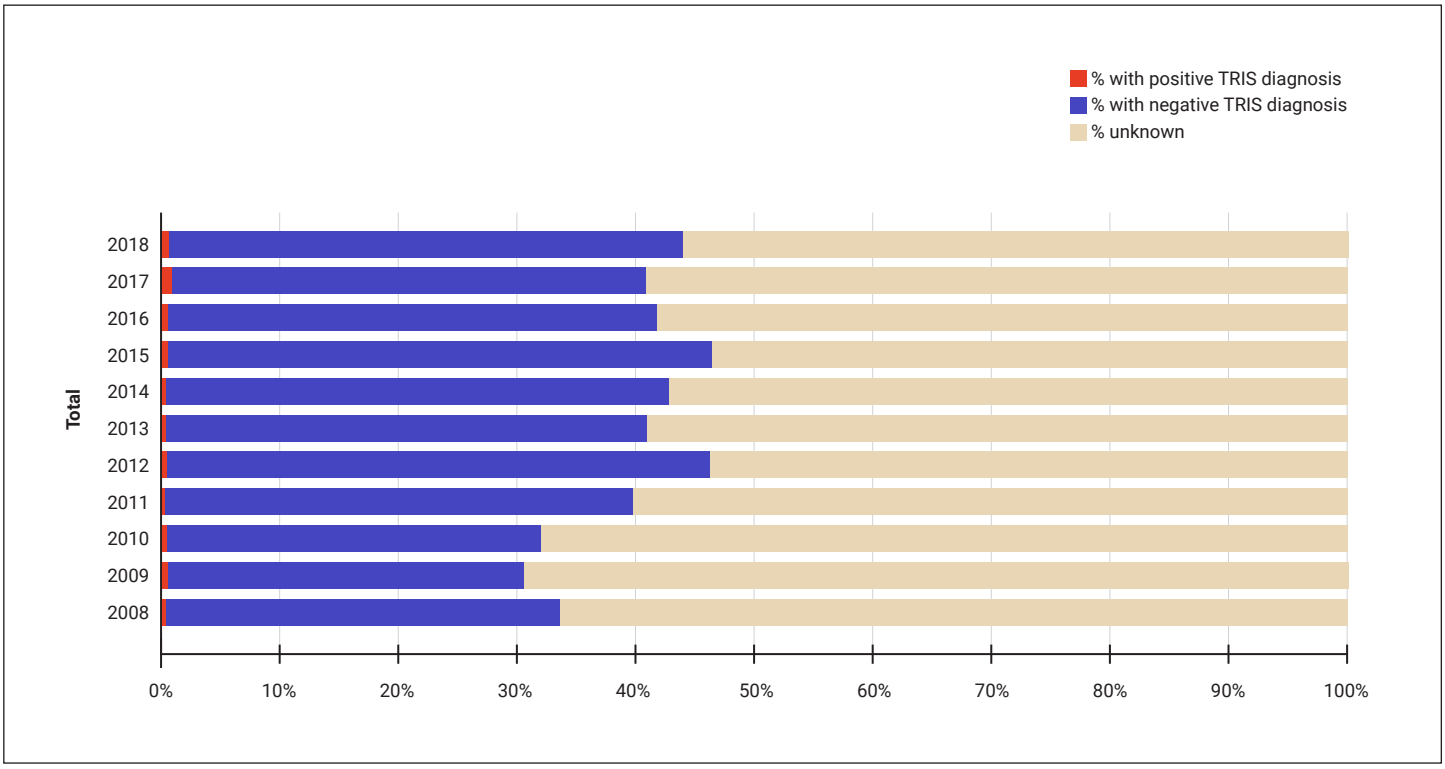
Transplant-related immunosuppression (TRIS) was diagnosed in 1.5% (*n*=12) of the 789 reported TB cases with available data in 2018 (**Table 22**). None of these cases were from the Maritime Provinces or Northern territories. Additionally, data for cases residing in ON, MB, and SK were unavailable.

Table 22: Diagnosis of TRIS among reported cases of incident active TB disease, CTBRS: 2018

	Diagnosis of TRIS in reported TB cases						Total TB cases reported	
	TRIS-positive		TRIS-negative		Information not provided			
	n	(%)	n	(%)	n	(%)	n	(%)
NL	0	(0.0%)	30	(100%)	8	(26.7%)	**30**	**(1.7%)**
PE	0	(0.0%)	1	(100%)	0	(0.0%)	**1**	**(0.1%)**
NS	0	(0.0%)	8	(100%)	0	(0.0%)	**8**	**(0.4%)**
NB	0	(0.0%)	6	(100%)	0	(0.0%)	**6**	**(0.3%)**
QC	4	(1.5%)	249	(90.5%)	22	(8.0%)	**275**	**(15.3%)**
ON	3	(0.5%)	0	(0.0%)	656	(99.5%)	**659**	**(36.7%)**
MB	0	(0.0%)	0	(0.0%)	187	(100%)	**187**	**(10.4%)**
SK	0	(0.0%)	0	(0.0%)	79	(100%)	**79**	**(4.4%)**
AB	3	(1.4%)	211	(95.9%)	6	(2.7%)	**220**	**(12.2%)**
BC	2	(0.7%)	266	(98.9%)	1	(0.4%)	**269**	**(15.0%)**
YT	0	(0.0%)	3	(100%)	0	(0.0%)	**3**	**(0.2%)**
NWT	0	(0.0%)	3	(100%)	0	(0.0%)	**3**	**(0.2%)**
NU	0	(0.0%)	0	(0.0%)	57	(100%)	**57**	**(3.2%)**
Total	**12**	**(0.7%)**	**777**	**(43.2%)**	**1,008**	**(56.1%)**	**1,797**	**(100%)**

The overall annual proportion of reported cases of incident active TB disease with TRIS has remained low and has never exceeded 0.9%. The response rate for this parameter is also low which makes national level interpretation challenging (**Figure 26**). Jurisdictional summaries are available in Appendix C — Section II (**Figures 26A–26D**).

Figure 26: CTBRS reporting rate (%) of TRIS diagnosis across Canadian jurisdictions over time, 2008 – 2018

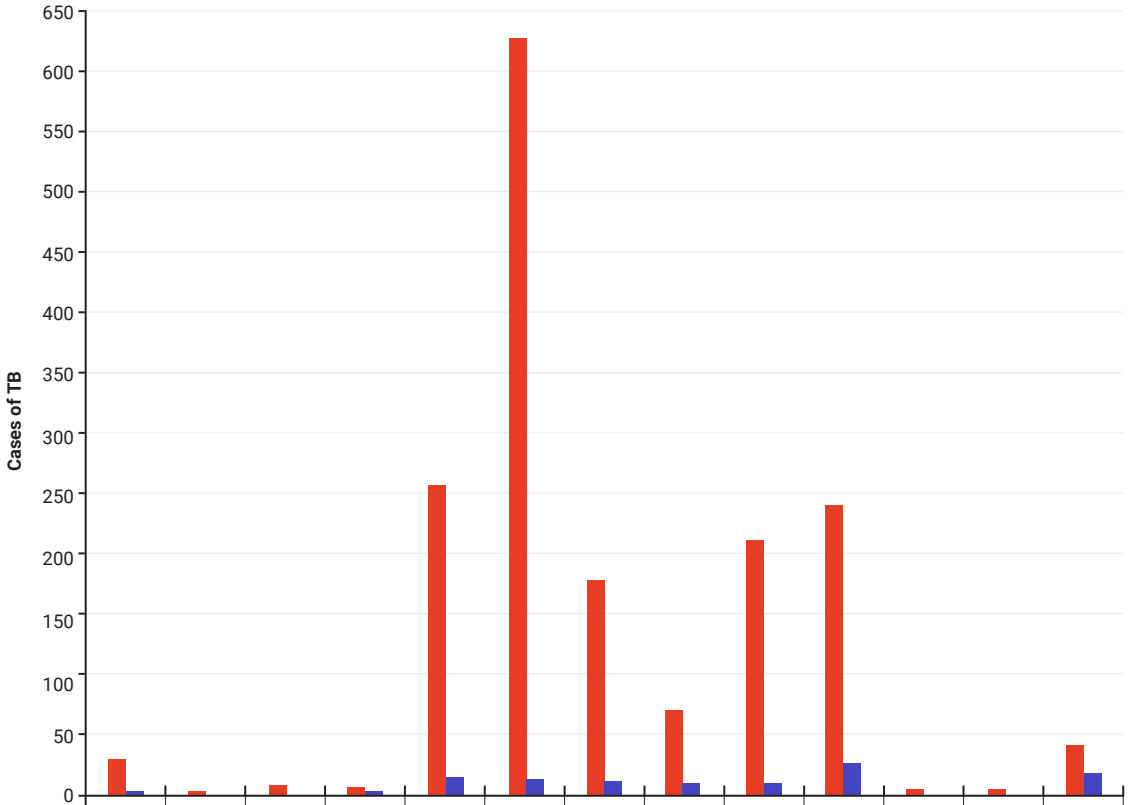


Other potential risk factors

History of previous TB disease

Among cases of incident active TB disease reported in 2018 in Canada, 5.5% (*n*=99) were re-treatment cases; corresponding to an overall ratio of at least one re-treatment to 17 new cases. The highest ratio was observed in NU with about one re-treatment to three new (1:3) cases (**Figure 27** and **Table 23**), followed by SK (1:8) and BC (1:9).

Figure 27: Reported cases of incident active TB with history of TB disease, CTBRS: 2018



Reporting Jurisdiction	NL	PE	NS	NB	QC	ON	MB	SK	AB	BC	YT	NW	NU
New Case	28	1	7	5	256	629	177	70	211	239	3	3	40
Re-treatment Case	2	0	0	1	13	12	10	9	9	26	0	0	17

The time interval between the last treatment outcome and the new diagnosis ranged from within the first two years (*n*=5) to more than 20 years (*n*=20). The largest proportion, 40.4% (*n*=40), of all re-treatment cases occurred within the first nine years following the last treatment (**Table 23**).

Table 23: Time interval between current diagnosis and end of last TB treatment course, CTBRS: 2018[15]

	0-2 years		3 - 5 years		6 - 9 years		10-19 years		> 20 years		Unknown		Total re-treatment TB cases reported	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
NL	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	2	(2.0%)	0	(0.0%)	**2**	**(2.0%)**
NB	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(1.0%)	**1**	**(1.0%)**
QC	1	(1.0%)	2	(2.0%)	1	(1.0%)	4	(4.0%)	5	(5.1%)	0	(0.0%)	**13**	**(13.1%)**
ON	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	12	(12.1%)	**12**	**(12.1%)**
MB	0	(0.0%)	6	(6.1%)	2	(2.0%)	2	(2.0%)	0	(0.0%)	0	(0.0%)	**10**	**(10.1%)**
SK	0	(0.0%)	0	(0.0%)	3	(3.0%)	3	(3.0%)	3	(3.0%)	0	(0.0%)	**9**	**(9.1%)**
AB	0	(0.0%)	1	(1.0%)	2	(2.0%)	4	(4.0%)	2	(2.0%)	0	(0.0%)	**9**	**(9.1%)**
BC	2	(2.0%)	7	(7.1%)	3	(3.0%)	2	(2.0%)	8	(8.1%)	4	(4.0%)	**26**	**(26.3%)**
NU	2	(2.0%)	1	(1.0%)	7	(7.1%)	6	(6.1%)	0	(0.0%)	1	(1.0%)	**17**	**(17.2%)**
Total	**5**	**(5.1%)**	**17**	**(17.2%)**	**18**	**(18.2%)**	**21**	**(21.2%)**	**20**	**(20.2%)**	**18**	**(18.2%)**	**99**	**(100%)**

From 2008 to 2018, the number of re-treatment cases in ON and QC declined significantly (*p<0.05*), falling from 43 to just 12 cases for the former, and from 22 to 13 cases for the latter (**Table 24**).

[15] No re-treatment cases were reported by PE, NS, YT and NWT.

Table 24: Reported cases of Incident active TB disease with past history of positive TB diagnosis over time and across all jurisdictions, CTBRS: 2008 – 2018[16]

	2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
NL	1	(0.8%)	2	(2.1%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	3	(3.2%)	0	(0.0%)	1	(1.0%)	1	(1.0%)	3	(3.1%)	2	(2.0%)
NS	0	(0.0%)	0	(0.0%)	2	(2.1%)	1	(1.0%)	1	(1.1%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
NB	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(1.2%)	0	(0.0%)	0	(0.0%)	1	(1.0%)	1	(1.0%)
QC	22	(17.6%)	11	(11.5%)	12	(12.5%)	15	(15.5%)	16	(18.0%)	10	(10.6%)	12	(14.6%)	16	(16.2%)	18	(18.4%)	16	(16.5%)	13	(13.1%)
ON	43	(34.4%)	36	(37.5%)	29	(30.2%)	20	(20.6%)	20	(22.5%)	27	(28.7%)	19	(23.2%)	23	(23.2%)	19	(19.4%)	25	(25.8%)	12	(12.1%)
MB	6	(4.8%)	7	(7.3%)	5	(5.2%)	5	(5.2%)	2	(2.2%)	5	(5.3%)	3	(3.7%)	5	(5.1%)	7	(7.1%)	4	(4.1%)	10	(10.1%)
SK	4	(3.2%)	7	(7.3%)	9	(9.4%)	9	(9.3%)	4	(4.5%)	6	(6.4%)	10	(12.2%)	4	(4.0%)	9	(9.2%)	5	(5.2%)	9	(9.1%)
AB	9	(7.2%)	11	(11.5%)	6	(6.3%)	12	(12.4%)	13	(14.6%)	17	(18.1%)	15	(18.3%)	18	(18.2%)	23	(23.5%)	12	(12.4%)	9	(9.1%)
BC	34	(27.2%)	17	(17.7%)	18	(18.8%)	23	(23.7%)	25	(28.1%)	19	(20.2%)	21	(25.6%)	18	(18.2%)	11	(11.2%)	21	(21.6%)	26	(26.3%)
YT	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(1.0%)	0	(0.0%)	2	(2.1%)	0	(0.0%)
NWT	2	(1.6%)	1	(1.0%)	2	(2.1%)	2	(2.1%)	1	(1.1%)	0	(0.0%)	1	(1.2%)	2	(2.0%)	1	(1.0%)	1	(1.0%)	0	(0.0%)
NU	4	(3.2%)	4	(4.2%)	13	(13.5%)	10	(10.3%)	7	(7.9%)	7	(7.4%)	0	(0.0%)	11	(11.1%)	9	(9.2%)	7	(7.2%)	17	(17.2%)
Total	**125**	**(100%)**	**96**	**(100%)**	**96**	**(100%)**	**97**	**(100%)**	**89**	**(100%)**	**94**	**(100%)**	**82**	**(100%)**	**99**	**(100%)**	**98**	**(100%)**	**97**	**(100%)**	**99**	**(100%)**

[16] No re-treatment case(s) have been reported by PE for the last ten years.

Homelessness 12 months prior to, or at the time of active TB diagnosis

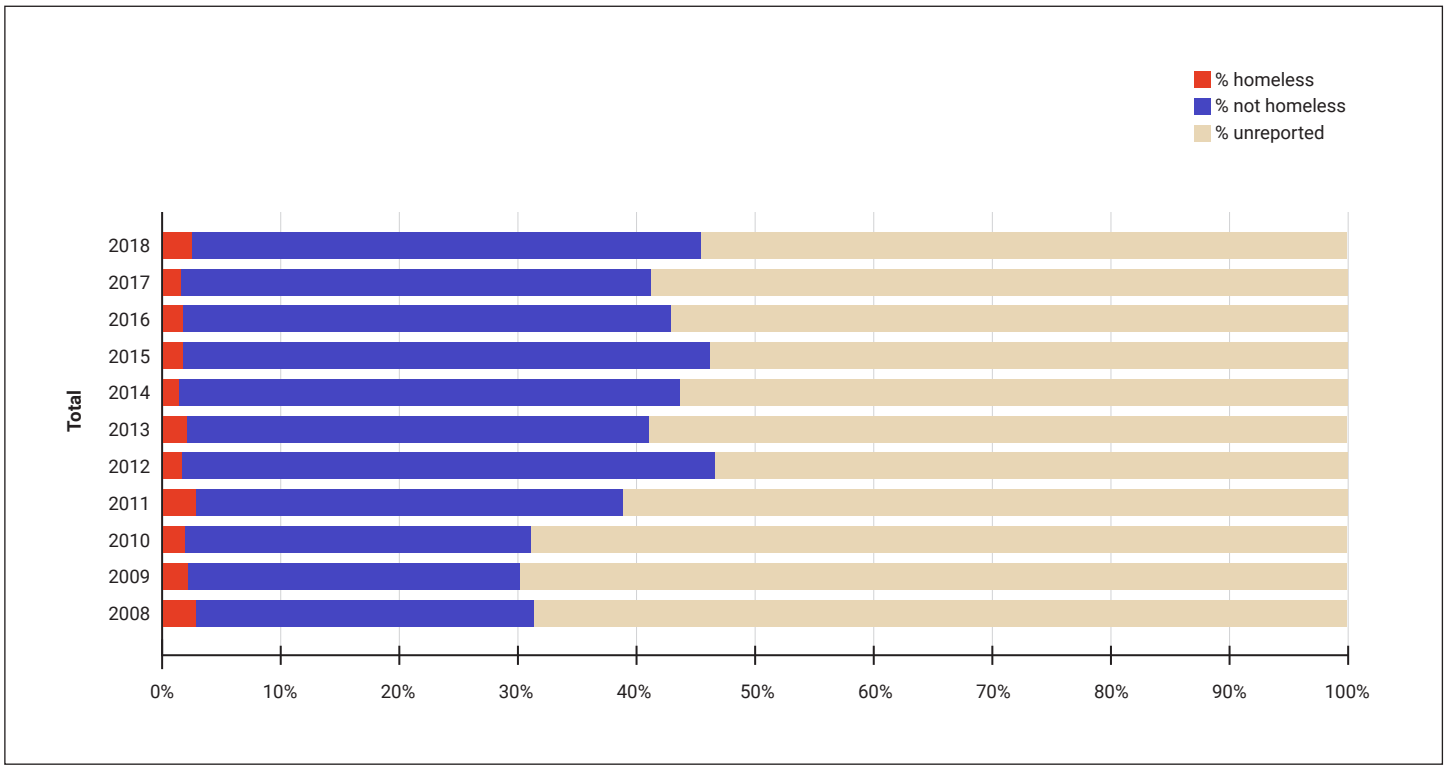
Only 5.5% (*n*=45) of the 815 case reports that provided information on housing described the diagnosed individual's status as homeless at the time of TB diagnosis or within the 12 months preceding the diagnosis (**Table 25**). There is a large proportion of missing information, which makes it challenging to interpret these results at the national level.

Table 25: Homelessness among reported cases of incident active TB disease across all jurisdictions, CTBRS: 2018

	Cases of TB with available information on homelessness						Total TB cases reported	
	Homeless		Not homeless		Information not provided			
	n	(%)	n	(%)	n	(%)	n	(%)
NL	0	(0.0%)	30	(100%)	0	(0.0%)	**30**	**(1.7%)**
PE	0	(0.0%)	1	(100%)	0	(0.0%)	**1**	**(0.1%)**
NS	0	(0.0%)	8	(100%)	0	(0.0%)	**8**	**(0.4%)**
NB	0	(0.0%)	6	(100%)	0	(0.0%)	**6**	**(0.3%)**
QC	6	(2.2%)	249	(90.5%)	20	(7.3%)	**275**	**(15.3%)**
ON	23	(3.5%)	0	(0.0%)	636	(96.5%)	**659**	**(36.7%)**
MB	0	(0.0%)	0	(0.0%)	187	(100%)	**187**	**(10.4%)**
SK	0	(0.0%)	0	(0.0%)	79	(100%)	**79**	**(4.4%)**
AB	4	(1.8%)	214	(97.3%)	2	(0.9%)	**220**	**(12.2%)**
BC	12	(4.5%)	256	(95.2%)	1	(0.4%)	**269**	**(15.0%)**
YT	0	(0.0%)	3	(100%)	0	(0.0%)	**3**	**(0.2%)**
NWT	0	(0.0%)	3	(100%)	0	(0.0%)	**3**	**(0.2%)**
NU	0	(0.0%)	0	(0.0%)	57	(100%)	**57**	**(3.2%)**
Total	**45**	**(2.5%)**	**770**	**(42.8%)**	**982**	**(54.6%)**	**1,797**	**(100%)**

Over the past decade, homelessness among reported incident active TB cases has been low, ranging from 1.6% to 2.9% (**Figure 28**). Though not yet at expected levels (below 20%), reporting has been improving incrementally, and non-availability of data from 2008 to 2018 has decreased from 68.7% to 54.6% (**Figure 28**). Jurisdictional summaries are available in Appendix C — Section II (**Figures 28A-28D**).

Figure 28: Reporting rate (%) of homelessness across Canadian jurisdictions and over time, CTBRS: 2008 – 2018[17]



[17] Data not available for Saskatchewan.

Living in a correctional setting at time of diagnosis

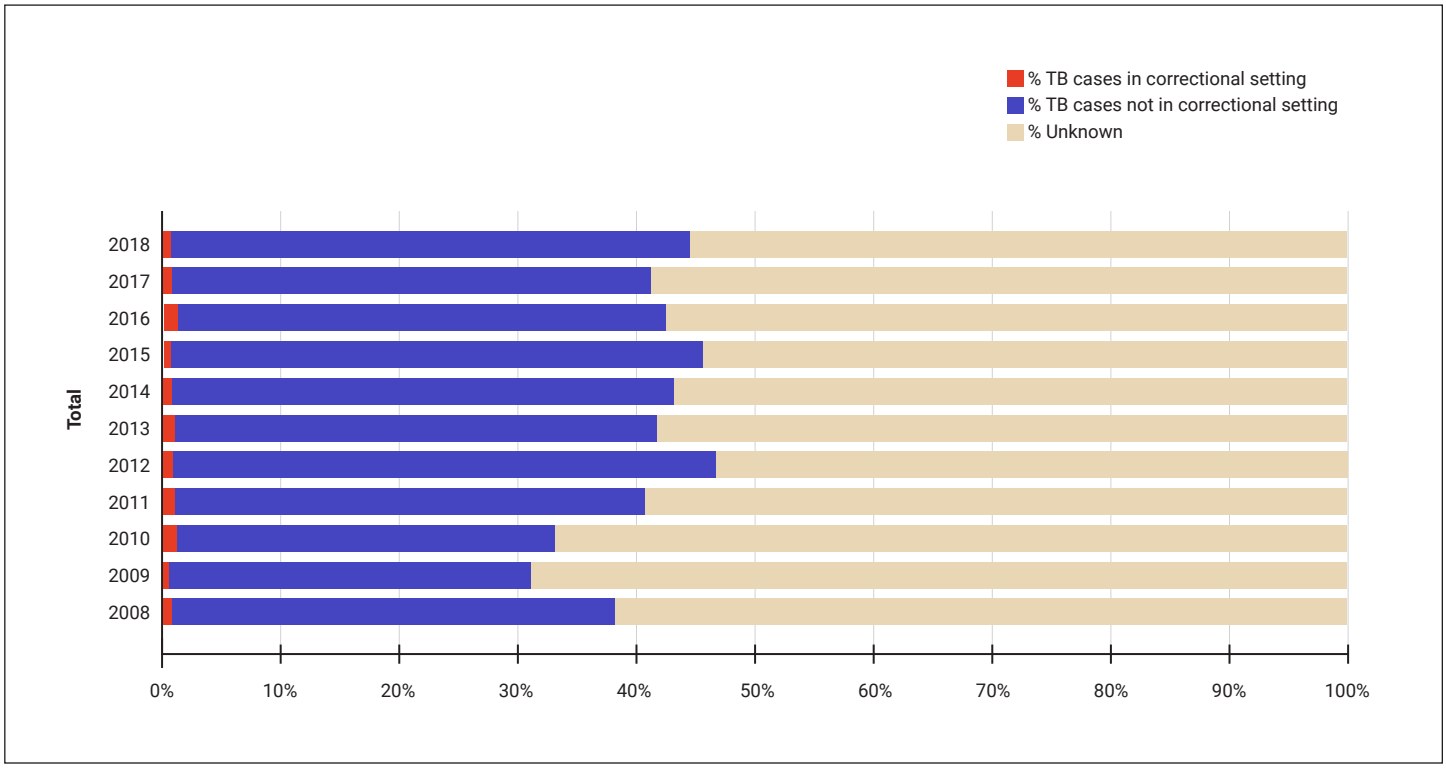
Only 12 of the TB cases reported in 2018 indicated having lived in a correctional setting (CS) within 12 months prior to TB diagnosis (**Table 26**).

Table 26: Residency in a correctional setting within 12 months prior to incident active TB diagnosis, CTBRS: 2018

	Residency in correctional setting within 12 months prior to TB diagnosis						Total TB cases reported	
	Yes		No		Information not provided			
	n	(%)	n	(%)	n	(%)	n	(%)
NL	0	(0.0%)	30	(100%)	0	(0.0%)	30	(1.7%)
PE	0	(0.0%)	1	(100%)	0	(0.0%)	1	(0.1%)
NS	0	(0.0%)	8	(100%)	0	(0.0%)	8	(0.4%)
NB	0	(0.0%)	6	(100%)	0	(0.0%)	6	(0.3%)
QC	1	(0.4%)	249	(90.5%)	25	(9.1%)	275	(15.3%)
ON	10	(1.5%)	1	(0.2%)	648	(98.3%)	659	(36.7%)
MB	0	(0.0%)	0	(0.0%)	187	(100%)	187	(10.4%)
SK	0	(0.0%)	0	(0.0%)	79	(100%)	79	(4.4%)
AB	1	(0.5%)	218	(99.1%)	1	(0.5%)	220	(12.2%)
BC	0	(0.0%)	268	(99.6%)	1	(0.4%)	269	(15.0%)
YT	0	(0.0%)	3	(100%)	0	(0.0%)	3	(0.2%)
NWT	0	(0.0%)	3	(100%)	0	(0.0%)	3	(0.2%)
NU	0	(0.0%)	0	(0.0%)	57	(100%)	57	(3.2%)
Total	**12**	**(0.7%)**	**787**	**(43.8%)**	**998**	**(55.5%)**	**1,797**	**(100%)**

Jurisdictional reporting on residency in a correctional setting within 12 months prior to diagnosis is inconsistent (**Table 26** and **Figures 29A—29D** in Appendix C — Section II) which creates challenges for overall or jurisdiction-based interpretation for jurisdictions with a low rate of reporting.

Figure 29: Reporting rate (%) of residency in correctional setting within 12 months prior to TB diagnosis across Canadian jurisdictions over time, CTBRS: 2008 – 2018



Long-term (>1 month) corticosteroid use (LTCU)

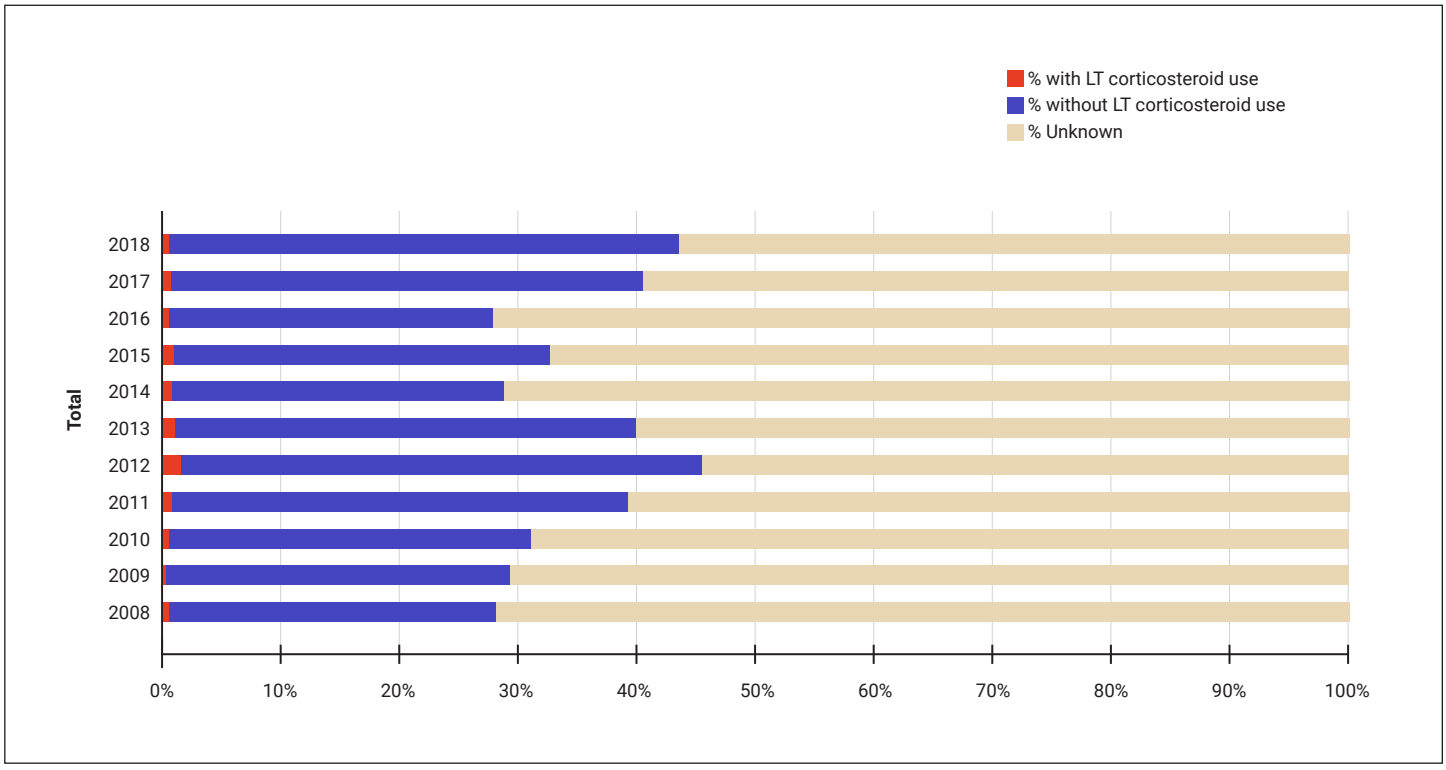
Long-term corticosteroid use (LTCU) was identified infrequently among incident active cases of TB reported in 2018 in the Maritime Provinces, QC, AB, BC, YT and NWT. Collectively these jurisdictions reported just ten cases, with a reporting rate of 91.3% to 100% (**Table 27**). This pattern has been consistent over the past decade for YT and NWT, PE, NS, NB, NL, and AB, while QC was progressively demonstrating improvement in its reporting rate (**Figures 30A–30D** in Appendix C — Section II).

Table 27: Long-term corticosteroid use among reported cases of incident active TB disease, CTBRS: 2018[18]

	Long-term use of corticosteriod known						Total TB cases reported	
	Yes		No		Information not provided			
	n	(%)	n	(%)	n	(%)	n	(%)
NL	0	(0.0%)	30	(100%)	0	(0.0%)	**30**	**(1.7%)**
PE	1	(100%)	0	(0.0%)	0	(0.0%)	**1**	**(0.1%)**
NS	0	(0.0%)	8	(100%)	0	(0.0%)	**8**	**(0.4%)**
NB	0	(0.0%)	6	(100%)	0	(0.0%)	**6**	**(0.3%)**
QC	7	(2.5%)	244	(88.7%)	24	(8.7%)	**275**	**(15.3%)**
ON	0	(0.0%)	0	(0.0%)	659	(100%)	**659**	**(36.7%)**
MB	0	(0.0%)	0	(0.0%)	187	(0.0%)	**187**	**(10.4%)**
SK	0	(0.0%)	0	(0.0%)	79	(0.0%)	**79**	**(4.4%)**
AB	1	(0.5%)	211	(95.9%)	8	(3.6%)	**220**	**(12.2%)**
BC	1	(0.4%)	267	(99.3%)	1	(0.4%)	**269**	**(15.0%)**
YT	0	(0.0%)	3	(100%)	0	(0.0%)	**3**	**(0.2%)**
NWT	0	(0.0%)	3	(100%)	0	(0.0%)	**3**	**(0.2%)**
NU	0	(0.0%)	0	(0.0%)	57	(0.0%)	**57**	**(3.2%)**
Total	**10**	**(0.6%)**	**772**	**(43.0%)**	**1,015**	**(38.5%)**	**1,797**	**(100%)**

[18] ON, MB, SK and NU did not report information on long-term corticosteroid use.

Figure 30: Reporting rate (%) of long-term corticosteroid use among incident active TB cases across Canadian jurisdictions over time, CTBRS: 2008 – 2018



Contact with an active TB case in the last two years

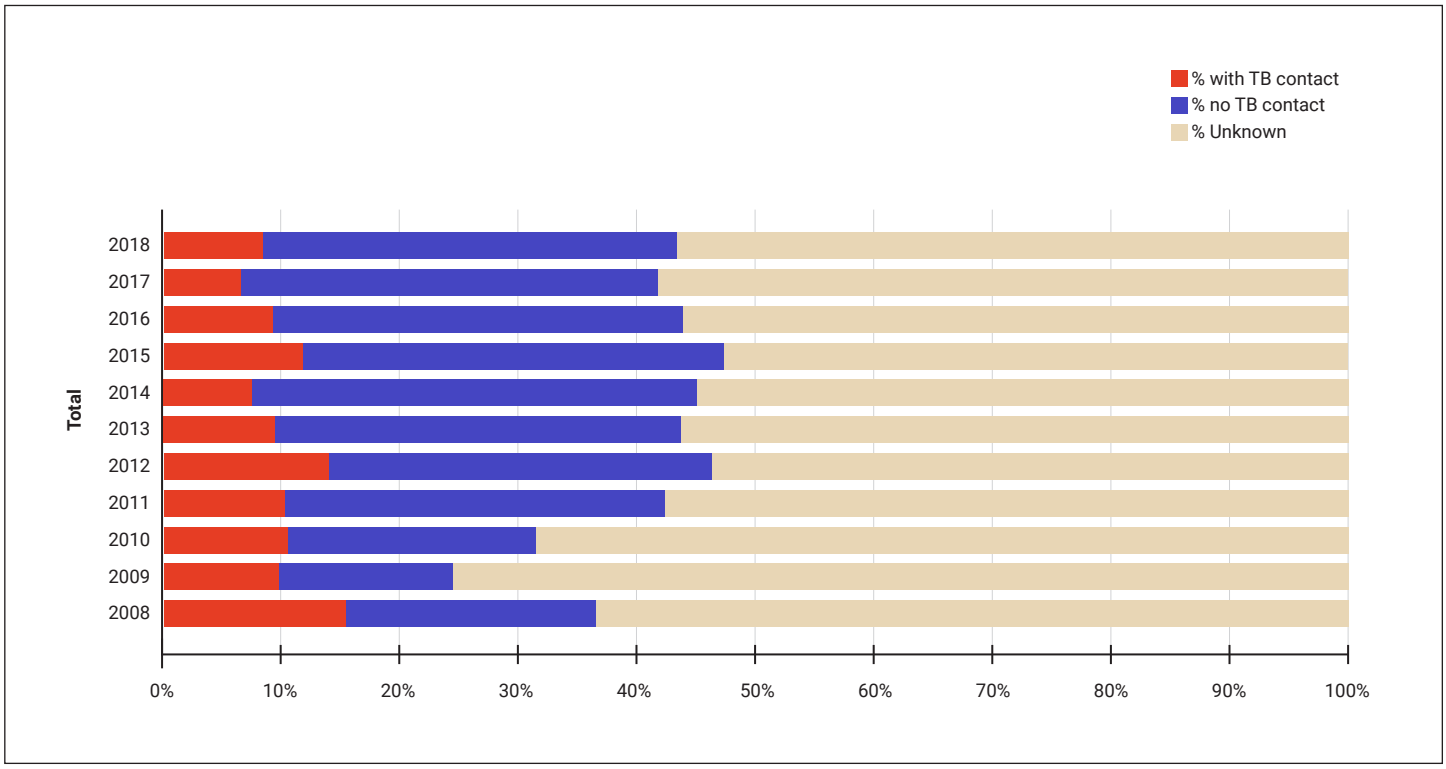
Contact with an active TB case within two years prior to diagnosis was reported by 8.6% (*n*=154) of incident active TB cases in 2018 (**Table 28**). Those who indicated having no contact with an active TB case accounted for 34.8% (*n*=625) of cases. The proportion of unknown or missing responses remained high in 2018 and at a level comparable to those of the last eight years (**Figure 31**). Consequently, interpretation at the jurisdictional level (**Figures 31A–31D** in Appendix C — Section II) is of more value than is national level interpretation (**Figure 31**).

