

# Tuberculosis in New South Wales

---

## Surveillance Report 2015-2016

**Produced by:**

**NSW TB Program**

**COMMUNICABLE DISEASES BRANCH**

Health Protection NSW

Locked Mail Bag 961

North Sydney NSW 2059

Email: [TBProgram@doh.health.nsw.gov.au](mailto:TBProgram@doh.health.nsw.gov.au)

[www.health.nsw.gov.au/infectious/pages/default.aspx](http://www.health.nsw.gov.au/infectious/pages/default.aspx)

This work is copyright. It may be reproduced in whole or in part for study and training purposes subject to the inclusion of an acknowledgement of the source. It may not be reproduced for commercial usage or sale. Reproduction for purposes other than those indicated above requires written permission from Health Protection NSW.

SHPN (HP NSW) 190007

ISBN 978-1-76081-060-3

**Suggested citation:**

NSW Tuberculosis Program, Communicable Diseases Branch. *Tuberculosis in New South Wales – Surveillance Report 2015-2016*. Sydney: Health Protection NSW, 2019.

© Health Protection NSW 2019

January 2019

# Contents

Summary.....	3
Introduction.....	4
Methods .....	5
Definitions.....	5
Statistical analyses .....	6
Section 1: Demographics.....	7
Demographics.....	8
Age and Sex .....	8
Place of residence .....	9
Country of Birth .....	10
Australian born cases.....	13
Overseas born cases.....	13
Length of Stay in Australia.....	14
Risk Factors.....	15
HIV Testing.....	16
Section 2: Clinical Presentation.....	17
Site of infection.....	17
Diagnosis Type .....	18
Disease Classification and Treatment.....	19
Drug susceptibility testing (DST).....	20
Section 3: Outcomes .....	21
Clinical Outcomes.....	21
Contact Investigations.....	22
Section 4: Discussion.....	23
Conclusion: .....	24
Acknowledgements:.....	24
Appendix 1.....	25
References.....	25

## **Summary**

- There were 445 TB cases notified in NSW in 2015 and 535 cases notified in 2016.
- Notification rates were 5.8 and 6.9 cases per 100,000 population per year in 2015 and 2016 respectively.
- 2016 notifications are similar to the number and lower than the rate in NSW from 2008 to 2011, with more cases among people born overseas in 2016 compared to 2015, suggesting overseas acquisition rather than local transmission.
- Overseas born TB cases accounted for 89% of cases. The most frequently reported countries of birth were India, China, and Vietnam.
- Of the 109 Australian born cases, nine (8%) identified as Aboriginal or Torres Strait Islander people.
- Notification rates were highest in Western Sydney and Sydney Local Health Districts.
- The most frequently reported risk factors were being born or past residence (>3mths) in a high risk country for TB, having an immunosuppressive health condition, or known contact with TB.
- 79% of cases had laboratory confirmation by culture or polymerase chain reaction (PCR), with 21% of cases receiving a clinical diagnosis only.
- Of those cases with laboratory confirmation, 15 cases were classified as having multi-drug resistant TB (MDR-TB), including 1 case with extensively drug resistant TB (XDR-TB). This represents 2% of all cases and is consistent with previous years.



## Introduction

Tuberculosis (TB) is a bacterial disease caused by infection with *Mycobacterium tuberculosis*. Globally TB remains a disease of public health significance with the World Health Organization (WHO) estimating 10.4 million new cases in 2016, including approximately 1.4 million cases of TB among people living with HIV [1]. People living with HIV have a 16-27 times greater risk of developing TB than those without HIV [2]. Drug resistant TB is an increasing threat, with nearly 500,000 cases of multidrug resistant TB estimated worldwide in 2016 [1]. Globally it is estimated that in 2016 there were 600,000 new cases of TB with rifampicin resistance, of which 82% were MDR-TB. Almost half of these cases were reported from three countries – India, China, and the Russian Federation[1]. In 2016, worldwide mortality due to TB was estimated at 1.7 million, of which nearly 400,000 deaths were among those with HIV/TB co-infection [1].

Australia continues to have a low incidence of TB, with the Australian Government Department of Health reporting a rate of 5.7 cases per 100,000 population in 2016 [3]. In 2014, the proportion of TB cases with HIV/TB co-infection in Australia was reported at 2% [4]. Mortality from TB in Australia is very low with 1% of cases reported to have died from TB in 2014 [3].

In 2014, the World Health Assembly, of which Australia is a member state, approved the 'End TB Strategy', a post-2015 strategy setting ambitious goals for the elimination of TB worldwide by 2050. Among the first milestones for the strategy, set for 2020, is a 20% reduction in TB incidence compared with 2015. Australia is committed to working towards this target [4]; and the NSW TB Program, through a network of dedicated TB services (chest clinics) across the state, continue to focus on active case finding, early diagnosis, and effective treatment of cases and contacts to minimise and eliminate local transmission of TB in NSW.

Surveillance of TB in NSW is conducted under the NSW *Public Health Act 2010*.

The purpose of this report is to describe the epidemiology of TB in NSW in 2015 and 2016.

Image: CDC PHIL #18139: Scanning Electron Microscopy image of *Mycobacterium tuberculosis* Credit: National Institute of Allergy and Infectious Diseases (NIAID)

## **Methods**

Data were extracted from the Notifiable Conditions Information Management System (NCIMS) on 28 February 2018 for all confirmed cases of TB notified from 1 January 1997 to 31 December 2016. Population data including NSW mid-year population estimates, estimated populations by country of birth and population estimates by local health district (LHD) were obtained from the Australian Bureau of Statistics (ABS) via the Secure Analytics for Population Health Research and Intelligence System.

## **Definitions**

**Clinically confirmed TB** is when a clinician experienced in TB makes a clinical diagnosis of TB disease [5]. Cases of latent TB infection are not included.

**Pulmonary TB** is disease affecting the lung, excluding the pleura.

**Extrapulmonary TB** is disease affecting any other region of the body, including the pleura.

**High risk countries** are those with an annual TB incidence of 40 cases per 100,000 population per year or more in 2017, as per estimates in WHO Global Tuberculosis Report 2017 at the time the data were collected [1].

**MDR-TB** are cases with isolates that demonstrate resistance to at least isoniazid and rifampicin [6]

**Extensively drug-resistant TB (XDR-TB)** are cases in which isolates demonstrated resistance to isoniazid and rifampicin, as well as additional resistance to any fluoroquinolone, and to at least one injectable second-line drug (capreomycin, kanamycin or amikacin) [6].

**Permanent resident** is a person who holds a permanent visa (or has become an Australian citizen) and is usually resident in Australia.

**Overseas student** is a person studying or seeking study, training, or skills development in Australia.

**Visitor** is a person entering Australia temporarily for tourism, to visit family and friends, to undergo pre-arranged medical treatment or for business related purposes.

**Refugee / humanitarian** is a person in humanitarian need overseas or a person already in Australia who arrived on a temporary visa or in an unauthorised manner, claiming Australia's protection.

**Unauthorized person** is an unlawful non-citizen.

## **Statistical analyses**

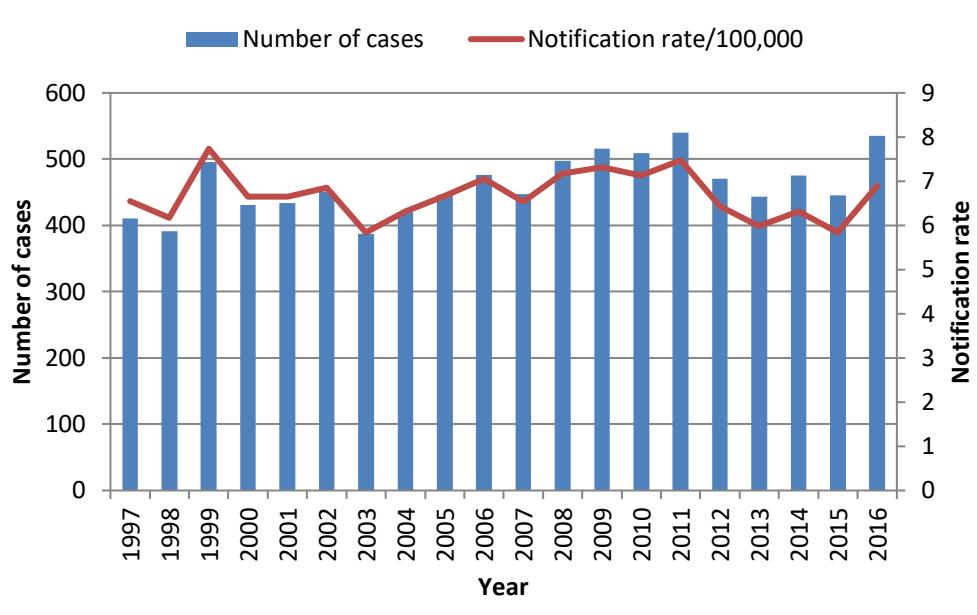
Notification data were analysed using descriptive and analytic methods. Overseas-born cases were categorised into regions of birth using ABS standards. Notification rates per 100,000 population were calculated for the whole of NSW using select fields from demographic, clinical, risk factor and contact management data categories. Notification rates for TB by LHD of residence were calculated and mapped using Arc GIS Portal (Esri, Redlands California). Data were analysed using SAS® Enterprise Guide® (version 4.3, SAS Institute, Cary, NC, USA).

## Section 1: Demographics

In NSW in 2015 and 2016, there were a total of 980 notified cases of TB (445 cases in 2015 and 535 cases in 2016), with a crude notification rate of 6.4 cases per 100,000 population per year (5.8 in 2015, 6.9 in 2016). It is unknown why case notifications fluctuate from year to year, underlying factors may include immigration and TB screening patterns.

