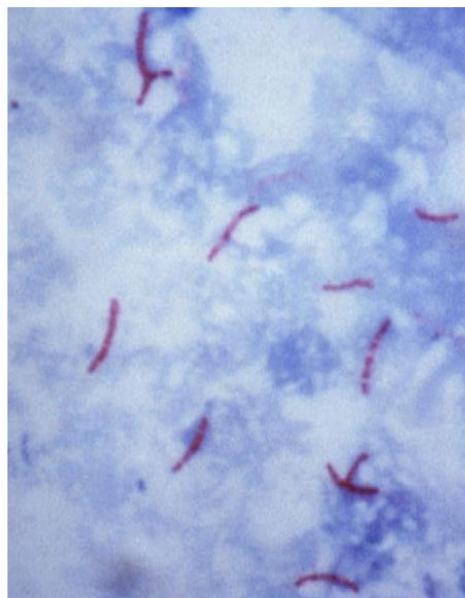
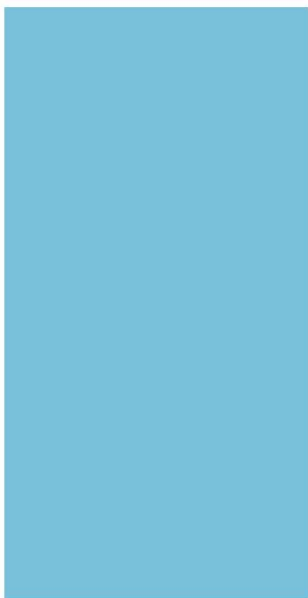
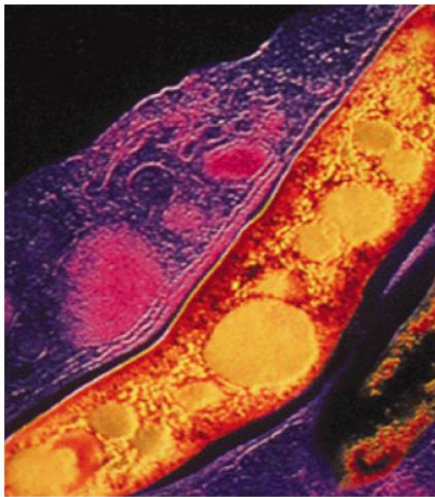


# Epidemiology of Tuberculosis In Northern Ireland

Annual surveillance report 2015



## Acknowledgements

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The Public Health Agency Northern Ireland gratefully acknowledges all those who contributed to this report, including; physicians, nurses, microbiologists, laboratory staff, and administrative staff who provide or contribute information on the surveillance of tuberculosis. A special word of thanks to Chris Nugent and Catherine Hanna for their contribution to data collection and validation.

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## Key Points

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- There were 62 cases of tuberculosis (TB) notified in Northern Ireland in 2015, giving a rate of 3.4 cases per 100,000 population. This represents a 35% decrease in both the number of cases and rate of TB from 2014 when the number of cases was 95 and the rate was 5.2/100,000.
- There are five Health and Social Care Trusts in Northern Ireland. Rates of TB were highest in the Southern Health and Social Care Trust at 7.0 cases per 100,000, a 19% decrease compared with 2014 when the rate was 8.7 cases per 100,000. Rates of TB in the Belfast Health and Social Care Trust more than halved in 2015 compared with 2014 (9.4 per 100,000 in 2014 to 4.3 per 100,000 in 2015).
- The highest rates of TB remained in young adults aged between 15 and 44 years (5.1 per 100,000), with 68% of these cases born outside the UK/Ireland.
- The proportion of TB cases that were born outside the UK was similar to previous years remaining at over 40%.
- One third (33%) of patients with pulmonary TB started treatment more than four months after symptom onset.
- The proportion of drug sensitive TB cases that completed treatment by 12 months, an indicator of the quality of the TB service, increased to 83% in 2015, a 9% increase compared with 2014.
- 10% of culture confirmed TB cases in 2015 were resistant to first line drugs.

## Introduction

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This report presents the epidemiological data for TB cases reported in Northern Ireland from 1 January 2015 to 31 December 2015. For comparative purposes and to give indications of trends in TB epidemiology, this report will also present data from previous years.

Outcome of TB treatments are collected annually and reported in retrospect. The treatment outcomes reported in this report are therefore on individuals notified to the Public Health Agency from 1 January 2014 to 31 December 2014.

There may be slight differences in numbers of TB cases quoted in the UK National TB report compared with this regional report, principally due to differences in time of data extraction and analysis between the two reports. This regional report takes account of late notifications that may have been reported after the national data extraction process has taken place.

## Definitions

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**Notified case:** Refers to clinically active disease caused, or thought to be caused, by infection with organisms of the *Mycobacterium tuberculosis* complex (*M. tuberculosis*, *M. bovis*, *M. africanum*).

**Culture confirmed cases:** Where the diagnosis has been confirmed by culture as *M. tuberculosis*, *M. bovis* or *M. africanum*.

**Other than culture confirmed cases:** In the absence of culture confirmation, a case with a clinician's judgement that the patient's clinical and/or radiological signs and/or symptoms are compatible with tuberculosis *and* a clinician's decision to treat the patient with a full course of anti-tuberculosis treatment<sup>1</sup>

**Pulmonary tuberculosis:** A disease involving the lung parenchyma and/or bronchial tree, with or without extra-pulmonary tuberculosis diagnosis.

**Sputum smear result:** Sputum smear positive tuberculosis is defined as a positive microscopy result on spontaneously produced or induced sputum.

**Multi-drug resistance (MDR):** Resistance to at least isoniazid and rifampicin.

**Extensively-drug resistant (XDR):** An MDR case with additional resistance to any fluoroquinolone and at least one of the second-line drugs (capreomycin, karamycin, amikacin).

**Health and Social Care Trusts in Northern Ireland (HSCT):** There are 5 HSCTs in Northern Ireland; Belfast (BHSCT), South East (SEHSCT), Northern (NHSCT), Southern (SHSCT) and Western (WHSCT).

**Treatment outcome:** A patient is defined as having completed treatment if; a) the case was reported, b) the patient completed a full course of treatment and c) was officially discharged by the attending physician.

## Methodology

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### Data collection

Completed tuberculosis notification forms are forwarded to the Public Health Agency (PHA) in Northern Ireland where the information is entered onto a secure database. Treatment outcome forms are generated and forwarded, approximately twelve months after initial notification, to the patient's clinician, who then returns them to the PHA. This information is then appended to the initial notification details.

Information on *Mycobacterium tuberculosis* complex isolates are obtained from local hospital diagnostic laboratories and the mycobacterial reference laboratory. Collected data include species (*Mycobacterium tuberculosis*, *M. bovis* and *M. africanum*), specimen type, strain type and drug susceptibility.

Data on cause of death, including tuberculosis, are also collected from the Northern Ireland Statistics and Research Agency (NISRA).

Datasets are validated (using laboratory reports and anti-microbial susceptibility information), updated and analysed.

### Data analysis

Data are entered onto the PHE National Enhanced TB Surveillance database and analysed using STATA. Tuberculosis rates per 100,000 of the population, stratified by age, sex and HSCT, were calculated using the mid-year estimates of the Northern Ireland population from NISRA.

## Results

### Overall number of cases and rates of infection

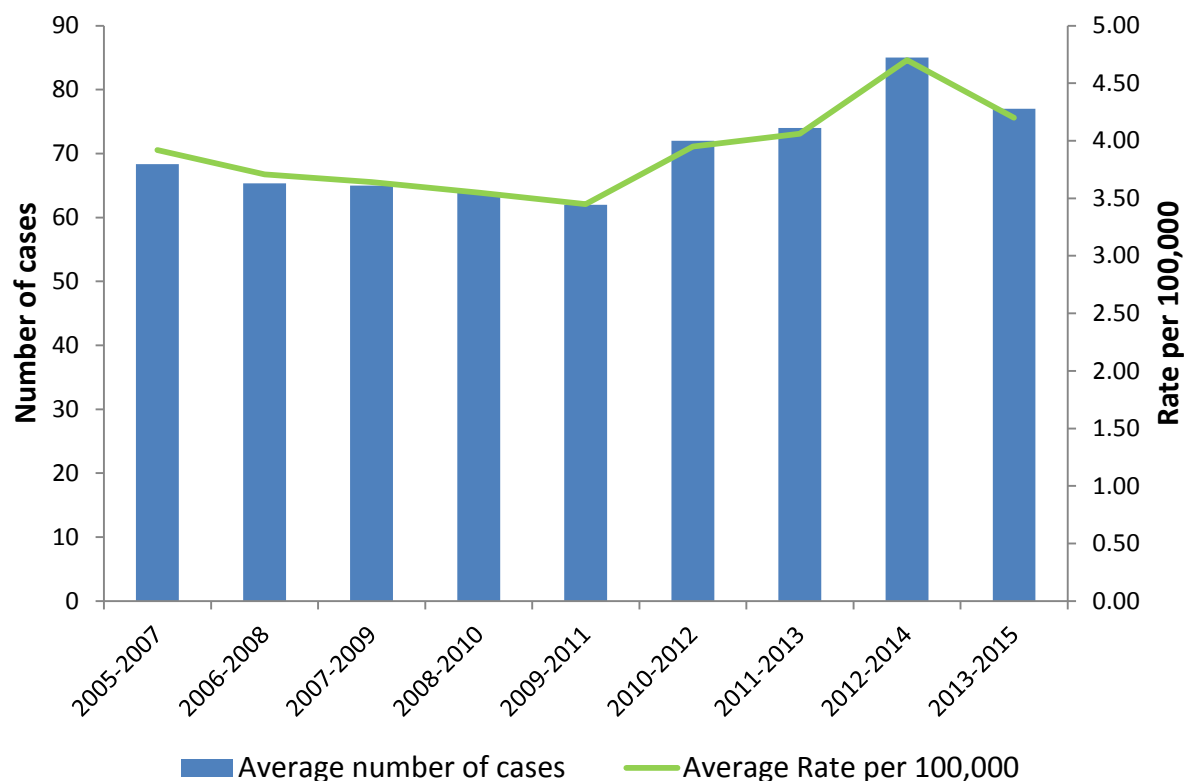
In 2015, a total of 62 cases of tuberculosis were reported in Northern Ireland giving a rate of 3.4 cases/100,000 population a 35% decrease from the rate of 5.2 cases per 100,000 population reported in 2014 (Figure 1).



**Figure 1: Tuberculosis case reports and rates, Northern Ireland, 2006-2015**

From 2009 there has been on average a small but gradual increase in both numbers of cases and rates of TB in the region. From 2012 to 2014 the annual incidence rates of TB have exceeded the nine year average rate (from 2006-2014; 3.9/100,000), however, the incidence rate in 2015 is below this average. The three-year moving average numbers and rates of notified TB cases for 2005-2015 are shown in Figure 2.





