Tuberculosis notifications in Australia, 2007

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Abstract

The National Notifiable Diseases Surveillance System received 1,135 tuberculosis (TB) notifications in 2007, of which 1,086 were new cases and 48 were relapsed cases. The incidence of TB in Australia in 2007 was 5.4 cases per 100,000 population, similar to rates since 1986. In 2007, 86.4% of cases occurred in the overseas-born population. The incidence in the Indigenous Australian population was 6.6 cases per 100,000 population. By contrast, the incidence of TB in the non-Indigenous population was 0.9 cases per 100,000 population. Household or other close contact with TB or past residence in a high risk country were the most commonly reported risk factors for TB infection. In 2007, 31 cases of TB were reported in health care workers, 29 of which were in health care workers born overseas. There were no reports of TB transmission in Australian health care settings. Outcome data of the 2006 TB cohort indicate that treatment success was attained in more than 95% of cases. As Australia continues to contribute to global TB control it is important to maintain good centralised reporting of TB to identify populations at risk and for early detection of reversal in trends in TB. *Commun Dis Intell* 2009;33(3):304–315.

Keywords: disease surveillance, tuberculosis

Introduction

Previous reports on tuberculosis (TB) notifications in Australia have highlighted that TB remains a major global health problem, with important implications for TB control locally.[1] The global burden of disease is such that international travel and mass movement of people, combined with the natural history of TB, make the goal of TB elimination in any 1 country optimistic.

For Australia, the global burden of TB has 2 major implications. The first is the maintenance of health policy and health services that have ensured rates of TB in Australia remain low, despite the global burden of TB. Experience elsewhere has shown that premature dismantling of TB services can have perverse effects on TB control.[2] The global situation and natural history of TB is such that cases of TB will continue to arise in migrants from high TB incidence countries for many years. If uncontrolled, this can lead to ongoing transmission within the general community. It is important that early diagnosis and effective management of TB cases remain a priority.

A subsidiary strategy is targeted screening and treatment of latent TB infection (LTBI). This strategy is limited because current tools available for diagnosis of LTBI provide a poor and unreliable prediction of risk versus benefits for individuals.[3] Indigenous Australians continue to have higher rates of TB than the non-Indigenous Australian population, although rates are falling. It is important that the health system remains vigilant in diagnosing reactivation cases of TB in Indigenous Australians as they age. This population also has higher rates of other chronic diseases, such as renal disease and diabetes, than the general population.[4] These chronic diseases also increase the risk for reactivation of TB and also of chronic lung diseases that confound the diagnosis of TB.

The second implication for Australia is the need to contribute to global TB control. This report looks at the impact of the overseas-born population on the burden of TB in Australia. It shows that TB control will not be achieved within Australia until TB is controlled throughout the world. Additionally, the advent of drug resistant TB internationally has implications for TB control efforts everywhere and this has already been felt in Australia, particularly with regard to the high rates of multi-drug resistant TB occurring in Papua New Guinea (PNG) nationals accessing health care in the Torres Strait Treaty Zone.[1]

The *Tuberculosis notifications in Australia* series of annual reports serve to review TB control in Australia through existing TB surveillance mechanisms. Additionally, the agreement for all jurisdictions within Australia to contribute to these reports ensures they maintain a health system capable of monitoring TB control. These reports should be viewed in conjunction with the Australian Mycobacterium Reference Laboratory Network reports on bacteriologically proven cases.

Methods

Data collection

TB is a nationally notifiable disease in Australia. Medical practitioners, public health laboratories and other health professionals are legally required to report cases of TB to state and territory health authorities. Information on notified cases is collated by state and territory jurisdictions under jurisdictional public health legislation. The *National Health Security Act 2007*[5] provides the legislative basis for

and authorises the exchange of health information between jurisdictions and the Commonwealth. The Act provides for the establishment of the National Notifiable Diseases List,[6] which specifies the diseases about which personal information can be provided. TB is one of the diseases specified in this list. De-identified data on notified cases are sent by jurisdictions electronically to the National Notifiable Diseases Surveillance System (NNDSS), managed by the Australian Government Department of Health and Ageing. National data standards ensure consistency and comparability of data collected across Australia. Enhanced data are collected for each notified case of TB, including information relating to cases' risk factors, clinical diagnostics and treatment outcomes.

A subcommittee of the Communicable Diseases Network Australia (CDNA), the National Tuberculosis Advisory Committee (NTAC) and its subcommittee, the Tuberculosis Data Quality Working Group were responsible for finalising the 2007 dataset reported to the NNDSS. Data presented in this report were analysed by date of diagnosis, a derived field within the NNDSS that is the earliest of the reported fields of notification date and notification received date.

Data presented in this report represent a point in time analysis of cases of TB notified to the NNDSS. Analyses of these cases were finalised in October 2009. Due to the dynamic nature of the NNDSS, data in this report may vary from data reported in other NNDSS reports and reports of TB notifications at the jurisdictional level.