Following lower annual case numbers from 2012 to 2015, case numbers increased in 2016. Although there are annual fluctuations, the notification rate of TB over the past 20 years in NSW has remained relatively stable (Figure 1), with the highest number of cases notified in 2011 (540 cases), and the highest population rate in 1999 (7.74 cases per 100,000 population).

**Figure 1: Number and rate of TB disease notifications, NSW, 1997-2016**



2015		2016	
445	5.8	535	6.9
Number of cases notified	Rate per 100,000 population	Number of cases notified	Rate per 100,000 population

## Demographics

Of the 980 cases of TB notified in 2015 and 2016, 55% of cases were male (n=535). The median age among males was 44 years (range 1 month - 100 years); while the median age among females was 33 years (range 1-91 years). The median age overall was 37 years (range 1 month -100 years).

Cases aged between 15 and 54 years accounted for 65% of cases notified in 2015 and 2016 (n=640); with a peak in notification rate in the 25-29 year age group, and a second peak among those aged 80-84 years (Figures 2 and 3). There were 13 cases notified in children aged less than five years (1%).

### Age and Sex

Sex (2015-2016)

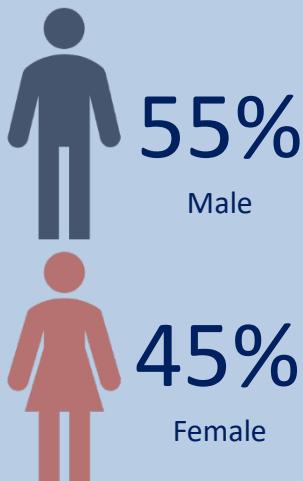
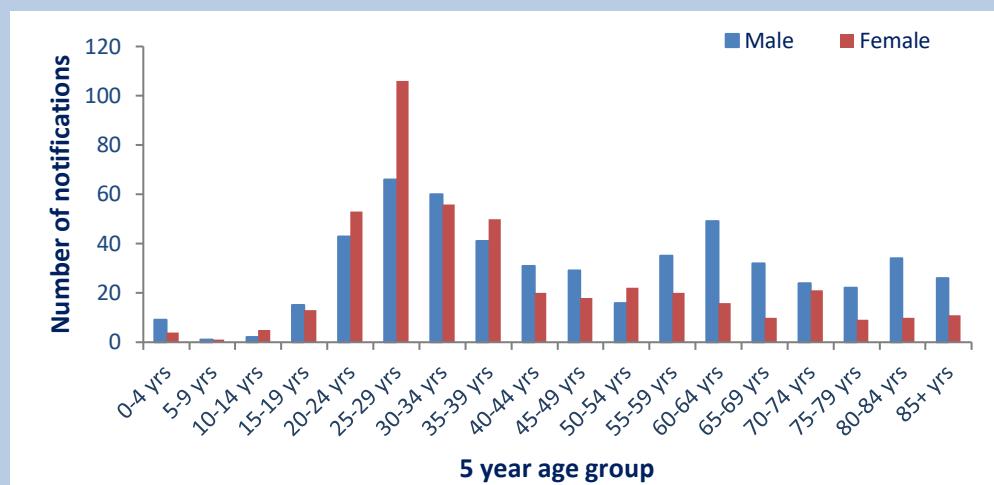


Figure 2. Number of TB notifications by age group and sex, NSW, 2015-2016.



Age Overall (2015-2016)

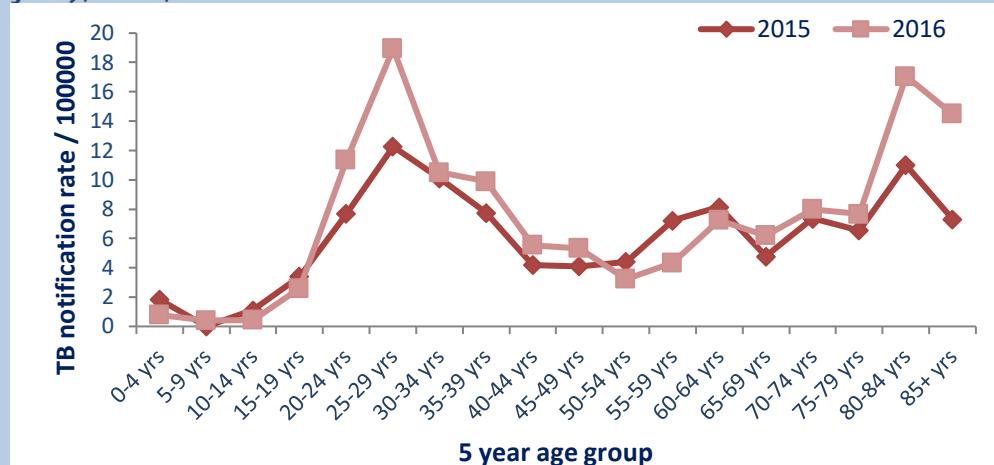
Range: 1 month-100 years  
Median: 37 years

Age by Sex (2015-2016)

Male  
Range: 1 month-100 years  
Median: 44 years

Female  
Range: 1-91 years  
Median: 33 years

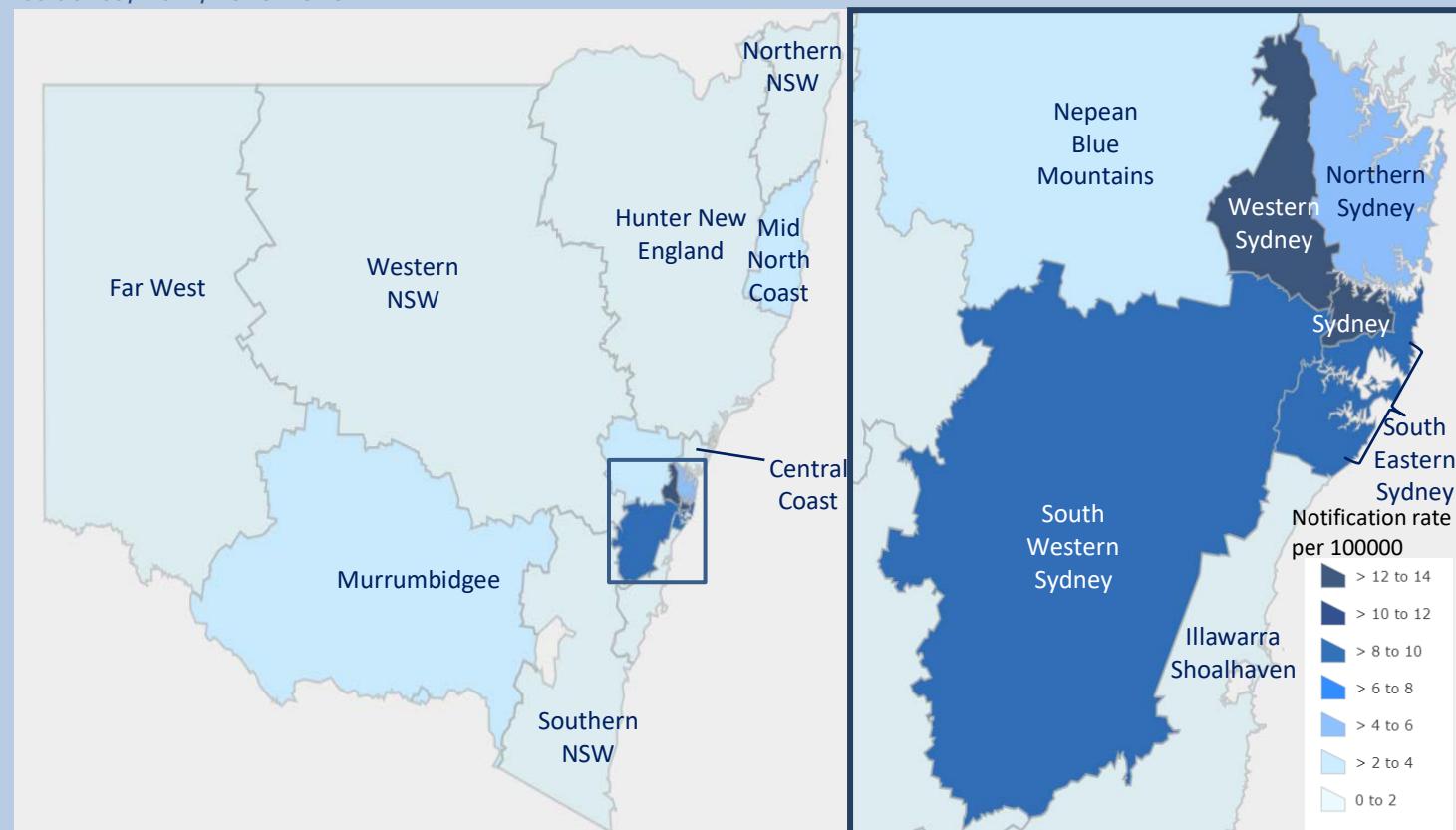
Figure 3. Age specific TB notification rate (per 100,000 population per year), NSW, 2015-2016



## Place of residence

Western Sydney Local Health District (LHD) had the highest notification rate, with 14.1 cases per 100,000 population per year (n= 262), followed by Sydney LHD with 11.1 cases per 100,000 population per year (n=155) (Figure 4). Nepean Blue Mountains LHD had the highest rate among LHDs in outer Sydney at 3.8 cases per 100,000 population per year (n=27), followed by Illawarra Shoalhaven with 1.9 cases per 100,000 population per year (n=16). Of LHDs comprising regional NSW, Mid North Coast LHD had the highest rate at 3.8 cases per 100,000 (n=15) followed by Murrumbidgee LHD at 2 cases per 100,000 (n=12). For data on individual years see appendix 1.

