Tuberculosis notifications in Australia, 2004

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Abstract

The National Notifiable Disease Surveillance System received 1,076 tuberculosis (TB) notifications in 2004, of which 1,043 were new cases and 33 were relapses. The incidence of TB in Australia has remained at a stable rate since 1985 and was 5.4 cases per 100,000 population in 2004. The high-incidence groups remain people born overseas and Indigenous Australians at 21.7 and 8.1 cases per 100,000 population, respectively. By contrast, the incidence of TB in the non-Indigenous Australian-born population was 1.0 cases per 100,000 population. Comparison of the 2004 TB notification data against the performance indicators set by National Tuberculosis Advisory Committee highlights that enhanced TB control measures should be considered among these high-risk groups. *Commun Dis Intell* 2006;30:93–101.

Keywords: disease surveillance, tuberculosis

Introduction

Australia has one of the lowest incidence rates of tuberculosis (TB) in the world with rates remaining stable at 5–6 cases per 100,000 population since the mid–1980s.[1] By contrast, approximately 60 per cent of the 8.8 million TB cases occurring globally in 2003 live in Australia's neighbouring countries in South East Asia and the Western Pacific.[2] Australia's migrant intake includes people from countries with high prevalence of TB and those born overseas have accounted for a large proportion of Australia's TB cases over the last decade.

A crucial component of effective TB control in a low-incidence country is the collection of accurate, comprehensive and timely statistics. These data must be compared against performance indicators to ensure that strategic directions are identified, that outcomes are achieved and that Australia's enviable record of TB control is maintained. This paper presents the TB notification data from the National Notifiable Diseases Surveillance System (NNDSS) in 2004. The data are compared against the National Tuberculosis Performance Indicators set by the National TB Advisory Committee in the *National Strategic Plan for TB Control in Australia beyond 2000.*[3] Information about drug susceptibility is published by the Australian Mycobacterium Laboratory Reference Network in an accompanying report.

Methods

Data collection

TB is a notifiable disease in Australia. Medical practitioners, public health laboratories and other health professionals are legally required to report cases of TB to the State and Territory health authorities. Information on notified cases for 2004 was collated by jurisdictions and sent electronically to the Australian Government Department of Health and Ageing. Records were dispatched in a de-identified format to ensure confidentiality. The National Tuberculosis Advisory Committee, as a sub-committee of the Communicable Diseases Network Australia, was responsible for determining the data set collected in 2004 and for its transmission to NNDSS. Data fields in the enhanced TB data set that are analysed in this report are listed in Table 1 with a brief description of each variable.

Data processing and quality control

Data on all TB notifications reported in 2004 were received by September 2005. Updated information on the outcomes of treatment of patients notified in 2003 was received by December 2005. Data received from the jurisdictions were examined for completeness and accuracy. Any invalid or missing entries were returned to the jurisdictions for review and correction.

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Table 1. Description of some of the data fields in the enhanced tuberculosis data set of the National Notifiable Diseases Surveillance System*

Data field	Description
Country of birth	Country in which the notified case was born.
Extrapulmonary site	Details of any extrapulmonary site involved.
New or relapse case	Options include: new case (without known previous treatment); relapse of disease following full treatment in Australia; relapse of disease following partial treatment in Australia; relapse of disease following full treatment overseas; relapse of disease following partial treatment overseas.
TB outcomes	Options include: cured (bacteriologically confirmed); completed treatment; interrupted treatment for less than 2 months (but still completed); died of TB during treatment phase; died of other cause during treatment phase; defaulter (failed to complete treatment); treatment failure (completed treatment but failed to be cured); transferred out of Australia during treatment phase.
Age	Age of notified case at diagnosis.
Indigenous status	Whether notified case is self-identified Indigenous (Aboriginal and/or Torres Strait Islander) Australian or not.
Selected risk factors	Options include: close contact with a TB patient; currently/recently residing in a correctional facility; currently/recently residing in an aged care facility; currently/previously employed in an institution; currently/previously employed in the health industry; HIV status (positive or negative); past residence (3 months or more) in a high risk country.

