

# TUBERCULOSIS NOTIFICATIONS IN AUSTRALIA, 2012 AND 2013

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## Abstract

The National Notifiable Diseases Surveillance System received 1,317 tuberculosis (TB) notifications in 2012 and 1,263 notifications in 2013. This represents a rate of 5.8 per 100,000 population in 2012 and 5.5 per 100,000 population in 2013 and a reversal of the upward trend in TB incidence reported since 2007. In 2012 and 2013, Australia's overseas-born population continued to represent the majority of TB notifications with an incidence rate of 19.5 per 100,000 and 18.4 per 100,000 respectively. The incidence of TB in the Australian-born Indigenous population has fluctuated over the last decade; however, it remained reasonably steady in 2012 and 2013 with an incidence rate of 4.5 per 100,000 and 4.6 per 100,000 respectively. The incidence of TB in the Australian-born non-Indigenous population has continued to remain low at 0.7 per 100,000 in 2012 and 0.8 per 100,000 in 2013. Australia continued to record only a small number of multi-drug resistant TB cases nationally (2012: n=20; 2013: n=22) of which nearly all were identified in the overseas-born population. This report demonstrates excellent and sustained control of TB in Australia and reflects Australia's commitment to reducing the global burden of TB. *Commun Dis Intell* 2015;39(2):E217–E235.

**Keywords:** Australia, *Mycobacterium tuberculosis* complex, communicable disease surveillance, epidemiology, annual report

## Introduction

Despite the progress made toward global tuberculosis (TB) control and the achievement of the 2015 Millennium Development Goal (MDG) of halting and reversing incidence, TB continues to pose a significant global public health challenge with the World Health Organization (WHO) estimating that in 2013, 9.0 million people developed TB and 1.5 million died from the disease.<sup>1</sup> Domestically, Australia has achieved good TB control since the mid-1980s with rates ranging from 5.2 to 7.0 per 100,000 population per year, although a slight overall increase has been observed over the last decade. Controlling TB in Australia's current and future migrant population continues to pose the biggest challenge to domestic TB control, with improvements to pre-

migration screening and the ongoing success of the Stop TB Strategy in the region likely to be the main contributors to further reductions in TB incidence in Australia.

Surveillance of TB in Australia is overseen by the National Tuberculosis Advisory Committee (NTAC), a subcommittee of the Communicable Diseases Network Australia (CDNA). NTAC has the key role of providing strategic, expert advice to CDNA, and subsequently the Australian Government, on a coordinated national approach to TB control. NTAC also develops and reviews nationally agreed strategic and implementation plans for the control of TB in Australia.

This report describes the epidemiology of notified cases of TB in Australia in 2012 and 2013 and includes some discussion on the factors that impact on the control of TB in Australia.

## Methods

TB is a nationally notifiable disease in Australia and is monitored using the National Notifiable Diseases Surveillance System (NNDSS). Medical practitioners, public health laboratories and other health professionals are required under state and territory public health legislation to report cases of TB to jurisdictional health authorities. The *National Health Security Act 2007* provides the legislative basis for the national notification of communicable diseases and authorises the exchange of health information between the Australian Government and state and territory governments. State and territory health departments transfer these notifications regularly to the NNDSS. The primary responsibility for public health action resulting from a notification resides with state and territory health departments.

The Tuberculosis Data Quality Working Group (TBDQWG), a working group of NTAC, has representation from states and territories, the Australian Government and the Australian Mycobacterium Reference Laboratory Network. It ensures routine and timely reporting of trends and emerging issues in TB. The TBDQWG is also responsible for maintaining national consistency and currency in data standards and systems for TB surveillance that are relied upon to produce this report.

With the exception of the pre-migration screening data, the data presented in this report represent a point-in-time analysis of notified cases of TB in Australia. This report presents data extracted from NNDSS during October 2014. 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 state or territory level. Detailed notes on case definition, data collection, quality control and the categorisation of population subgroups are available in the 2007 annual report.<sup>2</sup>

In accordance with the Torres Strait Treaty, some Torres Strait Islanders and coastal people from Papua New Guinea (PNG) are allowed free movement (without passports or visas) within the northern Torres Strait Islands of Australia and PNG. This free movement is to allow for traditional activities to take place and does not include visits for health treatment.<sup>3</sup> However, at times PNG nationals do still present with TB to Queensland health care clinics in the Torres Strait. In these instances, the patient's diagnosis of TB is notified in Australia and identified in the NNDSS as 'Residents of the Torres Strait Protection Zone (TSPZ) accessing TB treatment in Queensland', but the patient is transferred back to PNG for treatment providing they are well enough to travel.

This report presents data analysed by date of diagnosis, a derived field within the NNDSS. The methodology for date of diagnosis for TB changed in January 2014 and was applied to notifications retrospectively. The diagnosis date for TB is now equivalent to the notification receive date\*. Reported rates were calculated using population data described in the Australian Bureau of Statistics' (ABS) *Australian Demographic Statistics and Migration, Australia, 2011–12 and 2012–13* datasets.<sup>4,5</sup> Overall population rates were calculated using the 2012 and 2013 mid-year estimated resident population data, while rates for population subgroups (i.e. overseas-born), age and country of birth were calculated using 2011 mid-year estimated resident population data.

The pre-migration screening data represents a calendar year analysis of TB cases detected through the offshore pre-migration screening process. Cases of TB identified through this process are not included in the NNDSS as they are identified prior to entry to Australia. Pre-migration screening data are provided by the Australian Government Department of Immigration and Border Protection (DIBP).

\* The date the notification of the disease was received by the communicable disease section of the health authority (i.e. the date the notification was received by the state or territory health department).

## Results

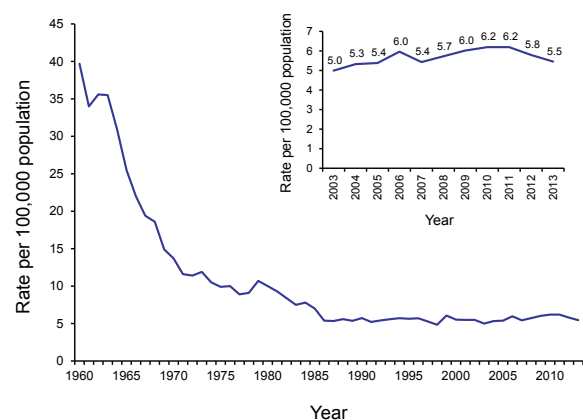
### Epidemiological situation in 2012 and 2013

In 2012, 1,317 cases of TB were reported to the NNDSS, representing a rate of 5.8 cases per 100,000 (Table 1). This was a 5% decrease on the number of TB notifications reported in 2011 (n=1,385). In 2013, 1,263 cases were reported, representing a rate of 5.5 per 100,000 and a 4% decrease on the number of notifications reported in 2012 (Table 1).

A case classification (whether new or relapse) was reported in almost all cases in both 2012 and 2013 (2012: n=1,315; 2013: n=1,261). Of those with a case classification, the majority of cases in both 2012 and 2013 were classified as new (2012: 96%, 1,261/1,317; 2013: 97%, 1,218/1,263), that is a patient who has never been treated for TB or a patient treated previously for less than one month. Relapse was reported in 54 cases in 2012 and 43 cases in 2013 with the majority of those cases (2012: 78%, 42/54; 2013: 63%, 27/43) having a treatment history of full or partial treatment overseas (Table 2).

Whilst Australia has maintained a low rate of TB since the mid-1980s, over the last 2 decades rates have been steadily increasing with Australia recording its highest rate since 1985 in 2011 (6.2 per 100,000). The decrease in rates observed in 2012 and 2013 are promising for Australian TB control; however, these lower rates will need to be sustained to have an impact on the overall trend in incidence (Figure 1).

**Figure 1: Notification rates for tuberculosis, Australia, 1960 to 2013, by year**



**Table 1: Notified cases and notification rate for tuberculosis, Australia, 2012 and 2013, by case classification and state or territory**

| State or territory | New cases         |                  | Relapse cases     |                  | Total cases*      |                  |
|--------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|
|                    | Notifications (n) | Rate per 100,000 | Notifications (n) | Rate per 100,000 | Notifications (n) | Rate per 100,000 |
| <b>2012</b>        |                   |                  |                   |                  |                   |                  |
| ACT                | 15                | 4.0              | 3                 | 0.8              | 18                | 4.8              |
| NSW                | 439               | 6.0              | 28                | 0.4              | 469               | 6.4              |
| NT                 | 27                | 11.5             | 1                 | 0.4              | 28                | 11.9             |
| Qld                | 170               | 3.7              | 2                 | 0.0              | 172               | 3.8              |
| SA                 | 83                | 5.0              | 0                 | 0.0              | 83                | 5.0              |
| Tas.               | 6                 | 1.2              | 0                 | 0.0              | 6                 | 1.2              |
| Vic.               | 352               | 6.3              | 17                | 0.3              | 369               | 6.6              |
| WA                 | 169               | 6.9              | 3                 | 0.1              | 172               | 7.1              |
| Australia          | 1,261             | 5.5              | 54                | 0.2              | 1,317             | 5.8              |
| <b>2013</b>        |                   |                  |                   |                  |                   |                  |
| ACT                | 16                | 4.2              | 2                 | 0.5              | 18                | 4.7              |
| NSW                | 426               | 5.8              | 14                | 0.2              | 440               | 5.9              |
| NT                 | 41                | 17.1             | 1                 | 0.4              | 42                | 17.5             |
| Qld                | 149               | 3.2              | 4                 | 0.0              | 154               | 3.3              |
| SA                 | 66                | 4.0              | 3                 | 0.1              | 69                | 4.1              |
| Tas.               | 8                 | 1.6              | 0                 | 0.0              | 8                 | 1.6              |
| Vic.               | 366               | 6.4              | 15                | 0.3              | 382               | 6.7              |
| WA                 | 146               | 5.8              | 4                 | 0.2              | 150               | 6.0              |
| Australia          | 1,218             | 5.3              | 43                | 0.2              | 1,263             | 5.5              |

\* Total includes 2 cases reported in New South Wales without a case classification in 2012 and 2 cases reported without a case classification (Queensland: 1; Victoria: 1) in 2013.

