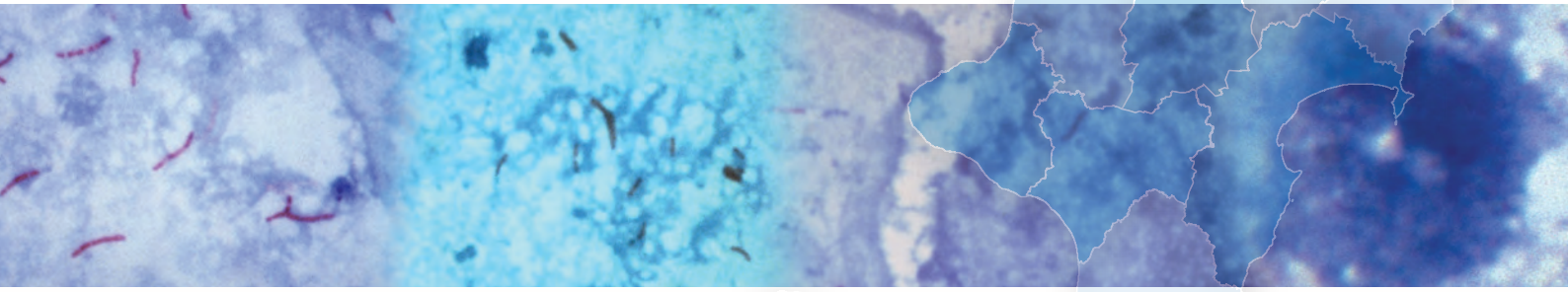
ESR

SURVEILLANCE REPORT



Tuberculosis in New Zealand

2012

Prepared as part of a Ministry of Health contract for scientific services by the Health Intelligence Team, Institute of Environmental Science and Research Limited

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Disclaimer

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SUMMARY

SUMMARY

Tuberculosis disease (TB) is a notifiable condition in New Zealand and the TB notification rate has been more or less stable over the last five years. The 2012 TB notification rate was 6.6 per 100 000 population. The vast majority of TB notifications were for new disease. Relapse/reactivation cases contributed sparingly to the notifications. A high proportion of TB cases were laboratory confirmed largely through positive culture for *Mycobacterium tuberculosis* complex (predominantly *M. tuberculosis)*.

The pattern of disease detection for new TB cases has been consistent over the past five years with more than two thirds of TB cases diagnosed when they presented with symptoms to a health practitioner. Around 10% of cases were identified through immigrant/refugee screening.

As in previous years, there were differences in new TB notification rates by all the demographic variables. Rates were higher in males compared with females, especially in the older age groups. The Asian and Middle Eastern/Latin American/African (MELAA) ethnic groups have consistently experienced the highest notification rates, although the number of MELAA cases remains relatively low.

Ministry of Health hospitalisation data showed a decreasing trend in hospital admissions for TB over the last decade. This was true for all age groups analysed.

Being born outside of New Zealand and current or recent residence with a person born outside New Zealand have consistently been dominant risk factors whereas exposure in a healthcare setting and current or recent residence in an institution were reported for comparatively few new TB cases. As in previous years, higher rates of TB occurred in socio-economically deprived areas.

Pulmonary disease was more common amongst new TB cases born in New Zealand than amongst overseas born cases. There were no cases of miliary TB in children aged less than five years in 2012 and only one case reported in the last five years. There were no cases of tuberculous meningitis in this age group over the same time period.

Most new TB cases in 2012 were reported to have received treatment. For cases where the time between the onset of symptoms and start of treatment could be calculated, around 30% started treatment within 1 month of the onset of illness with a similar proportion starting treatment within 1−3 months.

Human immunodeficiency virus (HIV) co-infection remained low in 2012 with three of the 279 new TB cases co-infected with HIV.

There were three outbreaks of *Mycobacterium tuberculosis* and 22 associated cases reported in 2012.

Between 2003 and 2012, there have been significant trends of decreasing ethambutol resistance and pyrazinamide resistance, but no significant changes in resistance to isoniazid, rifampicin or streptomycin. There were four cases of multidrug-resistant tuberculosis (MDR-TB) in 2012, but none were identified as extensively drug-resistant tuberculosis (XDR-TB).

Resistance to all antimicrobials, except pyrazinamide, was higher in isolates from cases born outside New Zealand than in isolates from New Zealand-born cases.

Isoniazid, rifampicin, ethambutol, pyrazinamide and streptomycin resistance was most frequent in cases from the Asian ethnic group.

Around a third of *M. tuberculosis* isolates that underwent molecular typing between 2008 and 2012 had results that matched other typed isolates i.e. were non-unique and could be assigned to clusters. Most clusters contained a small number of cases (less than five).

INTRODUCTION

INTRODUCTION

Worldwide, tuberculosis disease (TB) is one of the most common causes of death from a communicable disease. It is an ancient disease that almost disappeared from the world public health agenda in the 1960s, but returned in the early 1990s following the HIV/AIDS pandemic, and was sustained by a subsequent increase in drug resistance. Infection is usually curable with a combination of specific antibiotics, but this relies upon full compliance with treatment. The World Health Organization's most recently published global TB incidence rate was 125 per 100 000 population for 2011, with widely variable regional rates. TB is more prevalent in, but not confined to, low-income countries. The target for TB elimination is to reduce the global annual incidence to less than 1 case per million population by 2050. This requires a 1000-fold reduction in a relatively short time span [1].

In New Zealand, TB is notifiable under the Tuberculosis Act 1948. The 2011 notification rate of TB in New Zealand was 7.0 per 100 000 population, which is higher than Australia (6.0 per 100 000), Canada (4.5 per 100 000) and the United States of America (3.9 per 100 000) [1]. TB is one of a number of infectious diseases, including acute rheumatic fever, meningococcal disease and skin infections, that plays a major role in ethnic and socioeconomic inequalities in New Zealand [2].

This report summarises the descriptive epidemiology of TB notifications in New Zealand for 2012 and trends since 2003 where data is available. It also includes a summary of TB drug susceptibility and molecular typing trends. For the first time, this report also summarises hospitalisation and death data from the Ministry of Health's National Minimum Dataset and the National Mortality Collection.

The primary audience of this report is the New Zealand Ministry of Health and TB practitioners, including Medical Officers of Health and respiratory and infectious disease physicians.

METHODS

METHODS

Data sources

This report presents tuberculosis disease notification data recorded on EpiSurv, the national notifiable diseases database, as well as tuberculosis isolate antimicrobial susceptibility and mycobacterial species identification data provided to the Institute of Environmental Science and Research Ltd (ESR) by the mycobacteriology reference laboratories at Auckland City Hospital (LabPlus), Waikato Hospital and Wellington Hospital; and tuberculosis molecular typing data reported to ESR by LabPlus. Ministry of Health data on hospitalisations and deaths due to tuberculosis are also presented.

Notifications

Clinicians are required to notify all cases of tuberculosis disease to their local Medical Officer of Health under the Tuberculosis Act 1948. Unlike tuberculosis disease, cases diagnosed with latent tuberculosis infection (LTBI) or with old inactive tuberculosis disease are not notifiable under the Tuberculosis Act 1948[i]. Only cases of active tuberculosis disease (referred to as TB from this point on) are presented in this report.

TB notification data is entered by staff at each public health unit (PHU) onto EpiSurv via a secure web-based portal. This near real-time data is collated and analysed by ESR on behalf of the Ministry of Health. Notification data includes information such as the type of TB disease, case demography, clinical details, laboratory results, risk factors and case management details.

TB cases are recorded in EpiSurv as one of the following:

- **Tuberculosis disease – new case**: active TB in a person who has never been treated for TB before, or has active disease from a new genotype.
- **Tuberculosis disease – relapse or reactivation**: active TB in a person whose tuberculosis has been non-infectious or quiescent following full, partial or no treatment.

The case classification for TB, as defined by the Ministry of Health's Communicable Disease Control Manual in 2012 [3], is provided below.

Under investigation: A suspected case that has been notified, but information is not yet available to classify it as probable, confirmed or not a case.

Probable: Presumptive (without laboratory confirmation). There is no laboratory confirmation but:

- there are symptoms or signs compatible with active tuberculosis, such as compatible radiology or clinical evidence of current disease; and
- full anti-tuberculosis treatment has been started by a clinician.

Confirmed: A clinically compatible illness that is laboratory confirmed. Laboratory confirmation requires at least one of the following:

- positive culture for *Mycobacterium tuberculosis* complex
- positive microscopic examination for acid-fast bacilli when a culture has not been or cannot be obtained
- demonstration of *M. tuberculosis* complex nucleic acid directly from specimens
- histology strongly suggestive of tuberculosis when there is a strong clinical probability.

Not a case: A case that has been investigated and subsequently found not to meet the case definition.

[i] Cases of latent TB infection or with old inactive TB disease may be entered onto EpiSurv with patient consent for case management purposes.

Hospitalisations

Hospital discharge data for TB (ICD-10AM codes A15−A19 and P37.0) was extracted from the Ministry of Health's National Minimum Dataset (NMDS) (see www.health.govt.nz for more information). Hospitalisation numbers from the NMDS may differ from EpiSurv since the NMDS data includes repeated hospital discharges for the same individual and discharges that relate to cases notified in previous years. In addition, the criteria for TB notification differ from that required for diagnostic coding.

Deaths

Mortality data for TB was extracted from the Ministry of Health's Mortality Collection, which records a classification for the underlying cause of each death registered in New Zealand. Mortality data is available only up to 2010 due to the extended length of time taken to complete coronial inquiries. Deaths due to TB are assigned to the year in which the person died in the Mortality Collection and the year of initial disease notification in EpiSurv data. For this reason the number of deaths per year may differ.

Co-infections

The number of TB/HIV co-infection cases presented in this report was provided by the AIDS Epidemiology Group at the University of Otago.

Speciation and drug susceptibility

Antimicrobial susceptibility testing of *M. tuberculosis* and *M. bovis* isolates is undertaken by the mycobacteriology reference laboratories at Auckland City Hospital (LabPlus), Waikato Hospital and Wellington Hospital. These laboratories use the BACTEC® 460 radiometric method or the BACTEC® MGIT 960 method to test for drug susceptibility. Susceptibility to isoniazid (at concentrations of 0.1 mg/L and 0.4 mg/L), rifampicin, ethambutol, pyrazinamide and streptomycin is routinely tested. In addition, multidrug-resistant isolates are tested for susceptibility to second-line antimicrobials at LabPlus. The susceptibility testing and species identification results are sent to ESR and integrated with the TB notifications recorded on EpiSurv.

Molecular typing

The national TB molecular typing database is maintained by LabPlus, which carries out all human TB molecular typing in New Zealand. Since October 2011, typing of TB isolates has been undertaken by mycobacterial interspersed repetitive units (MIRU) analysis alone. Primary typing includes analysis at 12 loci (MIRU 12). Secondary typing at a further 12 loci (MIRU 24) is performed when an isolate has the same MIRU 12 as a previously typed isolate. Between October 2009 and October 2011, primary typing was by MIRU and secondary typing was by restriction fragment length polymorphism (RFLP). Prior to October 2009, RFLP was the primary typing method and MIRU was only performed where isolates had fewer than or equal to six bands on RFLP.

A TB isolate is defined as having a unique molecular type if the MIRU 12 + MIRU 24 combination does not match that of any other isolate in the national database. At least one isolate from all known MIRU/RFLP or RFLP-based clusters has been MIRU 12- and MIRU 24-typed so that new isolates can be matched to these existing clusters. The TB molecular typing data from LabPlus is routinely reported to ESR and periodically integrated with the TB notifications recorded in EpiSurv.

