Public Health England

Protecting and improving the nation's health

Tuberculosis in Yorkshire and Humber
Annual review (2017 data)

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Public Health England exists to protect and improve the nation's health and wellbeing and reduce health inequalities. We do this through world-leading science, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. We are an executive agency of the Department of Health and Social Care, and a distinct delivery organisation with operational autonomy. We provide government, local government, the NHS, Parliament, industry and the public with evidence-based professional, scientific and delivery expertise and support.

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About the Field Epidemiology Service

The Field Service (FS) supports Public Health England Centres and partner organisations through the application of epidemiological methods to inform public health action. FS does this in 2 main ways, firstly by providing a flexible expert resource, available, as and when needed, to undertake epidemiological investigations for key health protection work and secondly through the expert analysis, interpretation and dissemination of surveillance information to PHE Centres, local health partners, service providers and commissioners of services. Within the FS network, excellence and innovation is encouraged, we foster academic collaborations and take active part and lead in research, development and training. You can contact your local FS team at yhfes@phe.gov.uk

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SUSTAINABLE
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Contents

The data presented in this report are correct as at 22 March 2019.

Acknowledgements

Suggested citation

Public Health England. (December 2018) Tuberculosis in Yorkshire and Humber: Annual review (2017 data), 2018. Public Health England: (Yorkshire and Humber)

Notes on the report

Intended audience

This report is aimed at healthcare professionals involved in the diagnosis and/or treatment of TB patients, commissioners involved in planning and financing TB services, public health professionals working in the control of TB or health of at-risk populations, researchers with an interest in TB, and government and non-governmental organisations working in the field of TB. In particular, we aim to update the Yorkshire and Humber and North East TB Control Board.

Aim of report

This report describes the recent epidemiology of TB in Yorkshire and Humber, providing an update on local trends, identifying areas of high burden of disease, at risk population groups, and opportunities for interventions and prevention of future cases. The data presented is used to support the ongoing implementation of the Collaborative TB Strategy for England 2015 – 2020. [1]

Data sources

This report presents detailed data on TB case notifications made to the Enhanced Tuberculosis Surveillance system (ETS) in England to the end of 2017. Data from notifications made to ETS from 2000 is updated annually to take into account denotifications, late notifications and other updates. The data presented in the current year's report supersedes data in previous reports.

Other data displays

The national report presenting recent epidemiology of TB in England is available at:www.gov.uk/government/publications/tuberculosis-in-england-annual-report

Additional high-level data on TB notifications in the UK to the end of 2016, and breakdowns by country, can be found in the Official Statistic for TB, 'Reports of cases of tuberculosis to enhanced tuberculosis surveillance systems: United Kingdom, 2000 to 2017'. This is available at:www.gov.uk/government/collections/tuberculosis-and-other-mycobacterial-diseases-diagnosis-screening-management-and-data

As part of the Collaborative TB Strategy for England 2015-2020, a suite of TB Strategy Monitoring Indicators has been developed.
www.gov.uk/government/uploads/system/uploads/attachment_data/file/403231/Collaborative_TB_Strategy_for_England_2015_2020_.pdf

Where data for these indicators is presented in this report, the indicator name is shown, and a summary table of TB strategy indicators is presented in Appendix D.

Data for indicators which is presented at Upper Tier Local Authority and Clinical Commissioning Group can be found at: http://fingertips.phe.org.uk/profile/tb-monitoring

Executive summary

In January 2015, Public Health England and NHS England jointly launched the *Collaborative Tuberculosis Strategy for England 2015-2020* [1]. The strategy aims to achieve a year-on-year decrease in TB incidence, a reduction in health inequalities, and ultimately the elimination of TB as a public health problem in England. To achieve these aims and deliver significant improvements in TB control, the strategy set out 10 key areas for action, which were to:

- improve access and earlier diagnosis
- provide universal high-quality diagnostics
- improve treatment and care services
- ensure comprehensive contact tracing
- improve BCG vaccination uptake
- reduce drug resistant TB
- tackle TB in under-served populations
- implement new entrant latent TB (LTBI) screening
- strengthen surveillance and monitoring
- ensure an appropriate workforce to deliver TB control

Since the launch of the strategy, significant steps have been taken, locally and nationally, to deliver on the 10 areas of action. In Yorkshire and Humber this is coordinated by the Yorkshire and Humber and North East England TB Control Board. The continued reduction in the number of new cases of TB in Yorkshire and Humber and the low levels of those with multi-drug resistance is encouraging. This is in part testament to the efforts of the TB Control Board and all its partners.

This Annual Report highlights the demography, risk factors and outcomes of patients with TB in the region in the past year, providing empirical evidence to inform priorities for action.

Key points for Yorkshire and Humber

Notifications and incidence

There were 345 cases of tuberculosis reported in Yorkshire and Humber in 2017. This was an incidence rate of 6.3 per 100,000 population, a reduction from 2016 and the lowest in the last 13 years. The year on year decline in cases which slowed in 2016 has recovered both nationally and locally with an 18% decline in the number of reported TB cases in Yorkshire and Humber between 2016 and 2017.

There remains considerable variation in TB rates across Yorkshire and Humber and the gap between the highest burden local authority and other areas is large, despite significant progress in incidence reduction in the high burden areas. The Yorkshire and Humber TB incidence rate remains below the England rate in 2017. Five-year average incident rates have decreased across local authorities in Yorkshire and Humber from 2004-08 to 2013-17 except for Hull, North Lincolnshire and Doncaster which saw small rises. Bradford is notable for the substantial decrease in incidence in this time, although along with Kirklees, still has a higher rate than the national average. Reductions in incidence rates in 2017 are particularly noticeable in Sheffield, Leeds, Calderdale and Kirklees.

Case demographics

The reduction in numbers of TB cases in Yorkshire and Humber in the past year has occurred in both the non-UK born population and the UK born populations. However, the incidence rate of TB was nearly 21 times higher in those born outside the UK compared to the UK born population and 70% of all TB cases notified in the local population in 2017 were born abroad (where country of birth is known). The local non-UK born rate of TB slightly exceeds the national average. The trend in Yorkshire and Humber over the last 10 years among non-UK born cases, has been for a reduction in the proportion of TB cases among individuals resident in the UK for less than 5 years, and an increase in the proportion of cases among individuals resident in the UK for greater than 10 years. Between 2016 and 2017 Yorkshire and Humber had the largest decline in absolute numbers of TB notifications for people born outside the UK (-18.5%) of any PHE Centre.

Among UK born cases the proportion of TB cases with Indian Sub-continent (ISC) ethnicities (Pakistani, Indian, Bangladeshi), increased from 18% in 2004 to 37% in 2017. For Black ethnic groups the proportion that were UK-born decreased from 9% in 2004 to <3% in 2017.

The proportion of TB cases in the region occurring in children aged 1 year and under in 2017 was 1.4% (5). Of the fifteen TB cases in all children under 15 years old in the region, 80% were UK born, as in 2016. There is geographical variation and in Barnsley and Doncaster, 11% of all TB cases in the last 5 years have been in children aged 14 years or younger, compared to 6% across the whole of Yorkshire and Humber. The epidemiology of TB in children in Yorkshire and Humber, whilst improving overall, still indicates ongoing TB transmission.

Incidents and clusters

As in previous years, there were a number of TB incidents across the region, including in educational, health and social care, childcare and workplace settings. Several of these were particularly complex, with issues around mobile student populations, language barriers, difficulties in engaging with employers, and some of these incidents required successive screening rounds. Management of TB incidents consumes a significant amount of resource for many agencies, but also demonstrates excellent collaborative working with a range of partners.

Of the 147 clusters identified in Yorkshire and Humber as occurring between 2011 and 2016, most clusters were small, with just over half including only 2 cases and approximately one fifth including 5 or more cases.

Diagnosis and treatment

In 2017, 61% of people notified with TB had their diagnosis confirmed by culture, a decrease from 72% in 2016, but in line with all previous years since 2004. While 71% of pulmonary TB cases in Yorkshire and Humber were microbiologically confirmed, this was slightly lower than the national figure (75%) and a local reduction on the previous year (86%).

Sputum smear status was known for 65% (136/210) of pulmonary TB cases diagnosed in Yorkshire and Humber in 2017, similar to the national average of 63%. In 2017 over half (59%) of pulmonary TB cases commenced treatment more than 2 months after the onset of symptoms.

The proportion of TB cases completing treatment within 12 months of notification increased in the region from 62.5% for TB cases diagnosed in 2004 to 86.1% for cases diagnosed in 2016 (national rate 84.4%).

The proportion of patients reported as still on treatment or lost to follow up at 12 months is now lower in the Yorkshire and Humber region (2.9%) than the national average (4.4.%). Of the 23 cases in 2017 with a previous diagnosis of TB, 26% (6/23) were recorded as receiving Directly Observed Therapy (DOT).

LTBI screening

The NHSE-funded latent TB infection (LTBI) testing and treatment programme has now been in place in Yorkshire and Humber since February 2016, covering the areas identified as having the highest burden of TB (Sheffield, Leeds, Bradford and Kirklees). Those eligible for screening (aged 16 to 35 years, who have entered the UK from a high

incidence country within the last 5 years) are identified in primary care and subsequently screened by single interferon gamma release assay (IGRA).

In Yorkshire and Humber in 2017/18, 3,041 individuals were invited to screening with acceptance rates varying between 66% and 98% between CCGs. Across all the Yorkshire and Humber programmes test positivity averaged 15%, representing 354 LTBI cases diagnosed in 2017/18. There is some variation in treatment acceptance, with an average rate of 46% across the region. The proportion of those who commenced treatment who went on to complete treatment was 64% (the national rate was 71%).

MDR TB and isoniazid resistant TB

The number of cases with Multi Drug Resistant TB remained stable and consistent with the national epidemiology. Mono-resistance to Isoniazid decreased from 7% in 2016 to 5% in 2017, just below the national average. The world regions where Yorkshire and Humber cases resistant to Isoniazid alone and MDR-TB were born include Eastern Africa, Middle Africa, Northern Europe, South-Eastern Asia and Southern Asia. This contrasts with the national picture where the UK and the Indian subcontinent accounted for the country of birth of most of cases.

Social risk factors

The presence of social risk factors is known to affect adherence to treatment. In 2017 12.9% of cases in Yorkshire and Humber had at least 1 social risk factor recorded (12.6% nationally). TB cases with social risk factors are more likely to have pulmonary disease and drug resistance and have worse outcomes. Only 34% (12/35) of TB patients across the region in 2017 with any social risk factors indicating the need for DOT received this treatment, a decline on the previous year (39%) and compared to a national average of 50%.

There were 11 cases resistant to isoniazid without MDR-TB over the age of 15. Social risk factor information was known for 9 of them, and all of them reported "no" for each of the 4 risk factors. There were less than 5 cases of MDR-TB in Yorkshire and Humber.

In 2017 only <3% of people with TB in Yorkshire and Humber were coinfected with HIV; this is the lowest proportion of co-infection in the last 14 years.

TB notifications and incidence

Overall numbers, rates and geographical distribution

In 2017, a total of 345 cases of tuberculosis were reported in Yorkshire and Humber; a rate of 6.3 per 100,000 population (95% CI 5.7 - 7.1) which is a reduction from 2016 (421 cases; rate of 7.7/100,000, 95%CI 7.0 - 8.5). Figures 1.1 and 1.2 clearly show the decline in incidence rates nationally and in Yorkshire and Humber. This is the lowest incidence in Yorkshire and Humber in the last 12 years. The year on year decline in cases which slowed in 2016 has recovered both nationally and locally with an 18% decline in the number of reported TB cases in Yorkshire and Humber between 2016 and 2017. The TB incidence in Yorkshire and Humber is now the fourth lowest rate in Public Health England (PHE) Centres outside London (Figure 1.3).

While the Yorkshire and Humber TB incidence rate remains below the England rate in 2017 (9.2 per 100,000 population); 2 local authorities in the region have higher rates than the national average: Bradford (16.6 per 100,000 population) and Kirklees (10.5 per 100,000 population). Despite this, there have been substantial reductions in incidence over time in almost all our local authorities, except Hull, North East Lincolnshire and Doncaster (Figure 1.5). The reduction in incidence rates since 2004 in Bradford is particularly notable.

The reductions since 2016 are particularly noticeable in Sheffield with an incidence rate of 11.2 per 100,000 in 2016 reduced to 6.6 in 2017, in Calderdale with an incidence of 9 per 100,00 in 2016 reduced to 3.3 in 2017 and in Kirklees with an incidence of 15.1 per 100,000 in 2016 reduced to 10.5 in 2017. However, except for Kirklees, these reductions fall within the 95% confidence intervals and while they may represent a real downward trend, they could also be the result of natural variation year to year.

Figure 1.1. Tuberculosis case reports and rates Yorkshire and Humber and England, 2004-2017
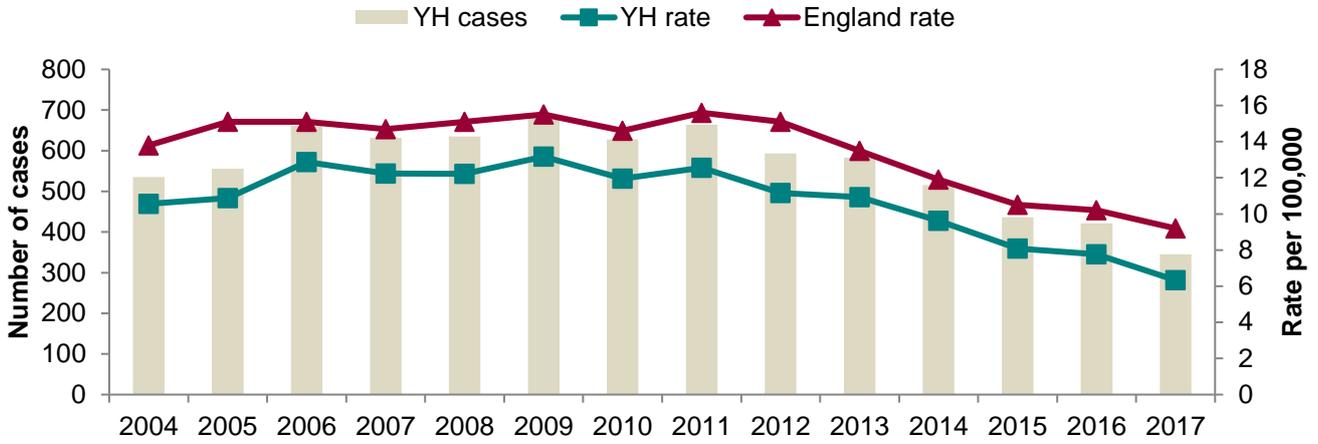
Figure 1.2. Tuberculosis incidence rates in Yorkshire and Humber with 95% confidence intervals, 2004-2017
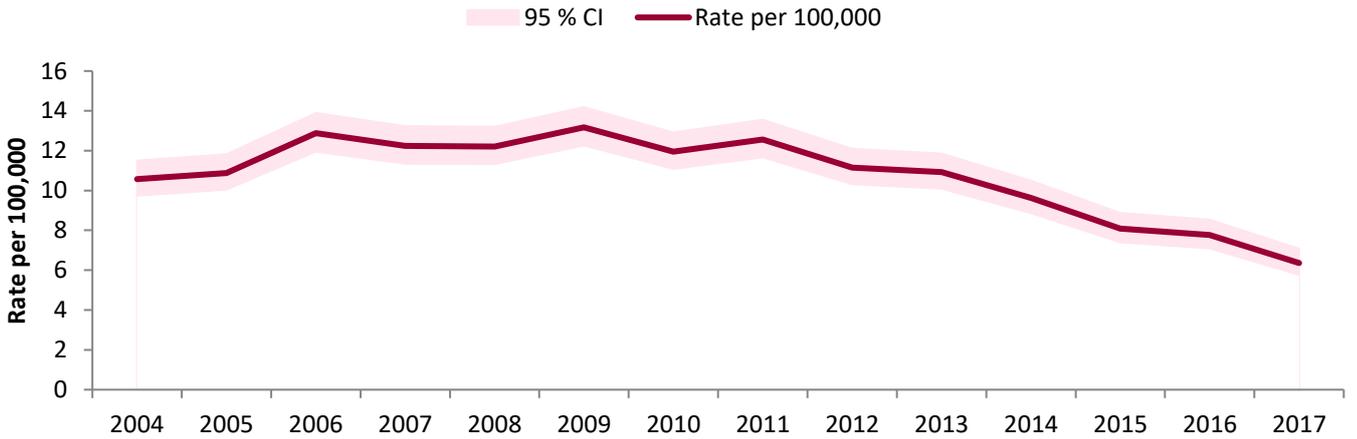
Figure 1.3. Tuberculosis rates by Public Health England Centre and England, 2017
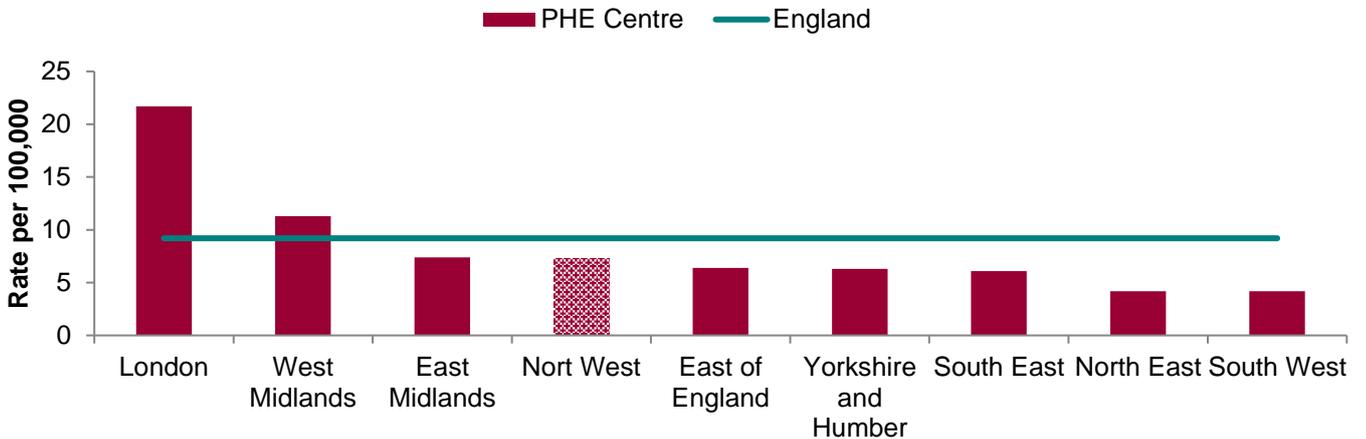
Figure 1.4. Tuberculosis incidence rates with 95% confidence intervals by local authority, Yorkshire and Humber, 2017
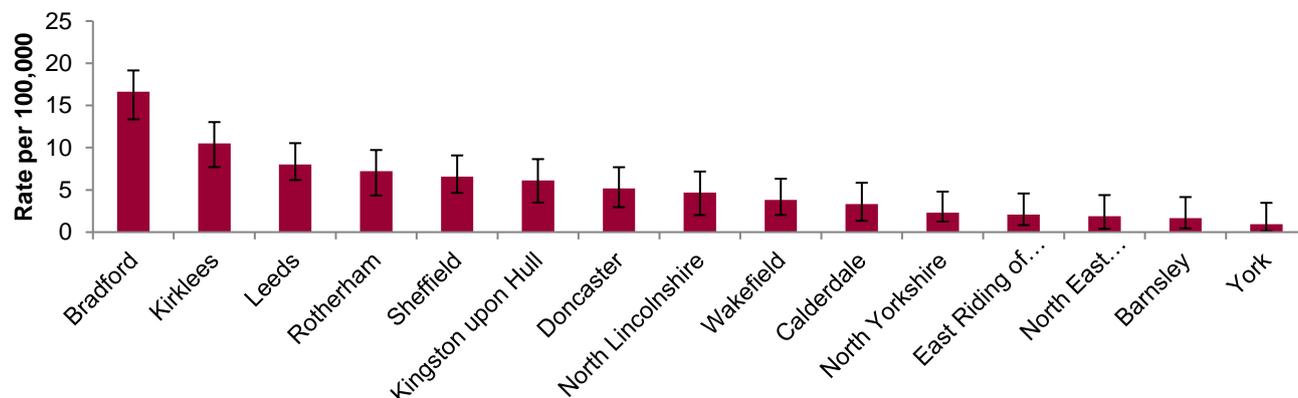
Table 1.1: Number of cases of tuberculosis and regional ranking by local authority, Yorkshire and Humber, 2004-2008, 2013-2017, and 2017

