

Tuberculosis in Queensland

2015

Tuberculosis in Queensland, 2015

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Summary

There were 183 notified cases of active tuberculosis (TB) in Queensland in 2015. Cases in Queensland comprised 15 per cent of the total cases of active TB notified in Australia. The notification rate of TB was 3.8 cases per 100,000 population per year, an increase from the previous two years but lower than the recent peak of 4.9 cases per 100,000 population per year in 2011. The overall rate of TB in Queensland remains low by global standards.

The majority of TB cases notified in Queensland were born in a high risk country for TB. Although rates of TB in Aboriginal and Torres Strait Islander Queenslanders are low on a global scale, they continue to be higher than rates among other Queenslanders, and in particular compared to Australian-born non-Indigenous Queenslanders.

During 2015, 87 per cent of Queensland TB cases were laboratory confirmed, with 98 per cent of these confirmed by culture. Drug susceptibility testing (DST) was performed for all culture confirmed cases. Thirteen per cent of cases were clinical diagnoses that were not able to be laboratory confirmed. Eighty-one per cent of culture confirmed cases had fully susceptible *M. tuberculosis* complex identified and seven cases (4 per cent) were identified as multi-drug resistant tuberculosis (MDR-TB). Three of the MDR-TB cases were Australian born, with all three cases reporting travel to high risk countries, and two of the three cases were identified as contacts of a known MDR-TB case.

Of the 166 notified cases in 2014, 72 per cent of cases completed treatment (with or without bacteriological evidence of cure). Sixteen per cent of cases were transferred out of Australia and nine cases (6 per cent) died prior to the completion of treatment, of which three were considered to have died from TB and six from other causes. Ninety-two per cent of cases were considered to have a successful treatment outcome. Treatment outcomes for cases notified in 2015 will be reported in the 2016 report in line with the National Notifiable Diseases Surveillance System reporting.

Acknowledgements

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1. Introduction

Tuberculosis (TB) is caused by the bacterium *Mycobacterium tuberculosis* complex. TB transmission usually occurs through the inhalation of infectious droplets when a person with TB disease of the lungs coughs, speaks, sings, laughs, or sneezes (1). The bacteria predominantly infect the lungs, but can also cause disease in other parts of the body (extra-pulmonary disease). Only a small proportion of people infected with *M. tuberculosis* complex develop active disease, with a lifetime risk of reactivation of TB disease in a person with documented latent TB (LTB) generally accepted to be between 5-10 per cent (1-3). A recent study in Victoria suggested in their jurisdiction, the risk of reactivation may be as high as 14.5 per cent over a five year period (4).

TB has been notifiable in Queensland since 1904 for pulmonary TB and 1937 for all forms of disease. Diagnosis and management of LTB is an important part of TB management, with the efficacy of currently available preventative treatments ranging from 60-90 per cent (5), though only active TB is notifiable. This report focuses on diagnoses of active TB in Queensland. It is important to note that the surveillance of notifiable conditions is a passive process which relies on laboratories and diagnosing clinicians to identify and appropriately notify under the Queensland *Public Health Act 2005* and the *Public Health Regulations (2005)*.

2. Methods

Tuberculosis is a pathological diagnosis and clinical diagnosis notifiable condition under the *Queensland Public Health Regulations 2005*. This requires pathology providers to notify the Department of Health of any positive tests for tuberculosis as per the Queensland notification criteria guidelines for laboratories (6). Cases were classified as per the national case definition for tuberculosis (7), however within Queensland, cases were additionally classified as confirmed (laboratory definitive evidence) and probable (clinical diagnosis only) (Box 1). Cases are followed up by tuberculosis services in Queensland for demographic details, risk factors, clinical symptoms, treatment, and outcomes. Where a case transfers interstate during treatment, this information is sought from interstate tuberculosis control services.

Box 1: Queensland tuberculosis case definition

Confirmed case

Isolation of *Mycobacterium tuberculosis* complex (*M. tuberculosis*, *M. bovis* or *M. africanum*, excluding *M. bovis* var BCG) by culture OR

Detection of *M. tuberculosis* complex by nucleic acid testing EXCEPT where this is likely to be due to previously treated or inactive disease.

Probable case

A clinician experienced in tuberculosis makes a clinical diagnosis of tuberculosis, including clinical follow-up assessment to ensure a consistent clinical course.

Data were extracted from the Queensland Notifiable Conditions System on 28 July 2016 for all confirmed and probable cases of tuberculosis with disease onset between 1 January 2011 and 31 December 2015.

Papua New Guinea (PNG) residents diagnosed with TB on the Australian islands of the Torres Strait Protected Zone are counted in the number of TB cases in Queensland and are included in the report data unless otherwise stated. All cross border cases in PNG residents are considered to be residing in a high risk country for TB.

Laboratory confirmatory testing and drug susceptibility testing were conducted at the Queensland Mycobacterial Reference Laboratory, a World Health Organization designated Supranational Reference Laboratory and Collaborating Centre. All TB cultures, including isolates referred by private pathology providers, were phenotypically tested for first line resistance to isoniazid (H), rifampicin (R), ethambutol (E), pyrazinamide (Z), and streptomycin (S) using the BACTEC™ MGIT™ 960 proportion method and additional susceptibility testing conducted for up to 13 different antibiotics where first line resistance was detected. GeneXpert™ (introduced November 2010) was also used to confirm cases, with GeneXpert™ and other molecular techniques (as subsequently implemented) used for early identification of resistance. Multi-drug resistant TB (MDR-TB) is defined as resistance to isoniazid and rifampicin, with or without resistance to other first-line drugs (8).

A successful outcome was defined as a case completing treatment. Unsuccessful outcomes included died of TB, treatment failure, and defaulted from treatment.

