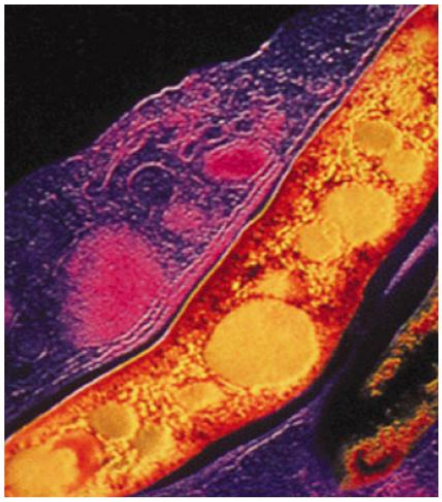
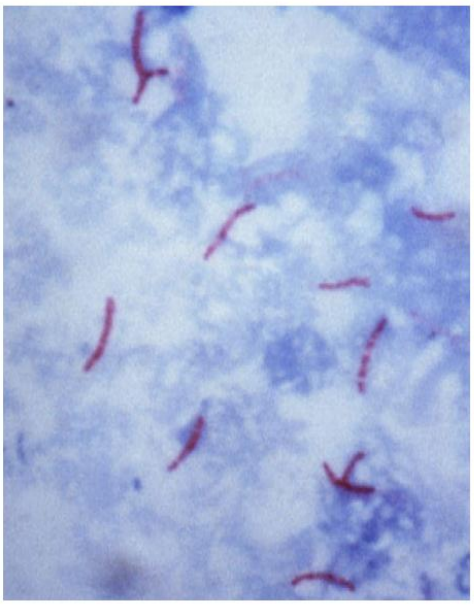
HSC Public Health Agency

Epidemiology of Tuberculosis In Northern Ireland

Annual surveillance report 2012





Surveillance of tuberculosis in Northern Ireland, 2012

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Acknowledgements

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Summary

In Northern Ireland in 2012 there were 87 notified cases of tuberculosis (TB), giving a rate of 4.8 cases per 100,000 population representing a 37% increase in rates from 2011 when the rate of TB was 3.5/100,000 population.

There are five Health and Social Care Trusts in Northern Ireland. In 2012, the highest rates of TB remained in the Belfast Health and Social Care Trust at 8.6 cases per 100,000 population, a 19% increase from 2011 when the rate was 7.2/100,000 population. Incident rates of TB were also high in the Southern Health and Social Care Trust, increasing from 2.8/100,000 in 2011 to 8.0/100,000 in 2012. The highest proportion of cases was also in this Trust with a three-fold increase in numbers of cases compared to 2011.

Cases of tuberculosis were principally male, with a male/female ratio of 2.3:1

There were six deaths in 2012 (CFR 6.9%), one case was diagnosed post mortem.

In 2012 the age of cases ranged from 5 to 89 years, with a mean age of 49 years and a median age of 45 years. The largest proportion of cases (46%) were in young adults aged between 15 and 44 years old. Those aged 65 and over continue to have the highest rate of tuberculosis at 8.4 cases per 100,000 population.

In 2012, the majority (55%) of notified cases were from cases born in countries with a high-burden of TB. Time from entry to the UK was known for 88% of non UK-born cases of which 24% were diagnosed within two years.

In 2012, 62% of cases were culture confirmed, all of which were confirmed as *Mycobacterium Tuberculosis*.

There were 47 (54%) cases with a pulmonary component in 2012. Rates of extra-pulmonary disease increased from 0.1/100,000 in 2011 to 2.2/100,000 in 2012.

In 2012, three cases showed resistance to one of the first-line drugs. All three cases were resistant to isoniazid.

Based on MIRU-VNTR strain typing over the period of 2011 and 2012, the proportion of TB cases in Northern Ireland likely to be due to recent transmission was 14%.

In 2012, outcome information was available for all cases. Of these, 66 (76%) completed treatment within 12 months. Thirteen cases (15%) were still receiving treatment after the 12 month period. In 2012, eight cases (9%) were lost to follow-up.

Introduction

In the United Kingdom TB notifications and rates have remained relatively stable but still at a high level from 2005, with the UK now having one of the highest incidence rates of any Western European Country[1].

In the United Kingdom, clinicians and public health staff work together at local levels to collect detailed clinical and demographic information on tuberculosis cases, which are reported to the enhanced surveillance scheme. Clinicians in Northern Ireland, similar to those throughout the UK, are required to notify all cases of tuberculosis to the Director of Public Health.

Notification forms (TBS1) are completed by clinicians, recording all available demographic, clinical, microbiological, histological and epidemiological details. In order to facilitate the export and central collation of data for England, Wales and Northern Ireland, outcome data is collected across all three regions of the UK on a standardised *Tuberculosis Treatment Outcome Surveillance Form* (TOM). This form is used to facilitate collection of drug treatment and outcome data, together with any additional clinical and/or microbiological information not available at the time of initial notification.

If *Mycobacterium bovis* infection is identified in a notified patient, an additional questionnaire is completed. This questionnaire collects data on case background information, travel history, un-pasteurised milk/milk product consumption, and occupational details (including animal contact).

This report presents the epidemiological data for tuberculosis cases reported in Northern Ireland from 1 January 2012 to 31 December 2012.

Definitions

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" [1]

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) (see ref 6 ROI 2009 report).

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.

Methods

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 nine months after initial notification, to the patients' clinician, who then returns it to the PHA. This data 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*), 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

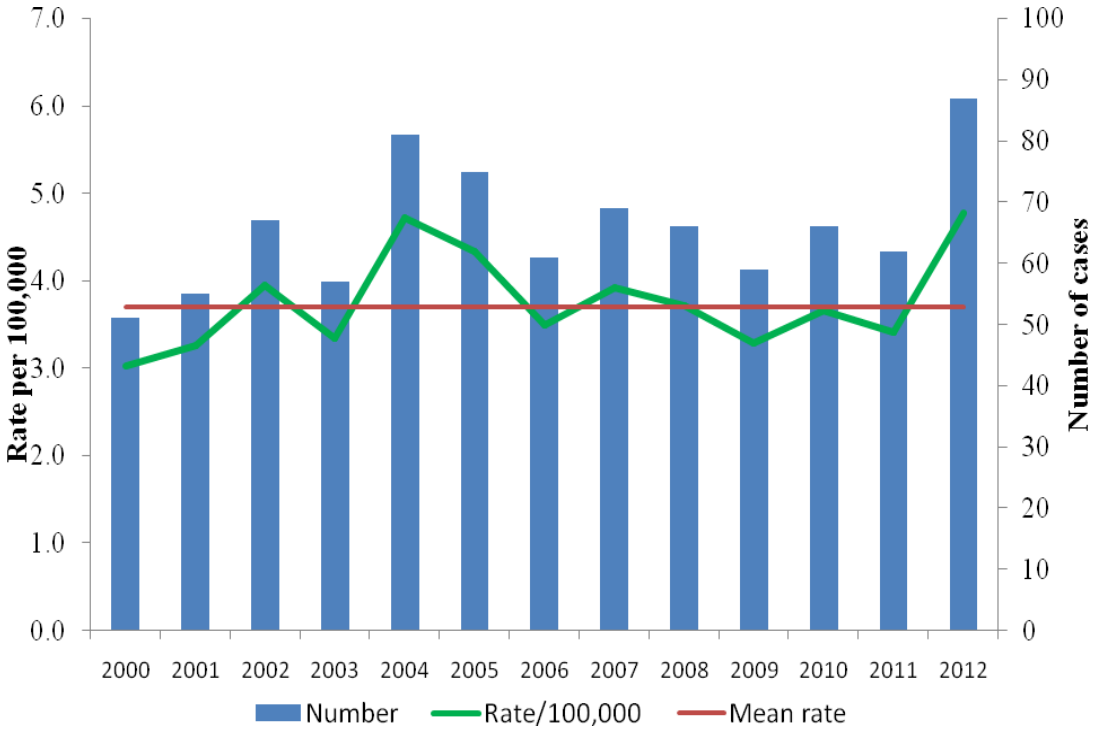
Data are entered onto the PHE National Enhanced TB Surveillance database and analysed using STATA. Tuberculosis rates per 100,000 of the population, stratified by age, sex and HSCT, were calculated using the mid-year estimates from NISRA.

