



Tuberculosis in Ottawa 2011

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Acknowledgements

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This report is one of a series of health status reports published by Ottawa Public Health. These comprehensive reports are an important part of the public health mandate to report on population health status and provide the evidence necessary to identify trends and health issues of public health significance in Ottawa. Local evidence helps tailor planning and decision making to enhance the health of the Ottawa population.

Tuberculosis (TB) is a reportable infectious disease caused by the bacteria *Mycobacterium tuberculosis*, which spreads from person to person through the air. TB typically affects the lungs, but can also infect other parts of the body such as the brain, the kidneys or the spine. There are nearly 9.5 million new cases of TB disease in the world each year¹ and approximately 1,600 new cases annually in Canada.²

A person exposed to TB bacteria responds in one of three ways:

1. Their immune system might successfully kill the TB bacteria.
2. They might become ill because their immune system was unable to kill the TB bacteria (active TB disease).
3. Their immune system might stop the TB bacteria from growing but not kill them. The TB bacteria will remain alive but inactive in the body without causing illness or symptoms (latent TB infection–LTBI).

A person with LTBI is not contagious. However, if their immune system becomes weakened, the TB bacteria may start to grow and they will develop active TB. Individuals with active pulmonary TB can infect others by coughing, sneezing or spitting, which circulates the TB bacteria into the air. Both latent and active TB can be treated.

To avoid confusion between TB and LTBI in this report, a TB case will refer to a person who is infected with TB and has active disease.

Summary of findings

This report describes the state of TB in Ottawa in 2010 compared with the past. It also describes disease outcomes, clinical management and risk to the population.

1. TB incidence rates in Ottawa have remained relatively unchanged in the past 10 years. Between 40 and 60 cases are reported annually.
2. Most Ottawa TB cases come from outside of Canada. In 2010, 89% of cases originated outside this country.
3. In 2010, just over half of cases in Ottawa (58%) had pulmonary TB, which is not significantly different than past years.
4. In 2010, 23% of cases cultured were resistant to at least one anti-tuberculosis drug and two cases had multi-drug-resistant TB (MDR-TB). Only two cases of MDR-TB have been previously reported: one each in 2005 and 2009.
5. A small proportion of 2010 TB cases were co-infected with HIV (4%). TB can cause much more serious disease in those co-infected with HIV, and treatment is more challenging.
6. Living and travelling in high TB incidence areas are the most commonly reported settings for exposure.
7. Contact with a confirmed case or having a low income are the most common reported social/behavioural risk factors.
8. Treatment adherence for TB cases in Ottawa is excellent. In the past five years, all pulmonary TB cases completed over 80% of their scheduled treatments. This is consistent with the minimum standard set out in the Ontario Ministry of Health and Long-Term Care *Tuberculosis Protocol 2006*.³



This report provides epidemiological data on all reported cases of TB and people with LTBI in Ottawa.

For details on the case definition of TB, please refer to the Ontario Public Health Standards, Infectious Disease Protocol, Appendix B – Provincial Case Definitions available online at:

http://www.health.gov.on.ca/english/providers/program/pubhealth/oph_standards/ophs/progstds/idprotocol/appendixb/appendix_b.pdf

For details about TB, please refer to the Ontario Public Health Standards, Infectious Disease Protocol, Appendix A – Disease-Specific Chapters, available online at:

http://www.health.gov.on.ca/english/providers/program/pubhealth/oph_standards/ophs/progstds/idprotocol/appendixa/appendix_a.pdf

For details about the management and control of TB, please refer to Ministry of Health and Long-Term Care Tuberculosis Protocol 2006 available at:

https://www.publichealthontario.ca/imageserver/content/publichealth/TBPConsolidated_Sept06.pdf

Data presentation

All cases are presented by diagnosis date. This is different from past reports, which reported cases by the date of symptom onset, date of laboratory test or date of report to Ottawa Public Health, whichever was earliest. In March of 2011, the Ministry of Health and Long-Term Care opted to make the reporting structure consistent with national tuberculosis reporting standards. This change was applied retroactively for reporting of all cases since January 1, 2000.

Data sources

Ottawa data were extracted from the integrated Public Health Information System (iPHIS), which is a secure province-wide, integrated data and surveillance system required for reporting and managing communicable diseases and outbreaks in Ontario. iPHIS was implemented in Ontario in 2005 and replaced the Reportable Disease Information System (RDIS). Data prior to 2005 were migrated from the RDIS database to iPHIS to facilitate historical comparisons. The data entered into iPHIS are obtained from laboratory reports, hospital reports, physician interviews and in-depth interviews with cases.

Provincial data were also extracted from iPHIS by the Ontario Ministry of Health and Long-Term Care and made available to public health units on the public health portal (www.publichealthontario.ca – password required).