UTLA	Average no. of cases 2004 to 2008	Rank 2004 to 2008	Average no. of cases 2013 to 2017	Rank 2013 to 2017	No. of cases 2017	Rank 2017
Bradford	158.8	1	106.4	1	89	1
Leeds	123.2	2	88.6	2	63	2
Kirklees	82.2	4	67.2	4	46	3
Sheffield	95	3	69.6	3	38	4
Rotherham	21.4	6	14.4	10	19	5
Doncaster	15.6	8	18.6	5	16	6
Kingston upon Hull, City of	13	10	16	7	16	7
North Yorkshire	15.6	9	14.8	9	14	8
Wakefield	20.6	7	17.2	6	13	9
North Lincolnshire	6.8	14	9	11	8	10
Calderdale	22	5	15.6	8	7	11
East Riding of Yorkshire	8.6	12	6	13	7	12
Barnsley	7.4	13	7.6	12	<5	13
North East Lincolnshire	5.5	15	5	14	<5	14
York	9.2	11	<5	15	<5	15

Figure 1.5. Change in incidence rates of tuberculosis between 2004-2008 and 2013-2017, by local authority, Yorkshire and Humber

Change in incidence rates per 100,000 population average 2004 to 2008 and 2013 to 2017
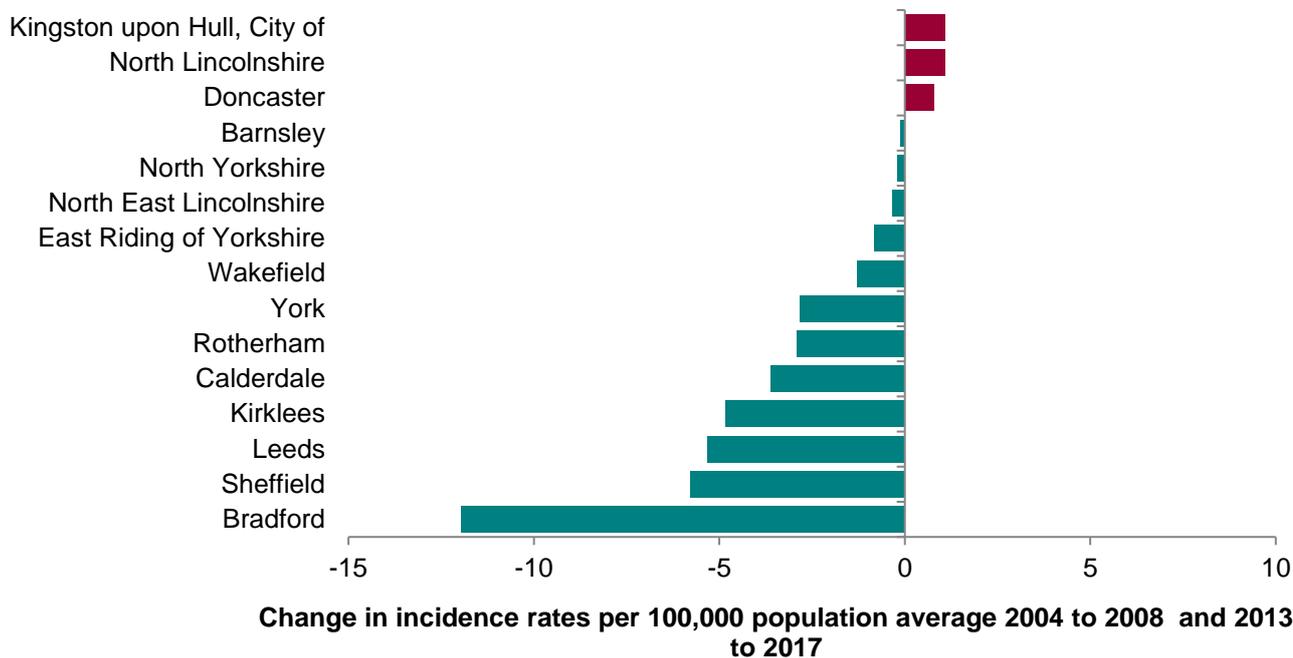
Figure 1.6. Tuberculosis incidence per 100,000 population for Yorkshire and Humber local authorities, average rate, 2004-2008
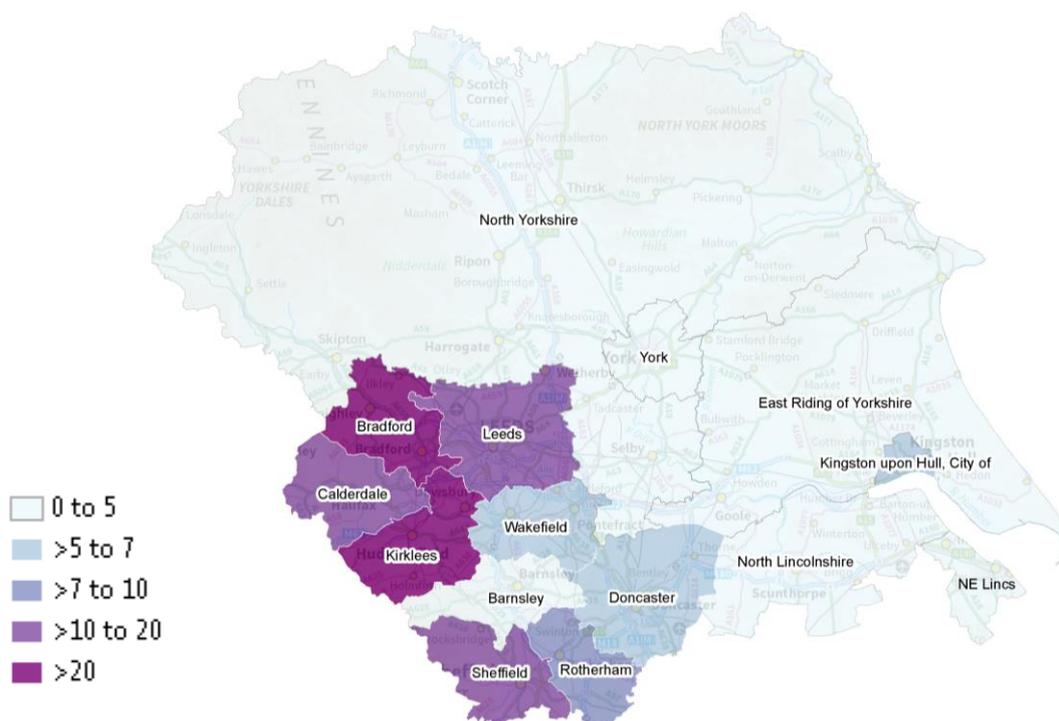
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Figure 1.7. Tuberculosis incidence per 100,000 population for Yorkshire and Humber local authorities, average rate, 2013-2017
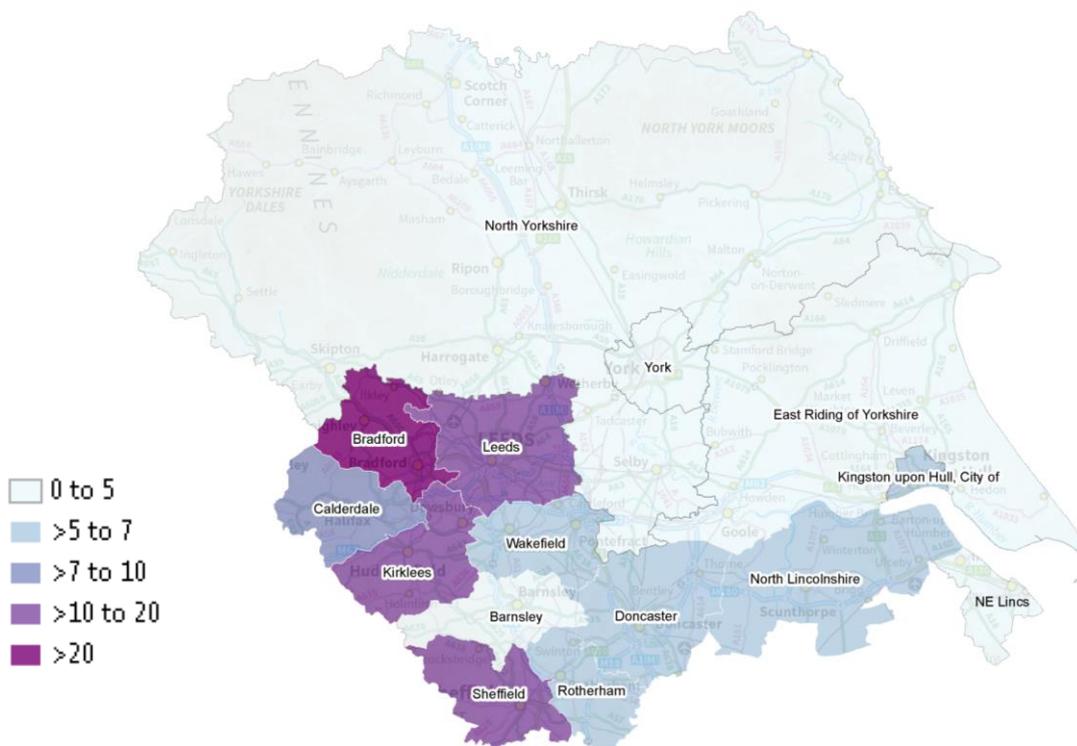
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Demographic characteristics

Age and sex

Fifty-nine per cent of the TB cases in the region in 2017 were aged between 20 and 49 years. The proportion of cases in the 70 years and over age-group has remained at 13% as in 2016.

The proportion of TB cases in the region occurring in children aged 1 year and under in 2017 was 1.4% (5) which is an increase from 2016 (0.5%, 2). Similarly, the incidence rate in those 1 year and under in Yorkshire and Humber increased from 3.1 per 100,000 (95%CI 0.4-11.2) in 2016 to 3.9 per 100,000 (95%CI 1.27-9.1) in 2017 but this is not statistically significant.

In Barnsley and Doncaster, 11% of all TB cases in the last 5 years have been in children aged 14 years or younger, compared to 6% in the whole of Yorkshire and Humber. The epidemiology of TB in children in Yorkshire and Humber, whilst improving overall, still indicates ongoing TB transmission.

In keeping with the national pattern, TB incidence in the Yorkshire and Humber region remained slightly higher in males than females (Figure 2.3).

Figure 2.1. Tuberculosis rates by age group, Yorkshire and Humber, 2004-2017
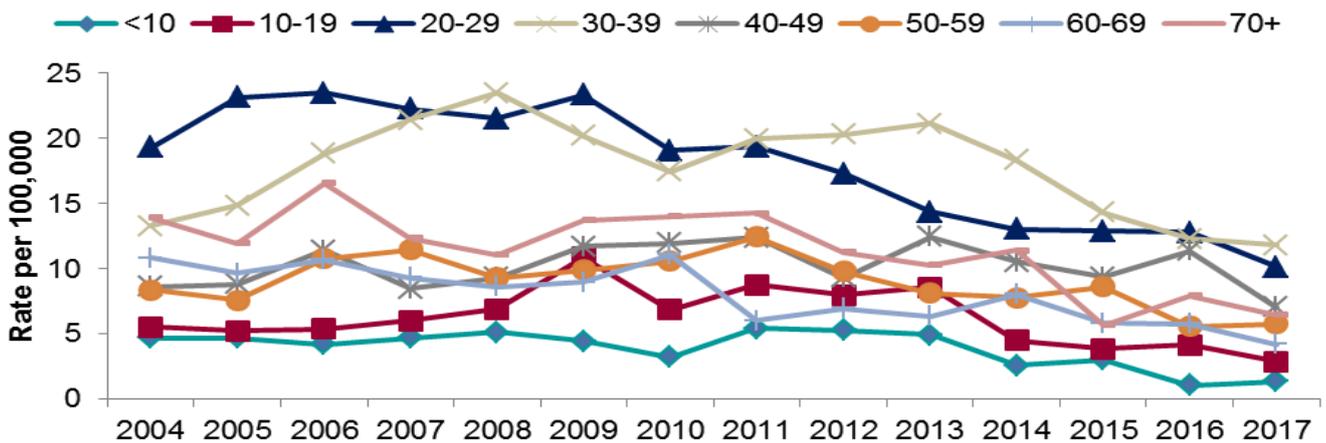
Figure 2.2. Child and adult tuberculosis notifications rates, Yorkshire and Humber, 2004-2017
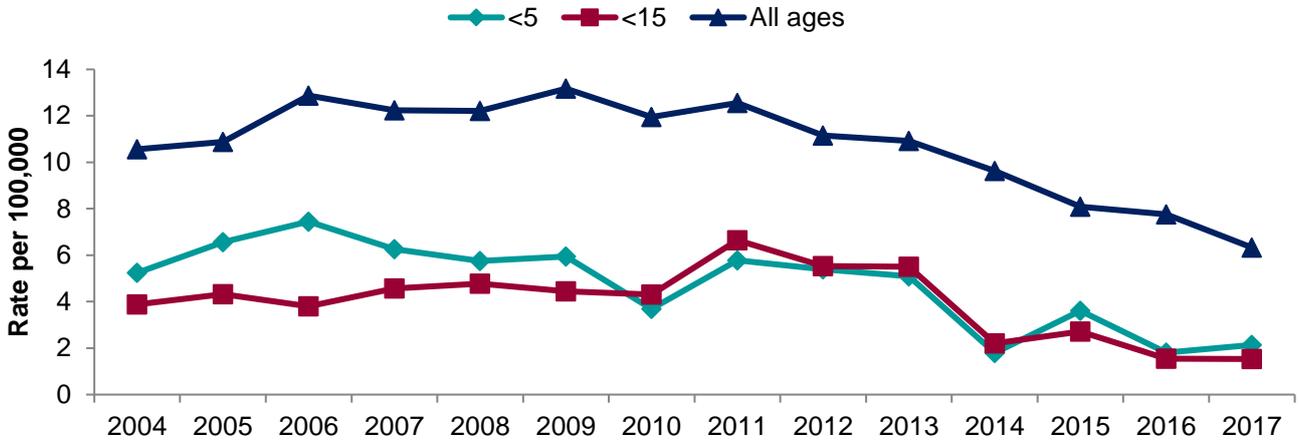
Figure 2.3. Tuberculosis reports & rates by age group and gender, Yorkshire and Humber, 2017
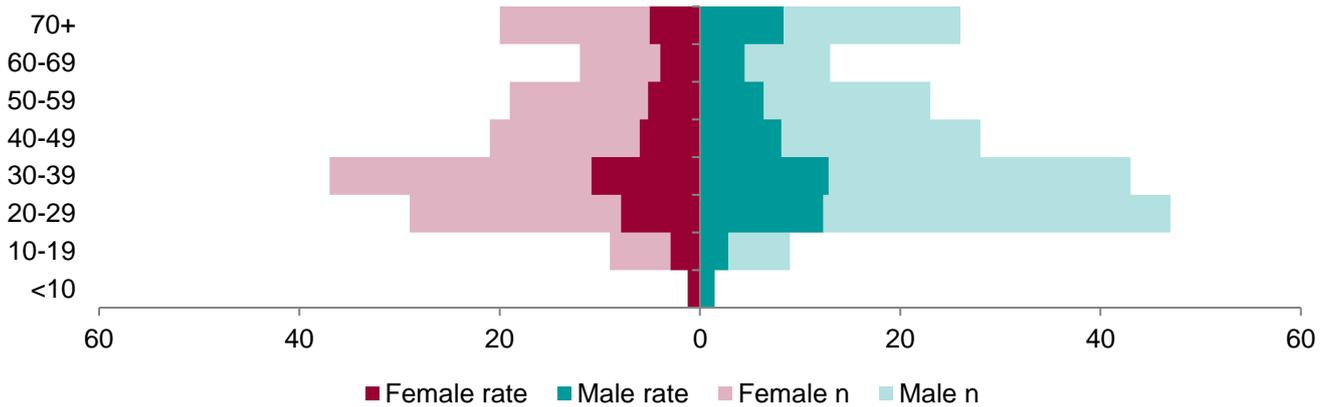
NB: n for age <10 is not shown due to small numbers

Place of birth and time since entry

Place of birth was recorded for 97.4% (336/345) of cases reported in 2017, in increase from the 95.1% in 2016.