Analytical methods

Key analytical methods used in this report are outlined below.

Dates

Data in this report is presented by the date reported and not by the date of onset of illness. The report's focus is the cases of TB notified in 2012 and trends since 2003 or 2008 (depending on data availability). Due to the length of time taken for the treatment of TB disease to be completed, information regarding the use of directly observed treatment (DOT) and treatment outcomes is presented for cases reported in 2011 rather than 2012.

Notification data presented in this report is based on information recorded on EpiSurv as at 1 July 2013. Changes made to EpiSurv data by PHU staff after this date will not be reflected in this report. Consequently, future data analysis may produce revised results. Notification data from 2003 to 2011 has been updated to reflect the cases in EpiSurv as at 1 July 2013.

Case status for notifications

All notifications of TB disease recorded in EpiSurv that meet the case classification criteria are included for analysis in this report, although their status may not be final. Any subsequent changes in a case's status will be reflected in future surveillance reports.

Population rate calculations

Population data used to determine all disease rates, except that used to determine disease rates for ethnic groups and birthplace, has been derived from the 2012 mid-year population estimates published by Statistics New Zealand.

Population data used to determine disease rates for ethnic groups is based on the proportion of people in each ethnic group from the estimated resident 2006 Census population applied to the 2012 mid-year population estimates from Statistics New Zealand.

Population data used to determine disease rates for each birthplace is derived from the 2006 Census usually resident population count by birthplace, published by Statistics New Zealand.

Rates are not presented in this report if there were fewer than five notified cases in the category. Calculating population rates from fewer than five cases produces unstable rates.

Percentages

Percentages are calculated with the denominator as the total number of cases for which information was recorded, unless otherwise specified.

Categorisation

Countries of birth were grouped into regions according to the Statistics New Zealand standard.

Ethnic groups presented are based on a prioritised classification of ethnicity, with the Māori ethnic group at the top of the hierarchy, followed by Pacific Peoples, Asian, Middle Eastern/Latin American/African (MELAA) and European or Other (including New Zealander) ethnic groups. More information about ethnicity classification is available on the Ministry of Health web site: http://www.health.govt.nz/publication/ethnicity-data-protocols-health-and-disability-sector.

Socioeconomic deprivation is based on the 2006 New Zealand Deprivation Index (NZDep06). The index, which measures relative socioeconomic deprivation, is derived from a weighted combination of nine variables from the 2006 census, with each reflecting a different aspect of material and social deprivation. The deprivation score is calculated for each geographical meshblock in New Zealand [4]. Quintiles of NZDep06, ranging from 1 (least deprived) to 5 (most deprived), are presented in this report. Approximately equal numbers of people reside in areas associated with each of the 5 deprivation levels.

Drug susceptibility

Drug susceptibility data is only available for cases of TB that were culture-positive. Where the genotypic and phenotypic susceptibility test results were discordant, the genotypic result took precedence for the isolate.

The chi-square test or Fisher's exact test, as appropriate, were used to determine the significance of any observed differences. The Cochran-Armitage trend test was used to calculate the significance of time trends. An associated P-value of 0.05 was used to identify whether a difference or trend was significant.

Molecular typing

Analysis of molecular typing data was only undertaken for TB cases infected with *M. tuberculosis*. A case was categorised as having a non-unique molecular type if the combination of their MIRU 12 and MIRU 24 typing results matched at least one other case in the national database. If there was no matching strain type in the national database, the case was considered to have a unique strain.

Quality of surveillance data

The level of completeness of data recorded in EpiSurv for key TB surveillance variables is shown in Table 1 for the years 2008 to 2012.

For most variables the level of completeness was more or less stable over the five year period. There were two notable exceptions. The completeness of the extra-pulmonary involvement variable improved from 85% in 2011 to 99% in 2012 following changes to this section of the case report form during 2012. Among children aged less than 5 years, the completeness of the BCG vaccination status improved from 75% in 2008 to 100% in 2012.

Variables with consistently high levels of data completeness (≥94%) were the demographic variables (age, sex, ethnicity, and geocoding accuracy), basis of discovery, pulmonary disease, and the risk factor relating to being born outside New Zealand. The completeness of data associated with the treatment variables was also high (≥95%) across the four years analysed (2008 to 2011).

The date of onset of illness variable had the lowest levels of completeness, ranging from 54% to 65%. This is to be expected as cases may be asymptomatic.

Table 1. Percentage of data completeness for tuberculosis notifications (new cases) by variable and year, 2008–2012

Variable	2008	2009	2010	2011	2012
Basis of diagnosis					
Basis of discovery	99	96	95	97	99
Laboratory confirmation	89	90	88	88	97
Demographic details					
Age	100	100	100	100	100
Sex	100	100	100	100	100
Ethnicity	97	98	98	97	98
Geocoding accuracy	95	93	94	95	95
Clinical course and outcomes					
Onset date	62	61	65	60	54
Hospitalisation status	97	98	98	99	98
Survival status	97	97	98	99	94
Protective and risk factors					
BCG vaccination[a]	75	58	100	100	100
Contact with confirmed case of tuberculosis	77	76	79	79	81
Case born outside New Zealand	99	99	100	99	100
Date of arrival[b]	79	68	75	72	84
Current/recent residence in an institution	85	80	79	81	86
Current/recent residence with person born outside New Zealand	89	82	87	90	89
Exposure in a healthcare setting	75	74	73	79	82
Having immunosuppressive illness	95	93	94	94	94
On immunosuppressive medication	95	92	95	94	94
Clinical characteristics					
Pulmonary disease	97	97	96	96	100
Extra-pulmonary involvement	87	85	88	85	99
Treatment[c]					
Date treatment started	96	95	97	96	-
Treatment outcome	100	100	100	100	-
Use of directly observed therapy (DOT)	99	100	99	100	-

[a] Cases in the less than 5 years age group only.

[b] Cases born outside New Zealand only.

[c] Cases who reported having received treatment only. Data is only reported for 2008−2011 due to length of time taken for TB treatment to be completed.

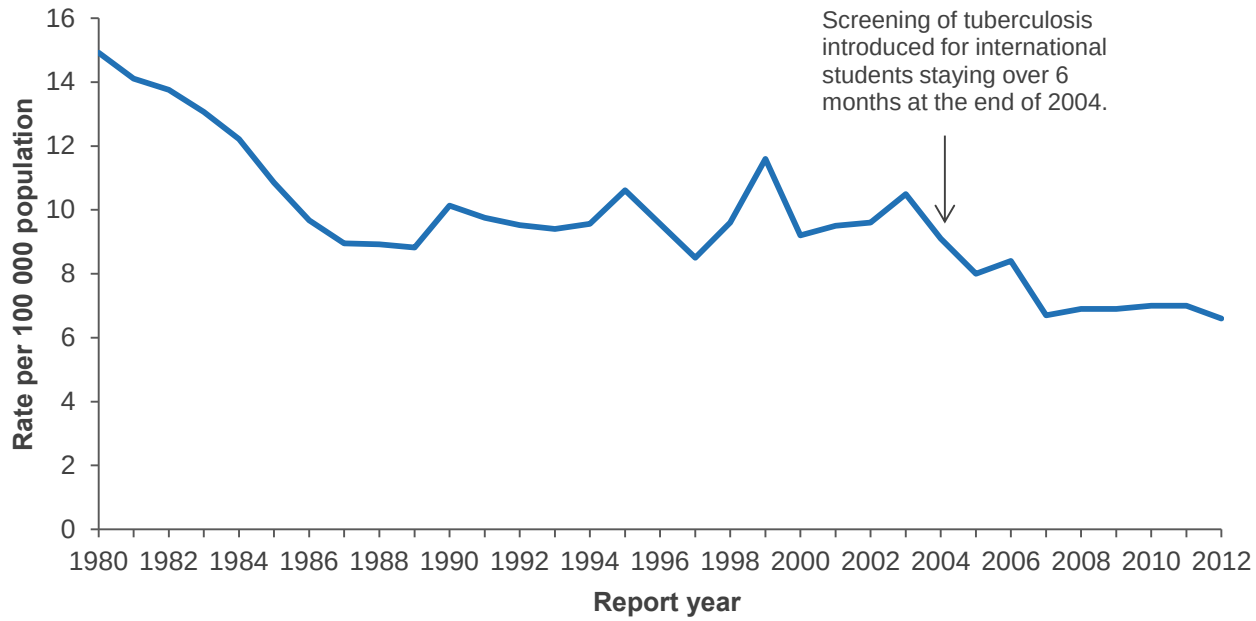
NOTIFICATIONS

NOTIFICATIONS

There were 294 cases of TB notified in 2012, including 279 (94.9%) new cases. The 2012 notification rate was 6.6 per 100 000 population, a slight decrease from the 2011 rate (7.0 per 100 000).

The notification rate in 2012 was the lowest observed in the past 30 years. Trends in that time period are shown in Figure 1. From 1980 to 1989 the rate decreased from 14.9 per 100 000 population to 8.8 per 100 000. The annual notification rate remained between 8.5 and 11.6 per 100 000 population between 1990 and 2003. There was a decrease between 2003 and 2007 to 6.7 per 100 000, followed by fairly stable rates over the following five years.

Figure 1. Notification rate of tuberculosis disease by year, 1980−2012



Note: Census population data was used as the denominator to calculate rates before 1991 and the Statistics New Zealand mid-year population estimates were used from 1991 onwards.

New tuberculosis cases

There were 279 new TB cases notified in 2012, giving a notification rate of 6.3 per 100 000 population. The 2012 rate was a slight decrease from 2011 (6.9 per 100 000). Between 2008 and 2012, the notification rate of new TB cases remained stable, ranging from 6.3 to 6.9 per 100 000 each year.

Basis of discovery

Information on the means by which TB was discovered was recorded for 278 (99.6%) of the new TB cases. Over 70% (197 cases) of cases were diagnosed when the symptomatic case presented to a health practitioner. Other recorded means of discovery included immigrant or refugee screening (11.2%, 31 cases) and contact follow-up (7.2%, 20 cases) (Table 2).

Between 2008 and 2012, the proportion of cases each for each method of discovery remained consistent: symptomatic case presented to health practitioner (70−73%), immigrant/refugee screening (9−13%), contact follow-up (4−9%), and other means of discovery (10−13%).

Table 2. Tuberculosis notifications (new cases) by basis of discovery, 2012

Basis of discovery	Cases	%[a]
Symptomatic case presented to health practitioner	197	70.9
Immigrant/refugee screening	31	11.2
Contact follow-up	20	7.2
Other	30	10.8
Unknown	1	-
Total	**279**	

[a] The denominator used to calculate this percentage was the total number of cases for which the information was available.