TB drug susceptibility data on bacteriologically confirmed cases are collected, analysed and reported by the Australian Mycobacterial Reference Laboratory Network in an accompanying report.[7] In future reports, it is hoped to combine notification and laboratory data into 1 report.

Data processing and quality control

Data on all TB notifications and outcomes of treatment received from state and territory jurisdictions were examined for completeness and accuracy. Any invalid or missing data were returned to the jurisdictions for review and correction. Invalid or missing data that were unable to be resolved are discussed along with the relevant data analyses in the results section.

It is believed that almost all cases of TB in Australia are reported to the NNDSS. Reasons for the high level of reporting include adherence to the *National Health Security Act 2007,*[5] the presence of effective TB screening programs, a high standard of health care, and specialised and multi-disciplinary TB services in each jurisdiction. The terms 'notification rate' and 'incidence rate' may therefore be used interchangeably in this report.

Indigenous status and country of birth

Three population subgroups are referred to in this report, 'Indigenous Australians', 'non-Indigenous Australians' and 'overseas-born'. These population subgroups are derived from a combination of the 2 distinct data fields indigenous status and country of birth that require completing for each individual notified case of TB. Cases with a reported indigenous status of Indigenous (Aboriginal and/or Torres Strait Islander) and a reported country of birth of Australia or unknown are assumed, for the purposes of this report, to be 'Indigenous Australians'. Cases with a reported indigenous status of non-Indigenous or unknown and a country of birth of Australia are assumed to be 'non-Indigenous Australians'. Cases with a country of birth of a country other than Australia, regardless of indigenous status, are assumed to be 'overseas-born'.

In 2007, the indigenous status field was 99.9% complete (1,134 of 1,135) for cases of TB reported to the NNDSS. The country of birth field was 97.9% complete (1,111 of 1,135) for all cases reported to the NNDSS. Generally, rates specific to the 3 population subgroups presented in this report exclude the 24 cases reported with an invalid or incomplete country of birth and indigenous status fields. Adjusted rates, where these cases with a country of birth of unknown and a reported indigenous status of unknown are proportionately distributed amongst the categories 'non-Indigenous' and 'overseas-born' are presented through this report where relevant.

Case definitions

Cases of TB were determined to be notified for national reporting according to the CDNA case definition for TB.[8] A confirmed case requires a diagnosis accepted by the Director of Tuberculosis Control (or equivalent) in the relevant jurisdiction, based on either laboratory definitive evidence or clinical evidence. Laboratory definitive evidence includes either the isolation of *Mycobacterium tuberculosis* complex (*M. tuberculosis*, *M. bovis* or *M. africanum*) from a clinical specimen by culture; or nucleic acid amplification testing indicating *M. tuberculosis* complex, except where it is likely to be due to previously treated or inactive disease. Clinical evidence is defined according to the case definition as a clinical diagnosis of tuberculosis, made by a clinician experienced in tuberculosis, including a clinical follow-up assessment to ensure a consistent clinical course.

TB cases were classified as new or relapsed at the time of notification. A new case required a diagnosis accepted by the Director of TB Control (or equivalent) in the relevant state or territory, based on either laboratory or clinical evidence, and in the absence of any previous treated or untreated TB diagnosis.

A relapsed TB case is defined as a case of active TB diagnosed bacteriologically, radiologically or clinically, having been considered inactive or quiescent following previous treatment (as deemed by the state or territory Director of Tuberculosis). Relapses refer to re-treatment cases of which some may be reinfections rather than a true relapse of prior disease. Relapse cases are disaggregated into relapse after full or partial treatment, in Australia or overseas.

It is important to note that this report only considers cases of active TB disease. Latent TB infection, when a person is infected with *M. tuberculosis* but does not have the disease and is non-infectious, is not a notifiable disease under the *National Health Security Act 2007*.[5]

National Performance Indicators

The performance criteria for the National Performance Indicators were set by NTAC in 2002 as part of the *National Strategic Plan for TB Control in Australia Beyond 2000*.[9] In TB annual reports before 2005, the performance criteria for incidence in people born overseas applied to people who had been living in Australia for more than 5 years. In this report the criteria have been applied to all cases regardless of length of residence.

Population estimates for 2007

Notification rates were calculated using the estimated 2007 mid-year resident population supplied by the Australian Bureau of Statistics.[10] Rates specific to the Indigenous Australian population were based on projections from the 2001 census estimate of the Indigenous population in Australia.[11] As data on the state and territory composition of Australia's estimated resident population by country of birth were only available for census years, rates specific to the Australian born population by state or territory were based on 2006 census counts where country of birth was Australia.[12] The preliminary 2007 estimated resident population by country of birth was used to calculate incidence rates of TB in the overseas-born population.[13]

Results

Tuberculosis notification rates

The incidence of TB in Australia has remained at a stable rate since 1986 (Figure 1). A total of 1,135 cases of TB was reported in Australia in 2007, representing a crude rate of 5.4 cases per 100,000 population (Table 1).

