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England

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Tuberculosis in the East Midlands: Annual review (2014 data)

Data from 2000 to 2014

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The data presented in this report are correct as at August 2015.

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Executive summary

In 2014, 399 tuberculosis (TB) cases were reported among East Midlands residents, a rate of 8.6 per 100,000 population. This was a non-significant decrease of 4.2% compared to 2013 and the second consecutive annual decrease in the East Midlands TB rate. The rate in the East Midlands remains significantly below the national rate of 12.0 per 100,000 population.

Males accounted for 59% of all cases in 2014 and the rate of TB was highest in those aged 30–39 years (15.9 per 100,000 population).

There continues to be variation in incidence across the East Midlands with the highest rates reported in the residents of Leicester (41.2 per 100,000), Nottingham (16.2 per 100,000), Derby (14.7 per 100,000) and Northampton (12.3 per 100,000) local authorities. Whereas the TB rate in Leicester has continued to decrease, other areas such as Derby, Derbyshire, Lincolnshire and Nottinghamshire have increased compared to 2013.

Rates of TB were nearly 17 times higher in those born outside the UK (53.5 cases per 100,000 population) compared to the UK born population (3.2 cases per 100,000 population). The number of cases and rate of TB in the non-UK born population has seen a year-on-year decline since 2012. This decrease has mainly occurred among new migrants who have been in the country for less than five years (35% in 2013 compared to 31% in 2014). Nearly half (47.5%) of the TB cases diagnosed in 2014 entered the UK 10 or more years previously. The most common country of birth of non-UK born TB patients in 2014 was India (43.2 %) followed by Pakistan (13.6%). There has been little change in the numbers and rate of TB in the UK born population, which in the East Midlands has remained fairly stable at around three cases per 100,000 population for the last decade.

Consistent with previous years, the most common ethnicity for newly diagnosed TB patients in the East Midlands was Indian (35.2% of all cases). However, the rate of TB was highest among residents of Black African ethnicity (112.5 cases per 100,000 population), which has increased from 2013. The next highest rates were among those of Indian or Pakistani ethnicity; 82.3 and 81.7 cases per 100,000 population, respectively. Although the white ethnic group accounted for 32.4% of all TB cases in 2014, the underlying incidence of TB in individuals of white ethnicity remains low (3.2 cases per 100,000 population).

In 2014, over half of TB cases had pulmonary disease, of which 60.1% were sputum smear tested and of these 46.3% were positive. Of pulmonary cases, 71.3% were confirmed by culture. Since 2010, 83.5% of all culture confirmed cases were strain

typed with at least 23 out of 24 loci and 383 cases (33.5%) were clustered with at least one other case in the East Midlands. The majority of clusters consisted of two people.

The rate of TB in UK born children under 15 years of age in East Midlands, an indirect indicator of recent transmission, has increased although numbers are small and this was not statistically significant. In 2014, this rate was 1.6 cases per 100,000 population.

For 2014, the median time between symptom onset and treatment start for pulmonary cases of TB was 87 days with an interquartile range (IQR) of 41 to 157 days. For pulmonary TB cases, approximately one third (35.9%) started treatment more than four months after onset of symptoms.

Out of East Midlands cases diagnosed in 2013 with rifampicin-sensitive non-CNS, spinal, miliary or cryptic disseminated disease, 88.1% completed treatment within 12 months. This was an increase from 2012 and the highest reported completion rate compared with other PHE Centres. The most common reason for non-completion of treatment was death of the case (17 cases). Treatment completion rates were lower for those with CNS, spinal, miliary or cryptic disseminated disease at 58.8% although 10 cases (15.9%) were still on treatment at their last reported outcome and only one case was reported as lost to follow up.

The proportion of cases with multiple drug resistant (MDR) has increased in the East Midlands from 0.4% in 2013 to 1.7% in 2014 (4 cases) but remains similar to England (1.3%).

There is a clear trend in the East Midlands of an increasing rate of TB with increasing deprivation. Social risk factors (histories of alcohol/drug misuse, homelessness, or imprisonment) were recorded in 11.5% of TB cases and were more commonly reported in UK-born cases. Although those with social risk factors account for a small proportion of East Midlands cases, they were statistically more likely to have pulmonary disease and require directly observed therapy.

In 2014, 81% of cases were offered an HIV test (303 cases) and uptake of testing was high, with 99% of patients (300) accepting the HIV test.

Although it is encouraging that overall numbers of TB cases in the East Midlands have declined in 2014, certain risk groups are still more likely to be affected than others. It should also be noted that the number of cases occurring in the UK born population remains static. Improvements in early diagnosis, TB treatment completion and comprehensive contact tracing that aims to identify all close contacts of active TB cases, not just household contacts, and provides appropriate follow up and treatment, with a particular focus on underserved populations will be required to achieve a marked

reduction in TB transmission and in health inequalities associated with the disease as set out in the TB strategy.

Recommendations for local NHS and PHE staff include ensuring that relevant information is completed accurately on the PHE Enhanced TB Surveillance system, encouraging the targeting of TB diagnosis and treatment among high-risk and underserved groups, obtaining a greater number of sputum smear and culture results and reviewing cases through cohort review to ensure that opportunities for prevention, early detection of cases and successful treatment are not missed and contact tracing is completed with all appropriate contacts being identified.

Introduction

Tuberculosis (TB) continues to be a serious public health problem in the UK. Surveillance provides relevant information on TB cases to teams within local organisations in order to assist in planning and evaluation of their services. This report is based on surveillance data on patients from TB clinics collected via the national Enhanced TB Surveillance (ETS) system and microbiological information, including drug resistance and strain type by the National Mycobacterium Reference Laboratory (NMRL).

This yearly report provides an update on the epidemiology of TB in residents of the East Midlands including characteristics and distribution, trends in anti-TB drug resistance, clustering of cases and treatment outcomes.

As part of the Collaborative TB Strategy for England 2015-2020, a suite of TB Strategy Monitoring Indicators have been developed (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/403231/Collaborative_TB_Strategy_for_England_2015_2020_.pdf). Where data for these indicators are presented in this report, the indicator name is shown. Data for indicators which are presented at upper tier local authority can be found at <http://fingertips.phe.org.uk/profile/tb-monitoring>.

Objectives

This report describes the recent epidemiology of TB in the East Midlands. We aim to update the East Midlands TB control board as well as public health, clinical and allied colleagues, including clinical commissioning groups and NHS England. We aim to inform about strategy indicators, provide the latest trends, and identify areas of high burden of disease, at-risk population groups, and opportunities for interventions and prevention of future cases.

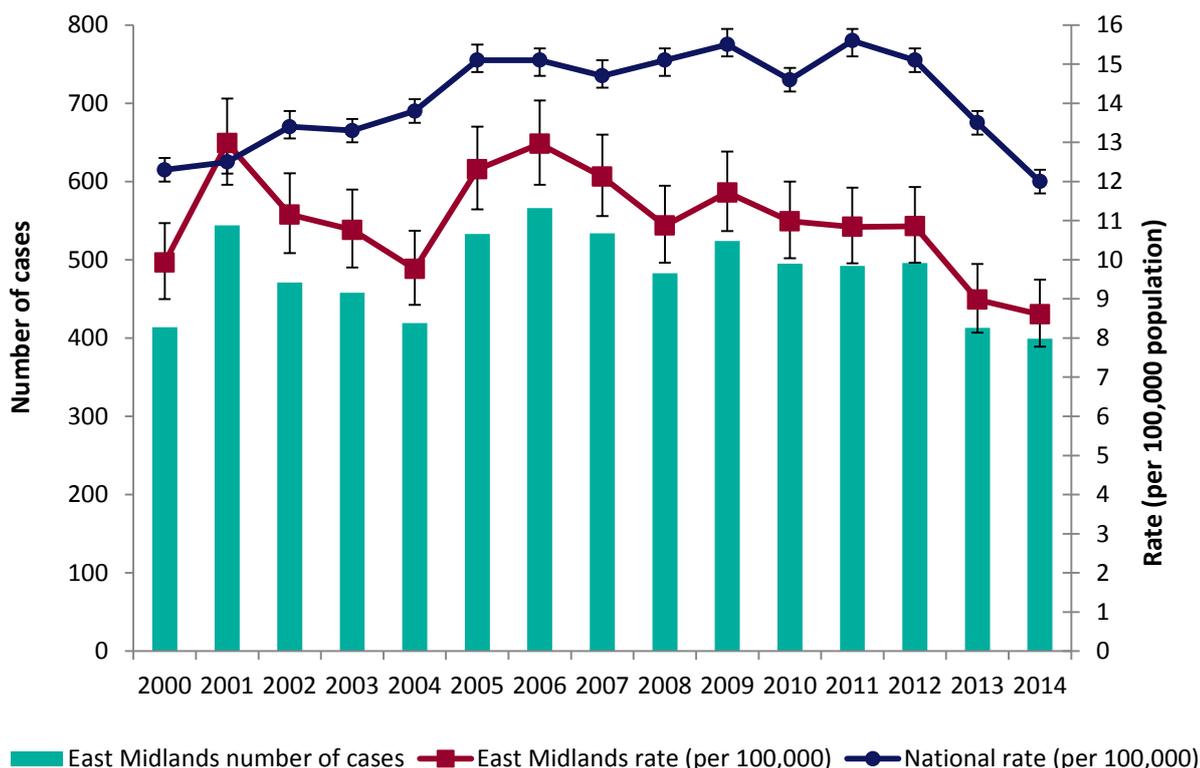
Tuberculosis epidemiology

Overall numbers, rates and geographical distribution

In 2014, 399 cases of tuberculosis were reported among East Midlands residents, an incidence of 8.6 per 100,000 population. This was a statistically non-significant decrease in rate of 4.2% compared to 2013 (413 cases) (Figure 1). After remaining relatively stable between 2010 and 2012, this was the second consecutive year showing a decrease in East Midlands TB notification rate. This decrease follows national trends in TB incidence, with England reporting an overall decrease of 11% since 2013.¹ Cases reported in the East Midlands in 2014 accounted for 6.1% of the 6,520 cases reported in England.

TB Monitoring Indicator 1: Overall TB incidence per 100,000 population (England and PHEC)

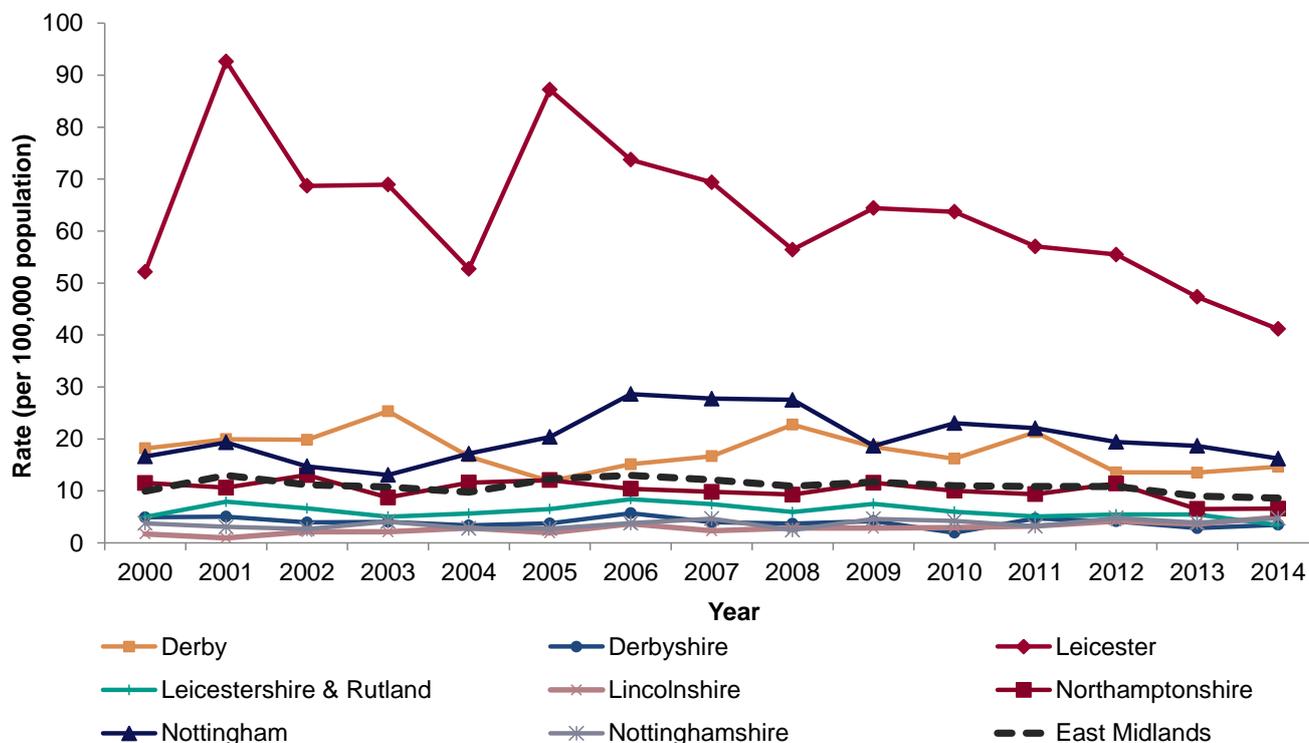
Figure 1: TB cases and rates per 100,000 population, East Midlands, 2000 – 2014



Similar to previous years, the highest rate of TB for East Midlands upper tier local authorities (UTLA) was in Leicester (41.2 cases per 100,000 population) although rates have been decreasing since 2009. The lowest rate was in Lincolnshire (4.9 cases per 100,000 population), however this has increased from 3.6 cases per 100,000 population in 2013 (Figure 2). In 2014, the UTAs Leicestershire and Nottingham also had a decrease in the number and rate of cases of TB reported compared with 2013, whereas

Derby, Derbyshire and Nottinghamshire increased compared to 2013. Northamptonshire remained similar to the previous year. None of these changes were statistically significant.

