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Tuberculosis in England: 2018

Presenting data to end of 2017

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Summary

Public Health England's principal publication on the epidemiology of tuberculosis (TB) in England, "Tuberculosis in England, 2018 report" is being published at a key time in the global response to TB. For the first time ever, the United Nations General Assembly is holding a high-level meeting on TB to accelerate efforts to end the global TB epidemic. The intended outcome of this meeting is a Political Declaration on TB endorsed by Heads of State that will strengthen action and investments to end TB as we drive towards elimination by 2035.

In 2018 the Collaborative Strategy for England 2015-2020 moves into the second half of its implementation period, with planning commenced for the continuation of efforts to control TB in England beyond 2020. These efforts will align with the direction provided by the UN high level meeting and respond to local epidemiology of TB across England. TB incidence in England peaked at 8,280 in 2011. Since then the number of people notified with TB has fallen by nearly 40% to 5,102 people in 2017. At 9.2 per 100,000, this was the lowest rate of TB ever recorded in England and, for the first time, it is considered to be a low incidence country under current World Health Organisation (WHO) definitions (under 10 people diagnosed with TB per 100,000 of the population).

There are now also 12 Local Authorities in England that have a three-year average TB incidence of less than 1.0 per 100,000, the WHO End TB pre-elimination target rate. Improved TB control and a reduction of transmission in the UK are probably key factors accounting for up to two thirds of the decline between 2011and 2015, with only one-third of the decline likely to be due to decreases in the numbers of migrants from high TB burden countries [1].

The recent declines are not experienced equally by all population groups, the largest falls occurring mainly in people born outside the UK. The proportion of people who experience a delay between symptom onset to diagnosis remains stubbornly high and the proportion of people who have multi-drug resistant TB, although relatively low, has not declined recently.

Despite the welcomed successes in the fall in overall numbers of people with TB, there remains little room for complacency. There are still significant inequalities in the rate of TB; the most deprived 10% of the population have a rate more than 7 times higher than the least deprived 10%, and people born outside the UK have a rate 13 times higher than people born in the UK. Nearly 13% of people notified with TB have a social risk factor.

The reduction in the number and rate of people with TB over the last six years is a positive step towards the End TB pre-elimination goal of 1.0 per 100,000 population by 2035. Achieving this will be difficult, but now is the time to refocus our collective efforts and ensure a strong multisectoral approach to TB control which must continue after the end of this current strategy. It requires the sustained enthusiasm, dedication and support from public health and clinical teams who have done so much to contribute to TB control through effective clinical care, surveillance, and public health action.

Key points

- in 2017, 5,102 people were notified with TB in England, the lowest number since 1990 (5,010)
- the incidence rate in 2017 was 9.2 per 100,000 population, our lowest recorded rate, which for the first time falls under the 10 per 100,000 WHO definition of a low incidence country
- between 2011 and 2017, there has been a large decline in both the number of TB notifications (-38%) and the rate (-41%)
- people born outside the UK accounted for 71% of TB notifications in 2017 and the rate of TB among this population was 13 times higher than among those born in the UK
- between 2016 and 2017 there was a decrease of 13% and 17% in the numbers and rate of TB, respectively, in people born outside the UK; in comparison, there was no change among people born in the UK
- nearly one-third (31%) of people with pulmonary TB continue to experience a delay of more than four months between symptom onset and treatment start. In 2017, delays were highest in those born in the UK (37%) and aged over 65 years (38%)
- the number of people with confirmed MDR/RR-TB at the point of diagnosis decreased between 2016 and 2017 (60 versus 55); however, the proportion was similar (1.7% versus 1.8%). Only three of these people had confirmed initial XDR-TB, fewer than each of the previous two years
- in 2017, 12.6% of people notified with TB had a social risk factor (SRF), the highest proportion since data collection began in 2010. The proportion of people with a SRF was higher in those born in the UK (21%) compared to those born outside the UK (9.4%). In addition, MDR/RR-TB was almost two times higher in people with a SRF (2.7%) compared to those without a SRF (1.5%)
- the rate of TB in the most deprived 10% of the population was 18.4 per 100,000, more than 7 times higher than in the least deprived (2.5 per 100,000)

- in 2016, there was a small increase in the proportion of people notified with drug sensitive TB (with an expected treatment duration of less than 12 months) who completed treatment by 12 months from 83.7% in 2015 to 84.4% in 2016. The proportion who died at the last recorded outcome was 5.5%, lower than in 2015 (6.1%)

- 58% of the drug resistant cohort notified in 2015 completed treatment by 24 months, a higher proportion than for those notified in 2014 (52%)

- outcomes in people with drug sensitive TB who had a SRF were worse (6.3% died and 6.5% were lost to follow-up) compared to those without a SRF (4.6% and 3.3%, respectively)

- in 2017, only 2.8% of people with TB were co-infected with HIV, the lowest proportion since the peak of 8.4% in 2004; the majority (80%) were born outside the UK, 70% of whom were born in sub-Saharan African countries

- by 2017, whole genome sequencing (WGS) had been rolled-out for the Midlands and North of England. In this area, 23% of people with TB were identified to be in a cluster (within 12 single nucleotide polymorphisms (SNPs) of another person also notified in 2017)

- in 2017, a total of 298 people were detected to have TB disease at pre-entry screening. The number of people with pulmonary TB notified in the UK within 1 year of entry to the UK from countries within the pre-entry screening programme decreased from 366 in 2006 to 51 in 2017

- between 2016 and 2017 there was a 73% increase in the number of LTBI tests performed, from 8,818 in 2016 to 15,222 in 2017. Overall, nearly 1 in 5 (17%) tests were positive in 2017

Contents

Acknowledgements

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Notes on the report

Intended audience

This report is aimed at healthcare professionals involved in the diagnosis and/or treatment of people with TB, 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.

Aim of report

This report describes the recent epidemiology of TB in England, providing an update on trends and burden of TB at a national and sub-national level. It also presents data on the implementation of the UK pre-entry TB screening programme, the national roll-out of systematic latent TB infection (LTBI) testing and treatment programme, and BCG vaccination coverage estimates. The data presented is used to inform recommendations on the ongoing implementation of the 'Collaborative TB Strategy for England 2015-2020' [2].

Data sources

This report presents detailed data on TB 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 this year's report supersedes data in previous reports.

Experimental BCG coverage data for areas with universal BCG vaccination is presented using the Cover of Vaccination Evaluated Rapidly (COVER) programme data from April 2016 to March 2018.

Public Health England (PHE) receives three different types of LTBI testing and treatment data:

- LTBI testing data: data collected by GPs using clinical templates. This is available for three GP systems (EMISWeb, SystmOne and VISION). Clinical and demographic information on tested patients is available through these systems
- LTBI treatment data: This data is collected from secondary care (TB nursing services) using an Microsoft Excel worksheet template providing details of treatment provided to LTBI positive patients with the exception of a few CCGs, where

treatment is provided in either primary or community care. Information includes prescribing data, treatment outcomes and test results for routine follow-up tests
- Laboratory data: this data is collected by laboratories carrying out the LTBI testing and include basic demographic information and IGRA test results

Data from the LTBI testing and treatment database (England) are presented for calendar years 2016 and 2017.

Data from the UK wide pre-entry screening database is presented to the end of 2017.

Other data displays

High-level data on TB notifications in the UK to the end of 2017, and breakdowns by country, can be found in the Official Statistics for TB, 'Reports of cases of tuberculosis to enhanced tuberculosis surveillance systems: UK, 2000 to 2017'. This is available at: https://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': https://www.gov.uk/government/publications/collaborative-tuberculosis-strategy-for-england.

Where data for these indicators is presented in this report, the indicator name is shown (in red boxes), and a summary table of national-level indicators is presented in Appendix V. Data for indicators that are presented by upper tier local authority and clinical commissioning group can be found at: http://fingertips.phe.org.uk/profile/tb-monitoring and will be updated with data for 2017 on 2 October 2018. Hyperlinks (in red boxes) for specific indicators are also shown throughout the report where data is presented.

Background and context

Historical context

TB has been a notifiable disease in England and Wales since 1913. In that first year of statutory notification more than 117,000 people were notified, a rate of over 300 per 100,000. Since then the number and rates of TB notifications have declined steadily, reaching a low in England in 1987 (Figure A). In England, a subsequent rise of nearly 40% in the number of notifications between 1987 and 2004 occurred against a background of poor global TB control and in 1993 the World Health Organization (WHO) declared TB a global public health emergency. More recently, the WHO has adopted a new and holistic strategy that places patients and communities at the heart of the response.

This End TB Strategy aims to end the global TB epidemic between 2015 and 2035 and has set targets to:

- reduce TB deaths by 95%
- reduce new TB notifications by 90%
- ensure that no family is burdened with catastrophic expenses due to TB

If these targets are to be met, the annual decline in global TB incidence rates needs to accelerate from 2% per year in 2015 to 10% per year by 2025.

Data for England alone (without Wales) on the number and rates of TB notifications is available from 1971 onwards (Figure A; Table Ai.A). This data allows the monitoring of TB trends in England over the last few decades to help understand the changing epidemiology of TB. Enhanced Surveillance was introduced in England in 2000. This involves the systematic collection of detailed data on demographics, clinical information and other risk factors for TB at the point of notification. This enhanced information provides the principal source of data for public health action based upon detailed local knowledge of the epidemiology of TB in England. It is this data from enhanced TB surveillance that forms the basis of this report.

Figure A: TB notifications and rates, England, 1971-2017

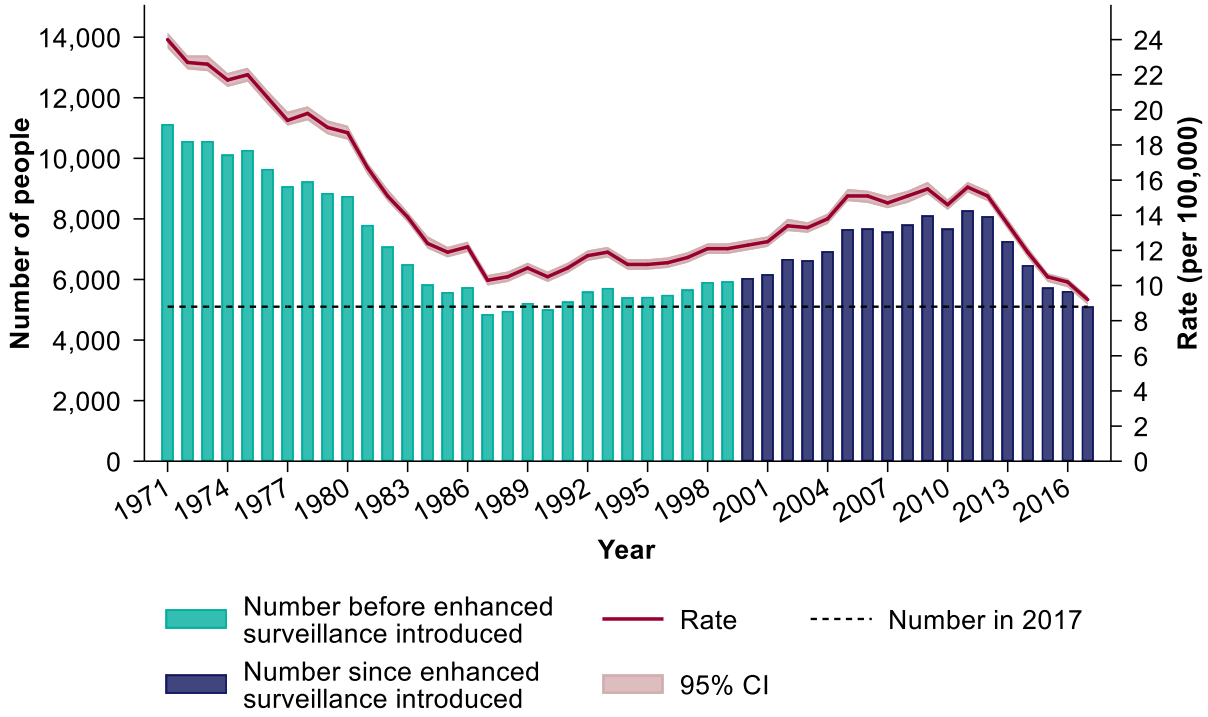
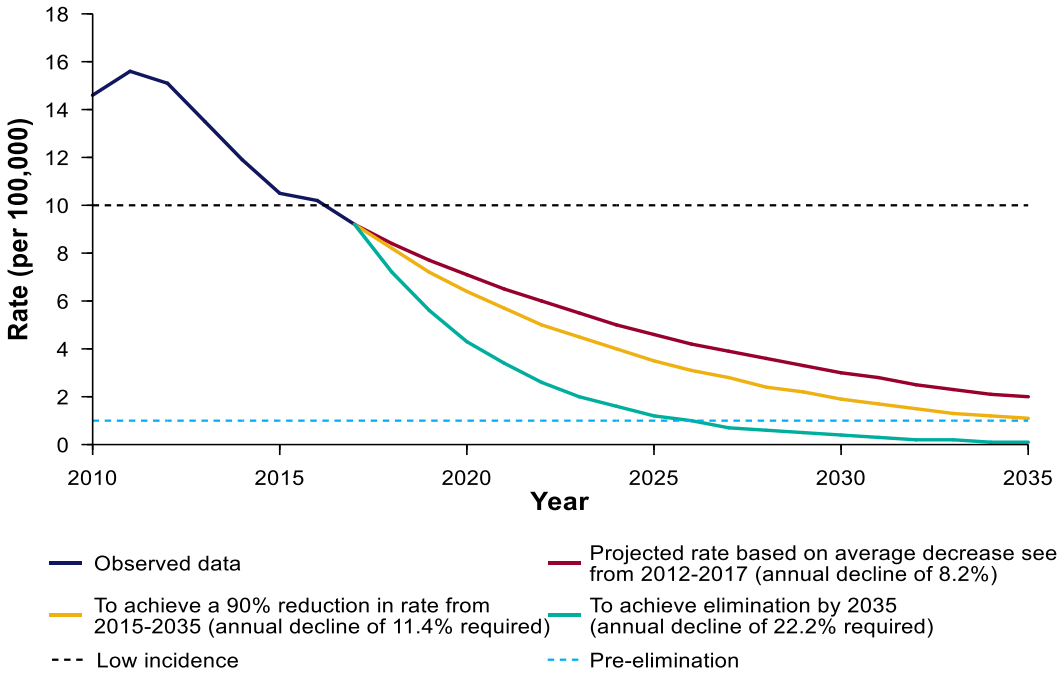


Figure B shows whether we are likely to meet the End TB target of a reduction in new notifications of 90% by 2035 (yellow line). Based on current trends in incidence in England between 2010 and 2017 (dark blue line), the average annual decline is 8.2%. If we maintain this average decline (red line) in itself a difficult task, we would fall just short of achieving the End TB Strategy's 90% reduction. Achieving elimination by 2035 would require a sustained annual decline of 22% (teal line).

Figure B: Observed and projected rate of TB notifications, England, 2010-2035



UK Collaborative TB Strategy for England, 2015-2020

It is against the background of rising TB in the 1990s and 2000s (Figure A) that a comprehensive approach to TB control in England was considered necessary and in January 2015, Public Health England and NHS England jointly launched the 'Collaborative Tuberculosis Strategy for England 2015-2020' [2]. 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 sets out 10 key areas for action:

- 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) testing and treatment
- strengthen surveillance and monitoring
- ensure an appropriate workforce to deliver TB control

Since the launch of the strategy, significant steps have been taken to deliver on the 10 'areas for action', and in the past year the following have been achieved:

- continued implementation of the Strategy by the seven multiagency TB Control Boards
- national TB clinical policy and service specification updated for commissioners and service providers
- national review of ethambutol prescribing undertaken
- creation of a British Association of Paediatric TB
- sharing of the NW paediatric care pathway, a weekly 'virtual' multi-disciplinary clinic that networks a specialist paediatric consultant to DGH consultants
- whole genome sequencing for TB rolled out country wide 2017/18
- national lab audit to assess capability of TB diagnostic services completed and outputs being used locally to improve access to diagnostics
- launch of the British Thoracic Society's MDR-TB Clinical Advice Service supported by PHE and NHS England
- 'Tackling TB – local government's public health role' updated by PHE in collaboration with the Local Government Association
- resource to tackle TB in under-served populations launched with local workshops and work streams to support housing the homeless with TB

- work to embed the new migrant LTBI testing and treatment programmes, funded by NHS England, in the priority CCGs
- LTBI animation video launched to raise TB awareness and encourage uptake of the LTBI test
- TB Alert (funded by NHSE) initiating work to improve communications to communities & people at risk of LTBI
- completion of initial stages of new National TB Surveillance System (NTBS)
- support to TB nurses through strengthening local TB nurse networks and a third national TB nurse conference
- development of standard TB nurse job descriptions by PHE and NHSE
- 'TB Strategy Update' newsletter - published 4 times a year to over 5,200 subscribers

The 2018 annual TB report describes the epidemiology of TB in England in 2017 and previous years, provides data on the UK pre-entry TB screening programme, the national systematic LTBI testing and treatment among migrants, and BCG vaccination coverage estimates. On the basis of data presented, recommendations are made on the further work required to deliver the aims of the Collaborative TB Strategy, and ultimately lead to improved TB control in England.

1. TB notifications and incidence

Key messages

- in 2017, a total of 5,102 people were notified with TB, a rate of 9.2 per 100,000 population; falling under the <10 per 100,000 definition for a low incidence country
- overall there has been a large decline in the number of TB notifications (-38%) and the rate (-41%) since 2011
- between 2016 and 2017, there was a 9.2% decline in the number of TB notifications and a 9.8% decline in the rate
- people born outside the UK accounted for 71% of TB notifications in 2017
- the rate of TB among people born outside the UK in 2017 remained 13 times higher than among those born in the UK
- decreases in the numbers and rates of TB continue to be focused among people born outside the UK; between 2016 and 2017 there was a large decline in the number (-13%) and rate (-17%) in this population, whilst there was no change among people born in the UK
- the decline in the number of TB notifications among people born outside the UK was not seen in all countries of birth; there has been a steady increase in the number of people with TB born in Romania (2011: 54 versus 2017: 206)

Overall numbers, rates and geographical distribution

In 2017, 5,102 people were notified with TB, a rate of 9.2 per 100,000 population (95% confidence interval (CI) 8.9-9.4) (Figure 1.1, Appendix I Table Ai.1.1), now falling below the 10 per 100,000 threshold which defines a low incidence country. Between 2016 and 2017, there was a large reduction in the number of people notified with TB (2016: 5,616, -9.2%) as well as in the rate of TB (2016: 10.2 per 100,000, 95% CI 9.9-10.4, -9.8%). This is in contrast to the smaller decline between 2015 and 2016, but similar to the previously observed larger annual declines (>10%) between 2012 and 2015 (Table Ai.1.1).

The number of TB notifications and rate in each of the seven TB Control Boards[1] in 2017 is shown in Figure 1.2.

The main burden of the disease remains concentrated in large urban areas; London PHE Centre (PHEC) accounted for 37.6% (1,919/5,102) of notifications, with a rate of 21.7 per 100,000 (95% CI 20.8-22.7). This proportion has however decreased over time since the 2011 peak in incidence, when it accounted for 42.2% of notifications. The

[1]The TB Control Boards (TBCBs) have been functioning since September 2015 and are aligned with PHEC boundaries other than the North East and Yorkshire and the Humber PHECs, which together form the North East, Yorkshire and Humber TBCB, and the South East and South West PHECs, which together form the South of England TBCB

number of people with TB continued to decline or remained stable across all PHECs between 2016 and 2017, with the exception of the East Midlands PHEC, where there was a small increase in the number of people of 2.9% (2016: 341 versus 2017: 351) (Figure 1.3, Table Ai.1.2).

Between 2015 and 2017, almost half (48.2%, 94/195) of clinical commissioning groups[2] had an average TB rate of less than 5.0 per 100,000, of which three had achieved the pre-elimination rate of less than 1.0 per 100,000 (Figure 1.4, Table Aii.1.2).

The proportion of local authority districts with a three-year average rate of TB of less than 5.0 per 100,000 increased from 43.9% (143/326) in 2011 to 2013, to 56.7% (185/326) in 2015 to 2017 (Figure 1.5, Appendix II Table Aii.1.1). Twelve local authority districts had reached the pre-elimination rate of less than 1.0 per 100,000, nine of which reported no notifications.

Figure 1.1: Number of TB notifications and rates, England, 2000-2017

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

[2] Clinical commissioning group boundaries as at May 2018

Figure 1.2: Number TB notifications and rates by TB Control Board, England, 2017

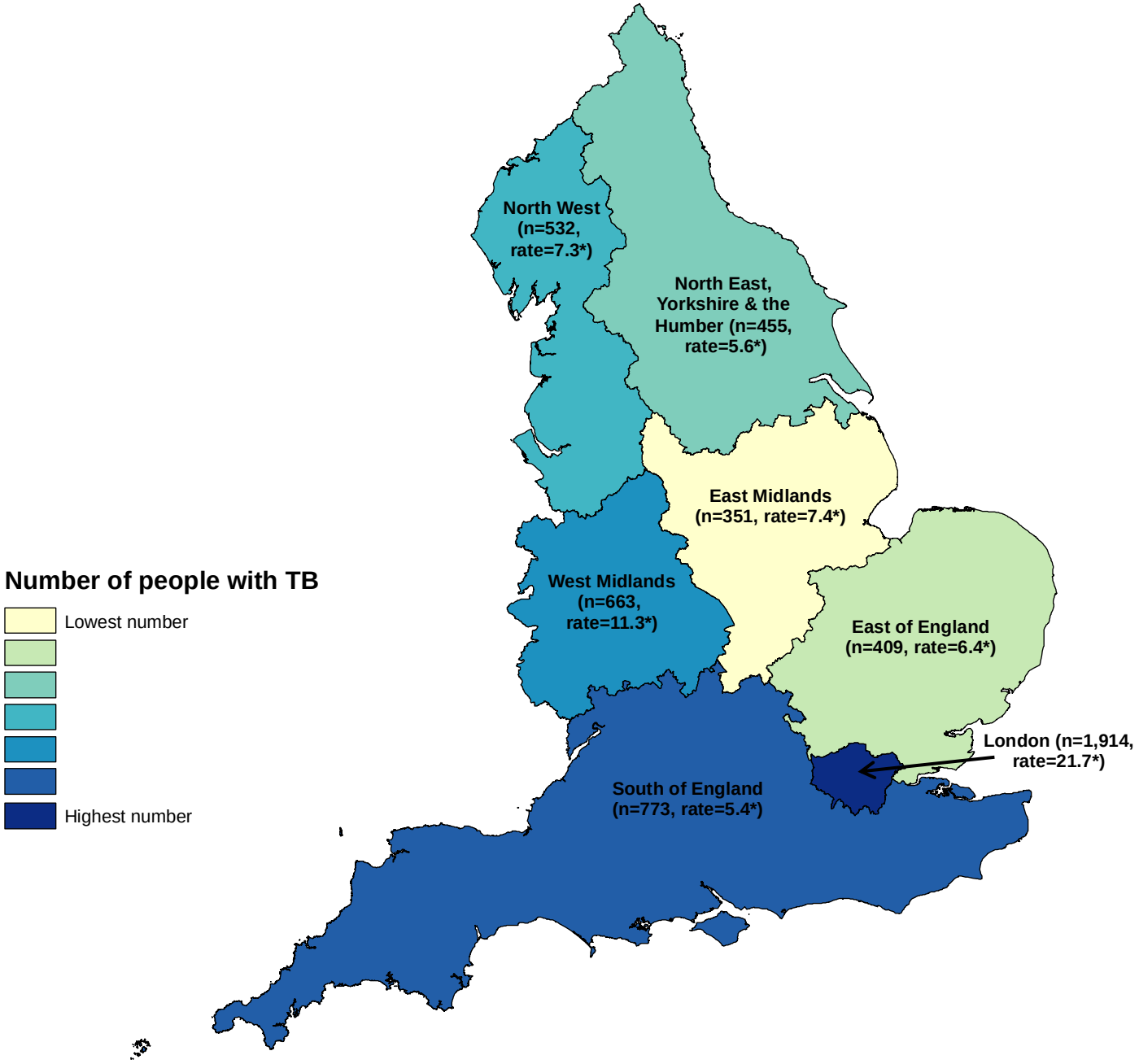


Figure 1.3: Number of TB notifications and rates by PHE Centre, 2000-2017

Please note: the axes on the London figure are different to that of other PHECs due to the higher number of TB notifications and rate in London.

Figure 1.3: Number of TB notifications and rates by PHE Centre, 2000-2017 (continued)

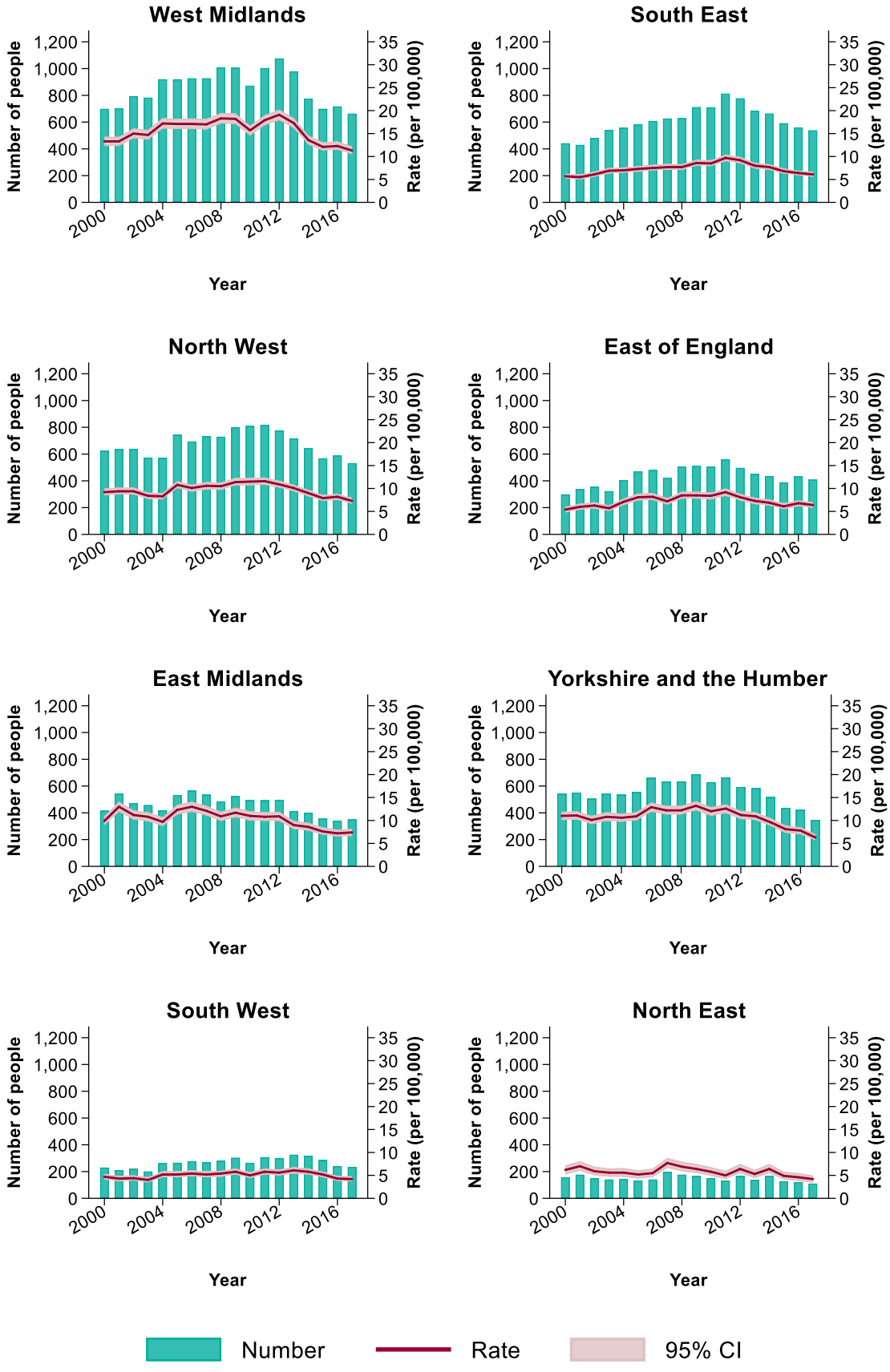


Figure 1.4: Three-year average TB rates by clinical commissioning group (CCG), England, 2015-2017 (box shows enlarged map of London area)

