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Tuberculosis epidemiology in New Zealand: 1995–2004

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Abstract

Aims To describe the epidemiology of tuberculosis (TB) in New Zealand (NZ) for the 10-year period 1995–2004, and to place this in the context of long-term incidence trends.

Methods We calculated TB incidence rates since the early 1920s using published data. A more detailed analysis examined TB notification and laboratory data for the period 1995 to 2004 using population denominator data from the 1996 and 2001 Census. We calculated incidence rates by age, sex, ethnicity, place of residence, country of birth, and deprivation for the two 5-year periods: 1995 to 1999 and 2000 to 2004. We also calculated and compared TB case fatality and mortality rates for those periods. We described outbreaks by using TB outbreak reporting data.

Results The long-term decline in TB incidence in NZ halted in the mid-1980s, and in the last two decades, annual rates have stabilised at around 10 cases per 100,000. The average rate for 1995-2004 period was 10.3 per 100,000. The TB incidence rate in NZ is higher than that in Australia, USA, and Canada, and slightly lower than that in the UK. Within NZ there are marked ethnic differences in rates, with age-standardised incidence rates 10.5, 22.3, and 36.5 times higher in Māori, Pacific peoples, and people of Other ethnicity respectively than the rate in Europeans. Rates generally increase with age. Approximately two-thirds (64.6%) of people with TB were born overseas. TB case fatality and mortality rates in NZ are declining and are comparable to those in Australia, Canada, USA, and the UK. Twenty-four TB outbreaks, including 221 cases, were reported between mid-1996 and 2004.

Conclusions TB is not declining in NZ. The burden of disease is very unevenly distributed across the population with marked ethnic inequalities.

During the past several decades, developed countries made remarkable progress in tuberculosis (TB) control. Indeed, even before the advent of anti-TB drugs in the 1940s and 1950s, notification rates were declining. The availability of anti-TB drugs further accelerated the decline.[1,2] However, the trend was halted in the mid-1980s and many developed countries experienced a rise in the incidence of TB.[3]

In New Zealand (NZ), TB notification steadily declined after the Second World War and reached a nadir of 295 in 1988. In subsequent years, between 300 and 450 cases have been reported annually with a notification rate of around 10 per 100,000.[4] This paper reports trends in the incidence of TB in NZ from the early 1920s and describes in detail the epidemiology of TB in NZ for the 10-year period from 1995 to 2004. Such information is essential to assess current TB prevention and control measures and identify areas where improvements can be made.

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Methods

This analysis was largely based on anonymised TB surveillance and outbreak data from the Institute of Environmental Science and Research Ltd (ESR) as well as population data from Statistics NZ (Statistics NZ). In addition, TB crude incidence rates for the years 1922 to 1995 were calculated using numerator data from annual reports of the Director-General of Health and population information from NZ Yearbooks and more recently from Statistics NZ publications.

TB is a notifiable disease in NZ. Any medical practitioner diagnosing or suspecting a case of new or relapsed TB is required, under the Tuberculosis Act 1948, to notify the case to the local Medical Officer of Health (MOH). Local public health staff enter these TB notifications and additional laboratory data onto a national computerised database (EpiSurv). These data are centrally compiled at ESR.

For surveillance, the notification data are supplemented with TB laboratory data to:

- Identify cases that have not been notified; and to
- Provide additional information about each laboratory confirmed case, including typing information.

This report includes both 'confirmed' and 'probable' cases.

A confirmed case of TB is one that has been laboratory confirmed by one of the following:

- Positive culture for *Mycobacterium tuberculosis* or *Mycobacterium bovis*;
- Positive microscopic examination for acid fast bacilli when a culture has not been or cannot be obtained;
- Demonstration of *Mycobacterium tuberculosis* or *Mycobacterium bovis* nucleic acid in specimens;
- Histology strongly suggestive of TB.

A probable case of TB is one where there is no laboratory confirmation, but:

- There are symptoms and signs compatible with active TB, such as compatible radiology or clinical evidence of current disease, and
- Full anti-TB treatment has been started by a clinician.

We included in this analysis all TB cases meeting the above case definition, and notified between 1 January 1995 and 31 December 2004. This analysis excluded latent TB infections (LTBI) on treatment (i.e. Mantoux-positive but no evidence of active disease) but included relapsed/reactivated disease on treatment.

For the two 5-year periods (1995–1999 and 2000–2004), we analysed cases by district health board (DHB) of residence, age, sex, ethnicity and country of birth, and NZ indices of deprivation (NZDep96 and NZDep01), which are area based measures of socioeconomic deprivation constructed from 1996 and 2001 Census data respectively. We also calculated case fatality rate (percentage of TB cases who die of TB) and annual mortality rate (rate of TB deaths per 100,000 population per year).

Annual incidence rates were calculated by dividing the number of cases notified during the year by mid-year population (estimated and published by Statistics NZ) and expressing the result as cases per 100,000. If mid-year population estimates were not available for a particular variable (e.g. DHB of residence) or combination of variables, we used census data (1996 data for calculation up to 1999 and 2001 data subsequently) to calculate rates.