Figure 4. Age and sex standardised rate of notified TB cases per 100,000 population per year by Local Health District of residence, NSW, 2015-2016



9.6

Rate per 100,000,  
Metropolitan Sydney  
(Sydney, South Western Sydney, Western  
Sydney, Northern Sydney and South Eastern  
Sydney LHDs)

2.5

Rate per 100000,  
Outer Sydney  
(Illawarra Shoalhaven,  
Central Coast and  
Nepean Blue Mountains LHDs)

1.9

Rate per 100000,  
Regional NSW  
(Far West, Western NSW, Northern NSW, Mid  
North Coast, Hunter New England, Southern  
NSW and Murrumbidgee LHDs)

## Country of Birth

In 2015 and 2016, 89% (n=871) of cases were born overseas. Of these, 92% (n=800) were born in a high risk country (HRC) for TB. There were 75 individual countries of birth reported among NSW TB cases (Table 1), with the most commonly reported country of birth being India (18% of all cases, n=175), followed by Australia (11%, n= 109), and China (11%, n=104) (Figure 6).

Of cases born in a HRC, 46% (n=366) were born in a country within the WHO South East Asian region, and a further 43% (n=347) were born in a country within the WHO Western Pacific Region. Country of birth in the Eastern Mediterranean region accounted for 6% (n= 47) of overseas born cases, while country of birth in the African region was reported for 3% (n=27) of overseas born cases.

<b>11%</b> Proportion of cases who are Australian born	<b>89%</b> Proportion of cases born overseas	<b>92%</b> Proportion of overseas born cases born in high TB risk countries	<b>75</b> Total countries of birth reported																																							
<b>Table 1: Countries of birth of TB cases, NSW, 2015-2016</b>																																										
<table><thead><tr><th>Country of birth</th><th>Number of cases</th><th>Proportion of cases</th></tr></thead><tbody><tr><td>India</td><td>175</td><td>18%</td></tr><tr><td>Australia</td><td>109</td><td>11%</td></tr><tr><td>China</td><td>104</td><td>11%</td></tr><tr><td>Vietnam</td><td>101</td><td>10%</td></tr><tr><td>Philippines</td><td>81</td><td>8%</td></tr><tr><td>Nepal</td><td>69</td><td>7%</td></tr><tr><td>Indonesia</td><td>42</td><td>4%</td></tr><tr><td>Bangladesh</td><td>30</td><td>3%</td></tr><tr><td>Thailand</td><td>25</td><td>3%</td></tr><tr><td>Pakistan</td><td>21</td><td>2%</td></tr><tr><td>Other</td><td>223</td><td>23%</td></tr><tr><td><b>Total</b></td><td><b>980</b></td><td><b>100%</b></td></tr></tbody></table>				Country of birth	Number of cases	Proportion of cases	India	175	18%	Australia	109	11%	China	104	11%	Vietnam	101	10%	Philippines	81	8%	Nepal	69	7%	Indonesia	42	4%	Bangladesh	30	3%	Thailand	25	3%	Pakistan	21	2%	Other	223	23%	<b>Total</b>	<b>980</b>	<b>100%</b>
Country of birth	Number of cases	Proportion of cases																																								
India	175	18%																																								
Australia	109	11%																																								
China	104	11%																																								
Vietnam	101	10%																																								
Philippines	81	8%																																								
Nepal	69	7%																																								
Indonesia	42	4%																																								
Bangladesh	30	3%																																								
Thailand	25	3%																																								
Pakistan	21	2%																																								
Other	223	23%																																								
<b>Total</b>	<b>980</b>	<b>100%</b>																																								

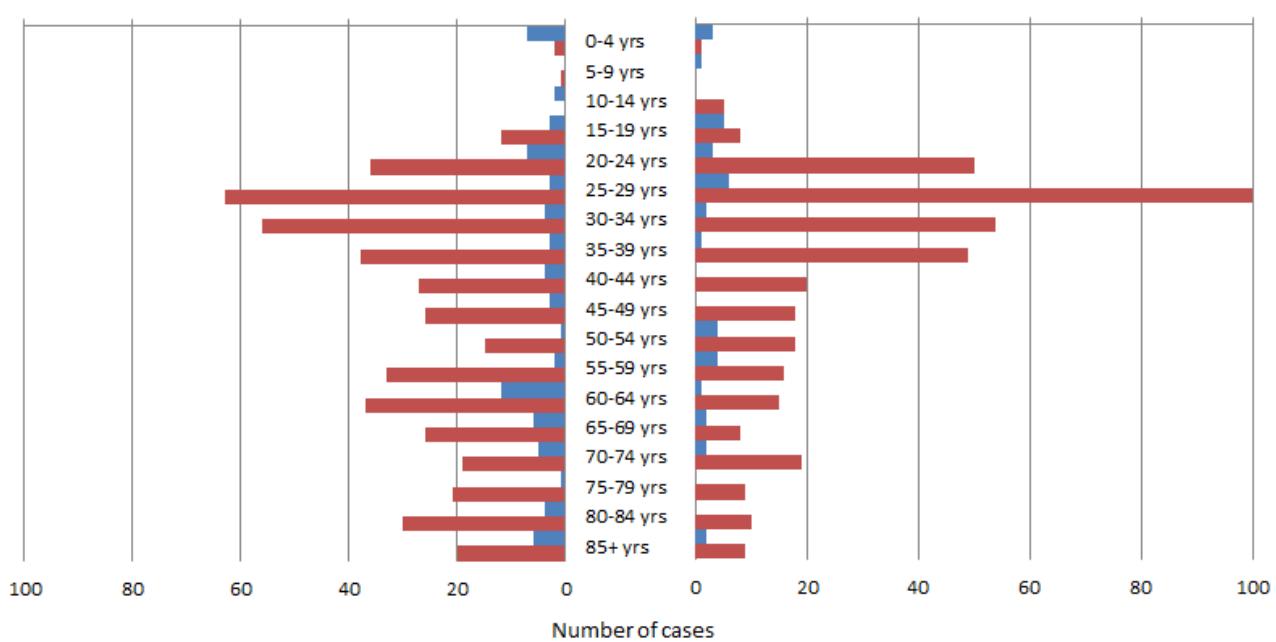
TB cases born in Australia tend to be older at TB diagnosis than those born overseas, and males tend to be older at diagnosis compared to females. In 2015 and 2016, the median age at diagnosis for Australian born cases was 45.5 years; 30.5 years for females (range 1 to 92 years) and 51 years for males (range 10 months to 92 years). For overseas born cases, the median age at TB diagnosis was 36 years; 33 years for females (range 4 to 91 years) and 44 years for males (range 5 months to 100 years). Over 50% of overseas born cases are aged between 20 and 39 years at diagnosis (Figure 5).