UK born

Thirty per cent (102/336) of TB cases in Yorkshire and Humber in 2017 were UK born. The incidence of TB in the UK born population in the region has improved modestly between 2004 and 2017; with a UK born TB incidence rate of 4.13/100,000 in 2004 declining to 2.11/100,000 in 2017 (Figure 2.4).

Non-UK born

Seventy per cent (234/336) of TB cases in the region in 2017 were born outside the UK. The incidence rate for TB in the non-UK born population in the region has declined year on year from the peak of 112.8 per 100,000 population in 2006, to 43.7 per 100,000 population in 2017 (Figure 2.5)[1]. However, the TB incidence rate in the non-UK born in the region remains higher than the national rate of 41.1 per 100,000. The non-UK born rate for Yorkshire and Humber is 21 times higher than the rate for UK born residents of Yorkshire and Humber. Nationally, the rate of TB among people born outside the UK remains 13 times higher than those born in the UK.

Between 2016 and 2017, the number of TB notifications and rates for people born outside the UK declined across all PHE Centres. The Yorkshire and Humber PHE Centre had the largest decline in absolute numbers of cases (-18.5%).

The trend in the last 10 years among non-UK born cases has been for a reduction in the proportion of TB cases among individuals resident in the UK for less than 5 years, and an increase in the proportion of cases among individuals resident in the UK for greater than 10 years. Figures for 2017 remain broadly consistent with this, changing little since 2016 but indicating a small increase in the proportion of cases in recent migrants against a background of overall reductions in cases in those born outside the UK (Figure 2.8). This is consistent with national trends where the proportion of people notified more than 11 years since entry to the UK continued to increase (2016: 44.4% versus 2017: 45.1%), with an overall increase of 55.5% since 2010.

Place of birth and age

In 2017, the number of TB cases in non-UK-born exceeded that in the UK born TB cases in every age group except the 0-19 age groups. Cases in UK born children outnumber cases in children born outside of the UK (Figure 2.6). The relatively higher proportion of UK born among TB cases in children is of concern as it could indicate recent TB transmission potentially occurring in the UK.

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[1] The population estimates used to calculate TB incidence rates by country of birth have been updated. This has resulted in an increase in the denominator population for non-UK born and thus a decrease in the TB incidence rate for non-UK born compared to the rates reported in the previous annual report. The incidence rates in the UK born remains mostly unchanged. Data source: www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/internationalmigration/datasets/populationoftheunited kingdombycountryofbirthandnationality

Figure 2.4. Tuberculosis rate per 100,000 population for UK born cases, with 95% confidence intervals and 2% decline target from 2004, Yorkshire and Humber, 2004-2017
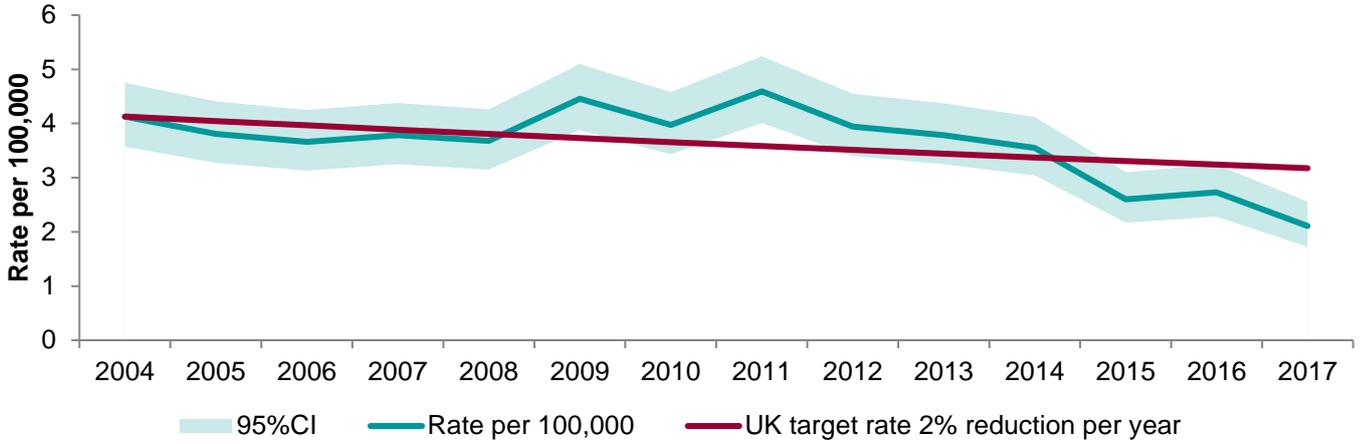
Figure 2.5. Tuberculosis case reports by place of birth, proportion of cases and rate per 100,000 population, Yorkshire and Humber, 2004-2017
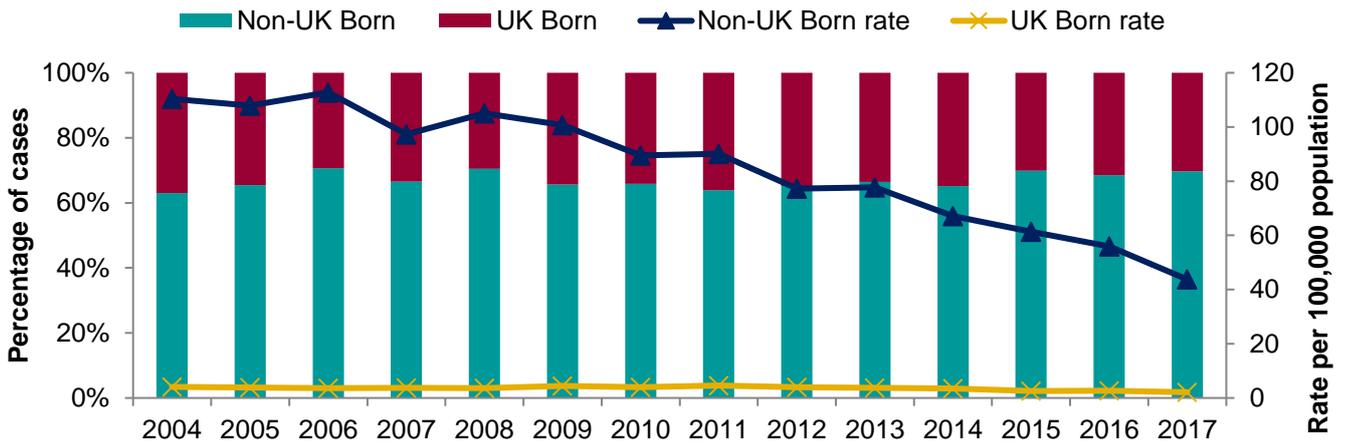
Figure 2.6. Tuberculosis case reports by place of birth and age group, Yorkshire and Humber, 2017.

■ Non-UK Born ■ UK Born

Age group	Non-UK Born	UK Born
70+	27	19
60-69	15	9
50-59	29	12
40-49	32	14
30-39	69	10
20-29	53	20
10-19	8	10
<10		

Number of cases
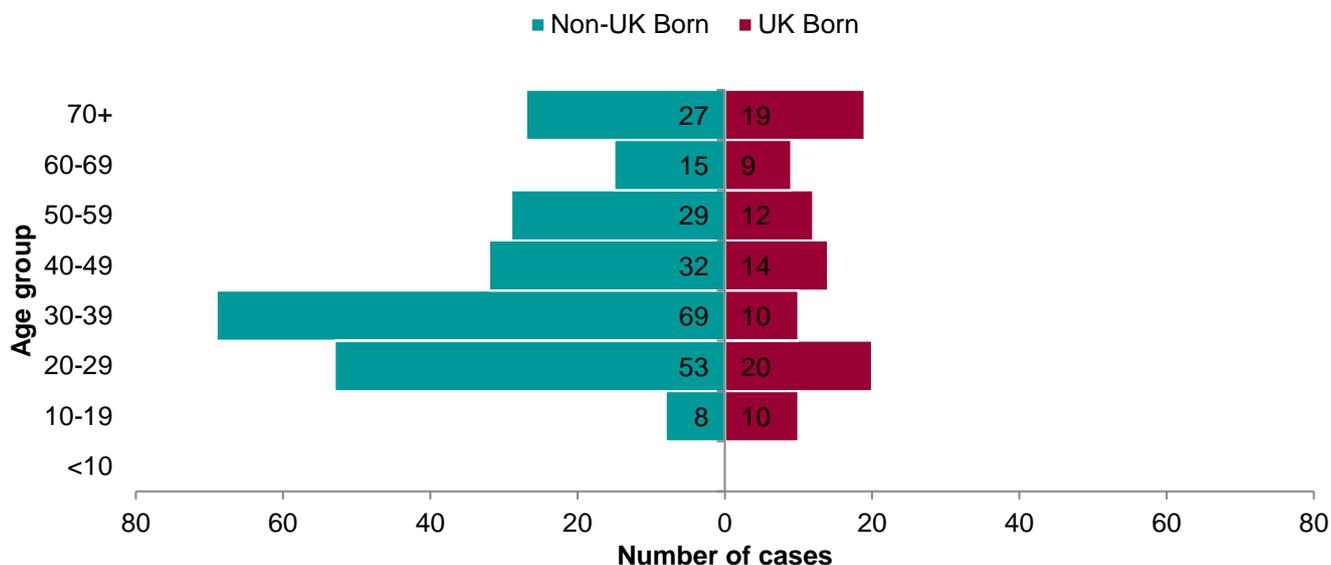
NB: n for age <10 is not shown due to small numbers

Among non-UK born cases, 4 in 10 cases in Yorkshire and Humber have been in the UK for 11 years or more at the point of notification (Figure 2.7). This is in line with national trends across the UK (45.1% in 2017, up from 27.5% in 2008).

Figure 2.7. Non-UK born tuberculosis cases by time since entry to the UK, Yorkshire and Humber, 2017

Years since entry	Proportion of cases*
0 to 1	26%
2 to 5	20%
6 to 10	14%
11 and over	40%
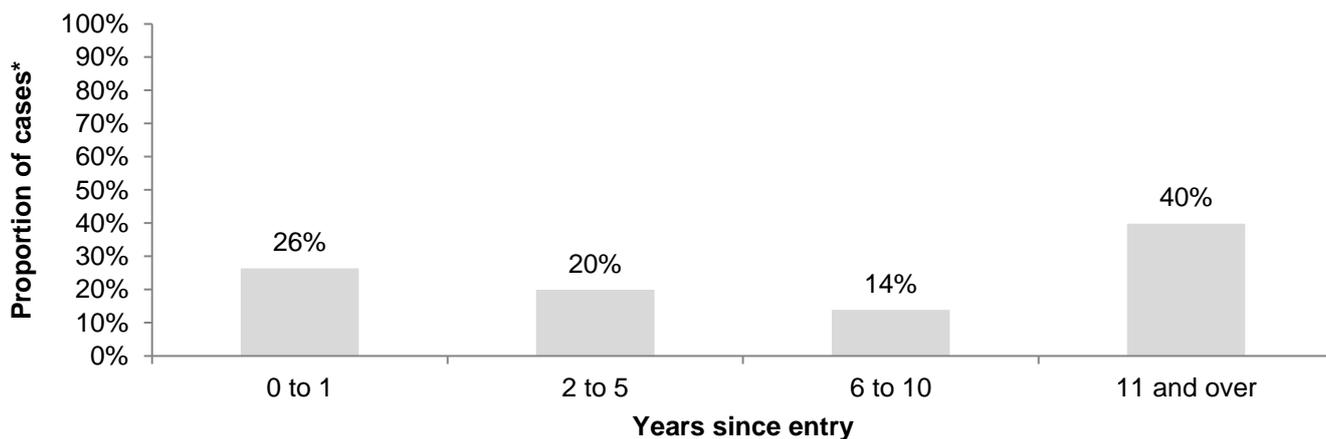
Figure 2.8. Time between entry to the UK and TB notification for non-UK born cases in years, Yorkshire and Humber 2004-2017
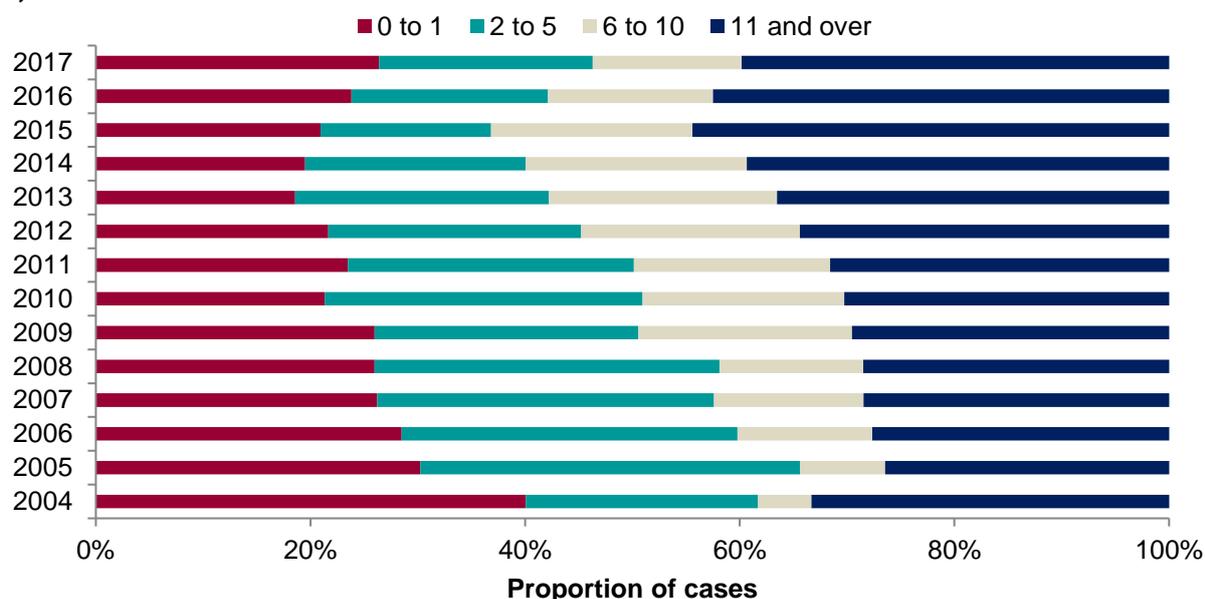
Country of birth

Amongst non-UK born TB cases in the region, the most commonly reported country of birth was Pakistan, accounting for 34% of all non-UK born cases in 2017, followed by India (12%). Five sub-Saharan African countries – Eritrea, Somalia, Zimbabwe, Ethiopia and Sudan collectively accounted for 19% of cases in 2017 (Table 2.1). The proportion of TB cases from Eastern European countries has increased to 12% compared to 8% in 2016, consistent with previous years.

Table 2.1. Reported country of birth for non-UK born tuberculosis cases, Yorkshire and Humber, 2017

Country of Birth	Number of cases	Percentage of Non-UK born cases
Pakistan	83	34
India	28	12
Eritrea	17	7
Sudan	15	6
Romania	10	<5
Unknown	9	<5
Poland	6	<5
Zimbabwe	6	<5
Ethiopia	5	<5
Lithuania	5	<5
Somalia	5	<5
Nepal	<5	<5
Slovakia	<5	<5
Other <=1% each	46	19

Ethnicity

Ethnicity was recorded for 99% of TB cases notified in 2017. Thirty-four per cent of TB cases in the region in 2017 were from the Pakistani ethnic group. The next most frequent reported ethnicities were white (25%), Black African (19%) and Indian (12%) (Figure 2.9).

The TB incidence rate in the Pakistani ethnic group has decreased between 2011 and 2017 from 99 to 51 per 100,000 population[2]. A less marked decline was observed for other ethnic groups. The incidence in the Indian ethnic group declined from a peak of 114 in 2011 to 57 per 100,000 population in 2017, and the Bangladeshi group declined from 57 in 2011 to 17 per 100,000 population in 2017 (Figure 2.11).

These rates are markedly higher than the rate for the white ethnic group which declined slightly between 2011 (3.2 per 100,000 population) and 2017 (1.8 per 100,000 population). The TB incidence rate for Black Africans in the region, whilst still the highest, has declined to the pre- 2015 levels with a rate of 141 per 100,000 in 2017 (Figure 2.11).

The proportion of TB cases with Indian Sub-continent (ISC) ethnicities (Pakistani, Indian, Bangladeshi), who were UK-born increased from 18% in 2004 to 37% in 2017. For Black ethnic groups (Black African, Black Caribbean, Black Other), the proportion that were UK-born decreased from 8.5% in 2004 to <3% in 2017. This suggests that while TB in the Black African ethnic groups in the region remains predominately associated with migration; for ISC ethnic groups, particularly in communities of Pakistani origin, acquisition of TB infection in the UK is an increasing concern.