Outcomes excluded from comparison are transferred out of Australia, died of a cause other than TB, still on treatment and outcome unknown.

Descriptive analyses were performed using Microsoft Excel™. Cases were assigned to a geographic Hospital and Health Service (HHS) area based on their residential address at the time of diagnosis. Geographic distribution used Queensland Hospital and Health Service (HHS) boundaries with mapping undertaken in ArcGIS. Rates were calculated using the Queensland Estimated Resident Population (ERP) 2011-2015. Rates in Indigenous and non-Indigenous Queenslanders were calculated using Indigenous and Non-Indigenous Experimental Estimated Resident Population (ERP) (2011-2014). 2014 Indigenous and Non-Indigenous populations were used to calculate 2015 rates as 2015 ERP were not available at time of report. Australian states and territories population were taken at July 2015, using Australian Bureau of Statistics Catalogue Number 3101.0 – Australian Demographic Statistics, Table 4 Estimated Resident Population, States and Territories (Number). Australian-born and overseas born notification rates were calculated using Australian Bureau of Statistics Catalogue 3412.0 - Migration, Australia, item 1.3 Estimated Resident Population, State and territory composition, 2011.

3. Notifications of TB

Epidemiology of TB in Queensland

There were 183 notified cases of TB in 2015 in Queensland (Figure 1). These cases comprised 15 per cent of the total notified cases in Australia in 2015 (1254 cases) (9), with Queensland making up 20 per cent of the Australian estimated resident population (July 2015). The annual notification rate of TB in 2015 in Queensland was 3.8 cases per 100,000 population per year.

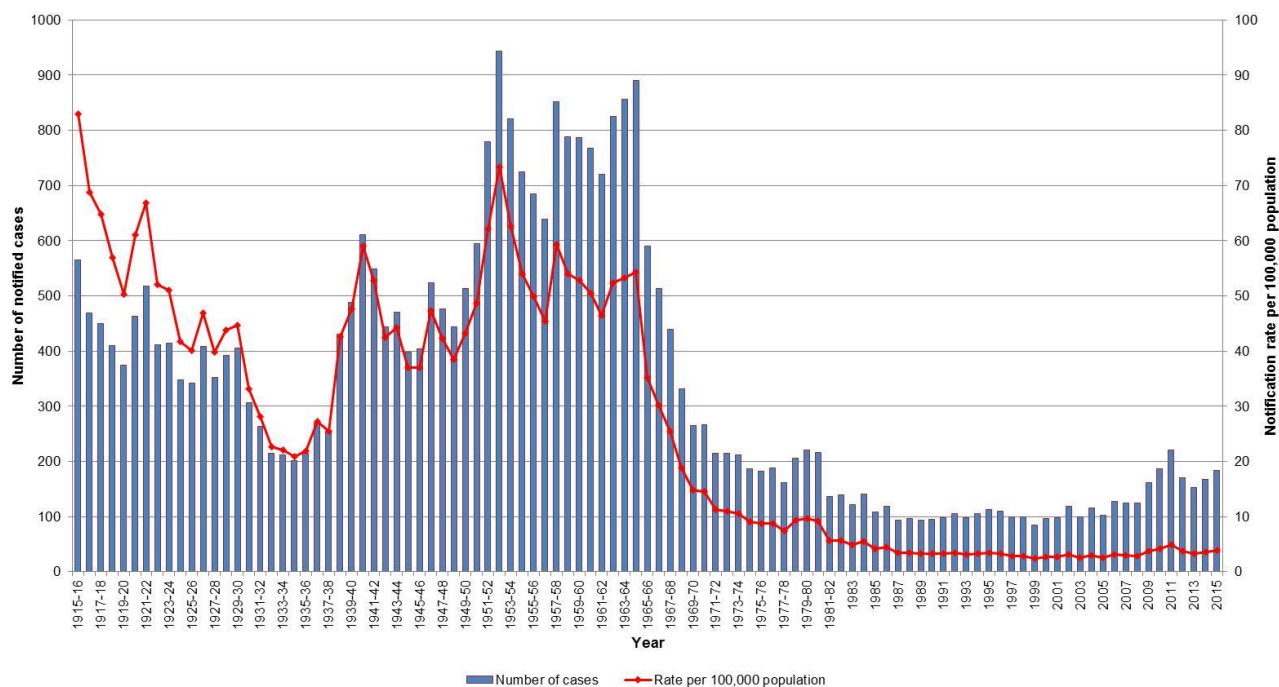


Figure 1: Number and notification rate[^] of TB notifications in Queensland, 1915/16-2015*

[^]Rates for 2006 onwards calculated using the Queensland Estimate Resident Population - data source for rates pre-2006 is unknown

*Data adjusted to report by calendar year (compared to financial year) from 1983. Cases notified from Jan-Jun 1983 appear in both the 1982-83 column and the 1983 column

Distribution of cases by Hospital and Health Service of residence

In 2015, the majority of cases resided in South-East Queensland, with 59 cases (32 per cent) notified with a residential address in Metro South Hospital and Health Service (HHS) and 34 cases (19 per cent) with a residential address in Metro North HHS. A small number of cases diagnosed in Queensland (14 cases, 8 per cent) had an overseas residential address. The majority of these (13 cases, 93 per cent) had a residential address in PNG at the time of diagnosis. Taking into account population size, the highest annual notification rate in 2015 was in the Torres and Cape HHS with 23.1 cases per 100,000 population per year (compared with 35.5 cases per 100,000 population per year in 2014), followed by North West HHS with 12.4 cases per 100,000 population per year. However case numbers were low with six cases in Torres and Cape HHS and 4 cases in North West HHS (Figure 2).