In 2007 there were 1,086 new cases of TB notified and 48 relapse cases notified (Table 1). A single case was notified to the NNDSS without this information. Of the 48 relapsed cases, 9 relapsed after full treatment in Australia, 9 following partial treatment in Australia, 18 following full treatment overseas and 12 following partial treatment overseas.

Tuberculosis notifications by state or territory

In 2007, New South Wales reported the largest number of cases of TB (454). However the highest notification rate was recorded in the Northern Territory (25.1 cases per 100,000 population) because there were relatively few cases (54 cases) in a smaller population (Table 1).

Table 1: Notifications of new and relapsed cases of tuberculosis and notification rate per 100,000 population, Australia, 2007, by state or territory

State or territory	New cases		Relapse cases		Total cases	
	Notifications	Rate	Notifications	Rate	Notifications*	Rate
ACT	10	2.9	0	0.0	10	2.9
NSW	437	6.3	17	0.2	454	6.6
NT	52	24.2	1	0.5	54	25.1
Qld	125	3.0	12	0.3	137	3.3
SA	55	3.5	4	0.3	59	3.7
Tas	8	1.6	0	0.0	8	1.6
Vic	345	6.6	8	0.2	353	6.8
WA	54	2.6	6	0.3	60	2.8
Australia	1,086	5.2	48	0.2	1,135	5.4

* Total includes 1 case reported with no new/relapse case information.

Figure 1: Tuberculosis notification rate per 100,000 population, Australia, 1960 to 2007

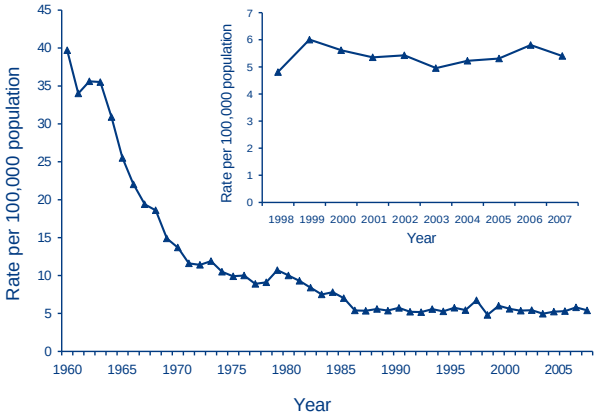


Figure 2 presents TB notification rates, on a semi-logarithmic scale, for the previous decade for each state and territory. The highest notification rates over the 10 year period were seen in the Northern Territory. Notification rates in 2007 for the Australian Capital Territory and Western Australia were their lowest in 10 years.

The largest increases in the number of cases of TB over the 10 year period were seen in the Northern Territory (39% increase), Victoria (36% increase) and Queensland (24% increase). The largest decrease in the number of cases of TB over the same period was seen in the Australian Capital Territory (70% decrease). Notification rates in the Australian Capital Territory varied greatly over the 10 year period. The volatility in the rate is due, in part, to small changes in the number of cases of TB over time proportionate to a relatively small estimated residential population.

Tuberculosis in non-Indigenous Australians

Indigenous status was reported for all 151 Australian-born cases (Table 2). The incidence rate of TB in non-Indigenous Australians in 2007 was 0.9 cases per 100,000 population (116 cases), with the trend over time for this population group suggesting continued decline (Figure 3). The adjusted rate for this population subgroup, accounting for cases reported with an invalid or incomplete country of birth and indigenous status, remained at 0.9 cases per 100,000 population.

Tuberculosis in Indigenous Australians

In 2007, the TB incidence rate in the Indigenous Australian population was 6.6 cases per 100,000 population (35 cases) (Table 2). There has been variability in incidence rates in the Indigenous Australian population over time, but overall rates

Figure 2: Tuberculosis notification rate per 100,000 population, Australia, 1998 to 2007, by state or territory

are decreasing with time (Figure 3). Nevertheless, the crude TB incidence rate in Indigenous Australians in 2007 was greater than 7 times the rate in non-Indigenous people. The adjusted rate for this population subgroup, accounting for cases reported with an invalid or incomplete country of birth and indigenous status, remained at 6.6 cases per 100,000 population.

Tuberculosis notifications in the overseas-born population

In 2007, the country of birth was reported for 1,111 of the 1,135 cases. Table 3 shows notifications and incidence rates by country of birth.

Of the cases reported with a country of birth, overseas-born people contributed 86.4% (960 cases) of the total tuberculosis case-load in 2007 (Table 3). The TB incidence rate in the overseas-born population was 18.3 cases per 100,000 population (960 cases) in 2007. This rate is more than 20 times

Figure 3: Tuberculosis notification rate per 100,000 population, Australia, 1996 to 2007, by population subgroup