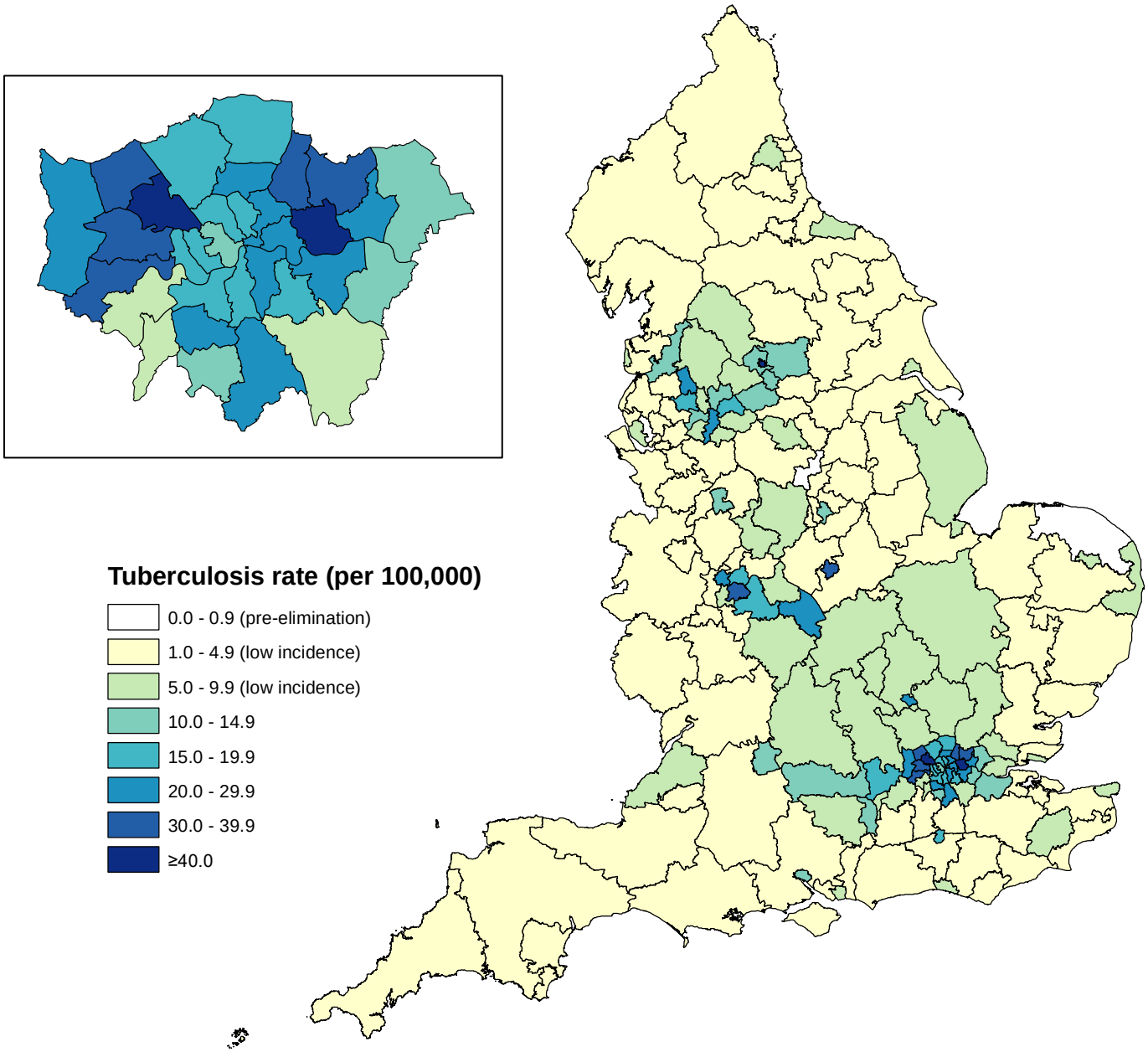
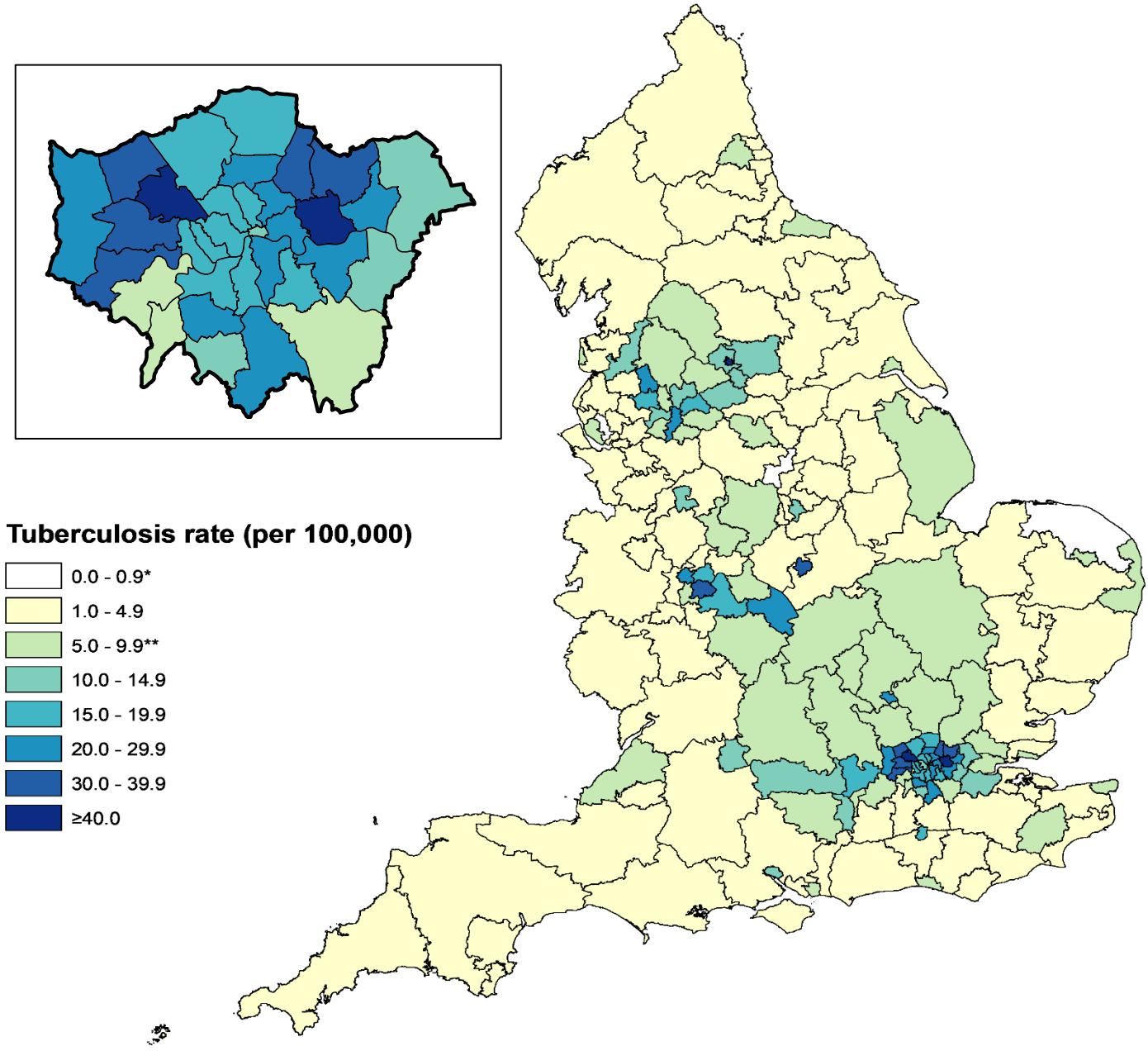


Figure 1.5: Three-year average TB rates by local authority district, England, 2015-2017 (box shows enlarged map of London area)



* Pre-elimination defined as an incidence of <1 person per 100,000
** Low-incidence defined as an incidence of <10 people per 100,000

Demographic characteristics

Age and sex

In 2017, 58.4% (2,978/5,102) of people with TB were male and 55.2% (2,816/5,102) were aged 15 to 44 years old. The rate of TB was highest in people aged 30 to 34 years (16.1 per 100,000) and 35 to 39 years (16.0 per 100,000), and was lowest in children aged 5 to 9 years (1.3 per 100,000) (Table Ai.1.3). A total of 180 children (<15 years) were notified with TB (Table Ai.1.3). For data on how the rate of TB among children born in the UK has changed over time, used as a proxy for TB transmission in England, see Chapter 3.

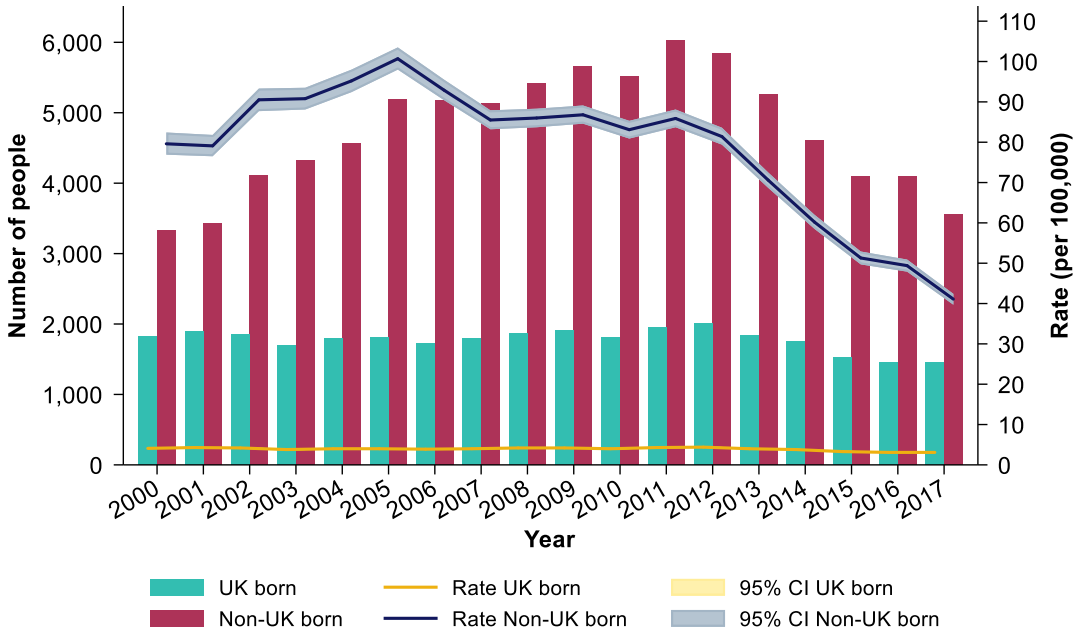
People with TB born outside the UK

In 2017, where the place of birth was known, 71.0% (3,556/5,010) of people with TB were born outside the UK. Between 2016 and 2017, there was a large decrease in both the number of notifications (-13.1%) and the rate (-16.8%) among this population (2017: 3,556; 41.1 per 100,000 versus 2016: 4,093; 49.4 per 100,000, respectively), which has halved since 2012 and is the lowest rate since 2000 (Figure 1.6, Table Ai.1.4).

However, in 2017 the rate of TB among people born outside the UK was still 13 times higher than in those born in the UK. Over time this difference in rate has decreased; peaking in 2005 at 25 times higher.

In 2017, among people born outside the UK, the highest rate of TB was in those aged 75 years and older (55.2 per 100,000) and was lowest in children (<15 years; 7.3 per 100,000) (Figure 1.7, Table Ai.1.3). The highest numbers, however, and with a high rate of TB, was in those aged 25-39. Since 2000, the rate of TB in this population has fluctuated over time, with the largest overall declines seen in the younger age groups (<35 years) whilst remaining fairly stable in the older age groups (≥35 years).

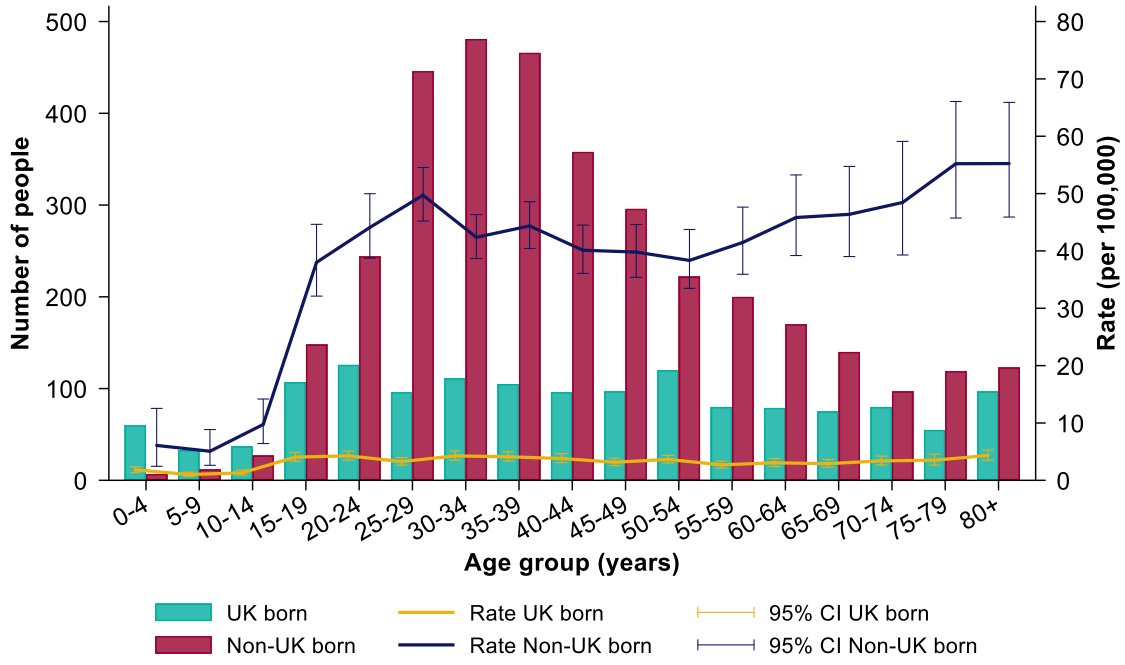
Figure 1.6: Number of TB notifications and rates by place of birth, England, 2000-2017



Please note: confidence intervals around those born in the UK are small therefore not visible.

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

Figure 1.7: Number of TB notifications and rates by age group and place of birth, England, 2017



Between 2016 and 2017, the number of TB notifications and rates for people born outside the UK declined across all PHECs (Figure 1.8, Table Ai.1.5). The Yorkshire and the Humber PHEC had the largest decline in numbers (-18.5%) whilst the South West PHEC had the largest decline in the rate of TB (-28.6%).

Figure 1.8: Number of TB notifications and rates by PHE Centre and place of birth, 2000-2017

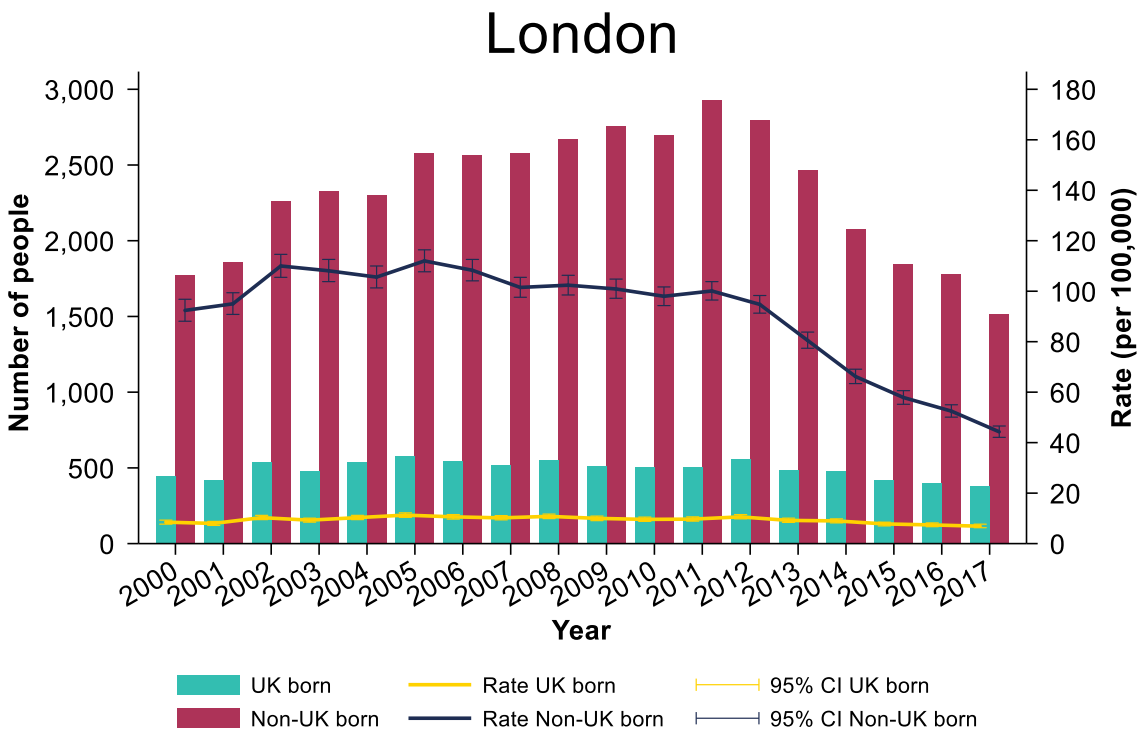
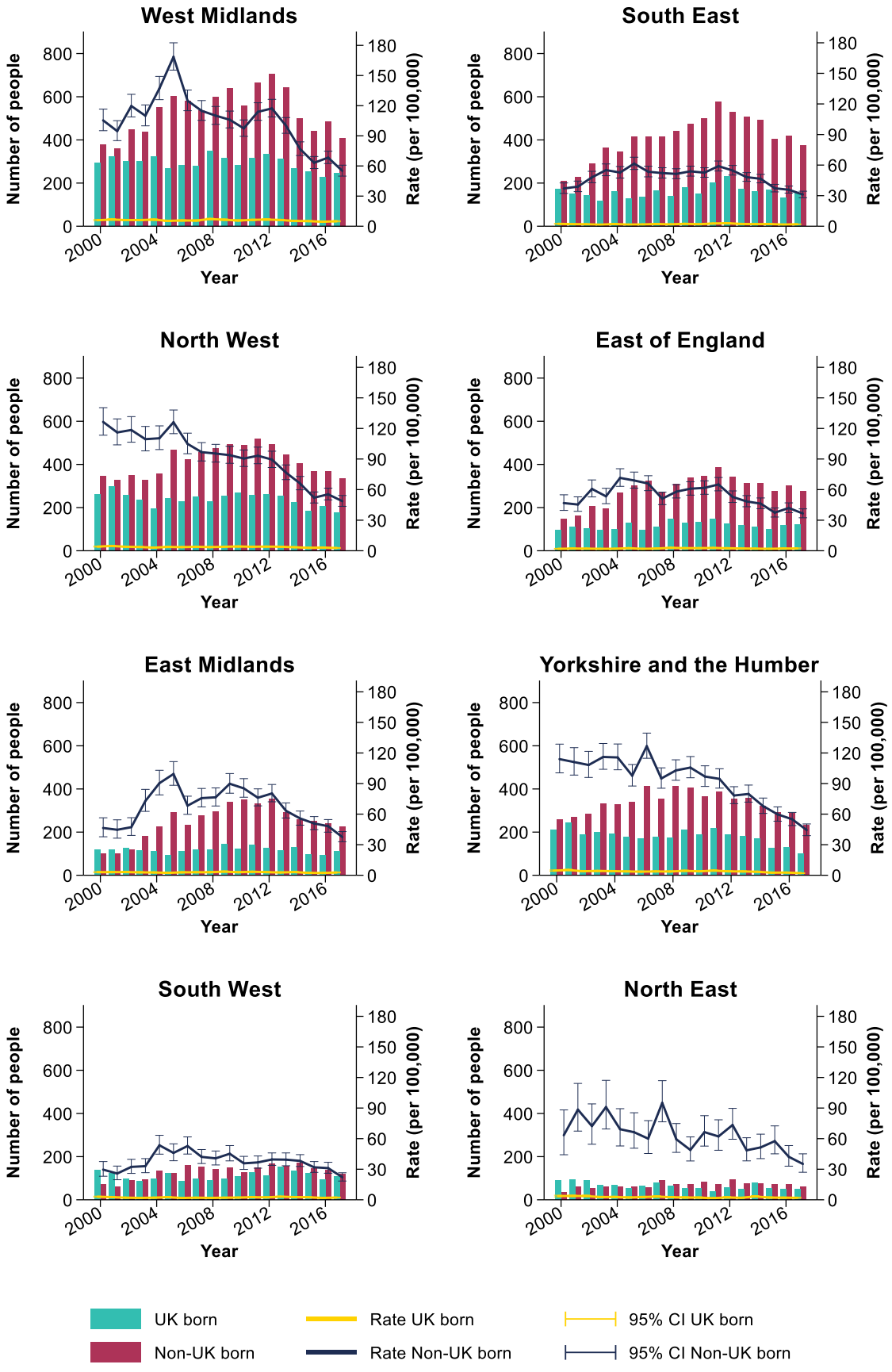
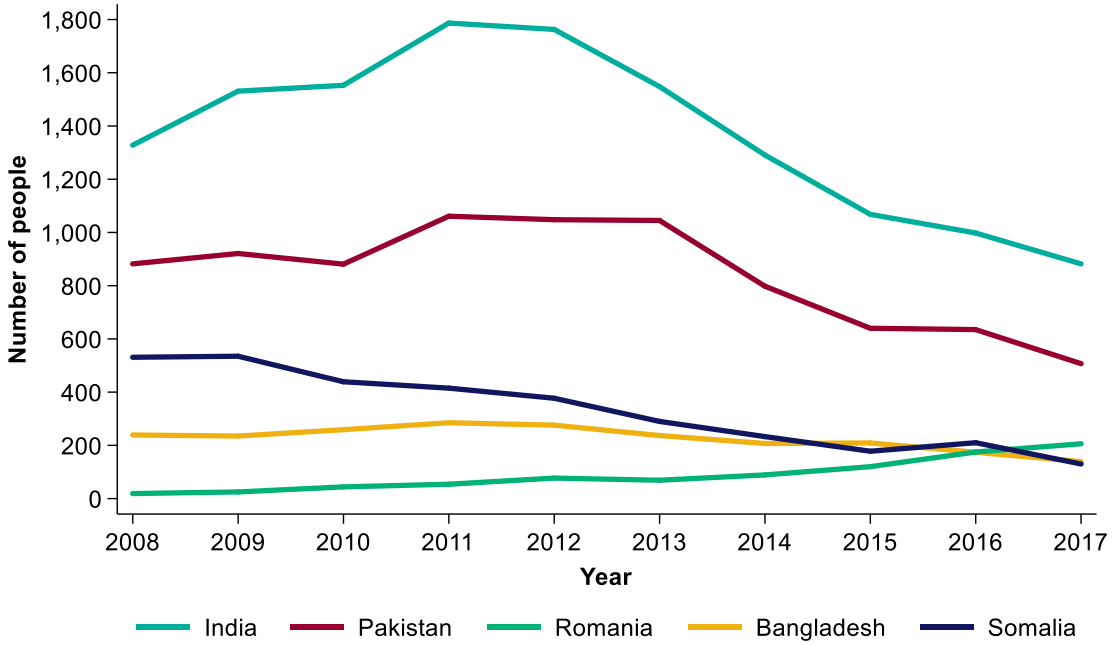


Figure 1.8: Number of TB notifications and rates by PHE Centre and place of birth, 2000-2017 (continued)



For those born outside the UK who were notified with TB in 2017, the most frequent countries of birth were India, Pakistan, Romania, Bangladesh and Somalia (Table 1.1, Table Ai.1.6). Between 2016 and 2017, there was a large decline in the number of notifications among people born in both India and Pakistan (-11.6% and -20.2%, respectively), after continuous annual decreases slowed between 2015 and 2016 (Figure 1.9, Table Ai.1.6). In the same time period, the number born in Somalia decreased by 38.1% (2016: 210 versus 2017: 130), continuing an overall decline since 2009 (535). The number born in Romania, however, has continued to steadily increase, more than doubling since 2014 (2014: 89 versus 2017: 206). Despite this large increase in numbers, the rate of TB among people born in Romania has remained stable at 56.1 per 100,000 (2014: 57.1 per 100,000), due to an increase in this population in England.

Figure 1.9: Trend in the number of people with TB for the top five countries of birth[a] for those born outside the UK, England, 2008-2017



[a] Five most frequent countries of birth in 2017

There was considerable variation by country of birth in the median time between a person's first entry into the UK and the time of their TB notification (Table 1.1). For people[3] born in four of the five most frequent countries of birth (India, Pakistan, Bangladesh and Somalia), the median time increased between 2012 and 2017 by an average of five years. In contrast, for people born in Romania, the median time has remained low and stable at two years.

Overall; in 2017, 36.9% (1,200/3,256) of people were notified less than six years since entering the UK, and 16.2% (528/3,256) were notified within two years of entry (Figure

[3] Where time between entry to the UK and notification is known

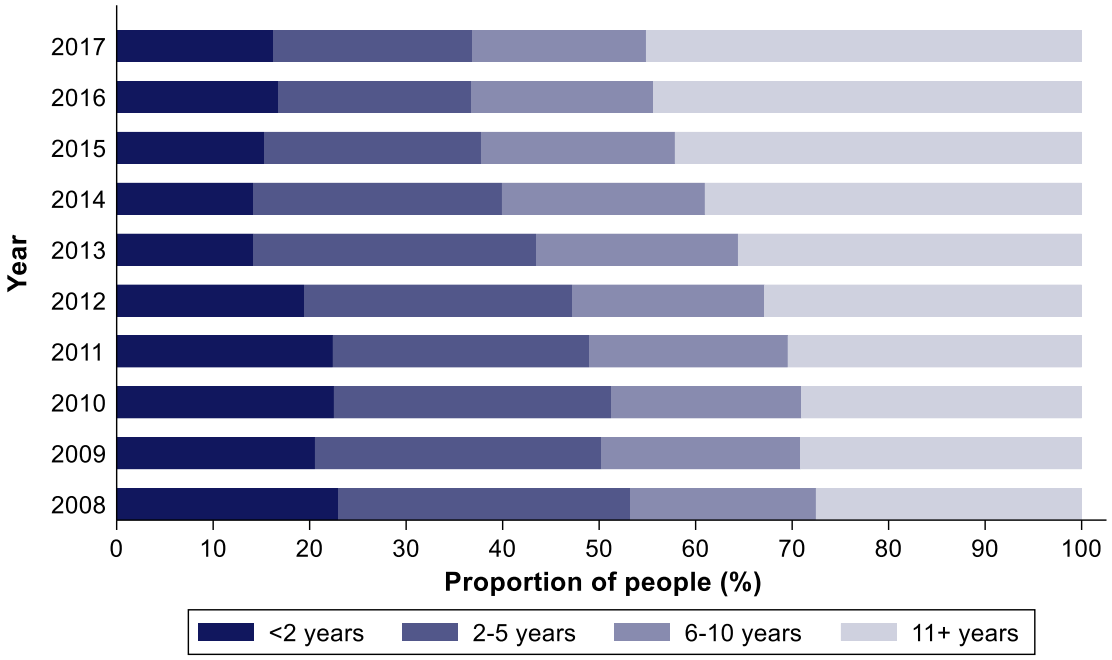
1.10, Table Ai.1.7). The proportion of people notified more than 11 years since entry to the UK continued to increase (2016: 44.4% versus 2017: 45.1%), with an overall increase of 55.5% since 2010.

Table 1.1: Most frequent countries of birth for people with TB and time between entry to the UK and TB notification, England, 2017

Country of birth	Number of people	Proportion of people (%)[a]	Median time since entry to UK (IQR)[b]
United Kingdom	1,454	29.4	-
India	882	17.9	9 (3-19)
Pakistan	507	10.3	14 (5-36)
Romania	206	4.2	2 (1-4)
Bangladesh	139	2.8	12 (6-25)
Somalia	130	2.6	12 (7-18)
Nigeria	98	2.0	7 (4-14)
Eritrea	97	2.0	3 (1-8)
Nepal	95	1.9	6 (2-8)
Philippines	79	1.6	11 (6-15)
Poland	73	1.5	9 (4-11)
Afghanistan	70	1.4	15 (12-17)
Zimbabwe	70	1.4	4 (1-15)
Sudan	64	1.3	1 (0-4)
Sri Lanka	53	1.1	15 (8-18)
Kenya	53	1.1	20 (10-32)
Ethiopia	52	1.1	2 (1-5)
Lithuania	49	1.0	6 (4-9)
Other (<1%)	768	15.5	11 (3-20)
Total*	**4,939**	**100.0**	**9 (3-18)**

[a] Where country of birth was known
[b] Years; IQR refers to interquartile range

Figure 1.10: Time between entry to the UK and TB notification for people born outside the UK, England, 2008-2017



People with TB born in the UK

In 2017, 1,454 people born in the UK were notified with TB, a rate of 3.1 per 100,000 (95% CI 3.0-3.3) (Figure 1.6, Table Ai.1.4). Between 2016 and 2017, there was no decline in the number of notifications (2016: 1,454, -0.0%) or the rate of TB (2016: 3.1 per 100,000, -0.0%), following an annual decline in both of these between 2012 and 2016.

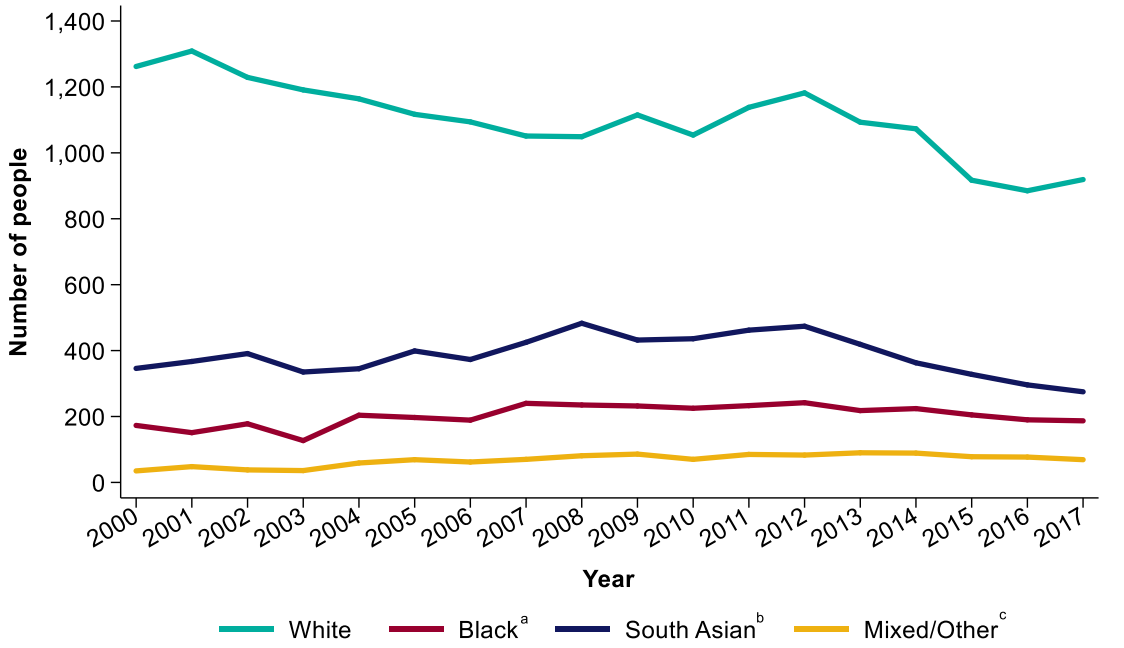
The age distribution of people with TB born in the UK differs substantially to that of those born outside the UK; with a fairly even distribution in both the numbers and rates across all adult (≥15 years) age groups. The highest rate was in those aged 80 years and older (4.3 per 100,000, 95% CI 3.5-5.3), and in those aged between 15 and 24 years (4.2 per 100,000, 95% CI 3.6-4.7) (Figure 1.7, Table Ai.1.3). Similar to in people born outside the UK, however, the lowest rates of TB were among the younger age groups (<15 years).

Between 2016 and 2017, the number of people with TB born in the UK increased or remained stable in most PHECs, with the exception of London (2016: 397 versus 2017: 378), the North West (2016: 209 versus 2017: 177) and Yorkshire and the Humber (2016: 132 versus 2017: 102) (Figure 1.8, Table Ai.1.5).
Where ethnic group was known, the majority of people with TB born in the UK (63.4%, 919/1,450) were White, while 19.0% (275/1,450) were from South Asian[4] ethnic groups

[4] Indian, Pakistani and Bangladeshi ethnic groups

and 12.9% (187/1,450) from Black[5] ethnic groups (Figure 1.11). Rates, however, were highest among people from non-White ethnic groups, being between two and nine times higher than in the White ethnic group (2.2 per 100,000), with the exception of people from a Chinese ethnic group (2.8 per 100,000) (Figure 1.12, Table Ai.1.8).

Figure 1.11: Number of people with TB born in the UK by ethnic group, England, 2000-2017

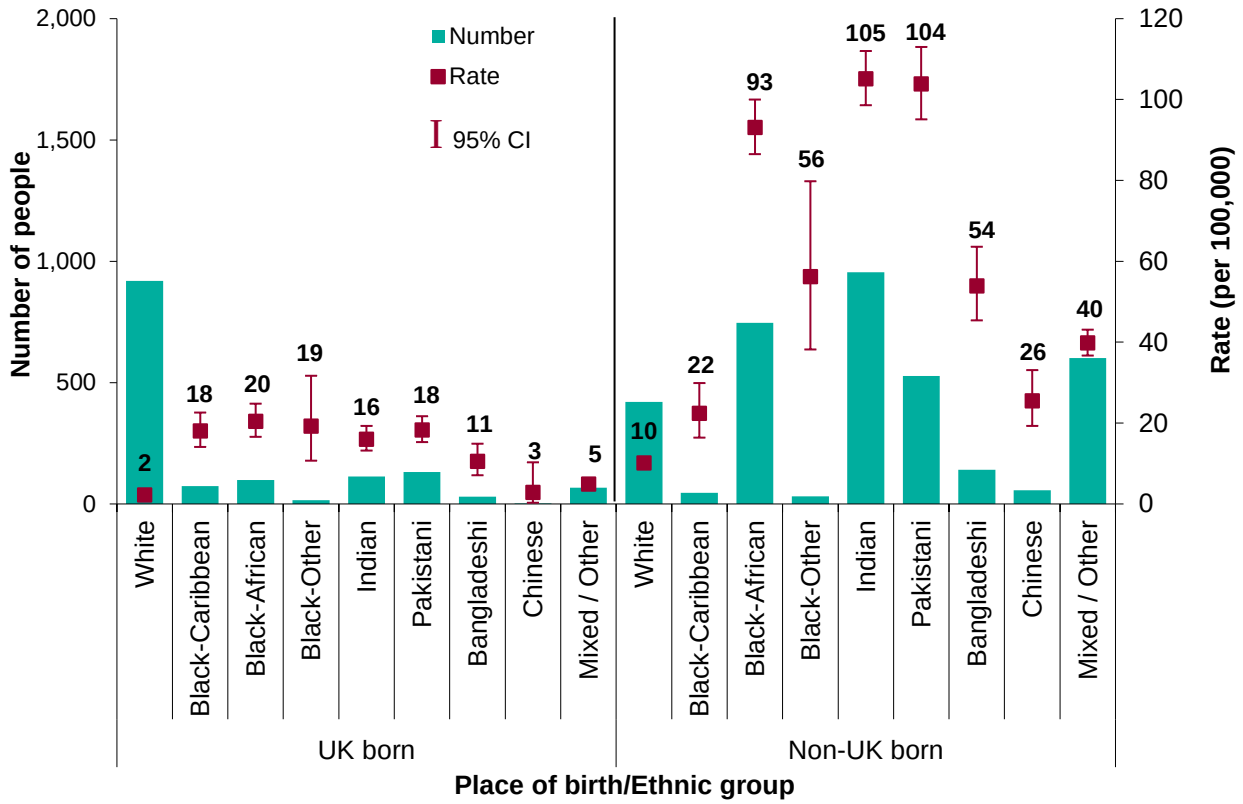


[a] People from Black-Caribbean, Black-African and Black-Other ethnic groups were grouped as 'Black'
[b] People from Indian, Pakistani and Bangladeshi ethnic groups were grouped as 'South Asian'
[c] People from Mixed/Other and Chinese ethnic groups were grouped as 'Mixed/other'

Whilst there was no change in the number of people with TB born in the UK from Black ethnic groups between 2016 and 2017, the number from South Asian ethnic groups continued to decline as in previous years (2016: 296 versus 2017: 275, -7.1%). The number of people from the White ethnic group, however, slightly increased by 3.8% (2016: 885 versus 2017: 919) after having decreased year-on-year since 2012 (Figure 1.11, Table Ai.1.9).