* Other data collected on each case included diagnosis details, therapy and susceptibility. These were analysed in the accompanying TB laboratory report pp. 102–108.

Most cases of TB in Australia are reported to the surveillance system. Reasons for the high level of reporting include 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' are therefore used interchangeably in this report.

Case definitions

TB cases were classified as new or relapsed. A new case required a diagnosis accepted by the Director of TB Control (or equivalent) in the relevant jurisdiction, based on laboratory or clinical evidence, and in the absence of any previous treated or untreated TB diagnosis. Laboratory 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 (NAAT) indicating *M. tuberculosis* complex except where it is likely to be due to previously treated or inactive disease. The inclusion of NAAT in this definition is to ensure full case ascertainment and does not endorse NAAT for TB diagnosis. Microscopy and culture remain mainstays of TB laboratory diagnosis and provide the capacity for assessing the level of risk for transmission and drug susceptibility testing.

Clinical evidence is a diagnosis made by a clinician experienced in tuberculosis and includes clinical follow-up assessment, with or without supporting radiology.

A relapsed TB case was 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 and some of these may be re-infections rather than a true relapse of prior disease.

Population estimates for 2004

The rates presented in this report were calculated using population data produced by the Australian Bureau of Statistics (ABS). The estimated resident population as at 30 June 2004, in each state and territory and in Australia as a whole, was used as the denominator in crude rate calculations.

Estimates of the Indigenous Australian population were based on projections from the 2001 census estimate of the Indigenous population in Australia. The ABS calculated the projections based on assumptions about future births, deaths and migrations in the Indigenous population and a 'low' and 'high' estimate were provided. For the purpose of this report, the 'low' estimate has been used, which is consistent with previous annual reports for TB notifications in Australia.

The 2001 census data were used to calculate incidence rates of TB in people born overseas. The estimated resident population of overseas-born people (total and by country of birth) in 2001 was used as the denominator in calculating rates, with additional data on recent arrivals from some countries supplied by the Australian Government Department of Immigration and Multicultural and Indigenous Affairs.

To estimate the non-Indigenous Australian-born population, the Indigenous population estimate and the overseas-born population estimate were subtracted from the total Australian population. Since some of the TB notifications in the report may include non-permanent residents of Australia in 2004, the rates may be overestimated.

Results

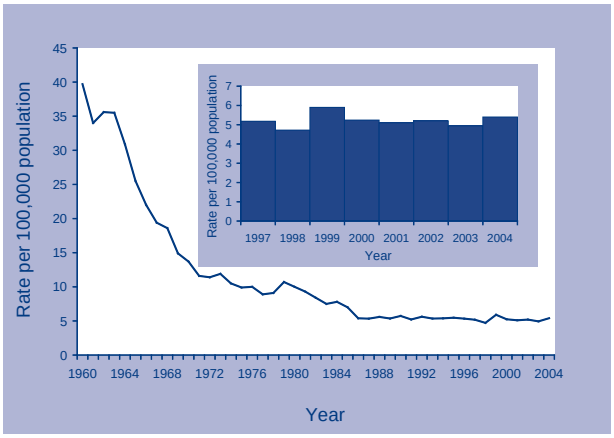
Data quality

The majority of data fields were well reported. Information on age (1,075/1,076) and sex (1,074/1,076) for all notifications were almost complete. Indigenous status was reported for 187 of the 191 (98%) people born in Australia and country of birth was recorded for 1,063 (98.7%) of the total TB notifications. The site(s) of TB disease was reported for 1,052 (97.7%) cases and whether the case was new or relapse was also reported for 1,075 (99.9%) cases. HIV status was not well reported (34%).

Tuberculosis notification rates

The total number of cases reported across Australia in 2004 was 1,076 (5.4 cases per 100,000 population). This is higher than in 2003 (982 cases, 4.9 cases per 100,000 population), and similar to the rate in 2002 (5.2 cases per 100,000 population, Figure 1).