**Figure 5: Age at TB diagnosis, by place of birth and sex, NSW, 2015-2016**

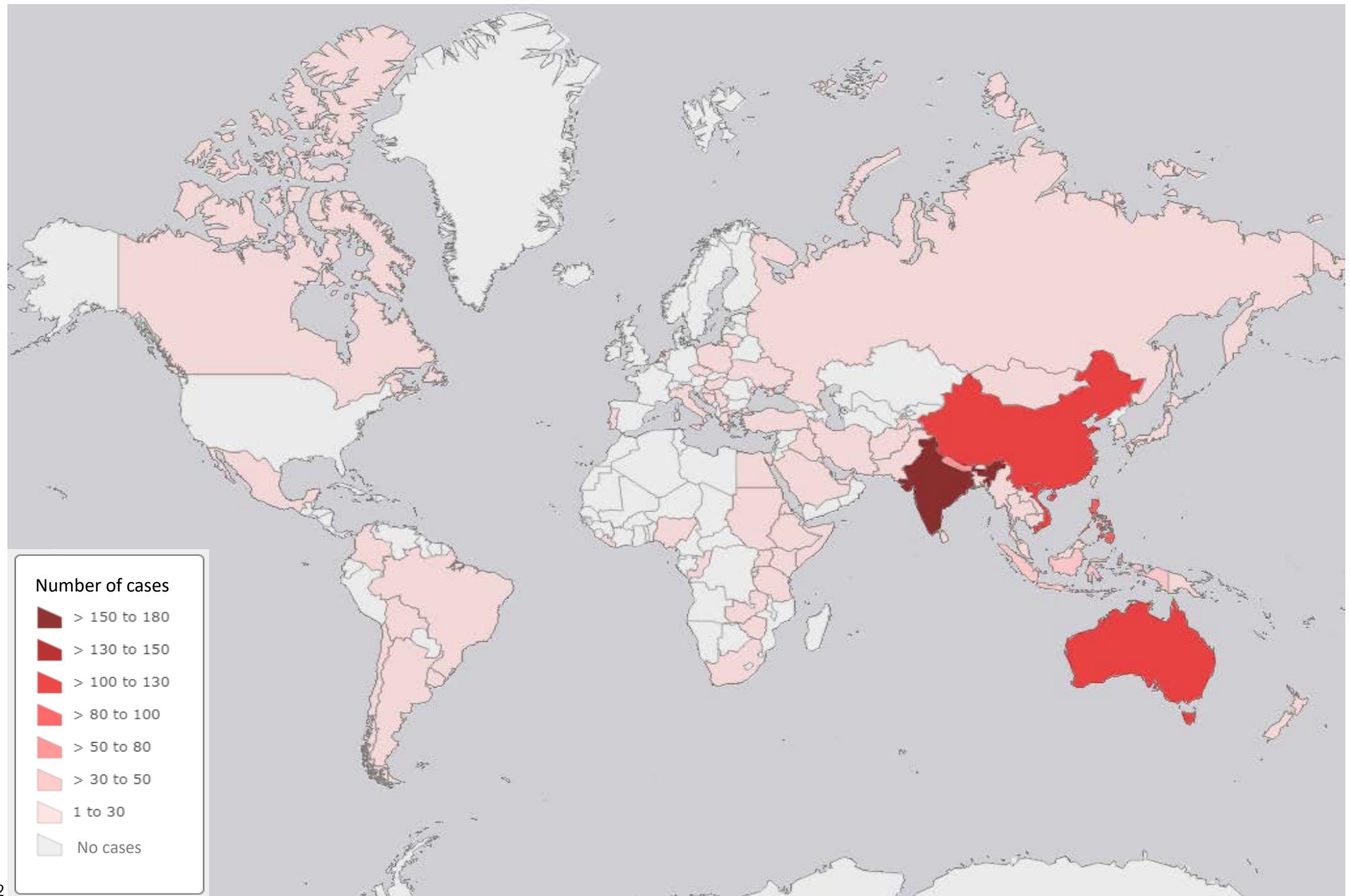
■ Australian born ■ Overseas born

**Males**

**Females**



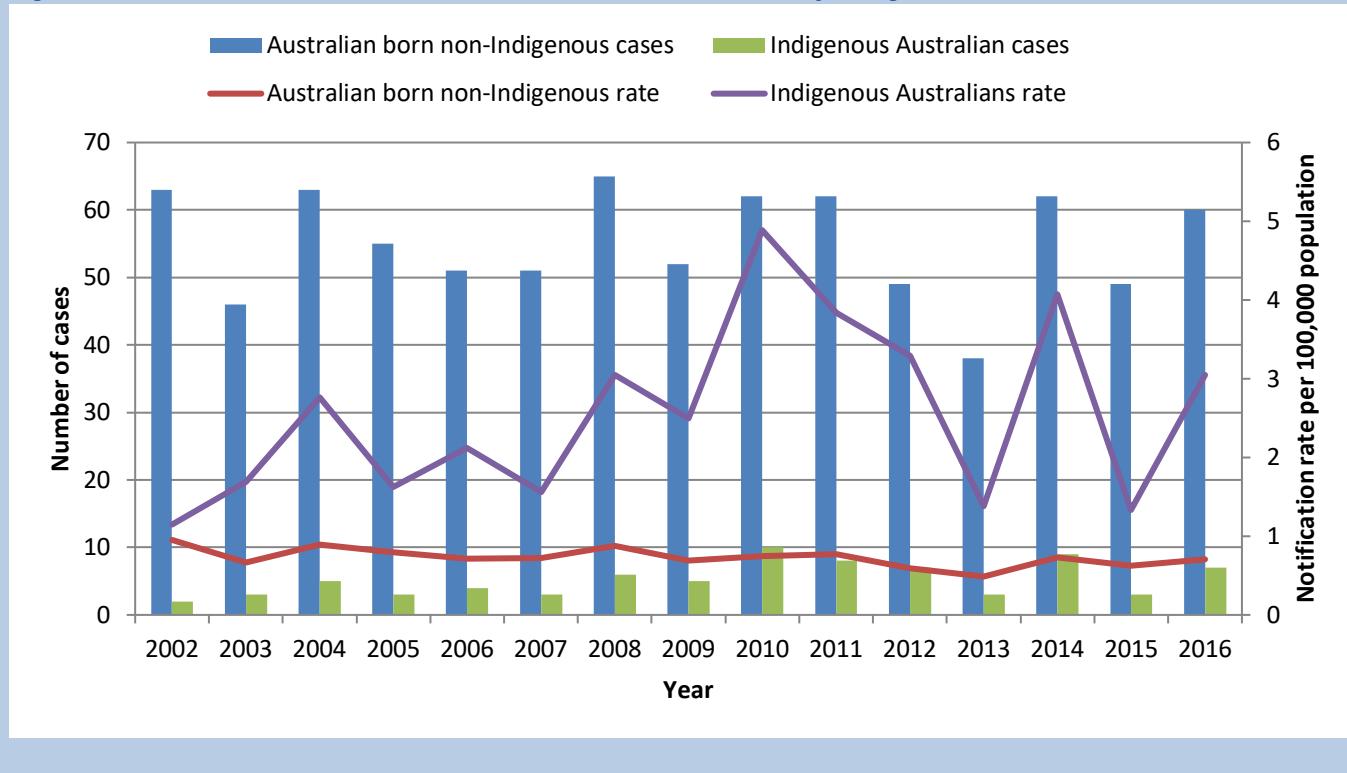
**Figure 6. Number of TB cases by country of birth, NSW, 2015-2016**



## Australian born cases

Of the 109 Australian born cases in 2015 and 2016, 8% (n=9) identified as Aboriginal (Figure 7). The number of TB cases who identify as Aboriginal fluctuates from year to year however the number notified in 2016 is about average since 2010. The rate of TB among Indigenous Australians is, on average, 3.5 times higher than that among non-Indigenous Australian born cases; a difference found to be statistically significant ( $p<0.0001$ ). Over the 15 years to 2016, while the rate in non-Indigenous Australian born cases remained stable, the rate in Indigenous Australians increased, although this increase was not found to be statistically significant ( $p>0.05$ ).

**Figure 7: Number and rate of notified TB in Australian born cases by Indigenous status, NSW, 2001-2016**



## Overseas born cases

Of the 871 overseas born cases in 2015 and 2016, those born in a HRC for TB (n=800) had a shorter median length of stay in Australia prior to diagnosis of TB (6 years, range 0-62 years) when compared to the other overseas born cases (n=71) (28 years, range 0-89 years) (Figure 8).

Two thirds of the overseas born cases were permanent residents at the time of diagnosis (n=536, 62%), 15% (n=130) were overseas students, 9% (n=82) were visitors, 2% (n=14) were refugees, 1% (n=6) were unauthorised persons, 10% (n=83) were on other types of visas, and 2% (n=20) had an unknown or missing Australian status (Table 2).

Some Australian visas require the applicant to undergo a medical examination prior to the visa being granted. These include all permanent visa applicants and some temporary visa applicants depending on how long they intend to stay

in Australia, if they intend to work or study, and their country of origin. If the medical examination shows that the visa applicant might be at increased risk of developing active TB they are placed on a TB Health Undertaking (TBU) and are required to be followed up by the health authorities in Australia. Of the 800 NSW TB cases born in HRCs, 12% (n=97) were on a TBU at the time of diagnosis, a further 7% (n=58) had previously been on a TBU, 77% (n=615) had never been on a TBU and for 3% (n=22) the TBU status was unknown.

**12%**

Proportion of NSW TB cases, born in a HRC, currently on a TB Health Undertaking at diagnosis with TB

**7%**

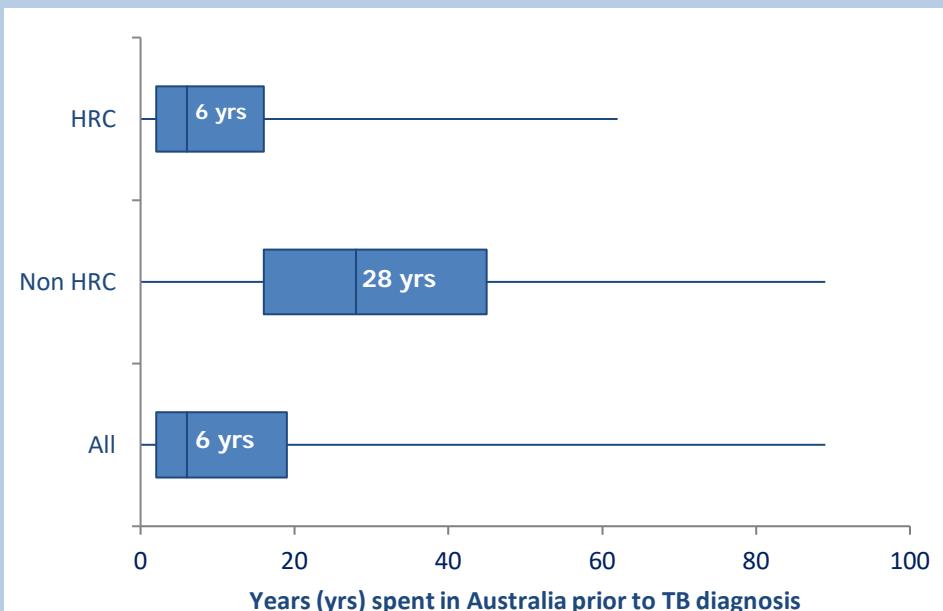
Proportion of NSW TB cases, born in a HRC, who have previously been on a TB Health Undertaking

**77%**

Proportion of NSW TB cases, born in a HRC, who have never been on a TB Health Undertaking

## Length of Stay in Australia

Figure 8: Median years spent in Australia prior to TB diagnosis, among overseas born cases, by country of birth risk category, NSW, 2015-2016



HRC = High risk country (TB incidence >40 cases per 100,000 population)

Table 2: Residency status, TB cases, NSW, 2015-2016

Residency status*	Number of cases	Percentage
Permanent resident	536	62%
Overseas student	130	15%
Visitor	82	9%
Refugee / humanitarian	14	2%
Unauthorized person	6	1%
Other	83	10%
Unknown/ missing status	20	2%
<b>Total</b>	<b>871</b>	<b>100%</b>

\*For definitions see appendix 2

## Risk Factors

The most commonly reported risk factor, present in 83% (n=816) of all notified cases in 2015 and 2016, was being born overseas in a HRC for TB. Past residence for three months or more in a HRC that was not the person's country of birth was the next highest reported risk factor (14%, n=139 of all cases). Health conditions causing immunosuppression, or being on immunosuppressive therapy were reported by 13% (n=130), and being either a household member or having close contact with another person with TB was reported by 11% (n=110) of cases.

