

Epidemiology of Tuberculosis In Northern Ireland

Annual surveillance report 2009-2010

Surveillance of tuberculosis in Northern Ireland, 2009-2010

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Summary

This report outlines information on tuberculosis in Northern Ireland for the years 2009 and 2010, respectively.

In Northern Ireland in 2009 there were 59 notified cases of tuberculosis, giving a rate of 3.3 cases per 100,000 population. In 2010 the number of cases increased to 66, giving a rate of 3.7 cases per 100,000 population and representing an increase of 12% from 2009.

Similar to previous years, the number of cases of tuberculosis notified in Northern Ireland in 2009 and 2010 remained relatively low. The total number of cases in 2009 comprising approximately 0.7% of all cases notified throughout the UK that year.

Of the five Health and Social Care Trusts in Northern Ireland (HSCT), the Belfast Trust (BHSCT) accounted for the highest proportion of tuberculosis cases in 2009 (34%), with the Southern Trust (SHSCT) accounting for the highest proportion in 2010 (28%). In both 2009 (6.5%) and 2010 (5%), the Western Health and Social Care Trust (WHSCT) accounted for the lowest proportion of notified cases.

In both years cases of tuberculosis were principally male, with a male/female ratio of 1.3.

In 2009 the age of cases ranged from 6 to 94 years, with a mean age of 49.6 years and a median age of 46 years. In 2010, cases ranged in age from 5 to 89 years, with a mean age of 49 years and a median age of 44 years. The majority of cases in both years were in young adults aged between 15 and 44 years old.

Those aged 65 and over represented the highest rate of tuberculosis in both 2009 and 2010, following the general trend in Northern Ireland throughout the past 10 years.

Place of birth was known for 97% of notified cases in 2009 and 2010, respectively. In 2009, the majority (58%) of notified cases were from the indigenous population. In 2010 however, the proportion reversed, with 55% of cases born outside the UK/Ireland.

In both 2009 (59%) and 2010 (53%), the largest proportion of notified cases originated from Europe and were of White ethnicity. Of the non-UK/Ireland born cases in both years, the highest proportion originated from South East Asia

In 2009, 83% (n=49) of cases were culture confirmed, of which 48 cases were confirmed as *M.tuberculosis* and 1 case as *M.bovis*. In 2010, 83% (n=55) of all notified cases were culture confirmed, of which 53 cases were confirmed as *M.tuberculosis*, 1 case as *M. bovis* and 1 case as *M. africanum*.

There were 42 (71%) cases of pulmonary disease in 2009, of which 31% were both culture confirmed and sputum smear positive. In 2010, the proportion of

pulmonary cases decreased (52%). Of the 34 pulmonary cases; 59% were both culture confirmed and sputum smear positive.

In 2009, the only drug resistance isolate recorded was for pyrazinamide, which was in the case confirmed as *M. bovis*.

In 2010, three cases showed resistance to one of the first-line drugs. All three cases were resistant to isoniazid and one case had extensively drug resistant TB (XDR TB). This is the first XDR TB case that has been reported in Northern Ireland to date.

In 2009, outcome information was available for all cases. Of these, 86% (n=51) had completed treatment within 12 months, while four cases (7%) were still receiving treatment after the 12 month period.

In 2010, outcome information was available for 97% (n=64) of cases. In comparison with 2009, the proportion of cases who had completed treatment within 12 months decreased to 68% (n=45), ten cases (15%) were still on treatment at the 12 month stage.

In 2009, the case fatality rate was 6.7%, decreasing to 4.5% in 2010. Of the 7 deaths in 2009/10, tuberculosis was cited as being the cause of, or contributing to the death of 3 cases.

Introduction

Tuberculosis remains a serious health problem, with a World Health Organization (WHO) global estimate of 8.8 million new cases and 1.45 million deaths in 2010. Multi-and-extensively–drug-resistant tuberculosis (MDR-TB, XDR-TB) are of particular concern, with 13.7% of new TB cases across Europe in 2010 with MDR-TB (increased from 12% in 2009).

In 2010, there were 309,648 new episodes of tuberculosis reported throughout the WHO European region giving an average notification rate of 34 cases per 100,000 population. Notification rates for newly detected and relapsed TB cases in the 16 high priority countries in the central and eastern parts of the region remained almost eight times higher than the rest of the region at 68.5 per 100,000 population¹.

In the UK in 2010, 8,410 new cases of tuberculosis were reported with 436 deaths. The annual notification rate for the UK was 13.6 per 100,000 population, with London reporting the highest rate (42 per 100,000). MDR-TB cases comprised of 1.3% of total tuberculosis cases in the UK in 2010².

This report presents the epidemiological data for tuberculosis cases reported in Northern Ireland from 1 January 2009 to 31 December 2010. The data provides information for inclusion in national, European and WHO reports, as well as for disease surveillance at a local level. Provisional data for 2011 is included where relevant.

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 completion: 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

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. Completed tuberculosis notification forms are forwarded to the Public Health Agency (PHA) in Northern Ireland where the information is entered onto an Enhanced Tuberculosis Surveillance (ETS) database. This database is password protected with access only by designated staff.

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 product consumption, and occupational details (including animal contact).

In order to facilitate the export and central collation of data for England, Scotland, Wales and Northern Ireland, outcome data is collected across all four regions of the UK on a standardised Tuberculosis Treatment Outcome Monitoring (TOM) form. 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.

TOM 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 (*M. 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

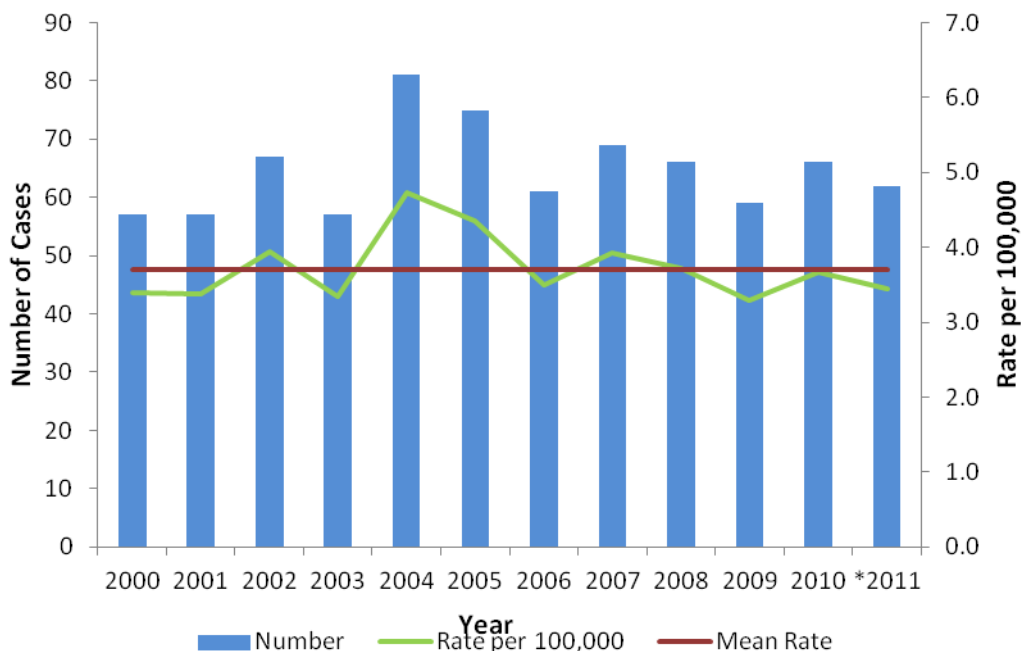
Data are entered onto the HPA National ETS database and analysed using STATA. Tuberculosis rates per 100,000 of the population, stratified by age, sex and Health and Social Care Trust (HSCT), were calculated using the mid-year estimates from NISRA.

Results

Overall number of cases and rates of infection

In Northern Ireland in 2009, a total of 59 cases of Tuberculosis (TB) were reported, giving a rate of 3.3 cases/100,000 population (95% CI 2.5 – 4.3) and comprising of approximately 0.7% of all cases reported throughout the UK. In 2010, a total of 66 TB cases were reported, giving a rate of 3.7 cases/100,000 population (95% CI 2.8-4.7) and comprising of approximately 0.8% of all cases reported in the UK. This represents a 12% increase in both numbers of cases and rates of TB between 2009 and 2010 (Figure 1). Provisional figures for 2011 suggest that the number of TB cases have decreased by approximately 6% (n=62) giving a rate of 3.5 per 100,000 population (95% CI 2.7 - 4.5).

Figure 1: Tuberculosis case reports and rates, Northern Ireland, 2000-2011



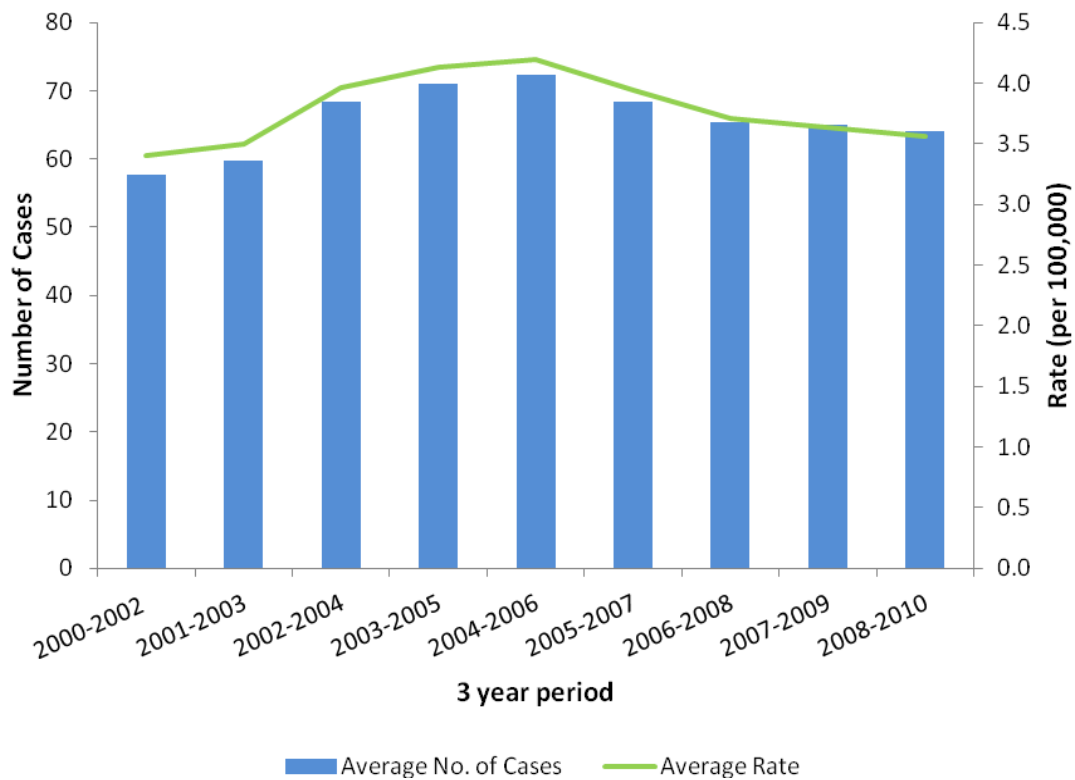
figures are provisional

*2011

Rates of tuberculosis in Northern Ireland are low and have remained relatively stable over the last few years, with the rate per 100,000 population staying below the mean rate (3.7/100,000) from 2008. (Figure 1)

The average number of cases and rates per 100,000 population has also remained relatively stable over the past 10 years, peaking in the period 2004-2006 (Figure 2).