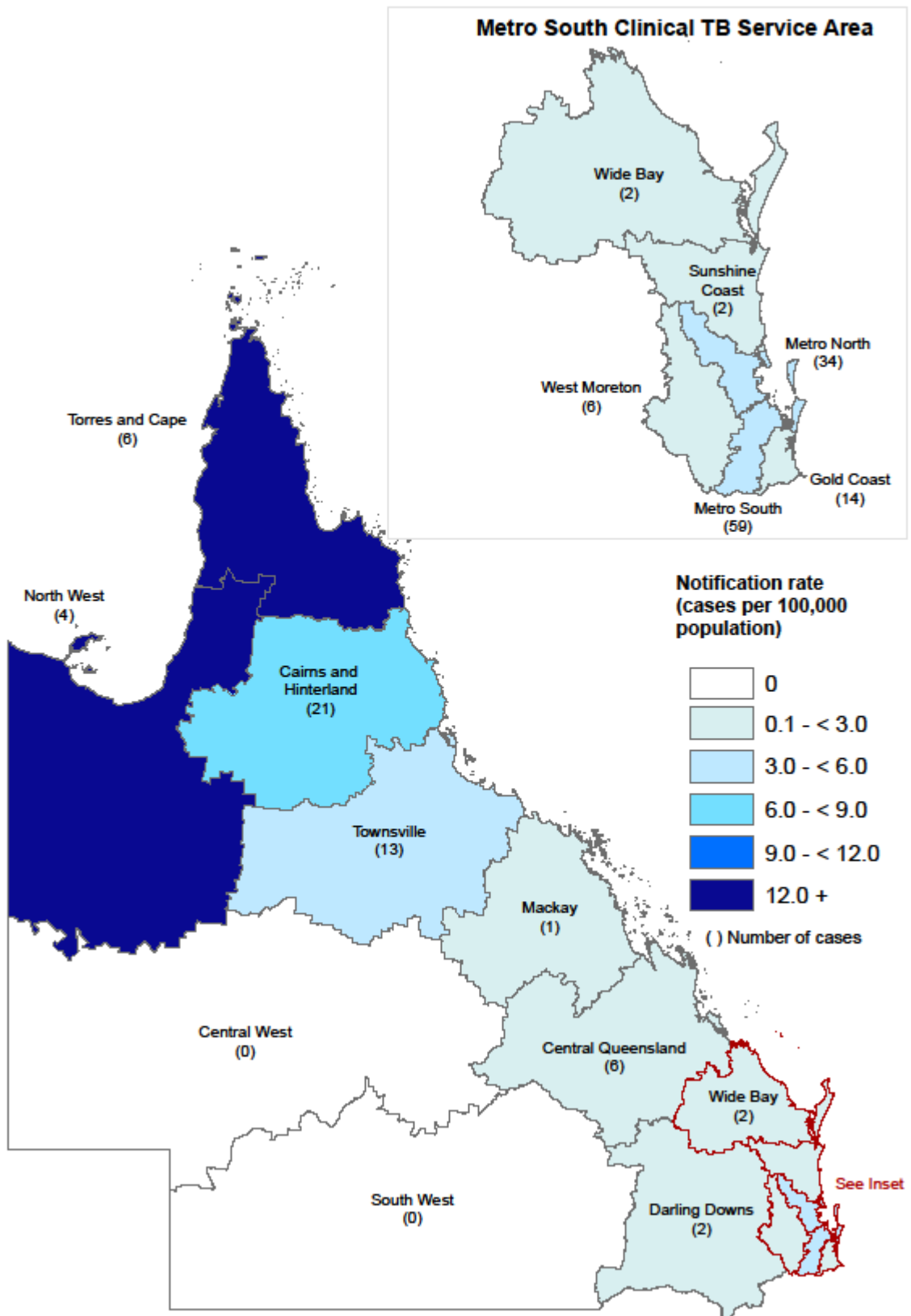


Figure 2: Number of cases and annual notification rate of TB by HHS of residence, Queensland, 2015

4. Demographic characteristics

Age and sex

In 2015, 57 per cent of TB cases were female and 43 per cent were male. The age of cases at onset of disease ranged from three months to 92 years, with a median age of 34 years. The most frequently notified age group was the 25-29 year age group (Figure 3).