Results

Overall number of cases and rates of infection

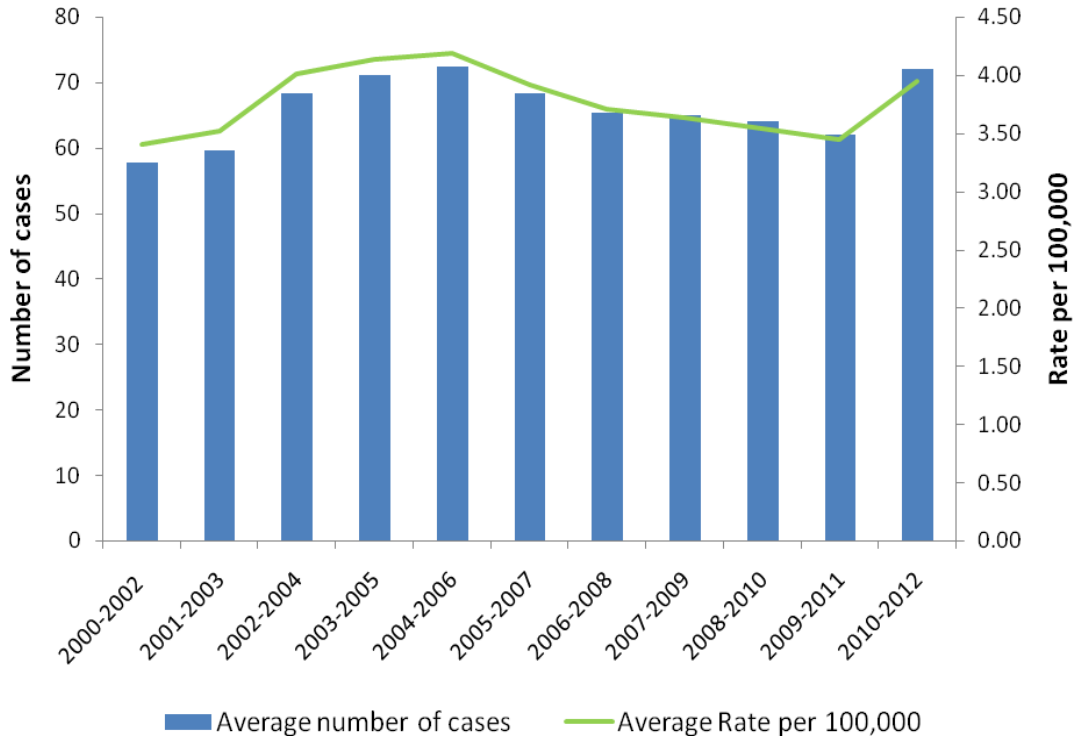
In 2012 in Northern Ireland, a total of 87 cases of tuberculosis were reported giving a rate of 4.8 cases/100,000 population. This represents a 40% increase in the number of cases compared with 2011 (Figure 1).

Figure 1: Tuberculosis case reports and rates, Northern Ireland, 2000-2012



The incident rate of tuberculosis in Northern Ireland in 2012 was 4.8 per 100,000 population, the highest rate to date and marginally increasing on the 2004 rate of 4.7 per 100,000 population. The number and rates of notified TB cases for 2000-2012 and the three-year moving averages are shown in Figure 2.

Figure 2: Three year moving average number and rates of Tuberculosis cases in Northern Ireland, 2000-2012



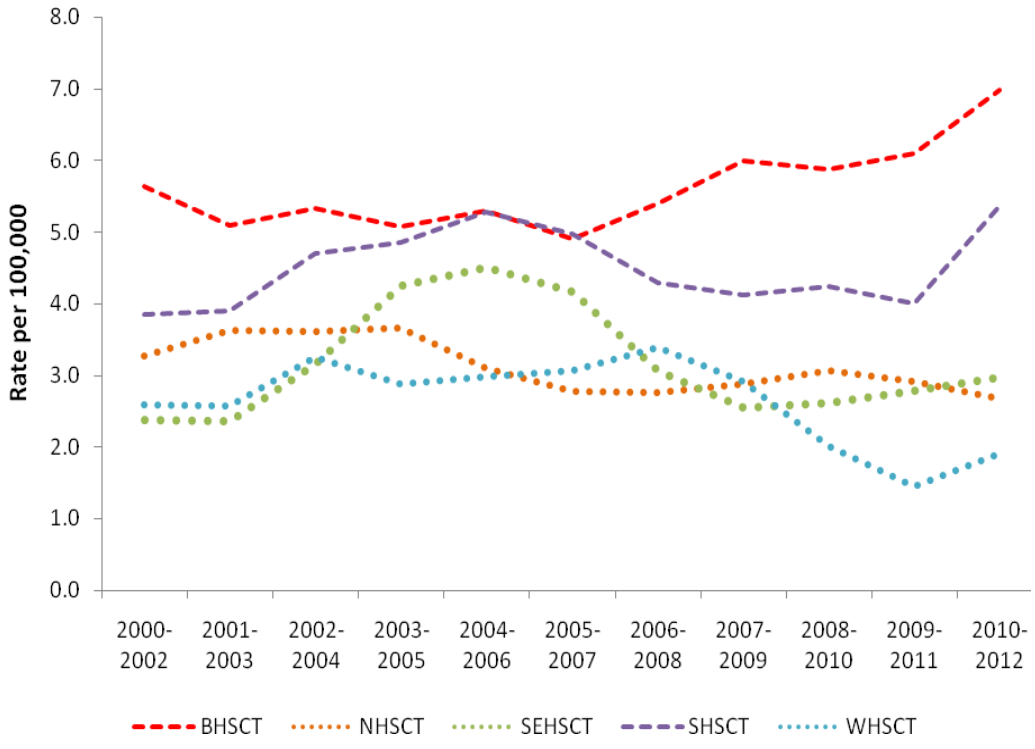
There are five Health and Social Care Trusts in Northern Ireland. In 2012, 34% (40% in 2011) of tuberculosis cases were from the Belfast Health and Social Care Trust (BHSCT), 33% (16% in 2011) of cases were from Southern Health and Social Care Trust (SHSCT), 11% from the Northern Health and Social Care Trust (NHSCT) and the South Eastern Health and Social Care Trust (SEHSCT), respectively. The remaining 9% were from the Western Health and Social Care Trust (WHSCT). The highest increase in case numbers in 2012 compared with 2011 was in the SHSCT where there was an almost three-fold increase in case numbers (Table 1).

Table 1: Number of Tuberculosis cases by Health and Social Care Trust, Northern Ireland, 2011 and 2012

Trust	Number of Cases 2012	Number of Cases 2011	Case Number difference (%)
BHSCT	30	25	20%
SEHSCT	10	9	11%
NHSCT	10	12	-17%
SHSCT	29	10	190%
WHSCT	8	6	33%
Total	**87**	**62**	**40%**

The BHSCT in 2012 had the highest rate of TB of all the Trust areas in Northern Ireland at a rate of 8.6 per 100,000 population, the highest rate of TB in this Trust to date. Incident rates also reached their highest to date in the SHSCT in 2012, with a rate of 8.0/100,000 population, a significant increase from 2.8/100,000 in 2011. Rates of TB increased slightly in both the SEHSCT and the WHSCT, while there was a very slight decrease in rates of TB in the NHSCT in 2012, compared with 2011 (Figure 3).

Figure 3: Three year moving average number and rates of Tuberculosis cases by HSCT in Northern Ireland, 2000-2012



Follow-up information (treatment outcome forms and/or death certificates) was provided for all cases in 2012, with eight cases being lost to follow up (Table 2).

Table 2: Tuberculosis notification and outcome forms by HSCT, 2012

Health & Social Care Trust	Number of Cases 2012	Completed at 12 Months	Still on treatment at 12 Months	Treatment interrupted /stopped	Died	Number of Cases Lost to Follow-up
BHSCT	30	22	1	2	2	3
SEHSCT	10	8	0	1	1	0
NHSCT	10	7	0	0	2	1
SHSCT	29	22	1	2	1	3
WHSCT	8	7	0	0	0	1
N.Ireland	**87**	**66**	**2**	**5**	**6**	**8**