Figure 2: TB rate per 100,000 population, by upper tier local authority of residence, East Midlands, 2000 – 2014



Figures 3 and 4, demonstrate that overall rates of TB can mask smaller areas with higher rates. In particular, the highest rates of TB occurred within Leicester City (41.2 per 100,000), Nottingham City (16.2 per 100,000 population), Derby City (14.7 per 100,000 population) and Northampton (12.3 per 100,000 population) local authorities in 2014. The incidence in Boston and South Kesteven local authorities were also high, with a rate of 9.0 and 8.7 cases per 100,000 population, respectively.

Further data by local authority area can be found in Appendix B. Rates by middle super output area showed that 24 areas in the East Midlands had rates over 40 cases per 100,000 population for 2014.

Figure 3: TB rate per 100,000 population by local authority of residence, East Midlands, 2014

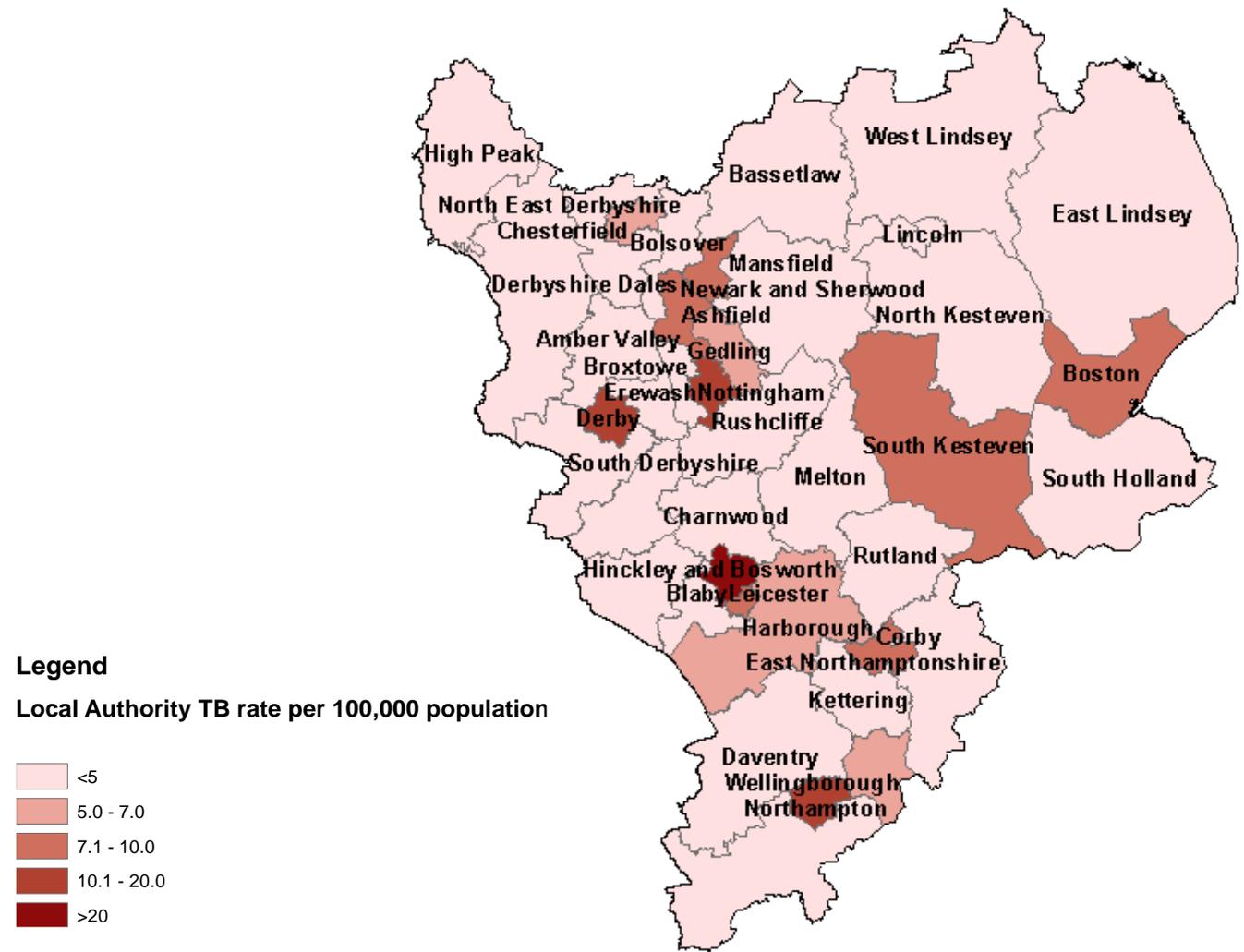
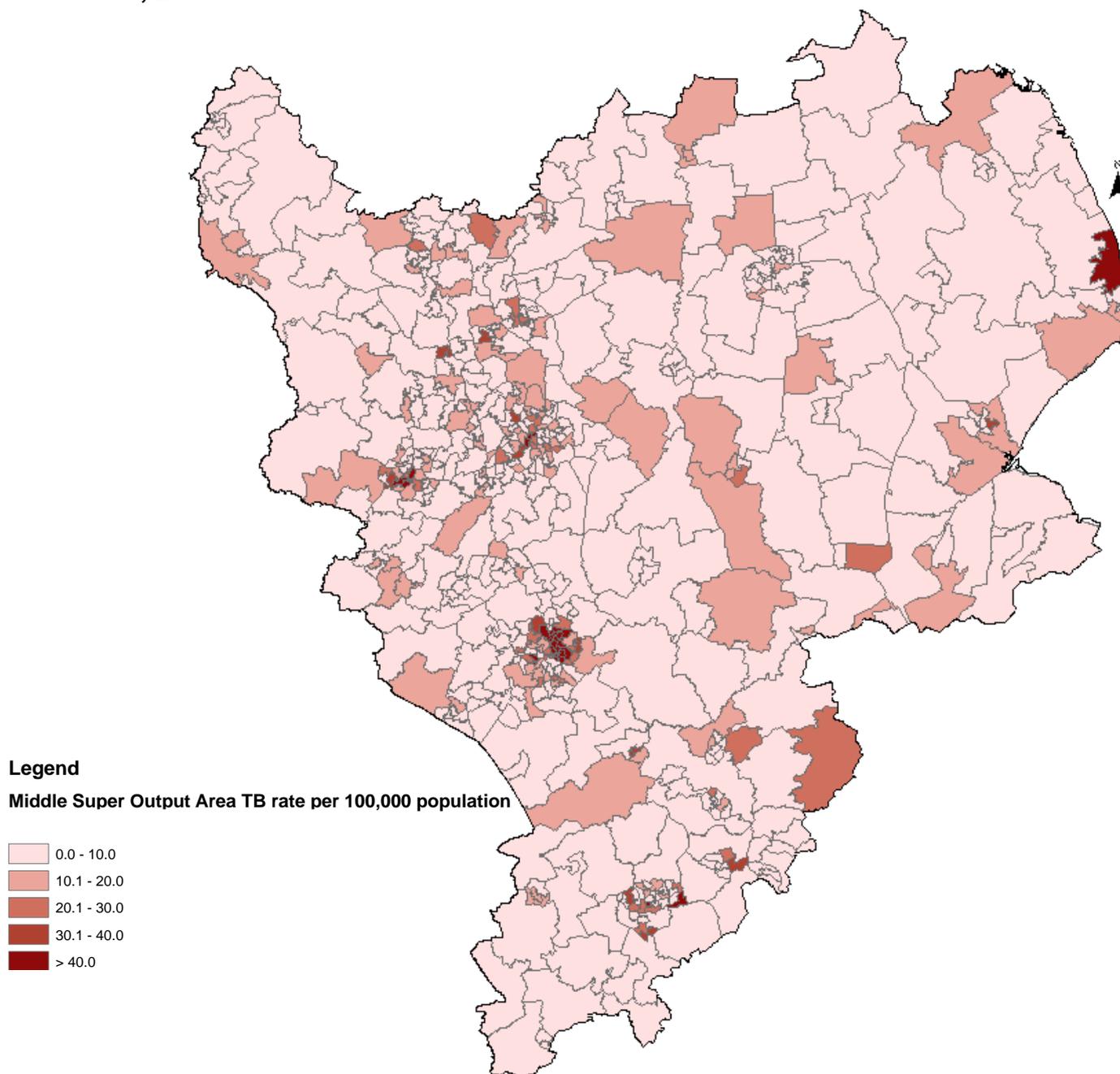


Figure 4: TB rate per 100,000 population by middle super output area of residence, East Midlands, 2014



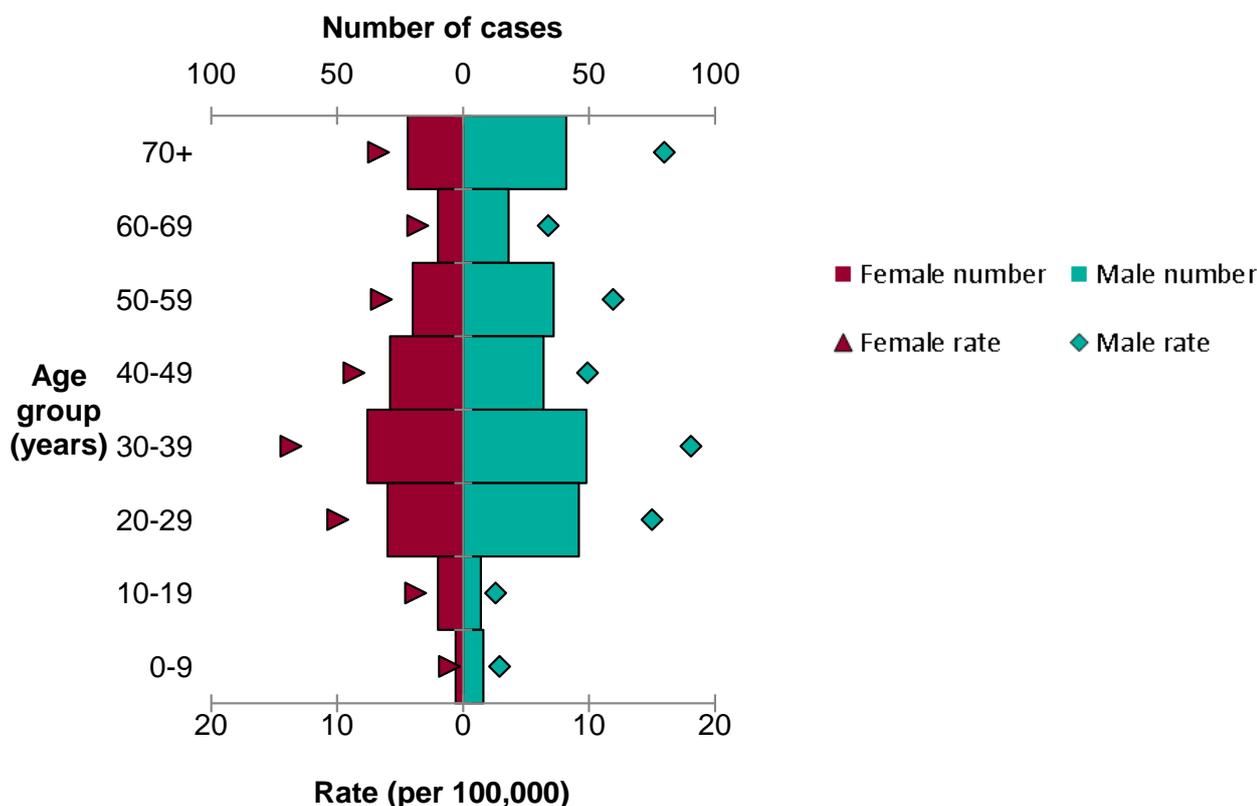
Demographic characteristics

Age and sex

In 2014, the rate of TB was statistically significantly higher in males; 10.4 cases per 100,000 population (95%CI 9.1 – 11.8) compared to females (6.9 cases per 100,000 population, 95%CI 5.9 – 8.0). Males accounted for 59% (237 cases) of cases.