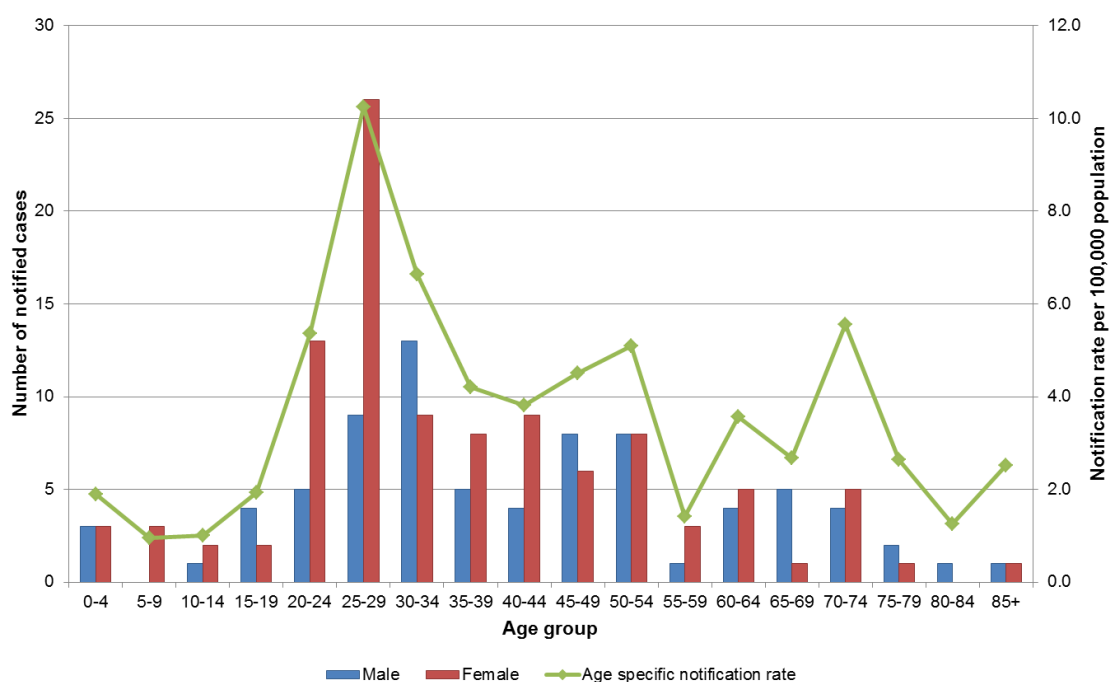


Figure 3: Number of TB cases and notification rate by sex and age group at onset of disease, Queensland, 2015

Aboriginal and Torres Strait Islander Queenslanders

There were 17 cases (9 per cent) of TB in Aboriginal and Torres Strait Islander people in 2015 (Table 1).

Table 1: TB notifications by Aboriginal and/or Torres Strait Islander origin, Queensland, 2011-15

Indigenous status	2011	2012	2013	2014	2015
Aboriginal but not Torres Strait Islander origin	8 (4%)	11 (6%)	7 (5%)	5 (3%)	10 (5%)
Torres Strait Islander but not Aboriginal origin	2 (1%)	4 (2%)	3 (2%)	13 (8%)	7 (4%)
Both Aboriginal and Torres Strait Islander origin	1 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Neither Aboriginal nor Torres Strait Islander origin	210 (95%)	156 (91%)	143 (93%)	148 (89%)	166 (91%)
Total	221 (100%)	171 (100%)	153 (100%)	166 (100%)	183 (100%)

The annual notification rate of TB in Queensland's Aboriginal and Torres Strait Islander population ranged from 5.0 to 8.9 cases per 100,000 population per year in 2011-15 (Table 2). The notification rate for TB in Indigenous Queenslanders in 2015 was 2.3 times the 2015 notification rate for non-Indigenous Queensland residents.

Table 2: TB cases and annual notification rates for Aboriginal and Torres Strait Islander and non-Indigenous Queenslanders, Queensland, 2011-15

Indigenous status	2011	2012	2013	2014	2015 [^]
Aboriginal and Torres Strait Islander Queenslanders	11	15	10	18	17
<i>Rate (per 100,000 population)*</i>	5.8	7.8	5.0	8.9	8.4
Non-Indigenous Queenslanders	210	156	143	148	166
<i>Rate (per 100,000 population)[#]</i>	4.9	3.6	3.2	3.3	3.7
Rate ratio	1.2	2.2	1.6	2.7	2.3

* Notification rates for Aboriginal and Torres Strait Islander people were calculated using the Indigenous and Non-Indigenous Experimental Estimated Resident Population (ERP), Queensland (2011-2014)

[^] Rates for 2015 calculated using the 2014 Indigenous and Non-Indigenous Experimental ERP (Queensland)

The rate of TB in Australian-born Aboriginal and Torres Strait Islander Queenslanders (10.0 cases per 100,000 population per year) is 13.0 times higher than the rate in Australian-born non-Indigenous Queenslanders (0.8 cases per 100,000 population per year) in 2015 (excluding those who did not report Indigenous status and those that did not report country of birth). These rates may differ from those in Table 2, as a small proportion of Aboriginal and/or Torres Strait Islander people in Queensland reported being born overseas, and population changes since the 2011 census have not been accounted for.

Country of birth

In 2015, the majority of cases were born overseas, with 38 cases (21 per cent) born in Australia and 145 cases (79 per cent) born overseas. Overseas-born cases notified in Queensland were predominantly from the World Health Organization (WHO) Western Pacific Region (68 cases, 37 per cent, excluding Australian-born TB cases) (Figure 4).

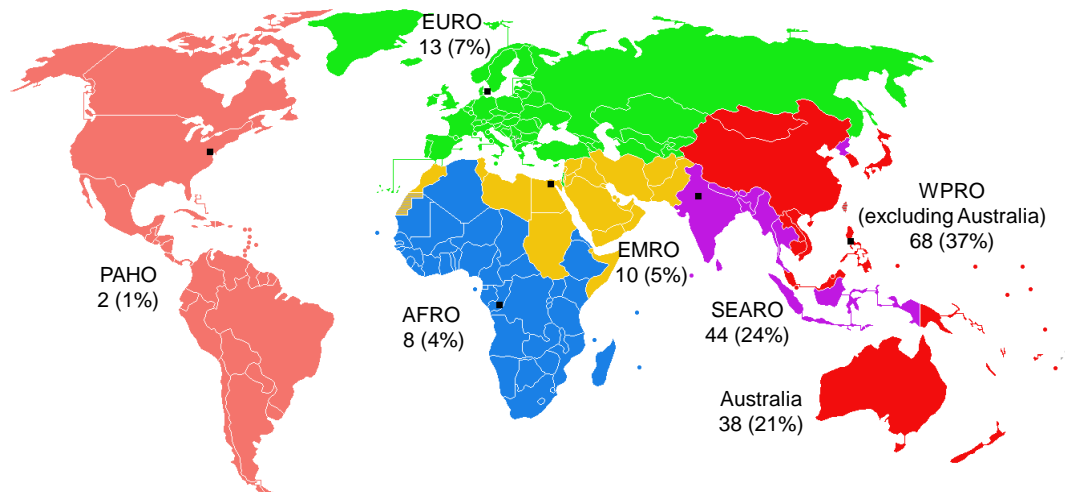


Figure 4: Number and proportion of TB cases notified by WHO region of birth, 2015

Of the 145 overseas-born cases, the most common country of birth was PNG (23 cases, 13 per cent). Other overseas countries where the highest number of cases were born included India (22 cases, 12 per cent), Philippines (16 cases, 9 per cent), and Vietnam (10 cases, 5 per cent). Of the 145 cases born overseas, 129 (88 per cent of overseas-born cases, 70 per cent of total cases) were born in countries considered to have high prevalence of TB (estimated incidence rates of 40 cases per 100,000 population per year or higher) (10).