Demographic Characteristics

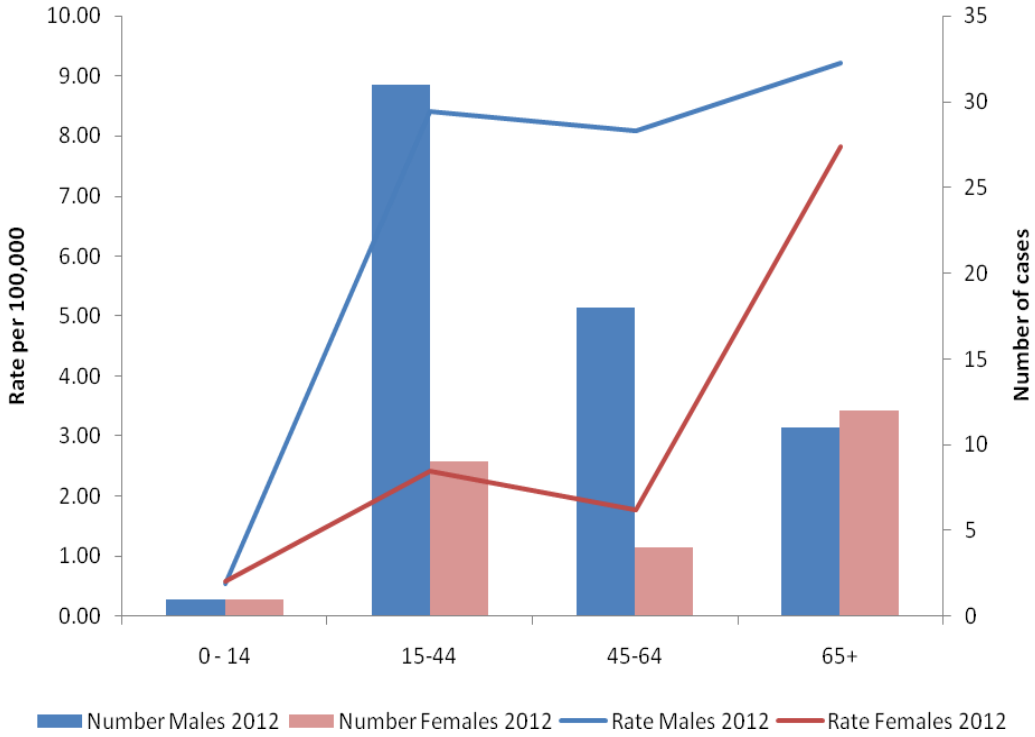
Age and gender

Of the 87 notified cases of tuberculosis in 2012, 61 were male and 26 were female, giving a sex ratio male/female (M/F) of 2.3 (an increase on the ratio of 1.5 recorded in 2011). The ages ranged from 5 years to 89 years, with a median age of 45 years (IQR 33-66) and a mean of 49 years. The average age of females with TB in 2012 was older than males at 56 years compared with 40 years for males.

Age profiles between UK and non-UK-born cases continue to differ, with the mean age of cases known to have been born in UK/Ireland of 63 years old and a median age of 66 years (IQR 55-76), compared with a mean age of 37 years and a median age of 35 years (IQR 29-43) for non-UK-born cases. There was very little difference in the average ages of men (62 years) and women (65 years) born in the UK/Ireland. Similarly, the average age of men (37 years) and women (39 years) born outside of the UK/Ireland who had TB also showed little difference between the genders.

The child-to-adult ratio is the ratio of the case notification rate in children age 15 years or under to adults and is used as an indicator of on-going transmission. In 2012, the Northern Ireland child-to-adult ratio was 0.02. TB incidence rates in children aged 5 years and under are also an indicator of recent transmission. In 2012 the TB rate in children age 5 years or under was 0.66 per 100,000 population. The low numbers in both these age groups may suggest a decreasing trend in ongoing transmission of TB in the region (Figure 4).

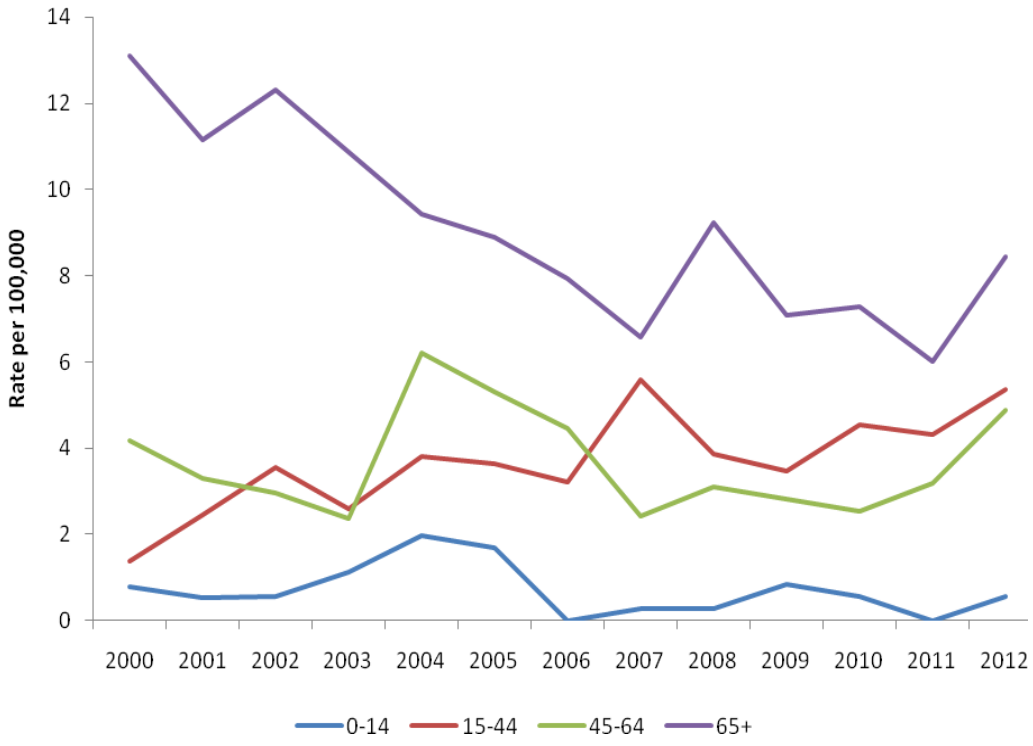
Figure 4: Tuberculosis case reports and rates by age group and gender, Northern Ireland, 2012



Similar to previous years, individuals aged 15-44 years accounted for the largest proportion of cases in Northern Ireland at 46% (52% of cases in 2011), a further 25% and 26% of cases were in the 45-64 year and 65 years and over age-groups, respectively.

Incidence rates of TB increased in all age-groups in 2012. The highest age-specific rate of tuberculosis remained in the elderly population (65 years and over), with the rate increasing from 6.0/100,000 population in 2011 to 8.4/100,000 population in 2012. Rates of tuberculosis in both males (9.2/100,000) and females (7.8/100,000) were highest in those aged over 65 years (Figure 5).

Figure 5: Northern Ireland TB rates per 100,000 by age group, 2000-2012



Place of birth

In 2012, the country of birth was known for all 87 cases. Of these 55% (48/87) were born outside the UK/Ireland, this compares with 48% of cases born outside the UK/Ireland in 2011 (Figure 6).

The majority of cases born outside the UK/Ireland in 2012 originated from South-east Asia (50%, n=24). The Western Pacific region accounted for a further 17%, n=8) with an additional 17% (n=8) of cases from other European countries, (Figures 7 and 8).

Information was available on ethnicity for all cases in 2012. The majority of cases, 53% (46/87), were of white ethnicity, with seven 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, 2000-2012