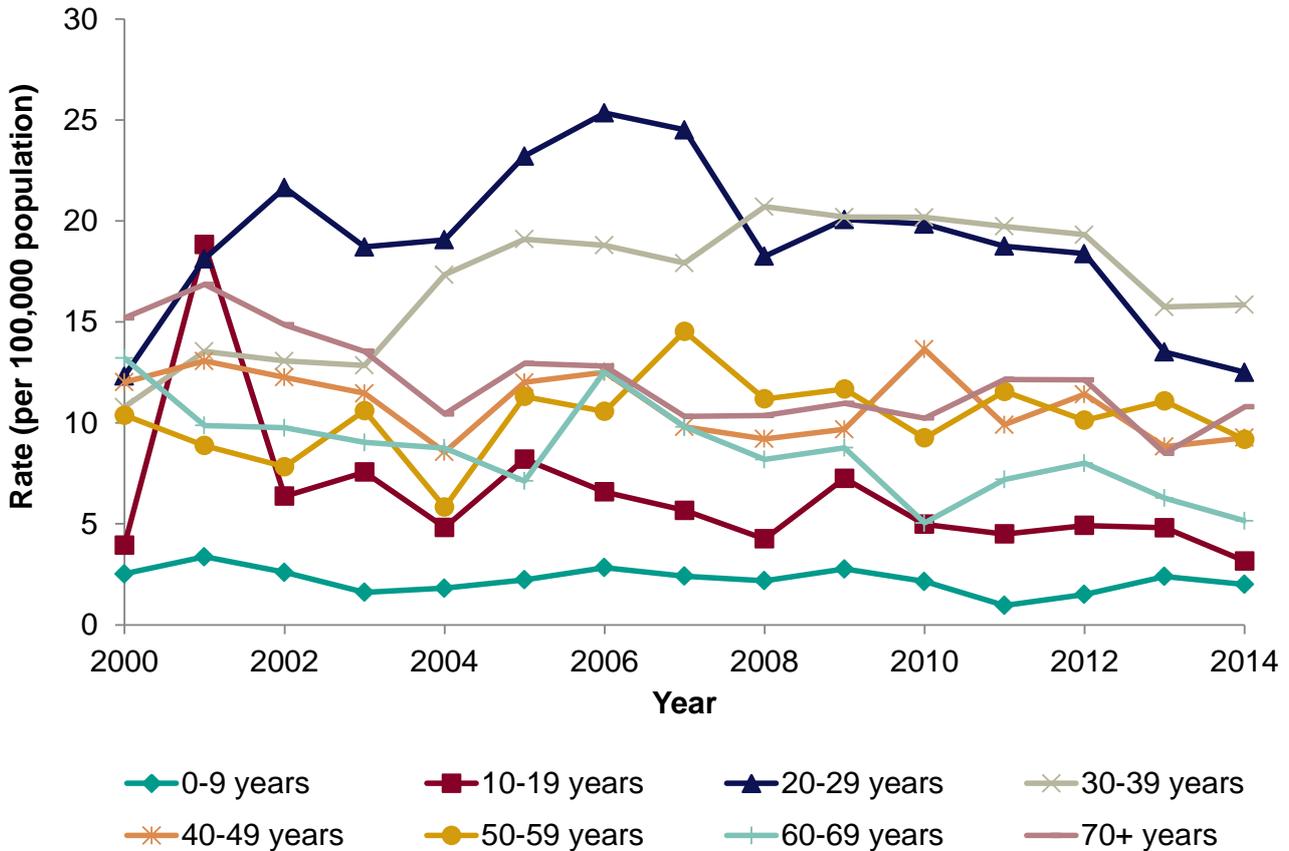
The majority of TB cases occurred in those aged between 20–29 and 30–39 years. The number of cases in these age ranges were slightly higher among males than females, a trend that can be seen across all age groups with the exception of those aged 10–19 years (Figure 5). Further information can be found in Appendix B.

Figure 5: TB cases and rate per 100,000 population by age and sex, East Midlands, 2014



The rate of TB has remained highest in East Midlands residents in the two age groups 20–29 and 30–39 years (Figure 6). In 2014, there was a decrease in incidence in the 20–29 years but an increase in the 30–39 years age group compared with 2013, although the trend from 2009 has been downwards. There were also small increases in incidence for the 40–49 years and over 70 years age groups. In the 0–9 years, 10–19 years, 55–75 years, 50–59 years and 60–69 years age groups the incidence decreased compared to 2013 with the majority showing a long-term downward trend since 2009.

Figure 6: TB rate per 100,000 population by age group (in years), East Midlands, 2000 – 2014



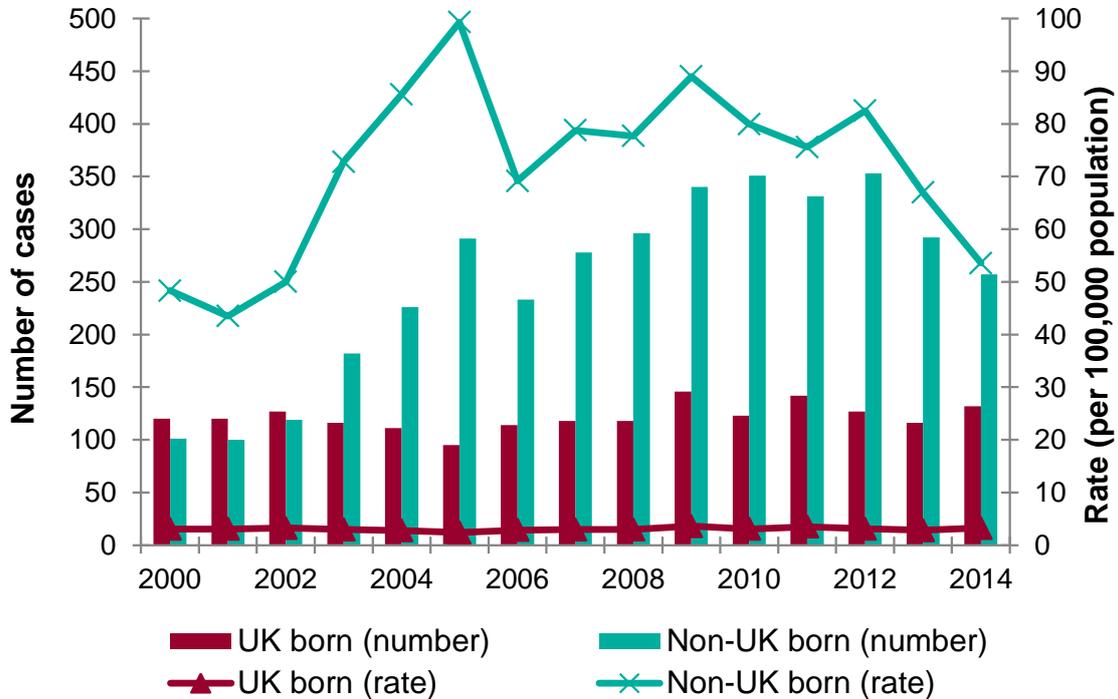
In 2014, the rate of TB in all children under 16 years of age within the East Midlands was 1.8 per 100,000 population (15 cases), of which 86.7% were UK born. This is a decrease from 2.3 cases per 100,000 population in 2013 (20 cases). Further information on TB in children for the UK born population can be found on page 21. In 2014, there were five cases of TB in children aged under five. Among those under 5, 80% were UK born. This was a decrease compared with 2014, when there were nine cases in children aged under five.

Place of birth and time since entry

In 2014, country of birth information was available for 389 cases (97.5%). Of these, 66% of all East Midlands TB cases were born outside the UK (257 cases), a rate of 53.4 cases per 100,000 population. Although this rate is approximately 17 times higher than the rate in those born in the UK (3.2 per 100,000 population), the rates within non-UK born population has been steadily decreasing since 2012. (Figure 7). The TB notification rate within the UK born population has remained static over previous years.

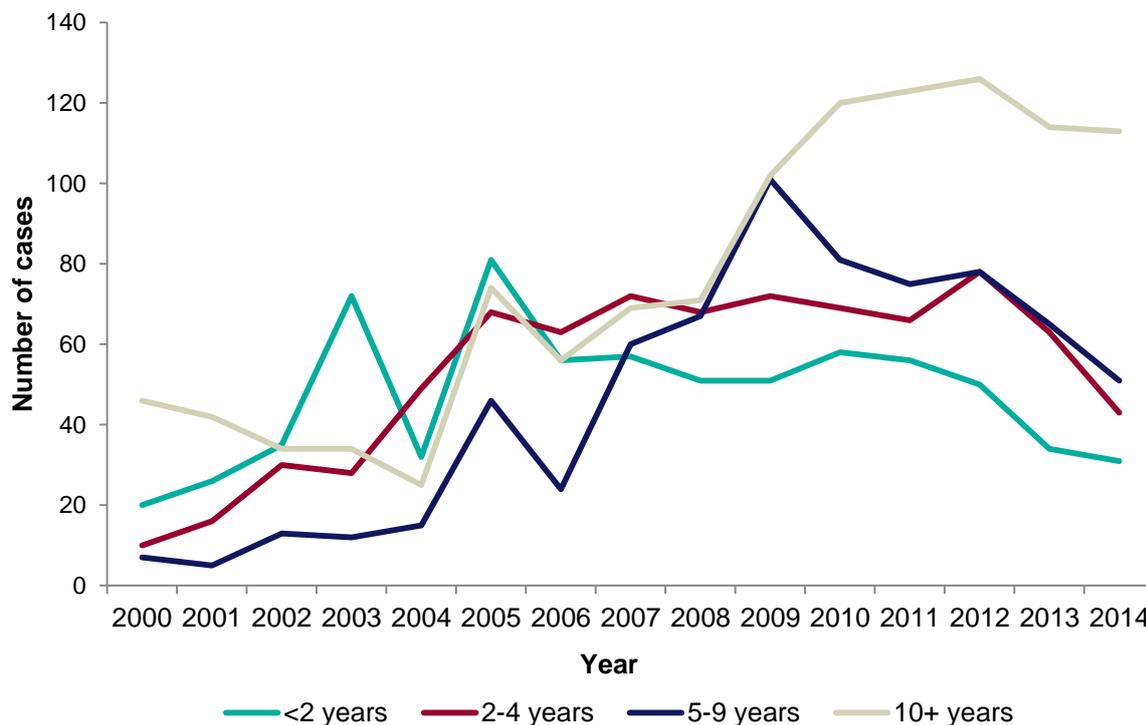
TB Monitoring Indicator 2: TB incidence in UK born and non-UK born populations (England)

Figure 7: TB cases and rate per 100,000 population by place of birth, East Midlands, 2000-2014



In 2014, information on the time between entry to the UK and TB diagnosis was available for 92.6% of non-UK born cases (238 cases). Among those that were non-UK born, 113 cases (47.5%) arrived in the UK 10 or more years prior to diagnosis and 31% (74 cases) arrived less than 5 years prior to diagnosis (Figure 8). In 2014, there was a decrease in the number of cases in the population entering the country within the last two years, in the 2–4 years and 5–9 years groups. The largest decrease was in cases that entered the UK less than five years prior to diagnosis, which was 35% (97 cases) in 2013.

Figure 8: Time between entry to the UK and TB diagnosis for non-UK born cases by year, East Midlands, 2000 – 2014



In 2014, the most commonly reported country of birth for non-UK born cases was India (43.2%), (Table 1) followed by Pakistan (13.6%), which was similar to 2013. Country of birth was unknown for two cases (0.8%).