Figure2: Three year moving average number and rates of Tuberculosis cases in Northern Ireland, 2000-10



There are five Health and Social Care Trusts in Northern Ireland. In 2009 the highest proportion (34%, n=20) of cases in Northern Ireland were reported by the Belfast Health and Social Care Trust (BHSCT). The Southern Health and Social Care Trust (SHSCT) accounted for 24% (n=14), Northern Health and Social Care Trust (NHSCT), 22% (n=13), South Eastern Health and Social Care Trust (SEHSCT) 13.5% (n=8) and the Western Health and Social Care Trust (WHSC) accounted for the remaining 6.5% (n=4) of TB cases.

In 2010, 28% (n=19) of tuberculosis cases were reported by the SHSCT, the BHSCT accounted for 27% (n=18), the NHSCT 23% (n=15), the SEHSCT 17% (n=11) and the WHSCT accounted for the remaining 5% (n=3) of cases. In comparison with 2009, the overall number of cases of tuberculosis increased by 12% (7/59) in 2010.

Both the BHSCT and WHSCT showed decreases of 10% and 25% respectively in 2010, while the number of cases in the SEHSCT and the SHSCT increased by 38%, respectively. The number of cases reported in the NHSCT increased by 15% from 2009 to 2010 (Table1).

Table 1: Number of Tuberculosis cases by Health and Social Care Trust, Northern Ireland, 2009-2010

Trust	Number of Cases 2010	Number of Cases 2009	Case Number difference (%)
BHSCT	18	20	-10%
SEHSCT	11	8	38%
NHSCT	15	13	15%
SHSCT	19	14	38%
WHSCT	3	4	-25%
Total	66	59	12%

After 12 months, treatment outcome monitoring (TOM) forms and/or death certificates) were available for all 59 cases of tuberculosis notified in 2009 and 97% (n=64) of the 66 cases notified in 2010.

Treatment outcome information was received on all cases reported by the BHSCT, SEHSCT and NHSCT, respectively in 2010. Out of the 19 cases of tuberculosis reported by the SHSCT in 2010, TOM's were received for 95% (n=18). Outcome information was lowest in the WHSCT at 66% of cases (n=2). It is worth noting however, the relatively small number of cases reported by the WHSCT, which accounts for the reduced proportion of TOM's received in comparison with the other four trusts. (Table2)

Table 2: Tuberculosis notification and treatment outcome forms received per Health and Social Care Trust, Northern Ireland, 2009-2010

HSCT	Number of Reports 2010	*TOM Received 2010	TOM 2010 (%)	TOM 2009 (%)
BHSCT	18	18	100%	100%
SEHSCT	11	11	100%	100%
NHSCT	15	15	100%	100%
SHSCT	19	18	95%	100%
WHSCT	3	2	66%	100%
Total	66	64	97%	100%

*TOM refers to Treatment Outcome Monitoring form.

Demographic Characteristics

Age and gender

Of the 59 notified cases of tuberculosis in 2009, 33 were male and 26 were female, giving a male/female ratio of 1.3. The ages of cases ranged from 6 to 94 years, with a mean of 49.6 years and a median of 46 years (IQR 34-69 years). In 2010, 37 of the 66 notified cases were male and 29 were female, giving a male/female ratio similar to 2009 of 1.3. The ages of cases ranged from 5 years to 89 years, with a mean of 49 years and a median of 44 years (IQR 30-71 years).

Individuals aged 15-44 years accounted for the largest proportion of cases in Northern Ireland in both 2009 and 2010 at 44% (n=26) and 51% (n=34), respectively. A further 31% (n=18) of cases in 2009 and 29% (n=19) in 2010 were in the 65 years and over age group, 20% (n=12) in 2009 & 17% (n=11) in 2010 of cases were aged 45-64 years and 5% (n=3) of cases in 2009 and 3% (n=2) of cases in 2010 were in the 5-14 year olds, (Figures 3 & 4).

Similar to previous years, the highest age-specific rate of tuberculosis in 2009 and 2010 for both males and females was in the elderly population (65 and over years) at a rate of 7.3 per 100,000 population, (7.1/100,000 in 2009). However, the rates in this age group have steadily fallen from 2000 (11.2/100,000). Provisional data for 2011 suggests this downward trend will continue (6.15/100,000) however, the 65 years and over age group will most likely remain the highest rate overall. There were no cases reported in children under the age of 5 years in 2009 or 2010 (Figure 5).

Figure 3: Tuberculosis case reports and rates by age group and gender, Northern Ireland, 2009

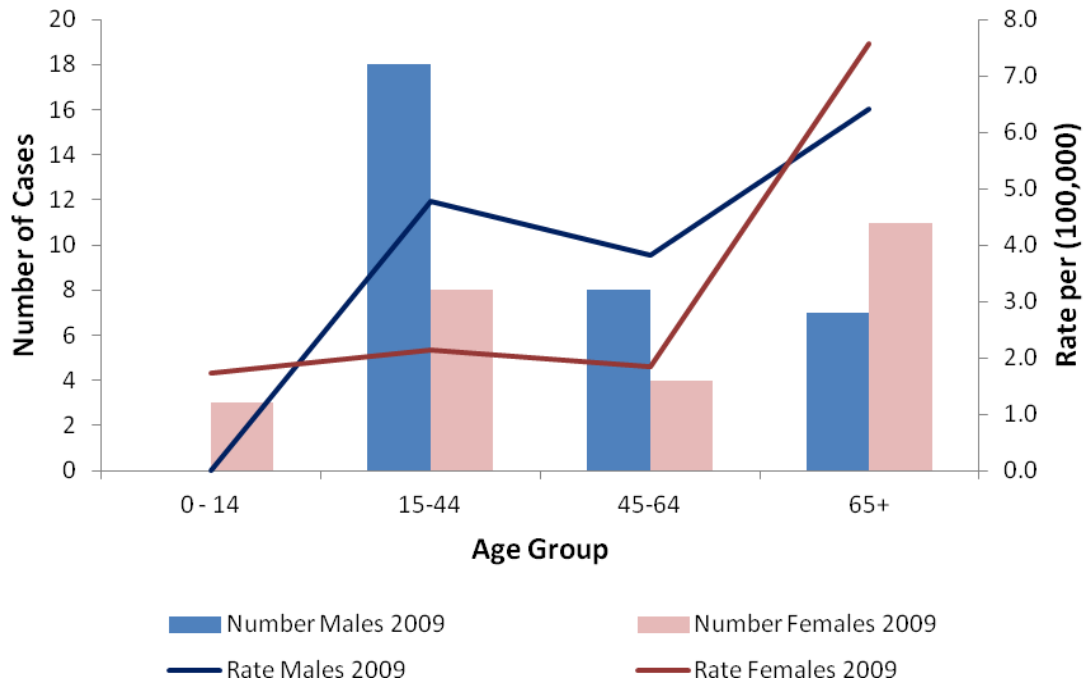


Figure 4: Tuberculosis case reports and rates by age group and gender, Northern Ireland, 2010

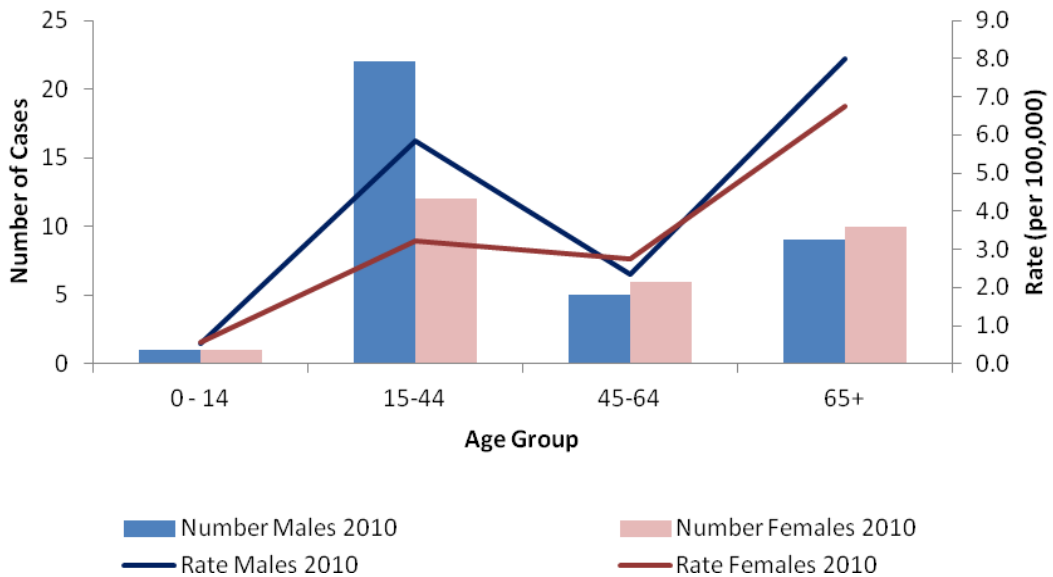
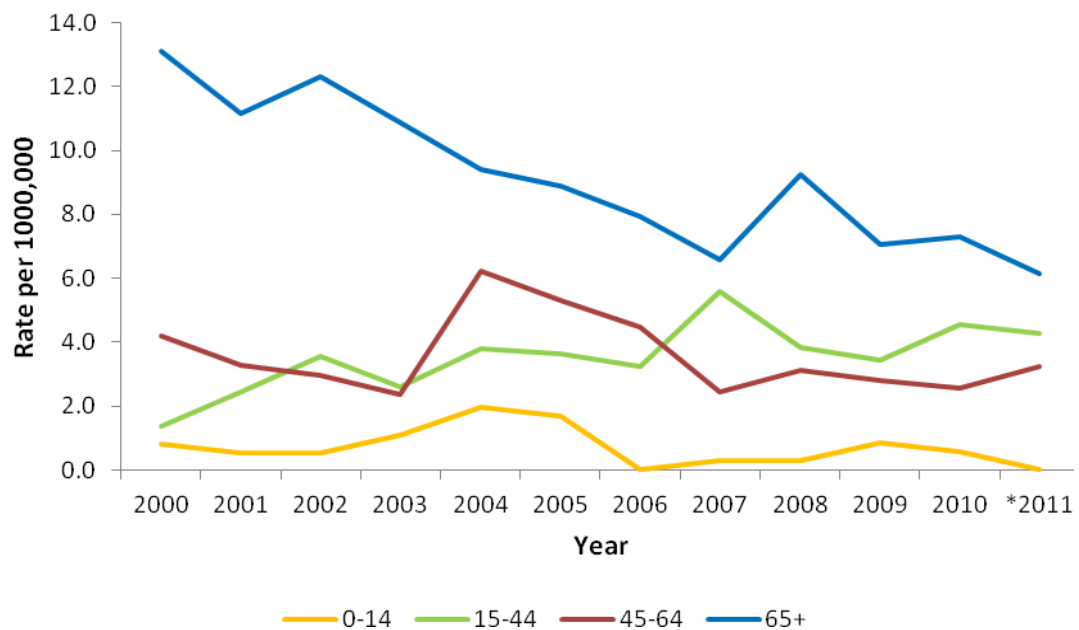