Figure 1. Incidence rates for tuberculosis notifications, Australia, 1960 to 2004



Tuberculosis notifications by jurisdiction

New South Wales reported the largest number of TB cases (431) however the highest rate was recorded in the Northern Territory (14 cases per 100,000 population, Table 2). Of the 33 relapsed cases, 11 were identified following full treatment in Australia, one following partial treatment in Australia, 12 following full treatment overseas and 9 following partial treatment overseas.

Figure 2 presents the TB notifications rates by jurisdiction for 2002 to 2004. The small increases and decreases over time are often difficult to interpret due to the small number of cases within jurisdictions.

Figure 2. Tuberculosis notification rates Australia, 2002 to 2004, by state or territory

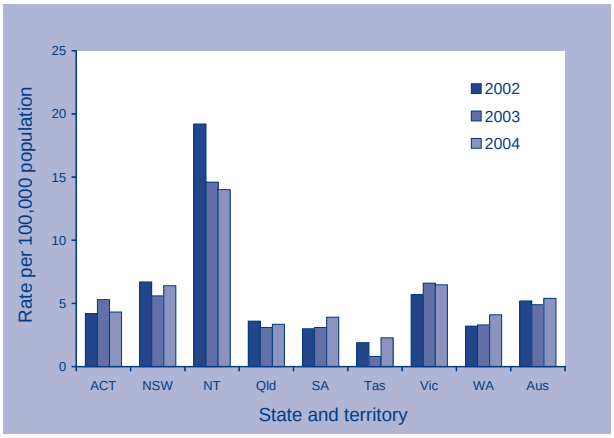


Table 2. New and relapsed cases and rates per 100,000 population, Australia, 2004, by state or territory

	New cases	New cases rate	Relapse cases	Relapse case rate	Total notifications	Total rate
ACT	14	4.3	0	0.0	14	4.3
NSW	412	6.1	19	0.3	431	6.4
NT	27	13.5	1	0.5	28	14.0
Qld	122	3.1	7	0.2	129	3.3
SA	60	3.9	0	0.0	60	3.9
Tas*	10	2.1	0	0.0	11	2.3
Vic	317	6.4	5	0.1	322	6.5
WA	80	4.0	1	0.1	81	4.1
Australia	1,042	5.2	33	0.2	1,076	5.4

* One case from Tasmania was unknown relapse/new status.

Tuberculosis notifications in the Australian-born population

In 2004, 191 (17.7%) cases of TB occurred in the Australian-born population, of whom 152 (79%) were non-Indigenous, and 39 (21%) were Indigenous Australians (Table 3).

The TB incidence rate in the non-Indigenous Australian-born population (1.0 cases per 100,000 population) has remained stable over the past 13 years. The incidence of TB in Indigenous Australians for 2004 was 8.1 cases per 100,000 population, the lowest rate reported for this population since 1991. However, the TB incidence was still 8 times the rate in non-Indigenous Australian-born people. Nineteen of the 39 cases in Indigenous Australians were reported from the Northern Territory, a jurisdiction where 28 per cent of the population are Indigenous Australians as compared to 2 per cent nation wide.

Tuberculosis notifications in the overseas-born population

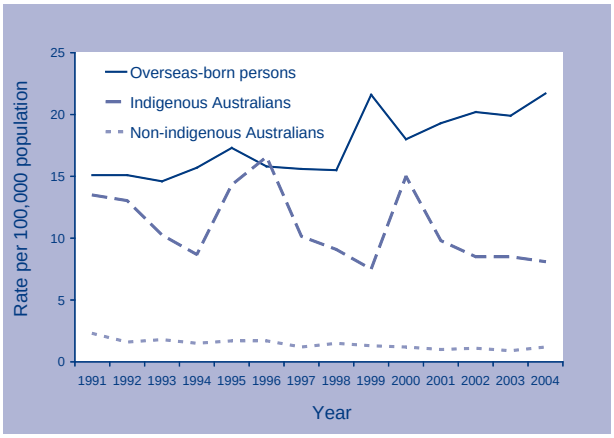
In 2004, 885 cases (82.3%) were overseas-born. The rate of notification, 21.7 cases per 100,000 population was similar to rates in this population in the previous two years (19.1 and 20.2 cases per 100,000 population in 2003 and 2002 respectively, Figure 3).