[5] Black-Caribbean, Black-African and Black-Other ethnic groups

Figure 1.12: Number of TB notifications and rates by place of birth and ethnic group, England, 2017



Please note: rates by ethnic group are displayed as labels.

Occupation

Among people[6] notified in 2017, 34.5% (1,310/3,798) were not in education or employment (for further information see Chapter 7); 10.3% (392) were either studying or working in education, 7.1% (270) were healthcare workers, and the remaining individuals (48.1%, 1,826) were classed as working in other occupations.

Clinical characteristics

Site of disease

Over half of people with TB[7] notified in 2017 had pulmonary disease (54.4%, 2,767/5,087) (Table 1.2), nearly one-quarter (22.8%, 630/2,767) of whom also had extra-pulmonary disease in at least one other site. A much higher proportion of people with TB born outside the UK had extra-pulmonary disease only (51.7%, 1,836/3,551), compared with those born in the UK (30.8%, 446/1,448) (Table Ai.1.10).

[6] Aged 16 to 64 years where occupation was known
[7] Where site of disease was known

Table 1.2: Number of people with TB by site of disease, England, 2017

Site of disease[a]	Number of people	Percentage[b]
Pulmonary	2,767	54.4
Miliary	135	2.7
Laryngeal	13	0.3
Extra-pulmonary	2,950	58.0
Extra-thoracic lymph nodes	1,050	20.6
Intra-thoracic lymph nodes	637	12.5
Unknown extra-pulmonary	364	7.2
Pleural	439	8.6
Other extra-pulmonary	410	8.1
Gastrointestinal	232	4.6
Bone – spine	195	3.8
Bone – not spine	113	2.2
CNS – meningitis	112	2.2
CNS – other	108	2.1
Genitourinary	76	1.5
Cryptic disseminated	38	0.7

[a] With or without disease at another site
[b] Proportion of people with TB for which sites of disease were known (5,087); total exceeds 100% due to disease at more than one site
CNS - Central Nervous System

Directly observed therapy (DOT)

Information on whether a person received DOT[8] was known for 94.8% (4,836/5,102) of people notified with TB in 2017. Of these, 13.5% (651) were reported to have received DOT (for further information see Chapter 7), with 31.0% (53/171) of children (<15 years) having received DOT (Table Ai.1.11).

Previous history of TB

In 2017, 5.9% (289/4,887) of people with TB[9] had a previous diagnosis more than 12 months before their current notification. Among these, 93.4% (212/227) were known to have previously been treated for TB, and 27.9% (77/276) received DOT during their current notification. Time since previous diagnosis was known for 88.2% (255/289) of these people, with a median time since previous diagnosis of seven years (IQR 3-25 years).

[8] In the Enhanced TB Surveillance system (ETS), the relevant variable is “Patient to begin a course of treatment under direct observation”; in the London TB Register (LTBR) the relevant variable is “Patient was taking Directly Observed Therapy at any time during the episode of care”.
[9] With known previous history of TB

Co-morbidities[10]

Overall, in 2017, where information on co-morbidity status was known, 20.0% (970/4,847) of all people with TB were known to have at least one co-morbidity, where the most frequent co-morbidity was diabetes (11.6%, 557/4,788) (Table 1.3).

Table 1.3: Number of people with TB by co-morbidity status, England, 2017

Co-morbidity	n	%	Total[a]
Diabetes	557	11.6	4,788
Hep B	65	1.5	4,345
Hep C	64	1.5	4,338
Chronic liver disease	78	1.7	4,680
Chronic renal disease	137	2.9	4,715
Immunosuppression	266	5.7	4,667
Cancer	51	19.2	266
Biological therapy	38	14.3	266
Steroids	18	6.8	266
Transplantation	12	4.5	266
Auto-immune disease	8	3.0	266
Other	82	30.8	266
Unknown	6	2.3	266

[a] Where information on co-morbidity status was known

Travel and visitor risk factors[11]

Information on history of travel to, and visitors received from a country[12] outside the UK, in the two years prior to their TB diagnosis was known for 79.7% (2,536/3,183) and 72.0% (2,293/3,183) of people notified in 2017, respectively. Nineteen percent (19.4%, 492/2,536) of these had travelled outside the UK and 6.2% (143/2,293) had received a visitor from outside the UK (Table 1.4).

One-quarter (26.6%, 432/1,627) of people born outside the UK had travelled abroad, compared with only 6.4% (57/892) of those born in the UK (Table 1.4). For people born outside the UK where the country of travel or origin of their visitor was known, 88.3% (355/402) had travelled to their own country of birth, and 90.7% (98/108) had received a visitor from their own country of birth.

[10] Information on co-morbidity status has been collected on ETS since mid-2015 and on LTBR since mid-2016 for London
[11] Excludes people with TB notified in London, as these data fields were not available in LTBR in 2017
[12] Excludes countries in Western Europe, US, Canada, New Zealand and Australia

Table 1.4: Number and proportion of people with TB with history of travel to and visitors received from a country[a] outside the UK in the last two year prior to diagnosis, England[b], 2017

	Travelled to a country outside the UK			Visitor received from outside the UK		
Place of birth[c]	**n**	**%**	**Total**	**n**	**%**	**Total**
UK born	57	6.4	892	23	2.7	847
Non-UK born	432	26.6	1,627	120	8.4	1,436
Total[d]	492	19.4	2,536	143	6.2	2,293

[a] Excludes countries in Western Europe, US, Canada, New Zealand and Australia
[b] Excludes people with TB notified in London
[c] Where place of birth was known
[d] Total includes those with unknown place of birth

In 2017, a high number of people born in Sudan (29.7%, 19/64), Pakistan (20.1%, 102/507), Nepal (20.0%, 19/95), India (13.8%, 122/882) and Romania (12.1%, 25/206) had travelled outside the UK in the two years prior to their TB diagnosis, the majority of whom had travelled to their own country of birth.

2. Laboratory confirmation among people notified with TB

Key messages

- in 2017, 62% of people notified with TB had their diagnosis confirmed by culture, a decrease from 64% in 2016
- as in previous years, a higher proportion of pulmonary TB was confirmed by culture compared with extra-pulmonary TB (75% versus 47%)
- culture confirmation was lowest (26%) among children (<15 years), similar to previous years
- only 63% of people with pulmonary TB had a sputum smear result recorded in ETS of which 53% had a positive result
- 31% of people notified with TB did not have any laboratory result (culture, microscopy, PCR or histology) reported to confirm their TB diagnosis
- the number and proportion of isolates in 2016 (52, 1.5%) which could not be matched to a notification within the same, previous or subsequent year were at the lowest level since 2008 (427, 8.5%)

Laboratory tests data collection

Data for all culture confirmed TB isolates from the National Mycobacterium Reference Service (NMRS) were matched to TB notifications (see Appendix III: Methods), and the results were used to report culture confirmation. Results for microscopy, PCR and histology were recorded manually in ETS (see Appendix III: Methods).

Culture confirmation

In 2017, 61.8% (3,153/5,102) of people notified with TB had their diagnosis confirmed by culture, a decrease from 63.9% (3,586/5,616) in 2016, but similar to previous years (2015: 60.9%, 3,492/5,731) (Table Ai.2.1). In 2017, 97.1% (3,063) had *Mycobacterium tuberculosis (M. tuberculosis)* identified in their sample, 1.1% (35) *Mycobacterium bovis (M. bovis)*, 1.5% (47) *Mycobacterium africanum (M. africanum)*, 0.1% (3) *Mycobacterium microti (M. microti)* and 0.2% (5) *Mycobacterium tuberculosis complex* (MTBC) not further differentiated (Table Ai.2.2).

As in previous years, culture confirmation was higher among people with pulmonary TB compared to those with extra-pulmonary TB (74.7%, 2,066/2,767 versus 46.6%, 1,082/2,320). For both pulmonary and extra-pulmonary TB, 2017 figures were lower than 2016 (pulmonary: 76.9%, 2,314/3,010, extra-pulmonary: 48.9%, 1,271/2,597) (Table Ai.2.3).

The proportion of people with culture confirmation varied by PHEC; the highest was the North East (69.1%, 76/110) and the lowest were the North West and Yorkshire and the Humber (60.9%, 324/532 and 210/345, respectively) (Table Ai.2.1). Between 2016 and 2017, the proportion increased in the West Midlands PHEC (58.0% in 2016 versus 62.4% in 2017), while all other PHECs remained stable or decreased.

In 2017, as in previous years, the proportion of culture confirmation was lower among children (<15 years) with TB (25.6%, 46/180) compared with people aged 15 to 44 years (65.6%, 1,848/2,816), 45 to 64 years (57.6%, 747/1,297) and 65 years and older (63.3%, 512/809). Among children, the proportion of culture confirmation was low for both pulmonary and extra-pulmonary TB (30.3%, 33/109 and 19.4%, 13/67, respectively).

Sputum smear test results

In 2017, 63.4% (1,755/2,767) of people with pulmonary TB (regardless of culture confirmation) had a sputum smear (microscopy) result recorded in ETS, of which 52.9% (928/1,755) had a positive result. Of those with a positive sputum smear result, 94.9% (881/928) also had their TB diagnosis confirmed by culture, compared with only 64.9% (537/827) of those who had a negative sputum smear result. Thirteen percent (13.2%, 364/2,767) of people notified with pulmonary TB had neither a sputum smear result nor positive culture to confirm their diagnosis.

The proportion of people with a reported sputum smear result was lower in children (<15 years) (33.0%, 36/109), compared with people aged 15 to 44 years (70.6%, 1,038/1,470), 45 to 64 years (61.1%, 418/684) and 65 years and older (52.2%, 263/504).

The proportion of people with a sputum result recorded in ETS also varied by PHEC, with the highest in London (80.5%, 778/966) and the lowest in the North East (39.0%, 23/59). For further information on data completeness, see Chapter Appendix IV. Surveillance data quality.

Other laboratory test results

In 2017, only 20.1% (392/1,949) of the people who did not have their diagnosis confirmed by culture had an alternative positive laboratory result (microscopy, PCR or histology) indicative of TB. Of these, the highest proportion (12.7%, 247/1,949) had a positive histology result (Table 2.1). Overall, 30.5% (1,557/5,102) of all people with TB were not reported to have their TB diagnosis confirmed by any laboratory method (culture, microscopy, PCR or histology), an increase from 28.3% (1,587/5,616) in 2016.

Table 2.1: Number and proportion of people without culture confirmed TB by alternative method of confirmation, England, 2017

Laboratory test results[a]	Pulmonary		Extra-pulmonary		All[b]	
	n (701)[c]	%	n (1,238)[c]	%	n (1,949)[c]	%
Sputum smear positive	47	6.7	N/A	N/A	47	2.4
Smear positive (not sputum)	23	3.5	32	2.6	55	2.9
Histology positive	62	8.8	185	14.9	247	12.7
PCR positive	26	3.7	36	2.9	62	3.2
No known positive lab result	552	78.7	995	80.4	1,557	79.9

[a] Some people may have more than one test result therefore the total percentage may exceed 100%
[b] Total number of people including those with an unknown site of disease
[c] Total number of people without culture confirmed TB, used as the denominator in proportion of laboratory test results shown

TB isolates not matched to a TB notification

Unmatched isolates[13] may occur if a person with TB is not notified, and can therefore provide an estimate of under-reporting. However, some isolates may also have failed to match to a TB notification if personal identifiers were incomplete or inaccurate, and a small number may represent contaminated samples which were not identified as such in surveillance reporting.

The number and proportion of isolates received from NMRS that could not be matched to a TB notification in the previous, same or subsequent year, decreased from 427 isolates (8.5%) in 2008 to 52 isolates (1.5%) in 2016 (Table 2.2). In 2017, isolates from 198 (6.2%) people could not be matched to a TB notification in the previous or same year (Table 2.2). The proportion of unmatched isolates is likely to decrease further once matched to 2018 notifications.

[13] Isolates are deduplicated to only count one isolate per TB notification per notification period, see Appendix III: Methods for further information.

Table 2.2: Unmatched isolates by specimen year, England, 2008-2017

Specimen year	Unmatched to a notification within the previous or same year		Unmatched to a notification within the previous, same or subsequent year		All isolates[a]
	n	%	N	%	n
2008	668	13.3	427	8.5	5,015
2009	590	11.7	360	7.1	5,038
2010	505	10.3	266	5.4	4,889
2011	497	9.3	209	3.9	5,327
2012	424	8.4	161	3.2	5,021
2013	364	8.1	156	3.5	4,502
2014	271	6.9	109	2.8	3,951
2015	247	6.9	56	1.6	3,554
2016	202	5.6	52	1.5	3,579
2017	198	6.2	-	-	3,183

[a] Deduplicated based on patient identifiers to represent one isolate per TB notification per notification period

3. TB transmission

Key messages

- TB molecular cluster identification has been conducted using whole genome sequencing (WGS), which identifies the number of single nucleotide polymorphisms (SNPs) between TB isolates, since the end of 2016 in North and Central England. Clusters are defined based on people with TB isolates who are within 12 SNPs of each other
- in 2017, 23% of people with TB in North and Central England were in a 12 SNP WGS cluster with at least one other person also notified with TB in 2017
- the South of England continued to use MIRU-VNTR in 2017; the proportion of people notified with TB in 2017 who were in a cluster with at least one other person notified between 2010 and 2017 was 57%
- in 2017, the rate of TB in children born in the UK, a proxy for recent transmission in England, was 1.4 per 100,000; a 59% reduction from the peak of 3.4 per 100,000 in 2008

Genotyping methods used to determine clustering

The National TB Strain Typing Service was established in 2010 to prospectively type TB isolates using 24 loci mycobacterial interspersed repetitive units - variable number tandem repeats (MIRU-VNTR). Whole genome sequencing (WGS) replaced MIRU-VNTR in December 2016 in North and Central England and in January 2018 in the South of England. WGS provides single nucleotide polymorphism (SNP) differences between isolates and provides more precise information than MIRU-VNTR typing on how isolates relate to each other [3]. Therefore WGS, together with additional clinical and epidemiological information, provides greater insight into whether people are likely to be part of the same transmission.

In order to support transition in cluster investigation from MIRU-VNTR to WGS, sequencing was carried out retrospectively on some isolates from people epidemiologically and molecularly linked by MIRU-VNTR typing and in active clusters of public health interest.

In all areas of England, WGS is now being used routinely to identify clusters in which people are within 12 SNPs of each other. These clusters are reviewed and prioritised for targeted public health investigation and action.

Because of the change in the method used to identify clusters, it is not possible to report on national clustering using a single method for the transition year of 2017. As has been done in previous years, annual clustering identified by MIRU-VNTR will be reported, but

limited to areas in the South of England. For North and Central England clustering for the first year of rollout of WGS in 2017 is reported.

MIRU-VNTR strain typing in the South of England

In 2017, of the people notified and culture confirmed with TB in the South of England, 87.3% (1,672/1,915) had an isolate with at least 23 loci typed (Table 3.1). This proportion is lower than previous years due to the transition from the use of strain typing to WGS at the start of 2018 with some isolates from 2017 not being processed until after the transition.

The proportion of people notified in 2017 who clustered with at least one other person in the South of England between 2010 and 2017 was 56.8%. Over this eight-year period the proportion has fluctuated annually; peaking at 60.5% in 2012, and reaching the lowest level of 54.9% in 2014 (Table 3.1). Between 2010 and 2017 the proportion of people in a cluster was 1.3 times higher among people born in the UK compared with outside the UK.

The number of new clusters detected[14] was at its lowest in 2017 (133) down from 214 in 2016. Overall, for the 2,185 clusters (new and growing) identified between 2010 and 2017, the median cluster size was three people (range 2-160). The majority of clusters (76.7%; 1,675/2,185) were small in size (<5 people), with 48.0% (1,048) having only two people in the cluster. Only 8.2% of clusters (179) had ten or more people.

[14] A new cluster forms at the point when a second person is notified with an indistinguishable MIRU-VNTR strain type

Table 3.1: Number and proportion of people with TB clustered using MIRU-VNTR by place of birth and year and number of new clusters by year, South of England, 2010-2017

Year	Culture confirmed	≥23 loci typed		Clustered[b]		Non-UK born clustered[b]		UK born clustered[b]		New clusters (per year)[d]
	n	n	%[a]	n	%[c]	n	%[c]	n	%[c]	n
2010	2,837	1,997	70.4	1,177	58.9	893	56.4	250	70.6	235
2011	3,131	2,701	86.3	1,533	56.8	1,133	53.6	366	70.8	319
2012	3,081	2,813	91.3	1,702	60.5	1,266	57.4	397	73.9	317
2013	2,682	2,404	89.6	1,413	58.8	1,065	56.1	327	69.0	233
2014	2,428	2,248	92.6	1,235	54.9	913	52.0	308	65.4	238
2015	2,140	1,990	93.0	1,128	56.7	810	53.1	305	70.1	144
2016	2,189	2,061	94.2	1,220	59.2	895	55.3	305	75.1	214
2017	1,915	1,672	87.3	949	56.8	646	52.6	287	68.7	133
Total	**20,403**	**17,886**	**87.7**	**10,357**	**57.9**	**7,621**	**54.7**	**2,545**	**70.5**	**1,833**

[a] Of people who have culture confirmed TB
[b] Number of people who are clustered with at least one other person notified between 2010 and 2017
[c] Of the people who have culture confirmed TB with an isolate typed to ≥23 loci, denominator restricted by place of birth for latter groupings
[d] A new cluster forms at the point when a second person is notified

Whole genome sequencing in North and Central England

In 2017, of the people notified with culture confirmed TB in North and Central England, 93.0% (1,151/1,238) 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 one other person at a cut-off of 12 SNPs was 23.3% (268/1,151) (Table 3.2). The proportion identified at 5 and 2 SNP cut offs are also shown in Table 3.2. The proportion of clustering at 12 SNPs was 3.4 times higher among people born in the UK compared with outside the UK.

Of the 83 clusters identified at a 12 SNP cut off in 2017, the majority (85.5%; 71) were small in size (<5 people), with 51.8% (43) having only two people in the cluster. Only one cluster had ten or more people. Cluster sizes will grow as more years of data accrue.

Table 3.2: Number and proportion of people with TB clustered using WGS by place of birth and number of new clusters, North and Central England, 2017

SNP cut off applied	Clustered		Non-UK born clustered		UK born clustered		Clusters	Clusters by cluster size							
								2		3-4		5-9		≥10	
	n	%[a]	n	%[a]	n	%[a]	n	n	%	n	%	n	%	n	%
12 SNPs	268	23.3	99	13.2	166	44.6	83	43	51.8	28	33.7	11	13.3	1	1.2
5 SNPs	218	18.9	82	10.9	134	36.0	73	38	52.1	26	35.6	9	12.3	0	0.0
2 SNPs	173	15.0	68	9.1	103	27.7	63	41	65.1	16	25.4	6	9.5	0	0.0

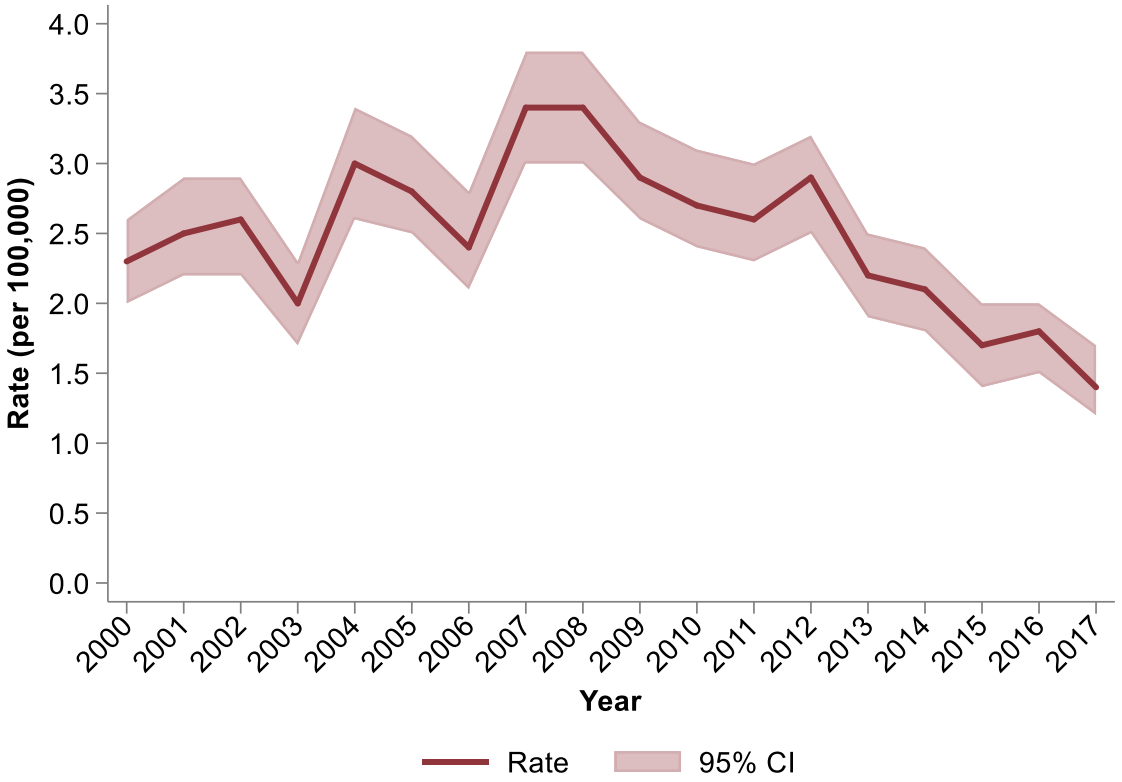
[a] Of the people who have culture confirmed TB with an isolate sequenced of sufficient quality to report relatedness, denominator restricted by place of birth for latter groupings

Rate of TB in children born in the UK[15]

TB in children indicates likely recent transmission, as children have a limited time during which they could have become infected, and in most cases progress to disease within 12 months. Therefore, the rate of TB in children (<15 years) born in the UK is a proxy for recent transmission within England. In 2017, this rate was 1.4 per 100,000 (95% CI 1.2-1.7). There has been a 58.8% overall reduction in this rate between its peak of 3.4 per 100,000 (95% CI 3.0-3.8) in 2007-2008 and the rate in 2017 (Figure 3.1, Table Ai.3.1).

[15] Rate for TB in England for children born in the UK

Figure 3.1: Rate of TB in children (<15 years) born in the UK, England, 2000-2017



TB Monitoring Indicator 5: Incidence of TB in UK born children (<15 years) (England)

Summary of TB transmission

In 2017, transmission indicators reduced to their lowest levels; these include the proportion of people with TB clustered by MIRU-VNTR, the number of new MIRU-VNTR clusters, and the rate of TB among children born in the UK.

Compared with MIRU-VNTR typing, a much smaller proportion of people cluster on WGS. Where clustering does occur this is markedly among people born in the UK, showing that WGS should assist in removing many of those clustered on MIRU-VNTR due to common endemic strains imported from abroad.

4. Delay from symptom onset to treatment start

Key messages

- in 2017, among people with pulmonary TB (pTB) there was a median of 79 days between symptom onset and treatment start
- nearly one-third (31%) of people with pTB experienced a delay of more than four months between symptom onset and treatment start, with no improvement seen over time (2011: 26%)
- a low proportion (17%) of children (<15 years) with pTB experienced a delay of more than four months; in contrast, 38% of those aged 65 years and older experienced a delay of more than four months
- a higher proportion of people with pTB born in the UK (37%) experienced a delay of more than four months compared with those born outside the UK (28%)

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

Information on time from symptom onset to treatment start was available for 92.3% (2,503/2,713) of people with pulmonary TB (pTB) notified in 2017. Data on the time from symptom onset to treatment start has been available for more than two-thirds of people with pTB since 2011, and data completion has improved during this period. Uncertainties about the quality of data collected for date of first presentation to health services means it is not possible to distinguish late presentation to health services from delays occurring within the health service. For further information on data completeness, see Chapter Appendix IV. Surveillance data quality.

In 2017, among people with pTB, the median time between symptom onset and treatment start was 79 days (interquartile range 39-143). Thirty nine percent (38.8%, 971/2,503) of people started treatment within two months, 30.0% (750) between two and four months and 31.2% (782) experienced a delay of more than four months. The proportion of people who experienced this delay in 2017 was the same as 2016, both years being the highest level since 2011 (Table 4.1).

Table 4.1: Number and proportion of people with pulmonary TB by time from symptom onset to treatment start, England, 2011-2017

Year	Time from symptom onset to treatment start						
	0-2 months		2-4 months		>4 months		Total[a]
	n	%	n	%	n	%	n
2011	1,317	45.0	855	29.2	753	25.7	**2,925**
2012	1,371	44.1	922	29.7	814	26.2	**3,107**
2013	1,224	41.2	898	30.2	847	28.5	**2,969**
2014	1,159	39.5	887	30.2	888	30.3	**2,934**
2015	1,181	42.3	834	29.8	780	27.9	**2,795**
2016	1,069	38.6	838	30.2	865	31.2	**2,772**
2017	971	38.8	750	30.0	782	31.2	**2,503**

[a] number of people with pulmonary TB for whom time between symptom onset to treatment start was known

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

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

Age

As in previous years, in 2017, the proportion of people with pTB who experienced a delay of more than four months increased with age (<15 years: 16.7%, 15-44 years: 28.1%, 45-64 years: 35.5%, 65+ years: 38.3%) (Table 4.2). Between 2016 and 2017, the proportion of people who experienced this delay increased in children (<15 years) (2016: 11.4%, 13/114) and those aged 15 to 44 years (2016: 27.9%, 428/1,536). In contrast, there was a small decrease in this delay for those aged 65 years and older (2016: 41.2%, 181/439).

Table 4.2: Number and proportion of people with pulmonary TB by time from symptom onset to treatment start by age group, England, 2017

Time from symptom onset to treatment start	Age group (years)									
	0-14		15-44		45-64		65+		Total[a]	
	n	%	n	%	n	%	n	%	n	%
0-2 months	66	68.8	566	41.5	203	33.2	136	31.6	971	38.8
2-4 months	14	14.6	415	30.4	191	31.3	130	30.2	750	30.0
>4 months	16	16.7	384	28.1	217	35.5	165	38.3	782	31.2
Total	**96**	**100.0[b]**	**1,365**	**100.0**	**611**	**100.0**	**431**	**100.0[b]**	**2,503**	**100.0**

[a] The number of people with pulmonary TB for whom time between symptom onset to treatment start was known

[b] Percentages may not sum to total of 100.0% due to rounding

Sex

In 2017, a higher proportion of females with pTB (34.8%, 334/959) experienced a delay of more than four months compared with males (29.0%, 448/1,544) (Table 4.3). Among females, this trend was observed in all age groups, with the exception of children; in particular, 45.0% (76/169) of females aged 65 years and older experienced a delay of more than four months (Table 4.3).

Table 4.3: Number and proportion of people with pulmonary TB who experienced a delay of more than four months between symptom onset and treatment start by age group and sex, England, 2017

Age group (years)	Female		Male		Total[a]
	n	%	n	%	n
0-14	7	13.7	9	20.0	16
15-44	170	31.4	214	26.0	384
45-64	81	40.9	136	32.9	217
65+	76	45.0	89	34.0	165
Total	**334**	**34.8**	**448**	**29.0**	**782**

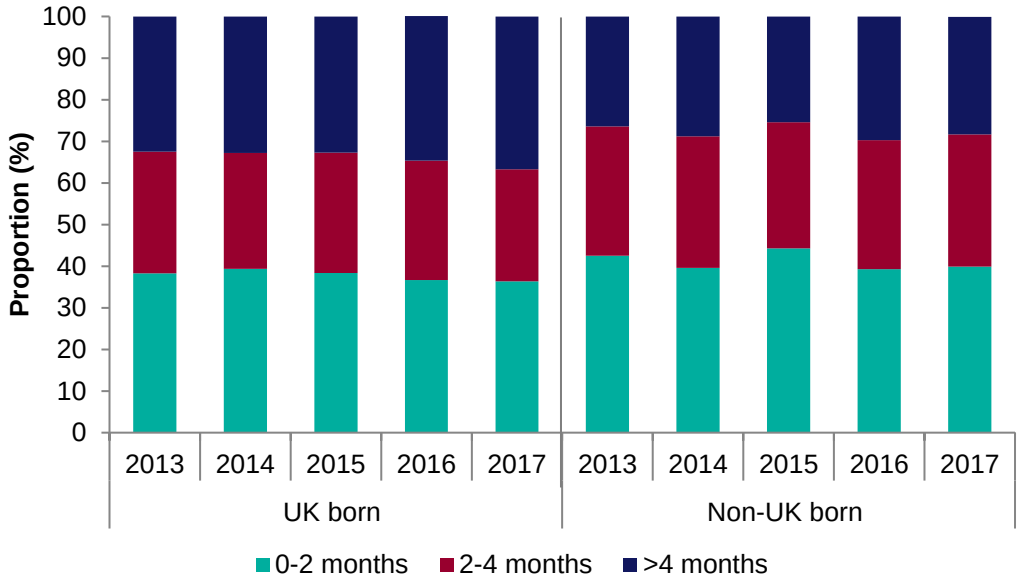
[a] The number of people with pulmonary TB for whom time between symptom onset to treatment start was known

Place of birth

In 2017, as in previous years, people with pTB who were born in the UK experienced a longer delay than those born outside the UK (Figure 4.1 and Table Ai.4.1). Among people born in the UK, there was an increase in the proportion with a delay of more than four months between 2016 (34.7%, 307/886) and 2017 (36.7%, 330/900). In contrast, there was a small decrease in this proportion for those born outside the UK during the same time period (2016: 29.7%, 553/1,863 versus 2017: 28.2%, 445/1,577).

The difference in delay by place of birth was similar between females (born in the UK: 37.9%, 130/343 versus born outside the UK: 33.1%, 200/605) and males (UK born: 35.9%, 200/557 versus non-UK born: 25.2%, 245/972) in 2017.