The notification rate for TB in overseas-born Queenslanders was 14.4 cases per 100,000 population per year compared with 1.1 cases per 100,000 population per year in Australian-born Queenslanders in 2015.

Australian-born TB cases had a median age of 50 years (age range 3 months–90 years), whilst overseas-born TB cases had a median age of 31 years (age range 7 months–92 years).

5. Risk factors

Overwhelmingly, past travel to or residence for a period greater than 3 months in a high risk country and migrating from a country considered high risk were the most commonly reported risk factors in 2015 (Table 3). Past travel or residence in a high risk country and household member or close contact with TB were the highest reported risk factors for Australian born cases.

Table 3: Risk factors*^ reported for TB cases by Australian born, overseas born permanent and temporary migrants and PNG cross border cases, 2015

Risk Factors*	Australian-born cases	Overseas-born cases	Cross border cases	Total
Past travel to or residence > 3 months in a high risk country/countries [#]	13 (34%)	110 (82%)	0 (0%)	123 (67%)
Migrant from a high risk country [#]	0 (0%)	75 (56%)	n/a	75 (41%)
Household member or close contact with TB	11 (29%)	14 (10%)	3 (27%)	28 (15%)
Currently or previously employed in the health industry	2 (5%)	15 (11%)	0 (0%)	17 (9%)
Diabetic	8 (21%)	7 (5%)	0 (0%)	15 (8%)
Refugee	0 (0%)	15 (11%)	0 (0%)	18 (8%)
Current residence in a high risk country [#]	n/a	n/a	11 (100%)	11 (6%)
Alcohol or non-intravenous drug abuse	4 (11%)	5 (4%)	0 (0%)	9 (5%)
Steroids/immunosuppressive therapy	2 (5%)	1 (1%)	0 (0%)	3 (2%)
Institutional living	2 (5%)	1 (1%)	0 (0%)	3 (2%)
Australian-born child with 1 or more parents born in high risk country	2 (5%)	n/a	n/a	2 (1%)
HIV positive	0 (0%)	2 (1%)	0 (0%)	2 (1%)
Immunosuppression due to cancer (excluding skin cancer)	2 (5%)	0 (0%)	0 (0%)	2 (1%)
Renal failure	1 (3%)	0 (0%)	0 (0%)	1 (1%)
Intravenous drug abuse	0 (0%)	1 (1%)	0 (0%)	1 (1%)
Major abdominal surgery	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Other risk factor	3 (8%)	3 (2%)	1 (9%)	7 (4%)
No known risk factors	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Unknown risk factors or risk factors not assessed	1 (3%)	0 (0%)	0 (0%)	1 (1%)

* Multiple risk factors may be recorded for each case

^ Risk factors other than country of residence were not routinely been collected on PNG residents diagnosed in the Torres Strait Protected Zone during 2015

[#] High risk country defined as those with an annual TB incidence of 40/100,000 per year or more in 2013, as per estimates in WHO Global Tuberculosis Report 2014 at the time the data were collected (11).

Visa status

Thirty-eight cases (21 per cent) notified in Queensland in 2015 were born in Australia. The largest proportion of cases diagnosed with TB was in Australian permanent residents (40 per cent). The number of PNG residents diagnosed in the Australian Torres Strait islands in the Torres Strait Protected Zone in 2015 was similar to that seen in 2014 (Table 4).

Table 4: Visa status of TB cases in Queensland, 2011-15

Visa status	2011	2012	2013	2014	2015
Australian born	30 (14%)	33 (19%)	20 (13%)	31 (19%)	38 (21%)
Overseas born, Australian citizens and permanent residents	60 (27%)	56 (33%)	78 (51%)	71 (43%)	73 (40%)
Overseas Visitor	19 (9%)	17 (10%)	9 (6%)	14 (8%)	17 (9%)
Overseas Student	33 (15%)	14 (8%)	13 (8%)	20 (12%)	15 (8%)
Refugee/Humanitarian	10 (5%)	6 (4%)	5 (3%)	6 (4%)	12 (7%)
Treaty Visitation Rights (PNG residents in Torres Strait Protected Zone)	47 (21%)	21 (12%)	3 (2%)	9 (5%)	10 (5%)
Unauthorised Person	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)
Other	21 (10%)	18 (11%)	15 (10%)	14 (8%)	17 (9%)
Unknown	1 (0%)	6 (4%)	10 (7%)	1 (1%)	0 (0%)
Total	221 (100%)	171 (100%)	153 (100%)	166 (100%)	183 (100%)

Period of residence prior to diagnosis

In 2015, 28 per cent of overseas born TB cases were diagnosed within one year of arrival to Australia (Table 5). The largest proportion of cases was in those diagnosed five or more years after their arrival in Australia, with 67 cases (46 per cent) arrived at least five years prior to diagnosis.