**Figure 2: Three year moving average numbers and rates of Tuberculosis cases in Northern Ireland, 2005-2015**

In 2015, TB rates were highest in the Southern Health and Social Care Trust (SHSCT) at 7.0 cases per 100,000, a 19% decrease compared to 2014 when the rate was 8.7 per 100,000. TB rates decreased by 54% in the Belfast Health and Social Care Trust (BHSCT) from 9.4 cases per 100,000 in 2014 to 4.3 cases per 100,000 in 2015, making TB rates in this Trust similar to 2006 levels. Rates of TB decreased slightly in the remaining three Trusts: in the South Eastern Health and Social Care Trust (SEHSCT) from 3.9 per 100,000 in 2014 to 2.8 per 100,000 in 2015, in the Northern Health and Social Care Trust (NHSCT) from 2.4 per 100,000 to 1.5 per 100,000 and in the Western Health and Social Care Trust (WHSCT) from 1.7 to 1.3 cases per 100,000. Small numbers of cases in some of the Trusts will affect percentages (Figures 3 and 4).

# Epidemiology of Tuberculosis in Northern Ireland, Annual Surveillance Report 2015

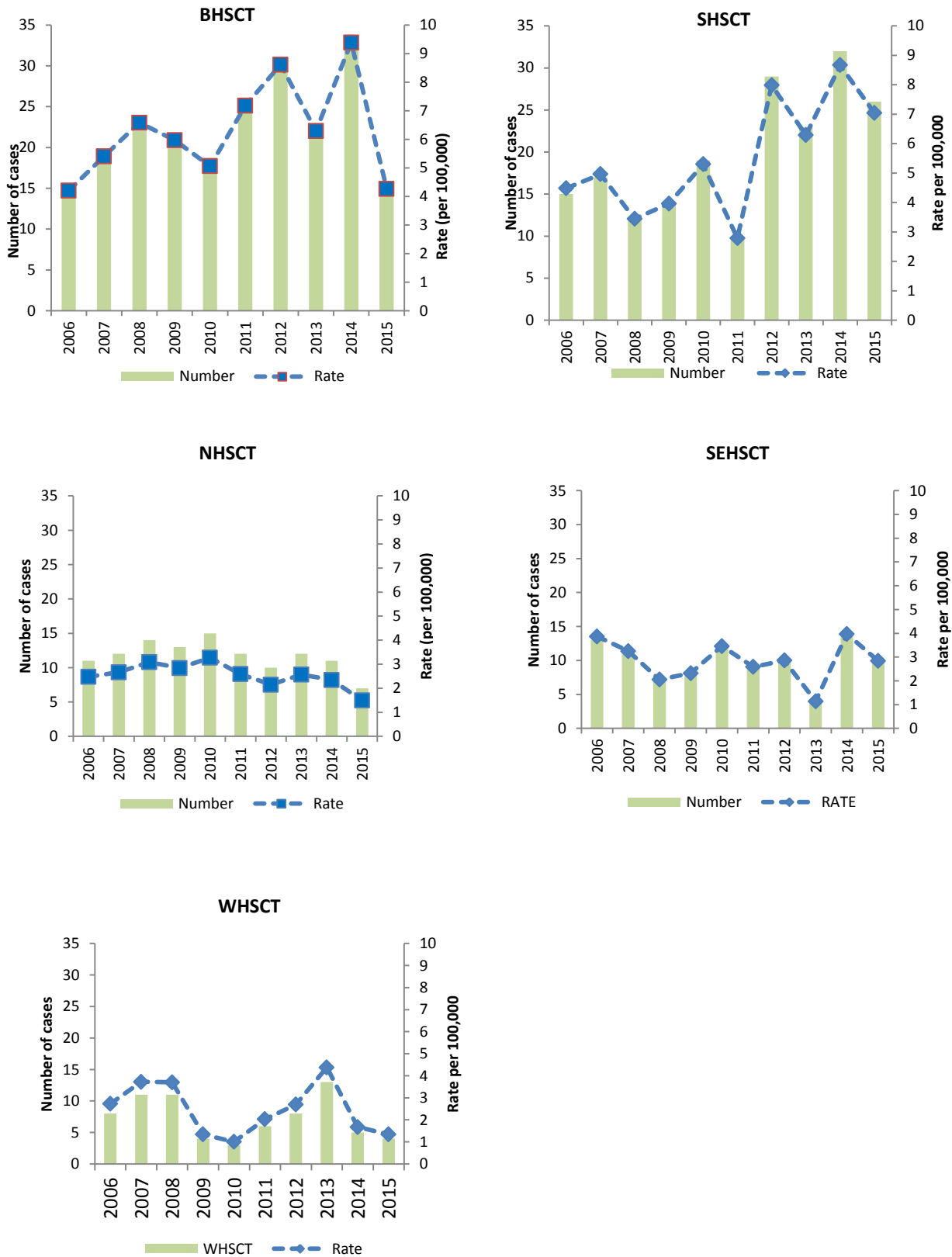
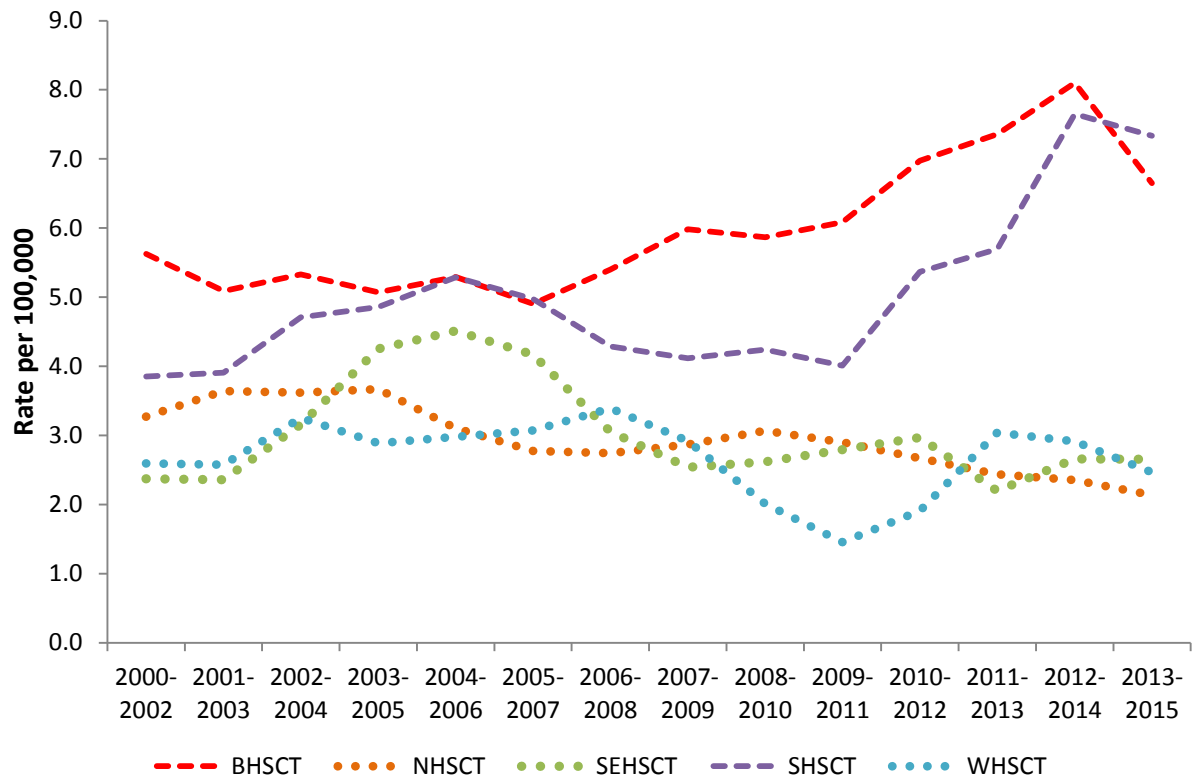


Figure3: Tuberculosis case reports and rates by Health and Social Care Trust, Northern Ireland, 2006-2015



**Figure 4: Three year moving average number and rates of Tuberculosis cases by HSCT in Northern Ireland, 2000-2015**

## Demographic Characteristics

### Age and gender:

Of the 62 notified cases of tuberculosis in 2015, 35 were male and 27 were female, giving a sex ratio male/female (M/F) of 1.30 (a slight decrease on the M/F ratio of 1.97 recorded in 2014). The ages ranged from 3 years to 86 years, with a median age of 38 years and a mean age of 41 years. Patients aged 15-44 years accounted for 60% of cases, an increase from 2014 when this group accounted for 54% of cases; those aged 45-64 years accounted for 19%; those age 65 years and over accounted for 16%; and patients aged 0-14 years accounted for the remaining 5% of TB cases in 2015.

Similar to 2014, TB rates in 2015 remained highest in those aged 15-44 years at 5.1 per 100,000 (Figure 5). This age-group accounted for 63% (n=22/35) of all male cases reported with TB in 2015 and 56% (n=15/27) of female cases, respectively. The majority (68%, n=25/37) of cases in this age group were born outside the UK/Ireland.

In 2015 there was also some evidence of recent transmission with four cases of TB diagnosed in those aged below 16 years. All four cases were born in the UK/Ireland.