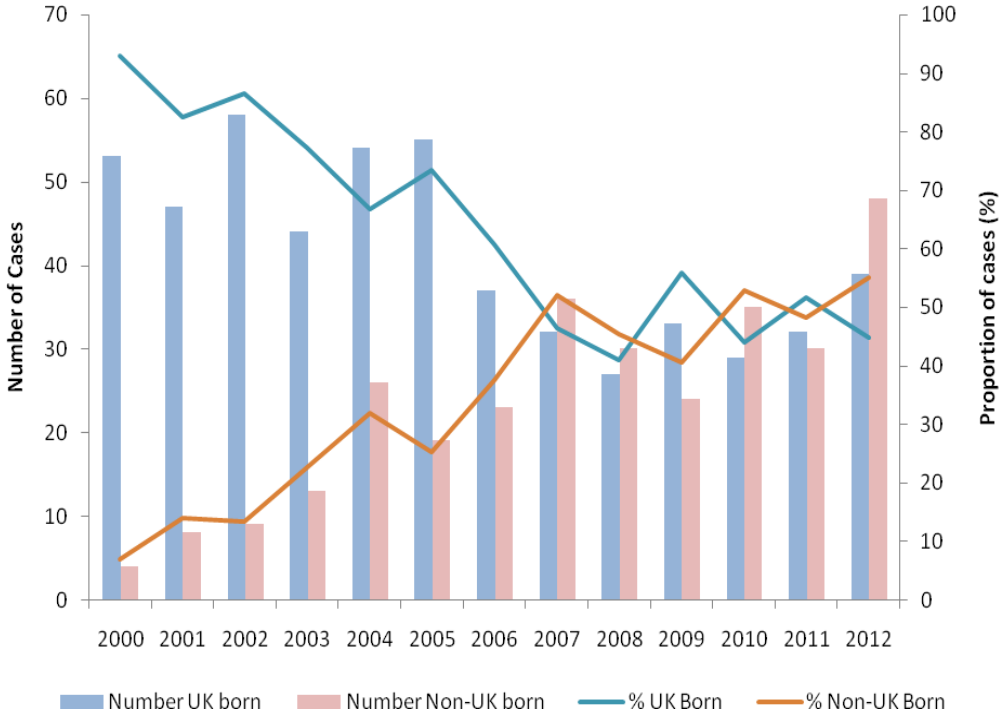


Figure 7: Northern Ireland tuberculosis reports by WHO region, 2000-2012

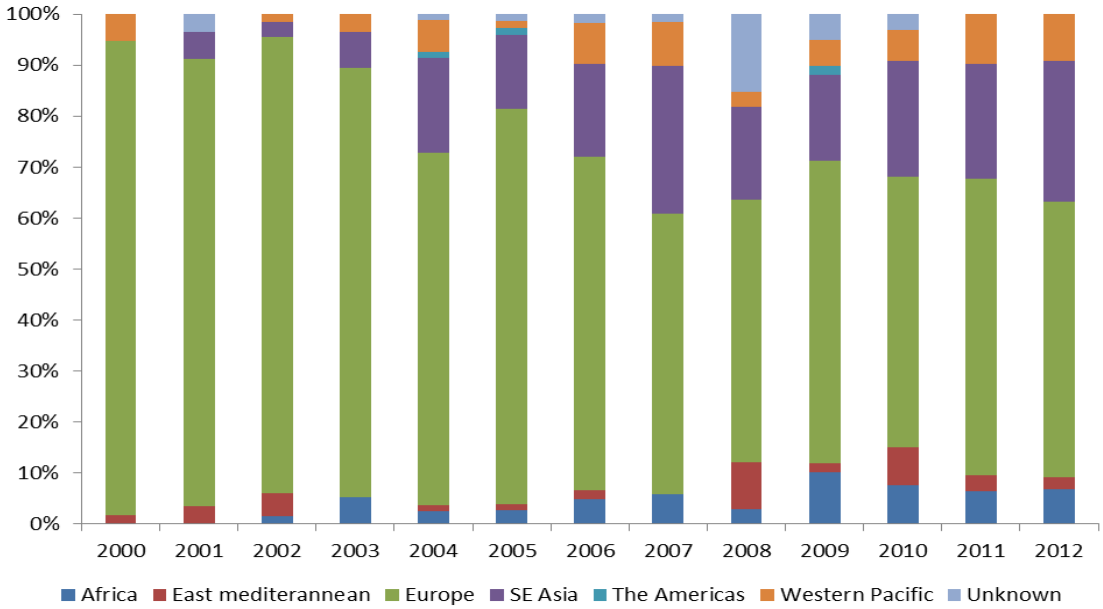
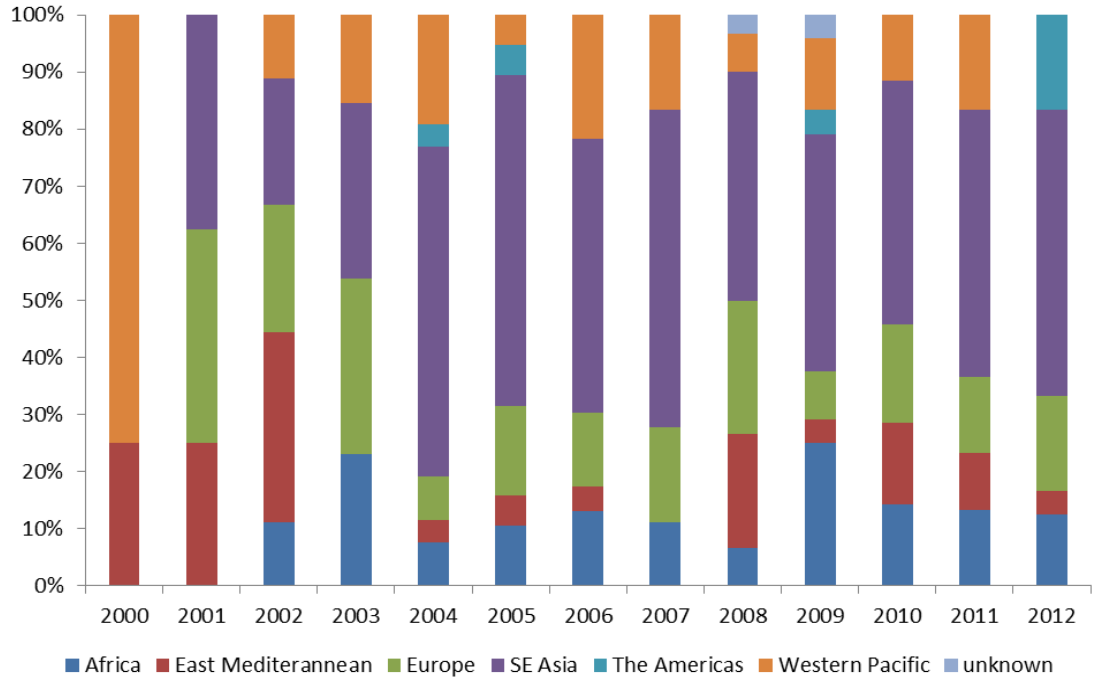


Figure 8: Non-UK Born tuberculosis reports in Northern Ireland by WHO region, 2000-2012



Time since entry into Northern Ireland until tuberculosis diagnosis was known for 88% (42/48) of cases born outside the UK/Ireland in 2012. Of these: 24% (10/42) were diagnosed within 2 years of entry; 62% (26/42) were diagnosed between three and nine years of entry; and the remaining 14% (6/42) had been in the UK/Ireland for ten years or more before diagnosis.

Clinical Characteristics

In 2012, 62% (n=54) of tuberculosis cases were culture confirmed, a decrease in comparison with all other years. All 54 isolates in 2012 were identified as *M. tuberculosis*. Thirty-three cases were notified on the basis of clinical or non-culture diagnosis and response to anti-tuberculosis therapy. Of these 33 cases, 11 were confirmed by histology of the lymph node, lung or other tissue.

In 2012, there were 47 (54%) cases with a pulmonary component, a decrease compared to 2011 when 76% of cases reportedly had pulmonary disease. Of the 47 cases, 36 (77%) were culture confirmed as *M. tuberculosis,* with the remaining 11 cases diagnosed by histology (n=3) or on a clinical basis. Six cases with pulmonary disease were also reported to have extra-pulmonary disease in at

least one site. Seventeen (36%) of the 47 pulmonary disease cases were also sputum smear positive (Table 3).

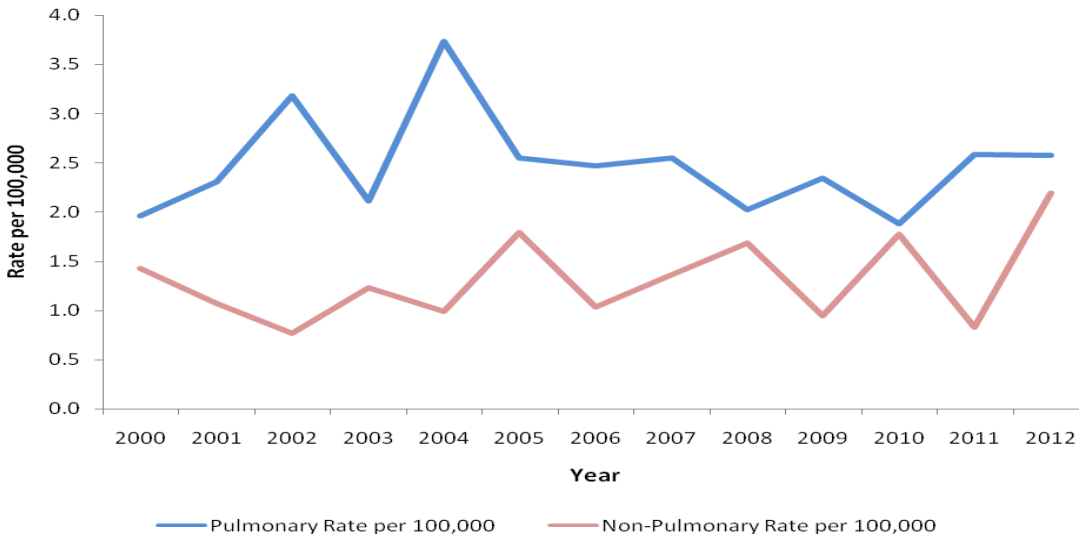
Of the 40 cases with extra-pulmonary disease, 18 (45%) were culture confirmed and an additional 12 (30%) cases were confirmed by histology.

Table 3: Pulmonary, Culture positive and Sputum Smear positive tuberculosis cases, Northern Ireland, 2000-2012

Year	Pulmonary Cases	Culture Positive (%)	Culture and Sputum Smear Positive (%)
2000	33	76%	18%
2001	39	79%	56%
2002	54	74%	35%
2003	36	67%	42%
2004	64	84%	42%
2005	44	86%	36%
2006	43	84%	37%
2007	45	93%	49%
2008	36	83%	39%
2009	42	83%	31%
2010	34	97%	59%
2011	47	81%	40%
2012	47	77%	36%
Total	**564**	**82%**	**40%**

The rate of pulmonary tuberculosis cases in Northern Ireland in 2012 remained similar to 2011 at 2.6 cases per 100,000 population. Conversely, the rates of non-pulmonary disease in the region increased significantly from 0.8 per 100,000 population in 2011 to 2.2 cases per 100,000 population in 2012, giving the highest rate of non-pulmonary tuberculosis disease in the region from 2000 (Figure 9).