Figure 2.9. Tuberculosis case numbers by ethnic group, Yorkshire and Humber, 2004-2017*

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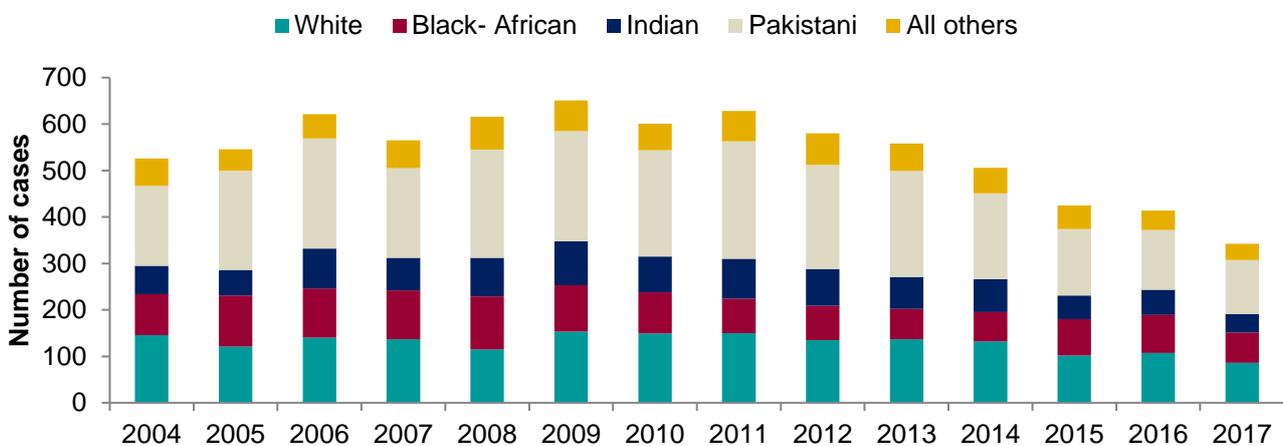
[2] Data source for population data by ethnic group is 2011 census data

Figure 2.10. Tuberculosis case numbers by ethnic group, Yorkshire and Humber, 2004-2017*
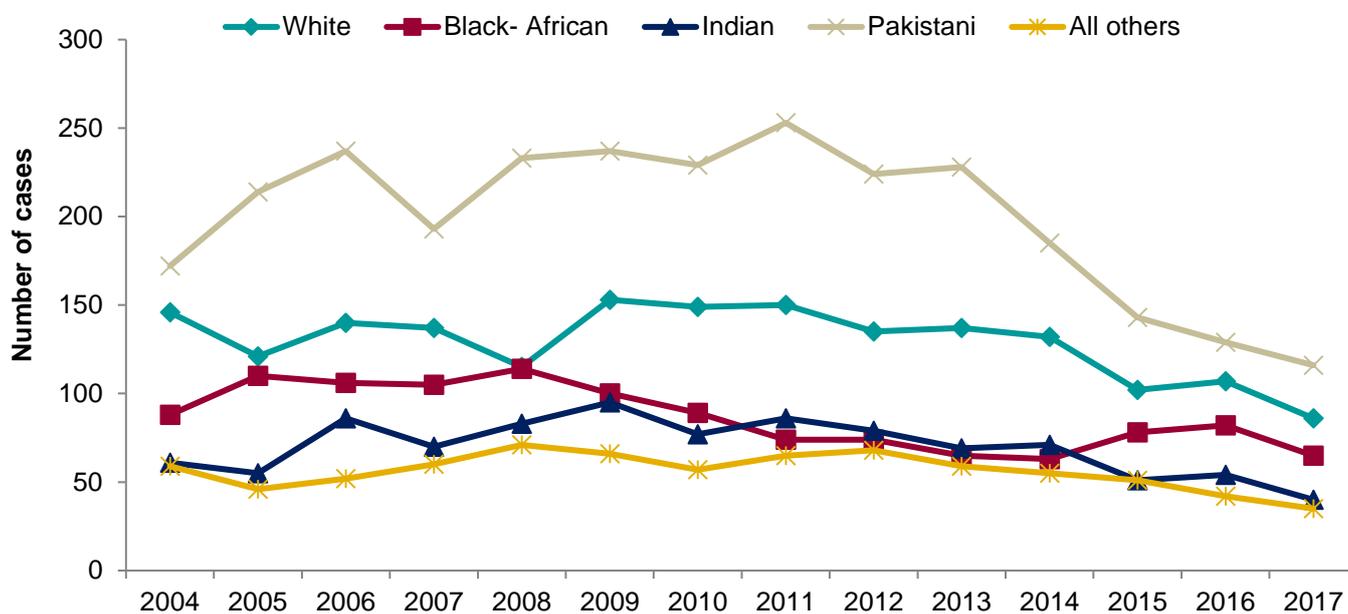
* Does not include 3 cases with unknown ethnic group

Figure 2.11. Trend in tuberculosis rates per 100,000 population a) Indian sub-continent ethnic groups b) black ethnic groups c) mixed/other ethnic groups and d) white and all ethnic groups

a)

b)

c)

d)
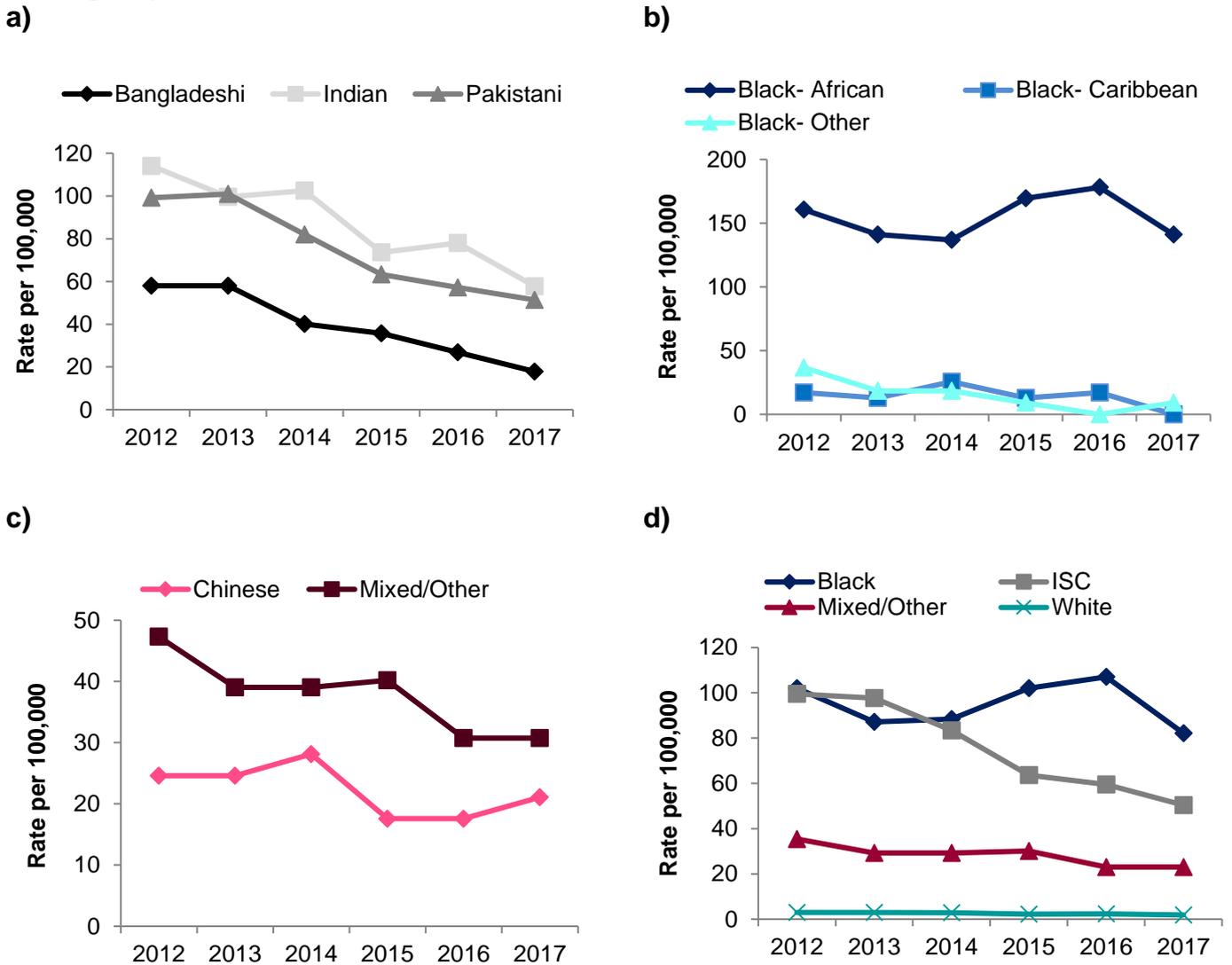
Occupation

TB cases with occupations in healthcare and education, can indicate complexity in case management due to the nature of transmission chains. In 2017 10 cases were reported as healthcare workers and 21 were employed within education. Forty-five per cent of cases between the ages of 18 and 65 were reported as unemployed.

Table 2.2. Occupational category of TB patients aged 18-65, Yorkshire and Humber, 2017

Occupation Category	n (%)
Education	21 (9%)
Health care worker	10 (4%)
Unemployed	107 (45%)
Other	102 (42%)

Clinical characteristics

Site of disease

Sixty-one per cent of TB cases reported in the region in 2017 had pulmonary disease, somewhat higher than the proportion observed nationally (54.4%). The ratio of pulmonary to extra-pulmonary TB cases has been relatively stable in the region in the past decade (Figure 3.1). In 2017 as in previous years, extra-pulmonary disease was more common in non-UK born (47%) than in UK born TB cases (22%) (Figure 3.2).

Figure 3.1: Tuberculosis cases by site of disease, Yorkshire and Humber, 2004-2017
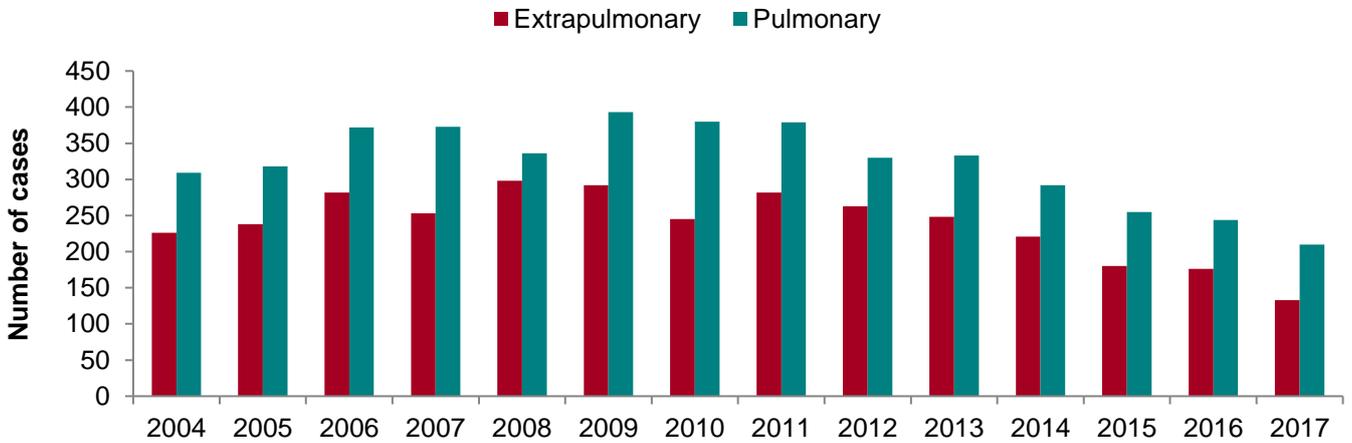
* Does not include 2 cases with unknown site of disease

Figure 3.2: Tuberculosis cases by site of disease and country of birth, Yorkshire and Humber, 2017*.
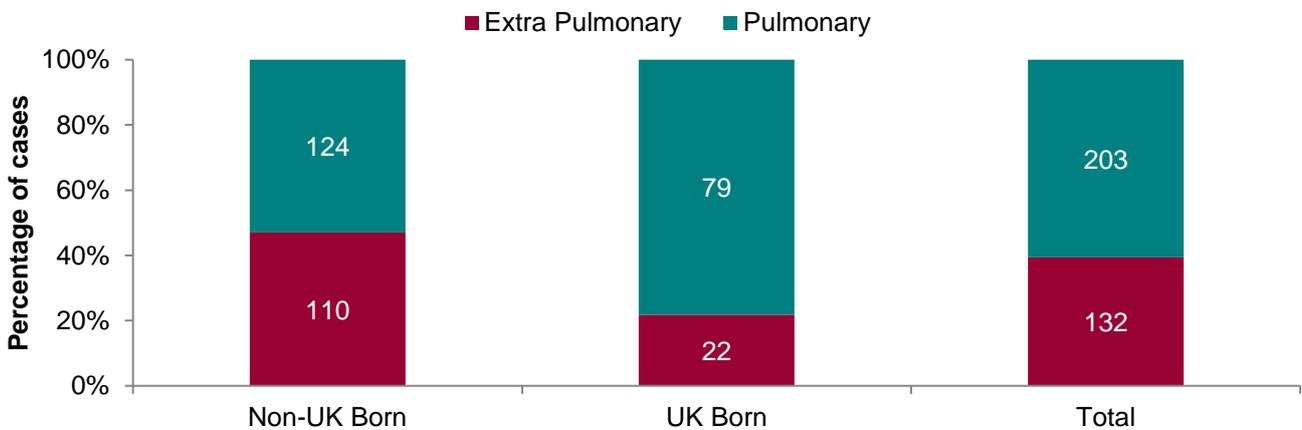
* Does not include 8 cases with unknown country of birth and 2 cases with unknown site of disease

Previous history of tuberculosis

For Yorkshire and Humber cases notified in 2017, 7% (23/332) of cases (where past history is documented*)* had a previous diagnosis of TB more than 12 months before their current notification. Among those with a previous diagnosis of TB, 65% had recorded previous treatment for TB (94%;15/16 of cases where treatment status was documented) and 26% were known to have received DOT during their current notification of TB (43% (6/14) of cases where DOT status is recorded). Time since previous diagnosis was known for 78% (18/23) of cases with a past history of TB, with a median time since previous diagnosis of thirteen years (IQR 1-65 years). This is consistent with the national picture. Given the recognised association between previous disease, treatment compliance and antimicrobial resistance this remains an area where assurance on treatment compliance through enhanced case management approaches may be helpful. It is also the case that clinical assessment may appropriately downgrade the risk of non-compliance and the need for DOT.

Table 3.1: Previous TB history among cases diagnosed between 2004 and 2017, Yorkshire and Humber

Year	Previous diagnosis unknown	No previous diagnosis of TB	Previous diagnosis of TB	% of cases with a previous diagnosis of TB (where status recorded)
2004	81	405	49	11%
2005	97	418	41	9%
2006	111	513	37	7%
2007	145	451	36	7%
2008	74	519	42	7%
2009	56	582	50	8%
2010	36	545	47	8%
2011	27	596	41	6%
2012	20	532	41	7%
2013	32	517	34	6%
2014	32	449	35	7%
2015	23	380	33	8%
2016	20	366	35	9%
2017	13	309	23	7%

Smoking status

Information on current smoking status at onset of symptoms, presentation or during care was collected from 2 July 2015. In 2017 information on smoking status was known for 81% (281/345) of notified TB cases in Yorkshire and Humber aged 15 years or older, which is slightly lower than the national figure (95%). Where information was known, 25.3% (78/308) were current smokers, which is higher than the England average of 20.0%. These figures may be subject to a bias towards completing this information in known smokers.

Travel and visitor risk factors

History of travel to and visitors received from a country outside the UK (excluding Western Europe, US, Canada, New Zealand and Australia) in the last 2 years prior to TB diagnosis has been collected since 13 May 2015. In 2017, in Yorkshire and Humber, information on travel history and visitor history was known for 75% and 57% of notified TB cases, respectively. Nationally there is little difference in the completion of a travel history for cases and a history of overseas visitors, so it is not clear why there is this distinction in the local data.

Where information was known, 22% (58/260) of TB cases had travelled outside the UK and 5.6% (11/196) had received a visitor from outside the UK. Where the country of travel or origin of visitor was known, 76% (41/54) of cases travelled to their country of birth and 66.7%% of cases had received a visitor from their country of birth.

Compared to the England averages Yorkshire and Humber cases were more likely to have travelled outside of UK (19.4.2%) and less likely to have received a visitor from outside of the UK (6.2%).

Laboratory confirmation of TB

Laboratory tests data collection

Data for all culture confirmed TB isolates from the Mycobacterium Reference Service was matched to TB notifications and the results were used to report culture confirmation. Results for microscopy, PCR and histology were recorded manually in ETS.

Culture confirmation and speciation

In 2017, 61% of people notified with TB had their diagnosis confirmed by culture, a decrease from 72% in 2016. This is line with previous years where the proportion has fluctuated between 57% and 63% every year since 2004 except for 2016. As in previous years, culture confirmation was higher in people with pulmonary TB compared to those with extrapulmonary TB. In 2017, 71% of pulmonary TB cases in Yorkshire and Humber were microbiologically confirmed, lower than the national figure (75%) and a local reduction on the previous year (86%).

In 2017 the proportion of culture confirmation was lowest among TB cases aged 0-14 years and highest in those age 65 years and older.

Sputum smear status

Sputum smear status is an indicator of TB infectivity and therefore, a marker for potential transmission. Sputum smear status was known for 65% (136/210) of pulmonary TB cases diagnosed in the region in 2017 (Figure 4.1), compared to 63.4% nationally.

Where sputum smear status was known, 45% (61/136) were sputum smear positive in 2017 compared to 45% (101/222) in 2004 (Figure 4.3). Nationally 52.9% of cases with a reported sputum smear result were positive in 2017.

