

Tuberculosis, 1994

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Abstract

In 1994, a total of 2,074 people in Canada were diagnosed with tuberculosis, a rate of 7.1 cases per 100,000 population. The same year, tuberculosis and its late effects caused 150 deaths—just over one in every 1,400 deaths.

Although tuberculosis is no longer a major health problem in Canada or a leading cause of death, some groups are particularly susceptible to the disease: Aboriginal people, residents of low-income households, immigrants, and the elderly. In the first two instances, the occurrence of tuberculosis is associated with poor living conditions. The risk of tuberculosis among immigrants is high because of the greater likelihood of exposure in their countries of origin. Among the elderly, the potential for developing active tuberculosis is relatively high due to exposure decades ago when the disease was far more prevalent. Since 1980, the rate of pulmonary tuberculosis has declined, while the rate of extra-pulmonary tuberculosis has remained steady. As a result, the proportion of cases attributable to extra-pulmonary tuberculosis has risen.

Keywords: tuberculosis, pulmonary tuberculosis, immigration, Aboriginal health, low-income population

Introduction

Earlier in this century, tuberculosis was probably the single most important health problem in Canada, as well as a major cause of death. In 1926, one in every 14 deaths was caused by TB. However, with the development of antibiotic treatment in the 1940s and improvements in basic public health, disease and death rates fell sharply (Chart 1). In 1994, 150 Canadians died of TB—just over one in every 1,400

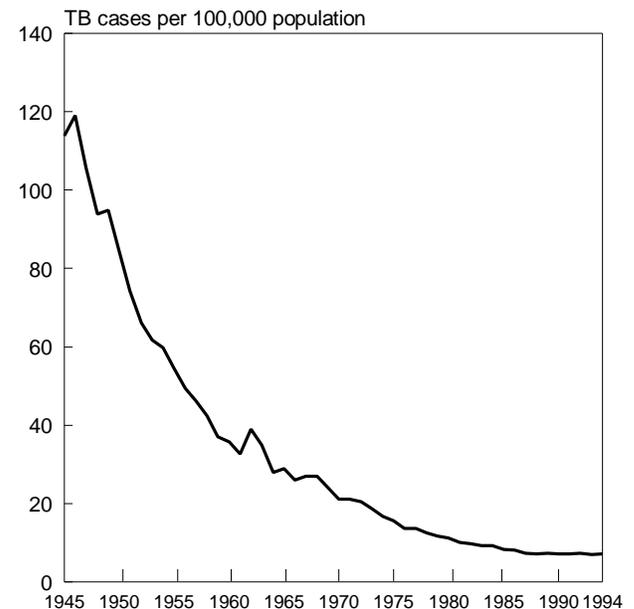
deaths. But although TB is no longer a leading cause of death, it tends to be concentrated in specific population groups.

Who is susceptible?

In 1994, a total of 2,074 people in Canada were diagnosed with tuberculosis, a rate of 7.1 cases per 100,000 population¹ (see *Methods*). The annual number had declined steadily until 1988 when 1,947 cases were reported, and then plateaued at around 2,000 in the early 1990s (Table 1). The 1994 TB rate was up marginally from 1993, when it had dipped to an all-time low of 7.0 cases per 100,000.

Chart 1

Tuberculosis rate, Canada, 1945-1994



Source: Health Statistics Division

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Methods

Data source

Tuberculosis case reports are completed in the provincial and territorial tuberculosis registries and provided to the Canadian Tuberculosis Reporting System at Statistics Canada. In most jurisdictions, information on cases, including age, sex, residence, Aboriginal origin, country of birth, diagnosis, previous treatment, previous vaccination, and bacteriological status, is collected using a standard notification form. Data on most core items are virtually complete, although inconsistencies in interpretation can affect some variables. For example, for "origin," the definitions of "registered Indian," "non-registered Indian or Métis," "Inuit," and "other" as reported on the case notification forms may not strictly correspond to definitions used by the census or by Indian and Northern Affairs Canada.