**Table 2: Notified cases of tuberculosis cases classified as relapse, Australia, 2012 and 2013, by treatment history**

| Treatment history                                    | 2012              |                                 | 2013              |                                 |
|--|-------------------|---------------------------------|-------------------|---------------------------------|
|  | Notifications (n) | Percentage of relapse cases (%) | Notifications (n) | Percentage of relapse cases (%) |
| Relapse following full treatment only in Australia   | 8                 | 15                              | 12                | 28                              |
| TB following partial treatment only in Australia     | 4                 | 7                               | 4                 | 9                               |
| Relapse following full or partial treatment overseas | 42                | 78                              | 27                | 63                              |
| Total  | 54                | –                               | 43                | –                               |

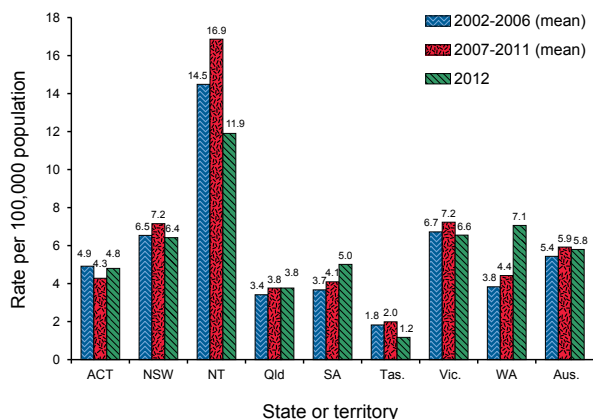
### Geographic distribution

Similar to previous years, in 2012 and 2013 New South Wales accounted for the largest number of cases notified by a state or territory (2012: n=469; 2013: n=440) while the Northern Territory recorded the highest jurisdiction-specific rates (2012: 11.9 per 100,000; 2013: 17.5 per 100,000). Also similar to previous years, Tasmania continued to record the lowest number of cases

notified (2012: n=6; 2013: n=8) and the lowest jurisdiction-specific rates (2012: 1.2 per 100,000; 2013: 1.6 per 100,000) for both years (Table 1). In 2012, South Australia and Western Australia recorded a jurisdiction-specific rate higher than the 5-year mean rate of the 2 preceding 5-year intervals (Figure 2). Western Australia recorded a rate of 7.1 per 100,000 in 2012, the highest rate recorded in Western Australia since the collection

of NNDSS data commenced in 1992 (Table 1). It is postulated that the large influx of irregular maritime arrivals peaking over both these years was a sizeable contributor to the increase in notifications in Western Australia and to a lesser extent in the Northern Territory.

**Figure 2: Notification rates of tuberculosis, Australia, 2002 to 2012, by state or territory**

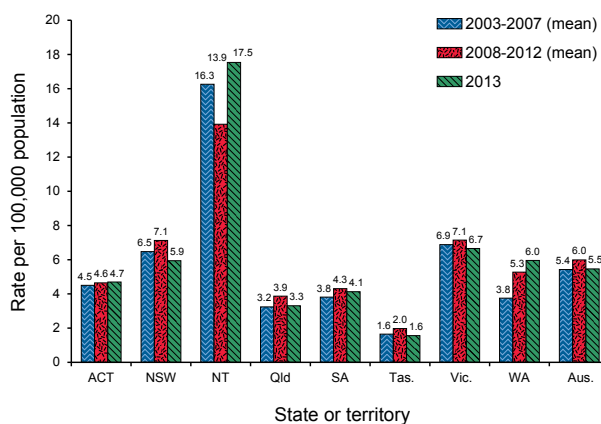


In 2013, the Australian Capital Territory, Western Australia and the Northern Territory all recorded a jurisdiction-specific rate higher than the 5-year mean jurisdiction-specific rate of the 2 preceding 5-year intervals (Figure 3). In 2013, the Northern Territory reported 42 cases, which was a 50% increase on the number of cases reported in 2012 (n=28) (Table 1). New South Wales recorded its lowest rate since 2003, which was also 5.9 per 100,000 (Table 1).

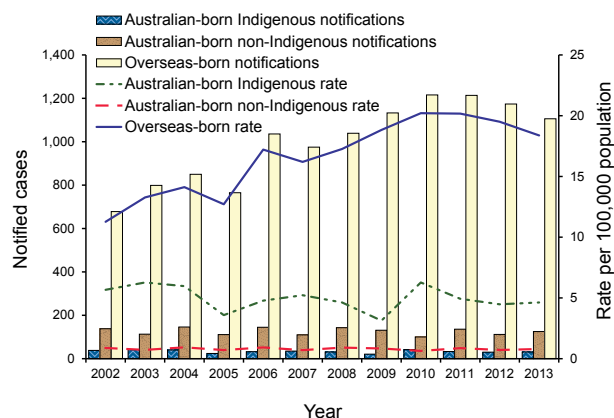
**Tuberculosis in the Australian-born population**

In 2012 and 2013, the rate of TB in the Australian-born population was 0.9 per 100,000 and 1.0 per 100,000 respectively (Table 3). Indigenous Australians continued to experience a greater TB burden when compared with Australian-born non-Indigenous Australians and in both 2012 and 2013, the rate of TB in the Australian-born Indigenous population (2012: 4.5 per 100,000; 2013: 4.6 per 100,000) was approximately 6 times that of the rate of TB in the Australian-born non-Indigenous population (2012: 0.7 per 100,000; 2013: 0.8 per 100,000). The rate of TB in the Australian-born non-Indigenous population continues to remain relatively stable with a rate ranging from 0.6 per 100,000 to 0.9 per 100,000 since 2002, while the rate in the Australian-born Indigenous population demonstrates no clear trend with rates ranging from 3.1 per 100,000 to 6.3 per 100,000 (Figure 4).

**Figure 3: Notification rate for tuberculosis, Australia, 2003 to 2013, by state or territory**



**Figure 4: Notified cases and notification rate for tuberculosis, Australia, 2002 to 2013, by population subgroup**



**Tuberculosis in the overseas-born population**

All but 1 case in 2012 and 1 case in 2013 were reported with country of birth information, with 89% (n=1,174) of notifications in 2012 and 88% (n=1,106) of notifications in 2013 being reported as overseas-born (Table 3). In 2012, the proportion of cases reported as being overseas-born ranged from 71% of cases in the Northern Territory (n=20) to 100% of cases in the Australian Capital Territory (n=18) and Tasmania (n=6). While in 2013, the proportion of cases reported as being overseas-born ranged from 55% in the Northern Territory (n=23) to 100% of cases in Tasmania (n=8).

In 2012, the rate of TB in the overseas-born population (19.5 per 100,000) was just over 22 times the rate in the Australian-born population, while the rate in the overseas-born population in 2013 (18.4 per 100,000) was just over 19 times the rate in the Australian-born population. The rate of TB in the overseas-born population has decreased by 3% in 2012 and by 6% in 2013, with the 2013 rate being the lowest recorded rate in this population sub-

**Table 3: Notified cases and notification rate for tuberculosis, Australia, 2012 and 2013, by population subgroup and state or territory**

| State or territory | Indigenous        |                  | Australian-born<br>Non-Indigenous |                  | Total             |                  | Overseas-born     |                  |
|--------------------|-------------------|------------------|-----------------------------------|------------------|-------------------|------------------|-------------------|------------------|
|                    | Notifications (n) | Rate per 100,000 | Notifications (n)                 | Rate per 100,000 | Notifications (n) | Rate per 100,000 | Notifications (n) | Rate per 100,000 |
| <b>2012</b>        |                   |                  |                                   |                  |                   |                  |                   |                  |
| ACT                | 0                 | 0.0              | 0                                 | 0.0              | 0                 | 0.0              | 18                | 18.8             |
| NSW                | 7                 | 3.4              | 42                                | 0.8              | 49                | 0.9              | 419               | 20.5             |
| NT                 | 6                 | 8.7              | 2                                 | 1.7              | 8                 | 4.3              | 20                | 45.9             |
| Qld                | 13                | 6.9              | 19                                | 0.6              | 32                | 0.9              | 140               | 13.9             |
| SA                 | 1                 | 2.7              | 9                                 | 0.7              | 10                | 0.8              | 73                | 18.8             |
| Tas.               | 0                 | 0.0              | 0                                 | 0.0              | 0                 | 0.0              | 6                 | 9.3              |
| Vic.               | 2                 | 4.2              | 27                                | 0.7              | 29                | 0.7              | 340               | 21.4             |
| WA                 | 1                 | 1.1              | 13                                | 0.9              | 14                | 0.9              | 158               | 20.1             |
| Australia          | 30                | 4.5              | 112                               | 0.7              | 142               | 0.9              | 1,174             | 19.5             |
| <b>2013</b>        |                   |                  |                                   |                  |                   |                  |                   |                  |
| ACT                | 0                 | 0.0              | 5                                 | 1.9              | 5                 | 1.8              | 13                | 13.5             |
| NSW                | 3                 | 1.4              | 36                                | 0.7              | 39                | 0.8              | 401               | 19.6             |
| NT                 | 15                | 21.8             | 4                                 | 3.4              | 19                | 10.1             | 23                | 52.7             |
| Qld                | 9                 | 4.8              | 12                                | 0.4              | 21                | 0.6              | 132               | 13.1             |
| SA                 | 1                 | 2.7              | 8                                 | 0.7              | 9                 | 0.7              | 60                | 15.4             |
| Tas.               | 0                 | 0.0              | 0                                 | 0.0              | 0                 | 0.0              | 8                 | 12.5             |
| Vic.               | 0                 | 0.0              | 45                                | 1.2              | 45                | 1.1              | 337               | 21.2             |
| WA                 | 3                 | 3.4              | 15                                | 1.0              | 18                | 1.1              | 132               | 16.8             |
| Australia          | 31                | 4.6              | 125                               | 0.8              | 156               | 1.0              | 1,106             | 18.4             |

group since 2008 (Figure 4). This figure should be interpreted with caution, given that completeness of reporting country of birth has improved over time.