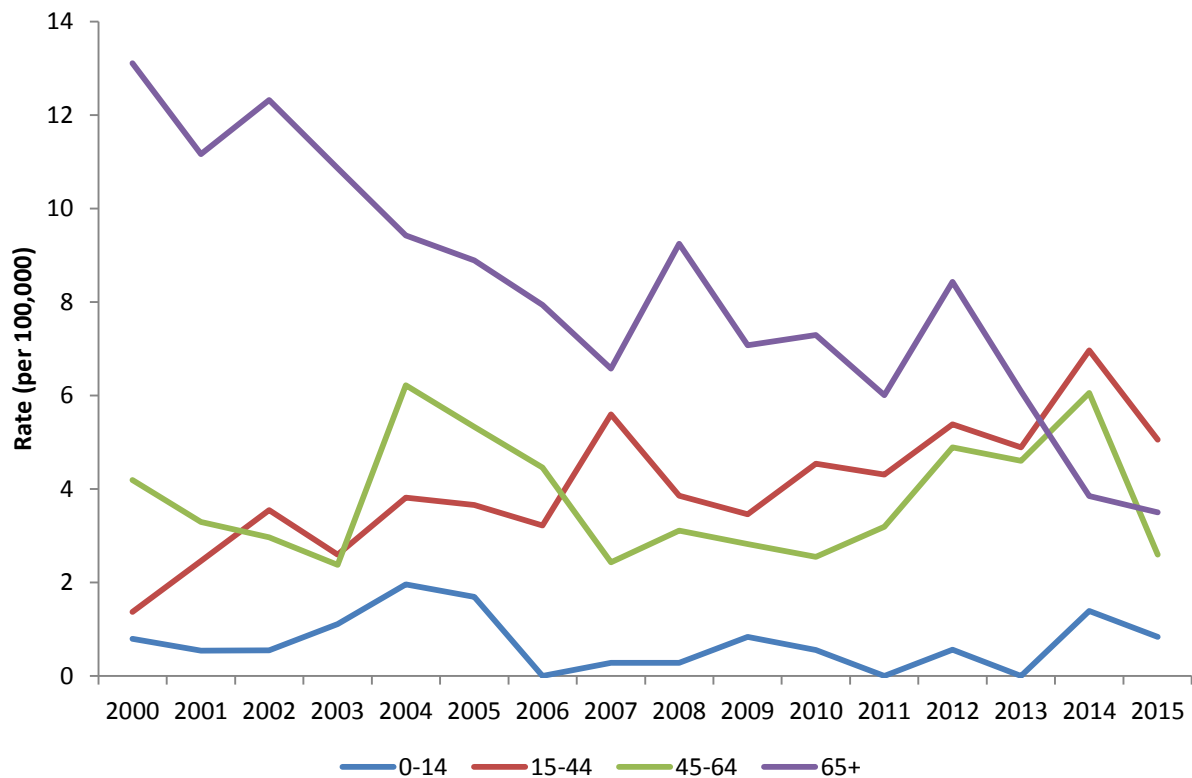
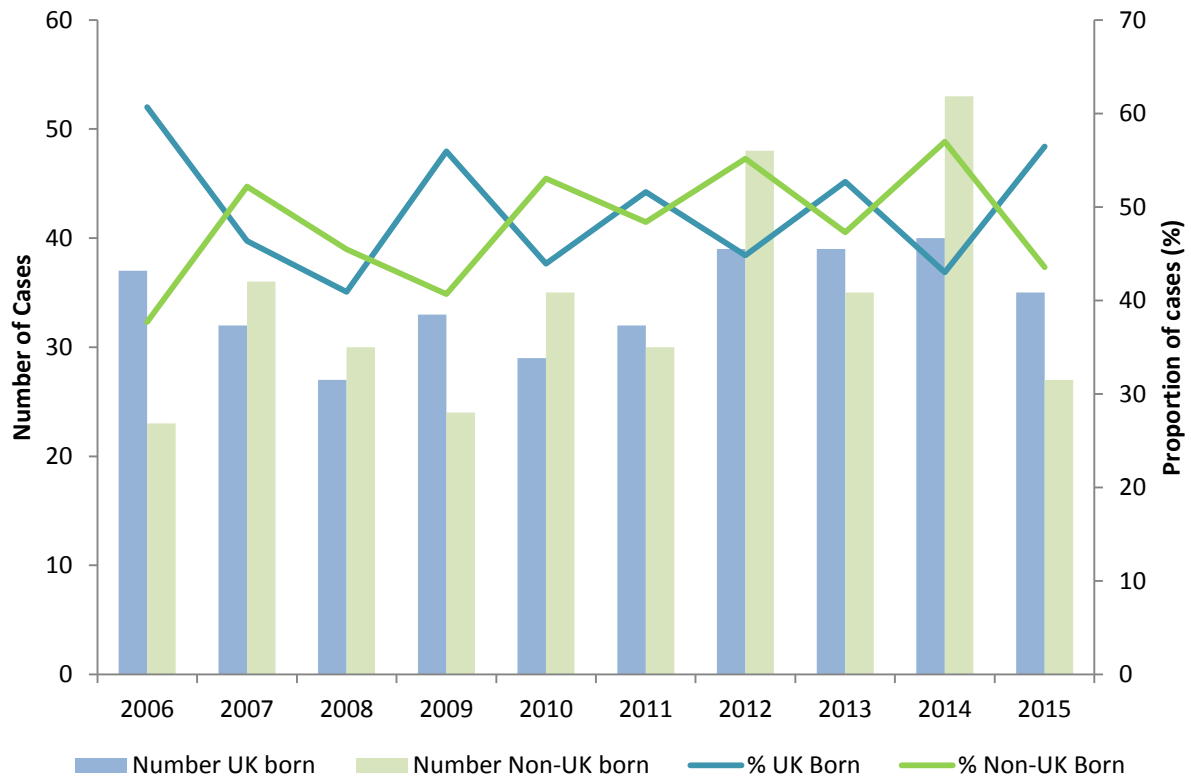


Figure 5: Northern Ireland TB rates per 100,000 by age group, 2000-2015

**Place of birth:**

In 2015, 44% (n=27/62) of TB cases were born outside the UK/Ireland, a decrease compared with 2014 when the proportion of non-UK-born cases was 56% (Figure 6). The country of origin was not known for three TB cases born outside the UK/Ireland in 2015. Similar to previous years the majority (88%, n=21/24) of TB cases born outside the UK/Ireland in 2015 originated from South-East Asia and the most common countries of origin remained similar to 2014 as being Timor-Leste (54%, n= 13/24) and India (21%, n=5/24) (Figures 7 and 8).

Information was available on ethnicity for all cases in 2015. The highest proportion of cases, 60% (n=37/62), was of white ethnicity, with three of these cases born outside the UK/Ireland.



**Figure 6: Northern Ireland number and proportion of UK Born and Non-UK Born tuberculosis case reports, 2006-2015**

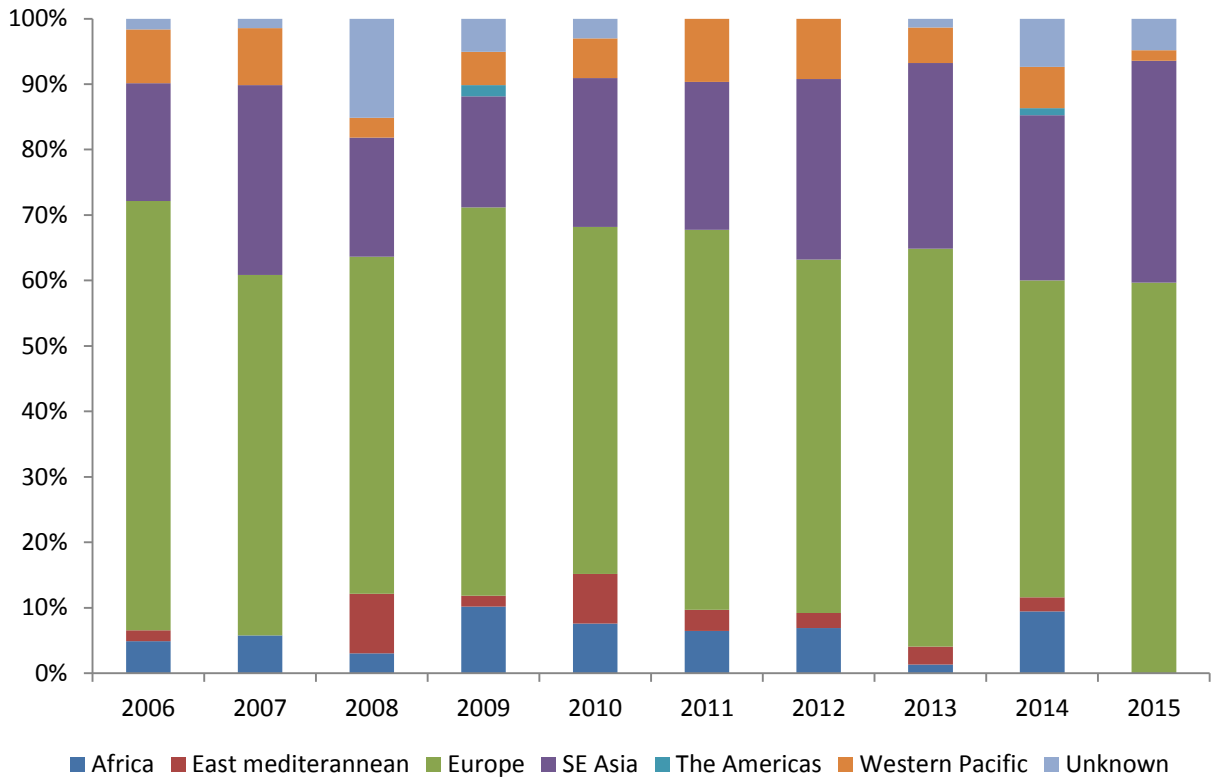


Figure 7: Northern Ireland tuberculosis reports by WHO region of case, 2006-2015

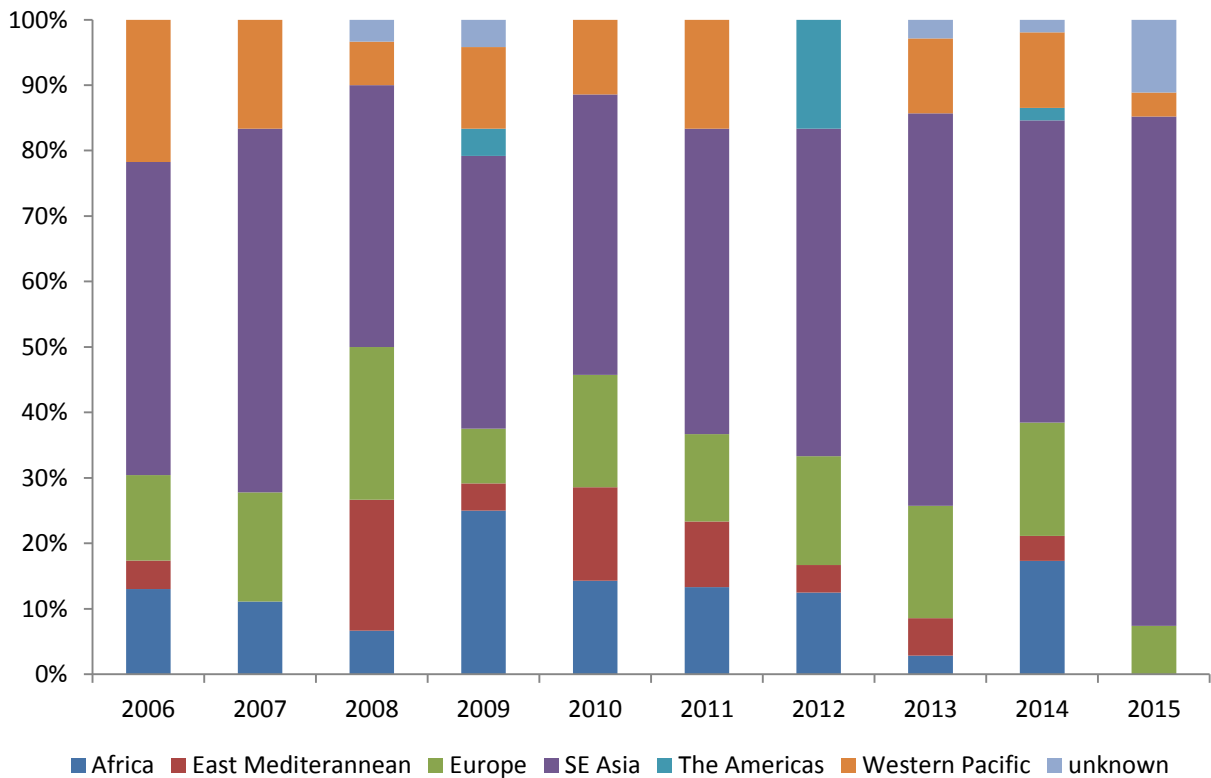


Figure 8: Non-UK Born tuberculosis reports in Northern Ireland by WHO region, 2006-2015