Table 1: Most common countries of birth of non-UK born TB cases, East Midlands, 2014

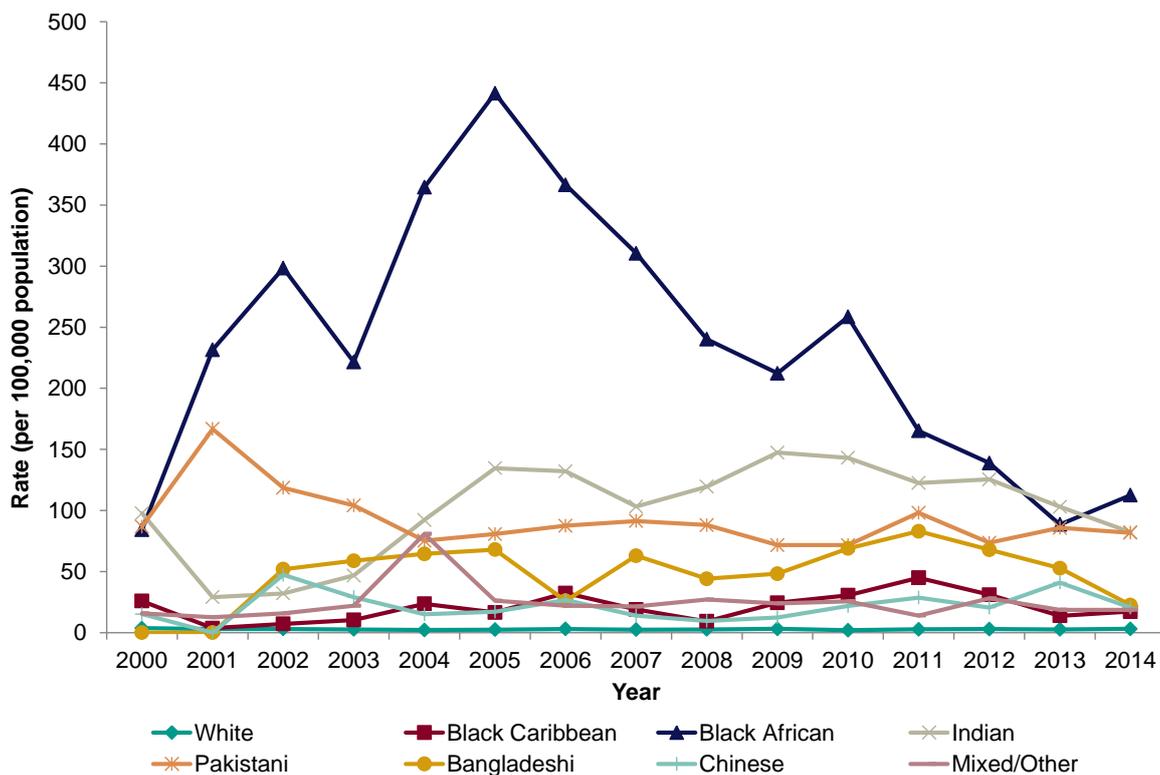
| Country of birth | n | % of non-UK born patients |
|------------------|-----|---------------------------|
| India | 111 | 43.2 |
| Pakistan | 35 | 13.6 |
| Zimbabwe | 10 | 3.9 |
| Somalia | 8 | 3.1 |
| Lithuania | 5 | 1.9 |
| Poland | 5 | 1.9 |
| Other (<5 cases) | 81 | 31.5 |
| Unknown | 2 | 0.8 |
| Total | 257 | 100 |

Ethnicity

In 2014, ethnicity data was available for 99% (395) of cases. The most common ethnic group of TB cases in 2014 was Indian (35.2%). However, the rate of TB cases was highest among residents of black African ethnicity, 112.5 cases per 100,000 population

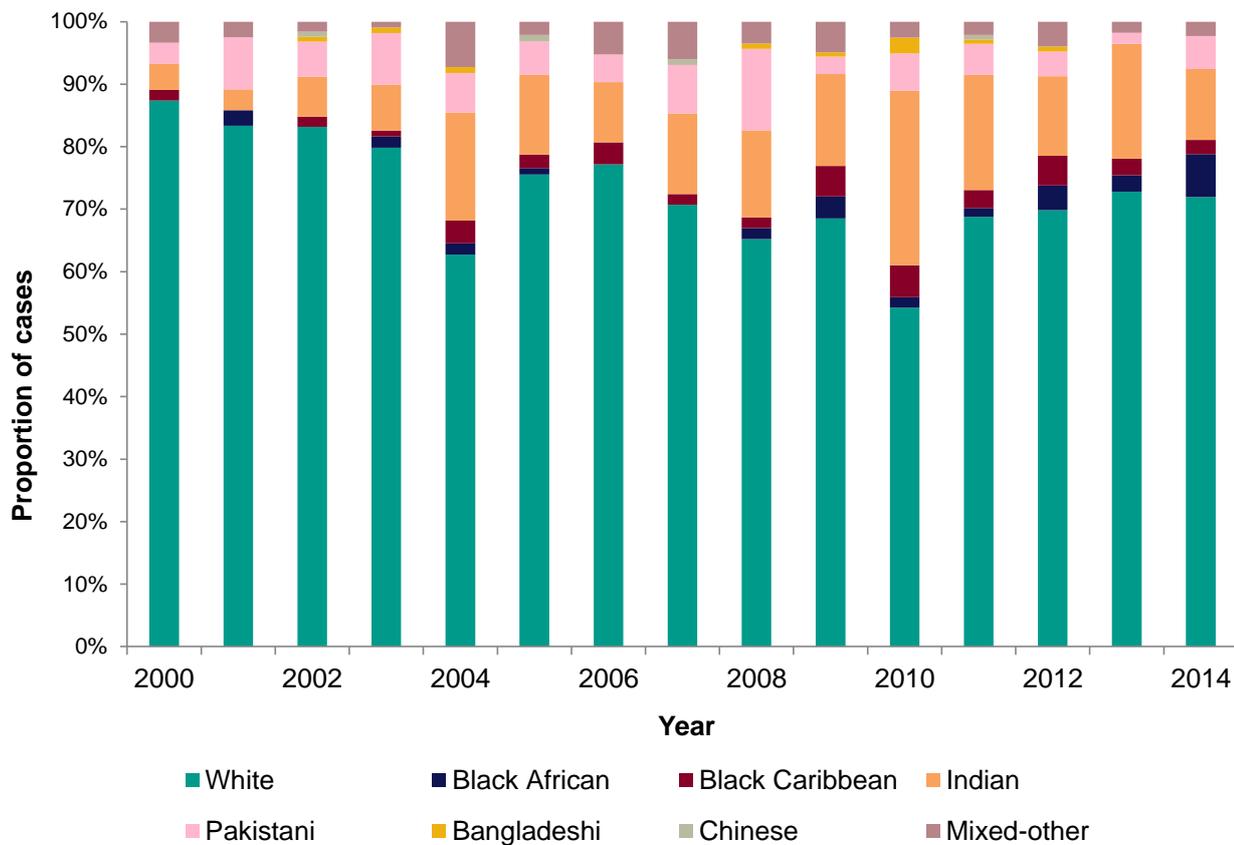
(47 cases), which has increased from 2013 (Figure 9). The next highest rates were among those of Indian or Pakistan ethnicity; 82.3 and 81.7 cases per 100,000 population, respectively. Although the white ethnic group accounts for 32.4% of all TB cases in 2014, the incidence of TB in individuals of white ethnicity remains lower (3.2 cases per 100,000 population).

Figure 9: TB rate per 100,000 population by ethnic group, East Midlands, 2000 – 2014



In 2014, the most common ethnic group within the UK born case population was white (72%, 95 cases) which has remained the same as 2013 (Figure 10). The next most common ethnicity was Indian (11.4%, 15 cases), which decreased from 2013. The proportion of UK born cases of black African and Pakistan ethnicity have increased compared to 2013.

Figure 10: Proportion of UK born TB cases by ethnic group, East Midlands, 2000 – 2014



Clinical characteristics

Site of disease

In 2014, 55.9% of TB cases were pulmonary. The second most common site was extra thoracic lymph node TB accounting for 16.8% of cases (Table 2).

Table 2: Site of disease of TB cases, East Midlands, 2014

| Site of disease | 2014 | |
|--------------------------------|------|------|
| | n | % |
| Pulmonary | 223 | 55.9 |
| Lymph Node (extra thoracic) | 67 | 16.8 |
| IT Lymph Nodes | 55 | 13.8 |
| Pleural | 40 | 10.0 |
| Other | 30 | 7.5 |
| Bone/Joint (spine) | 25 | 6.3 |
| Gastrointestinal/Peritoneal | 18 | 4.5 |
| Miliary | 15 | 3.8 |
| CNS (meningitis) | 11 | 2.8 |
| Bone/Joint (other - not spine) | 10 | 2.5 |
| Genitourinary | 8 | 2.0 |
| Cryptic Disseminated | 5 | 1.3 |
| CNS (Other - not meningitis) | 4 | 1.0 |
| Laryngeal | 0 | 0.0 |
| Unknown | 49 | 12.3 |

*cases may have disease at more than one site, so the total % will not equal 100%

Pulmonary TB was more common among UK born cases (66.7%, 88/132) than those born abroad (50.2%, 129/257). It was most common among those of black Caribbean (80%, 4/5) and white ethnicity (74.2%, 95/128).

Previous diagnosis of tuberculosis

In 2014, information on previous diagnosis was available for 89.7% of cases. Of these, 7.8% (28) of cases were previously diagnosed with TB.

BCG vaccination

In 2014, information was available on BCG vaccination for 46.4% of cases. Overall, 75.7% (140 cases) of cases had been vaccinated but the proportion vaccinated was higher in the non-UK born cases (81%, 98 cases) compared to the UK born cases (65.6%, 42 cases).

Microbiological information

Culture confirmation and speciation

In 2014, 58.6% (234) of cases were culture confirmed. This was higher among those with pulmonary TB (71.3%, 159 cases) compared to patients with extra-pulmonary TB (42%, 75 cases).

Of those that were culture confirmed, the majority (98%, 230 cases) were *Mycobacterium tuberculosis*. The remaining four cases were *Mycobacterium bovis*.

Sputum smear

In 2014, sputum smear results were recorded for 60.1% (134) of cases with pulmonary TB. Of these, 46.3% were smear positive.

TB transmission

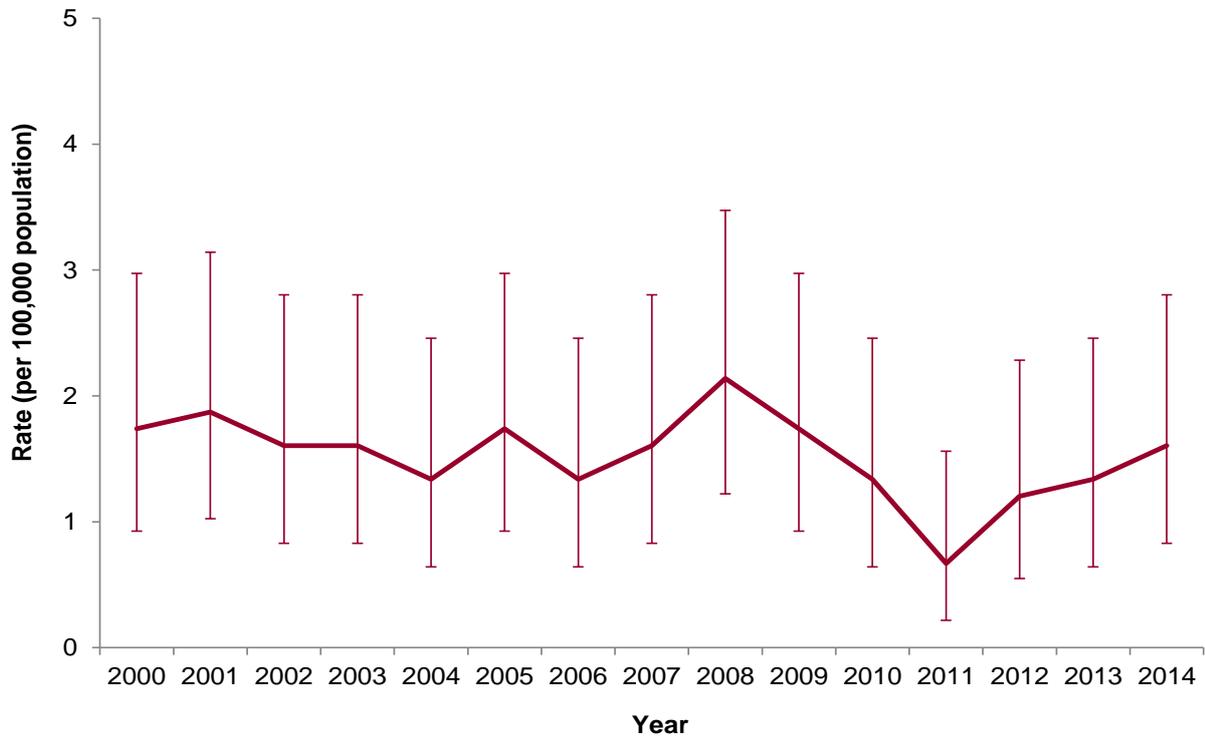
It is not currently possible to directly measure TB transmission at a population level, so proxy measures are required. The rate of TB in children is widely accepted to be a good indicator of TB transmission in a community. Molecular genotyping of the organisms causing TB in a population can also provide insight into putative transmission chains.

Rate of TB in UK born children

In 2014, the rate of TB in UK born children under 15 years of age in the East Midlands, an indirect indicator of recent transmission, was estimated at 1.6 cases per 100,000 population (12 cases). There has been a steady increase in the rate within UK born children since 2011 (Figure 11). However, these changes have not been significant, the numbers are small and should be interpreted with caution and the longer-term trend since the millennium remains static. This suggests further work is required to disrupt transmission networks.