Figure 5: Northern Ireland TB rates per 100,000 by age group, 2000-2011



*2011 data is provisional

Place of birth

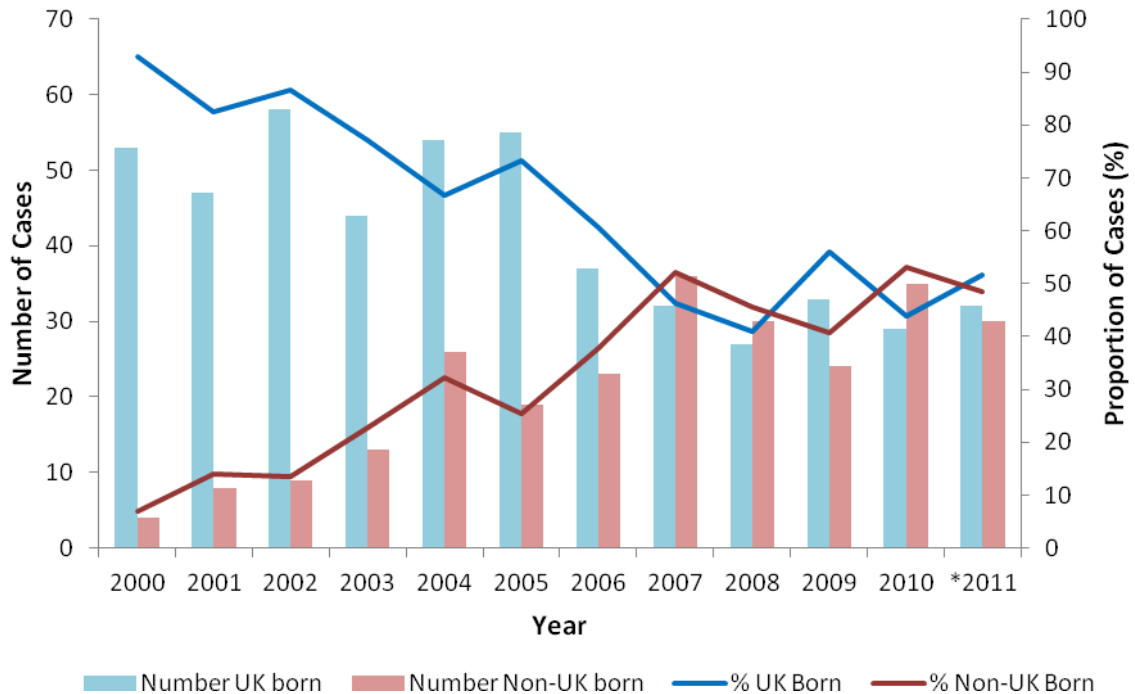
In 2009 the country of birth was known for 97% (n=57) of cases. Of these 57 cases, 58% (n=33) were born within the UK/Ireland and the remaining 42% (n=24) were born outside the UK.

Similarly, the country of birth was known for 97% (n=64) of cases notified in Northern Ireland in 2010. Of these 64 cases, 55% (n=35) were born outside the UK/Ireland, the remaining 45% (n=29) were from the indigenous population.

There has been a 31% increase in 2010 compared with 2009, in the proportion of tuberculosis cases in Northern Ireland who were non-UK born. Provisional data for 2011 suggests that the proportion of cases born outside the UK/Ireland will decrease slightly to 48% (n=30).

In the past decade in Northern Ireland the proportion of tuberculosis cases born outside the UK/Ireland has steadily increased from 7% in 2000 to 55% in 2010. Although the proportion dropped slightly in 2009 to 41% (n=24) it has remained relatively stable in recent years and provisional data for 2011 suggests that this general trend will continue. (Figure 6)

Figure 6: Northern Ireland- number and proportion of UK Born and Non-UK Born tuberculosis case reports, 2000-2011

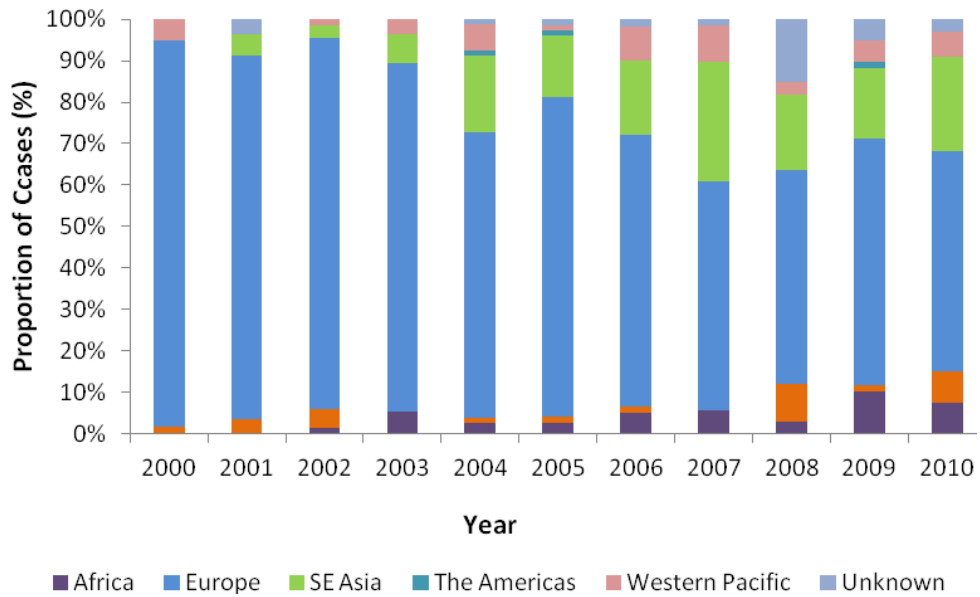


*2011 figures are provisional

Similar to previous years the majority of tuberculosis cases who were notified in Northern Ireland in 2009 originated from Europe (59%, n=35). An estimated 17% originated from South-East Asia (n=10), while 10% (n=6) of cases originated from Africa, approximately 5% of cases originated from the Western Pacific (n=3), while an estimated 4% (n=2) of cases originated from the Eastern Mediterranean and the Americas respectively. The country of origin was unknown for the remaining 5% (n=3).

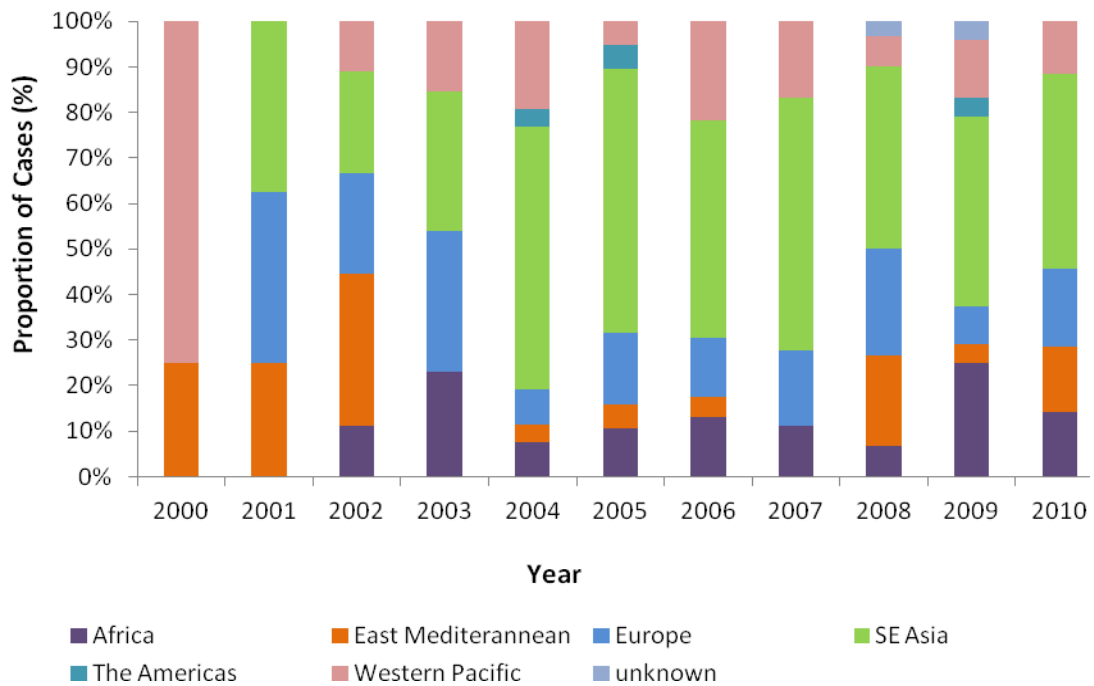
The majority of tuberculosis cases who were notified in Northern Ireland in 2010 also originated from Europe (53%, n=35). An estimated 23% originated from South-East Asia (n=15), while 8% (n=5) of cases each originated from Africa and the Eastern Mediterranean respectively. Approximately 6% of cases originated from the Western Pacific (n=4) and the remaining 3% (n=2) were unknown. (Figure 7)

Figure 7: Northern Ireland tuberculosis reports by WHO region of birth, 2000-2010



Of the 24 cases of tuberculosis born outside the UK/Ireland in 2009, the majority (42%, n=10) originated from South-East Asia, while approximately 25% (n=6) originated from Africa. An estimated 13% (n=3) originated from the Western Pacific while 8% (n=2) originated from Europe. The remaining 8% (n=2) originated from the Americas and the East Mediterranean. For one case (4%) the country of origin was unknown (Figure 8).