There was variation in reported risk factors between Australian and overseas born cases. In Australian born cases, the most frequently reported risk factor was having a household or close contact with TB (25%, n=27), followed by past residence in a HRC (more than 3 months) (22%, n=24). For overseas born cases, 94% were born in a HRC. Other reported risk factors can be found in Table 3.

**Table 3: Reported risk factors for TB\* among notified case, by place of birth, NSW, 2015-2016**

	All cases		Australian born		Overseas born	
	N	%	N	%	N	%
<b>Total</b>	<b>980</b>	<b>100%</b>	<b>109</b>	<b>100%</b>	<b>871</b>	<b>100%</b>
Born in a HRC	816	83%	n/a	n/a	816 <sup>^</sup>	94%
Past residence ( $\geq 3$ months) in a HRC	139	14%	24	22%	115	13%
Immunosuppressive health condition/therapy	130	13%	23	21%	107	12%
Household member or close contact with TB	110	11%	27	25%	83	10%
Previously diagnosed with TB	70	7%	8	7%	62	7%
Ever employed in healthcare	62	6%	5	5%	57	7%
Australian born child of parent(s) born in HRC	16	2%	16	15%	n/a	n/a
Ever homeless/residing in a shelter	8	<1%	4	4%	4	<1%
Ever resided in a correctional facility	5	<1%	3	3%	2	<1%
Ever employed/resided in an institution	3	<1%	0	0%	3	<1%
Other	18	2%	8	7%	10	1%
Not able to be determined	36	4%	20	18%	16	2%
Not assessed	2	<1%	0	0%	2	<1%

\*Multiple risk factors can be recorded

<sup>^</sup>Born in a HRC is recorded as well as country of birth, as some countries may have been high incidence when the person was born but are no longer considered HRC

### Australian born cases

**1<sup>st</sup>**

Household member or close contact with TB

**2<sup>nd</sup>**

>3 months spent in a high risk country (other than country of birth)

**3<sup>rd</sup>**

Immunosuppressive health condition or therapy

### Overseas born cases

**1<sup>st</sup>**

Born in a high risk country

**2<sup>nd</sup>**

>3 months spent in a high risk country (other than country of birth)

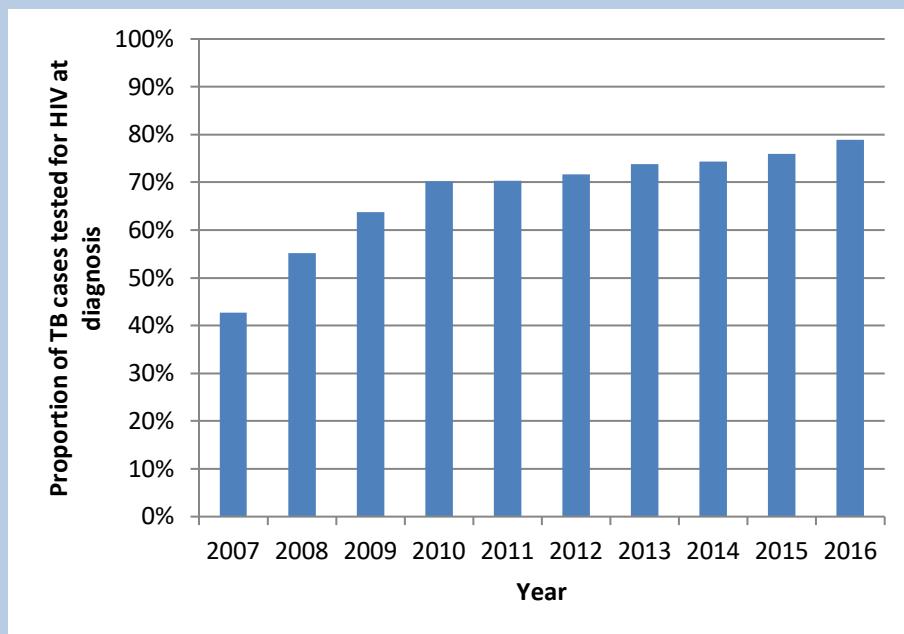
**3<sup>rd</sup>**

Immunosuppressive health condition or therapy

## HIV Testing

Over the 10 year period to 2016, there has been a 36% increase in the proportion of TB cases tested for HIV at the time of TB diagnosis, from 43% in 2006 to 79% in 2016 (Figure 9). Of cases tested, 1% (n=9) were found to be co-infected with HIV and TB. Of cases with co-infection, 66% (n=6) were male, 89% (n=8) were overseas born, and 44% (n=4) were new HIV diagnoses.

**Figure 9: Proportion of TB cases tested for HIV at TB diagnosis, NSW, 2007-2016**



**78%**

Proportion of NSW TB cases  
tested for HIV at diagnosis, 2015-  
2016



**9**

Number of NSW TB cases known  
to be HIV infected, 2015-2016

**100%**

Target for TB cases tested for HIV  
at diagnosis

## Section 2: Clinical Presentation

### Site of infection

In 2015 and 2016, pulmonary only disease accounted for 58% (n=565) of cases. A further 8% (n=81) of cases were pulmonary plus other sites and 34% (n=334) had extrapulmonary TB (Figure 10). Of extrapulmonary sites reported, lymph node was the most common (n = 195, 47% of cases with extrapulmonary involvement), followed by infection of the pleura (n = 65, 16%) and infection of the gastrointestinal tract (n=28, 7%) (Table 4).

Figure 10: Site of disease for NSW TB cases, 2015-2016

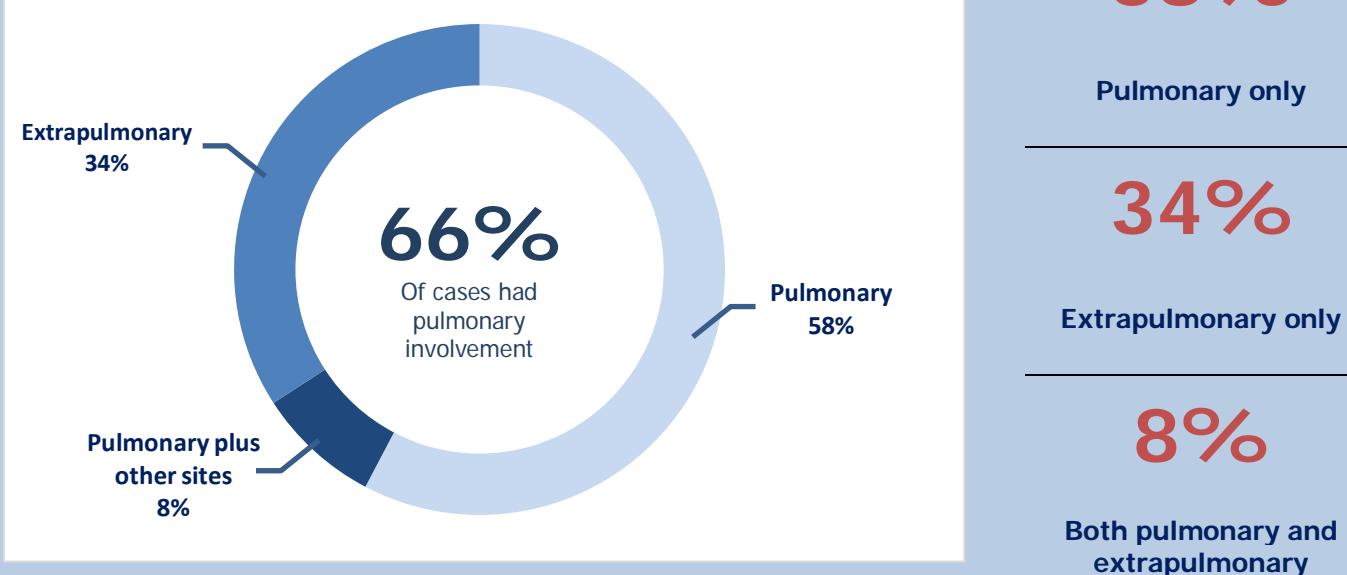


Table 4: Extrapulmonary sites\* of infection, NSW TB cases, 2015-2016

Site	Number of cases	Percentage
Lymph node	195	47%
Pleura	65	16%
Gastrointestinal tract	28	7%
Eye	24	6%
Genitourinary tract	23	6%
Disseminated disease	21	5%
Brain/Central nervous system/Meninges, dural sinus, choroid plexus	19	5%
Bone	13	3%
Skin	9	2%
Joints (synovial fluid)	5	1%
Pericardium	5	1%
Other	34	8%

\*Multiple sites can be recorded

## Diagnosis Type

Of the 980 TB cases in 2015 and 2016, 79% (n=777) of diagnoses were laboratory confirmed, 74% with a culture result (n=722) and an additional 5% laboratory diagnosed by molecular methods (polymerase chain reaction (PCR)) only (n=55). Clinical diagnoses were made in the remaining 21% (n=203) of cases (Figure 11). Laboratory confirmation was more commonly obtained for pulmonary disease (85%, n=482), compared to extrapulmonary disease (65%, n=215). PCR only confirmation accounted for a greater proportion of laboratory confirmation in extrapulmonary cases (13%, n=27), compared to laboratory confirmation of pulmonary cases (5%, n=25). For the ten year period to 2016, there has been a significant increase ( $p<0.02$ ) in the proportion of cases confirmed using PCR only, while a significant decrease ( $p<0.03$ ) in the number of cases with clinical diagnosis has been seen over the same period (Figure 12). The majority of cases notified in NSW in 2015-2016 (80%, n=785) were tested for TB as part of an investigation of clinical symptoms.