Figure 4.1. Proportion of pulmonary tuberculosis cases where sputum smear status known Yorkshire and Humber, 2004-2017
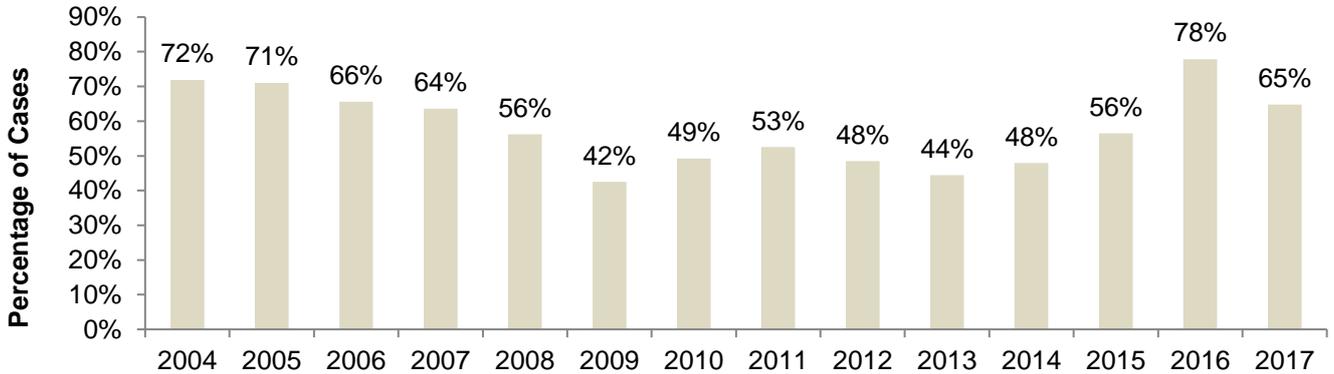
Figure 4.2. Proportion of pulmonary tuberculosis cases microbiologically* confirmed, Yorkshire and Humber, 2004-2017
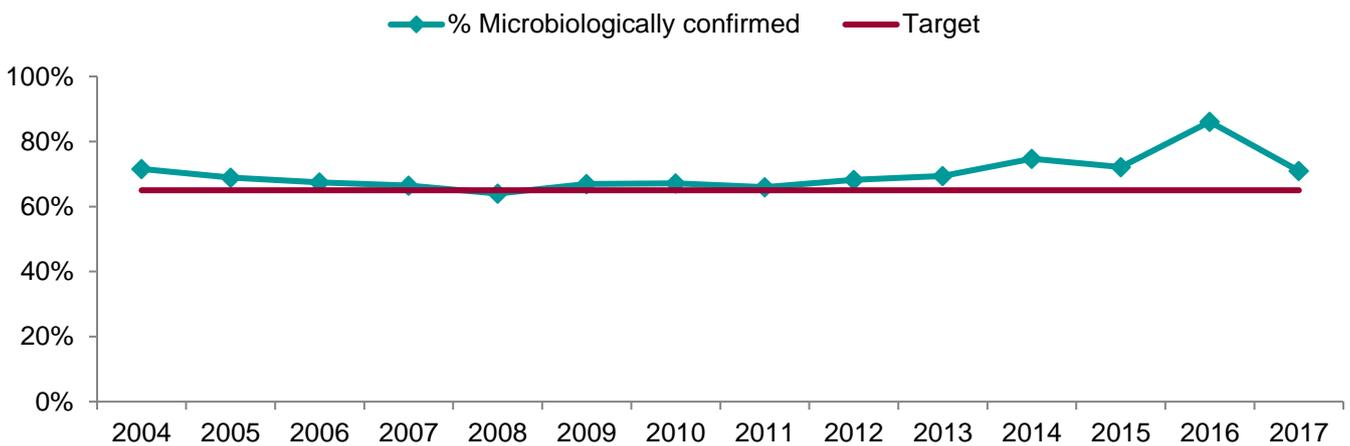
* Culture or PCR

Figure 4.3. Proportion of sputum positive pulmonary Tuberculosis cases (where sputum status known), Yorkshire and Humber, 2004-2017
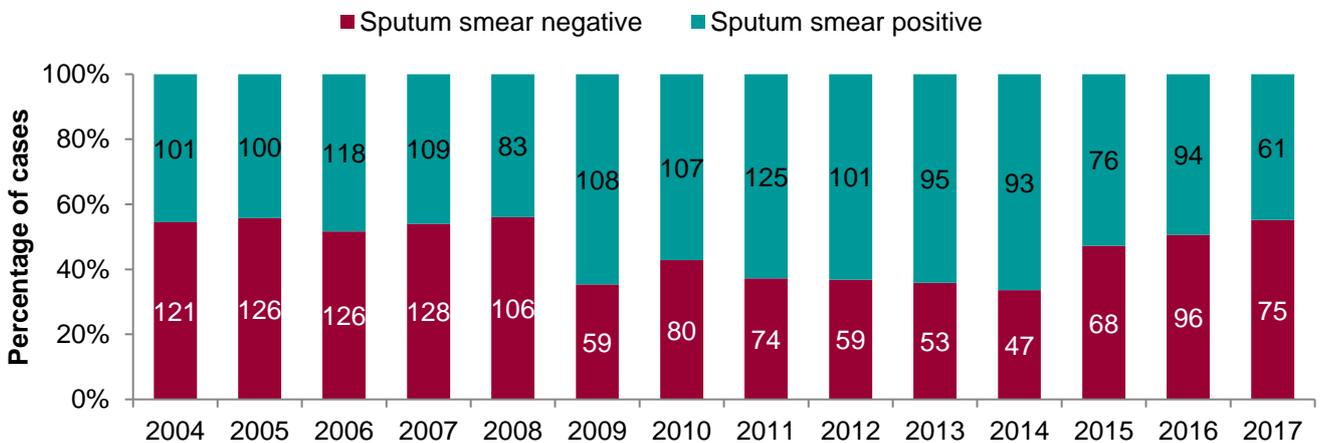
TB transmission

The incidence rate of TB in children is widely accepted to be a good indicator of TB transmission in a community as children have a limited time during which they could become infected, and in most cases progress to disease within 12 months. Molecular genotyping of the organisms causing TB in a population can also provide insight into putative transmission chains.

Rate of TB in UK born children

In 2017, the rate of TB in UK born children under 15 years of age within England was 1.4 per 100,000 (95% CI 1.2-1.7) with an overall reduction since the peak in 2007-2008 of 3.4 per 100,000 (95%CI 3.0 -3.8). In Yorkshire and Humber, the rate of TB in UK born children under 15 in 2017 was 1.3 per 100,000 similar to 2016 (1.2 per 100,000)

Figure 5.1. Rate of TB in UK born children (<15), Yorkshire and Humber, 2012-2017
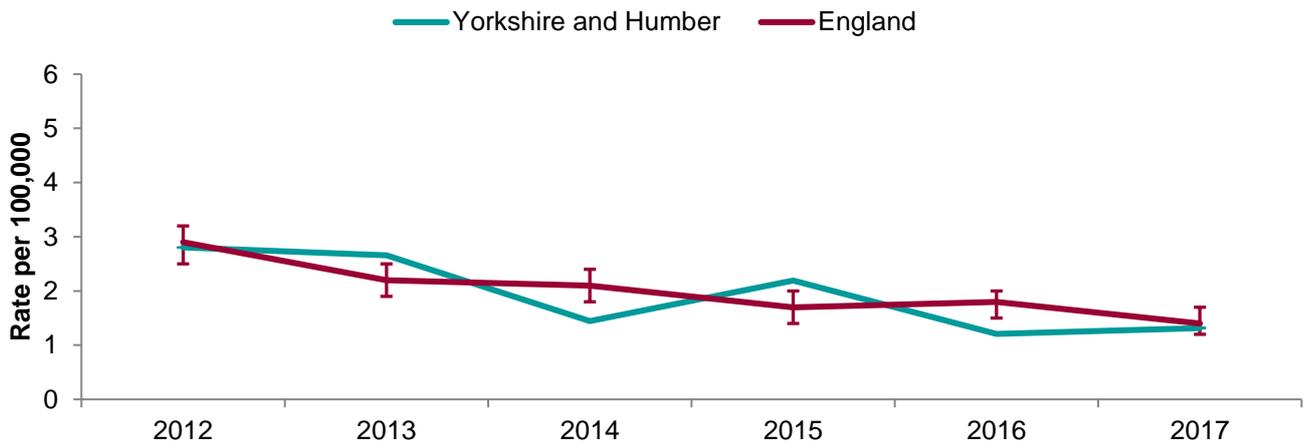
Strain typing and clustering

Whole genome sequencing (WGS) of *Mycobacterium tuberculosis* complex isolates provides information on Single Nucleotide Polymorphisms (SNP) differences between isolates and provides more information than MIRU-VNTR strain typing on how isolates are related to each other. WGS has been carried out retrospectively on some isolates of TB cases epidemiologically and molecularly linked by MIRU-VNTR to support cluster investigation and to inform public health action going forward.

Clustered cases may reflect cases that are part of the same chain of transmission, but additional epidemiological information is required to assess whether cases with indistinguishable strain types are likely to reflect recent transmission.

Proportion of cases clustered and geographical distribution

In 2017, of the people notified with culture confirmed TB in the North and Central England 93% had a WGS result that could be used to report relatedness (based on sequencing coverage and quality).

In 2017, the proportion of people that clustered with at least 1 other person at a cut-off of 12 SNPs was 23.3%. As might be expected clustering was higher among those born in the UK compared to outside the UK. Of the 83 clusters identified in Northern and Central England at the 12 SNP cut-off in 2017, the majority were small (<5 people) with 51.8% (43) having only 2 people in the cluster. Only 1 cluster had more than 10 people.

There were 147 clusters in Yorkshire and Humber identified between 2011 and 2016. Most of these clusters were small, with just over half including only 2 cases and approximately one fifth including 5 or more cases.

Figure 5.2. Proportion of clusters by size, Yorkshire and Humber, 2011-2016.
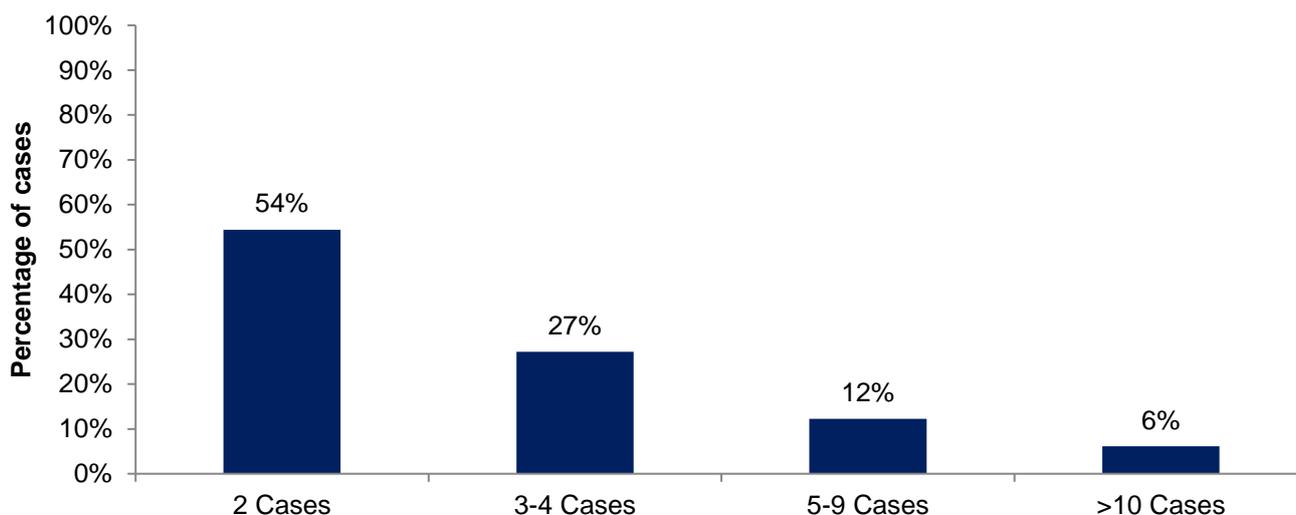
Delay from onset of symptoms to start of treatment

Time from symptom onset to treatment start for patients with pulmonary TB

Dates of symptom onset and treatment start were available for 98% (205/210) and 95% (200/210) respectively of pulmonary TB cases diagnosed in 2017, which is an improvement from 2016.

In 2017, among the 210 pulmonary TB patients where the interval between onset and treatment is known (197), 41% (81/197) started treatment within 60 days (2 months) of symptom onset. Of concern is the significant proportion of pulmonary cases, 31% (61/197) commencing treatment over 121 days (4 months) after onset of symptoms which is a small increase from the 29% in 2016. However, Yorkshire and Humber is not an outlier in this as across England 31% of pulmonary cases were reported as commencing treatment over 4 months after onset of symptoms in cases.

Figure 6.1: Pulmonary tuberculosis case reports by time of onset to treatment start date, Yorkshire and Humber, 2017
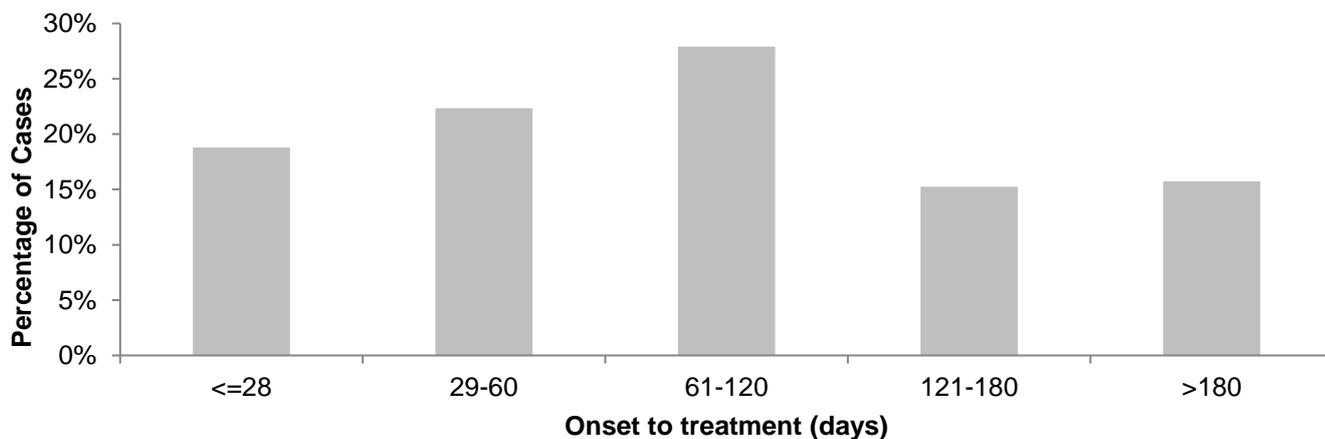
*excluding asymptomatic cases, and those with missing onset dates

A low proportion of children (<15 years) with pulmonary TB experienced a delay of more than 4 months; in contrast 51.2 % of those aged 65 years and older in Yorkshire and Humber experienced a delay of more than 4 months which is higher than the national proportion with 38% of those over 65 years experiencing a delay of this order.

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There was a slightly higher proportion of UK-born pulmonary TB cases with longer delays from symptom onset to treatment start in comparison to non-UK born cases (33% v. 30%)[3] but the difference is smaller than observed nationally with 37% and 28% respectively experiencing delay greater than 4 months. (Figure 6.1). There was no clear pattern for delays in treatment by ethnic group, (Figure 6.3) The median delay for pulmonary TB cases in Yorkshire and Humber is 77 days, compared to 79 days nationally.

Figure 6.1. Proportion of pulmonary tuberculosis case reports by time from onset to treatment start date and place of birth, Yorkshire and Humber, 2017
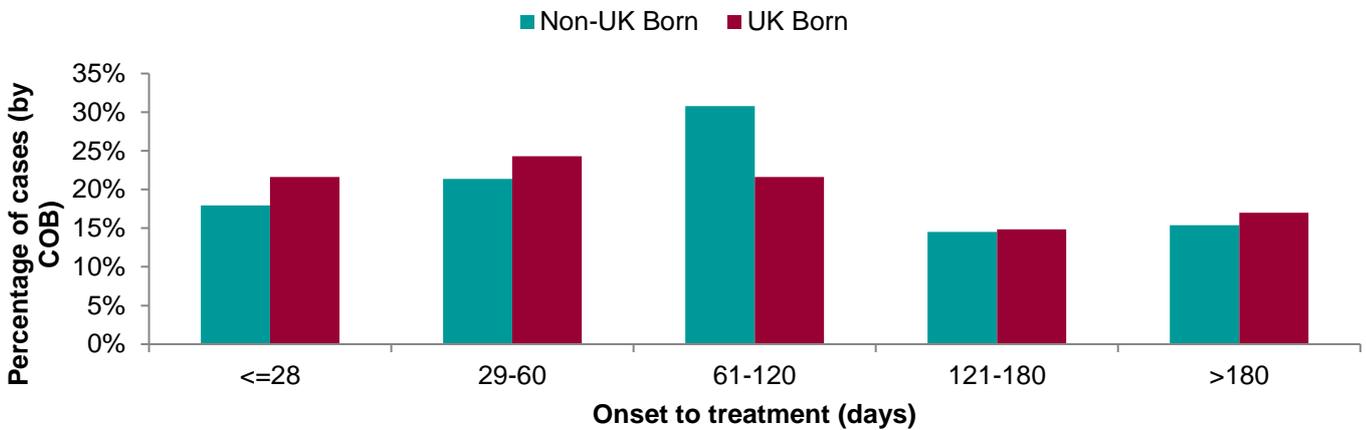
Figure 6.2. Proportion of pulmonary TB cases with a delay from symptom onset to treatment start by place of birth, Yorkshire and Humber 2013-2017

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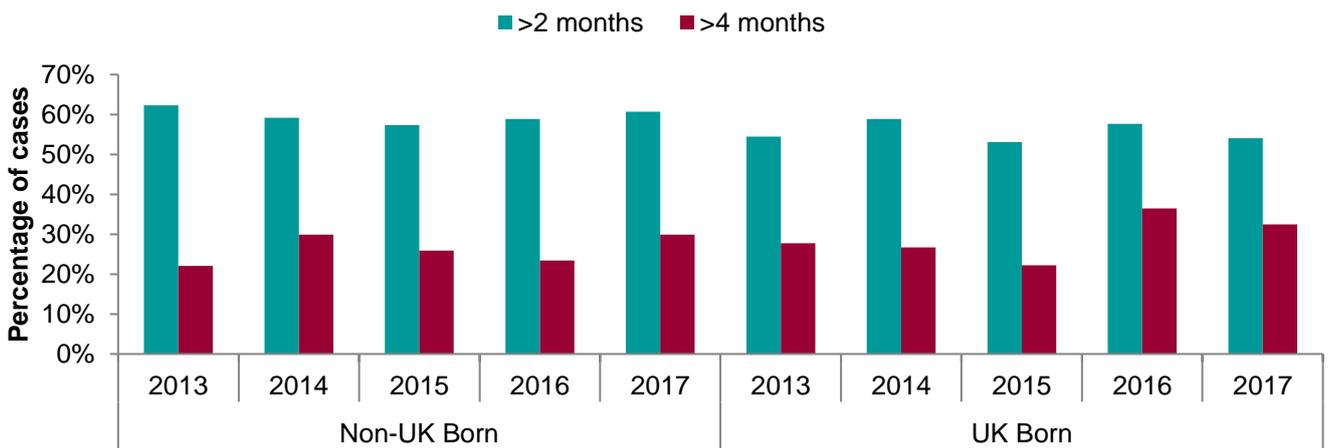
[3] Early diagnosis: diagnosis made within 28 days of onset of symptoms. Late diagnosis: diagnosis made more than 120 days after onset of symptoms.