Data limitations

People who contract TB may not seek care immediately upon becoming sick, particularly if the symptoms are not severe. This creates a gap between the time of infection and the time of reporting to Ottawa Public Health (OPH). Therefore, the TB counts in this report may underestimate the true incidence in the population. Similarly, although LTBI may be detected in routine screening or as part of a medical examination, LTBI counts in this report may underestimate the true incidence in the population.

Recently, the Ministry of Health and Long-Term Care revised the way TB risk factors are reported to improve the validity of reporting risk factors in iPHIS. For example, the risk factor *under-housed* is now replaced by *under-housed/homeless*.

To avoid undercounting, this report combined discontinued risk factors with the new or still-existing categories. For example, the counts of risk factors *under-housed* and *under-housed/homeless* were combined rather than reported individually.

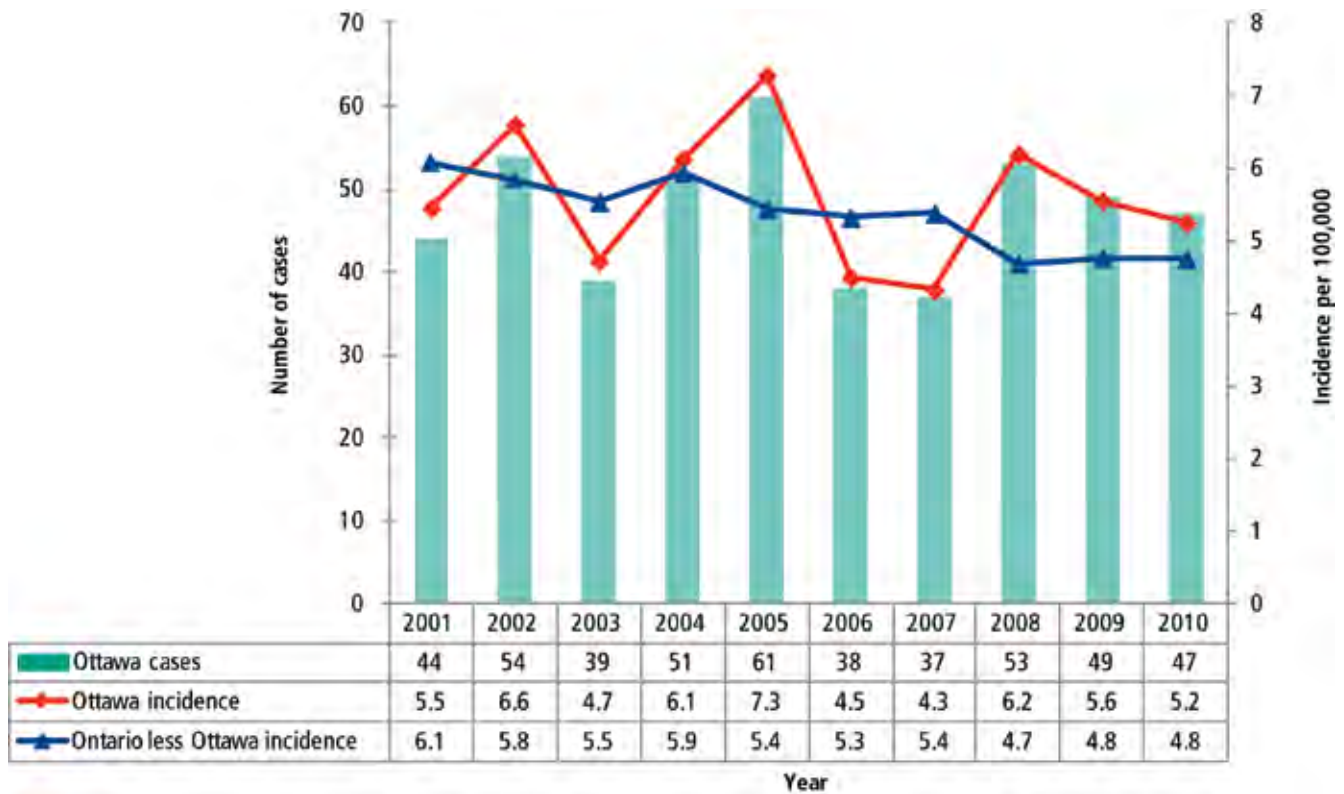


Incidence of tuberculosis

In 2010, 47 cases of tuberculosis were reported in Ottawa, which represents an incidence rate of 5.2 cases per 100,000 people. The incidence of TB in Ottawa has fluctuated from year to year. As Figure 1 illustrates, there has been no consistent trend over the past 10 years.

TB in Ottawa tends to disproportionately affect the young adult and middle-aged more than children or the elderly. In 2010, 24 male and 23 female TB cases were reported.