Amongst people born overseas in the Australian population, the largest number of cases was in those born in India, Viet Nam, the Philippines and China as in previous years (Table 4). TB rates were highest among those born in Somalia, Sudan and Ethiopia, although these represent a relatively small number of cases in a small estimated resident population.

Table 3. Tuberculosis notifications and incidence rates in all Australian-born persons, Australia, 2004, by state or territory

	Indigenous	Indigenous rate	Non Indigenous Australian born	Non-Indigenous rate	Total Australian born	Total rate
ACT	0	0.0	2	0.8	2	0.8
NSW	7	4.9	54	1.1	61	1.2
NT	19	31.9	0	0.0	19	11.1
Qld	9	6.7	31	1.0	40	1.2
SA	2	7.4	10	0.8	12	1.0
Tas	0	0.0	4	1.0	4	0.9
Vic	0	0.0	40	1.0	40	1.0
WA	2	2.9	11	0.8	13	0.9
Australia	39	8.1	152	1.0	191	1.2

Figure 3. Tuberculosis incidence rates by Indigenous status and country of birth, Australia, 1991 to 2004



Tuberculosis notifications by age and sex

One of the most important measures of TB control is the incidence in children less than 15 years of age because these cases represent recent TB infection. TB was notified in 38 children aged less than 15 years. These were 15 Australian-born non-Indigenous children and 23 children born overseas. There were no Indigenous children reported with TB in 2004. The overall notification rate for the less than 15 year age group was 0.9 cases per 100,000 population (target of less than 0.1 cases per 100,000 population for all groups). The rate was highest in overseas-born children (11.4 cases per 100,000 population) and remained low in the non Indigenous Australian-born children (0.4 cases per 100,000 population, Table 5).

Table 4. Notifications of tuberculosis and estimated rate per 100,000 population for selected countries of birth, Australia, 2004

Country of birth	New	Relapse	Total cases	ERP x COB 2001*	Rate per 100,000 population in Australia 2004	WHO incidence rate per 100,000 2003†
India	123	0	123	95,455	128.9	101
Viet Nam	112	2	114	154,833	73.6	114
Philippines	73	0	73	103,942	70.2	168
China‡	67	1	68	142,778	47.6	47
Sudan	37	0	36	17,133	210.1	NA
Indonesia	26	2	28	47,156	59.4	81
Hong Kong (SAR of China)	26	0	26	67,121	38.7	80
Somalia	26	0	26	4,285	606.8	NA
Papua New Guinea	20	2	22	23,618	93.1	322
Ethiopia	18	0	18	5,777	311.6	166
Malaysia	16	0	16	78,858	20.3	64
Thailand	15	0	15	23,599	63.6	87
England	14	0	14	847,365	1.7	2
New Zealand	14	0	14	355,765	3.9	3
Others	270	22	292	2,135,821	13.7	
Overseas	856	29	885	4,087,928	21.7	
Australia§	186	4	190	16,023,372	1.2	
Total	1,042	33	1,076	20,111,300	5.4	

* Country of birth for denominator is the estimated resident population (ERP) from the 2001 census. ERP totals were updated for Somalia, Sudan and Ethiopia with data from the Australian Government Department of Immigration and Multicultural and Indigenous Affairs as of November 2005 because of recognised shift of intake from these countries.

† Rates from the World Health Organization 2005 Global Tuberculosis Report.

‡ China excludes Hong Kong SAR and Taiwan.

§ For one Australian-born case the new/relapse status was unknown.

