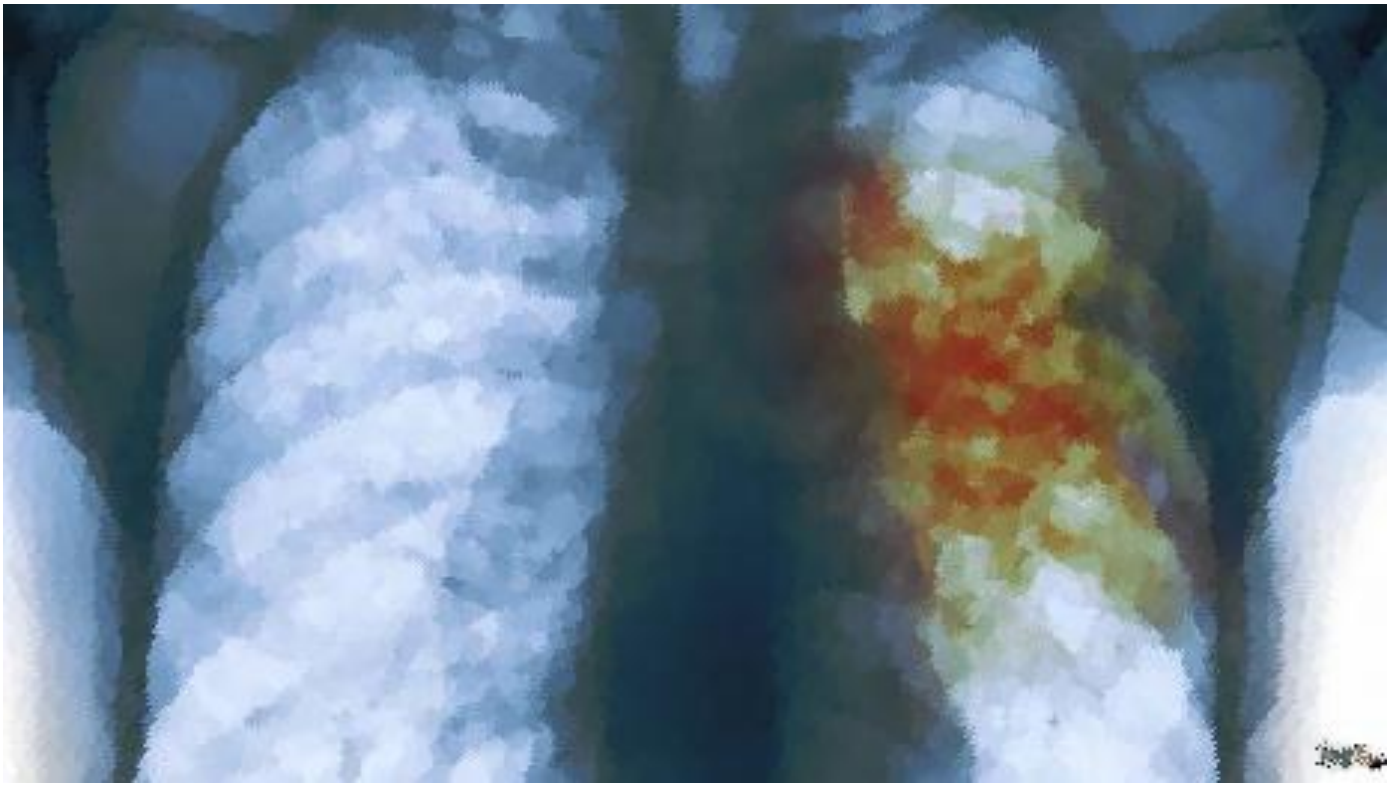

Tuberculosis

New South Wales: 2012-2014

- Tuberculosis (TB) is a disease caused by infection with *Mycobacterium tuberculosis* or closely related bacteria.
- Tuberculosis can damage a person's lungs or other parts of the body and cause serious illness.
- Tuberculosis is spread through the air when a person with TB in the lungs or throat coughs, sneezes or speaks, sending germs into the air.
- Only a small proportion of people infected with *M. tuberculosis* develop active disease.
- Tuberculosis can be treated with antibiotics

In 2014, there were

473

cases of active TB notified in NSW

For more Information see the NSW Health: TB Factsheet

Introduction

Tuberculosis (TB) remains a disease of global public health significance. The World Health Organization (WHO) estimates that in 2013 there were 9.0 million incident cases of TB and 1.1 million TB-related deaths, as well as an additional 360 000 deaths as a result of TB and human immunodeficiency virus (HIV) co-infection.[1] In Australia the incidence of TB is low: in 2013 it was reported by the Commonwealth Department of Health to be 5.5 cases per 100 000 population.[2] Mortality from TB, excluding HIV-positive cases, was less than two TB-related deaths per 100 000 population in Australia in 2013.[1]

Despite Australia's low incidence, TB control remains a challenge as the epidemiology of this disease must be considered in a global context given the frequency of international travel and migration from high-incidence countries.[3] The incidence and prevalence of TB in many of Australia's neighbouring countries remains high. Twenty-two countries account for 80% of the global burden of TB; nine of these countries are within the South-East Asian and Western Pacific Regions. These two regions also account for approximately 38% of multidrug-resistant TB (MDR-TB) cases worldwide.[1]

Given the global context of TB epidemiology, elimination of disease within any given country in isolation is not considered feasible. The key goals and strategies of the New South Wales (NSW) TB Control Program therefore focus on case finding, early diagnosis and effective treatment in order to minimise and eliminate local transmission.[4] NSW has a strong surveillance system in place, whereby all patients diagnosed with TB are notified to a public health unit in accordance with the NSW Public Health Act 2010. Case details are then entered into a central registry, the Notifiable Conditions Information Management System.

The purpose of this report is to describe the epidemiology of TB in NSW for 2012 - 2014. Understanding the epidemiology of TB in NSW is critical for informing and evaluating disease control strategies.

Methods:

TB notification data were extracted from the Notifiable Conditions Information Management System. Data were included in the study for records with a year of diagnosis of 2012, 2013 and 2014; data were correct as at 30 July 2015. 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

For the purpose of this report TB was defined as active infection with *Mycobacterium tuberculosis complex* (*M. tuberculosis*, *M.bovis* or *M.africanum*). Cases of latent TB are not included. Pulmonary TB was defined as disease occurring within the patient's lung, excluding the pleura. Extrapulmonary TB was defined as disease affecting any other region of the body including the pleura. A case of TB was defined as 'new' when there was no record of previous TB treatment of more than 1 month duration.

TB notification data were analysed by year of diagnosis. Each case of TB is assigned a year of diagnosis, which is the year in which the majority of clinical and public health action, including diagnosis, treatment, isolation and contact tracing, occurred.