EpiSurv recorded self-reported ethnicity of cases. There was provision for indicating more than one ethnicity in the TB case report form and in the census form. We used Statistics NZ's 'prioritised ethnicity' concept for both numerator and denominator.[5] Prioritisation of ethnic group data assigns each person to just one ethnic group when a multiple response is given. In this analysis we used four prioritised ethnic groups: Māori, Pacific people (mostly of Samoan, Tongan, Niuean, or Cook Islands origin), 'Other' (Asian and non- Māori, non-Pacific, and non- European combined) and European (NZ and other European combined).

We age-standardised incidence rates to the NZ population age structure of the 2001 Census. Trend lines in TB incidence rates were generated by the least square method and were tested for statistical significance by the Chi-square test for trend. We used Microsoft Excel and EpiInfo (version 3.3.2)

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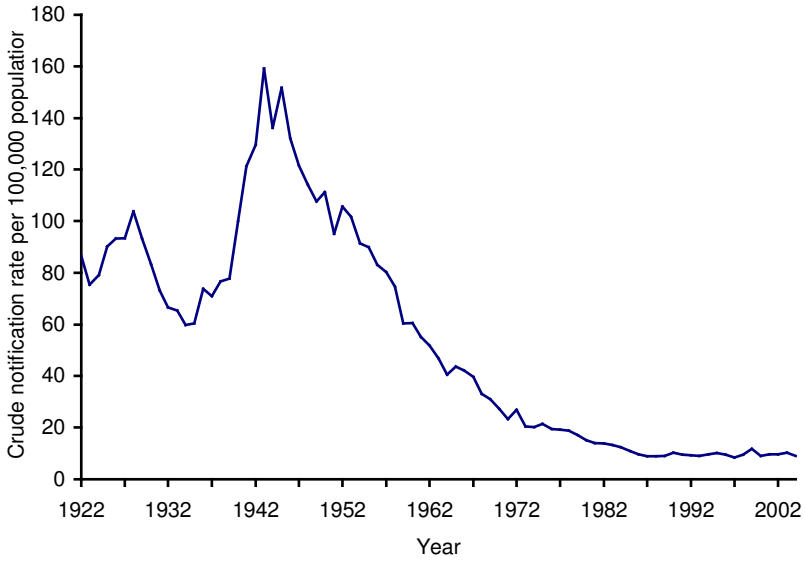
software to analyse the data. We described outbreaks using outbreak-reporting data, which is also entered into EpiSurv.

Results

TB incidence by year—In the late 1920s and early 30s the TB incidence rate was declining. In the mid-30s, the trend was reversed and disease incidence peaked during the time of the Second World War with 2603 cases and a rate of 159.1 per 100 000 in 1943. The TB incidence rate then declined steadily for the following 40 years up to the late 1980s (Figure 1).

Figure 1. Tuberculosis notification rate (crude rate per 100,000), New Zealand, 1922–2004



Over the two decades from 1985 to 2004, between 300 and 450 cases were notified annually with a significant ($p<0.001$) increasing trend (Figure 2). The lowest number of notifications (295 cases) was in 1988. In spite of the increasing trend in the number of notified cases, the crude TB incidence rate has remained constant within a narrow range around 10 per 100,000 for these two decades (Figure 1). The crude rate for the 1995-2004 period was 10.3 per 100,000. The lowest incidence rate (8.5 per 100,000) was noted in 1997.

TB incidence by District Health Board—Table 1 in the Appendix shows the crude incidence rate of TB for each DHB for the two 5-year periods from 1995 to 2004. Some DHBs have consistently higher rates than the others. In the 1995–1999 period, DHBs with rates above 10 per 100,000 were Auckland (22.8), Counties Manukau (19.1), Hutt Valley (14.8), Capital and Coast (14.2), and Northland (10.2). In 2000–2004, DHBs with rates above 10 per 100,000 were Auckland (20.9), Counties Manukau (18.5), Capital and Coast (16.2), Hawke's Bay (14.9), Waitemata (12.0), and Hutt Valley (11.4).

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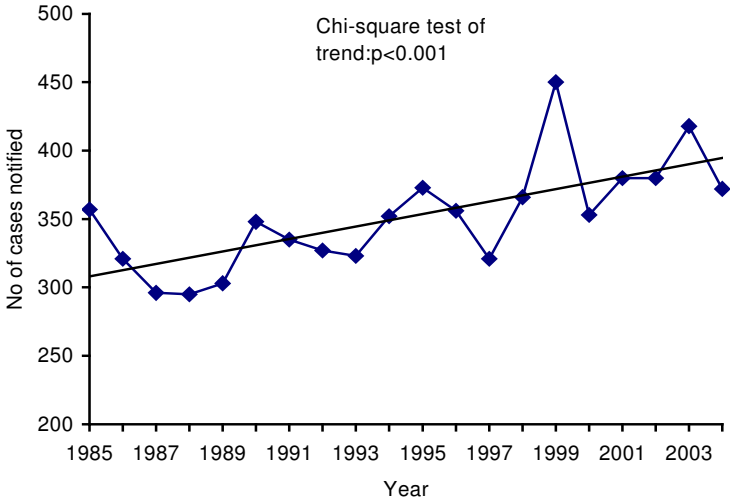
TB rates were consistently higher in overseas-born people than in NZ-born people in all DHBs and in both time periods. The rates in NZ-born were below 10 per 100,000 in all DHBs except in Counties Manukau in 1995–99 (10.8 per 100,000) and Hawke's Bay in 2000–2004 (11.9 per 100,000). In Hawke's Bay there was more than a three-fold increase in rate in the NZ-born between 1995–1999 and 2000–2004 (from 3.3 to 11.9 per 100,000). This increase was presumably due to a large outbreak in 2002 involving NZ-born people (mainly Māori).[6]