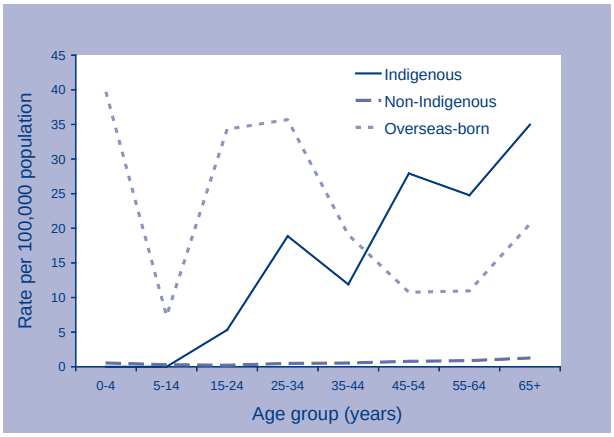
Table 5. Tuberculosis notifications and estimated incidence rate, Australia, 2004, by age group, Indigenous status and country of birth

Age group	Indigenous		Non-Indigenous		Overseas-born	
	n	Rate	n	Rate	n	Rate
0–4	0	0	7	0.6	10	39.7
5–14	0	0	8	0.4	13	7.3
Subtotal - < 15 years	0	0	15	0.4	23	11.4
15–24	4	5.3	6	0.2	135	34.3
25–34	12	18.9	14	0.5	216	35.7
35–44	6	11.9	16	0.5	165	19.1
45–54	9	27.9	21	0.8	94	10.8
55–64	4	24.8	17	0.9	76	11.0
65+	4	35.0	63	1.3	175	20.6

The male to female ratio for TB notifications was 1.6:1 in non-Indigenous Australian-born TB cases, 1.4:1 in Indigenous cases and 1.2:1 in overseas-born cases.

The age-group incidence rates for TB in overseas-born, Indigenous Australian-born and non-Indigenous Australian-born populations are shown in Figure 4. The TB incidence in the overseas-born population showed two peaks: one among infants aged less than 5 years and a second among young adults

Figure 4. Tuberculosis incidence in Australian-born and overseas-born, 2004, by age



(15 to 34 years). In the non-Indigenous Australian-born there was a small but gradual increase in TB rates up to 65 years. TB rates among Indigenous Australians also showed an increase in rates with increasing age.

Tuberculosis and selected risk factors

Information on risk factors for TB disease excluding HIV were reported for 1,020 of the 1,076 cases. Where risk factors were reported, the majority (520 cases) identified as having previously resided for three or more months in high risk countries as defined by the Australian Government Department of Immigration and Multicultural and Indigenous Affairs. Among these 520 cases, 25 were Australian-born and 495 were overseas-born. An additional 105 cases were household members or close contacts of TB cases, six cases either resided or had recently resided in a correctional service and 13 cases either resided or recently resided in an aged care facility. For individuals working in high risk settings, three cases were employed or had been recently employed in institutions such as correctional facilities or aged care facilities and 23 cases were employed or had been recently employed in the health industry. Among these 23 cases, three were Australian-born and 20 were overseas-born.

Tuberculosis and HIV status

Information on HIV status was reported in 352 (34%) cases. Sixteen people were identified with HIV infection at the time of diagnosis with TB; 5 Australian-born and 11 overseas-born. The National Strategic Plan recommends that HIV status of all TB cases be reported. In 2004, reporting of HIV status was equivalent to that in 2003.

Anatomical site of disease

The anatomical site of tuberculosis infection was recorded in 1,052 cases. Of these 548 (52%) cases of notified cases had pulmonary disease only, a further 92 (8.7%) cases had pulmonary disease along with disease at an extrapulmonary site. Pulmonary TB was reported in 65 per cent of the Australian-born cases and 57 per cent of the overseas-born cases.

412 (39%) cases had extrapulmonary disease only. The sites of disease in new and relapse cases are shown in Table 6.

Treatment outcomes of 2003 tuberculosis patient cohort

Treatment outcomes were reported for 962 of the 982 TB notifications in 2003 (98%) by December 2005. Treatment success including those with bacteriologically confirmed cure and those who completed treatment without bacteriological evidence of cure were reported for 797 (95%) of 838 with assessable outcomes (Table 7). There was no treatment failure recorded. Eighteen (2.2%) cases were reported as defaulting treatment. The proportion of cases cured or who completed treatment were 97 per cent among Indigenous Australians, 97 per cent among non-Indigenous Australian born and 96 per cent among overseas born.