High-risk countries were defined as per the WHO definition of countries in which the incidence of TB is greater than or equal to 60 cases per 100 000 population per year.[1]

Cases were defined as having MDR-TB when their isolates demonstrated resistance to at least isoniazid and rifampicin. Extensively drug-resistant TB (XDR-TB) was defined as 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).[1]

Statistical analyses

Descriptive analyses of notification data were undertaken. Cases were categorised as overseas-born, non-Indigenous Australian-born, or Aboriginal and/or Torres Strait Islander Australian-born. Overseas-born cases were categorised into regions of birth using ABS standards.[7] Incidence 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. Incidence rates for TB by LHD of residence were calculated and mapped. Data were analysed using SAS® Enterprise Guide® (version 4.3, SAS Institute, Cary, NC, USA).

Results

Notification rates

From 2012 to 2014 there were a total of 1386 confirmed tuberculosis cases notified in NSW (470 in 2012, 443 in 2013, and 473 in 2014), equating to annual incidence rates of 6.4, 6.0, and 6.3 cases per 100,000 population, respectively. The annual TB incidence rate in NSW has remained relatively stable over time (Figure 1). TB notifications peaked in 2011 (n = 540, 7.5 per 100,000 population) and declined in 2012 and 2013. In 2014 notifications increased slightly.

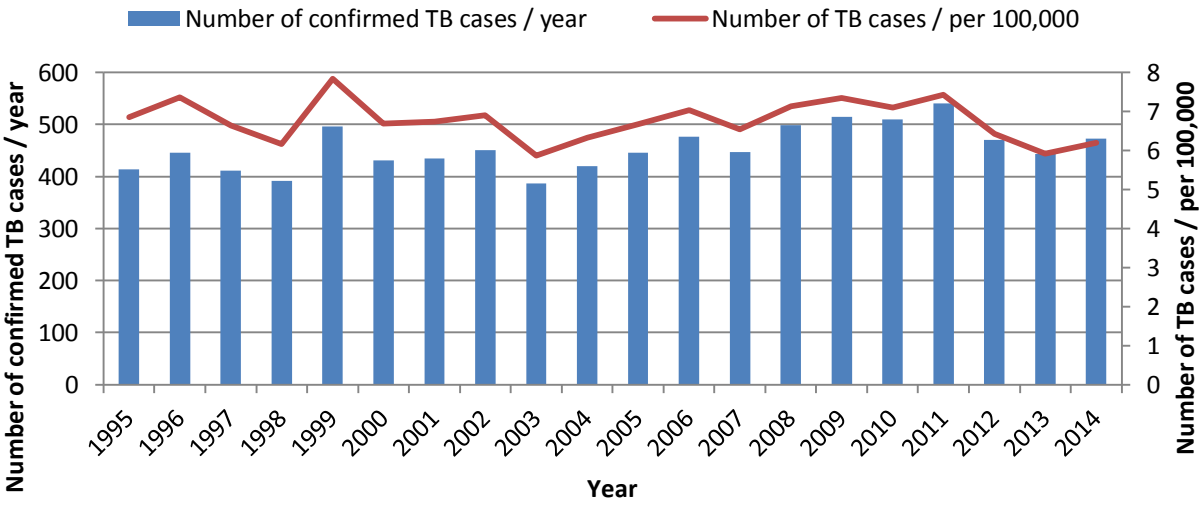

Figure 1: Number and Rate of TB notifications in NSW, 1995-2014

Demographics

Age and sex

Two-thirds of TB cases notified between 2012 and 2014 were in people aged between 15 and 49 years (n = 873; 63%), with the mean age of cases being 43 years (range: 2 months – 97 years). Males accounted for 53% of all cases (n = 733) (Figure 2).

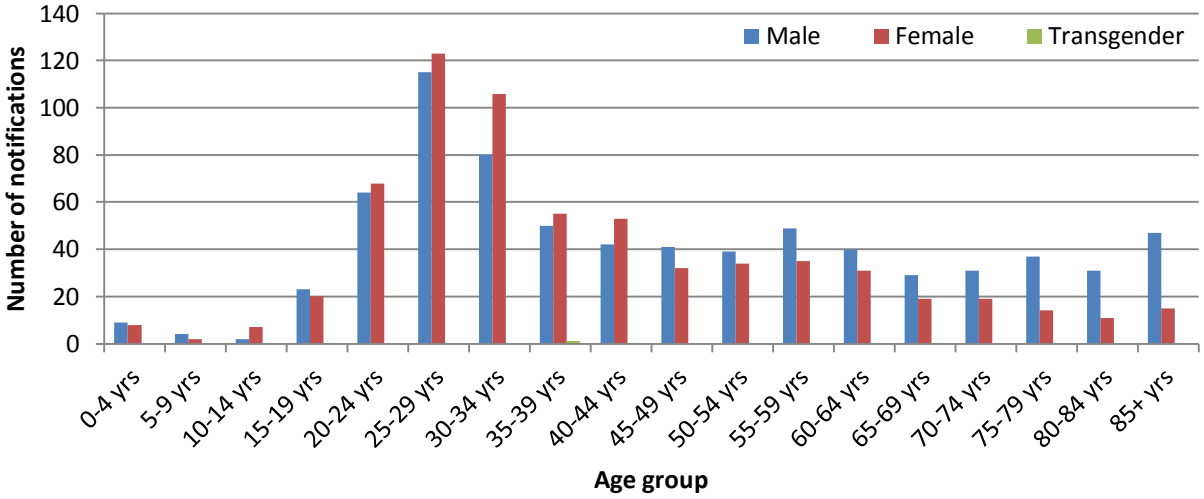

Figure 2: Number of TB notifications in NSW, by sex and age group in NSW, 2012, 2013 and 2014 combined.

There were two age peaks in the TB notification rate. The first peak occurred in the 20-34 year olds and the second peak was in people aged over 75 years old (Figure 3). In cases aged over 65 years, 69% were male.