TB Monitoring Indicator 5: Incidence of TB in UK born children aged under 15 years

Figure 11: TB case rate in UK born children aged under 15 years, East Midlands, 2000 – 2014



Strain typing and clustering

The PHE National Strain Typing Service was established in January 2010 and since that time all TB isolates have been typed using 24 loci Mycobacterial Interspersed Repetitive Unit-Variable Number Tandem Repeats (MIRU-VNTR). Such strain typing identifies clusters of cases with indistinguishable strain types that may indicate they are part of the same chain of transmission.² However, this could also reflect common endemic strains circulating within England or abroad and therefore the detection of a common strain type among cases does not confirm recent transmission. Additional epidemiological information is required to assess if a common strain type is likely to reflect recent transmission. MIRU-VNTR strain typing can be used to support refutation of transmission between individuals who have different strain types.

Within the Field Epidemiology Service, there is a designated TB cluster investigator whose role is to review strain typing and identify clusters within and across PHE Centres. Cluster information is regularly provided to the East Midlands, including contextual information about strain types, which are routinely reviewed for epidemiological links.

It is hoped that the higher level of resolution provided by whole genome sequencing (WGS) will improve our understanding of TB transmission in England.

Proportion of cases clustered and geographical distribution

Between 2010 and 2014, there were 1368 culture confirmed cases, of which 1343 cases (98.2%) had an isolate that was strain typed and 1142 (83.5%) had at least 23 loci typed (Table 3). Of those which had at least 23 loci typed, 759 (66.5%) did not cluster with any other strain type within the East Midlands. The remaining 383 (33.5%) cases clustered with at least one other case in the East Midlands since 2010. This is less than the proportion of cases clustering in England (57.2%).¹ In total, 115 different strain type clusters were reported during 2010 to 2014.

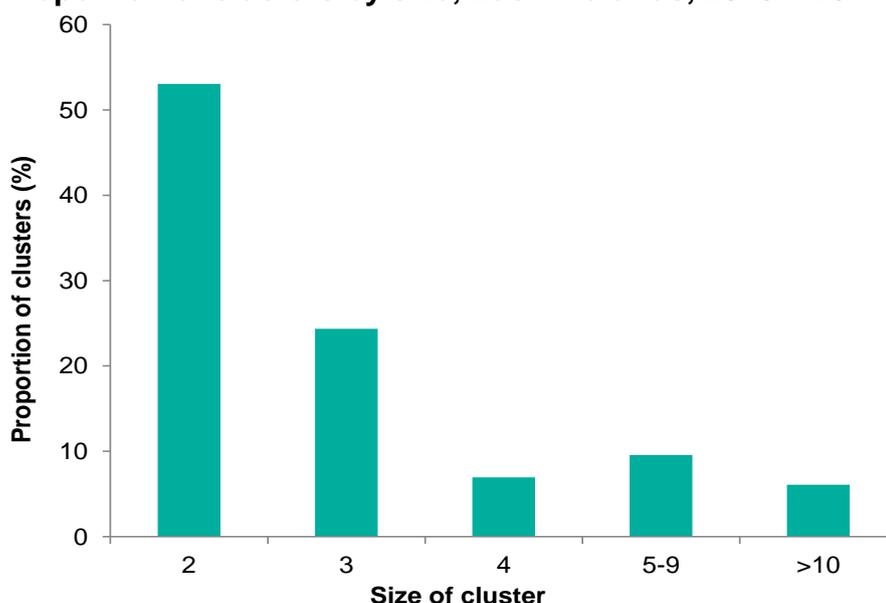
Table 3: Number and proportion of culture confirmed cases typed and number and proportion of cases in clusters, East Midlands, 2010 – 2014

| Years | Culture confirmed cases | Strain typed cases | | Strain typed cases \geq 23 loci | | Cases clustered | | Clusters |
|-------------|-------------------------|--------------------|------|-----------------------------------|------|-----------------|------|----------|
| | n | n | % | n | % | n | % | n |
| 2010 - 2014 | 1368 | 1343 | 98.2 | 1142 | 83.5 | 383 | 33.5 | 115 |

Size of clusters

Of the 115 clusters in the East Midlands identified from 2010 to 2014, the median cluster size was two cases (range 2 – 16). The majority of clusters (53.0%) consisted of two cases, while 9.6% consisted of 5 to 9 cases and 6.1% consisted of more than 10 cases (Figure 12).

Figure 12: Proportion of clusters by size, East Midlands, 2010 – 2014



Time from symptom onset to treatment start for pulmonary TB cases

Information on time from symptom onset to starting treatment was available for 92.4% (206 cases) of pulmonary TB cases in 2014 (Table 4). The median time between symptom onset to treatment start for pulmonary TB cases was 87 days with an interquartile range (IQR) of 41 to 157 days. This was longer than the median delay to treatment start for England (74 days, IQR 39-139).¹ In the East Midlands, 35.9% of pulmonary cases started treatment within 0–2 months of symptom onset and 64.1% within four months. There has been an increase in the proportion of pulmonary TB cases started treatment more than four months after symptom onset from 24.4% in 2013 to 35.9% in 2014.

Table 4: Time between symptom onset and starting treatment for pulmonary TB cases*, East Midlands, 2011- 2014

| Year | 0-2 months | | 2-4 months | | >4 months | | Total |
|------|------------|------|------------|------|-----------|------|-------|
| | n | % | n | % | n | % | n |
| 2011 | 75 | 40.8 | 57 | 31.0 | 52 | 28.3 | 184 |
| 2012 | 69 | 35.2 | 63 | 32.1 | 64 | 32.7 | 196 |
| 2013 | 75 | 41.7 | 61 | 33.9 | 44 | 24.4 | 180 |
| 2014 | 74 | 35.9 | 58 | 28.2 | 74 | 35.9 | 206 |

*excluding asymptomatic cases, and those with missing onset dates

TB Monitoring Indicator 6: Proportion of pulmonary TB cases starting treatment within two months of symptom onset (England, PHEC and UTLA data shown on Fingertips)

TB Monitoring Indicator 7: Proportion of pulmonary TB cases starting treatment within four months of symptom onset (England, PHEC and UTLA data shown on Fingertips)

Characteristics of pulmonary TB cases with a delay from onset of symptoms to starting treatment of more than four months

There was a higher proportion of female (40.6%, 28/69) than male (33.9%, 46/137) pulmonary TB cases with a delay in starting treatment of more than four months. The proportion of cases with a delay increased with age, from 0% of children under the age of 15 years with a delay of more than four months to 43.2% (16/37) of cases in the 65 years and over age group. There were comparable proportions in the UK born (34.2%) and non UK born (37.1%) groups. The highest proportion of cases with treatment delays of more than four months were in those of Chinese ethnicity, although numbers were very small (50%, 1/2). This was followed by those in white (42.9%, 36/84) and Pakistani ethnicities (41.7% 5/12).

TB outcome in drug sensitive cohort

Drug sensitive cohort

For the purposes of TB outcome reporting, the drug sensitive cohort excludes all TB cases with rifampicin resistant TB (initial or amplified) including multi-drug resistant (MDR) TB (initial or amplified), and non-culture confirmed cases treated as MDR-TB³.

Treatment outcomes for the drug sensitive cohort are reported separately for the following 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 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. However, for cases notified in 2013, information on final outcome was collected in 2014 which may only be one year after treatment start for many patients and treatment may therefore still be ongoing.

In 2013, 413 TB cases were notified, of which 411 (99.5%) were sensitive to rifampicin and included in the drug sensitive cohort.

1: Outcomes for TB cases with expected duration of treatment less than 12 months

Of those with rifampicin-sensitive TB notified in 2013, 87.6% (360) had non-CNS, spinal, miliary or cryptic disseminated disease. Of these, 88.1% (317) completed treatment within 12 months, an increase from 80.3% in 2012 (Table 5). When compared to other centres in England, the East Midlands obtained the highest treatment completion at 12 months for 2013¹.

Of those that completed treatment, 13.9% (44) of cases completed in less than 6 months, 71.9% (228) completed between 6 and 8 months, 7.4% (23) between 8 and 10 months and 5.7% (18) between 10 and 12 months.

Table 5: Number and proportion completing treatment at 12 months, East Midlands, 2002 – 2013*

| Year | TB patients | | Total |
|------|-------------|------|-------|
| | n | % | |
| 2002 | 144 | 32.4 | 444 |
| 2003 | 128 | 29.6 | 433 |
| 2004 | 140 | 36.2 | 387 |
| 2005 | 138 | 28.0 | 492 |
| 2006 | 389 | 74.8 | 520 |
| 2007 | 382 | 80.4 | 475 |
| 2008 | 332 | 77.4 | 429 |
| 2009 | 390 | 80.6 | 484 |
| 2010 | 370 | 84.9 | 436 |
| 2011 | 359 | 81.8 | 439 |
| 2012 | 351 | 80.3 | 437 |
| 2013 | 317 | 88.1 | 360 |

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

At 12 months, 17 patients (4.7%) died before treatment completion, making this the most common reason for incomplete treatment (Table 6). Of those who died before treatment completion, two were diagnosed post-mortem. The next most common reasons were loss to follow up and still on treatment, both 12 patients, 3.3%. Where the reason for loss of follow up was known, six of these had left the UK. There were two cases (0.6%) which had not been evaluated at 12 months.

Table 6: TB outcome at 12 months, East Midlands, cases diagnosed in 2013*

| Outcome at 12 months | n | % |
|----------------------|-----|------|
| Completed | 317 | 88.1 |
| Died | 17 | 4.7 |
| Lost to follow up | 12 | 3.3 |
| Still on treatment | 12 | 3.3 |
| Treatment stopped | 0 | 0.0 |
| Not evaluated | 2 | 0.6 |
| Total | 360 | |

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

2: Outcomes for drug sensitive cohort of cases with CNS, spinal, miliary or cryptic disseminated TB

Of the 51 patients with CNS, spinal, miliary or cryptic disease notified in 2013, 52.9% (27) completed treatment within 12 months and 58.8% (30) had completed at the last recorded outcome (Table 7). For those with available information on treatment length (29), the median treatment time was 364 days (IQR 281 – 365); approximately 12 months.

There were 10 cases (19.6%) still on treatment at the last recorded outcome, 15.7% of cases had died and 2% were lost to follow up.

Table 7: Last recorded TB outcome for cases with rifampicin sensitive, CNS, spinal, miliary or cryptic disseminated disease, East Midlands, cases notified in 2013*

| Outcome | n | % |
|--------------------|----|------|
| Completed | 30 | 58.8 |
| Died | 8 | 15.7 |
| Lost to follow up | 1 | 2 |
| Still on treatment | 10 | 19.6 |
| Treatment stopped | 0 | 0 |
| Not evaluated | 2 | 3.9 |
| Total | 51 | 100 |

*excludes rifampicin resistant TB

Deaths and lost to follow up in the drug sensitive cohort

Overall, 6.1% (25) of rifampicin sensitive cases notified in 2013 had died at the last recorded outcome. Of these, TB caused or contributed to six (24%) of these deaths, was incidental to six (24%) and the relationship was unknown for 13 (52%). Three cases were diagnosed at post-mortem.

The proportion of rifampicin sensitive cases notified in 2013 and lost to follow up at the last recorded outcome was 3.2% (13 cases). The reason for lost for follow up was available for 12 of these cases, seven (58.3%) had left the UK and the remaining 5 were recorded as 'other reason'.