Figure 8: Non-UK Born tuberculosis reports in Northern Ireland by WHO region, 2000-2010



Similar to 2009, the majority of the 35 cases of tuberculosis born outside the UK/Ireland in 2010, originated from South-East Asia (43%, n=15), while approximately 17% (n=6) originated from Europe. Africa accounted for 14% (n=5), East Mediterranean 14% (n=5), and the remaining 12% (n=4) originated from the Western Pacific. There were no cases originating from the Americas in 2010, (Figure 8).

Similar to previous years, the age profile in 2009 and 2010 remains older in the indigenous population with a mean age of 58 and 60 years, respectively. This compares with a mean of 37 years in both years for those born outside the UK/Ireland (Table 3).

Provisional data for 2011 suggests this trend continuing with the age of UK-born cases remaining similar to previous years with a mean of 60 years and a median of 65 years (IQR 50-78 years), while the mean age of non-UK born TB cases is slightly younger than 2009/10 at 34 years and a median of 33 years (IQR 27-38 years) (Table 3).

Table 3: Age-specific tuberculosis cases in Northern Ireland, UK and Non-UK Born, per year, 2000-2011

Year	Total Cases	0-4		5-14		15-44		45-64		65+		Mean Age		Median Age (IQR)	
		(%) UK	(%) Non-UK	(%) UK	(%) Non-UK	(%) UK	(%) Non-UK	(%) UK	(%) Non-UK	(%) UK	(%) Non-UK	UK	Non-UK	UK	Non-UK
2000	57	4	0	2	0	11	7	26	0	51	0	62	39	69 (53-78)	41 (36-43)
2001	55	4	0	0	0	20	9	20	2	42	4	58	46	63 (40-79)	37 (30-62)
2002	67	1	0	1	0	27	12	15	1	42	0	56	38	62 (39-74)	38 (31-44)
2003	57	2	0	5	0	11	23	16	0	44	0	58	34	67 (48-75)	35 (30-40)
2004	80	6	1	1	0	11	23	23	8	26	1	53	33	56 (40-69)	28 (24-46)
2005	74	3	0	3	3	15	20	27	1	27	1	55	31	58 (41-73)	27 (25-42)
2006	60	0	0	0	0	5	35	27	2	30	2	65	34	62 (55-80)	33 (27-38)
2007	68	1	0	0	0	10	50	12	3	24	0	61	32	65(45-76.5)	30 (27-37)
2008	57	0	0	2	0	4	47	11	4	32	2	67	35	74 (56-81)	32 (27-42)
2009	57	0	0	4	2	14	32	12	7	28	2	58	37	64 (41-71)	37(30-43)
2010	64	0	0	3	0	8	44	9	8	25	3	63	37	71 (55-82)	33 (28-44)
*2011	62	0	0	0	0	11	40	15	8	26	0	60	34	65(50-78)	33(27-38)

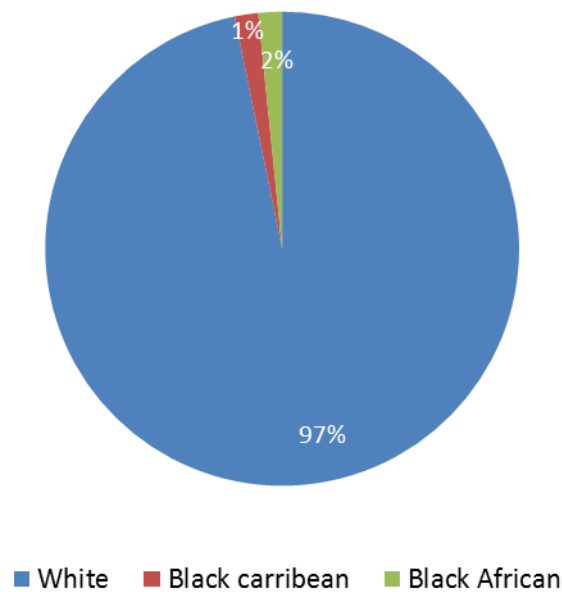
*2011 figures are provisional

**Case totals only include those where place of birth was know

Ethnicity

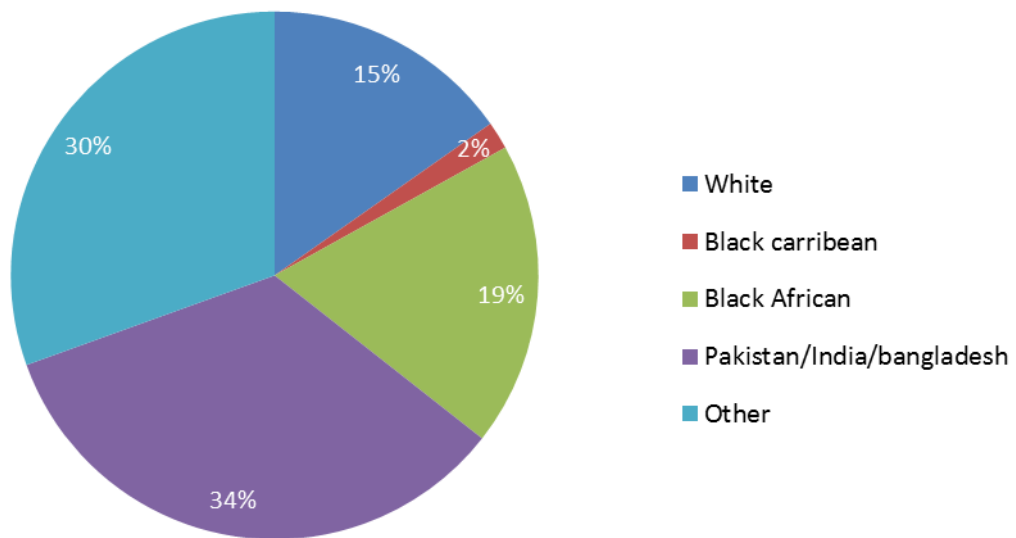
Information was available on ethnicity for all cases in both 2009 (n=59) and 2010 (n=66). Of those cases from the indigenous population across both years, 97% (n=62) were of White ethnicity. The remaining 3% were of either Black African or Black Caribbean ethnicity. (Figure 9)

Figure 9: Ethnicity of UK born tuberculosis cases in Northern Ireland, 2009-2010



Of those cases known to have been born outside the UK/Ireland in 2009/10 (n=59), the majority (34%, n=20) were of Pakistani/Indian/Bangladeshi origin. An additional 19% (n=11) were of Black African ethnicity, while those of White ethnicity accounted for 15% (n=9) of TB cases. Those of Black Caribbean ethnicity accounted for 2% (n=1) of cases, while the remaining 30% (n=18) were of other ethnic origins. (Figure 10)

Figure 10: Ethnicity Non-UK born tuberculosis cases in Northern Ireland, 2009-2010



Year of entry into Northern Ireland was known for 71% (n=17) of tuberculosis cases born outside the UK/Ireland in 2009 and 77% (n=27) of cases in 2010. Of these, time since entry into the UK/Ireland until tuberculosis diagnosis was known for 47% (n=8) in 2009 and 67% (n=18) in 2010.

Of the eight cases notified in 2009, where time since entry to the UK/Ireland and tuberculosis diagnosis was known, two (25%) were diagnosed within 2 years of entry. An additional five (63%) cases were diagnosed between 2 and 9 years after entry to the UK/Ireland, and the remaining one case had been in the UK/Ireland for ten years or more before diagnosis.

In 2010, four (22%) cases where time since entry to the UK/Ireland and tuberculosis diagnosis was known, were diagnosed within 2 years of entry. An additional ten cases (56%) were diagnosed between two and nine years of entry, and the remaining four cases (22%) had been in the UK/Ireland for ten years or more before diagnosis.

Clinical Characteristics

In 2009, 83% (n=49) of tuberculosis cases were culture confirmed. Forty-eight of these isolates were identified as *M. tuberculosis* and one as *M. bovis*. The remaining 10 cases (17%) were diagnosed on the basis of clinical or non-culture diagnosis. Of these 10 cases, 50% (n=5) were confirmed by histology of the lymph node or other tissues and one case (10%) was confirmed by sputum

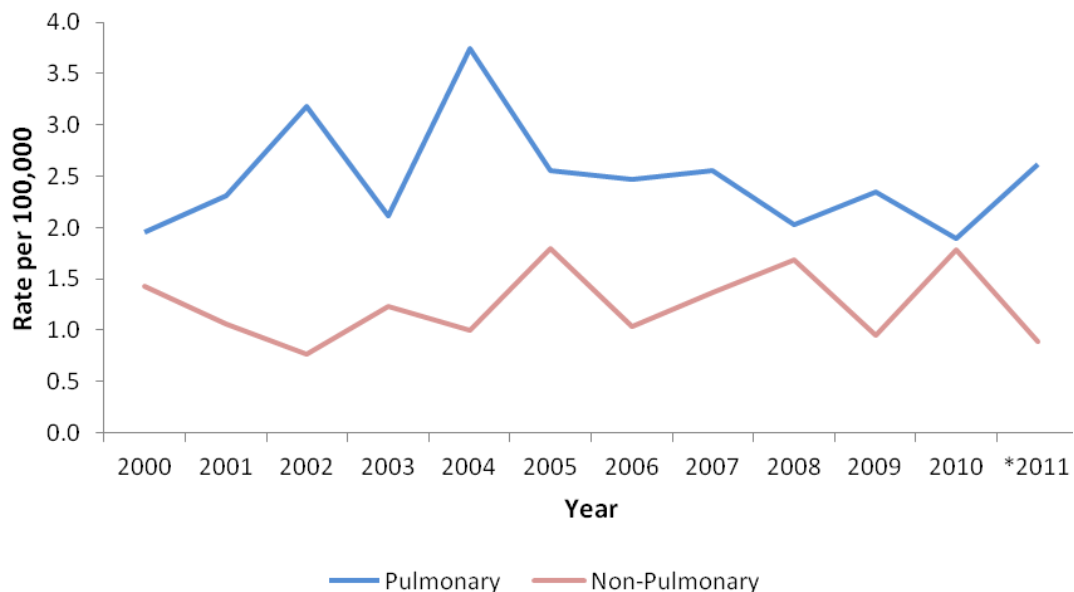
microscopy. The remaining 40% (n=4) had no known positive laboratory result or had been diagnosed prior to entry to the UK.