Figure 6.3. Pulmonary tuberculosis case reports by time from onset to treatment start date and ethnic group, Yorkshire and Humber, 2017
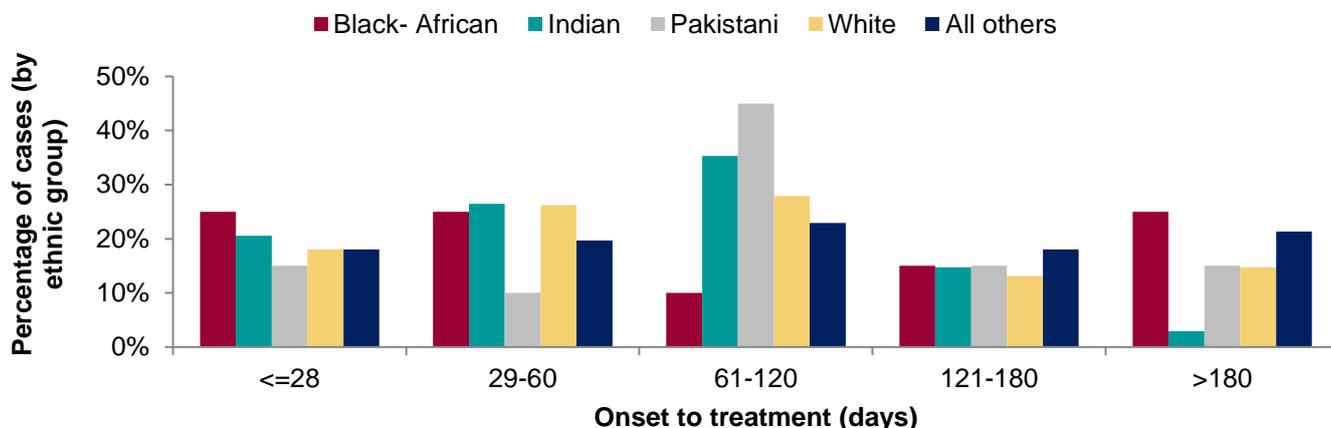
Figure 6.4. Pulmonary tuberculosis case reports by time from onset to treatment start date and age group, Yorkshire and Humber, 2017 (pulmonary TB cases only)
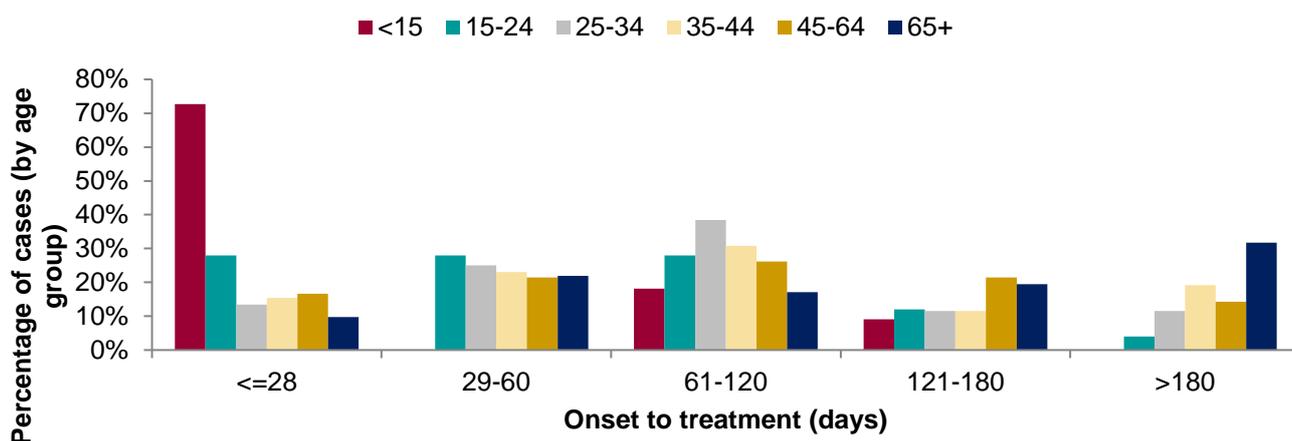
Figure 6.5. The proportion of all cases with time to the onset of treatment, Yorkshire and Humber, 2017*
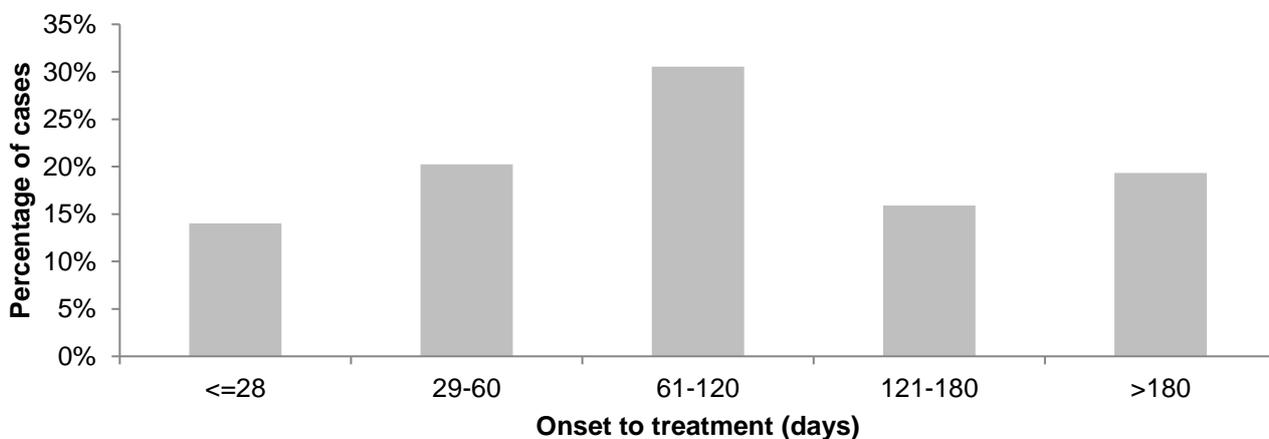
*excluding asymptomatic cases, and those with missing onset dates

# TB outcome in drug sensitive cohort

Drug sensitive cohort

For the purposes of reporting outcomes for people with TB, the drug sensitive cohort is defined as all people notified with TB, excluding those in the drug resistant cohort. Under this definition, people with TB resistant to isoniazid, ethambutol and/or pyrazinamide but without resistance to rifampicin are included in the drug sensitive cohort. Outcomes are reported according to year of notification for people with drug sensitive TB up to, and including, 2016. For TB outcomes in the drug resistant cohort see section 8 of this report. Definitions have been updated in line with the revised 2013 World Health Organization (WHO) TB outcome definitions. [2]

Treatment outcomes for the drug-sensitive cohort are reported separately for 2 groups:

1. For cases with an expected duration of treatment less than 12 months, TB outcomes at 12 months are reported. This group excludes cases with Central Nervous System (CNS) disease, who have an expected duration of treatment of 12 months. In addition, those with spinal, cryptic disseminated or miliary disease are excluded from this group, as CNS involvement cannot be reliably ruled out for the purposes of reporting.

2. For cases with CNS, spinal, cryptic disseminated or miliary disease, the last recorded treatment outcome is reported.

Treatment outcome reports were received for 98.9% of cases diagnosed in 2016, compared to 75.7% of cases diagnosed in 2004 and 98.7% cases diagnosed in 2015.

The proportion of TB cases completing treatment within 12 months of notification increased in the region from 62.5% for TB cases diagnosed in 2004 to 86.1% for cases diagnosed in 2016 (Figure 7.1). This is just above the national treatment completion rate of 84.4%.

Outcomes for TB patients with expected duration of treatment less than 12 months

Figure 7.1. Proportion of tuberculosis cases diagnosed in 2015 that complete treatment in 12 months, by Public Health England Centre, 2016
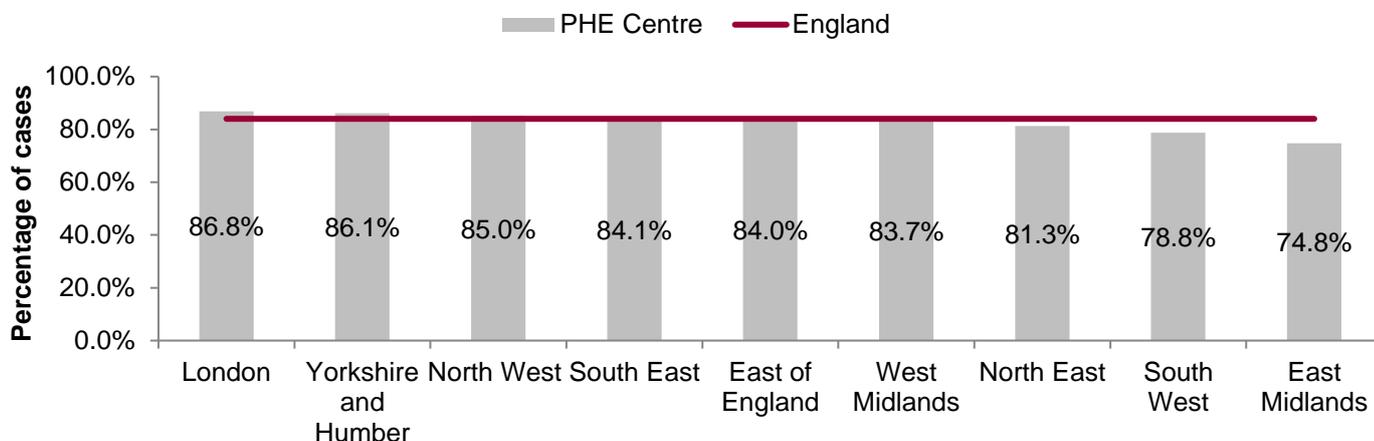
TB treatment outcome

The proportion of patients reported as still on treatment, died or treatment stopped is now lower in the Yorkshire and Humber region than the national average. Of the TB cases diagnosed in 2016, 2.9% (compared to 5.0% in 2015 cases) were reported as still on treatment compared to the national proportion of 4.4%. Some patients still on treatment at 12 months had experienced interruption of treatment for various reasons leading to an extension of the treatment time. TB treatment was also stopped for a small number of patients due to clinical reasons such as intolerance of the treatment regimen. Those with complex disease and known resistance to anti-tuberculous drugs requiring longer treatment periods are excluded from this analysis.

Of TB patients diagnosed in 2016 in the region, 3.5% were reported as lost to follow up 12 months later, a decrease from the previous year (4.7%) and below the England proportion of 3.9% (Figure 7.3).

Figure 7.2. Tuberculosis cases by treatment outcome for cases diagnosed in 2016, Yorkshire and Humber*
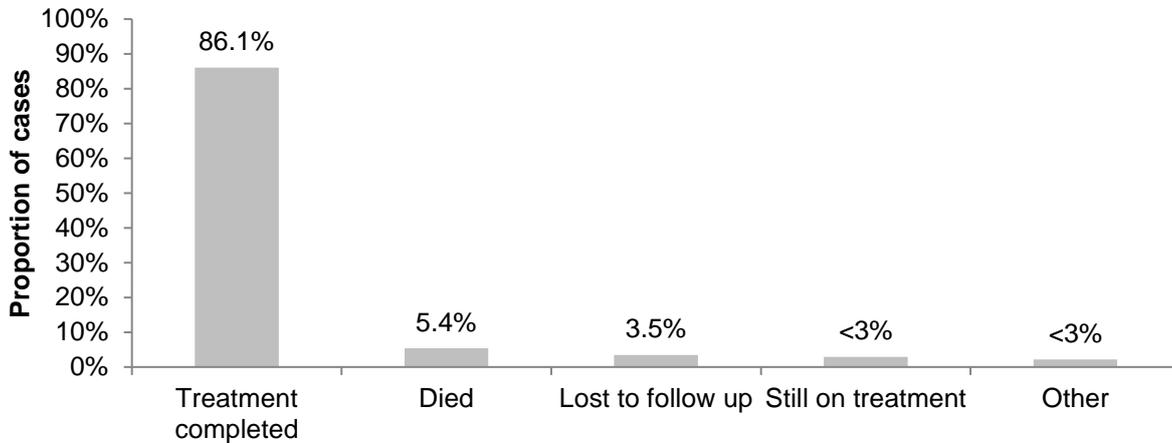
*excludes rifampicin resistant TB, and patients with CNS, spinal, miliary or cryptic disseminated disease

Figure 7.3. Proportion of tuberculosis cases diagnosed in 2016 that reported being lost to follow up as a treatment outcome by 12 months, by PHE Centre
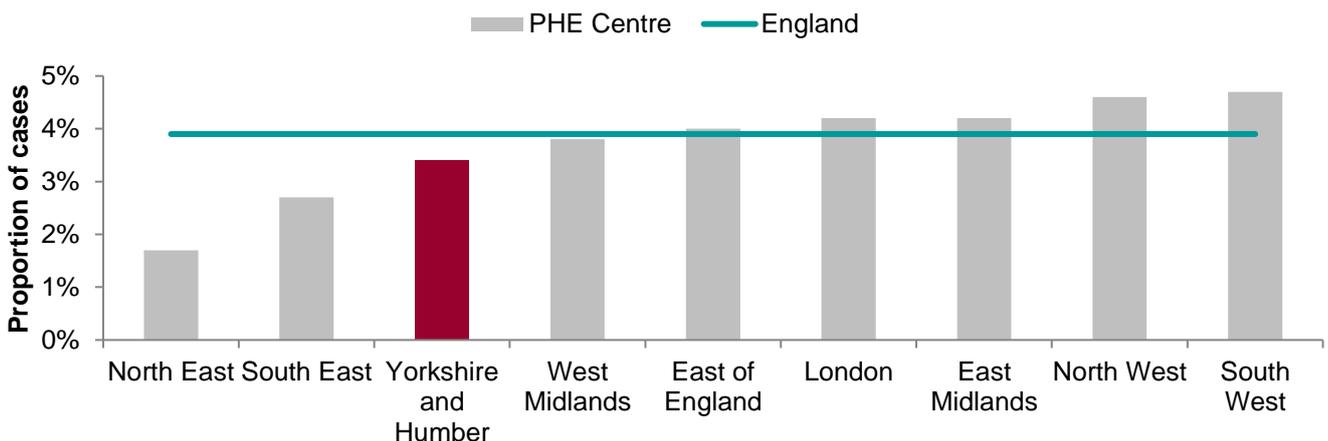
*excludes rifampicin resistant TB, and patients with CNS, spinal, miliary or cryptic disseminated disease

The proportion of patients completing treatment within 12 months was lowest in the 65+ age group. Death was the most commonly reported reason for failing to complete treatment in the 65+ age group (13/20), while lost to follow up was most commonly reported in the 25-34 age group (7.5%). Treatment completion was 100% for those under 15 years of age and 89% (46/52) for those aged 15-24.

Treatment completion rates varied by ethnicity of the TB patient with the lowest treatment completion rates reported in the white ethnic group – 78%, and highest completion rates in the Black African ethnic group (94%) and the Pakistani ethnic group (91%). This is partly explained by the age profile of the white TB patients who tend to be older, with an associated higher chance of death from other causes before treatment is completed. This may also due to the slightly higher proportion of white TB patients (19%

v 15%) with risk factors associated with poor treatment adherence such as substance misuse.

Table 7.1. Proportion of tuberculosis cases diagnosed in 2016 by treatment outcome and country of birth, Yorkshire and Humber*

Outcome recorded at 12 months	Non-UK Born n(%)	UK Born n(%)
Treatment completed	227 (89%)	93 (80%)
Lost to follow up	13 (5%)	0 (0%)
Still on treatment	7 (3%)	< 5 (-)
Died	7 (3%)	13 (11%)
Not evaluated	0 (0%)	< 5 (-)
Treatment stopped	0 (0%)	< 5 (-)

*excludes rifampicin resistant TB, and patients with CNS, spinal, miliary or cryptic disseminated disease

TB treatment outcome – death

Death was the most commonly reported reason for not completing treatment in the region (Figure 7.2). The median age of TB patients who were notified in 2016 and died before or whilst on treatment was 73 years.

Twenty deaths were recorded in people who were reported as having TB in 2016 but of these TB was thought to be incidental in 8 and a contributory factor in less than 5 cases, with no deaths directly attributed to TB. It should be noted that numbers are small and the proportion of deaths where the role of TB was reported as unknown was very high, 45% in 2016.

Drug resistant TB

Overall initial drug resistance and geographical distribution

The proportion of TB cases in Yorkshire and Humber with initial resistance to Isoniazid without MDR-TB has declined slightly from 7% in 2016 to 5% in 2017 which is just below the national proportion of 5.7%. The number of cases with MDR-TB detected through a drug sensitivity test (DST) remained stable and consistent with the national epidemiology.

The world regions where Yorkshire and Humber cases resistant to Isoniazid alone and MDR-TB were born include Eastern Africa, Middle Africa, Northern Europe, South-Eastern Asia and Southern Asia. This contrasts with the national picture where the UK and the Indian subcontinent accounted for the country of birth of most of cases.

There were 11 cases resistant to isoniazid without MDR-TB over the age of 15. Social risk factor information was known for 9 of them, and all of them reported "no" for each of the 4 risk factors.