Figure 2. Number and trend in tuberculosis notifications, New Zealand, 1985–2004



TB incidence by age and sex—TB incidence by age groups has a bimodal distribution with higher rates in young adults and the elderly (Table 1, Figure 3). In the 1995–1999 period, rates were highest in the ≥70 group (20.3 per 100,000). However in the 2000–2004 period the highest rate was observed in the 20–29 years age group (18 per 100,000).

Comparison of the two 5-year periods (1995–1999 and 2000–2004) indicates that rates have risen significantly in adults in the age group 20–29 years ($p<0.001$). Rates have fallen significantly in 0–9 years ($p<0.02$), 50–59 years ($p<0.05$) and ≥70 years ($p<0.001$). In all other age groups, there are no significant changes in the incidence rates between the two periods.

In the whole 10-year period, sex was recorded for 99.2% (3743 /3772) of cases. The proportion of cases in males (1923 or 51.4%) was similar to females (1820 or 48.6%).

TB incidence by ethnicity—Europeans have the lowest age-standardised annual incidence rates and people of Other ethnicity have the highest, with Māori and Pacific people in between (Table 1). Between the two 5-year periods, the age-standardised rates declined significantly in Europeans and in people of Other ethnicity, with no significant changes in rates in Māori and Pacific people. In the whole 10-year period,

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the age standardised annual incidence rate for different ethnic groups were as follows: European - 2.0/100,000, Maori - 21.1/100 000, Pacific people - 44.8/100 000 and people of Other ethnicity - 73.1/100 000. This means that compared to European New Zealanders, Maori, Pacific and people of Other ethnicity had 10.5, 22.3 and 36.5 times higher risk of having TB respectively.

TB incidence by age and ethnicity—Figure 4 shows the age specific rates of TB for European, Māori, Pacific, and Other ethnic groups. Ethnicity and date of birth were not recorded for 133 and 6 cases respectively, and these records are excluded from the analysis. The actual number of cases and the age-specific incidence rates in different ethnic groups are shown in Table 2 in the Appendix. The higher rates of TB observed in the 20–29 year and 30–30 year age groups (Figure 3) are due to overrepresentation of people of Pacific and Other ethnicity in these age groups (Table 2 in the Appendix).

In all ethnic groups, the incidence rates generally rise with increasing age and are highest in people aged 70 years or over. However, in people of Other ethnicity high rates are also observed in young adults (20–39 years). When the two 5-year periods are compared, it is observed that in recent years the rates have significantly decreased in some age groups of European, Māori, and people of Other ethnicity. On the other hand, TB incidence has risen significantly in young Pacific adults (20–29 years old), which is contributing to a significant increase in the age-specific rate in 20–29 years in the total population (Figure 3).

TB incidence by place of birth—For the total 10-year period, country of birth was recorded for 89.3% (3367/3772) cases. Of these cases, 35.4% (1193) were born in NZ and 64.6% (2174) were born overseas. Figure 5 shows the number of TB cases with known country of birth (NZ-born and overseas-born) for the period 1995 to 2004. While the decreasing trend in the number of NZ-born cases is not significant ($p=0.606$), there is a significant ($p<0.001$) increasing trend in the number of cases in overseas-born people during this period. However, there was no significant increase in the incidence rate in overseas-born people between 1996 (31.7 per 100,000) and 2001 (32.3 per 100,000).

TB incidence by NZ Index of Deprivation (NZDep)—The incidence of TB generally increased with increasing deprivation, particularly for the most deprived decile (Figure 6). This pattern was more evident in the 2000–04 period where the average rate in the most deprived 20% of the population (19.7 / 100 000) was 3.7 times higher than in the least deprived (5.3 / 100 000). In the 1995–99 period, a large number of cases were notified from one particular area of low deprivation which resulted in a somewhat "U-shaped" distribution. During that period the average rate in the most deprived 20% of the population (15.5 / 100 000) was 1.4 times higher than in the least deprived (10.7 / 100 000).

Death due to TB—Of the 3772 cases notified during 1995–2004, 227 died from TB. This variable was not reported for 343 cases so they are excluded from the analysis. For the 1995–1999 period, the case fatality rate averaged 8.0% and mortality rate averaged 0.7 per 100,000. For the 2000–2004 period, the case fatality rate averaged 5.3% and the mortality rate averaged 0.5 per 100,000. Both the case fatality rate ($p=0.01$) and mortality rate ($p=0.03$) were significantly lower in the 2000–2004 period than in the 1995–1999 period.