Table 5: Period in Australia prior to diagnosis in TB cases born overseas, 2011-15

Visa status	2011	2012	2013	2014	2015
New arrivals - diagnosed within one year from arrival	84 (44%)	41 (30%)	25 (19%)	27 (20%)	41 (28%)
Diagnosed 1 - <2 years from arrival	14 (7%)	12 (9%)	8 (6%)	11 (8%)	15 (10%)
Diagnosed 2 - <5 years from arrival	46 (24%)	26 (19%)	28 (21%)	19 (14%)	15 (10%)
Diagnosed 5 years or more from arrival	37 (19%)	39 (28%)	55 (41%)	57 (42%)	67 (46%)
Unknown arrival date	10 (5%)	19 (14%)	17 (13%)	21 (16%)	7 (5%)
Total*	191 (100%)	137 (100%)	133 (100%)	135 (100%)	145 (100%)

*Excludes Australian born TB cases and those with an unknown country of birth

The number of TB diagnoses in new arrivals (diagnosed within one year of arrival in Australia) increased, as did the number and proportion of those diagnosed more than five years after arriving in Australia.

Human immunodeficiency virus co-infection

The proportion of TB cases tested for HIV in 2015 was 72 per cent (Table 6). There were three cases (2 per cent) found to be co-infected with HIV at diagnosis.

Table 6: HIV testing amongst TB cases, Queensland, 2011-15

HIV testing history	2011	2012	2013	2014	2015
Tested	181 (82%)	132 (77%)	116 (76%)	126 (76%)	132 (72%)
Not tested	39 (19%)	35 (20%)	32 (14%)	23 (22%)	40 (22%)
Refused testing	0 (0%)	1 (1%)	0 (0%)	0 (0%)	1 (1%)
Unknown testing history	1 (0%)	3 (2%)	5 (3%)	17 (10%)	10 (5%)
Total	221 (100%)	171 (100%)	153 (100%)	166 (100%)	183 (100%)

TB in health care workers

Seventeen cases (9 per cent) in 2015 reported having worked in a healthcare facility prior to their diagnosis with TB. Of these, 12 cases (71 per cent) were healthcare workers (HCW), with 3 cases (18 per cent) working as non-healthcare workers. This information was unknown for two cases (12 per cent) who only worked in healthcare facilities overseas. Two cases in health care workers were born in Australia (12 per cent) and 15 cases were born overseas (88 per cent); with all of the overseas born cases born in a country with an annual estimated TB incidence of at least 40 cases per 100,000 population per year.

Eleven cases were identified as working as HCWs in Australian healthcare facilities at or within the 12 months prior to diagnosis, of which two cases were deemed likely to have been infectious. Contact tracing was undertaken by TB Control Units in healthcare settings where a HCW or patient was considered infectious (or where vulnerable populations were involved); no cases of active TB were identified where transmission from a HCW within a healthcare setting was suspected.

No cases in HCW were identified as likely to have acquired tuberculosis in a Queensland healthcare facility in 2015.

6. Diagnosis and clinical details

In 2015, 180 cases (98 per cent) diagnosed with TB were new cases and three cases were relapse cases following past treatment of TB. Of the three relapse cases, two relapsed following full treatment in Australia and one relapsed following full or partial treatment overseas. Previous history of TB treatment was reported for six additional cases who were not classified as relapse cases (may have included treatment for latent TB).

In 2015, diagnosis primarily followed consultation with a general practitioner or specialist as a result of clinical symptoms consistent with their TB diagnosis (132 cases, 72 per cent). Thirty-three cases (18 per cent) were found through TB screening. Of those cases found through TB screening, the most common reasons screening was indicated were immigration and/or health undertakings (18 cases) and contact screening of household and other close contacts (9 cases). Eighteen cases (10 per cent) were recorded as having an incidental diagnosis of TB.

Site of disease

Pulmonary and extra-pulmonary disease

In 2015, 121 cases (66 per cent) had pulmonary disease only, 15 cases (8 per cent) had pulmonary plus other sites of disease, and 47 cases (26 per cent) had extra-pulmonary disease only.

Extra-pulmonary disease

There were 62 cases (34 per cent) reported to have TB disease elsewhere than the lungs (including 15 cases with concurrent pulmonary disease). The most common extra-pulmonary sites recorded were lymph nodes (44 per cent of cases reporting extra-pulmonary sites of disease) and pleural (10 per cent) (Table 7).

Table 7: Sites of TB disease in cases reported with extra-pulmonary disease, Queensland, 2015

Site of disease	Number and proportion of cases reporting extra-pulmonary disease*
Lymph node	27 (44%)
Pleural	6 (10%)
Bone/joint	5 (8%)
Disseminated (systemic symptoms)	5 (8%)
Abdominal	4 (6%)
Miliary (with millet seed appearance on chest x-ray)	4 (6%)
Genitourinary	3 (5%)
Central nervous system	2 (3%)
Soft tissue abscesses	2 (3%)
Laryngeal	1 (2%)
Peritoneal	1 (2%)
Other	11 (18%)

*Multiple sites of disease may be reported for one case

7. Laboratory testing

Of the 183 TB cases notified in 2015, 160 (87 per cent) were laboratory confirmed (by isolation of *Mycobacterium tuberculosis* complex [*M. tuberculosis*, *M. bovis*, or *M. africanum*, excluding *M. bovis* var BCG] by culture or detection of *M. tuberculosis* complex by nucleic acid testing except where this is likely to be due to previously treated or inactive disease (7)). Of these, 157 cases were confirmed by culture and 3 cases were confirmed by nucleic acid testing only. There were two cases where *M. africanum* was isolated and no cases of *M. bovis* (excluding BCG variant). Twenty-three clinically diagnosed cases (13 per cent) were unable to be laboratory confirmed.

Pulmonary cases

Of the 125 laboratory confirmed pulmonary cases (including those with pulmonary TB plus other sites of disease), 101 cases (81 per cent) were sputum culture positive. An additional 21 cases (16 per cent) had a positive culture result from a specimen other than sputum (but were not positive on sputum culture); 15 cases from bronchoscopy, 2 cases from a gastric aspirate, and 4 cases from other non-pulmonary sites. Three pulmonary cases (4 per cent) were confirmed by nucleic acid testing only.