To calculate the number of TB cases by neighbourhood income level in metropolitan areas, census enumeration areas were ranked by the percentage of low-income households they contained and then combined into 10 groups of roughly equal population size (deciles). TB cases were allocated to the appropriate decile by means of the postal code of the residence.

Definitions

The classification of tuberculosis cases is based on the International Classification of Diseases, ninth revision (1977) (ICD-9) and consists of codes 010-018 and 137.

All cases are classified as either **new active** (no documented evidence or history of previously active TB) or **reactivated** (documented evidence or history of previously active TB that became inactive).

Active tuberculosis: Positive culture for *Mycobacterium tuberculosis*, or in the opinion of the clinician, clinical signs and laboratory tests compatible with active TB (including pathology, if available).

Inactive tuberculosis: Cultures for *Mycobacterium tuberculosis* negative for at least six months, or in the absence of cultures, chest (or other) x-rays stable for a minimum of six months.

Tuberculosis is closely related to socioeconomic status. Poor living conditions predispose a person to activation or reactivation of the disease even when exposure occurred many years before. However, not everyone infected with TB actually becomes ill with the disease. The lifetime probability of developing active TB among infected people is estimated at 10% and depends on factors such as nutrition, immune status, and general health.²

In Canada, certain populations are at much greater risk of developing tuberculosis than others. Aboriginal people (registered and non-registered Indians, Métis, and Inuit), and people who have lived in countries where the TB rate is high, are particularly susceptible. Residents of low-income households and elderly people, especially men, are also at heightened risk.

Since 1980, the distribution of the population with tuberculosis has shifted (Chart 2). Non-Aboriginal Canadian-born persons benefited most from the overall decline of the disease. In 1994, this group accounted for 21% of all cases, down sharply from 49% in 1980. On the other hand, the proportion of cases diagnosed among people born outside Canada rose from 35% to 57%. (In the United States, foreign-born people accounted for just 32% of all TB cases reported in 1994. However, at 9.4 cases per 100,000 population, the American rate was higher than Canada's.³) The proportion of cases diagnosed among Aboriginal people also increased, but not as rapidly, from 14% in 1980 to 19% in 1994.

Table 1

New active and reactivated tuberculosis cases, Canada, provinces and territories, 1980, 1991-1994

	New and reactivated TB cases					TB rate (TB cases per 100,000 population)				
	1980	1991	1992	1993	1994	1980	1991	1992	1993	1994
Canada	2,762	2,018	2,108	2,012	2,074	11.2	7.2	7.4	7.0	7.1
Newfoundland	89	35	34	62	14	15.5	6.0	5.8	10.6	2.4
Prince Edward Island	7	3	2	5	-	5.6	2.3	1.5	3.8	-
Nova Scotia	83	17	13	17	12	9.7	1.9	1.4	1.8	1.3
New Brunswick	59	27	19	15	16	8.3	3.6	2.5	2.0	2.1
Quebec	809	400	424	352	361	12.4	5.6	5.9	4.9	5.0
Ontario	764	768	822	769	831	8.7	7.3	7.7	7.1	7.6
Manitoba	172	101	86	108	116	16.6	9.1	7.7	9.6	10.3
Saskatchewan	137	184	133	153	147	14.1	18.3	13.2	15.1	14.5
Alberta	241	173	222	156	179	10.9	6.7	8.4	5.8	6.6
British Columbia	371	279	324	337	323	13.5	8.3	9.3	9.4	8.8
Yukon	2	9	3	3	10	8.2	30.9	9.9	9.9	33.7
Northwest Territories	28	22	26	35	65	60.0	35.9	41.6	55.0	100.5

Source: Catalogue 82-220

Note: Rates are calculated using population estimates that have been adjusted for net census undercoverage; non-permanent residents are included. Large year-to-year fluctuations in rates may occur in jurisdictions with relatively small populations.

Aboriginal people and immigrants

Together, Aboriginal people and immigrants accounted for over three-quarters of all tuberculosis cases diagnosed in 1994. But because both groups grew during the 1980s, increases in the number of TB cases do not necessarily reflect greater risk of disease. In fact, TB rates among Aboriginal people and immigrants have fallen over time.