### ***Time from entry to UK to diagnosis***

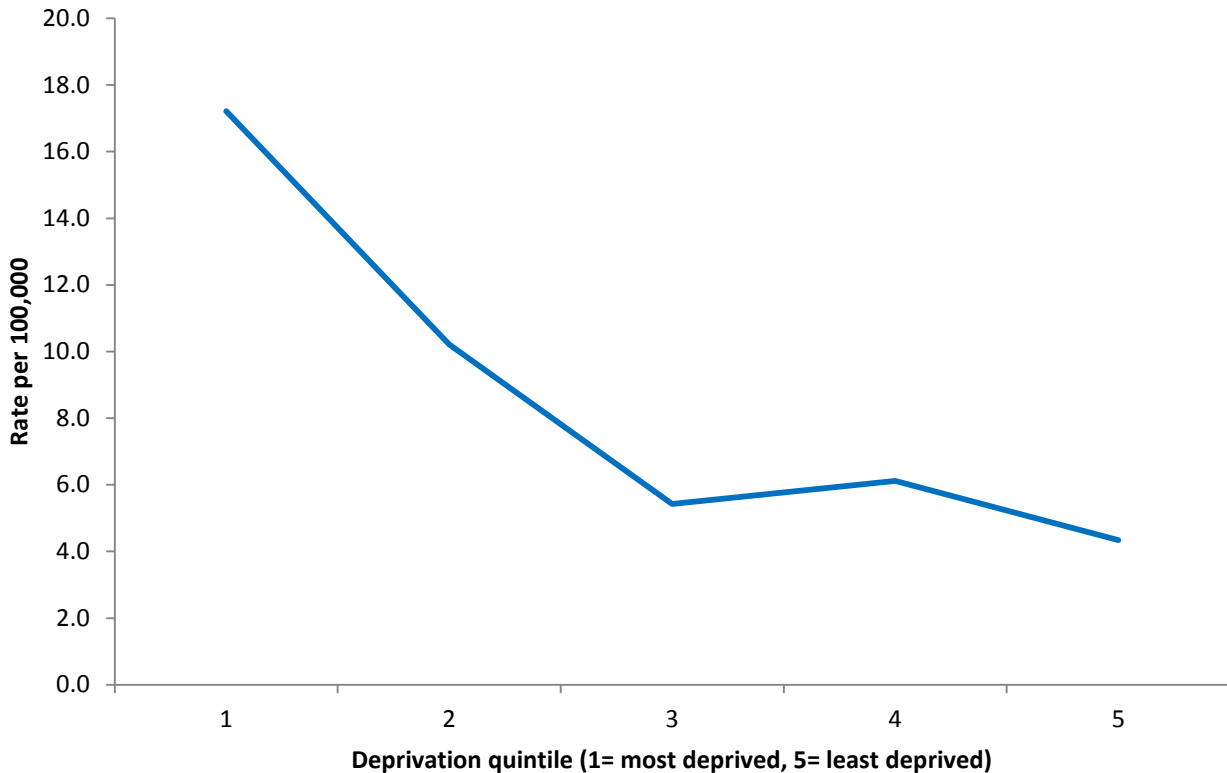
Time from entry into Northern Ireland until TB diagnosis was known for 85% (n=23/27) of cases born outside the UK/Ireland in 2015. Of these 44% (n=10/23) were diagnosed within two years of entry; 39% (n=9/23) were diagnosed between three and nine years of entry; and the remaining 17% (n=4/23) had been in Northern Ireland for ten years or more before diagnosis.

### ***Social risk factors***

Similar to 2014, there were only five (8%) TB cases in 2015 that reported one or more social risk factors. The risk factors associated with the cases were reported as being homeless and/or a history of alcohol misuse/abuse or were in prison in the last five years. However, non-reporting of risk factors may not be indicative of there being no risk factors existing; therefore it is difficult to ascertain the true incidence.

### ***Deprivation:***

In 2014-2015 the rate of TB in the 20% of the population living in the most deprived areas of Northern Ireland was 17.2 per 100,000 population compared with 4.3 per 100,000 in the 20% of the population living in the least deprived areas. The rates of TB generally increased with increasing deprivation (Figure 9).



**Figure 9: Rate of TB by deprivation, Northern Ireland 2014-2015**

*The Index of Multiple Deprivation (IMD) 2010, is an overall measure of multiple deprivation experienced by people living in an area and is measured at Super Output (SOA) level. Commissioned output is based on Small Area Population Estimates for 890 Super Output Areas in Northern Ireland. NISRA - Demography and Methodology Branch*

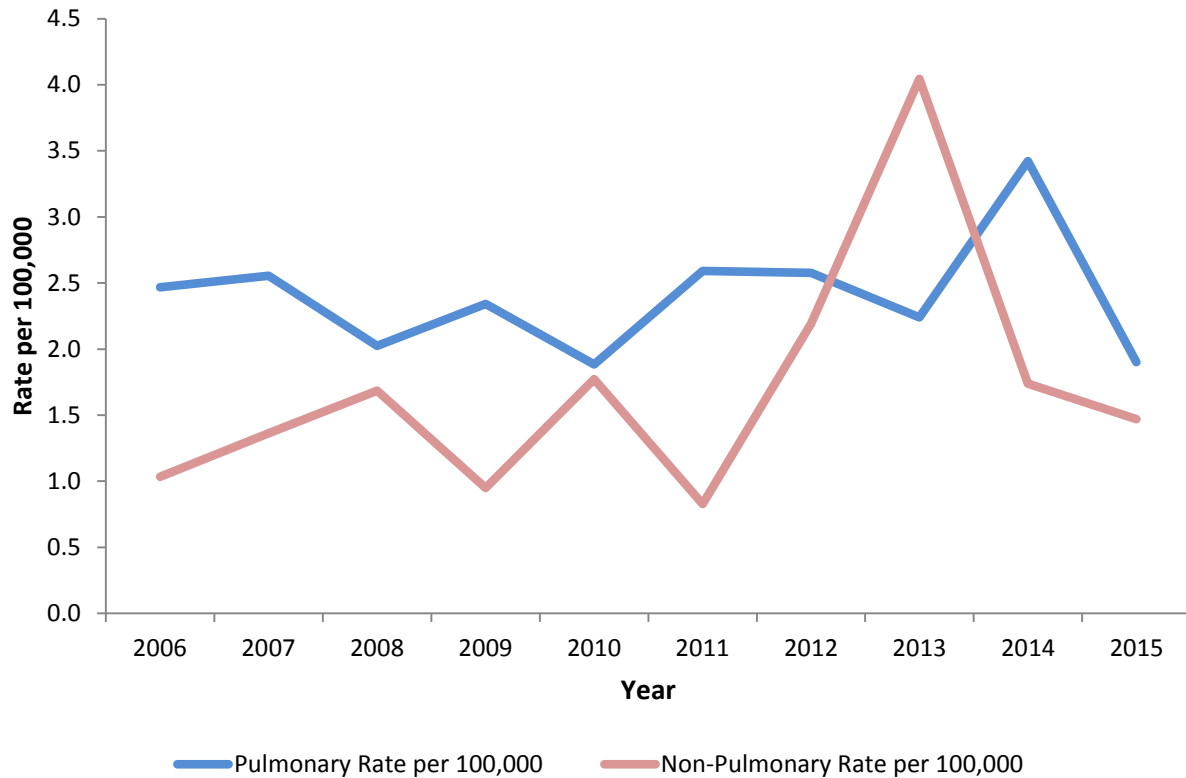
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## Clinical Characteristics

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In 2015, there were 35 (56%) cases with pulmonary disease, a decrease compared with 2014, when 66% of cases had a pulmonary component. Six cases (17%) of pulmonary disease were reported to have extra-pulmonary disease in at least one additional site. The rate of pulmonary tuberculosis cases in Northern Ireland decreased from 3.4 per 100,000 population in 2014 to 1.9 per 100,000 in 2015. The rates of non-pulmonary disease in the region also decreased from 1.7 cases per 100,000 in 2014 to 1.5 per 100,000 in 2015 (Figure 10).

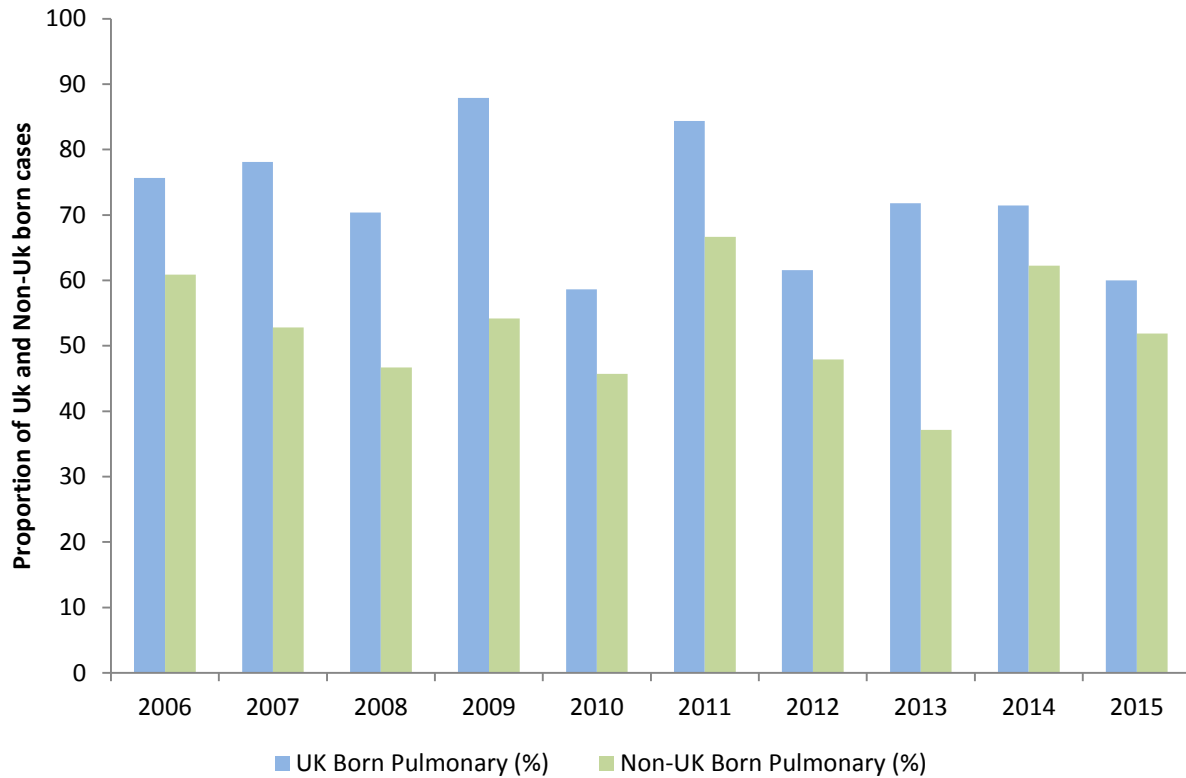




**Figure 10: Rates of pulmonary and non-pulmonary tuberculosis, Northern Ireland, 2006-2015**

**Site of disease-Pulmonary:**

In 2015, 60% (n=21/35) of cases born in the UK/Ireland had pulmonary disease, compared with 71% in 2014. The proportion of pulmonary disease in those born outside the UK/Ireland also decreased from 62% in 2014 to 52% (n=14/27) in 2015 (Figure11).