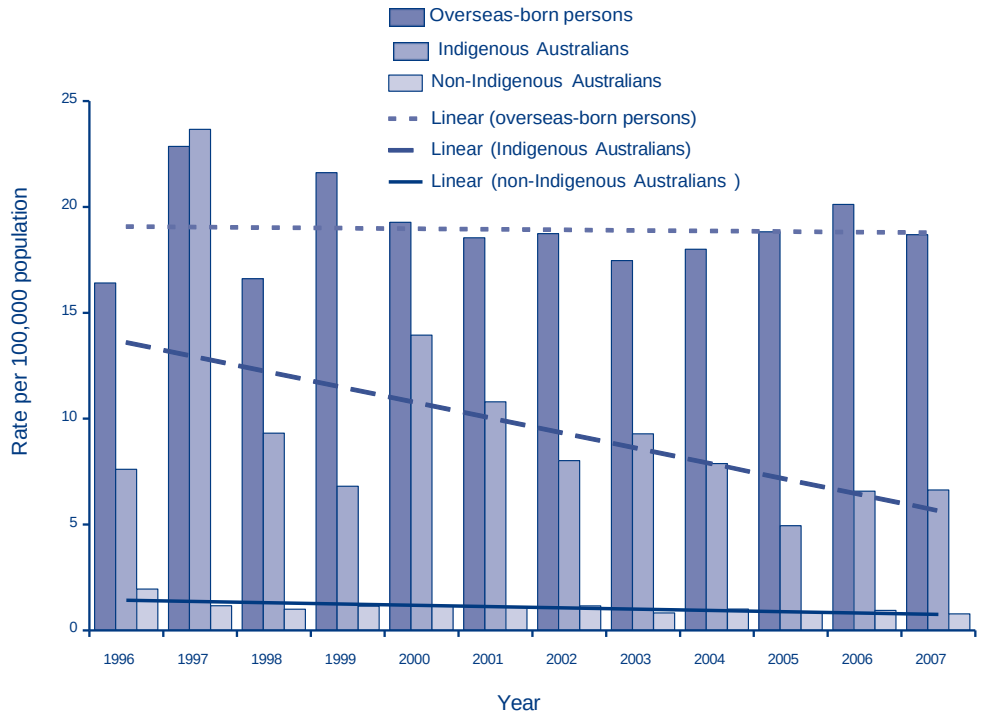


Table 2: Notifications of tuberculosis and notification rate per 100,000 population in all Australian-born cases, Australia, 2007, by state or territory and indigenous status

State or territory	Indigenous Australians		Non-Indigenous Australians		Total Australian-born	
	Notifications	Rate	Notifications	Rate	Notifications	Rate*
ACT	0	0.0	2	0.9	2	0.8
NSW	3	1.9	52	1.2	55	1.2
NT	21	32.2	2	2.4	23	15.5
Qld	7	4.7	12	0.4	19	0.6
SA	3	10.5	9	0.8	12	1.1
Tas	0	0.0	3	0.8	3	0.8
Vic	1	2.9	30	0.9	31	0.9
WA	0	0.0	6	0.5	6	0.5
Australia	35	6.6	116	0.9	151	1.0

* Australian-born rates by state or territory were based on 2006 census counts where country of birth was Australia.[12]

the incidence rate experienced by non-Indigenous Australians. The adjusted rate for this population subgroup, accounting for cases reported with an invalid or incomplete country of birth and indigenous status, increased to 18.7 cases per 100,000 population.

The rate of notification of overseas-born cases was similar to rates in this population in the previous 2 years (20.1 and 18.8 per 100,000 population in 2006 and 2005 respectively, (Figure 3). The rate of notification of TB in the overseas-born population has remained relatively stable since 1996.

While the highest notification rates were among those born in Nepal (19 notifications; 293.9 cases per 100,000 population), Somalia (15 notifications; 283.8 cases per 100,000 population) and Eritrea (6 notifications; 245.1 cases per 100,000 population), these represent a relatively small number of cases in a small resident population (Table 3). As in previous years, the largest numbers of TB cases were detected in those born in India (193 notifications; 96.6 cases per 100,000 population), Viet Nam (88 notifications; 46.8 cases per 100,000 population), China (82 notifications; 29.2 cases per 100,000 population),

Table 3: Notifications of tuberculosis and estimated rate per 100,000 population for selected countries of birth, Australia, 2007

Country of birth	New cases	Relapse cases	Total cases	Estimated resident population 2007	Rate per 100,000 population in Australia*	WHO incidence rate per 100,000 population 2007†
Nepal	19	0	19	6,465	293.9	173.0
Somalia	14	1	15	5,286	283.8	248.7
Eritrea	6	0	6	2,448	245.1	95.4
Sierra Leone	5	0	5	2,434	205.4	573.9
Libya	3	0	3	1,794	167.2	17.2
Ethiopia	11	0	11	6,981	157.6	378.2
Papua New Guinea	34	8	42	28,531	147.2	249.5
Myanmar	20	1	21	15,103	139.0	170.9
Sudan	26	1	27	23,100	116.9	243.3
India	189	4	193	199,696	96.6	167.8
Liberia	2	0	2	2,123	94.2	277.1
Bangladesh	16	0	16	19,530	81.9	222.5
Albania	2	0	2	2,467	81.1	16.9
Pakistan	16	1	17	21,117	80.5	181.3
Indonesia	43	1	45	63,060	71.4	228.0
Timor-Leste	6	1	7	10,584	66.1	322.0
New Caledonia	1	0	1	1,542	64.9	21.6
Nigeria	2	0	2	3,161	63.3	310.7
Kenya	7	0	7	12,361	56.6	352.6
Philippines	77	3	80	144,340	55.4	290.0
Solomon Islands	1	0	1	1,885	53.1	127.8
Viet Nam	85	3	88	188,038	46.8	171.2
China‡	76	6	82	281,009	29.2	98.3
Other overseas-born	419	19	268	4,210,797	6.4	
Total overseas-born	1,080	49	960	5,253,852	18.3	
Australian-born	144	7	151	15,763,370	1.0	
Total§	1,086	48	1,135	21,017,222	5.4	