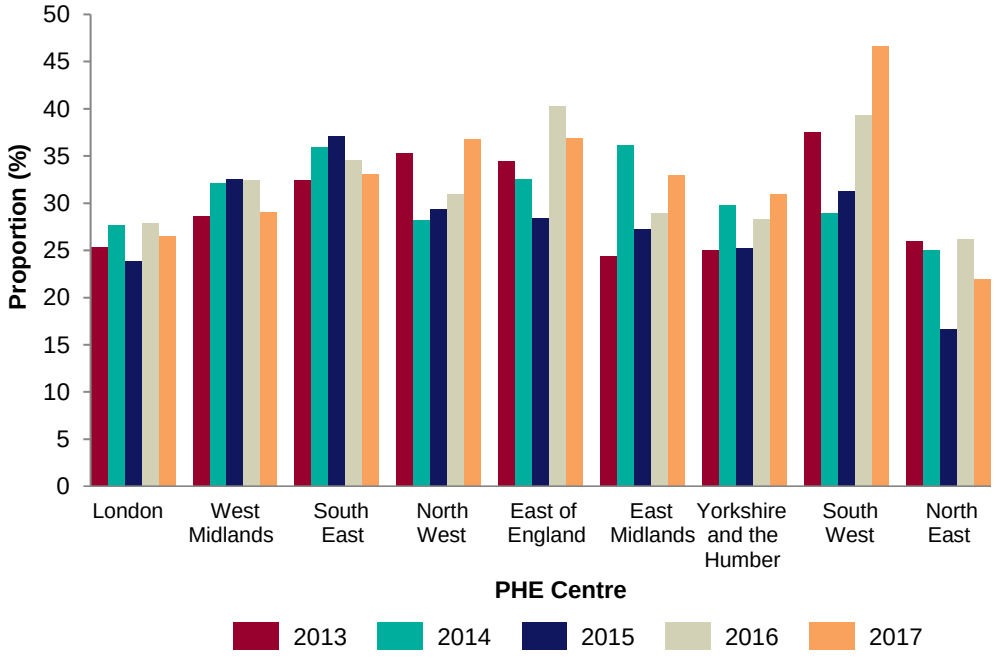
Figure 4.1: Proportion of people with pulmonary TB by time from symptom onset to treatment start by place of birth, England, 2013-2017



Geographical distribution

The proportion of people with pTB who experienced a delay of more than four months varied by PHEC. In 2017, this was highest in the South West (46.6%, 68/146), where there has been an annual increase since 2014. In contrast, the North East had the lowest proportion (22.0%, 11/50) in 2017 (Figure 4.2 and Table Ai.4.2).

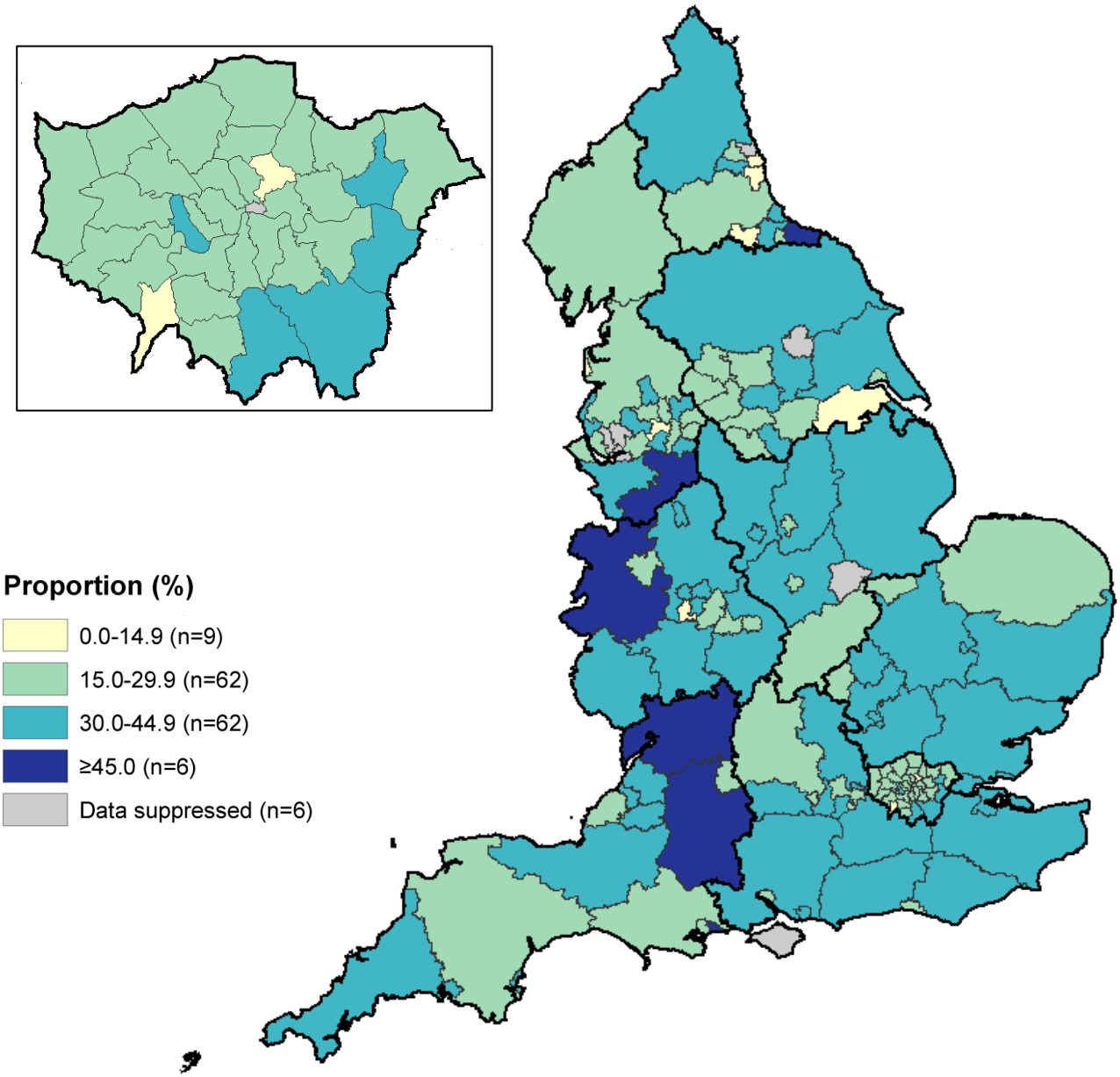
Figure 4.2: Proportion of people with pulmonary TB with a delay of more than four months between symptom onset and treatment start by PHE Centre[a], England, 2013-2017



[a] Ordered by decreasing total number of TB notifications in 2017

For the three years of 2015 to 2017, there was considerable variation by upper tier local authority in the proportion of people with pTB who experienced a delay of more than four months between symptom onset and treatment start (Figure 4.3).

Figure 4.3: Proportion of people with pulmonary TB[a] who experienced a delay of more than four months between symptom onset date and treatment start by local authority district[b], England, 2015-2017 (box shows enlarged map of London area)



[a] People with pulmonary TB for whom time between symptom onset to treatment start was known
[b] Data for Upper-tier local authorities with less than five people with pulmonary TB and known time between symptom onset to start of TB treatment are suppressed due to the effect of small numbers on the proportion.
PHEC boundaries are outlined in black

5. TB outcomes in the drug sensitive cohort

Key messages

- in 2016 there was an increase in the proportion of people notified with drug sensitive TB (with an expected treatment duration of less than 12 months) who completed treatment by 12 months (84.4%)
- the proportion of all people with drug sensitive TB who died at the last recorded outcome was 5.5%, lower than in 2015 (6.1%)
- similar to previous years, the proportion of people who were lost to follow-up at the last recorded outcome was 3.9%

Drug sensitive cohort, 2007-2016

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 (for the full definition of the drug resistant cohort see Chapter 6). 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 Chapter 6.

TB outcomes for the drug sensitive cohort are reported separately for the following groups:

- for people with TB with an expected treatment duration of less than 12 months, TB outcomes at 12 months are reported This group excludes people with CNS disease. In addition, those with spinal, cryptic disseminated or miliary disease are excluded, as CNS involvement cannot be reliably ruled out for the purposes of reporting.
- for people with CNS, spinal, cryptic disseminated or miliary disease, the last recorded TB outcome is reported.

Detailed data on deaths and people lost to follow-up at last recorded outcome are presented for the entire drug sensitive cohort.

TB outcomes for the drug sensitive cohort with expected treatment duration of less than 12 months

Treatment completion

Table 5.1: Outcome at 12 months for people with drug sensitive TB with expected treatment duration <12 months[a], England, 2016

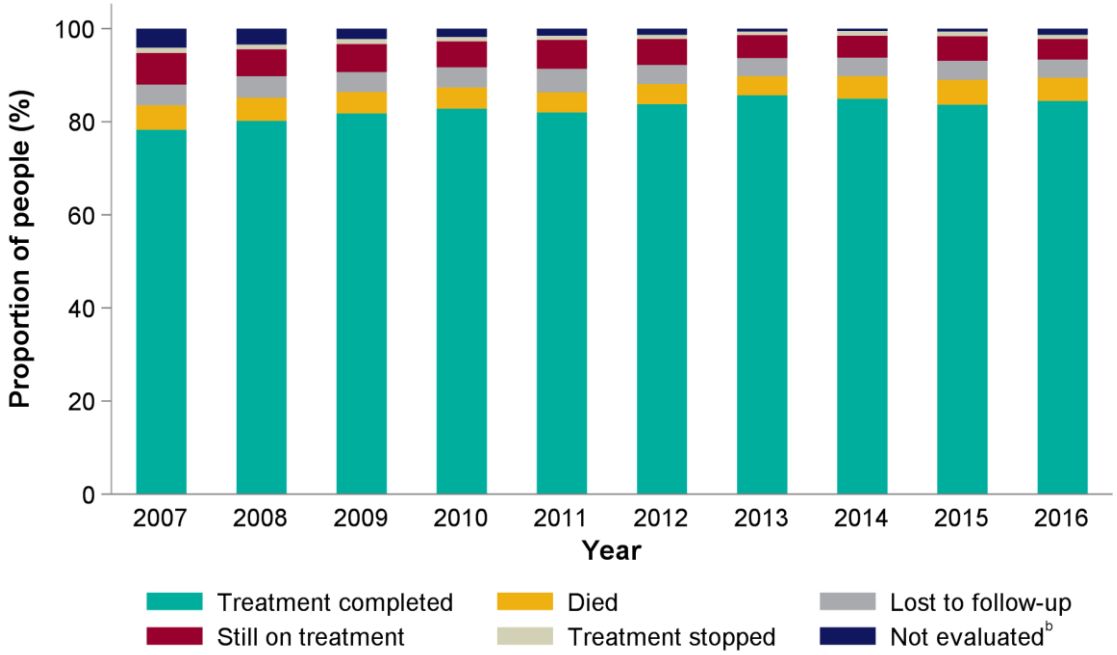
TB outcome	n	%
Treatment completed	4,201	84.4
Died	248	5.0
Lost to follow-up	196	3.9
Still on treatment	219	4.4
Treatment stopped	47	0.9
Not evaluated[c]	64	1.3
Total	**4,975**	**100.0[b]**

[a] Excludes people in the drug resistant cohort and those with CNS, spinal, miliary or cryptic disseminated TB
[b] Percentages may not sum to total of 100% due to rounding
[c] Not evaluated includes unknown and transferred out

Eighty four percent (84.4%, 4,201/4,975) of people notified in 2016 completed treatment within 12 months; an increase from 83.7% (4,189/5,005) in 2015 (Table 5.1, Figure 5.1, Table Ai.5.1). A further 2.8% (139/4,975) of people notified in 2016 are known to have completed treatment after 12 months, bringing the overall treatment completion to 87.2% (4,340/4,975) at the last recorded outcome (Table Ai.5.2).

Of those who completed treatment and had known duration of treatment, 96.9% (4,156/4,290) completed within 12 months and nearly three-quarters (72.6%, 3,113/4,290) completed in six to eight months. However, 5.6% (241/4,290) of people completed treatment in less than six months (168 days), which is less than a full course of short-course treatment (Table Ai.5.3). This has increased from 5.1% (221/4,360) in the cohort notified in 2015.

Figure 5.1: Outcomes at 12 months for people with drug sensitive TB with expected treatment duration <12 months[a], England, 2007-2016



[a] Excludes people in the drug resistant cohort and those with CNS, spinal, miliary or cryptic disseminated TB
[b] Not evaluated includes unknown and transferred out

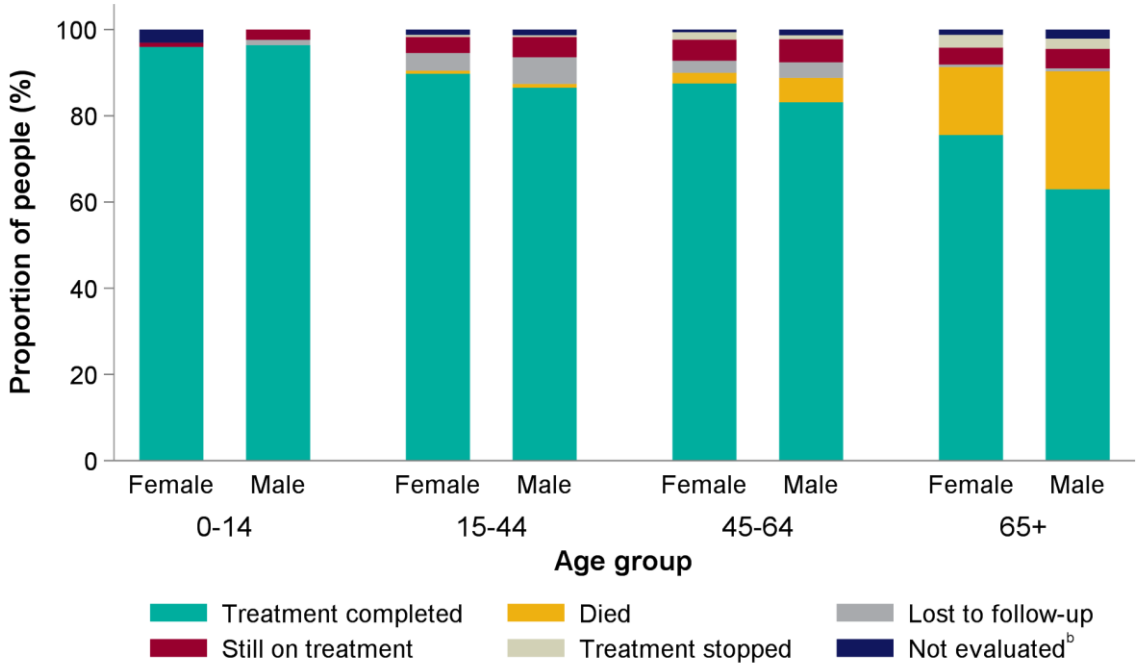
Age and sex

Treatment completion within 12 months was higher for females (87.2%, 1,772/2,033) than for males (82.6%, 2,429/2,942) notified in 2016.

As in previous years, the proportion of people notified in 2016 who completed treatment within 12 months decreased with increasing age, from 96.2% (179/186) in children (<15 years) to 68.6% (519/757) in those aged ≥65 years (Table Ai.5.4). Among people aged 65 years and older this proportion was higher than in 2015 (63.6%), and among children there has been a year-on-year improvement since 2011 (85.5%).

The difference in treatment completion by sex increased with age. The difference was largest in people aged 65 years and older; 62.9% (265/421) of males completed treatment compared with 75.6% (254/336) of females (Figure 5.2, Table Ai.5.5).

Figure 5.2: Outcomes at 12 months by age group for people with drug sensitive TB with expected treatment duration <12 months[a], by sex and age group, England, 2016



[a] Excludes people in the drug resistant cohort and those with CNS, spinal, miliary or cryptic disseminated TB
[b] Not evaluated includes unknown and transferred out

Site of disease

Treatment completion at 12 months was lower in people who had pulmonary TB, compared with those who only had extra-pulmonary TB (80.7%, 2,183/2,706 versus 89.0%, 2,012/2,260, respectively). A detailed breakdown of treatment completion by site of disease at the last recorded outcome is available in Table Ai.5.6.

Geographical distribution

Treatment completion at 12 months varied by PHEC for people notified in 2016; from 86.8% (1,661/1,914) in London to 74.8% (228/305) in the East Midlands (Table Ai.5.7). The South West had a year-on-year improvement in treatment completion between 2011 (68.8%) and 2016 (78.8%). In comparison, in the East Midlands there has been a decline in treatment completion since 2013 (88.1%) (Table Ai.5.8).

Still on treatment

Four percent (4.4%, 219/4,975) of people notified in 2016 were still on treatment at 12 months (Table 5.1, Table Ai.5.1), although it is known from the last recorded outcome that the majority (63.5%, 139/219) went on to complete treatment (Table Ai.5.2). Twenty-five percent (24.7%, 42/170) of people who were still on treatment at 12 months with known drug sensitivity results were resistant to isoniazid without MDR-TB.

Where the reason for still being on treatment was recorded (86.8%, 190/219), 57.9% (110) were on a planned regimen exceeding 12 months, 26.8% (51) had their treatment changed, and 15.3% (29) had their treatment interrupted.

TB outcomes for drug sensitive cohort with CNS, spinal, miliary or cryptic disseminated TB

Table 5.2: Last recorded TB outcome for drug sensitive cohort with CNS, spinal, miliary or cryptic disseminated[a] TB, England, 2016

TB outcome	n	%
Treatment completed	416	72.6
Died	54	9.4
Lost to follow-up	22	3.8
Still on treatment	52	9.1
Treatment stopped	4	0.7
Not evaluated[b]	25	4.4
Total	**573**	**100.0**

[a] Excludes people in the drug resistant cohort and only includes people with drug sensitive CNS, spinal, miliary or cryptic disseminated TB
[b] Not evaluated includes unknown and transferred out

At the last recorded outcome, 72.6% (416/573) of people notified in this cohort in 2016 had completed treatment and 9.1% (52/573) were still on treatment (Table 5.2, Table Ai.5.9). There is a shorter follow-up period for people notified in 2016, and so the proportion who complete treatment is expected to increase, as in previous years. For people notified with TB in 2015, 80.7% (532/659) completed treatment at the last recorded outcome (Table Ai.5.9).

TB outcomes in the entire drug sensitive cohort

At the last recorded outcome, eighty six percent (85.7%, 4,756/5,548) of all people notified with drug sensitive TB in 2016 had completed treatment, 5.5% (304) had died, and 3.9% (219) were lost to follow-up (Table 5.3, Table Ai.5.10).

Table 5.3: Last recorded TB outcome for the entire drug sensitive cohort[a], England, 2016

TB outcome	n	%
Treatment completed	4,756	85.7
Died	304	5.5
Lost to follow-up	219	3.9
Still on treatment	129	2.3
Treatment stopped	51	0.9
Not evaluated[c]	89	1.6
Total	**5,548**	**100.0[b]**

[a] Excludes people in the drug resistant cohort
[b] Percentages may not sum to total of 100% due to rounding
[c] Not evaluated includes unknown and transferred out

Death in the entire drug sensitive cohort

In 2016, 5.5% (304/5,548) of people notified were reported to have died at the last recorded outcome, a slight decrease compared with 2015 (6.1%) (Table Ai.5.10). For people notified in 2016 who had died, TB caused or contributed to 35.2% (107) of deaths, was incidental to 25.0% (76) of deaths, and for 39.8% (121) the relationship between TB and death was unknown (Table Ai.5.11). Overall, TB was diagnosed post-mortem in 14.5% (44/304) of these deaths. The median time to death after starting treatment (known for 71.2% (185/260) of those who were not diagnosed post-mortem) was 34 days (range 0-435 days); and 68.1% (126/185) died within two months of starting treatment.

A higher proportion of males died at last recorded outcome (6.2%, 204/3,268) compared with females (4.4%, 100/2,280). The proportion of people with TB that died at the last recorded outcome was highest in those aged 65 years and older (23.1%, 195/845), compared with 5.2% (73/1,409) in the 45 to 64 age group and 1.2% (36/3,095) in the 15 to 44 age group.

A higher proportion of people notified with pulmonary TB in 2016 died at the last recorded outcome compared to those with only extra-pulmonary disease (7.6%, 226/2,962 versus 2.9%, 76/2,577, respectively) (Table Ai.5.6). A higher proportion of people with a previous diagnosis of TB (5.9%, 20/341) died compared with those who had not had TB previously (4.7%, 233/4,992). This difference was smaller than in 2015 (9.8% vs 5.0%, respectively).

Fourteen percent (14.3%, 33/231) of adults (aged ≥15 years) who died had a social risk factor, which was lower than in the previous two years (2015: 20.6% and 2014: 17.7%).

The proportion of deaths varied by PHEC; from 4.0% (88/2,179) in London to 8.5% (28/331) in the East Midlands (Table Ai.5.12).

Lost to follow-up in the entire drug sensitive cohort

Four percent (3.9%, 219/5,548) of people notified in 2016 were lost to follow-up at the last recorded outcome (Table 5.3). This proportion was higher among people born outside the UK (4.6%, 186/4,037) compared with those born in the UK (1.8%, 26/1,443). Where the reason was known, 58.8% (97/165) of people born outside the UK had left the country. The proportion of people lost to follow-up was highest in those aged 15 to 44 years (5.4%, 168/3,095). Nearly two-thirds (64.8%, 142/219) of people lost to follow-up had pulmonary disease.

6. Drug resistant TB and outcomes in the drug resistant cohort

Key messages

- the proportion of people with initial isoniazid resistance without MDR/RR-TB has remained stable (around 6%) over the past 10 years
- the number of people with confirmed initial MDR/RR-TB decreased slightly between 2016 and 2017 (60 versus 55); however, the proportion was similar (1.7% versus 1.8%)
- in 2017, of the 55 people with MDR/RR-TB, three had confirmed initial XDR-TB, fewer than each of the previous two years
- the number of people in the drug resistant cohort (confirmed or treated as MDR/RR-TB) decreased between 2016 and 2017 (68 versus 61)
- 58% of the drug resistant cohort notified in 2015 completed treatment by 24 months, a higher proportion than for those notified in 2014 (52%)
- by the last recorded outcome, 8% of the 2015 cohort were lost to follow-up, a much lower proportion than in 2014 (19%)

Identification and classification of drug resistance

Susceptibility testing is conducted for all people with culture confirmed TB. Whole genome sequencing (WGS) (see chapter 3 for further details) provides resistance predictions for first line drugs (isoniazid, rifampicin, ethambutol and pyrazinamide), aminoglycosides and fluoroquinolones, at the same time as species identification and strain relatedness determination. Recognition and reporting of drug resistance is much faster using WGS. Phenotypic drug susceptibility testing (DST) is performed for first line drugs, with additional testing for second line drugs if first line resistance is detected [4]. Results from these tests are presented in this chapter, along with some additional data for those who had resistance identified by a PCR method or were treated with an MDR-TB regimen in the absence of confirmation of resistance.

Drug resistance may be classified as initial resistance if identified early during the diagnosis and treatment phase (on isolates within three months of the first specimen date). Drug resistance is classed as acquired if identified on repeat culture three or more months after the first specimen date. In addition, people with a change from a sensitive to resistant result following treatment start are reclassified as having acquired resistance, even if this is within the three month period.

Data presented in this chapter includes people notified with initial isoniazid resistance (INH-R) without MDR-TB and for those in the drug resistant cohort. The drug resistant cohort includes: people with confirmed[16] initial or acquired MDR/RR-TB and people treated with a second line regimen for MDR/RR-TB without confirmation of this resistance [5].

Initial first line drug resistance

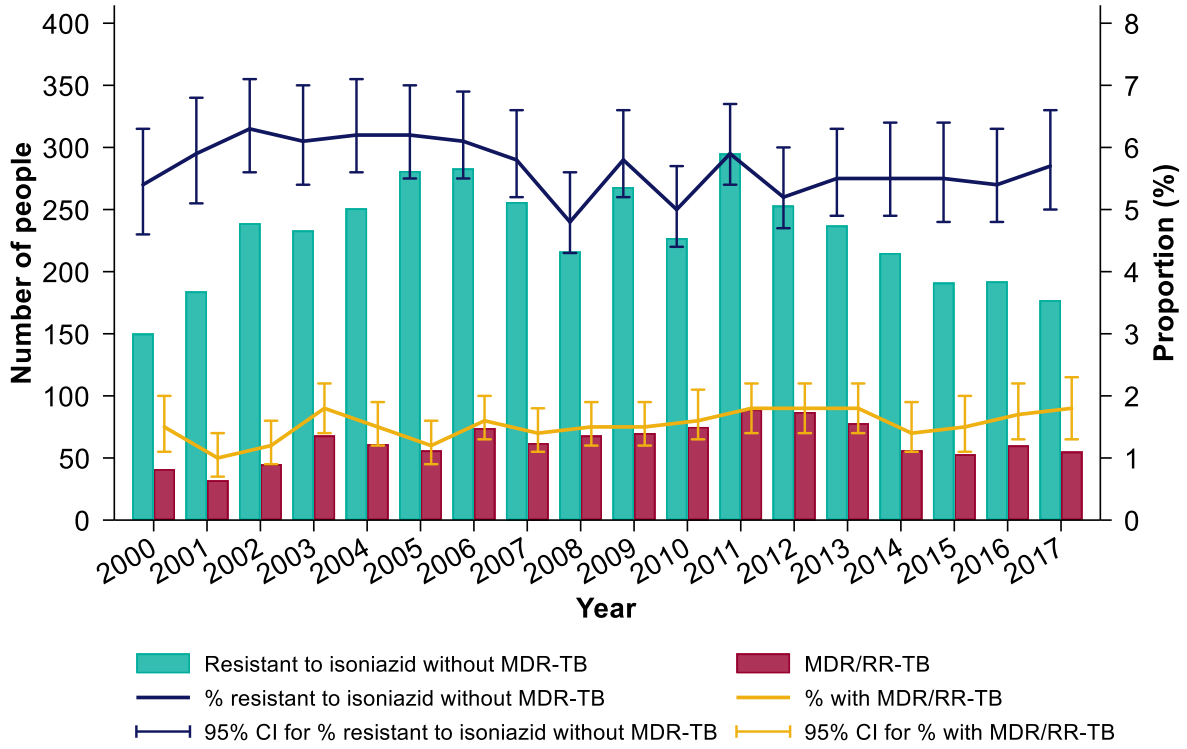
In 2017, 98.8% (3,115/3,153) of people with culture confirmed TB had results for at least isoniazid and rifampicin susceptibility and 96.6% (3,045/3,153) had results for all first line drugs, a similar proportion to previous years (Table Ai.6.1). Of these people, 7.1% (222/3,115) had resistance to isoniazid (INH-R), 1.8% (55/3,115) to rifampicin, 1.7% (53/3,113) to ethambutol and 1.9% (58/3,047) to pyrazinamide (Table Ai.6.2). Overall, 8.5% (265/3,115) of people had resistance to at least one first line drug, and 1.4% (45/3,115) had MDR-TB[17] (Tables Ai.6.2, Ai.6.3).

Isoniazid resistance without MDR-TB

Similar to previous years, in 2017, 5.7% (177/3,115) of people had initial INH-R without MDR-TB (INH-R TB) (Figure 6.1, Table Ai.6.3). Seven percent (7.2%, 89/1,240) of females had INH-R TB compared with 4.7% (88/1,875) of males (Table 6.1). The most frequent countries of birth for these individuals were the UK (48), India (40) and Pakistan (22). In the five years from 2013 to 2017 the highest proportion of people with INH-R TB was in the East of England PHEC (6.5%, 87/1,336) and London PHEC (6.2%, 444/7,164) (Table Ai.6.4).

[16] Culture confirmed TB with phenotypic DST or WGS resistance predictions conducted
[17] MDR-TB is defined as resistance to at least isoniazid and rifampicin

Figure 6.1: Number and proportion[a] of people notified with TB with initial drug resistance, England, 2000-2017



[a] People with culture confirmed TB with a result (DST or WGS) for isoniazid and rifampicin

Table 6.1: Number and proportion of people with drug resistant TB by characteristic, England, 2017

Characteristic	Total number[a]	Isoniazid resistance without MDR-TB		MDR/RR-TB	
	n	n	%	n	%
Sex					
Female	1,240	89	7.2	31	2.5
Male	1,875	88	4.7	24	1.3
Age					
0-14	46	3	6.5	1	2.2
15-44	1,824	92	5.0	33	1.8
45-64	739	54	7.3	15	2.0
65+	506	28	5.5	6	1.2
Most frequent countries of birth[b]					
UK	838	48	5.7	14	1.7
India	502	40	8.0	12	2.4
Pakistan	317	22	6.9	1	0.3
Romania	148	4	2.7	1	0.7
Somalia	80	4	5.0	1	1.3
Bangladesh	64	4	6.3	1	1.6
Philippines	59	8	13.6	2	3.4
Lithuania	38	0	0.0	9	23.7
At least one social risk factor	404	23	5.7	11	2.7
Previous diagnosis	151	10	6.6	10	6.6

[a] People with culture confirmed TB with a result (DST or WGS) for isoniazid and rifampicin
[b] Included if four or more people had either isoniazid resistance without MDR-TB or MDR/RR-TB, ordered by number of people with a result (DST or WGS) for isoniazid and rifampicin

Drug resistant cohort

In this chapter, where possible, we report on the entire DR cohort[18]. To report on the proportion of people with MDR/RR-TB, only those with initial MDR/RR-TB confirmed by DST or WGS are included, as there is no denominator data for people with acquired MDR/RR-TB or those treated with a second line regimen without confirmation.

The number of people in the DR cohort decreased over the six years leading to 2017, from 95 people notified in 2011 to 61 in 2017 (Table 6.2). In 2017, 10 people had RR-TB and 51 had MDR-TB; 46 of who had confirmed resistance (one acquired) and 5 were treated with a second line regimen without confirmation (Table 6.2). Four of the five people without confirmation were contacts of people with confirmed MDR/RR-TB, while one was treated based on clinical decision.

Multi-drug resistant/rifampicin resistant (MDR/RR) TB

The number of people with MDR/RR-TB who had initial resistance decreased from 60 in 2016 to 55 in 2017, while the proportion increased slightly from 1.7% (60/3,545) to 1.8% (55/3,115) (Figure 6.1, Table Ai.6.3)[19]. In 2017, the proportion of females with MDR/RR-TB (2.5%, 31/1,240) was higher than in males (1.3%, 24/1,875) (Table 6.1). While the proportion of people with MDR/RR-TB was similar among those born in the UK (1.7%, 14/838) and those born outside the UK (1.9%, 41/2,214), there was considerable variation by country of birth. A very high proportion of people born in Lithuania had MDR/RR-TB (23.7%, 9/38), compared with other countries of birth (Table 6.1). A higher proportion of people with a social risk factor (SRF) had MDR/RR-TB than those without a SRF (2.7%, 11/404 versus 1.5%, 36/2,339). The proportion of people with MDR/RR-TB was higher among those with a previous diagnosis of TB compared with those without (6.6%, 10/151 versus 1.5%, 41/2,810) (Table 6.1). Between 2013 and 2017, the Yorkshire and the Humber PHEC had the highest proportion of people with MDR/RR-TB (2.3%, 33/1,457) (Table Ai.6.4).

[18] The drug resistant (DR) cohort includes people with culture confirmed initial and acquired MDR/RR-TB, as well as those treated with a second line regimen for MDR/RR-TB without a DST or WGS result indicating resistance. People with TB may be treated with a second line regimen in the absence of this confirmation if they were diagnosed abroad, were a contact of a person with MDR/RR-TB or for other clinical reasons.

[19] Proportions are calculated using the denominator of all people with culture confirmed TB with phenotypic DST results or WGS resistance predictions for at least isoniazid and rifampicin

Table 6.2: Number of people with TB in the drug resistant cohort, England, 2000-2017

Year	Rifampicin resistant without MDR-TB[a]			MDR-TB including XDR				Drug resistant cohort[b]
	Initial resistance	Acquired resistance	Total	Initial resistance	Acquired resistance	Treated with MDR-TB regimen	Total	
2000	13	0	13	28	0	0	28	**41**
2001	10	0	10	22	0	3	25	**35**
2002	10	1	11	35	3	0	38	**49**
2003	19	0	19	49	2	0	51	**70**
2004	16	1	17	45	6	3	54	**71**
2005	15	1	16	41	4	1	46	**62**
2006	20	0	20	54	4	2	60	**80**
2007	13	2	15	49	4	3	56	**71**
2008	18	0	18	50	6	6	62	**78**
2009	11	1	12	59	2	4	65	**77**
2010	10	1	11	66	2	1	68	**79**
2011	8	0	8	81	4	2	87	**95**
2012	10	0	10	77	2	5	84	**94**
2013	10	1	11	68	0	6	74	**85**
2014	4	0	4	52	3	10	65	**69**
2015	8	0	8	45	2	12	59	**67**
2016	7	0	7	53	0	9	62	**68**
2017	10	0	10	45	1	5	51	**61**

[a] People with culture confirmed TB with a result (DST or WGS) for isoniazid and rifampicin
[b] Total number of people with initial or acquired MDR/RR-TB, and people treated with a second line regimen.