Table 28: Reported cases of incident active TB disease that had contact with an active TB case within two years preceding diagnosis, CTBRS: 2018[19]

	Contact with an individual diagnosed with active TB						Total TB cases reported	
	Yes		No contact		Information not provided			
	n	(%)	n	(%)	n	(%)	n	(%)
NL	26	(86.7%)	1	(3.3%)	3	(10.0%)	**30**	**(1.7%)**
PE	0	(0.0%)	1	(100%)	0	(0.0%)	**1**	**(0.1%)**
NS	0	(0.0%)	4	(50.0%)	4	(50.0%)	**8**	**(0.4%)**
NB	0	(0.0%)	4	(66.7%)	2	(33.3%)	**6**	**(0.3%)**
QC	57	(20.7%)	136	(49.5%)	82	(29.8%)	**275**	**(15.3%)**
ON	65	(9.9%)	2	(0.3%)	592	(89.8%)	**659**	**(36.7%)**
MB	0	(0.0%)	0	(0.0%)	187	(100%)	**187**	**(10.4%)**
SK	0	(0.0%)	0	(0.0%)	79	(100%)	**79**	**(4.4%)**
AB	0	(0.0%)	211	(95.9%)	9	(4.1%)	**220**	**(12.2%)**
BC	4	(1.5%)	263	(97.8%)	2	(0.7%)	**269**	**(15.0%)**
YT	2	(66.7%)	1	(33.3%)	0	(0.0%)	**3**	**(0.2%)**
NWT	0	(0.0%)	2	(66.7%)	1	(33.3%)	**3**	**(0.2%)**
NU	0	(0.0%)	0	(0.0%)	57	(100%)	**57**	**(3.2%)**
Total	**154**	**(8.6%)**	**625**	**(34.8%)**	**1,018**	**(56.6%)**	**1,797**	**(100%)**

[19] Data for MB, SK and NU were not available.

Figure 31: Rate (%) of reporting contact with active TB within two years preceding diagnosis across Canadian jurisdictions over time, CTBRS: 2008 – 2018



Substance abuse

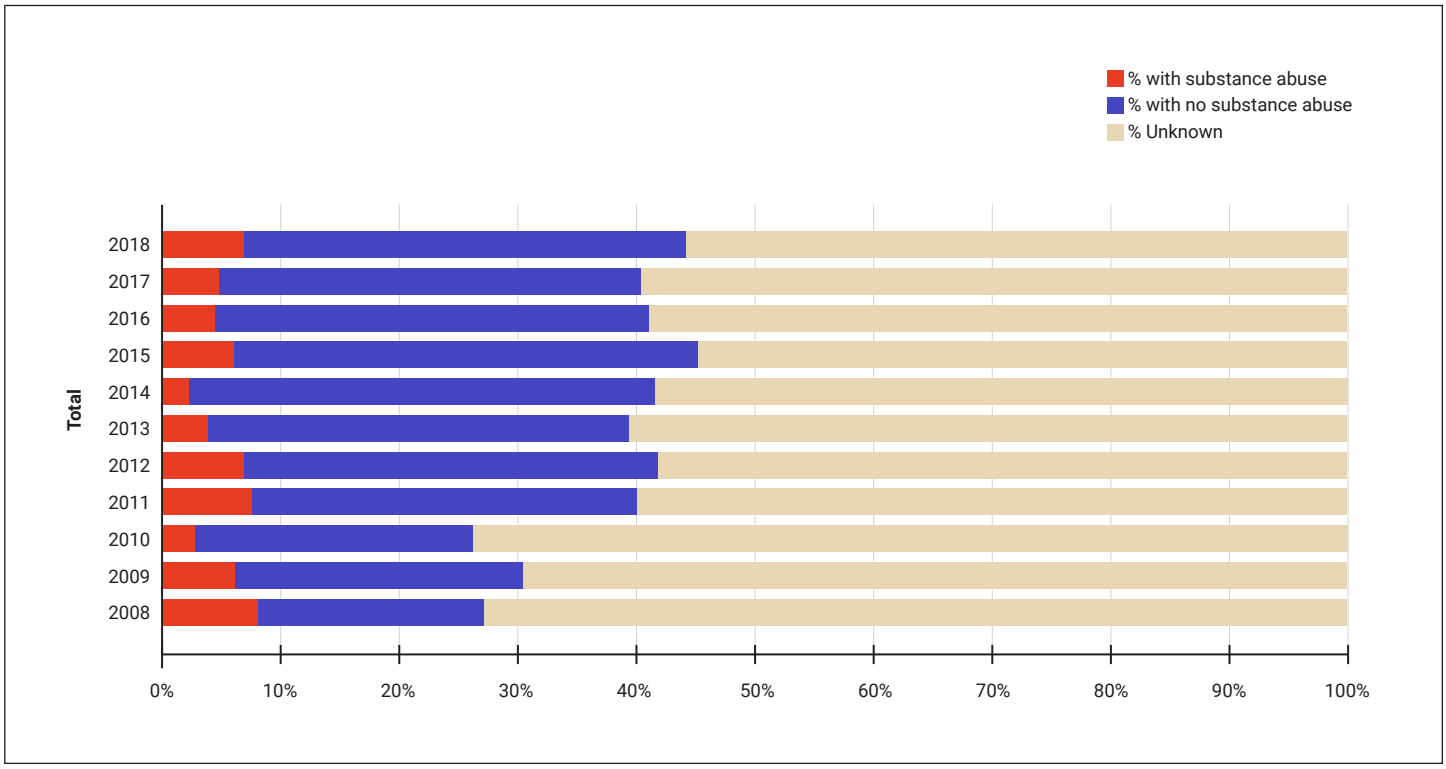
In 2018, nine (9) jurisdictions had a high reporting rate (>70.0%) on substance abuse by individuals diagnosed with incident active TB disease (**Table 29**). Even with high reporting rates, only 121 (6.7%) cases of incident active TB reported substance abuse, with the majority from QC (*n*=30; 24.8%), BC (*n*=29; 24.0%), ON (*n*=28; 23.1%) and AB (*n*=16; 13.2%).

Table 29: Substance abuse among reported cases of incident active TB, CTBRS: 2018

	Reported substance abuse						Total TB cases reported	
	Yes		No		Information not provided			
	n	(%)	n	(%)	n	(%)	n	(%)
NL	13	(43.3%)	9	(30.0%)	8	(26.7%)	**30**	**(1.7%)**
PE	0	(0.0%)	1	(100%)	0	(0.0%)	**1**	**(0.1%)**
NS	0	(0.0%)	8	(100%)	0	(0.0%)	**8**	**(0.4%)**
NB	2	(33.3%)	4	(66.7%)	0	(0.0%)	**6**	**(0.3%)**
QC	30	(10.9%)	203	(73.8%)	42	(15.3%)	**275**	**(15.3%)**
ON	28	(4.2%)	0	(0.0%)	631	(95.8%)	**659**	**(36.7%)**
MB	0	(0.0%)	0	(0.0%)	187	(100%)	**187**	**(10.4%)**
SK	0	(0.0%)	0.0	(0.0%)	79	(100%)	**79**	**(4.4%)**
AB	16	(7.3%)	201	(91.4%)	3	(1.4%)	**220**	**(12.2%)**
BC	29	(10.8%)	239	(88.8%)	1	(0.4%)	**269**	**(15.0%)**
YT	2	(66.7%)	1	(33.3%)	0	(0.0%)	**3**	**(0.2%)**
NWT	1	(33.3%)	2	(66.7%)	0	(0.0%)	**3**	**(0.2%)**
NU	0	(0.0%)	0	(0.0%)	57	(100%)	**57**	**(3.2%)**
Total	**121**	**(6.7%)**	**668**	**(37.2%)**	**1,008**	**(56.1%)**	**1,797**	**(100%)**

Substance abuse by individuals diagnosed with active TB disease has increased (*p<0.05*) progressively in the last six years from 3.8% to 6.7% (**Figure 32**). However, because of high non reporting rate (56.1%; *n*=1,008), generalized interpretation is challenging. However, jurisdictional interpretations would be of value where reporting rates are high (**Figures 32A–32D** in Appendix C — Section II). Among reported TB cases from QC, substance abuse rose from 4.8% in 2012 to 10.9% in 2018; and in BC, it increased from 4.1% to 10.8% in the last five years (**Figures 32A–32D** in Appendix C — Section II).

Figure 32: Rate (%) of reporting substance abuse among incident active TB cases across Canadian jurisdictions over time, CTBRS: 2008 – 2018



Travel to high-incidence TB country for more than a week in the last two years

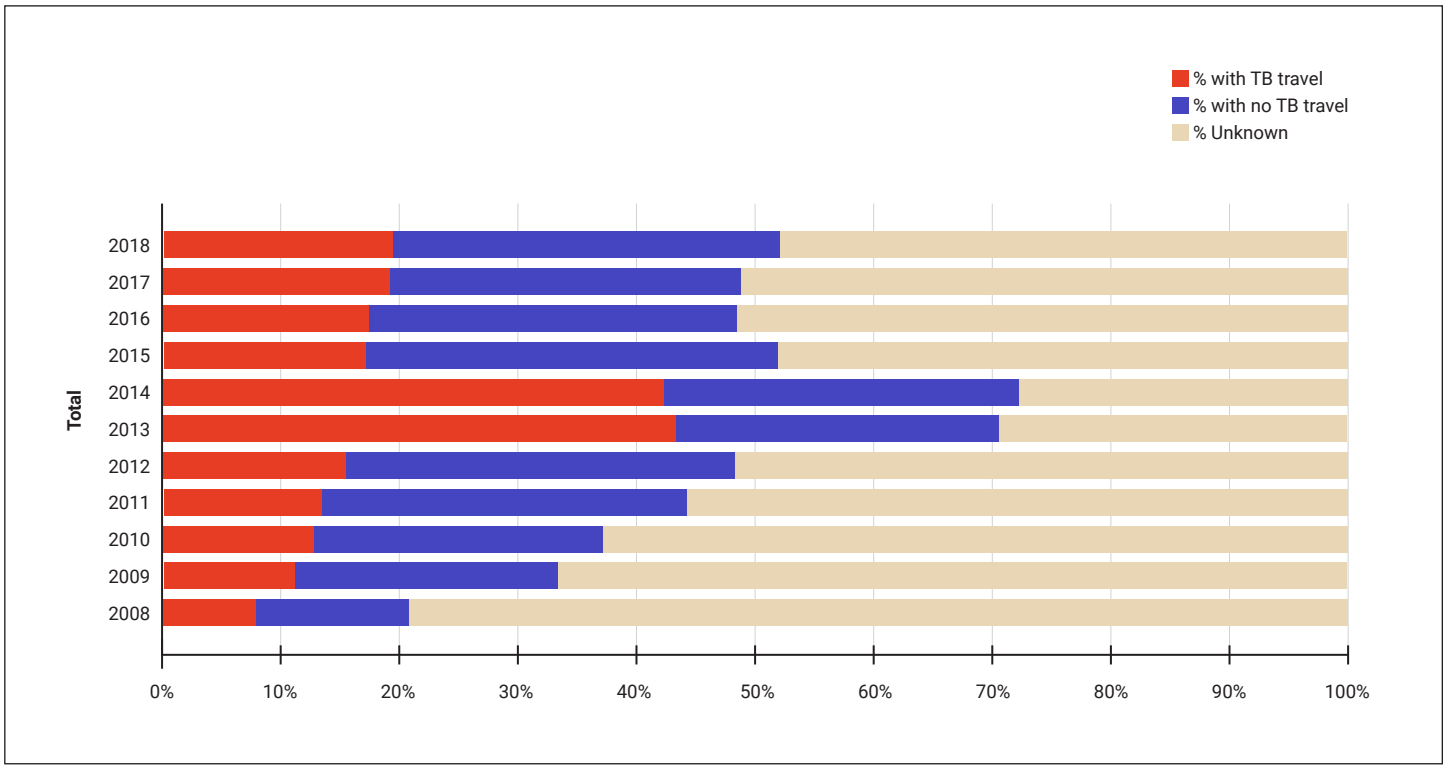
In 2018, 935 (52.0%) cases from all jurisdictions except MB, SK and NU, reported travelling to a country with high TB incidence (**Table 30**). The response rate varied between 26.3% and 100%, and of the reported incident active TB cases with available travel history information, 350 (37.4%) had traveled to a high-incidence TB country/region (**Table 30**).

Table 30: Travel to a country with high incidence of TB within two years prior to TB diagnosis among reported cases of incident active TB disease, CTBRS: 2018

	Travel to high TB incidence country						Total TB cases reported	
	Yes		No		Information not provided			
	n	(%)	n	(%)	n	(%)	n	(%)
NL	1	(3.3%)	29	(96.7%)	0	(0.0%)	**30**	**(1.7%)**
PE	0	(0.0%)	1	(100%)	0	(0.0%)	**1**	**(0.1%)**
NS	3	(37.5%)	5	(62.5%)	0	(0.0%)	**8**	**(0.4%)**
NB	5	(83.3%)	0	(0.0%)	1	(16.7%)	**6**	**(0.3%)**
QC	49	(17.8%)	179	(65.1%)	47	(17.1%)	**275**	**(15.3%)**
ON	172	(26.1%)	1	(0.2%)	486	(73.7%)	**659**	**(36.7%)**
MB	0	(0.0%)	0	(0.0%)	187	(100%)	**187**	**(10.4%)**
SK	0	(0.0%)	0	(0.0%)	79	(100%)	**79**	**(4.4%)**
AB	66	(30.0%)	150	(68.2%)	4	(1.8%)	**220**	**(12.2%)**
BC	54	(20.1%)	214	(79.6%)	1	(0.4%)	**269**	**(15.0%)**
YT	0	(0.0%)	3	(100%)	0	(0.0%)	**3**	**(0.2%)**
NWT	0	(0.0%)	3	(100%)	0	(0.0%)	**3**	**(0.2%)**
NU	0	(0.0%)	0	(0.0%)	57	(100%)	**57**	**(3.2%)**
Total	**350**	**(19.5%)**	**585**	**(32.6%)**	**862**	**(48.0%)**	**1,797**	**(100%)**

CTBRS documentation of travel history of reported incident active TB cases to countries or regions with a high incidence of TB has improved significantly over the past decade. The proportion of unknown or missing responses decreased from 79.2% in 2008 to 48.0% in 2018, a level comparable to those recorded since 2015 (**Figure 33**). Improved reporting rate of travel history is necessary in order to boost the reliability of tabulated results and generalized interpretations. Jurisdictional summaries are available in Appendix C — Section II (**Figures 33A–33D**).

Figure 33: Rate (%) of reporting travel to high TB incidence country among incident active TB cases across Canadian jurisdictions over time, CTBRS: 2008 – 2018



5

CHAPTER 5

DRUG-RESISTANT TUBERCULOSIS

2008 -2018 Data

Detailed information on TB-related drug resistance in Canada is collected by the Canadian Tuberculosis Laboratory Surveillance System (CTBLSS). Susceptibility testing was administered to 1,459 TB isolates in 2018, and resistance to any first-line anti-TB drug was detected in about 10.1% (*n*=148) of the isolates.

Table 31: TB drug-resistance patterns as per the *Canadian Tuberculosis Standards*

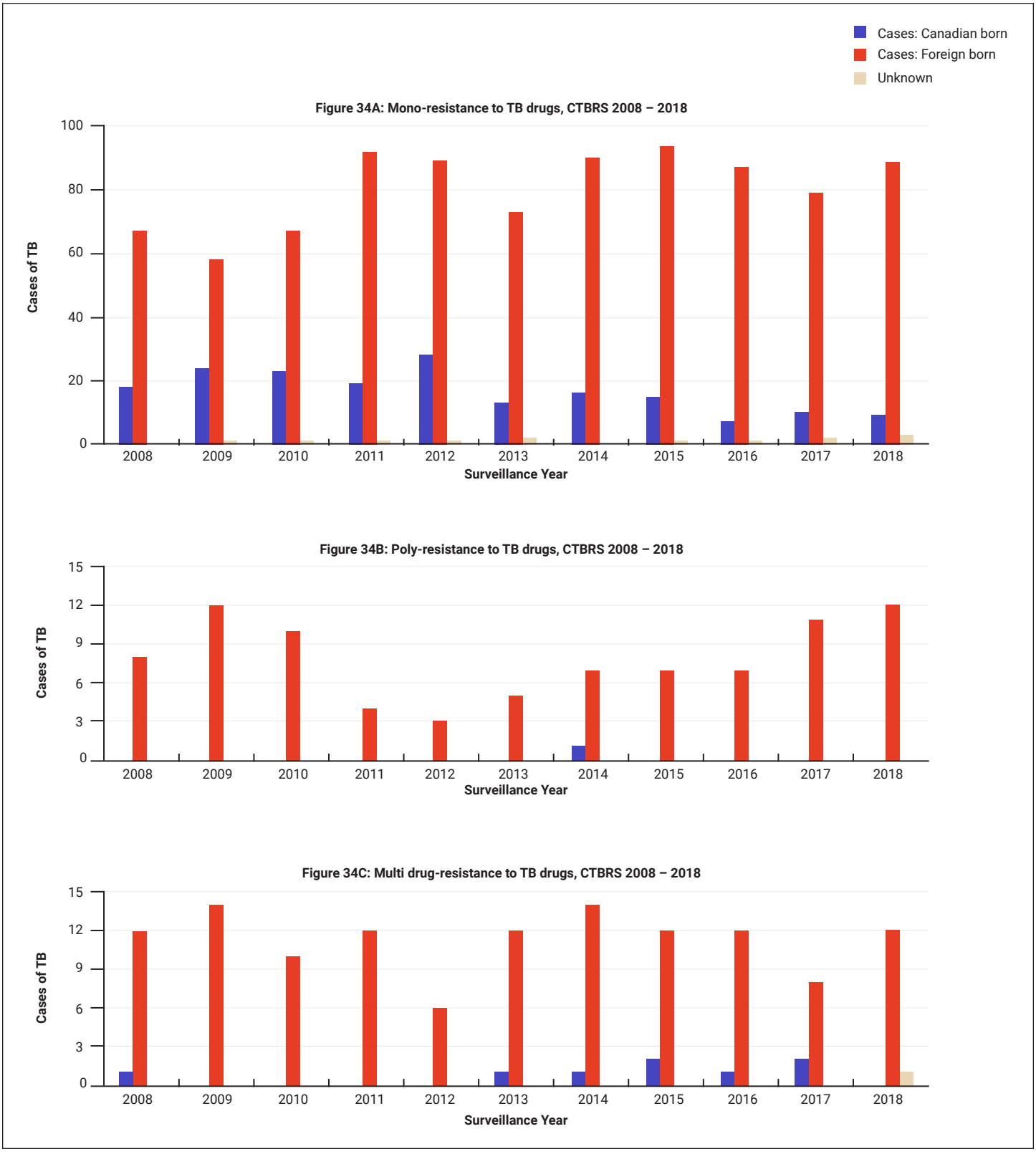
Type of drug resistance	Description
MONO-RESISTANT	• Resistance to one first-line anti-TB drug only (isoniazid, rifampin, ethambutol or pyrazinamide)
POLY-RESISTANT	• Resistance to more than one first-line anti-TB drug, not including the combination of isoniazid and rifampin
MULTI-DRUG RESISTANT	• Resistance to isoniazid AND rifampin with or without resistance to other anti-TB drugs
EXTENSIVELY DRUG RESISTANT	• Resistance to isoniazid AND rifampin AND any fluoroquinolone AND at least one of the three injectable second-line drugs (amikacin, capreomycin or kanamycin)

Overall, mono-, poly-, multi-drug resistant (MDR) and extensively drug resistant (XDR) TB (**Table 32**) was detected in 121 (8.3%), five (0.3%), 21 (1.4%) and one (0.07%) individual isolate(s), respectively (**Tables 31** and **32**). From 2008 to 2018, no correlation or trend was detected between drug resistance and the sex or age of individuals from whom drug-resistant isolates were obtained. In addition, there was no change in the proportions of isolates that exhibited mono-, poly-, multi-, or extensive resistance to TB drugs (**Table 32**). Country of birth, however, presented a different picture as it suggests that isolates from TB cases who were born outside Canada exhibit higher levels of drug resistance (**Figure 34**). Very few isolates from Canadian-born TB cases were poly- or multi-drug resistant (**Figures 34B** and **34C**).

Table 32: Proportion of drug-resistant TB cases over time, CTBLSS: 2008 – 2018

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Mono-resistant	**n**	94	98	88	119	128	93	107	114	108	103	121
	(%)	(6.9%)	(7.4%)	(6.9%)	(9.0%)	(9.1%)	(6.8%)	(7.8%)	(8.5%)	(7.4%)	(6.8%)	(8.3%)
Poly-resistant	**n**	6	11	6	1	2	4	4	3	5	6	5
	(%)	(0.4%)	(0.8%)	(0.4%)	(0.1%)	(0.1%)	(0.2%)	(0.2%)	(0.2%)	(0.3%)	(0.4%)	(0.3%)
Multi-drug resistant	**n**	15	18	17	18	8	14	18	22	17	14	21
	(%)	(1.2%)	(1.4%)	(1.4%)	(1.4%)	(0.6%)	(1.1%)	(1.4%)	(1.6%)	(1.2%)	(0.9%)	(1.4%)
Extensively drug resistant	**n**	1	0	1	1	1	1	1	0	0	0	1
	(%)	(0.1%)	(0.0%)	(0.1%)	(0.1%)	(0.1%)	(0.1%)	(0.1%)	(0.0%)	(0.0%)	(0.0%)	(0.1%)

Figure 34: Resistance to anti-TB drugs among reported cases of incident active TB disease, CTBRS: 2008 – 2018



Only one case of extensively drug resistant (XDR) TB was identified among Canadians in 2018, increasing the total count for the 2008-2018 period to six. Additional details on the CTBLSS and TB drug resistance can be found in the January 2020 Canada Communicable Disease Report (CCDR) publication, *Tuberculosis drug resistance in Canada: 2018* (9).

6

CHAPTER 6

TUBERCULOSIS TREATMENT OUTCOME

2017 Data

In 2017, 80.4% (*n*=1,484) of reported incident active TB cases successfully completed treatment. There were no reports of treatment failure and 3.8% (*n*=71) of cases were still undergoing treatment (**Table 33**) at the time of data collection. The data demonstrate that there appears to be a decline in the treatment success, which is perhaps partially explained by the increased number of cases lost to follow-up, which went from 82 (5.0%) in 2008 to 145 (8.8%) cases in 2017 (**Table 33**).

Table 33: Treatment outcome for reported incident cases of active TB disease, CTBRS: 2008 - 2017

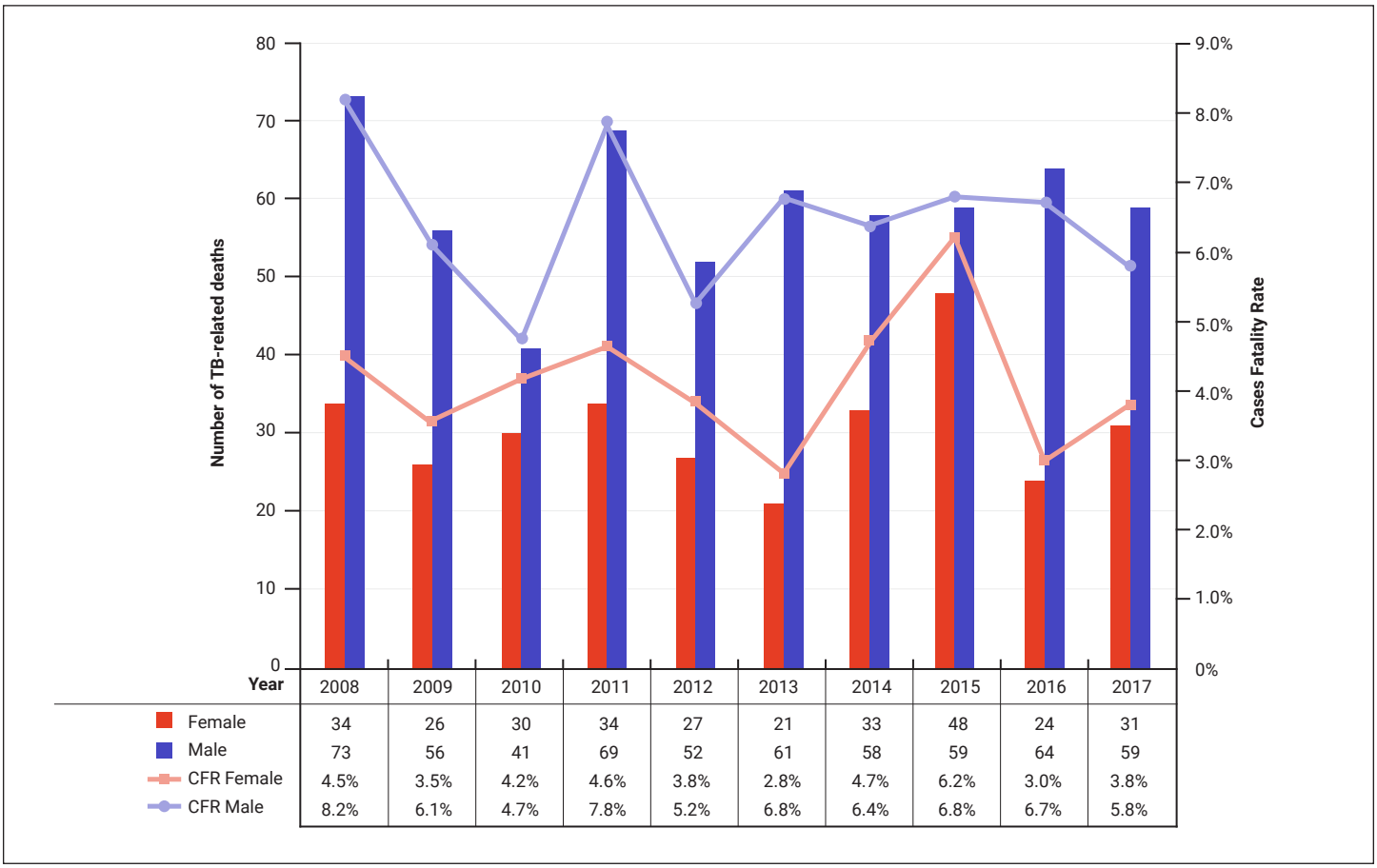
	Treatment Success		Treatment Ongoing		Treatment Discontinued		Lost to follow-up		Treatment Failure		Total Number of deaths		Total	
	n	(Rate)	n	(Rate)	n	(Rate)	n	(Rate)	n	(Rate)	n	(Rate)	n	(Rate)
2008	1,398	(85.1%)	19	(1.2%)	0	(0.0%)	82	(5.0%)	0	(0.0%)	143	(8.7%)	**1,642**	**(100%)**
2009	1,434	(86.7%)	3	(0.2%)	3	(0.2%)	83	(5.0%)	3	(0.2%)	128	(7.7%)	**1,654**	**(100%)**
2010	1,372	(86.5%)	28	(1.8%)	9	(0.6%)	54	(3.4%)	1	(0.1%)	122	(7.7%)	**1,586**	**(100%)**
2011	1,228	(75.8%)	48	(3.0%)	4	(0.2%)	201	(12.4%)	0	(0.0%)	140	(8.6%)	**1,621**	**(100%)**
2012	1,415	(83.2%)	66	(3.9%)	7	(0.4%)	82	(4.8%)	1	(0.1%)	129	(7.6%)	**1,700**	**(100%)**
2013	1,378	(83.5%)	62	(3.8%)	9	(0.5%)	75	(4.5%)	1	(0.1%)	126	(7.6%)	**1,651**	**(100%)**
2014	1,361	(84.3%)	39	(2.4%)	10	(0.6%)	83	(5.1%)	0	(0.0%)	122	(7.6%)	**1,615**	**(100%)**
2015	1,382	(84.1%)	31	(1.9%)	4	(0.2%)	84	(5.1%)	0	(0.0%)	142	(8.6%)	**1,643**	**(100%)**
2016	1,395	(79.1%)	86	(4.9%)	1	(0.1%)	147	(8.3%)	0	(0.0%)	134	(7.6%)	**1,763**	**(100%)**
2017	1,484	(80.3%)	71	(3.8%)	1	(0.1%)	145	(8.8%)	0	(0.0%)	130	(7.0%)	**1,831**	**(100%)**

In 2017, 7% (*n*=130) of individuals with reported incident active TB died either before starting TB treatment or during the course of their treatment. Tuberculosis was deemed to have been the underlying cause of death in 23.8% (*n*=31) of cases (**Table 34**) and a contributing factor in 45.4% (*n*=59) of cases. Individuals aged 45 years and older accounted for 93.3% (*n*=84) of all TB-related deaths (**Table 34**), and two-thirds of deaths were among males. However, as in the previous decade, the mortality rate among women was not significantly (*p>0.05*) different than it was among men (**Figure 35**).

Table 34: Mortalities recorded incidence among cases of active TB disease by age group – CTBRS, 2017

FEMALE	TB was the underlying cause of death	TB was a contributing factor to death	Death not related to TB detected incidentally	Unknown	Subtotal
< 1 year old	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**0 (0.0%)**
1-14 years old	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**0 (0.0%)**
15-44 years old	2 (1.5%)	0 (0.0%)	0 (0.0%)	2 (1.5%)	**4 (3.1%)**
45-74 years old	4 (3.1%)	7 (5.4%)	2 (1.5%)	2 (1.5%)	**15 (11.5%)**
75+ years old	6 (4.6%)	12 (9.2%)	5 (3.8%)	3 (2.3%)	**26 (20.0%)**
Subtotal	**12 (9.2%)**	**19 (14.6%)**	**7 (5.4%)**	**7 (5.4%)**	**45 (34.6%)**
MALE	**TB was the underlying cause of death**	**TB was a contributing factor to death**	**Death not related to TB detected incidentally**	**Unknown**	**Subtotal**
< 1 year old	1 (0.8%)	0 (0.0%)	(0.0%)	0 (0.0%)	**1 (0.8%)**
1-14 years old	0 (0.0%)	0 (0.0%)	(0.0%)	0 (0.0%)	**0 (0.0%)**
15-44 years old	3 (2.3%)	0 (0.0%)	(0.0%)	1 (0.8%)	**4 (3.1%)**
45-74 years old	4 (3.1%)	17 (13.1%)	8 (6.2%)	7 (5.4%)	**36 (27.7%)**
75+ years old	11 (8.5%)	23 (17.7%)	5 (3.8%)	5 (3.8%)	**44 (33.8%)**
Subtotal	**19 (14.6%)**	**40 (30.8%)**	**13 (10.0%)**	**13 (10.0%)**	**85 (65.4%)**
Overall	**31 (23.8%)**	**59 (45.4%)**	**20 (15.4%)**	**20 (15.4%)**	**130 (100%)**

Figure 35: Temporal distribution of TB-related mortalities and associated case-fatality rate, CTBRS: 2008 - 2017



Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Female	34	26	30	34	27	21	33	48	24	31
Male	73	56	41	69	52	61	58	59	64	59
CFR Female	4.5%	3.5%	4.2%	4.6%	3.8%	2.8%	4.7%	6.2%	3.0%	3.8%
CFR Male	8.2%	6.1%	4.7%	7.8%	5.2%	6.8%	6.4%	6.8%	6.7%	5.8%

7

CHAPTER 7

DISCUSSION

The rate of incident active TB disease in Canada is one of the lowest in the world (10) and has remained virtually unchanged since the launch of the End TB Strategy of the WHO (1) in 2015. However, significant differences in jurisdiction-specific rates remain. Some jurisdictions (PE, NS and NB) have consistently reported rates comparable to the targets defined in the *Strategy*[21], while others continue to report higher rates (**Table 16**).

During the period covered by this report (2008 – 2018), the proportion of TB in children under 15 years of age (used as a proxy for recent TB transmission) varied between jurisdictions from 0.0% to 21.0%. The jurisdictions (PE, NS, NB, YT, and NWT) with the lowest overall number (*n<10*) of cases in 2018 registered no cases in children of this age group.

Individuals born outside Canada continued to be disproportionately affected by active TB disease and experienced rates significantly higher than the national average. Given that individuals applying for residency in Canada are screened for active TB disease prior to entry, it can be speculated that these are primarily reactivation cases that can be triggered by challenging working and living conditions, and inequitable access to health services[22] that a proportion of new immigrants experience during their first years in Canada.

21 <1 case per 100,000 population by 2035.

22 https://www.canada.ca/en/public-health/corporate/publications/chief-public-health-officer-reports-state-public-health-canada/eliminating-tuberculosis.html

Connecting case reports with countries of birth will remain speculative however, since no scientific linkage has been established between isolated TB strains and the strains circulating in those regions during the period covered in this report or in the past. Current diagnosis and new cases among individuals born outside Canada may constitute reactivation of latent TB infections, recent transmissions, or both. Although information about country of birth is well captured for most reported cases, the CTBRS still cannot evaluate whether new cases of active TB disease among individuals born outside Canada were recently acquired. Integrating genomic surveillance into the CTBRS can help address this gap.

Incident active TB disease continued to disproportionately affect Indigenous populations; particularly the Inuit population who have continuously recorded the highest rates in the country as a consequence of small-size outbreaks. The disproportionate impact of TB disease on Indigenous Peoples is not a novel circumstance and is rooted in historical inequities widely acknowledged[23,24]. Multiple parallel initiatives to address TB in these communities have been put in place either by the Indigenous Communities themselves or in collaboration with the federal government. These include:

i. the Taima TB project based in Iqaluit in the northern territory of NU, sponsored by PHAC through the National Lung Health Framework, to create greater awareness of TB among the Inuit population in Iqaluit and to test a novel approach to the screening and treatment of latent TB infections in neighbourhoods in which residents were at high risk for active TB disease, and

ii. the Government of Canada and Inuit Tapiriit Kanatami commitment to eliminate TB across Inuit Nunangat by 2030 and reduce active TB by at least 50% by 2025.

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23 Canadian Public Health Association. History of Public Health - TB and Aboriginal People. Available: https://www.cpha.ca/tb-and-aboriginal-people

24 https://www.canada.ca/en/public-health/corporate/publications/chief-public-health-officer-reports-state-public-health-canada/eliminating-tuberculosis.html

Limitations of the CTBRS

The response rate for a number of variables in the surveillance protocol was below or slightly above 50.0%. As a consequence, interpretation of these variables may only be valid for reporting jurisdictions and not to Canada as a whole because of lack of proper representation. The overall TB surveillance program could be strengthened by streamlining and improving data collection on potential risk factors such as: co-morbidity with diabetes mellitus or HIV, homelessness, use of non-prescription drugs, long-term corticosteroid use, and travel history to regions with high TB incidence.

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CHAPTER 8

CONCLUSION

A comprehensive understanding of the epidemiology of incident active TB in Canadian subpopulations is integral to Canada's approach to eliminate this complex disease. Although Canada continues to experience a low incidence of TB, almost two decades of efforts to curb sporadic TB outbreaks have yielded only minimal improvement, and certain communities and regions continue to be disproportionately affected. Achieving TB elimination as per the *End TB Strategy* of the World Health Organization (WHO), which Canada has endorsed, will require a multi-pronged, collaborative approach, as noted in the 2018 Chief Public Health Officer (CPHO) report on eliminating TB in Canada[25]. This approach necessitates the continued collaboration and coordination of TB surveillance and programmatic areas, and sustained engagement with communities by all levels of government, to tailor interventions that help address inequities and improve the monitoring, prevention, diagnosis, and treatment of TB. In particular, the effective and ongoing linkage of TB surveillance and programmatic responses can help to: (i) identify the factors associated with the persistence of TB outbreaks in Canada and the predictors of active TB disease in individuals migrating to Canada; (ii) inform the tailoring of programmatic interventions/ strategies to address TB and social inequities for specific groups; and (iii) monitor the progress of these efforts and evaluate their effectiveness.

[25] https://www.canada.ca/content/dam/phac-aspc/documents/corporate/publications/chief-public-health-officer-reports-state-public-health-canada/eliminating-tuberculosis/PHAC_18-086_TB_Report_E_forwebcoding.pdf

During the period covered by this report, a large proportion of reported incident active TB occurred in individuals born outside Canada. However, the CTBRS has not been able to differentiate newly acquired infections from reactivations of latent TB infections in this sub-group of foreign-born individuals. Appropriate integration of genomic surveillance may help address this gap and could inform work to better identify and support foreign-born individuals who may be at higher risk for reactivation from latent TB.

Similar to the previous six years, the CTBRS 2017 data indicate an 80.4% 12-month TB treatment success rate, which is still below the WHO aspirational target of 90.0% or more. At the same time, a rise in the proportion of cases lost to follow-up was also observed. This situation is one of many challenges Canada faces in accurately evaluating the progress of efforts, including the national TB treatment surveillance program, to reach Canada's targets in pursuit of global TB elimination.