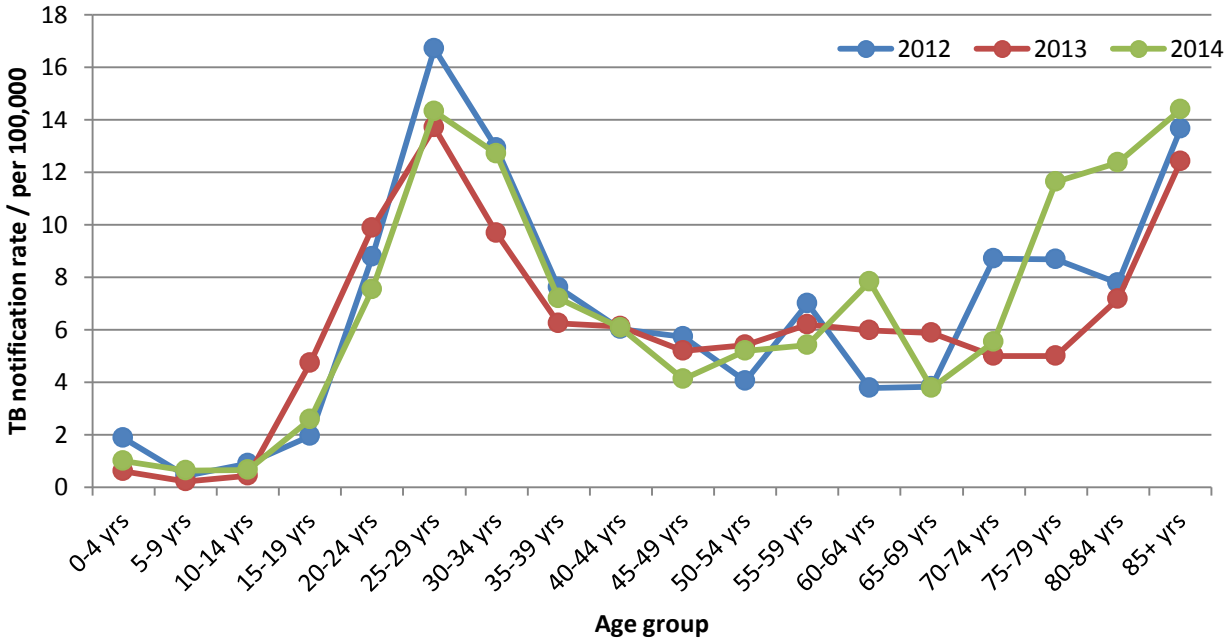

Figure 3: Age specific TB notification rate (per 100 000 population), NSW, 2012-2014.

Place of residence

Residents of Sydney metropolitan local health districts (LHDs) made up 85% of all confirmed TB cases notified in NSW between 2012 and 2014 (Western Sydney LHD, n = 373; South Western Sydney LHD, n = 256; Sydney LHD, n = 210; South Eastern Sydney LHD, n = 186; Northern Sydney LHD, n = 147). Five per cent of cases were from outer Sydney (Illawarra Shoalhaven, n = 33; Central Coast, n = 11; Nepean Blue Mountains n = 29), 9% from regional NSW and 1% from Justice Health or overseas (table1).

The annualised incidence rate for the Sydney metropolitan LHDs was 9.2 cases per 100 000 population per year. The rate of infection in outer Sydney and regional LHDs was 2.3 and 1.9 cases per 100 000 population per year respectively (table 1).

Within the Sydney metropolitan area, Western Sydney LHD and Sydney LHD had the highest overall rates and accounted for 42% of all TB notifications in NSW between 2012 and 2014. Outside the Sydney metropolitan areas, Mid North Coast LHD had the highest annualised incidence rate (3.4 cases per 100 000 population per year), followed by the Illawarra Shoalhaven LHD (3.1 cases per 100 000 population per year) (table 1).

Table 1: Number and rate per 100,000 of notified tuberculosis cases by Local Health District of residence, NSW, 2012-2014.

	2012		2013		2014		Total	
	n	**Rate**	***n***	**Rate**	***n***	**Rate**	***n***	**Rate**
Sydney Metro	**398**	**9.6**	**375**	**9.0**	**399**	**9.2**	**1172**	**9.2**
Sydney	67	10.1	74	11.7	69	10.0	210	10.6
South West Sydney	77	9.1	91	10.0	88	9.6	256	9.6
South East Sydney	61	6.4	60	6.4	65	6.5	186	6.4
Western Sydney	140	16.3	107	11.9	126	14.0	373	14.1
Northern Sydney	53	6.1	43	4.9	51	5.7	147	5.6
Outer Sydney	**30**	**2.7**	**22**	**2.1**	**21**	**2.0**	**73**	**2.3**
Illawarra Shoalhaven	14	3.7	7	1.8	12	3.7	33	3.1
Central Coast	<5	0.4	5	1.5	<5	0.9	11	0.9
Nepean Blue Mountains	14	4.0	10	2.9	5	1.4	29	2.8
Regional NSW	**37**	**1.6**	**39**	**2.1**	**48**	**2.0**	**124**	**1.9**
Northern NSW	5	2.0	<5	1.4	12	3.7	21	2.4
Mid North Coast	6	2.7	<5	3.1	8	4.4	18	3.4
Hunter New England	16	1.9	13	1.4	17	2.1	46	1.8
Western NSW	<5	1.1	<5	0.6	<5	0.6	7	0.8
Far West	0	0	<5	3.5	0	0	<5	1.2
Murrumbidgee	<5	2.1	7	3.0	<5	1.0	14	2.0
Southern NSW	<5	0.7	8	3.7	5	2.1	15	2.2
Albury (Victoria in-reach)	<5	2.2	0	0	<5	1.7	<5	1.3
Other								
Justice Health	<5	n/a	<5	n/a	0	n/a	<5	n/a
Overseas	<5	n/a	5	n/a	5	n/a	12	n/a

n/a: population estimates not available
Small cell counts have been suppressed for privacy and confidentiality reasons

Country of birth

Australian born cases

Indigenous people experience a higher incidence of TB disease when compared to Australian born non-Indigenous people[2]. In NSW since 2001 the rate of infection in Australian born non-Indigenous cases has been stable or slightly decreasing; in contrast to the rate of infection in Indigenous persons which demonstrates no clear trend, ranging from 1.1 cases per 100,000 in 2003 to 8.5 cases per 100,000 in 2011 (figure 4).

Between 2012 and 2014, there were 148 TB cases in Australian born people (49 in 2012, 38 in 2013 & 61 in 2014), of which 19 identified as Aboriginal (seven in 2012, three in 2013 & nine in 2014). In this time period, the age standardised rate for Indigenous Australians was over six times higher than Australian born non-Indigenous Australians (3.9 per 100,000 and 0.6 per 100,000 respectively).

Of the 19 Aboriginal persons notified with TB between 2012 and 2014, 11 were linked by MIRU typing to a cluster of TB associated with the Aboriginal communities of Northern and Mid North Coast NSW[5].