* The Australian Bureau of Statistics estimated resident population at June 2007.[13]

† Rates from the World Health Organization 2009 Global Tuberculosis Report.[14]

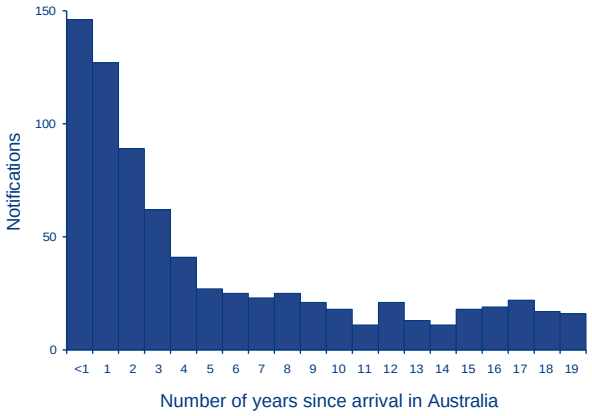
‡ China excludes Hong Kong SAR and Taiwan.

§ Total includes 24 cases reported with an invalid or incomplete country of birth and indigenous status.

the Philippines (80 notifications; 55.4 cases per 100,000 population) and Indonesia (45 notifications; 71.4 cases per 100,000 population).

Data on the year of arrival were available for 935 of the 960 overseas-born cases in 2007. Of the overseas-born cases that were reported with a year of arrival, 29.2% (273 cases) presented within 2 years of arrival in Australia and 80.4% (752 cases) within 20 years of arrival (Figure 4).

Figure 4: Tuberculosis notifications in the overseas-born population, Australia, 2007, by number of years since arrival in Australia



The Australian immigration status was available for 508 (52.9%) of the 960 overseas-born cases in 2007. The majority of these cases were permanent residents (291 cases, 57.3%), with refugees, overseas visitors and overseas students representing a similar proportion within the subgroup (51 cases, 10.0%; 48 cases, 9.4%; 48 cases, 9.4%, respectively.)

Unauthorised entrants made up 3.9% nationally, with 18 of the 20 cases reported by the Northern Territory. These cases were illegal fisherpersons detained by Australian Customs, diagnosed with TB and commenced on TB treatment. There was a total of 33 notifications of TB in Queensland among Papua New Guinea nationals accessing health care in the Torres Strait Treaty Zone, representing an increase on previous years.

Tuberculosis notifications by age and sex

Information on the sex and age of TB cases was available for all cases. The male to female ratio in TB notifications was 1:0.8.

One of the most important measures of TB control is the incidence in children aged less than 15 years because these cases represent recent TB infection. TB was notified in 58 children aged less than 15 years in 2007, 5.1% of the total number of notified cases (Table 4). Of these, 20 were Australian-born and 38 were born overseas. Of the 20 Australian-born children, 7 were identified as Indigenous Australians.

The NTAC target performance indicator for rates of TB in children aged less than 15 years is less than 0.1 case per 100,000 population for all groups. The age group-specific notification rate for children under 15 years of age in 2007 was 1.4 cases per 100,000 population (Table 4). The rate was highest in overseas-born children (12.9 cases per 100,000 population), followed by the Indigenous Australian children (3.6 cases per 100,000 population). The notification rate remained low in non-Indigenous children (0.4 cases per 100,000 population, Table 4).

The age group incidence rates for TB in overseas-born, Indigenous Australian and non-Indigenous

Table 4: Notifications of tuberculosis and estimated rate per 100,000 population, Australia, 2007, by age group and population subgroup

Age group	Indigenous Australians		Non-Indigenous Australians		Overseas-born		Total*	
	Notifications	Rate	Notifications	Rate	Notifications	Rate	Notifications	Rate
0–4	3	4.7	9	0.7	4	8.6	16	1.2
5–14	4	3.1	4	0.2	34	13.7	42	1.5
Subtotal	7	3.6	13	0.4	38	12.9	58	1.4
15–24	3	3.0	14	0.6	151	27.9	173	5.9
25–34	6	8.2	9	0.4	295	38.4	314	10.8
35–44	7	10.8	6	0.3	138	15.1	153	5.0
45–54	5	11.1	18	0.9	116	12.4	141	4.8
55–64	4	16.6	14	0.9	77	9.2	99	4.2
65+	3	18.9	42	2.4	145	15.0	197	7.1

* Total includes 24 cases reported with an invalid or incomplete country of birth and indigenous status.