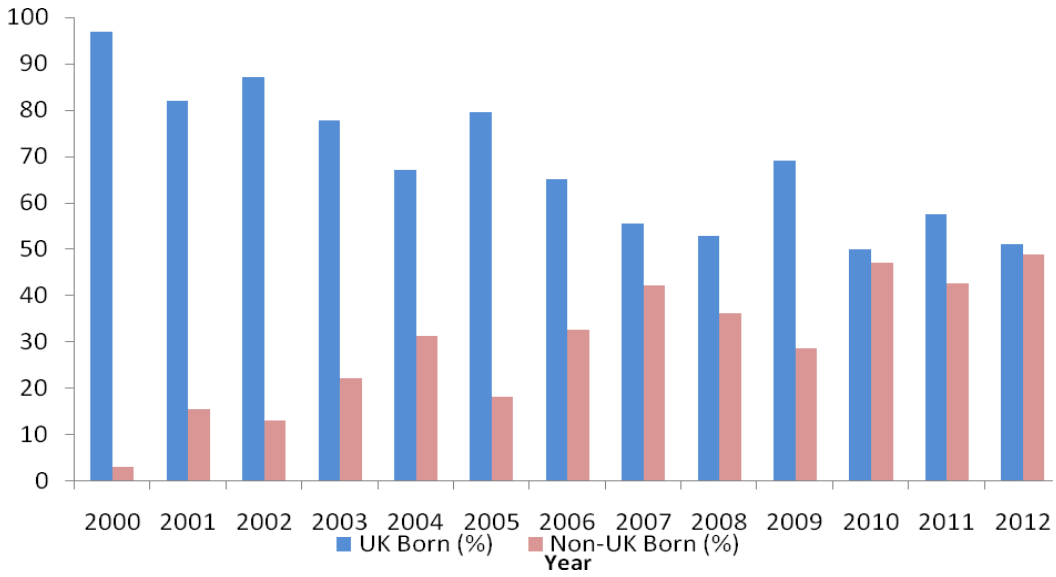
Figure 9: Rates of pulmonary and non-pulmonary tuberculosis, Northern Ireland, 2000-2012



Site of disease-Pulmonary

In 2012, 62% (24/39) of cases born in the UK/Ireland had pulmonary disease compared with 84% in 2011. The proportion of pulmonary disease also decreased in those born outside the UK/Ireland from 67% in 2011to 48% (23/48) in 2012 (Figure 10).

Figure 10: Proportion of Pulmonary tuberculosis cases UK and Non-UK born in Northern Ireland 2000-2012

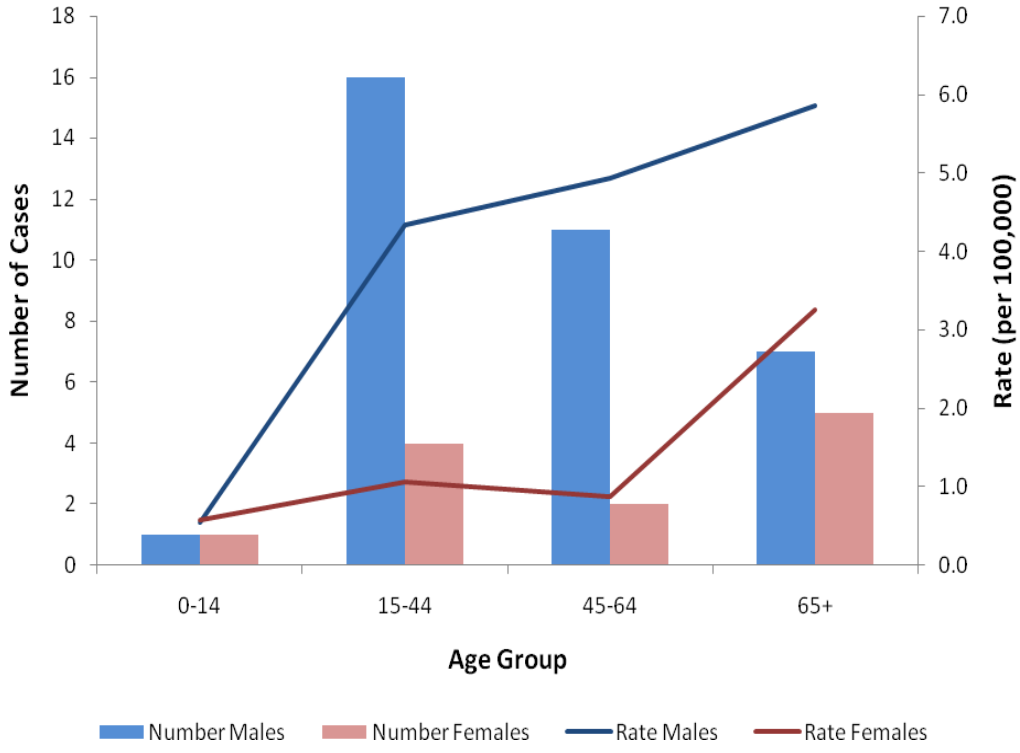


Of the 47 cases diagnosed in 2012 with pulmonary disease, 17 (36%) were found to be sputum smear positive at the time of notification, all of which, were subsequently confirmed by culture as *M. tuberculosis*.

Twenty-four (51%) pulmonary tuberculosis cases in 2012 were sputum smear negative at the time of notification. Seventeen of these cases were subsequently confirmed by culture as *M. tuberculosis*. Six pulmonary disease cases had no sputum sample taken. Of these: two were confirmed by culture on bronchial washings; three were confirmed on histology; and one on clinical assessment.

Of the 47 tuberculosis cases in 2012 with pulmonary disease; 35 (74%) were male, with a mean and median age of 47 and 45 years, respectively (IQR 32-60 years) and 12 (26%) were female, with a mean age of 56 years and a median age of 61 years (IQR 35-76 years). Similar to previous years, the age-sex distribution shows the highest age-specific rates for pulmonary tuberculosis continuing to be recorded in older age groups (Figure 11).

Figure 11: Pulmonary tuberculosis case reports and rates by age group and gender, Northern Ireland, 2012



Pulmonary disease rates in both males and females were highest in the elderly population. However, in elderly males the rate of disease with a pulmonary

component is on the decline. In 2012 the rate of pulmonary disease in males aged 15-44 years increased from 2.7 per 100,000 in 2011 to 4.3 per 100,000 in 2012 (Figures 12 & 13).

The SHSCT had the highest rate of TB with a pulmonary component in 2012 at 5.2 cases per 100,000 population, followed by the BHSCT with a rate of 2.9 cases per 100,000 population.

Figure 12: Pulmonary age-specific disease rates in males in Northern Ireland, 2000-2012

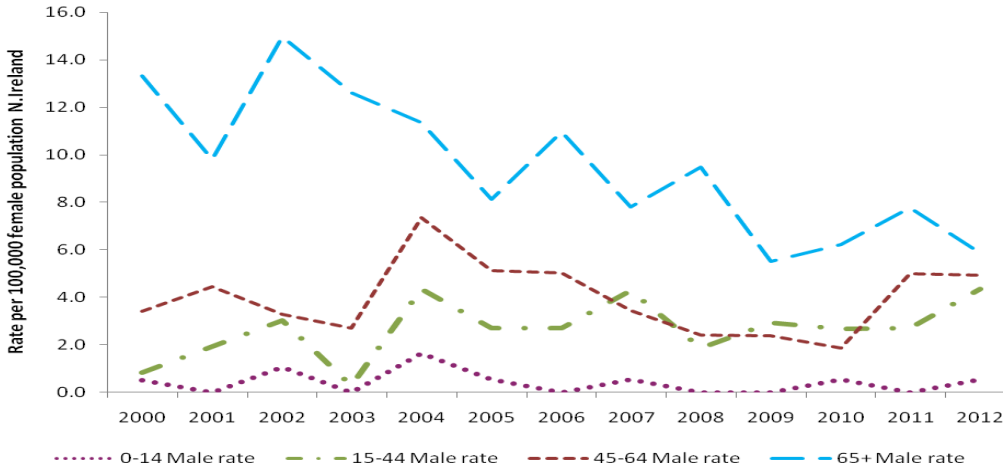
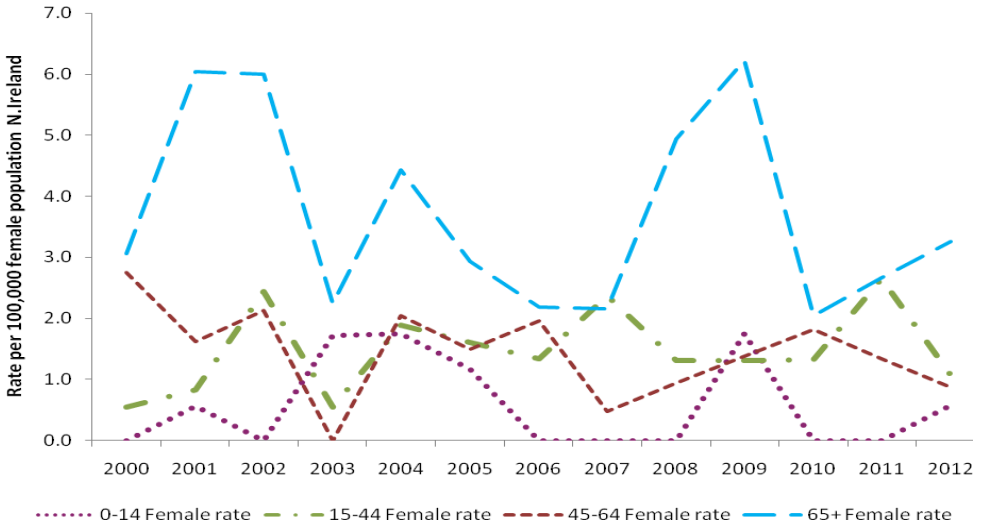