**Figure 11: Proportion of UK and Non-UK born tuberculosis cases pulmonary in Northern Ireland 2006-2015**

Pulmonary disease rates decreased in most age groups in 2015 compared with 2014. In males the highest rates of pulmonary TB disease were in those aged 15-44 years at 3.3 per 100,000. Pulmonary disease rates were lower in females than males. The highest rates in females were those aged 15-44 years and those over 65 years at 1.9 per 100,000, respectively (Figures 12 and 13).

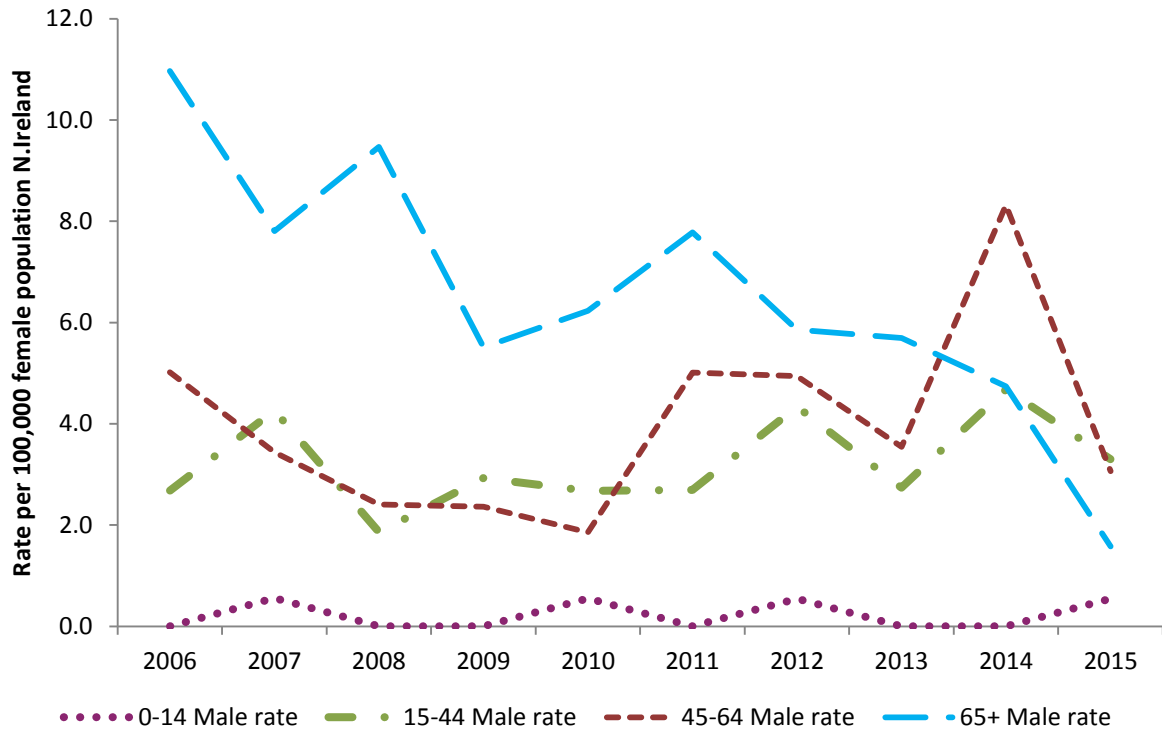


Figure 12: Pulmonary age-specific disease rates in males in Northern Ireland, 2006-2015

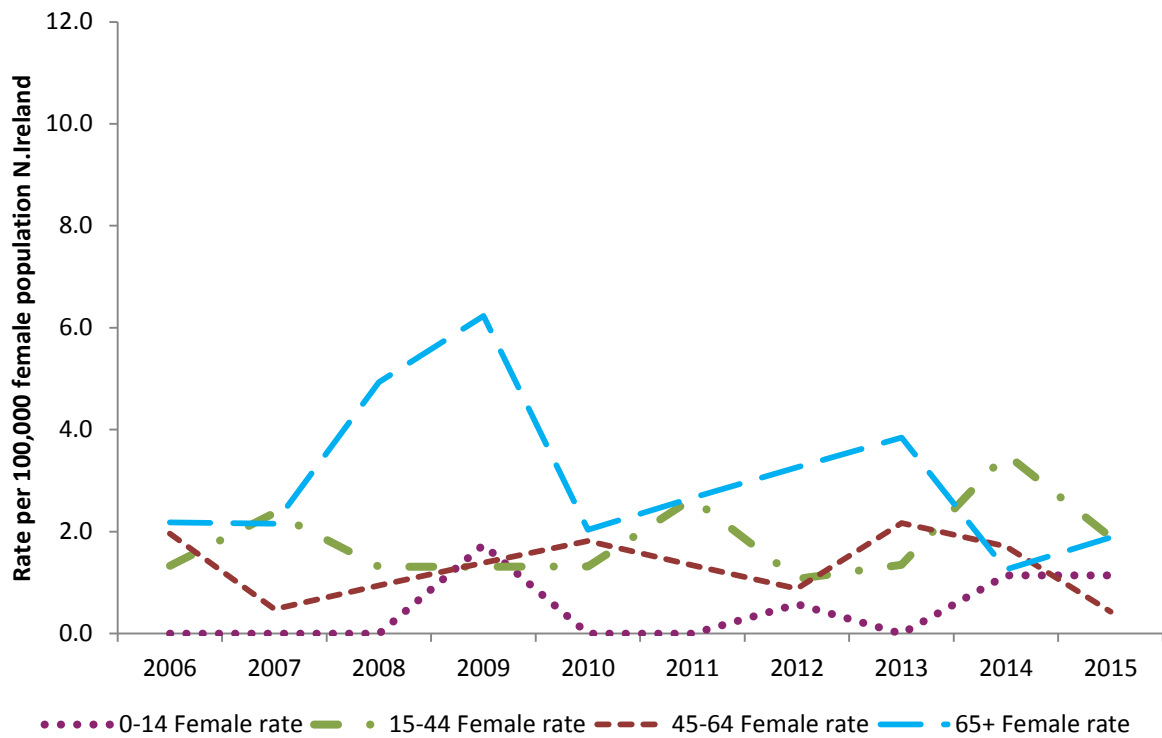
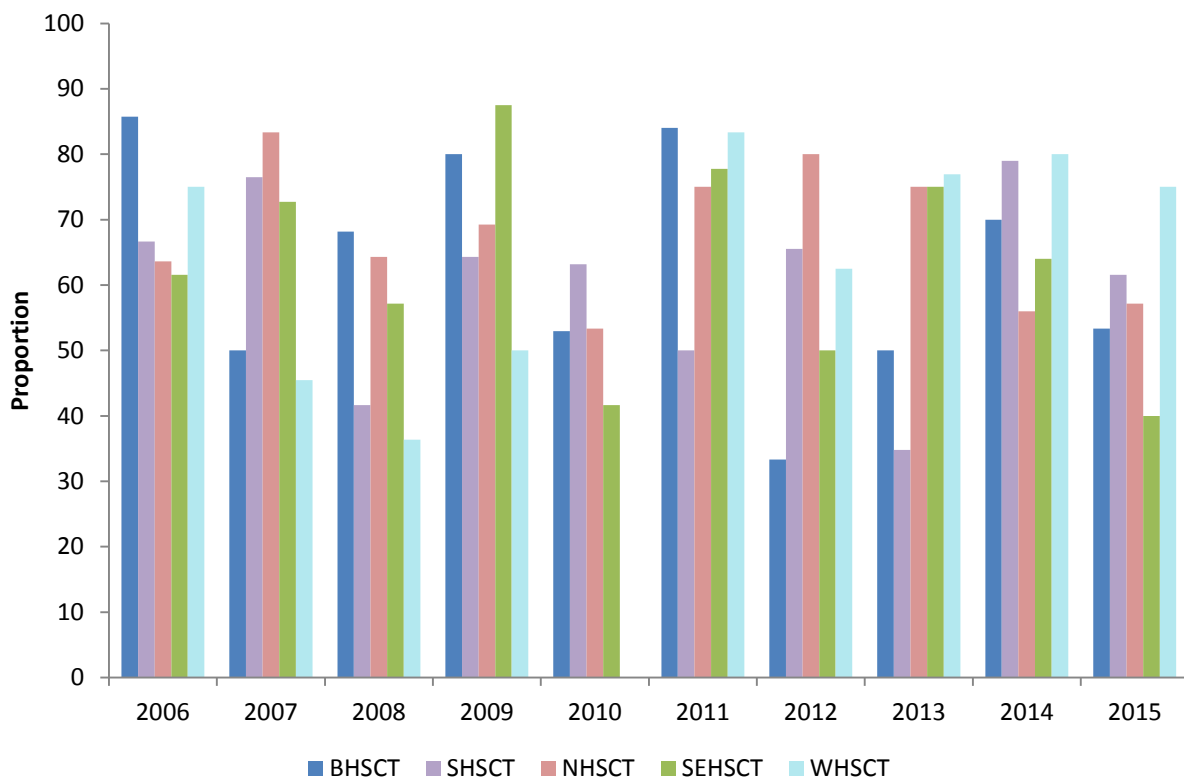


Figure 13: Pulmonary age-specific disease rates in females in Northern Ireland, 2006-2015

The SHSCT had the highest rate of TB with a pulmonary component in 2015 at 4.5 cases per 100,000 population, with TB pulmonary infection accounting for 62% (n=16/26) of all TB cases reported in this HSCT in 2015 (Figure 14). Similar to 2014, the WHSCT had the highest proportion of pulmonary cases, with 75% (n=3/4) of all cases having a pulmonary component (Figure 14).