The enhancement of existing surveillance systems, coupled with appropriate monitoring and evaluation of TB programs and ongoing collaboration with government, community partners, and other key stakeholders, is critical to ultimately eliminating TB in Canada. While TB surveillance remains paramount, it is equally important to ensure the resulting data are used to make appropriately tailored, evidence-informed program decisions with the ultimate goal of successfully eliminating TB in Canada as per the *End TB Strategy* of the WHO (3).

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CHAPTER 9

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CHAPTER 10

REFERENCES

1 World Health Organization. Global tuberculosis report 2019. Geneva (CH): World Health Organization; 2019. https://www.who.int/tb/post2015_strategy/en/

2 World Health Organization. Canada, tuberculosis profile 2019. Geneva (CH): World Health Organization; 2019. https://extranet.who.int/sree/Reports?op=Replet&name=%2FWHO_HQ_Reports%2FG2%2FPROD%2FEXT%2FTBCountryProfile&ISO2=CA&LAN=EN&outtype=html

3. Lönnroth K, Migliori GB, Abubakar, I, D'Ambrosio L, De Vries G, Diel R, Douglas P, Falzon D, Gaudreau MA, Goletti D and Ochoa EG. Towards tuberculosis elimination: an action framework for low-incidence countries. Eur Respir J. 2015; 45(4):928-952.

4. Statistics Canada. Aboriginal peoples in Canada: key results from the 2016 Census. Ottawa (ON): Stats Can; October 25, 2017. https://www150.statcan.gc.ca/n1/daily-quotidien/171025/dq171025a-eng.htm

5. Province of British Columbia. Diagnostic code descriptions (ICD-9). Vancouver (BC): Medical Services Plan; 2020. https://www2.gov.bc.ca/gov/content/health/practitioner-professional-resources/msp/physicians/diagnostic-code-descriptions-icd-9

6. Menzies D, Wong T, editors. Canadian tuberculosis standards, 7th ed. Ottawa (ON): Public Health Agency of Canada; 2014. Joint publication of the Canadian Thoracic Society and the Canadian Lung Association. https://www.canada.ca/en/public-health/services/infectious-diseases/canadian-tuberculosis-standards-7th-edition.html

7. Campbell I. Chi-squared and Fisher-Irwin tests of two-by-two tables with small sample recommendations. Stat Med. 2007; 26:3661-3675.

8. Richardson JTE. The analysis of 2 x 2 contingency tables - Yet again. Stat Med 2011; 30:890.

9. LaFreniere M, Dam D, Canadian Tuberculosis Laboratory Technical Network, Strudwick L, McDermott S. Tuberculosis drug resistance in Canada: 2018. Can Commun Dis Rep 2020:46(1):10-6. https://www.canada.ca/en/public-health/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2020-46/issue-1-january-2-2020/article-2-tuberculosis-trend-canada-2008-2018.html

10. WHO. Global tuberculosis report 2019. Geneva (CH): World Health Organization; 2019. https://apps.who.int/iris/bitstream/handle/10665/329368/9789241565714-eng.pdf?ua=.

11. Statistics Canada. Immigrant population by selected places of birth, admission category and period of immigration, Canada, provinces and territories, census metropolitan areas and areas outside of census metropolitan areas, 2016 Census. https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/dv-vd/imm/index-eng.cfm

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CHAPTER 11

APPENDICES

Appendix A: CTBRS case reporting form

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

Active Tuberculosis Case Report Form – New and Re-treatment Cases

EFFECTIVE JANUARY 2011

CONFIDENTIAL WHEN COMPLETED

Province/Territory/Patient ID

1. Reporting province/territory
2. Register case number
3. Unique identifier
4. Date of birth (Year / Month / Day)
5. Sex (1 Male 2 Female)

6. Usual residence — City/Town/Village; County and Health Unit; Postal code

Lives on First Nation's reserve most of the time? 1 Yes 2 No 8 N/A 9 Unknown

Origin

7. Canadian born? N / Y
6 Foreign-born — Country of birth
Origin Unknown

Y: 1 Status Indian *(Registered)* 2 Métis 3 Inuit 4 Other Aboriginal *(specify)*

5 Canadian born non-Aboriginal → Under age 15? Y → Country of birth of mother; Country of birth of father

Year of arrival in Canada (Year)

Immigration status at the time of diagnosis:
1 Canadian citizen/Permanent resident
2 Refugee → 3 Convention refugee 4 Refugee claimant

Temporary resident: 5 Work 6 Student 7 Visitor 8 Immigration status – Other *If other, specify:*
9 Unknown

Diagnosis

8. Provincial/territorial case date (Year / Month / Day)

ICD 9 | ICD 10

9. Chest X-Ray 1 Normal 2 Abnormal 3 Not done 9 Unknown — If abnormal: 1 Cavitary 2 Non-cavitary

Bacterial Status

10. Microscopy

	Sputum	Bronchial Wash	GI Wash	Node Biopsy	Urine	CSF	Other
Negative							
Positive							
Not done							
Unknown							

11. Culture

	Sputum	Bronchial Wash	GI Wash	Node Biopsy	Urine	CSF	Other
Negative							
Positive							
Not done							
Unknown							

12. Case Criteria 1 Culture positive 2 Clinical diagnosis

13. If initial positive culture – Antibiotic resistance?

DRUG	Result: Susceptible	Resistant	Not done	Unknown
INH				
EMB				
RMP				
PZA				

Drug	Result: Susceptible	Resistant	Not done	Unknown
Streptomycin				
Kanamycin				
Capreomycin				
Ofloxacin				
Ethionamide				
PAS				
Rifabutin				
Amikacin				
Moxifloxacin				
Linezolid				

Other *(specify)* / Unknown

14. Genotyping results? 1 Yes 2 No 9 Unknown — Spoligo Octal Code

MIRU — RFLP 1 Yes 2 No

Treatment Details

15. Date treatment started (Year / Month / Day)

16. Initial drugs prescribed *(check all that apply)*
INH RMP EMB PZA
Streptomycin Ethionamide Moxifloxacin Kanamycin PAS Linezolid Capreomycin Rifabutin Ofloxacin Amikacin
No drugs prescribed / Other *(specify)* / Unknown

17. Death before or during treatment?
1 Yes 2 No 9 Unknown — If yes, date of death (Year / Month / Day)
1 TB was the cause of death
2 TB contributed to death but was not the underlying cause
3 TB did not contribute to death

TB History/Case Finding/Risk Factors/Markers

18. First episode of TB disease?
1 Yes 2 No → If no: Year of previous diagnosis

Previous diagnosis occured in: 1 Canada 2 Other country:

Previous treatment completed or cured: 1 Yes 2 No 9 Unknown
If yes, end date of previous treatment: (Year / Month / Day)

Previous treatment with *(check all antibiotics used)*:
INH EMB RMP PZA
Streptomycin Ethionamide Moxifloxacin Kanamycin PAS Linezolid Capreomycin Rifabutin Ofloxacin Amikacin
Other *(specify)* / Unknown

19. Case finding
1 Symptoms compatible with site of disease
2 Incidental finding
3 Post-mortem
4 Contact investigation
5 Immigration medical surveillance
7 Occupational screening
1 Initial immigration medical exam done outside Canada
8 Other screening
2 Initial immigration medical exam done inside Canada
9 Other *(specify)*
10 Unknown

20. Risk factors/Markers
HIV 1 Positive 2 Negative — If positive, year of 1st positive test / If negative, year of most recent test (Year)
3 Test refused 4 Test not offered 5 Unknown

Contact with person with active TB in past 2 years	1 Yes	2 No	9 Unknown
Diabetes mellitus type 1 or 2	1 Yes	2 No	9 Unknown
End-stage renal disease	1 Yes	2 No	9 Unknown
Homeless *(at diagnosis or within the previous 12 months)*	1 Yes	2 No	9 Unknown
Lives in correctional setting at time of diagnosis	1 Yes	2 No	9 Unknown
Long-term (≥ 1 month) corticosteroid use *(prednisone ≥ 15 mg/day or equivalent)*	1 Yes	2 No	9 Unknown
Previous abnormal chest x-ray *(fibronodular disease)*	1 Yes	2 No	9 Unknown
Substance abuse (known or suspected)	1 Yes	2 No	9 Unknown
Transplant related immunosuppression	1 Yes	2 No	9 Unknown
Travel to high incidence TB country in last 2 years If yes, how long _____ (in weeks)	1 Yes	2 No	9 Unknown
Other *(specify)* _____	1 Yes	2 No	9 Unknown

PHAC/ASPC 9012E (01-2011)

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Appendix B: Treatment outcome of a new active or re-treatment

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

Treatment Outcome of a New Active or Re-treatment Tuberculosis Case

EFFECTIVE JANUARY 2011

CONFIDENTIAL WHEN COMPLETED

1. Reporting province/ territory	2. Register case number	3. Unique identifier	4. Date of birth (Year / Month / Day)	5. Sex (1 Male, 2 Female)

6. If transfer from diagnosing province/territory, please state treating province/territory	7. Register case number *(if different from 2 above)*	8. Unique identifier *(if different from 3 above)*

9. Provincial/territorial case date (Year / Month / Day)	10. Date treatment started (Year / Month / Day)	11. Last day of treatment (Year / Month / Day)

12. Did resistance develop during treatment?

1 ☐ Yes 2 ☐ No

If yes, please check drug(s) *(check all that apply)*

☐ INH ☐ EMB ☐ RMP ☐ PZA

☐ Streptomycin	☐ PAS
☐ Kanamycin	☐ Rifabutin
☐ Capreomycin	☐ Amikacin
☐ Ofloxacin	☐ Moxifloxacin
☐ Ethionamide	☐ Linezolid

☐ Other *(specify)* _____

☐ Unknown

13. What was the treatment outcome? *(Check one only)*

1 ☐ Cure – negative culture at completion of treatment*

2 ☐ Treatment completed – without culture at end of treatment*

3 ☐ Death before or during treatment
Date of death (Year / Month / Day)
- 1 ☐ TB was the cause of death
- 2 ☐ TB contributed to death but was not the underlying cause
- 3 ☐ TB did not contribute to death

4 ☐ Transferred to new country – outcome of treatment unknown *(specify new country)* _____

5 ☐ Failure – continued or recurrent positive cultures after 4 or more months of treatment

6 ☐ Absconded *(lost to follow-up before completion of 80% of doses)*

7 ☐ Treatment ongoing 8 ☐ Treatment discontinued due to adverse event

9 ☐ Other *(specify)* _____ 10 ☐ Unknown

* if MDR-TB please see guidelines for definitions

14. Treatment regimen ***(for drugs taken ≥1 month)*** *(check all that apply)*

☐ INH ☐ EMB ☐ RMP ☐ PZA

☐ Streptomycin	☐ PAS
☐ Kanamycin	☐ Rifabutin
☐ Capreomycin	☐ Amikacin
☐ Ofloxacin	☐ Moxifloxacin
☐ Ethionamide	☐ Linezolid

☐ No drugs prescribed ☐ Unknown

☐ Other *(specify)* _____

15. Major mode of treatment:

1 ☐ DOT *(Directly Observed Therapy)*
- 1 ☐ Modified
- 2 ☐ Standard
- 3 ☐ Enhanced

2 ☐ Daily, self-administered

8 ☐ Other *(specify)* _____

9 ☐ Unknown

16. Adherence estimate *(% of medication received)*

1 ☐ 80%+ 2 ☐ 50-79% 3 ☐ < 50% 9 ☐ Unknown

17. Contact investigation results

	Close	Casual	Community
TOTAL number of contacts identified			
The number of contacts evaluated			
The number of active TB cases found among the contacts			
The number of contacts diagnosed with LTBI			
The number of contacts beginning treatment			
The number of contacts completing treatment			

PHAC/ASPC 4386E (01-2011)

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Appendix C:

Section I—Reported cases of incident active TB disease by method of detection, CTBRS: 2008 – 2018[26]

Figure 8A: Newfoundland, CTBRS: 2008-2018

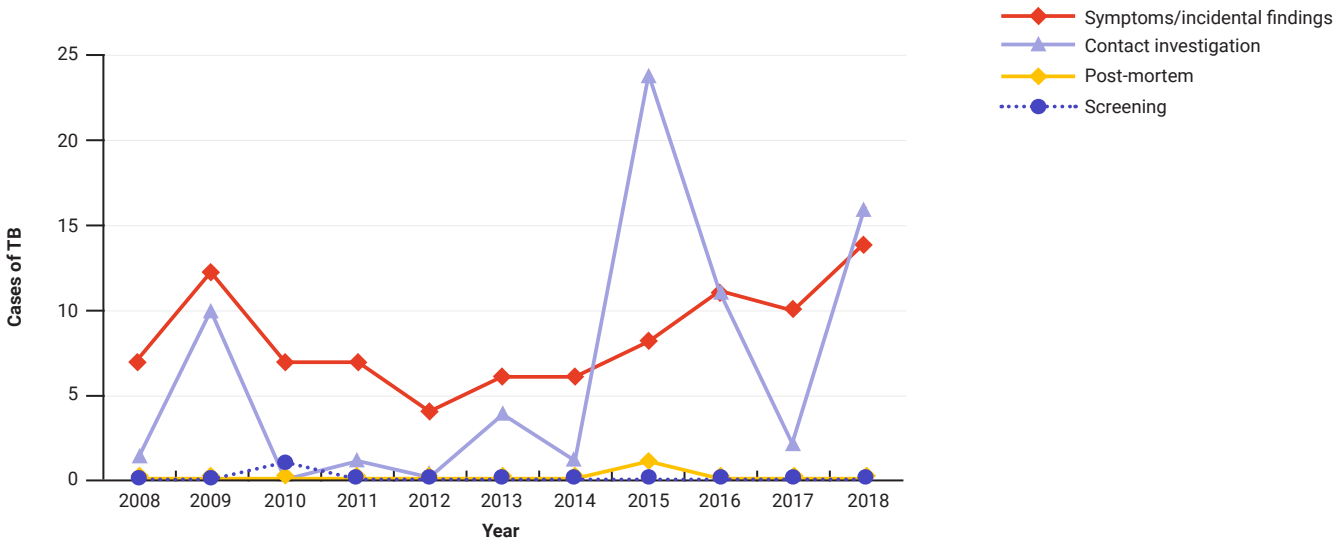


Figure 8B: Prince Edward Island: 2008-2018[27]

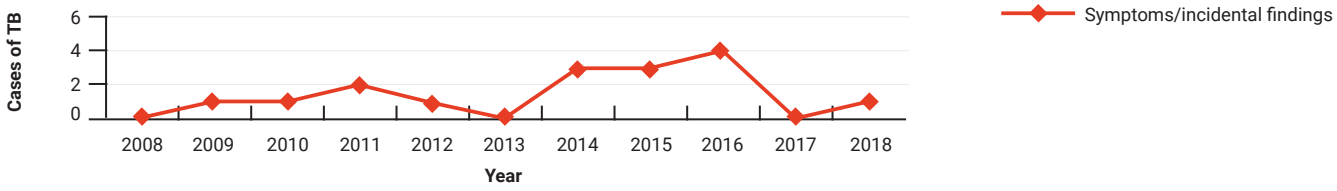
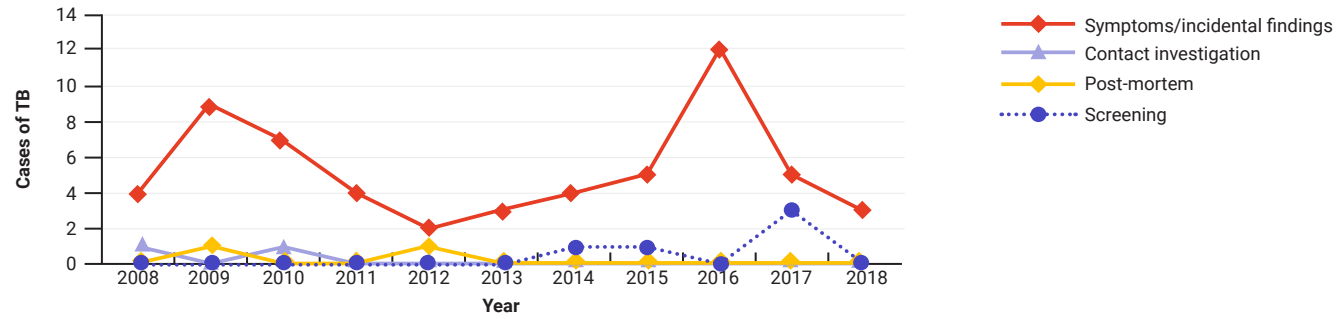


Figure 8C: New Brunswick: 2008-2018



[26] Cases with unknown, unspecified and missing diagnostic procedure are not included.

[27] All TB cases were diagnosed only through symptoms/incidental findings.