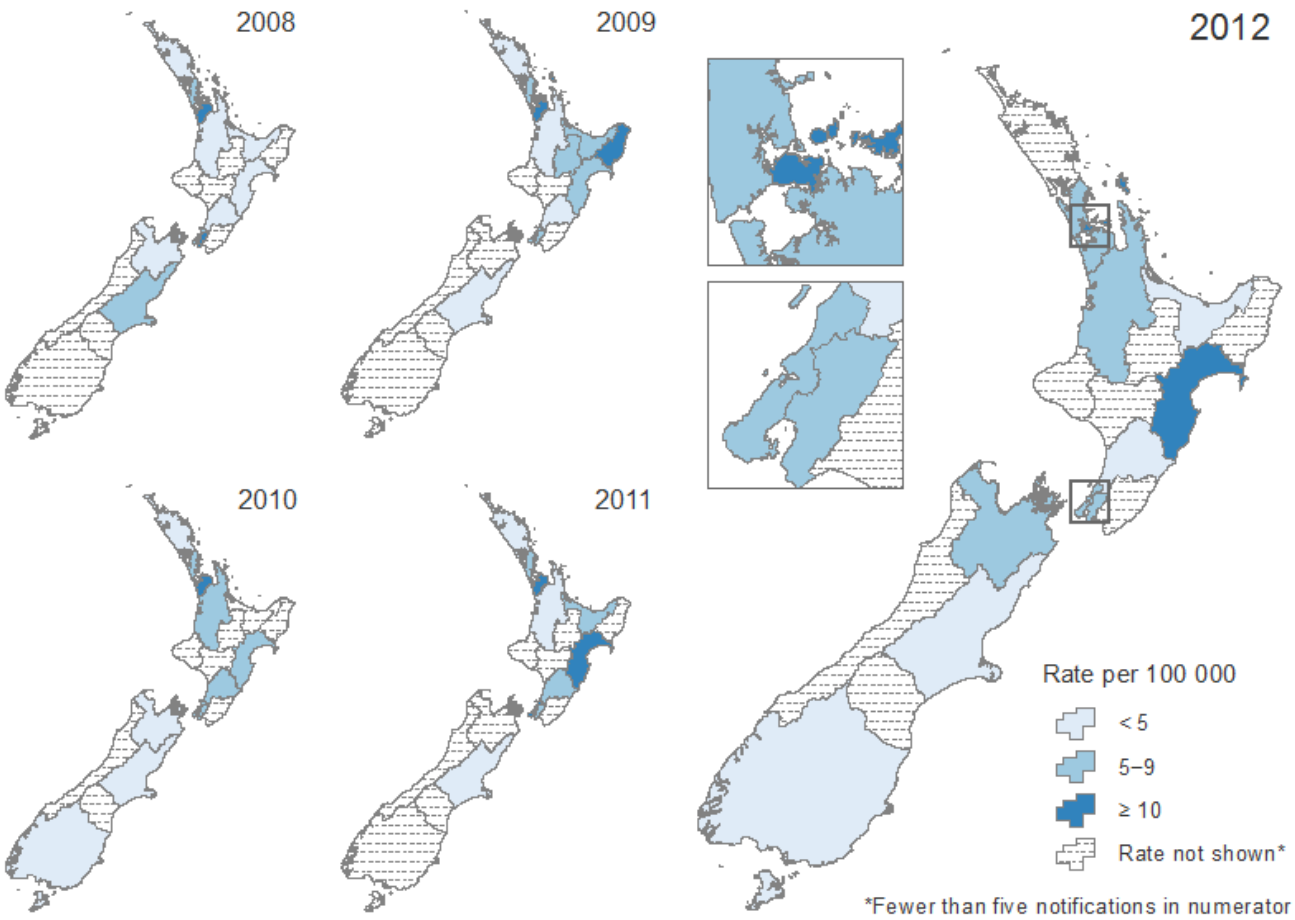
In 2012, 237 (84.9%) of the new TB cases were laboratory-confirmed. Among the 233 (98.3%) cases for which the method of laboratory confirmation was recorded, 211 (90.6%) were confirmed by isolation of *M. tuberculosis* or *M. bovis* from a clinical specimen. A further seven cases (3.0%) were confirmed by demonstration of acid-fast bacilli in a clinical specimen, 10 cases (4.3%) by demonstration of *M. tuberculosis* nucleic acid directly from specimens, and five cases (2.1%) by histology strongly suggestive of TB.

Geographic distribution

The District Health Board (DHB) with the highest notification rate for new TB cases in 2012 was Hawke's Bay (12.9 per 100 000 population, 20 cases), followed by Auckland (11.5 per 100 000, 53 cases) and Nelson Marlborough (10.0 per 100 000, 14 cases) DHBs.

Between 2008 and 2012, there was an increasing trend in notification rates for Hawke's Bay (from 3.3 to 12.9 per 100 000 population) and Nelson Marlborough (from 3.7 to 10.0 per 100 000) DHBs. Conversely, there was a decrease in rates for Canterbury (from 5.6 to 3.4 per 100 000) and Hutt Valley (from 11.3 to 6.9 per 100 000) DHBs. Notification rates were fairly stable for all other DHBs (Figure 2). Counts and rates of new TB cases by DHB for the last five years are provided in Table 12 in the summary tables section of this report.

Figure 2. Notification rate of tuberculosis (new cases) by District Health Board and year, 2008–2012



Demographic information

The notification rate for males (6.7 per 100 000, 147 cases) was higher than for females (5.9 per 100 000, 132 cases) (Table 3). This finding is consistent with previous years. The age group with the highest notification rate for new TB cases in 2012 was the 15−39 years age group (9.5 per 100 000 population, 142 cases), next highest was the 60 years and over age group (8.2 per 100 000, 70 cases).

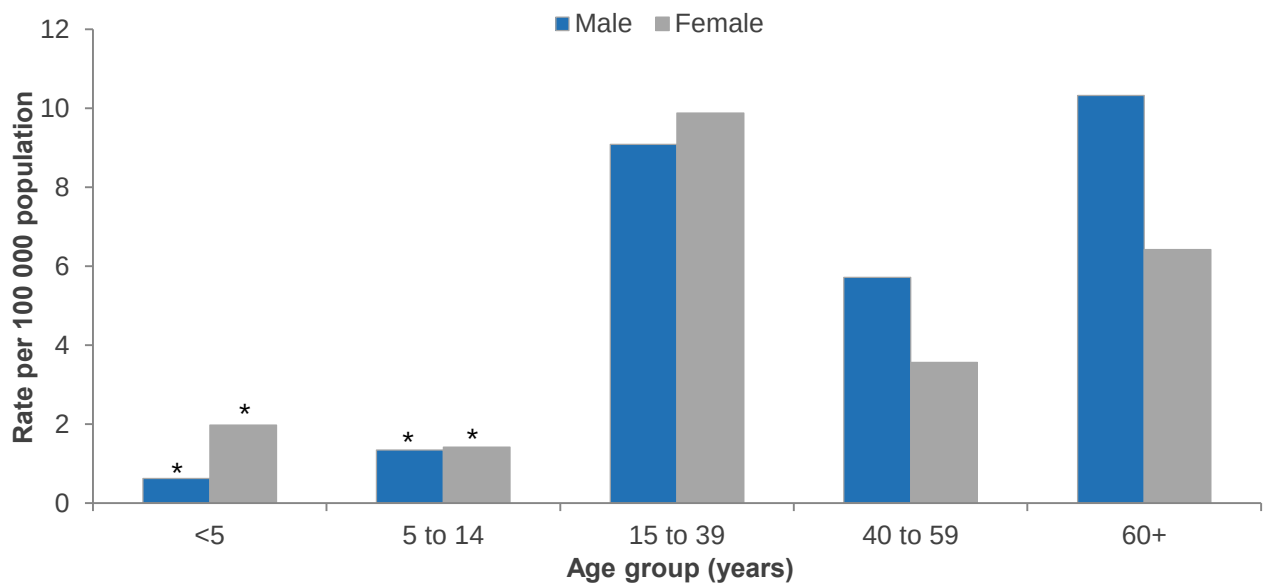
Table 3. Number and rate of tuberculosis notifications (new cases) by sex and age group, 2012

Age group (years)	Male		Female		Total	
	Cases	Rate[1]	Cases	Rate[1]	Cases	Rate[1]
<5	1	-	3	-	4	-
5 to 14	4	-	4	-	8	1.4
15 to 39	68	9.1	74	9.9	142	9.5
40 to 59	33	5.7	22	3.6	55	4.6
60+	41	10.3	29	6.4	70	8.2
Total	**147**	**6.7**	**132**	**5.9**	**279**	**6.3**

[1] Rate per 100 000 based on 2012 mid-year population estimates; not shown for counts less than 5 cases

The age group with the highest rate differed between males and females. For males the 60 years and over had the highest rate (10.3 per 100,000 population, 41 cases) whereas for females it was the 15 to 39 years age group (9.9 per 100,000, 74 cases) (Figure 3). The rates for males aged 40 to 59 years, and males aged 60 years and over were both 1.6 times the rate for females in the same age groups).

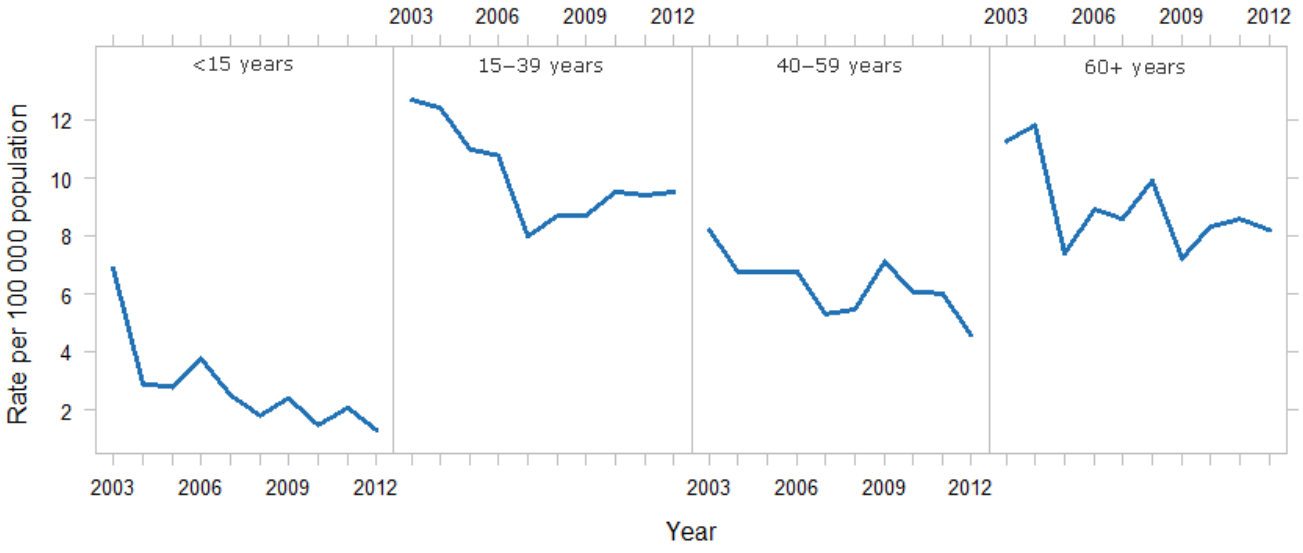
Figure 3. Notification rate of tuberculosis (new cases) by age group and sex, 2012



*Rates calculated on fewer than 5 cases should be interpreted with caution.

Between 2003 and 2012, there was a decreasing trend in the notification rate for all age groups (Figure 4). The largest decrease was observed in those aged less than 15 years down 80.4% from 6.9 to 1.3 per 100 000 population. The rate in the 40–59 years age group had the next largest decrease down 44.0% from 8.2 to 4.6 per 100 000.

