

TB

TUBERCULOSIS CONTROL

2005 | 2006 | 2007 | 2008

ANNUAL REPORT



BC Centre for Disease Control

An agency of the Provincial Health Services Authority

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Foreword

This report presents selected statistical and epidemiological information referring to tuberculosis (TB) in the province of British Columbia derived from the activities of the Division of Tuberculosis Control, BC Centre for Disease Control for the calendar years 2005–2008.



On October 21st 2003 a new clinical TB module was introduced allowing the division to go largely paperless. The module is contained within the integrated Public Health Information System (iPHIS). In April 2003 the module was introduced in the Yukon and is available

for read only access for most health units throughout the province.

The information contained in this report is wholly derived from statistics contained in iPHIS maintained in the Division of Tuberculosis Control. Although tuberculosis is a notifiable disease, the Division of Tuberculosis Control is informed of cases from several sources including directly from the Provincial Laboratory Services of the BC Centre for Disease Control and through Pharmacy Services of BC Centre for Disease Control which is responsible for dispensing all anti-tuberculosis medication throughout the province. These additional reporting mechanisms help to ensure the Division of Tuberculosis Control is advised of all active and suspect tuberculosis treated in the province of British Columbia. The 2005–08 Annual Report is offered with high degree of confidence in its accuracy.

The care of Aboriginal peoples on reserve is administered by the Federal Government through First Nations and Inuit Health (FNIH) who contract with the Division of Tuberculosis Control for this service. All Aboriginal peoples living off reserve are the responsibility of the provincial Ministry of Health Services.

For this report the term 'Aboriginal peoples' is a collective name used to describe Status and non-Status North American Indians (commonly known

as First Nations), Métis (mixed First Nations and European ancestry), and Inuit (of Arctic Canada) peoples. Although the term First Nations is widely used in Canada, Status and non-Status Indians are the legally defined terms recognized by the Department of Indian and Northern Affairs. A reserve has been defined as a tract of land set apart for use and benefit by and Indian Band.

The 2005–08 Annual Report includes details of in-patient treatment of tuberculosis patients which is not directly administered by the Division of Tuberculosis Control. The care of these patients is carried out in a TB unit specifically dedicated to the care of patients with TB, located in the Vancouver General Hospital and Health Sciences Centre and run by the Division of Respiratory Medicine.

TB cases diagnosed between January 1st, 2005 and December 31, 2008 for whom data were entered into the database up to April 2009 were included in the analysis. Incidence rates (IR) of TB in British Columbia as a whole and in each health region were calculated, as were age specific rates. Population figures were based on the information provided by Statistics Canada (Statistics Canada, Population section, BC Stats, Ministry of Finance and Corporate Relations). I am grateful for the assistance of Dr. Eduardo Hernandez, Claus Sorensen, Maria MacDougall, Ritinder Harry, Ms. Valerie Lee, Sunny Mak and Ms. Fay Hutton in the preparation of this report.

A handwritten signature in black ink that reads "Richard K. Elwood". The signature is written in a cursive, flowing style.

Dr. R.K. Elwood, MB, MRCP(UK), FRCPC
Provincial Director
Division of Tuberculosis Control

In 2005–08 there were 277,336,290 and 305 reported cases of tuberculosis in British Columbia (BC) providing a rate varying from 6.5–7.9 per 100,000 for an average rate of 7.1/100,000 over the 4 years of the report. The national rate for Canada for 2008 is 4.5/100,000 with an average rate of 4.85/100,000 over the last 4 years. BC remains above the national rate and in 2008 there were 1,490 cases reported in Canada.

Active cases:

Rates for various health regions vary across the province. High rates compared to the provincial figures persist for Vancouver Coastal (11.9), Richmond (11.6) and Fraser (7.6) health service delivery areas, rates that exceed the provincial rate (7.1/100,000 population). All figures refer to the 4 year average.

The Downtown East Side rates remain consistently high although not at the rates seen in 2001 and 2002 when the rates were 85.5 and 64.2/100,000 respectively. The rates varied from a low of 29.4 in 2008 to a high of 46.3/100,000 in 2006. 2008 saw 25% reduction in rates.

A substantial outbreak occurred in the Central Vancouver Island HSDA, primarily centred around the city of Port Alberni, over the span of this report. Rates went from 3.2/100,000 in 2005 to 41.8 in 2006 and '07 with a fall to 35.5/100,000 in 2008. This represented 38 cases of active disease diagnosed over 4 years. A similar outbreak has recently occurred in the Okanagan.

The median age of cases was 48 years. The rate was higher in men than women (7.7 vs 6.4) overall, but higher in women compared to men in individuals aged 15–34 years old. In individuals ≥ 60 years the rate of tuberculosis was considerably higher in men than in women.

Rates of tuberculosis among Aboriginal peoples living on and off reserve rose from 23.3/100,000 in 2005 to 34.2 in 2008. Aboriginal peoples living

off reserve continue to have the highest incidence rate of tuberculosis among any group including the foreign born. With rates varying from 29.4 in 2005–48.0/100,000 in 2007. The rate in 2008 was 43.9/100,000. Of note, 2 Métis and 2 Inuit cases were included in the figures over the 4 year period.

The rate among the foreign born averaged 18.9/100,000 while the rate among the Canadian born non-Aboriginal people was 1.3/100,000 averaged over the 4 years. The top 6 countries of origin of the foreign born cases were in descending order India, China, Philippines, Vietnam, Hong Kong and South Korea.

The rate of HIV positivity among active cases has remained fairly steady over the 4 years of this report at 6% average, although not all cases were tested. Of the HIV positive cases, 28.8% were foreign-born, 32.9% were Canadian-born non-Aboriginal people and 34.2% were Aboriginal peoples. Of the 305 cases in 2008, 182 were tested for HIV (62%).

Drug resistance rates remain low with 10.4 % being resistant to at least 1 drug. 75 (7.77%) were mono-resistant, 9 (0.9%) cases were multiple drug resistant and 17 (1.7%) cases poly-resistant treated over the 4 years. The great majority of drug resistant TB was found in the foreign born, and Aboriginal peoples were the least likely to harbour resistant organisms. The commonest single drug resistance was to isoniazid (36.6%, n = 37).

Executive Summary

Seventy-six percent of patients were treated with self administered treatment and 17% received directly observed therapy. On average over the 4 years 76.9% of cases completed treatment satisfactorily. Reasons not to complete treatment include death, moved out of province or were lost to follow-up. Relatively few were due to noncompliance (1.2%).

8.7 percent (n = 24) of cases had a reactivation of TB in 2005 with 9.5, 9.7 and 11.8% in subsequent years. Relapsed pulmonary cases were drug resistant, on average, 18.3% on sensitivity testing.

Preventive Therapy:

In 2005–08, 5,654 patients were placed on preventive therapy for latent tuberculosis infection for an average of 1,413 cases a year with the commonest reason being contact with an active case or a positive skin test not further defined. The completion rate for preventive therapy was 60% (range 55–65%). The majority were foreign born (70%). The commonest causes of non-completion were drug reactions followed by poor compliance.

Skin Test and BCG:

Over the 4 years covered by this report 92,704 TB skin tests were performed in the province. Of these 16,983 (18%) tests were positive. The commonest reason for skin testing was for employment and student screening followed by contact tracing and screening of Aboriginal communities.

BCG is no longer administered in the province of BC.

Contacts:

Contact tracing is an important component of TB Control activities and the number of cases diagnosed as a result of contact tracing has risen steadily over the last 4 years from 2.5% in 2005 to 6.9% in 2008. On average 3,164 annual contacts were screened for active or latent disease over the 4 years. The rates of active TB in all contacts exceeds 700/100,000.

Admission:

A designated ward is located in the Vancouver General Hospital which contains 12 beds. Over the 4 years admissions to the ward varied from 86 cases in 2005 to 113 cases in 2008. A number of cases were readmitted in different years. Fifty-five percent of cases admitted to the ward were foreign born while Canadian born and Aboriginal peoples were equally represented.

Health regions:

Rates for various health regions vary across the province. Over the four years, the Vancouver, Richmond, Fraser North and Fraser South health service delivery areas have consistently had rates exceeding the provincial rate (7.1/100,000 population average over 4 years). The highest incidence rate was observed in Richmond-Vancouver HSDA which varied from 13.2 to 16.6/100,000 over the 4 years, while the lowest incidence rates were typically observed in North Vancouver Island and the East/West Kootenay. Reference should be made to GIS maps for further details.

Due to a significant outbreak in Central Vancouver Island over the last 3 years the rates increased from 2.0/100,000 in 2005 to over 6.3/100,000 in 2007 in that region.

Forty two percent (n = 512) of all TB cases lived in Vancouver and 37% (n = 458) in Fraser North or Fraser South.



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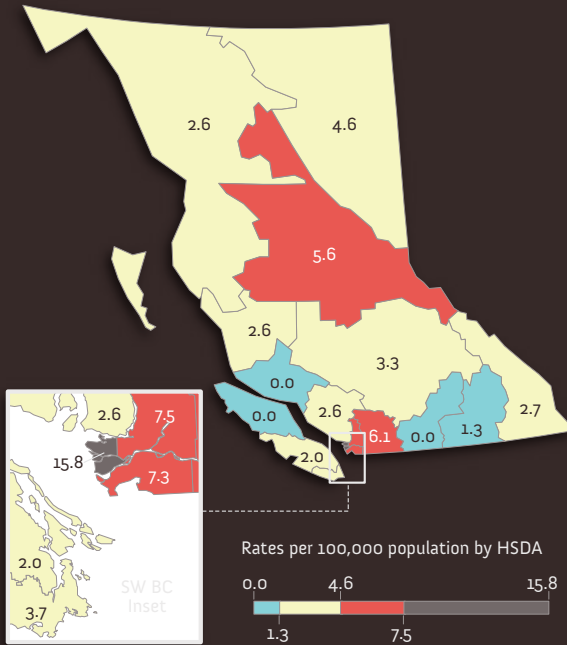
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TB ACTIVE CASES

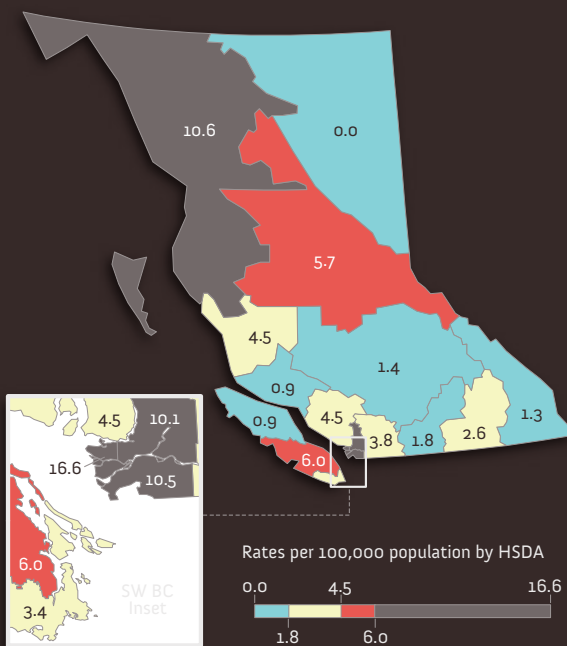
2005



HSDA	Health Service Delivery Area	Cases	Rate
11	East Kootenay	2	2.7
12	Kootenay Boundary	1	1.3
13	Okanagan	0	0.0
14	Thompson Cariboo Shuswap	7	3.3
21	Fraser East	16	6.1
22	Fraser North	42	7.5
23	Fraser South	47	7.3
31/32	Richmond-Vancouver	124	15.8
33	North Shore/Coast Garibaldi	7	2.6
41	South Vancouver Island	13	3.7
42	Central Vancouver Island	5	2.0
43	North Vancouver Island	0	0.0
51	Northwest	2	2.6
52	Northern Interior	8	5.6
53	Northeast	3	4.6

Notes: Map classification by natural breaks method. Data are aggregated for Richmond-Vancouver HSDAs.