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Table 1. Incidence of tuberculosis by age, sex, ethnicity, and place of birth (NZ or overseas), New Zealand, 1995–2004

Variables	1995–1999					2000–2004					Total cases
	Cases	Population[2]	Rate[4]	Rate ratio (RR)	95% CI of RR	Cases	Population[3]	Rate[4]	Rate ratio (RR)	95% CI of RR	
Age[1]											
0 to 9	170	567897	5.99*	0.99	0.80-1.24	129	557004	4.63*	0.75	0.59-0.95	299
10 to 19	158	527163	5.99	Reference		171	556026	6.15	Reference		329
20 to 29	317	545064	11.63*	1.94	1.60-2.35	439	486684	18.04*	2.93	2.46-3.50	756
30 to 39	313	578700	10.82	1.80	1.49-2.18	340	576738	11.79	1.92	1.60-2.30	653
40 to 49	216	496227	8.71	1.45	1.18-1.78	209	537405	7.78	1.26	1.03-1.55	425
50 to 59	189	345321	10.95*	1.83	1.48-2.26	187	418434	8.94*	1.45	1.18-1.79	376
60 to 69	214	268239	15.96	2.66	2.17-3.27	187	282480	13.24	2.15	1.75-2.65	401
≥70	294	289692	20.30*	3.39	2.79-4.11	233	322512	14.45*	2.35	1.93-2.86	527
Unknown	3					3					6
Sex											
Female	894	1,840,839	9.58	Reference		924	1,914,270	9.55	Reference		1818
Male	972	1,777,461	11.38	1.19	0.81-1.74	963	1,823,007	10.73	1.12	0.74-1.70	1935
Unknown	8					11					19
Ethnicity											
European	382	2,594,688	2.56*	Reference		209	2,610,408	1.43*	Reference		591
Māori	352	523,371	23.55	9.18	8.07-10.44	332	526,281	20.46	14.34	11.80-17.43	684
Other ethnicity	763	175,347	109.25*	42.60	42.03-43.17	939	249,792	79.73*	55.89	54.12-57.72	1702
Pacific people	303	173,181	51.77	20.19	19.57-20.83	359	200,253	48.79	34.20	32.68-35.79	662
Unknown	74					59					133
NZ- or overseas born											
NZ-born	631	2,848,209	4.60	Reference		562	2,890,869	3.91	Reference		1193
Overseas-born	998	605,019	31.69	6.88	6.05-7.83	1176	698,595	32.30	8.25	7.14-9.54	2174
Unknown	245					160					405

[1]For the variable 'age', the rate, rate ratio, and the 95% CI are age-specific; [2] Census 1996, [3] Census 2001, [4] Age-standardised rate per 100,000, *Statistically significant difference, at the 95%CI in the rates between the two time periods.

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Figure 3. Average annual incidence rate of tuberculosis by age group, New Zealand, 1995–1999 and 2000–2004