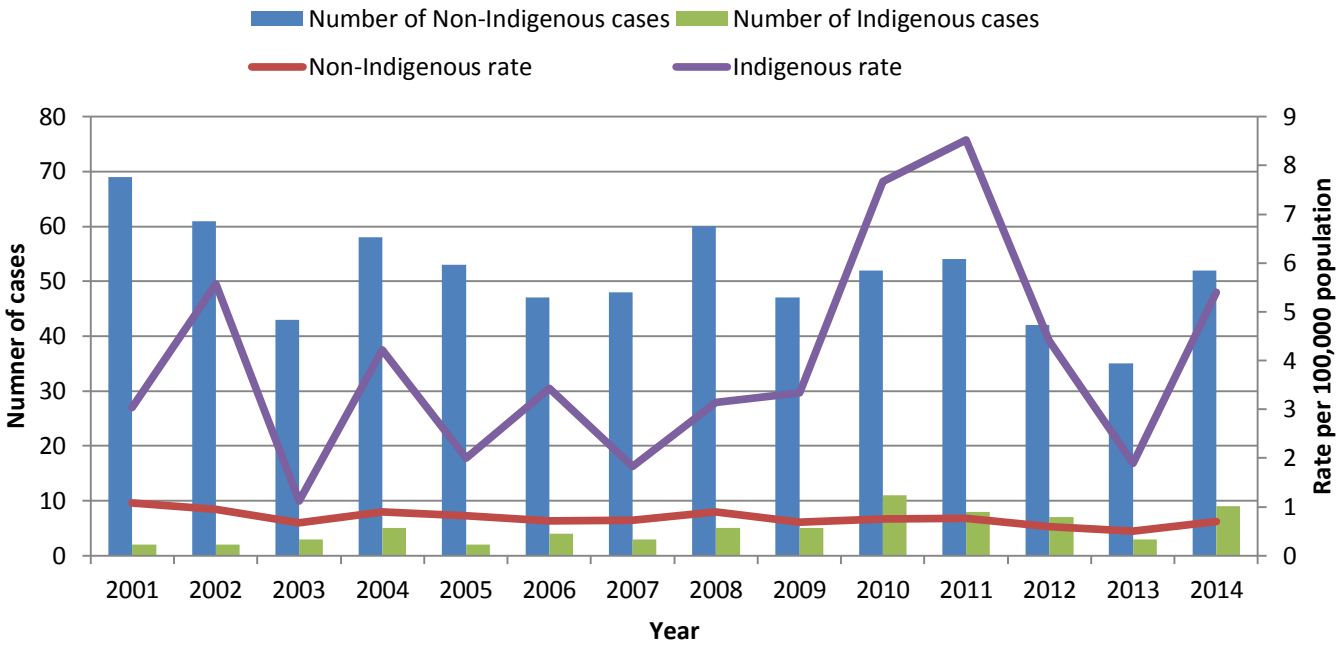

Figure 4: Number and rate of notified TB in Australian born cases by Indigenous status, NSW, 2001-2014

Snapshot: North Coast TB cluster

Since 2000, there have been 37 NSW cases linked to a TB cluster associated with the Aboriginal communities of Northern and Mid North Coast NSW. This cluster was first identified in 2003 when routine contact tracing of a newly diagnosed case identified several other TB cases[5].

The median age of patients in this cluster is 41 years (range 9 months to 65 years) and three quarters of the cases are male. Over 75% (n=28) of cases linked to this cluster reside in the North Coast or Mid North Coast LHDs, the remaining cases reside in the Hunter New England (n=5), Sydney (n=3) and South Western Sydney (n=1) LHDs. All cases have identified as Aboriginal and have an epidemiological link to at least one other member of the cluster. Almost 60% of the cases (n=22) have been diagnosed since 2010 and prevention efforts have intensified since then.

All laboratory confirmed cases have had the same MIRU type. MIRU typing has helped identify cases where initial epidemiological information was limited. More recently, whole genome sequencing of the cluster isolates have revealed two distint geographical sub clusters however all cases are highly similar.

In responding to the cluster, TB services have created a partnership with the local Aboriginal Health Services to develop a better understanding of these Aboriginal communities. This partnership has led to the development of an intensive household contact tracing approach[5]. This approach involves long wide-ranging conversations with the case, family members and others in the community to identify often complex social and family networks and offer screening in the community environment[5]. TB assessment and screening has also been offered more broadly to Aboriginal people living in North Coast towns acknowledging that many people are highly mobile and some close contacts many be difficult to identify and/or locate[5]. Research on the utility of community-based screening by Interferon Gamma Release Assay (IGRA) is ongoing in highly mobile communities of the NSW North Coast.

Overseas born cases

Between 2012 and 2014, nine out of ten notified cases were born overseas (n=1238; 89%); over half (53%) of those born overseas were born in either India (n = 234), Vietnam (n = 146), Philippines (n = 140) or China (n = 139). The remaining top countries of birth are Nepal (n =88), Indonesia (n = 54), Cambodia (n = 29), Thailand (n = 29), Afghanistan (n = 28), New Zealand (n = 24) and Sri Lanka (n = 24; Figure 5).