2006

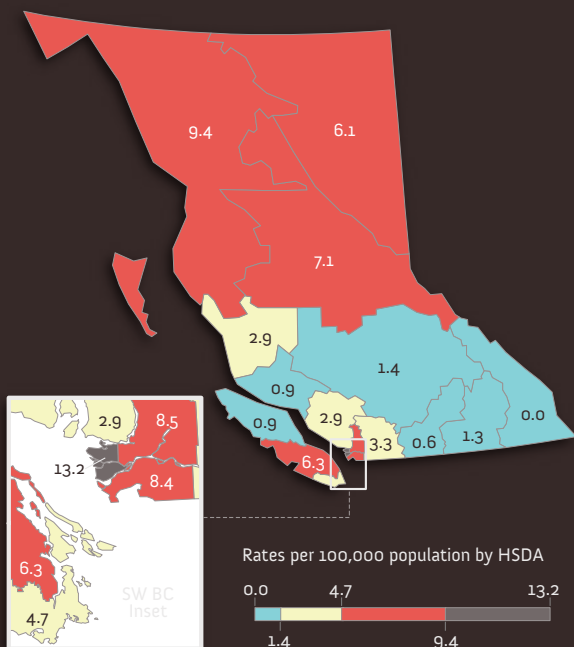


HSDA	Health Service Delivery Area	Cases	Rate
11	East Kootenay	1	1.3
12	Kootenay Boundary	2	2.6
13	Okanagan	6	1.8
14	Thompson Cariboo Shuswap	3	1.4
21	Fraser East	10	3.8
22	Fraser North	57	10.1
23	Fraser South	69	10.5
31/32	Richmond-Vancouver	132	16.6
33	North Shore/Coast Garibaldi	12	4.5
41	South Vancouver Island	12	3.4
42	Central Vancouver Island	15	6.0
43	North Vancouver Island	1	0.9
51	Northwest	8	10.6
52	Northern Interior	8	5.7
53	Northeast	0	0.0

Notes: Map classification by natural breaks method. Data are aggregated for Richmond-Vancouver HSDAs.

TB ACTIVE CASES

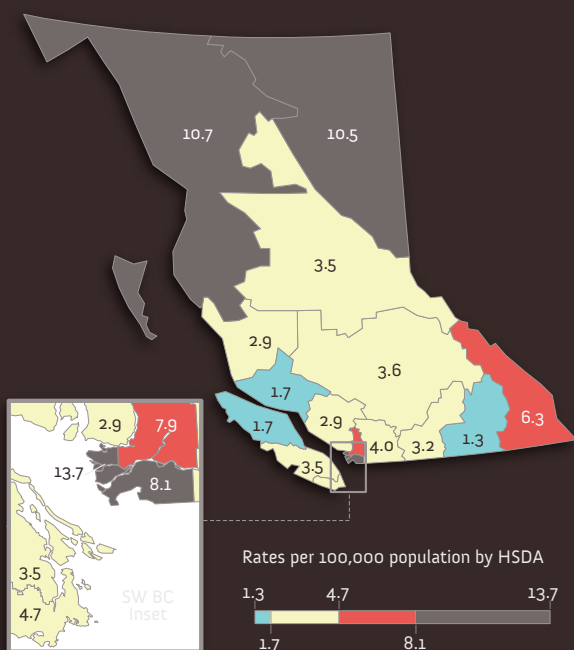
2007



HSDA	Health Service Delivery Area	Cases	Rate
11	East Kootenay	0	0.0
12	Kootenay Boundary	1	1.3
13	Okanagan	2	0.6
14	Thompson Cariboo Shuswap	3	1.4
21	Fraser East	9	3.3
22	Fraser North	49	8.5
23	Fraser South	56	8.4
31/32	Richmond-Vancouver	107	13.2
33	North Shore/Coast Garibaldi	8	2.9
41	South Vancouver Island	17	4.7
42	Central Vancouver Island	16	6.3
43	North Vancouver Island	1	0.9
51	Northwest	7	9.4
52	Northern Interior	10	7.1
53	Northeast	4	6.1

Notes: Map classification by natural breaks method.
Data are aggregated for Richmond-Vancouver HSDAs.

2008



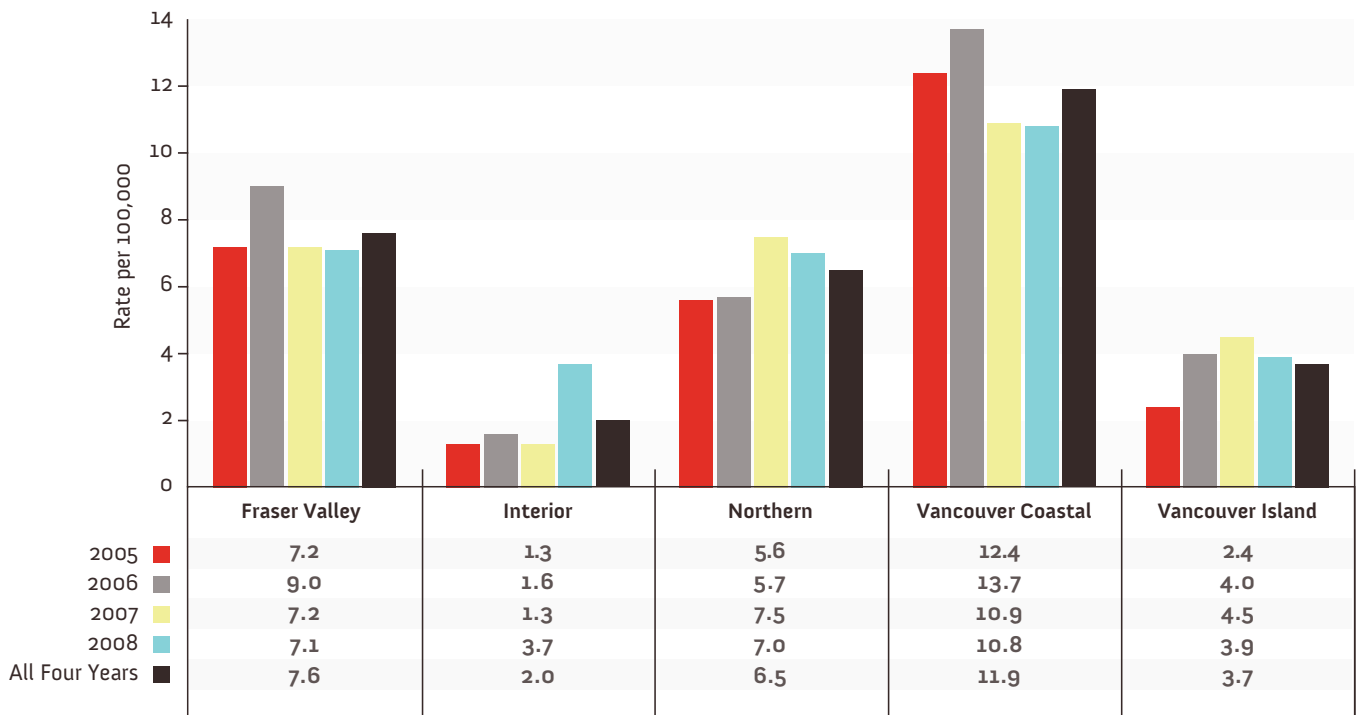
HSDA	Health Service Delivery Area	Cases	Rate
11	East Kootenay	5	6.3
12	Kootenay Boundary	1	1.3
13	Okanagan	11	3.2
14	Thompson Cariboo Shuswap	8	3.6
21	Fraser East	11	4.0
22	Fraser North	46	7.9
23	Fraser South	55	8.1
31/32	Richmond-Vancouver	112	13.7
33	North Shore/Coast Garibaldi	8	2.9
41	South Vancouver Island	17	4.7
42	Central Vancouver Island	9	3.5
43	North Vancouver Island	2	1.7
51	Northwest	8	10.7
52	Northern Interior	5	3.5
53	Northeast	7	10.5

Notes: Map classification by natural breaks method.
Data are aggregated for Richmond-Vancouver HSDAs.

Incidence Rates

Rates for various health regions vary across the province. High rates compared to the provincial figures persist for Vancouver Coastal (11.9), Richmond (11.6) and Fraser (7.6) health service delivery areas, rates that exceed the provincial rate (7.1/100,000 population). The majority of cases numerically are reported from Vancouver, Fraser South and Fraser North Health Regions (221 cases, 71%). Over the last few years, there has been an increase in the number of cases in the Northwest and Northeast Health Regions. All figures refer to the 4 year average.