Figure 1: Tuberculosis cases and rates in Ottawa* and the rest of Ontario 2001–2010**

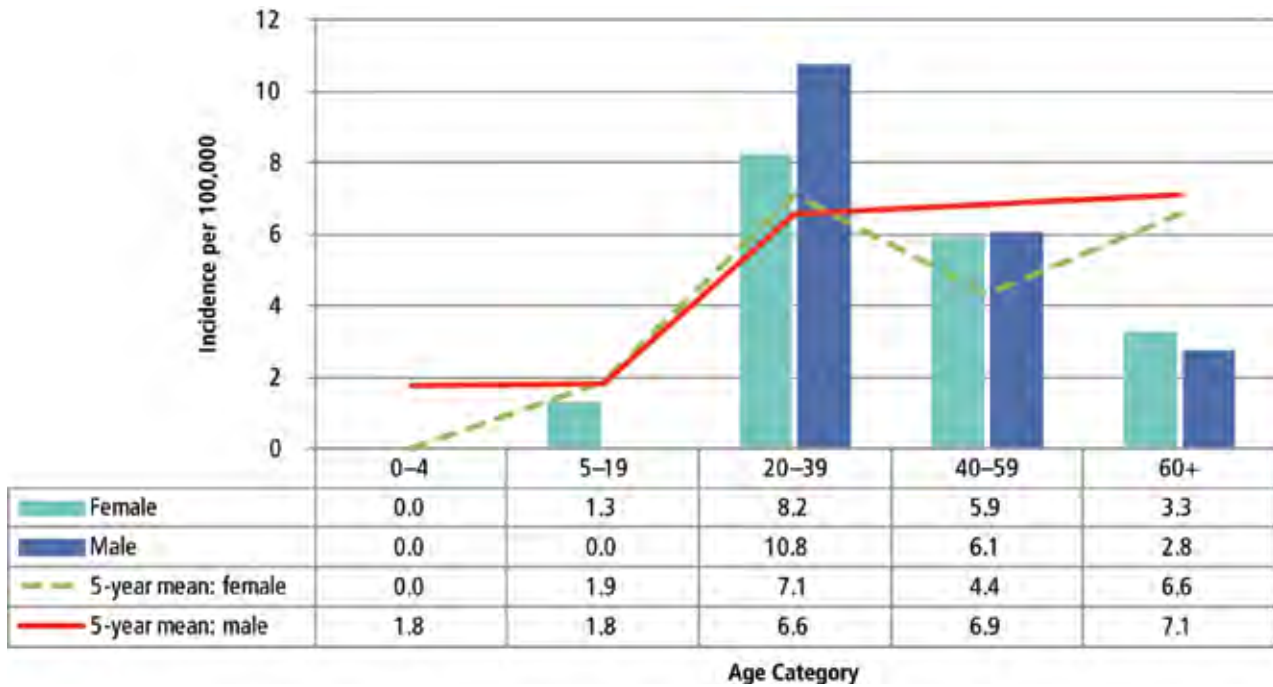


*Source: iPHIS, Ottawa Public Health, data extracted June 14, 2011

**Source: iPHIS, Ontario Ministry of Health and Long-Term Care, data extracted June 21, 2011

What is the current situation?

Figure 2: 2010 incidence of tuberculosis in Ottawa by sex and age category with 5-year mean 2006–2010



Source: iPHIS, Ottawa Public Health, data extracted June 14, 2011

What is the current situation?

Tuberculosis by origin and country of birth

Most active cases of TB in Ottawa were born outside of Canada (Table 1). Figure 3 shows the countries of origin of Ottawa cases in 2010.

For those who are born outside of Canada and have pulmonary TB (which affects the lungs and is often contagious), the median time from arrival to diagnosis is 6.4 years with a range of 9 days to 77 years.