Drug resistant TB (including outcomes in the drug resistant cohort)

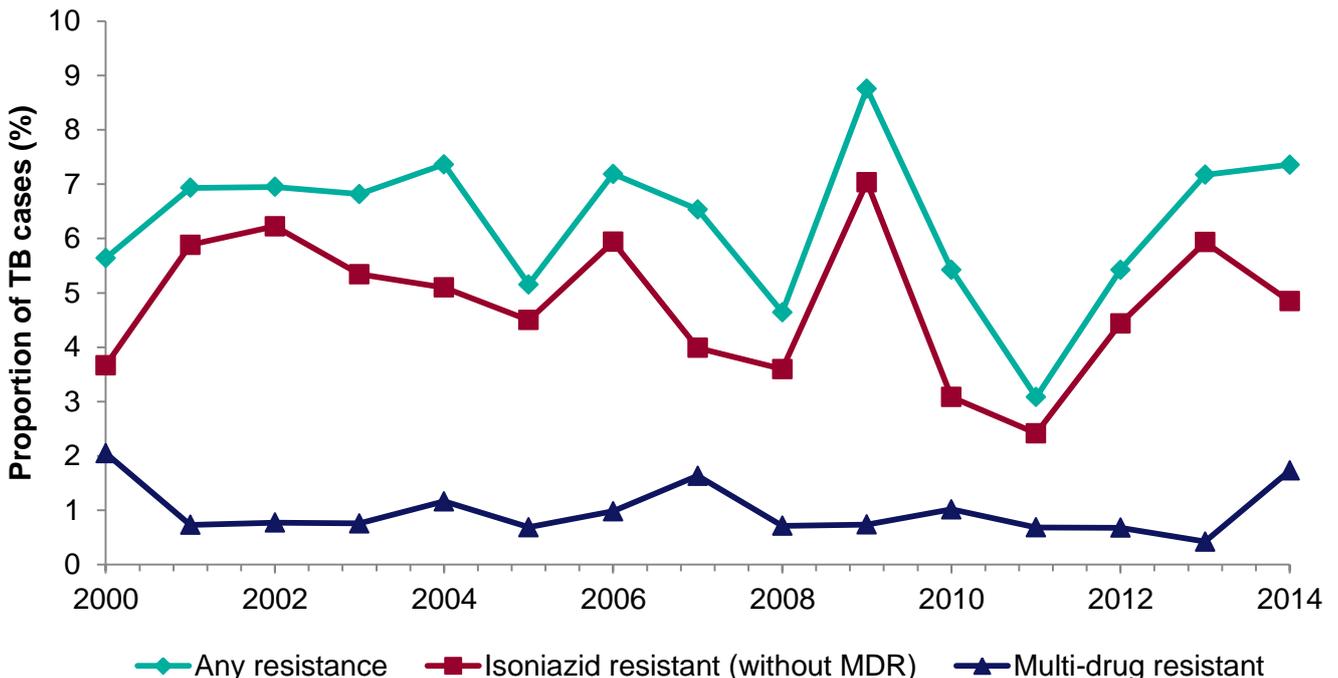
Drug resistance

Overall drug resistance

In 2014, resistance profiles were available for 95.7% (224) of culture confirmed cases and drug susceptibility test (DST) results were available for at least isoniazid and rifampicin for 98.7% (231) of culture confirmed cases. Of these, the proportion of TB cases resistant to one or more first line drugs was 7.4% (17 cases resistant of the 231 culture confirmed), which was comparable to 2013 (7.2%, 17 resistant of the 237 culture confirmed). The proportion of cases with isoniazid resistance without multi-drug resistance (MDR) decreased from 5.9% (14 cases) in 2014 to 4.8% (11 cases) in 2014 (Figure 13). The proportion of MDR TB cases increased from 0.4% (1 case) in 2013 to 1.7% (4 cases) in 2014, which is similar to the proportion of MDR TB cases in England (1.3%).¹

Numbers within the East Midlands are small and any year-on-year changes should be interpreted with caution. Further information can be found in Appendix B.

Figure 13: Proportion of TB cases with first line drug resistance, East Midlands, 2000 – 2014



There was a higher proportion of resistance to one or more first line drugs in females (8.3% 7/84) compared to males (6.8%, 10/147) and the highest proportion was within the 15–44 years age range (9.7%, 13/134). Resistance was higher among cases of pulmonary TB, 8.3% (13/157) compared to extra pulmonary TB, 5.4% (4/74). There was a higher proportion of resistance among those born outside of the UK (7.93% 13/164) than UK born (4.8% 3/62) and most of these presented with TB more than five years after entering the UK. Resistance was also higher among those that had a previous diagnosis of TB (21.4% 3/14) compared with those that did not (6.3%, 12/191).

TB outcome for patients with rifampicin resistant disease

In 2012, there were three cases of rifampicin resistant TB. At 12 months, one had been lost to follow up (left the UK), one had their treatment stopped and one was still on treatment. At 24 months, this case was still on treatment but completed treatment at approximately 27 months.

TB in those with social risk factors and health inequalities associated with TB

Social risk factors

In 2014, information on social risk factors was available for 287 (71.9%) cases and 11.5% of cases had at least one social risk factor (Table 8). A social risk factor is defined as current/history of homelessness, current/history of drug use, current/history of imprisonment or current alcohol misuse. Homelessness was the most common social risk factor (5.0%) followed by alcohol misuse (3.5%) and imprisonment (3.4%) (Table 9). These risk factors are not mutually exclusive as 2.8% of cases (8) had multiple risk factors recorded.

Table 8: Social risk factors among TB cases, East Midlands, 2009 – 2014

| Year | Any risk factor | | Total* |
|------|-----------------|------|--------|
| | n | % | |
| 2009 | 30 | 8.5 | 353 |
| 2010 | 27 | 6.8 | 395 |
| 2011 | 28 | 7.5 | 375 |
| 2012 | 24 | 6.4 | 374 |
| 2013 | 30 | 9.3 | 322 |
| 2014 | 33 | 11.5 | 287 |

*Total number of cases for the year with risk factor data recorded

Table 9: Social risk factors among TB cases, East Midlands, 2014

| Social risk factor | n | % | Total* |
|--------------------|----|-----|--------|
| Homelessness | 16 | 5.0 | 321 |
| Imprisonment | 10 | 3.4 | 292 |
| Drug misuse | 6 | 1.8 | 335 |
| Alcohol misuse | 12 | 3.5 | 346 |

*Total number of cases with data recorded for the risk factor

There were a higher proportion of those with social risk factors in the UK born cases (14.4% 15/104) than the non-UK born population (10.1% 18/179) but this was non-significant.

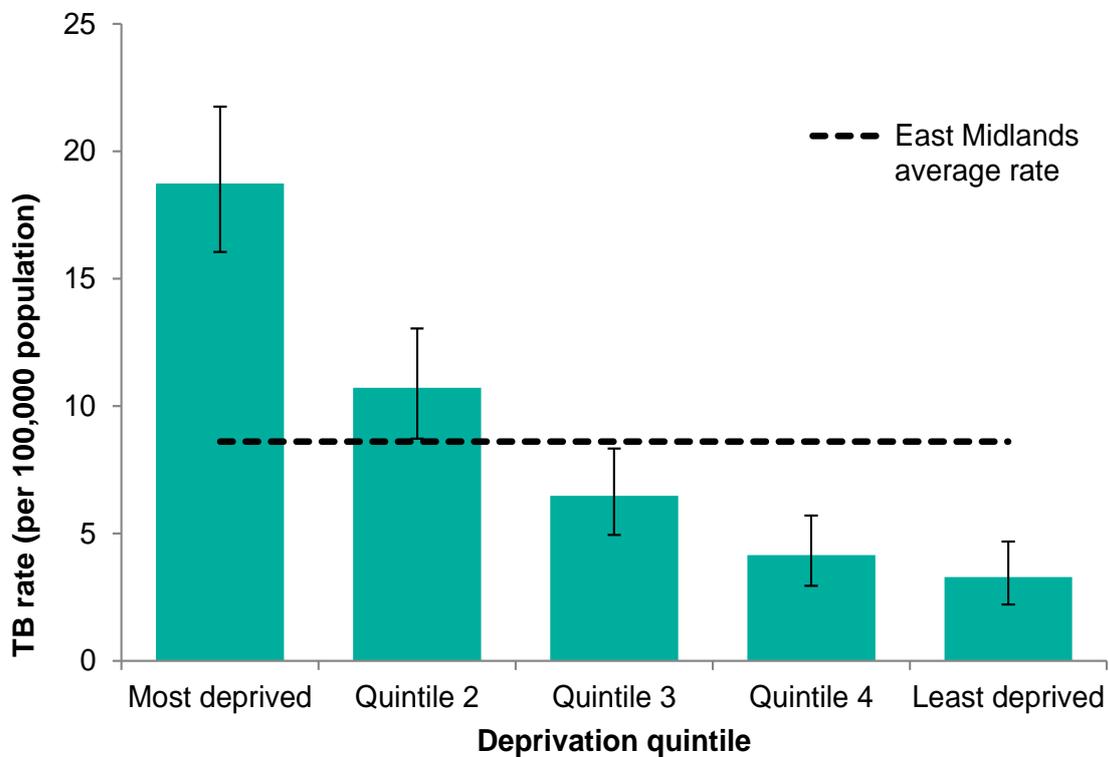
Individuals with social risk factors had a statistically significant higher proportion of pulmonary TB cases (81.8%, 27/33) compared to those that did not have social risk factors (52%, 132/254). They also had a higher proportion of infectious (sputum smear positive) cases (61% 11/18 vs 45% 34/76) but this was not statistically significant.

There was a higher proportion of cases with drug resistance among those with at least one social risk factor 16% (4/25 cases) compared to those with no risk factors 5.2% (7/135) which was borderline significant (p=0.05). Patients with social risk factors accounted for 36.4% of resistant cases in 2014.

Deprivation

In 2014, the rate of TB was highest in those living in the areas that constituted the most deprived in the East Midlands; 18.7 cases per 100,000 population, which accounted for 43% of all cases (Figure 14). This compared to a rate of 3.3 per 100,000 population living in the least deprived areas, equivalent to 7.5% of cases. There is a clear trend of an increasing rate of TB with increasing deprivation.

Figure 14: TB rate per 100,000 population by deprivation quintile with East Midlands average rate, East Midlands, 2014



Patient care: testing for HIV and directly observed therapy

HIV testing

In 2014, data on HIV testing was available for 87.7% of patients with previously unknown HIV status. Of these 81% were offered an HIV test (303 cases). Among those offered, uptake of testing was high, with 99% of patients (300) accepting the HIV test.

The proportion that were not offered testing was highest in children under 15 (85.7%, 6/7) and higher in UK born cases compared with non-UK born cases (11.2%, 12/107 vs 5.3%, 12/226).

HIV coinfection

The most recent year for which TB-HIV co-infection data are available is 2013. In 2013, 1.8% of TB cases aged 15 years and over in the East Midlands was estimated to be co-infected with HIV. This was a decrease from 4.8% in 2012.

Directly observed therapy

In 2014, information on directly observed therapy (DOT) was available for 92.7% of notified cases. Of these, 12.2% of cases (45) received DOT, an increase from 9.8% (35) in 2013. There was a statistically significant higher proportion of cases receiving DOT within those that recorded one or more social risk factors (66.7%, 20/30) compared to those without any social risk factors recorded (6.1%, 15/245).

Discussion

In January 2015, PHE and NHS England published the *Collaborative Tuberculosis Strategy for England, 2015 to 2020*, which sets out the actions required to achieve a year-on-year reduction in TB incidence and a reduction in the health inequalities associated with the disease.⁴ This report of TB for the East Midlands up until end of 2014 provides the latest epidemiology prior to the strategy.

The incidence of TB in the East Midlands has decreased in 2014, continuing a decreasing trend observed since 2012. This decrease in incidence has also been seen nationally and the East Midlands figures remain below the TB rate for England as a whole.¹

The decrease in the East Midlands was primarily seen among the non-UK born population. Decreases were seen in the number of cases who were recent entrants to the UK (arriving within the previous five years). Nationally, the reduction in rates for the non-UK born population is thought, in part, to reflect the decrease in the number of new migrants from high TB burden countries in recent years,⁵ combined with the impact of pre-entry screening⁶ although it is difficult to know if this is true for the East Midlands population.

Despite this decrease, the TB rate in the non-UK born population in the East Midlands is nearly 17 times higher than the UK born population; with India being the most common country of birth. Of those cases notified in 2014, nearly half entered the UK 10 or more years prior to diagnosis, which mainly represents reactivation of latent TB infection. The numbers and rates of TB in the UK born population have not decreased and have remained stable since 2007.

Variation in TB rates continues to be seen across the East Midlands with the highest rates in Leicester City, Nottingham City, Derby City and Northampton local authorities. These are areas that are to be targeted for latent TB screening of new entrants as part of the TB strategy.⁴

The time between symptom onset and starting treatment for pulmonary TB cases is of concern, with over one third of pulmonary TB cases starting treatment more than four months after onset. This delay in treatment increases the opportunity for TB transmission to others. However, it is unclear whether these delays are due to the case presenting late to healthcare services, late diagnosis by clinicians or problems in the post diagnosis to treatment pathways. This is an area that can be documented during cohort review to identify any themes and target improvements.

In 2014, the rate of TB in UK born children under 15 years of age has continued to increase. Although numbers are small; it may suggest recent transmission within the East Midlands. In the East Midlands, one third of strain typed cases were found to cluster with at least one other case between 2010 and 2014. The majority of clusters consisted of only two people, although 6.1% contained 10 or more cases.

It is encouraging that the proportion of cases with rifampicin sensitive and non-CNS, spinal, miliary or cryptic disseminated disease within the East Midlands completing treatment at 12 months has increased, and was the highest in England when compared to other Centres. However, this now needs to be sustained. The proportion completing treatment at their last recorded outcome was lower among those with CNS, spinal, miliary or cryptic disseminated disease for which the current recommendation is to treat for 12 months, although several patients were still on treatment and only one was lost to follow up.

In 2014, although there was an increase in the number of MDR cases in the East Midlands, the proportion of drug resistant cases remains low and similar to England.¹ However, the associated workload of drug resistant cases should not be underestimated, with a case in the East Midlands from 2012 taking over two years to treat. Culture confirmation of cases, particularly pulmonary cases, is important to ensure drug resistant cases can be identified and effective treatment regimes put in place.