Figure 1: Tuberculosis incidence rates by Health Authority in BC at the time of diagnosis, 2005-2008

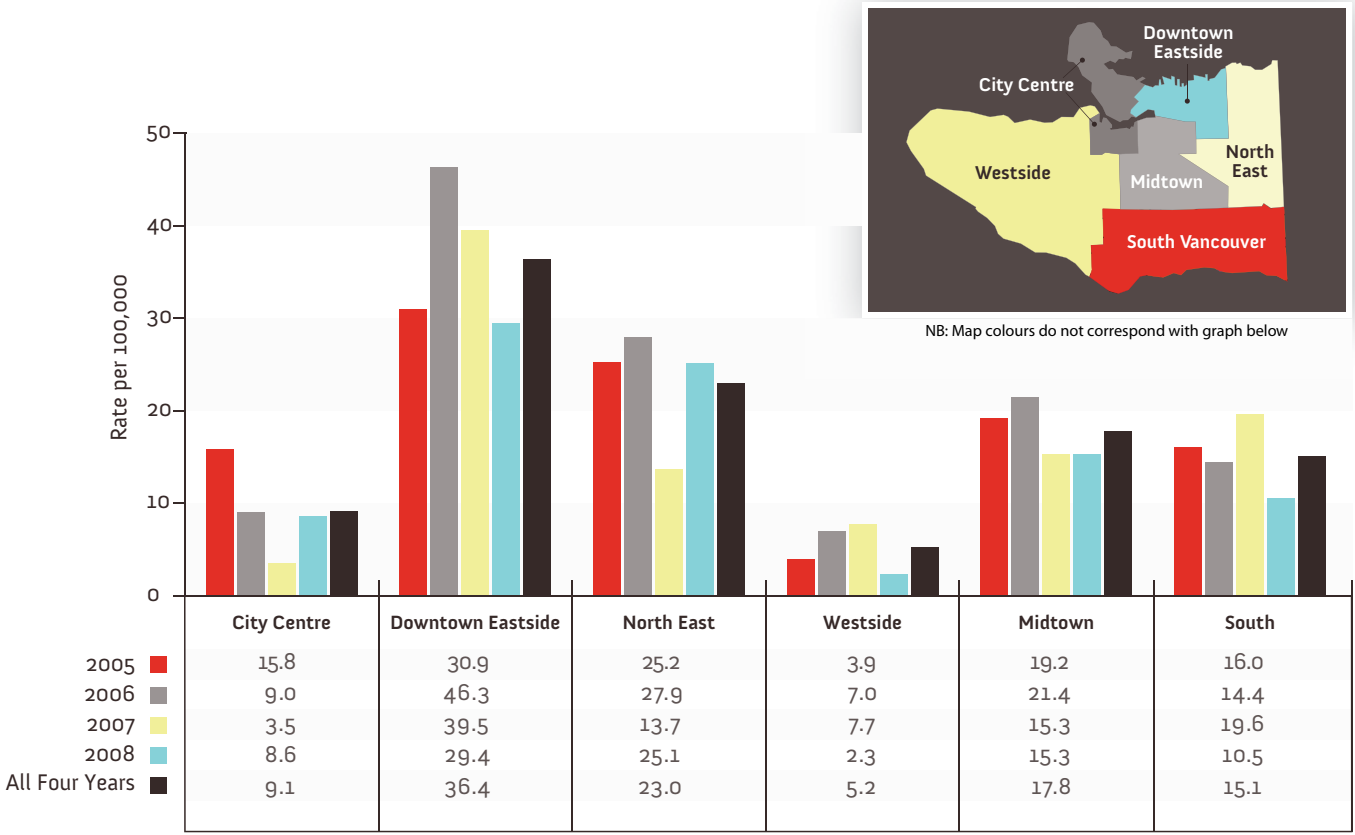


Incidence Rates Sub-Vancouver Areas

Sub-Vancouver areas:

The incidence rate of TB varied from 29.4 /100,000 in 2008 to 46.3/100,000 in 2006 in Downtown Eastside. Compared to 2007 there was a 25% reduction in the number of cases. The rates in Richmond remain above the provincial rate averaging 11.6/100,000 over 4 years. The Westside of Vancouver has the lowest rates averaging 5.2 /100,000. There have been no major fluctuations in rates in these areas over the 4 years.

Figure 2: Tuberculosis incidence rates in sub-Vancouver areas, 2005–2008

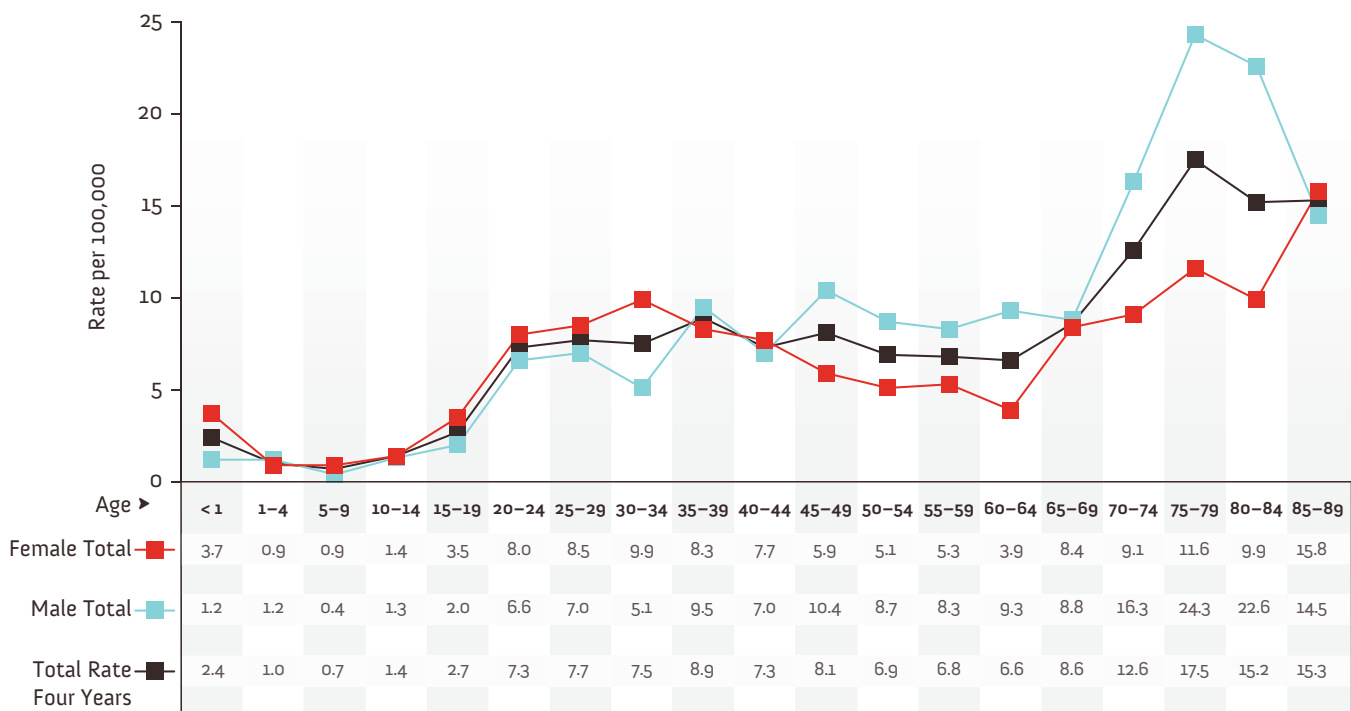


General Description of Active Cases

The average age of cases was approximately 50 years (median = 48). Overall, more men than woman were diagnosed with active disease over the 4 years although in 2006 the ratio was equal. The mean was 54.3 % male and 45.7% female. Rates in men exceeded those in women (7.7 vs. 6.4/100,000).

The majority of cases (75%) were diagnosed due to symptoms compatible with the site of disease while the next commonest method of diagnosis was contact tracing (5%). Occupational screening diagnosed TB in 0.6% of the cases screened for a total of 7 cases over the 4 years whereas post-landing immigrant surveillance diagnosed 45 cases representing 3.7% of cases. Thirty two cases were diagnosed at post-mortem (2.6%).

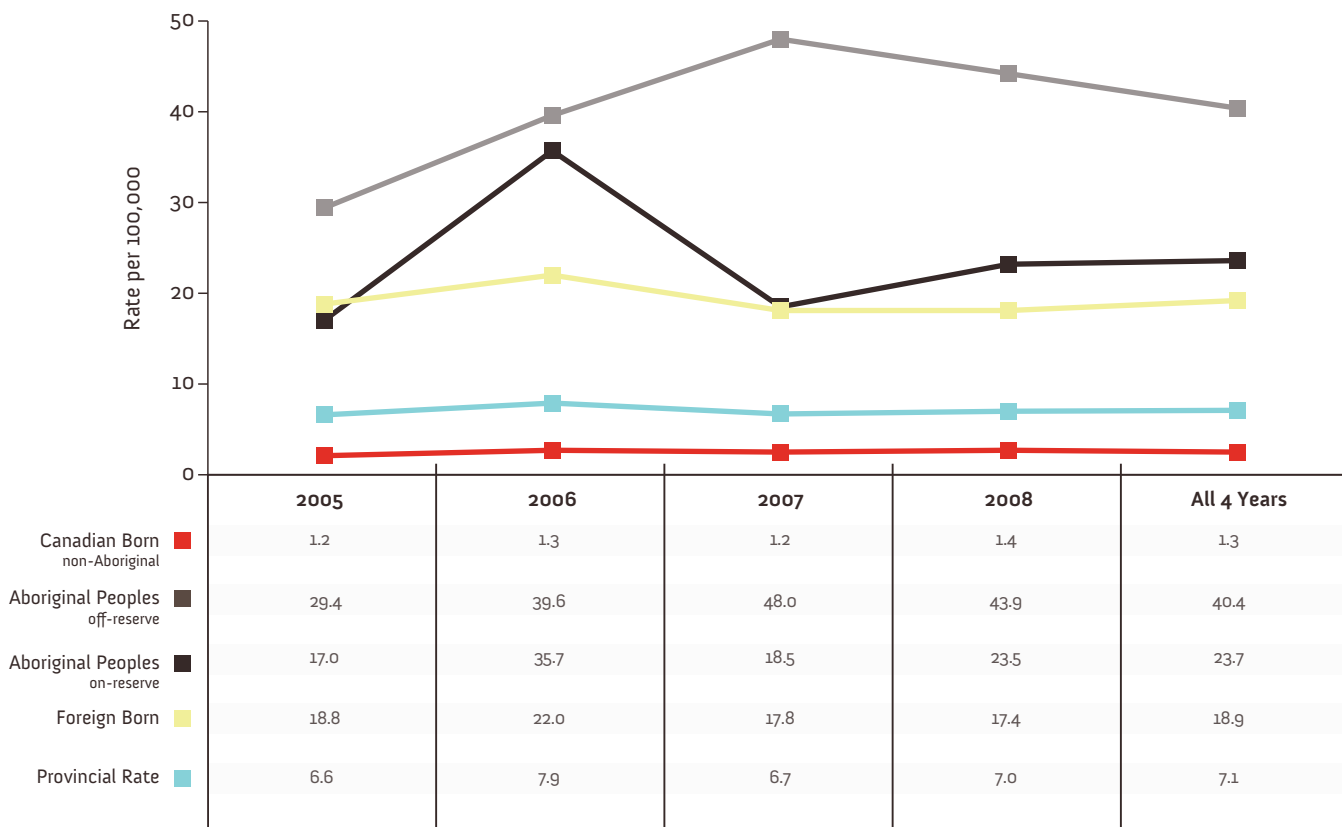
Figure 3: Average TB incident rates in BC by age and gender, 2005–2008



Demographics

Seventy-two percent of cases were foreign born (n = 869, 19.2/100,000) while only 12% were Canadian born non-Aboriginal people (n=154, 1.3/100,000). Rates for Aboriginal peoples living off reserve exceeded those living on reserve, 40.4 vs 23.7/100,000 average over 4 years. On-reserve rates varied from a high of 35.7/100,000 in 2006 to a low of 17/100,000 in 2005. In 2008 the rate was 23.5/100,000.