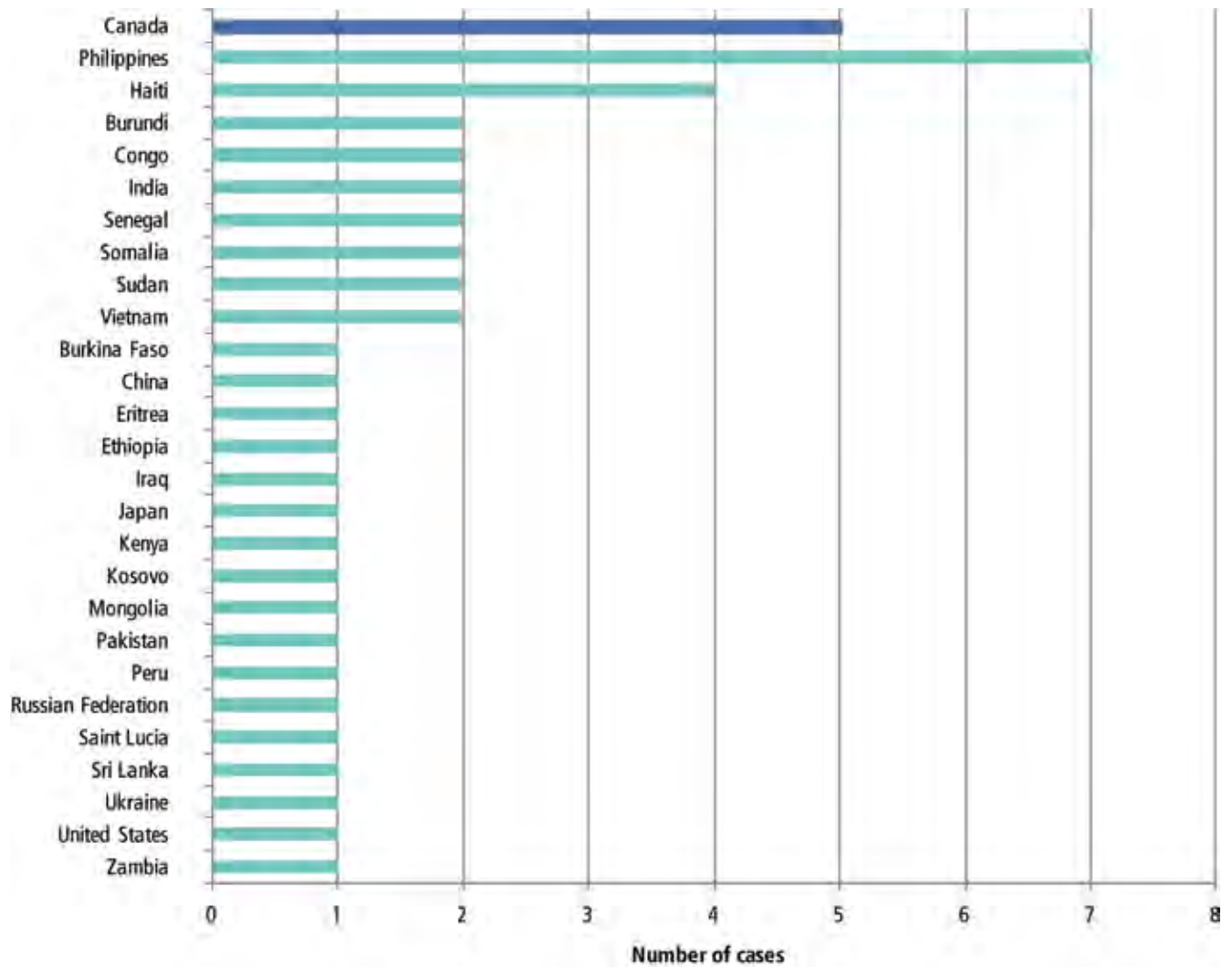
Table 1: Tuberculosis cases in Ottawa by origin, 2006–2010

	Number of cases (%)				
	2006	2007	2008	2009	2010
Born outside Canada	35 (92%)	32 (86%)	46 (87%)	38 (78%)	42 (89%)
Born in Canada	3 (8%)	5 (14%)	7 (13%)	11 (22%)	5 (11%)
Non-Aboriginal born in Canada	3	3	4	9	4
Inuit	0	1	2	1	1
Other Aboriginal	0	0	1	1	0
Registered/Status Indian	0	1	0	0	0
Total	38	37	53	49	47

Source: iPHIS, Ottawa Public Health, data extracted July 27, 2011

What is the current situation?

Figure 3: Ottawa tuberculosis cases in 2010 by country of birth



Source: iPHIS, Ottawa Public Health, data extracted June 14, 2011

What is the current situation?

Tuberculosis by site of disease

TB can infect many body sites and more than one site can be infected. In 2010 and the preceding five years, pulmonary TB has accounted for more than half of all the TB cases in Ottawa.

Pulmonary TB is of particular public health importance because it can be transmitted to others by coughing or sneezing.

Table 2: Tuberculosis sites of infection*, Ottawa, 2010 and 5-year mean (2006–2009)

	2010	% of 2010 cases	5-year mean	% of 5-year cases
Total number of TB cases	47			
Pulmonary	30	57.7	27.2	50.4
Lymphatic system (lymph nodes)	9	17.3	12.0	22.2
Disseminated (miliary)	3	5.8	1.8	3.3
Brain (meningitis)	3	5.8	0.4	0.7
Other organs	2	3.8	3.0	5.6
Genitourinary	2	3.8	1.8	3.3
Bones and joints	1	1.9	1.6	3.0
Ocular (uveitis)	1	1.9	2.6	4.8
Skin and subcutaneous tissue	1	1.9	0.4	0.7
Pleural (pleurisy)	0	0.0	2.8	5.2
Nervous system	0	0.0	0.4	0.7
Total sites infected	52		54	