Death from TB is rare in Australia. In the 2003 patient cohort there were 12 deaths due to TB reported and the case fatality rate was 1.2 per cent. A number of these cases were identified on post-mortem. The following treatment outcomes were excluded from analysis: deaths from other causes (39), cases transferred out of Australia (62), and cases still undergoing treatment at the time of reporting (23).

Table 6. New and relapsed tuberculosis cases, Australia, 2004, by site of disease

Site	New cases	Relapse cases	Total case	Per cent of cases
Pulmonary only	527	21	548	52.1
Pulmonary plus other sites	91	1	92	8.7
Extrapulmonary only	405	7	412	39.2
Pleural	81	2	83	7.9
Lymph nodes	166	3	169	16.1
Bone/joint	56		56	5.3
Genito/urinary	31		31	2.9
Miliary	14		14	1.3
Meningeal	18		18	1.7
Peritoneal	5	1	6	0.6
Other	39		39	3.7

Table 7. TB treatment outcomes, Australia, 2003, by population group

Treatment outcomes	Indigenous	Non-Indigenous Australian-born	Overseas-born	All	Per cent of cases
Treatment success	34	94	669	797	95.1
– Cured*	22	14	46	82	9.8
– Completed treatment	12	80	623	715	85.3
Died of TB	1	7	4	12	1.4
Interrupted treatment†	0	0	2	2	0.2
Defaulted‡	1	2	15	18	2.1
Failed§	0	0	0	0	0
Missing	0	1	8	9	1.1
Total	36	104	698	838	100.0

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

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

‡ Defaulted means failed to complete treatment

§ Failed means treatment completed but failed to be cured.

Note: The following treatment outcomes were excluded from analysis: deaths from other causes (39), cases transferred out of Australia (62) and cases still undergoing treatment at the time of reporting (23).

Table 8. National tuberculosis performance indicators, performance criteria and the current status of tuberculosis in Australia, 2003 and 2004

National TB Performance Indicator	Performance criteria	2003	2004
Annual incidence of TB (per 100,000 population)			
Crude incidence			
Indigenous Australians	<1	8.7	8.1
Non-Indigenous Australian-born	<1	0.9	1.2
Overseas-born persons*	†	10.2	10.4
Relapse cases initially treated in Australia	<2% of total treated cases	1.1	1.0
Incidence in children <15 years, by risk group			
Indigenous Australian children	<0.1	5.6	0
Non-Indigenous Australian-born children	<0.1	0.4	0.4
Overseas-born children*	†	0.0	0.0
Collection of HIV status in TB cases (% of cases with data collected)	100% over next 3 years	32.2	34
Treatment outcome measures (%)			
Cases evaluated for outcomes‡	100	98.0	NA
Cases that have treatment completed and are cured	>90	95.1	NA
Cases recorded as treatment failures	<2	0.0	NA

* The performance criteria for overseas born are applied to people who have been living in Australia for more than 5 years.

† Performance criteria currently under review.

‡ Evaluation of outcomes of 2003 patient cohort re-assessed in December 2005.

NA Assessment of outcomes of 2004 patient cohort – not available.

National Performance Indicators

The performance criteria for the National Performance Indicators were set by the National Tuberculosis Advisory Committee in 2002 and reviewed in 2003 (Table 8). As in previous TB annual reports, the performance criteria for people born overseas applies to people who have been living in Australia for more than 5 years. Of the 886 cases born overseas, 426 (48%) had been living in Australia for more than five years. The TB incidence rate for people born overseas who have been living in Australia for more than 5 years was 10.4 cases per 100,000 population.

There were no cases of TB in Indigenous children aged less than 15 years in 2004. This compares with nine cases (5.6 cases per 100,000) in 2003 and seven cases (4.3 cases per 100,000 population) in 2002.