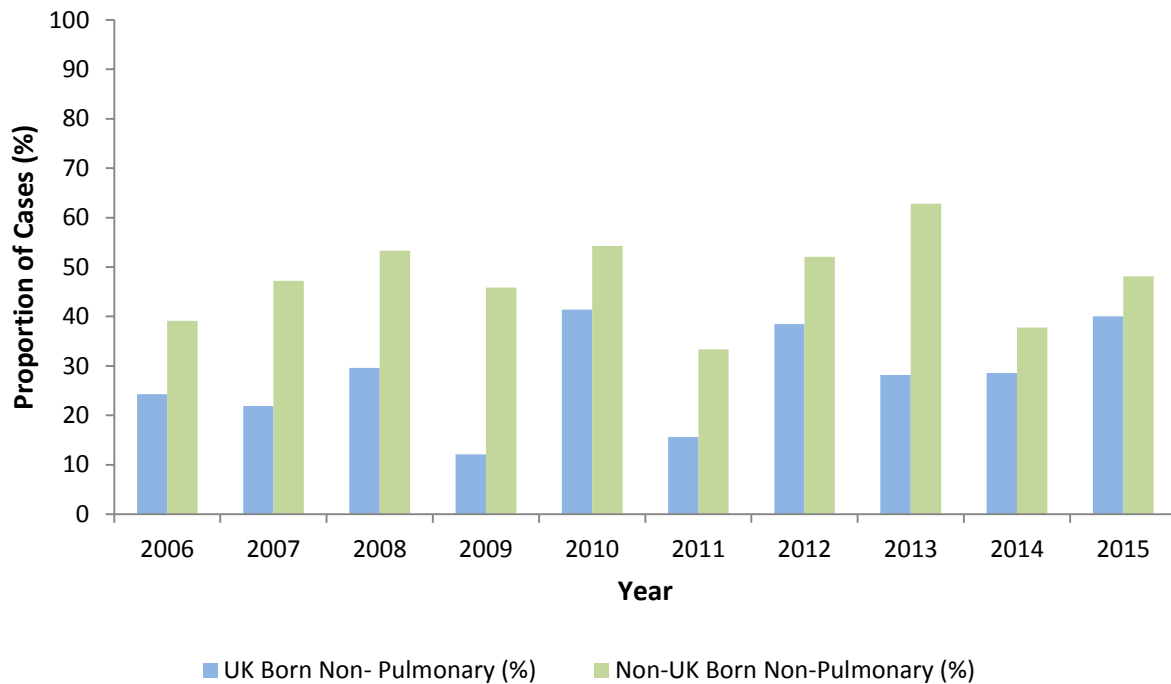


**Figure 14: Proportion of TB cases in Northern Ireland HSCTs with pulmonary infection, 2006-2015**

#### **Site of disease- Non-pulmonary:**

Of the 62 cases notified in 2015, 27 cases were diagnosed with non-pulmonary TB representing 44% of all cases notified, an increase compared with 2014 when 34% of TB cases had non-pulmonary disease.

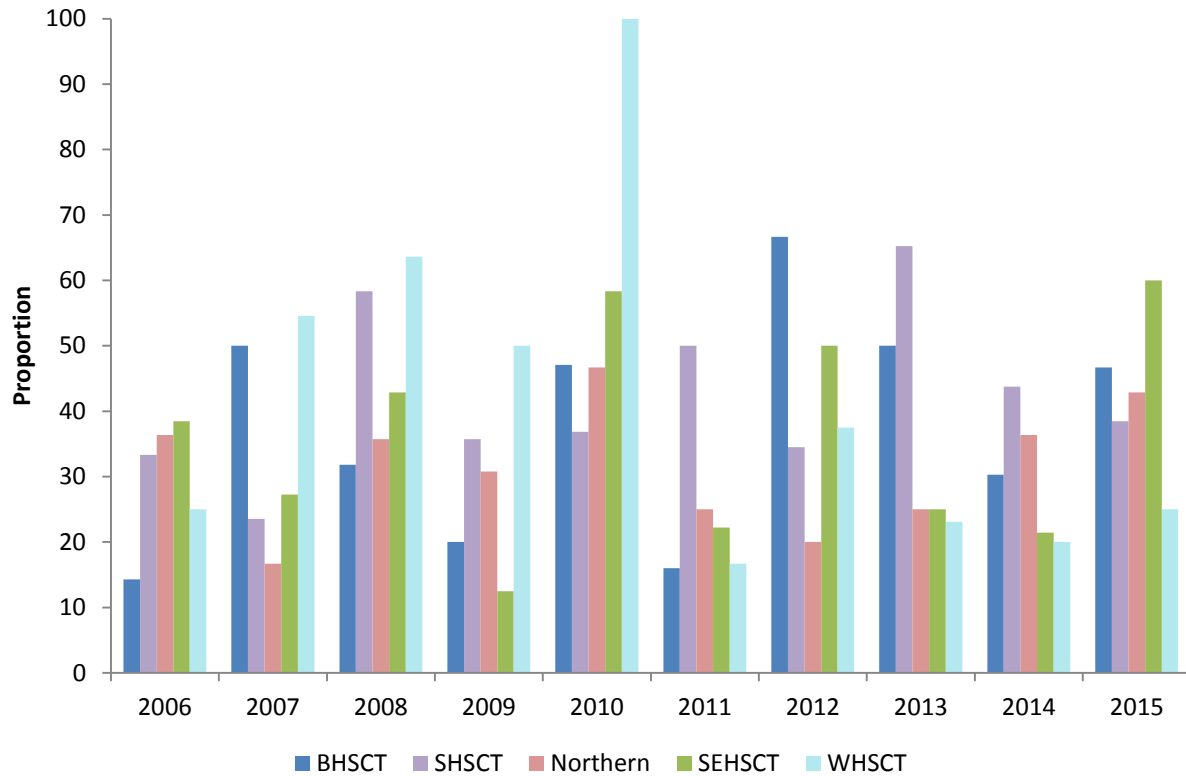
The proportion of cases born outside the UK/Ireland that presented with non-pulmonary TB increased from 38% in 2014 to 48% (n=13/27) in 2015 (Figure 15).



\*\* Cases only included where place of birth was known

**Figure 15: Proportion of UK and Non-UK born tuberculosis cases Extra-pulmonary in Northern Ireland 2006-2015**

The South Eastern Health and Social Care Trust had the highest proportion of extra-pulmonary tuberculosis cases at 60% (n=6/10), an increase from 2014 when 21% of cases in this Trust were extra-pulmonary however, small numbers in some of the Trusts can influence the statistics.



**Figure 16: Proportion of TB cases in Northern Ireland HSCT's with non-pulmonary infection, 2006-2015**

Of the 27 non-pulmonary cases of TB notified during 2015, 13 cases were male and 14 were female. The average age of both pulmonary and non-pulmonary disease cases was similar at 41.1 years, with a median age of 37.0 and 39.0 years, respectively. The highest age-specific rate in both males and females with non-pulmonary tuberculosis in 2015 was in those aged 15-44 years (Figures 17 and 18).

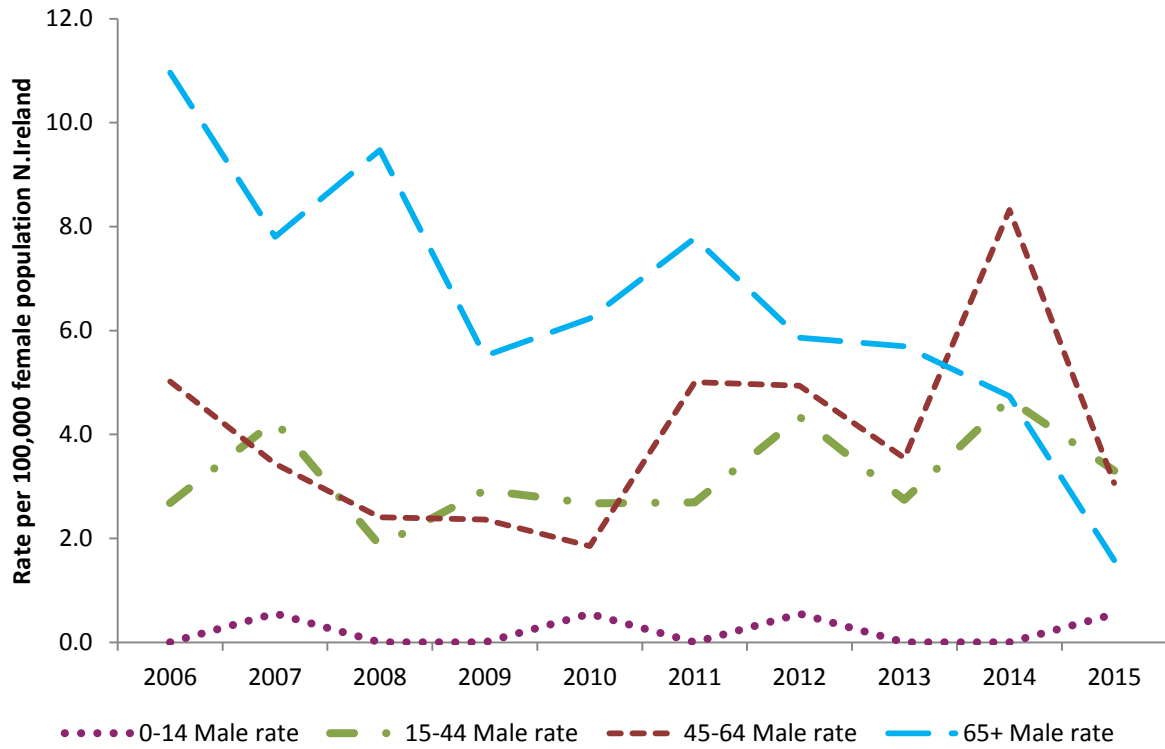


Figure 17: Non-pulmonary age-specific rates in males in Northern Ireland, 2006-2015