There is a clear trend in the East Midlands of an increasing rate of TB with increasing deprivation. Social risk factors were noted in 11.5% of TB cases, with some reporting multiple factors. Social risk factors were more commonly reported by UK born cases and although those with social risk factors account for a small proportion of East Midlands cases they were statistically more likely to have pulmonary disease and require DOTs. This underlines the need for good management of such patients, as described in the NICE guidance for vulnerable patients.⁷

Although the offering of HIV testing and uptake was high, this information was missing on 12% of patients. Few children under 15 years were offered a HIV test and a higher proportion of UK born cases were not offered a test compared to non-UK born cases. UK guidance states all TB patients should be offered a test, regardless of age or ethnicity.⁸

Conclusion and recommendations

Although it is encouraging that overall numbers of TB cases in the East Midlands have declined in 2014, certain risk groups are still more likely to be affected than others. This underlines the need for services to work collaboratively across the range of health and social care issues that affect these underserved populations in order to both treat and prevent further cases.

Improvements in early diagnosis, TB treatment completion and comprehensive contact tracing that aims to identify all close contacts of active TB cases, not just household contacts, and provides appropriate follow up and treatment, with a particular focus on underserved populations, will be required to achieve a marked reduction in TB transmission and in health inequalities associated with the disease as set out in the TB strategy.

Key recommendations for the NHS and PHE derived from the data presented in this report include:

1. Ensuring relevant information is completed accurately on the PHE Enhanced TB Surveillance System, particularly with respect to dates of onset of symptoms and presentation to healthcare services and evaluation of treatment completion.
2. Healthcare staff should offer universal HIV testing for all those diagnosed with tuberculosis and ensure where possible, tests are carried out in line with national guidance.⁸
3. Increase the proportion of cases who have a culture result, including pulmonary cases with a sputum smear result, to promptly identify drug resistance.
4. Ensure TB detection, treatment and prevention is prioritised among high-risk and underserved populations:
 - a. Commission and support specific and targeted interventions focused on active case finding and prevention activities, eg 'Find and Treat' from London
 - b. Implement recommendations from NICE guidance in these groups⁷

5. Use cohort review as the standard tool to routinely review appropriate case management and contact tracing decisions and examine opportunities for prevention or earlier identification of all cases, with a particular emphasis on investigating delays between symptom onset to start of treatment.
6. Refer to the National Institute for Health and Care Excellence (NICE) and the Royal College of Nursing guidance on TB case management as best practice.
9,10

To strengthen the co-ordination and oversight of all aspects of TB control, in line with the TB strategy, an East Midlands TB control board has been established. The board includes representation of all relevant local stakeholders including local government, CCGs, NHS England, acute trusts, PHE, academia and the voluntary sector. Its aim is to lead local networks to deliver the key changes outlined in the strategy. TB control boards are accountable to PHE and NHS England and will deliver sustained improvement in TB control, monitored through the key indicators in the strategy.

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Appendix A: Description of data sources and definitions

Data sources

Data on TB cases in East Midlands 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

Social risk factors and directly observed therapy (DOT) have been defined in the RCN TB case management guidance.

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 2015.

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 using the relevant procedure in Stata, assuming a Poisson distribution.

Population denominator

TB rates by geographical area (Centre, local authority and MSOA), age and sex were calculated using ONS mid-year population estimates for the most recently available year. TB rates by place of birth were calculated using the ONS Annual Population Survey (APS), rates by ethnicity were calculated using ONS experimental Population Estimates by Ethnic Group up to 2010 and ONS Census data from 2011 onwards.

Cluster definitions

Strain typing was performed at the TB reference laboratories using 24 MIRU-VNTR profiling. Analysis was undertaken on strain type clusters defined as two or more people with TB caused by indistinguishable strains, with at least 23 complete VNTR loci. Analysis of clustering in East Midlands was carried out on cases that clustered in the East Midlands and notified between 2010 and 2014.

Appendix B: TB among residents in the East Midlands

Table Bi: TB numbers by upper tier local authority and local authority district of residence, East Midlands, 2000 – 2014*

| Upper tier local authority* and local authority district | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Derby | 42 | 46 | 46 | 59 | 39 | 28 | 36 | 40 | 55 | 45 | 40 | 53 | 34 | 34 | 37 |
| Amber Valley | 8 | 6 | 3 | 2 | 3 | 5 | 7 | 2 | 6 | 5 | 1 | 6 | 5 | 4 | 6 |
| Bolsover | 1 | 2 | 2 | 3 | 0 | 3 | 3 | 0 | 2 | 1 | 1 | 2 | 5 | 0 | 3 |
| Chesterfield | 7 | 8 | 8 | 6 | 10 | 10 | 11 | 10 | 4 | 5 | 2 | 8 | 5 | 7 | 6 |
| Derbyshire Dales | 2 | 2 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 4 | 1 | 1 | 5 | 1 | 1 |
| Erewash | 6 | 6 | 5 | 7 | 4 | 0 | 3 | 4 | 3 | 4 | 2 | 7 | 5 | 2 | 4 |
| High Peak | 3 | 8 | 3 | 1 | 2 | 1 | 9 | 4 | 3 | 3 | 2 | 7 | 3 | 2 | 2 |
| North East Derbyshire | 2 | 2 | 2 | 4 | 3 | 4 | 3 | 6 | 3 | 2 | 1 | 2 | 1 | 1 | 2 |
| South Derbyshire | 7 | 3 | 3 | 4 | 2 | 3 | 4 | 3 | 5 | 8 | 5 | 3 | 3 | 5 | 3 |
| Derbyshire | 36 | 37 | 29 | 30 | 25 | 28 | 43 | 30 | 28 | 32 | 15 | 36 | 32 | 22 | 27 |
| Leicester | 148 | 262 | 196 | 199 | 155 | 263 | 226 | 216 | 178 | 206 | 207 | 188 | 184 | 158 | 139 |
| Rutland | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 2 | 1 | 3 | 3 | 2 | 1 |
| Blaby | 7 | 4 | 7 | 7 | 6 | 10 | 11 | 7 | 9 | 6 | 10 | 4 | 4 | 8 | 3 |
| Charnwood | 11 | 18 | 14 | 9 | 19 | 17 | 19 | 20 | 13 | 21 | 18 | 17 | 7 | 10 | 4 |
| Harborough | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 6 | 2 | 2 | 1 | 3 | 6 | 5 |
| Hinckley and Bosworth | 1 | 8 | 6 | 4 | 3 | 5 | 3 | 5 | 3 | 6 | 0 | 1 | 6 | 7 | 2 |
| Melton | 1 | 2 | 1 | 0 | 1 | 1 | 2 | 2 | 3 | 2 | 0 | 1 | 2 | 0 | 0 |
| North West Leicestershire | 1 | 4 | 2 | 4 | 1 | 1 | 6 | 3 | 3 | 1 | 4 | 1 | 3 | 2 | 4 |
| Oadby and Wigston | 9 | 12 | 9 | 5 | 3 | 5 | 11 | 10 | 3 | 11 | 6 | 7 | 10 | 3 | 5 |
| Leicestershire & Rutland | 32 | 51 | 43 | 33 | 37 | 43 | 56 | 50 | 40 | 51 | 41 | 35 | 38 | 38 | 24 |
| Nottingham | 45 | 52 | 40 | 36 | 48 | 58 | 82 | 80 | 80 | 55 | 69 | 67 | 60 | 58 | 51 |
| Ashfield | 2 | 0 | 2 | 7 | 4 | 2 | 5 | 3 | 1 | 5 | 3 | 3 | 7 | 3 | 9 |
| Bassetlaw | 3 | 2 | 2 | 2 | 3 | 4 | 1 | 5 | 2 | 5 | 4 | 1 | 4 | 4 | 3 |
| Broxtowe | 4 | 6 | 7 | 7 | 3 | 2 | 6 | 5 | 4 | 8 | 7 | 5 | 7 | 8 | 5 |
| Gedling | 6 | 3 | 5 | 4 | 1 | 6 | 7 | 7 | 4 | 4 | 8 | 5 | 8 | 6 | 6 |
| Mansfield | 9 | 5 | 3 | 3 | 8 | 4 | 4 | 5 | 2 | 5 | 4 | 5 | 3 | 4 | 8 |
| Newark and Sherwood | 1 | 0 | 1 | 6 | 1 | 2 | 3 | 1 | 1 | 5 | 1 | 2 | 3 | 2 | 4 |
| Rushcliffe | 3 | 7 | 0 | 2 | 1 | 1 | 3 | 10 | 5 | 4 | 6 | 4 | 6 | 4 | 3 |
| Nottinghamshire | 28 | 23 | 20 | 31 | 21 | 21 | 29 | 36 | 19 | 36 | 33 | 25 | 38 | 31 | 38 |
| Boston | 1 | 1 | 2 | 8 | 6 | 1 | 4 | 2 | 5 | 2 | 4 | 2 | 5 | 7 | 6 |
| East Lindsey | 0 | 2 | 1 | 1 | 2 | 0 | 2 | 5 | 0 | 4 | 4 | 3 | 1 | 3 | 6 |
| Lincoln | 1 | 1 | 2 | 0 | 2 | 5 | 3 | 3 | 5 | 2 | 2 | 4 | 6 | 5 | 3 |
| North Kesteven | 3 | 0 | 2 | 1 | 1 | 2 | 0 | 0 | 2 | 1 | 3 | 3 | 2 | 1 | 2 |
| South Holland | 3 | 1 | 4 | 3 | 1 | 3 | 9 | 1 | 3 | 4 | 3 | 1 | 4 | 1 | 3 |
| South Kesteven | 1 | 1 | 3 | 1 | 4 | 2 | 3 | 4 | 4 | 4 | 3 | 6 | 12 | 5 | 12 |
| West Lindsey | 2 | 0 | 0 | 0 | 3 | 0 | 4 | 1 | 1 | 3 | 2 | 4 | 0 | 4 | 4 |
| Lincolnshire | 11 | 6 | 14 | 14 | 19 | 13 | 25 | 16 | 20 | 20 | 21 | 23 | 30 | 26 | 36 |
| Corby | 6 | 5 | 6 | 3 | 1 | 9 | 4 | 7 | 5 | 13 | 9 | 6 | 5 | 4 | 5 |
| Daventry | 8 | 4 | 6 | 1 | 2 | 0 | 3 | 0 | 3 | 6 | 3 | 3 | 4 | 4 | 3 |
| East Northamptonshire | 5 | 2 | 3 | 1 | 2 | 3 | 1 | 0 | 3 | 3 | 5 | 2 | 3 | 2 | 3 |
| Kettering | 13 | 6 | 15 | 4 | 9 | 9 | 8 | 3 | 10 | 6 | 5 | 11 | 6 | 3 | 3 |
| Northampton | 21 | 39 | 47 | 35 | 53 | 50 | 41 | 49 | 29 | 42 | 35 | 32 | 47 | 26 | 27 |
| South Northamptonshire | 5 | 2 | 2 | 5 | 3 | 2 | 2 | 0 | 4 | 1 | 2 | 2 | 7 | 1 | 1 |
| Wellingborough | 14 | 9 | 4 | 7 | 5 | 6 | 10 | 7 | 9 | 8 | 10 | 9 | 8 | 6 | 5 |
| Northamptonshire | 72 | 67 | 83 | 56 | 75 | 79 | 69 | 66 | 63 | 79 | 69 | 65 | 80 | 46 | 47 |
| East Midlands | 414 | 544 | 471 | 458 | 419 | 533 | 566 | 534 | 483 | 524 | 495 | 492 | 496 | 413 | 399 |