Figure 8D: Nova Scotia, CTBRS: 2008-2018

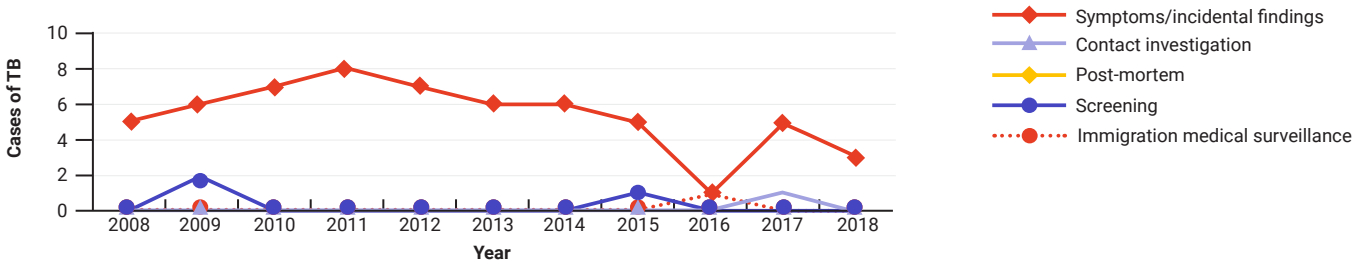


Figure 8E: Quebec, CTBRS: 2008-2018

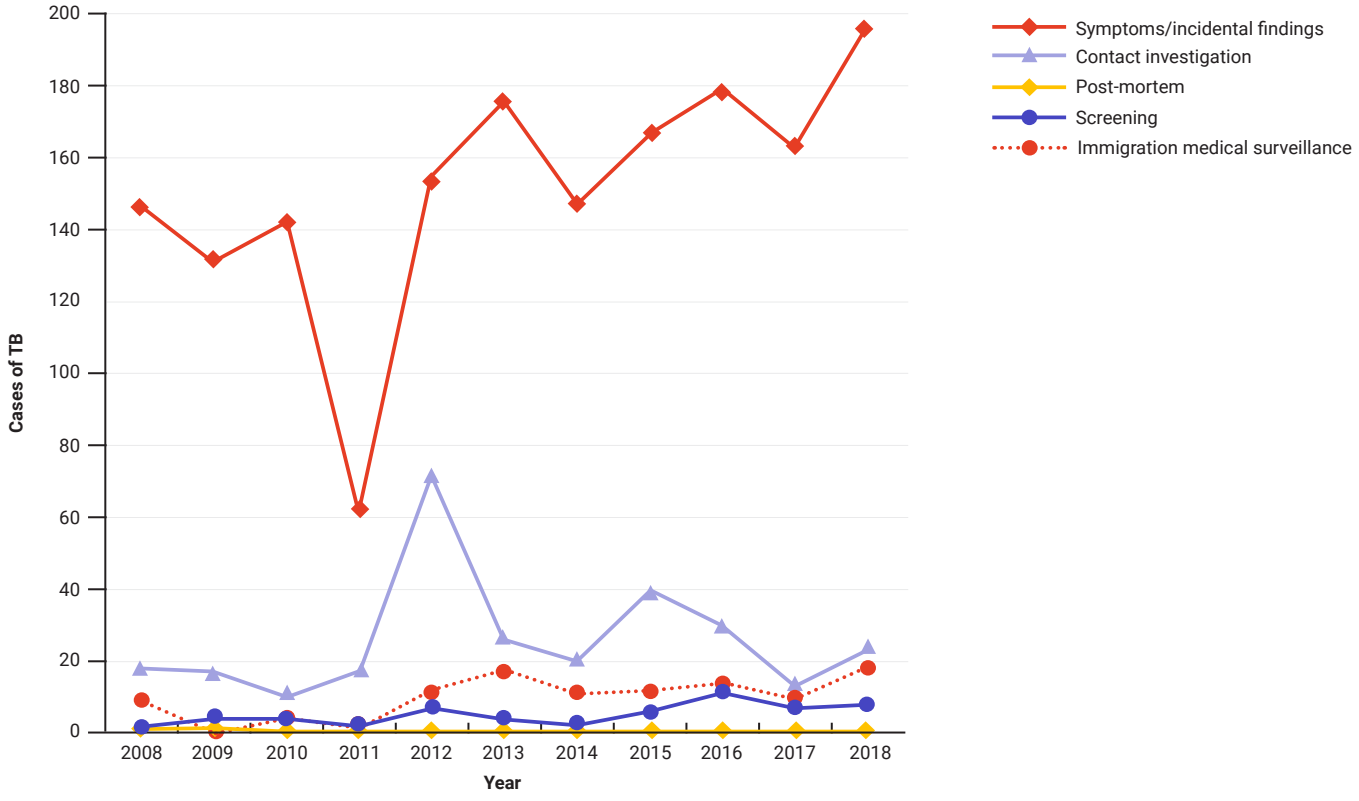


Figure 8F: Ontario, CTBRS: 2008-2018

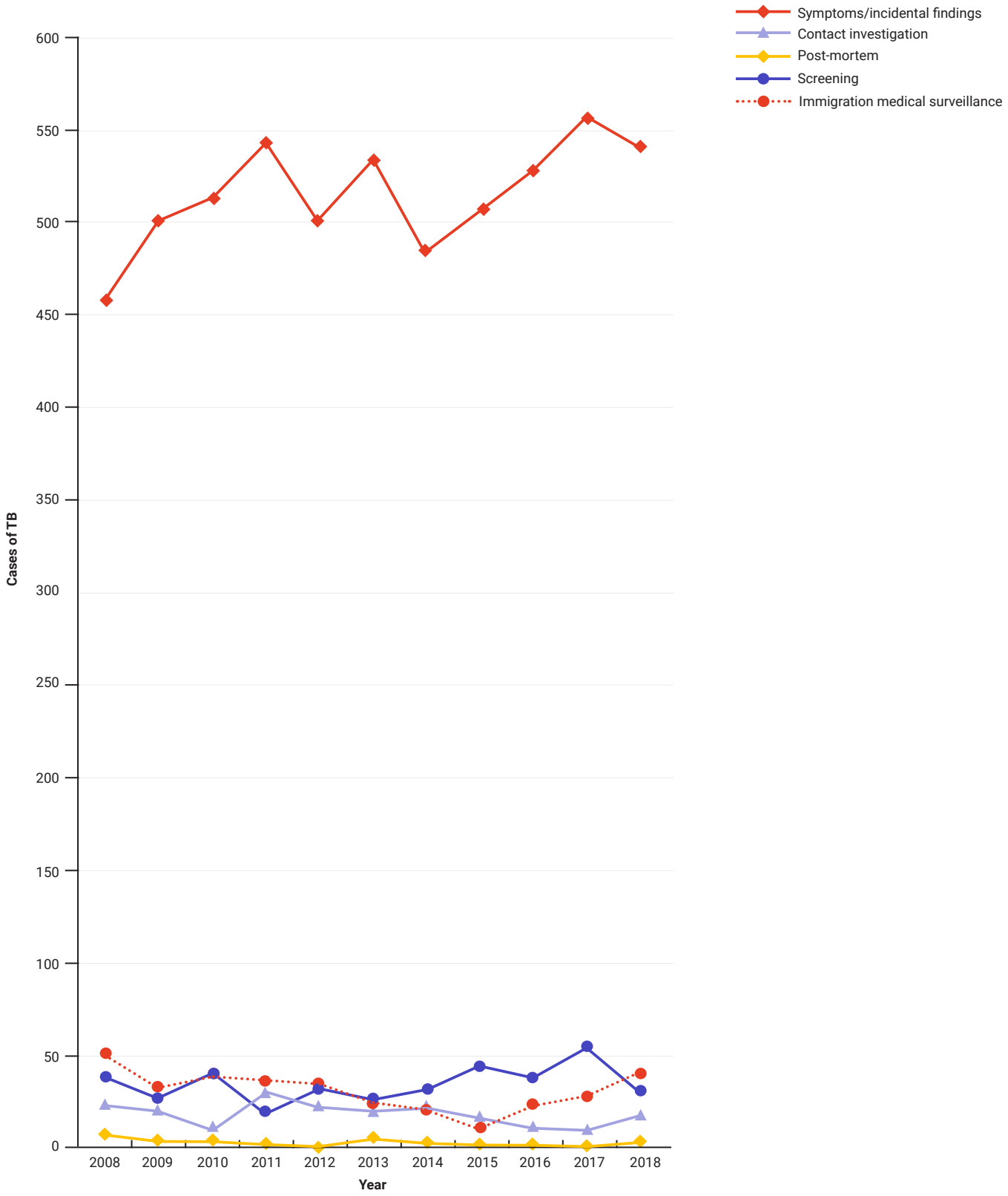


Figure 8G: Manitoba, CTBRS: 2008-2018

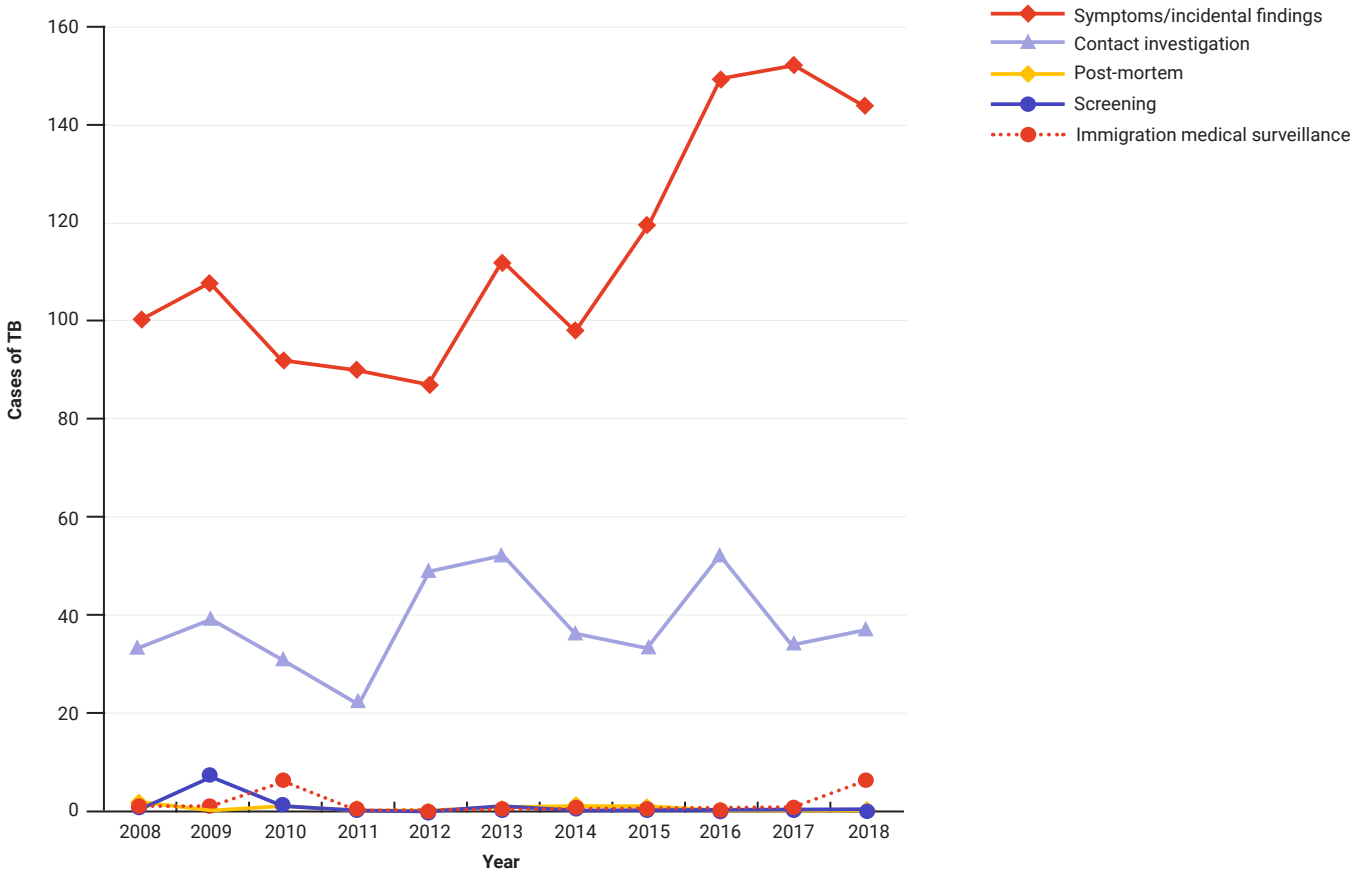


Figure 8H: Saskatchewan, CTBRS: 2008-2018

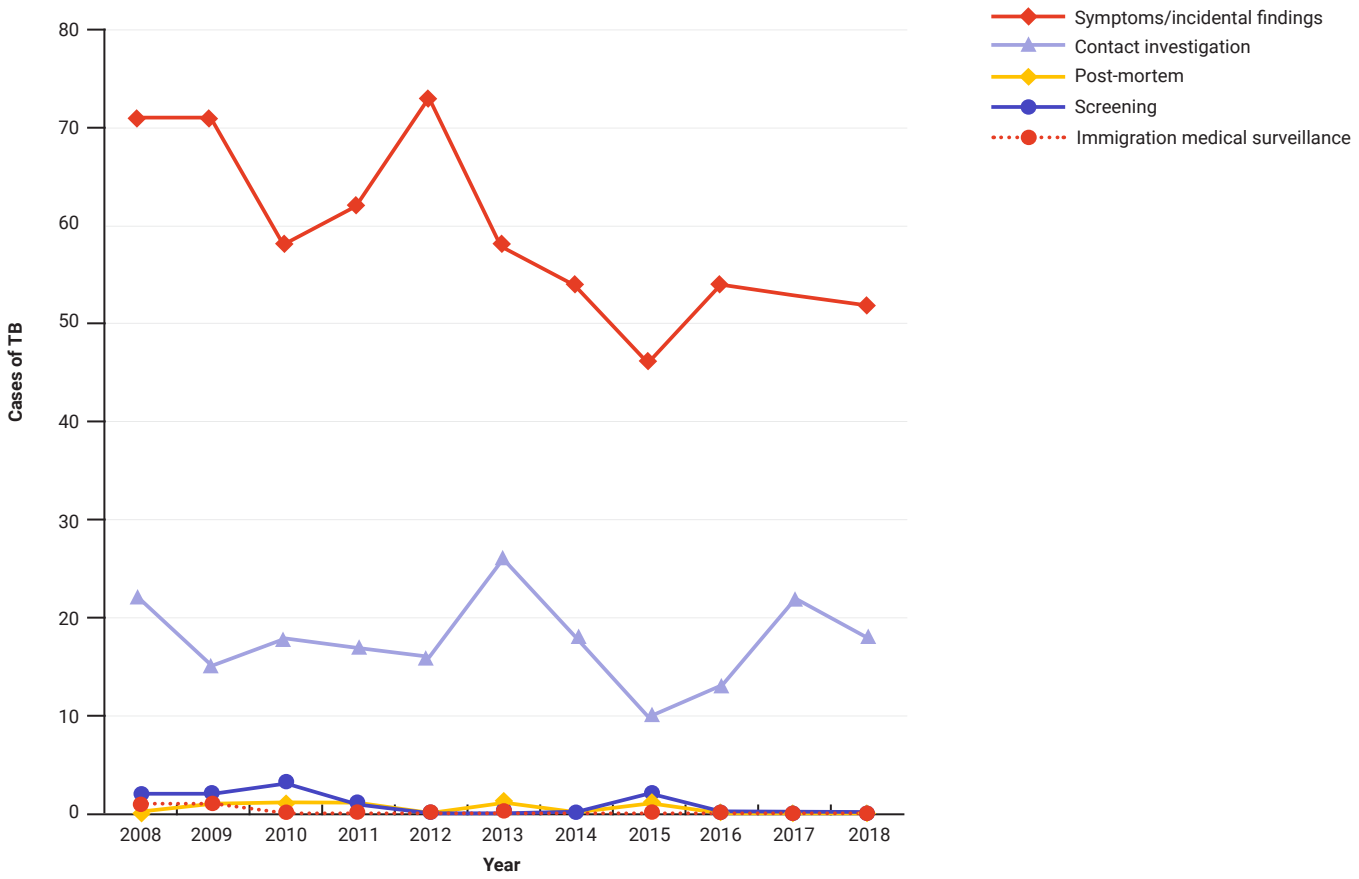


Figure 8I: Alberta, CTBRS: 2008-2018

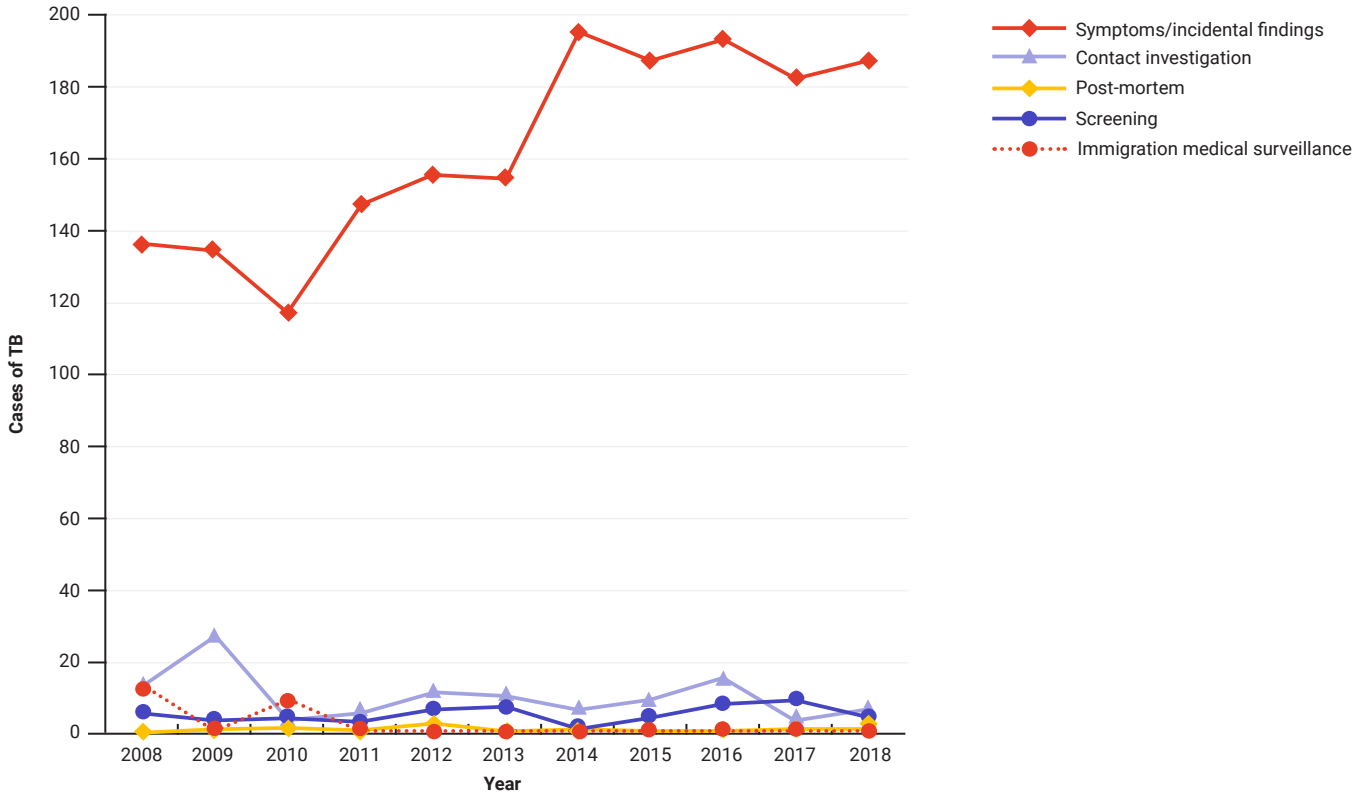


Figure 8J: British Columbia, CTBRS: 2008-2018

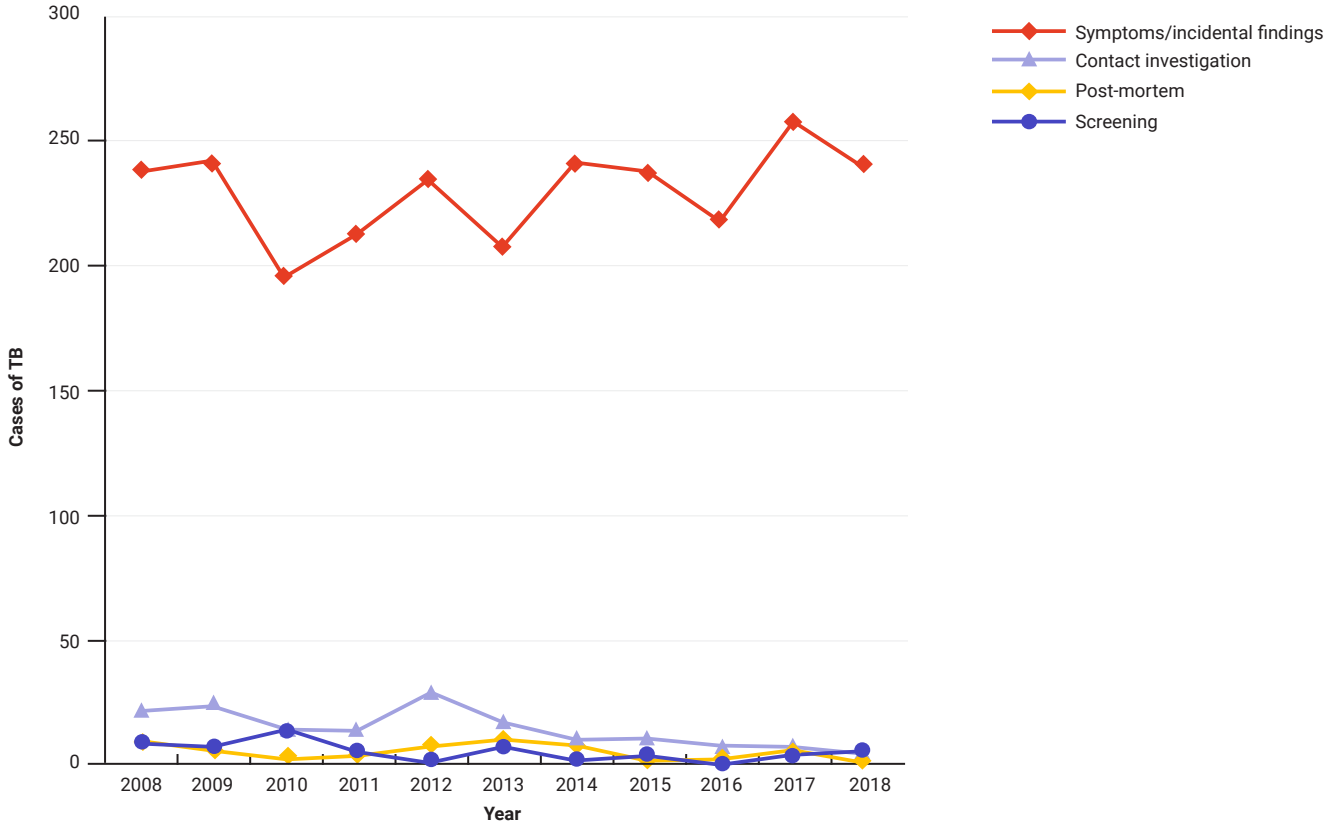


Figure 8K: Yukon Territories, CTBRS: 2008-2018

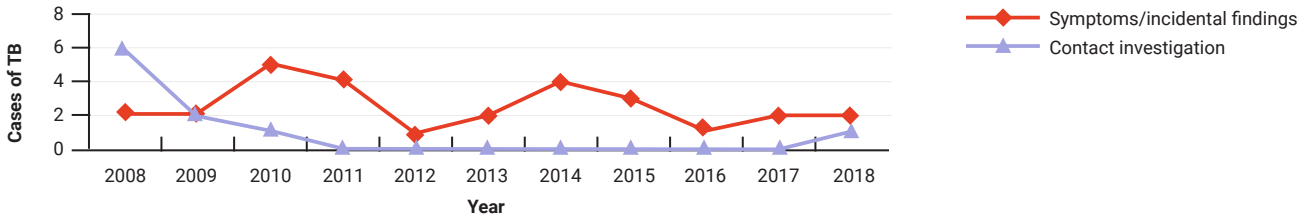


Figure 8L: Northwest Territories, CTBRS: 2008-2018

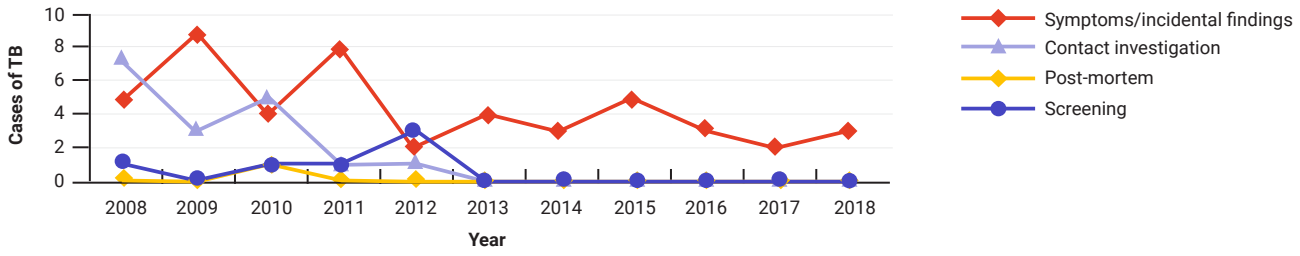
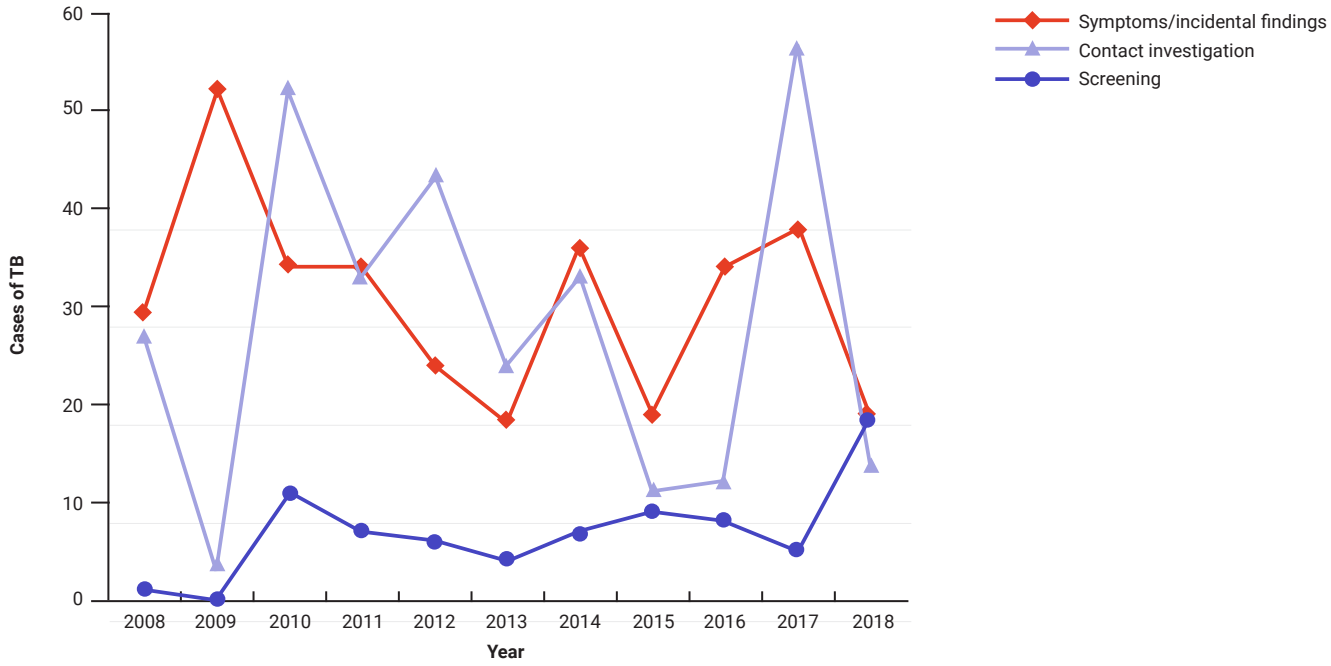


Figure 8M: Nunavut, CTBRS: 2008-2018



Section II—Reporting rate (%) of co-morbidity/infection (HIV, DM, ESRD, etc.), and other potential risk factors (homelessness, residency in correctional facilities, non-prescription substance abuse, etc.) for each province/territory, CTBRS: 2008 - 2018

Figure 22A (Northern Territories): Reporting rate (%) of HIV/TB co-infection (to the CTBRS) by Canadian jurisdictions, CTBRS: 2008 – 2018

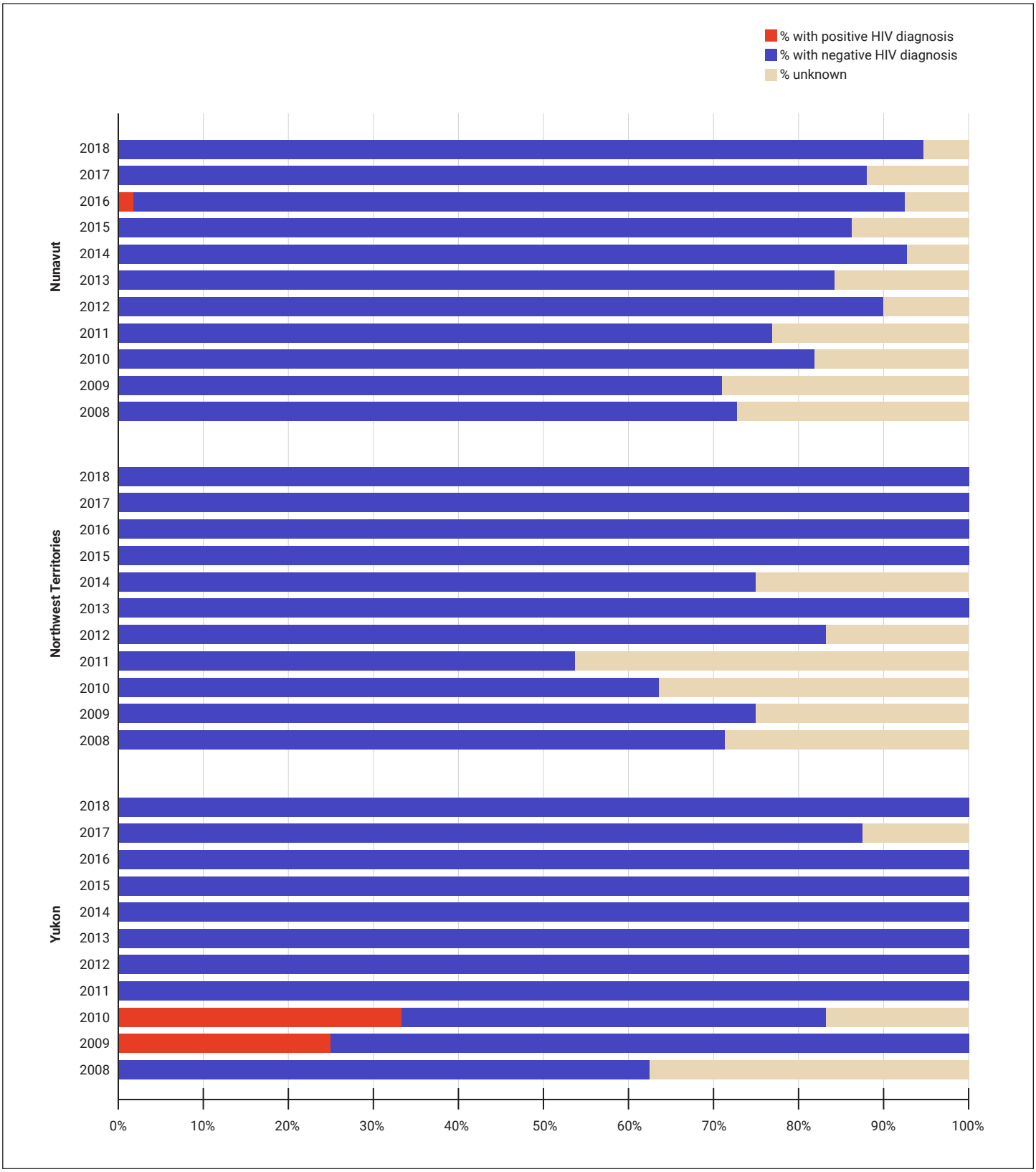


Figure 22B (Western Canada): Reporting rate (%) of HIV/TB co-infection (to the CTBRS) by Canadian jurisdictions, CTBRS: 2008 – 2018

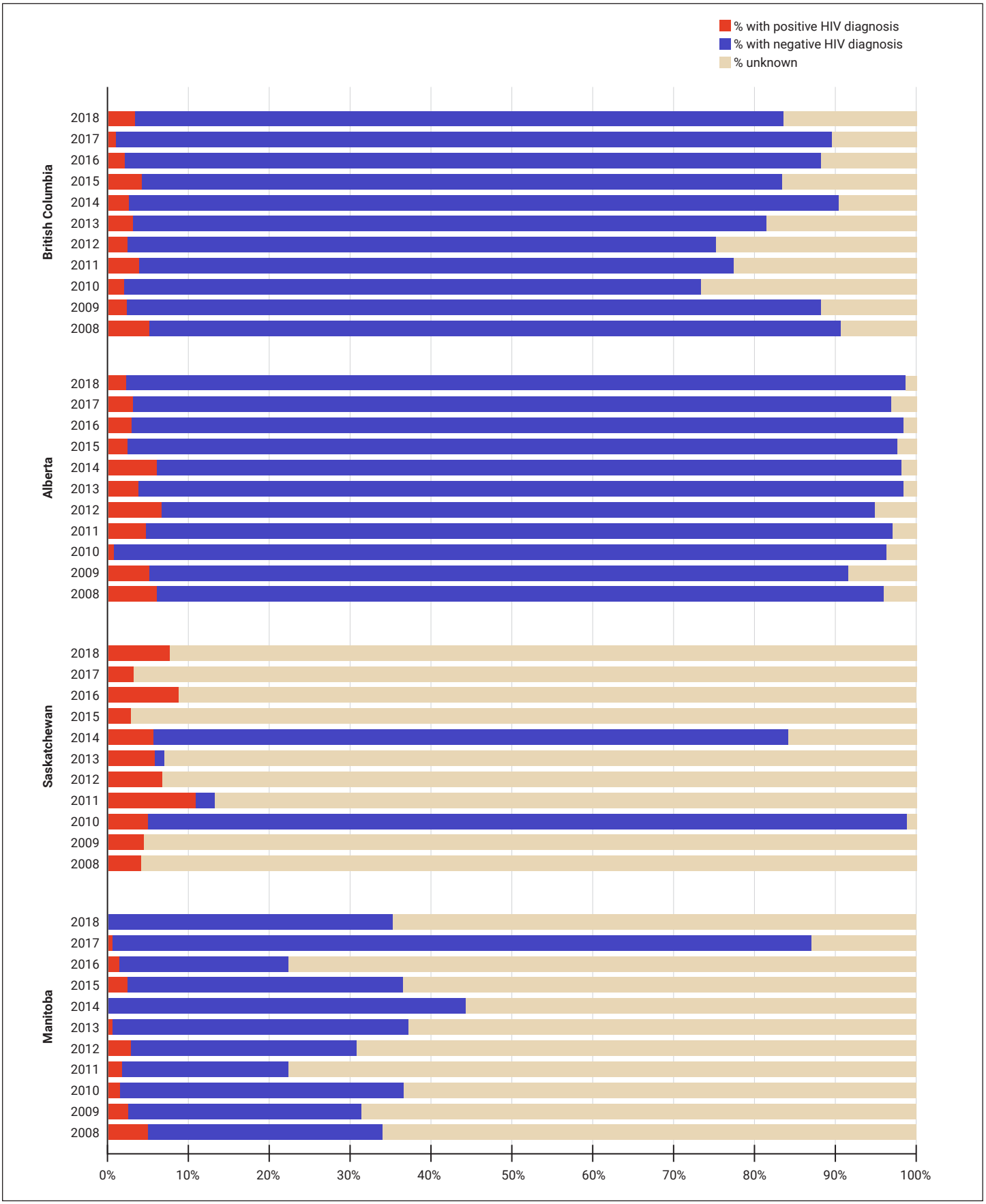


Figure 22C (Central Canada): Reporting rate (%) of HIV/TB co-infection (to the CTBRS) by Canadian jurisdictions, CTBRS: 2008 – 2018

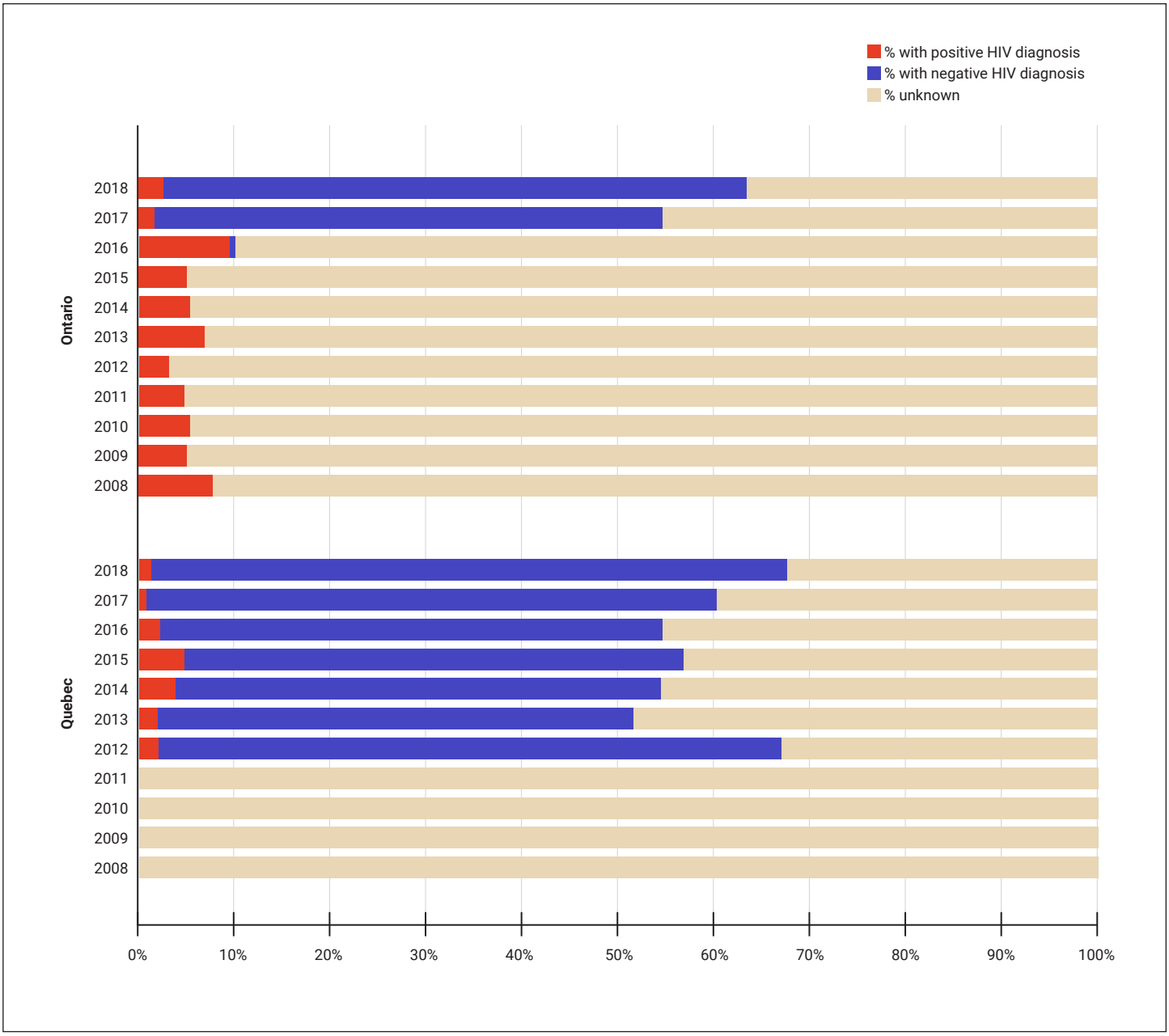


Figure 22D (Atlantic Canada): Reporting rate (%) of HIV/TB co-infection (to the CTBRS) by Canadian jurisdictions, CTBRS: 2008 – 2018

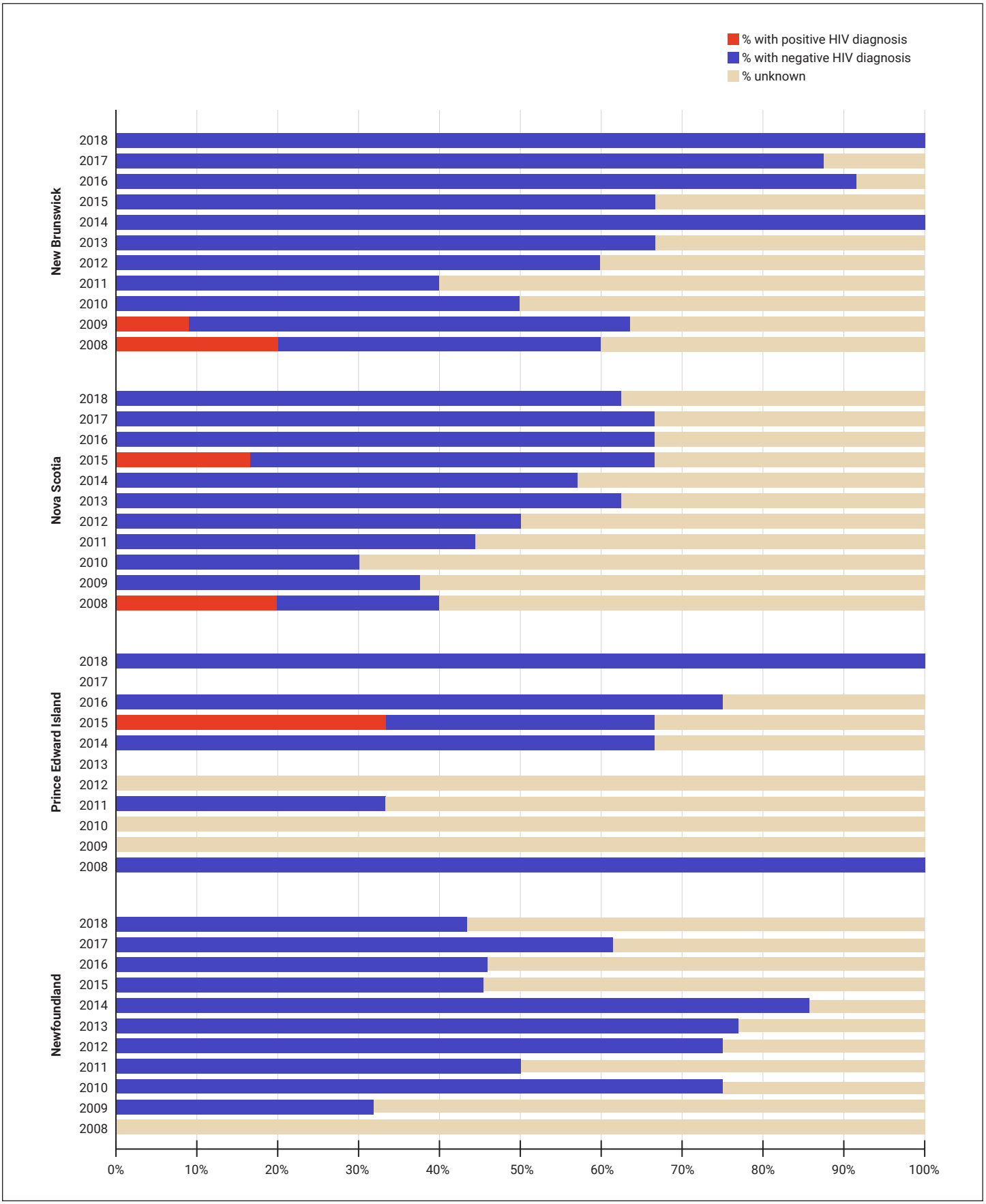


Figure 23A (Northern Territories): CTBRS reporting rate (%) of TB / diabetes mellitus co-morbidity across all jurisdictions over time, 2008-

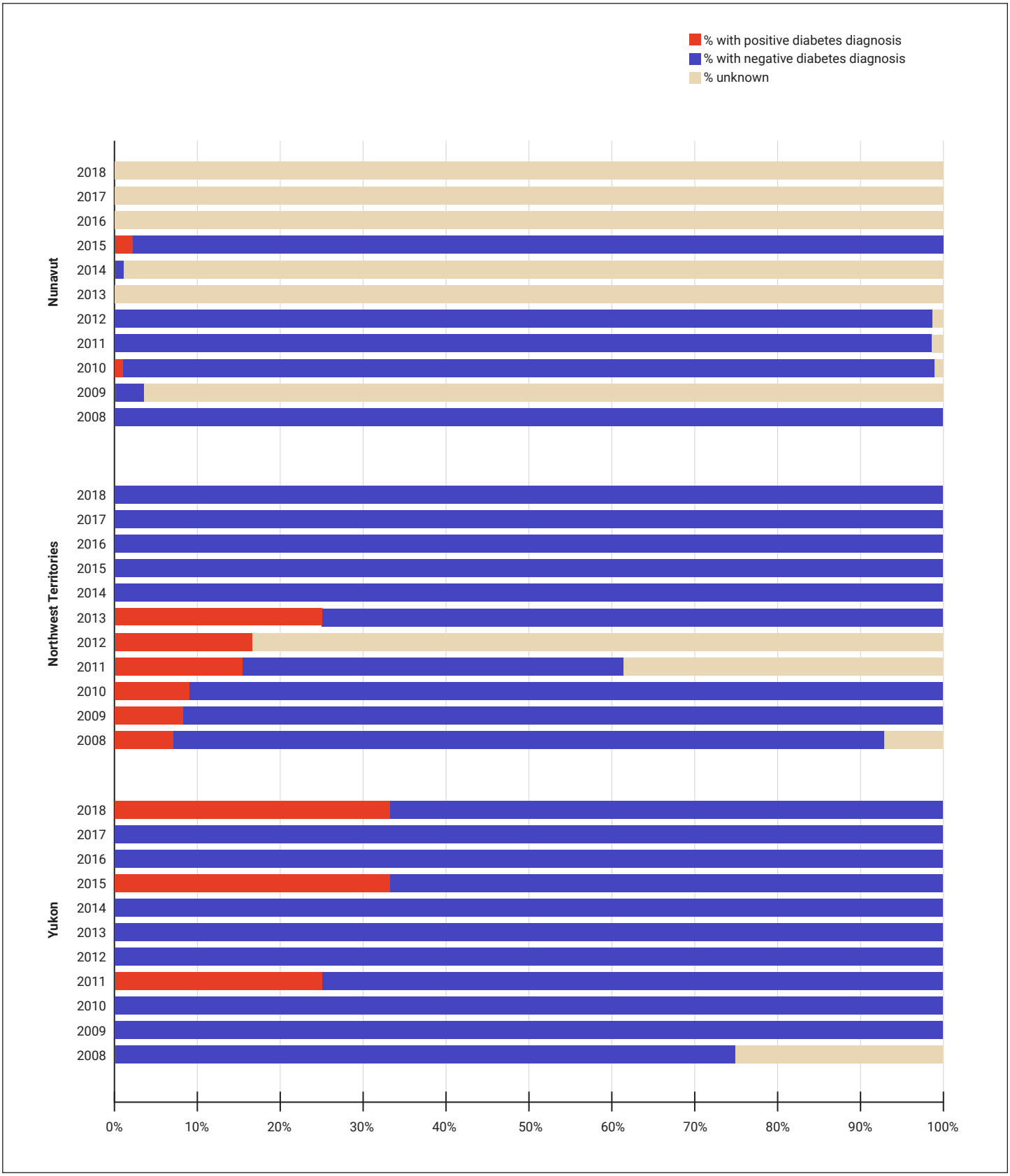


Figure 23B (Western Canada): CTBRS reporting rate (%) of TB / diabetes mellitus co-morbidity across all jurisdictions over time, 2008-2018

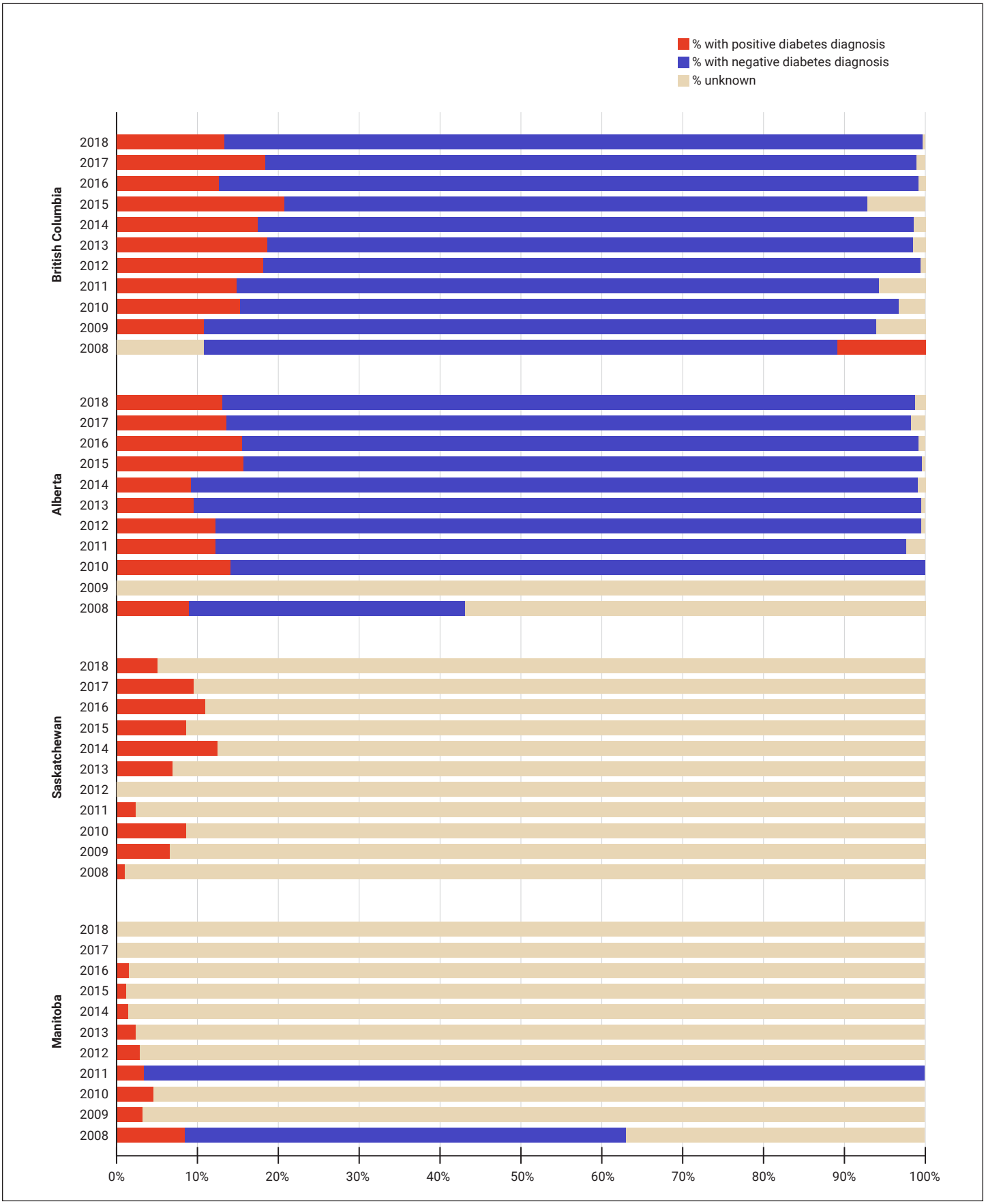


Figure 23C (Central Canada): CTBRS reporting rate (%) of TB / diabetes mellitus co-morbidity across all jurisdictions over time, 2008-2018

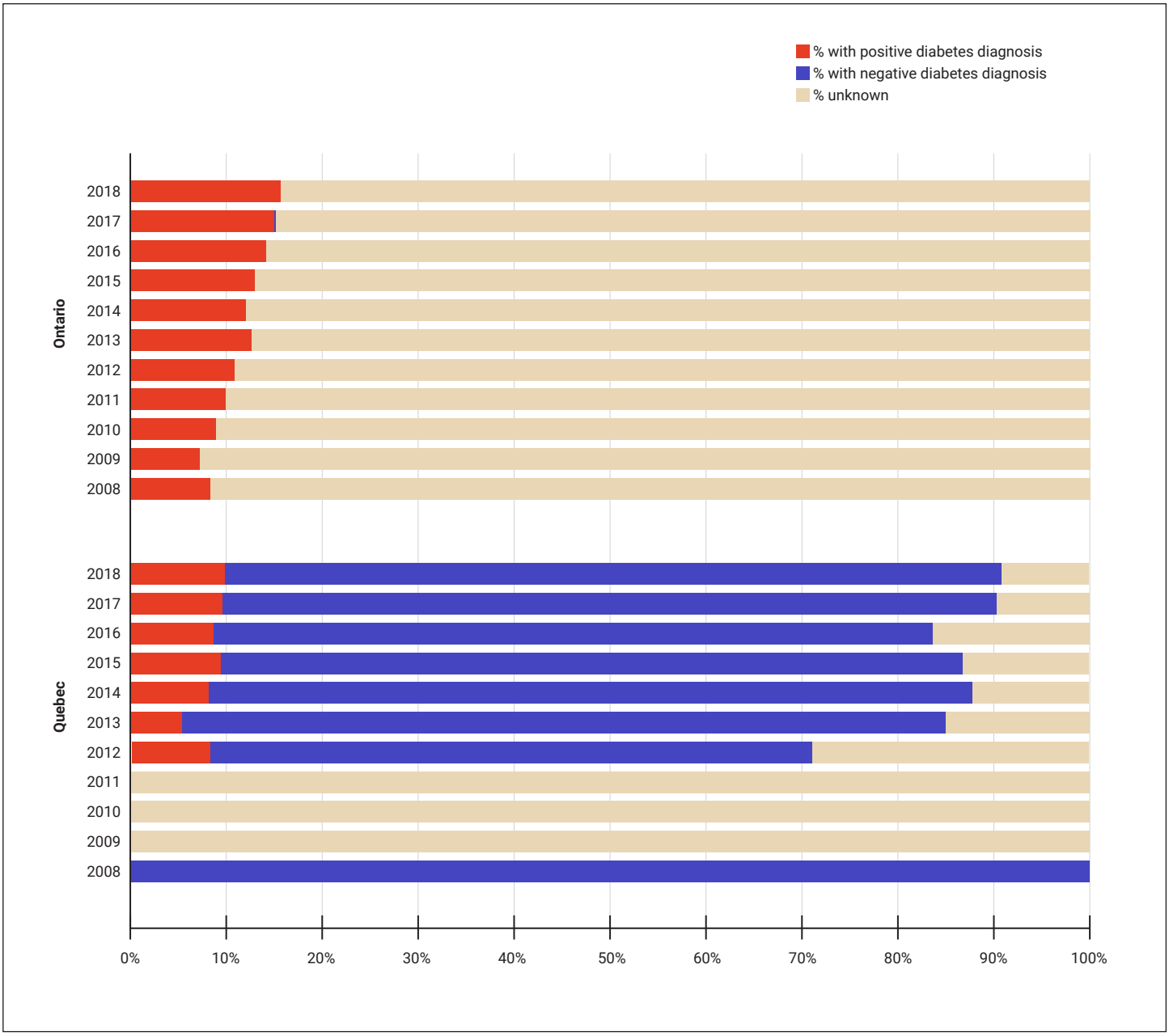


Figure 23D (Atlantic Canada): CTBRS reporting rate (%) of TB / diabetes mellitus co-morbidity across all jurisdictions over time, 2008-2018