It is impossible, however, to calculate precise rates of disease in these subpopulations in intercensal years, because the actual numbers of Aboriginal people and foreign-born persons are unknown. Even so, it is safe to say that the tuberculosis rate is considerably higher among Aboriginal people than among immigrants (who make up roughly 3% and 20% of the population, respectively). The rate among registered Indians (a count of whom is available from Indian and Northern Affairs Canada⁴) was 47 cases per 100,000 in 1994, down from 50 per 100,000 in 1991.

The World Health Organization estimates that about 1.9 billion people—one-third of the world's population—are infected with either latent or active tuberculosis. Since 1980, well over two million people have immigrated to Canada, most of them from countries where the TB rate is higher than in Canada. In 1993, for example, more than 76,000

people, or 30% of immigrants admitted that year, came from countries where the TB rate in the late 1980s and early 1990s exceeded 100 cases per 100,000 population, and in at least one country, nearly 300 cases per 100,000 population (Table 2).^{5,6}

Nonetheless, the number of tuberculosis cases reported among foreign-born persons in 1994 was only about 200 more than in 1980. This increase was quite small, considering the substantial influx of people who have lived in high-prevalence countries, and thereby are likely to have been exposed to active TB.

Table 2

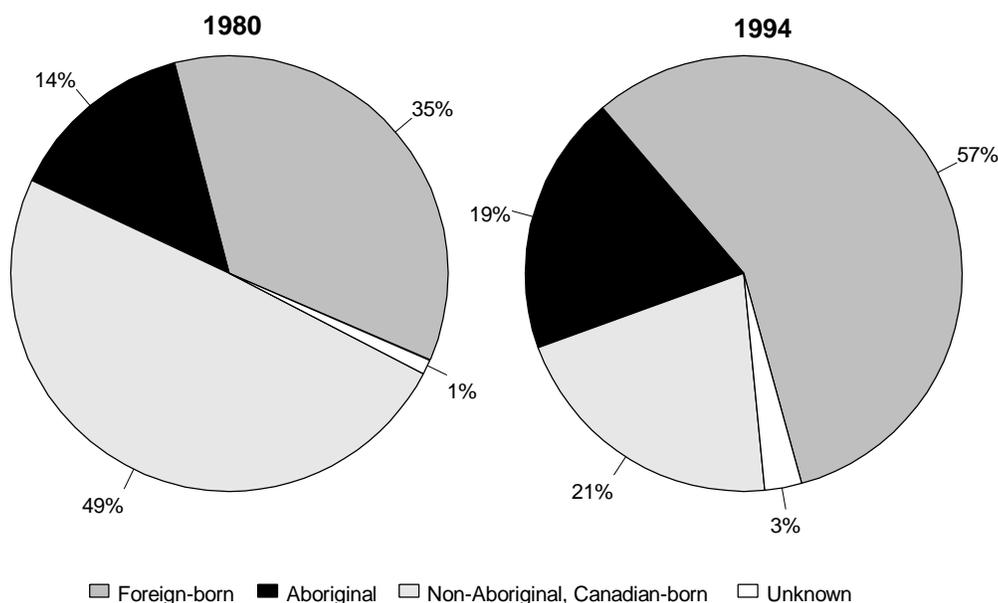
Immigrants to Canada from selected countries in 1993 and tuberculosis rate in country of origin, 1989-1991

	Immigrants to Canada in 1993	TB rate per 100,000 population in country of origin
Hong Kong	36,485	116.0
India	20,298	153.2
Philippines	19,640	289.5
Sri Lanka	9,072	35.4
Vietnam	8,007	65.5
USA	7,982	10.5
United Kingdom	7,104	10.5
Poland	6,852	42.0