Figure 13: Pulmonary age-specific disease rates in females in Northern Ireland, 2000-2012



Outcome information was available for all 47 pulmonary tuberculosis cases in 2012. Forty-one (87%) are known to have successfully completed a full course of anti-tuberculosis treatment. Three cases with pulmonary tuberculosis disease died, one of which was diagnosed post mortem, two cases had their treatment interrupted and one case was lost to follow up at the time of completion of the outcome form due to the patient leaving the United Kingdom.

Site of disease- Non-pulmonary

In 2012, 40 cases were diagnosed with non-pulmonary tuberculosis, representing 46% of all cases notified, an increase when compared with 2011 when 24% of tuberculosis cases had non-pulmonary disease.

Of the 40 non-pulmonary cases of tuberculosis reported in 2012, 18 (45%)were culture confirmed as *M. Tuberculosis* (Table 4*)*. Of the remaining 22 cases, 8 cases (20%) were histology positive and 14 cases were clinically diagnosed.

The Belfast Health and Social Care Trust had the highest rates of extra-pulmonary tuberculosis at 5.7 cases per 100,000 population almost a five-fold increase in comparison with 2011 when the rate was 1.2 cases per 100,000 population.

Table 4. Non-Pulmonary, cculture positive tuberculosis cases, Northern Ireland, 2000-2012

Year	Non-Pulmonary Cases	Culture Positive (%)
2000	24	71%
2001	18	83%
2002	13	69%
2003	21	76%
2004	17	65%
2005	31	39%
2006	18	67%
2007	24	63%
2008	30	70%
2009	17	76%
2010	32	69%
2011	15	67%
2012	40	45%
Total	**300**	**64%**

Of the 40 non-pulmonary cases of tuberculosis notified during 2012, 26 cases were male and 14 were female, giving a ratio of 1.9:1. The ages of non-pulmonary disease cases ranged from 22 to 83 years with a median age of 44 years. The highest age-specific rates in males with non-pulmonary tuberculosis remained in those age 15-44 years, with 2012 having the highest rate to date in this age-group for males at 4.1 cases per 100,000. TB rates in females with non-pulmonary disease remained highest in the over 65 year olds. (Figures 14 and 15)

Figure 14: Non-pulmonary age-specific rates in Males in Northern Ireland, 2000-2012

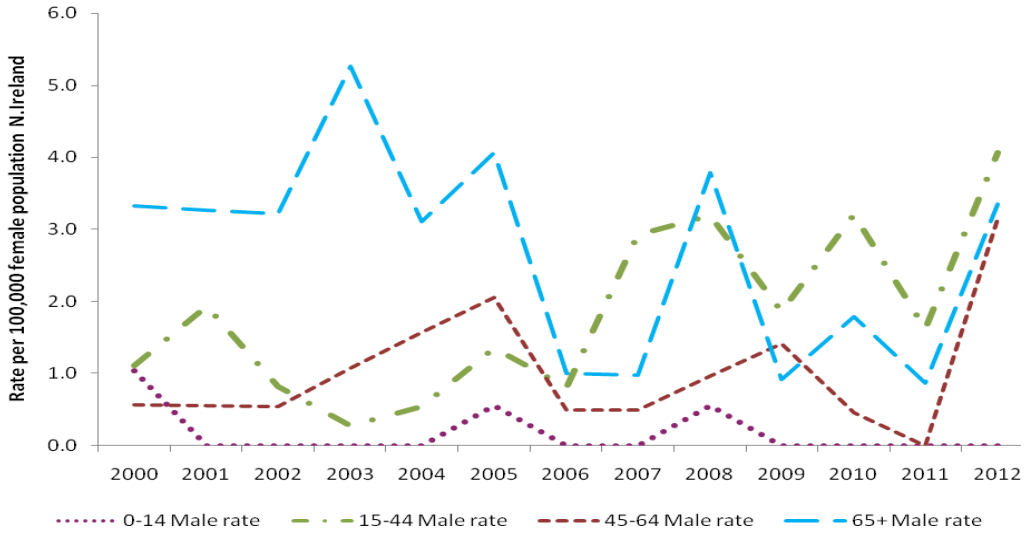
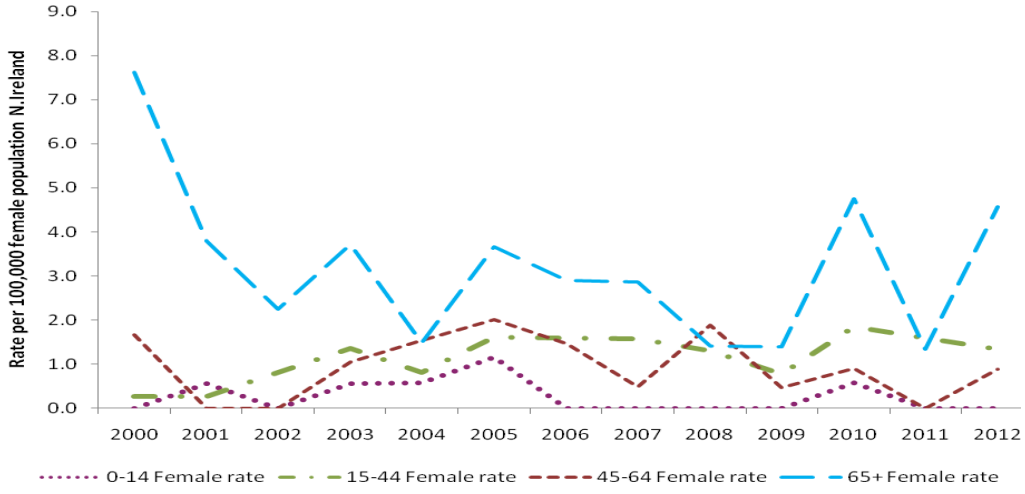


Figure 15: Non-pulmonary age-specific rates in Females in Northern Ireland, 2000-2012



Of the specified extra-pulmonary sites, the most commonly reported in 2012 was extra-thoracic lymph nodes (21%). Of the 10% of other extra-pulmonary sites recorded in 2012, three cases were diagnosed with tuberculosis uveitis. There were no cases of TB meningitis reported in 2012 (Table 5).

Table 5: Tuberculosis case reports by site of disease, Northern Ireland, 2012

Site of Disease	Number of Cases 2012	Proportion of all Cases 2012
Pulmonary	47	54%
Extra-thoracic lymph nodes	11	21%
Gastrointestinal-peritoneal	6	7%
Genitourinary	4	5%
Intra-thoracic lymph nodes	3	3%
Bone-spine	3	3%
CNS Other	2	2%
Miliary	2	2%
Other extra-pulmonary	9	10%

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

Of the 40 cases of non-pulmonary tuberculosis notified in Northern Ireland in 2012, 25 (63%) were born outside the UK/Ireland, a slight decrease in comparison with 2011 when 67% of non-pulmonary cases were born outside of Northern Ireland.

Over the past decade, the proportion of non-pulmonary cases of tuberculosis has been increasing in those who are born outside the UK (Figure 16)

Figure16: Proportion of Non-Pulmonary tuberculosis cases UK and Non-UK born in Northern Ireland, 2000-2012

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

Outcome information was available for 38 of the 40 non-pulmonary tuberculosis cases in 2012. Twenty-five (66%) cases are known to have successfully completed a full course of anti-tuberculosis treatment at the 12 month report; two cases were still on treatment at the time of reporting, five (13%) cases were lost to follow-up, three cases had their treatment interrupted or stopped and a further three cases died either before or while on treatment.