* Upper tier local authorities are marked in bold

Table Bii: TB rate* per 100,000 population by upper tier local authority and local authority district of residence, East Midlands, 2000 – 2014**

| Upper tier local authority* and local authority district | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Derby | 18.2 | 19.9 | 19.8 | 25.3 | 16.6 | 11.8 | 15.1 | 16.7 | 22.7 | 18.4 | 16.2 | 21.3 | 13.6 | 13.5 | 14.7 |
| Amber Valley | 6.9 | 5.1 | 2.6 | 1.7 | 2.5 | 4.2 | 5.8 | 1.7 | 5.0 | 4.1 | 0.8 | 4.9 | 4.1 | 3.2 | 4.8 |
| Bolsover | 1.4 | 2.8 | 2.8 | 4.1 | 0.0 | 4.1 | 4.0 | 0.0 | 2.7 | 1.3 | 1.3 | 2.6 | 6.5 | 0.0 | 3.9 |
| Chesterfield | 7.1 | 8.1 | 8.1 | 6.0 | 9.9 | 9.9 | 10.8 | 9.8 | 3.9 | 4.9 | 1.9 | 7.7 | 4.8 | 6.7 | 5.8 |
| Derbyshire Dales | 2.9 | 2.9 | 4.3 | 4.3 | 1.4 | 2.9 | 4.3 | 1.4 | 2.8 | 5.7 | 1.4 | 1.4 | 7.0 | 1.4 | 1.4 |
| Erewash | 5.5 | 5.4 | 4.5 | 6.4 | 3.6 | 0.0 | 2.7 | 3.6 | 2.7 | 3.6 | 1.8 | 6.2 | 4.4 | 1.8 | 3.5 |
| High Peak | 3.4 | 8.9 | 3.4 | 1.1 | 2.2 | 1.1 | 10.0 | 4.4 | 3.3 | 3.3 | 2.2 | 7.7 | 3.3 | 2.2 | 2.2 |
| North East Derbyshire | 2.1 | 2.1 | 2.1 | 4.1 | 3.1 | 4.1 | 3.1 | 6.1 | 3.1 | 2.0 | 1.0 | 2.0 | 1.0 | 1.0 | 2.0 |
| South Derbyshire | 8.7 | 3.7 | 3.6 | 4.7 | 2.3 | 3.4 | 4.5 | 3.3 | 5.4 | 8.6 | 5.3 | 3.2 | 3.1 | 5.2 | 3.0 |
| Derbyshire | 4.9 | 5.0 | 3.9 | 4.0 | 3.4 | 3.7 | 5.7 | 4.0 | 3.7 | 4.2 | 2.0 | 4.7 | 4.1 | 2.8 | 3.5 |
| Leicester | 52.2 | 92.7 | 68.7 | 68.9 | 52.7 | 87.2 | 73.7 | 69.4 | 56.4 | 64.4 | 63.7 | 57.0 | 55.5 | 47.3 | 41.2 |
| Rutland | 0.0 | 0.0 | 2.8 | 5.6 | 2.8 | 2.8 | 2.7 | 0.0 | 0.0 | 5.3 | 2.7 | 8.0 | 8.1 | 5.3 | 2.6 |
| Blaby | 7.8 | 4.4 | 7.7 | 7.6 | 6.5 | 10.9 | 11.9 | 7.5 | 9.6 | 6.4 | 10.6 | 4.2 | 4.2 | 8.4 | 3.1 |
| Charnwood | 7.2 | 11.7 | 9.1 | 5.9 | 12.3 | 10.9 | 12.1 | 12.6 | 8.1 | 12.9 | 11.0 | 10.2 | 4.1 | 5.9 | 2.3 |
| Harborough | 2.7 | 3.9 | 3.8 | 2.5 | 3.8 | 3.7 | 3.7 | 3.6 | 7.2 | 2.4 | 2.4 | 1.2 | 3.5 | 6.9 | 5.7 |
| Hinckley and Bosworth | 1.0 | 8.0 | 6.0 | 4.0 | 2.9 | 4.9 | 2.9 | 4.8 | 2.9 | 5.7 | 0.0 | 0.9 | 5.7 | 6.6 | 1.9 |
| Melton | 2.1 | 4.2 | 2.1 | 0.0 | 2.1 | 2.1 | 4.1 | 4.1 | 6.1 | 4.0 | 0.0 | 2.0 | 3.9 | 0.0 | 0.0 |
| North West Leicestershire | 1.2 | 4.7 | 2.3 | 4.6 | 1.1 | 1.1 | 6.6 | 3.3 | 3.3 | 1.1 | 4.3 | 1.1 | 3.2 | 2.1 | 4.2 |
| Oadby and Wigston | 16.2 | 21.5 | 16.1 | 8.9 | 5.3 | 8.9 | 19.5 | 17.7 | 5.3 | 19.8 | 10.9 | 12.5 | 17.8 | 5.3 | 8.9 |
| Leicestershire & Rutland | 5.0 | 7.9 | 6.6 | 5.0 | 5.6 | 6.5 | 8.4 | 7.4 | 5.9 | 7.5 | 6.0 | 5.1 | 5.5 | 5.4 | 3.4 |
| Nottingham | 16.6 | 19.3 | 14.7 | 13.1 | 17.2 | 20.4 | 28.6 | 27.8 | 27.5 | 18.7 | 23.0 | 22.0 | 19.4 | 18.7 | 16.2 |
| Ashfield | 1.8 | 0.0 | 1.8 | 6.2 | 3.5 | 1.7 | 4.3 | 2.6 | 0.9 | 4.2 | 2.5 | 2.5 | 5.8 | 2.5 | 7.3 |
| Bassetlaw | 2.8 | 1.9 | 1.8 | 1.8 | 2.7 | 3.6 | 0.9 | 4.5 | 1.8 | 4.4 | 3.5 | 0.9 | 3.5 | 3.5 | 2.6 |
| Broxtowe | 3.7 | 5.6 | 6.5 | 6.5 | 2.8 | 1.8 | 5.5 | 4.6 | 3.7 | 7.3 | 6.4 | 4.6 | 6.3 | 7.2 | 4.5 |
| Gedling | 5.4 | 2.7 | 4.5 | 3.6 | 0.9 | 5.4 | 6.3 | 6.3 | 3.6 | 3.5 | 7.1 | 4.4 | 7.0 | 5.2 | 5.2 |
| Mansfield | 9.1 | 5.1 | 3.0 | 3.0 | 8.0 | 4.0 | 3.9 | 4.9 | 1.9 | 4.8 | 3.8 | 4.8 | 2.9 | 3.8 | 7.6 |
| Newark and Sherwood | 0.9 | 0.0 | 0.9 | 5.5 | 0.9 | 1.8 | 2.7 | 0.9 | 0.9 | 4.4 | 0.9 | 1.7 | 2.6 | 1.7 | 3.4 |
| Rushcliffe | 2.9 | 6.6 | 0.0 | 1.9 | 0.9 | 0.9 | 2.8 | 9.2 | 4.6 | 3.6 | 5.4 | 3.6 | 5.4 | 3.5 | 2.6 |
| Nottinghamshire | 3.8 | 3.1 | 2.7 | 4.1 | 2.8 | 2.7 | 3.8 | 4.7 | 2.4 | 4.6 | 4.2 | 3.2 | 4.8 | 3.9 | 4.7 |
| Boston | 1.8 | 1.8 | 3.5 | 14.0 | 10.3 | 1.7 | 6.7 | 3.3 | 8.0 | 3.2 | 6.2 | 3.1 | 7.7 | 10.6 | 9.0 |
| East Lindsey | 0.0 | 1.5 | 0.8 | 0.8 | 1.5 | 0.0 | 1.5 | 3.7 | 0.0 | 2.9 | 2.9 | 2.2 | 0.7 | 2.2 | 4.4 |
| Lincoln | 1.2 | 1.2 | 2.3 | 0.0 | 2.3 | 5.6 | 3.4 | 3.3 | 5.5 | 2.2 | 2.2 | 4.3 | 6.3 | 5.2 | 3.1 |
| North Kesteven | 3.3 | 0.0 | 2.1 | 1.0 | 1.0 | 2.0 | 0.0 | 0.0 | 1.9 | 0.9 | 2.8 | 2.8 | 1.8 | 0.9 | 1.8 |
| South Holland | 4.0 | 1.3 | 5.1 | 3.8 | 1.2 | 3.7 | 10.8 | 1.2 | 3.5 | 4.6 | 3.4 | 1.1 | 4.5 | 1.1 | 3.3 |
| South Kesteven | 0.8 | 0.8 | 2.4 | 0.8 | 3.1 | 1.6 | 2.3 | 3.1 | 3.0 | 3.0 | 2.3 | 4.5 | 8.9 | 3.7 | 8.7 |
| West Lindsey | 2.5 | 0.0 | 0.0 | 0.0 | 3.6 | 0.0 | 4.7 | 1.1 | 1.1 | 3.4 | 2.2 | 4.5 | 0.0 | 4.4 | 4.4 |
| Lincolnshire | 1.7 | 0.9 | 2.1 | 2.1 | 2.8 | 1.9 | 3.6 | 2.3 | 2.9 | 2.8 | 3.0 | 3.2 | 4.2 | 3.6 | 4.9 |
| Corby | 11.3 | 9.4 | 11.2 | 5.6 | 1.9 | 16.5 | 7.2 | 12.3 | 8.6 | 22.0 | 15.0 | 9.7 | 7.9 | 6.2 | 7.6 |
| Daventry | 11.4 | 5.6 | 8.2 | 1.3 | 2.7 | 0.0 | 3.9 | 0.0 | 3.9 | 7.7 | 3.9 | 3.8 | 5.1 | 5.1 | 3.8 |
| East Northamptonshire | 6.6 | 2.6 | 3.8 | 1.3 | 2.5 | 3.7 | 1.2 | 0.0 | 3.5 | 3.5 | 5.8 | 2.3 | 3.4 | 2.3 | 3.4 |
| Kettering | 15.9 | 7.3 | 18.0 | 4.7 | 10.5 | 10.4 | 9.1 | 3.3 | 11.0 | 6.5 | 5.4 | 11.7 | 6.3 | 3.1 | 3.1 |
| Northampton | 10.8 | 20.1 | 24.2 | 18.0 | 27.2 | 25.4 | 20.5 | 24.1 | 14.1 | 20.2 | 16.7 | 15.1 | 21.9 | 12.0 | 12.3 |
| South Northamptonshire | 6.4 | 2.5 | 2.5 | 6.1 | 3.6 | 2.4 | 2.3 | 0.0 | 4.7 | 1.2 | 2.3 | 2.3 | 8.1 | 1.1 | 1.1 |
| Wellingborough | 19.5 | 12.4 | 5.5 | 9.6 | 6.8 | 8.1 | 13.4 | 9.4 | 12.0 | 10.7 | 13.3 | 11.9 | 10.5 | 7.9 | 6.5 |
| Northamptonshire | 11.5 | 10.6 | 13.0 | 8.7 | 11.6 | 12.1 | 10.4 | 9.8 | 9.3 | 11.6 | 10.0 | 9.4 | 11.4 | 6.5 | 6.6 |
| East Midlands | 9.9 | 13.0 | 11.2 | 10.8 | 9.8 | 12.3 | 13.0 | 12.1 | 10.9 | 11.7 | 11.0 | 10.8 | 10.9 | 9.0 | 8.6 |

*rates calculated using ONS mid-year population estimates. ** Upper tier local authorities are marked in bold

Table Biii: TB case numbers and rate by age and sex, East Midlands, 2014

| Age group (years) | Female | | Male | | Total | |
|-------------------|------------|------------|------------|-------------|------------|------------|
| | n | rate | n | rate | n | rate |
| 0-9 | 3 | 1.1 | 8 | 2.9 | 11 | 2.0 |
| 10-19 | 10 | 3.8 | 7 | 2.5 | 17 | 3.2 |
| 20-29 | 30 | 10.0 | 46 | 15.0 | 76 | 12.5 |
| 30-39 | 38 | 13.7 | 49 | 18.0 | 87 | 15.9 |
| 40-49 | 29 | 8.7 | 32 | 9.9 | 61 | 9.3 |
| 50-59 | 20 | 6.5 | 36 | 11.9 | 56 | 9.2 |
| 60-69 | 10 | 3.6 | 18 | 6.7 | 28 | 5.2 |
| 70+ | 22 | 6.7 | 41 | 15.9 | 63 | 10.8 |
| Total | 162 | 6.9 | 237 | 10.4 | 399 | 8.6 |

Table Biv: Drug resistance among TB patients with culture confirmed disease*, East Midlands, 2000 – 2014

| Year | Any resistance | | Isoniazid resistant (without MDR) | | Multi-drug resistant | |
|------|----------------|-----|-----------------------------------|-----|----------------------|-----|
| | n | % | n | % | n | % |
| 2000 | 11 | 5.6 | 7 | 3.7 | 4 | 2.1 |
| 2001 | 19 | 6.9 | 16 | 5.9 | 2 | 0.7 |
| 2002 | 18 | 6.9 | 16 | 6.2 | 2 | 0.8 |
| 2003 | 18 | 6.8 | 14 | 5.3 | 2 | 0.8 |
| 2004 | 19 | 7.4 | 13 | 5.1 | 3 | 1.2 |
| 2005 | 15 | 5.2 | 13 | 4.5 | 2 | 0.7 |
| 2006 | 22 | 7.2 | 18 | 5.9 | 3 | 1.0 |
| 2007 | 20 | 6.5 | 12 | 4.0 | 5 | 1.6 |
| 2008 | 13 | 4.6 | 10 | 3.6 | 2 | 0.7 |
| 2009 | 24 | 8.8 | 19 | 7.0 | 2 | 0.7 |
| 2010 | 16 | 5.4 | 9 | 3.1 | 3 | 1.0 |
| 2011 | 9 | 3.1 | 7 | 2.4 | 2 | 0.7 |
| 2012 | 16 | 5.4 | 13 | 4.4 | 2 | 0.7 |
| 2013 | 17 | 7.2 | 14 | 5.9 | 1 | 0.4 |
| 2014 | 17 | 7.4 | 11 | 4.8 | 4 | 1.7 |

*culture confirmed cases with drug susceptibility testing results for at least isoniazid and rifampicin

Appendix C: Local authority TB epidemiological summaries

Local authority TB epidemiological summaries will provide further information about TB cases among residents of East Midlands upper tier local authorities with an average of at least 50 TB cases per year over the previous three years. These will be published shortly by your local FES team.