Source: World Health Organization. Tuberculosis notification update: July 1992

Chart 2

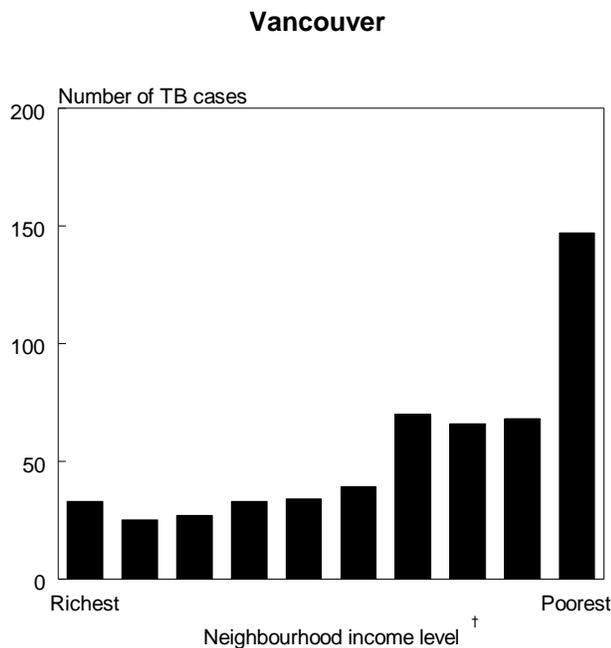
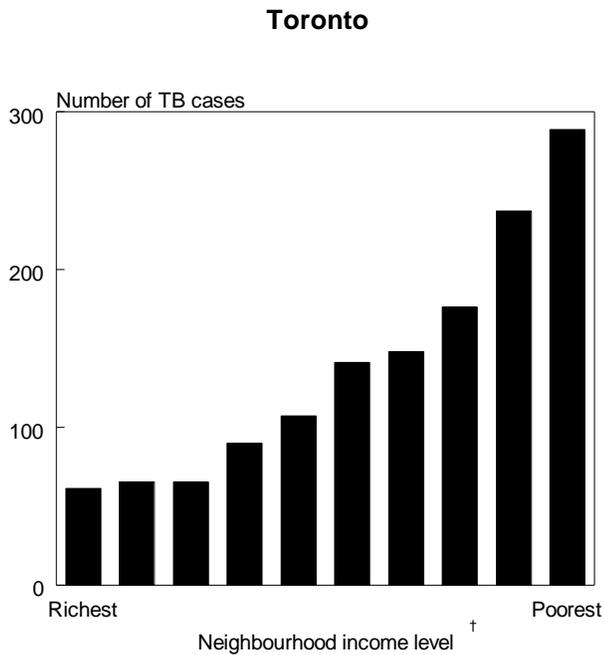
New and reactivated tuberculosis cases, by origin of patient, Canada, 1980 and 1994



Source: Health Statistics Division

Chart 3

Tuberculosis cases, by neighbourhood income level, Toronto and Vancouver, 1991-1993



Source: Health Statistics Division

Note: Based on 1,379 TB cases in Toronto and 542 cases in Vancouver.

[†] Census enumeration areas (neighbourhoods) were ranked and combined into 10 roughly equal groups (deciles) according to the percentage of low-income households they contained.

Among the foreign-born, the distribution of tuberculosis cases by country of origin has shifted, partly because of changes in immigration patterns, and partly because of changes in TB rates in other parts of the world. For example, immigrants from Europe had made up 38% of cases diagnosed among foreign-born persons in 1980; by 1994, they contributed only 12% of such cases. Asian-born persons, on the other hand, had accounted for 48% of immigrant TB cases in 1980, but by 1994, their share had risen to 65%. Similarly, those born in Africa had made up only 3% of immigrant cases in 1980, but 15% by 1994.

More TB among urban poor

The association of tuberculosis with poverty is well known. In Canada, poor socio-sanitary conditions are acknowledged as an important factor in the elevated TB rate in many Aboriginal communities. Similarly, in urban areas, the incidence of TB tends to be higher in poorer neighbourhoods.^{7,8} In the years 1991 to 1993, far more cases were reported among people living in low-income areas of metropolitan areas than in more affluent districts. For example, in Toronto and Vancouver, generally the more low-income households in a neighbourhood, the higher the number of TB cases diagnosed (Chart 3).^a

Rates still higher among elderly

From 1980 through 1994, the overall rate of tuberculosis in Canada fell from 11.2 to 7.1 cases per 100,000 population. However, only people aged 35 and over benefited from this decrease; rates among children and young adults were strikingly static (Chart 4).