Figure 4. Notification rate of tuberculosis (new cases) by age group and year, 2003–2012



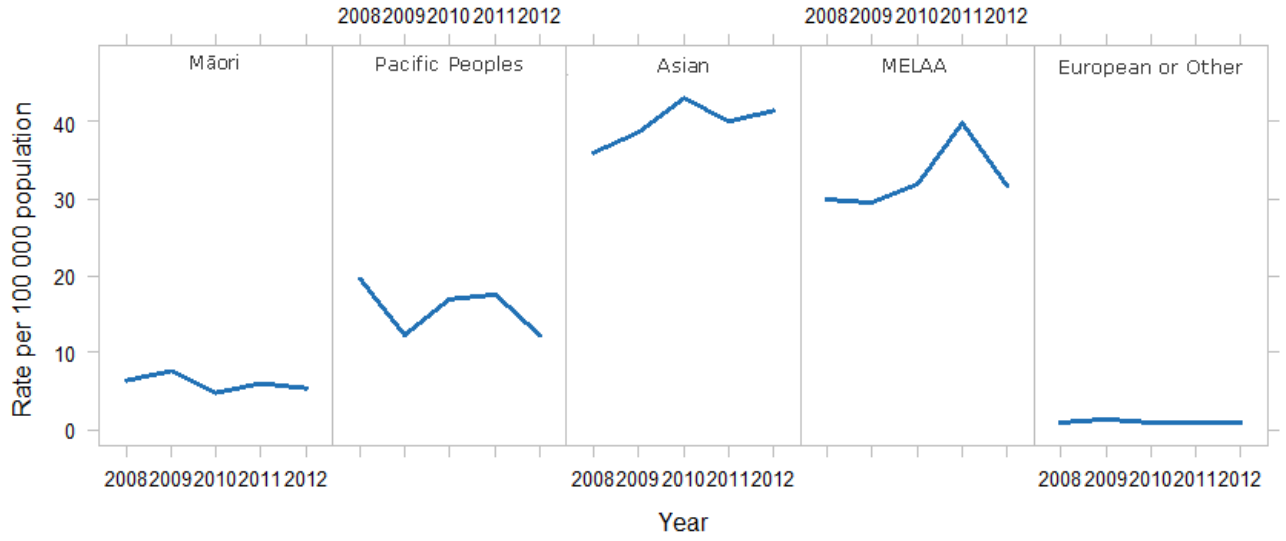
Over the five year period 2008−2012, the annualised notification rate of TB for New Zealand born children aged less than 5 years was 1.7 per 100 000 population. This was less than half the rate (4.3 per 100 000 population) for the previous five years, 2003–2007[ii]. The significance of this statistic is that this indicates a decrease in endemic transmission of TB.

[ii] Population data used in the denominator was derived from the 2001 and 2006 census usually resident population count by birthplace, published by Statistics New Zealand.

Ethnicity was recorded for 276 (98.9%) of the new TB cases notified in 2012. The Asian ethnic group had the highest notification rate at 41.4 per 100 000 population (169 cases), followed by the Middle Eastern/Latin American/African (MELAA) (31.8 per 100 000, 12 cases), Pacific Peoples (12.4 per 100 000, 33 cases), Māori (5.4 per 100 000, 35 cases) and European or Other (0.9 per 100 000, 27 cases) ethnic groups. Among the new TB cases born in New Zealand, over 50% (35/65) were in the Māori ethnic group. A further 29% (19/65) were in the European or Other ethnic group.

Between 2008 and 2012 the Asian and the MELAA ethnic groups have consistently had the highest notification rates, although it should be noted that the number of cases belonging to the MELAA ethnic group in any one year was low (11 to 15 cases annually). Over the five year period, there was an increasing trend in the notification rate for the Asian ethnic group (Figure 5).

Figure 5. Notification rate of tuberculosis (new cases) by ethnic group and year, 2008–2012



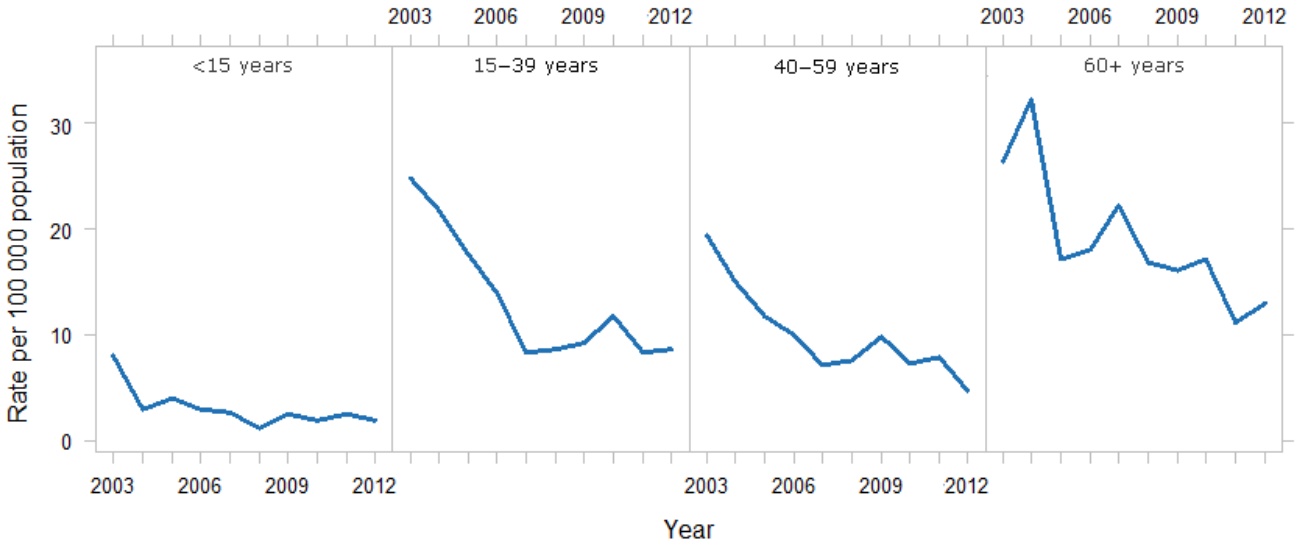
MELAA: Middle Eastern/Latin American/African

Clinical outcomes

Hospitalisation status was complete for 276 (98.9%) of new TB cases notified in 2012, of which 144 (52.2%) were hospitalised. The 144 hospitalised cases were distributed into the following age groups: less than 5 years (1), 5−14 years (3), 15–39 years (75), 40–59 years (21), and 60 years and over (44).

Similar to the trend observed in TB (new cases) notification rates (Figure 4), data from the Ministry of Health's National Minimum Dataset shows a decreasing trend in the TB hospitalisation rate for all age groups over the past 10 years (Figure 6). The largest decreases were for the less than 15 years age group down 76.1%, from 8.0 to 1.9 per 100 000 population and the 40−59 years age group down 75.8%, from 19.4 to 4.7 per 100 000.

Figure 6. Hospitalisation rate for tuberculosis by age group and year, 2003–2012



Source: National Minimum Dataset, Ministry of Health

Of the 279 new TB cases notified in 2012, the disease was recorded as fatal for four cases. All four cases were in the 60 years and over age group. Over the last 10 years (2003−2012) reported fatality varied from 3–8 cases annually, all of whom were aged 20 years or older.

The number of deaths recorded in the Ministry of Health's Mortality Collection with TB as the underlying cause was slightly higher than recorded in EpiSurv. Between 2003 and 2010 (the latest year available), there were 5–13 deaths recorded each year, with approximately 90% aged 40 years and over. The Mortality Collection includes one TB death in a child. The child was aged less than 5 years and died in 2003.

Protective factors

Immunisation of neonates with the Bacillus Calmette-Guérin (BCG) vaccine was introduced in New Zealand in 1976. It is currently available to neonates at increased risk of exposure to TB, and is primarily given to protect young children from developing severe disease, particularly miliary TB and tuberculous meningitis [5].

There were four cases of TB aged less than 5 years in 2012. All four cases were born in New Zealand. One reported having received BCG vaccine and three were not vaccinated.

Risk factors

In 2012, the most common risk factor reported by new TB cases was being born outside New Zealand, followed by current/recent residence with person(s) born outside New Zealand (Table 4).

Table 4. Risk factors reported for tuberculosis notifications (new cases) 2012

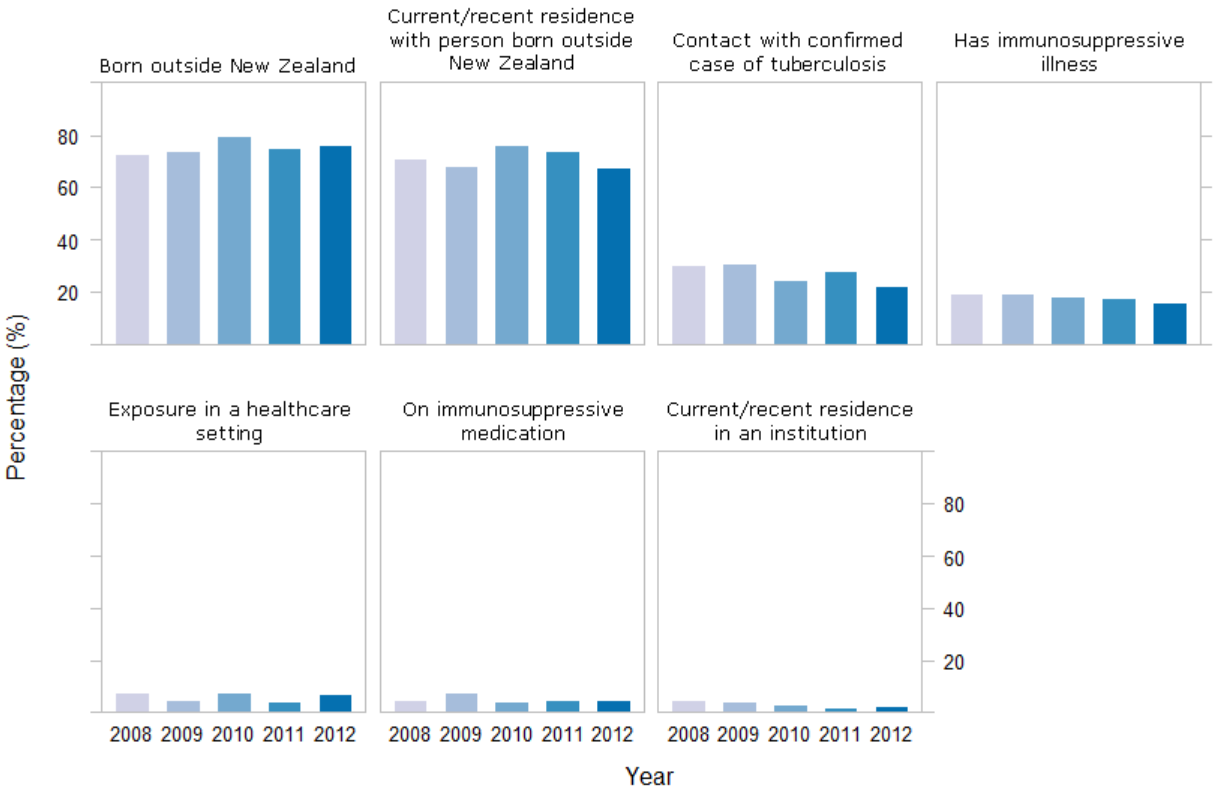
Risk factor	Cases[a]	Total[b]	%
Born outside New Zealand	214	279	76.7
Current/recent residence with person born outside New Zealand	172	250	68.8
Contact with confirmed case	49	227	21.6
Has immunosuppressive illness	41	263	15.6
Exposure in a healthcare setting	17	229	7.4
On immunosuppressive medication	14	265	5.3
Current/recent residence in an institution	6	240	2.5

[a] Number of cases with 'yes' recorded for the risk factor.