Similar to recent years, the most frequently reported country of birth for TB cases in both 2012 and 2013 was India, followed by Vietnam, the Philippines, China and Nepal (Table 4). In both 2012 and 2013, people born in these 5 countries contributed to just over half of all the overseas-born cases (2012: 54%, 634/1,174; 2013: 51%, 568/1,106). Of the most frequently reported countries of birth, those born in Nepal (183 per 100,000), Ethiopia (177 per 100,000) and Papua New Guinea (150 per 100,000) recorded the highest estimated rates of TB in 2012, while those born in Somalia (243 per 100,000), Nepal (205 per 100,000) and Myanmar (160 per 100,000) recorded the highest estimated rates of TB in 2013 (Table 4).

Residency status was available for 94% of TB cases reported as overseas-born in 2012 and 95% of cases in 2013. Residency status is self-reported at the time of diagnosis and is not verified against migration records. In both 2012 and 2013, the majority of overseas-born cases reported with a residency status were reported as permanent residents (2012: 59%, 653/1,104; 2013: 60%, 636/1,056)

(Table 5). International students continue to be the 2nd most reported category of residency status (2012: 14%, 155/1,104; 2013: 12%, 130/1,056). Of the most frequently reported countries of birth, the proportion of cases who were international students was highest among cases born in Nepal in both 2012 (39%, 20/51) and 2013 (37%, 21/57) followed by Pakistan (33%, 7/21), China (31%, 24/77) and Indonesia (28%, 12/43) in 2012, and Indonesia (25%, 14/56), the Republic of Korea (South) (25%, 4/16) and China (22%, 16/74) in 2013 (Table 4).

There were 22 cases of TB notified among PNG nationals accessing health care in the TSPZ in 2012; a 53% decrease on the 47 cases reported in 2011. Just 3 cases were reported in 2013, which was an 86% decrease on the number of cases reported in 2012 (Table 5). In 2012 and 2013, PNG nationals being diagnosed with TB in the TSPZ accounted for 13% (22/172) and 2% (3/154) respectively of Queensland's TB cases.

Data on year of arrival were available for 97% of overseas-born cases in both 2012 (n=1,142) and 2013 (n=1,073). Of these, almost half (2012: 49%, 560/1,142; 2013: 47%, 501/1,073) were diagnosed with active TB within 4 years of arrival in Australia.



**Table 4: Notified cases and notification rate for tuberculosis for frequently reported countries of birth, Australia, 2012 and 2013, by residency status**

| Country of birth           | Residency status           |                         |            | Total cases (n) | Estimated resident population <sup>†</sup> | Estimated rate per 100,000 | WHO incidence rate per 100,000 <sup>‡</sup> |
|----------------------------|----------------------------|-------------------------|------------|-----------------|--|----------------------------|---|
|                            | International students (n) | Permanent residents (n) | Other* (n) |                 |  |                            |   |
| <b>2012</b>                |                            |                         |            |                 |  |                            |   |
| India                      | 40                         | 130                     | 102        | 272             | 337,120                                    | 81                         | 176   |
| Vietnam                    | 11                         | 100                     | 21         | 132             | 207,620                                    | 64                         | 147   |
| Philippines                | 4                          | 73                      | 25         | 102             | 193,030                                    | 53                         | 265   |
| China <sup>§</sup>         | 24                         | 38                      | 15         | 77              | 387,420                                    | 20                         | 73  |
| Nepal                      | 20                         | 17                      | 14         | 51              | 27,810                                     | 183                        | 163   |
| Papua New Guinea           | 2                          | 15                      | 29         | 46              | 30,650                                     | 150                        | 348   |
| Indonesia                  | 12                         | 16                      | 15         | 43              | 73,060                                     | 59                         | 185   |
| Afghanistan                | 0                          | 10                      | 29         | 39              | 32,970                                     | 118                        | 189   |
| Myanmar                    | 2                          | 13                      | 16         | 31              | 24,430                                     | 127                        | 377   |
| Sudan                      | 0                          | 17                      | 10         | 27              | 22,000                                     | 123                        | 114   |
| Cambodia                   | 2                          | 15                      | 4          | 21              | 32,510                                     | 65                         | 411   |
| Pakistan                   | 7                          | 8                       | 6          | 21              | 34,150                                     | 61                         | 231   |
| Malaysia                   | 3                          | 13                      | 3          | 19              | 134,140                                    | 14                         | 80  |
| New Zealand                | 0                          | 17                      | 1          | 18              | 543,950                                    | 3                          | 8   |
| Ethiopia                   | 0                          | 13                      | 4          | 17              | 9,630                                      | 177                        | 247   |
| Thailand                   | 3                          | 8                       | 5          | 16              | 52,990                                     | 30                         | 119   |
| Other overseas-born        | 25                         | 150                     | 67         | 242             | –  | –                          | –   |
| Total overseas-born        | 155                        | 653                     | 366        | 1,174           |  |                            |   |
| Australian-born            | –                          | –                       | –          | 142             |  |                            |   |
| Total <sup>  </sup>        | –                          | –                       | –          | 1,317           |  |                            |   |
| <b>2013</b>                |                            |                         |            |                 |  |                            |   |
| India                      | 31                         | 101                     | 87         | 219             | 337,120                                    | 65                         | 176   |
| Vietnam                    | 6                          | 92                      | 12         | 110             | 207,620                                    | 53                         | 147   |
| Philippines                | 8                          | 80                      | 20         | 108             | 193,030                                    | 56                         | 265   |
| China <sup>§</sup>         | 16                         | 43                      | 15         | 74              | 387,420                                    | 19                         | 73  |
| Nepal                      | 21                         | 20                      | 16         | 57              | 27,810                                     | 205                        | 163   |
| Indonesia                  | 14                         | 21                      | 21         | 56              | 73,060                                     | 77                         | 185   |
| Afghanistan                | 0                          | 13                      | 29         | 42              | 32,970                                     | 127                        | 189   |
| Myanmar                    | 1                          | 20                      | 18         | 39              | 24,430                                     | 160                        | 377   |
| Papua New Guinea           | 3                          | 16                      | 16         | 35              | 30,650                                     | 114                        | 348   |
| Pakistan                   | 5                          | 6                       | 19         | 30              | 34,150                                     | 88                         | 231   |
| Sri Lanka                  | 0                          | 19                      | 6          | 25              | 99,740                                     | 25                         | 66  |
| Cambodia                   | 1                          | 18                      | 3          | 22              | 32,510                                     | 68                         | 411   |
| Sudan                      | 0                          | 14                      | 6          | 20              | 22,000                                     | 91                         | 114   |
| Thailand                   | 3                          | 10                      | 5          | 18              | 52,990                                     | 34                         | 119   |
| Korea, Republic of (South) | 4                          | 8                       | 4          | 16              | 85,930                                     | 19                         | 108   |
| Somalia                    | 0                          | 11                      | 5          | 16              | 6,590                                      | 243                        | 286   |
| Other overseas-born        | 17                         | 144                     | 58         | 219             |  |                            |   |
| Total overseas-born        | 130                        | 636                     | 340        | 1,106           |  |                            |   |
| Australian-born            | –                          | –                       | –          | 156             |  |                            |   |
| Total <sup>  </sup>        | –                          | –                       | –          | 1,263           |  |                            |   |

\* Total includes cases reported without a residency status.

† Population data are sourced from the Australian Bureau of Statistics estimated resident population, at 30 June 2011, Table 9.1, Cat 3412.0.

‡ Rates for countries of birth, taken from the World Health Organization TB Burden Estimates, 2012.

§ China excludes Special Administrative Regions and Taiwan.

|| Total includes 1 case without a reported country of birth in 2012 and 1 case without a reported country of birth in 2013.

Note that these estimated rates must be interpreted with caution as temporary residents are included in Australia's TB notifications (the numerator) but may not be included in the ABS' estimated resident population (the denominator).

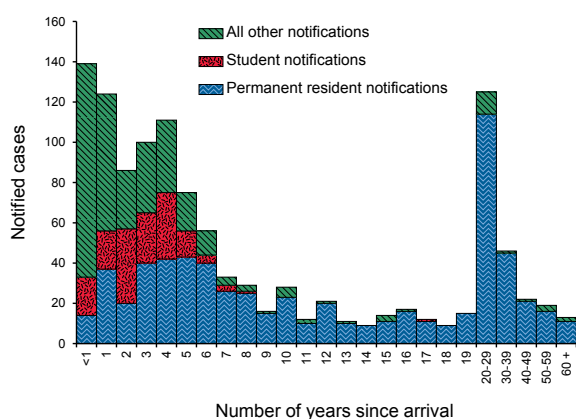
**Table 5: Notified cases of tuberculosis in overseas-born people, Australia, 2012 and 2013 by residency status and state or territory**