*Note that an individual case may have more than one site of disease

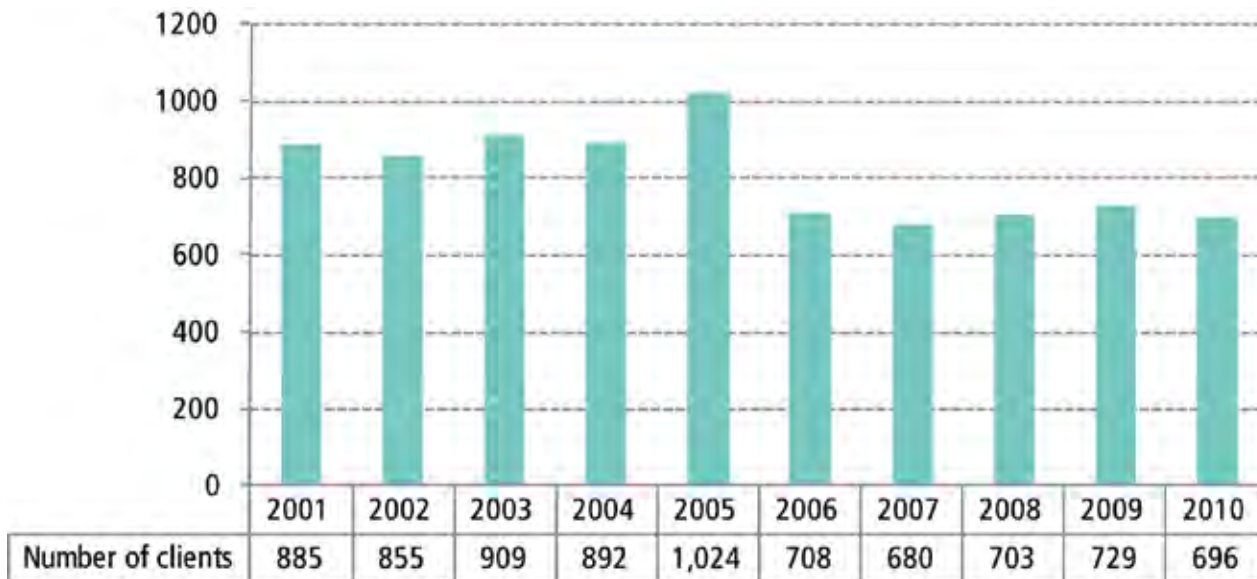
Source: iPHIS, Ottawa Public Health, data extracted June 21, 2011

What is the current situation?

Latent tuberculosis infection (LTBI)

Reports of LTBI have decreased slightly since 2005. Although LTBI may be detected through routine screening such as medical screening at immigration or workplace screening, the number of cases in the population is likely higher because people with LTBI are not ill and have no symptoms.

Figure 4: Number of clients reported with latent tuberculosis infection in Ottawa 2001–2010



Source: iPHIS, Ottawa Public Health, data extracted July 29, 2011



Tuberculosis impact on the community includes the burden of illness for those with active disease as well as its potential risk to those who are uninfected.

Treatment outcome

Tuberculosis can generally be treated successfully. Ten cases that were diagnosed in 2010 were still undergoing treatment as of this report. Table 3 shows the outcomes for all cases in the past five years.

Table 3: Treatment outcome for tuberculosis cases in Ottawa 2006–2010

Treatment outcome	2006	2007	2008	2009	2010	Total
Treatment completed	31	34	46	43	35	189
Treatment ongoing	0	0	0	0	10	10
Transferred to another jurisdiction	0	0	0	2	2	4
Death	4	2	5	3	0	14
Lost to follow-up	1	1	0	0	0	2
Other	1	0	0	0	0	1
Declined treatment or to complete treatment*	1	0	2	1	0	4
Total	38	37	53	49	47	224

Source: iPHIS, Ottawa Public Health, data extracted July 27, 2011

*non-infectious cases of extrapulmonary TB

Treatment adherence

Achieving a positive treatment outcome depends on whether the client adheres with treatment. Treatment adherence is most important in pulmonary TB because it is communicable and presents a public health risk. In the past five years, all pulmonary cases received treatment at or above the provincial minimum standard of 80% of treatments completed.³