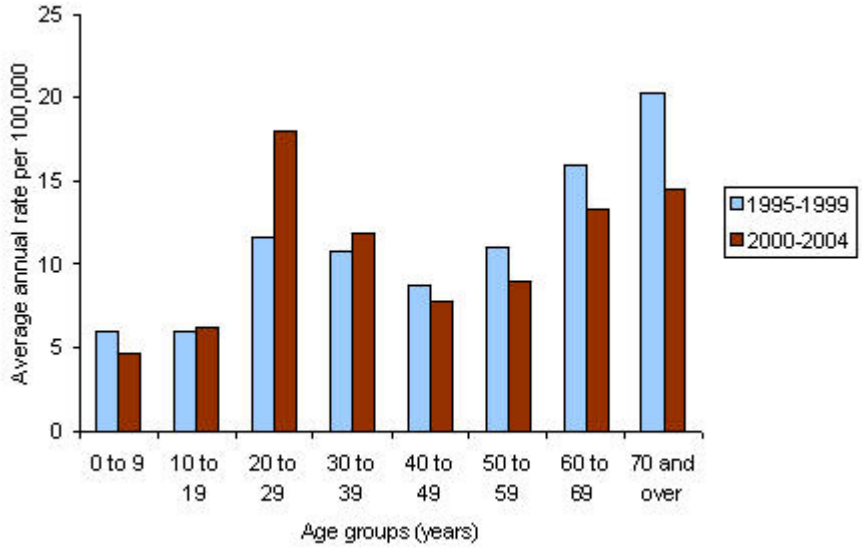
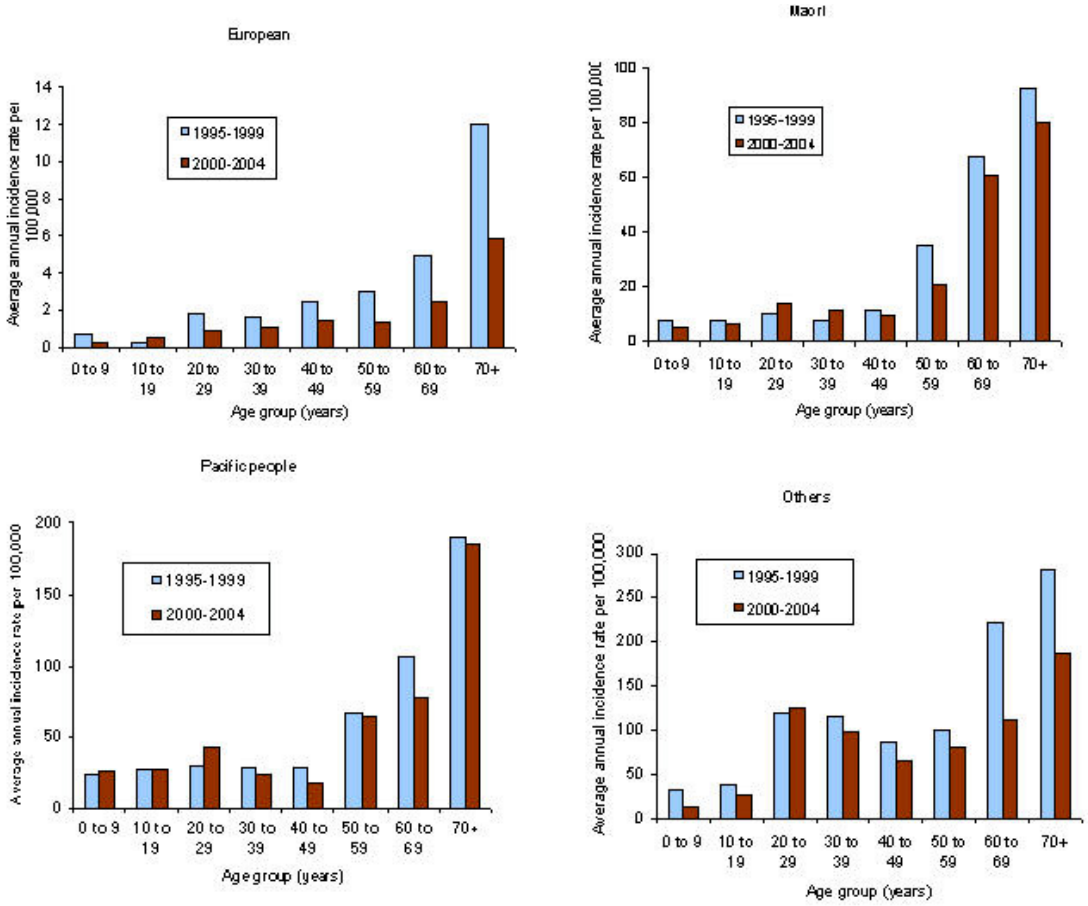


Figure 4. Incidence rate of tuberculosis by age group and ethnicity, New Zealand, 1995–1999 and 2000–2004



Note that Y-axis scale is different for different ethnicities; Other=Asian and non- Māori, non-Pacific, and non- European combined.

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Figure 5. Numbers and trends of tuberculosis cases in NZ-born and overseas-born people, New Zealand, 1995–2004

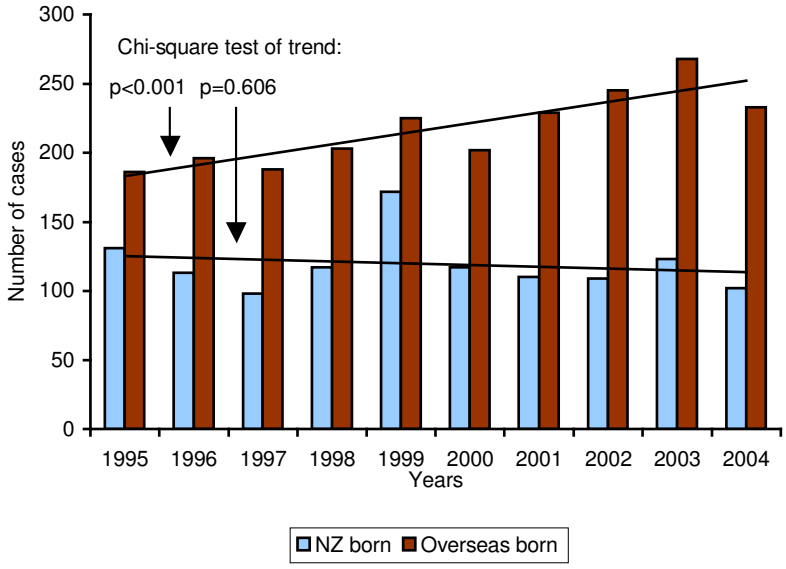

Figure 6. Tuberculosis incidence rate by NZ Index of Deprivation, New Zealand, 1995–1999 and 2000–2004