| Residency status   | ACT       | NSW        | NT        | Qld        | SA        | Tas.     | Vic        | WA         | Aus.         |
|--|-----------|------------|-----------|------------|-----------|----------|------------|------------|--------------|
| <b>2012</b>  |           |            |           |            |           |          |            |            |              |
| Refugee/humanitarian                                       | 0         | 8          | 0         | 6          | 12        | 1        | 14         | 32         | 73           |
| Permanent resident   | 13        | 282        | 6         | 57         | 9         | 4        | 201        | 81         | 653          |
| Overseas visitor   | 1         | 28         | 0         | 17         | 12        | 0        | 9          | 6          | 73           |
| Overseas student   | 4         | 59         | 2         | 15         | 11        | 0        | 44         | 20         | 155          |
| Unauthorised person  | 0         | 1          | 9         | 0          | 0         | 0        | 1          | 5          | 16           |
| Other  | 0         | 35         | 3         | 18         | 0         | 1        | 46         | 9          | 112          |
| Illegal foreign fisher                                     | 0         | 0          | 0         | 0          | 0         | 0        | 0          | 0          | 0            |
| Residents of the TSPZ accessing TB treatment in Queensland | N/A       | N/A        | N/A       | 22         | N/A       | N/A      | N/A        | N/A        | 22           |
| Unknown or not reported                                    | 0         | 6          | 0         | 5          | 29        | 0        | 25         | 5          | 70           |
| <b>Total overseas-born cases</b>                           | <b>18</b> | <b>419</b> | <b>20</b> | <b>140</b> | <b>73</b> | <b>6</b> | <b>340</b> | <b>158</b> | <b>1,174</b> |
| <b>2013</b>  |           |            |           |            |           |          |            |            |              |
| Refugee/humanitarian                                       | 0         | 5          | 0         | 5          | 6         | 4        | 17         | 31         | 68           |
| Permanent resident   | 9         | 284        | 7         | 79         | 3         | 3        | 198        | 53         | 636          |
| Overseas visitor   | 2         | 23         | 0         | 8          | 12        | 1        | 18         | 15         | 79           |
| Overseas student   | 1         | 52         | 0         | 12         | 6         | 0        | 45         | 14         | 130          |
| Unauthorised person  | 0         | 2          | 15        | 0          | 0         | 0        | 1          | 4          | 22           |
| Other  | 1         | 34         | 1         | 15         | 2         | 0        | 52         | 13         | 118          |
| Illegal foreign fisher                                     | 0         | 0          | 0         | 0          | 0         | 0        | 0          | 0          | 0            |
| Residents of the TSPZ accessing TB treatment in Queensland | N/A       | N/A        | N/A       | 3          | N/A       | N/A      | N/A        | N/A        | 3            |
| Unknown or not reported                                    | 0         | 1          | 0         | 10         | 31        | 0        | 6          | 2          | 50           |
| <b>Total overseas-born cases</b>                           | <b>13</b> | <b>401</b> | <b>23</b> | <b>132</b> | <b>60</b> | <b>8</b> | <b>337</b> | <b>132</b> | <b>1,106</b> |

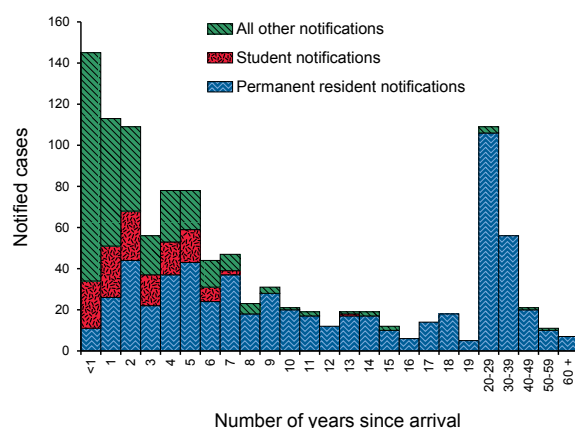
Of those diagnosed within 4 years of arrival in Australia, the proportion of these being international students has reduced from 31% (185/593) in 2011 to 24% (133/560) in 2012 and 21% (103/501) in 2013 (Figure 5 and Figure 6). It is unclear why the

proportion of cases who are international students has reduced but it may reflect more robust pre-migration screening practices.

**Figure 5: Notified cases of tuberculosis in the overseas-born population, Australia, 2012, by residency status and number of years since arrival in Australia**



**Figure 6: Notified cases of tuberculosis in the overseas-born population, Australia, 2013, by residency status and number of years since arrival in Australia**



### Pre-migration health screening

The Migration Regulations 1994, enabled by the *Migration Act 1958*, stipulate that visa applicants must meet certain Public Interest Criteria; and these criteria include a stipulation that visa applicants must be “[...] free from TB” and/or not be a “[...] threat to public health in Australia or a danger to the Australian community”.<sup>6</sup> Therefore, permanent resident visa applicants, and some temporary resident visa applicants are required to undergo offshore pre-migration screening, which includes a medical examination and a chest x-ray to screen for active TB. Children aged less than 11 years of age are required to undergo a physical examination. Visa applicants who are identified as having active TB during pre-migration screening are required to undergo treatment for the disease prior to entry to Australia.<sup>7</sup>

In 2012, there was a 44% increase in the number of TB cases detected through offshore pre-migration screening when compared with 2011. In 2013, the number of cases continued to increase with a 13% rise compared with the number recorded in 2012 (Table 6). In both 2012 and 2013, the highest number of TB cases was identified in adults aged 21–30 years, closely followed by adults aged 31–40 years.

**Table 6: Number of cases and notification rate for tuberculosis identified through offshore pre-migration health screening, 2011 to 2013**

| Year | Number of cases* | Estimated rate per 100,000 offshore medical examinations |
|------|------------------|--|
| 2011 | 287              | 80   |
| 2012 | 412              | 116  |
| 2013 | 467              | 88   |

\* The number of cases includes cases newly diagnosed through the pre-migration screening process and cases that were already on treatment for tuberculosis at the time of screening.

In 2012 and 2013, the majority of TB cases identified through offshore pre-migration screening (approximately 90%) were in visa applicants from countries in the South East Asian and Western Pacific World Health Organization (WHO) regions, with the Philippines, Vietnam and China contributing 61% of all cases in 2012 and 55% of all cases in 2013. Approximately 60% of all cases identified through offshore pre-migration screening in 2012 and 55% of all cases in 2013 were identified in temporary visa applicants and approximately 80% of those cases were detected in short-term visitor (less than 12 months) or student visa applicants.

The diagnostic capacity in the offshore setting has improved with nearly two-thirds of cases recorded on the database being diagnosed with laboratory confirmation; up from 50% in 2011. There was increased number of multi-drug resistant TB (MDR-TB) with 3.4% of cases with drug susceptibility testing (DST) results available in 2012 and 11.2% in 2013. Some form of resistance was observed in 26% of cases overall. This is potentially a result of both a growing resistance problem and improvements to laboratory standards in the offshore environment. In 2013, 9 separate countries had a MDR-TB case, with the majority coming from India, the Philippines and Vietnam.

Since mid-2013, DIBP has implemented an automated pre-migration screening data collection process resulting in more accurate data collection than previous years. Therefore, the comparison of pre-migration screening data to previous years should be interpreted with some caution. Further information on the pre-migration health screening process and related statistics can be obtained from DIBP's Immigration Health Branch.<sup>†</sup>

### Age and sex distribution

Age and sex were reported for all TB cases notified in 2012 and 2013. Similar to previous years, there were more males than females notified with TB, with a male to female ratio of 1.3:1 in both 2012 and 2013.

As for previous years, TB was predominantly seen in young adults aged 25–34 years in both 2012 and 2013 (2012: 13.3 per 100,000; 2013: 12.0 per 100,000), and again this was driven by the high rates observed in overseas-born cases in this age group (Table 7).

### Tuberculosis in children aged under 15 years

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. Similar to the past 5 years, children aged less than 15 years contributed 4% of all TB cases in both 2012 and 2013 (2012: n=48, 1.1 per 100,000; 2013: n=48, 1.1 per 100,000). In the last decade, the number of cases in children aged less than 15 years has ranged from 37 in 2003 to 66 in 2006, and on average just over half of these notifications are recorded in overseas-born children.

In 2012 and 2013, there were three cases in children reported as Australian-born Indigenous (2012: n=1; 2013: n=2). Two of these reported

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**Table 7: Notification rate for tuberculosis, Australia, 2012 and 2013, by population subgroup and age group**

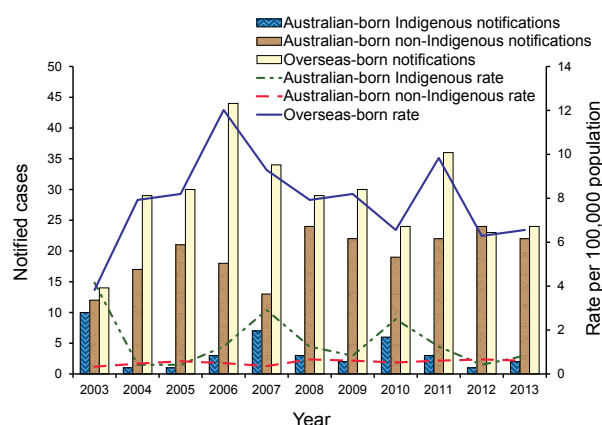
| Age group | Australian-born Indigenous |      | Australian-born non-Indigenous |      | Overseas-born |      | Total |      |
|-----------|----------------------------|------|--------------------------------|------|---------------|------|-------|------|
|           | 2012                       | 2013 | 2012                           | 2013 | 2012          | 2013 | 2012  | 2013 |
| 0–4       | –                          | –    | 1.4                            | 1.3  | 9.4           | 10.9 | 1.6   | 1.6  |
| 5–14      | 0.6                        | 1.3  | 0.3                            | 0.2  | 5.6           | 5.6  | 0.9   | 0.9  |
| 0–14      | 0.4                        | 0.8  | 0.7                            | 0.6  | 6.3           | 6.6  | 1.1   | 1.1  |
| 15–24     | 3.7                        | 3.0  | 0.7                            | 0.7  | 29.1          | 29.9 | 6.5   | 6.7  |
| 25–34     | 4.4                        | –    | 0.8                            | 0.5  | 38.8          | 35.7 | 13.3  | 12.0 |
| 35–44     | 6.1                        | 9.8  | 0.3                            | 0.7  | 17.6          | 19.0 | 5.8   | 6.5  |
| 45–54     | 11.1                       | 19.0 | 0.4                            | 0.8  | 12.0          | 9.7  | 4.5   | 4.1  |
| 55–64     | 19.0                       | 8.2  | 0.7                            | 0.7  | 10.6          | 11.4 | 4.4   | 4.6  |
| 65+       | 4.4                        | 8.8  | 1.4                            | 1.8  | 16.1          | 12.7 | 6.8   | 5.8  |

a 'household member or close contact with TB' and no risk factor information was provided for the 3rd case. Of the Australian-born non-Indigenous cases in children, 46% in 2012 (11/24) and 41% (9/22) in 2013 reported a 'household member or close contact with TB' as the only risk factor.