Drug-resistant tuberculosis

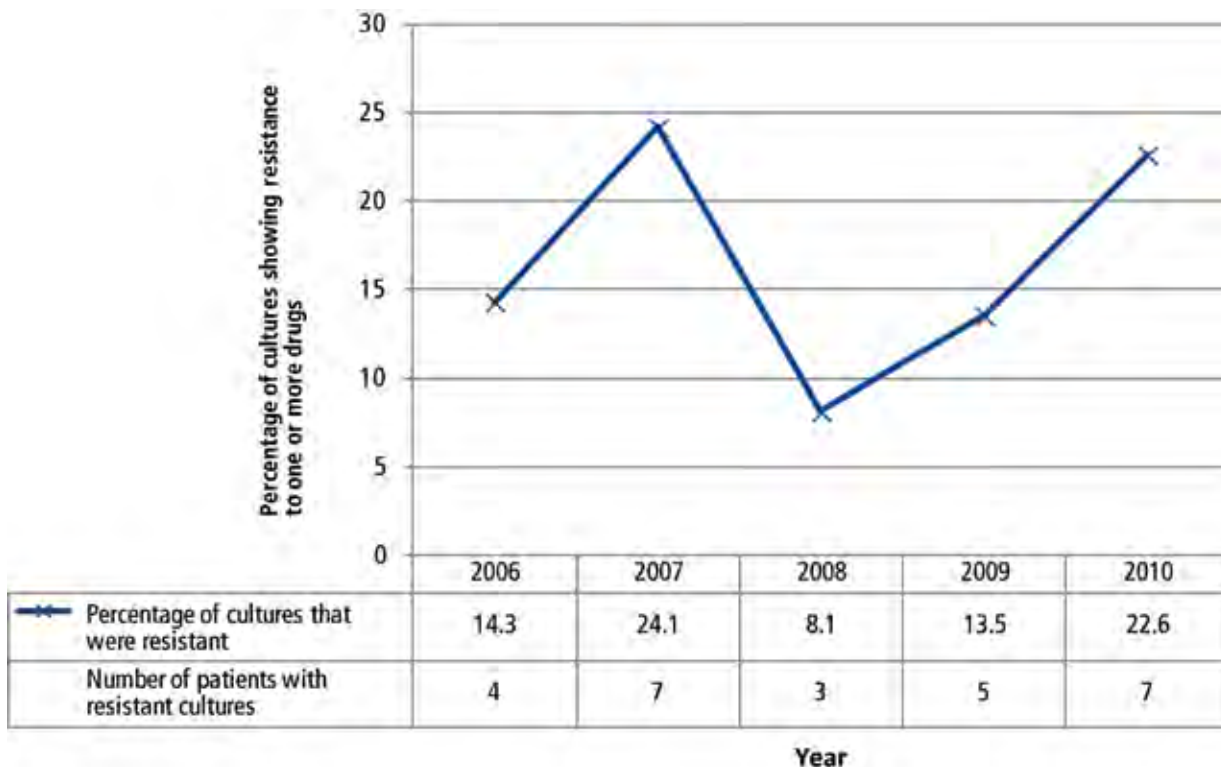
Adherence may be a challenge in transient populations and is a factor in drug- and multidrug-resistant tuberculosis (MDR-TB). Internationally, there is considerable concern about the growth of MDR-TB related to poor TB control programs.

While the occurrence of MDR-TB in Canada is below the global average,⁴ drug resistant strains of TB are of concern because they are difficult to treat.

When TB is diagnosed based on the growth of *M. tuberculosis* culture, the culture is also tested for drug resistance. In 2010, 66% of TB cases were cultured. Of these, 23% were resistant to at least one anti-TB drug. This represents seven patients in 2010.

Most of the drug-resistant cases were susceptible to at least one of the most powerful anti-tuberculosis drugs, however two cases of multiple drug resistance occurred in 2010. Previously, one case was reported in each of 2009 and 2004. MDR-TB cases require longer and more complex treatment. No extensively drug-resistant TB (XDR-TB) has been reported in Ottawa to date.

Figure 5: Proportion of cases resistant to at least one tuberculosis drug in Ottawa, 2006–2010



Source: (iPHIS), Ottawa Public Health, data extracted June 22, 2011

Delay in care

At a population level, limiting the spread of TB depends on timely diagnosis and management of individuals with pulmonary TB. Although it is difficult to determine how long an individual has been infectious, this can be estimated from time that elapsed between the onset of symptoms and the beginning of treatment. Ideally, this period should be as short as possible to reduce risk to both the general population and the infected individual. Onset dates can be very difficult to determine because other health problems or behaviours (for example, smoking) can mask TB symptoms such as chronic coughing.

Treatment delay was calculated for cases with pulmonary TB based on the date of symptom onset or their date of arrival in Canada (whichever was most recent), to the start of treatment.