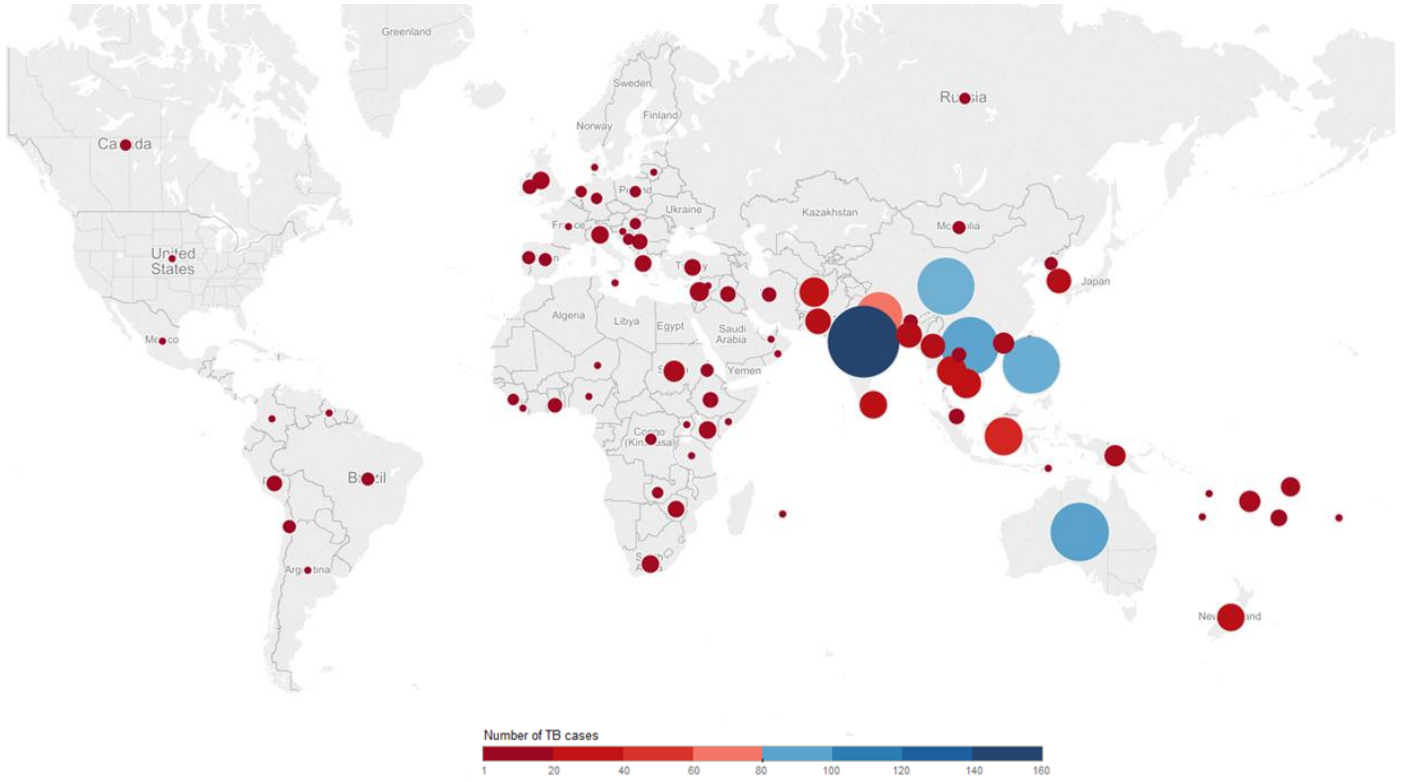

Figure 5: Number of TB cases notified in NSW by Country of Birth, 2012 to 2014

Those 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. Between 2012 and 2014 the median age at diagnosis for Australian born cases was 48 years; 40 years for females (range 3 months to 88 years) and 54 years for males (range 8 months to 97 years). For overseas born cases the median age at TB diagnosis was 36 years; 34 years for females (range 2 months to 92 years) and 40 years for males (range 3 to 97 years). Over 50% of overseas born cases are aged between 20 and 39 years at diagnosis (figure 6).

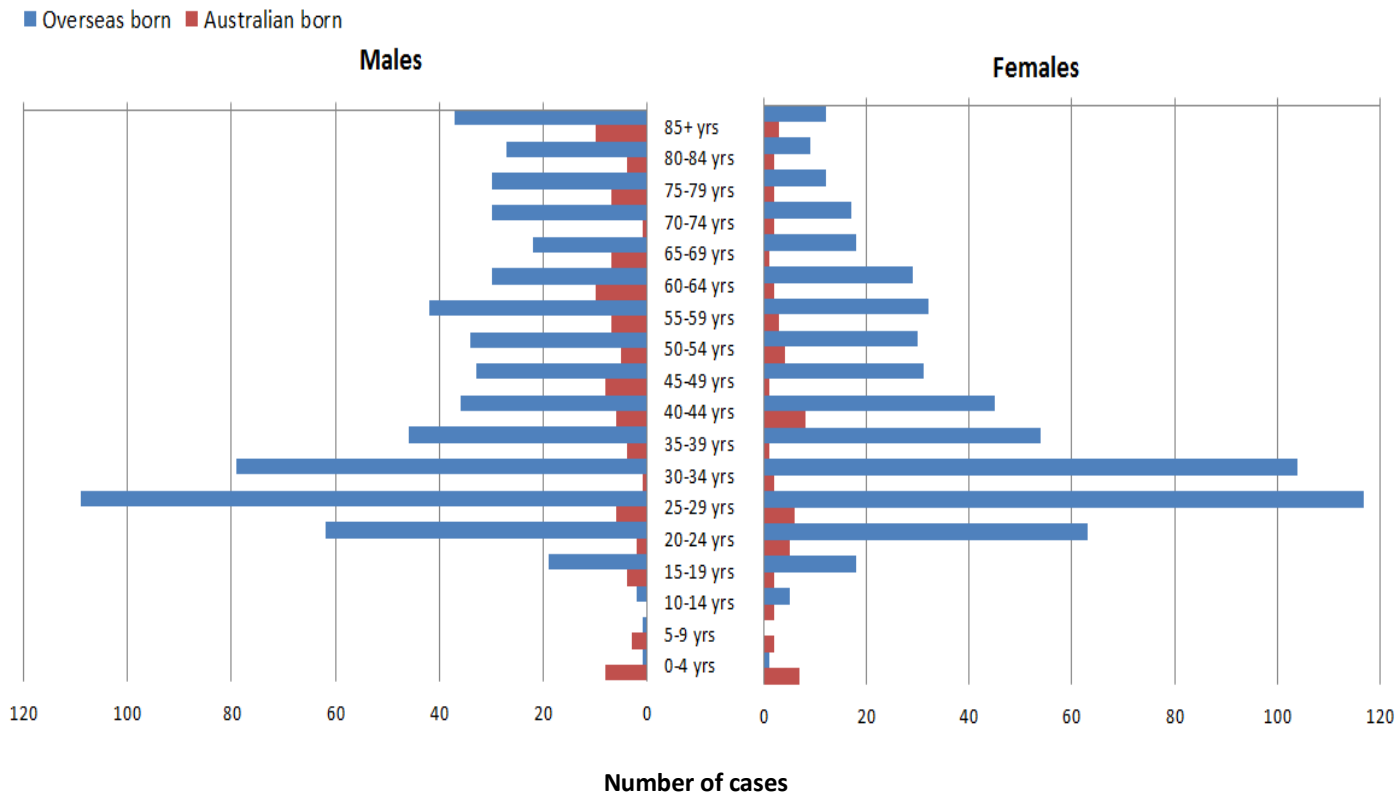

Figure 6: Age at diagnosis of TB, by place of birth and sex, NSW, 2012-2014

Snapshot: Immigration screening

As part of the Australian visa application process, applicants for some types of visas are required to undergo a medical assessment in their country of origin. If a visa applicant is found to have active TB when overseas they will not be granted an Australian visa until they complete appropriate treatment. If the assessment finds the applicant has a history of, or chest x-ray evidence of previous TB they will be placed on a health undertaking and required to be re-assessed for active TB on entry into Australia. Short term visa holders already in Australia who apply for a subsequent visa where a medical assessment is required are also assessed for TB.

A health undertaking is a condition placed on some visas which obliges the applicant to be assessed for TB by specialist TB services.

In NSW, chest clinics provide the service of screening new immigrants on health undertakings to meet visa requirements as well as managing the follow up of any treatment or investigations that may be required. Approximately 2000 new immigrants (both offshore and onshore) are referred to TB services in NSW for screening each year, with less than 2% found to have active TB.

Risk factors

The most commonly identified risk factor, present in 80% of all notified cases 2012 and 2014 was being born overseas in a high TB- burden country. Past residence for 3 or more months in a high-risk country that was not the person's country of birth was the next highest reported risk factor and reported in 17% of all cases. Health conditions causing immunosuppression, or being on immunosuppressive therapy were reported by 15% of all cases, and being a household member or having close contact with another person with TB was reported by 14% of cases. Other reported risk factors can be found in Table 2.

There was variation in reported risk factors between Australian and overseas-born cases. In Australian-born cases, the most frequently reported risk factor was household member or close contact with a person with TB (30% of Australian-born cases), followed by being a past resident (more than 3 months) in a high-risk country (24% of Australian-born cases).