Similar to 2009, 83% (n=55) of tuberculosis cases in 2010 were culture confirmed. Fifty-three of these cases were identified as *M. tuberculosis*, one as *M. bovis* and one case as *M. africanum*. The remaining 11 cases (17%) were notified on the basis of clinical or non-culture diagnosis. Of these eleven cases, five were confirmed by histology of the lymph node or other tissue and an additional case was confirmed by microscopy of the lymph node. The remaining five cases had no known positive laboratory result.

In 2009, 71% (n=42) of the 59 notified cases of tuberculosis had a pulmonary component; the remaining 17 (29%) cases were non-pulmonary. In 2010, the proportion of pulmonary cases decreased to 52 %, (n=34) of the 66 notified cases, with the remaining 32 cases (48 %) being non-pulmonary.

The rate of pulmonary tuberculosis cases in Northern Ireland in 2009 was 2.35 per 100,000 population. This decreased slightly to 1.89 per 100,000 population in 2010, provisional data for 2011 suggest an increase in the rate of pulmonary cases to 2.61/100,000 population, (Figure 11).

Figure 11: Rates of pulmonary and non-pulmonary tuberculosis, Northern Ireland, 2000-2011

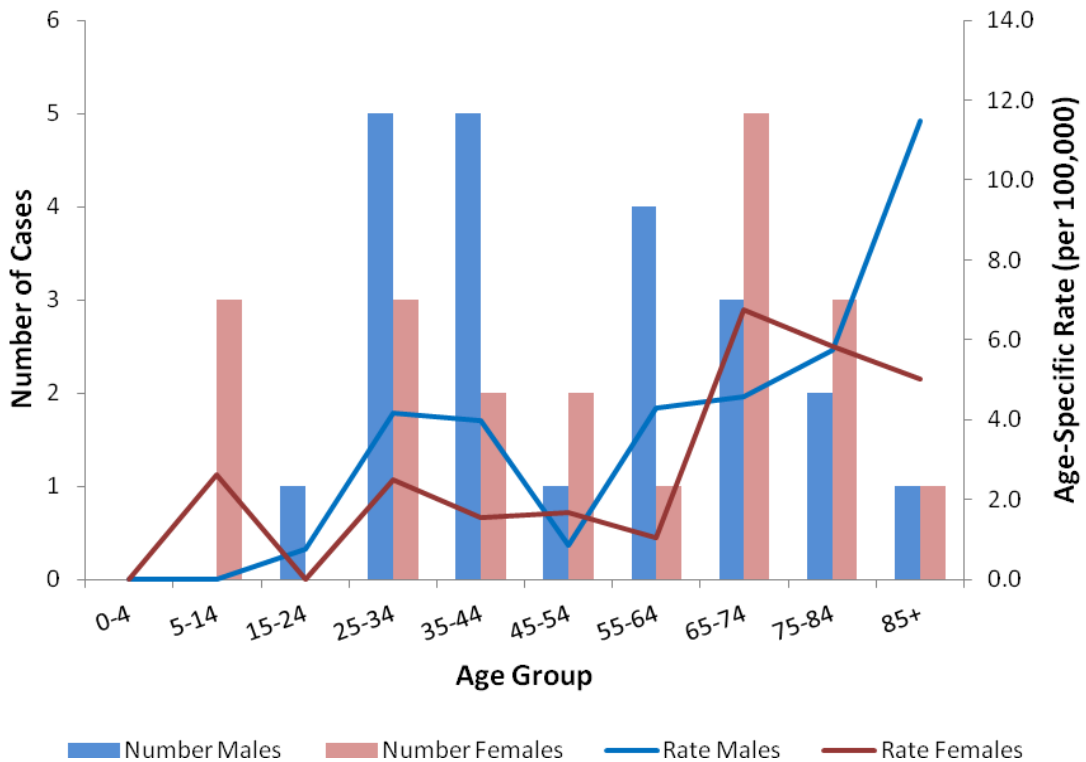


*2011 figures are provisional

Site of disease-Pulmonary

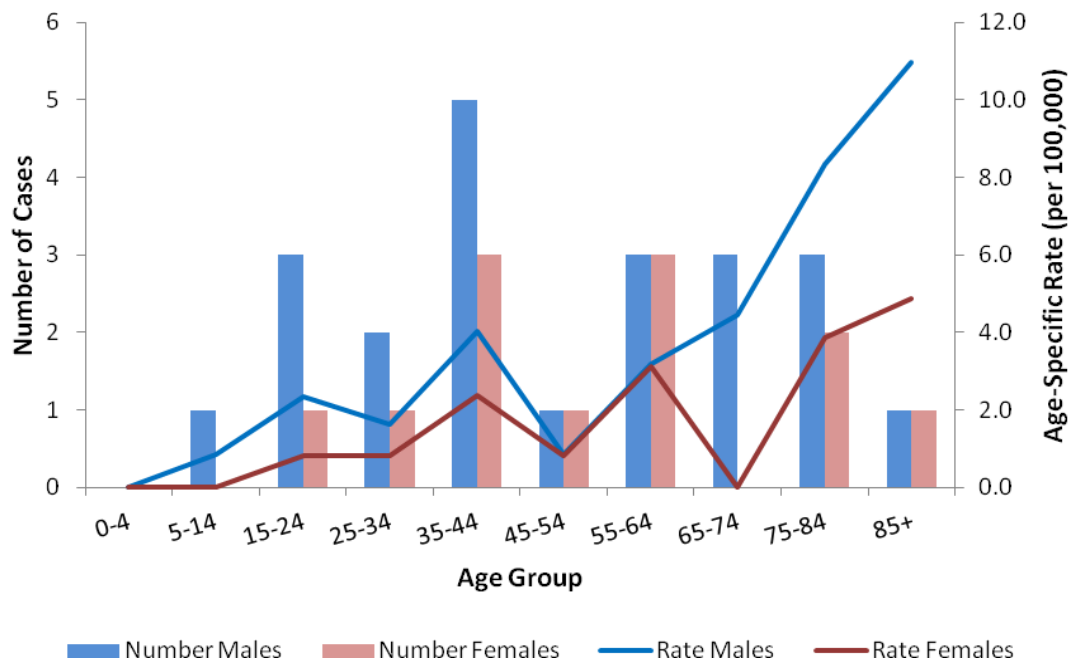
Similar to previous years, the age-sex distribution shows the highest age-specific rates for pulmonary tuberculosis continuing to be recorded in older age groups. Of the 42 tuberculosis cases in 2009 with pulmonary disease; 22 (52%) were male, with a mean age of 51 years and a median age of 45 years (IQR 33-68 years) and 20 (48%) were female, with a mean age of 52 years and a median age of 57 years (IQR 33-71 years), (Figure 12).

Figure 12: Pulmonary tuberculosis case reports and rates by age group and gender, Northern Ireland, 2009



Of the 34 pulmonary tuberculosis cases in 2010; 22 (65%) were male, with a median age of 46 years (IQR 28-72 years) and 12 (35%) were female, with a median age of 53 years (IQR 40-72 years). During 2010, the highest age-specific rates occurred in the 85 years and older age group for both men and women. However, care should be taken with interpretation of the data due to small numbers in some age-groups (Figure 13).

Figure 13: Pulmonary tuberculosis case reports and rates by age group and gender, Northern Ireland, 2010



Of the 42 cases diagnosed in 2009 with pulmonary disease, 86% (n=36) were confirmed by culture of which 35 were confirmed as *M. tuberculosis* and the remaining case as *M.bovis*. Fourteen (33%) of the 42 pulmonary cases were found to be sputum smear positive at the time of notification. Thirteen cases were both culture and sputum smear positive, (Table 4).

Of the 34 cases diagnosed in 2010 with pulmonary disease, 97% (n=33) were confirmed by culture (*M. tuberculosis*). Twenty (59%) of the 34 pulmonary cases were found to be sputum smear positive at the time of notification, and all but one were subsequently confirmed by culture as *M. tuberculosis* (Table 4).

An estimated 67% (n=28) of pulmonary tuberculosis cases in 2009 and 41% (n=14) of cases in 2010 were sputum smear negative at the time of notification. Of the 28 cases in 2009, 82% (n=23) were subsequently confirmed by culture (22 *M. tuberculosis*, 1 *M. bovis*), while the remaining 18% (n=5) were diagnosed on the basis of clinical or non-culture diagnosis and response to anti-tuberculosis therapy.

Of the 14 cases who were sputum smear negative at the time of notification in 2010, 93% (n=13) were subsequently confirmed by culture (*M. tuberculosis*). The outcome of culture testing was not known for the remaining case.

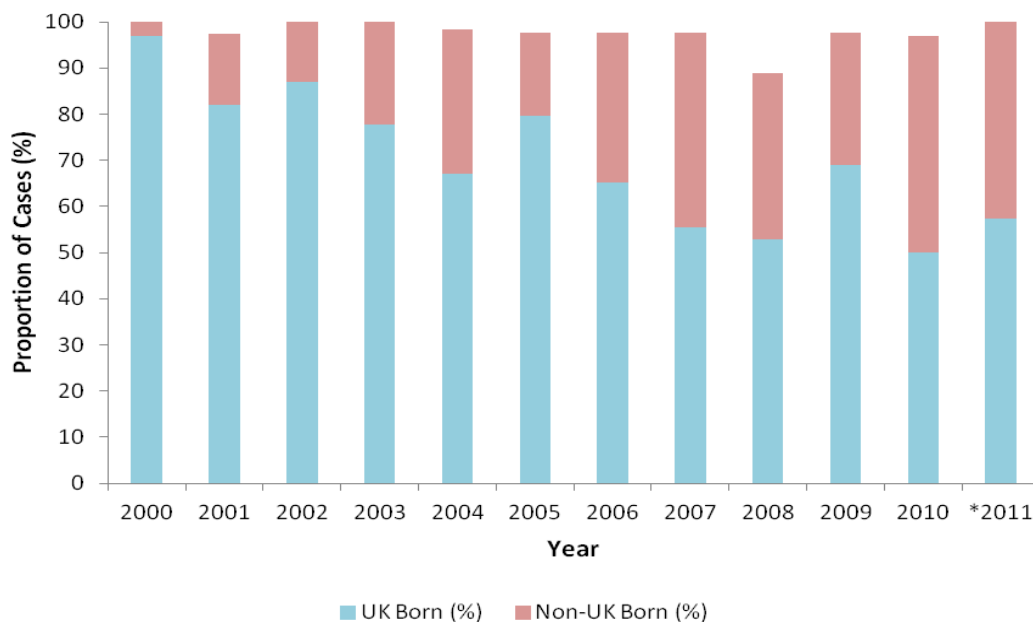
Table 4: Pulmonary, Culture positive and Sputum Smear positive tuberculosis cases, Northern Ireland, 2000-2011

Year	Pulmonary Cases	Culture Positive (%)	Culture and Sputum Smear Positive (%)
2000	33	76%	18%
2001	39	79%	56%
2002	54	72%	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	86%	31%
2010	34	97%	59%
*2011	47	83%	38%
Total	517	83%	40%

*2011 figures are provisional

There was a higher proportion of pulmonary disease in UK-born cases in 2009 (88%, n=29), than in 2010 when 50% (n=17) of UK-born cases had pulmonary disease. Almost half of non-UK born cases had pulmonary disease in 2009 and 2010 at 50% (12/24) and 46% (16/35), respectively, (Figure 14).