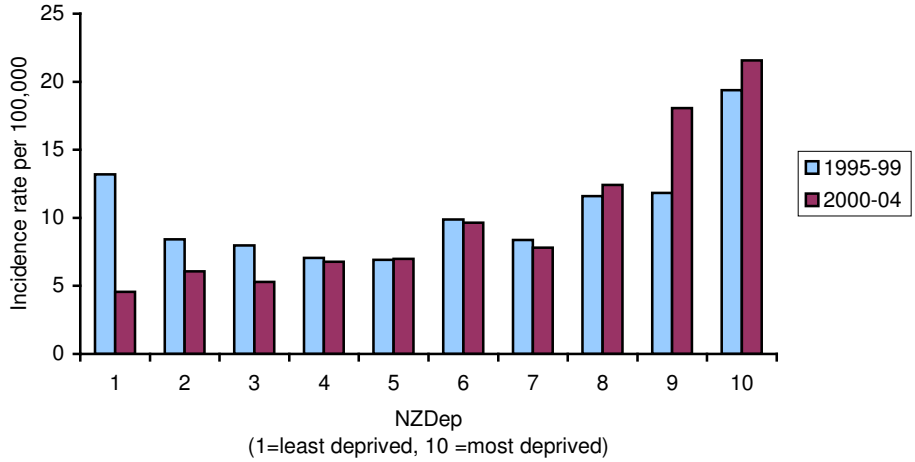

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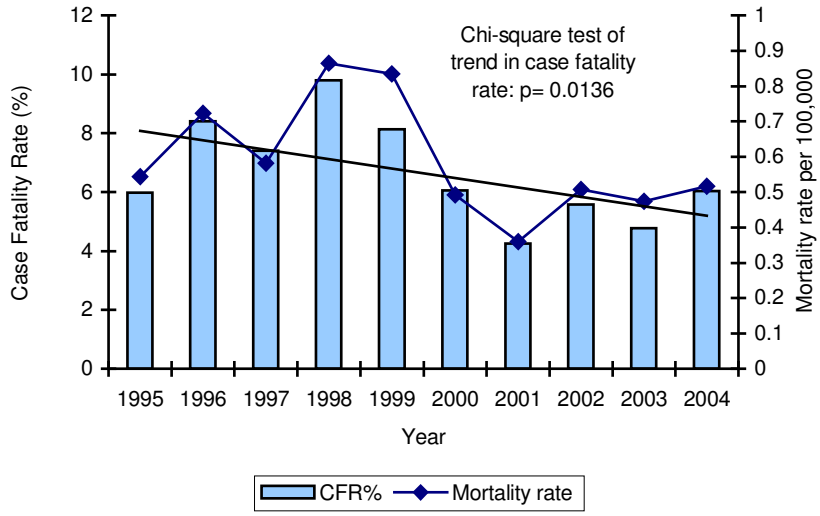
Figure 7 shows the TB case fatality and mortality rates and their trend in the period 1995–2004. The significant declining trend line for case fatality rate (p=0.014) results in a parallel decline in mortality rate (non-significant, p=0.057) over this period.

Figure 7. Tuberculosis case fatality and mortality rates, New Zealand, 1995–2004



Outbreaks—Outbreak information is recorded in two ways on EpiSurv: the outbreak reporting system and the case report form. An outbreak is defined as two or more cases that are linked by epidemiological investigation or DNA fingerprinting. A cluster of cases all living in the same household is not considered an outbreak. The outbreak reporting system recorded 24 TB outbreaks involving a total of 241 cases (including cases of LTBI) between June 1996 and the end of 2004. As an outbreak unfolds, the EpiSurv records get updated, though this process is not entirely complete. For example, in EpiSurv there are several outbreaks with only one case recorded, which by definition is not an outbreak.

Through the outbreak reporting system, nine outbreaks were reported from Auckland, six from Hawke's Bay, three from Wellington and two from Wanganui in this period. Forty-seven percent of cases in outbreaks were Pacific people and 41% were Māori, whereas in non-outbreak situations their proportions were 16% and 15% respectively. Individual case report forms recorded 221 cases of TB disease (6.8%) as being part of outbreaks between June 1996 and December 2004.

Discussion

This review of TB epidemiology indicates that the incidence of TB in NZ has not declined over the past two decades. The moderate increase in case numbers over this period has been offset by an increase in population resulting in no net increase in the crude rate of disease. This finding is consistent with the results of a previous study,

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which found a stable rate of bacteriologically and histologically confirmed cases for the period 1985–1990.[7]

NZ has a higher rate of TB than some other developed countries. Australia, Canada, and the USA all had annual incidence rates between 5 and 6 per 100,000 during the period 2000–2003.[8] UK had a higher rate of around 12 per 100,000.[8] The TB incidence rate declined in recent years in some of these countries. For example, USA had a gradual decline in incidence rate from 9.8 per 100,000 in 1993 to 5.1 per 100,000 in 2003.[9] Canada has also had a gradual decline in the incidence rate from 7.2 per 100,000 in 1991 to 5.2 per 100,000 in 2002.[10] However, the incidence rate remained stable in Australia[11] (in the last 20 years) and the UK[12] (in the last 15 years).

In terms of mortality, NZ rates are comparable to those of other countries. In NZ the average annual TB mortality rate declined from 0.7 per 100,000 in 1995–1999 period to 0.5 per 100,000 in 2000–2004 period. In the USA, the TB mortality rate was halved between 1993 and 2003 (from 0.6 per 100,000 to 0.3 per 100,000).[9] In England and Wales, the TB mortality rate declined from 0.83 per 100,000 in 1993 to 0.74 per 100,000 in 2003.[12]

The TB case fatality rate in NZ (average 8.0% in 1995–1999 and 5.3% in 2000–2004) was comparable to that in Canada in 2001 (5.8%).[10] The decline in mortality was mainly due to the decline in case fatality rate, as the TB incidence rate remained stable during this period.