Discussion

The incidence of TB in Australia has remained between five and six cases per 100,000 population since the mid-1980s, and represents one of the lowest incidence rates in the world. [2] Tuberculosis control in low-incidence countries faces specific problems and challenges, such as the reduced awareness of TB among healthcare professionals, the increasing importance of imported TB among migrants, and sub-groups at high risk of TB such as Indigenous Australians.

Doctors and other healthcare professionals in Australia must maintain an index of suspicion for TB, particularly when caring for migrants, Indigenous Australians, and elderly non-Indigenous Australian-born patients. This depends on adequate undergraduate and postgraduate training in TB epidemiology, diagnosis, management and control measures for doctors, nurses, laboratory staff and migrant health workers.

The overseas-born population represented 82 per cent of new TB cases in 2004. People born in countries with a high incidence of TB are likely to have acquired latent infection prior to migration. Refugees who have been living in camps where overcrowding, poor sanitation and malnutrition are at increased risk of progressing to active disease. Resettlement conditions which are socioeconomically stressful to migrants, may contribute to the progression of latent TB to active TB. Social contact with other migrants from high incidence countries may also increase the risk of exposure to TB.

Australian TB services continue to support pre-migration screening for active TB and to participate in post-migration follow-up programs in coopera-

tion with the Australian Government Department of Immigration, Multicultural and Indigenous Affairs and other organisations. Migrants need ready access to cost-free, non-threatening and culturally-appropriate TB assessment and treatment. People from Sudan, Somalia and Ethiopia were reported as high-incidence sub-populations in Australia in 2004, reflecting changes in the composition of Australia's migrant intake. Tuberculosis clinics need to adapt to the specific cultural and social needs of these new patient populations. Community leaders in the new migrant populations must be identified and encouraged to assist with TB control efforts. These TB control measures have proved successful in other migrant populations in the past and are likely to succeed again. As Australia and other low-incidence countries move towards TB elimination, the overseas-born population will continue to account for a large proportion of incident cases. Additional measures, such as active case finding and increased detection and treatment of latent TB infection, should be considered in migrant populations with a high incidence of TB.

Indigenous Australians are at increased risk of TB with incidence rates 8 times higher than among non-Indigenous Australian-born people in 2004. This disparity has remained evident for the last decade despite the efforts of TB control programs. Some of the known risk factors that explain the high incidence of TB in the Indigenous Australians are socioeconomic disadvantage), co-morbidities (such as diabetes and renal diseases), smoking, alcohol abuse and poor nutrition.[4]

The comparison of the 2004 TB notification data against the National TB Performance Indicators demonstrates some progress toward achieving the goals of the *National Strategic Plan for TB Control*. The low incidence of TB among non-Indigenous Australian-born children (0.4 per 100,000 population) and absence of any reported cases among Indigenous Australian children are approaching the target incidence of less than 1 case per million. The success of TB treatment programs in Australia are reflected in the declining proportion of relapsed cases initially treated in Australia (1%), and the absence of any cases recorded as treatment failures (Table 8).

Further action is required to reduce the incidence of TB in Indigenous communities to the same low rate as the non-Indigenous Australian-born population. The reporting of HIV status for TB cases remains at an unacceptable low level (34% in 2004). Despite incomplete reporting, 16 cases of HIV/TB co-infection were recognised in Australia in 2004 of whom 11 were overseas-born. Australian migrant intake includes people who come from countries where HIV and TB are prevalent. Privacy laws in some states confound efforts to collect information on the HIV status of TB patients. Alternative acceptable strategies must be found to obtain this essential public health information.

In 2004, 23 TB cases occurred among health care workers of whom 20 were overseas-born. Health services in Australia are increasingly reliant upon attracting medical and nursing staff from overseas, including from countries where TB is prevalent. State TB services and staff induction programs should be aware of this trend and ensure that new employees are screened and followed-up appropriately for TB.

In conclusion, easy access to effective TB treatment programs, contact tracing, and provision of health education in appropriate languages remain the essential elements for TB control. Australia also needs to remain alert to the growing global threat of TB and to contribute to TB control efforts in Southeast Asia and the Pacific region.

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