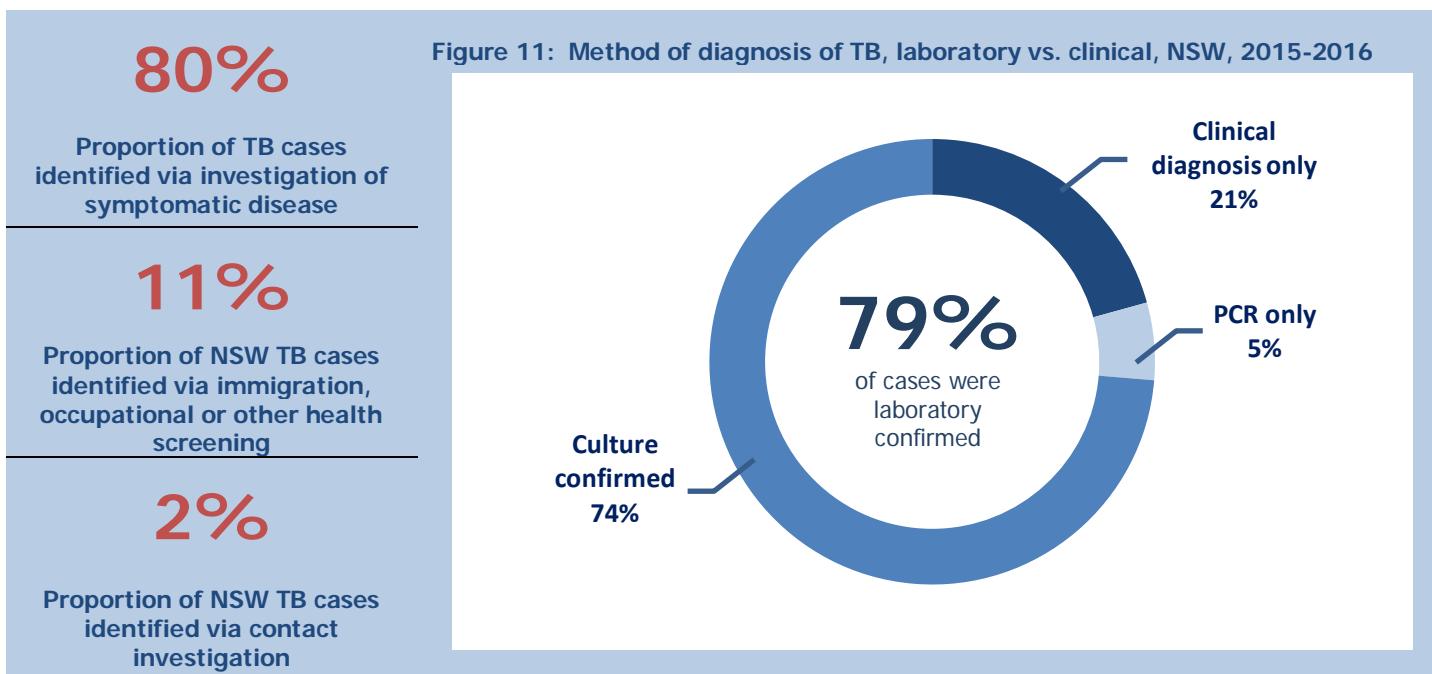
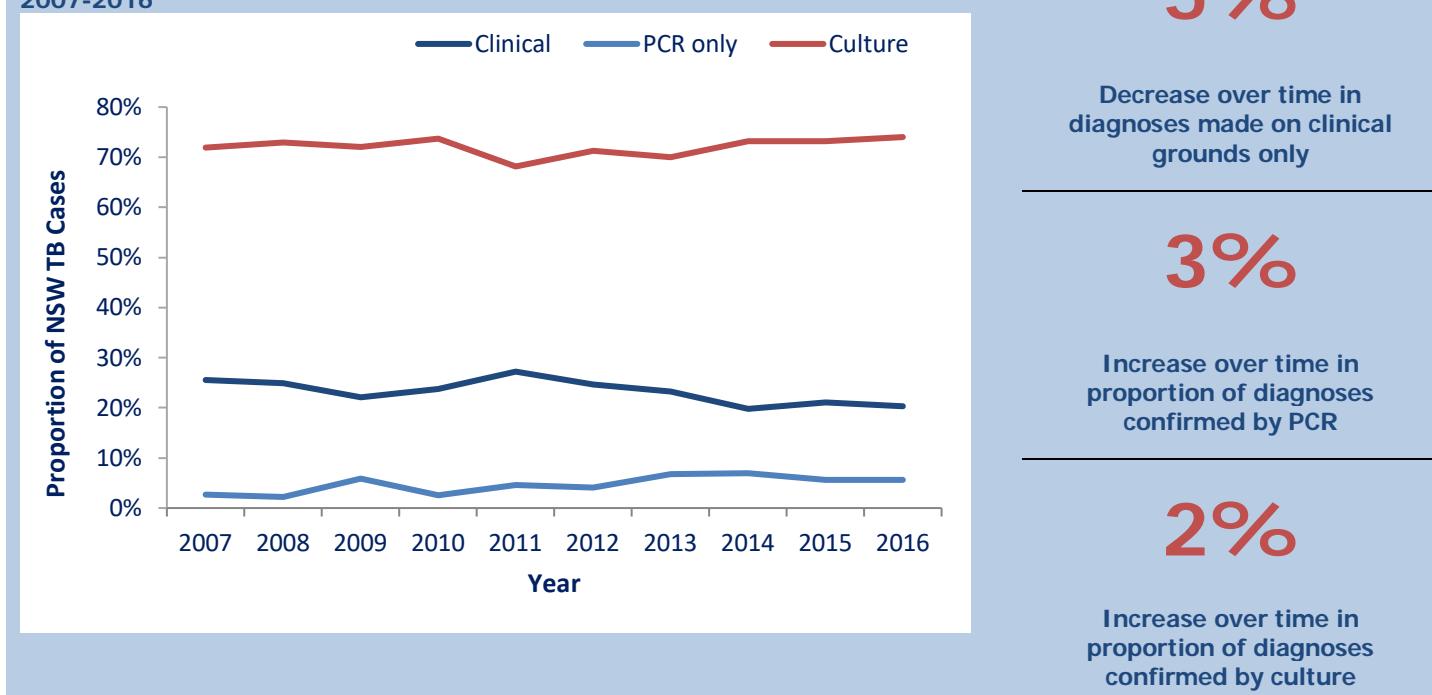


Figure 12: Method of laboratory confirmation of diagnosis of TB cases, NSW, 2007-2016



## Disease Classification and Treatment

Of the 980 cases notified in 2015-2016, 94% (n=924) were new diagnoses of TB; while 5% (n=52) of cases were classified as a relapse, following treatment either in Australia (2%, n=23) or overseas (3%, n=29) (Table 5). Cases classified as relapse may also include re-infection. Four cases (<1%) had an unknown disease classification.

Almost all cases were commenced on antimicrobial treatment in NSW following diagnosis (98%, n=960). There was no difference in the uptake of antimicrobial therapy between those with pulmonary infection (98%, n=553), extrapulmonary infection (98%, n=329), and those with infection at both pulmonary and other sites (96%, n=78); or between those born in Australia (96%, n=105), or overseas (98%, n=855).

Of the 20 cases (2%) who were not commenced on antimicrobial treatment in NSW, 10 (50%) had died prior to their TB diagnosis, eight (40%) transferred overseas for treatment (via the NSW TB Program), one (5%) had surgery to remove TB, one (5%) case chose not to have treatment.

There was no difference in the median time to treatment from first health presentation between those born in Australia (22 days) and those born overseas (21 days). Cases with pulmonary involvement were commenced on treatment sooner (16 days) than those cases with extrapulmonary disease only (31 days).

One quarter of cases (26%, n=245) that commenced on treatment did so within one week of their first health presentation, with 50% (n=490) commencing within 3 weeks of first health presentation.