Probably the most important trend over the 1995–2004 period was the diverging number of NZ- and overseas-born cases (Figure 5). While NZ-born cases are declining, overseas-born cases are increasing. However, the incidence rate in overseas-born people did not increase significantly between 1996 and 2001 (31.7 and 32.3 per 100,000 respectively). The increased number of overseas-born cases without a concomitant increase in the rate can be explained by a disproportionate increase in the size of the overseas-born population (an approximate 15% increase compared to about 10% for the total NZ population) between 1996 and 2001. The net effect is that NZ's total TB incidence rate has remained static.

The contribution of immigration from high incidence countries, human immunodeficiency virus infection, multi-drug-resistant TB, and *Mycobacterium bovis* infection to total TB incidence in NZ is explored in detail in the following article in this issue of the *Journal*.[13]

Probably the most striking feature of TB epidemiology in NZ is the huge and persisting differences in incidence rate by ethnicity. For the whole 10-year period studied, the age-standardised incidence rates in Māori, Pacific people, and people of Other ethnicity are approximately 10, 22, and 36 times higher, respectively, than the rate in Europeans. This finding is consistent with previous observations.[4,7,14] For all ethnic groups, TB rates reflect age cohort levels of infection and population socioeconomic status. Socioeconomic status is an important determinant of the disparity between European rates and those of the other groups. For Pacific people and people of Other ethnicity, pre-migration infection and subsequent development of disease is a major factor contributing to this disparity.

Cases occurring as part of reported outbreaks give an indication of ongoing disease transmission within NZ. The proportion of cases (6.8%) belonging to outbreaks is

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lower than previously reported (10%).[4,14] However, these proportions are likely to be underestimates, as several outbreaks had only one recorded case suggesting that outbreak reporting is incomplete. Māori and Pacific people are disproportionately affected by outbreaks, indicating social factors such as poor access to healthcare, delayed diagnosis and increased transmission due to overcrowding. There is some evidence that the incidence of TB is associated with overcrowding at the census area unit level.[15] We will report on our investigation of this association in a future paper. As TB outbreaks are often prolonged, the outbreak information gets updated by recording outbreak number in the case report form of subsequent cases, which does not happen reliably. This mismatch has also been noted previously.[4,14] There is a need to improve the outbreak information updating system in the individual case report form in EpiSurv and to standardise the case definitions so that cases of active disease can be distinguished from cases of LTBI.

This analysis has identified quite marked variations in TB burden between different DHB regions. An indication of local transmission is provided by the incidence rate in NZ-born cases, which effectively excludes the contribution from migration. Such rates were generally low across NZ. An exception was the Hawke's Bay DHB, which was the only DHB where there was a significant rise in TB rate over the 10 years observation period (Table 1 in Appendix). This increase was explained by a large outbreak in 2002.[6]

Surveillance data have inherent limitations for describing disease occurrence and distribution. Previous analyses have shown a degree of under-ascertainment (for TB in children this was 4% over the period 1 January 1992 to 30 June 2001,[16] and in Otago in the early 1990s this was 33% for 1985-90 and 48.5% for 1991–92).[17] The current surveillance system has measures to increase its sensitivity, including using both notification and laboratory data, availability of EpiSurv software in all public health services and dedicated clerical staff.[14] The findings of this study are limited by incomplete data on some variables. For example, ethnicity and country of birth were not recorded in 133 (3.5%) and 405 (10.7%) of notified cases.

For calculation of rate by ethnicity, where there were multiple responses, we used the Statistics NZ prioritised ethnicity approach for both the numerator and denominator. However, it is possible that the numerator (surveillance data) and denominator (census data) were collected differently. In the census, ethnicity recorded is self-identified. EpiSurv is supposed to record client-identified ethnicity (including multiple responses if that is applicable). However, this may not happen consistently, particularly in a hospital setting.[18] The health professional notifying the case might indicate only one ethnicity from his or her general knowledge of the patient or from the front sheet of the hospital record without specifically enquiring about multiple ethnicities the patient might belong to.

It has been repeatedly shown that hospital records are more frequently coded with sole rather than multiple ethnicities.[14,18] These practices create a numerator-denominator bias which we cannot eliminate. The effect is to underestimate TB rates in Māori.[18] This underestimation has been observed for other diseases as well.[19]

In conclusion, this review of the epidemiology of TB in NZ paints a mixed picture of success in the prevention and control of this disease. Positive observations are the

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decline in incidence rate in European, in people of Other ethnicity, and the steady decline in case-fatality rate among reported cases.

Persistent ethnic disparities in TB risk remain a major concern. The main challenge to TB control in NZ, as in other developed countries, is the high global prevalence of infection in developing countries.[1] This global disease burden manifests itself in a high prevalence of infection in migrants from these countries and is a further reminder of the urgent need to increase TB prevention and control at a global level.[1] This analysis also demonstrates that ongoing TB transmission within NZ remains an import source of disease. The factors contributing to such transmission will be examined in detail in a future paper.