The rate of TB in Australian-born non-Indigenous children has remained relatively stable over the past decade (range: 0.3 per 100,000 to 0.7 per 100,000), whilst the rate in Australian-born Indigenous (range: 0.4 per 100,000 to 4.2 per 100,000) and overseas-born children (range: 3.8 per 100,000 to 12.0 per 100,000) has fluctuated over that time (Figure 7).

### Selected risk factors for tuberculosis

Selected risk factor data were provided for 92% (n=1,212) of notified cases in 2012 and 92% (n=1,162) in 2013. Of those cases assessed for risk factors, the most frequently reported risk factor in both 2012 and 2013 was 'past travel to or residence in a high-risk country' (2012: 84%, n=1,014; 2013: 81%, n=947) (Table 8). Since 2011, the proportion of cases with information available who had this risk factor increased from approximately 60% to approximately 80%. The increase is in part due to Victoria initiating reporting of this risk factor to the national dataset from 2011. Interpretation of this risk factor in overseas-born cases is problematic as at the time these data were collected there were inconsistent practices across states and territories as to the inclusion of a case's country of birth in the assessment of this risk factor. NTAC has agreed that this risk factor is to identify travel-related TB and as such is intended to be exclusive of a case's country of birth. The reporting and interpretation of this risk factor should be clearer post-2013.

**Figure 7: Notified cases and notification rate for tuberculosis in children aged less than 15 years, Australia, 2003 to 2013, by population subgroup**

In 2012, the most frequently reported risk factor among overseas-born cases and Australian-born non-Indigenous cases was 'past travel to or residence in a high-risk country' (n=978 and n=36, respectively). In 2013, the most frequently reported risk factor among overseas-born cases was again 'past travel to or residence in a high-risk country' (n=913) whilst the Australian-born non-Indigenous cases more frequently reported 'none of the above risk factors' (n=29). In both 2012 and 2013, the most frequently reported risk factor among Australian-born Indigenous cases was a 'household member or close contact with TB' (2012: n=16; 2013: n=15) (Table 8).

A total of 67 cases of TB in 2012 and 77 in 2013 were reported in people who were currently or had previously worked in a health care setting. Of these, 27 in 2012 and 24 in 2013 were working in a health care setting in Australia at the time of diagnosis or within 12 months of diagnosis. 63% (n=17) of

**Table 8: Notified cases of tuberculosis, Australia, 2012 and 2013, by population subgroup and selected risk factors**

| Risk factor*  | Australian-born Indigenous | Australian-born non-Indigenous | Overseas-born | Total        |
|---|----------------------------|--------------------------------|---------------|--------------|
| <b>2012</b>   |                            |                                |               |              |
| Household or other close contact with tuberculosis                            | 16                         | 26                             | 89            | 131          |
| Ever resided in a correctional facility†                                      | 0                          | 1                              | 9             | 10           |
| Ever resided in an aged care facility†  | 0                          | 0                              | 3             | 3            |
| Ever employed in an institution‡  | 0                          | 0                              | 9             | 9            |
| Currently or previously† employed in health industry in Australia or overseas | 0                          | 4                              | 63            | 67           |
| Ever homeless   | 1                          | 1                              | 5             | 7            |
| Past travel to or residence in a high-risk country                            | 0                          | 36                             | 978           | 1,014        |
| Chest X-ray suggestive of old untreated tuberculosis                          | 0                          | 1                              | 19            | 20           |
| Currently receiving immunosuppressive therapy                                 | 0                          | 4                              | 27            | 31           |
| Australian-born child with one or more parent born in a high-risk country     | 0                          | 9                              | 0             | 9            |
| None of the above risk factors  | 7                          | 29                             | 75            | 111          |
| <b>Total cases assessed for risk factors</b>                                  | <b>23</b>                  | <b>100</b>                     | <b>1,089</b>  | <b>1,212</b> |
| <b>2013</b>   |                            |                                |               |              |
| Household or other close contact with tuberculosis                            | 15                         | 24                             | 89            | 128          |
| Ever resided in a correctional facility†                                      | 1                          | 0                              | 12            | 13           |
| Ever resided in an aged care facility†  | 0                          | 3                              | 3             | 6            |
| Ever employed in an institution‡  | 0                          | 2                              | 5             | 7            |
| Currently or previously† employed in health industry in Australia or overseas | 3                          | 4                              | 70            | 77           |
| Ever homeless   | 0                          | 2                              | 6             | 8            |
| Past travel to or residence in a high-risk country                            | 0                          | 34                             | 913           | 947          |
| Chest X-ray suggestive of old untreated tuberculosis                          | 0                          | 3                              | 34            | 37           |
| Currently receiving immunosuppressive therapy                                 | 0                          | 7                              | 27            | 34           |
| Australian-born child with one or more parent born in a high-risk country     | 0                          | 13                             | 1             | 14           |
| None of the above risk factors  | 8                          | 38                             | 67            | 113          |
| <b>Total cases assessed for risk factors</b>                                  | <b>26</b>                  | <b>109</b>                     | <b>1,027</b>  | <b>1,162</b> |

\* More than one risk factor may be reported for each notified case of tuberculosis.

† Within the preceding 5 years.

‡ Institution is defined as a correctional facility, aged care facility or homeless shelter.

those cases in 2012 and 50% (n=12) in 2013 were reported as having extrapulmonary disease only, which is generally not communicable.

### Tuberculosis and HIV status

According to Australia's *2011 National HIV Testing Policy version 1.3*, '...all people with HIV should be tested for tuberculosis, and all people with tuberculosis should be tested for HIV...'<sup>8</sup>. The HIV testing history<sup>‡</sup> of notified cases of TB were reported

in 97% of cases in 2012 (n=1,281) and 96% of cases in 2013 (n=1,215). Of those cases, just over 80% were tested for HIV (2012: 81%, n=1,033; 2013: 83%, n=1,004) (Table 9).

More than half of the cases with a known HIV test history in both 2012 and 2013 were reported with a known HIV status (2012: 58%, 741/1,281; 2013: 56%, 683/1,215), of which 1.5% in 2012 (n=11) and 3.4% in 2013 (n=23) were reported as being HIV positive (Table 9).

‡ HIV test history means knowing whether or not the person was tested for HIV, not tested for HIV or refused testing for HIV.

Approximately a quarter of cases in 2012 (23%, n=292) and 2013 (26%, n=321) with a known

HIV testing history were reported as being tested for HIV but the result of that test has not been reported to the NNDSS. Nearly all these cases were reported by Victoria (2012: n=287; 2013: n=310) where policy has prevented the HIV status of an individual being reported against their TB notification.

### Anatomical site of disease

The anatomical site of TB disease was recorded in nearly all notified cases in 2012 (n=1,315) and 2013 (n=1,262). Similar to previous years, pulmonary disease was the most frequently reported site of disease in both 2012 (60%, n=796) and 2013 (58%, n=734), with most of these cases being reported as having pulmonary disease only. Extrapulmonary disease only was reported in 39% (n=519) of all cases in 2012 and 42% (n=528) in 2013, with the most frequently reported extrapulmonary site of disease being lymph nodes (2012: n=259; 2013: n=268) (Table 10). In both 2012 and 2013, children aged less than 15 years made up only 3% of the total cases of extrapulmonary TB (2012: 16/519; 2013: 18/528) and interestingly have a lower proportion of cases with this form of the disease than found overall for the population (2012: 33%, 16/48; 2013: 38%, 18/48). Of the more severe forms of TB, 4 cases in 2012 and 9 cases in 2013 were classified as miliary, while 9 cases in 2012 and 6 cases in 2013 were classified as meningeal. This is similar to the number of miliary and meningeal cases reported in previous years.

### Bacteriologically confirmed cases

The majority of cases in 2012 (n=1,146, 87%) and 2013 (n=1,068, 85%) were bacteriologically and/or histological confirmed as TB. The remaining 13% (n=171) and 15% (n=195) of cases in 2012 and 2013 respectively were diagnosed using clinical and radiological evidence.

Of the total number of cases with pulmonary disease<sup>§</sup>, 79% (632/796) in 2012 and 75% (547/734) in 2013 were either sputum culture positive or bronchoscopy washings/aspirate culture positive with nearly half of these cases also being smear positive (2012: 47%, 294/632; 2013: 44%, 243/547). Smear positive cases of pulmonary TB can be up to 10 times more infectious than smear negative cases and are usually the main source of TB transmission in the community.<sup>9,10</sup>

Of the extrapulmonary only cases, 60% (311/519) in 2012 and 55% (289/528) in 2013 were culture positive. Cases with extrapulmonary disease only are generally not infectious and rarely are a source of transmission.<sup>9</sup> Of the extrapulmonary only cases reported in children aged less than 15 years, 63% (10/16) in 2012 and 50% (9/18) in 2013 were bacteriologically confirmed. The WHO recommends that wherever possible, a diagnosis of TB in a child should be bacteriologically confirmed.<sup>11</sup>

§ Pulmonary cases include both pulmonary only cases and pulmonary cases that also have extrapulmonary sites detected.