Of the laboratory confirmed pulmonary cases, 55 cases (44 per cent) were sputum smear positive (acid fast bacilli [AFB] detected by microscopy). An additional 15 cases (11 per cent) had AFBs detected by microscopy from a specimen other than sputum (but were not positive for AFBs on sputum); 12 cases from bronchoscopy, 1 case from a gastric aspirate, and 2 cases from other non-pulmonary sites. Two of the clinical cases without laboratory confirmation or smear positivity had histology suggestive of TB.

Extra-pulmonary only cases

All 35 laboratory confirmed extra-pulmonary cases were culture positive; 15 cases from a lymph node, 3 cases from pleural fluid, and 17 cases from other sites including bone/joint, cerebral spinal fluid, genitourinary, peritoneal, and pus. Eight of the clinical cases without laboratory confirmation had histology suggestive of TB.

Drug susceptibility testing

All 157 culture confirmed TB cases in 2015 had drug susceptibility testing (DST) results available. One hundred and twenty-seven cases (81 per cent) had fully sensitive *M. tuberculosis* complex identified (Table 8). Thirteen cases (8 per cent) were resistant to isoniazid but not rifampicin, 1 case (1 per cent) was resistant to rifampicin but not isoniazid, and 9 cases (6 per cent) were identified to have other first line resistance patterns but were not resistant to isoniazid or rifampicin.

Table 8: Drug susceptibility testing of culture positive TB cases by site of disease, 2015

Drug susceptibility testing	Pulmonary (including those with other sites)	Extra-pulmonary disease only	Total
Fully sensitive	100 (82%)	27 (77%)	127 (81%)
Isoniazid (H) resistance (but sensitive to rifampicin [R])	7 (6%)	6 (17%)	13 (8%)
Rifampicin (R) resistance (but sensitive to isoniazid [H])	1 (1%)	0 (0%)	1 (1%)
Other resistance (but sensitive to isoniazid [H] and rifampicin [R])	8 (7%)	1 (3%)	9 (6%)
Multi-drug resistance (resistant to isoniazid [H] and rifampicin [R])	6 (5%)	1 (3%)	7 (4%)
Total	122 (100%)	35 (100%)	157 (100%)

Seven cases (4 per cent) were considered to have MDR-TB; six with pulmonary disease and one with extra-pulmonary disease only. There were six different resistance profiles seen in the seven MDR-TB cases (Table 9). There were no cases of extensively drug resistant TB (XDR-TB) or pre-XDR TB. Four of the seven MDR-TB cases were born overseas, three in PNG, and one in Myanmar. Three cases were Australian born. All three MDR-TB cases born in PNG were diagnosed in the Torres Strait Protected Zone. The three Australian born MDR-TB cases all had travel to a high risk country, and one case was identified as a contact of a known MDR-TB case in Australia.

Table 9: Antibiotic resistance profiles of MDR-TB cases, 2015

Antibiotic susceptibility profiles*													Number of cases
AK	CAP	CYC	E	ETD	H.1	H.4	KAN	OFL	PAS	Z	R	S	
S	S	S	S	S	R	R	S	S	S	R	R	R	1
S	S	S	S	R	R	S	S	S	S	R	R	R	1
S	S	S	S	R	R	R	S	S	S	R	R	S	1
S	S	S	S	R	R	R	S	S	S	S	R	R	2
S	S	S	S	R	R	R	S	S	S	R	R	R	1
S	S	S	R	R	R	R	S	S	S	R	R	R	1
Total MDR-TB cases													7

*Antibiotic abbreviations shown in Abbreviations table (page 22)

#S = sensitive, R = resistant

Of the 32 Australian born TB cases with DST results available, 27 cases (84 per cent) were fully susceptible, one case (3 per cent) was resistant to isoniazid but not rifampicin, one case (3 per cent) were resistant to other drugs but not to isoniazid or rifampicin, and three cases were MDR-TB.

8. Treatment outcomes

The treatment outcomes of an annual patient cohort are reported in the following year's report. This allows adequate time for all cases notified to begin treatment and for the opportunity for a treatment outcome to be recorded for the majority of cases. This section covers outcomes from TB cases notified in 2014. Treatment outcomes for 2015 will be reported in subsequent years. Treatment outcomes are defined by the National Notifiable Diseases Surveillance System dataset (Appendix 2).

Of the 166 notified cases in 2014, 120 (72 per cent) completed treatment (including those demonstrating cure), 26 cases (16 per cent) were transferred out of Australia, and 9 cases (6 per cent) died prior to the completion of treatment (Table 10).

Table 10: Treatment outcome for notified TB cases, 2014

Treatment outcome	Total
Cured (bacteriologically confirmed)	8 (5%)
Completed treatment	112 (67%)
Defaulted from treatment	8 (5%)
Died of TB	3 (2%)
Died of other cause	6 (4%)
Transferred out of Australia	26 (16%)
Still on treatment	2 (1%)
Not followed up, outcome unknown	1 (1%)
Total	166 (100%)

Of the nine cases notified in 2014 that died before completion of treatment, three were considered to have died from TB and six died of other causes. All three cases that were considered to have died from TB had pulmonary disease with involvement of other sites, with one case diagnosed post mortem, one within one week of presentation, and one following three months of TB treatment.

Ninety-two per cent of cases were considered to have a successful treatment outcome.

Outcomes for MDR-TB cases

There were five cases of MDR-TB diagnosed in 2014. Two cases completed treatment, one case died of TB, and two cases were transferred back to PNG to complete treatment. The MDR-TB case that died passed away within one week of presentation.

