

SUPPLEMENTARY MATERIAL

Clinical data collection and disease control policies during the study period (1986-2004)

Since 1986, the TB control program of Saskatchewan has maintained a computerized database of all individuals in the province diagnosed with tuberculosis.

Individuals in Saskatchewan with a suspected diagnosis of tuberculosis were evaluated by a TB control physician for the purposes of diagnosis and treatment of tuberculosis, as well as the initiation of disease control measures. Demographic and clinical data collected during patient management and disease control activities were included in the TB control database and are analyzed here. Variables included in this study were part of a standard assessment of patients with tuberculosis. No data were specifically collected for this study. Data were entered into the database using a standard format by two data entry clerks; these data were reviewed annually by the director of TB control.

Intradermal BCG vaccination was offered to all Aboriginal newborns living on reserve. Aboriginal children living on reserve were also screened for tuberculosis with TSTs administered at age 2, at school entry (kindergarten) and biannually thereafter through grade 6. Clinical evaluation (including TST) was provided to contacts of infectious TB cases (>10 hours exposure in preceding 30 days) as well as potential source cases for individuals with primary tuberculosis.

1,471 cases of tuberculosis were analyzed in this study. Notes on potentially missing data are in the accompanying table (**Table S1**).

Supplementary Table 1. Description of clinical variables included in the study

Clinical Variable	Description	Missing data
Disease category	Clinical assessment of TB disease by TB control physician.	Data missing for 167 cases (11%)
Cavitary pneumonia	Pulmonary cavity identified on radiographic imaging of the chest. Chest X rays and other imaging tests were obtained during routine clinical care and were not obtained specifically for this study.	No chest imaging data for 148 cases (10%)
History of TB	Individual with TB has record of TB disease recorded in the TB control database, at least 2 years prior to the current diagnosis.	Unknown
History of LTBI treatment	Individual with TB has record of treatment administered for latent TB infection in the TB control database. Treatment may or not have been complete according to current standards.	Unknown
History of BCG vaccination	BCG status assessed by TB control physician.	Unknown
Medical risk factor identified	Medical risk factors for TB assessed by TB control physician. Risk factors identified in the database included HIV infection, steroid use, cancer, renal disease and diabetes. Diagnostic tests for these conditions were performed at the discretion of treating physicians, as required for patient care; no attempt was made to estimate rates of diseases other than tuberculosis.	Unknown
Case finding method	The means by which the TB case came to the attention of TB control (e.g. referral by primary care physician, contact tracing investigation).	Categorization missing for 4 cases (0.3%)

Population registry data

Annual population registry data were obtained from Saskatchewan Health registrations. Data were available for each of the 67 Aboriginal communities, for 16 of 19 years in the study period (1986-2004). Missing data for years 1988 and 1989 were imputed for all communities using linear regression fitted to the available census data from 1986 to 1991. Missing data for year 2000 were similarly imputed by fitting regression lines to census data from years 1998 to 2002. Mean annual census was calculated by averaging the yearly total census over the 19 years of the study period. For each community, age-group data were also obtained from Saskatchewan Health registrations in 5-year age bins. We used data available from 13 of the 19 years in the study period to calculate the mean annual census of the communities by age group.

Census data

The measure of household crowding we analyzed in this study is percent of households in the community with more than one person per room ($\% > 1\text{ppr}$, average of 1996 and 2001). For the purposes of defining this variable, a room is “an enclosed area within a dwelling that is finished and suitable for year-round living”, exclusive of bathrooms; in most household configurations, greater than 1 person per room occupancy would not meet accepted standards for adequate housing¹. We found the other crowding measure reported in the census (mean persons per room) to be highly correlated with $\% > 1\text{ppr}$ ($R=0.82$, Spearman’s test), and thus did not include it in statistical models. The community level of education variable we used was percent of the community aged 20-64y with less than a high school education (2001). There was no directly comparable variable in the 1996 census. Community rate of unemployment was included in our analyses (average of 1996 and 2001). We collected two measures of income from census reports: average income (Canadian dollars) among individuals in the community reporting income (1996 and 2001) and median income of households within the community (available for 2001 only). Income data for some of the communities were suppressed by Statistics Canada. For average individual income, data were suppressed for 10 communities in **Group 1**, and 5 communities in **Group 2**. For median household income, data were suppressed for 7 communities in **Group 1** and 3 communities in **Group 2**. As median household income data were complete, these were the data we included in statistical analyses.

Supplementary Table 2. Predictors of age-specific TB incidence 1986-2004: Multivariate Analysis of Covariance (MANCOVA)

Age Category	Independent variable	F statistic	P value	R-square
0-4y	historical group ^a	7.5	0.008	0.49
	zone ^b	1.2	0.31	
	crowding ^c	5.24	0.03	
	education ^d	0.52	0.47	
5-9y	historical group	11.28	0.001	0.55
	zone	5.66	0.002	
	crowding	0.46	0.5	
	education	0.2	0.65	
10-34y	historical group	9.77	0.003	0.76
	zone	27.86	<0.001	
	crowding	0.23	0.63	
	education	0.48	0.49	
35-64y	historical group	5.22	0.03	0.55
	zone	8.34	<0.001	
	crowding	0.02	0.88	
	education	0.75	0.39	
≥ 65y	historical group	2.54	0.12	0.29
	zone	1.67	0.18	
	crowding	0.17	0.68	
	education	0.24	0.62	

^a Group 1 (epidemic $t_0 < 1920$) or Group 2 (epidemic $t_0 > 1920$)

^b Indian and Northern Affairs (INAC) geographic categories; INAC classification is by [road] distance from nearest service center.

^c Percentage of households within the community reporting > 1 person per room occupancy. Source: Census 1996 and 2001.

^d Percent of the community aged 20-64y with less than a high school education, 2001 (Census).

Figure Legend

Figure S1 Secular trends in TB incidence, **Group 1** and **Group 2**, 1986-2004

Scatterplot of average annual incidence of TB/100,000 population in **Group 1** and **Group 2** communities, 1986-2004. The linear regression line is shown for both groups. **Group 1**, R-square = 0.04 (P=0.42); **Group 2**, R-square = 0.29 (0.02).

References

1. Larcombe L, Orr P. Housing conditions that serve as risk factors for tuberculosis infection and disease. Canada Communicable Diseases Report. 2007;33:1-13.

Secular trends in TB incidence, 1986-2004