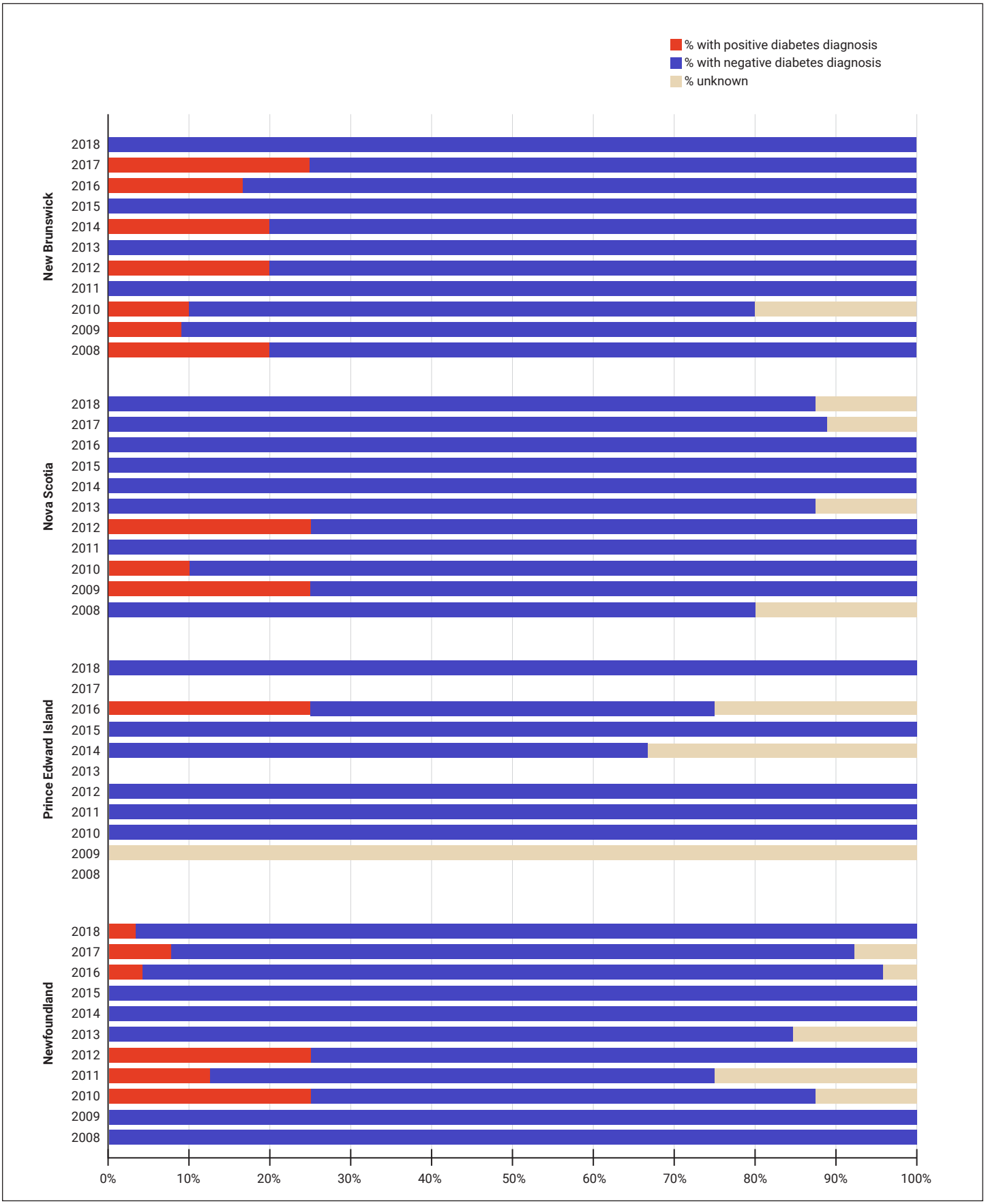


Figure 24A (Northern Territories): Reporting rate (%) of ESRD/TB diagnoses across all jurisdictions over time, CTBRS: 2008 – 2018

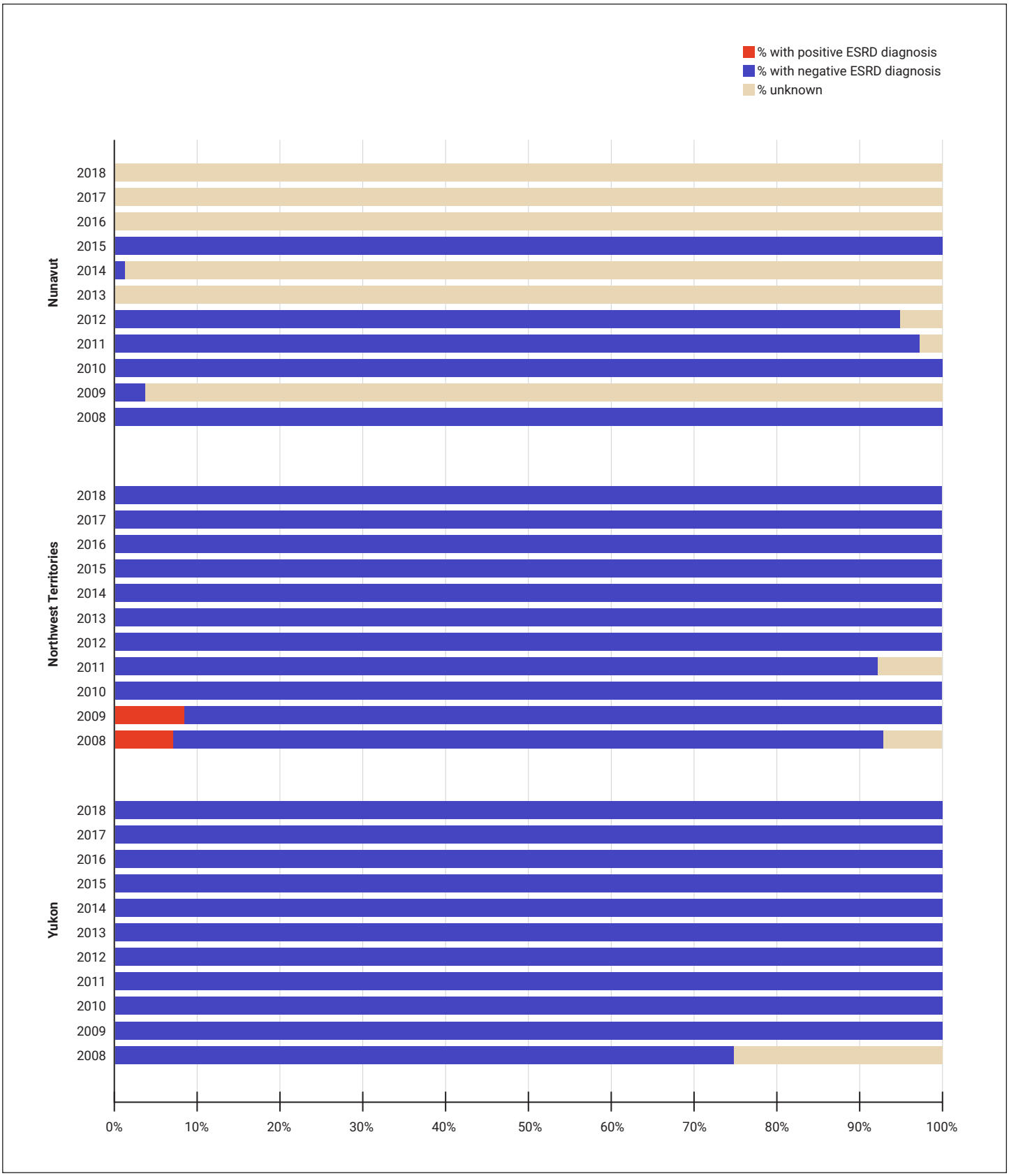


Figure 24B (Western Canada): Reporting rate (%) of ESRD/TB diagnoses across all jurisdictions over time, CTBRS: 2008 – 2018

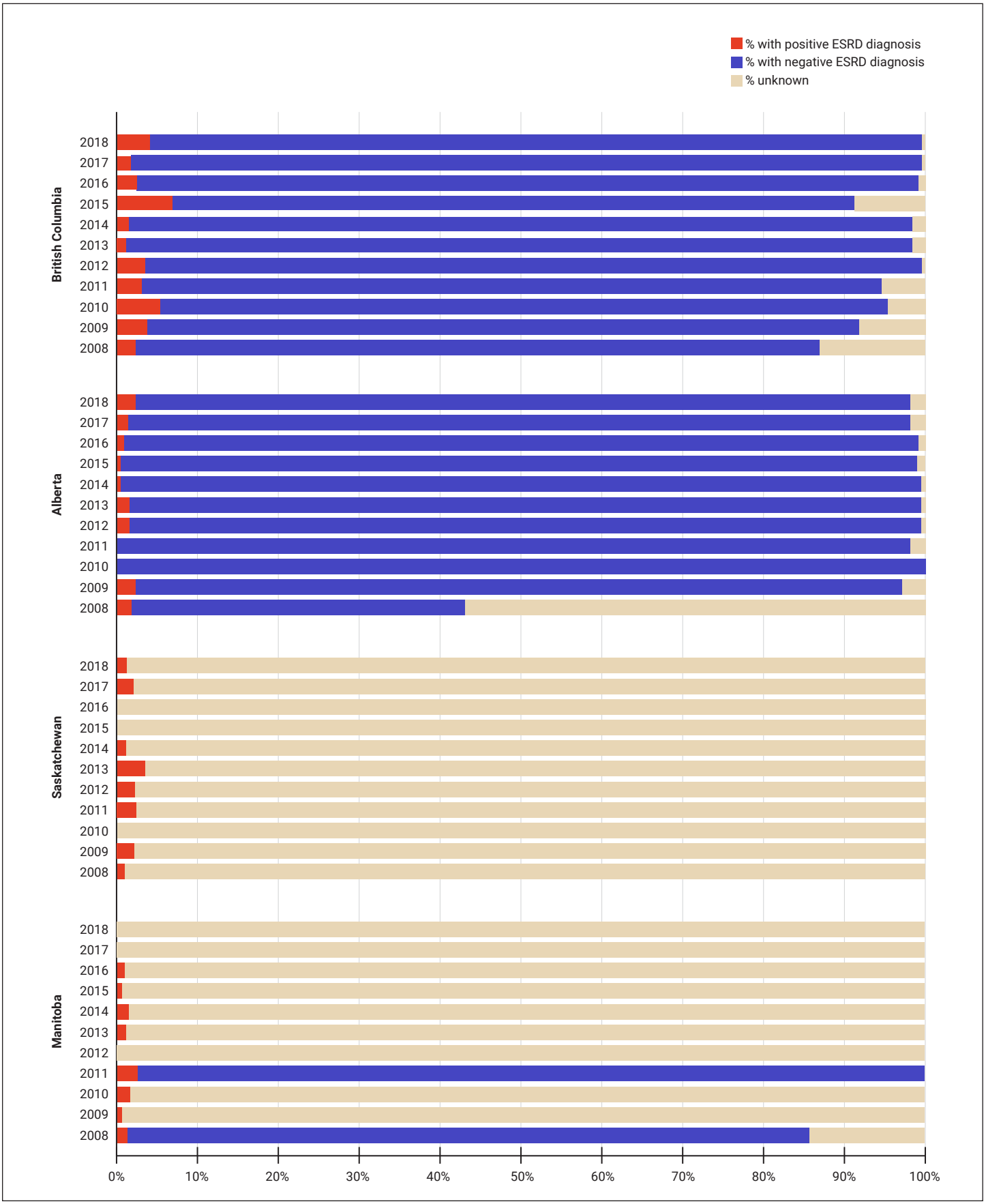


Figure 24C (Central Canada): Reporting rate (%) of ESRD/TB diagnoses across all jurisdictions over time, CTBRS: 2008 – 2018

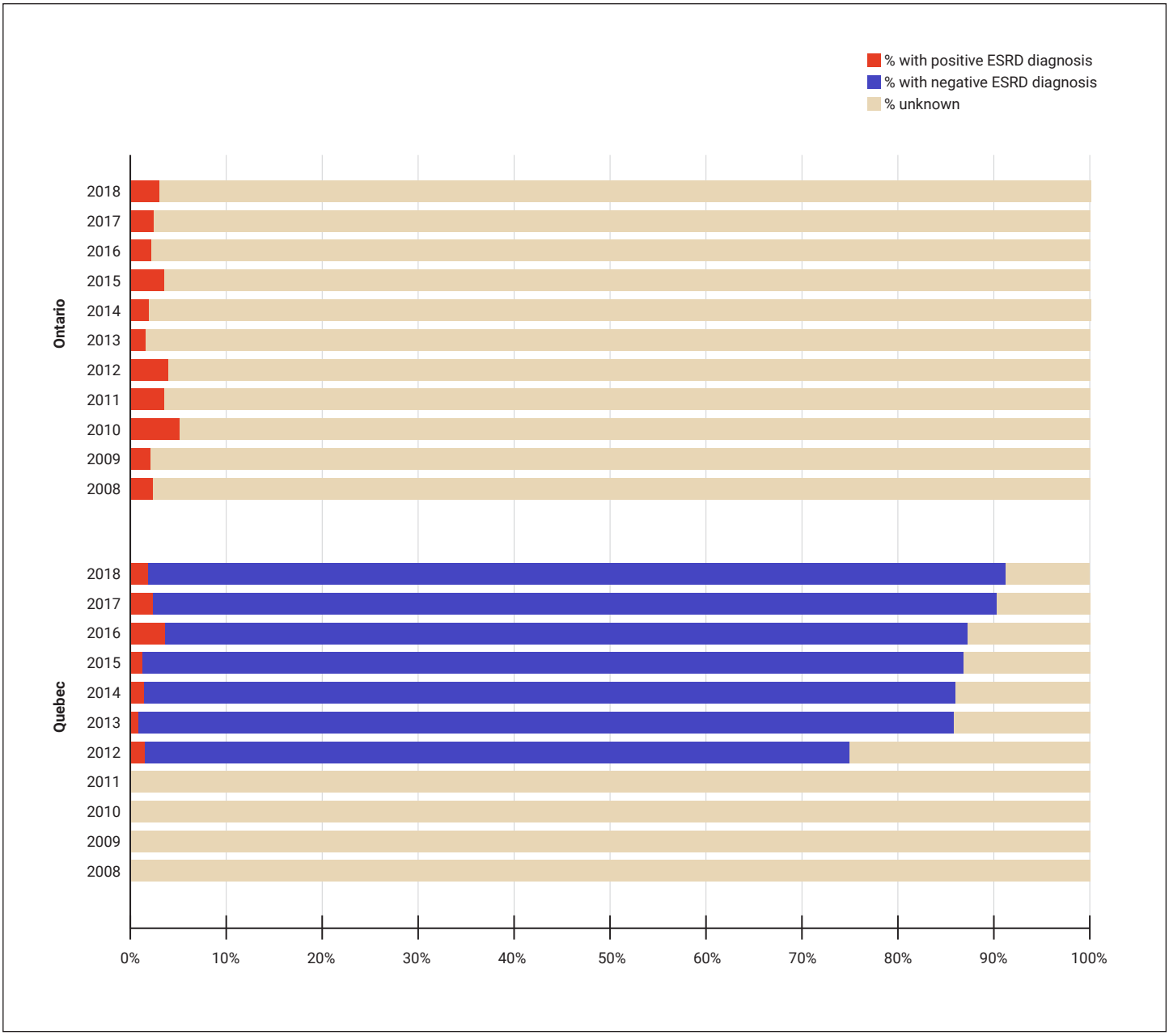


Figure 24D (Atlantic Canada): Reporting rate (%) of ESRD/TB diagnoses across all jurisdictions over time, CTBRS: 2008 – 2018

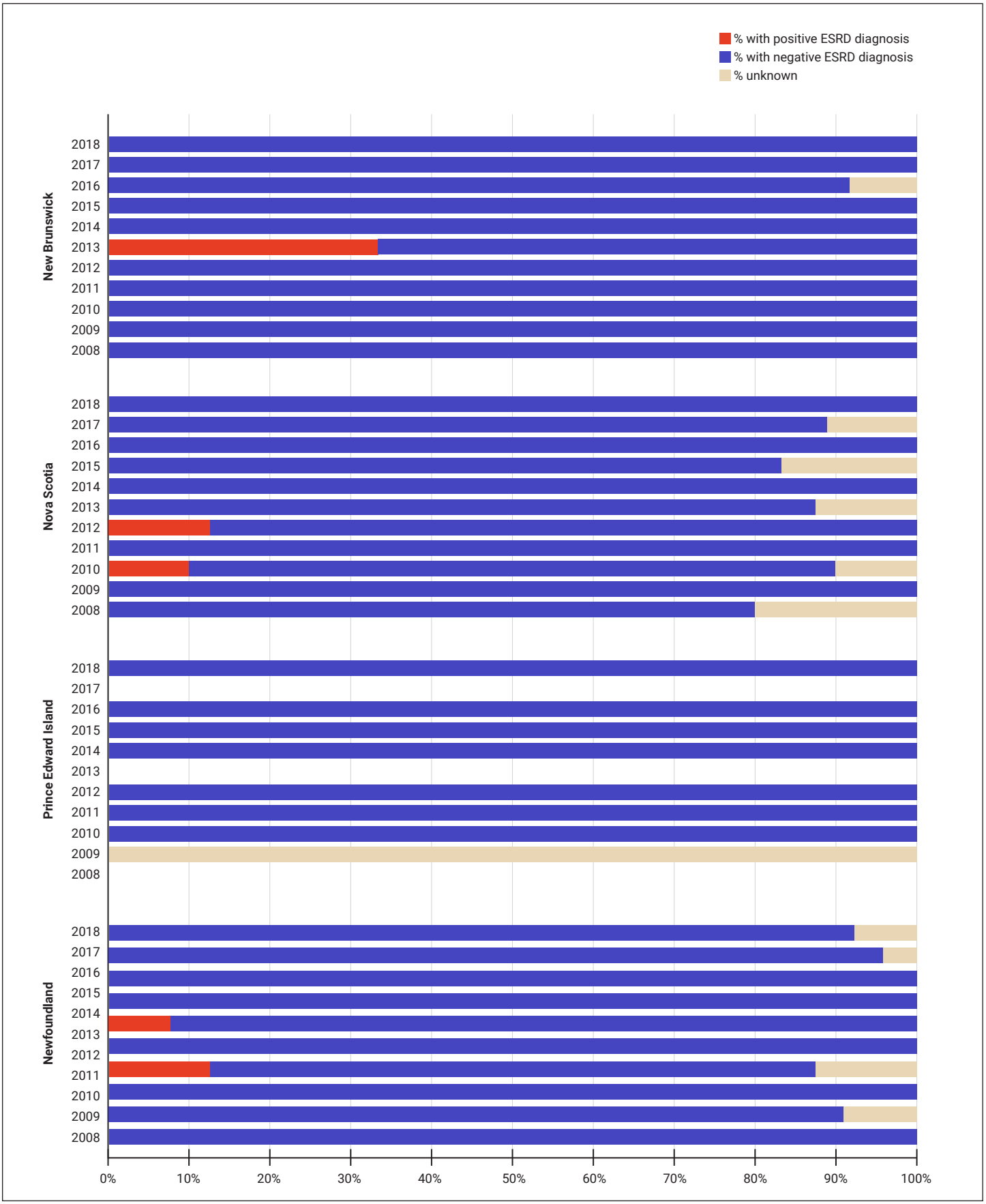


Figure 25A (Northern Territories): Reporting rate (%) of prior abnormal chest x-ray diagnosis across all jurisdictions over time, CTBRS: 2008 – 2018

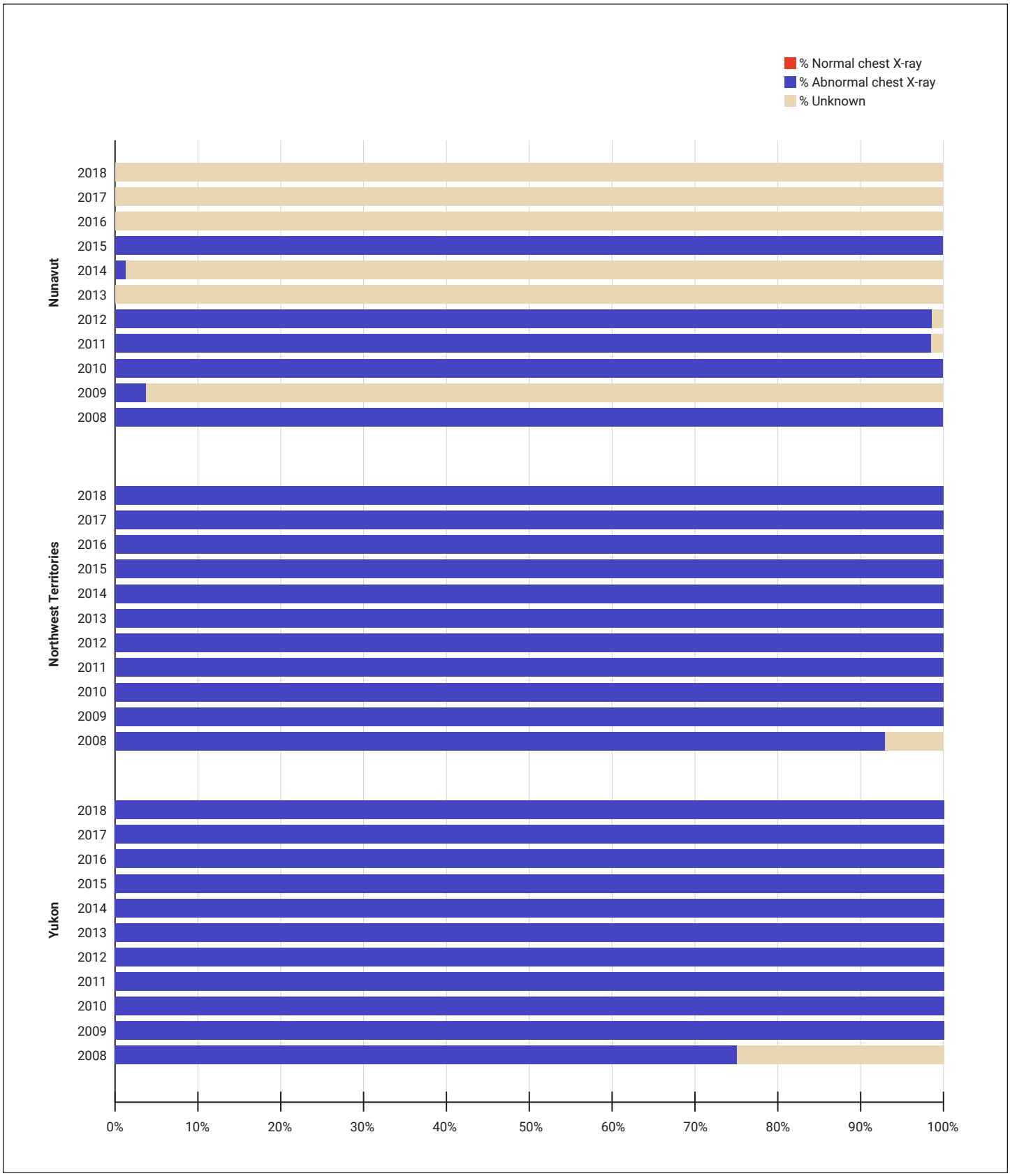


Figure 25B (Western Canada): Reporting rate (%) of prior abnormal chest x-ray diagnosis across all jurisdictions over time, CTBRS: 2008 – 2018

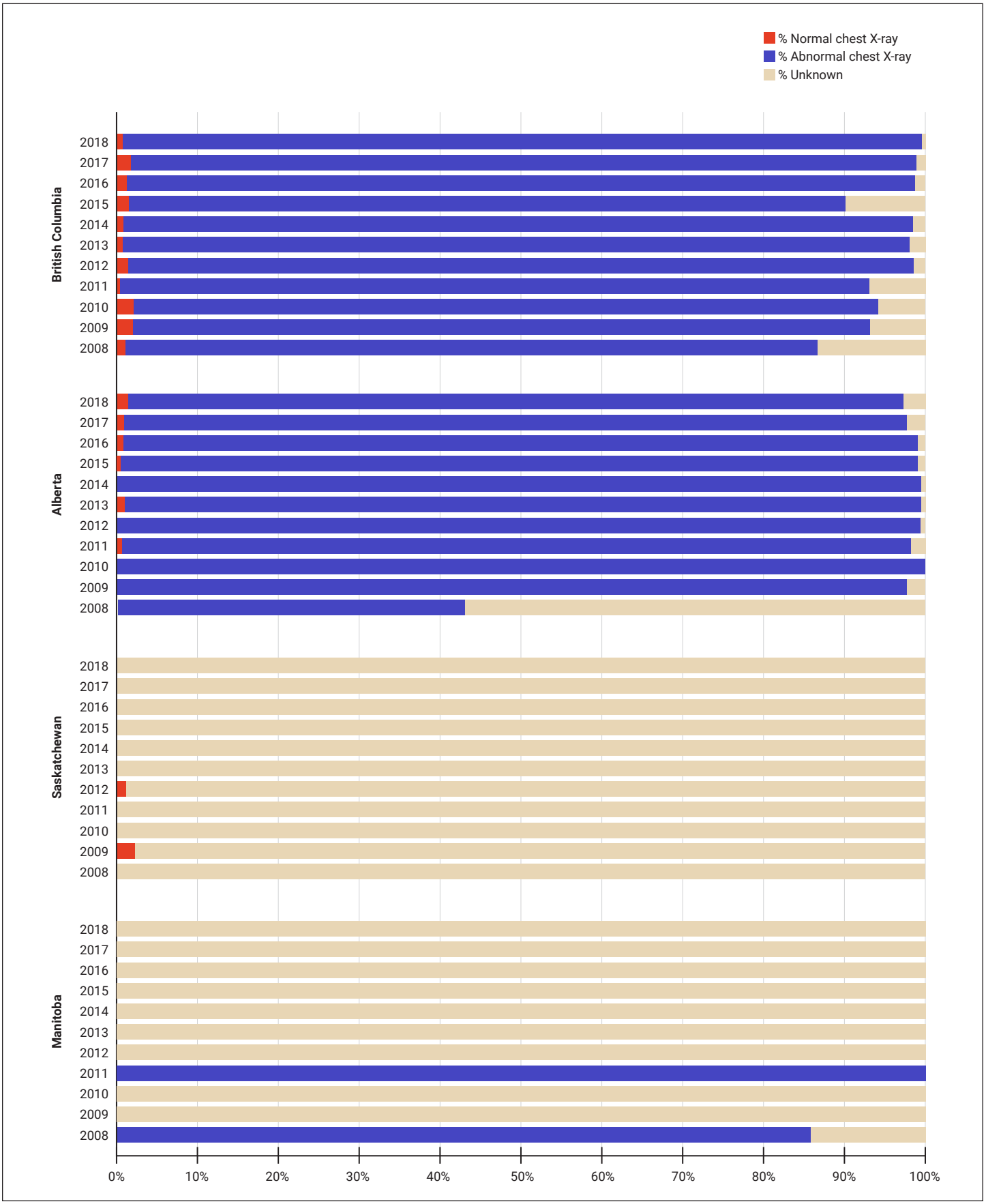


Figure 25C: Reporting rate (%) of prior abnormal chest x-ray diagnosis across all jurisdictions over time, CTBRS: 2008 – 2018

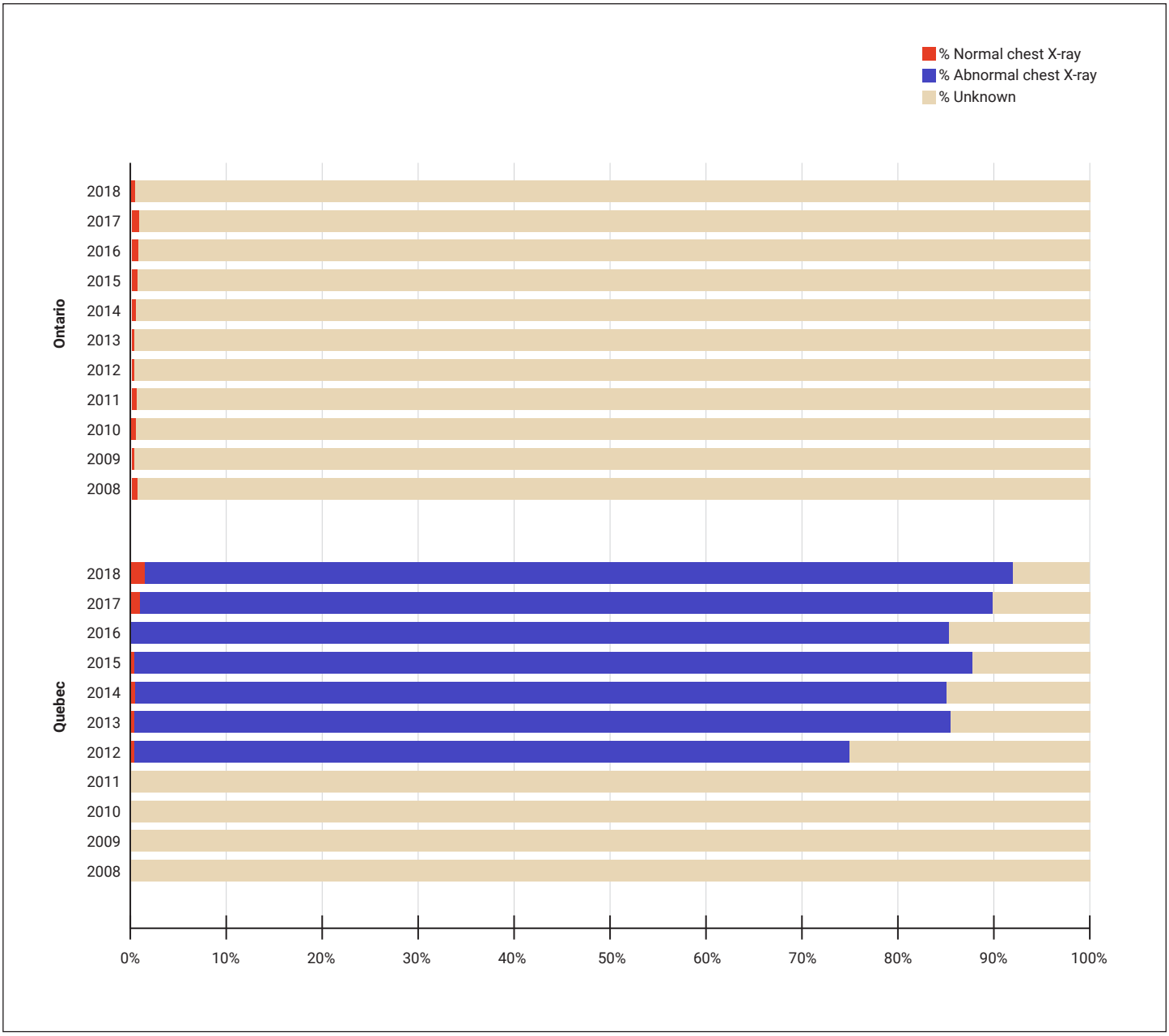


Figure 25D (Atlantic Canada): Reporting rate (%) of prior abnormal chest x-ray diagnosis across all jurisdictions over time, CTBRS: 2008 – 2018

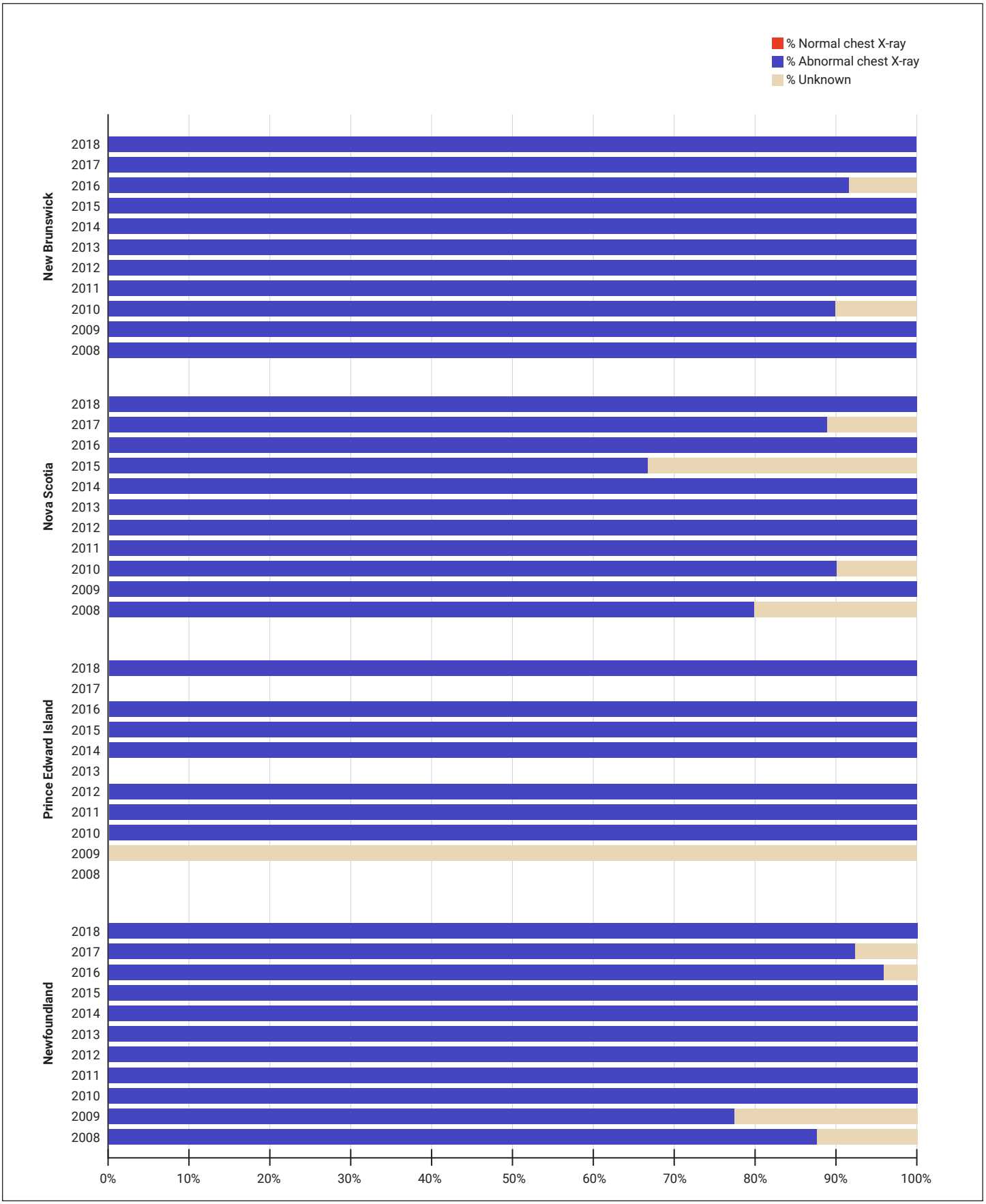


Figure 26A (Northern Territories): CTBRS reporting rate (%) of TRIS diagnosis across all jurisdictions over time, 2008 – 2018

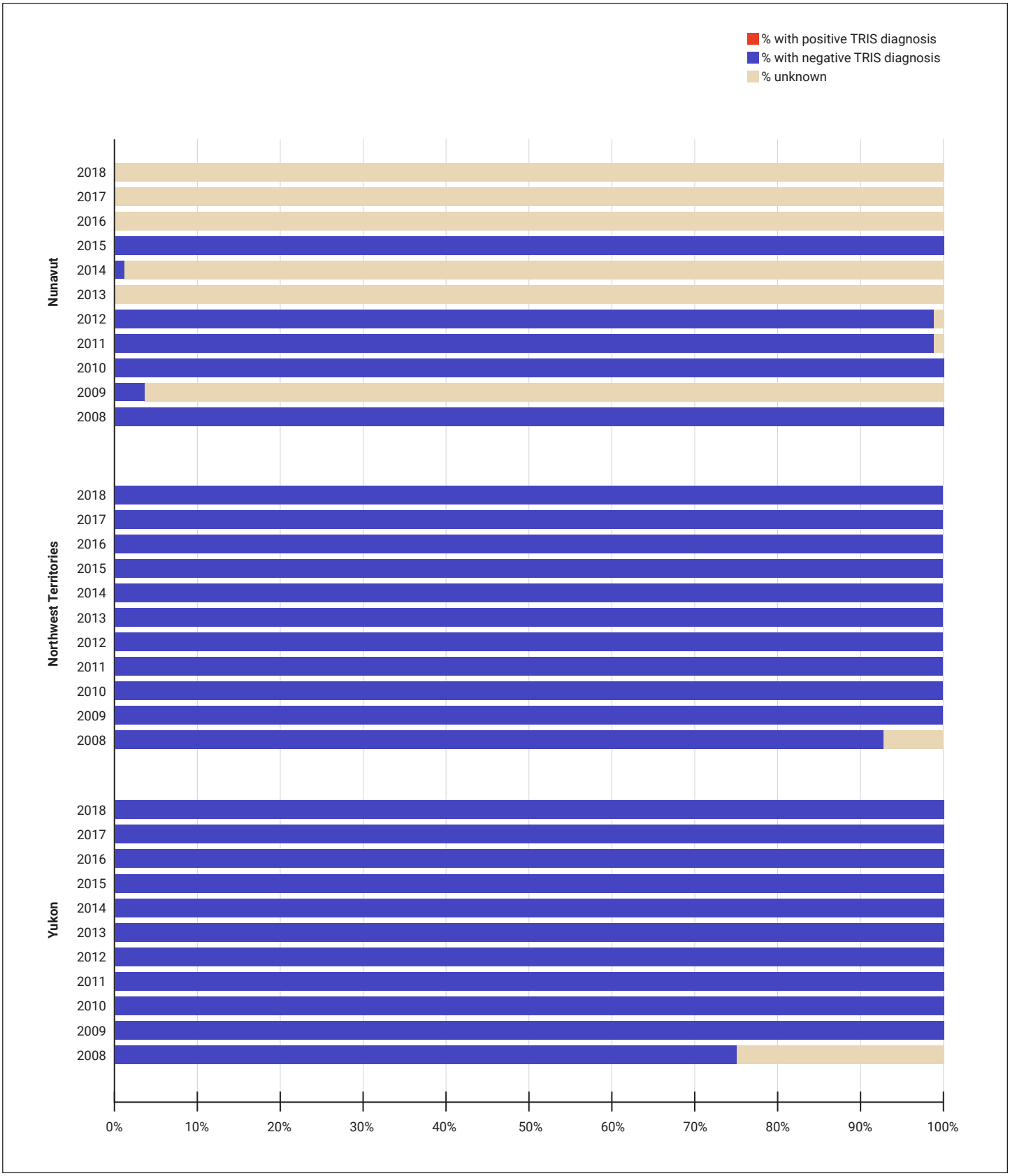


Figure 26B (Western Canada): CTBRS reporting rate (%) of TRIS diagnosis across all jurisdictions over time, 2008 – 2018