For overseas-born cases, 89% were born in a high-risk country (HRC) (see appendix 1 for the current high risk countries). Amongst these cases, the median length of stay in Australia prior to TB diagnosis was 6 years (50% of cases were diagnosed between 2–19 years in Australia; Figure 7) compared to 25 years for those born in a non-HRC.

Table 2: Risk factors for tuberculosis (TB) among notified cases, by country of birth, NSW, 2012-2014

	All 2012, 2013 and 2014*		Australian born		Overseas born	
	N	**%**	**N**	**%**	**N**	**%**
Total**	**1386**		**148**	**11%**	**1237**	**89%**
Born in a HRC***	1109	80%	0	0	1109	89%
Past residence (>= 3m) in HRC	232	17%	35	24%	197	16%
Immunosuppressive health condition/therapy	203	15%	19	13%	184	15%
Household member or close contact with TB	198	14%	45	30%	153	12%
Currently/previously employed in healthcare	85	6%	9	6%	76	6%
Previously diagnosed with TB	91	7%	6	4%	85	7%
Child (Australian born), of parent(s) born in a HRC	19	1%	19	13%	0	0
Ever homeless / residing in a shelter	12	1%	2	1%	10	1%
Ever resided in a correctional facility	11	1%	3	2%	8	1%
Ever employed in an institution	4	<1%	0	0	4	<1%
Ever resided in an aged care facility	4	<1%	2	1%	2	<1%
Other specified	25	2%	4	3%	21	2%
Not assessed	2	<1%	0	0	2	<1%
Not able to be determined	75	5%	36	24%	33	3%

* 1 record from 2012 has no recorded Country of birth

**Any individual can have multiple Risk factors, therefore rows will not sum to total

*** High Risk as defined by the clinician assessing the patient

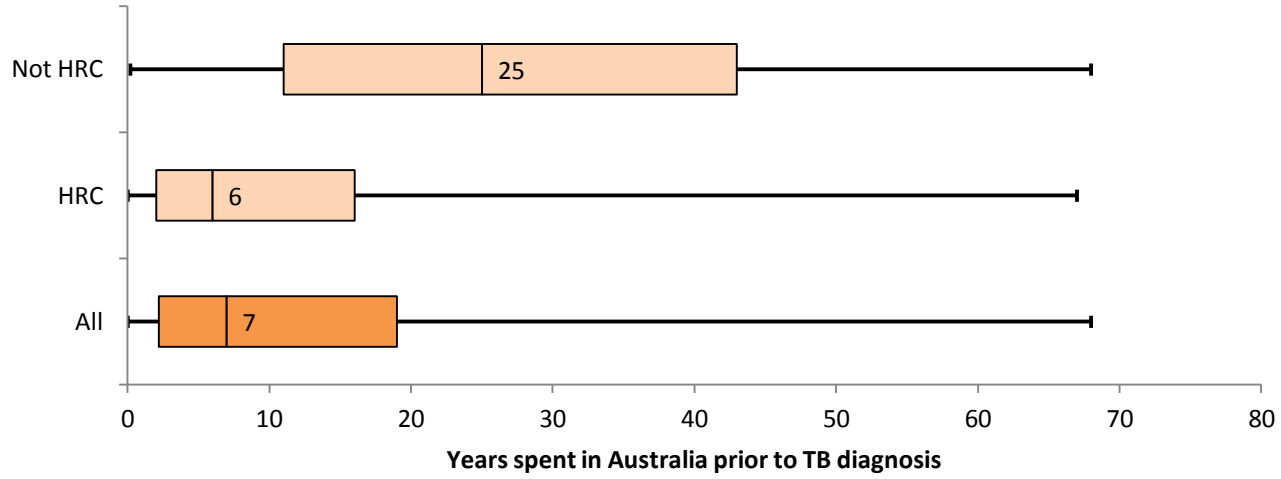

Figure 7: Median length of time spent in Australia prior to TB diagnosis among overseas born notified cases, by being born in a High Risk Country (HRC) or non-HRC, NSW, 2012-2014

Clinical presentation

For cases between 2012 and 2014, pulmonary only disease (defined as site of infection including the lung but excluding the pleura) accounted for 52% (n = 718) of TB cases. Extrapulmonary disease accounted for 42% (n = 576) and cases with both pulmonary and extrapulmonary disease accounted for 6% of cases (n = 90). Lymph nodes were the second most common site of infection after the lung, and were recorded as a site of infection in 18% of all cases and 44% of cases with extrapulmonary involvement.

Diagnosis

Of cases where the nature of identification was reported (n = 1294), the majority (85%, n = 1101) were identified through investigation of symptomatic disease. This was followed by screening for TB (13%, n = 162); screening is defined as when the case is identified by either migration screening, community screening, occupational screening or as a result of other health screening. Contact tracing identified 2% (n = 39) of cases between 2012 and 2014.

Most notified TB cases were newly diagnosed (n = 1318, 95%). There were 66 cases that relapsed following treatment, 17 of which were treated in Australia and 13 of those were treated within the last five years.

Of cases between 2012 and 2014, 77% (n = 1072) were laboratory confirmed. Of these, laboratory confirmation was made by isolation of *M. tuberculosis* by culture in 92% (n = 989) of cases and by polymerase chain reaction alone in 8% (n = 83) of cases. Of the cases with pulmonary disease, 33% (n = 270) were sputum smear positive. In the remaining 23% (n = 314) that were not laboratory confirmed, diagnosis was made on clinical grounds with or without laboratory-suggestive evidence such as a positive skin test for TB.

Between 2012 and 2014, 73% of cases undertook a HIV test at diagnosis (n = 1009). Testing rates varied by age group with 44% (n = 14) of cases aged 0-14 years tested, 80% (n = 697) of cases aged 15-49 years, and 62% (n = 298) of cases aged 50 years or over. Of those tested for HIV, 19 cases had HIV co-infection (2%; four in 2012, 10 in 2013 and five in 2014). All HIV co-infected

cases were born overseas primarily in South-East Asian and African countries, 53% (n=10) were male, and 84% (n = 16) were aged between 25 and 49 years (range 25 to 70 years).

Snapshot: Clusters by MIRU typing

Identification of clusters can lead to improved case detection, can help identify at risk communities, and helps improve understanding of patterns of TB transmission in Australia.

The National TB Advisory Committee (NTAC) has developed the following cluster definitions:

- Cluster – two or more cases with epidemiological links and indistinguishable laboratory profiles
- Probable cluster – two or more cases with epidemiological links without genomic identification of the organism
- Possible cluster – two or more cases with a genomic link without epidemiological links
- Outbreak – a cluster with three or more cases with evidence of serial transmission.

The NSW Mycobacterium Reference Laboratory has been performing MIRU typing since 2004 using 12 loci in combination with a technique called spoligotyping. In 2010 spoligotyping was discontinued and an extra 12 MIRU loci were introduced to increase the loci analysed to 24.