Despite the sharp decline among the elderly, the highest tuberculosis rates still occur in the older population, who have the greatest potential for developing active disease, due to previous exposure. People over age 65 grew up in an era when most of the population was infected with TB.^{9,10} Older men are at greatest risk—at age 75 and over, men’s TB rate is more than twice as high as women’s.

^a Comparable information is not presented for Montreal because data for calculating tuberculosis cases by neighbourhood income level are not available for the province of Quebec.

A small upturn in the tuberculosis rate also occurs at ages 25 to 34. This may be partially because of immigration patterns (in 1993, for example, 44% of immigrants to Canada were aged 25 to 44) and the higher rate of disease among the foreign-born. However, the rise in the rate in early adulthood may also reflect age-related changes in resistance to the disease. A landmark paper published in 1939 showed that in a group of people born at the same time and followed through their life span, the highest TB mortality rate occurred between ages 20 and 30.¹¹ Unlike older age groups, at younger ages, the TB rate is about the same in males and females.

In other parts of the world, increases in TB rates in early adulthood correspond to the emergence of HIV-AIDS, reflecting the greater susceptibility of people whose immune systems are weakened. In Canada, effects of the HIV epidemic on the epidemiology of TB have not yet been substantiated, although recent evidence indicates that HIV-related TB may be on the rise.¹²

Highest rates in north

The tuberculosis rate varies greatly across the country (Table 1). Since 1980, rates have tended to be low in the Maritime provinces and Quebec, but relatively high in Manitoba, Saskatchewan, and British Columbia. The highest TB rates, however, have been in the Northwest Territories.

Pulmonary TB rates falling

Tuberculosis occurs most commonly in the lungs (pulmonary), although other parts of the body, such as the lymph nodes or bones, may be affected (extra-pulmonary). Because TB is usually spread by coughing and sneezing, pulmonary TB poses a greater risk to public health than do other manifestations of the disease.

The rate of pulmonary tuberculosis in Canada was nearly halved between 1980 and 1990 and then leveled off, while there was no net change in the rate of extra-pulmonary TB (Chart 5). As a result, extra-pulmonary TB has accounted for a rising share of cases. In 1980, 29% of TB cases were extra-pulmonary, compared with over 40% today.^b

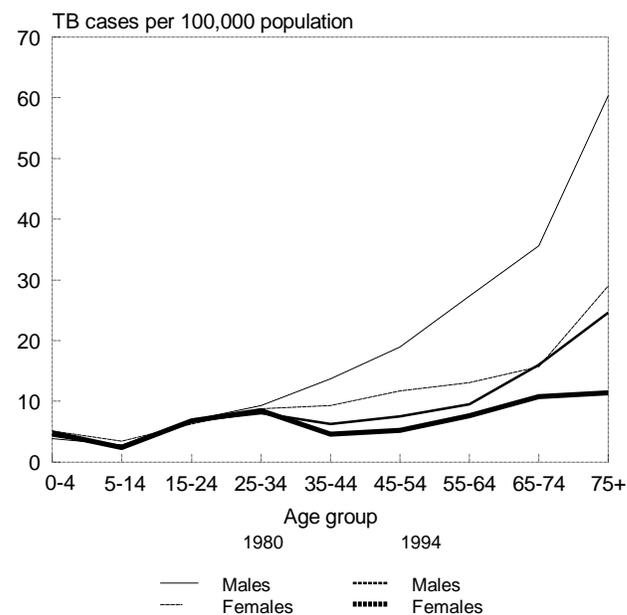
^b Patients in whom both extra-pulmonary and pulmonary disease have been reported are counted in Statistics Canada reports only as pulmonary cases.

The distribution of pulmonary and extra-pulmonary TB varies with the patient's origin. The majority (70%) of non-Aboriginal Canadian-born persons diagnosed with TB in 1994 had pulmonary disease (Chart 6). By contrast, just over half of cases among Aboriginal people (53%) and foreign-born persons (55%) were pulmonary.