Figure 14: Proportion of Pulmonary tuberculosis cases UK and Non-UK born in Northern Ireland, 2000-2011



*2011 figures are provisional

**Cases only included where place of birth was known

Outcome information was available for all 42 pulmonary tuberculosis cases in 2009. Of these 38 (90%) cases are known to have successfully completed a full course of anti-tuberculosis treatment. One pulmonary patient was still on treatment at the time of completion of the outcome form. An additional three cases died. Tuberculosis was cited as either causing or contributing to the cause of death for two of these cases.

Outcome information was available for all 34 pulmonary tuberculosis cases in 2010. Twenty-one (62%) are known to have successfully completed a full course of anti-tuberculosis treatment. Seven patients (20%) were still on treatment and three cases were lost to follow up at the time of completion of the outcome form. An additional three cases with pulmonary disease died. Tuberculosis was cited as either causing or contributing to the cause of death for one of these cases.

Site of disease- Non-pulmonary

In 2009, 17 cases were diagnosed with non-pulmonary tuberculosis, representing 29% of all cases notified and giving an annual notification rate of 1 case per 100,000 population. The proportion of cases with non-pulmonary tuberculosis increased in 2010 to 48% (n=32), giving an increased annual notification rate of 1.8 cases/100,000.

Of the 17 non-pulmonary cases of tuberculosis reported in 2009, 76% (n=13) were culture confirmed (*M. tuberculosis*). The remaining 24% (n=4) were either histology positive or had been diagnosed overseas.

In 2010, 69% (n=22) of the 32 cases of non-pulmonary tuberculosis were culture confirmed. Of these, 20 cases (91%) were confirmed as *M. tuberculosis*, 1 case was culture confirmed as *M. bovis* and 1 case as *M. africanum*. An additional 12% (n=4) of cases were histology positive and one case had a positive microscopy result. The remaining five cases had no known positive laboratory result, (Table 5).

Table 5. Non-Pulmonary, Culture positive tuberculosis cases, Northern Ireland, 2000-2011

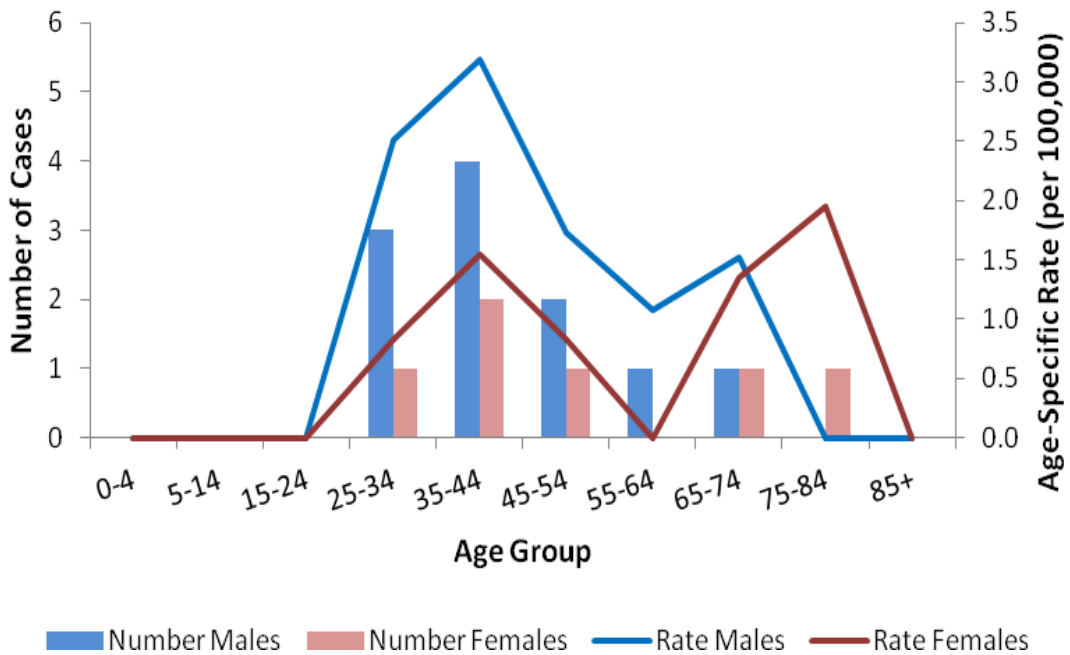
Year	Non-Pulmonary Cases	Culture Positive (%)
2000	24	66%
2001	18	83%
2002	13	69%
2003	21	76%
2004	17	65%
2005	31	39%
2006	18	67%
2007	24	63%
2008	30	70%
2009	17	76%
2010	32	69%
*2011	15	67%
Total	238	68%

*2011 figures are provisional

Of the five health and social care trusts in Northern Ireland, the BHSCT had the highest rate of non-pulmonary tuberculosis in both 2009 and 2010 with rates of 1.5 and 2.4 cases/100,000 population, respectively

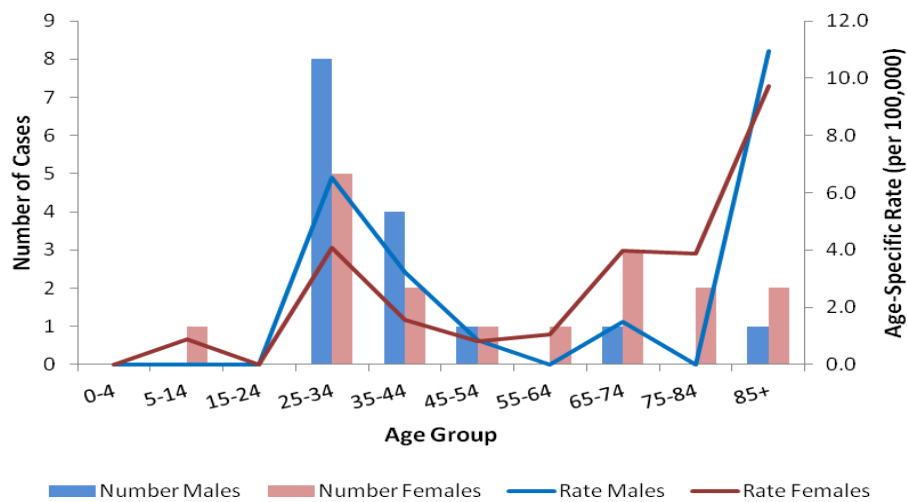
Of the 17 non-pulmonary cases of tuberculosis notified during 2009, 11 cases were male and 6 were female, giving a ratio of 1.8:1. The ages of non-pulmonary disease cases ranged from 25 to 84 years with a median age of 39 years. (Figure 15)

Figure 15: Non-pulmonary tuberculosis case reports and rates by age group and gender, Northern Ireland, 2009



In 2010, there were more females than males with non-pulmonary disease. Of the 32 non-pulmonary TB cases, 15 were male and 17 were female giving a ratio of 0.8:1. The ages of non-pulmonary disease cases ranged from 5 to 89 years with a median age of 43 years. The highest age-specific rate for both males and females was in the over 85 year group. It should be noted however that rates may be affected by small numbers. (Figure 16)

Figure 16: Non-pulmonary tuberculosis case reports and rates by age group and gender, Northern Ireland, 2010



The proportion of non-pulmonary disease cases that were culture positive decreased from 76% in 2009 to 69% in 2010. Of the 59 cases of tuberculosis notified in 2009, 44% (n=26) reported an extra-pulmonary component, in 2010 the extra-pulmonary proportion increased to 57% (n=38/66). In both 2009 (n=10) and 2010 (n=27) the most commonly reported extra-pulmonary component was extra-thoracic lymph nodes. (Table 6)

There was one case of TB meningitis reported in 2009 and three cases reported in 2010. There have been a total of 19 cases (2% of all cases) of TB meningitis reported from 2000 to 2010 in Northern Ireland.

Table 6: Tuberculosis case reports by site of disease, Northern Ireland, 2009-2010

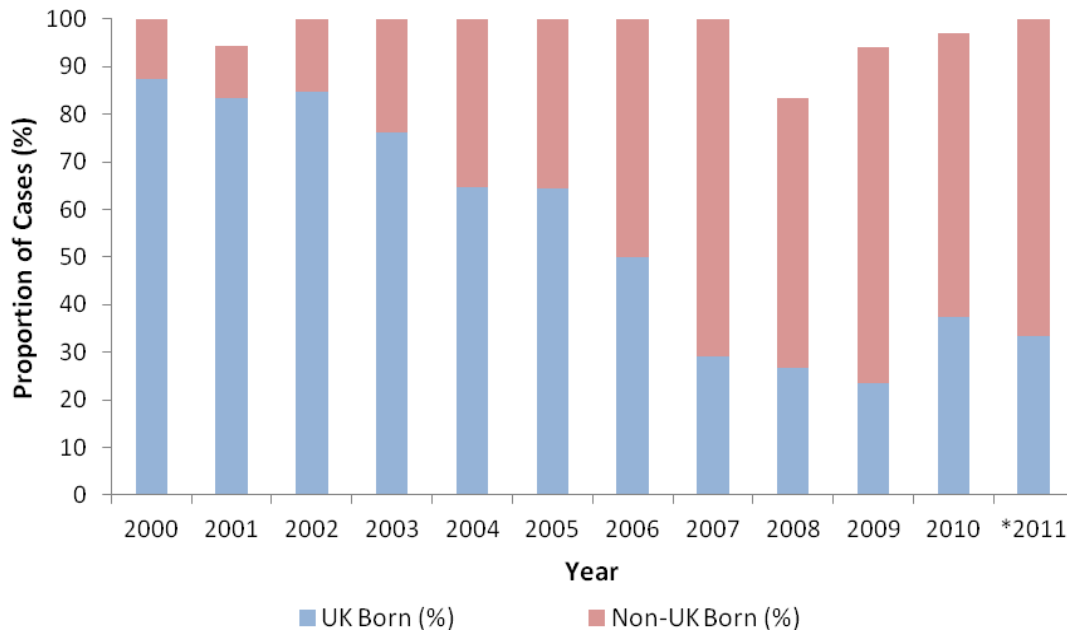
Site of Disease	Number of Cases 2009	Proportion of all Cases 2009	Number of Cases 2010	Proportion of all Cases 2010
Pulmonary	42	71%	34	51%
Extra-thoracic lymph nodes	10	17%	27	41%
Intra-thoracic lymph nodes	3	5%	3	5%
Miliary	3	5%	3	5%
CNS-meningitis	1	2%	3	5%
Gastrointestinal	2	3%	2	3%
Genitourinary	1	2%	2	3%
Unknown extra-pulmonary	1	2%	2	3%
Pleural	3	5%	1	2%
CNS Other	0	0%	1	2%
Bone-spine	1	2%	1	2%
Bone Other	0	0%	1	2%
Laryngeal	1	2%	0	0%
Other extra-pulmonary	3	5%	1	2%