Second line drug resistance and Extensively Drug Resistant (XDR) TB

In 2017, of the 55 poeple with confirmed initial MDR/RR-TB and results for all first line drugs (98.2%, 54/55), 42.6% (23/54) were resistant to all four. Among people with MDR/RR-TB tested for resistance to injectables[20,21] and/or fluoroquinolones[22,23], 13.7% (7/51) were resistant to at least one injectable agent and 34.0% (18/53) were resistant to at least one fluoroquinolone (Table Ai.6.5) [6]. The resistance patterns of people with MDR/RR-TB with injectable or fluoroquinolone resistance is strongly associated with country of birth (Figure 6.2, Table Ai.6.6).

In 2017, three people had initial XDR-TB, fewer than the seven in 2016. An additional three people were treated for XDR-TB without confirmation (Tables 6.3 and Ai.6.3), all of whom were contacts of individuals with confirmed XDR-TB. The majority of people with XDR-TB (confirmed/treated) were aged 15 to 44 years (4/6), born outside the UK (4/6) and had pulmonary TB (4/6). One had a previous history of TB diagnosis. Overall between 2013 and 2017, the highest numbers of people with confirmed XDR-TB were born in Lithuania (10), followed by a small number from the UK (6), India (3) and Romania (2) (Figure 6.2, Table Ai.6.6).

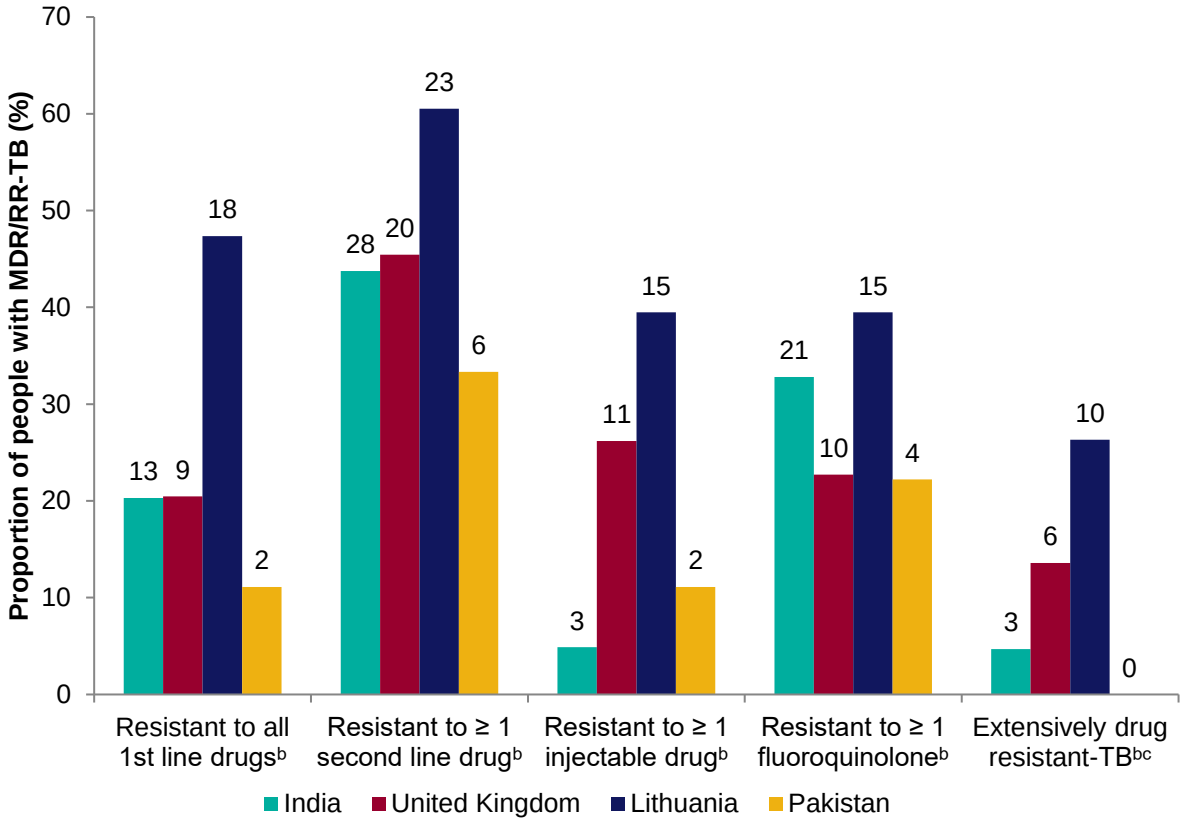
Table 6.3 Number of people with TB with initial and amplified XDR-TB, England, 2008-2017

Year	XDR-TB			
	Initial resistance	Acquired resistance	Treated with an XDR-TB regimen	Total
2008[a]	2	0	0	2
2009	2	0	0	2
2010	2	1	0	3
2011	6	0	0	6
2012	2	0	0	2
2013	3	0	0	3
2014	3	0	0	3
2015	10	0	0	10
2016	7	0	2	9
2017	3	0	3	6
Total	**40**	**1**	**5**	**46**

[a] Prior to 2008, only three people with TB were confirmed or treated as XDR: one in 2000 who acquired XDR, one in 2003 with initial confirmed XDR, and one in 2007 treated with an XDR regimen without confirmation

[20] Includes those with a DST result for at least one injectable or a WGS result for aminoglycosides
[21] Injectables include amikacin, capreomycin or kanamycin
[22] Includes those with a DST result for at least one fluoroquinolone or a WGS result for quinolones
[23] Fluoroquinolones include ofloxacin, moxifloxacin or ciprofloxacin

Figure 6.2: Number and proportion of people with MDR/RR-TB[a] by full resistance profile by most frequent country of birth, England, 2013-2017



[a] People with culture confirmed TB with results (DST or WGS) for isoniazid and rifampicin
[b] Denominators only include people with results for the drugs in question
[c] Resistant to both a fluoroquinolone and an injectable

Please note: number of people with MDR/RR-TB are displayed as labels

Acquired drug resistance on repeat culture

Five people with culture confirmed TB notified in 2017 were identified to have acquired resistance on repeat testing. Two people with drug sensitive TB acquired resistance to isoniazid, one acquired resistance to both isoniazid and rifampicin developing MDR-TB, and two people with MDR-TB acquired resistance to pyrazinamide.

Among people with culture confirmed TB notified between 2000 and 2017[24], 164 (0.2%) were known to have acquired resistance while on treatment in England, of which 31.7% (52) acquired resistance to rifampicin and 31.7% (52) acquired resistance to isoniazid.

[24] People who acquire resistance are recorded in the year of notification, not the year resistance was acquired. Numbers for recent years may increase for those still on treatment

TB outcomes for the drug resistant cohort

TB outcomes are reported for the entire DR cohort; outcomes are reported at 24 months so the most recent year of reporting is for people notified in 2015. In 2015, of the 67 people in the cohort; eight had rifampicin resistance without MDR-TB, 37 had MDR-TB, 10 had XDR-TB, and 12 were treated with a second line regimen without confirmation (Table 6.2, Table 6.3).

Fifty-eight percent (58.2%, 39/67) of people completed treatment within 24 months (Figure 6.3, Table 6.4, Table Ai.6.7). A further seven people are known to have completed treatment after 24 months, bringing overall treatment completion for people notified in 2015 to 68.7% (46/67) (Table 6.4, Table Ai.6.8).

Table 6.4: 24-month and last recorded TB outcomes for the drug resistant cohort[a], England, 2015

TB outcome	At 24 months		At last recorded outcome	
	n	%[b]	n	%[b]
Completed	39	58.2	46	68.7
Died	5	7.5	5	7.5
Lost to follow-up	5	7.5	5	7.5
Still on treatment	12	17.9	9	13.4
Treatment stopped	1	1.5	1	1.5
Not evaluated[c]	5	7.5	1	1.5
Total	**67**	**100.0**	**67**	**100.0**

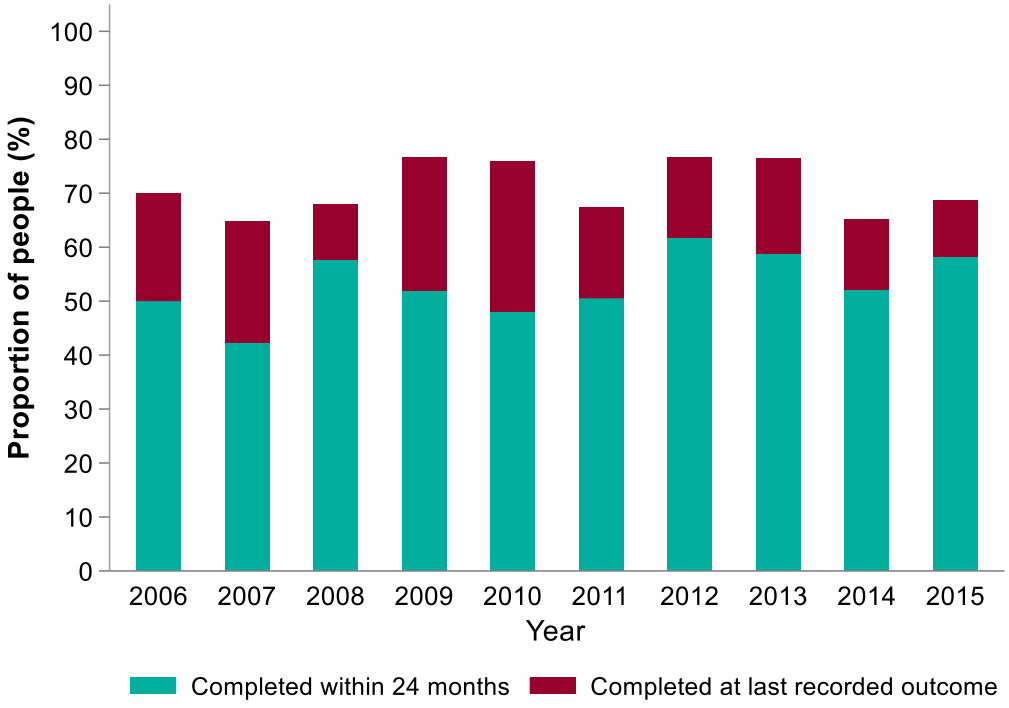
[a] Includes people with initial and acquired MDR/RR-TB and people treated with a second line regimen
[b] Percentages may not sum to total of 100% due to rounding
[c] Not evaluated includes unknown and transferred out

For people with known treatment start and treatment completion dates, 16 (36.4%, 16/44) had less than 18 months of treatment, of which four had less than 12 months of treatment (Table Ai.6.9).

Five (7.5%, 5/67) people had died at their last recorded outcome, compared with two (2.9%) from the drug resistant cohort notified in 2014 (Table 6.4, Table Ai.6.8). Five (7.5%) people were lost to follow-up; all five were born outside the UK with two being lost to follow-up abroad. From 2006 to 2015, only three people (out of 119) born in the UK were lost to follow-up.

Of the ten people notified with XDR-TB in 2015, seven had completed treatment, two had died and one was still on treatment at the last recorded outcome.

Figure 6.3: Treatment completion for the drug resistant cohort[a], England, 2006-2015



[a] Includes people with initial and acquired MDR/RR-TB and people treated with a second line regimen

7. TB in under-served populations

Key messages

- in 2017, 12.6% of people notified with TB had a social risk factor (SRF), the highest proportion since data collection began in 2010
- 21% of people born in the UK had a SRF, compared with only 9.4% in those born outside the UK
- a higher proportion of people with a SRF had pulmonary disease (77%) compared to those without a SRF (51%)
- 2.7% of people with a SRF had MDR/RR-TB; almost two times more than those without a SRF (1.5%)
- outcomes in people with drug sensitive TB who had a SRF were worse (6.3% died and 6.5% were lost to follow-up) compared to those without a SRF (4.6% and 3.3%, respectively)
- treatment completion was lower among people with drug sensitive TB who had a SRF (80%, 420/525), compared to those without a SRF (88%, 3,762/4,292)
- the rate of TB in the most deprived 10% of the population was 18.4 per 100,000, more than 7 times higher than in the least deprived (2.5 per 100,000)

In the Enhanced TB Surveillance system (ETS), data is collected on the presence or absence of four social risk factors (SRF) known to increase the risk of TB: current alcohol misuse that would impact on the patient's ability to take treatment, current or history of drug misuse, homelessness and/or imprisonment[25]. This chapter presents data for people notified with TB with SRFs and in addition, for people with TB who were remanded in an immigration removal centre, identified as asylum seekers, or unemployed. TB rates by area level deprivation are also presented (see Appendix III: Methods). Data in this chapter, with the exception of area level deprivation, is presented for people with TB aged 15 years and older, for whom information was known.

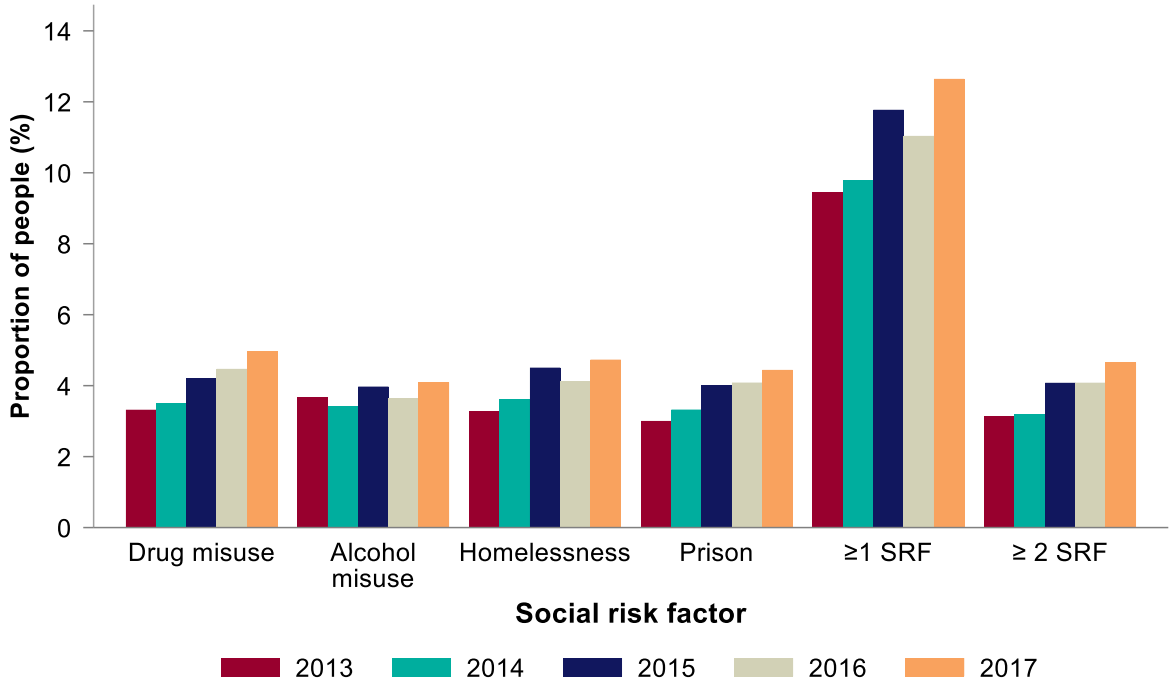
Social risk factors

Overall in 2017, 12.6% (549/4,341) of people with TB had at least one SRF (hereafter referred to as a SRF), an increase from 11.0% (538/4,873) in 2016 and the highest proportion since data collection began in 2010 (Figure 7.1, Table Ai.7.1). In 2017, more than one-third (36.8%, 202/549) of people with a SRF had two or more SRFs. The proportion of people with two or more SRFs (4.7%, 202/4,341) has increased since 2010.

[25] For people notified with TB in London a history of imprisonment is only recorded if imprisonment was in the UK, which will lead to an underestimate of the total number of people with TB with any history of imprisonment.

In 2017, 4.1% (188/4,591) had current alcohol misuse, 5.0% (229/4,603) had current or a history of drug misuse, 4.7% (217/4,584) of homelessness, and 4.4% (197/4,432) of imprisonment (Table Ai.7.1). Between 2016 and 2017, the proportion of people with each SRF increased.

Figure 7.1: Proportion of people with TB (≥15 years) with at least one social risk factor (SRF), England, 2013-2017



In 2017, where information about the timing of drug misuse was known (51.1%, 117/229), 55.6% (65/117) of which reported to be current. Sixty-five percent (64.5%, 140/217) of those with homelessness had known information about the timing of their homelessness, of which 57.1% (80/140) were reported to be homeless while receiving care for TB. Seventy-one percent (71.1%, 140/197) of those currently in prison or with a history of imprisonment were reported to have been in prison in the UK, 22 of whom were currently in prison.

Demographic characteristics

Age and sex

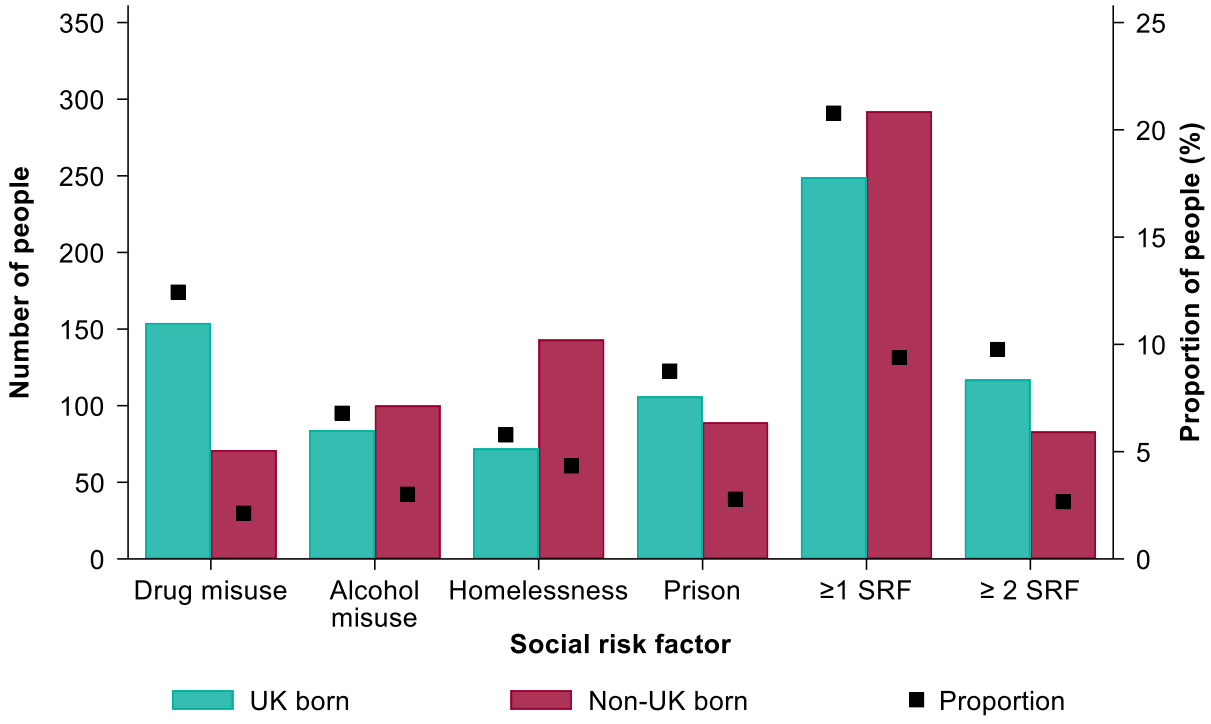
The proportion of men with TB who had a SRF was almost four times higher (18.3%, 459/2,508) than women (4.9% 90/1,833) (Table 7.1). Among men born in the UK, 27.6% (197/714) had a SRF. The proportion of people with a SRF was highest among those aged 45 to 64 years (15.9%).

Place of birth and ethnicity

In 2017, the proportion of people with a SRF was 2.2 times higher in those born in the UK than in those born outside the UK (20.8% (249/1,198) versus 9.4% (292/3,110)) (Figure 7.2, Table 7.1). Between 2016 and 2017, there was a slight increase in the proportion of people with a SRF among those born in the UK (20.3% to 20.8%) while there was a larger increase among those born outside the UK (8.1% to 9.4%) (Table Ai.7.1).

While the overall increase among those born in the UK was small, there was a larger increase in homelessness; from 4.9% (59/1,211) to 5.8% (72/1,246). However, longer term trends are unclear due to year-on-year variation (Table Ai.7.1). Among people with TB born outside the UK, there were increases in homelessness, imprisonment, and alcohol misuse; with the largest increase in the latter from 2.2% (87/3,896) to 3.0% (100/3,314) (Table Ai.7.1).

Figure 7.2: Proportion of people with TB (≥15 years) with social risk factors by place of birth, England, 2017



Among people born in the UK notified between 2013 and 2017, the Black-Caribbean ethnic group had the highest proportion with a SRF (36.9%, 128/347) (Table Ai.7.2), in particular drug misuse (23.6%, 83/352) and imprisonment (18.3%, 65/355). In people born outside the UK with a SRF, the largest number were born in India (162), Somalia (115) and Eritrea (104), but the highest proportion were born in Poland (33.6%, 100/298), Ireland (32.1%, 42/131), and Lithuania (31.7%, 63/199) (Table Ai.7.2).

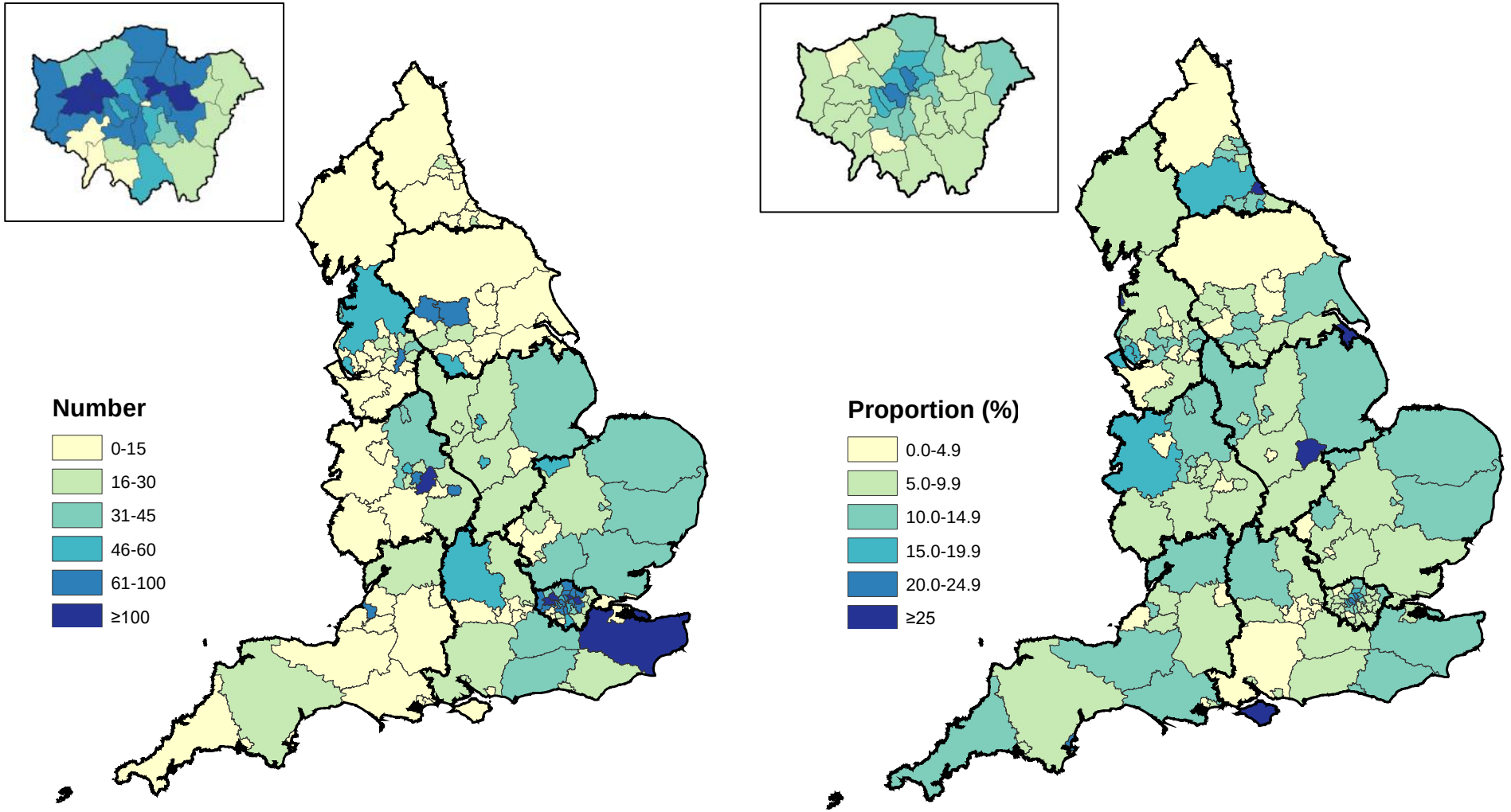
Table 7.1: Number and proportion of people with TB (≥15 years) with a social risk factor (SRF) by demographic characteristic, England, 2017

Demographic characteristic	Drug use		Alcohol use		Homeless		Prison		≥ 1 SRF		≥ 2 SRF	
	n	%	n	%	n	%	n	%	n	%	n	%
Sex												
Female	44	2.3	41	2.1	38	2.0	16	0.8	90	4.9	37	2.0
Male	185	6.9	147	5.5	179	6.7	181	7.1	459	18.3	165	6.6
Age												
15-44	159	6.0	92	3.5	140	5.3	126	4.9	344	13.7	125	5.0
45-64	64	5.4	79	6.6	72	6.0	59	5.2	176	15.9	70	6.3
65+	6	0.8	17	2.3	5	0.7	12	1.7	29	4.1	7	1.0
Place of birth												
UK Born	154	12.4	84	6.8	72	5.8	106	8.8	249	20.8	117	9.8
Non-UK Born	71	2.1	100	3.0	143	4.3	89	2.8	292	9.4	83	2.7
Other												
Asylum seekers	3	5.7	2	3.8	22	43.1	6	13.6	24	49.0	7	14.3
Unemployed	124	17.4	81	11.6	116	16.2	85	12.5	232	34.1	124	18.2

Geographical distribution

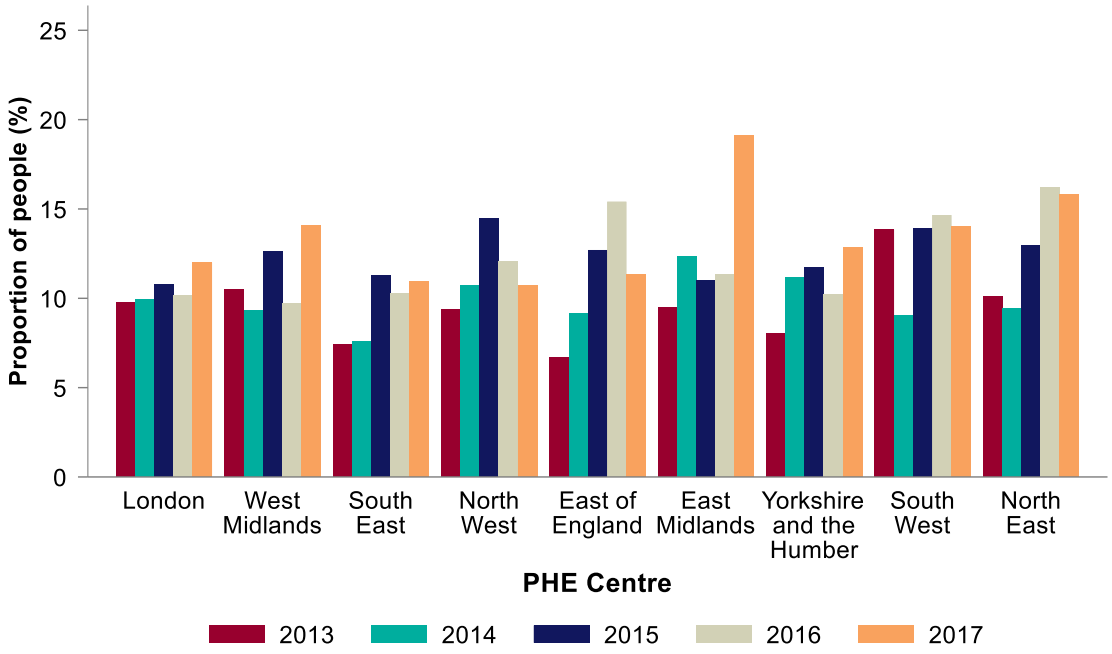
Between 2010 and 2017, there was considerable geographical variation in the number and proportion of people with TB who had a SRF by local authority (Figure 7.3), and by PHEC (Figure 7.4, Table Ai.7.3). Between 2016 and 2017, the greatest increase was in the East Midlands PHEC; from 11.3% (30/265) to 19.1% (49/256), in 2017 this was the highest proportion in any PHEC. Increases in the number and proportion of people with SRFs also occurred in the London (10.2%, 209/2,059 to 12.0%, 215/1,791) and West Midlands (9.7%, 62/640 to 14.1%, 81/576) PHECs. For all other PHECs, the number and proportion of people with a SRF remained stable or decreased (Table Ai.7.4).

Figure 7.3: Number and proportion of people with TB (≥15 years) with at least one SRF[a] by local authority, England, 2010-2017 (boxes shows enlarged map of London area)



[a] SRF refers to those with current alcohol misuse, current or history of homelessness, imprisonment and drug misuse. PHEC boundaries are outlined in black.

Figure 7.4: Proportion of people with TB (≥15 years) with at least one social risk factor by PHE Centre, England, 2013-2017



Clinical characteristics

Similar to previous years, in 2017 a higher proportion of people with a SRF had a previous history of TB compared to people with no known SRFs (8.5%, 44/521 versus 5.3%, 200/3,759). More than three-quarters (76.6%, 420/548) of people with a SRF had pulmonary TB (Table Ai.7.5).

Almost half (49.6%, 252/508) of people with a SRF received DOT (Table Ai.7.5), a decrease from 2016 (53.7%, 270/503). Of the twenty-two people in prison at the time of notification, all but one were known to have received DOT.

The proportion of people with pulmonary TB and a SRF who experienced a delay from symptom onset to treatment start of more than four months was slightly higher than those without a SRF (33.9%, 130/383 versus 31.6%, 568/1,798).

Where information was known, 18.1% (783/4,316) of people with TB were current smokers. Sixty-two percent (59.4%, 282/475) of people with a SRF were current smokers, compared with 12.2% (426/3,490) of people without a SRF.

Drug resistance

In 2017, the proportion of people with resistance to isoniazid without MDR-TB was similar in those with and without a SRF (5.8%, 23/396 versus 5.7%, 130/2,267, respectively). The proportion of people with a SRF that had initial MDR/RR-TB (2.7%, 11/404) was nearly double that of those without a SRF (1.5%, 35/2,295) (Table Ai.7.5).

TB outcomes

Among people with drug sensitive TB notified in 2016, treatment completion at last recorded outcome was lower for those with a SRF (80.0%, 420/525) compared to people without a SRF (87.7%, 3,762/4,292). Treatment completion at 12 months for people with TB with a SRF is TB Strategy Monitoring Indicator 17 and can be found at Appendix V. A higher proportion of people with a SRF had died or were lost to follow-up at their last recorded outcome compared to people without a SRF (Table 7.2). The proportion of people that had died at their last recorded outcome was 2.5 times higher in those with alcohol misuse (11.6%, 21/181) compared to those with no alcohol misuse (4.7%, 229/4,890).