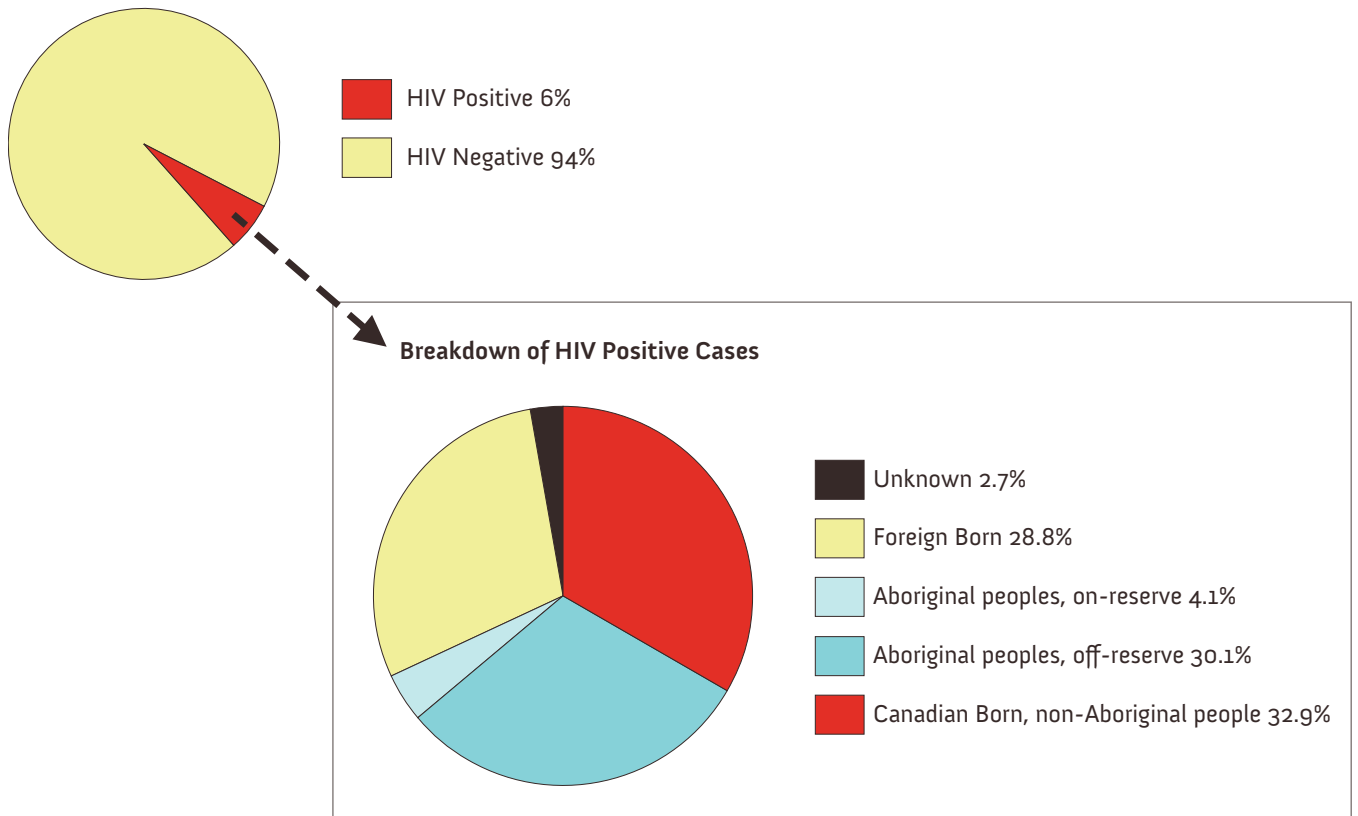
Figure 4: Tuberculosis incident rates in BC by origin and year, 2005-2008



HIV Status

Six percent of patients with active tuberculosis were positive for HIV infection by history or laboratory results. The percentage of TB patients tested for HIV infection has steadily increased from 42% in 2005 to 62% in 2008. Percent positivity has varied from 5.4% (2005) to 6.8% (2007). Of the HIV positive cases during the four year period, 28.8% were foreign-born, 32.9% were Canadian-born non-Aboriginal people and 34.2% were Aboriginal peoples.

Figure 5: HIV status of TB cases in BC tested for HIV by origin, 2005–2008



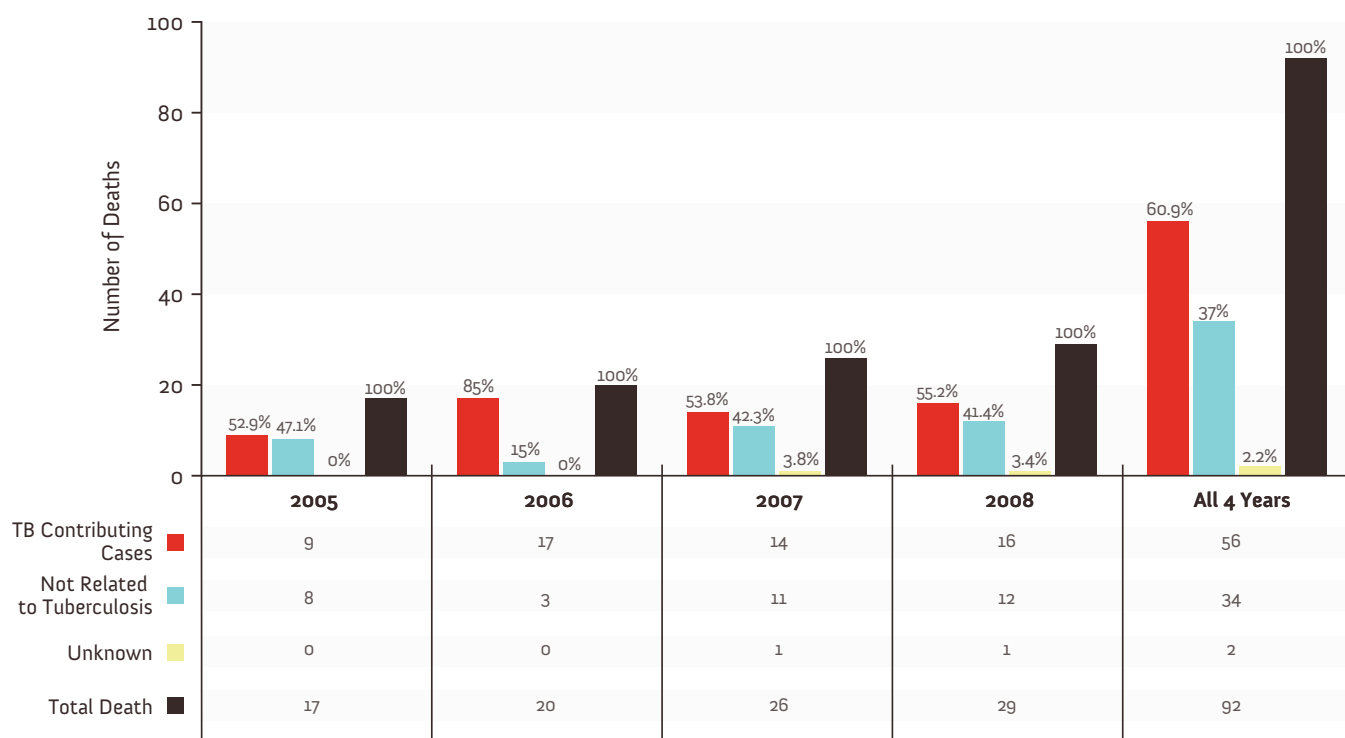
Mortality

Ninety-two cases died over the 4 years for a case mortality rate of 7.6% with 69.6% of those cases being diagnosed at post mortem. Tuberculosis was the cause or contributed to death in 4.6% of cases. Sixty eight percent of the deaths occurred in the over 60 year age group, 44.6% were foreign born and 23.9% Aboriginal peoples. Over the 4 years there were no deaths in the 0–14 age group. The median age of death varied from 65 years in 2006 to 77 years in 2008. The cause of death was not determined in 2.2% of cases.

Figure 6: TB related mortality in BC by origin, 2005-2008



Figure 7: Number of deaths among TB cases in BC, 2005–2008



Types of Tuberculosis

There were 785 cases of pulmonary TB diagnosed from 2005–2008, the commonest site of disease representing 65% of cases. TB lymphadenitis was the commonest extrapulmonary site (12.4%) with a predominance in the foreign born (94%).

There were 40 cases of miliary or disseminated disease diagnosed over the 4 years ranging from a low of 7 cases in 2008 to a high of 16 cases in 2006. There were 16 cases of meningeal/central nervous system disease during the same period. Fifty-six percent of these cases occurred in the foreign born.

There were 3 cases in Aboriginal persons over the 4 years.

Laboratory Result:

Eighty two percent (n = 988) of cases were bacteriologically confirmed and 46% (n = 557) were positive on both smear and culture. There was little difference between the different ethnic groups in the rate of smear positivity.