**Table 9: Notified cases of tuberculosis, Australia, 2012 and 2013, by population subgroup and HIV status**

| HIV testing history         | Australian-born Indigenous | Australian-born non-Indigenous | Overseas-born | Unknown population subgroup | Total        |
|-----------------------------|----------------------------|--------------------------------|---------------|-----------------------------|--------------|
| <b>2012</b>                 |                            |                                |               |                             |              |
| HIV positive                | 0                          | 3                              | 8             | 0                           | 11           |
| HIV negative                | 25                         | 54                             | 651           | 0                           | 730          |
| HIV tested, result unknown  | 1                          | 14                             | 277           | 0                           | 292          |
| Not tested                  | 2                          | 33                             | 207           | 1                           | 243          |
| Refused testing             | 1                          | 1                              | 3             | 0                           | 5            |
| HIV testing history unknown | 0                          | 7                              | 28            | 1                           | 36           |
| <b>Total</b>                | <b>29</b>                  | <b>112</b>                     | <b>1,174</b>  | <b>2</b>                    | <b>1,317</b> |
| <b>2013</b>                 |                            |                                |               |                             |              |
| HIV positive                | 0                          | 3                              | 19            | 1                           | 23           |
| HIV negative                | 24                         | 58                             | 578           | 0                           | 660          |
| HIV tested, result unknown  | 0                          | 21                             | 300           | 0                           | 321          |
| Not tested                  | 4                          | 37                             | 164           | 0                           | 205          |
| Refused testing             | 1                          | 0                              | 5             | 0                           | 6            |
| HIV testing history unknown | 2                          | 6                              | 40            | 0                           | 48           |
| <b>Total</b>                | <b>31</b>                  | <b>125</b>                     | <b>1,106</b>  | <b>1</b>                    | <b>1,263</b> |

**Table 10: Notified cases of tuberculosis, Australia, 2012 and 2013, by case classification and site of disease**

| Site                            | New cases | Relapse cases | Total cases* | Percentage of cases (%) |
|---------------------------------|-----------|---------------|--------------|-------------------------|
| <b>2012</b>                     |           |               |              |                         |
| <b>Pulmonary</b>                |           |               |              |                         |
| Pulmonary only                  | 630       | 28            | 659          | 50.0                    |
| Pulmonary plus other sites      | 129       | 8             | 137          | 10.4                    |
| Pulmonary - total               | 759       | 36            | 796          | 60.4                    |
| <b>Extrapulmonary only†</b>     |           |               |              |                         |
| Pleural                         | 82        | 1             | 83           | 6.3                     |
| Lymph nodes                     | 247       | 11            | 259          | 19.7                    |
| Bone/joint                      | 36        | 4             | 40           | 3.0                     |
| Genitourinary                   | 19        | 0             | 19           | 1.4                     |
| Miliary                         | 4         | 0             | 4            | 0.3                     |
| Meningeal                       | 9         | 0             | 9            | 0.7                     |
| Peritoneal                      | 26        | 0             | 26           | 2.0                     |
| Other                           | 153       | 4             | 157          | 11.9                    |
| Unknown extrapulmonary site     | 1         | 0             | 1            | 0.1                     |
| Extrapulmonary – total          | 500       | 18            | 519          | 39.4                    |
| Unknown site of disease – total | 2         | 0             | 2            | 0.2                     |
| Total                           | 1261      | 54            | 1317         | 100.0                   |
| <b>2013</b>                     |           |               |              |                         |
| <b>Pulmonary</b>                |           |               |              |                         |
| Pulmonary only                  | 589       | 26            | 616          | 48.8                    |
| Pulmonary plus other sites      | 117       | 1             | 118          | 9.3                     |
| Pulmonary – total               | 706       | 27            | 734          | 58.1                    |
| <b>Extrapulmonary only†</b>     |           |               |              |                         |
| Pleural                         | 63        | 3             | 66           | 5.2                     |
| Lymph nodes                     | 255       | 12            | 268          | 21.2                    |
| Bone/joint                      | 35        | 1             | 36           | 2.9                     |
| Genitourinary                   | 27        | 0             | 27           | 2.1                     |
| Miliary                         | 9         | 0             | 9            | 0.7                     |
| Meningeal                       | 6         | 0             | 6            | 0.5                     |
| Peritoneal                      | 35        | 0             | 35           | 2.8                     |
| Other                           | 102       | 0             | 102          | 8.1                     |
| Unknown extrapulmonary site     | 1         | 0             | 1            | 0.1                     |
| Extrapulmonary – total          | 511       | 16            | 528          | 41.8                    |
| Unknown site of disease – total | 1         | 0             | 1            | 0.1                     |
| Total                           | 1,218     | 43            | 1,263        | 100.0                   |

\* Total includes 1 pulmonary case and 1 extrapulmonary case reported without a case classification in 2012 and 1 pulmonary case and 1 extrapulmonary case reported without a case classification in 2013.

† More than one extrapulmonary site may be reported for each notified case of tuberculosis.

It is recommended that a bronchoscopy should not be performed on patients with known active tuberculosis (i.e. sputum smear positive) unless absolutely necessary as this presents an increased risk of TB transmission to future bronchoscope patients and clinical staff.<sup>12,13</sup> Of the bacteriologi-

cally confirmed cases, 17% (191/1,146) of cases in 2012 and 20% (208/1,068) of cases in 2013 recorded a positive microscopy or culture result on a bronchoscopy obtained washing or aspirate. Of these cases, 14% (27/191) in 2012 and 34% (71/208) in

2013 also recorded a sputum smear positive result with one of those cases in 2013 being identified as MDR-TB.

Of the bacteriologically confirmed cases, 2% in 2012 (28/1,146) and 5% (54/1,068) in 2013 were reported as being confirmed using a nucleic acid testing (NAT) method only. In Australia, culture remains the gold standard diagnostic for confirming TB cases as it is more sensitive than NAT and it provides a bacterial isolate for DST and molecular typing.<sup>14</sup>

### Drug resistant tuberculosis in Australia

The results of DST were available for 3 quarters of the TB cases notified in 2012 (75%, 988/1,317) and 2013 (73%, 928/1,263) and of those cases, resistance to at least one of the standard first line anti-tuberculosis agents was identified in 13% of cases (2012: 129/988; 2013: 120/928). Resistance to rifampicin only (mono-resistance) remains low and is reported in only 0.3% cases with DST results available in both 2012 (3/988) and 2013 (3/928). Mono-resistance to isoniazid was more common than rifampicin mono-resistance but still relatively low and was reported in 4% (42/988) of cases in 2012 and 5% (48/928) of cases in 2013. Similar to previous years, resistance to at least rifampicin and isoniazid, known as MDR-TB, was identified in approximately 2% of cases with DST results in both 2012 (20/988) and 2013 (22/928). There were no cases of extensively drug resistant TB (XDR-TB) reported in 2012 or 2013 (Table 11).

The majority of MDR-TB cases were reported in the overseas-born population (2012: n=18; 2013:

n=20) and of those, 7 cases in 2012 and 1 case in 2013 were identified as residents of the TSPZ accessing TB treatment in Queensland. The remaining MDR-TB cases (2012: n=2; 2013: n=2) were reported in the Australian-born non-Indigenous population. Of these cases, 1 case in 2012 was recorded as having completed treatment, while the other case in 2012 was reported as defaulting from treatment. Both cases in 2013 are currently reported as being still under treatment.

### Treatment outcomes of 2011 and 2012 tuberculosis patient cohorts

The treatment outcomes of an annual patient cohort are reported in the following year's annual report. This allows adequate time for all cases notified in a single year to begin treatment and for the treatment outcomes to be recorded in the NNDSS. Treatment outcomes for the 2011 and 2012 patient cohorts are reported in this annual report; and treatment outcomes for the 2013 patient cohort will be reported in the 2014 annual report.

#### 2011 tuberculosis patient cohort

In 2011, treatment success, which includes those bacteriologically confirmed as cured and those who completed treatment, was reported in 96% (1,178/1,233) of cases with assessable outcomes (Table 12). Treatment success ranged from 77% in Australian-born Indigenous cases to 96% in overseas-born cases. In 2011, there were 2 cases of a treatment failure reported, one in an Australian-born Indigenous case and one in an overseas-born case, and 20 (1.6%) cases were reported to have died due to TB.

**Table 11: Notified cases of tuberculosis, Australia, 2012 and 2013, by drug susceptibility testing profile**

| Drug susceptibility testing (DST) profile                       | 2012              |  | 2013              |  |
|---|-------------------|--|-------------------|--|
|   | Notifications (n) | Percentage of cases with DST results (%) | Notifications (n) | Percentage of cases with DST results (%) |
| Total cases with DST results                                    | 988               | –  | 928               | –  |
| Resistance to at least one first line anti-tuberculosis agents* | 129               | 13.1                                     | 120               | 12.9                                     |
| Mono-resistance to rifampicin                                   | 3                 | 0.3                                      | 3                 | 0.3                                      |
| Mono-resistance to isoniazid                                    | 42                | 4.3                                      | 48                | 5.2                                      |
| MDR-TB†   | 20                | 2.0                                      | 22                | 2.4                                      |
| XDR-TB‡   | 0                 | 0.0                                      | 0                 | 0.0                                      |

\* Isoniazid, rifampicin, pyrazinamide, ethambutol and streptomycin.

† Multi-drug resistant tuberculosis: resistance to isoniazid and rifampicin.