Figure 8.1. Proportion of culture confirmed tuberculosis cases with drug resistance, Yorkshire and Humber 2004-2017*
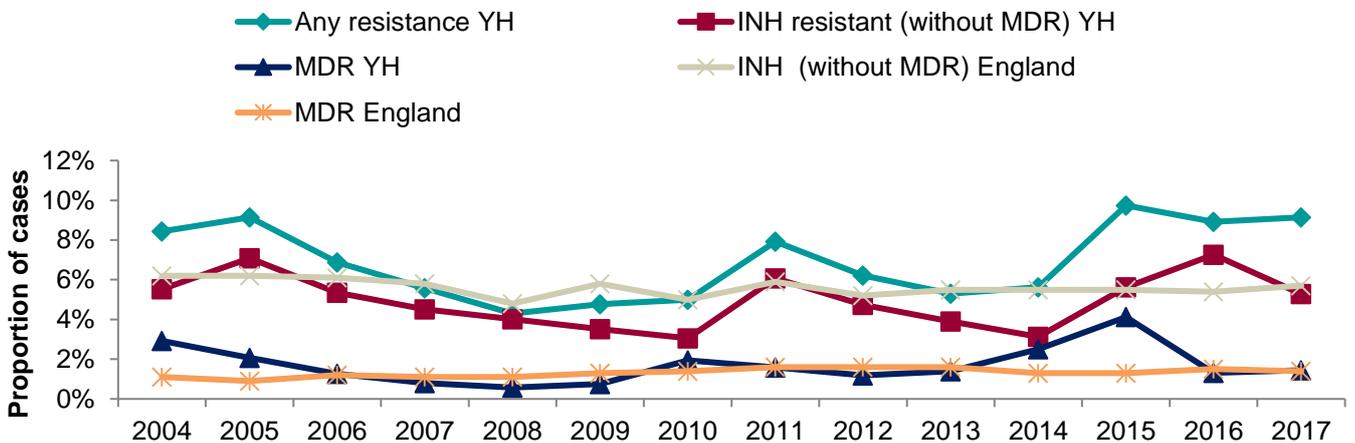
*Cases with DST results for at least isoniazid and rifampicin

Figure 8.2. Proportion of tuberculosis cases with drug resistance by PHE centre, Yorkshire and Humber, 2013-2017
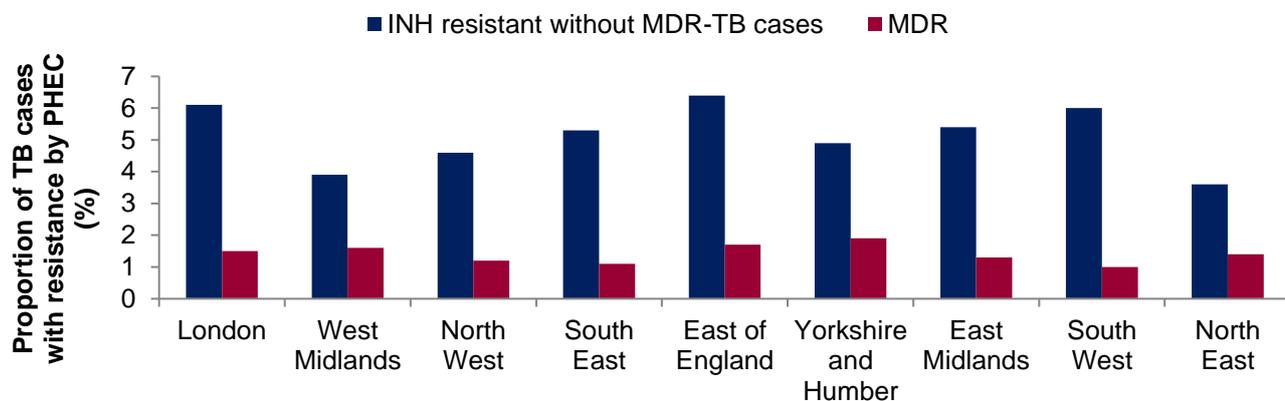
TB in underserved populations

The Collaborative Tuberculosis Strategy for England defines underserved populations (USPs) as individuals whose social circumstances, language, culture or lifestyle (or those of their parents or carers) make it difficult to recognise the clinical onset of TB, access diagnostic and treatment services; self-administer treatment or, in the case of children and young people, have treatment administered by a parent or carer; or attend regular appointments for clinical follow-up.

Social risk factors

Information on factors associated with increased risk of TB is collected for all TB cases. The risk factors collected include:

- substance misuse – alcohol or drug misuse
- current or recent history (5 years) of homelessness
- current or recent history (5 years) of imprisonment

Reporting of risk factors associated with TB has improved since their addition to ETS in 2008. A response for 'any risk factor' was recorded for 82.4% in those cases over 14 years of age (272/330) reported in the region in 2017. In 2017 14/301 (4.7%%) reported alcohol misuse, 12/295 (4%) reported drug misuse; 10/298 (3.4%) reported homelessness; and 11/277 (4%%) reported imprisonment.

In total, 35/272 (13%) of TB cases notified in Yorkshire and Humber in 2017 were reported as having at least 1 social risk factor for TB, consistent with the national epidemiology. Cases reporting social risk factors are distributed across the region (Figure 9.1) which indicates that even in areas with low incidence, TB cases may still present a management challenge as they are still likely to have factors that increase the complexity of case management.

Previous diagnosis of TB

Information on previous diagnosis of TB was available for 96% (317/330) of cases notified in 2017 who were over 14 years of age. A previous diagnosis of TB in cases over 14 years of age was reported in 23/317 (7%) of cases in 2017.

Figure 9.1. Proportion of tuberculosis cases reporting any risk factor aged >14, Yorkshire and Humber, 2015-2017
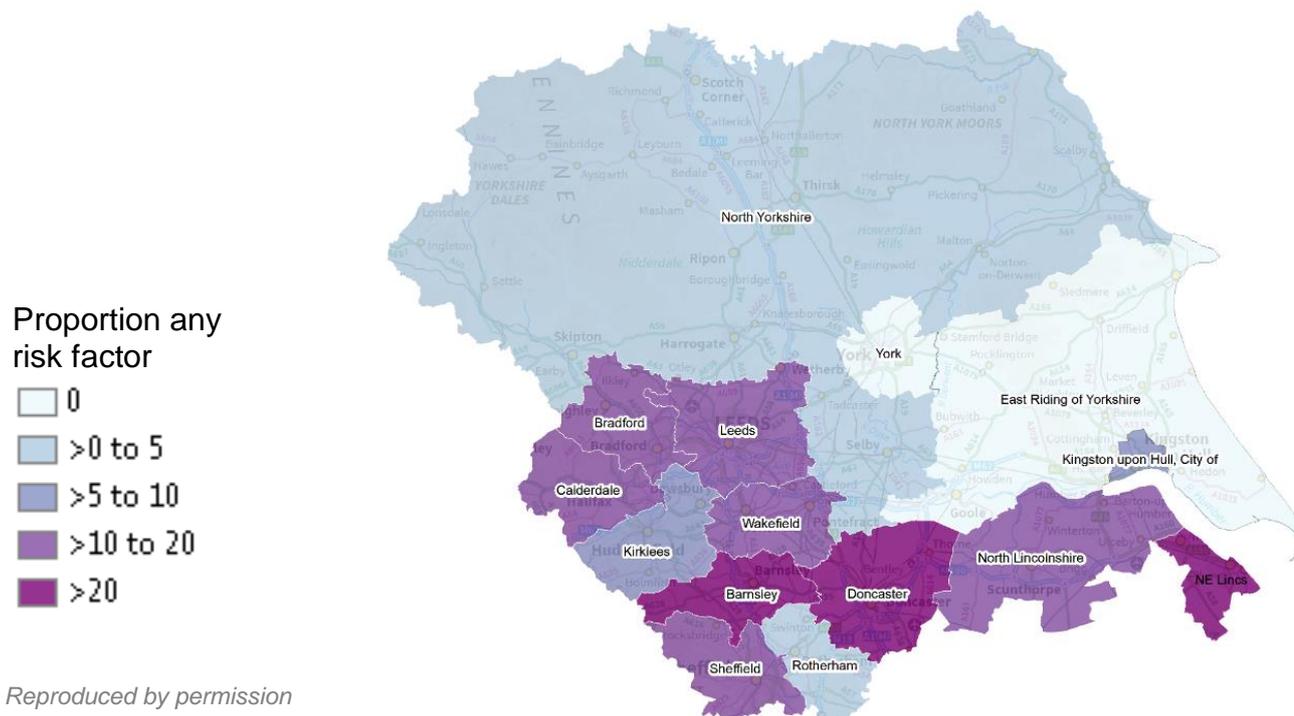
Proportion any
risk factor

☐ 0
☐ >0 to 5
☐ >5 to 10
☐ >10 to 20
☐ >20

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Treatment adherence risk factors: use of Directly Observed Therapy

After drug-sensitivity, the most important factor affecting TB treatment outcome is treatment adherence. Non-adherence to TB treatment can result in onward transmission, increased morbidity and mortality and the emergence of drug resistant strains. Directly Observed Therapy (DOT) is a well-recognised option for improving treatment adherence and is recommended by NICE. [3]

NICE recommends DOT should be considered for TB patients with active disease who have a past history of poor adherence to treatment, a past history of active TB, a history of homelessness or substance misuse, major psychiatric, memory or cognitive disorders, or have multi-drug resistant TB.

DOT is resource intensive and figures below suggest that DOT is not being applied in some situations where national guidance recommends it should be considered for use. Among TB cases in 2017 in Yorkshire and Humber with a previous diagnosis of TB 26% (6/23) were recorded as receiving DOT. Only 34% (12/35) of TB patients across the region in 2017 with any social risk factors indicating the need for DOT received this treatment, a decline on the previous year (39%). Whilst these risk factors for poor adherence may be more nuanced and require local clinical assessment the use of DOT remains low across the region. This disparity between those with adherence risk factors

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and the use of DOT is observed in both low and high burden areas although the underlying reasons may differ. Nationally 50% of cases with a social risk factor received DOT.

Deprivation

The association between TB and deprivation is well established. Using the Index of Multiple Deprivation (IMD) based on small geographical areas of a few thousand people known as LSOAs. Around a fifth (18%) of the LSOAs in our region were categorised amongst the most deprived 10% of LSOAs in England in 2015 [6]. Of the region's population, 28.1% live in these most deprived areas. Much of the region's significant deprivation is concentrated within towns and cities but also around the former coalfields of the region.

Figure 9.2 and Table 9.1 shows the association between TB incidence rates in 2017 and IMD scores, with a clear social gradient present between high rates in the most deprived areas and lower rates in the least deprived.

Figure 9.2. Incidence of TB in Yorkshire and Humber by deprivation, 2017
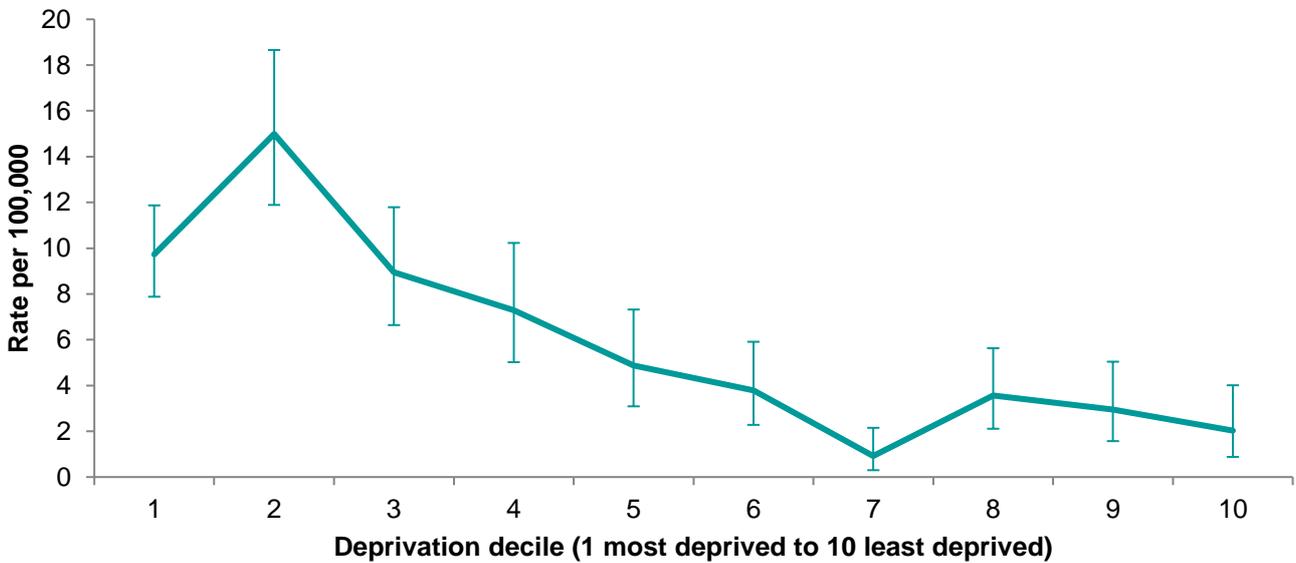
Table 9.1. Tuberculosis rates by local authority and corresponding local authority deprivation ranking, Yorkshire and Humber, 2017

Table 9.2 utilises UTLA IMD average rank score (population weighted)

Upper tier local authority	Rate per 100,000- 2017	Deprivation Rank in Y&H
Bradford	16.6	2
Kirklees	10.5	11
Leeds	8.0	10
Rotherham	7.2	5
Sheffield	6.6	8
Kingston Upon Hull	6.1	1
Doncaster	5.2	4
North Lincolnshire	4.7	12
Wakefield	3.8	7
Calderdale	3.3	9
North Yorkshire	2.3	14
East Riding of Yorkshire	2.1	13
North East Lincolnshire	<5	6
Barnsley	<5	3
York	<5	15

TB-HIV co-infection and HIV testing among TB cases

HIV testing

Most TB patients in 2017 (89%) were offered and had an HIV test (excluding those diagnosed post-mortem or where HIV status was already known). There appears to be some geographical variation in the offer of HIV testing among TB patients, but this may partly reflect the variation in the documentation of the offer. The proportion offered HIV tests in Figure 10.2 will be affected strongly by the small numbers of cases in some areas where 1 case might account for a sizable proportion of cases notified.

Seventeen patients were reported as not having been offered a HIV test although some of these will have been children under 6 years of age, this is double the number in the previous year. The proportion of cases where an HIV test has been offered and done in Yorkshire and Humber has declined to 89% from 94% in 2016 and below the national average of 93.3% among those where information was reported.

Figure 10.1. Proportion of notified TB cases where a HIV test was offered and done by year, Yorkshire and Humber, 2017*
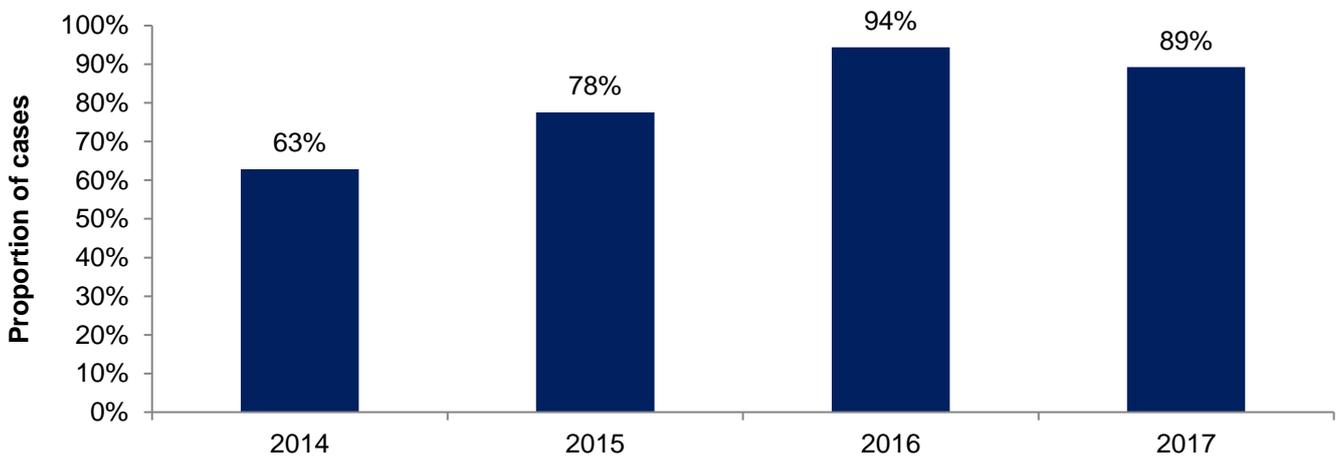
*Excludes cases where HIV status is known. Where HIV test offer is not recorded, these have been counted as not offered

HIV co-infection rates

HIV status is not collected in the Enhanced TB surveillance system (ETS). To estimate TB-HIV coinfection, TB and HIV surveillance data is matched annually for notified people with TB aged 15 years and older.

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In 2017 under 3%% of people with TB in Yorkshire and Humber were coinfected with HIV. This is the lowest proportion of co-infection in the last 14 years (2006: 6.4%). National data indicates that the median age of people with TB-HIV has increased from 34 years in 2001 to 43 years in 2017. In 2017, where place of birth was known, 80.1% (109/136) of people with TB-HIV co-infection in England were born outside of the UK, the lowest proportion since data collection started in 2001. Where country of birth was known, 69.8% (74/106) of those born outside the UK originated form sub-Saharan Africa.

BCG vaccination

The BCG vaccination programme in Yorkshire and Humber is a risk-based programme. The vaccine is recommended for individuals deemed to be at higher risk of exposure to TB, particularly to protect against serious forms of disease in infants. BCG vaccine shortages between May 2015 and June 2016 are likely to have impacted on coverage.

It is not possible to calculate vaccine coverage for areas with a selective programme as the denominator is not defined within Child Health Information Systems.

Information on BCG vaccination history is collected for TB cases and this information is available for 51% of cases in Yorkshire and Humber in 2017, which is the lowest in the last 8 years. Among those cases where vaccination was recorded 50% were vaccinated.

BCG vaccination status of cases

Table 11.1. Number and proportion of TB patients with BCG vaccination, Yorkshire and Humber, 2010-2017

Year	Unknown vaccination status	Not vaccinated	Yes vaccinated	Total known vaccination status	Proportion vaccinated (where known)
2010	254	154	220	374	59%
2011	229	179	256	435	59%
2012	209	149	235	384	61%
2013	219	163	201	364	55%
2014	213	107	196	303	65%
2015	194	84	158	242	65%
2016	172	70	179	249	72%
2017	170	87	88	175	50%

New migrant latent TB infection testing

Key points

In Yorkshire and Humber 6 CCGs covering 4 local authorities were identified as eligible for funding and have established programmes.

Across the region, 3,041 individuals were invited to screening with acceptance rates varying between 66% and 98% in 2017/18, though this does not include data from Sheffield.

Across all the Yorkshire and Humber programmes test positivity ranged between 13% and 17.5%, averaging 15% across the region. This represents 354 LTBI cases diagnosed in 2017/18.

There is some variation in treatment acceptance, with an average rate of 46% across the region. However, the proportion of those who commenced treatment who went on to complete treatment is higher at 64%.

Note on time periods reported

Data in this section of the report is given by financial year rather than calendar year unless otherwise indicated.

Implementing new migrant LTBI testing and treatment in Yorkshire and Humber and England

In 2015, of the 209 CCGs in England, 59 with the highest incidence and burden of TB were prioritised for the new migrant LTBI systematic testing and treatment programme. The national LTBI programme is now in its fourth year of operation. Eligibility for inclusion in the programme is for persons aged 16-35 years who entered the country from a high incidence country (>150/100,000 or sub-Saharan Africa) within the last 5 years and have previously been living in that country for 6 months or longer.