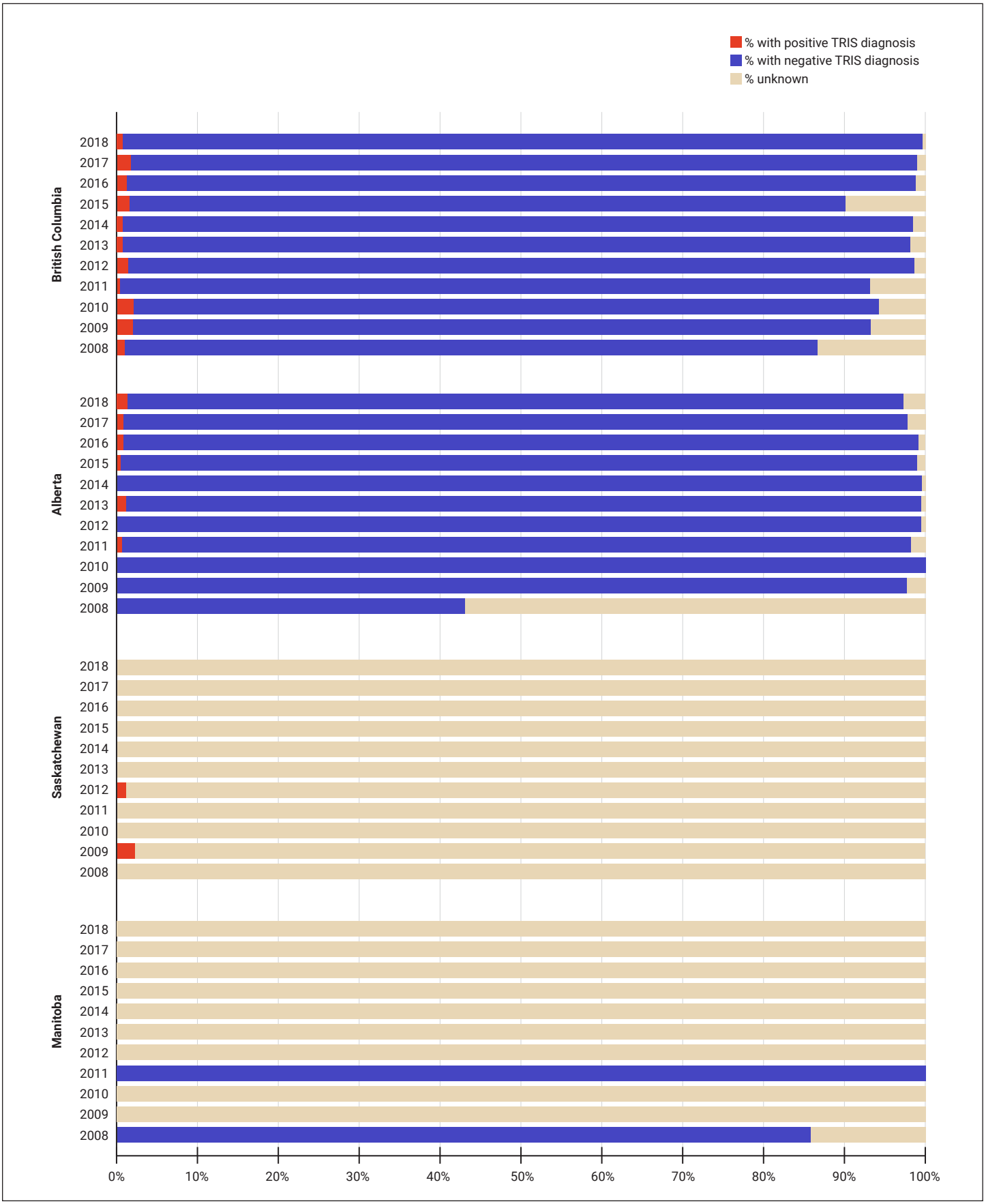


Figure 26C (Central Canada): CTBRS reporting rate (%) of TRIS diagnosis across all jurisdictions over time, 2008 – 2018

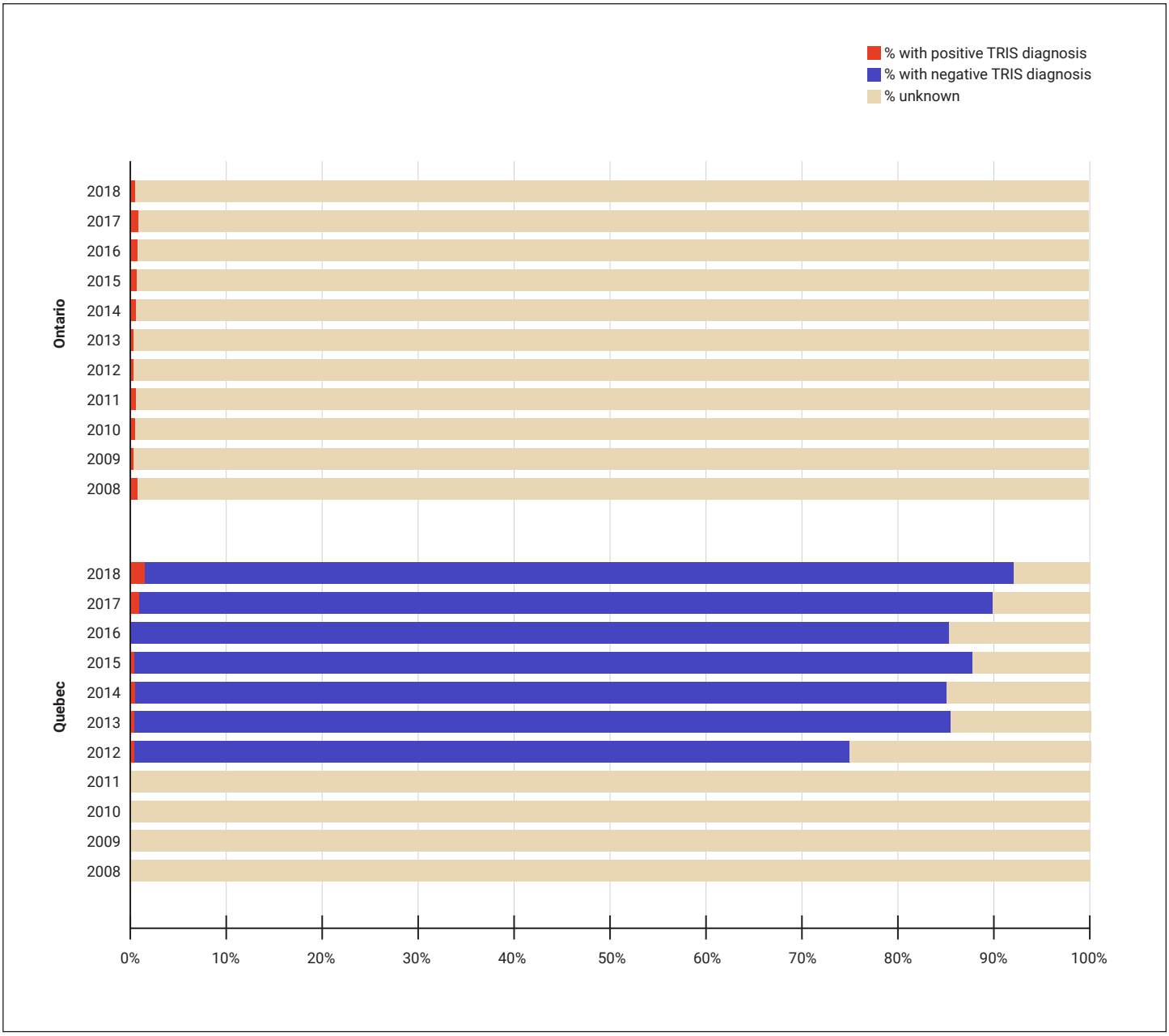


Figure 26D (Atlantic Canada): CTBRS reporting rate (%) of TRIS diagnosis across all jurisdictions over time, 2008 – 2018

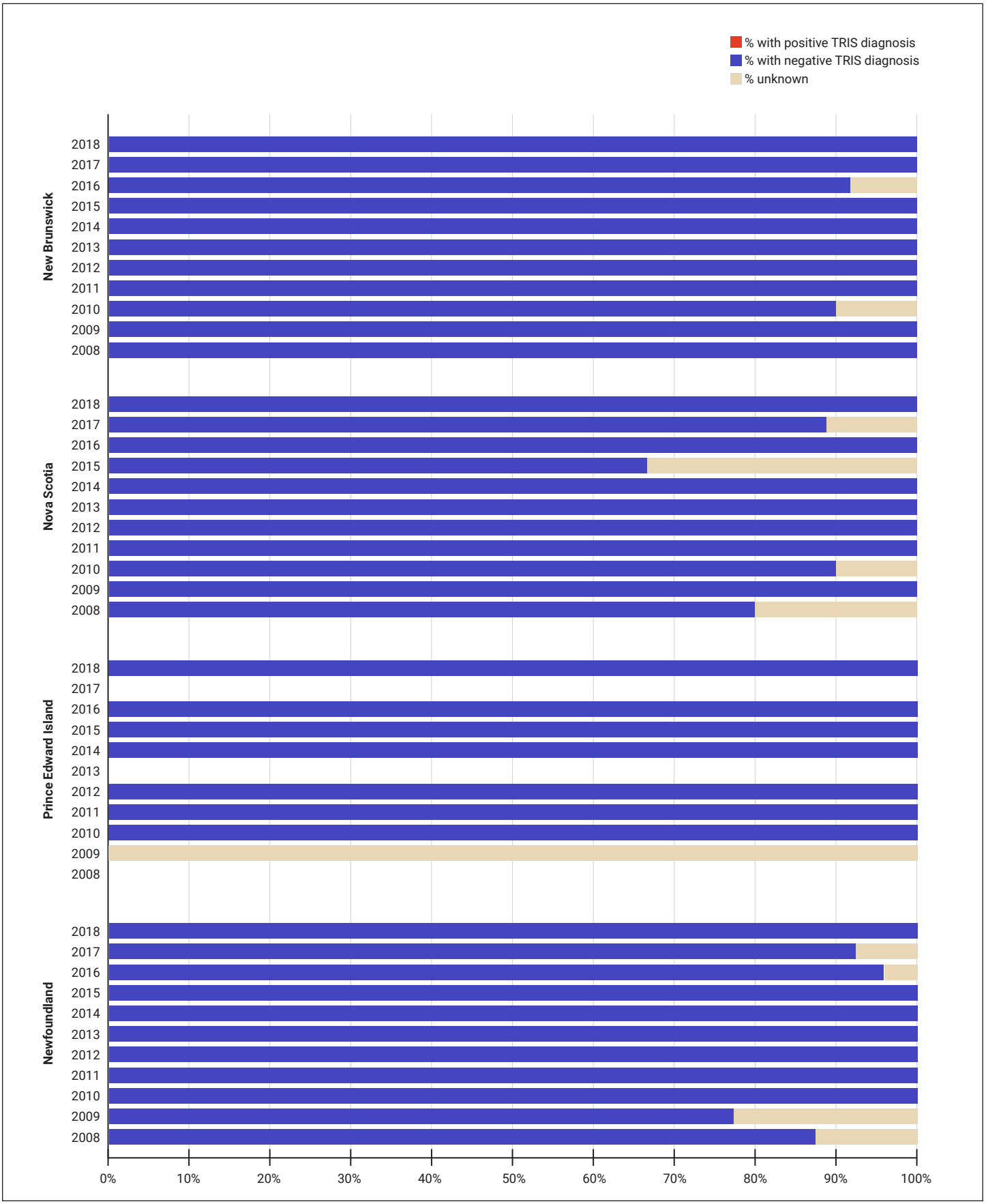


Figure 28A (Northern Territories): Reporting rate (%) of homelessness across all jurisdictions and over time, CTBRS: 2008 – 2018

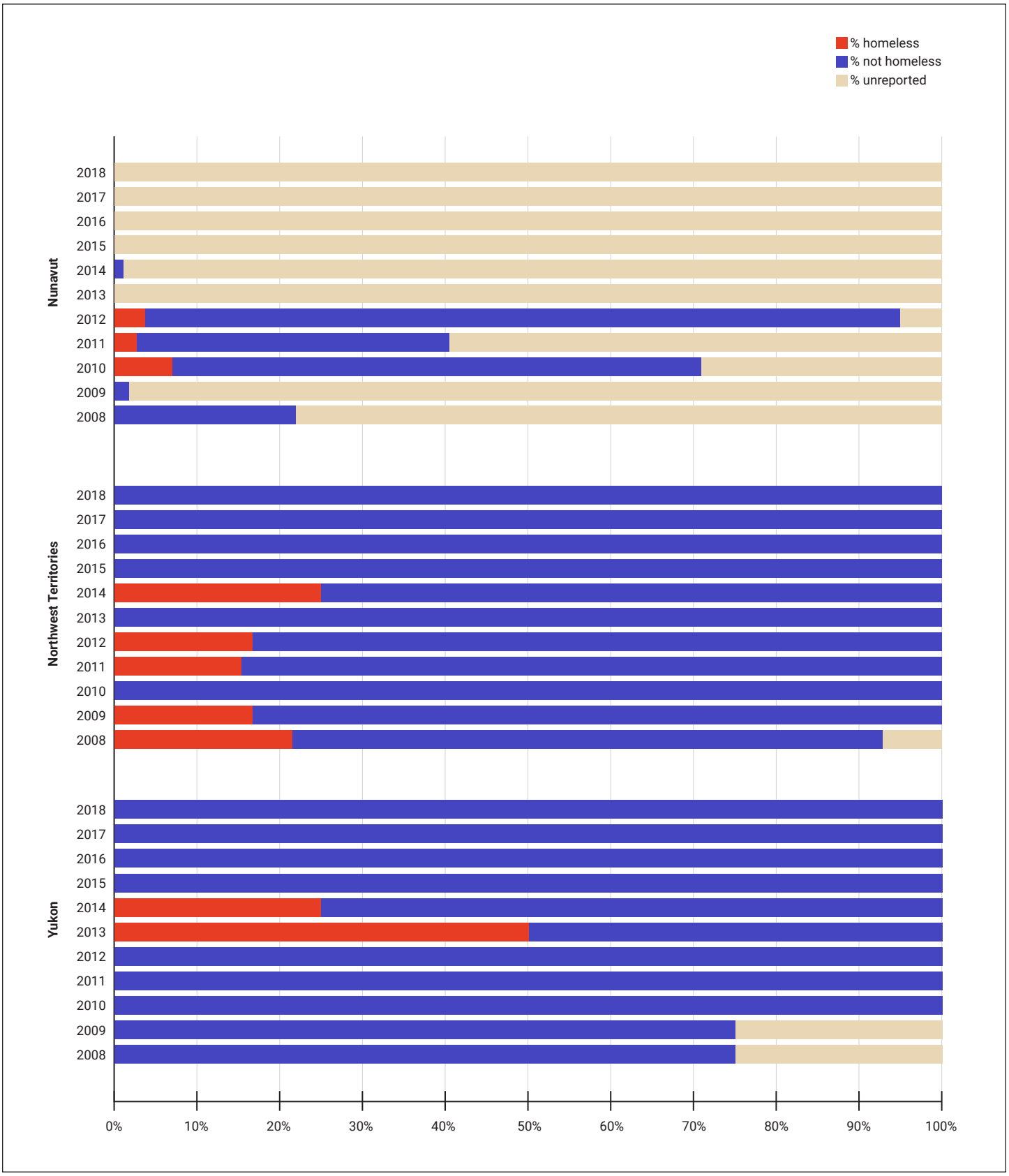
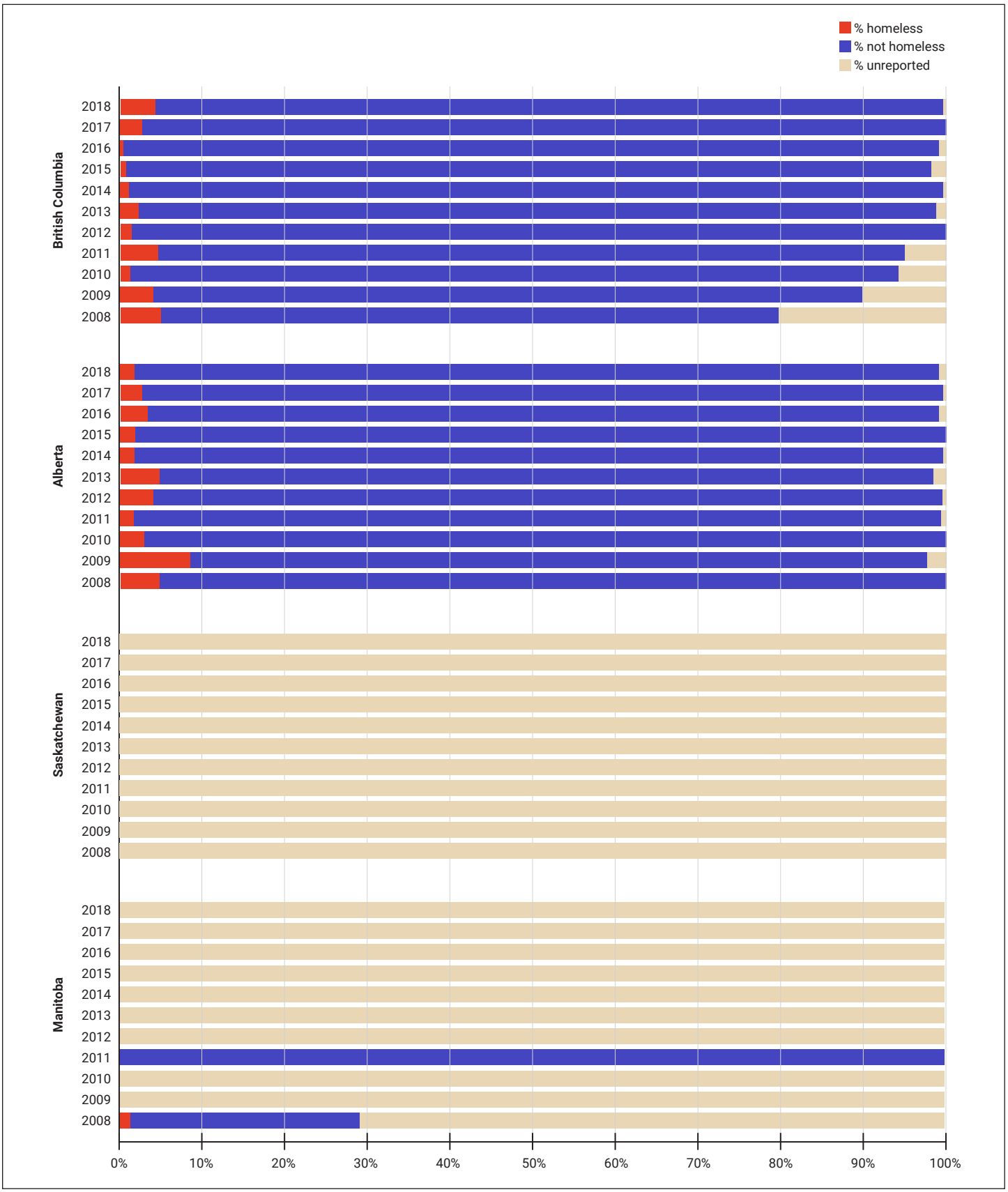


Figure 28B (Western Canada): Reporting rate (%) of homelessness across all jurisdictions and over time, CTBRS: 2008 – 2018[28]



[28] Data not available for Saskatchewan.

Figure 28C (Central Canada): Reporting rate (%) of homelessness across all jurisdictions and over time, CTBRS: 2008 – 2018

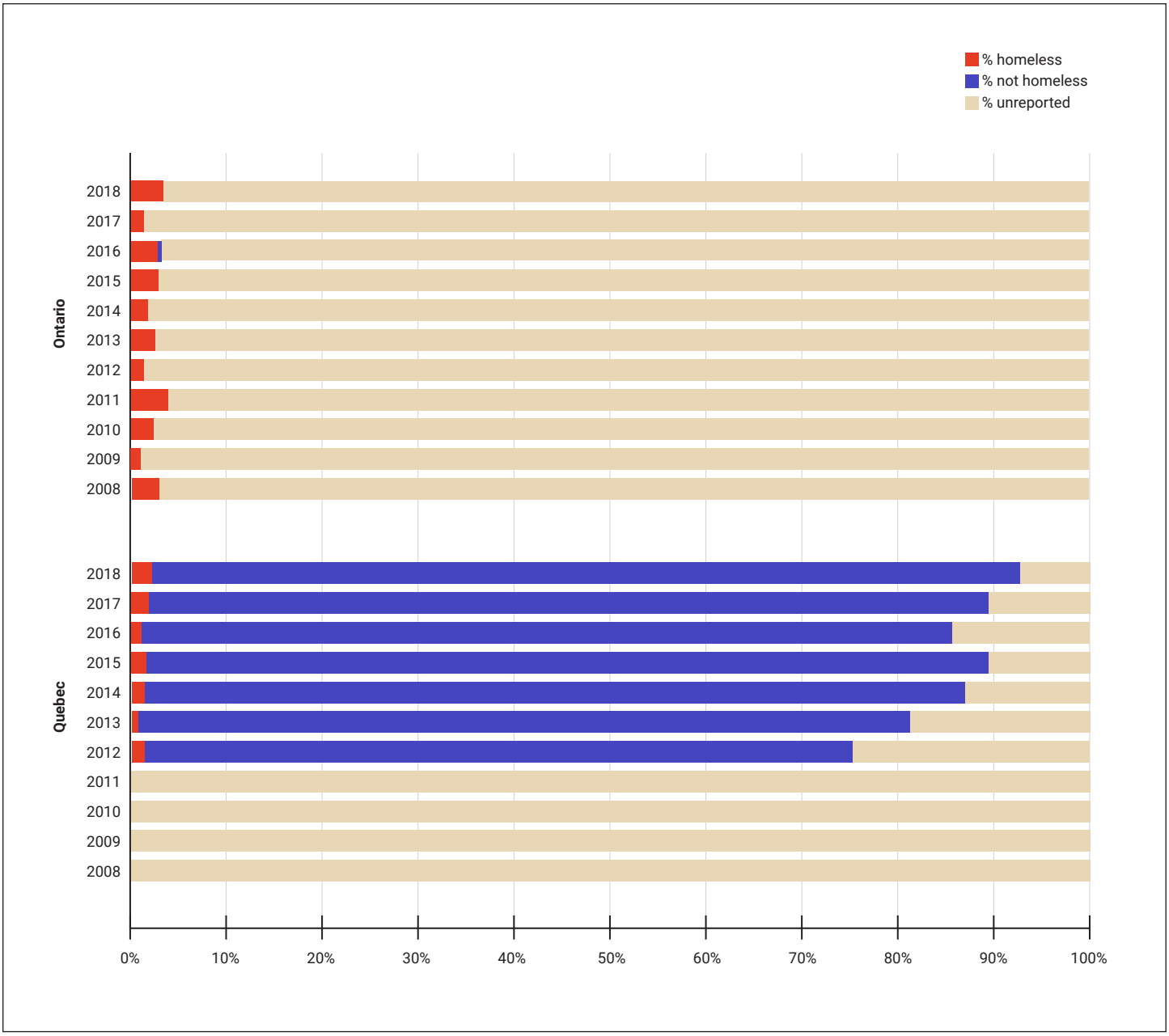


Figure 28D (Atlantic Canada): Reporting rate (%) of homelessness across all jurisdictions and over time, CTBRS: 2008 – 2018

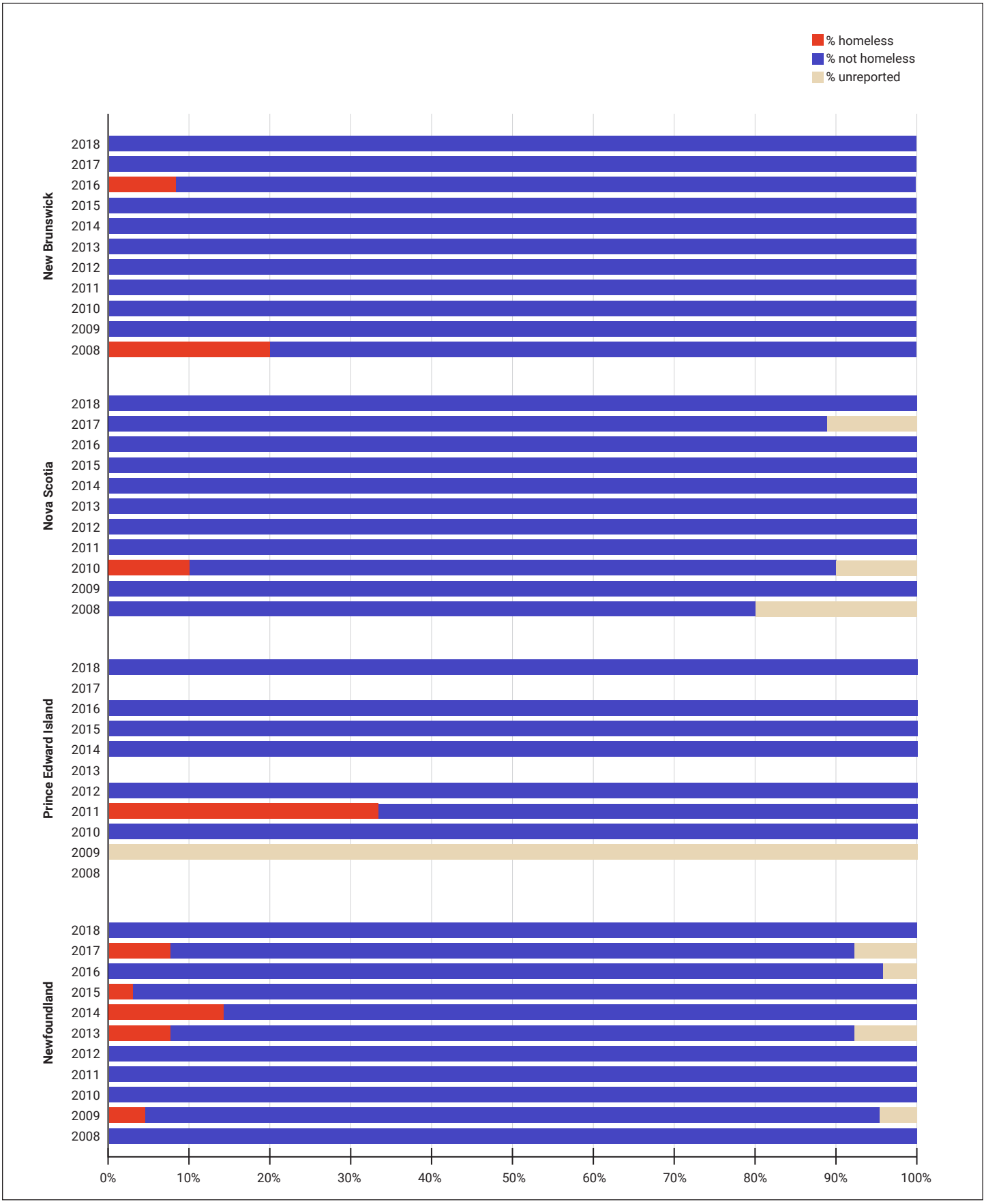


Figure 29A (Northern Territories): Reporting rate (%) of residency in correctional setting within 12 months prior to diagnosis across all jurisdictions and over time, CTBRS: 2008 – 2018

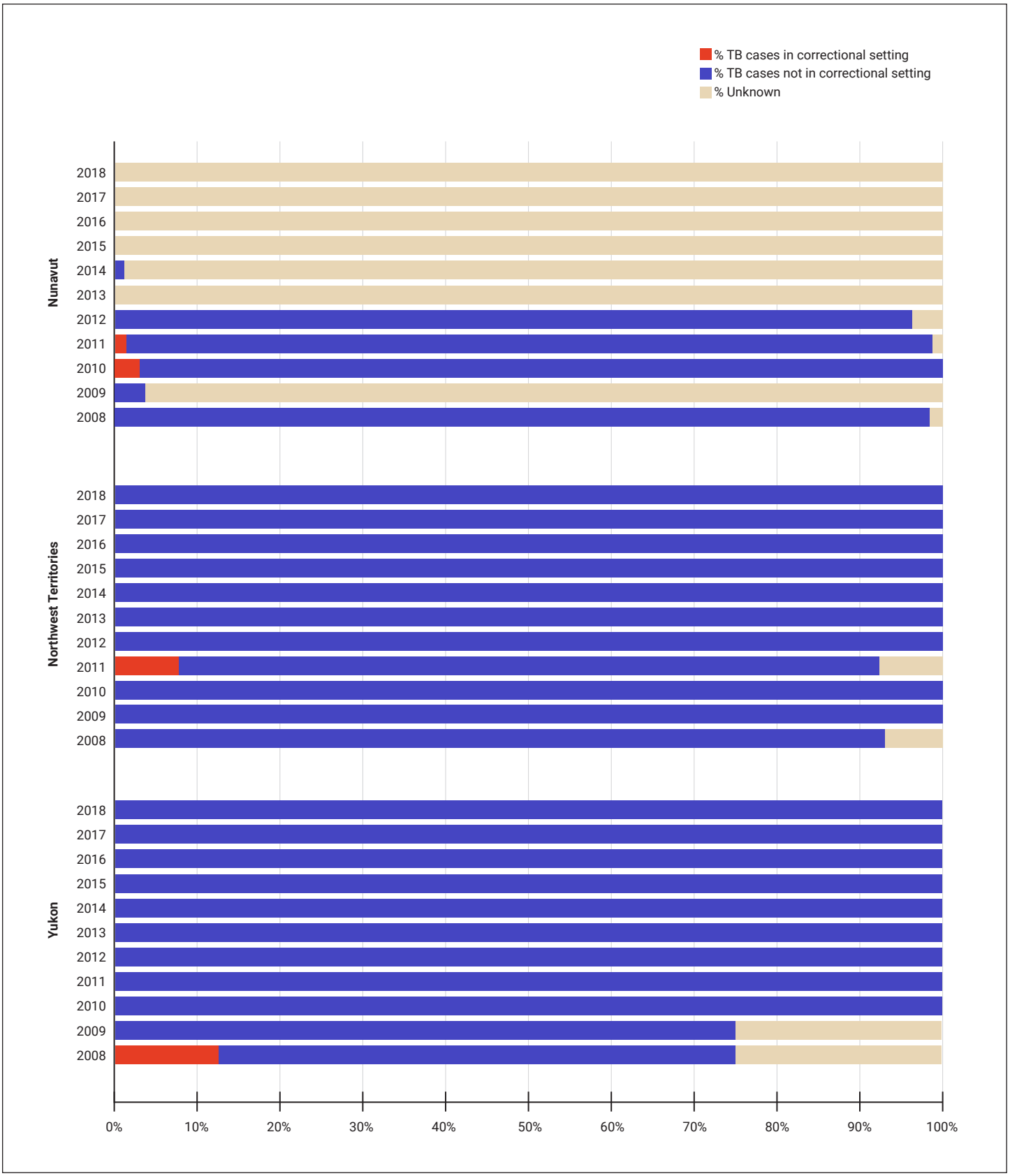


Figure 29B (Western Canada): Reporting rate (%) of residency in correctional setting within 12 months prior to diagnosis across all jurisdictions and over time, CTBRS: 2008 – 2018

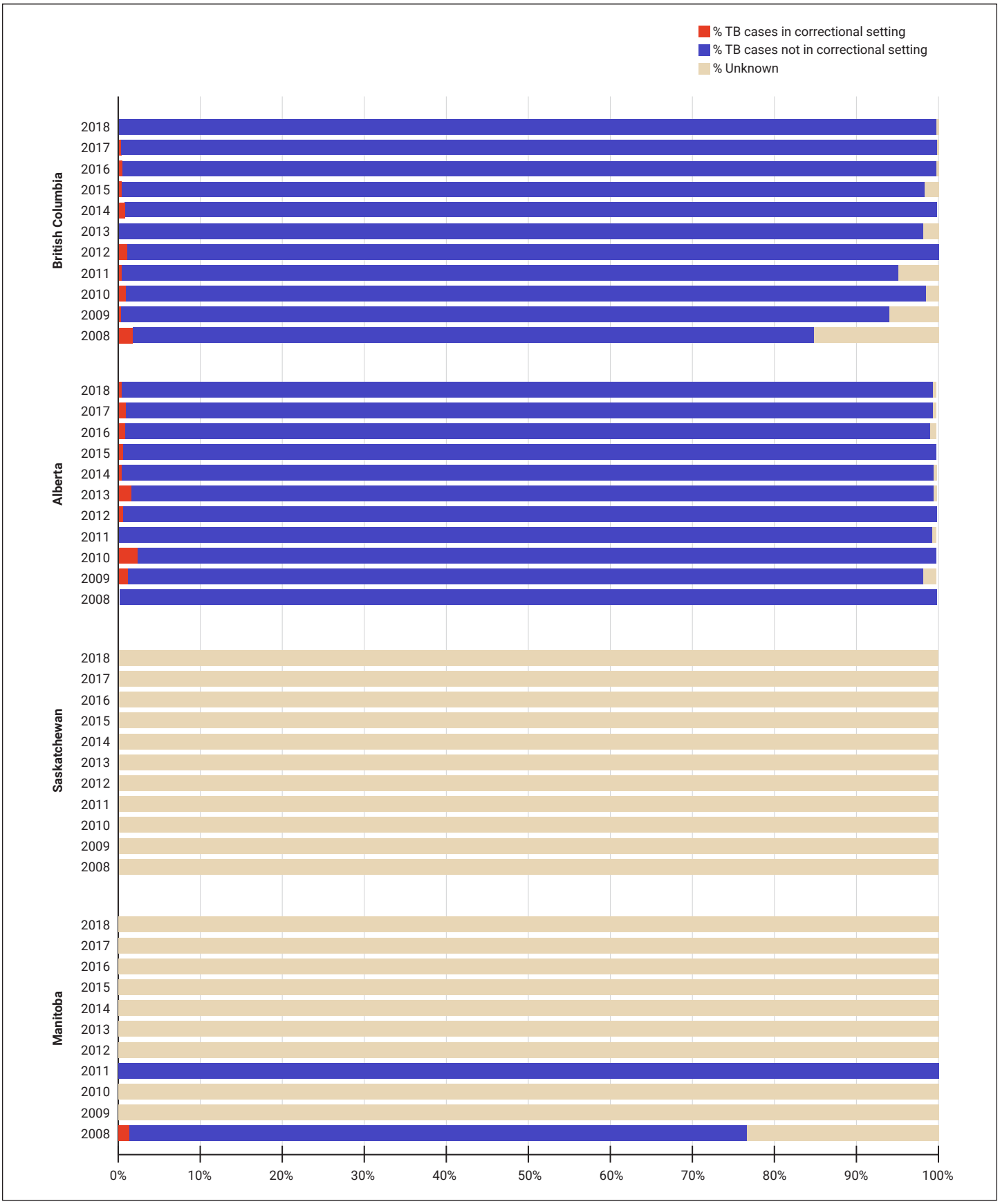


Figure 29C (Central Canada): Reporting rate (%) of residency in correctional setting within 12 months prior to diagnosis across all jurisdictions and over time, CTBRS: 2008 – 2018