Table 7.2: Last recorded TB outcome for the entire drug sensitive cohort by social risk factor[a], England, 2016

TB outcome	With at least one social risk factor		With no social risk factor		Total[c]
	n	%	n	%	N
Treatment completed	420	80.0	3,762	87.7	4,182
Died	33	6.3	198	4.6	231
Lost to follow-up	34	6.5	140	3.3	174
Still on treatment	16	3.0	98	2.3	114
Treatment stopped	6	1.1	43	1.0	49
Not evaluated[d]	16	3.0	51	1.2	67
Total	**525**	**100.0[b]**	**4,292**	**100.0[b]**	**4,817**

[a] Excludes people in the drug resistant cohort
[b] Percentages may not sum to total of 100.0% due to rounding
[c] Total number of people with information reported for all four social risk factors
[d] Not evaluated includes unknown and transferred out

For people with MDR/RR-TB notified in 2015, treatment completion in those with a SRF was 71.4 % (5/7), compared with 70.7% (29/41) in those without. Among those with a SRF, this proportion was higher than in 2014 (55.6%, 5/9).

Unemployment

In 2017, 16.4% (754/4,594) of people with TB were unemployed at notification. Of those more than one-third (34.1%, 232/681) were known to have a SRF, fewer than in 2016 (34.7%, 263/757), but higher than in all other years since 2010.

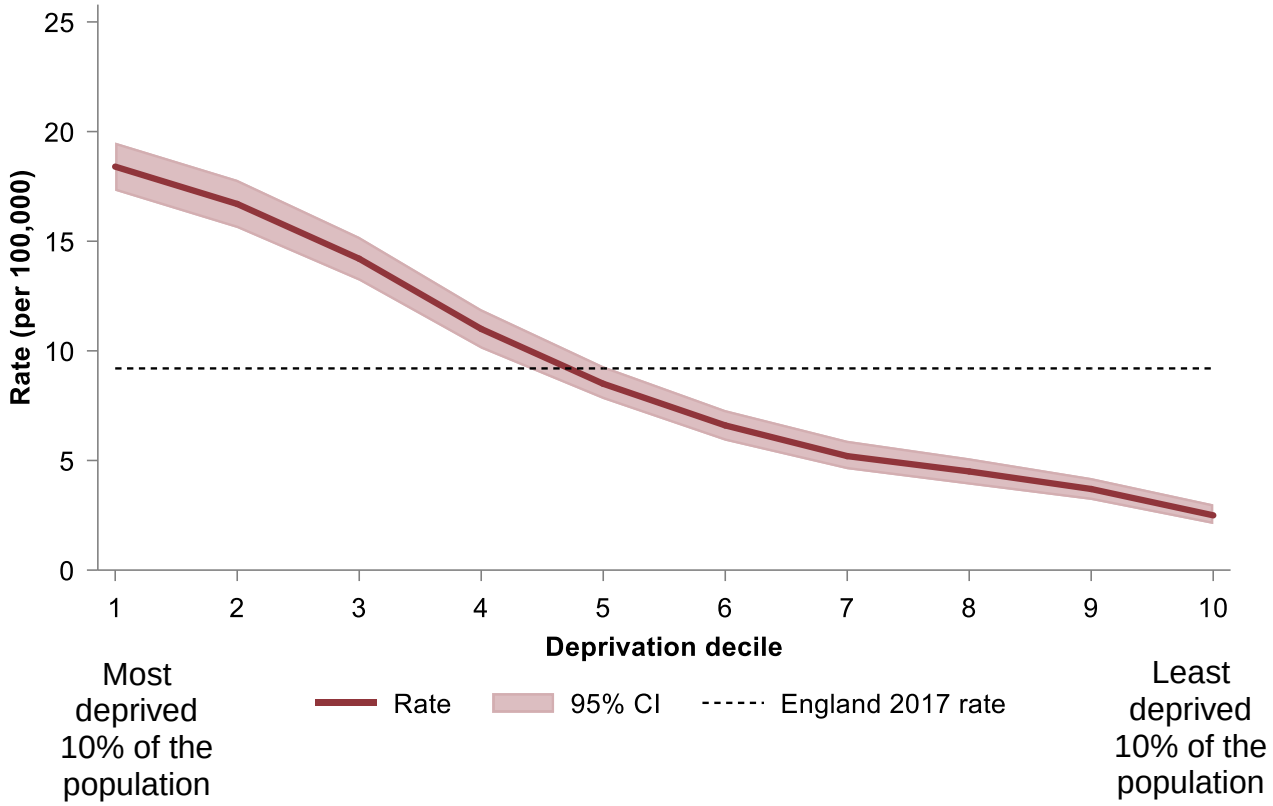
People with TB who were asylum seekers or resident in an immigration removal centre

In 2017, 55 people notified with TB were recorded as being asylum seekers and three people were recorded as being in an immigration removal centre. Where information was known, almost half (49.0%, 24/49) of asylum seekers had a SRF, the majority (91.7%, 22/24) of whom were currently homeless or had a history of homelessness (Table 7.1). A total of 102 people with TB were recorded as being in an immigration removal centre between 2010 and 2017 (range 3-20 per year).

Deprivation

In 2017, the rate of TB was 18.4 per 100,000 in the 10% of the population living in the most deprived areas compared with only 2.5 per 100,000 in the 10% of the population living in the least deprived areas[26], with a clear trend of an increasing rate of TB with increasing deprivation (Figure 7.5, Table Ai.7.6).

Figure 7.5: Rate of TB by deprivation decile, England, 2017



[26] The Index of Multiple Deprivation (IMD) 2015, part of the English Indices of Deprivation, is an overall measure of multiple deprivation experienced by people living in an area and is measured at Lower Super Output (LSOA) level. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/465791/English_Indices_of_Deprivation_2015_-_Statistical_Release.pdf

8. TB-HIV co-infection and HIV testing

Key messages

- in 2017, only 2.8% of people with TB were co-infected with HIV; this is the lowest proportion of co-infection since the peak of 8.4% in 2004
- the median age of people with TB-HIV co-infection has increased from 34 years (IQR 30-41) in 2001 to 43 years (IQR 36-50) in 2017
- in 2017, the majority (80%) of people with TB-HIV co-infection were born outside the UK, 70% of whom were born in sub-Saharan African countries
- in 2017, 93% of people with TB who had an unknown HIV status were offered and received HIV testing, however, this was lower among children (64%)

TB-HIV co-infection

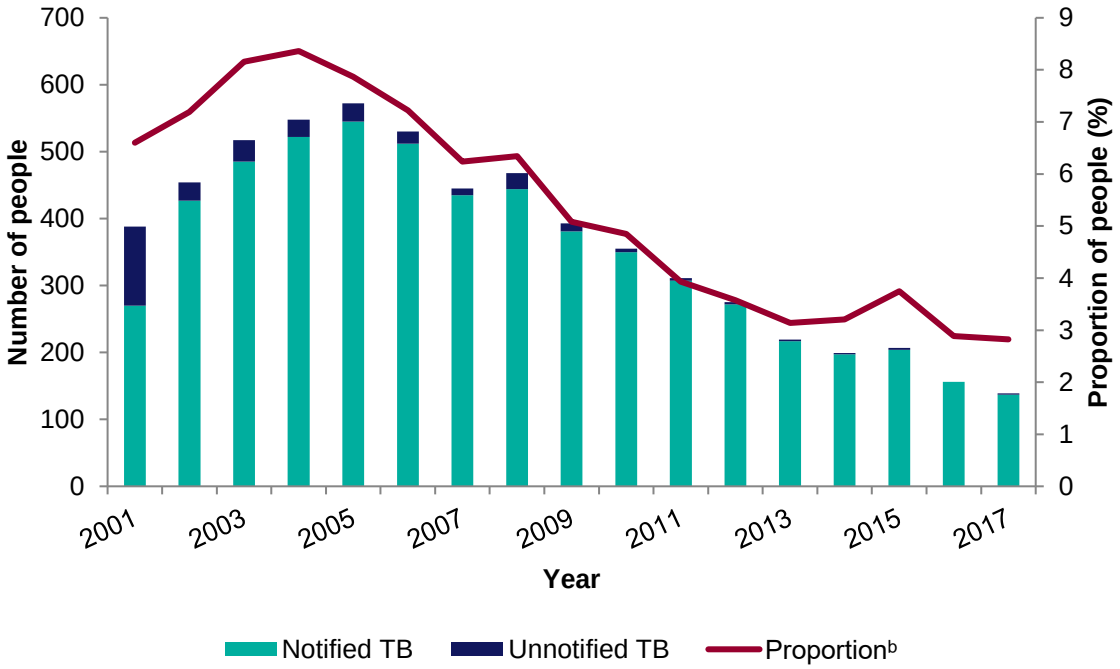
HIV status is not collected in the Enhanced TB Surveillance system (ETS). To estimate TB-HIV co-infection, TB and HIV surveillance data are matched annually for notified people with TB aged 15 years and older (see Appendix III: Methods).

In 2017, 2.8% (139/4,924) of people with TB[27] were estimated to be co-infected with HIV (Figure 8.1, Table Ai.8.1). This is the lowest level of co-infection among people with TB since 2001 (from when data are available). TB-HIV co-infection rates by PHEC are available in Table Ai.8.2.

The age group distribution of people with TB-HIV co-infection has changed over time. The median age increased over time from 34 years (IQR 30-41) in 2001 to 43 years (IQR 36-50) in 2017. The biggest reduction in the number of people with co-infection was seen among those aged 25 to 44 years (Figure 8.2, Table Ai.8.3). In 2017, the proportion of HIV co-infection was highest among people with TB aged 45 to 54 years (6.4%, 48/753).

[27] Aged 15 years and older

Figure 8.1: Number and proportion of people with TB who have HIV co-infection[a], England, 2001-2017

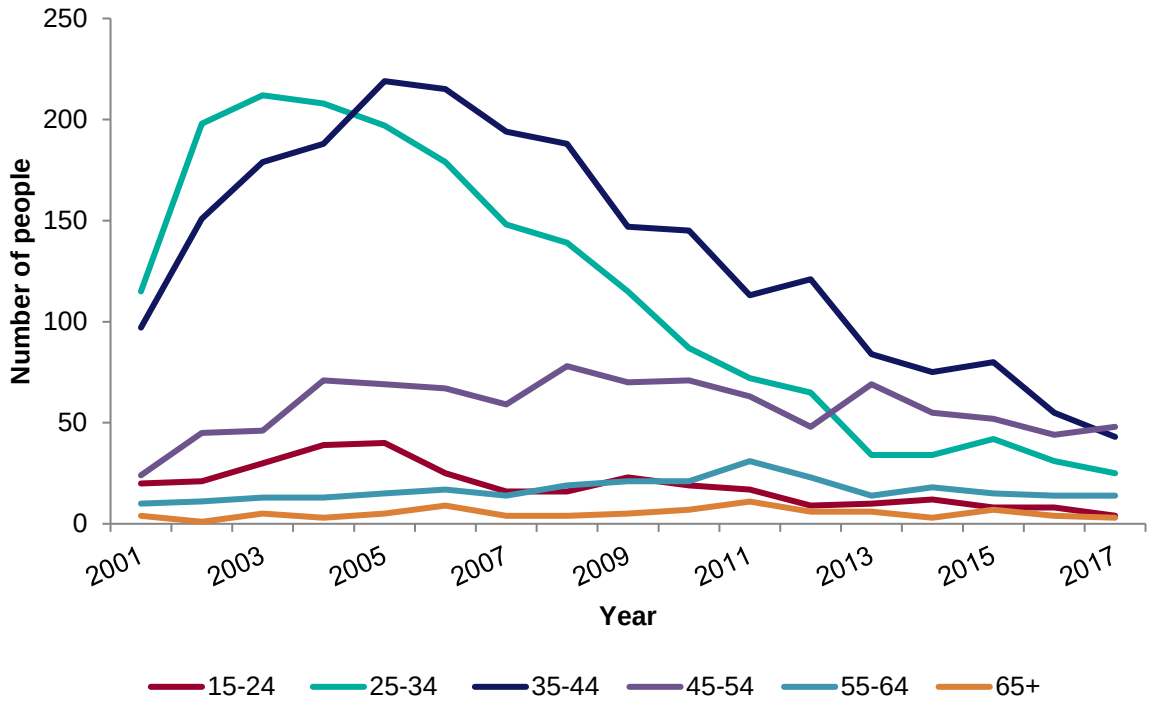


[a] Includes people with TB-HIV co-infection aged 15 years and older.
[b] Proportion is calculated using the number of TB notifications with HIV co-infection plus the number who are un-notified with an MTBC isolate which matched to a person with HIV as the numerator, and the number of all TB notifications (with or without HIV co-infection) plus the number of un-notified TB isolates which matched to a person with HIV as the denominator.

In 2017, where place of birth was known, 80.1% (109/136) of people with TB-HIV co-infection were born outside the UK, the lowest proportion since 2001 (range 2001-2016: 83%-93%). Where country of birth was known, 69.8% (74/106) of those born outside the UK originated from sub-Saharan African countries.

In 2017, of those who had culture confirmed TB with results for isoniazid and rifampicin (90 people), seven (7.8%) people with TB-HIV co-infection had isoniazid resistance without MDR-TB and three (3.3%) had MDR/RR-TB.

Figure 8.2: Number of people notified with TB-HIV co-infection by age group[a], England, 2001-2017



[a] Based on age at TB notification

Testing for HIV in people notified with TB

Information on HIV testing was reported for 90.7% (4,627/4,864) of people notified with TB[28] in 2017 with previously unknown HIV status. Of these, 93.3% (4,315) were offered and received HIV testing, 3.9% (180) were not offered testing, 2.4% (112) were offered but did not receive this testing, and 0.4% (20) were offered but declined (Table 8.1). The number and proportion of people with TB who were offered but did not receive a HIV test was higher in 2017 than in the previous three years.

The proportion of people with TB who had HIV testing offered and received varied by PHEC; in 2017, the highest was in London (97.0%, 1,773/1,828), and the lowest was in East of England (83.3%, 300/360) and North East (87.1%, 88/101) (Table Ai.8.4). However, the reason for the low proportion differed between East of England and North East; in East of England 11.4% (41/360) of people were offered but did not receive HIV testing, while in North East 10.9% (11/101) were not offered HIV testing.

[28] Unlike reporting for co-infection, this includes children

Table 8.1: HIV testing in people notified with TB, England, 2012-2017

Year	HIV testing								
	Not offered		Offered and received		Offered but not received		Offered but declined		Total[a]
	n	%	n	%	n	%	n	%	n
2012	379	6.8	4,905	87.9	195	3.5	104	1.9	5,583
2013	398	6.4	5,513	89.1	166	2.7	109	1.8	6,186
2014	260	4.6	5,248	92.7	95	1.7	58	1.0	5,661
2015	188	3.7	4,814	93.7	88	1.7	45	0.9	5,135
2016	156	3.0	4,885	94.5	89	1.7	42	0.8	5,172
2017	180	3.9	4,315	93.3	112	2.4	20	0.4	4,627
Total	**1,782**	**4.9**	**32,986**	**91.5**	**866**	**2.4**	**434**	**1.2**	**36,068**

[a] Total with previously unknown HIV status where HIV testing is known and excluding those diagnosed post-mortem

TB Monitoring Indicator 16: Proportion of TB cases offered an HIV test (England, PHEC, UTLA, NHS sub-region and CCG data shown on Fingertips)

The proportion of people who were offered and received HIV testing was lower in those aged under 15 years (64.3%, 99/154) and in those aged 65 years and older (87.7%, 639/729) compared with other age groups (Table 8.2).

Table 8.2: HIV testing in people with notified TB by age group, England, 2017

Age group (years)	HIV testing								
	Not offered		Offered and received		Offered but not received		Offered but declined		Total[a]
	n	%	n	%	n	%	n	%	n
0-14	50	32.5	99	64.3	5	3.2	0	0.0	154
15-44	48	1.8	2,486	95.8	54	2.1	8	0.3	2,596
45-64	20	1.7	1,091	95.0	30	2.6	7	0.6	1,148
65+	62	8.5	639	87.7	23	3.2	5	0.7	729
Total	**180**	**3.9**	**4,315**	**93.3**	**112**	**2.4**	**20**	**0.4**	**4,627**

[a] Total with previously unknown HIV status where HIV testing is known and excluding those diagnosed post-mortem

9. BCG vaccination

Key messages

- a BCG vaccine shortage between May 2015 and June 2016 is likely to have impacted on coverage for those areas evaluated in this year, and has affected the number of areas offering universal coverage
- in 2017/18, six local authorities offered a universal BCG programme, compared with 34 in 2016/17
- among those six areas there was wide variability in BCG coverage, ranging from 25.7% in Slough to 74.7% in Newham
- compared with 2016/17, BCG vaccination coverage increased in three of those areas, and decreased in the other three

BCG vaccine coverage data

The BCG immunisation programme is a risk-based programme recommended for people at higher risk of exposure to TB. In addition to this risk-based approach, all infants (0-12 months) living in an area with an incidence above 40/100,000 should be offered the BCG vaccine. Detailed information on the BCG programme can be found in the 'Green Book': https://www.gov.uk/government/collections/immunisation-against-infectious-disease-the-green-book [7].

In 2017/18 a universal BCG programme was offered by local authorities with a three-year average (2014-16) annual TB rate equal or greater than 40 per 100,000 population.

In 2017-18 six local authorities (LAs) offered a universal BCG programme based on the criteria above, five of which are in London (Newham, Brent, Hounslow, Ealing and Redbridge), with one in the South East (Slough). A coverage figure is only reported for those LAs running a universal programme. For other LAs, the number children aged 12 months who received BCG is provided in Table Ai 9.1.

From April 2015, as part of the COVER programme, neonatal BCG was included in the data extraction template from local Child Health Information Systems (CHISs), alongside extraction of coverage data for other vaccines offered under the age of five years. This provides an opportunity for BCG vaccine coverage to be estimated only LAs offering a universal neonatal programme [8]. It is not possible to calculate LA level coverage for the selective programme offered in the rest of England as the number of eligible children is not defined in the CHISs.

COVER collections for BCG data have only recently been established and data are of variable quality. A shortage of BCG vaccine from May 2015 to June 2016 is likely to have impacted on coverage for those evaluated in this year (born between 1 April 2015 and 31 March 2016). From June 2016, an alternative BCG vaccine was supplied by PHE to enable the continuation of the neonatal programme.

Estimates of low coverage may therefore in part be reflecting poor data quality but also vaccine supply issues, and should be interpreted with caution. In London, prior to the shortage, all boroughs were providing universal BCG vaccination. This is no longer the case. These issues should be considered when interpreting London data. BCG data can be found in Table Ai 9.1.

Annual universal BCG programme vaccine coverage data

At the time when threshold levels for universal BCG vaccination were set (using the average annual rate of TB per 100,000 between 2014 and 2016), there were six LAs in England with a TB incidence of ≥40 cases per 100,000 population, five of which were in London. Based on data submitted by CHISs to COVER for 2017/18, estimated coverage for five London LAs with high TB incidence ranged from 28.1% to 74.7%, compared with 23.8% to 85.4% in financial year 2016/17 (Table 9.1).

Table 9.1: Annual BCG vaccine coverage at 12 months in English local authorities with TB incidence ≥40 per 100,000: April 2017 to March 2018

Upper tier Local Authority	Three-year average (2014-16) annual TB rate per 100,000[a]	Number of eligible children (1st birthday in 2017-18)[b]	Universal BCG coverage% in 2017-18 (2016-17)
Newham	69.0	5851	74.7 *(85.4)*
Brent	57.8	4958	28.1 *(23.8)*
Hounslow	47.5	4461	47.1 *(58.0)*
Ealing	47.3	5409	37.3 *(46.2)*
Slough	41.8	2469	25.7 *(11.1)*
Redbridge	41.5	4683	44.0 *(29.9)*

[a] The BCG vaccination programme was based on the 2012-14 LA TB rates, as published in the Tuberculosis in England Annual report 2015
[b] Cohort born between 1 April 2016 and 31 March 2017

10. Latent TB infection testing and treatment

Key messages

- in 2017 the majority of priority CCGs received funding from NHS England to support their LTBI testing and treatment programmes
- between 2016 and 2017 there was an improvement in data submissions from primary care, TB services and laboratories
- despite this improvement, data submissions remain low; this weakens monitoring and evaluation efforts of the programme
- in total, 15,224 LTBI tests have been reported in 2017 which is an improvement on the 8,818 tests reported for 2016
- 17% (2,507/14,907) of the tests conducted in 2017 were positive for LTBI compared with 18% (1,572/8,765) in the previous year
- overall, 60% of people with a positive LTBI test commenced treatment in 2017 a slight decline from 65% in 2016
- overall treatment completion decreased from 85% in 2016 to 71% in 2017

Implementing and monitoring systematic LTBI testing and treatment in England

The national LTBI testing and treatment programme is now in its fourth year of operation since it commenced in 2015. The eligible population for the treatment and testing programme consists of new migrants aged 16 to 35 years, who entered the UK from a high incidence country (≥150/100,000 or sub-Saharan Africa) within the last five years and have been previously living in that high incidence country for six months or longer [9].

To ensure the programme is delivered effectively, the following indicators are reported for programme monitoring:

- LTBI testing and treatment programme coverage:the number of priority CCGs that have implemented their LTBI programme as a proportion of the total number of priority CCGs
- LTBI testing acceptance: the number of eligible people offered a test as a proportion of the total number of individuals tested
- IGRA test performance and LTBI positivity: the number of people tested positive for LTBI as a proportion of the total number tested with a known result
- LTBI treatment uptake: the number of people who access LTBI treatment as a proportion of the number of people who tested positive for LTBI
- LTBI treatment completion: the number of people who complete treatment as a proportion of the number who started treatment

- Adverse events from LTBI treatment: the number of people who reported adverse events due to LTBI treatment as a proportion of the number that started treatment

Programme coverage

The implementation and delivery of the LTBI testing and treatment programme has been supported by NHS England. CCGs are required to submit data to PHE for monitoring and surveillance purposes.

Data in this chapter

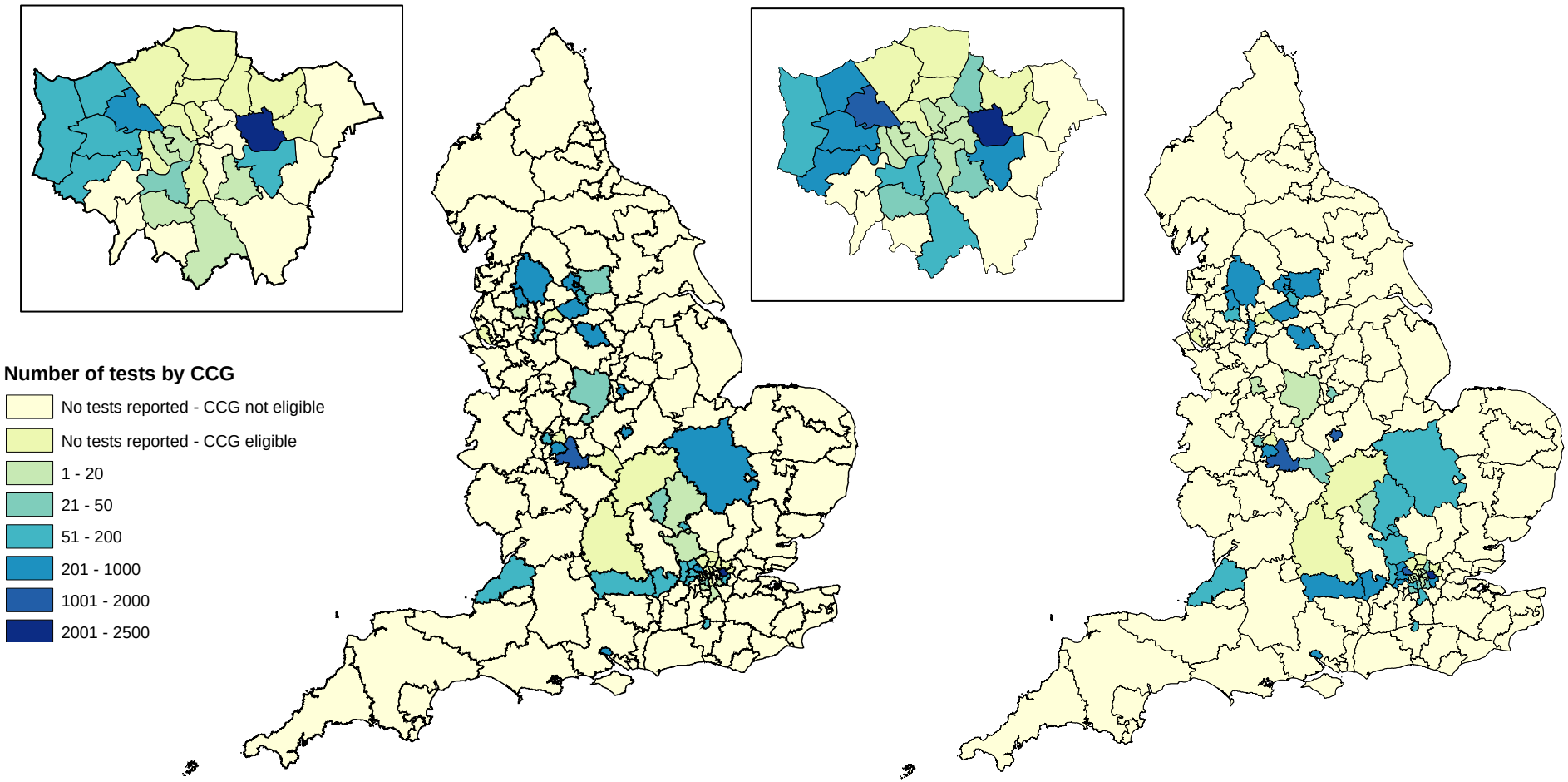
Data presented in this chapter were reported from 27 CCGs (primary care data), 27 CCGs (secondary/community care data) and 54 CCGs (laboratory data). Only data submitted to PHE on activity carried out between January 2016 and December 2017 and meets the programme eligibility criteria has been included in this report.

Number of tests

In 2017, 15,224 LTBI tests were reported. Newham CCG reported the highest number of tests with 15.2% (2,316/15,224), followed by Leicester City CCG with 10.3% (1,566/15,224) (Figure 10.1).

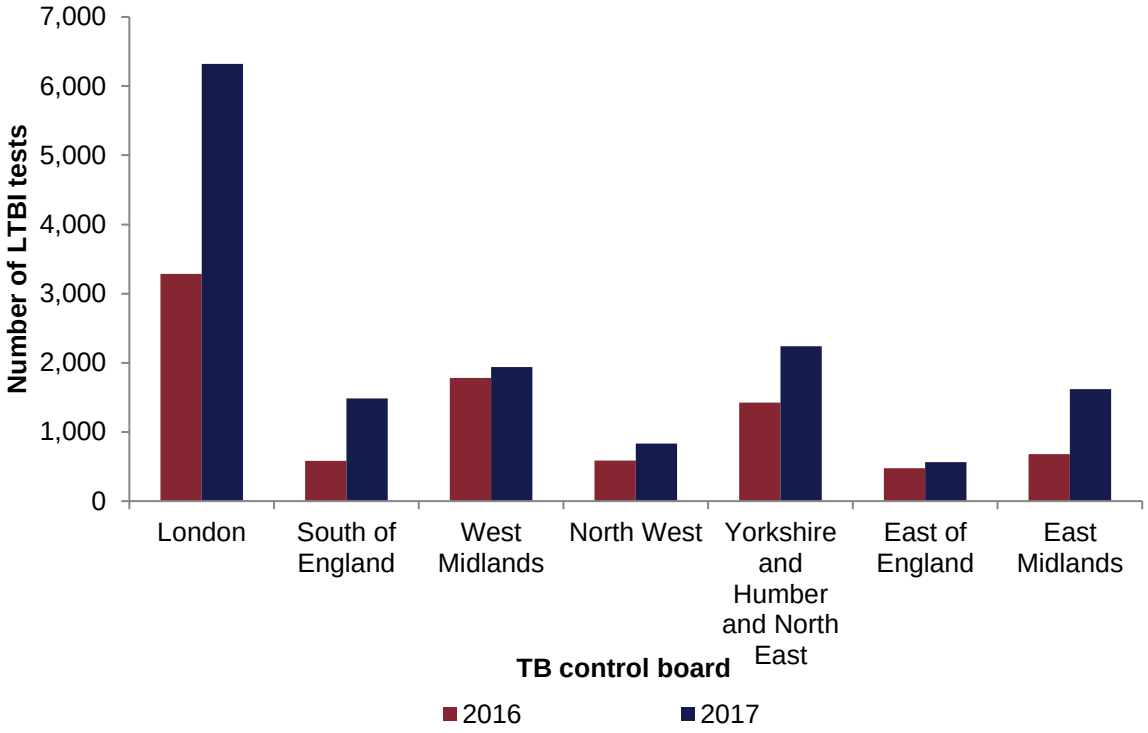
In 2015, the majority of the CCGs were in the early stages of starting to implement their LTBI programmes. Between 2016 and 2017, when the majority of CCGs had fully implemented their programme, there was a 72.6% increase in the number of tests from 8,818 to 15,224. This trend was observed among all TBCB (Figure 10.2) (Table Ai.10.2).

Figure 10.1: Number of LTBI tests by CCG and year, England, 2016 - 2017 (box shows enlarged map of London area)



LTBI Indicator 1: The number of CCGs with systematic new entrant LTBI testing and treatment in place (England)

Figure 10.2: Number of LTBI tests by TB control board[a] and year, 2016 - 2017



[a] TB control boards presented in order of the number of people notified with active TB in 2017

Demographic characteristics

Age and sex

The highest number of people tested were aged between 25 to 30 years in both 2016, 34.5% (3,039/8,818) and 2017, 33.3% (5,077/15,224). Among those who met the age eligibility (16 to 35 years) criteria, 86.2% (7,604/8,818) and 93.0% (14,158/15,224) had a known sex in 2016 and 2017, respectively. Among who, more than half, 53.5%, (4,065/7,604) in 2016 and 54.9%, (7,776/14,158) in 2017, were women. Distribution by age and sex is presented in Figure 10.3.