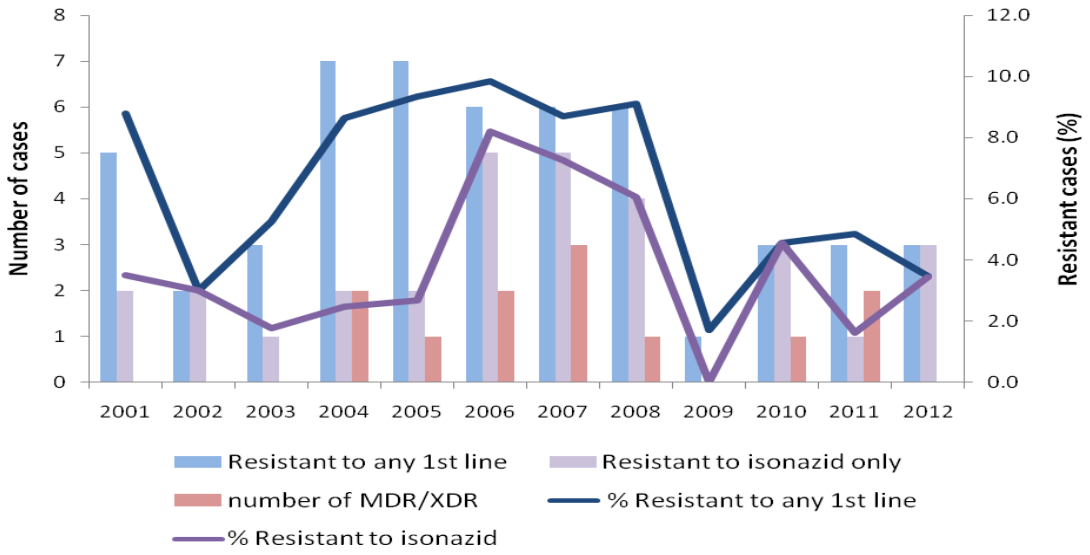
Anti-tuberculosis treatment

Isoniazid, rifampicin, ethambutol and pyrazinamide are first-line drugs for treatment of tuberculosis in the UK. Drug susceptibility test results were available for 53 of the 54 culture confirmed cases of tuberculosis in Northern Ireland in 2012.

Drug resistance

In 2012, a total of three TB cases were resistant to Isoniazid at the start of treatment, all three cases were born outside the UK/Ireland. There were no cases of multi-drug resistance recorded in 2012 (Figure 17).

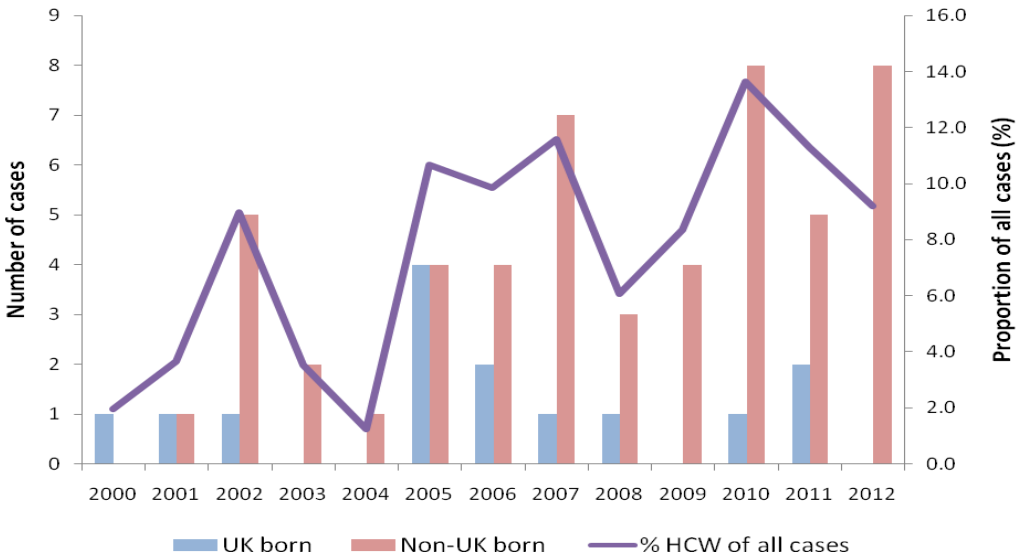
Figure 17: Number and proportion of drug resistant cases of tuberculosis in Northern Ireland, 2000-2012



Tuberculosis in healthcare workers

In 2012, there were eight healthcare workers notified with tuberculosis, approximately 9% of all notified cases. Only one case had pulmonary disease, which was culture confirmed and sputum smear negative. The remaining cases all had extra-pulmonary disease. All eight cases were born outside the UK/Ireland (Figure 18).

Figure 18: Number of tuberculosis notifications and proportion (%) of Healthcare Workers, Northern Ireland 2000-2012.



**2009 data excludes 1 HCW case where place of birth was unknown*

The proportion of tuberculosis cases notified in 2012 who work in a healthcare setting, was lower than 2011 (11%) at 9%.

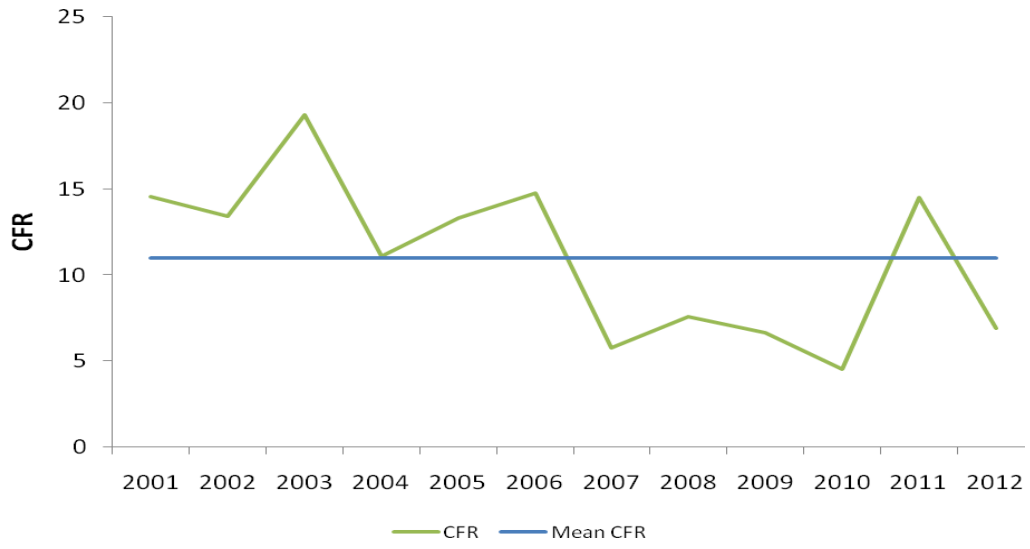
The majority (78%) of healthcare workers with tuberculosis reported in Northern Ireland from 2000 to 2012 were born outside the UK/Ireland.

Treatment Outcomes

Treatment outcomes were known for all 87 cases in 2012. Sixty-six (76%) patients completed treatment at 12 months of which 53 (80%) were reported as having received the standard six month treatment regime. Thirteen cases had extended treatment due to a number of clinical complications but still completed within 12 months. Of the remaining 21 cases reported in 2012: six patients died; two patients' treatment exceeded 12 months; eight cases were lost to follow-up; and five cases either had their treatment interrupted or stopped.

Six patients died in 2012, giving a CFR of 6.9%, below the 10 year average (Figure 19). One case was diagnosed post-mortem. Of the remaining five cases tuberculosis contributed to death in two of the cases and was incidental to death in one case. Five of the six cases were from the indigenous population. The average age of those that died was 68 years with an age-range from 55-81 years.

Figure 19: Case-Fatality Rate of tuberculosis notifications, Northern Ireland 2001-2012.



From 2006 the proportion of cases completing treatment at 12 months has exceeded 70%, with the highest completion rate in 2009 at 86%, (Table 6).

Table 6: Number and proportion of tuberculosis cases completing treatment within 12 months, Northern Ireland, 2000-2012

Year	Number of Cases	Completed Treatment at 12 months	Completed at 12 months (%)
2000	57	25	44%
2001	57	38	67%
2002	67	47	70%
2003	57	30	53%
2004	81	58	72%
2005	75	41	55%
2006	61	33	54%
2007	69	50	73%
2008	66	46	70%
2009	59	51	86%
2010	66	45	68%
2011	62	46	74%
2012	87	66	76%
Total	**864**	**576**	**67%**

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.

In 2011, 100% of all culture confirmed TB cases in Northern Ireland were typed at 23 loci or more. In 2012, 53/54 culture confirmed cases were also typed.