**Table 5: Disease classification\*, NSW TB cases 2015-2016**

Disease classification	Number of cases	Percentage
New	924	94%
Relapse following full treatment only in Australia	19	2%
Relapse following partial treatment only in Australia	4	<1%
Relapse following full treatment overseas	20	2%
Relapse following partial treatment overseas	9	<1%
Unknown	4	<1%
<b>Total</b>	<b>980</b>	<b>100%</b>

\*Relapse may include cases who have relapsed or have been reinfected

**98%**

Proportion of cases commenced on antimicrobial therapy

**21 days**

Median time to treatment from first health presentation

**15 days**

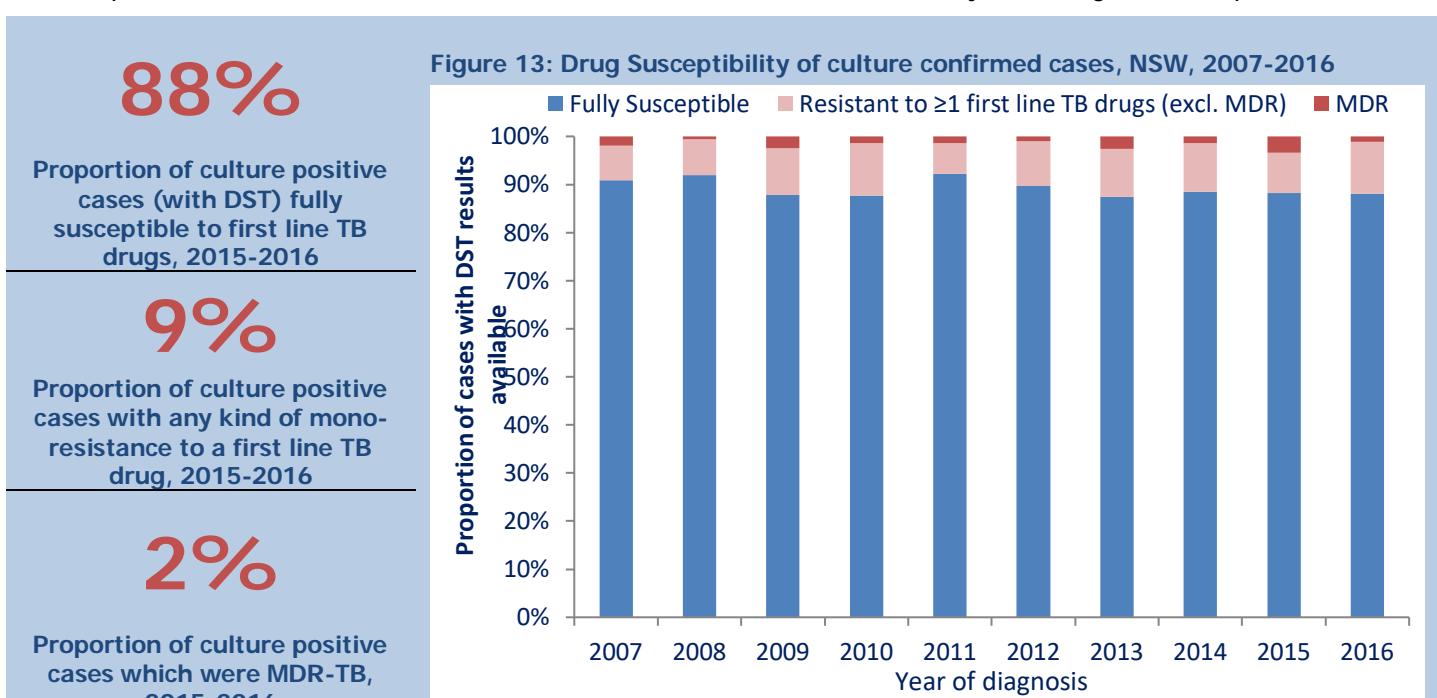
Difference in median time to treatment between pulmonary and extrapulmonary cases

## Drug susceptibility testing (DST)

Of the 725 culture positive TB cases in NSW 2015-2016, 94% (n=683) had drug susceptibility results reported. Of these, 88% (n=602) were fully susceptible to first line TB drugs, 9% (n=63) were resistant to a single first line TB drug (mono-resistant), and 2% (n=15) were classified as MDR-TB (which included one extensively drug resistant case (XDR-TB)) (Figure 13). These proportions have not significantly changed over the last 10 years (Table 6).

Of the 15 cases classified as MDR-TB (11 in 2015, four in 2016) (including the single case of XDR-TB in 2015), 67% (n= 10) were new cases and 33% (n=5) were relapses (four following treatment overseas and one following treatment in Australia).

All MDR-TB cases occurred in individuals born overseas (India = 5, Philippines = 3, Vietnam = 3, China = 1, Myanmar = 1, Nepal = 1, Saudi Arabia = 1,); 93% (n=14) of whom were born in a country with a high MDR-TB prevalence.



**Table 6: Drug susceptibilities of culture confirmed TB cases with DST results available, NSW, 2007-2016**

Drug Susceptibility	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fully susceptible	91%	92%	88%	88%	92%	90%	87%	88%	88%	88%
Ethambutol	0%	0%	0%	0%	0%	<1%	0%	1%	0%	0%
Isoniazid	6%	5%	9%	9%	6%	8%	7%	8%	7%	10%
Pyrazinamide	<1%	1%	1%	1%	1%	1%	2%	1%	<1%	1%
Rifampicin	0%	<1%	0%	1%	0%	0%	<1%	0%	1%	0%
Resistant to ≥2 first line drugs (but not MDR)	<1%	1%	0%	1%	0%	<1%	1%	1%	1%	<1%
MDR*	2%	1%	2%	1%	1%	1%	3%	1%	3%	1%
XDR**	0%	0%	0%	<1%	0%	0%	0%	0%	<1%	0%

\* Multi Drug Resistant: Resistance to at least Isoniazid AND Rifampicin

\*\* Extensively Drug Resistant: Resistance to Isoniazid AND Rifampicin, AND any fluoroquinolone AND at least 1 injectable TB drug

## Section 3: Outcomes

### Clinical Outcomes

Clinical outcomes are reported for cases notified in previous years to allow time for completion of treatment. Outcomes for cases notified in 2014 and 2015 are recorded in Table 7. A total of 76% (n=700) of cases were successfully treated, consisting of 7% (n=49) who were considered cured (culture positive prior to treatment and culture negative after completion of treatment) and 93% (n=651) who completed treatment. There were nine TB-related deaths reported, six in 2014 and three in 2015. Eighteen cases (2%) defaulted before completion of treatment; the remainder were either transferred overseas, died of a non-TB related cause, were continuing on treatment at the time of analysis or outcome was unknown.

Of the 16 cases classified as MDR-TB (5 in 2014, 11 in 2015), 13 (81%) had completed treatment (including 1 who was considered cured), 2 (13%) were transferred overseas and 1 (6%) was continuing treatment at the time of report.

Of those cases in 2014 and 2015 where the outcome was known (excluding continues on treatment, transferred overseas and outcome unknown), 93% of cases successfully completed treatment (including those demonstrating cure).

**96%**

Proportion of cases who survived

**0.1%**

Proportion of surviving cases with treatment failure

**1%**

Proportion of cases who died due to TB

Table 7: Clinical outcomes of cases diagnosed in 2014 and 2015\*

		Year of diagnosis		
		2014	2015	Both years
Total cases	475	445	920	
Alive	Completed treatment	363 (76%)	288 (65%)	651 (71%)
	Cured	27 (6%)	22 (5%)	49 (5%)
	Defaulted	6 (1%)	12 (3%)	18 (2%)
	Continues on treatment	38 (8%)	68 (15%)	106 (12%)
	Transferred overseas	21 (4%)	23 (5%)	44 (5%)
	Treatment failure	0 (0%)	1 (<1%)	1 (<1%)
	Outcome unknown	2 (<1%)	8 (2%)	10 (1%)
Died	Cause related to TB	6 (1%)	3 (1%)	9 (1%)
	Unrelated to TB	12 (3%)	14 (3%)	26 (3%)
Outcome unknown		0 (0%)	6 (1%)	6 (1%)

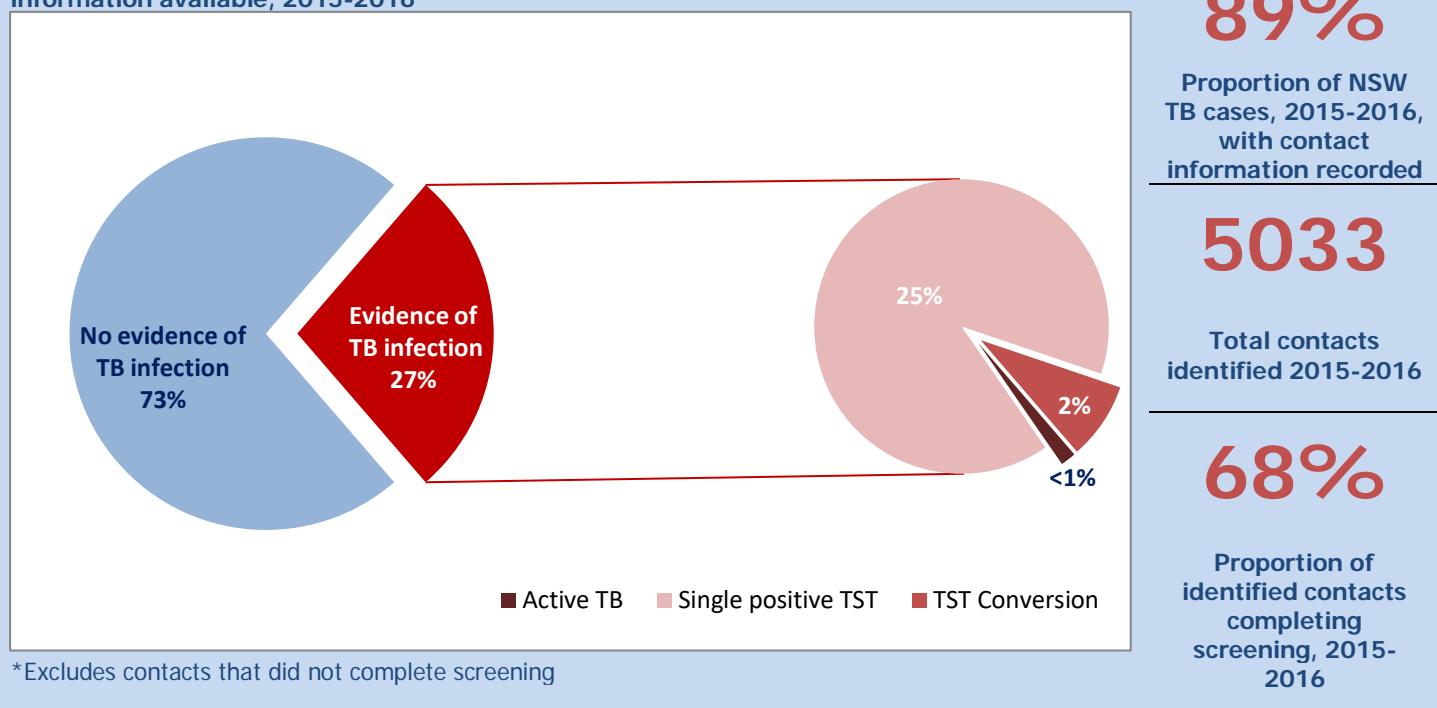
\*Outcome data are reported for the year prior to allow time for treatment completion