Figure 8A: Type of Tuberculosis in BC by year, 2005-2008

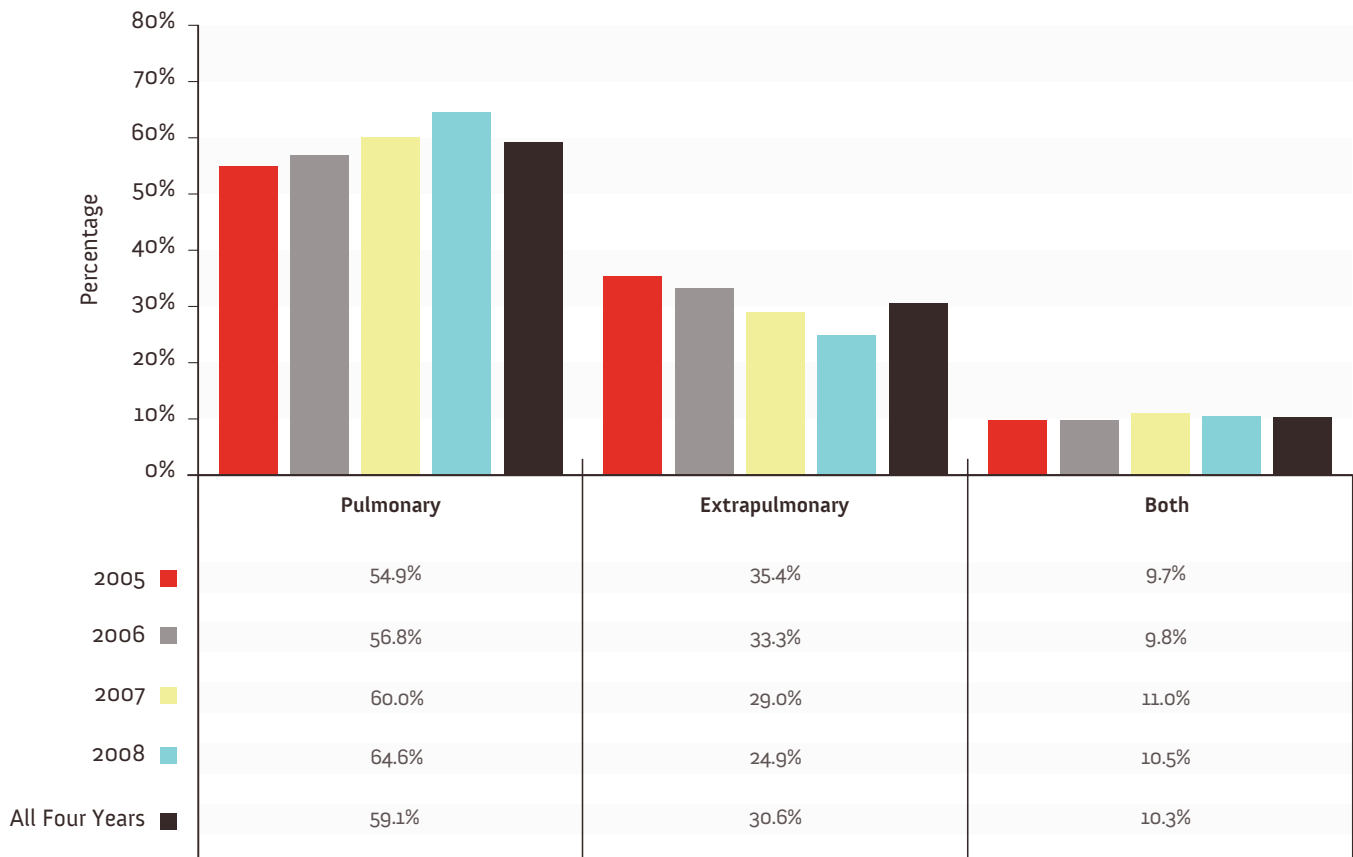


Figure 8B: Type of Tuberculosis in BC by origin and year, 2005-2008

	2005		2006		2007		2008		Whole Period	
	N=	%	N=	%	N=	%	N=	%	N=	%
PULMONARY										
Aboriginal peoples	25	14.9	26	13.0	32	16.3	37	16.7	120	15.3
Non-Aboriginal people	23	13.7	24	12.0	31	15.8	35	15.8	113	14.4
Foreign born	118	70.2	145	72.5	129	65.8	144	65.2	536	68.3
Missing	2	1.2	5	2.5	4	2.0	5	2.3	16	2.0
Total	168		200		196		221		785	
PRIMARY										
Aboriginal peoples	2	66.7	1	14.3	1	100	1	50.0	5	38.5
Non-Aboriginal people	0	0.0	4	57.1	0	0.0	0	0.0	4	30.8
Foreign born	1	33.3	2	28.6	0	0.0	1	50.0	4	30.8
Total	3		7		1		2		13	
MILIARY										
Aboriginal peoples	0	0.0	7	43.8	2	22.2	1	14.3	10	25.0
Non-Aboriginal people	4	50.0	2	12.5	2	22.2	2	28.6	10	25.0
Foreign born	3	37.5	7	43.8	3	33.3	2	28.6	15	37.5
Missing	1	12.5	0	0.0	2	22.2	2	28.6	5	12.5
Total	8		16		9		7		40	
MENINGES / CNS										
Aboriginal peoples	0	0.0	1	20.0	2	40.0	0	0.0	3	18.8
Non-Aboriginal people	1	20.0	1	20.0	0	0.0	0	0.0	2	12.5
Foreign born	4	80.0	2	40.0	3	60.0	0	0.0	9	56.3
Missing	0	0.0	1	20.0	0	0.0	1	100	2	12.5
Total	5		5		5		1		16	

Resistance & Location of Treatment

Resistance:

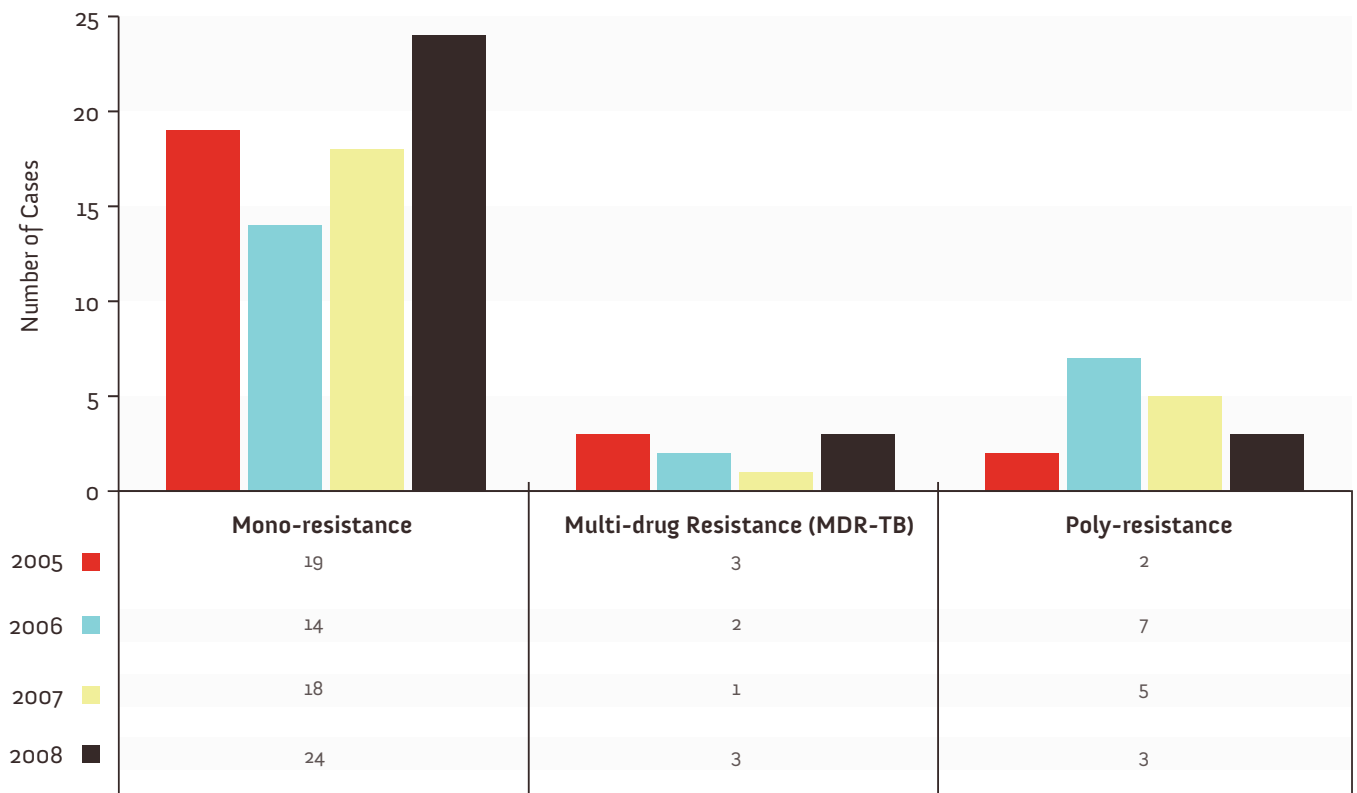
Multiple drug resistance (MDR; resistance to both isoniazid and rifampin) was found in only 9 cases over the 4 years representing <1% of cases. Mono-resistance occurred in 7.7% of cases while poly-resistance was noted in 1.7% of cases. There were no cases of so called extensively drug resistant TB (XDR) diagnosed in BC over the 4 years. The commonest single drug resistance was to INH. Eight cases were rifampin mono-resistant.

Both acquired and primary drug resistant rifampin mono-resistance was seen. The acquired resistance developed mostly in HIV positive patients. Over the 4 years, on average, the 83 % of drug resistant cases were found in the foreign born as expected (range 80–87%). For the remainder of cases resistance was more likely in Canadian born non-Aboriginal people than in Aboriginal peoples.

Treatment:

Sixty-four percent of cases (n=776) were treated in the community while 22.7 % of cases were started in a hospital setting. Five per cent of cases were treated in the at the Vancouver General Hospital (VGH) in the dedicated TB ward. The remaining cases either started treatment outside of the province or did not start treatment at all or the information was missing. The majority of cases were treated by self administered therapy while 17% of cases where data was available were treated by DOT (directly observed therapy). Completion rates were approximately 80%. Reasons for non completion of treatment were death, adverse drug event, left the province, non-compliance or were lost to follow-up.

Figure 9: Type of drug resistance in BC, 2005–2008





LATENT TUBERCULOSIS INFECTION (LTBI)

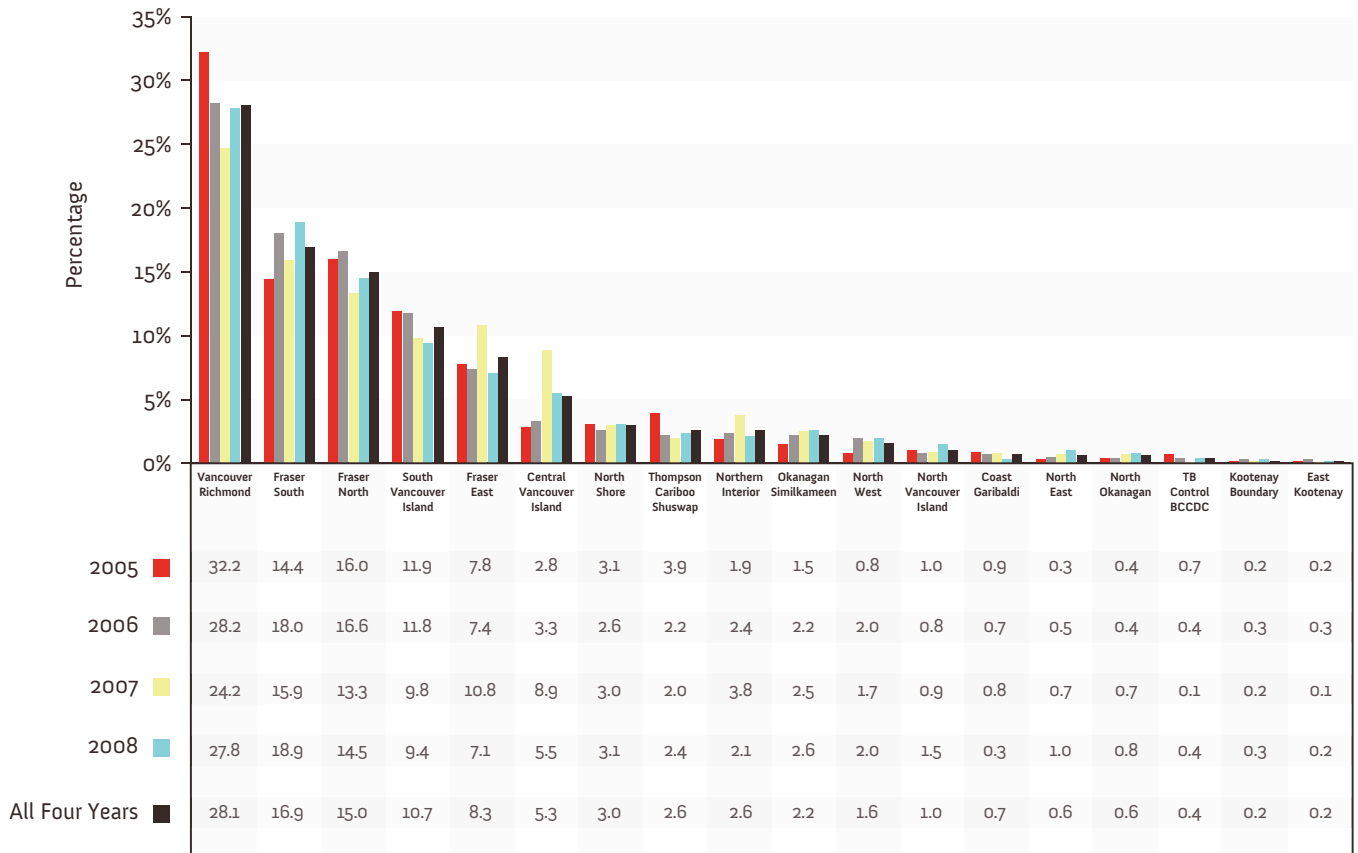
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Latent Tuberculosis Infection Rates

In 2005–2008, 5654 individuals were placed on treatment for latent TB infection. The commonest reasons for starting treatment were contact with an active case (21%), incidental positive skin test (53%) or radiological evidence of inactive disease. The average completion rate over the 4 years was 60% with a range of 55–65%. The commonest reasons for not finishing the treatment were non-compliance with medication and adverse drug effects.