‡ Extensively drug resistant tuberculosis: resistance to isoniazid and rifampicin, and any of the fluoroquinolones, and to at least one of the 3 injectable second-line drugs.<sup>15</sup>



Table 12: Notified cases of tuberculosis, Australia, 2011, by population subgroup and treatment outcome

| Treatment outcome                    | Australian-born Indigenous cases |                           | Australian-born non-Indigenous |                           | Overseas-born     |                           | Total cases*      |                           |
|--------------------------------------|----------------------------------|---------------------------|--------------------------------|---------------------------|-------------------|---------------------------|-------------------|---------------------------|
|                                      | Notifications (n)                | Percentage assessable (%) | Notifications (n)              | Percentage assessable (%) | Notifications (n) | Percentage assessable (%) | Notifications (n) | Percentage assessable (%) |
| <b>Assessable outcomes</b>           |                                  |                           |                                |                           |                   |                           |                   |                           |
| Treatment success                    | 20                               | 76.9                      | 117                            | 94.4                      | 1,040             | 96.1                      | 1,178             | 95.5                      |
| Cured (bacteriologically confirmed)† | 3                                | 11.5                      | 10                             | 8.1                       | 35                | 3.2                       | 48                | 3.9                       |
| Completed treatment                  | 17                               | 65.4                      | 107                            | 86.3                      | 1,005             | 92.9                      | 1,130             | 91.6                      |
| Interrupted treatment‡               | 1                                | 3.8                       | 0                              | 0.0                       | 2                 | 0.2                       | 3                 | 0.2                       |
| Died of tuberculosis                 | 1                                | 3.8                       | 5                              | 4.0                       | 14                | 1.3                       | 20                | 1.6                       |
| Defaulted§                           | 0                                | 0.0                       | 1                              | 0.8                       | 18                | 1.7                       | 19                | 1.5                       |
| Failure                              | 1                                | 3.8                       | 0                              | 0.0                       | 1                 | 0.1                       | 2                 | 0.2                       |
| Not followed up, outcome unknown     | 3                                | 11.5                      | 1                              | 0.8                       | 7                 | 0.6                       | 11                | 0.9                       |
| Total assessable                     | 26                               | 100.0                     | 124                            | 100.0                     | 1,082             | 100.0                     | 1,233             | 100.0                     |
| <b>Non-assessable outcomes</b>       |                                  |                           |                                |                           |                   |                           |                   |                           |
| Transferred out of Australia         | 0                                | 0.0                       | 2                              | 1.5                       | 106               | 8.7                       | 108               | 7.8                       |
| Died of other causes                 | 7                                | 21.2                      | 9                              | 6.6                       | 25                | 2.1                       | 41                | 3.0                       |
| Still under treatment                | 0                                | 0.0                       | 1                              | 0.7                       | 1                 | 0.1                       | 2                 | 0.1                       |
| Total                                | 33                               | 100.0                     | 136                            | 100.0                     | 1,214             | 100.0                     | 1,384             | 100.0                     |

\* Total includes 1 case reported with an unknown population subgroup.

† Cured is defined as the bacteriologically confirmed sputum smear and culture positive at the start of treatment and culture negative in the final month of treatment and on at least one previous occasion.

‡ Interrupted treatment is defined as treatment interrupted for 2 months or more but completed

§ Defaulted is defined as failed to complete treatment.

|| Failure is defined as sputum culture positive at 5 months or later.

### 2012 tuberculosis patient cohort

In 2012, treatment success, which includes those bacteriologically confirmed as cured and those who completed treatment, was reported in 95% (1,124/1,181) of cases with assessable outcomes (Table 13). Treatment success ranged from 86% in Australian-born Indigenous cases to 96% in overseas-born cases. In 2012, there were 2 cases of a treatment failure reported, one in an Australian-born Indigenous case and one in an overseas-born case, and 14 (1.2%) cases were reported to have died due to TB.

### National performance indicators

In 2011, 2012 and 2013, the performance criterion for annual incidence (less than 1 per 100,000) was met only in the Australian born non-Indigenous cases and incidence rates in Australian born children continue to exceed the performance criteria of less than 0.1 per 100,000. The reporting of HIV testing history has improved over time but still remains just short of the reaching the target of 100%. In 2011 and 2012, outcome reporting fell just short of the performance criteria with 1% of cases with assessable outcomes in 2011 and 2% in 2012 reported with an unknown outcome (Table 14). Overall the performance indicators for treatment success and treatment failure were achieved in both 2011 and 2012; however, at a sub-population level these indicators were only achieved in the Australian-born non-Indigenous and overseas born cases, and not in the Australian born Indigenous cases (Table 13).

### Discussion

Although Australia has maintained a low incidence of TB, over the past decade, the rate of TB had been showing a steady upward trend, largely attributed to the growth in immigration from high TB burden countries. The rate had increased from 5 per 100,000 in 2003 to highs of 6.2 per 100,000 population in 2010 and 2011.

For this 2 year reporting period, the trend has reversed with successive annual declines amounting to a net reduction of 8.8% in overall case numbers. The case rate of 5.5 per 100,000 in 2013 is the lowest since 2007. This decline mirrors a fall in the number of persons from high TB burden countries notified with TB. The substantial increase in TB detected offshore through the pre-migration screening process may be a contributing factor to this change (44% increase 2011 to 2012; 13% increase 2012 to 2013). Also during this period the absolute number of overseas students and the proportion of cases they contribute to the overseas-

born TB case-load fell from 224 in 2011 (18.5%) to 155 in 2012 (13.2%) and 130 in 2013 (11.8%). The reasons for the latter are unclear.

New South Wales and Victoria between them accounted for approximately two-thirds of all cases in 2012 and 2013. This disproportionate share of the TB burden has not changed significantly since 2010 although New South Wales has experienced a notable decline in notifications and rate from 541 (7.5 per 100,000) in 2011 to 469 (6.4 per 100,000) in 2012 and 440 (5.9 per 100,000) in 2013. In contrast the Northern Territory reported the highest rates (11.9 and 17.5 per 100,000), although significantly lower notification numbers, that predominantly relate to the Indigenous Australian and overseas-born groups. Western Australia and South Australia also have experienced higher rates than previously. These geographic fluctuations may reflect changing patterns in migrant and temporary resident placements across the states and territories. In Queensland, the number of notifications detected in PNG nationals in the TSPZ with TB and drug resistant TB has fallen dramatically from 47 cases in 2011 to three in 2013. In mid-2012, the policy regarding the management of cross-border patients in the Torres Strait was amended and resulted in a more stringent enforcement of the Torres Strait Treaty rules regarding health treatment. This likely contributed to the decreased number of PNG nationals diagnosed over that time period.

Australian-born Indigenous people continue to experience TB at a rate about 6 times that of Australian-born non-Indigenous people, although the actual rate by international standards is low (< 5 per 100,000) and the proportion of all notifications small (2.5%–3%). The key issue however, is that socioeconomic conditions in some Indigenous communities remain conducive for TB to prosper and in such settings, TB can be more problematic to manage. In contrast, TB rates in Australian-born non-Indigenous people have remained stable and consistently below 1 per 100,000 over the past decade at the pre-elimination level. Of these cases, when examined by risk factors, household or close TB contact was identified in 26% (2012) and 22% (2013) of cases and past travel or residence in a high risk country in 36% (2012) and 31% (2013) of cases. Approximately 10% had at least 1 overseas-born parent but in a 3rd of cases no risk factors were identified. While many of these cases may be unavoidable, if the goal of elimination is to be achieved (<1 per million) then further TB preventive initiatives are required.

Overseas-born persons continue to drive the epidemiology of TB in Australia, contributing nearly 90% of all cases. The overall rates of disease are

Table 13: Notified cases of tuberculosis, Australia, 2012, by population subgroup and treatment outcome

| Treatment outcome                    | Australian-born Indigenous cases |                           | Australian-born non-Indigenous |                           | Overseas-born     |                           | Total cases*      |                           |
|--------------------------------------|----------------------------------|---------------------------|--------------------------------|---------------------------|-------------------|---------------------------|-------------------|---------------------------|
|                                      | Notifications (n)                | Percentage assessable (%) | Notifications (n)              | Percentage assessable (%) | Notifications (n) | Percentage assessable (%) | Notifications (n) | Percentage assessable (%) |
| <b>Assessable outcomes</b>           |                                  |                           |                                |                           |                   |                           |                   |                           |
| Treatment success                    | 24                               | 85.7                      | 98                             | 90.7                      | 1,002             | 96.0                      | 1,124             | 95.2                      |
| Cured (bacteriologically confirmed)† | 4                                | 14.3                      | 3                              | 2.8                       | 50                | 4.8                       | 57                | 4.8                       |
| Completed treatment                  | 20                               | 71.4                      | 95                             | 88.0                      | 952               | 91.2                      | 1,067             | 90.3                      |
| Interrupted treatment‡               | 0                                | 0.0                       | 1                              | 0.9                       | 1                 | 0.1                       | 2                 | 0.2                       |
| Died of tuberculosis                 | 1                                | 3.6                       | 1                              | 0.9                       | 11                | 1.1                       | 14                | 1.2                       |
| Defaulted§                           | 0                                | 0.0                       | 3                              | 2.8                       | 13                | 1.2                       | 16                | 1.4                       |
| Failure                              | 1                                | 3.6                       | 0                              | 0.0                       | 1                 | 0.1                       | 2                 | 0.2                       |
| Not followed up, outcome unknown     | 2                                | 7.1                       | 5                              | 4.6                       | 16                | 1.5                       | 23                | 1.9                       |
| Total assessable                     | 28                               | 100.0                     | 108                            | 100.0                     | 1,044             | 100.0                     | 1,181             | 100.0                     |
| <b>Non-assessable outcomes</b>       |                                  |                           |                                |                           |                   |                           |                   |                           |
| Transferred out of Australia         | 0                                | 0.0                       | 1                              | 0.9                       | 86                | 7.3                       | 87                | 6.6                       |
| Died of other causes                 | 1                                | 3.4                       | 2                              | 1.8                       | 32                | 2.7                       | 36                | 2.7                       |
| Still under treatment                | 0                                | 0.0                       | 1                              | 0.9                       | 12                | 1.0                       | 13                | 1.0                       |
| Total                                | 29                               | 100.0                     | 112                            | 100.0                     | 1,174             | 100.0                     | 1,317             | 100.0                     |

\* Total includes 2 cases reported with an unknown population subgroup.

† Cured is defined as the bacteriologically confirmed sputum smear and culture positive at the start of treatment and culture negative in the final month of treatment and on at least one previous occasion.

‡ Interrupted treatment is defined as treatment interrupted for 2 months or more but completed

§ Defaulted is defined as failed to complete treatment.

|| Failure is defined as sputum culture positive at 5 months or later.