9. Discussion

The rate of TB in Queensland remains low by global standards, and lower than that in some other Australian states. The majority of TB cases notified in Queensland were born in a high risk country for TB. The World Health Organization Framework towards tuberculosis elimination targets low incidence countries, including Australia, for TB elimination (12), reflected in *National Strategic Plan for Control of Tuberculosis in Australia: 2011 – 2015* with the goal of eliminating TB in the Australian-born population (13). The notification rate for TB in the Australia-born Queensland population was 1.1 cases per 100,000 population per year in 2015. This rate is still above the pre-elimination target of less than 10 notified cases per million population per year, with the elimination target generally considered less than 1 case per million population per year (12).

Rates of TB in Aboriginal and Torres Strait Islander Queenslanders continued to be more than double that of other Queenslanders, and 13 times more compared to the Australian-born non-Indigenous population. Five Aboriginal and/or Torres Strait Islander cases were screened as a result of known close contact with another TB case; the proportion found through screening was slightly higher than that for all TB cases (29 per cent of Aboriginal and Torres Strait Islander TB cases compared to 18 per cent for all TB cases in 2015). This continuing disparity highlights that further work is required to meet the Australian National Tuberculosis Advisory Committee's goals to eliminate TB in the Australian-born population and to reduce differences in the incidence of TB between the overall Australian rate and specific higher risk groups (13).

The number and proportion of cases diagnosed five or more years since arrival in Australia continued to increase to 46 per cent of overseas-born cases. There has been a decreasing trend in the proportion of cases diagnosed between two and five years from arriving in Australia. These changes may be the result of a scale up of offshore pre-migration screening, which may also have contributed to the reduction of TB cases in new arrivals as more migrants may have been diagnosed and treated prior to arriving in Australia (14). It is also important to note that the completion of the arrival date field in 2015 was 95 per cent, a notable improvement from the three years prior which could have influenced these changes. The number of cases of PNG residents diagnosed in the Torres Strait Protected Zone stabilised in 2015 following the nadir in 2013, with these cases consisting of five per cent of the total number of cases in Queensland.

Co-infection with TB and HIV remains low with three cases (2 per cent) diagnosed in 2015. Queensland and international guidelines recommend all TB cases should be tested for HIV (15, 16). HIV testing in people diagnosed with TB is important as there is evidence that active TB infection in TB HIV co-infected cases is associated with increased immunodeficiency and mortality (17). Seventy-two per cent of TB cases in Queensland were tested for HIV at or around the time of diagnosis in 2015, the lowest proportion tested in the past five years.

The probable transmission and development of active MDR-TB disease in Queensland in a known Australian-born contact was of particular concern. The case was initially identified as a contact, with active TB identified through follow up chest x-ray surveillance. Preventing the development and transmission of drug resistant TB in

Australia is also a focus as part of the current *Strategic Plan for Control of Tuberculosis in Australia* (13). This circumstance contributed to the development of a position statement from the Queensland Tuberculosis Expert Advisory Group on the management of contacts of MDR-TB including consideration of the use of preventative drug therapy for this group (18).

Ninety-one per cent of cases in 2014 had a successful treatment outcome, similar to that seen in 2012-13 (19). However, it is important to note that two relapses following full treatment in Australia were seen in 2015.

Priorities for TB control in Queensland closely reflect activities outlined in the World Health Organization Framework towards tuberculosis elimination (12). These include addressing the disparity between Aboriginal and Torres Strait Islander Queenslanders, capturing high risk migrant groups for appropriate screening for active and latent TB, and minimising the likelihood of developing active disease following latent TB infection. Efforts to monitor TB control and improve the quality of TB surveillance and reporting continue to be of public health importance given Australia's population demographics, history of migration and the high burden of TB and MDR-TB in neighbouring countries.

Appendix

NNDSS Field: TB_Outcomes

Patient outcomes after anti-tuberculosis treatment (20)

Outcome	Description
Cured (bacteriologically confirmed)	A pulmonary sputum smear positive and culture positive patient who was culture negative in the last month of treatment and on at least one previous occasion and completed treatment.
Completed treatment	Patient who has successfully completed treatment but who does not meet the criteria to be classified as a cure or a failure.
Interrupted treatment	Patient whose treatment was interrupted for two months or more but completed treatment.
Died of TB	Patient died during the course of treatment as a result of TB disease.
Died of other cause	Patient died during the course of treatment of cause other than TB disease.
Defaulted	Patient defaults from treatment.
Treatment failure	A patient who is sputum culture positive at 5 months or later during treatment.
Transferred out	Patient who has been transferred overseas and treatment outcome is unknown.
Still under treatment	Patient currently under treatment in Australia.
Not followed up, outcome unknown	Patient should have completed treatment in Australia but outcome is unknown.

Abbreviations

Antibiotic abbreviations used:

AK	Amikacin
CAP	Capreomycin
CYC	Cycloserine
E	Ethambutol
ETD	Ethionamide
H.1	Isoniazid 0.1
H.4	Isoniazid 0.4
KAN	Kanamycin
OFL	Ofloxacin
PAS	Para Amino Salicylate
Z	Pyrazinamide
R	Rifampicin
S	Streptomycin

Other abbreviations used:

AFB	Acid-fast bacilli
AFRO	Regional Office for Africa (World Health Organization)
BCG	Bacillus Calmette-Guérin
DST	Drug susceptibility testing
EMRO	Regional Office for the Eastern Mediterranean (World Health Organization)
ERP	Estimated resident population
EURO	European Regional Office (World Health Organization)
HIV	Human Immunodeficiency Virus
HCW	Healthcare worker
HHS	Hospital and Health Service
LTB	Latent tuberculosis infection
MDR-TB	Multi drug resistant tuberculosis
PAHO	Pan American Health Organization
PNG	Papua New Guinea
SEARO	South-East Asia Regional Office (World Health Organization)
TB	Tuberculosis
WHO	World Health Organization
WPRO	Western Pacific Regional Office (World Health Organization)
XDR-TB	Extensively drug resistant tuberculosis

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