[b] Number of cases for which information was recorded for the risk factor.

The percentage of cases reporting the various risk factors in 2012 was similar to previous years (Figure 7). Over 70% of cases reported being born outside New Zealand with a similar proportion reporting having current/recent residence with a person born outside New Zealand. Approximately 15−30% of cases reported having contact with a confirmed case of TB or having an immunosuppressive illness. Less than 10% of cases reported exposure in a healthcare setting, being on immunosuppressive medication, or having current/recent residence in an institution.

Figure 7. Annual percentage of tuberculosis notifications (new cases) reporting exposure to risk factors, 2008–2012



Cases born in the Southern and Central Asia region had the highest notification rate in 2012 (152.5 per 100 000 population, 88 cases), followed by the South-East Asia region (89.2 per 100 000, 52 cases) (Table 5). Over 90% (81/88) of the cases born in the Southern and Central Asia region were from India. Amongst the cases born in South-East Asia, the most commonly reported country of birth was the Philippines (44.2%, 23/52).

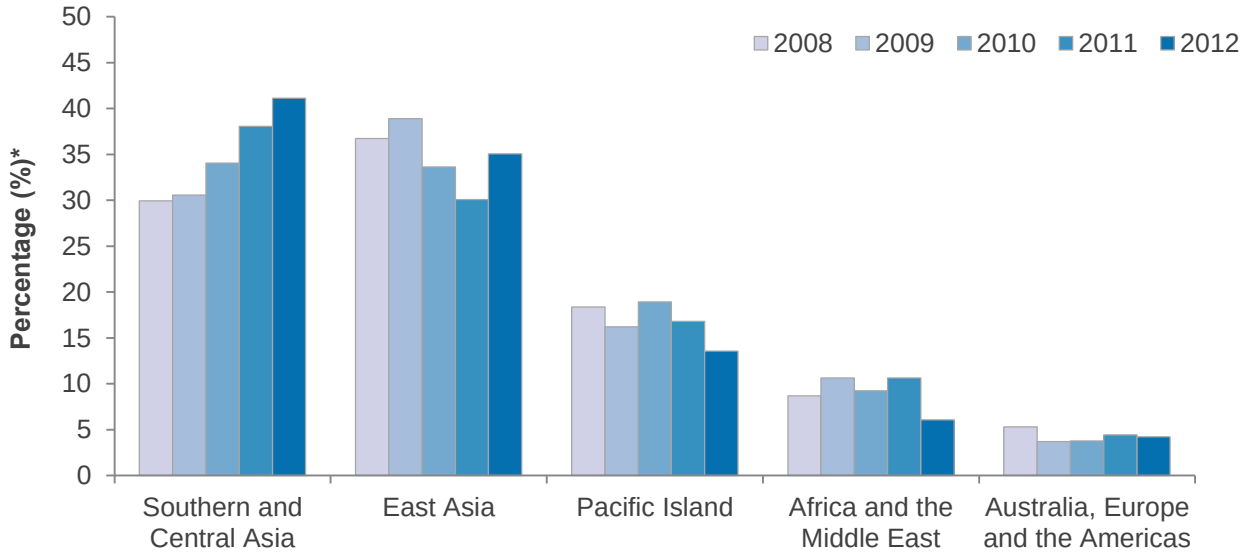
Table 5. Tuberculosis notifications (new cases) by region of birth, 2012

Region of birth	Cases	Rate[a]
Born in New Zealand	**65**	**2.2**
Born outside New Zealand	**214**	**24.3**
Pacific Islands	29	21.3
North Africa and the Middle East	1	-
Sub-Saharan Africa	12	20.3
North-East Asia	23	17.0
South-East Asia	52	89.2
Southern and Central Asia	88	152.5
North Western Europe	4	-
Southern and Eastern Europe	2	-
Southern and Central America	3	-
Total	**279**	**-**

[a] Rate per 100 000 population. Population data used for the denominator was derived from the 2006 census usually resident population count by birthplace, published by Statistics New Zealand.

Among new TB cases born outside New Zealand, the proportion of cases born in the Southern and Central Asia region increased steadily between 2008 and 2012. Conversely, the percentage of cases born in the Pacific Islands and Africa and the Middle East regions were approximately 26−30% lower in 2012 than in 2008 (Figure 8).

Figure 8. Percentage of tuberculosis notifications (new cases) born outside New Zealand by birth region and year, 2008−2012

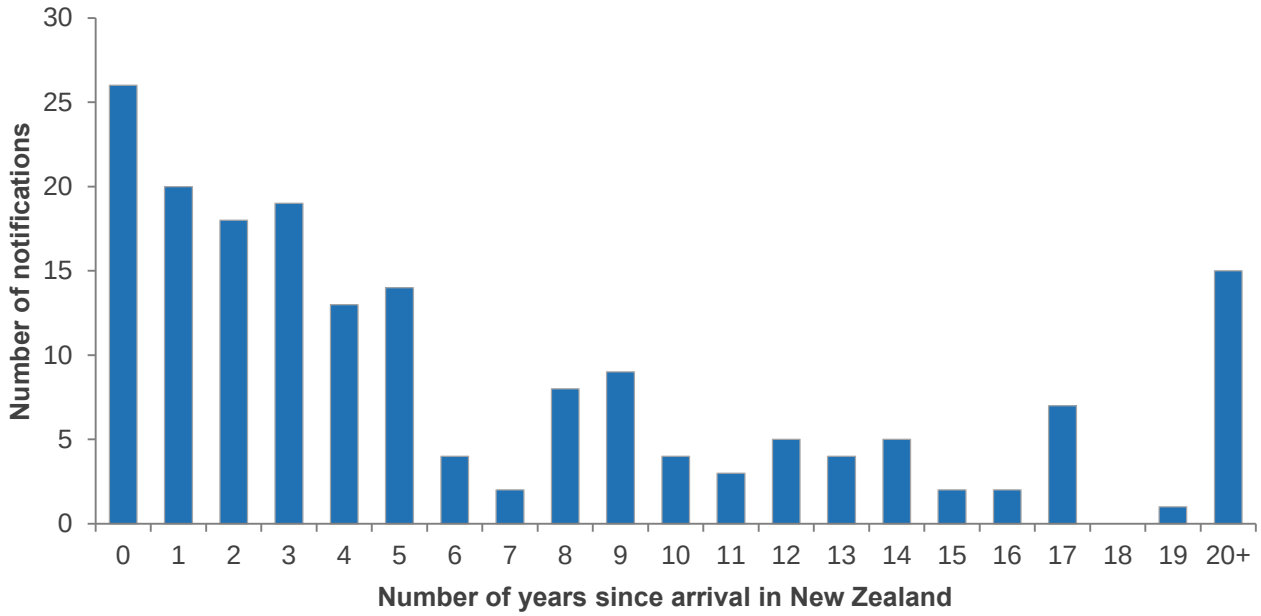


* Number of cases born in a region divided by the total number of cases born outside New Zealand for the year.

The date of arrival in New Zealand was recorded for 181 (84.6%) of the 214 new TB cases born outside New Zealand. Of these, the interval between the date of arrival in New Zealand and the TB notification date ranged from 2 days to 64 years, with a mean interval of 7.7 years and median interval of 4 years. TB notification occurred within the first year of arrival in New Zealand for approximately 14% of cases born outside New Zealand (Figure 9).

Between 2008 and 2012, the annual median interval between arrival in New Zealand and date of TB notification remained stable at 4 years. The annual mean interval ranged between 7.2 and 8.3 years.

Figure 9. Tuberculosis notifications (new cases) born outside New Zealand by the number of years since arrival in New Zealand, 2012



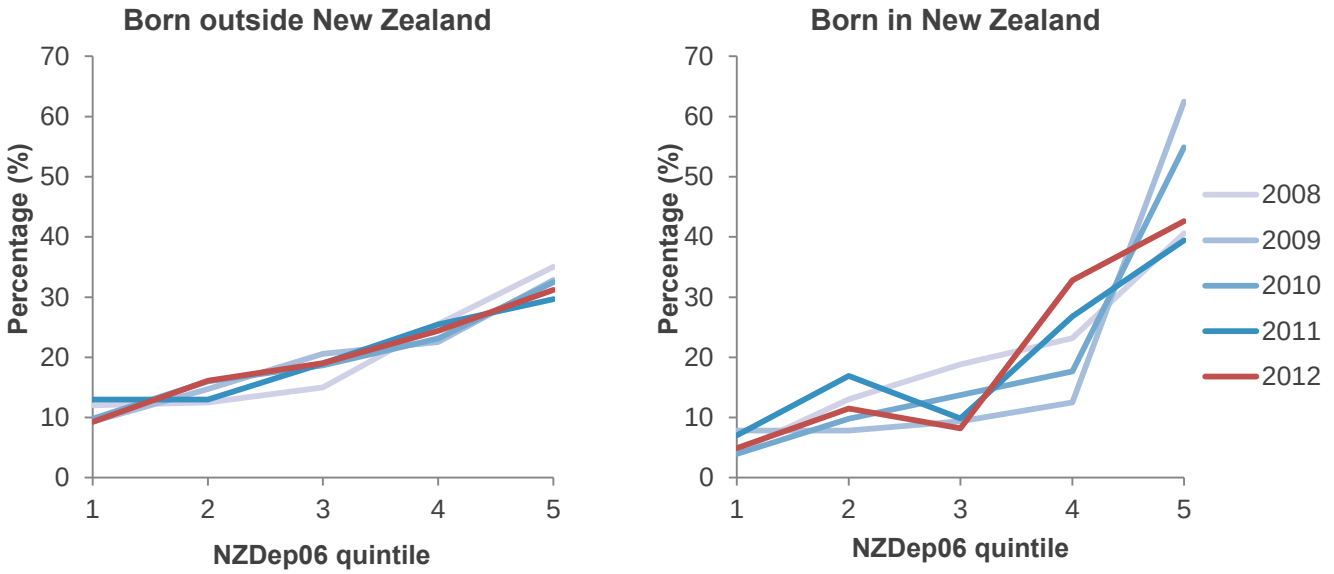
Note: the date of arrival was not recorded for 38 cases.

Socio-economic deprivation

In 2012, 266 (95.3%) of new TB cases had a recorded residential address that could be assigned a 2006 New Zealand Socioeconomic Deprivation Index (NZDep06) score. Over 60% of cases resided in the most deprived areas (NZDep06 quintile 4 or 5).

Figure 10 shows the relationship between deprivation quintiles and percentage of new TB cases over the last five years. A disproportionate number of new TB cases resided in the most deprived areas. This was observed each year and was more marked in cases born in New Zealand.