Figure 10: Percentage of clients treated for latent infection by region in BC, 2005-2008

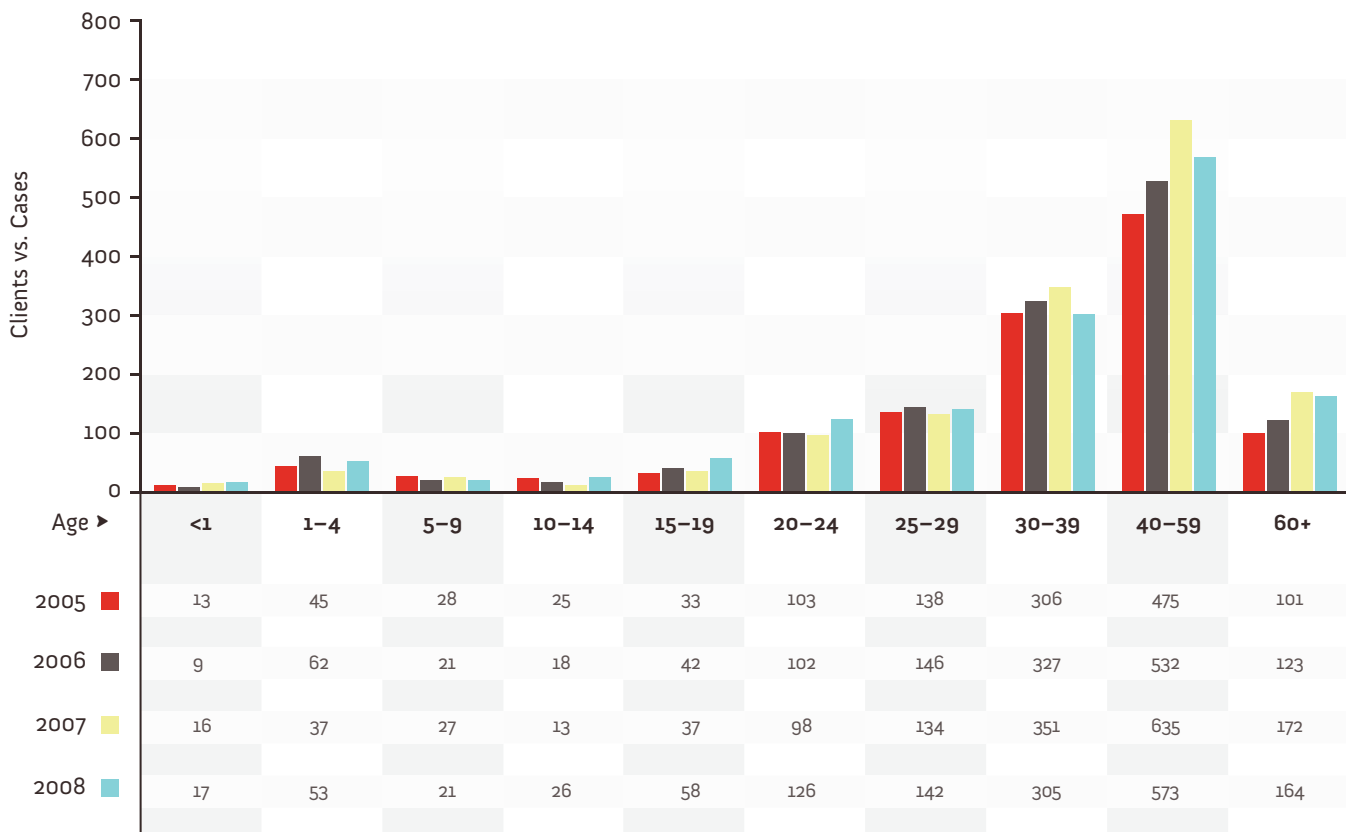


Demographic Characteristics

Females were consistently more likely to be placed on treatment for latent TB infection, representing 58% (n=3303) of subjects over the four year span. Proportion of prophylaxis was highest among subjects greater than 30 years of age and lowest among those less than 1 year of age.

Seventy percent (n=3,570) of subjects were foreign born and 17.6% (n=890) were Canadian born non-Aboriginal people. Aboriginal peoples accounted for 11.7% (n=592) of subjects.

Figure 11: Clients treated for latent infection by age in BC, 2005-2008





TB SERVICES FOR ABORIGINAL COMMUNITIES

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Introduction

Tuberculosis Services for Aboriginal Communities (TBSAC) is the Tuberculosis Control program for Aboriginal persons living on-reserve in British Columbia.

This program is administered out of the Division of TB Control at the BC Centre for Disease Control (BCCDC) located in Vancouver, BC. Dr. Victoria Cook is the physician consultant, Shawna Buchholz is the nurse educator, Nash Dhalla and Maria MacDougall are the nurse consultants.

For this report the term 'Aboriginal peoples' is a collective name used to describe Status and non-Status Indians (commonly known as First Nations), Métis (mixed First Nations and European ancestry), and Inuit (of Arctic Canada) peoples. Although the term First Nations is widely used in Canada, Status and non-Status Indians are the legally defined terms recognized by the Department of Indian and Northern Affairs. A reserve has been defined as a tract of land set apart for use and benefit by an Indian Band.

TBSAC provides routine TB program activities on-reserve, including active case finding and management with appropriate infection control measures, contact evaluation, identification and treatment of latent TB infection, community and school-based screening as well as ongoing education of physicians, nurses and community members regarding all aspects of TB. Our educational program is fundamental to the success of TBSAC and we continue to strive to adequately support the Community Health Nurses (CHNs) and Community Health Representatives (CHRs) working in on-reserve communities.

The following report includes data extracted as of April 2009 for Aboriginal persons (including Métis and Inuit), living both on and off reserve in BC for the calendar years 2005–2008.

ACTIVE TB DISEASE

Incidence

For the years 2005–2008, new active tuberculosis (TB) cases diagnosed in Aboriginal persons were 28 (10.1%), 46 (13.7%), 42 (14.5%), and 43 (14.1%) cases respectively. The increased number of cases in 2006–08 was related to an outbreak of TB in the Central Vancouver Island HSDA. The incidence per 100,000 in each of the 4 years was 23.3, 37.7, 33.9 and 34.2.

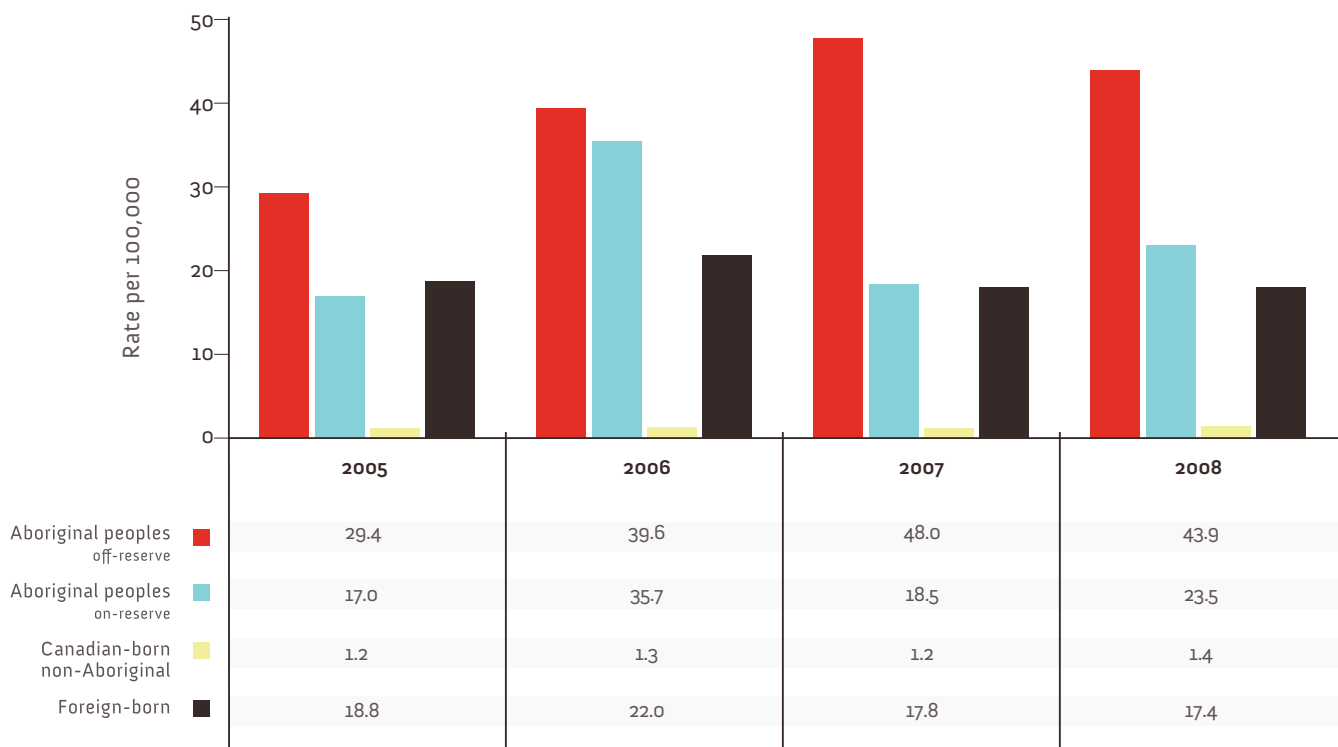
The breakdown for cases of Aboriginal persons living on-reserve were 10 (35.7%), 21 (45.7%), 11 (26.2%) and 14 (32.6%) respectively, corresponding to a rate varying from 17–35.7 per 100,000. For Aboriginal persons living off-reserve, the number of new cases were 18 (64.3%), 25 (54.3%), 31 (73.8%) and 29 (67.4%) respectively, with an incidence varying from 29.4–48 per 100,000 (Figure 12). Aboriginal persons living off-reserve continue to have the highest incidence of TB in the province.