Delivery of the funded programme is monitored through:

- LTBI testing and treatment programme coverage
- LTBI testing acceptance
- IGRA test performance and LTBI positivity
- LTBI treatment uptake

- LTBI treatment completion
- adverse events from LTBI treatment (data currently unavailable nationally)

LTBI screening invitations

Table 12.1. LTBI screening invitations by CCG in Yorkshire and Humber, July 2016-June 2018

CCG	Number of invitations 2016/17	Number of invitations 2017/18
Bradford: City & Districts	629 (*11 /12 months)	824
Greater Huddersfield	651	640
Leeds South and east	**	1267 (*7/12 months)
North Kirklees	318	310
Sheffield	**	**
Yorkshire and Humber total	1598	3041

Source local reporting data

 *Number of months data covers if less than 12 months

** data unavailable due to programme model. Data is now being collected and will be available for future reports.

Table 12.2. LTBI testing invitations, number of tests and percentage uptake

CCG	Number of invitations 2017/18	Number of test appointments 2017/18	Percentage uptake from invitation to appt
Bradford: City & Districts	824	805	98%
Greater Huddersfield	950	626	66%
North Kirklees			
Leeds (*7/12 months)	1267	1144	90%
Sheffield	-**	-	-
Yorkshire and Humber total	3041	2575	85%

Source Yorkshire and Humber LTBI programme data

* Sheffield number invited data is unavailable so not included in these figures. Leeds data is taken from 17 October to 18 March where other CCGs have full financial year data.

Number of tests and positivity

Data from the Yorkshire and Humber laboratory data for the screening sites for the 12-month period between April 2017 and March 2018 indicates that over 2,300 tests for LTBI were done as part of the screening programme with an average positivity rate of 15.2% which is of a similar order across the 4 reporting CCGs Across England 17% of tests conducted were positive.

Table 12.3. LTBI test results April 2017 to March 2018

CCG	Number of tests 2017/18	Number positive 2017/18	% positivity of those tested
Bradford: City & Districts	802	118	14.7
Greater Huddersfield	464	72	15.5
North Kirklees	162	21	13
Leeds (*7/12 months)	410	72	17.6
Sheffield	487	71	14.6
Yorkshire and Humber total	2324	354	15.2

Treatment for LTBI

The proportion of LTBI positive patients accepting and completing treatment varied by CCG ranged from 50% in Greater Huddersfield to 82% in Leeds. The available data reflects service activity rather than a cohort of patients which accounts for some of the mismatch in figures. Nationally 71% of those who accessed treatment completed.

Table 12.4. LTBI Treatment acceptance and completion for individuals who tested positive for LTBI by CCG, July 2016-June 2017

CCG	Positives who should be referred for treatment 2017/18	Treatment start/referred in 2017	Completed treatment (n)	Completed treatment (%)
Bradford: City & Districts	97	46	32	69.6
Greater Huddersfield	58	21	8	50.0
North Kirklees	20	12	9	75.0
Leeds (*7/12 months)	98	39	27	81.8
Sheffield	71	41	19	46.3
Yorkshire and Humber total	344	354	95	64.2

Source Yorkshire and Humber LTBI programme data

Data limitations

The recording of some key variables (for example 'test invitation or offer' and 'IGRA test result') has not always been consistently recorded and these fields contain missing data. Data from laboratory services is now routinely collected by PHE with well completed variables although there may be under reporting for some CCGs. Laboratory data was used to determine the number of LTBI tests and calculate the positivity for each CCG except where denoted otherwise. CCGs were requested to submit the number of people offered or invited to be tested obtained from their systems and acceptance was only calculated for CCGs that provided these figures. Laboratory data only provides data on 2 demographic characteristics (age and sex). Other demographic characteristics such as country of birth and ethnicity are reported for England in the Tuberculosis in England: 2018 report (presenting data to end of 2017). [4]

Standards for tuberculosis surveillance

Time from diagnosis to notification

Standards for TB surveillances are set out in Department of Health guidance for England. [5] The guidance identifies key surveillance variables and reporting times and includes the surveillance standard that:

- at least 95% of cases should be reported within 2 weeks of diagnosis or decision to treat with a full course of anti-TB drugs
- at least 95% of reported cases should include complete data for the key variables which are name, date of birth, sex, ethnic group, born/not born in the UK, postcode, date of notification, previous TB treatment, site of disease (pulmonary/extra-pulmonary), and, for pulmonary cases, sputum smear status

The time from diagnosis to notification could be calculated for 328/345 (95.3%) of TB cases notified in 2017. Seventy-four per cent of the cases in 2017 were reported within 2 weeks of diagnosis, a slight decrease on 2016 (79%) and still below the target of 95%. There were some very long delays in reporting of a few cases with 3.7% of cases reported more than 6 months after diagnosis.

Completeness of ETS data

Across the region, completeness of reporting of the key variables listed below was not quite as good as in previous years. Many variables failed to reach the 95% completeness target (Table 13.1).

The reporting of postcode and country of birth achieved the target. The region also achieved a 98.6% return for the treatment outcome forms, with 86.1% of cases reported as completing their treatment. Overall data completion is consistent with last year although the reporting of the presence or absence of a prison history has reduced.

Table 13.1. Completeness of key information in TB Notifications, Yorkshire and Humber 2016 and 2017

Variable	2017 Essential Data	2017 % Complete	2016 % Complete
Total Cases	345	N/A	421
Postcode	345	100.0%	99.5%
Ethnic group	342	99.1%	98.3%
UK or Non-UK Born	336	97.4%	99.5%
*COB where Non-UK Born	234	100.0%	100.0%
*Year of Entry where Non-UK Born	216	92.3%	95.1%
BCG Yes/No	175	50.7%	59.1%
Previously Diagnosis yes/no	332	96.2%	95.2%
Alcohol Yes/No	316	91.6%	93.3%
Drug Yes/No	310	89.9%	92.2%
Homelessness Yes/No	313	90.7%	92.2%
Prison Yes/No	292	84.6%	88.1%
DOT	315	91.3%	89.3%
Travel outside UK	260	75.4%	76.7%
Visitor outside UK	196	56.8%	59.9%
**HIV Test	326	94.5%	97.3%
***<28 days diagnosis to notification	270	82.3%	88.5%
****Pulmonary cases culture result	210	100.0%	100.0%
****Pulmonary cases smear test result	136	64.8%	77.9%
*****TOM Submitted	369	98.6%	98.7%
*****Treatment Complete	321	86.1%	85.0%

*234 Non-UK Born Cases 2017;287 2016

** excludes cases diagnosed post mortem 2017:344 ; 2016: 415

***of 328 for 2017 where date of onset and case report date known; 401 for 2016

*****of 210 Pulmonary Cases 2017 and 244 2016

****** of 373 2016 cases, 381 cases 2015. (of those expected to complete treatment)

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Appendix A: Description of data sources and definitions

Data sources

Data on TB cases in 2017 comes from the national Enhanced TB surveillance (ETS) system. Data collected includes notification details, and demographic, clinical and microbiological information, including drug resistance and strain type, provided by the Reference Laboratory.

Definitions

Treatment outcome

Information on outcomes were reported for all cases reported in the previous year, excluding those with known rifampicin resistant disease: outcomes for these cases were reported at 24 months. Definitions for outcome are based on World Health Organization (WHO) and European definitions but adapted to the UK context. In this report, all data was obtained from the ETS matched dataset provided in August 2017.

Proportions

All proportions in this report are calculated among cases with known information or a known result, except where otherwise stated.

Confidence intervals

A 95% confidence interval for incidence was obtained assuming a Poisson distribution.

Population denominator

Tuberculosis rates by geographical area (Centre, local authority, MSOA and LSOA), age, sex and place of birth were calculated using ONS mid-year population estimates, 2014 mid-year population estimates were also used for 2015 data. Tuberculosis rates by ethnicity were calculated using 2011 census data.

Cluster definitions

Whole Genome Sequencing (WGS) and strain typing using 24 MIRU-VNTR profiling was performed at the TB reference laboratories. Analysis was undertaken on clusters defined as 2 or more people with TB caused by indistinguishable strains, with at least 23 complete VNTR loci, or within 12 single nucleotide polymorphisms (SNPs) on WGS or with known epidemiological links to a case within a cluster identified through WGS or strain typing. Analysis of clustering in Yorkshire and Humber was carried out on cases that were notified between 2011 and 2017.

Appendix B: TB cohort

Yorkshire and Humber has been taking part in Cohort Review since March 2013. There are 4 areas covered by separate cohorts – LBA (Leeds, Bradford and Airedale), CKW (Calderdale, Kirklees and Wakefield), SY (Barnsley, Doncaster, Rotherham and Sheffield), and NYH (North Yorkshire and Humber). Not all areas started the process straight away, but since November 2016 all areas are represented. The cohort review process collects extra information regarding the cohort of cases in order to measure against the set of agreed standards shown below. The treatment pathway of each case is presented to a group of TB professionals for peer review. Since March 2013 up until December 2018, there have been 52 cohort meetings held, and 1937 cases covered. Due to the nature of cohort, and a break for evaluation, not all cases recorded on ETS have been presented in cohort, but the majority of cases from 01/01/2012-30/06/2013 and 01/09/2014-31/03/2017 have been included in the cohort process.

Case Management
1) 100% of TB patients will be assessed for need for enhanced case management (ECM)
2) 100% of TB patients will be offered HIV testing (adults and children >6)
3) At least 95% of fully sensitive pulmonary TB cases will successfully complete a recommended treatment regime within 365 days (12 months).
4) 100% of MDR-TB cases are discussed with BTS MDR-TB group.
5) Treatment outcomes:
a) 100% of fully sensitive TB patients receiving enhanced case management from treatment outset will complete treatment within a recommended treatment regime within 365 days (12 months).
b) 85% of patients who have had smear positive pulmonary TB will complete treatment within a recommended treatment regime within 365 days (12 months).
c) 70% of patients with any first line drug resistance will complete treatment within a recommended treatment regime within 365 days (12 months).
d) Less than 5% of TB cases will be LFU at time of cohort review.
Contact Investigation
1) Among pulmonary sputum smear positive cases:

a)	95% will have 1 or more contacts identified.
b)	80% will have 5 or more contacts identified.
c)	90% of all contacts will receive a clinical evaluation.

2) 85% of all contacts with Latent TB Infection (LTBI), who are started on preventative treatment, will successfully complete the course.

Appendix C: Yorkshire and Humber level data for TB strategy monitoring indicators, 2004-2017

Year	Indicator 1 Overall TB incidence per 100,000 population			Indicator 2 TB incidence in UK born and non-UK born populations						Indicator 5 Incidence of TB in UK born children aged under fifteen years		
				Non UKBorn			UKBorn					
	n	Rate	(95%CI)	n	Rate	(95%CI)	n	Rate	(95%CI)	n	Rate	(95%CI)
2004	535	10.6	(11.5 - 9.69)	330	110.4	(98.8 - 122.9)	194	4.1	(3.57 - 4.75)	36	3.9	(2.71 - 5.37)
2005	556	10.9	(11.8 - 10)	341	107.9	(96.8 - 120.0)	180	3.8	(3.27 - 4.41)	40	4.3	(3.09 - 5.89)
2006	661	12.9	(13.9 - 11.91)	415	112.8	(102.2 - 124.2)	172	3.7	(3.13 - 4.25)	35	3.8	(2.65 - 5.29)
2007	632	12.2	(13.2 - 11.3)	356	97.3	(87.4 - 107.9)	179	3.8	(3.25 - 4.38)	42	4.6	(3.3 - 6.18)
2008	635	12.2	(13.2 - 11.28)	415	105.1	(95.2 - 115.7)	174	3.7	(3.15 - 4.26)	44	4.8	(3.47 - 6.42)
2009	688	13.2	(14.2 - 12.21)	406	100.7	(91.2 - 111.0)	212	4.5	(3.88 - 5.1)	41	4.4	(3.19 - 6.02)
2010	628	12.0	(12.9 - 11.03)	366	89.5	(80.6 - 99.1)	190	4.0	(3.43 - 4.58)	40	4.3	(3.08 - 5.86)
2011	664	12.6	(13.6 - 11.62)	389	90.0	(81.3 - 99.5)	220	4.6	(4.01 - 5.24)	62	6.6	(5.1 - 8.52)
2012	593	11.2	(12.1 - 10.27)	354	77.3	(69.5 - 85.8)	189	3.9	(3.4 - 4.55)	52	5.5	(4.14 - 7.26)
2013	583	10.9	(11.9 - 10.05)	360	77.8	(69.9 - 86.2)	182	3.8	(3.25 - 4.37)	52	5.5	(4.11 - 7.22)
2014	516	9.6	(10.5 - 8.81)	320	67.1	(59.9 - 74.9)	171	3.5	(3.04 - 4.12)	21	2.2	(1.37 - 3.38)
2015	436	8.1	(8.9 - 7.35)	292	61.3	(54.5 - 68.8)	126	2.6	(2.17 - 3.1)	26	2.7	(1.77 - 3.97)
2016	421	7.8	(8.5 - 7.04)	287	55.9	(49.7 - 62.8)	132	2.7	(2.28 - 3.24)	15	1.5	(0.87 - 2.55)
2017	345	6.4	(7.1 - 5.71)	234	43.7	(38.3 - 49.7)	102	2.1	(1.72 - 2.56)	15	1.5	(0.86 - 2.53)

Year	Indicator 6 Number and proportion of pulmonary TB cases starting treatment within two months of symptom onset		Indicator 7 Number and proportion of pulmonary TB cases starting treatment within four months of symptom onset		Indicator 8 Number and proportion of pulmonary TB cases that were culture confirmed		Indicator 9 Number and proportion of microbiologically confirmed cases with drug susceptibility testing reported for the four first line agents	
	n	Proportion(95%CI)	n	Proportion(95%CI)	n	Proportion(95%CI)	n	Proportion(95%CI)
2004	80	34.9% (29.1% - 41.3%)	161	70.3% (64.1% - 75.8%)	221	71.5% (66.2% - 76.3%)	307	99.7% (98.2% - 99.9%)
2005	101	40.6% (34.7% - 46.8%)	176	70.7% (64.7% - 76.0%)	218	68.6% (63.3% - 73.4%)	338	99.7% (98.3% - 99.9%)
2006	132	48.2% (42.3% - 54.1%)	207	75.5% (70.1% - 80.3%)	250	67.2% (62.3% - 71.8%)	391	99.5% (98.2% - 99.9%)
2007	120	47.1% (41.0% - 53.2%)	183	71.8% (65.9% - 76.9%)	245	65.7% (60.7% - 70.3%)	372	98.7% (96.9% - 99.4%)
2008	94	39.2% (33.2% - 45.5%)	181	75.4% (69.6% - 80.4%)	213	63.4% (58.1% - 68.4%)	344	98.6% (96.7% - 99.4%)
2009	118	43.2% (37.5% - 49.2%)	202	74.0% (68.5% - 78.8%)	263	66.9% (62.1% - 71.4%)	390	98.0% (96.1% - 99.0%)
2010	119	43.0% (37.3% - 48.8%)	206	74.4% (68.9% - 79.2%)	255	67.1% (62.2% - 71.6%)	357	99.2% (97.6% - 99.7%)
2011	110	38.6% (33.1% - 44.4%)	199	69.8% (64.3% - 74.9%)	248	65.4% (60.5% - 70.0%)	377	99.5% (98.1% - 99.9%)
2012	116	43.9% (38.1% - 50.0%)	191	72.3% (66.7% - 77.4%)	222	67.3% (62.0% - 72.1%)	333	98.5% (96.6% - 99.4%)
2013	107	41.0% (35.2% - 47.1%)	196	75.1% (69.5% - 80.0%)	229	68.8% (63.6% - 73.5%)	353	98.3% (96.4% - 99.2%)
2014	96	39.5% (33.6% - 45.8%)	170	70.0% (63.9% - 75.4%)	218	74.7% (69.4% - 79.3%)	316	98.8% (96.8% - 99.5%)
2015	100	43.9% (37.6% - 50.3%)	171	75.0% (69.0% - 80.2%)	183	71.8% (65.9% - 76.9%)	260	97.4% (94.7% - 98.7%)
2016	93	41.5% (35.3% - 48.1%)	161	71.9% (65.7% - 77.4%)	210	86.1% (81.2% - 89.9%)	298	98.3% (96.2% - 99.3%)
2017	80	41.5% (34.7% - 48.5%)	134	69.4% (62.6% - 75.5%)	146	69.5% (63.0% - 75.4%)	206	99.0% (96.6% - 99.7%)

Year	Indicator 10			Indicator 11			Indicator 12		
	Number and proportion of drug sensitive TB cases who had completed a full course of treatment by 12 months * Excludes CNS Miliary and cryptic TB			Number and proportion of drug sensitive TB cases who were lost to follow-up at last reported outcome *Includes CNS Miliary and cryptic TB			Number and proportion of drug sensitive TB cases who had died at last reported outcome		
	n	Proportion(95%CI)		n	Proportion(95%CI)		n	Proportion(95%CI)	
2004	304	62.6% (58.2% -	66.7%)	17	3.2% (2.0% -	5.1%)	36	6.7% (4.9% -	9.2%)
2005	355	71.4% (67.3% -	75.2%)	31	5.7% (4.0% -	7.9%)	38	6.8% (5.0% -	9.2%)
2006	421	72.3% (68.6% -	75.8%)	39	5.9% (4.4% -	8.0%)	43	6.5% (4.9% -	8.6%)
2007	406	71.0% (67.1% -	74.5%)	45	7.2% (5.4% -	9.5%)	41	6.5% (4.8% -	8.7%)
2008	436	76.1% (72.4% -	79.4%)	43	6.8% (5.1% -	9.0%)	40	6.3% (4.7% -	8.5%)
2009	468	77.2% (73.7% -	80.4%)	47	6.9% (5.2% -	9.0%)	44	6.4% (4.8% -	8.5%)
2010	428	75.8% (72.1% -	79.1%)	39	6.3% (4.6% -	8.5%)	46	7.3% (5.5% -	9.6%)
2011	431	72.7% (69.0% -	76.1%)	51	7.8% (6.0% -	10.1%)	47	7.1% (5.4% -	9.3%)
2012	442	82.5% (79.0% -	85.4%)	25	4.3% (2.9% -	6.2%)	32	5.4% (3.8% -	7.5%)
2013	459	86.4% (83.3% -	89.1%)	28	4.8% (3.4% -	6.9%)	30	5.1% (3.6% -	7.3%)
2014	401	85.0% (81.5% -	87.9%)	16	3.1% (1.9% -	5.1%)	32	6.2% (4.4% -	8.6%)
2015	324	85.0% (81.1% -	88.3%)	17	4.0% (2.5% -	6.3%)	22	5.0% (3.4% -	7.5%)
2016	321	86.1% (82.2% -	89.2%)	14	3.4% (2.0% -	5.6%)	22	5.2% (3.5% -	7.8%)

*Indicators 13-19 have not been included to protect patient confidentiality due to small numbers present in the data.