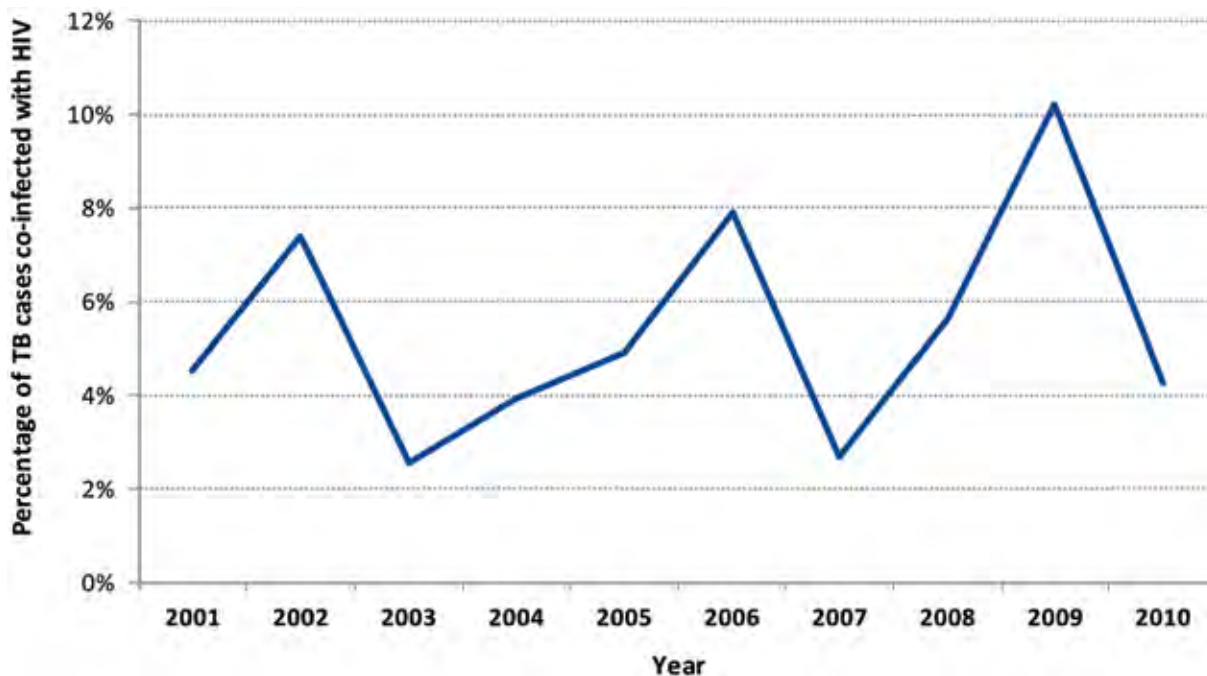
Table 4: Delay in treatment for cases with pulmonary tuberculosis, 2006–2010

Percentage of cases	Delay in treatment (days)
25%	≤ 9 days
50%	≤ 38
75%	≤ 74
<10%	174 to 625

Tuberculosis cases with HIV co-infection

People with HIV are more susceptible to TB infection because their immune system is suppressed. Figure 6 shows the proportion of people with TB who also had HIV in the last 10 years. These proportions represent approximately three TB cases per year.

Figure 6: Proportion of tuberculosis cases co-infected with HIV, 2001–2010



Source: (iPHIS), Ottawa Public Health, data extracted June 22, 2011

Tuberculosis exposure settings and risk factors

OPH nurses interview cases to determine exposure settings (where someone may have been exposed to TB), and medical and behavioural risk factors that could increase susceptibility. Cases can report more than one risk factor.

As Table 5 demonstrates, there was an increase in travel to high TB incidence countries (15 or greater sputum smear-confirmed cases per 100,000 population)^{5,6} in 2009 and 2010. Further analysis shows that most of those travelling to these areas also lived in such areas in the past. This increase in travel risk may be due to more complex travel patterns among cases or it could be due to better recording of travel histories in recent years.

In 2010, there appears to be an increase in workplace-related exposure settings. Further analysis shows that most of those exposed in the workplace had also lived in high incidence areas. The workplace settings include hospitals, an embassy for a high incidence country and summer work in a high incidence country.

How serious is tuberculosis in Ottawa?

Table 5: Exposure settings* as a proportion of tuberculosis cases by year in Ottawa 2006–2010

Exposure setting	2006	2007	2008	2009	2010
Number of cases	38	37	53	49	47
Lived in high incidence area	87%	86%	87%	80%	83%
Travel to high incidence area	5%	8%	4%	31%	34%
Workplace	0%	0%	0%	4%	15%
Shelter (client)	5%	3%	9%	0%	6%
Unknown	5%	3%	6%	6%	6%
Correctional facility (inmate)	0%	0%	2%	2%	4%
Hospital (patient)	0%	0%	0%	2%	4%
Other	3%	5%	6%	2%	4%
In home	5%	3%	0%	4%	2%
Lived in First Nation community	0%	5%	6%	4%	2%
Residential facility (resident)	0%	3%	0%	0%	0%

*Cases may report more than one exposure setting

Source: iPHIS, Ottawa Public Health, data extracted July 22, 2011

How serious is tuberculosis in Ottawa?

Table 6 shows medical risk factors for cases from 2006 to 2010.

Table 7 shows behavioural risk factors. Low income and contact with a confirmed case are the two most frequently reported risks.

Table 6: Medical risk factors* as a proportion of tuberculosis cases by year in Ottawa 2006–2010

Risk factor	2006	2007	2008	2009	2010
Number of cases	38	37	53	49	47
Diabetes	8%	5%	13%	2%	11%
LTBI not adequately treated	3%	0%	2%	0%	9%
Chronic illness	5%	8%	4%	4%	4%
HIV lab confirmed	8%	3%	6%	10%	4%
Low body weight (< 90% of ideal)	5%	3%	6%	6%	4%
Other	16%	11%	4%	2%	4%
Cancer	5%	5%	4%	4%	2%
Chronic renal failure	0%	5%	2%	2%	2%
Immunocompromised	5%	11%	4%	2%	2%
Pregnant	0%	0%	0%	0%	2%
Unknown	0%	0%	0%	0%	2%
Age when infected < 5 years old	0%	0%	0%	2%	0%
Organ/tissue transplant	3%	0%	2%	0%	0%

*Cases may report more than one risk factor

Source: iPHIS, Ottawa Public Health, data extracted July 22, 2011

How serious is tuberculosis in Ottawa?