Figure 10. Tuberculosis notifications (new cases) for cases born in New Zealand and born outside New Zealand by quintiles of the 2006 New Zealand Deprivation Index (NZDep06) and year, 2008–2012

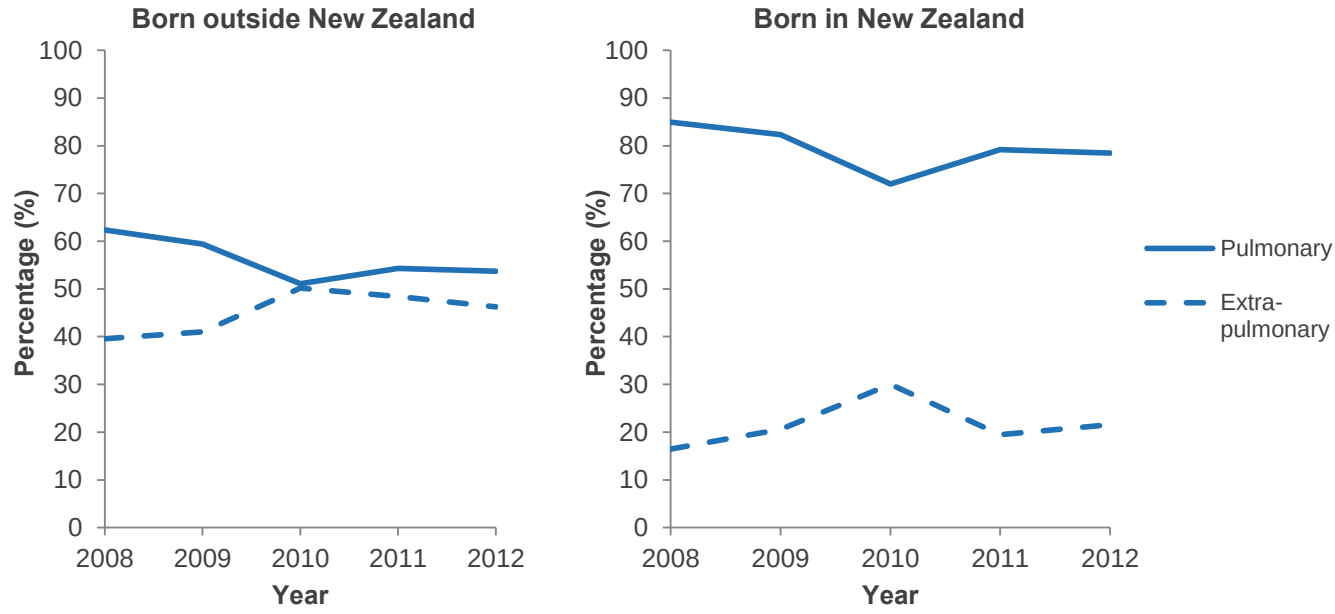


Site of infection

There were 166 (59.5%) new TB cases in 2012 that had pulmonary disease, including 41 that also had extra-pulmonary involvement. A further 113 cases (40.5%) reported having only extra-pulmonary involvement.

As seen in previous years there was a marked difference in the clinical characteristics of cases born in New Zealand and cases born outside New Zealand. Among cases born in New Zealand, approximately 80% were reported with pulmonary disease between 2008 and 2012. Compared with New Zealand born cases, new TB cases born outside New Zealand had less pulmonary disease (Figure 11).

Figure 11. Comparison of the percentage of pulmonary versus solely extra-pulmonary involvement for cases born in New Zealand and born outside New Zealand by year, 2008–2012



Note: cases of pulmonary disease presented in this graph include cases with both pulmonary disease and extra-pulmonary involvement.

Among the new TB cases in 2012 with pulmonary disease, 43.0% (68/158) were smear positive based on demonstration of acid-fast bacilli in a clinical specimen with sputum the reported specimen site for almost 70% (46/68) of these cases.

Approximately 35% (55/154) of cases with extra-pulmonary involvement in 2012 had lymph node (excluding abdomen) recorded as a site of infection. One case of tuberculous meningitis was reported in 2012, in the 40−59 years age group. Five cases of miliary TB were reported, all five cases were aged 15 years and over.

Between 2008 and 2012, the most common site recorded for cases with extra-pulmonary involvement was lymph node (excluding abdominal), followed by pleural and intra-abdominal (excluding renal). During this period, there were 21 cases of tuberculous meningitis and 19 cases of miliary TB. One of the miliary TB cases was in the less than 5 years age group and was an infant aged less than 1 year that had not received BCG vaccine. There were no cases of tuberculous meningitis in the less than 5 years age group. A breakdown of the new TB cases with extra-pulmonary involvement by site of infection and year is shown in Table 13 in the summary tables section of this report.

Receipt of treatment

In 2012, 98.7% (229/232) of new TB cases were reported to have received treatment. The interval between the onset of symptoms and start of treatment could be calculated for 119 (52.0%) of cases. Among these, 35 (29.4%) started treatment within 1 month of the onset of illness and 36 (30.3%) started treatment within 1−3 months. The median interval to the start of treatment was 2 months from the onset of symptoms.

A treatment delay for patients with pulmonary TB represents a risk to public health from disease transmission. The interval between the onset of symptoms and the start of treatment could be calculated for 50.0% (69/138) of the TB cases with pulmonary disease. Among these, 25 (36.2%) started treatment within 1 month of the onset of illness and 19 (27.5%) started treatment within 1−3 months. The median interval to the start of treatment was 2 months from the onset of symptoms.

Co-infections

Three of the 279 new TB cases notified in 2012 were co-infected with human immunodeficiency virus (HIV) infection. Less than 5% of new TB cases were reported to be co-infected with HIV over the last five years.

Treatment outcomes for cases notified in 2011

Due to the length of time taken for the treatment of TB to be completed, the data presented in this section is for the 302 new TB cases notified in 2011. Among these, 289 (95.7%) reported receiving treatment for TB.

Treatment outcome information was recorded for 288 (99.7%) of the cases that had received treatment. The majority of these cases (81.3%, 234 cases) completed treatment to the satisfaction of the prescribing doctor. TB treatment for the remaining 54 cases ended earlier than planned for the following reasons: case went overseas (10.1%, 29 cases), case died (7.3%, 21 cases), case refused to complete treatment (0.7%, 2 cases), case was lost to follow-up (0.3%, 1 case), and treatment was stopped because of adverse effects (0.3%, 1 case).

For the 234 TB cases that completed treatment to the satisfaction of the prescribing doctor, approximately 23% (55/234) had received directly observed therapy (DOT) throughout the course of treatment. Cases born in New Zealand were more likely to have received DOT throughout the course of treatment (38.6%) compared with cases born outside New Zealand (18.6%). For cases with pulmonary disease, cases born in New Zealand were still more likely to have received DOT throughout the course of treatment (41.1%) compared with cases born outside New Zealand (26.5%).

Reactivations of tuberculosis

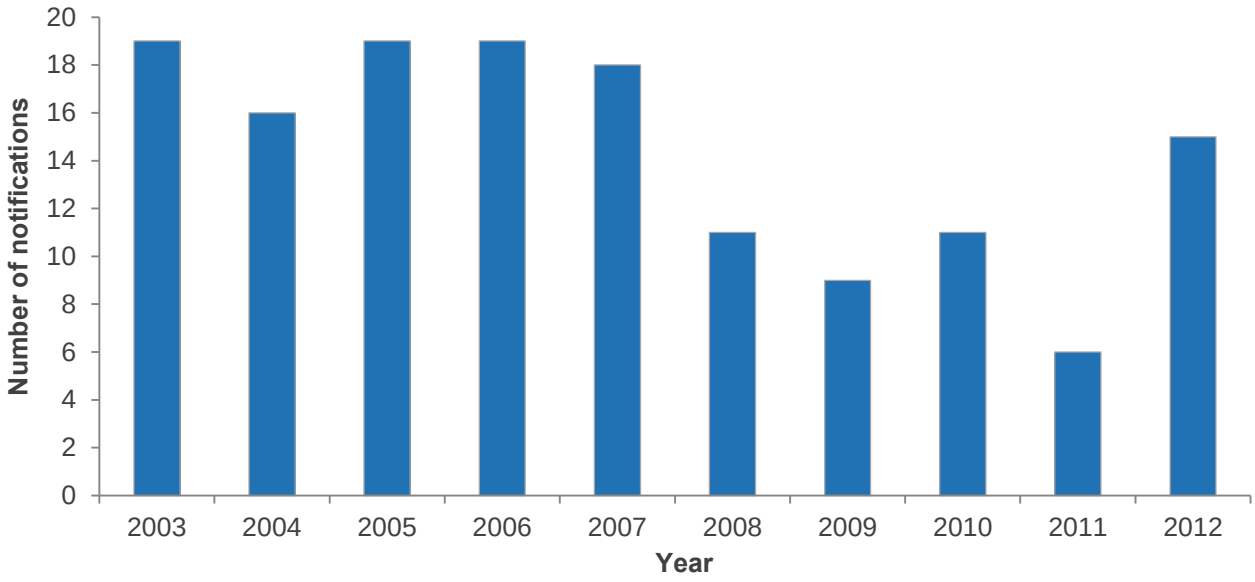
In 2012, 15 TB reactivation cases were notified from seven DHBs: Auckland (5 cases), Canterbury (3 cases), Waitemata (2 cases), Southern (2 cases), Bay of Plenty, Taranaki and Capital & Coast (1 case each) DHBs. Cases were distributed among the 20–39 years, 40–59 years and 60 years and over age groups (5 cases each). Reactivation cases included those in the Asian (7 cases), Māori (3 cases), MELAA (2 cases), Pacific Peoples and European or Other (1 case each) ethnic groups. Ethnicity was unknown for one case.

Information about the place of birth, place of original diagnosis and whether the case had been previously treated for TB was recorded for nine (60.0%) of the reactivation cases. Four cases were both born and diagnosed with TB in New Zealand, one was born overseas but diagnosed in New Zealand, and four were born and diagnosed overseas. All nine cases had been previously treated for TB. Among the five cases that had been diagnosed in New Zealand, three cases had previously received treatment for 6 months, one case had received treatment for one year and the duration of treatment was unknown for the remaining case.

Hospitalisation status was recorded for all 15 reactivation cases, 12 (80.0%) were hospitalised. One reactivation case was reported to have died from the disease.

The number of TB reactivation cases has remained low over the last ten years ranging from 6 to 19 cases annually (Figure 12).

Figure 12. Tuberculosis notifications (reactivation cases) by year, 2003−2012



Outbreaks

In 2012, three outbreaks of *M. tuberculosis* were reported in Auckland, Hawke's Bay and Canterbury DHBs.

The outbreak in Auckland DHB comprised six cases and involved repeated exposure to the index case during church gatherings and in private homes.

The outbreak in Hawke's Bay DHB comprised 14 cases and a further 65 cases with latent TB infection were identified. The exposures occurred in a work environment and in private homes.

The outbreak in Canterbury DHB involved two cases. The exposure occurred in a private home.

CULTURE CONFIRMATION, SPECIATION AND DRUG SUSCEPTIBILITY

CULTURE CONFIRMATION, SPECIATION AND DRUG SUSCEPTIBILITY

Data presented in this section was collected from the three mycobacteriology reference laboratories in New Zealand.

Culture confirmation and speciation

Among the 279 new TB cases notified in 2012, 221 (79.2%) were culture-positive. The mycobacterial species identified were *Mycobacterium tuberculosis* (216 cases), *M. bovis* (4 cases), and *M. tuberculosis* complex (1 case). Almost 85% (140/166) of the new TB cases with pulmonary disease were culture-positive, comprising 138 cases identified as *M. tuberculosis* and two cases as *M. bovis.*

Of the 15 TB reactivation cases notified in 2012, 12 were culture-positive; 11 were identified as *M. tuberculosis* and one as *M. tuberculosis* complex.

Fewer than 10 cases of *M. bovis* were reported each year between 2008 and 2012.

Drug susceptibility

Antimicrobial susceptibility data was available for the isolates from 233 culture-positive TB cases in 2012. The proportion of isolates resistant to the five antimicrobials routinely tested is shown in Table 6.