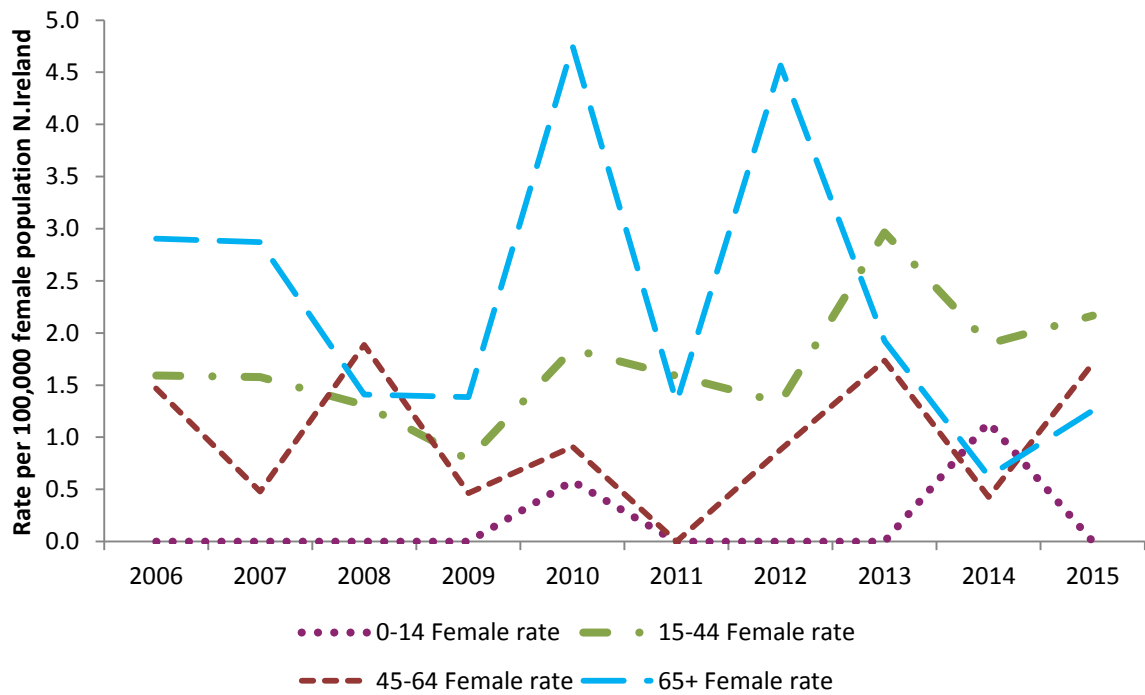


Figure 18: Non-pulmonary age-specific rates in females in Northern Ireland, 2006-2015

Pulmonary disease in TB patients in 2015 accounted for 56% of all TB cases reported (Table 1).

**Table 1: Tuberculosis case reports by site of disease, Northern Ireland, 2015**

Site of Disease	Number of cases	Proportion of all cases
Pulmonary	35	56%
CNS meningitis	5	8%
Extra-thoracic lymph nodes	4	6%
Gastrointestinal	4	6%
Miliary	4	6%
Pleural	3	5%
Intra-thoracic lymph nodes	3	5%
CNS other	3	5%
Bonejoint-spine	2	3%
Laryngeal	2	3%
Bonejoint-other	1	2%
genitourinary	1	2%

*Note: Total percentage exceeds 100% due to infections at more than one site.*

#### **Previous diagnosis of tuberculosis:**

In 2015 two cases reported a previous history of TB; both cases were born in the UK.

#### **Time symptomatic:**

The time between onset of symptoms and starting treatment was known for 57 (92%) cases in 2015. Of the 57 cases: 49% (n=28) were treated within two months of onset of symptoms with a median time frame of 24 days (IQR 11-41), an additional 16% (n=9) of cases were treated within two to four months of onset with a median time period of 83 days (IQR 80-104), the remaining 35% (n=20) of cases reported a treatment period from onset of symptoms greater than four months with a median time period of 240 days (IQR 175-347).

The time between onset of symptoms and starting treatment was known for 30 (86%) of the 35 pulmonary cases in 2015. The overall median time period from onset of symptoms to treatment was 54 days (IQR 22-166), this period was lower than for non-pulmonary cases where the median time period from onset to treatment was 80 days (IQR 37 to 197) ( Table 2).



**Table 2: Time between onset of symptoms and start of treatment (days)**

All cases	Number	Median	IQR
<b>0-2 months</b>	28	24	11-41
<b>2-4 months</b>	09	83	80-104
<b>&gt;4 months</b>	20	240	175-347
<b>All</b>	<b>57</b>	<b>72</b>	<b>25-184</b>
Pulmonary cases			
<b>0-2 months</b>	17	22	11-45
<b>2-4 months</b>	03	83	80-107
<b>&gt;4 months</b>	10	218	184-298
<b>All pulmonary</b>	<b>30</b>	<b>54</b>	<b>22-166</b>
Non-pulmonary			
<b>0-2 months</b>	11	32	08-50
<b>2-4 months</b>	06	91	72-104
<b>&gt;4 months</b>	10	289	166-448
<b>All non-pulmonary</b>	<b>27</b>	<b>80</b>	<b>37-197</b>

## Microbiology

In 2015, 68% (n=40/62) of TB cases were culture confirmed, a similar proportion as 2014. Of the 40 isolates culture confirmed, 35 were identified as having *Mycobacterium tuberculosis* infection and five were *Mycobacterium bovis*. The additional 22 cases were notified on the basis of clinical or non-culture diagnosis and response to anti-tuberculosis therapy. Of these 22 cases, 6 (27%) were confirmed by histology.

Of the 35 pulmonary cases in 2015, 83% (n=29) were culture positive. Sputum smear results were known for 24 (69%) of the 35 pulmonary infection cases. Eleven (31%) pulmonary cases were sputum smear positive at notification, of which all were confirmed by culture. An additional 13 (37%) pulmonary infection cases were sputum smear negative of which ten were later confirmed by culture as *M. tuberculosis* and one as *M. bovis*. Of the 11 (31%) pulmonary cases where sputum smear status was not known or not done, five were culture confirmed (Table 3).

Of the 27 extra pulmonary cases in 2015, 41% (n=11) were culture positive, 37% (n=10) were culture negative and the remaining six cases were not cultured.

**Table 3: Pulmonary, Culture positive and Sputum Smear positive tuberculosis cases, Northern Ireland, 2006-2015**

Year	Pulmonary Cases	Culture Positive (%)	Culture and Sputum Smear Positive (%)
2006	43	84%	37%
2007	45	93%	51%
2008	36	83%	39%
2009	42	86%	33%
2010	34	97%	59%
2011	47	81%	40%
2012	47	77%	36%
2013	41	66%	32%
2014	63	68%	41%
2015	35	83%	37%
<b>Total</b>	<b>433</b>	<b>81%</b>	<b>40%</b>

**Table 4. Non-Pulmonary, culture positive tuberculosis cases, Northern Ireland, 2006-2015**

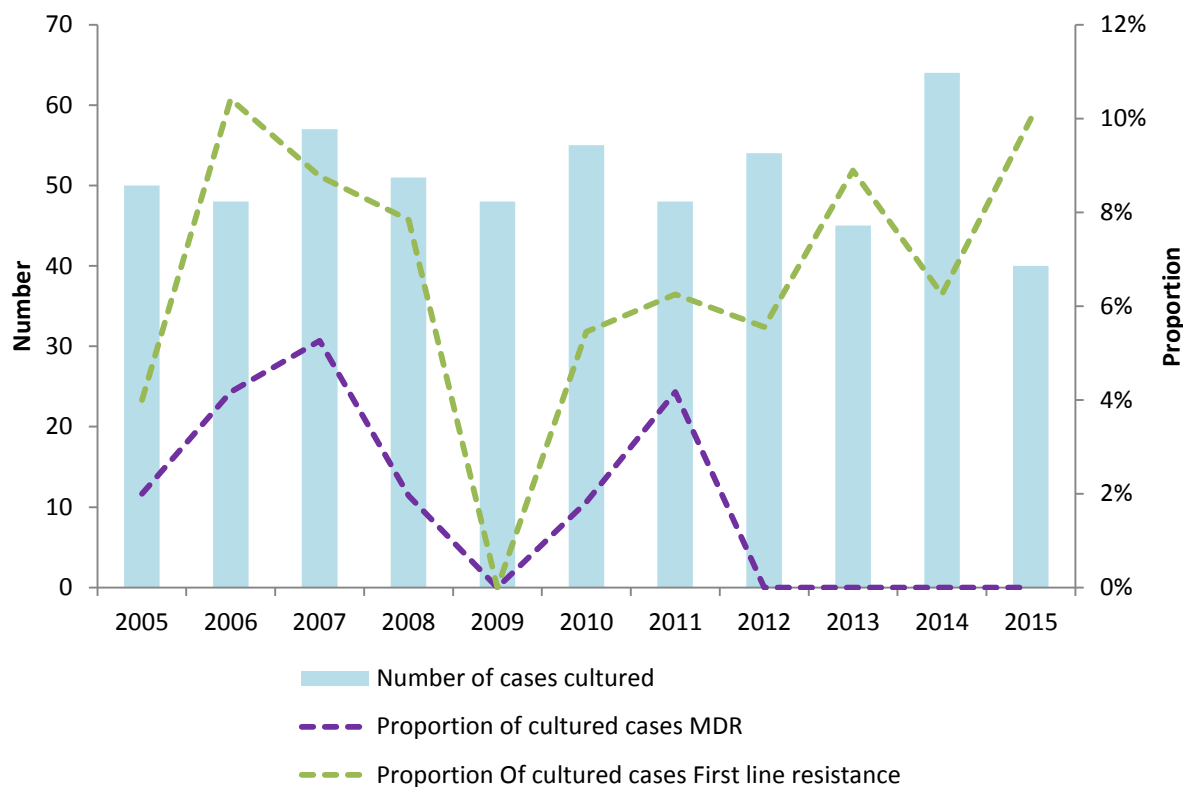
Year	Non-Pulmonary Cases	Culture Positive (%)
2006	18	67%
2007	24	63%
2008	30	70%
2009	17	76%
2010	32	69%
2011	15	67%
2012	40	45%
2013	33	55%
2014	32	66%
2015	27	41%
<b>Total</b>	<b>268</b>	<b>61%</b>

### Drug resistance

Isoniazid, rifampicin, ethambutol and pyrazinamide are first-line drugs for treatment of tuberculosis in the UK. Drug susceptibility test results were available for all 40 culture confirmed cases of TB in Northern Ireland in 2015.

In 2015, there was only one case recorded as being resistant to rifampicin, with an additional three TB cases resistant to Isoniazid at the start of treatment, representing 10%

of all culture confirmed cases. Three of the four cases were born outside the UK/Ireland with none of the four cases having a previous diagnosis of TB. All five *M. bovis* cases were also resistant to pyrazinamide (Figure 19).



**Figure 19: Number and proportion of drug resistant cases of tuberculosis in Northern Ireland, 2005-2015**

### Strain typing

Northern Ireland joined the National Strain Typing Service in 2011. TB isolates are typed using 24 loci Mycobacterial Interspersed Repetitive Unit-Variable Number Tandem Repeats (MIRU-VNTR). Molecular clusters of cases with indistinguishable 24 loci MIRU-VNTR profiles which fulfil certain criteria are investigated further to try and identify epidemiological links and transmission settings that can be then used to inform public health action.

From 2011 to 2015 there were 251 TB culture confirmed cases of which 249 (99%) were strain typed. Of the 249 typed, 209 (84%) had at least 23 complete loci.