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

Of the 17 cases of non-pulmonary tuberculosis notified in Northern Ireland in 2009, 71% (n=12) were born outside the UK/Ireland. In 2010 the proportion decreased to 59% (n=19).

Over the past decade however, the proportion of non-pulmonary cases of tuberculosis who were born outside the UK has steadily risen from 13% (n=3) in 2000 to 63% (n=10) in 2011 (provisional figure), (Figure 17).

Figure 17: Proportion of Non-Pulmonary tuberculosis cases UK and Non-UK born in Northern Ireland, 2000-2011



*2011 data is provisional

** Cases only included where place of birth was known

Outcome information was available for 94% (n=30) of non-pulmonary tuberculosis cases in 2010. Twenty-four (80%) cases are known to have successfully completed a full course of anti-tuberculosis treatment; three cases were still on treatment at the time of reporting and a further three non-pulmonary cases were lost to follow-up.

Microbiology and Microscopy

The BHSCT reported the highest number of cases in 2009 (n=20), of which 75% were confirmed by culture. In 2010 the SHSCT reported the highest number of cases (n=19), of which 89% were also culture confirmed.

In 2009, 93% of SHSCT cases and 92% of the NHSCT were culture confirmed. In 2010, 91% of SEHSCT cases were culture positive, (Table 7).

Table 7. Proportion of culture positive and sputum smear positive cases of tuberculosis per Health & Social Care Trust, Northern Ireland, 2009-2010

Trust	No. Of Cases 2010	No. Of Cases 2009	Culture Positive 2010 (%)	Culture Positive 2009 (%)	Sputum Positive 2010(%)*	Sputum Positive 2009 (%)*
BHSCT	18	20	89%	75%	50%	35%
SEHSCT	11	8	91%	75%	18%	12.5%
NHSCT	15	13	66%	92%	13%	15%
SHSCT	19	14	89%	93%	37%	29%
WHSCT	3	4	66%	75%	0%	0%
NI Total	66	59	83%	83%	30%	24%

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 all 49 culture confirmed cases of tuberculosis in Northern Ireland in 2009 and all 55 culture-confirmed cases in 2010.

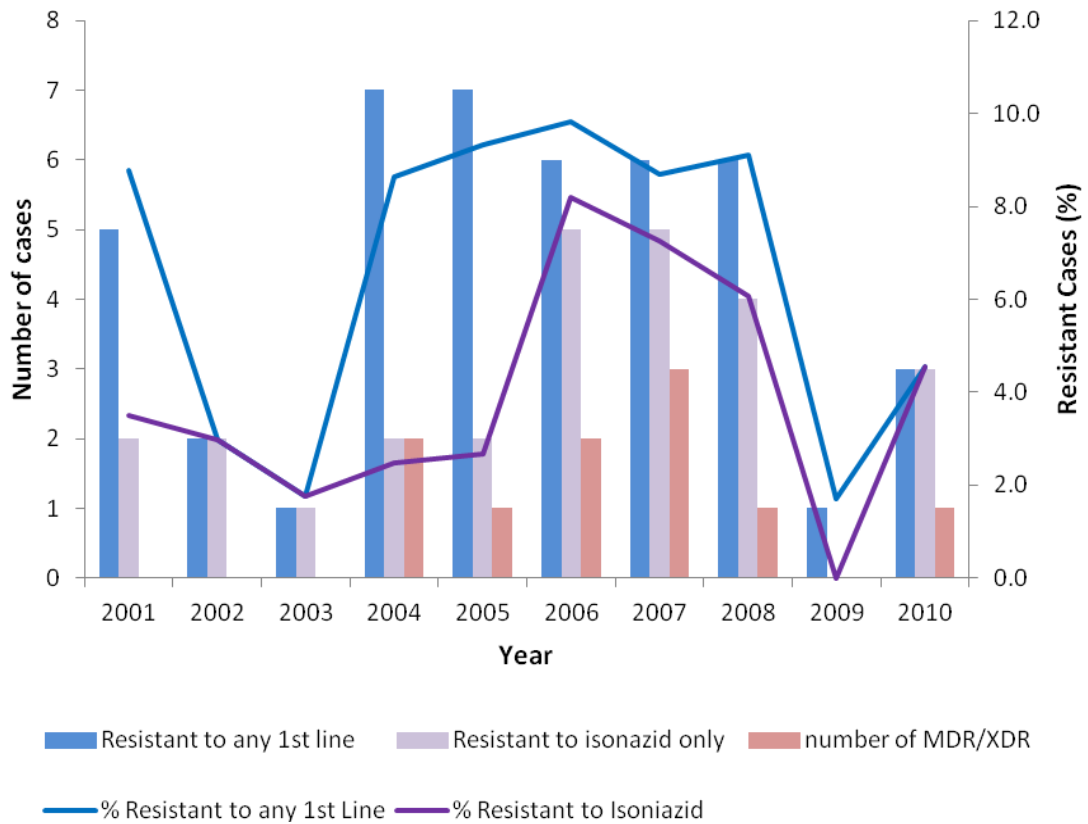
Drug resistance

Of the 49 culture confirmed cases in 2009, only one (*M. bovis*) isolate was resistance to pyrazinamide, no other resistances were detected.

In 2010 a total of three TB cases were resistant to Isoniazid, of which one was Extra Drug Resistant (XDR), also showing resistance to rifampicin, ethambutol and pyrazinamide, and the second line-drug streptomycin. This is the first XDR-TB case recorded in Northern Ireland, (Figure 18).

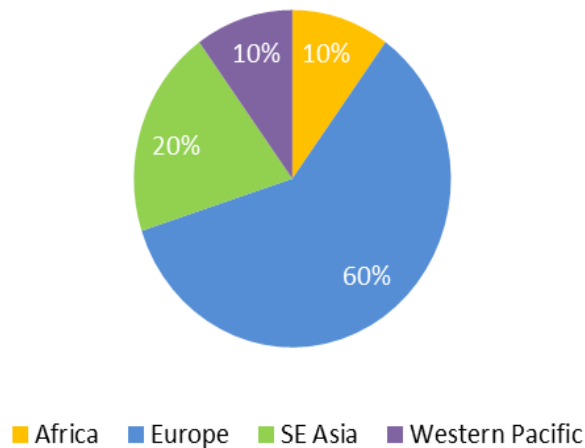
Initial and continuation drug therapy was recorded for 92% (n=54) of tuberculosis cases in 2009 and for 77% (n=51) of cases in 2010. The most commonly reported treatment regimen for both years was the concurrent use of the four first-line drugs: rifampicin, isoniazid, ethambutol and pyrazinamide.

Figure 18: Number and proportion of drug resistant cases of tuberculosis in Northern Ireland, 2000-2010



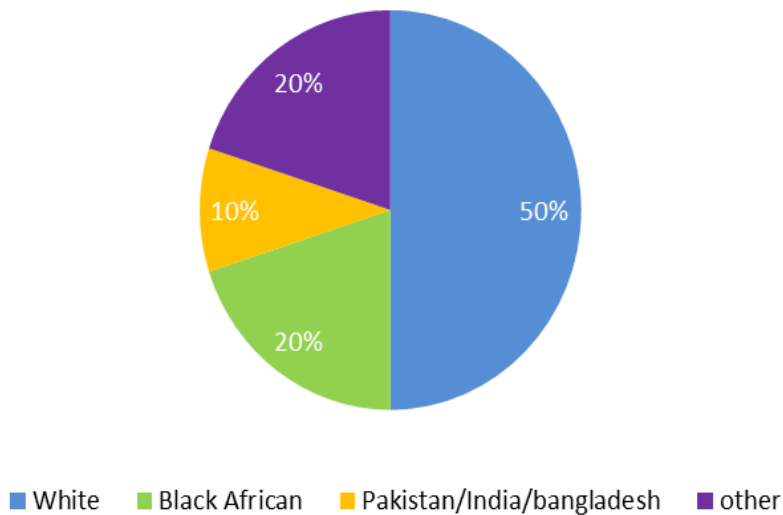
With the exception of 2009 when there were no MDR/XDR-TB isolates, there has been at least one case of MDR/XDR-TB from 2004 annually in Northern Ireland. Throughout the past decade, 60% (n=6/10) of MDR/XDR tuberculosis cases notified in Northern Ireland have originated from Europe, (Figure 19).