## Contact Investigations

Of the 980 TB notification received in 2015 and 2016, 89% (n= 876) had contact information completed in NCIMS at the time of analysis. A total of 5,033 contacts had been identified (2,270 in 2015 and 2,763 in 2016). Of these, 68% (n=3,425) had completed screening. Of the 3,425 contacts screened, less than 1% (n=16) were found to have TB disease, 2% (n=80) had a tuberculin skin test (TST) conversion (where serial skin tests are conducted with an increase of at least 10mm induration between consecutive readings), and 25% (n=848) had a positive TST result on initial screening (Figure 14). Of those with a positive TST 98% (n=829) had a risk factor for TB other than recent exposure to the infectious case (such as having been born in, or spent greater than three months in a TB high risk country). There were 243 (7%) contacts commenced on preventative treatment.

The median number of contacts per case was two (range 0-386), and 4% (n=39) of contact investigations involved more than 20 contacts.

**Figure 14: Contact investigation outcomes, NSW TB cases with contact investigation information available, 2015-2016\***



There was 275 sputum or respiratory smear positive cases notified (118 in 2015 and 157 in 2016), these cases are generally considered to be more infectious than smear negative cases. Over 90% (n=251) of smear positive cases had contact information available identifying 3,423 contacts. Of these contacts, 67% (n=2,308) completed screening where 9 (<1%) were found to have active TB disease, 49 (2%) had TST conversion and 506 (22%) had a positive TST result on initial screening. There were 159 (7%) contacts commenced on preventative treatment.

## **Section 4: Discussion**

Following a decline in the 2012-2015 period, the number of TB notifications in NSW increased in 2016, consistent with national trends [3]. Whilst the notification rate of TB in NSW increased in 2016, the 2016 rate was consistent with those seen in the previous ten-year period from 2002 to 2011. The majority of TB cases in NSW continue to occur in persons born overseas, particularly among those born in countries with a high incidence of TB. The burden of TB disease in NSW is concentrated in local health districts with large populations of migrants from countries in the South-East Asian and Western Pacific regions; reflective of both the global epidemiology of TB, and current trends in migration patterns. The rate of TB in NSW remains low by global comparison[1] .

The proportion of Australian born cases of TB remained steady. The notification rate in the Australian born non-Indigenous population has remained relatively unchanged for more than a decade. The rate in Australian born Indigenous people in NSW is approximately 3.5 times higher than in non-Indigenous Australian born people, however fluctuates from year to year.

Risk factors reported among NSW TB cases for the period 2015-2016 were similar to those reported in previous years in NSW and nationally. Birth or previous residence longer than three months in a TB high risk country remain the most commonly reported risk factors. There was a 5% reduction in the proportion of Australian born cases where household or close contact with TB was reported as a risk factor, compared with the previous report from 2012-2014; while an increase of 8% was observed in the reporting of an immunosuppressive health condition or therapy as a risk factor among Australian born cases [7]. A slightly higher proportion of overseas born cases were reported as having been born in a high TB burden country (94%) compared to the previous report (89%), while decreases of 3% were observed in the proportion of overseas born cases reporting past residence in a HRC that was not their country of birth, and the presence of an immunosuppressive health condition or therapy [7].

Drug resistance, including multi-drug resistance and mono-resistance to isoniazid and rifampicin; continue to pose a challenge to the control and management of TB, both globally and within NSW. Of MDR-TB cases reported in 2015 and 2016 in NSW, 40% were in people born in India (n=5) or China (n=1), two of three countries reported as having the highest number of MDR-TB cases in the world[1]. There has been no statistically significant difference to the proportions of drug resistant cases as a group or to individual drugs over a 10 year period in NSW. Continued monitoring and review of NSW TB cases identified as drug resistant continues to be a priority of the NSW TB Program.

The proportion of NSW TB cases tested for HIV at the time of diagnosis continues to increase. The prevalence of HIV among NSW TB cases remains low, with 1% of cases tested found to have HIV.

Ninety-three per cent of cases in 2014 and 2015 successfully completed treatment where the outcome was known (excluding continues on treatment, transferred overseas and outcome unknown). Mortality among NSW TB cases remained stable at 4%, with 1% of cases reported to have died due to TB. NSW continued to see low rates of treatment default (2%) and treatment failure (0.1%), among surviving TB cases in 2014 and 2015. Whilst 12% of cases in 2014 and 2015 were reported as still being on treatment, it is likely that these cases have finished treatment and the data was not updated prior to this report.

Despite the low incidence, TB control in Australia remains an ongoing challenge. TB control cannot be viewed in the context of one country alone, and the global epidemiology of this disease has significant impact on control measures in low incidence countries, due to increasing international travel to and migration from high incidence countries. This is 23

particularly true for Australia as 62% of incident TB cases globally in 2016 occurred in the Western Pacific, and neighbouring South East Asian regions[1]. Five countries accounted for 56% of TB cases in 2016, of which four are within these two regions[1].

### **Conclusion:**

Whilst NSW had the second highest number of cases of TB notified in NSW in the past 20 years in 2016, notification rates are stable, and the number of cases and notification rate remain low compared to global comparisons. Where previous reports have highlighted the success and efficacy of the NSW TB Program, this report strengthens the notion that the control and elimination of TB in an individual country must be considered in the context of the global epidemiology of TB.

While the rate of TB in NSW remains low and consistent with that observed nationally [3], the increase in the number of cases between 2015 and 2016 is a reminder that this is not the time for complacency. TB anywhere remains a challenge everywhere. Drug resistance and continuing high prevalence in neighbouring countries, particularly in the presence of high rates of travel to and migration from these countries pose an ongoing challenge to the control efforts of TB in NSW. The WHO END TB strategy calls for a 20% reduction in incident cases of TB by 2020 compared to 2015. The NSW TB Program, along with the network of Chest Clinics around the state remains dedicated to the control of TB within our borders, through timely and appropriate identification and management of cases, and their contacts.

### **Acknowledgements:**

The NSW TB Program would like to acknowledge the staff from the network of chest clinics and associated public health units across NSW who collected the data. Thanks are also extended to the nurses and doctors of NSW TB services for their continued dedication to the control and management of TB in NSW. The NSW TB Program would also like to acknowledge the Mycobacterium Reference Laboratory at the Institute for Clinical Pathology and Medical Research, Westmead.

## Appendix 1

Number and rate of TB by LHD, 2015-2016, age and sex standardised.

Local Health District	2015		2016	
	Number	Rate	Number	Rate
Sydney LHD area	69	10.1	86	12.1
South Western Sydney LHD area	78	8.2	95	10.0
South Eastern Sydney LHD area	74	7.7	95	9.3
Illawarra Shoalhaven LHD area	8	2.1	8	1.8
Western Sydney LHD area	127	14.0	135	14.3
Nepean Blue Mountains LHD area	14	4.1	13	3.5
Northern Sydney LHD area	39	4.2	56	6.2
Central Coast LHD area	9	2.7	2	0.6
Hunter New England LHD	9	0.9	13	1.4
Northern NSW LHD	2	0.8	4	1.1
Mid North Coast LHD	4	2.3	11	5.4
Southern NSW LHD	3	1.5	3	2.1
Murrumbidgee LHD	4	0.8	8	2.2
Western NSW LHD	1	0.4	2	0.9
Far West NSW	0	0	0	0

## References

1. World Health Organization, *Global tuberculosis report 2017*. 2017, World Health Organization: Geneva, Switzerland.
2. World Health Organization, *Tuberculosis and HIV*. 2018: Geneva, Switzerland.
3. Commonwealth Department of Health, *Notification Rate of Tuberculosis 1991 to 2017*. 2018: Canberra, Australia.
4. Toms, C., Stapledon, R., Coulter, C., Douglas, P., National Tuberculosis Advisory Committee, *Tuberculosis notifications in Australia, 2014*. Communicable Disease Intelligence, 2017. **41**(3): p. E247-263.
5. Commonwealth Department of Health. *Tuberculosis case definition*. 2010. Updated 22 December 2010 [cited 2018]; Available from: [http://www.health.gov.au/internet/main/publishing.nsf/Content/cda-surveil-nndss-casedefs-cd\\_tb.htm](http://www.health.gov.au/internet/main/publishing.nsf/Content/cda-surveil-nndss-casedefs-cd_tb.htm).
6. World Health Organization, *Definitions and reporting framework for tuberculosis - 2013 revision (updated December 2014)*. 2014: Geneva, Switzerland.
7. New South Wales Health, *Tuberculosis in New South Wales 2012-2014*. 2015, NSW Health: Sydney, Australia.