Australian populations are shown in Table 4 and Figure 5. TB incidence in the overseas-born population was highest in the 25–34 year age group (295 cases, 38.4 cases per 100,000 population). In the Indigenous Australian and non-Indigenous Australian cases, rates increased throughout adult life with the highest notification rates in the 65 years or over age group (3 cases, 18.9 cases per 100,000 population; 42 cases, 2.4 cases per 100,000 population, respectively).

Tuberculosis and selected risk factors

Information on risk factors for TB, excluding HIV, is reported in Table 5. One case may report more than one associated risk factor. Information on risk factors for TB, excluding HIV, was reported in 658 (58.0%) of the 1,135 cases.

Of the cases that reported risk factors in 2007, household or other close contact with a TB patient was a common risk factor in all 3 population subgroups (163 total cases). A total of 31 TB cases were reported in people who had previously worked or were currently working in a health care setting, with over 90% of these cases being overseas-born. Past residence of 3 months or longer in duration in a TB high risk country was reported in the majority of cases (481 total cases), including 14 Australian-born cases.

The number of TB cases reported in health care workers has varied between 12 (2005) and 42 (2006) cases per year since 2001 with 31 cases reported in 2007 (Figure 6). Since 2001, the proportion born overseas has varied between 50.0% in 2001 to 93.5% in 2007. At diagnosis, most health care workers were or had been working in the previous 12 months in an Australian health care setting. None of the cases were deemed to have acquired TB in an Australian

Figure 5: Tuberculosis notification rate per 100,000 population, Australia, 2007, by age group and population subgroup

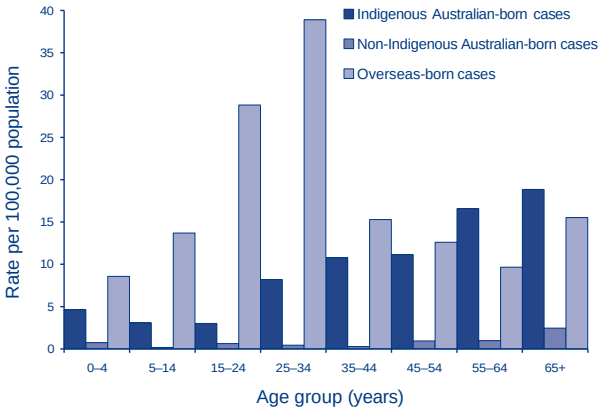


Figure 6: Tuberculosis notifications reported in health care workers, Australia, 2001 to 2007, by country of birth

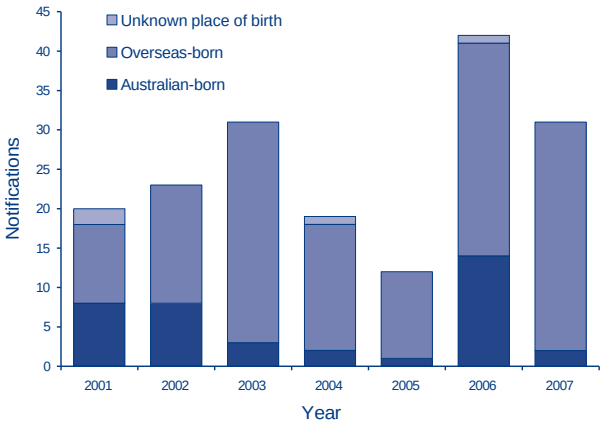


Table 5: Notifications of tuberculosis, Australia, 2007, by selected risk factors*,† and population subgroup

Risk factor	Indigenous Australians notifications	Non-Indigenous Australians notifications	Overseas-born notifications	Total notifications‡
Household or other close contact with a TB patient	15	22	111	163
Currently or recently resident in correctional facility§	1	0	1	2
Currently or recently residing in aged care facility§	0	1	3	4
Currently or recently employed in an institution§	0	6	6	13
Currently or previously employed in health industry§	0	2	29	31
Past residence in high risk country	1	14	465	481

* Excludes HIV status.

† More than 1 risk factor may be reported for each notified case.

‡ Total includes cases reported with risk factor and with an invalid or incomplete country of birth and indigenous status.

§ Within the preceding 5 years.

health care setting, nor were there any reports of active TB transmission to patients from health care workers in Australia in 2007.

Tuberculosis and HIV status

Information on HIV status was reported in 486 of the 1,135 (42.8 %) cases. Of these cases, 13 were identified with HIV infection at the time of diagnosis (10 Overseas-born, and 3 non-Indigenous). The proportion of cases with HIV status reported increased from 35.2% in 2006 to 42.8% in 2007.