Incidence was calculated using population figures from the Registered Indian Population by Sex and Residence, Information Management Branch, Department of Indian Affairs and Northern Development, Minister of Public Works and Government Services of Canada.

Demographics

From 2005–2008 female Aboriginal persons made up 50.3% (n=80) of active TB cases with 32.5% living on-reserve. Male Aboriginal persons made up 79 (49.7%) of cases, 38% (n=30) lived on-reserve. The mean age range of all cases of Aboriginal was 40–44 years. Four cases were diagnosed in children under the age of 5. The total age range varied from 1 to 90+ years for both on and off reserve populations.

Figure 12: Active TB incident rates in BC, 2005-2008



Statistics

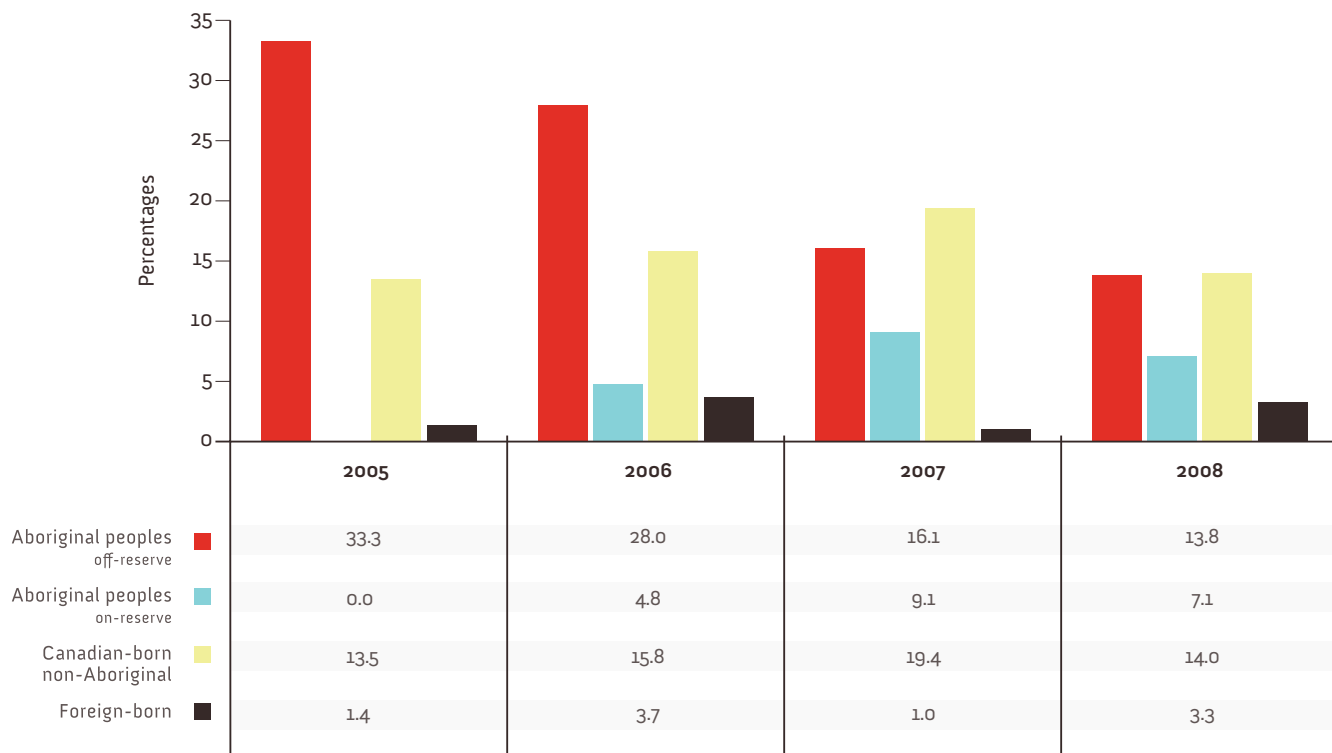
Site of Disease

The number of cases of pulmonary TB varied from 25 (14.9% of provincial total) in 2005 to 37 (16.7%) in 2008. Extra-pulmonary TB accounted for only 1 case (1.0%) in 2005 but represented as many as 12 cases (10.7%) in 2006. Additionally, the number of cases with both pulmonary and extra-pulmonary disease ranged from 3 in 2005 to 8 in both 2007 and 2008. A single case of miliary/disseminated disease was diagnosed in 2008, while 7 cases occurred in 2006, with one case under the age of 5 diagnosed with disseminated disease with meningeal involvement. Three cases of meningeal/CNS were diagnosed in Aboriginal persons; 1 in 2006 and 2 in 2007, all between the ages of 25–34. A total of 5 cases were diagnosed with primary disease; 2 in 2005, with one case under age 5, the other between 10–14 years of age. From 2006–08, there was a single case of primary disease each year, two cases less than 5 years old, and 1 case between 10–14 years of age.

HIV Status

The overall rate of HIV positive active TB cases has remained stable in BC. However, the picture of HIV-related TB in Aboriginal persons has significantly changed over the last 4 years (Figure 13). The number of HIV positive cases has increased and there are now HIV-related TB cases diagnosed on-reserve. In 2004, only 1 of the 29 cases (3.5%) of active TB was HIV positive, diagnosed off-reserve. Of the 28 cases of active TB in 2005, 6 cases (21.4%) were HIV positive, all diagnosed off-reserve. In 2006, 8 of 46 cases (17.4%) were HIV positive, with 7 of these cases being diagnosed off-reserve. In 2007, 6 of 42 cases (14.3%) were HIV positive, 5 diagnosed off-reserve; and in 2008, 5 of the 43 (11.6%) cases were HIV positive with 4 diagnosed off-reserve.

Figure 13: Proportion of HIV infected TB cases in BC, 2005-2008



Laboratory and Treatment

Sputum was positive on both smear and culture at a low of 47.6% of cases in 2007 to a high of 71.4% in 2005. Culture confirmation of active TB occurred in 89.3% of cases from 2005–2008. Mono-resistance was found in 1 case in both 2005 and 2007, 2 cases in 2006, and 3 cases in 2008. Over the 4 years, the most common single-drug resistance was to rifampin (3 cases) while both ethambutol and isoniazid had 2 cases each of mono-resistance. However, the proportion of drug mono-resistance in culture-positive TB cases diagnosed in Aboriginal persons (6.9%) continues to be minimal compared to foreign-born (83.2%) and Canadian-born non-Aboriginal people (9.9%).

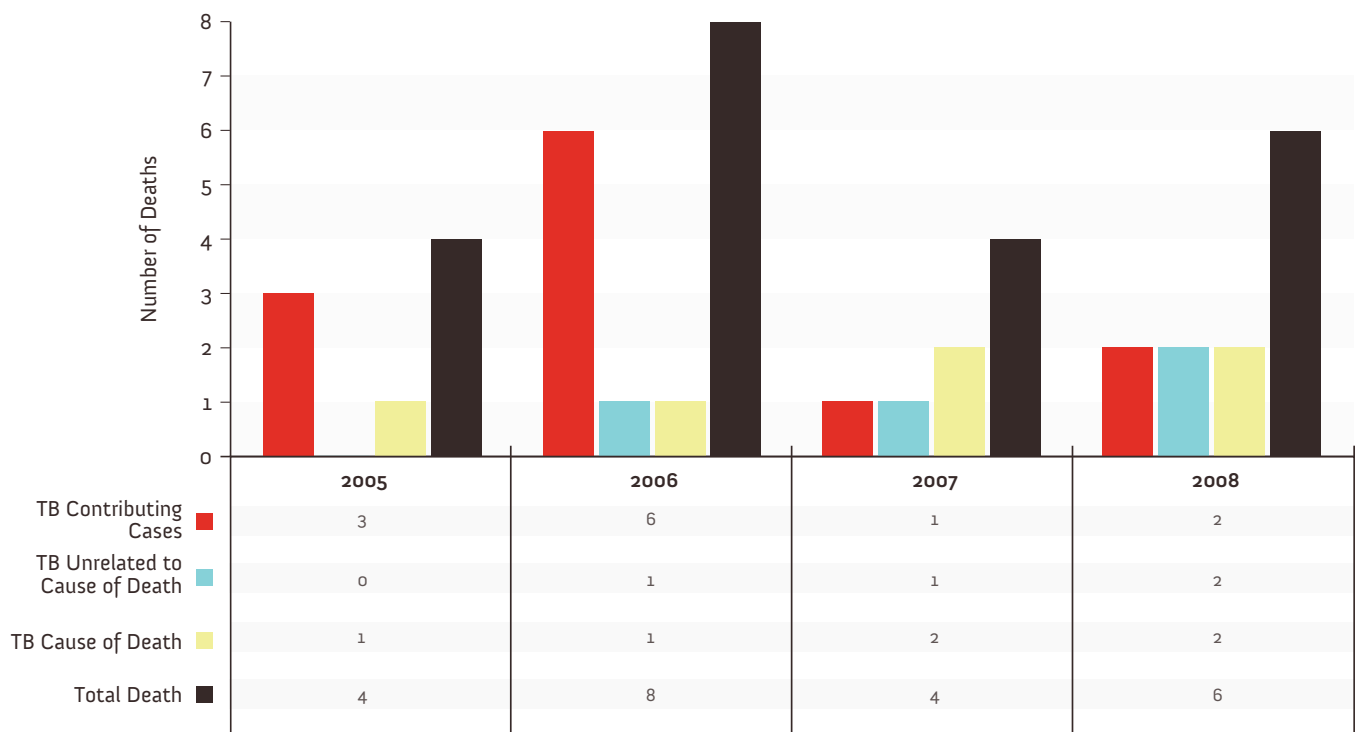
The proportion of active cases who received Directly Observed Therapy (DOT) over the 4 year span was 40% of average number of Aboriginal persons living off-reserve and 48% of average number of active cases of those living on-reserve. The percentage of cases on DOT for 2006-2007 increased during the

Central Vancouver Island outbreak, with 12 cases (48%) off-reserve on DOT and 16 cases (76.2%) on-reserve on DOT in 2006. In 2008, 7 cases (24.1%) living off-reserve received DOT and 5 cases (35.7%) of TB living on-reserve were on DOT.

Mortality

There was an average of 5.5 deaths per year from 2005–08 (Figure 14). TB was the underlying cause of death for 6 cases, one case in 2005 and 2006 and 2 cases in both 2007 and 2008. TB contributed to the cause of death in 12 cases over the 4 year span, with 6 cases living on-reserve. Of the 22 deaths in the past 4 years, 13 deaths occurred in off-reserve cases. The age range of TB deaths was 25 to 90+ with most deaths occurring in the 40–44 year old age group.