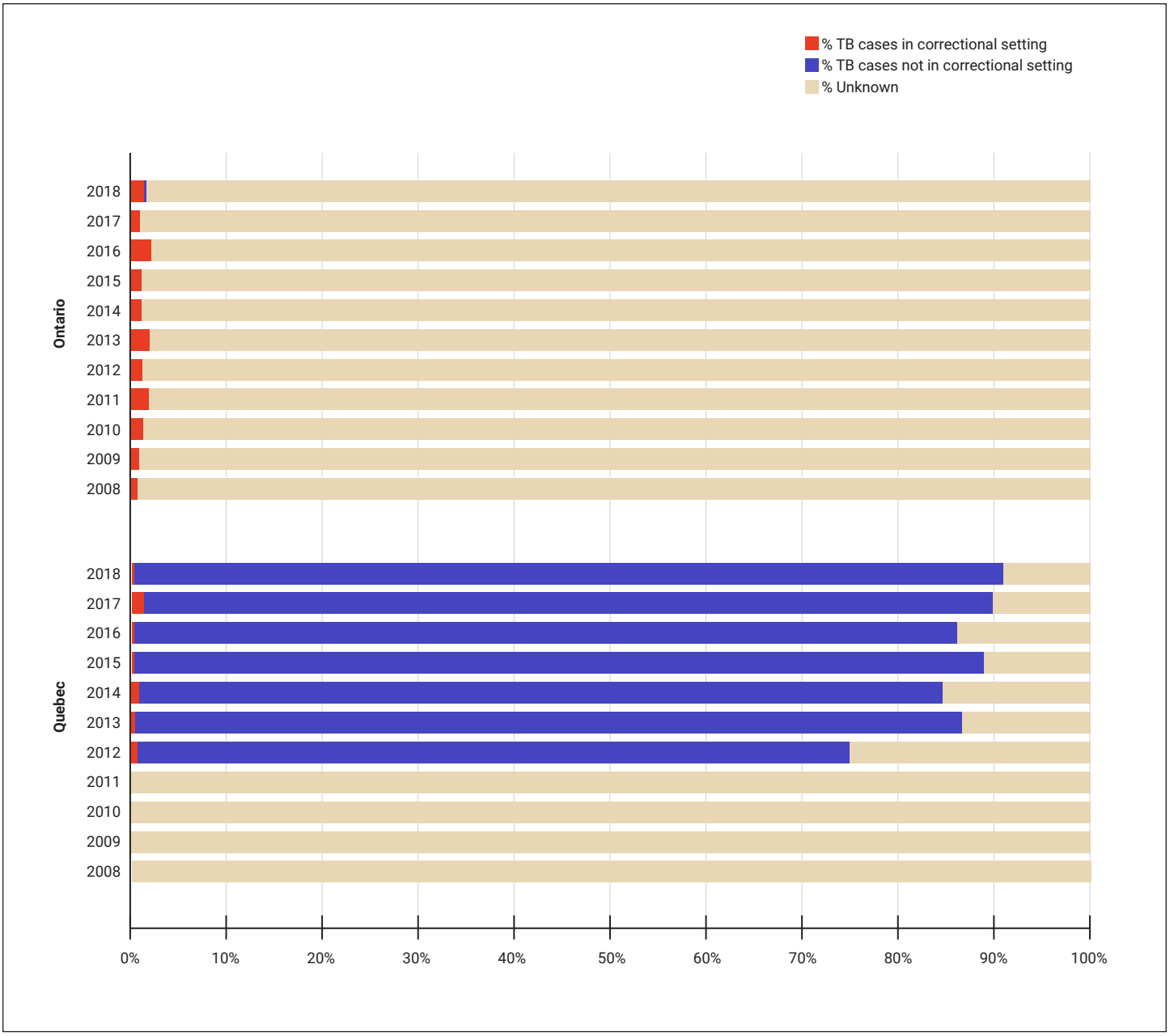


Figure 29D (Atlantic Canada): Reporting rate (%) of residency in correctional setting within 12 months prior to diagnosis across all jurisdictions and over time, CTBRS: 2008 – 2018

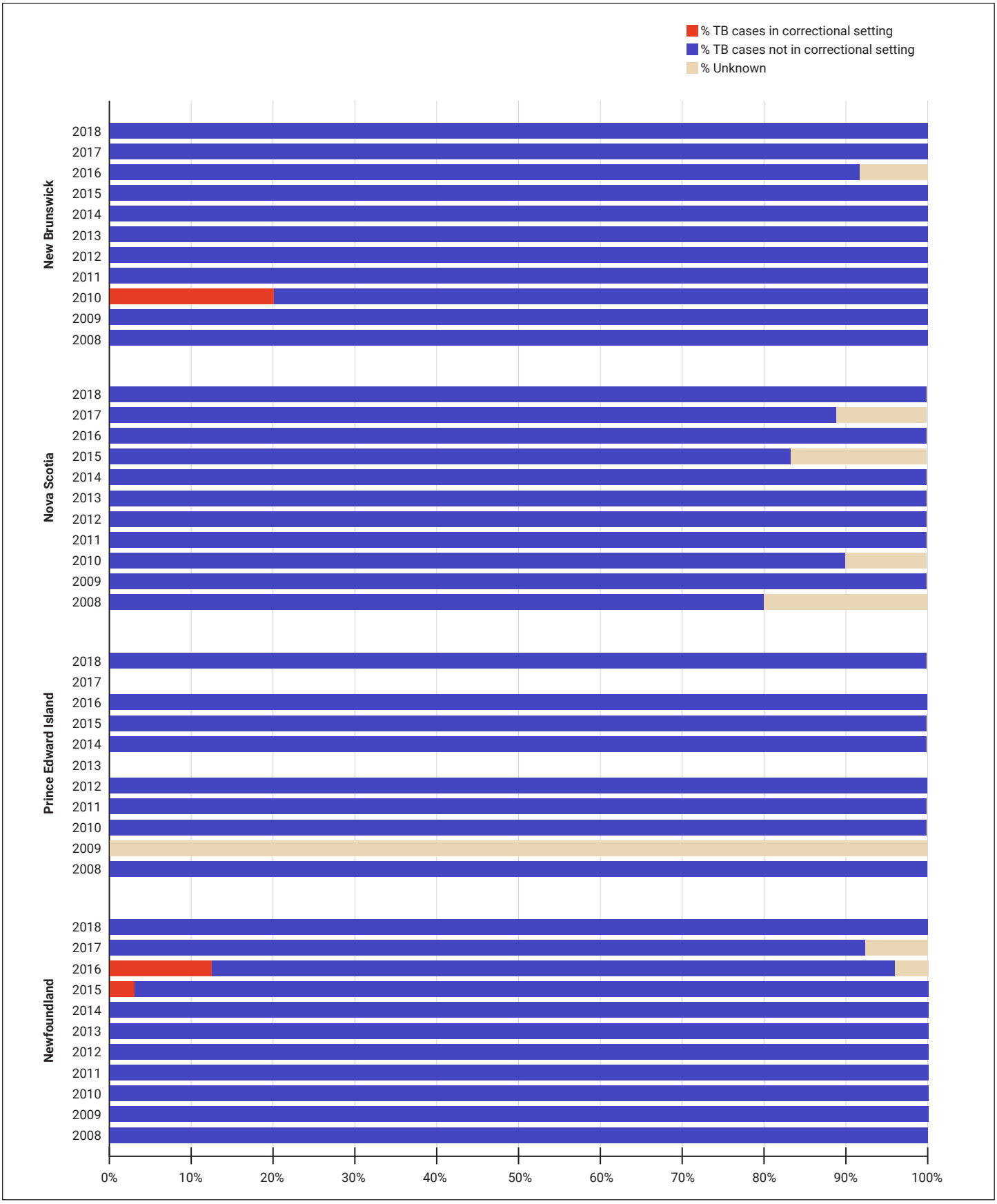


Figure 30A (Northern Territories): Reporting rate (%) of long-term corticosteroid use among incident active TB cases all jurisdictions, CTBRS: 2008 – 2018

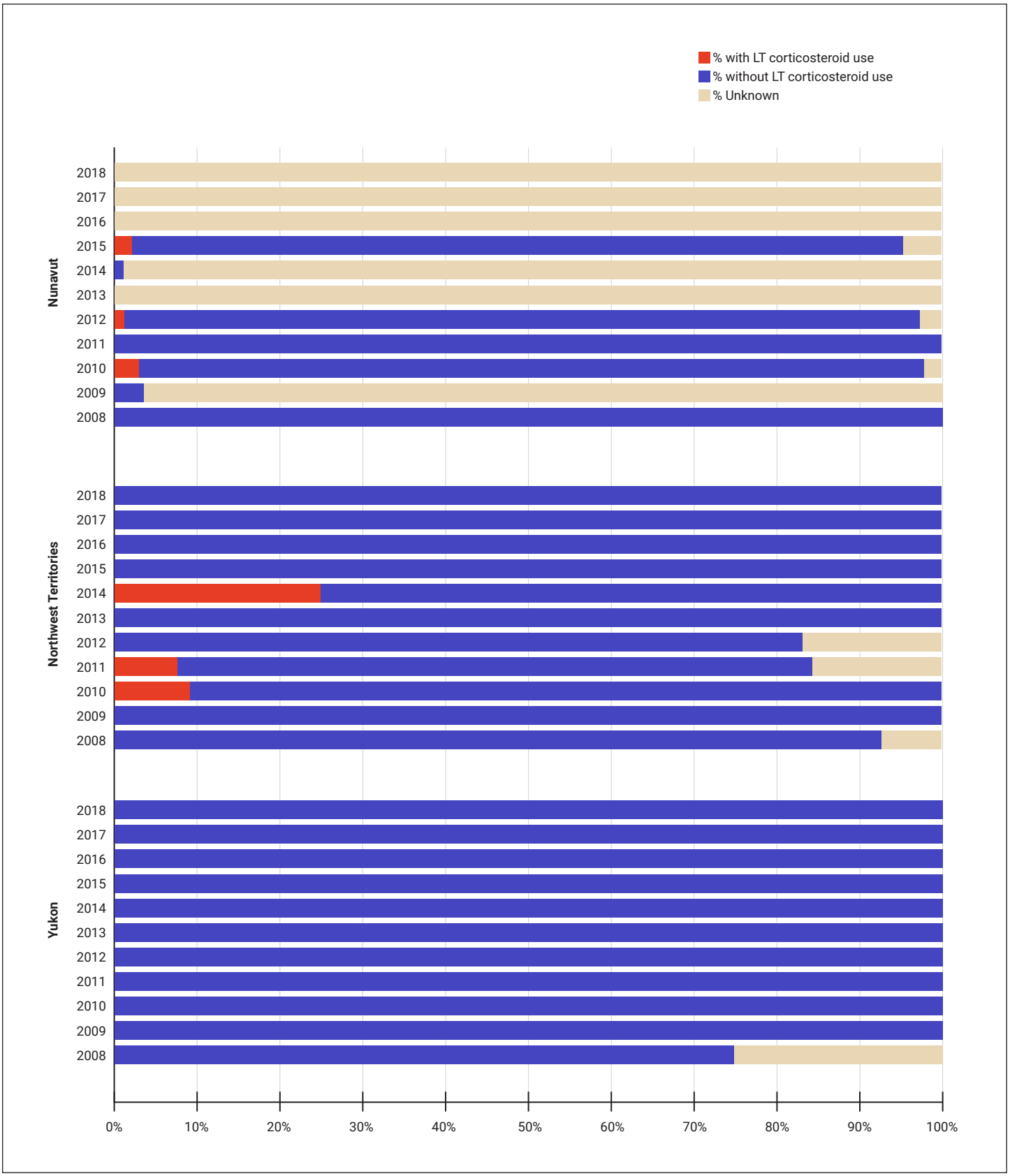


Figure 30B (Western Canada): Reporting rate (%) of long-term corticosteroid use among incident active TB cases all jurisdictions, CTBRS: 2008 – 2018

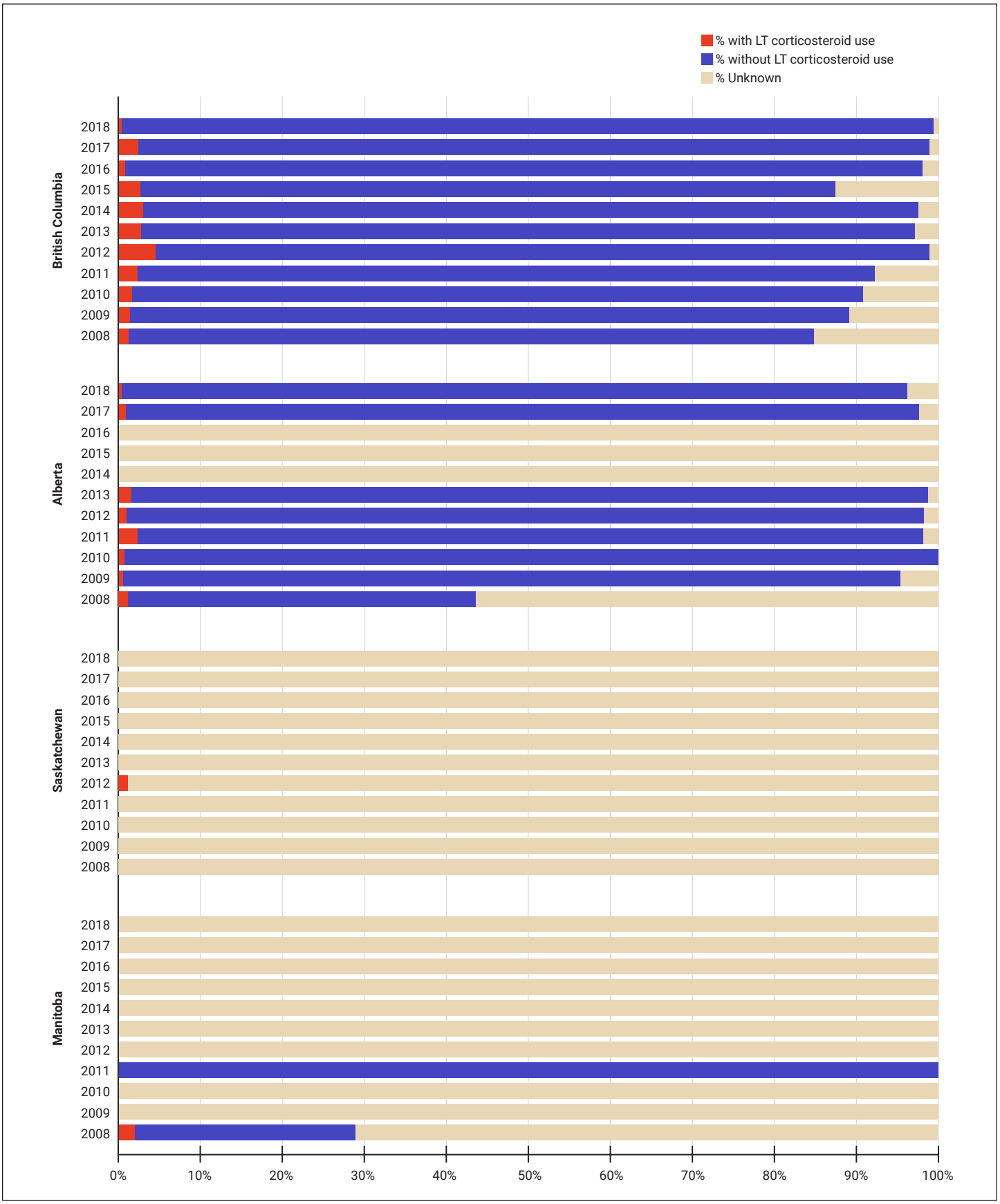


Figure 30C (Central Canada): Reporting rate (%) of long-term corticosteroid use among incident active TB cases all jurisdictions, CTBRS: 2008 – 2018

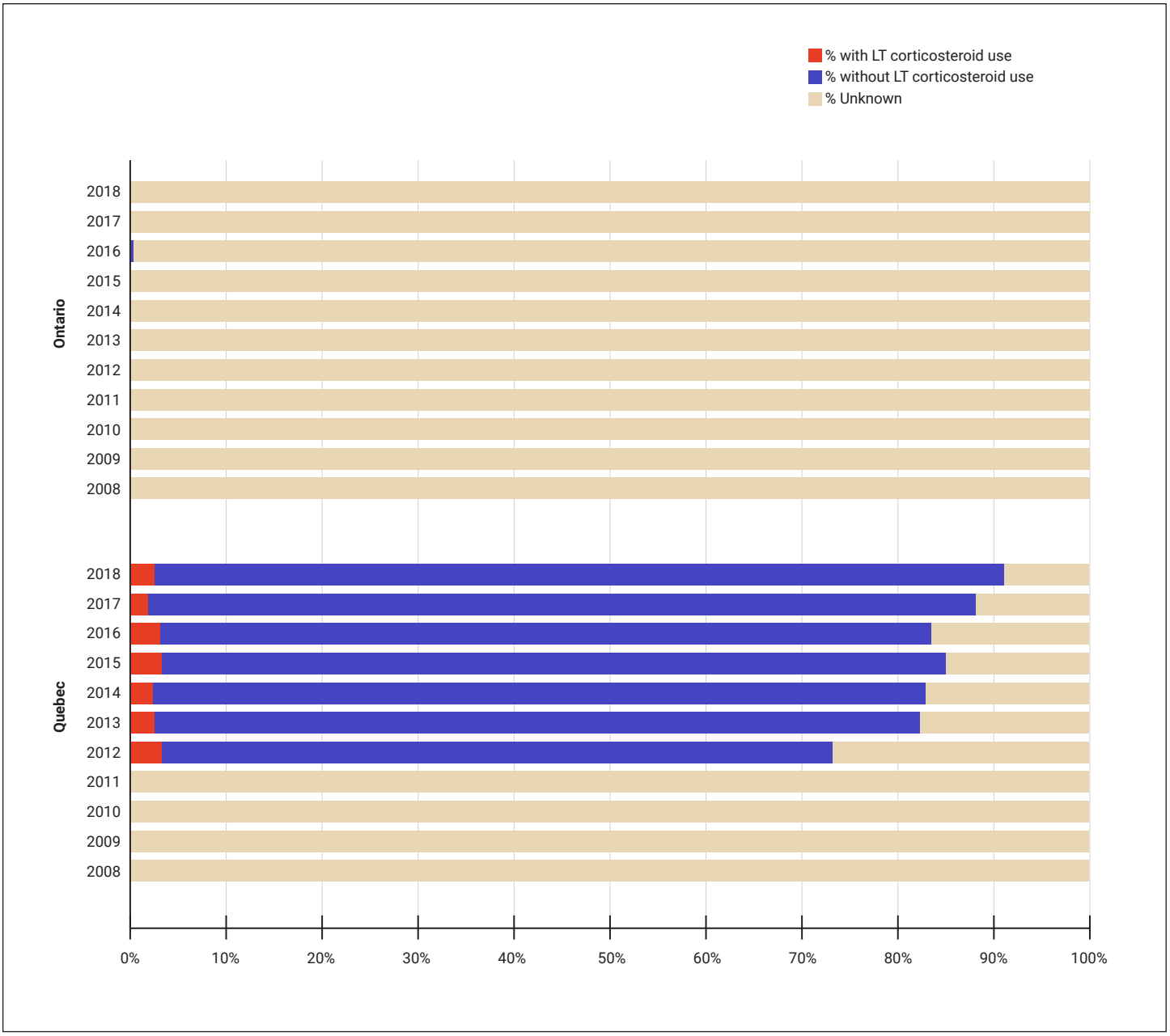


Figure 30D (Atlantic Canada): Reporting rate (%) of long-term corticosteroid use among incident active TB cases all jurisdictions, CTBRS: 2008 – 2018

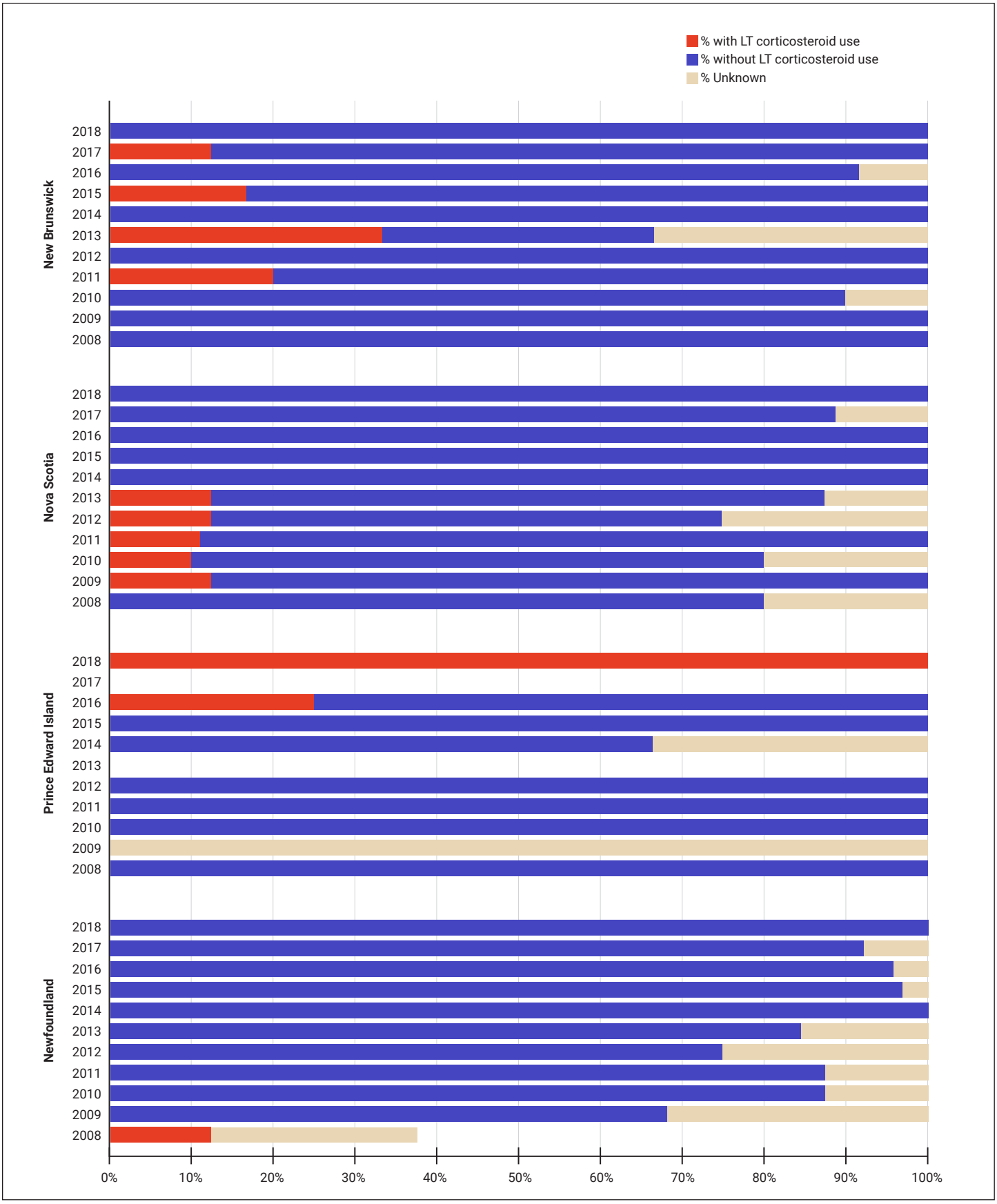


Figure 31A (Northern Territories): Rate (%) of reporting contact with active TB within two years preceding diagnosis, CTBRS: 2008 – 2018

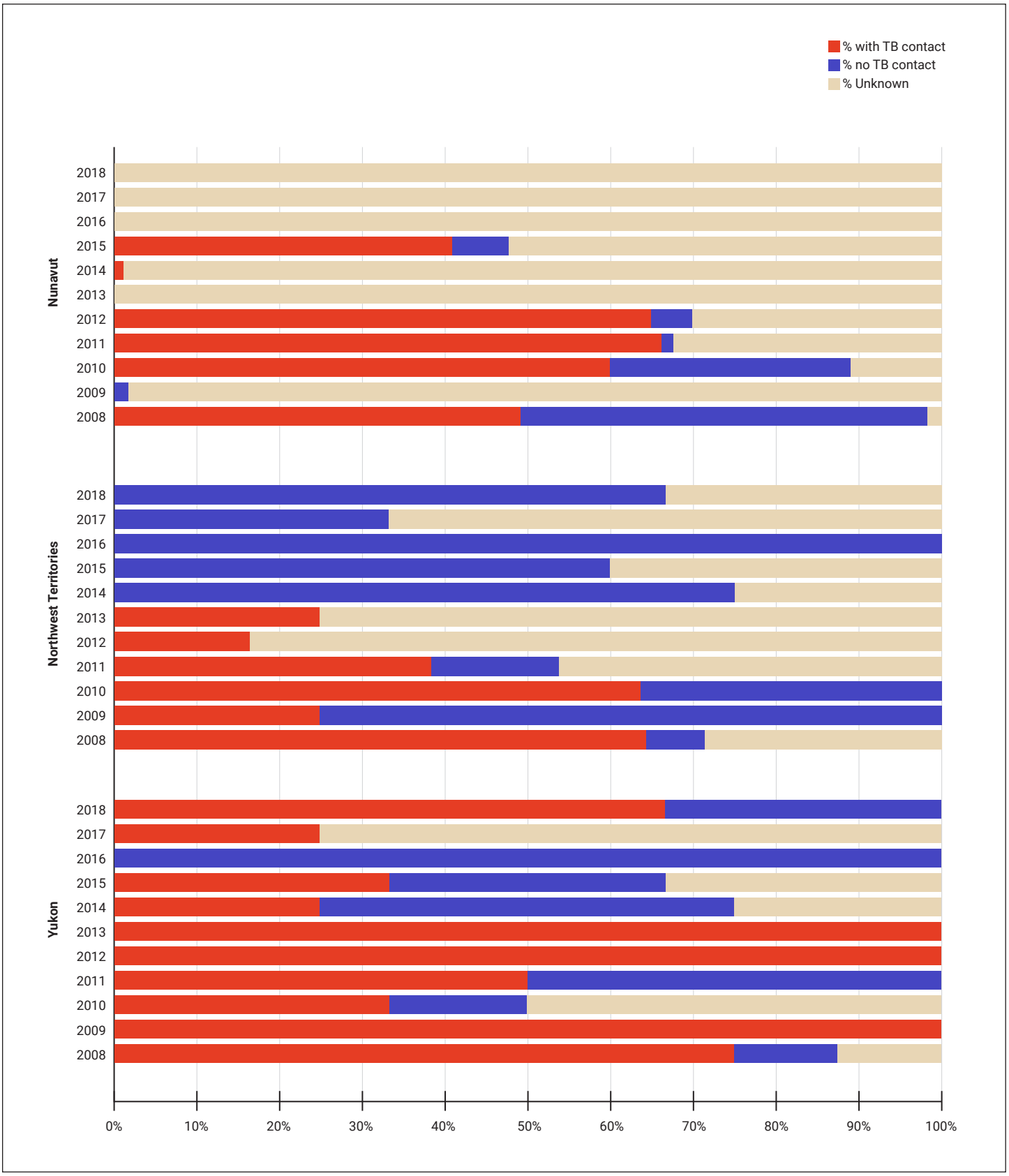


Figure 31B (Western Canada): Rate (%) of reporting contact with active TB within two years preceding diagnosis, CTBRS: 2008 – 2018

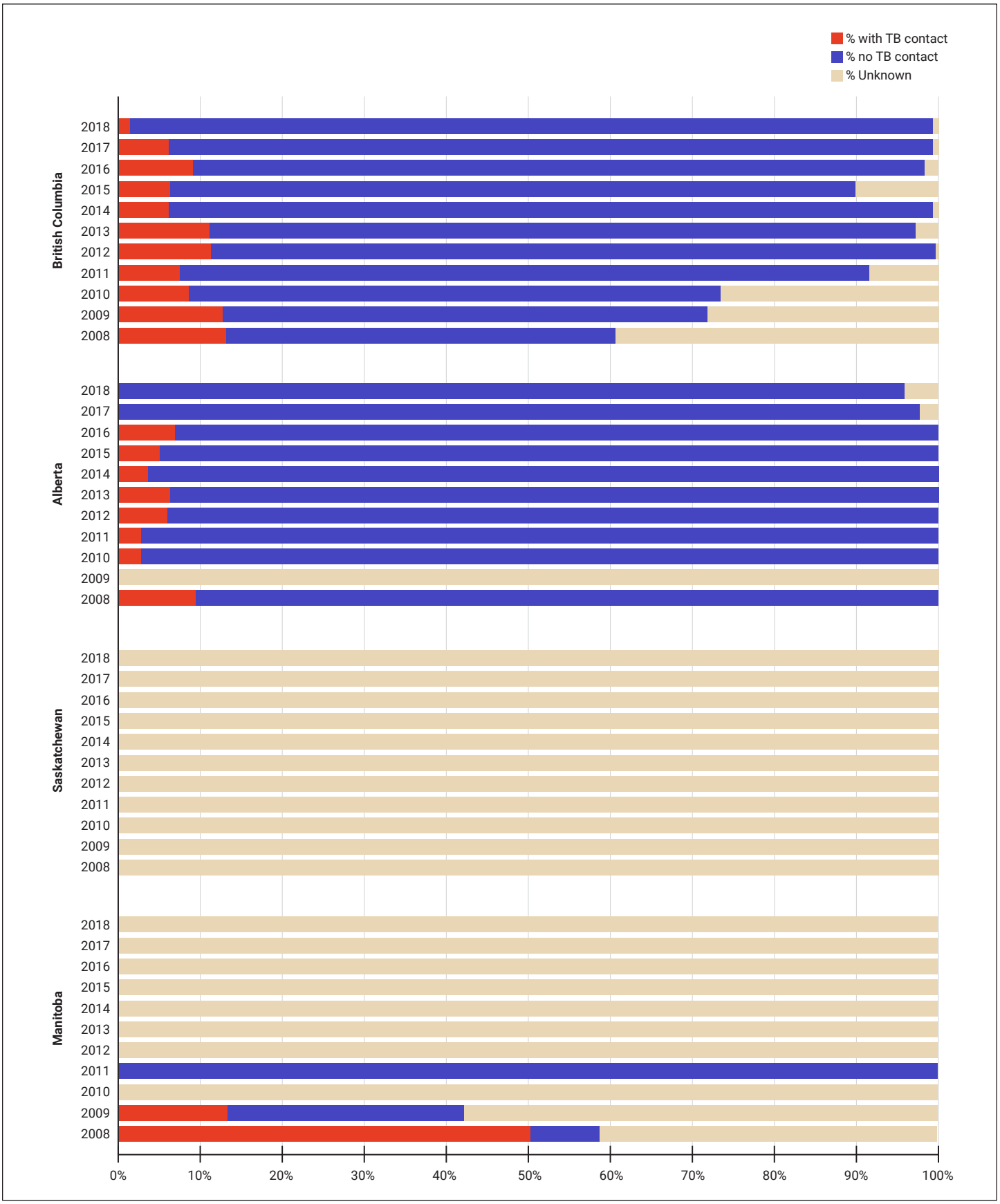


Figure 31c (Central Canada): Rate (%) of reporting contact with active TB within two years preceding diagnosis, CTBRS: 2008 – 2018

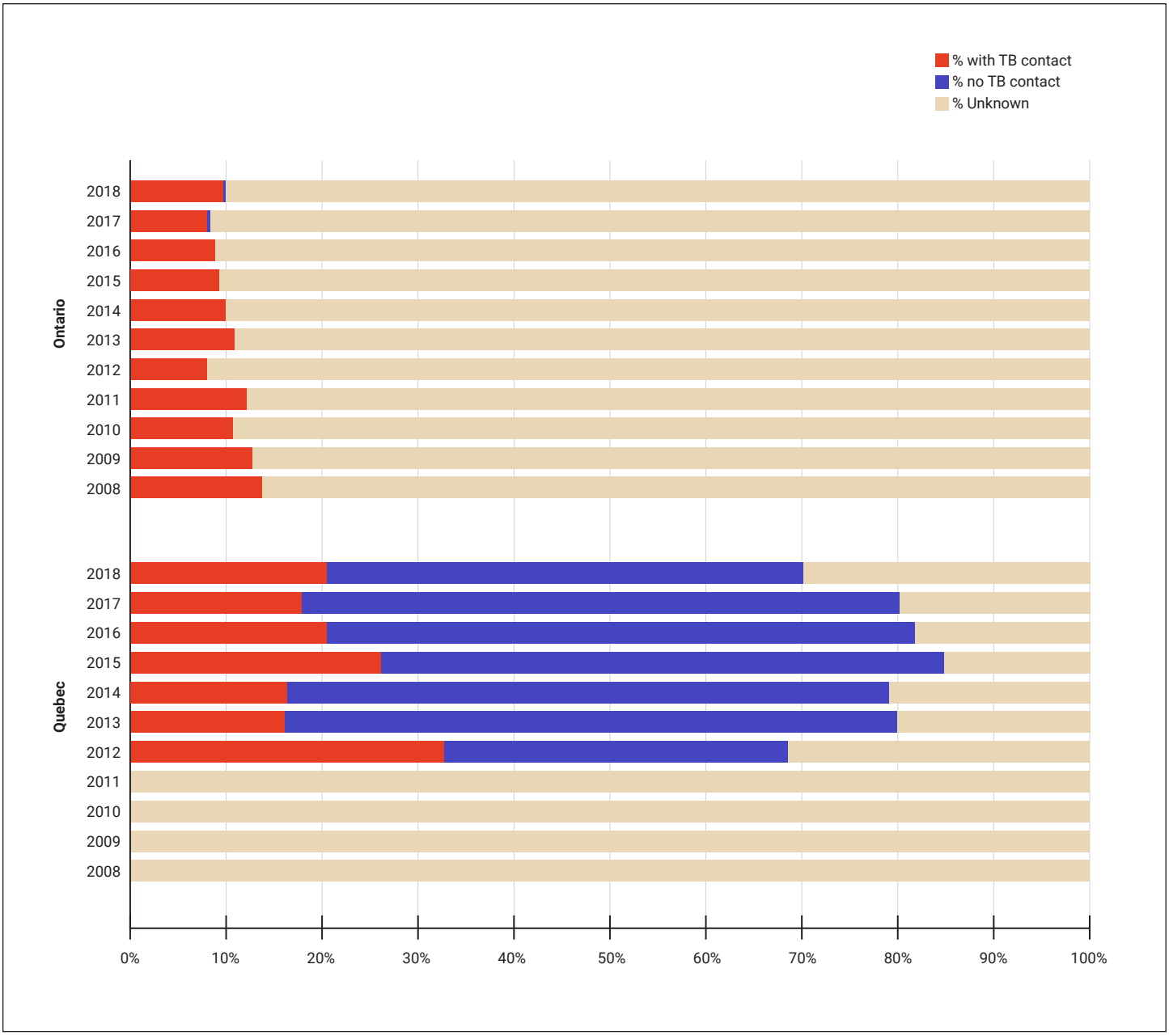


Figure 31d (Atlantic Canada): Rate (%) of reporting contact with active TB within two years preceding diagnosis, CTBRS: 2008 – 2018