Country of birth

Country of birth was only known for 44.1% (3,887/8,818) and 50.8% (7,732/15,224) of people tested for LTBI among those eligible for the LTBI programme in 2016 and 2017, respectively. Among those with known country of birth, India 32.3% (2,495/15,224) accounted for the majority of people tested in 2017, whereas Pakistan 34.1% (1,327/7,732) had the majority in 2016. (Figure 10.4) (Table Ai.10.3)

Figure 10.3: Number of people tested for LTBI by sex and age group, 2016-2017

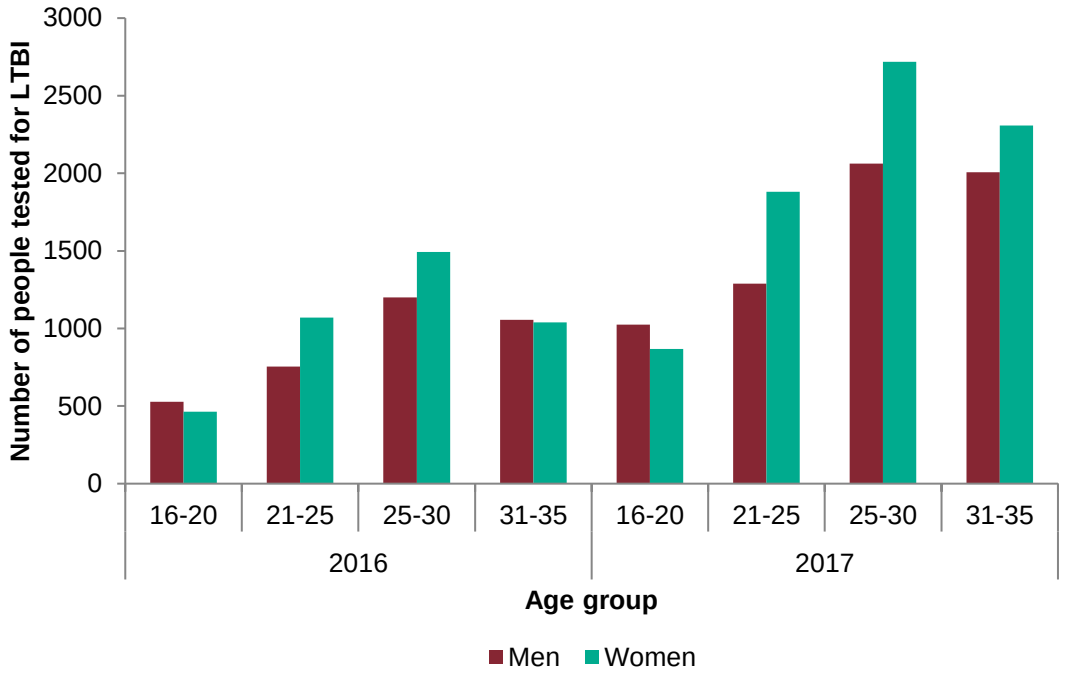
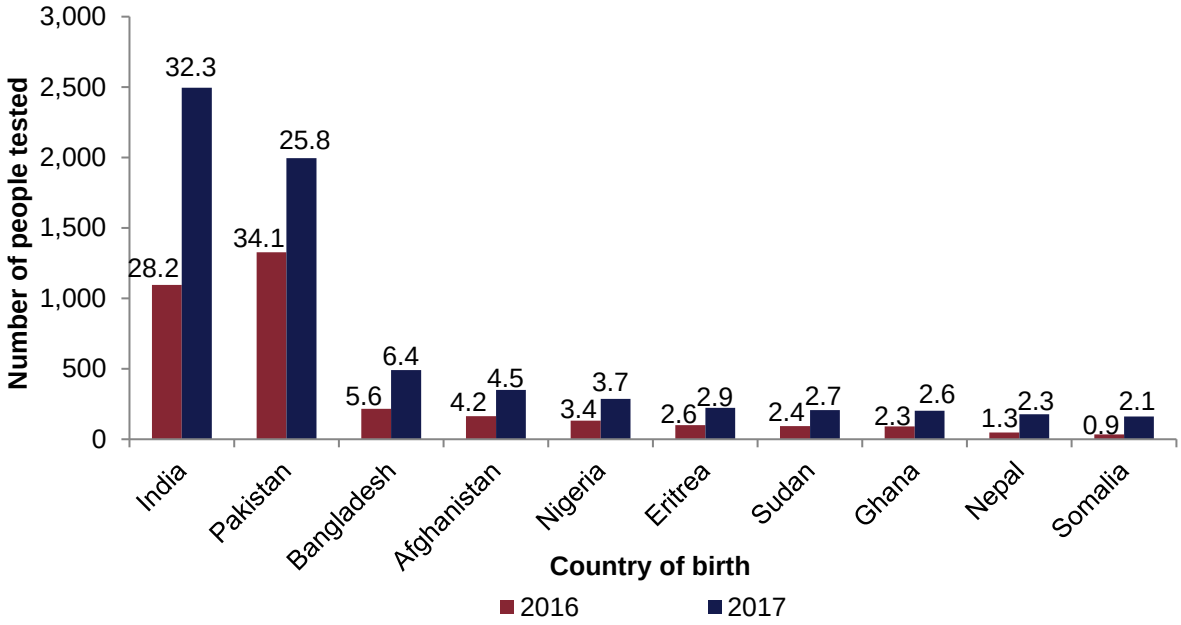


Figure 10.4: Number and proportion[a] of LTBI tests by country of birth, 2016- 2017



[a] Figures above bars represent the proportion (%) of LTBI tests from respective country

LTBI testing acceptance

LTBI testing acceptance varied across CCG areas. Acceptance ranged between 6.3% (6/95) to 96.4% (80/83) in 2016 and between 19.4% (108/335) to 82.4% (14/17) in 2017. Figures are presented in Table 10.1 for CCGs that provided information to PHE on the number of people offered a test.

Table 10.1: People who were tested for LTBI as a proportion of total number of those offered a test as part of the LTBI, by CCG, 2016- 2017

Clinical commissioning group (CCG)	2016 (%)	2017 (%)
NHS Bradford City & Districts CCG	NR[a]	NR[a]
NHS Greater Huddersfield CCG	86.9	67.1
NHS Greenwich CCG	96.4	51.4
NHS Hammersmith and Fulham CCG	33.3	NR[a]
NHS Herts Valleys CCG	6.3	-
NHS Hounslow CCG	23.8	34.8
NHS Leeds South And East CCG	20.2	61.3
NHS Luton CCG	19.2	-
NHS Merton CCG	10.3	-
NHS Newham CCG	40.0	-
NHS North Kirklees CCG	66.5	49.0
NHS Sheffield CCG	70.1	47.8
NHS Southern Derbyshire CCG	40.0	-
NHS Tower Hamlets CCG	-	82.4
NHS Wandsworth CCG	NR[a]	63.8
NHS Wolverhampton CCG	36.4	19.4

Note: NHS Bradford City and Districts CCGs submit a joint dataset

[a] NR = Not Reported. The denominator provided exceeded the number of tests submitted through laboratories
- = Denominator (number offered) not reported

LTBI Indicator 2: Proportion of eligible new entrants covered by the LTBI testing programme who accept LTBI testing (England)

IGRA test performance and LTBI positivity

LTBI test results were available for 99.4% (8,765/8,818) of people tested in 2016 and 97.9% (14,907/15,224) in 2017. The proportion of people who tested positive in 2017 was 16.8% (2,507/14,907), a slight decline from 17.9% (1,572/8,765) in 2016. The small numbers of tests (53) with unknown results were either not processed due to insufficient sample or results had not yet been obtained at the time of submitting data to PHE. A higher proportion of men tested positive for LTBI than women, this was identified in all age groups, and in both 2016 and 2017 (Figure 10.5). The proportion of people who tested positive for LTBI also varied by CCG in 2017, ranging between 0.0% (0/1) and 54.5% (6/11) (Figure 10.6, Table Ai.10.4).

Figure 10.5: Proportion of people that tested positive for LTBI by sex and age group, 2016-2017

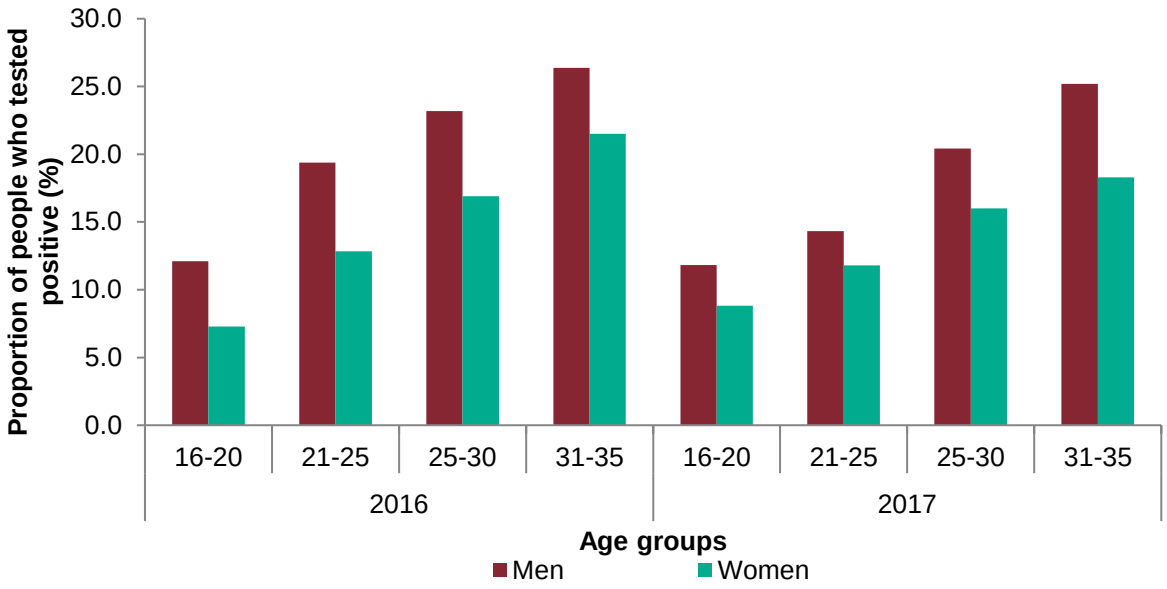
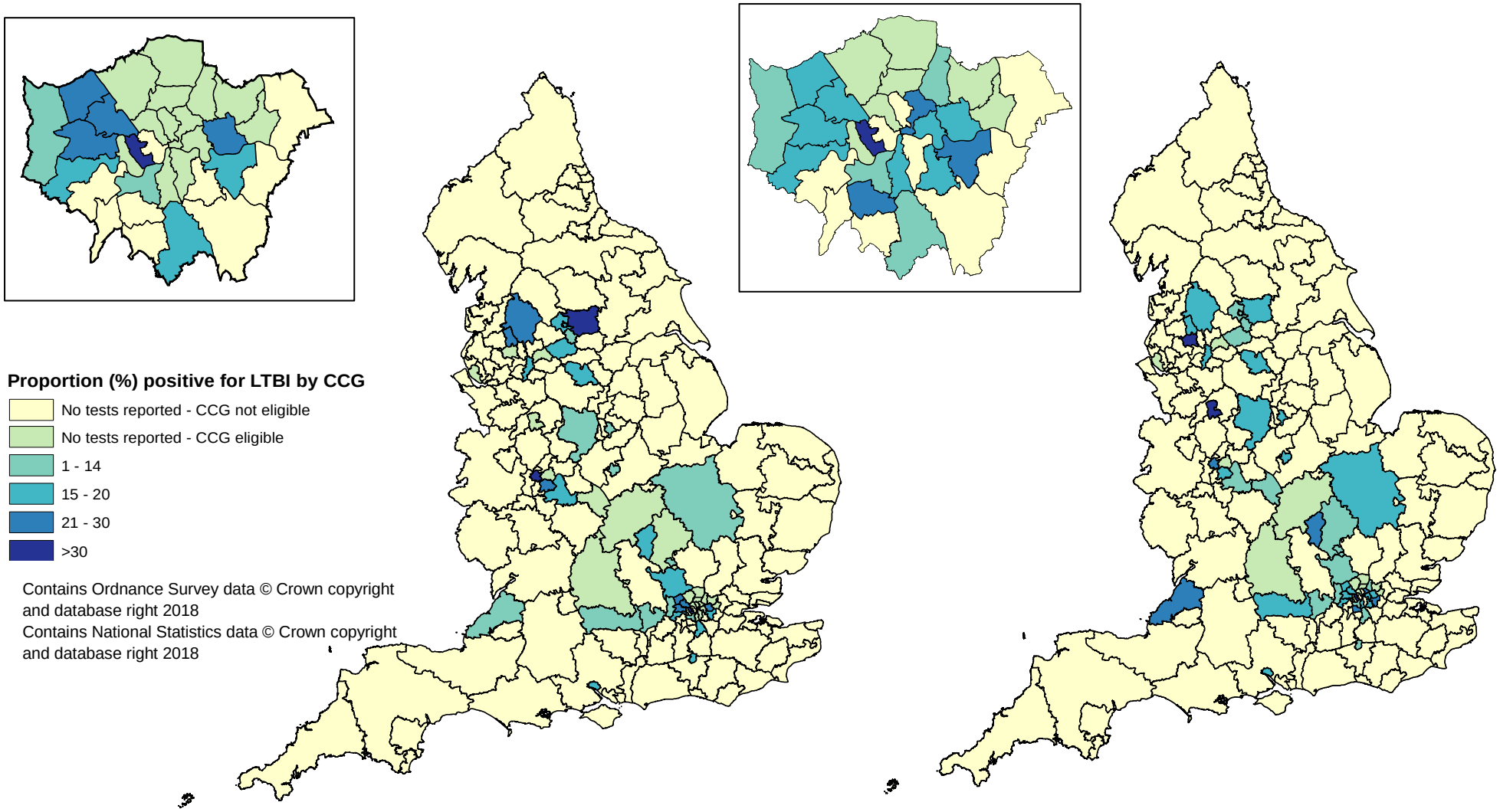


Figure 10.6: Proportion of people that tested positive for LTBI by CCG and year, 2016-2017
(box shows enlarged map of London area)



LTBI Indicator 3: Proportion of eligible new entrants who tested positive for LTBI

Treatment for LTBI

Treatment uptake and completion

Twenty-seven CCGs reported treatment data, but data from two CCGs was not usable because it was incomplete. From the remaining 25 CCGs, 926 and 1,364 people who tested positive for LTBI in 2016 and 2017 respectively were estimated to be eligible for treatment using an algorithm. Overall, the proportion of people who accessed treatment slightly decreased from 64.5% (597/926) in 2016 to 60.3% (823/1,364) in 2017. Treatment uptake varied by CCG between 23.9% (46/56) and 100.0% (16/16) in 2016 and 0.0% (0/4) and 100.0% (11/11) in 2017 (Table 10.2). Overall treatment completion decreased from 84.5% (480/568) in 2016 to 71.0% (526/741) in 2017. Treatment completion also varied by CCGs, ranging between 43.8% (7/16) and 100% (17/17) in 2016 and 0.0% (0/6) and 100.0% (46/46) in 2017 (Table 10.2). These figures have been calculated to take into consideration that treatment uptake and completion can be subject to pathway delays, which may lower the observed figures (as eligible patients may still be on the pathway at the time of reporting). The method used is further explained in the methods section.

Table 10.2: Treatment acceptance and completion by for individuals tested positive for LTBI by CCG, 2016 - 2017

Clinical commissioning group (CCG)	Positives who should be referred for treatment		Treatment uptake				Cohort who should have completed treatment		Treatment completion			
			(n)	(n)	(%)	(%)			(n)	(n)	(%)	(%)
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
NHS Birmingham & Solihull CCG	190	185	143	106	75.3	57.3	143	106	138	94	96.5	88.7
NHS Blackburn and Darwen CCG	85	50	48	49	56.5	98.0	46	48	33	27	71.7	56.3
NHS Bolton CCG	0	54	0	25	-	46.3	0	25	0	19	-	76.0
NHS Bradford CCG	108	109	84	75	77.8	68.8	84	75	72	59	85.7	78.7
NHS Bristol CCG	17	42	9	20	52.9	47.6	9	18	8	13	88.9	72.2
NHS Coventry and Rugby CCG	8	36	8	5	100.0	13.9	8	5	4	1	50.0	20.0
NHS Crawley CCG	11	11	9	11	81.8	100.0	9	11	7	10	77.8	90.9
NHS Croydon CCG	0	5	0	1	-	20.0	-	-	-	-	-	-
NHS Ealing CCG	30	56	8	27	26.7	48.2	8	24	5	9	62.5	37.5
NHS Greater Huddersfield CCG	55	54	45	16	81.8	29.6	45	16	37	3	82.2	18.8
NHS Greenwich CCG	15	178	15	137	100.0	77.0	17	137	16	124	94.1	90.5
NHS Hillingdon CCG	17	9	17	9	100.0	100.0	17	9	17	5	100.0	55.6
NHS Leeds South and East CCG	10	99	10	27	100.0	27.3	10	27	9	18	90.0	66.7
NHS North Kirklees CCG	13	20	11	10	84.6	50.0	11	10	9	6	81.8	60.0
NHS North and Central Manchester CCG	46	78	11	56	23.9	71.8	11	50	6	24	54.5	48.0
NHS Nottingham CCG	25	34	12	26	48.0	76.5	12	26	12	16	100.0	61.5
NHS Sandwell and West Birmingham CCG	119	51	34	8	28.6	15.7	30	6	23	0	76.7	0.0
NHS Sheffield CCG	54	71	35	37	64.8	52.1	35	37	27	21	77.1	56.8
NHS Slough CCG	8	67	6	41	75.0	61.2	6	9	4	6	66.7	66.7
NHS South Reading CCG	16	48	16	47	100.0	97.9	16	47	7	20	43.8	42.6
NHS Southampton CCG	37	91	33	81	89.2	89.0	33	46	32	46	97.0	100.0
NHS Stoke on Trent CCG	28	12	19	9	67.9	75.0	18	9	14	5	77.8	55.6
NHS Wolverhampton CCG	34	4	24	0	70.6	0.0	-	-	-	-	-	-
Total	**926**	**1364**	**597**	**823**	**64.5**	**60.3**	**568**	**741**	**480**	**526**	**84.5**	**71.0**

Note: NHS Birmingham cross city and Birmingham South Central CCGs & NHS Bradford City and Districts CCGs submitted joint treatment datasets

[a] Protocol has been applied to determine number of people that should be referred to treatment

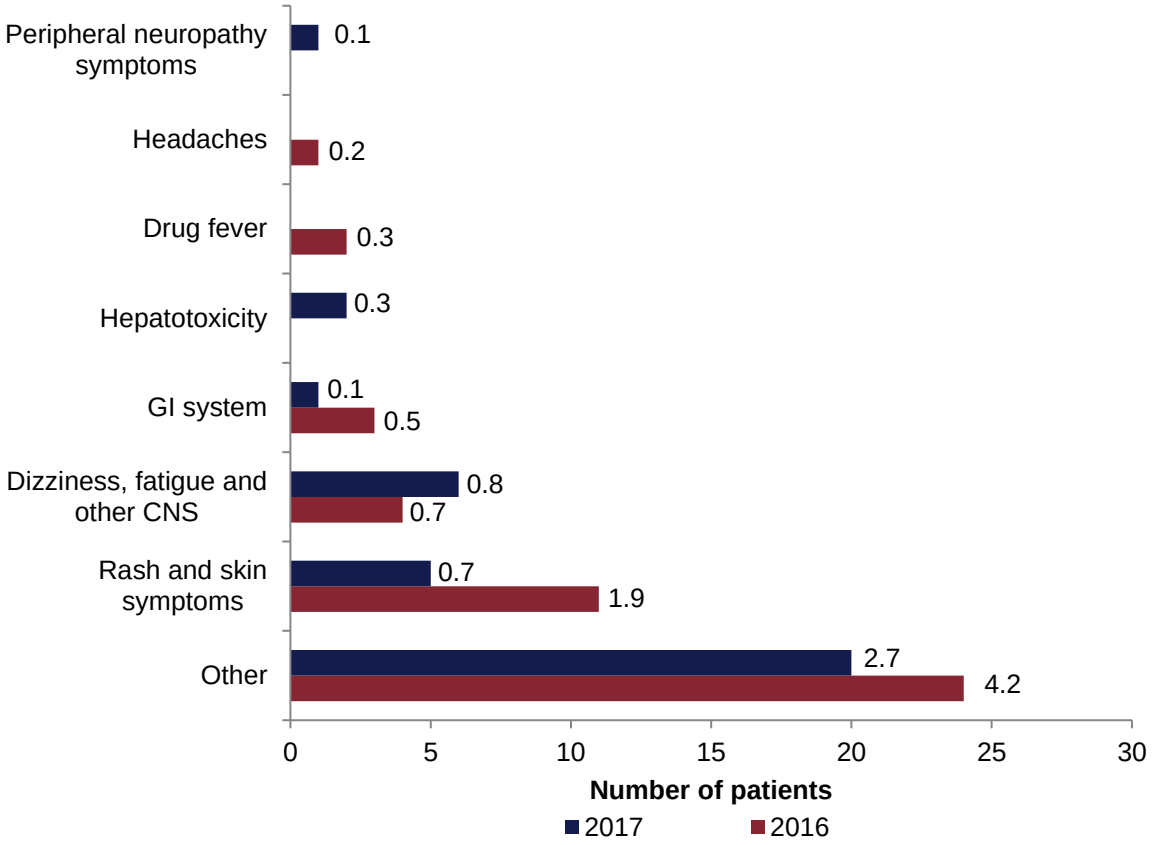
[b] Protocol has been applied to determine number of people that should have completed treatment

LTBI Indicator 4: The proportion of patients who take up treatment amongst those who have been offered it (England)
LTBI Indicator 5: The proportion of patients who complete LTBI treatment amongst those who start treatment (England)

Adverse events

Among patients who started LTBI treatment, 7.8% (45/576) and 4.7% (35/752) reported one or more adverse effects through the course of treatment in 2016 and 2017 respectively. Among those that reported an adverse effect, rash and skin symptoms, 1.9% (11/576) in 2016 and dizziness, fatigue and other CNS 0.8% (6/752) in 2017 were the most recorded adverse treatment effects. No hepatotoxicity was reported in 2016 and it remained was rare in 2017, 0.3% (2/752). Figure 10.7 summarises all recorded adverse reactions.

Figure 10.7: Number and proportion[a] of people reporting adverse treatment effects following LTBI treatment, 2016- 2017



[a] Numbers besides bars represent the percentage rounded to 1 decimal place (%) reporting adverse effects following LTBI treatment

LTBI Indicator 6: The proportion of patients who experience significant drug events amongst those who initiated treatment (England)

11. UK tuberculosis pre-entry screening programme

Key messages

- all long term visa applicants (>6 months) from countries with an estimated incidence of >40 per 100,000 are required to undergo screening for active pulmonary TB prior to entry to the UK
- over 1.7 million screening episodes were recorded to have taken place since October 2005, 255,510 of which took place in 2017
- a total of 298 people with TB were detected in 2017 at pre-entry screening
- as more people with pulmonary TB were detected overseas, the number of people with prevalent pulmonary TB notified in the UK (within 1 year of entry to the UK) from countries within the pre-entry scheme decreased from 366 in 2006 to 51 in 2017

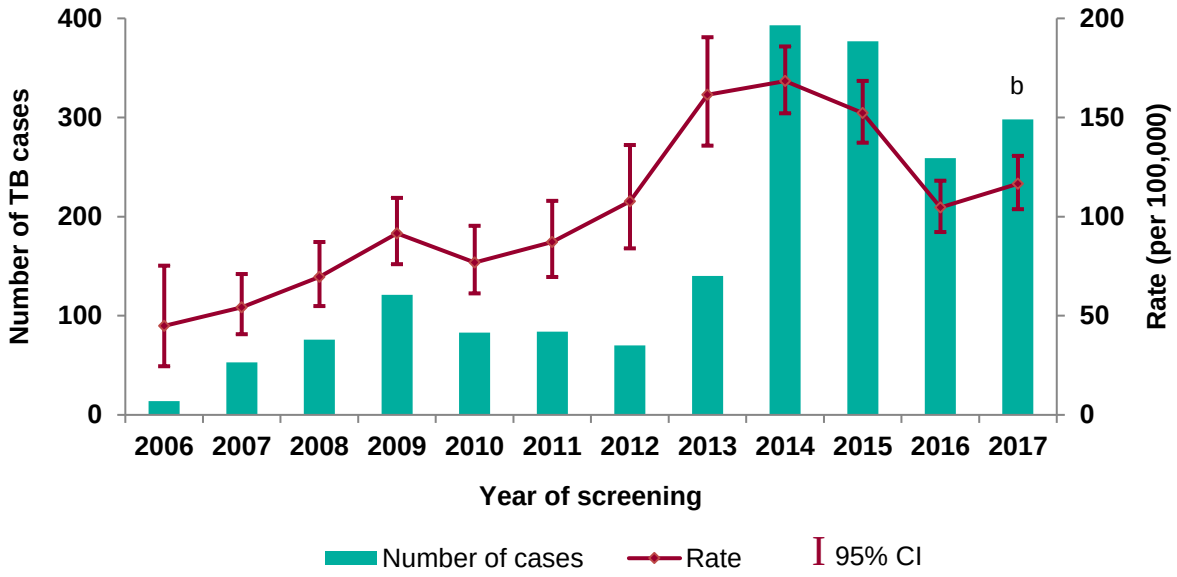
After a successful pilot in 15 high TB incidence countries between 2005 and 2012, the UK replaced port based on-entry screening with pre-entry screening overseas. The global roll out of pre-entry screening to 101 high incidence countries took place between September 2012 and March 2014, when on-entry screening ceased. Chest x-ray based active pulmonary TB screening is a requirement for all migrants from countries with a TB incidence of 40 per 100,000 and above who apply for a UK visa for more than six months. It is done by appointed panel clinics usually in the country of origin [10].

In total, 1,712,561 screening episodes have taken place since October 2005, of which 255,510 were performed in 2017. In 2017, the majority of applicants (where sex was known) were female (55.6%, 112,164 / 201,176) which was similar to 2016 (56.3% female, 99,036 / 176,057). The majority of applicants (where age was known) were aged 15 to 34 years old (75.6%, 152,817 / 202,011). The largest number of screening episodes took place in China (33.1%, 84,559 / 255,510), India (23.7%, 60,477 / 255,510), Pakistan (8.3%, 21,129 / 55,510) and Nigeria (4.2%, 10,834 / 255,510). This pattern has changed over the years with fewer screening episodes from Africa (37,890 to 35,410 between 2015 and 2017, a 6.5% decrease) and Europe and Commonwealth of Independent States (10,899 to 8,847 between 2015 and 2017, an 18.8% decrease). This was broadly in keeping with general migration patterns to the UK [11].

In 2017, 298 people with TB were detected, giving an overall TB detection yield of 116.6 per 100,000 applications. The number of people with TB and rate of TB detection was higher in females (n=126, 112.3 per 100,000) than in males (n=90, 100.5 per 100,000). The number and rate of people with TB detected through the pre-entry

screening programme increased from 14 individuals (45.0 per 100,000) in 2006 to 393 (168.4 per 100,000) in 2014, then decreased to 259 people (104.6 per 100,000) in 2016 but increased again to 298 (116.6 per 100,000) in 2017 (Figure 11.1, Table 11.1). Between 2006 and 2014, increases in numbers and detection rates are likely due to improved screening procedures and introduction of mandatory sputum collection.

Figure 11.1: Number and rate of people with TB detected in high incidence countries through the UK pre-entry screening programme, 2006 to 2017[a]



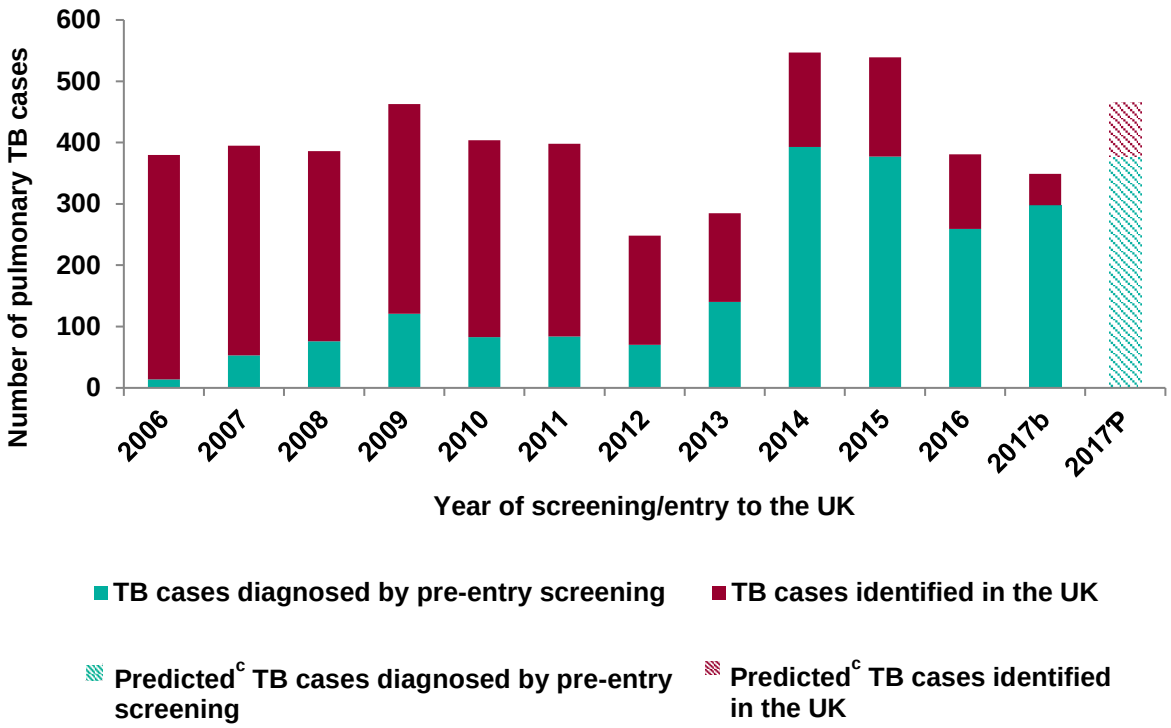
[a] For countries which became part of pre-entry screening programme during the global roll out, there is a possibility of under-ascertainment in 2012 and 2013, as clinics were establishing reporting systems during this transition phase

[b] As of 1st May 2018, 794 sputum samples are pending and the rate may increase when final results are available

While the majority of people with TB were in the 15 to 34 year age group (57.0%, 170/298), the TB rates were highest in those aged 55 years or older (15 to 34 years: 112.3 per 100,000 versus 55 years or older: 337.9 per 100,000).

Between 2006 and 2017, the number of people with pulmonary TB notified in the UK within one year of entry decreased from 366 in 2006, to 51 in 2017. These were compared to people with pulmonary TB detected from the same countries in the UK pre-entry TB screening programme which increased from 14 in 2006 to 298 in 2017 (Figure 11.2, Table Ai.11.2).

Figure 11.2: Number of people with TB detected by pre-entry screening in the 101 programme countries and those identified within one year of UK entry[a], 2006 to 2017[b]



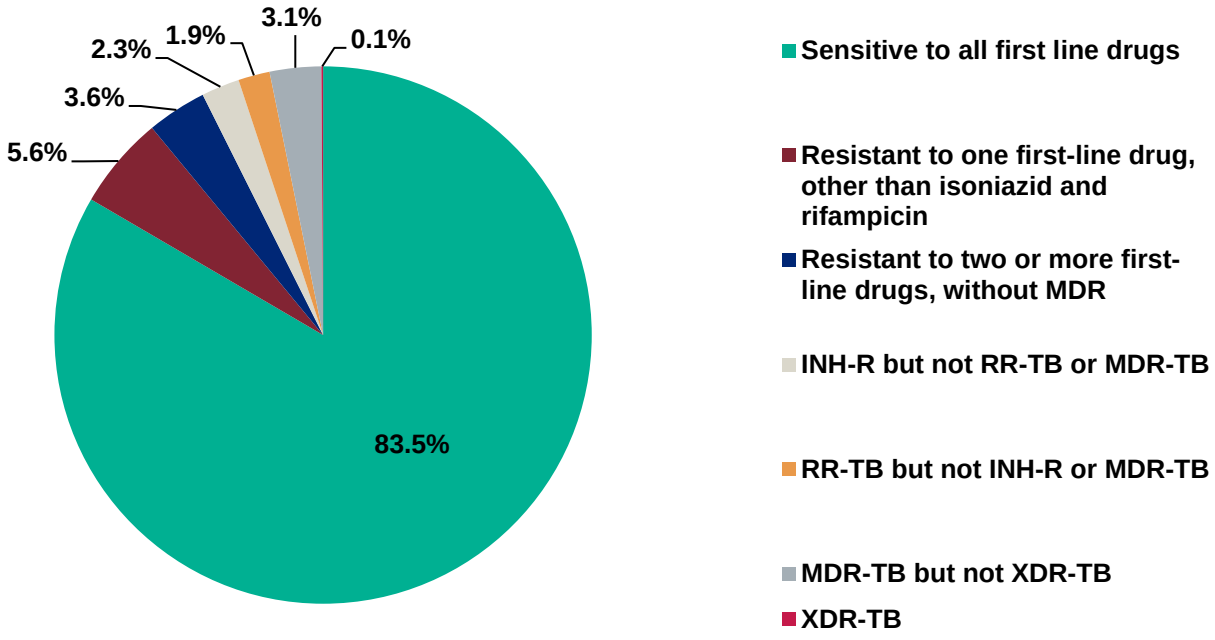
[a] The number of people with pulmonary TB identified within one year of entry into the UK were from all 101 high incidence countries but the number of people with pulmonary TB detected by pre-entry screening were from an increasing number of countries as screening was rolled out; 5 pilot countries (2006), 15 pilot countries (2007 and 2012), 101 countries (by 2014). [b] As of 1st May 2018, 794 sputum samples are still pending and the rate may increase when final results are available.
[b] For countries which became part of pre-entry screening during the global roll-out in 2012-13, there is a possibility of under-ascertainment, as clinics were establishing reporting systems during this transition phase.
[c] The predicted number of people detected with TB are based on the assumption that 10% of the pending sputum cultures will be positive. There will be 72% more people notified with TB in the UK for 2017 because the 2nd July was used as a proxy entry date.