Figure 19: MDR/XDR tuberculosis cases in Northern Ireland by WHO Region, 2000-2010



Of the ten MDR/XDR tuberculosis cases notified in Northern Ireland during the past decade, the majority (50%) were of White ethnicity. Black African ethnicity accounted for a further 20% of cases. (Figure 20)

Figure 20: Ethnicity of MDR/XDR tuberculosis cases in Northern Ireland, 2000-2010

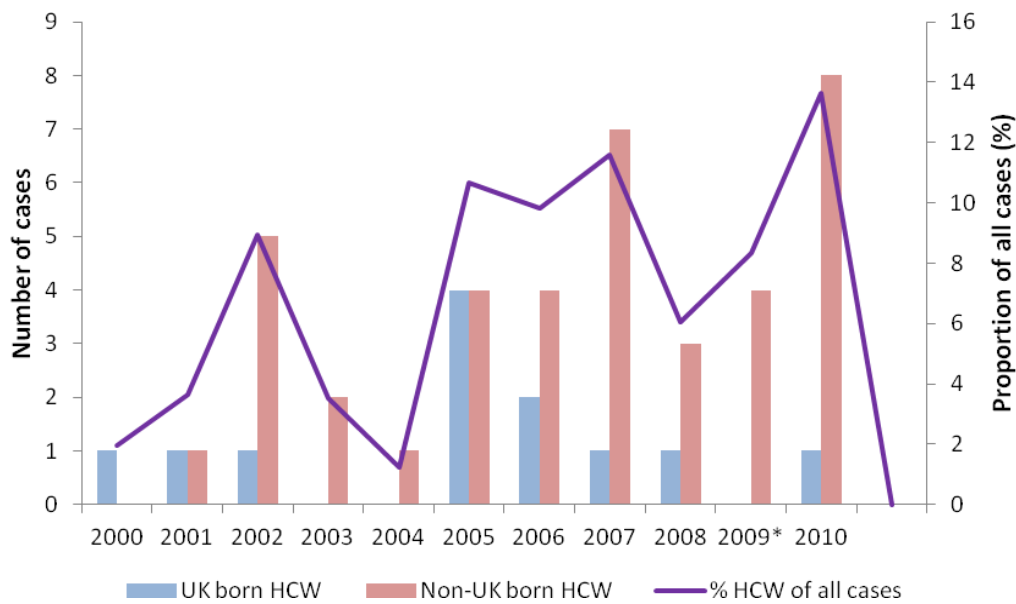


Tuberculosis in healthcare workers

In 2009, there were five healthcare workers notified with tuberculosis, accounting for approximately 8% of all notified cases. Three cases had pulmonary disease, of which two were culture confirmed and sputum smear positive, the remaining two cases were extra-pulmonary. The place of birth was known for four of the five cases (80%), of which all four were born outside the UK/Ireland, (Figure 21).

In 2010, there were nine healthcare workers notified with tuberculosis, accounting for approximately 14% of all notified cases. Four cases had pulmonary disease, of which three were culture confirmed and sputum smear positive, the remaining five cases were extra-pulmonary. The place of birth was known for all nine cases, of which all but one was born outside the UK/Ireland, (Figure 21).

Figure 21: Number of tuberculosis notifications and proportion (%) among Healthcare Workers, Northern Ireland 2000-2010.



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

The proportion (14%) of tuberculosis cases notified in Northern Ireland in 2010 who work in a healthcare setting is the highest that has been reported during the past decade. The number of cases who work in healthcare settings has fluctuated from year to year over the past ten years, with increases in later years being partially attributable to increased screening in this sector; however, there has been a general upward trend in the instance of TB in healthcare workers from 2008.

From 2000-2010 the majority, 75% (n=39) of healthcare workers with tuberculosis were born outside the UK/Ireland.

Treatment Outcomes

Of the 59 cases of tuberculosis reported in Northern Ireland in 2009, outcome information was available for all cases. Of these 59 cases, 86% (n=51) completed anti-tuberculosis treatment within 12 months, while an estimated 7% (n=4) of cases were still receiving treatment after 12 months. Approximately 7% of patients died (n=4) in 2009, of which tuberculosis was the cause of, or contributed to, the death of two cases, (Table 8).

Of the 66 cases of tuberculosis reported in Northern Ireland in 2010, outcome information was available for 97% (n=64). Of the 66 cases reported, 68% (n=45) completed anti-tuberculosis treatment within 12 months, a decrease of 17% in comparison with 2009. At the time of reporting however, 15% of cases (n=10) were still receiving anti-tuberculosis treatment. An estimated 9% (n=6) of cases were lost to follow-up (LTF), and no outcome report was submitted for 2 cases, representing 3% of all cases in 2010. Three patients died in 2010; of these tuberculosis was cited as the cause of, or contributing to, the death of one case. (Table 8)

Table 8: Tuberculosis treatment outcomes at 12 months, Northern Ireland, 2009-2010

Treatment Outcome	Number of Cases 2009	Proportion (%) 2009	Number of Cases 2010	Proportion (%) 2010
Completed Treatment	51	86%	45	68%
Lost To Follow-up	0	0%	6	9%
Died	4	7%	3	5%
No Outcome Report	0	0%	2	3%
Transferred out	0	0%	0	0%
Still on Treatment	4	7%	10	15%
Treatment Stopped	0	0%	0	0%
Total	59	100%	66	100%

From 2006 the proportion of cases completing treatment at 12 months has exceeded 70%, with the highest completion rate in 2009 at 86%, (Table 9).

Table 9: Number and proportion of tuberculosis cases completing treatment within 12 months, Northern Ireland, 2000-2010

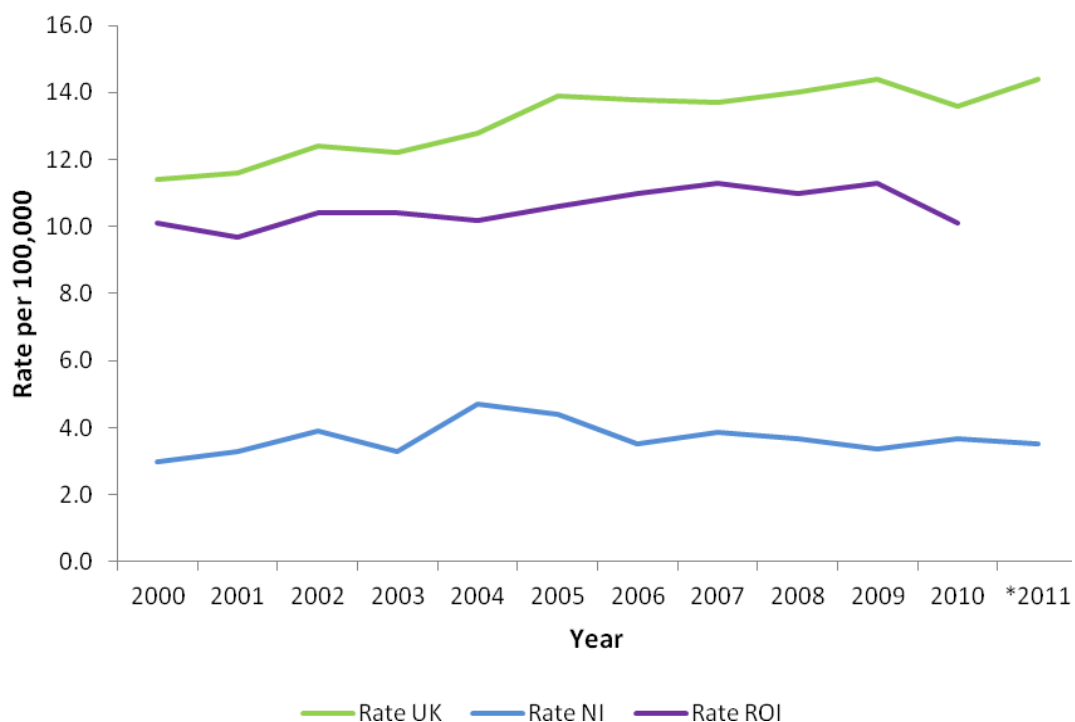
Year	Number of Cases	Completed Treatment at 12 months	Completed at 12 months (%)	95% CI
2000	57	25	44%	31.8 - 56.7
2001	57	38	67%	53.7 - 77.5
2002	67	47	70%	58.3 - 79.8
2003	57	30	53%	39.9 - 65.0
2004	81	58	72%	61.0 - 80.3
2005	75	41	55%	43.4 - 65.4
2006	61	33	54%	41.7 - 66.0
2007	69	50	73%	61.0 - 81.6
2008	66	46	70%	57.8 - 79.4
2009	59	51	86%	71.5 - 90.5
2010	66	45	68%	56.2-78.1
Total	715	462	65%	61-68

Discussion

There was a slight decrease in the number of cases of tuberculosis notified in the UK in 2010 (8,483) compared with 2009 (9,040), giving rates of 13.6 and 15 per 100,000 population, respectively. 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. Conversely, the numbers of cases in Northern Ireland increased slightly in 2010 compared with 2009. However, rates of TB in the region continue to remain low and stable and are much lower than rates of TB in the UK and ROI (Figure 22).

The majority of patients in Northern Ireland in both years were in young adults aged 15 to 44 years; this follows the national trend where 60% of UK cases were also in this age group.

Figure 22: Rate of tuberculosis per 100,000 population in the UK, Republic of Ireland and Northern Ireland 2000-2010



**2011 figures are provisional*

*** UK data from 'Report on tuberculosis surveillance in the UK, 2012'*

**** ROI data from 'TB Cases notified in Ireland in 2009' & 'TB Cases notified in Ireland in 2010'*

Similar to trends elsewhere in the UK, the proportion of cases born outside the UK/Ireland has increased over the last decade, with 55% of TB cases in Northern Ireland in 2010 born outside the UK/Ireland. The majority (46%) of these cases originated from South-East Asia. This was similar across the UK with 55% of all non-UK born cases originating from South Asia. Almost 40% of the world's burden of tuberculosis, an estimated five million prevalent cases, is found in the

WHO South-East Asia Region³. The annual notification rate of tuberculosis in this region in 2008 was 183 cases per 100,000 population.

The first case of XDR TB in Northern Ireland was reported in 2010. The incidence of multi-drug resistance in the region remains low. However, from 2000-2010, there have been a total of ten MDR/XDR tuberculosis cases, with cases been identified annually from 2004 onwards. All 10 cases were pulmonary with 50% also sputum smear positive at the time of detection. The majority (70%) were also born outside the UK/Ireland.

In 2009, 86% of cases completed treatment within 12 months. The proportion completing treatment within the 12 month period in 2010 fell to 68%, with 15% of cases still on treatment at the 12 month stage. This falls below the UK 85% target for completion.

Although rates of TB in Northern Ireland are low and stable, this should not be interpreted as a reason for complacency. Public health action to decrease TB will need to continue to target high- risk groups such as immigrants.

References

1. European Centre for Disease Prevention and Control/WHO Regional Office for Europe. Tuberculosis surveillance and monitoring in Europe 2012. Stockholm: European Centre for Disease Prevention and Control, 2012. Available online: <http://www.ecdc.europa.eu/en/publications/Publications/1203-Annual-TB-Report.pdf>
2. Tuberculosis in the UK: 2011 Report. London: Health Protection Agency, December 2011. Available online: http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1317131791612
3. Tuberculosis control in the South-East Asia Region: Annual TB report 2013, World Health Organisation