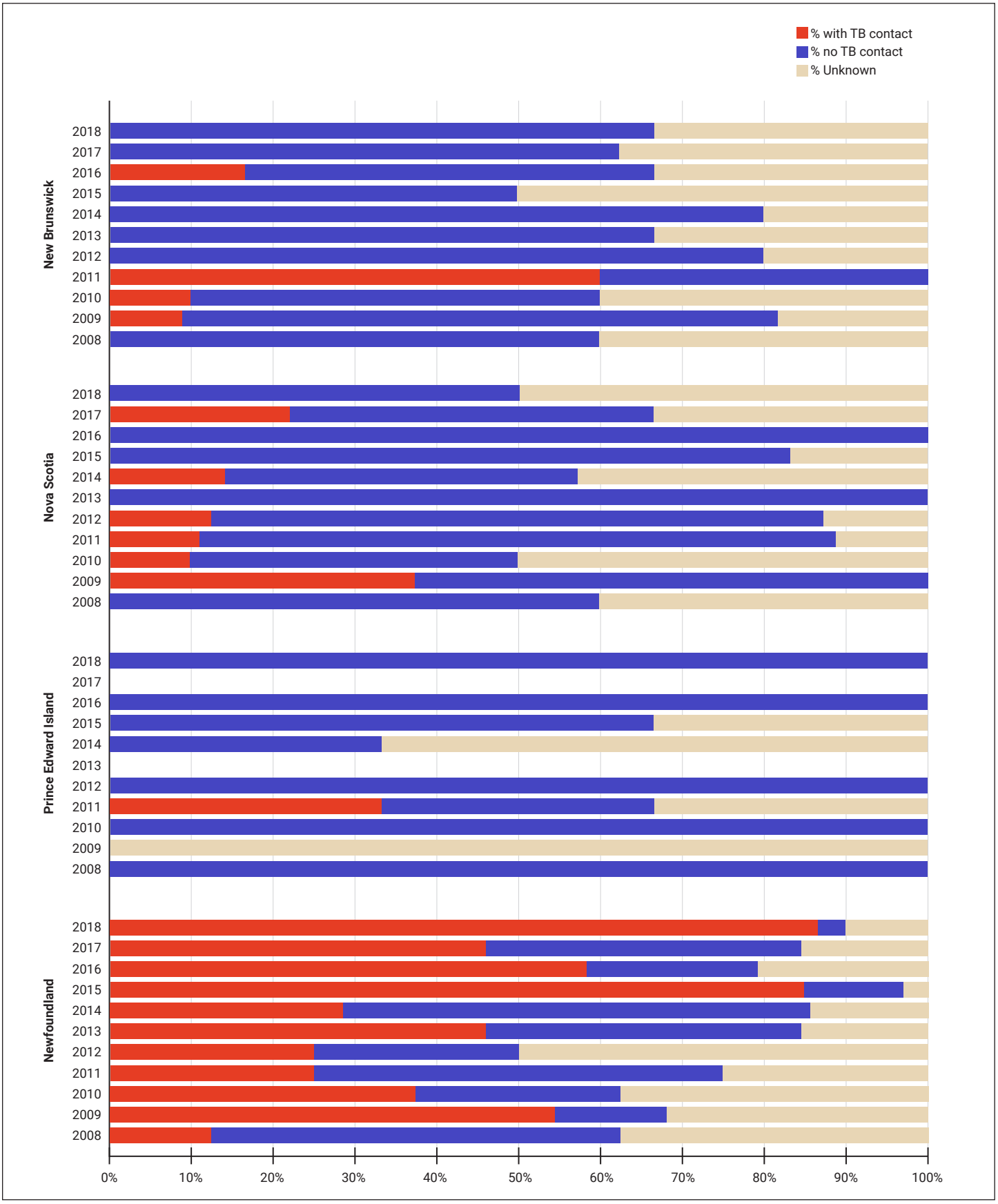


Table 32A (Northern Territories): Rate (%) of reporting non-prescription substance abuse among incident active TB cases, CTBRS: 2008 – 2018

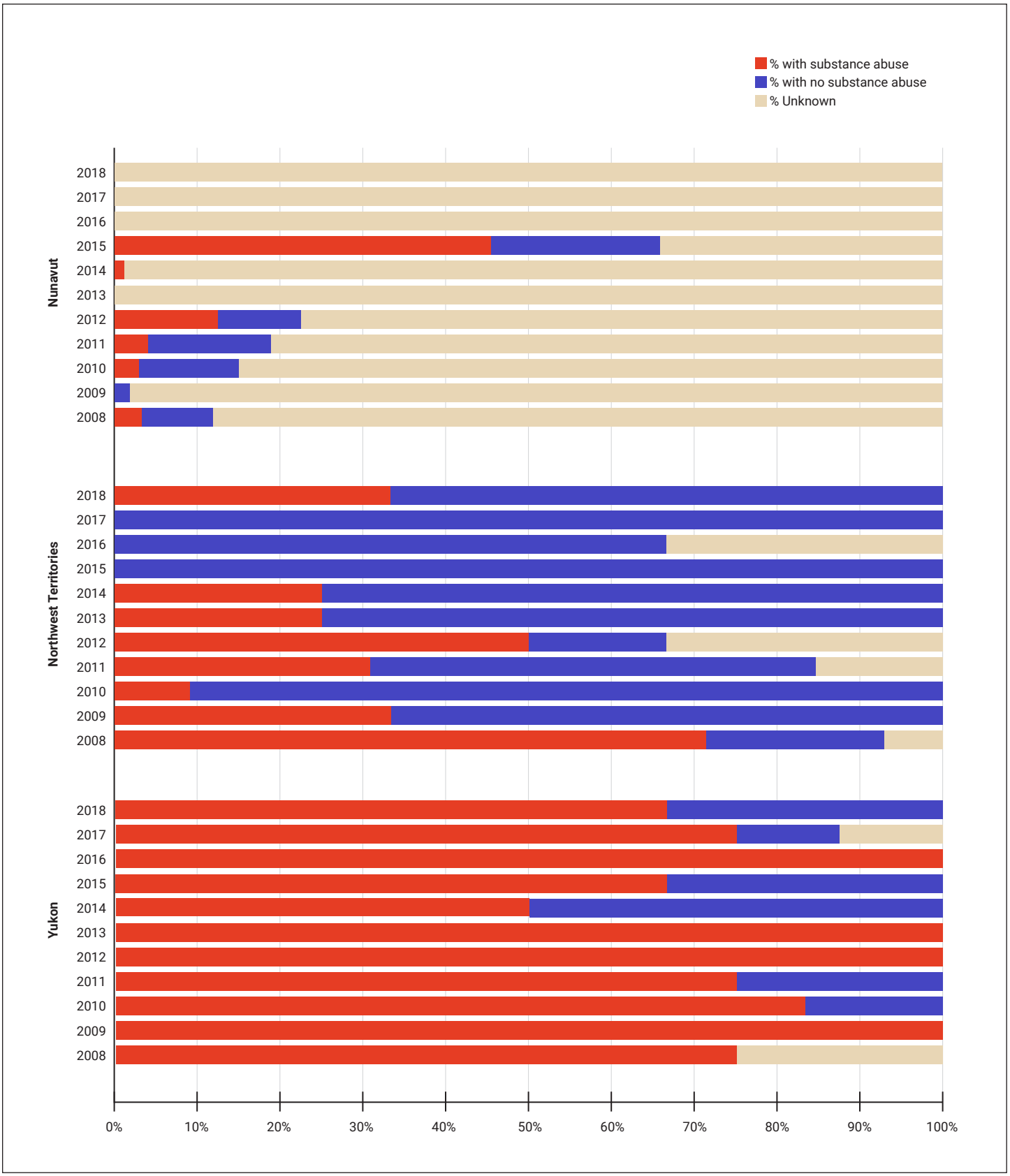


Table 32B (Western Canada): Rate (%) of reporting non-prescription substance abuse among incident active TB cases, CTBRS: 2008 – 2018

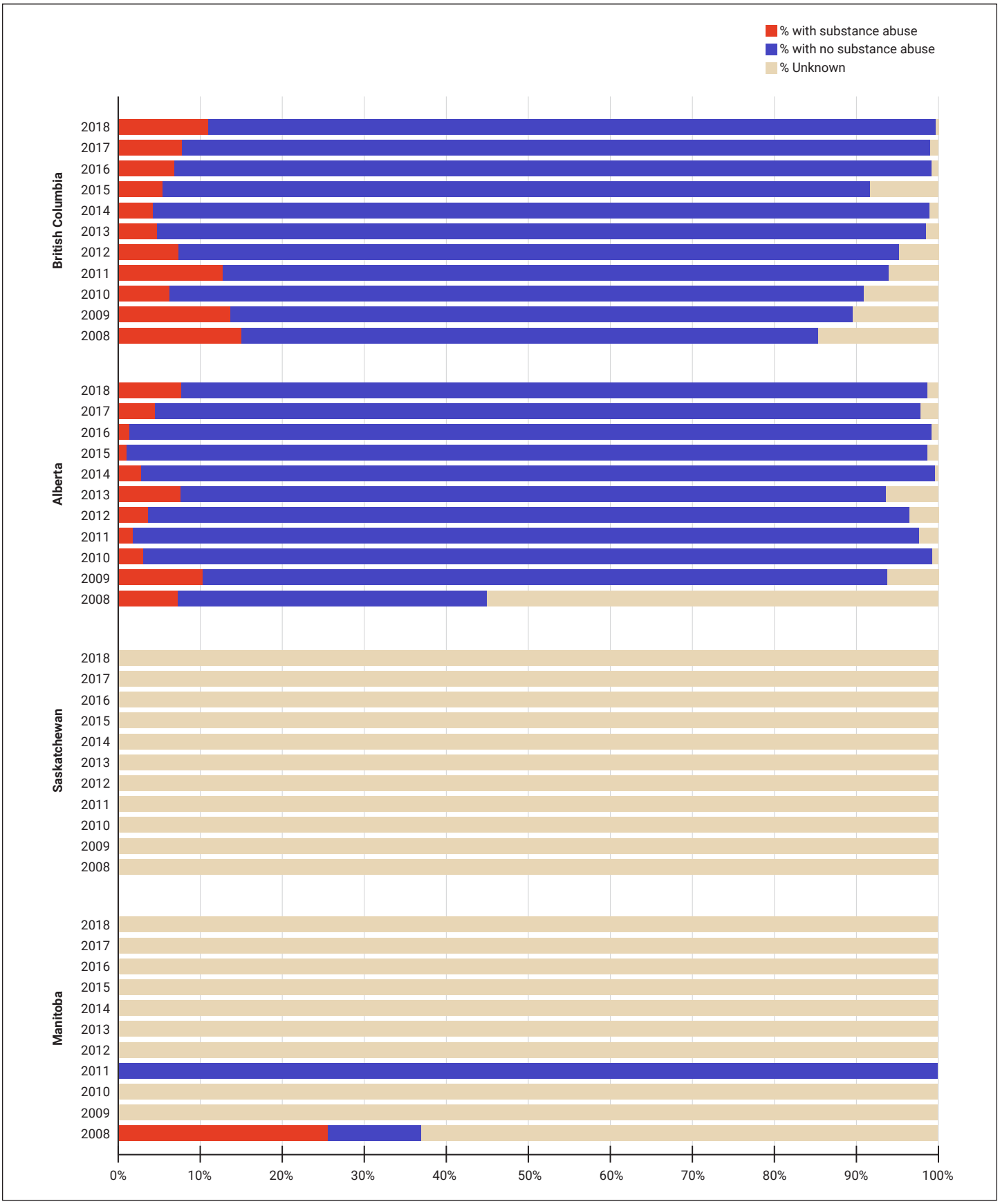


Table 32C (Central Canada): Rate (%) of reporting non-prescription substance abuse among incident active TB cases, CTBRS: 2008 – 2018

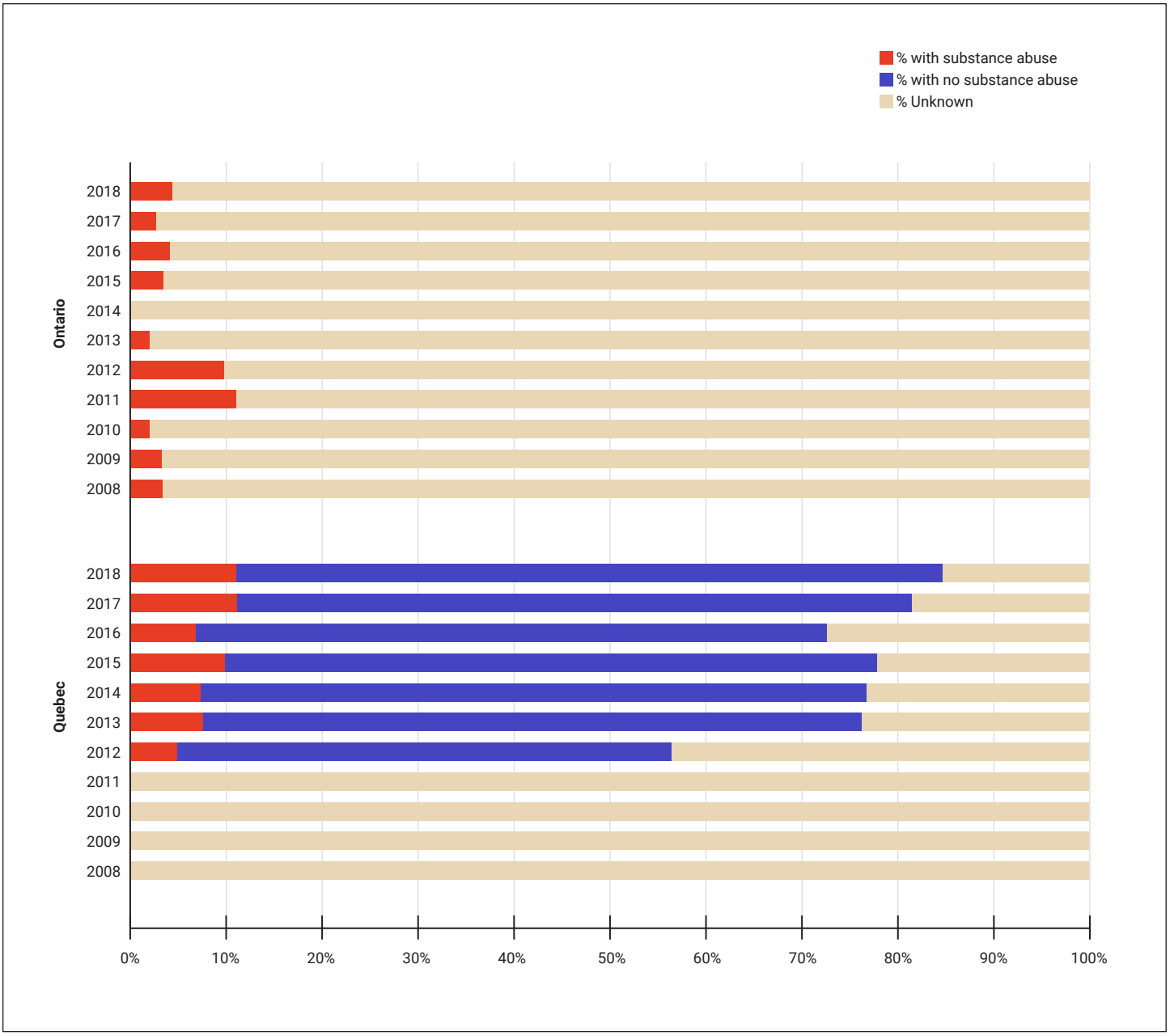


Table 32D (Atlantic Canada): Rate (%) of reporting non-prescription substance abuse among incident active TB cases, CTBRS: 2008 – 2018

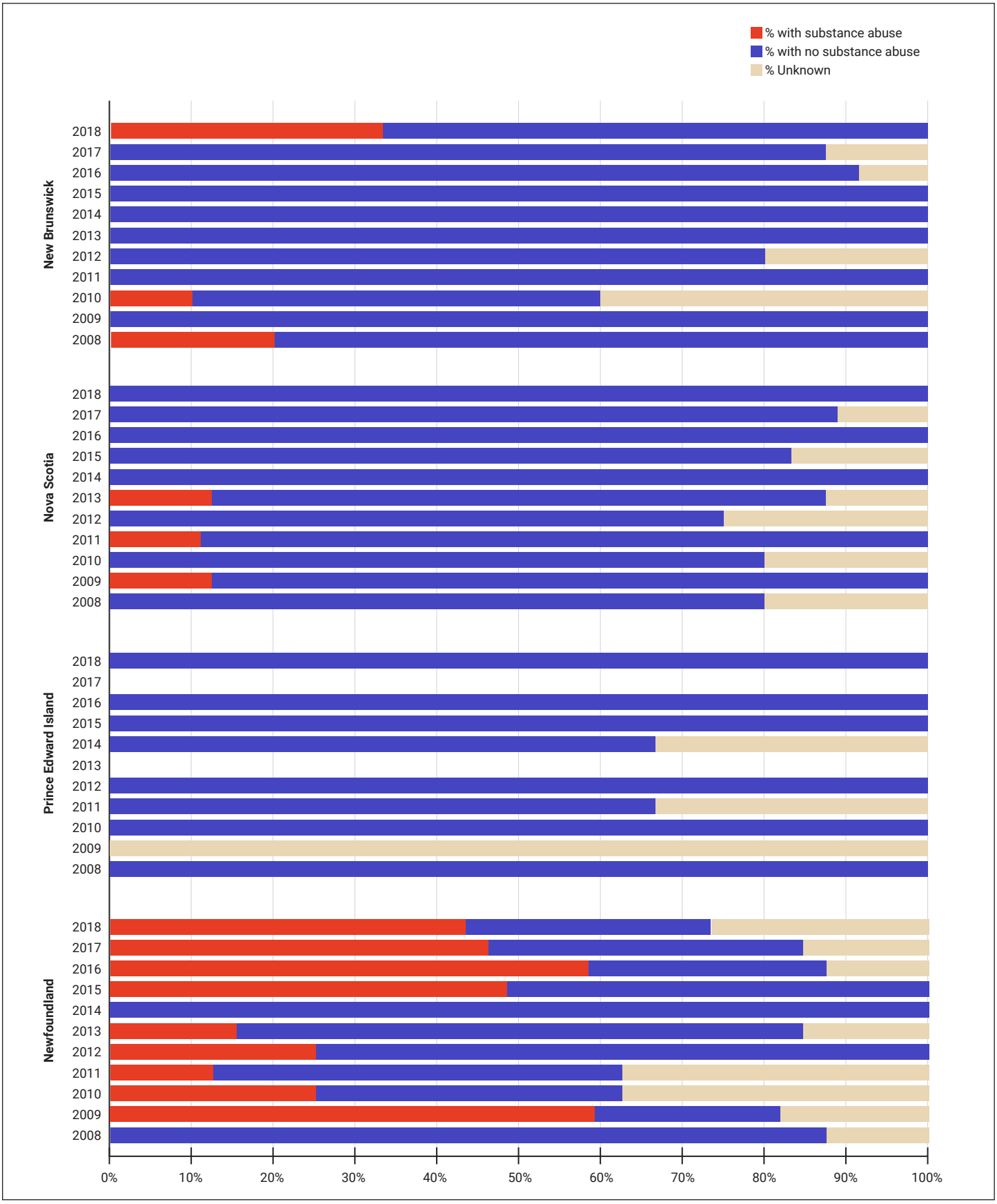


Figure 33A (Northern Territories): Rate (%) of reporting travel to high TB incidence country by incident active TB cases, CTBRS: 2008 – 2018

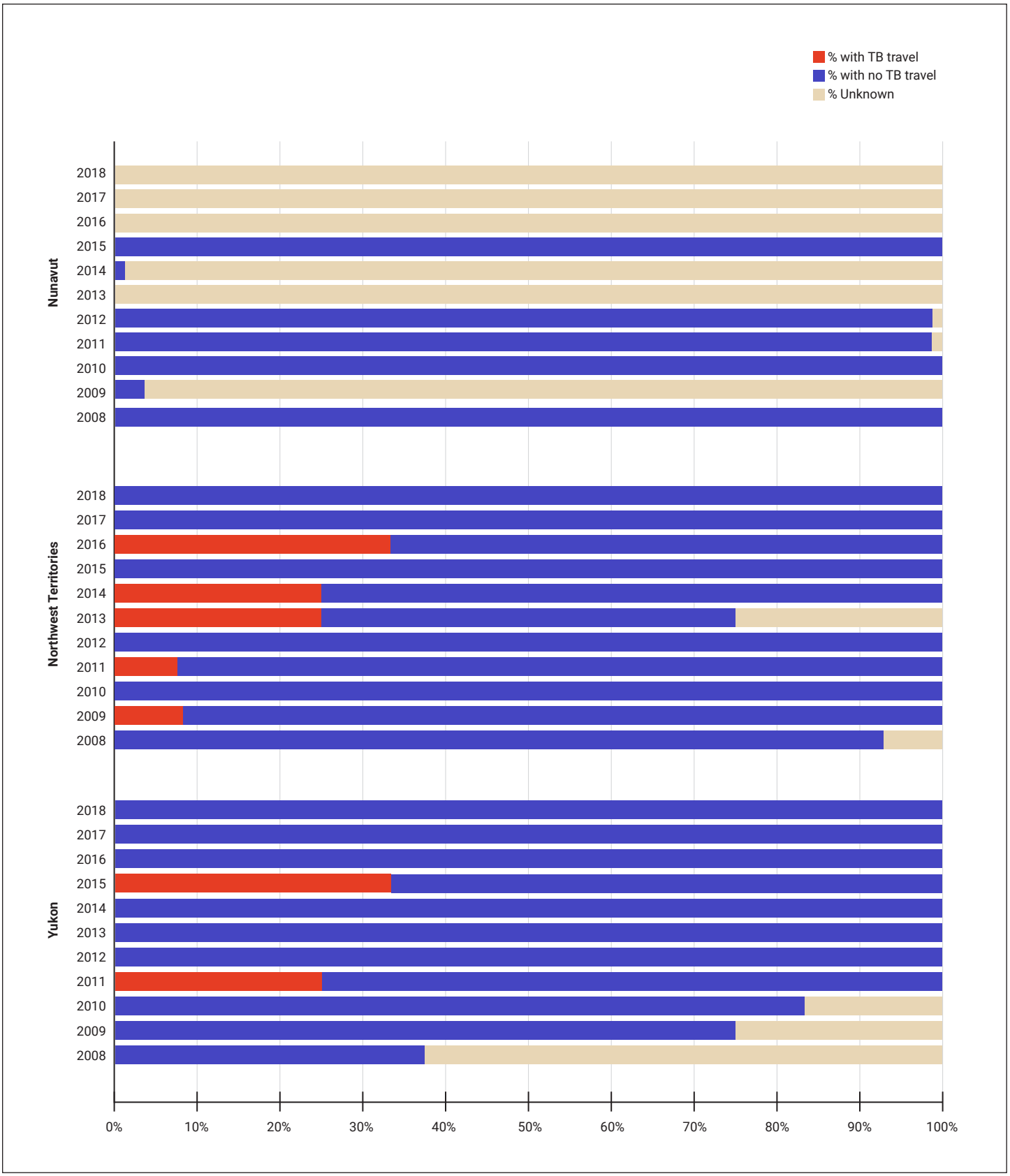
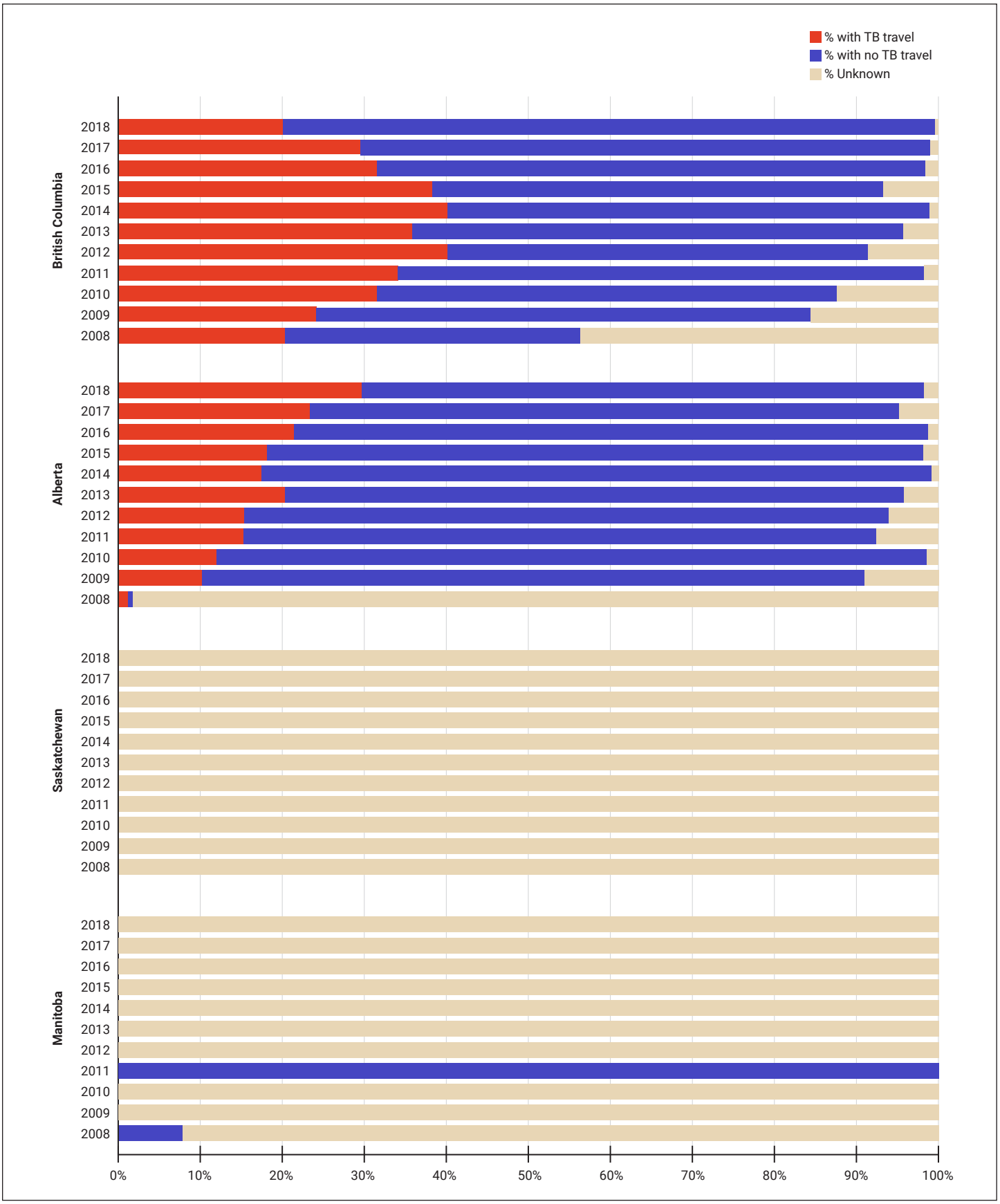


Figure 33B (Western Canada): Rate (%) of reporting travel to high TB incidence country by incident active TB cases, CTBRS: 2008 – 2018[29]



[29] Data from MB and SK have been unavailable respectively for nine and ten consecutive years.

Figure 33C (Central Canada): Rate (%) of reporting travel to high TB incidence country by incident active TB cases, CTBRS: 2008 – 2018

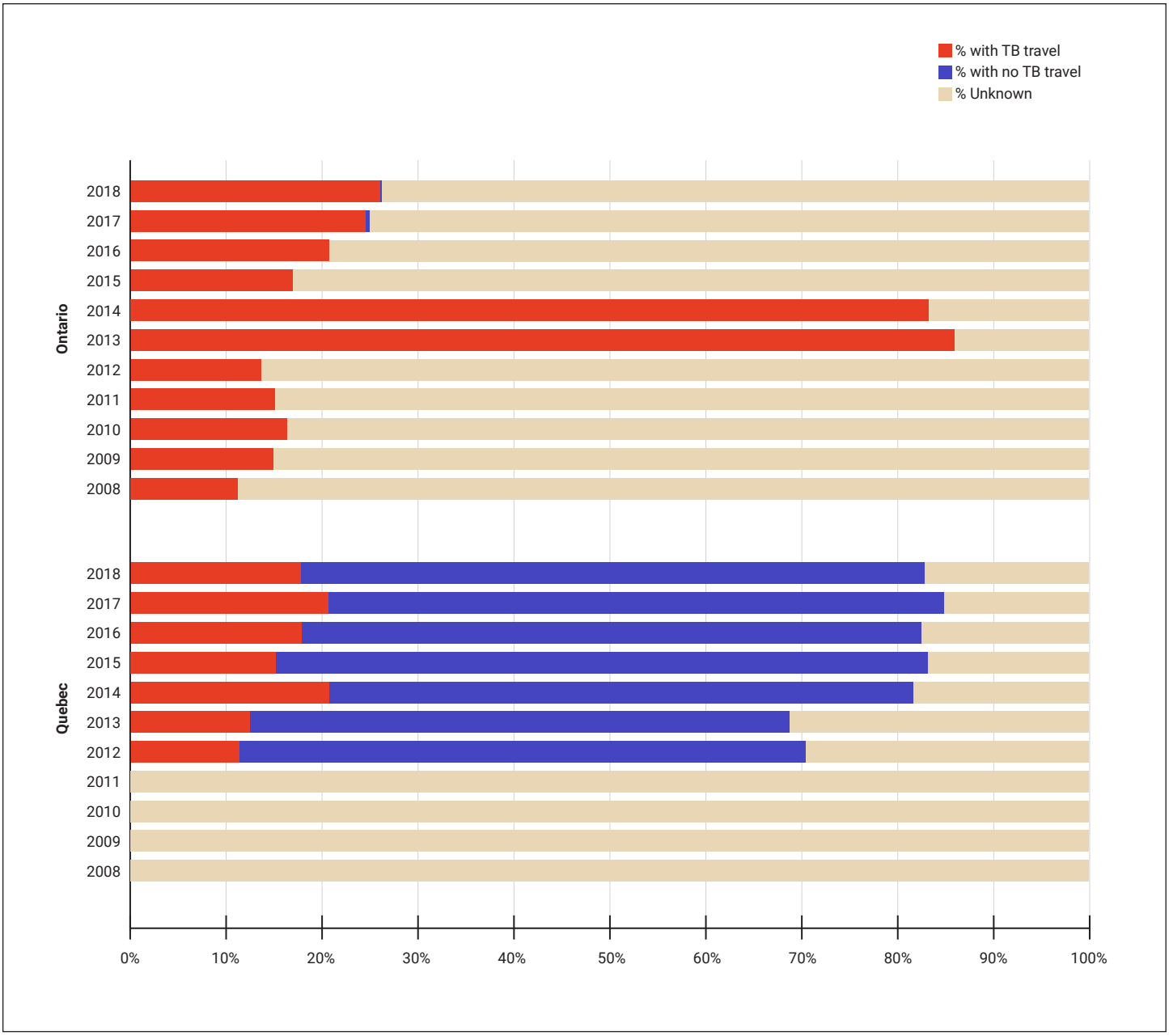
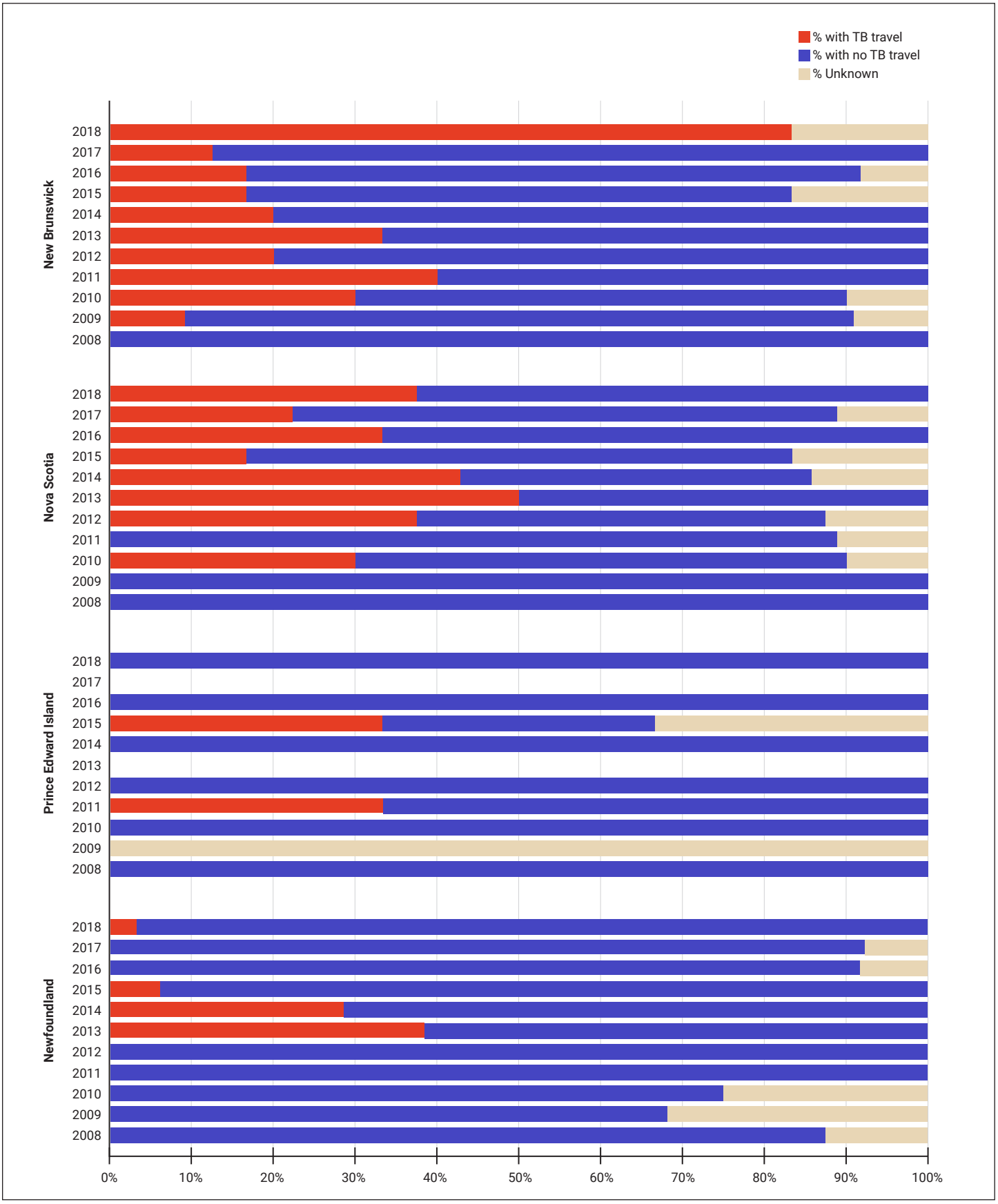


Figure 33D (Atlantic Canada): Rate (%) of reporting travel to high TB incidence country by incident active TB cases, CTBRS: 2008 – 2018



Appendix D: Member countries of each WHO epidemiological region

African Region				
Algeria	Comoros	Gambia	Mauritius Mozambique	Sierra Leone
Angola	Congo	Ghana	Namibia	South Africa
Benin	Cote d'Ivoire	Guinea	Niger	South Sudan
Botswana	Chad	Guinea-Bissau	Nigeria	Swaziland
Burundi	Democratic Republic of	Kenya	Sao Tome and Principe	Togo
Burkina Faso	the Congo	Liberia	Sénégal	Uganda
Cabo Verde	Equatorial Guinea	Madagascar	Rwanda	United Republic of
Cameroon	Ethiopia	Malawi	Seychelles	Tanzania
Central African Republic	Eritrea	Mali		Zimbabwe
	Gabon	Mauritania		Zambia

American Region				
Argentina	Canada	Ecuador	Jamaica	Suriname
Antigua and Barbuda	Chile	El Salvador	Mexico Nicaragua	Saint Kitts and Nevis Saint
Bahamas	Colombia	Grenada	Paraguay	Vincent & the Grenadines
Barbados	Costa Rica	Guatemala	Panama	Trinidad and Tobago
Belize	Cuba	Guyana	Peru	United States of America
Bolivia	Dominica	Haïti	Saint Lucia	Uruguay
Brazil	Dominican Republic	Honduras		Venezuela

Eastern Mediterranean Region (EMR)				
Afghanistan	Iraq	Libya	Qatar	Syria
Bahrain	Jordan	Morocco	Saudi Arabia	Tunisia
Djibouti	Kuwait	Oman	Somalia	United Arab Emirates
Egypt	Lebanon	Pakistan	Sudan	Yemen
Iran				

European Region (EUR)				
Albania	Czech Republic	Italy	Poland	Spain
Andorra	Denmark	Latvia	Portugal	Sweden
Armenia	Estonia	Kazakhstan	Republic of Moldova	Switzerland
Austria	France	Kyrgyzstan	Romania	Tajikistan
Azerbaijan	Finland	Lithuania	Russian Federation	The former Yugoslav
Belarus	Germany	Luxembourg	San Marino	Republic of Macedonia
Belgium	Georgia	Malta	Serbia	Turkey
Bosnia and Herzegovina	Greece	Monaco	Slovakia	Turkmenistan
Bulgaria	Hungary	Montenegro	Slovenia	Ukraine
Croatia	Iceland	Netherlands		United Kingdom
Cyprus	Ireland	Norway		Uzbekistan
	Israel			

South East Asia Region (SEAR)				
Bangladesh	Bhutan	Nepal	India	Democratic People's
Maldives	Myanmar	Sri Lanka	Thailand	Republic of Korea
Timor-Leste	Indonesia			(NORTH)

Western Pacific Region (WPR)				
Australia	Kiribati	Mongolia	Papua New Guinea	Samoa
Brunei Darussalam	Lao Peoples Democratic	Nauru	Republic of Korea	Solomon Islands
Cambodia	Republic	New Zealand	(SOUTH)	Tonga
China	Malaysia	Niue	Philippines	Tuvalu
Cook	Marshall Islands	Palau		Vanuatu
Fiji Islands	Micronesia	Singapore		Vietnam
Japan				

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