Table 6. Antimicrobial resistance among tuberculosis isolates by mycobacterial species, 2012

Antimicrobial	Resistant[a]					
	M. tuberculosis (*n* = 227)		*M. bovis* (*n* = 4)		All isolates[b] (*n* = 233)	
	No.	%	No.	%	No.	%
Isoniazid (0.1 mg/L)	17	7.5	1	25.0	18	7.7
Isoniazid (0.4 mg/L)[c]	10	4.4	0	0.0	10	4.3
Rifampicin	4	1.8	0	0.0	4	1.7
Ethambutol	2	0.9	0	0.0	2	0.9
Pyrazinamide	1	0.4	4[d]	100.0	6[e]	2.6
Streptomycin	21	9.3	0	0.0	21	9.0

[a] Includes resistance alone or in combination with other antimicrobials.

[b] Includes two isolates only identified as *M. tuberculosis* complex.

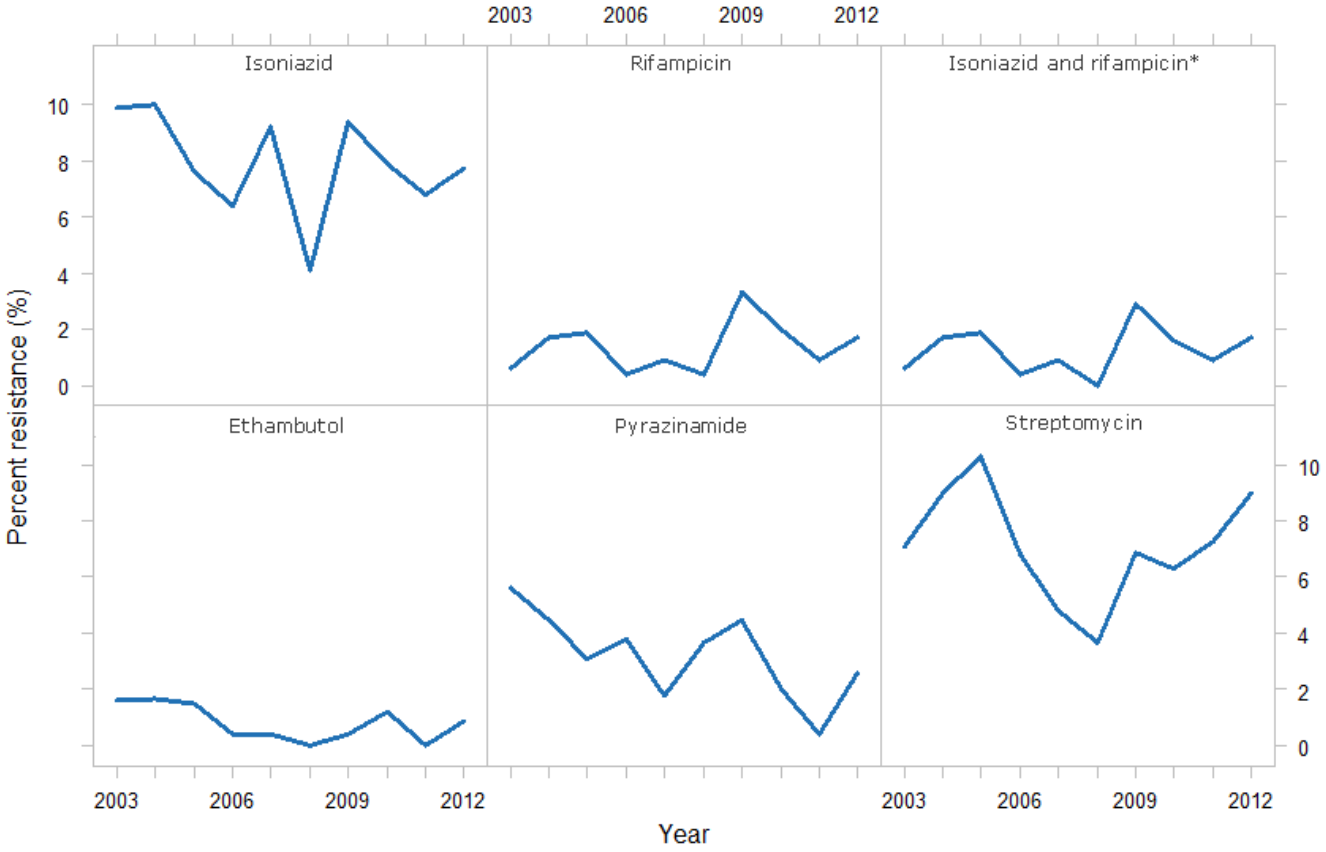
[c] All isolates resistant to isoniazid at the standard breakpoint concentration of 0.1 mg/L were also tested at the higher concentration of 0.4 mg/L.

[d] *M. bovis* is intrinsically resistant to pyrazinamide.

[e] Pyrazinamide susceptibility was not available for one of the two *M. tuberculosis* complex isolates. The other *M. tuberculosis* complex isolate was pyrazinamide resistant.

Over the 10-year period 2003−2012, there have been significant trends ($p \leq 0.05$) of decreasing ethambutol resistance and pyrazinamide resistance, but no significant changes in resistance to isoniazid, rifampicin or streptomycin (Figure 13).

Figure 13. Resistance among tuberculosis isolates by antimicrobial and year, 2003−2012



*Isoniazid and rifampicin resistant isolates are defined as multidrug-resistant tuberculosis (MDR-TB).

In 2012, 85.4% (199/233) of the isolates were fully susceptible to all five antimicrobials routinely tested. There were four cases of multidrug-resistant tuberculosis (MDR-TB), defined as resistance to at least isoniazid and rifampicin (Table 7). During the last 10 years, there has been a total of 32 cases of MDR-TB – an average annual rate of 1.2% among culture-positive TB cases. All but 2 of these 32 cases were born overseas and are assumed to have acquired their MDR-TB overseas.

MDR-TB isolates are tested for susceptibility to an extended range of antibiotics to detect extensively drug-resistant tuberculosis (XDR-TB), defined as MDR-TB with additional resistance to any fluoroquinolone and at least one of the following second-line drugs: amikacin, capreomycin or kanamycin. None of the four MDR-TB cases in 2012 was XDR-TB. Only one case of XDR-TB has been identified in New Zealand – this occurred in 2010.

Table 7. Distribution of antimicrobial resistance patterns among tuberculosis isolates, 2012

	Resistance pattern[a]	Percent (no.) of isolates with each pattern
Fully susceptible		**85.4 (199)[b]**
Resistant to 1 agent		**9.4 (22)**
	H	2.6 (6)
	Z	1.7 (4)
	S	5.2 (12)
Resistant to 2 agents		**3.9 (9)**
	HR[c]	0.4 (1)
	HE	0.4 (1)
	HZ	0.4 (1)
	HS	2.6 (6)
Resistant to 3 agents		**0.4 (1)**
	HRS[c]	0.4 (1)
Resistant to 4 agents		**0.9 (2)**
	HRES[c]	0.4 (1)
	HRZS[c]	0.4 (1)

[a] H, isoniazid resistance at the standard concentration of 0.1 mg/L; R, rifampicin; E, ethambutol; Z, pyrazinamide; S, streptomycin.
[b] The pyrazinamide susceptibility of one of the isolates categorised as fully susceptible was not available.
[c] Multidrug-resistant tuberculosis (MDR-TB) - resistant to at least isoniazid and rifampicin.

Table 8 compares antimicrobial resistance among isolates from cases born in New Zealand and cases born overseas. Resistance to all antimicrobials, except pyrazinamide, was higher in isolates from cases born overseas than in isolates from New Zealand-born cases, although none of the differences were significant. All four MDR-TB cases in 2012 were born overseas.

Table 8. Antimicrobial resistance among tuberculosis isolates by place of birth, 2012

	Born in New Zealand (*n* = 49)		Born outside New Zealand (*n* = 184)		*p*-value[a]
	No.	%	No.	%	
Fully susceptible	**44**	**89.8**	**155**	**84.2**	**0.33**
Resistant to:[b]					
Isoniazid[c]	1	2.0	17	9.2	0.13
Rifampicin	0	0.0	4	2.2	0.58
Ethambutol	0	0.0	2	1.1	1.00
Pyrazinamide[d]	2	4.1	4	2.2	0.66
Streptomycin	3	6.1	18	9.8	0.58
MDR-TB[e]	**0**	**0.0**	**4**	**2.2**	**0.58**

[a] Rates compared by the chi-square test or Fisher's exact test, as appropriate.
[b] Includes resistance alone or in combination with other antimicrobials.
[c] Isoniazid resistance at the standard concentration of 0.1 mg/L.
[d] Pyrazinamide susceptibility was not available for an isolate from one overseas-born case.
[e] Multidrug-resistant tuberculosis – resistant to at least isoniazid and rifampicin.

Isoniazid, rifampicin, ethambutol, pyrazinamide and streptomycin resistance was most frequent among cases in the Asian ethnic group, with 83.3% (15/18) of isoniazid-resistant isolates, all four rifampicin-resistant isolates, both ethambutol-resistant isolates, and 76.2% (16/21) of streptomycin-resistant isolates being for cases in the Asian ethnic group (Table 9). All four MDR-TB cases were in the Asian ethnic group.

Table 9. Antimicrobial resistance among tuberculosis isolates by ethnic group, 2012

	Māori (*n* = 27)		Pacific Peoples (*n* = 26)		Asian (*n* = 145)		MELAA[a] (*n* = 12)		European or Other (*n* = 22)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Fully susceptible	**26**	**96.3**	**24**	**92.3**	**120**	**82.8**	**9**	**75.0**	**19**	**86.4**
Resistant to:[b]										
Isoniazid[c]	0	0.0	0	0.0	15	10.3	2	16.7	1	4.6
Rifampicin	0	0.0	0	0.0	4	2.8	0	0.0	0	0.0
Ethambutol	0	0.0	0	0.0	2	1.4	0	0.0	0	0.0
Pyrazinamide[d]	1	3.7	1	3.9	2	1.4	1	8.3	1	4.6
Streptomycin	0	0.0	1	3.9	16	11.0	2	16.7	2	9.1
MDR-TB[e]	**0**	**0.0**	**0**	**0.0**	**4**	**2.8**	**0**	**0.0**	**0**	**0.0**

[a] Middle Eastern/ Latin American/African

[b] Includes resistance alone or in combination with other antimicrobials.

[c] Isoniazid resistance at the standard concentration of 0.1 mg/L.

[d] Pyrazinamide susceptibility was not available for an isolate from one case in the Asian ethnic group.

[e] Multidrug-resistant tuberculosis – resistant to at least isoniazid and rifampicin.

Note: ethnic groups were prioritised in the following order: Māori, Pacific Peoples, Asian, MELAA, European or Other (including New Zealander). Excludes one fully susceptible isolate from a case of unknown ethnicity.

In 2012, 5.2% (12/233) of the culture-positive cases were reported as TB relapses or reactivations. This category of disease could also include cases of re-infection. As the number of cases notified as TB relapses/reactivations in any one year is small, the following analysis of drug resistance among relapses/reactivations is for the last five years, 2008−2012. During this period, 3.8% (46/1207) of the culture-positive cases were reported to be relapses/reactivations. Information about previous treatment was recorded for 33 of these 46 relapses/reactivations and, of these, 30 (90.9%) were recorded as having received previous anti-tuberculosis drug treatment.