Disclaimer: Parts of this work are based on data and information provided by the Institute of Environmental Science & Research Limited (on behalf of the Ministry of Health) and Statistics New Zealand. However, the analyses, conclusions, opinions, and statements expressed herein are those of the authors, and not necessarily those of the Institute of Environmental Science & Research Limited, the Ministry of Health, or Statistics New Zealand.

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Appendix

Table 1. Tuberculosis number and incidence rate by District Health Board, New Zealand, 1995–1999 and 2000–2004

District Health Board	1995–1999						2000–2004					
	NZ-born		Overseas-born		Total[1]		NZ-born		Overseas-born		Total[1]	
	Number	Rate[2]	Number	Rate[2]	Number	Rate[2]	Number	Rate[2]	Number		Number	Rate[2]
Auckland	63	5.7	325	63.3	395	22.8	50	4.5	335	54.2	385	20.9
Bay of Plenty	16	2.3	9	9.8	54	6.6	21	2.8	4	3.7	60	6.7
Canterbury	60	3.5	52	18.1	164	8.0	32	1.8	53	16.4	94	4.4
Capital and Coast	40	4.7	121	46.2	167	14.2	51	5.7	135	47.6	199	16.2
Counties Manukau	127	10.8	193	44.6	327	19.1	119	9.6	226	41.4	348	18.5
Hawke's Bay	20	3.3	14	19.5	51	7.1	73	11.9	23	29.0	107	14.9
Hutt Valley	39	7.5	53	43.9	98	14.8	24	4.6	48	38.7	75	11.4
Lakes	20	5.0	6	11.0	35	7.4	5	1.3	6	10.4	33	6.9
MidCentral	23	3.4	14	15.6	47	6.0	16	2.4	30	33.0	54	7.0
Nelson-Marlborough	8	1.6	6	8.8	19	3.3	2	0.4	7	9.0	14	2.3
Northland	38	6.7	5	6.7	70	10.2	23	4.1	11	13.7	49	7.0
Otago	26	3.4	17	17.5	45	5.1	15	2.0	14	13.9	32	3.7
South Canterbury	10	4.1	1	4.8	11	4.0	1	0.4	2	9.5	5	1.9
Southland	9	1.9	3	7.8	25	4.6	5	1.1	2	4.9	13	2.5
Tairawhiti	11	5.5	1	6.7	13	5.7	7	3.6	1	6.5	8	3.6
Taranaki	9	1.9	2	4.4	13	2.4	12	2.7	5	11.0	18	3.5
Waikato	37	2.8	39	21.3	119	7.6	23	1.7	70	34.1	113	7.1
Wairarapa	6	3.6	1	5.5	7	3.6	6	3.6	6	30.6	15	7.9
Waitemata	47	3.4	130	26.0	183	9.3	61	4.2	197	32.0	258	12.0
West Coast	4	2.8	2	18.7	6	3.7	2	1.5	1	8.8	4	2.6
Whanganui	18	6.1	4	14.0	25	7.4	13	4.7	1	3.5	14	4.4

[1] Total includes cases whose birthplace status is unknown;

[2] Annual incidence rate per 100,000.

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Table 2. Tuberculosis number and incidence rate by age group and ethnicity, New Zealand, 1995–1999 and 2000–2004

Age group (years)	European				Māori				Pacific people				Other ethnicity			
	1995–1999		2000–2004		1995–1999		2000–2004		1995–1999		2000–2004		1995–1999		2000–2004	
	Number	Rate[1]	Number	Rate[1]	Number	Rate[1]	Number	Rate[1]	Number	Rate[1]	Number	Rate[1]	Number	Rate[1]	Number	Rate[1]
0 to 9	12	0.7	4	0.3	53	7.6	32	4.8	52	23.7	62	25.9	45	31.4	27	13.0
10 to 19	4	0.2	8	0.5	41	7.5	36	6.4	47	27.6	55	27.7	65	36.1	67	25.9
20 to 29	33	1.8	13	0.9	47	10.4	58	14.1	47	29.7	73	43.2	179	117.9	288	125.3
30 to 39	32	1.6	21	1.1	30	7.7	45	11.6	38	28.3	36	22.4	206	115.3	232	97.7
40 to 49	45	2.4	29	1.5	29	11.5	27	9.3	25	27.8	20	18.2	109	84.9	127	65.3
50 to 59	42	3.0	22	1.3	53	35.2	34	20.6	34	66.5	43	64.4	51	99.4	81	79.8
60 to 69	56	4.9	28	2.4	59	67.6	59	60.6	30	106.4	29	77.7	58	213.4	63	111.1
70 & over	157	12.0	84	5.8	40	92.3	39	80.1	30	190.1	41	184.9	49	308.2	54	186.8
All age group combined[2]	381	2.6	209	1.4	352	23.5	330	20.4	303	51.8	359	48.8	763	109.3	939	79.7

[1] Average annual incidence rate per 100,000.

[2] Age-standardised rate per 100,000, standardised to the NZ-population-age-structure of the 2001 Census.

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