Example – Newcastle cluster

The Hunter area of NSW has a low incidence of TB with cases mainly in overseas born people. A cluster was suspected in 2005 based on an interview with a locally acquired case who identified four previous TB cases with whom they shared links dating back to 1994[6]. The links included a music recording studio, marijuana smoking and working at or visiting a hotel[6].

MIRU typing of all available TB cases in the area who were born in Australia or New Zealand between 1994 and 2005 revealed an additional nine cases with the same MIRU type and 12 other cases that had distinct MIRU types from those of the cluster[6]. All cases were re-interviewed where possible and epidemiological links between the additional nine cluster cases were also identified[6]. Routine typing has since revealed an additional three cluster cases.

Treatment

Between 2012 and 2014 pulmonary TB cases generally commenced treatment earlier than extrapulmonary TB cases and cases born overseas started treatment earlier than cases born in Australia (table 3).

Table 3: Days between first presentation and treatment start date (where known), NSW, 2012 – 2014.

Australian born	**Number of cases**	**10% started treatment**	**50% started treatment**	**90% started treatment**
Extrapulmonary	35	4 days	37 days	202 days
Pulmonary	105	2 days	26 days	119 days
Overseas born				
Extrapulmonary	512	7 days	34 days	151 days
Pulmonary	676	2 days	21 days	95 days

Of the 989 culture confirmed TB cases between 2012 and 2014, 89% (n = 882) had fully sensitive *M. tuberculosis* identified (Table 4). There were 47 cases resistant to isoniazid only (5%). Monoresistance was also found in a further 14 cases (1%), two to rifampicin, eight to pyrazinamide, and four to ethambutol. Five cases (<1%) were resistant to two or more first line TB drugs but were not classified as MDR-TB. There were 26 records without drug susceptibility testing results (3%).

Between 2012 and 2014 there were 15 cases of MDR-TB reported (3 in 2012, 7 in 2013 and 5 in 2014). All cases were born in high incident TB countries in Asia (Vietnam (4), China (4), India (3), Philippines (2), Nepal (1) and Myanmar (1)) with 11 of the cases residing in Australia for 5 years or less before their MDR-TB diagnosis. Six of the cases had a pulmonary smear positive infection and four had an extrapulmonary infection. There were no XDR-TB cases reported.

Table 4: Number and proportion of the levels of drug resistance in culture confirmed TB cases, by year of diagnosis, NSW, 2012 - 2014

	2012		**2013**		**2014**		**Total 2012 - 2014**	
	N	%	N	%	N	%	N	%
Culture confirmed TB cases	**335**		**310**		**344**		**989**	
Fully sensitive	291	87%	280	90%	311	90%	882	89%
Resistant only to isoniazid (H)	18	5%	13	4%	16	5%	47	5%
Resistant only to rifampicin (R)	0	0	2	<1%	0	0	2	<1%
Other resistance (sensitive to H and/or R)	4	1%	5	2%	8	3%	19	2%
MDR – TB^	3	1%	7	2%	5	2%	15	2%
XDR – TB^^	0	0	0	0	0	0	0	0
No drug sensitivities results recorded	19	6%	3	1%	4	1%	26	3%

^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 three injectable second-line drugs.

Snapshot: Multi-Drug Resistant TB

Multi-drug resistant TB (MDR-TB) is defined as disease caused by *Mycobacterium tuberculosis* bacilli that are resistant to isoniazid and rifampicin, with or without resistance to other first-line anti-tuberculosis agents[1]. MDR-TB represents an important public health concern for the effective control of TB.

In order to ensure best practice management of MDR-TB, an expert panel is convened by Health Protection NSW in response to every identified MDR-TB case in NSW. The expert panel is made up of representatives from Health Protection NSW, the NSW TB program, NSW Mycobacterium Reference Laboratory, the physician and TB co-ordinator responsible for the case as well as at least two other independent expert TB physicians.The purpose of the MDR-TB expert panel is to provide advice on the clinical and public health management of the case and develop a case management plan.

Between 2000 and 2014, all 67 cases of MDR-TB (including 2 extensively drug-resistant TB) diagnosed in NSW were reviewed by an expert panel. Of these cases, 58 (87%) have been successfully treated or are continuing on treatment, 3 (4%) died of TB, 2 (3%) defaulted on treatment and 4 (6%) were transferred overseas. No MDR-TB cases were reported among contacts[7].

To limit the impact of global increases in MDR-TB continued commitment to TB control in all countries is required. A multidisciplinary, expert guided, case-management approach, can achieve excellent outcomes in MDR-TB control as demonstrated by the NSW TB Program[7].

Treatment outcomes of 2011 – 2013 cases*

Clinical outcomes for cases between 2011 and 2013 are recorded in Table 5. A total of 88% (n = 1278) of cases were successfully treated, consisting of 5% (n = 67) who were considered cured (culture positive prior to treatment and culture negative after completion of treatment) and 95% (n = 1211) who completed treatment. There were five TB-related deaths reported, four in 2011 and one in 2012. Twenty four 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.

Table 5: Number and Proportion of clinical outcome in confirmed TB cases, by year of diagnosis, NSW, 2011-2013

	2011		2012		2013		Total 2011 – 2013	
	N	%	N	%	N	%	N	%
Clinical outcome	**540**		**470**		**443**		**1453**	
Completed treatment	457	85%	394	84%	360	81%	1211	83%
Cured	14	3%	27	6%	26	6%	67	5%
TB-related death	4	1%	1	<1%	0		5	<1%
Defaulted	8	1%	8	2%	8	2%	24	2%
Continues on treatment	1	<1%	1	<1%	7	2%	9	1%
Transferred overseas	30	6%	17	4%	14	3%	61	4%
Died (nonTB related)	20	4%	18	4%	22	5%	60	4%
Treatment failure	2	<1%	2	<1%	1	<1%	5	<1%
Unknown	4	1%	2	<1%	5	1%	11	1%

***Reporting of treatment outcomes are delayed by 1 year to allow adequate time for treatment to occur. Treatment outcomes for 2014 cases will be reported in the next annual report.

Contact tracing

A total of 7014 contacts of TB cases were identified between 2012 and 2014. Of these, 5043 (72%) received contact screening. Of contacts screened, 39 (<1%) were determined to have active TB disease. A further 150 (3%) contacts screened had a tuberculin skin test (TST) conversion. On initial TST screening, 31% (n = 1575) of contacts who received screening were TST positive. Of contacts screened, 324 (6%) received preventative treatment.

Discussion

Since a peak in 2011, TB notifications in NSW declined in 2012 and 2013 but increased slightly in 2014. This is consistent with national trends[2]. The vast majority of cases diagnosed with TB in NSW are in people born overseas. The epidemiology of TB in NSW can be expected to reflect the broader global trends[3] and patterns of migration, and as such there is a continued need for the implementation of TB control methods in NSW.