**Table 14: National tuberculosis performance indicators, performance criteria\* and the current status of tuberculosis, Australia, 2011 to 2013**

| National tuberculosis performance indicator                                       | Performance criteria | 2013             | 2012 | 2011 |
|---|----------------------|------------------|------|------|
| <b>Annual incidence of TB (cases per 100,000 population)</b>                      |                      |                  |      |      |
| Total   | <6.0 <sup>†</sup>    | 5.5              | 5.8  | 6.2  |
| Australian-born Indigenous Australians  | <1.0                 | 4.6              | 4.5  | 4.9  |
| Australian-born non-Indigenous Australians  | <1.0                 | 0.8              | 0.7  | 0.9  |
| Overseas-born persons   | *                    | 18.4             | 19.5 | 20.2 |
| <b>Incidence in children &lt;15 years, by risk group (per 100,000 population)</b> |                      |                  |      |      |
| Australian-born Indigenous Australians  | <0.1                 | 0.8              | 0.4  | 1.2  |
| Australian-born non-Indigenous Australians  | <0.1                 | 0.6              | 0.7  | 0.4  |
| Overseas-born persons   | *                    | 6.6              | 6.3  | 9.0  |
| <b>Collection of HIV testing history</b>  |                      |                  |      |      |
| Collection of HIV testing history in all tuberculosis cases                       | 100%                 | 96%              | 97%  | 98%  |
| <b>Treatment outcome measures (%)</b>   |                      |                  |      |      |
| Cases evaluated for outcomes  | 100%                 | TBA <sup>‡</sup> | 98%  | 99%  |
| Cases that have treatment completed and are cured (treatment success)             | >90%                 | TBA <sup>‡</sup> | 95%  | 96%  |
| Cases recorded as treatment failures  | <2%                  | TBA <sup>‡</sup> | 0.2% | 0.2% |

\* Performance criteria currently under review.

† This performance criterion is based on the key performance indicator published in the DIBP 2012–13 and 2013–14 Portfolio Budget Statements under Program 1.1: Visa and Migration.

‡ TBA is to be assessed: 2013 patient cohort outcomes to be reported in 2014 annual report.

more than 20 times higher than for the Australian-born population and reflect rates in the countries of origin. The highest proportions of cases were found in permanent residents (54% in 2012, 57% in 2013) and overseas students. Individuals from India, Vietnam, the Philippines, China and Nepal, as in recent years, contributed more than 50% of cases. In most instances, TB is attributed to reactivation of 'imported' infection rather than from recent transmission within Australia. Given the expected high rates of TB infection in the overseas-born and that nearly 50% of cases are occurring more than 5 years after arrival, without increased attempts at identifying latent TB infection the rate of decline of TB will be slow and the pool of infected persons in the Australian population will continue to increase with future implications for TB control.

Cases classified as 'relapse' are a potential indicator of TB program performance (past or recent). The proportion of cases in this group remains low and in both years was lower than the 2011 figure of 4.8% (2012: 54, 4.1%; 2013: 43, 3.4%). The majority of these cases occurred in persons previously treated overseas and hence do not reflect on the quality of TB management in Australia. If these cases are excluded, then for those previously treated in Australia, very low numbers were reported (2012:

12, 0.9%; 2013: 16, 1.2%). From the surveillance data, it is not possible to determine whether these cases related to recent or more distant previous treatment or to classify possible contributing factors such as treatment quality or non-adherence, drug resistance or possible re-infection.

The proportion of cases that are smear positive for TB in a sample obtained by bronchoscopy but also in a diagnostic sputum specimen may be an indicator of suboptimal clinical practice. Approximately 20% of pulmonary cases in both 2012 and 2013 were bacteriologically confirmed from bronchoscopy specimens. The concern is that of these cases, 14% and 34% in 2012 and 2013 respectively were also confirmed smear positive from diagnostic sputum specimens. Risk to staff is an important consideration particularly when multidrug-resistance is involved. However, as it is often common practice to obtain post-bronchoscopy spontaneous sputum samples for smear and culture, further investigation is required to confirm whether the proportions of cases above were post bronchoscopy collections and/or whether the collection of a pre-bronchoscopy sputum sample was considered. If there is difficulty in obtaining spontaneous

sputum specimens for diagnosis, then induced sputum in a negative pressure setting is strongly encouraged as the next step.

The proportion of TB occurring in children is an important indicator of recent transmission of infection in the community. The proportion of cases reported to have occurred in people less than 15 years of age remained steady at 4% of all cases, with overseas-born children contributing approximately half of these. In both Australian-born Indigenous and Australian-born non-Indigenous children, case rates were less than 1 per 100,000 and in nearly half of the cases, close contact with TB was reported as a risk factor. These cases may have represented a missed opportunity for earlier intervention with TB preventive therapy. In the Australian-born Indigenous population, although case numbers were small, the ability of TB programs to respond in a timely manner to a new case remains paramount.

Acquired drug resistance is a marker of TB program performance. Drug resistant TB in Australia remains at low levels. MDR-TB (resistance to at least isoniazid and rifampicin) was reported in only 2% of cases, of which 90% of cases were in overseas-born persons. Mono-resistance to rifampicin is considered as significant as MDR-TB in terms of treatment requirements but was only found in 0.3% of cases. No cases of XDR-TB were reported. Future cases are inevitable, but the low number of these cases and their problematic nature mean that management should be undertaken by, or in close collaboration with, the specialised TB services at state level.

The incidence of TB in health care workers continues to be of interest because of the increased reliance on overseas health care workers from high burden regions. The proportion of cases reported has remained relatively stable since 2010, contributing 5.5% of all cases in 2012 and 6.6% in 2013. As indicated in the 2011 report, more than 90% of these cases occurred in overseas-born people and invariably reflect reactivation of infection acquired in their country of origin. Only about a third of these cases however, were working in a health institution at the time or within 12 months of diagnosis and greater than 50% of cases were reported as extrapulmonary suggesting that the overall risk of transmission in the workplace is not high. Nevertheless, this requires continued monitoring.

Testing of HIV status in all TB cases is recommended nationally, although until recently, data reporting has varied between states and territories. Although high rates of reporting of testing history have been achieved, only about 80% were tested

for HIV and of these, HIV results were obtained for 58% and 56% of cases in 2012 and 2013 respectively. Despite this, HIV co-infection appears to have minimal impact on TB control in Australia.

Monitoring treatment outcomes provides an important measure of the quality of treatment programs. Despite the slight upward trend in the TB case-load observed over the last decade, high rates of treatment success have been maintained and few adverse outcomes (treatment failure, deaths) have been reported, supporting overall good TB control efforts across the country. Treatment success rates remain at high levels ( $\geq 95\%$ ) by international standards and consistently exceed the national performance and WHO criteria of greater than 90%. However, in the Australian-born Indigenous population, success rates were only 76.9% and 85.7% in 2011 and 2012 respectively. These figures need to be interpreted with caution, because of the small case numbers involved. In all population groups the rate of adverse outcomes (treatment failure, treatment default or TB related deaths) was low at approximately 3% in total, with cases classified as treatment failure only 0.2%.

Overall, this report, as in previous years, demonstrates that Australia's jurisdictional TB programs achieve a very high level of diagnostic and treatment success, and thereby maintenance of one of the lowest rates of TB in the world. In addition, Australia is probably improving pre-migration detection of TB, which is leading to a fall in the incidence of TB in Australia. However, in 2014 the Australian Government endorsed the World Health Assembly's *Global Strategy and targets for tuberculosis prevention, care and control after 2015*, which sets targets for ending the global TB epidemic.<sup>16</sup> NTAC is currently drafting a new strategic plan for 2016–2020, which will align with the WHO's framework for low-incidence countries and primarily consider the actions needed to achieve TB elimination targets.<sup>17</sup>

## Acknowledgements

National Tuberculosis Advisory Committee members (in alphabetical order): Associate Professor Anthony Allworth, Dr Ral Antic, Dr Ivan Bastian, Mr Philip Clift, Dr Chris Coulter, Dr Paul Douglas, Dr Justin Denholm, Associate Professor Steve Graham, Clinical Associate Professor Mark Hurwitz, Mr Chris Lowbridge, Ms Rhonda Owen, Dr Vicki Krause, Dr Richard Stapledon, Dr David Stock, Mr Peter Trevan and Dr Justin Waring (Chair) with Dr Kerry Coleman (Medical Advisor), Ms Cindy Toms (TB Epidemiologist) and the NTAC Secretariat from the Department of Health.



Tuberculosis Data Quality Working Group members (in alphabetical order) in 2012 and 2013: Ms Michelle Bringham (Chair), Mr David Coleman, Ms Ellen Donnan, Ms Belinda Farmer, Ms Delilah Gyi, Mr Chris Lowbridge, Dr Vanessa Johnston, Mr Richard Lumb, Mr Byron Minas, Ms Wendy Mossman, Dr Ee Laine Tay, Ms Tracie Reinten and Ms Cindy Toms with Ms Rachael Corvisy from the Secretariat.

The Australian Mycobacterium Reference Laboratory Network: Mr Richard Lumb and Dr Ivan Bastian, Chief Medical Scientist and Clinical Microbiology Consultant at SA Pathology, Adelaide, South Australia; Mr Peter Jelfs, Scientist in charge, Mycobacterium Reference Laboratory at the Institute of Clinical Pathology and Medical Research, Westmead Hospital, Westmead, New South Wales; Ms Terillee Keehner, Scientist in charge, Mycobacterium Reference Laboratory of PathWest Laboratory Medicine WA – QEIMC, Hospital Avenue, Nedlands, Western Australia; Dr Sushil Pandey, Scientist in charge, Mycobacterium Reference Laboratory at Queensland Health Pathology Services, Herston Hospitals Complex, Herston, Queensland; Ms Aina Sievers, Scientist in charge, Mycobacterium Reference Laboratory at the Victorian Infectious Diseases Reference Laboratory, North Melbourne, Victoria.

The data on which this report is based is the work of many people in addition to those noted above. We thank the public health laboratories, state and territory communicable disease control units, public health units, staff in state and territory TB control programs and the Department of Immigration and Border Protection.

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