Before they leave their country of origin, immigrant applicants over age 10 receive chest x-rays to screen for active pulmonary tuberculosis; those with positive results must undergo treatment before being admitted to Canada. Nonetheless, in 1994, 125 of the 1,183 TB cases reported in foreign-born persons occurred in people who had arrived in Canada that year. This may partially reflect the substantial proportion of cases that are extra-pulmonary, and thus, not detectable by chest x-ray. It may also be attributable to cases that were inactive at the time of screening and subsequently became active, or cases in children that went undetected.

Chart 4

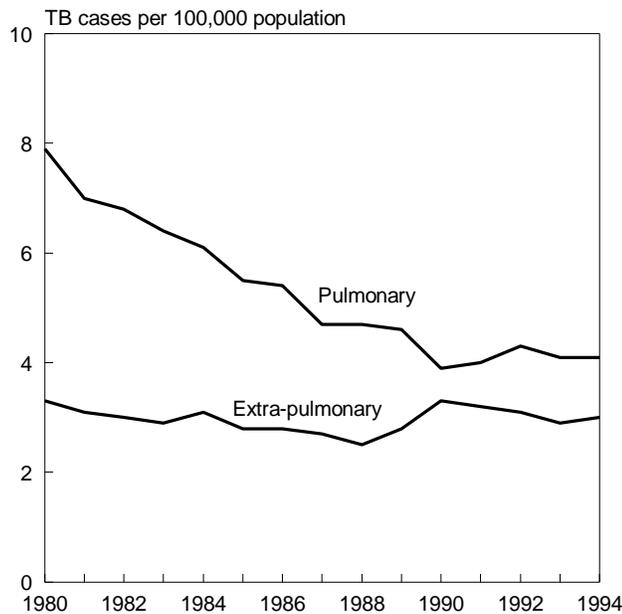
Rates of new and reactivated tuberculosis cases, by age and sex, Canada, 1980 and 1994



Source: Health Statistics Division

Chart 5

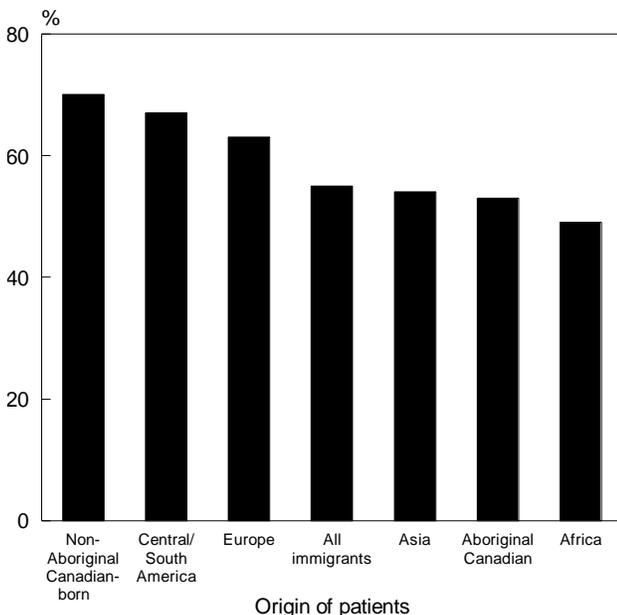
Pulmonary and extra-pulmonary tuberculosis rates, Canada, 1980-1994



Source: Health Statistics Division

Chart 6

Percentage of tuberculosis cases that were pulmonary, by origin of patients, Canada, 1994



Source: Health Statistics Division

Sometimes hidden

With the decline of tuberculosis in the last 50 years, the disease is sometimes not diagnosed, or treatment may not be sought. One indicator of the frequency of missed diagnosis is the proportion of cases in which diagnosis is made only after death. In 1994, TB was diagnosed after the patient had died in 28 or 1% of all cases.¹ Since 1990, the proportion of cases diagnosed after death has varied between 1% and 2%. However, during the same period, the percentage of all deaths that were autopsied fell steadily, so it is likely that an increasing number of cases remain undiagnosed.

Acknowledgment

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