In 2012-2014, TB rates were highest in the Sydney metropolitan area, particularly in the western and inner city suburbs. This is consistent with 2009-2011 data and is likely to be a reflection of migrant settlement patterns within NSW[3]. The vast majority of these cases are the result of imported disease rather than local transmission[8].

Australian born cases made up 11% (n=148) of all TB notifications in NSW between 2012-2014, including 19 people who identify as Aboriginal. The proportion of Australian born TB cases has remained consistent in NSW for the past 10 years[3, 9]. There is little evidence for community transmission of TB in NSW with the most common risk factors of Australian born cases remaining similar to previous years: household or close contact with another person with TB, or past residence for three months or more in a high risk country[3]. Aboriginal people continue to experience a higher rate of TB disease than Australian born non-Aboriginal people[2]. In NSW one of biggest challenges for the TB Program over the past 15 years has been an ongoing cluster among Aboriginal people associated with the NSW North Coast (see Snapshot: North Coast TB cluster).

Multi-drug resistant TB (MDR-TB) represents an important public health concern for the effective control of TB. Worldwide, 3.5% of new cases and 20.5% of previously treated cases were estimated to have MDR-TB in 2013, which translates to over 480 000 people[1]. Nationally in 2012 and 2013 the proportion of MDR-TB was approximately 2% of all cases[2]. This is the same proportion observed in NSW in 2012-2014, which equates to an average of 5 cases per year. Between 2009 and 2011 the there were slightly more MDR-TB cases reported in NSW with an average annual number of 6.7 cases[3]. Despite the low numbers of MDR-TB in NSW it is vital to maintain robust surveillance and control methods as MDR-TB rates in countries surrounding Australia are among the highest in the world. In 2013, India and China reported the highest number of MDR-TB cases globally with over 50,000 cases each[1]. The Philippines and Indonesia are also among the top 10 countries for MDR-TB[1].

Monoresistance to rifampicin is considered as significant as MDR-TB in terms of treatment requirements[2]. Between 2012 and 2014 only two cases displayed this resistance pattern in NSW. Monoresistance to isoniazid was more common occurring in 5% of cases. This is consistent with previous years both in NSW and nationally [2,3,9].

People living with an HIV infection are more likely to develop TB than those without HIV[1]. The WHO recommends that routine HIV testing should be offered to all people with suspected or confirmed TB infection[1]. In NSW the proportion of TB cases tested for HIV between 2012 and 2014 was 73%. This is an increase from the period between 2009 and 2011 when 68% of cases were tested[3] but still lags behind the national testing rate of 80%[2]. Of the TB cases tested in NSW between 2012 and 2014, 2% were found to have HIV which is consistent with the national average[2].

Conclusion

NSW has a long history of effective TB control demonstrated by the prevailing low mortality from TB, the high rate of cases successfully treated, minimal local transmission of TB and the high number of contacts screened. There will continue to be challenges to TB control in NSW including TB transmission among sub-groups of the population and the ongoing immigration from countries with a high burden of TB.

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Acknowledgement

The authors wish to acknowledge staff from the network of chest clinics and public health units in NSW who collected the data. We also acknowledge Dr Vitali Sintchenko, Peter Jelfs and staff of the NSW Mycobacterium Reference Laboratory at the Institute for Clinical Pathology and Medical Research, Westmead Hospital.

Appendix 1: List of Countries with a Tuberculosis Incidence of 40 cases per 100,000 Persons or Greater, 2014.

Western Pacific	
Number of TB cases per 100,000 persons	
Brunei Darussalam	58
Cambodia	400
China (excludes SARs and Taiwan)	70
Fiji	57
Hong Kong (SAR of China)	76
Kiribati	497
Korea, Republic of (South)	97
Laos	197
Macau (SAR of China)	88
Malaysia	99
Marshall Islands	354
Micronesia, Federated States of	188
Mongolia	181
Nauru	47
Northern Mariana Islands	70
Palau	44
Papua New Guinea	347
Philippines	292
Singapore	47
Solomon Islands	92
Tuvalu	228
Vanuatu	62
Vietnam	144

South East Asia	
Number of TB cases per 100,000 persons	
Bangladesh	224
Bhutan	169
Burma (Myanmar)	373
East Timor	498
India	171
Indonesia	183
Korea, Democratic People's Republ	429
Maldives	40
Nepal	156
Sri Lanka	66
Thailand	119

Eastern Mediterranean	
Number of TB cases per 100,000 persons	
Afghanistan	189
Djibouti	619
Iraq	45
Libya	40
Morocco	104
Pakistan	275
Qatar	40
Somalia	285
Sudan	108
Yemen	48

Africa	
Number of TB cases per 100,000 persons	
Algeria	81
Angola	320
Benin	70
Botswana	414
Burkina Faso	54
Burundi	128
Cameroon	235
Cape Verde	143
Central African Republic	359
Chad	151
Congo	382
Congo, Democratic Republic of	326
Cote d'Ivoire	170
Equatorial Guinea	144
Eritrea	92
Ethiopia	224
Gabon	423
Gambia	173
Ghana	66
Guinea	177
Guinea-Bissau	387
Kenya	268
Lesotho	916
Liberia	308
Madagascar	233
Malawi	156
Mali	60
Mauritania	115
Mozambique	552
Namibia	651
Niger	102
Nigeria	338
Rwanda	69
Sao Tome and Principe	91
Senegal	136
Sierra Leone	313
South Africa	860
South Sudan	146
Swaziland	1382
Tanzania	164
Togo	73
Uganda	166
Zambia	410
Zimbabwe	552

Europe	
Number of TB cases per 100,000 persons	
Armenia	49
Azerbaijan	85
Belarus	70
Bosnia and Herzegovina	46
Georgia	116
Greenland	194
Kazakhstan	139
Kyrgyzstan	141
Latvia	50
Lithuania	65
Moldova	159
Romania	87
Russian Federation	89
Tajikistan	100
Turkmenistan	72
Ukraine	96
Uzbekistan	80

America	
Number of TB cases per 100,000 persons	
Bolivia	123
Brazil	46
Dominican Republic	60
Ecuador	56
Guatemala	60
Guyana	109
Haiti	206
Honduras	54
Nicaragua	55
Panama	48
Paraguay	44
Peru	124

Data is based on the WHO Global Tuberculosis Control Report 2014: View report at: http://www.who.int/tb/publications/global_report/en/index.html

Map of Countries with a Tuberculosis Incidence of 40 cases per 100,000 Persons or Greater, 2014

High Risk Countries are defined in NSW Policy directives as:

BCG Vaccination (PD2013_032): All countries shaded below (greater than or equal to 40 per 100,000) Occupational screening (PD2011_055): Countries greater than or equal to 60 per 100,000 (dark only)

Data is based on the WHO Global Tuberculosis Control Report 2014: View report at: http://www.who.int/tb/publications/global_report/en/index.html