Antimicrobial resistance among new cases of TB, cases reported to be relapses/reactivations, and cases that were reported to have been previously treated, is shown in Table 10. Compared with new cases, previously treated cases were significantly more resistant to rifampicin and streptomycin, more likely to be MDR-TB, and less likely to be fully susceptible to all the antimicrobials tested.

Table 10. Antimicrobial resistance among new tuberculosis cases, relapses/reactivations and previously treated cases, 2008−2012

	New cases (*n* = 1161)	Relapse/reactivation cases			
		All (*n* = 46)		Previously treated[a] (*n* = 30)	
	%	%	*p*-value[b]	%	*p*-value[b]
Fully susceptible	**87.3**	**76.1**	**0.03**	**73.3**	**0.05**
Resistant to:[c]					
Isoniazid[d]	7.1	10.9	0.37	13.3	0.27
Rifampicin	1.3	10.9	<0.001	13.3	<0.001
Ethambutol	0.5	0.0	1.00	0.0	1.00
Pyrazinamide[e]	2.5	6.5	<0.001	6.7	0.18
Streptomycin	6.4	13.1	0.12	16.7	0.04
MDR-TB[f]	**1.2**	**8.7**	**0.004**	**10.0**	**0.008**

[a] Information about previous treatment was reported for only 33 of the 46 relapse/reactivation cases.

[b] Rate compared with that for new cases by the chi-square test or Fisher's exact test, as appropriate.

[c] Includes resistance alone or in combination with other antimicrobials.

[d] Isoniazid resistance at the standard concentration of 0.1 mg/L.

[e] Pyrazinamide susceptibility was not available for an isolate from one relapse/reactivation case for whom no previous treatment information was reported.

[f] Multidrug-resistant tuberculosis – resistant to at least isoniazid and rifampicin.

MOLECULAR TYPING

MOLECULAR TYPING

TB molecular typing results were available for 220 of the 221 culture-positive new TB cases in 2012. The mycobacterial species identified were *M. tuberculosis* (215 cases), *M. bovis* (4 cases) and *M. tuberculosis* complex (1 case). Among the 215 *M. tuberculosis* cases, 72 (33.5%) had non-unique molecular types and were in 44 separate molecular clusters. Five new clusters were identified in 2012 with fewer than five cases in each. The remaining 143 cases (66.5%) had a unique strain type.

In the last five years (2008–2012), 1122 *M. tuberculosis* cases had TB molecular typing results, of which 386 (34.4%) had non-unique molecular types and were in 124 separate molecular clusters.

Overall the median cluster size was 2 (range 2−46), and almost 90% (109/124) of clusters had fewer than 5 cases. The remaining 15 clusters were distributed into the following cluster sizes: 5−9 cases (8), 10−19 cases (4) and 20 or more cases (3).

Between 2008 and 2012, the proportion of cases aged less than 15 years was higher amongst those with non-unique molecular types compared to those with unique strain types (6.2% vs. 1.1%). Similarly, the proportion of cases for the Māori (29.3% vs. 5.1%) and Pacific Peoples (28.5% vs. 7.5%) ethnic groups, as well as cases from Hawke's Bay DHB (6.7% vs. 2.0%), and cases born in New Zealand (40.8% vs. 11.6%) was higher among those with non-unique molecular types, over the same period.

Conversely, the proportion of cases in the Asian/MELAA ethnic group was much lower among cases with non-unique molecular types compared to those with unique strain types (32.7% vs. 78.3%). The proportion of cases from Auckland DHB (16.6% vs. 24.6%), as well as cases born in the Southern and Central Asia (14.8% vs. 33.9%) and East Asia (14.0% vs. 35.4%) was lower than among cases with non-unique molecular types.

Table 11 shows a breakdown of cases by age group, sex, ethnic group, DHB, region of birth, quintiles of NZDep06 and clinical manifestation split by whether cases had unique or non-unique strain types.

Table 11. Number and percentage of non-unique and unique strain tuberculosis notifications (new cases) for selected variables, 2008−2012

Variable[a]	Non-unique		Unique	
	Cases	%[b]	Cases	%[b]
Age group (years)	**386**	-	**736**	-
<15	24	6.2	8	1.1
15−39	193	50.0	365	49.6
40−59	93	24.1	167	22.7
60+	76	19.7	196	26.6
Sex	**386**	-	**736**	-
Male	210	54.4	366	49.7
Female	176	45.6	370	50.3
Ethnic group	**379**	-	**723**	-
Māori	111	29.3	37	5.1
Pacific Peoples	108	28.5	54	7.5
Asian/Middle Eastern/Latin American/African	124	32.7	566	78.3
European or Other	36	9.5	66	9.1
District Health Board	**386**	-	**736**	-
Northland	13	3.4	11	1.5
Waitemata	45	11.7	115	15.6
Auckland	64	16.6	181	24.6
Counties Manukau	81	21.0	146	19.8
Waikato	20	5.2	46	6.3
Lakes	5	1.3	8	1.1
Bay of Plenty	15	3.9	22	3.0
Tairawhiti	4	1.0	5	0.7
Taranaki	4	1.0	3	0.4
Hawke's Bay	26	6.7	15	2.0
Whanganui	1	0.3	2	0.3
MidCentral	15	3.9	15	2.0
Hutt Valley	19	4.9	27	3.7
Capital & Coast	35	9.1	50	6.8
Wairarapa	1	0.3	0	0.0
Nelson Marlborough	10	2.6	7	1.0
West Coast	0	0.0	2	0.3
Canterbury	24	6.2	63	8.6
South Canterbury	2	0.5	1	0.1
Southern	2	0.5	17	2.3
Region of birth	**385**	-	**734**	-
New Zealand	157	40.8	85	11.6
Southern and Central Asia	57	14.8	249	33.9
East Asia	54	14.0	260	35.4
Pacific Islands	89	23.1	59	8.0
Africa and the Middle East	18	4.7	58	7.9
Australia, Europe and the Americas	10	2.6	23	3.1
2006 NZ Deprivation Index (NZDep06) quintile	**364**	-	**701**	-
1	24	6.6	78	11.1
2	43	11.8	114	16.3
3	47	12.9	133	19.0
4	82	22.5	169	24.1
5	168	46.2	207	29.5
Clinical manifestation	**384**	-	**732**	-
Pulmonary disease	280	72.9	449	61.3
Extra-pulmonary involvement only	104	27.1	283	38.7

[a] The total provided for each variable is the number of cases for which the information is recorded.

[b] The denominator value used to calculate this percentage is the total number of cases for which information was recorded for the variable.

SUMMARY TABLES

SUMMARY TABLES

Table 12. Number and rate of tuberculosis notifications (new cases) by age group, sex, ethnic group, District Health Board and year, 2008–2012

Category	2008		2009		2010		2011		2012	
	Cases	Rate[a]	Cases	Rate[a]	Cases	Rate[a]	Cases	Rate[a]	Cases	Rate[a]
Age group (years)										
<5	4	-	12	3.9	3	-	8	2.5	4	-
5–14	12	2.0	9	1.5	10	1.7	11	1.9	8	1.4
15–39	128	8.7	129	8.7	142	9.5	141	9.4	142	9.5
40–59	64	5.5	83	7.1	72	6.1	71	6.0	55	4.6
60+	74	9.9	56	7.2	66	8.3	71	8.6	70	8.2
Sex										
Male	150	7.2	145	6.8	147	6.9	154	7.1	147	6.7
Female	132	6.1	144	6.6	146	6.6	148	6.6	132	5.9
Ethnic group[b]										
Māori	41	6.5	49	7.7	31	4.8	39	6.0	35	5.4
Pacific Peoples	51	19.6	32	12.2	45	17.0	47	17.7	33	12.4
Asian	142	35.9	154	38.6	174	43.1	163	40.1	169	41.4
MELAA	11	29.8	11	29.6	12	32.0	15	39.8	12	31.8
European or Other	30	1.0	39	1.3	27	0.9	30	1.0	27	0.9
Unknown	7	-	4	-	4	-	8	-	3	-
District Health Board										
Northland	6	3.9	7	4.5	6	3.8	6	3.8	3	-
Waitemata	47	9.0	46	8.7	33	6.1	33	6.0	40	7.2
Auckland	51	11.6	63	14.2	62	13.8	79	17.3	53	11.5
Counties Manukau	56	11.8	66	13.7	61	12.4	51	10.2	45	8.9
Waikato	17	4.8	12	3.3	20	5.5	18	4.9	22	5.9
Lakes	4	-	6	5.9	3	-	2	-	2	-
Bay of Plenty	8	3.9	12	5.8	4	-	14	6.6	9	4.2
Tairawhiti	1	-	6	13.0	3	-	3	-	2	-
Taranaki	3	-	0	-	1	-	1	-	4	-
Hawke's Bay	5	3.3	9	5.8	10	6.4	17	10.9	20	12.9
Whanganui	1	-	0	-	2	-	1	-	1	-
MidCentral	7	4.3	5	3.0	9	5.4	11	6.5	6	3.5
Hutt Valley	16	11.3	10	7.0	12	8.3	9	6.2	10	6.9
Capital & Coast	25	8.8	16	5.6	28	9.6	36	12.2	22	7.4
Wairarapa	0	-	0	-	1	-	0	-	0	-
Nelson Marlborough	5	3.7	3	-	5	3.6	4	-	14	10.0
West Coast	0	-	2	-	1	-	0	-	1	-
Canterbury	28	5.6	21	4.2	23	4.5	12	2.4	17	3.4
South Canterbury	0	-	2	-	0	-	1	-	1	-
Southern	2	-	3	-	9	3.0	4	-	7	2.3
Total	**282**	**6.6**	**289**	**6.7**	**293**	**6.7**	**302**	**6.9**	**279**	**6.3**

[a] Rate is expressed as cases per 100 000 population. Rates are not presented for where there are fewer than five cases.

[b] Population data used to determine the rates for the ethnic groups is based on the proportion of people in each ethnic group from the estimated resident 2006 census population applied to the 2012 mid-year population estimates published by Statistics New Zealand. Ethnicity is prioritised and grouped in the following order: Māori, Pacific Peoples, Asian, Middle Eastern/Latin American/African (MELAA), and European or Other (including New Zealander).

Table 13. Site of infection for tuberculosis notifications (new cases) with extra-pulmonary involvement by year, 2008–2012

Site of infection	2008		2009		2010		2011		2012	
	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%
Lymph node (excl. abdominal)	58	45.7	48	34.3	75	46.9	65	44.2	55	35.7
Pleural	24	18.9	19	13.6	25	15.6	18	12.2	29	18.8
Intra-abdominal (excl. renal)	9	7.1	22	15.7	21	13.1	26	17.7	18	11.7
Bone/joint	11	8.7	19	13.6	16	10.0	17	11.6	15	9.7
Renal/genitourinary tract	7	5.5	10	7.1	5	3.1	5	3.4	15	9.7
Soft tissue/skin	6	4.7	9	6.4	6	3.8	7	4.8	9	5.8
Miliary tuberculosis	3	2.4	6	4.3	3	1.9	2	1.4	5	3.2
Tuberculous meningitis	3	2.4	3	2.1	8	5.0	6	4.1	1	0.6
Other	11	8.7	14	10.0	11	6.9	14	9.5	17	11.0
Total	**127**		**140**		**160**		**147**		**154**	

[a] Total number of new tuberculosis cases reported with extra-pulmonary involvement, including cases with pulmonary disease. Some cases had more than one site of infection recorded.

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REFERENCES

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