There were 13 molecular clusters identified in Northern Ireland for the period 2011/12. Of these, four clusters had the same molecular type as cases elsewhere in the UK, linking them by strain type to national clusters. Of the 13 molecular clusters, epidemiological links were identified in five (38%). With the exception of cases that were linked to national clusters where numbers ranged from 4 to33, the cluster sizes were small with a median size of two. Six (46%) clusters comprised of UK-born cases only, three (23%) clusters were non UK-born only and the remainder had a mixture of both UK and non UK-born cases.

Nine (69%) clusters consisted of exclusively pulmonary cases with the remainder a mixture of both pulmonary and extra-pulmonary disease cases. Clusters of TB cases with identical MIRU-VNTR strain types may reflect recent transmission. The Tuberculosis section at the Centre for Infectious Disease Surveillance and Control, PHE calculate national and regional estimates of the proportion of cases likely to be due to recent transmission in the population. Using the strain typing

data for 2011/12 Northern Ireland cases, the estimated proportion of cases likely to be due to recent transmission was 14%[1].

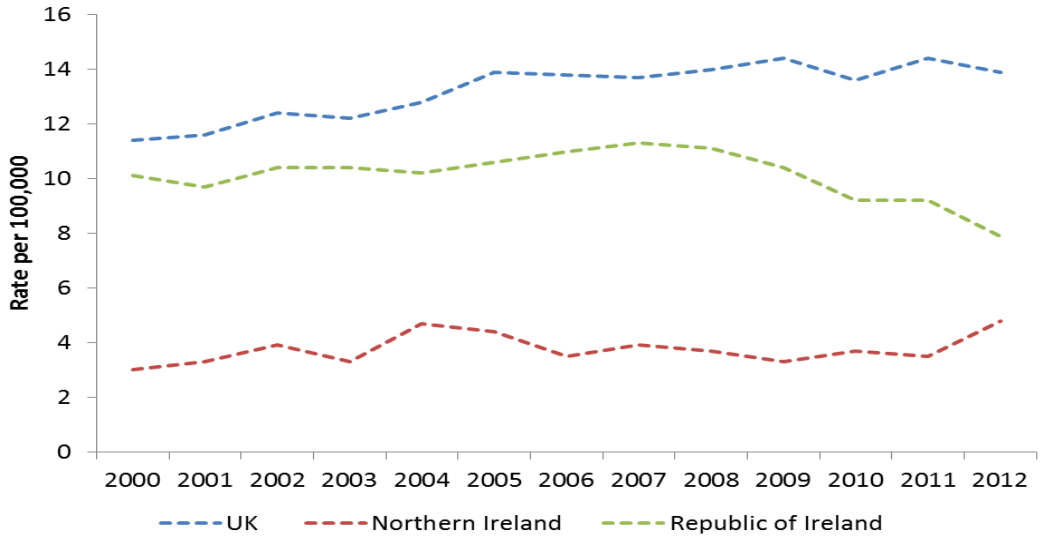
Two (15%) clusters had one or more isoniazid resistant cases. One *Mycobacterium bovis* cluster was resistant to both isoniazid and pyrazinamide.

Discussion

The number of cases of tuberculosis notified in the UK in 2012 decreased slightly to 8,751 compared with 8,963 in 2011, a 2% decrease, giving a rate of 13.9 per 100,000 population in 2012. Rates of TB nationally over the last number of years have remained relatively stable but continue to remain high compared to most other Western European countries[2,3]. As in previous years the highest rates of TB in the UK were in London accounting for approximately 39% of all cases in the UK. Provisional data for the Republic of Ireland indicates a 14% decrease in rates of TB from 9.2/100,000 population in 2011 to 7.9/100,000 population in 2012 (Figure 20).

Conversely, the numbers of cases in Northern Ireland increased by 40% in 2012 to 87 compared with 62 in 2011. Rates of TB in Northern Ireland continue to remain low and stable. The main burden of the disease is in the largely urban Belfast Health and Social Care Trust area, where rates of TB increased by 19% compared with 2011 and are on average approximately 1.5 times higher than the region's average. Incidence rates in this Trust have been steadily increasing since 2006. Rates were also high in the Southern Health and Social Care Trust area.

Figure 20: Rate of tuberculosis per 100,000 population in the UK, Republic of Ireland and Northern Ireland 2000-2012



**2012 figures are provisional for Republic of Ireland*
*** UK data from Tuberculosis in the UK, 2013 report'*
**** ROI data from 'TB Cases notified in Ireland in 2012'*

Similar to the national trend the majority (46%) of patients with TB in Northern Ireland in 2012 were young adults aged 15 to 44 years. However, the proportion of cases aged >65 years in Northern Ireland was higher at 26% than nationally where 14% of all cases were in this age group.

Nationally In 2012, 73% of cases were born outside of the UK. In Northern Ireland the proportion of cases born outside the UK/Ireland has also increased over the last decade and the trend continued in 2012, with 55% of cases born in high-burden countries, an increase from 48% in 2011. Similar to previous years the majority (50%) of cases born outside Northern Ireland originated from South-East Asia. In the Republic of Ireland, 43% of TB cases were foreign- born in 2012

In the UK-born population in Northern Ireland, the incidence of TB has remained stable from 2005 at around 2 cases per 100,000 population.

The proportion of culture confirmed cases continues to decrease with 62% of cases culture confirmed in 2012 compared with 77% of cases in 2011. Almost all (53/54) culture confirmed cases were tested for first line drug sensitivity. In pulmonary cases the proportion culture confirmed also decreased from 97% in 2010 to 81% in 2011 to 77% of cases in 2012. The proportion of pulmonary cases culture confirmed in 2012 did not reach the EU monitoring framework target of ≥ 80% culture confirmation among new pulmonary TB cases[4]. The proportion of pulmonary cases that were culture confirmed and sputum smear positive dropped from 45% in 2011 to 36% in 2012. Trends in the proportion of culture confirmed pulmonary TB cases can be viewed as indicator of the performance of a TB control programme.

Rates of pulmonary TB disease in 2012 remained similar to 2011 with rates remaining highest overall in the elderly population. However, rates of pulmonary disease in the elderly population in Northern Ireland have been steadily decreasing over the last decade.

In the UK the number and proportion of drug resistant cases stabilised in 2012. The majority of patients with MDR/XDR TB continue to be born outside the UK and the proportion of TB cases with MDR was particularly high in patients from Eastern Europe[1]

The incidence of drug resistance in Northern Ireland remains low with only three cases of first line drug resistance reported in 2012. All three were resistant to Isoniazid and were non UK-born.

In 2012, 76% of cases in Northern Ireland completed treatment within 12 months, a slight decrease from 2011 when 78% of cases completed treatment within this time frame. This continues to fall below the UK 85% target for completion. Nationally the completion rates for TB have been increasing over the last few years. A factor in this improvement has been attributed to the adoption of Cohort Review by a large number of TB services across the UK.

The analysis of strain typing data for the region suggested that 14% of culture confirmed cases in the last two years were likely due to recent transmission. This proportion was higher than Wales (8%) and a number of other areas in the UK.[1]

In conclusion, while rates of TB remain low in the region they have increased in 2012 and there has been no decline in rates in the UK-born population in the last decade. The vast majority of cases are in the Belfast Health and Social Care Trust area with rates in this Trust area increasing for the past number of years. To reduce this trend more targeted interventions may be required in this Trust area, possibly through identifying communities with on-going transmission. The identification of social risk factors may contribute positively in this area. From 2009 information on social risk factors was introduced into surveillance data collection through the statutory notification form, however, this is generally not well completed.

Treatment completion rates did not reach the UK target again in 2012; this may be due to more clinically complex cases of TB requiring extended periods of treatment. Those cases that are lost to follow-up are principally from ethnic minority groups.

References

1. Tuberculosis in the UK: 2013 report, Public Health England, London: Health Protection Agency, August 2013.

2. Centers for Disease Control Reported Tuberculosis in the United States 2011. Atlanta, GA: U.S Department of Health and Human Services, CDC, October 2012.
http://www.cdc.gov/tb/statistics/reports/2011/pdf/report2011.pdf

3. Borgdorff MW; van den Hof S; Kremer K; Verhagen L; Kalisvaart N; Erkens C; van Soolingen D. *Progress towards tuberculosis elimination: secular trend, immigration and transmission.* Eur Respir J. 2010 Aug;36(2):339-47. doi: 10.1183/09031936.00155409. Epub 2009 Dec 8.

4. World Health Organization. *Roadmap to prevent and combat drug-resistant tuberculosis. The consolidated action plan to prevent and control multidrug- and extensively drug-resistant tuberculosis in the WHO European Region, 2011-2015*. WHO, Geneva, Switzerland. 2011. Available at:
http://www.euro.who.int/en/what-we-publish/abstracts/roadmap-to-prevent-and-combat-drug-resistant-tuberculosis