Anatomical site of disease

The anatomical site of TB infection was recorded in all notified cases (Table 6). Pulmonary disease was reported in 694 cases, of which 556 cases were reported as having pulmonary disease only and the remaining 138 cases were reported as having pulmonary disease plus disease at an extrapulmonary site. Extrapulmonary disease only was reported in 441 notifications, with lymph nodes reported as the most frequent extrapulmonary site.

Treatment outcomes of 2006 tuberculosis patient cohort

Treatment outcome data for all TB cases reported in 2006 were received by August 2009 (Table 7).

Treatment success, including those with bacteriologically confirmed cure and those who completed treatment, was reported in more than 95% of cases with assessable outcomes in the non-Indigenous and overseas-born populations. In contrast, only 83.9% of Indigenous Australian cases were reported with treatment success. There was 1 case of a treatment failure; this was reported in a non-Indigenous case.

National Performance Indicators

Performance criteria for incidence (less than 1 per 100,000 population) were met only for the crude incidence rates in non-Indigenous cases (Table 8). Incidence rates in the age groups under 15 years exceeded the performance criteria (less than 0.1 case per 100,000 population) in all population groups. The completeness of HIV data collection remains well below the goal of 100%, however has improved upon the completeness of HIV data recorded for 2006 notifications. Outcome reporting did not meet the target of 100% for the 2006 patient cohort, with 1.7% of cases with assessable outcomes reported with an unknown outcome. While overall the performance indicator for cases that reported treatment success was met, the performance indicator was not met by the Indigenous Australian subset of the population, with 83.9% of cases reporting treatment success.

Discussion

The annual incidence of reported TB cases has remained reasonably constant in Australia since 1986. In 2007, the crude rate of total cases (including new and relapse cases) was 5.4 cases per 100,000 population. However, the incidence of total cases in the Australian born population continues to show a downward trend with 1 case per 100,000 population observed in 2007. Notifications of TB cases in Australia that were overseas-born comprised 86.4% of all notified cases in 2007 (Table 3), with over one-quarter of these having lived in Australia for 2 years or less. Thus, most TB cases currently seen in Australia arise from transmission overseas or transmission in Australia within the overseas-born population. Currently, molecular typing of TB isolates is carried out in various Australian jurisdictions by the Mycobacterial Reference Laboratory Network. Such testing should provide data to support whether the transmission within overseas-born populations is occurring within Australia or not.

Among Australian-born populations, much disparity still exists between Indigenous and non-Indigenous Australians, with crude rates of TB in Indigenous Australians being more than 7 times that of non-Indigenous Australians in 2007 (Table 2). Table 4 shows that the difference in younger age groups is much greater than this, suggesting that age-adjusted rates would show that the disparity is much greater than suggested by crude rates. Variations in rates between jurisdictions may reflect differences in the proportion of migrants in the population or, in the case of the Northern Territory, the proportion of Indigenous Australians in the population. However, in the case of the Northern Territory, rates among non-Indigenous Australians are higher than in other states (Table 2).

While it is felt that TB transmission is rare in Australian-born people generally, we suggest that transmission is still a problem among the Australian Indigenous community. This ongoing transmission could then explain the higher rate among non-Indigenous Australians in an Australian jurisdiction with the highest proportional population of Indigenous people. Molecular studies in the future will allow greater elucidation of this. However, the Queensland TB Control Centre (QTBCC) has noted that the incidence of TB among non-Indigenous Australians in Far North Queensland (where there is again a relatively high proportion of Indigenous Australians) is higher than in those from other areas of the State (QTBCC, personal communication). The large variation of TB in Indigenous Australians throughout Australia (Table 2) reflects both the low numbers of Indigenous people and the fact that incidence seems to occur within various community groups and is subject to case-finding

Table 6: New and relapsed cases of tuberculosis, Australia, 2007, by site of disease

Site	New cases	Relapse cases	Total cases	Per cent of total cases
Total pulmonary disease	656	37	694	61.1
Pulmonary only	530	25	556	49.0
Pulmonary plus other sites	126	12	138	12.2
Extrapulmonary only*	430	11	441	38.9
Pleural	58	2	60	5.3
Lymph nodes	130	3	133	11.7
Bone/joint	31	2	33	2.9
Genito/urinary	20	0	20	1.8
Milliary	2	0	2	0.2
Meningeal	12	0	12	1.1
Peritoneal	3	0	3	0.3
Other	51	2	53	4.7

* Extrapulmonary only' includes 153 cases reported without an extrapulmonary site further categorised. More than 1 extrapulmonary site may be reported for each notified case.