Table 7: Behavioural risk factors* as a proportion of tuberculosis cases by year in Ottawa 2006–2010

Risk factor	2006	2007	2008	2009	2010
Number of cases	38	37	53	49	47
Known contact with confirmed case	8%	14%	13%	8%	23%
Low income	11%	3%	13%	16%	15%
Underhoused/homeless	0%	0%	17%	2%	6%
Substance use	0%	0%	11%	8%	4%
Unknown	0%	0%	0%	0%	4%
Cigarette smoker	0%	0%	0%	0%	2%
Other	3%	5%	4%	2%	2%

*Cases may report more than one risk factor

Source: iPHIS, Ottawa Public Health, data extracted July 22, 2011

Medical surveillance for tuberculosis

All immigrant applicants to Canada, those who come as refugees and some visitors, are required to undergo an immigration medical examination (IME) prior to entry. If active TB disease is found, the person is denied entry until they receive adequate treatment and have been reassessed.⁷ Medical surveillance is conducted on new immigrants who are identified as being at risk for developing pulmonary TB. The number of individuals reported for medical surveillance by age category is shown in Table 8.

Table 8: Clients reporting for medical surveillance by age category in Ottawa 2006–2010

Age category	2006	2007	2008	2009	2010	Totals
0–4	1	0	1	0	0	2
5–19	8	7	9	3	7	34
20–39	61	45	70	64	67	307
40–59	62	53	46	52	47	260
60+	90	70	72	83	78	393
Total	222	175	198	202	199	996

Source: iPHIS, Ottawa Public Health, data extracted July 22, 2011



Active TB case

A person who has an abnormal chest x-ray or positive sputum smear (or culture), has active TB bacteria in his/her body, and usually feels sick and may have symptoms such as coughing, fever and weight loss. Someone may be infected with TB and have no abnormal signs or symptoms. In that case, the person has LTBI.

Exposure settings

Environments or settings that increase the risk of contracting TB.

LTBI

Latent tuberculosis infection occurs when an infected person is asymptomatic but tests positive to a tuberculin skin test. An infected person is at the highest risk (about 5%) of developing active TB disease within the first two years of becoming infected. People who do not develop TB within the first two years have a 5% chance of developing active TB disease sometime after that.⁷ The risk is much higher in those who are HIV infected.

Medical risk factors

Health-related factors (e.g., immune suppressing disease) that may increase susceptibility to TB infection or development of active TB.

MDR-TB

Multi-drug resistant TB that is resistant to at least isoniazid and rifampin, the two most powerful anti-TB drugs.

Social/behavioural risk factors

Behaviours or risk factors within or outside of a person's control that may put them at higher risk of infection with TB.

XDR-TB

Extensively drug-resistant TB that is resistant to isoniazid and rifampin, as well as to any member of the quinolone drug family, and at least one of the following second-line anti-TB injectable drugs: kanamycin, capreomycin or amikacin.



- ¹ World Health Organization. *Tuberculosis Fact Sheet No 104*. [monograph on the internet]. Washington: National Academy Press; Nov 2010 [cited 2011 Jul 28]. Available from: www.who.int/mediacentre/factsheets/fs104/en/index.html
- ² Public Health Agency of Canada. *Tuberculosis in Canada 2009 Pre-release*. Ottawa (Canada): Minister of Public Works and Government Services Canada; 2010
- ³ Ontario Ministry of Health and Long-Term Care. Tuberculosis Prevention and Control. Version 1.0. September 2006 [cited Sept 12, 2011]. Available from: www.publichealthontario.ca/imageserver/content/publichealth/TBPCConsolidated_Sept06.pdf
- ⁴ Public Health Agency of Canada. *Tuberculosis: Drug resistance in Canada – 2010*. Ottawa (Canada): Minister of Public Works and Government Services Canada; 2011
- ⁵ Public Health Agency of Canada. Canadian Tuberculosis Standards. 6th edition 2007. Available from: http://www.phac-aspc.gc.ca/tbpc-latb/pubs/pdf/tbstand07_e.pdf
- ⁶ Public Health Agency of Canada. [homepage on the Internet] Ottawa(Canada) [updated Oct 18 2011; cited Nov 4 2011]. International Tuberculosis Incidence Rates. Available from <http://www.phac-aspc.gc.ca/tbpc-latb/itir-eng.php>
- ⁷ Public Health Agency of Canada. *Tuberculosis FACT SHEETS – Latent TB infection progressing to TB disease*. Ottawa (Canada): Minister of Public Works and Government Services Canada; 2011 Date Modified: 2008-04-18 [cited 2011 Aug 04] Available from: www.phac-aspc.gc.ca/tbpc-latb/fa-fi/progres-eng.php