In 2015, 98% (n=39/40) of all culture confirmed TB cases in Northern Ireland were typed at 23 loci or more.

## Treatment Outcomes

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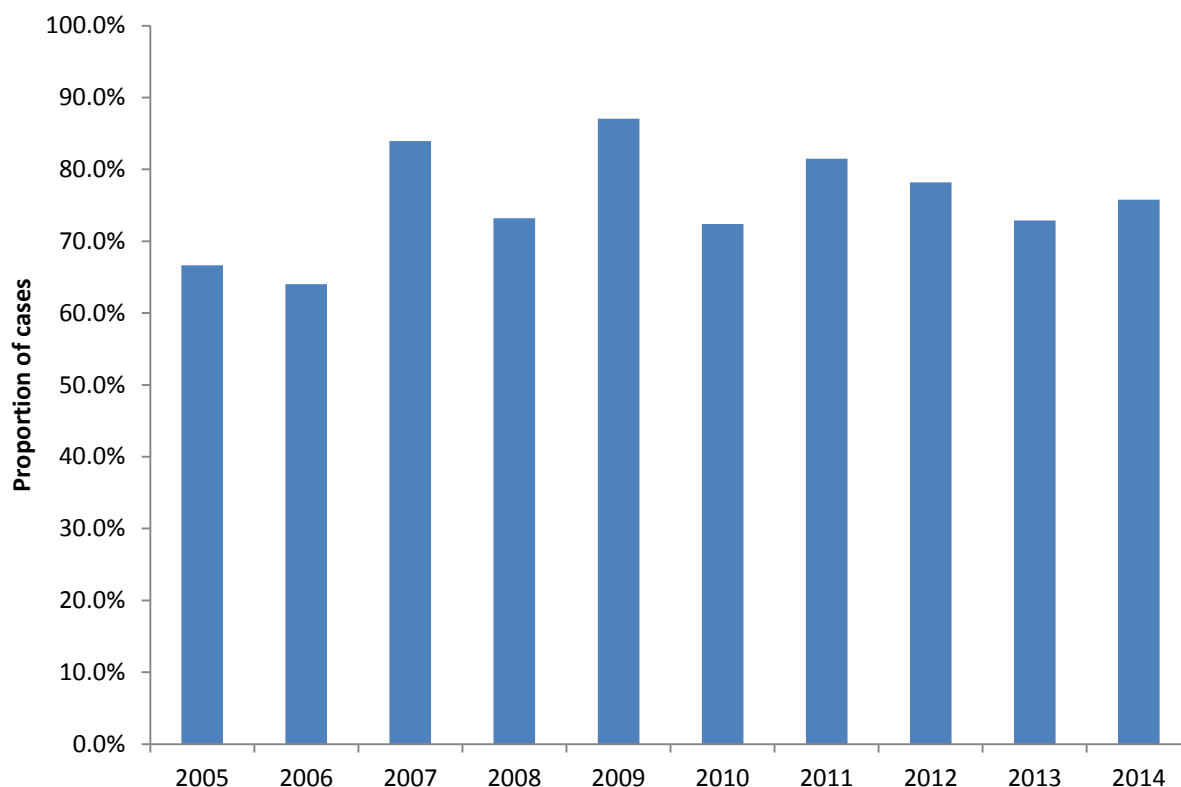
TB patient outcomes are reported in accordance with the World Health Organization (WHO) treatment outcome definitions<sup>1</sup>. Under these definitions, treatment outcome at 12 months reporting is defined as all TB cases, diagnosed in 2014 with drug sensitive TB, excluding those with rifampicin resistant TB or MDR-TB.

In this report, treatment outcomes for drug sensitive TB cases are reported separately for the following groups:

**Cohort 1:** For cases with an expected duration of treatment less than 12 months, treatment outcomes at 12 months (excluding Rifampicin and multi-drug resistance).

**Cohort2:** For cases with an expected duration of treatment less than 12 months, excluding Rifampicin and Multi-drug resistance AND cases with CNS, spinal, cryptic disseminated or miliary disease.

TB treatment outcomes for cases notified from 2005 to 2014 under the new definitions have been calculated to allow for trends to be monitored (Figure 20).



\*Excludes rifampicin resistant TB and MDR-TB cases and those with CNS, spinal, miliary or cryptic disseminated TB

**Figure 20: Treatment completion at 12 months for drug sensitive cases with expected treatment <12 months, 2005-2014**

In 2014, 95 TB cases were notified in Northern Ireland; there was only one case recorded as being resistant to rifampicin and no cases that were multi-drug resistant. Thus 94 cases are included in cohort 1. Seven cases had CNS, spinal, miliary or cryptic disseminated disease and are excluded from the outcomes presented in cohort 2 (Table 5).

**Table 5: Outcome of cohorts 1 and 2 2014 TB cases**

Outcome	Cohort 1 (n=94)	%	Cohort 2 (n=87)	%
Completed	76	81	72	83
Died	5	5	5	6
Lost to Follow up	5	5	5	6
Still on Treatment	7	8	4	4
Stopped	1	1	1	1
Not evaluated*	0	0	0	0
Total	94		87	

\*transferred out/unknown/missing

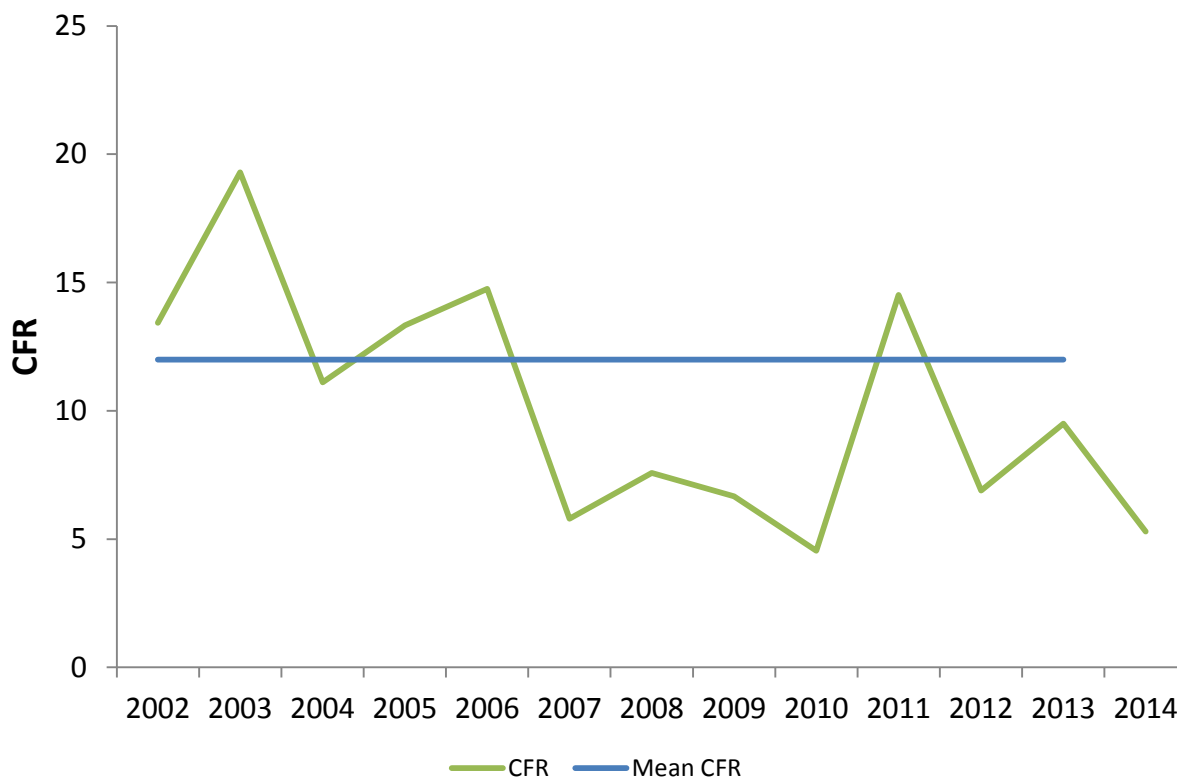
The proportion of cases notified in 2014 with expected treatment of less than 12 months that completed treatment within 12 months was 76% (n=72/95), compared with 73% (n=43/59) in 2013 (Figure 20).

In 2014, of the 87 cases expected to complete treatment within 12 months completion was slightly higher (85%, n=33/39) among cases born in the UK born compared with non-UK born cases (81%, n=39/48). Similarly the proportion of females completing at 12 months was marginally higher (86%, n=24/28) than males (81%, n=48/59).

The proportion of cases in cohort 2 who completed treatment within 12 months was 83% (n=72/87) an increase compared with 2013 when completion was 73% (n=43/59).

Of the four cases that were still on treatment at 12 months, two cases completed after the 12 months period.

Five patients died in 2014 giving a CFR of 5.3%, remaining well below the 10 year average (2003-2013) of 12% (Figure 21). One case was diagnosed post-mortem. Of the five cases; TB was cited as causing the death of two cases, contributing to death in two of the cases and was incidental to death in the fifth case. Two of the five cases were born outside the UK/Ireland. The average age of those who died was 55 years with an age-range from 30-91 years.



**Figure 21: Case-Fatality Rate of tuberculosis notifications, Northern Ireland 2002-2014.**

## Discussion

The incidence of TB in Northern Ireland remains at relatively low levels compared with other parts of the UK and Republic of Ireland<sup>2, 3, 4</sup>. However, the disease continues to affect the most deprived areas of Northern Ireland. The main burden of the disease in 2015 was in the Southern Health and Social Care Trust area, with the majority (62%) of cases in this Trust born outside of the UK/Ireland. In 2015, over 40% of all TB cases in Northern Ireland occurred in individuals born outside of the UK/Ireland, many of which are from countries with a high burden of TB.

The overall incidence of TB in 2015 of 3.4 per 100,000 population is at a similar level to 2006 and while there has been fluctuations annually in incidence of TB, on average there has been a slight decline in rates of the disease since 2012 in the region. In 2015 there was also some evidence of transmission with four cases in children, all born in the UK/Ireland.

The proportion of cultured cases of TB with first line drug resistance in 2015 was 10%, a slight increase from 2014 when 8% showed resistance. It is encouraging that the proportion of drug sensitive TB cases that were expected to complete treatment by 12 months, an indicator of the quality of the TB services, has improved again in 2015 with 83% of cases completing treatment in this time frame compared with 73% in 2014. The proportion of cases that died and were lost to follow-up also decreased in 2015.

The proportion of pulmonary TB cases that had a delay of greater than 4 months between symptom onset and treatment start was 33% in 2015, a decrease compared to 40% in 2014. While this decrease is reassuring it still suggests that that one third of pulmonary cases are having a substantial delay before treatment, and while we do not know the reasons behind the delay it highlights the need to continue raising awareness of TB.

## References

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