Table 7: Notifications of tuberculosis, Australia, 2006, by population subgroup and treatment outcomes

	Indigenous Australians		Non-Indigenous Australians		Overseas-born		Total cases	
	Cases	% assessable	Cases	% assessable	Cases	% assessable	Cases	% assessable
Assessable outcomes								
Treatment success	26	83.9	119	96.7	854	95.4	999	95.2
Cured (bacteriologically confirmed)*	13	41.9	13	10.8	39	4.3	65	6.2
Completed treatment†	13	41.9	105	85.9	816	91.1	934	89.0
Interrupted treatment‡	0	0.0	0	0.0	0	0.0	0	0.0
Died of tuberculosis§	2	6.5	2	1.6	10	1.1	14	1.3
Defaulted‖	0	0.0	1	0.8	16	1.8	17	1.6
Failure¶	0	0.0	1	0.8	0	0.0	1	0.1
Not followed up, outcome unknown	3	9.7	0	0.0	15	1.7	18	1.7
Total assessable	31	100.0	123	100.0	895	100.0	1,049	100.0
Non-assessable outcomes								
Transferred out of Australia§	0	0.0	1	0.7	77	7.5	78	6.5
Died of other causes§	2	6.1	14	9.9	43	4.2	59	4.9
Still under treatment	0	0.0	4	2.8	5	0.5	9	0.8
Total	33		142		1,020		1,195	

* Cured is defined as the bacteriologically confirmed cure of smear or culture positive pulmonary cases.

† 80% of standard regimen completed.

‡ Interrupted treatment means treatment interrupted for two months or more but completed.

§ During treatment phase.

‖ Defaulted means failed to complete treatment.

¶ Failed means treatment completed but failed to be cured.

Table 8: National tuberculosis performance indicators, performance criteria and the current status of tuberculosis, Australia, 2006 and 2007

National tuberculosis performance indicator	Performance criteria	2006†	2007
Annual incidence of TB (cases per 100,000 population)			
Crude incidence			
Indigenous Australians	<1	6.8	6.6
Non-Indigenous persons	<1	0.9	0.9
Overseas-born persons	*	20.1	18.3
Relapse cases initially treated in Australia	<2% treated cases	0.9%	0.8%
Incidence in children <15 years, by risk group (per 100,000 population)			
Indigenous children	<0.1	1.7	3.6
Non-Indigenous children	<0.1	0.5	0.4
Overseas-born children	*	19.8	12.9
Collection of HIV status in tuberculosis cases (% of cases with data collected)	100%	35%	43%
Treatment outcome measures (%)			
Cases evaluated for outcomes	100%	98.3%	TBA
Cases that have treatment completed and are cured	>90%	95.2%	TBA
Cases recorded as treatment failures	<2%	0.1	TBA

* Performance criteria currently under review.

† Evaluation of outcomes of 2006 patient cohort re-assessed in August 2009

TBA To be assessed: 2007 patient cohort outcomes to be reported in 2008 annual report.

activities. Ongoing molecular typing will help elucidate these issues as well as explore further the reason for increasing rates in Queensland and Victoria over the last 10 years. Victoria has a high migrant intake (as does New South Wales) while Queensland has had increasing numbers reported among people from PNG over the last 10 years.[1,15]

As in previous reports, the data show that most TB in Australia occurs in migrants. Table 3 is useful in identifying the source countries for many of these migrants and can be useful for informing health services about risk groups for TB. However, the estimates of rates are biased by the fact that temporary visitors are included among the cases but are not necessarily enumerated within the base population. Nevertheless, it is important to recognise that migrants from high incidence TB countries will be a source of reactivation of TB as they age and develop other medical conditions that increase the risk for reactivation. It is important that health services remain alert to this possibility now that TB has become rare even in the oldest non-Indigenous people (Table 4) and thus rarely encountered as a cause of morbidity among the aged by the general medical workforce.

It is important that good centralised reporting of TB continues for Australia to identify populations at risk and to detect promptly any reversal in trends in TB incidence. This is particularly important as the full impact of poor TB control often emerges only after many years of neglect when reversal of trends can become costly. Due to the low rates of TB in Australia, important risk groups for TB are often overlooked because of the perception that latent infection and newly acquired TB infection are rare in the community at large. However, this can lead to unwarranted complacency and failure to recognise risk for those populations with higher rates of TB (overseas-born and Indigenous Australians). In this respect, it is unfortunate that HIV infection status is still being reported for only a small percentage of TB cases, despite the aims of the NTAC to achieve 100% reporting for many years. There is a need to explore other avenues for achieving greater compliance, for example, initiating HIV testing by TB control unit clinical staff after TB has been notified or increasing reminders to clinicians managing TB about the need for HIV data. It is also possible that the reported data are under-reporting the true extent of HIV testing if the test results are only available after the collection of data or if the data collection process initiates testing for HIV after data have been provided. Such information could be better elucidated without the barriers of the administrative and political constraints to linking data in a manner that protects individual confidentiality.

Unfortunately, data on bacteriology and drug resistance testing are provided separately at the national level. It is planned that these databases will be

linked at the national level in the near future, which will allow more complete reporting. However, the data provided do suggest that TB is currently well-controlled within Australia. The challenge for the future is to maintain such high level control in the face of the continuing high incidence for much of the world's population, by maintaining effective diagnostic and treatment services that are readily and freely accessible to all population groups within the Australian setting. Even among Australia's health care workers, the major risk for TB is birth overseas. Reporting on molecular typing of TB strains in the future will provide better data to determine whether disease in the overseas-born population was acquired overseas or the result of transmission within clusters of overseas-born people within Australia.

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