Figure 14: TB related mortality in Aboriginal persons in BC, 2005-2008



Other Activities

Contact Investigations

From 2005–2008 3,706 contacts were identified through the contact investigation of 159 TB cases of Aboriginal persons. 821 were classified as Type 1 contacts, 569 Type 2 contacts, and 1,365 Type 3 contacts. Over the 4 year span, an average of 13.7 cases had 21 or more contacts identified for contact tracing. Of the total number of contacts listed from 2005–08 2,142 received a TB skin test (57.8%), 844 had a positive TST (22.8%) and 365 (9.8%) contacts were recommended preventative therapy. Contact tracing identified 53 secondary active cases of TB (1.4%), 9 in 2005, 17 in 2006, 16 in 2007, and 11 in 2008 compared to a total of 4 secondary active cases for 2004 and one case in 2003. The increased numbers of secondary active cases reflects the extent of contact tracing initiated and ongoing due to recent outbreak activity.

Tuberculin Skin Testing

On average, tuberculin skin testing (TST) was completed on 1,748 Aboriginal persons per year during 2005–08: total on-reserve; n = 3,584 (51.3%), total off-reserve; n = 1,380 (19.7%) and unknown; n = 2,029 (29.0%). Of all TST's planted, 17.8% (n = 1,248) were read as positive: on reserve; n = 629/3,584 (17.6%) and off-reserve; n = 436/1,380 (31.6%). For 183 positive skin tests between 2005-08, information on Aboriginal status was not available.

Latent Tuberculosis Infection (LTBI)

Over the 4 year span of this report, 502 Aboriginal persons started INH treatment for LTBI. In 2005, 105 Aboriginal persons started therapy, 109 in 2006, 179 in 2007 and 109 in 2008. The majority of persons from 2005–08 receiving treatment for LTBI (57.2%, n = 287) lived on-reserve.

Of those who started treatment for LTBI from 2005–08, 67.7% (398) had finished treatment by the end of the calendar year of 2008. Of those persons who ended treatment (n = 398), only 52.8% (n = 210) of subjects completed their treatment satisfactorily. For Aboriginal persons on-reserve, 57.5% completed satisfactorily (111/193) while for Aboriginal persons living off-reserve, 49.3% had satisfactory completion (76/154). The most common causes for non-completion of therapy were poor compliance (n = 57) and drug reaction (n = 34).

BCG Vaccination

Effective June 1st, 2003, the FNIH BC-Yukon Region elected to discontinue routine BCG vaccination of newborn children of Aboriginal persons born on-reserve. No infants living on-reserve in BC received BCG vaccination from 2005–2008.

Tuberculosis remains a significant public health problem for Aboriginal persons living on and off reserve in BC. Over the four year span of this report, rates of active TB disease in Aboriginal persons have increased both on and off-reserve likely due to outbreak activity.

It is important to note that TB disease rates in many communities will vary from year to year and data from a single year may not predict a coming trend. Calculating TB incidence in the Aboriginal communities is also limited by inexact population figures and rate estimations in populations of very small numbers. However, with the best estimates available it is well documented that TB rates in Aboriginal persons are far greater than the provincial rate highlighting the need for ongoing work towards the elimination of TB in Aboriginal communities.

Tuberculosis "consumes" resources and active case numbers do not accurately reflect disease burden in Aboriginal communities. TB remains "a symptom of a larger social problem" and multiple inter-related medical and social issues are involved. Challenges to Aboriginal TB Control include community isolation/remoteness, inadequate housing, and chronic medical problems including substance abuse and mental health issues, under-employment, high health care worker turnover and human-power shortages. Continuity of care on and off-reserve, low rates of DOT/DOPT, incomplete HIV testing of all active TB cases, health care worker "buy-in" of treatment for LTBI, and the ongoing social stigma and misinformation regarding TB are other significant issues faced by TB stakeholders. To address these challenges, TBSAC will continue to work closely with stakeholders and community partners to improve TB control efforts in Aboriginal communities.

While active case management is paramount, the importance of education and prevention activities must not be overlooked. Community-based, culturally appropriate programs and capacity-

building are crucial to address the educational needs as prioritized by communities. All communities have been risk stratified and are provided with their own community-specific TB profiles. TBSAC continues to recommend enhanced surveillance for Aboriginal communities and this program has been designed to help monitor the impact of BCG discontinuation (June 1st, 2003). Support for lay dispensers has improved the access to Directly Observed Preventative Therapy (DOPT) for treatment of LTBI. However, despite incentives, satisfactory completion of treatment for LTBI remains suboptimal. A continued focus on prevention as well as the maintenance of health in communities (i.e. treatment of LTBI) will work towards reducing the rates of TB in Aboriginal communities.

A final note, this multi-annual report raises a concern regarding HIV-related TB in Aboriginal persons. Historically, HIV co-infection has been diagnosed in Aboriginal persons living off-reserve. While the overall rate of HIV positive active TB cases has remained stable in BC, there have been HIV-positive TB cases diagnosed on-reserve in 2006, 2007 and 2008. This data may herald an unwelcome trend in HIV-related TB on-reserve. HIV prevalence in TB cases off-reserve has been decreasing over the last four years, which is reassuring.

Update & Future Plans

The 2009–10 year is an exciting time for the TBSAC program with the roll-out of new education and training materials and the first Community Health Representative TB educational workshop.

Challenges to controlling and eliminating TB among Aboriginal communities continue to exist due to community isolation, high nursing turnover, misinformation and stigmatization of TB, and broader social and economic factors. The TBSAC program is working closely with Aboriginal communities to address these challenges and reduce the impact of TB.

1) TBSAC Nurse Educator:

In 2007, our TBSAC Nurse Educator was hired and has since been providing ongoing TB educational support for Aboriginal communities and facilitating communications on TB-related issues in Aboriginal communities. Activities include coordination of the Strategic Community Risk Assessment and Planning for Tuberculosis (SCRAP-TB) program in BC. SCRAP-TB is a national tuberculosis elimination strategy designed with and for Aboriginal communities and has been utilized within a number of First Nations communities in BC. The goals of this process are to support and enhance community TB programs through the participation of community members, to strengthen partnerships and build a broad understanding and awareness of TB, and to assess community TB risk status and local strengths. This program was piloted in 2004 and to date, three communities have actively participated in SCRAP-TB initiatives; Heiltsuk, Lake Babine, and Saikuz. Ongoing community interest is under evaluation with plans to enroll a further 3 communities per year.

The Nurse Educator is also directly involved in promoting TB education within Aboriginal communities, assisting with TB screening surveys, developing the new Directly Observed Therapy (DOT) manual, and assisting with Community Health Nurse's

(CHNs) education at TB 101 sessions. Currently, an evaluation of the 2003 discontinuation of BCG vaccine in newborns of Aboriginal persons living on-reserve is underway: "Enhanced Surveillance Screening in BC First Nation Children: A framework for evaluation".

2) TB Educational & Training Materials:

TBSAC recently developed a DOT manual and a Contact Investigation Tool to support CHNs and Community Health Representatives (CHRs) in TB case management. Both will be available in early 2010. DOT is strongly recommended by the TBSAC program for all active cases and for high-risk clients on preventative therapy, though uptake remains sub-optimal. To support this key program guideline, the TBSAC DOT manual is designed to facilitate education of community members and CHRs to work as DOT Lay Workers/Dispensers. The Contact Investigation Tool is designed to clearly outline the important steps in organizing and prioritizing contact tracing activities when a community has a new active case(s). With preventative strategies a priority for the TBSAC program, this tool will support the CHN/CHR to effectively and efficiently identify and assess high-risk contacts. Both tools also work to address concerns raised in communities dealing with ongoing TB outbreaks and the inherent challenges of TB case management in remote Northern communities.

3) Culturally-appropriate TST Instructional Video for CHNs:

Providing culturally-appropriate and respectful resources requires a process of ongoing dialogue, collaboration and in-put with Aboriginal peoples for

any materials created. In response to the isolation of certain communities, the high turnover of some CHNs and the importance of providing prompt, culturally-appropriate TB education, funding has been secured to develop a TST instructional video that will provide the historical context of TB in First Nations communities as well as demonstrate the skill of TST planting and reading. It is anticipated that this video will be available in 2010.

4) CHN and CHR TB Educational Workshops:

Twice a year, TB 101 workshops are offered for CHNs working on-reserve across the province. The goal is to ensure CHNs will have the knowledge, skills and confidence to implement TB programming at the community level.

Funding has also been allocated to provide four TB educational workshops in 2010 designed specifically for CHRs. One session is planned for Prince George and three sessions will be held in Vancouver. The goal of these workshops will be to build the capacity of CHRs to engage in TB-related work in their communities. CHRs are well-respected, integral members of their communities and are well-situated to play a key role in prevention and elimination of TB.

5) Interferon Gamma Release Assay (IGRA) Feasibility Project:

First Nations Inuit Health and the Division of TB Control have collaborated to explore the feasibility of implementing IGRAs in two remote northern First Nations communities in BC. Masters student and TB

Control employee, Maya Nakajima will determine the feasibility (cost, transport, public uptake, ease of application) of using IGRAs in two northern First Nations communities. The two communities collaborating in the project were invited to participate due to a history of newly TST positive children, all of whom have been BCG vaccinated, and are considered to be a "high-risk" community for enhanced screening.

6) PHSA Aboriginal Health Plan:

The PHSA Aboriginal Health Plan has been developed with several goals and objectives for improving the health of Aboriginal peoples in British Columbia. PHSA's respective Aboriginal health plan is aligned with the Transformative Change Accord First Nations Health plan, local First Nations community health plans, and the Métis Nation of British Columbia plan. The health plan is designed to address several health disparities and improve access to quality health care for Aboriginal peoples. The TBSAC program contributes to this overall plan by participating in BCCDC's Strategic Planning Action (SPA) committee.

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This multi-annual report covers a period of significant personnel change for the TBSAC program. We would like to thank Shirley Rempel and Shelley Dean for their long service to TBSAC, and Louanne Ohlhauser for her contributions. We would also like to acknowledge the work of Jerry Cyr and Joanne Crosbie who made themselves available to this program to ensure continuity of nursing care and all TB control staff who supported the program in times of need. We thank Fay Hutton, Claus Sorensen and Eduardo Hernandez for surveillance data, Valerie Lee for data entry, Larissa Creuss, Mary Jane Lopez, Patricia Henderson, Abhijit Phukan, Joyce Pickering, Maggie Wong, and Anne-Marie Havard for their administrative support and all the CHNs, CHRs and other health care workers for their efforts during the past year. We also acknowledge and thank Dr. Leila Srour and Dr. David Martin at the Pacific Region, First Nations and Inuit Health, Health Canada for their support of this program during the years outlined in this report.



RESEARCH 2005–2008

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