Drug susceptibility testing of positive TB cultures

Of the 1,019 people detected with culture positive TB by pre-entry screening between 2007 and 2017, 702 had drug susceptibility testing (DST) results. Whilst culture confirmation increased significantly over the years to 100% in the International Organization for Migration (IOM) clinics, culture confirmation in non-IOM clinics remains poor. In an attempt to improve the completion of sputum culture results, an audit was conducted during 2017 across non-IOM clinics for people with culture confirmed TB. This identified an additional 83 people with culture confirmed TB between 2012 and 2017 that had not previously been reported.

Figure 11.3 summarises the overall DST results for culture confirmed TB. During this period the majority of people with culture confirmed TB were sensitive to all first-line drugs (83.5%, 586/702). Two percent (2.3%, 16/702) had isoniazid resistance (INH-R), 1.9% (13/702) had rifampicin resistance (RR-TB), 3.1% (22/702) had multidrug resistant TB (MDR-TB) and 0.1% (1/702) had extensively drug resistant TB (XDR-TB).

Figure 11.3: Summary of drug susceptibility pattern for the 702 positive TB cultures that underwent DST, 2007 to 2017



12. Conclusions

From 2016 to 2017, the number of notifications fell by over 9% to 5,102 people, the lowest number of people notified with TB in England since 1990 (5,010). Between the peak in 2011 and 2017, there was a fall of 38% in the number of people notified with TB.

Since 2011 the rate of TB has fallen by 41% to 9.2 per 100,000, the lowest ever recorded rate of TB, and for the first time falling below the 10 per 100,000 mark which defines a low incidence country [1]. The rate of TB in children born in the UK, a proxy for recent transmission in England has also seen a reduction of 59%, from the peak of 3.4 per 100,000 in 2008 to 1.4 per 100,000 in 2017.

In England, over half of local authorities (57%) have now achieved a three-year average TB incidence of less than 5.0 per 100,000 and 12 of these have reached the WHO End TB pre-elimination target rate of less than 1.0 per 100,000.

As in previous years, people born outside the UK accounted for the majority (71%) of TB notifications in 2017 and had a rate of TB 13 times higher than that of people born in the UK. Those born outside the UK also experienced larger declines in both numbers and rate of TB compared with the UK born population, but falls in notifications were not seen for all countries of birth, with Romania showing a steady increase in numbers but not rate.

There was no overall decline in the number of people with TB in the UK born population, although the rate is low at 3.1 per 100,000. Notifications continued to decline in people from South Asian ethnic groups but increased slightly in people who identified as White.

If the number of people notified with TB continues to fall, it is likely that not all population groups will be equally affected. The proportion of people with complex TB (additional medical or social problems which may require increased support) may increase despite an overall fall in numbers. This has important implications for the needs of patients seen in TB clinics and services may find that workloads do not decline as much as might be suggested by incidence figures alone. Surveillance systems will need to ensure that these changes in case complexity and social risk factors can be accurately captured.

People with social risk factors (SRF) continue to be disproportionally affected by TB. In 2017, 13% of people notified with TB had a SRF, the highest proportion since data collection began in 2010. People with a SRF are more likely to have infectious pulmonary TB, have poorer outcomes and are almost two times more likely to have MDR/RR-TB. There are inequalities in TB rates; the rate of TB in the most deprived 10% of the population being more than 7 times higher than in the least deprived.

Delay between date of reported symptom onset and treatment start is difficult to interpret with certainty, but the median delay in people with pulmonary TB has increased slightly to 79 days. Overall, nearly one-third (31%) of people with pulmonary TB experienced a delay of more than four months, the same as in 2016, but the proportion was higher in people born in the UK (37%) compared with those born outside the UK (28%) and was highest in the South West (47%).

In 2017, a complete year of whole genome sequencing (WGS) data was available only for North and Central England. For these areas in 2017, 23% of people with TB were within 12 SNPs of another person notified in the same year. Next year will see the first full year of WGS data for the entire country and is the start of a longer series of data that will permit more detailed analysis of the impact of WGS on understanding TB transmission in England.

TB outcomes in the drug sensitive cohort have improved slightly this year. The proportion of people with drug sensitive TB completing treatment by 12 months rose to 84.4% in 2016, but was still below the peak of 85.6% in 2013. The number and proportion of all people with drug sensitive TB who had died at the last recorded outcome decreased to 304 (5.5%) in 2016. Most deaths occured in those aged 65 years and older, a population who often have comorbidities associated with poor outcomes.

In England, the number of people in the drug resistant cohort (confirmed or treated as MDR/RR-TB) has fallen from 68 in 2016 to 61 in 2017, although the proportion was similar and has remained below 2% since 2000. In 2017, three people had confirmed initial XDR-TB, fewer than each of the previous two years. Outcomes for the drug resistant cohort have improved, with a higher proportion of people notified in 2015 (58%) completing treatment by 24 months compared with those notified in 2014 (52%) and a much lower proportion being lost to follow-up (8% vs 19%).

Since the introduction of the pre-entry TB screening programme the number of people with pulmonary TB notified in the UK (within one year of entry to the UK) from countries implementing pre-entry screening decreased from 366 in 2006 to 51 in 2017. In 2017 over 255,000 people were screened and 298 people with active TB detected at a rate of 117 per 100,000. These findings continue to support the effectiveness of the pre-entry screening programme in detecting prevalent pulmonary TB prior to entry to the UK.

The LTBI testing and treatment programme is now in its fourth year. Between 2016 and 2017 there was a 73% increase in the number of tests performed. Overall, nearly 1 in 5 (17%) tests was positive although there was considerable geographic variation. Treatment uptake and completion rates were also variable but over half (52%) of all CCGs reporting data achieved an uptake of over 60% and a large majority (87%) reported completion rates over 60%. Important gains have been made in the implementation of the LTBI programme but there is still a need to improve data submission to strengthen monitoring and evaluation efforts.

Continued declines in the number and rate of people notified with TB over the last six years are very positive and move us a step closer towards the end TB pre-elimination goal of 1 per 100,000 pre-elimination by 2035. Achieving this will be difficult and requires the sustained enthusiasm, dedication and support for public health and clinical teams who have done so much to contribute to TB control through effective surveillance, clinical care and public health action.

13. Recommendations

It is very encouraging that TB notifications and rates in England have declined for the sixth consecutive year. The 38% decline in TB notifications since the peak of 2011 is impressive as is the nearly 10% reduction in 2017. However there is more to do to sustain this decline and meet the needs of the most vulnerable patients.

To achieve ongoing reductions in TB incidence and deliver the 'Collaborative TB Strategy for England's 10 areas for action (AfA) further work is required [2]. Based on the findings in this report, a number of recommendations are outlined below. Wider recommendations on improving TB control in England are available in the 'Collaborative TB Strategy for England 2015-2020'.

To improve access to services and ensure early diagnosis (AfA1)

The delay between symptom onset and treatment start for people notified with pulmonary TB remains unchanged since 2016 and unacceptably long.

Recommendations to reduce diagnostic delay:

- TB clinical teams are encouraged to raise awareness of TB among local communities affected by TB, other service providers and primary care (as per the national TB clinical policy) and by utilising the resources available from TB Alert http://www.thetruthabouttb.org/professionals/professional-education/ [12]
- TB Control Boards (TBCBs), CCGs and primary care to raise awareness of TB in primary care by encouraging use of the RCGP TB e-learning module http://elearning.rcgp.org.uk/course/info.php?id=107 [13]
- National TB Office to raise TB awareness in groups-at-risk of TB through a selective awareness raising campaign

To provide universal access to high quality diagnostics (AfA2)

In 2017, there was a small decrease in the proportion of people notified with TB who were culture confirmed (2017: 64% versus 2016: 62%). A significant proportion of people with TB (31%) remain unconfirmed by any laboratory method. It is increasingly important to use all diagnostic modalities and to ensure high culture confirmation rates to maximise the benefits of whole genome sequencing.

Recommendations to improve TB diagnostics:

- TB clinical teams to prioritise obtaining diagnostic samples wherever possible
- TBCBs and lead TB microbiologists to work with local laboratories to find solutions to gaps identified by the laboratory audit and encourage use of the TB diagnostics standard of best practice

To improve treatment and care services (AfA3)

TBCBs, CCGs, primary care and TB services need to work collaboratively to ensure a continuing decline in TB notifications and recent transmissions and to further improve treatment and care for TB patients.

Recommendations to improve TB treatment and care:

- TB clinical teams to continue their supportive case management of complex TB patients, offer DOT where indicated and consider the use of innovative approaches such as VOT to improve treatment completion
- TB clinical teams to continue cohort review as a tool to improve local TB control and to monitor treatment outcomes and contact tracing activity
- CCGs to use the 2017 National TB Service Specification and Clinical Policy to commission and monitor local TB services
- TBCBs encouraged to review local services against the 2017 National TB Service Specification and Clinical Policy to identify gaps and take appropriate action with key partners
- national TB Office to review case complexity to inform workforce needs into the future

To reduce drug-resistant TB (AfA6)

In 2017, the number of people notified with MDR/RR-TB decreased overall. People with drug resistant TB have more complex treatment and work is needed to ensure treatment completion in this group continues to improve.

Recommendations to reduce drug resistant TB:

- encourage TB clinical teams to refer all MDR cases to the British Thoracic Society MDR-TB Clinical Advice Service to support MDR-TB case management
- TB clinical teams to continue supporting patients complete treatment, using DOT or VOT where indicated, and to minimise patient loss to follow-up through careful case management

To tackle TB in under-served populations (USPs) (AfA7)

In 2017, we saw an increase in both the number and proportion of people notified with TB who have social risk factors (SRFs). Treatment completion in this group has remained constant at 75% to 80% and is a little lower than for people without SRFs. Patients with SRFs have more complex needs and worse TB outcomes and an enhanced focus on preventing TB in USPs and improving the support available to these patients is required. This should, in turn, help to reduce health inequalities, one of the key aims of the Collaborative TB Strategy.

Recommendations to improve TB control among USPs:

- TBCBs and their partners are encouraged to use the Resource 'Tackling TB in Under-Served Populations' [14] to take appropriate local action and better meet the needs of USPs
- TBCBs and partners to work to provide more integrated services for USPs
- TB commissioners, in both CCGs and local authorities, to ensure appropriate access to services, treatment and support to enable patients to complete treatment
- local authorities are encouraged to use 'Tackling TB - local government's public health role' [15], a joint publication from PHE and the Local Government Association to help support USPs with TB
- national TB Office to update 'Tackling TB in Under-Served Populations' with new data and exemplars to support TBCBs and partners better meet the needs of USPs

To implement new entrant latent TB screening (AfA8)

The rate of TB in the non-UK born population remains considerably higher than in the UK born population with seven out of ten people notified with TB in 2017 born abroad. Driving forward the roll-out of the new migrant LTBI testing and treatment programme is key to the delivery of better TB control in England.

Recommendations to sustain the roll-out of new migrant LTBI programmes:

- TBCBs should continue to work with CCGs and TB services in high TB burden CCGs to embed local new migrant LTBI testing and treatment programmes, facilitate data returns and encourage use of the LTBI toolkit to support this work http://www.tbalert.org/health-professionals/ltbi-toolkit/ [16]
- in high TB burden areas, CCGs, primary and secondary care staff are encouraged to invite people for LTBI testing, encourage those with LTBI to consider treatment; and utilise the support of *TB Alert* and their programme of work to increase uptake in communities at risk

Three final overarching recommendations that relate to the broader aspects of TB control include:

- TBCBs are encouraged to continue their work providing support to local TB control and overseeing local implementation of the strategy's ten areas for action
- CCGs and local authorities are encouraged to use the PHE TB Fingertips tool to assess their local TB burden to support JSNA development and TB commissioning and monitoring
- TB Services are encouraged to submit high quality data to strengthen surveillance to support appropriate public health decision making and commissioning

This year's annual TB report shows the dedication and hard work of all those involved in TB patient care is having an impact. The number of people with TB in England is the lowest it has been in nearly 30 years; the 38% decline in TB since the peak of 2011 is impressive. However, action is still needed to sustain these declines and it is crucial that work to implement the Collaborative TB Strategy continues at pace to strengthen TB control, achieve the Strategy's goals of a year-on-year decrease in incidence, a reduction in health inequalities and, ultimately, the elimination of TB as a public health problem in England.

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Appendix I. Supplementary tables

Table Ai.A: Number of TB notifications, rates and annual percentage change, England, 1960-2017[a]

Year	Number of people	Rate per 100,000 (95% CI)	Annual change in numbers (%)	Annual change in rate (%)
1960	22,328	-	-	-
1961	20,433	-	-8.5	-
1962	19,344	-	-5.3	-
1963	17,860	-	-7.7	-
1964	16,527	-	-7.5	-
1965	15,161	-	-8.3	-
1966	13,773	-	-9.2	-
1967	12,477	-	-9.4	-
1968	12,328	-	-1.2	-
1969	11,559	-	-6.2	-
1970	11,280	-	-2.4	-
1971	11,128	24.0 (23.5 - 24.4)	-1.3	-
1972	10,566	22.7 (22.3 - 23.1)	-5.1	-5.4
1973	10,572	22.6 (22.2 - 23.1)	0.1	-0.4
1974	10,119	21.7 (21.3 - 22.1)	-4.3	-4.0
1975	10,276	22.0 (21.6 - 22.4)	1.6	1.4
1976	9,650	20.7 (20.3 - 21.1)	-6.1	-5.9
1977	9,071	19.4 (19.1 - 19.9)	-6.0	-6.3
1978	9,231	19.8 (19.4 - 20.2)	1.8	2.1
1979	8,854	19.0 (18.6 - 19.4)	-4.1	-4.0
1980	8,752	18.7 (18.3 - 19.1)	-1.2	-1.6
1981	7,803	16.7 (16.3 - 17.0)	-10.8	-10.7
1982	7,083	15.1 (14.8 - 15.5)	-9.2	-9.6
1983	6,501	13.9 (13.6 - 14.2)	-8.2	-7.9
1984	5,833	12.4 (12.1 - 12.8)	-10.3	-10.8
1985	5,583	11.9 (11.6 - 12.2)	-4.3	-4.0
1986	5,743	12.2 (11.9 - 12.5)	2.9	2.5
1987	4,854	10.3 (10.0 - 10.6)	-15.5	-15.6
1988	4,962	10.5 (10.2 - 10.8)	2.2	1.9
1989	5,223	11.0 (10.7 - 11.3)	5.3	4.8
1990	5,010	10.5 (10.2 - 10.8)	-4.1	-4.5
1991	5,270	11.0 (10.7 - 11.3)	5.2	4.8
1992	5,598	11.7 (11.4 - 12.0)	6.2	6.4
1993	5,722	11.9 (11.6 - 12.2)	2.2	1.7
1994	5,410	11.2 (10.9 - 11.5)	-5.5	-5.9
1995	5,428	11.2 (10.9 - 11.5)	0.3	0.0
1996	5,493	11.3 (11.0 - 11.6)	1.2	0.9
1997	5,664	11.6 (11.3 - 11.9)	3.1	2.7

Year	Number of people	Rate per 100,000 (95% CI)	Annual change in numbers (%)	Annual change in rate (%)
1998	5,915	12.1 (11.8 - 12.4)	4.4	4.3
1999	5,939	12.1 (11.8 - 12.4)	0.4	0.0
2000	6,044	12.3 (12.0 - 12.6)	1.8	1.7
2001	6,169	12.5 (12.2-12.8)	2.1	1.6
2002	6,675	13.4 (13.1-13.8)	8.2	7.2
2003	6,631	13.3 (13.0-13.6)	-0.7	-0.7
2004	6,930	13.8 (13.5-14.1)	4.5	3.8
2005	7,658	15.1 (14.8-15.5)	10.5	9.4
2006	7,682	15.1 (14.7-15.4)	0.3	0.0
2007	7,577	14.7 (14.4-15.1)	-1.4	-2.6
2008	7,809	15.1 (14.7-15.4)	3.1	2.7
2009	8,112	15.5 (15.2-15.9)	3.9	2.6
2010	7,676	14.6 (14.3-14.9)	-5.4	-5.8
2011	8,280	15.6 (15.3-15.9)	7.9	6.8
2012	8,084	15.1 (14.8-15.4)	-2.4	-3.2
2013	7,265	13.5 (13.2-13.8)	-10.1	-10.6
2014	6,472	11.9 (11.6-12.2)	-10.9	-11.9
2015	5,731	10.5 (10.2-10.7)	-11.4	-11.8
2016	5,616	10.2 (9.9-10.4)	-2.0	-2.9
2017	5,102	9.2 (8.9-9.4)	-9.2	-9.8

CI - confidence interval

[a] Data between 2000-2017 is the same as that presented in Table Ai.1.1 and reflects data collected after enhanced surveillance was introduced. Data from 1960-1999 is from NOIDs Public Health England (2012) Notifiable diseases: annual totals from 1912 to 1981.

Table Ai.1.1: Number of TB notifications, rates and annual percentage change, England, 2000-2017

Year	Total		Annual change in numbers (%)	Annual change in rate (%)
	Number of people	Rate per 100,000 (95% CI)		
2000	6,044	12.3 (12.0 - 12.6)	-	-
2001	6,169	12.5 (12.2-12.8)	2.1	1.6
2002	6,675	13.4 (13.1-13.8)	8.2	7.2
2003	6,631	13.3 (13.0-13.6)	-0.7	-0.7
2004	6,930	13.8 (13.5-14.1)	4.5	3.8
2005	7,658	15.1 (14.8-15.5)	10.5	9.4
2006	7,682	15.1 (14.7-15.4)	0.3	0.0
2007	7,577	14.7 (14.4-15.1)	-1.4	-2.6
2008	7,809	15.1 (14.7-15.4)	3.1	2.7
2009	8,112	15.5 (15.2-15.9)	3.9	2.6
2010	7,676	14.6 (14.3-14.9)	-5.4	-5.8
2011	8,280	15.6 (15.3-15.9)	7.9	6.8
2012	8,084	15.1 (14.8-15.4)	-2.4	-3.2
2013	7,265	13.5 (13.2-13.8)	-10.1	-10.6
2014	6,472	11.9 (11.6-12.2)	-10.9	-11.9
2015	5,731	10.5 (10.2-10.7)	-11.4	-11.8
2016	5,616	10.2 (9.9-10.4)	-2.0	-2.9
2017	5,102	9.2 (8.9-9.4)	-9.2	-9.8

CI - confidence intervals

Table Ai.1.2: Number of TB notifications and rates by PHE Centre, England, 2000-2017

Year	London		West Midlands		South East		North West		East of England	
	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)
2000	2,632	36.4 (35.0-37.8)	699	13.3 (12.3-14.3)	442	5.7 (5.2-6.2)	624	9.2 (8.5-10.0)	299	5.4 (4.8-6.0)
2001	2,574	35.2 (33.8-36.5)	702	13.3 (12.3-14.3)	430	5.5 (5.0-6.1)	638	9.4 (8.7-10.2)	338	6.0 (5.4-6.7)
2002	3,055	41.4 (40.0-42.9)	794	15.0 (14.0-16.1)	481	6.1 (5.6-6.7)	638	9.4 (8.7-10.2)	355	6.3 (5.6-7.0)
2003	3,063	41.4 (40.0-42.9)	783	14.7 (13.7-15.8)	542	6.9 (6.3-7.5)	574	8.4 (7.7-9.1)	323	5.7 (5.1-6.3)
2004	3,111	41.9 (40.4-43.4)	920	17.2 (16.1-18.4)	557	7.0 (6.5-7.6)	570	8.3 (7.7-9.0)	405	7.1 (6.4-7.8)
2005	3,448	45.9 (44.3-47.4)	920	17.1 (16.0-18.2)	583	7.3 (6.7-7.9)	743	10.8 (10.1-11.6)	470	8.1 (7.4-8.9)
2006	3,328	43.8 (42.3-45.3)	927	17.1 (16.0-18.3)	607	7.5 (7.0-8.2)	694	10.1 (9.3-10.8)	479	8.2 (7.5-9.0)
2007	3,234	42.0 (40.6-43.5)	928	17.0 (15.9-18.2)	627	7.7 (7.1-8.4)	733	10.6 (9.8-11.4)	421	7.2 (6.5-7.9)
2008	3,362	43.0 (41.6-44.5)	1,008	18.3 (17.2-19.5)	629	7.7 (7.1-8.3)	730	10.5 (9.7-11.3)	506	8.5 (7.8-9.3)
2009	3,402	42.8 (41.4-44.3)	1,006	18.2 (17.1-19.4)	712	8.6 (8.0-9.3)	799	11.4 (10.7-12.3)	512	8.5 (7.8-9.3)
2010	3,241	40.2 (38.8-41.6)	872	15.7 (14.6-16.7)	711	8.5 (7.9-9.2)	809	11.5 (10.7-12.3)	506	8.4 (7.6-9.1)
2011	3,491	42.6 (41.2-44.0)	1,004	17.9 (16.8-19.0)	813	9.7 (9.0-10.4)	818	11.6 (10.8-12.4)	560	9.2 (8.4-10.0)
2012	3,401	40.9 (39.6-42.3)	1,076	19.1 (17.9-20.2)	778	9.2 (8.5-9.9)	775	10.9 (10.2-11.7)	497	8.1 (7.4-8.8)
2013	2,975	35.3 (34.1-36.6)	979	17.3 (16.2-18.4)	684	8.0 (7.4-8.6)	716	10.1 (9.4-10.8)	451	7.3 (6.6-8.0)
2014	2,555	29.9 (28.8-31.1)	775	13.6 (12.6-14.6)	664	7.7 (7.1-8.3)	642	9.0 (8.3-9.7)	436	6.9 (6.3-7.6)
2015	2,277	26.3 (25.2-27.4)	699	12.1 (11.3-13.1)	592	6.8 (6.3-7.4)	568	7.9 (7.3-8.6)	389	6.1 (5.5-6.8)
2016	2,196	25.0 (24.0-26.1)	717	12.3 (11.5-13.3)	560	6.4 (5.9-6.9)	589	8.2 (7.5-8.8)	432	6.8 (6.1-7.4)
2017	1,919	21.7 (20.8-22.7)	663	11.3 (10.5-12.2)	539	6.1 (5.6-6.7)	532	7.3 (6.7-8.0)	409	6.4 (5.8-7.0)

CI - confidence intervals

Table Ai.1.2: Number of TB notifications and rates by PHE Centre, England, 2000-2017 continued

Year	East Midlands		Yorkshire and the Humber		South West		North East	
	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)
2000	414	9.9 (9.0-10.9)	544	11.0 (10.1-11.9)	230	4.7 (4.1-5.3)	157	6.2 (5.2-7.2)
2001	544	13.0 (11.9-14.1)	551	11.1 (10.2-12.0)	211	4.3 (3.7-4.9)	177	7.0 (6.0-8.1)
2002	471	11.2 (10.2-12.2)	505	10.1 (9.2-11.0)	220	4.4 (3.9-5.0)	149	5.9 (5.0-6.9)
2003	458	10.8 (9.8-11.8)	544	10.8 (9.9-11.8)	201	4.0 (3.5-4.6)	141	5.6 (4.7-6.5)
2004	418	9.7 (8.8-10.7)	535	10.6 (9.7-11.5)	263	5.2 (4.6-5.9)	143	5.6 (4.7-6.6)
2005	533	12.3 (11.3-13.4)	556	10.9 (10.0-11.8)	266	5.2 (4.6-5.9)	132	5.2 (4.3-6.1)
2006	566	13.0 (11.9-14.1)	661	12.9 (11.9-13.9)	278	5.4 (4.8-6.1)	141	5.5 (4.6-6.5)
2007	534	12.1 (11.1-13.2)	632	12.2 (11.3-13.2)	269	5.2 (4.6-5.9)	196	7.7 (6.6-8.8)
2008	483	10.9 (9.9-11.9)	635	12.2 (11.3-13.2)	279	5.4 (4.7-6.0)	177	6.9 (5.9-8.0)
2009	524	11.7 (10.7-12.8)	688	13.2 (12.2-14.2)	303	5.8 (5.2-6.5)	166	6.4 (5.5-7.5)
2010	494	11.0 (10.0-12.0)	628	12.0 (11.0-12.9)	265	5.0 (4.4-5.7)	150	5.8 (4.9-6.8)
2011	492	10.8 (9.9-11.8)	664	12.6 (11.6-13.5)	307	5.8 (5.2-6.5)	131	5.0 (4.2-6.0)
2012	497	10.9 (9.9-11.9)	593	11.2 (10.3-12.1)	300	5.6 (5.0-6.3)	167	6.4 (5.5-7.5)
2013	413	9.0 (8.1-9.9)	583	10.9 (10.1-11.8)	326	6.1 (5.4-6.8)	138	5.3 (4.4-6.2)
2014	400	8.6 (7.8-9.5)	516	9.6 (8.8-10.5)	316	5.8 (5.2-6.5)	168	6.4 (5.5-7.5)
2015	357	7.6 (6.9-8.5)	436	8.1 (7.3-8.9)	285	5.2 (4.6-5.8)	128	4.9 (4.1-5.8)
2016	341	7.2 (6.5-8.0)	421	7.8 (7.0-8.5)	239	4.3 (3.8-4.9)	121	4.6 (3.8-5.5)
2017	351	7.4 (6.6-8.2)	345	6.3 (5.7-7.0)	234	4.2 (3.7-4.8)	110	4.2 (3.4-5.0)

CI - confidence intervals

Table Ai.1.3 Number of TB notifications and rates by age group and place of birth, England, 2017

Age group (years)	Place of Birth				Total[a]	
	UK born		Non-UK born			
	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)
0-4	60	1.8 (1.4-2.4)	7	6.1 (2.4-12.5)	68	2.0 (1.6-2.5)
5-9	33	1.0 (0.7-1.4)	12	5.1 (2.6-8.9)	46	1.3 (1.0-1.8)
10-14	37	1.3 (0.9-1.8)	27	9.7 (6.4-14.2)	66	2.1 (1.6-2.7)
15-19	107	4.0 (3.3-4.9)	148	38.0 (32.1-44.6)	257	8.5 (7.5-9.6)
20-24	126	4.3 (3.6-5.1)	244	44.1 (38.7-50.0)	373	10.6 (9.6-11.8)
25-29	96	3.3 (2.6-4.0)	446	49.7 (45.2-54.6)	547	14.2 (13.1-15.5)
30-34	111	4.3 (3.5-5.1)	481	42.4 (38.7-46.3)	601	16.1 (14.8-17.4)
35-39	105	4.1 (3.4-5.0)	466	44.4 (40.4-48.6)	577	16.0 (14.7-17.4)
40-44	96	3.8 (3.1-4.7)	358	40.1 (36.1-44.5)	461	13.5 (12.3-14.8)
45-49	97	3.2 (2.6-3.9)	296	39.8 (35.4-44.6)	403	10.6 (9.6-11.6)
50-54	120	3.6 (3.0-4.4)	222	38.3 (33.5-43.7)	350	9.0 (8.1-10.0)
55-59	80	2.7 (2.1-3.4)	200	41.5 (35.9-47.6)	286	8.3 (7.4-9.3)
60-64	79	3.1 (2.4-3.8)	170	45.8 (39.2-53.3)	258	8.7 (7.7-9.9)
65-69	75	2.9 (2.3-3.6)	140	46.4 (39.0-54.7)	218	7.6 (6.6-8.6)
70-74	80	3.4 (2.7-4.2)	97	48.5 (39.3-59.1)	182	7.1 (6.1-8.2)
75-79	55	3.5 (2.6-4.6)	119	55.2 (45.7-66.1)	177	9.9 (8.5-11.5)
80+	97	4.3 (3.5-5.3)	123	55.2 (45.9-65.9)	232	9.4 (8.2-10.7)

[a] Total number of people including those with an unknown place of birth

CI - confidence intervals

Table Ai.1.4: Number of TB notifications, rates and annual percentage change by place of birth, England, 2000-2017

Year	Place of birth							
	UK born				Non-UK born			
	Number of people	Rate per 100,000 (95% CI)	Annual change in numbers (%)	Annual change in rate (%)	Number of people	Rate per 100,000 (95% CI)	Annual change in numbers (%)	Annual change in rate (%)
2000	1,830	4.1 (3.9 -4.3)	-	-	3,329	79.6 (76.9 -82.4)	-	-
2001	1,889	4.3 (4.1 -4.4)	3.2%	4.9%	3,431	79.1 (76.5 -81.8)	3.1%	-0.6%
2002	1,852	4.2 (4.0 -4.4)	-2.0%	-2.3%	4,111	90.5 (87.7 -93.3)	19.8%	14.4%
2003	1,703	3.8 (3.6 -4.0)	-8.0%	-9.5%	4,326	90.8 (88.1 -93.5)	5.2%	0.3%
2004	1,791	4.0 (3.8 -4.2)	5.2%	5.3%	4,571	95.2 (92.4 -98.0)	5.7%	4.8%
2005	1,804	4.0 (3.8 -4.2)	0.7%	0.0%	5,186	100.7 (98.0 -103.5)	13.5%	5.8%
2006	1,729	3.9 (3.7 -4.1)	-4.2%	-2.5%	5,175	92.9 (90.4 -95.5)	-0.2%	-7.7%
2007	1,799	4.0 (3.8 -4.2)	4.0%	2.6%	5,135	85.5 (83.2 -87.9)	-0.8%	-8.0%
2008	1,867	4.2 (4.0 -4.4)	3.8%	5.0%	5,417	86.0 (83.7 -88.3)	5.5%	0.6%
2009	1,907	4.2 (4.1 -4.4)	2.1%	0.0%	5,662	86.8 (84.6 -89.1)	4.5%	0.9%
2010	1,814	4.0 (3.8 -4.2)	-4.9%	-4.8%	5,515	83.1 (80.9 -85.3)	-2.6%	-4.3%
2011	1,958	4.3 (4.1 -4.5)	7.9%	7.5%	6,021	85.9 (83.7 -88.1)	9.2%	3.4%
2012	2,003	4.4 (4.2 -4.6)	2.3%	2.3%	5,841	81.4 (79.4 -83.6)	-3.0%	-5.2%
2013	1,842	4.0 (3.8 -4.2)	-8.0%	-9.1%	5,258	70.6 (68.7 -72.5)	-10.0%	-13.3%
2014	1,756	3.8 (3.6 -4.0)	-4.7%	-5.0%	4,611	60.2 (58.5 -62.0)	-12.3%	-14.7%
2015	1,530	3.3 (3.2 -3.5)	-12.9%	-13.2%	4,097	51.3 (49.7 -52.9)	-11.1%	-14.8%
2016	1,454	3.1 (3.0 -3.3)	-5.0%	-6.1%	4,093	49.4 (47.9 -50.9)	-0.1%	-3.7%
2017	1,454	3.1 (3.0 -3.3)	0.0%	0.0%	3,556	41.1 (39.7 -42.4)	-13.1%	-16.8%

CI - confidence intervals

Table Ai.1.5: Number of TB notifications and rates by place of birth and PHE Centre, England, 2000-2017

Year	London				West Midlands				South East			
	UK born		Non-UK born		UK born		Non-UK born		UK born		Non-UK born	
	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)
2000	446	8.5 (7.7-9.3)	1,775	92.4 (88.1-96.8)	293	6.0 (5.4-6.8)	380	105.4 (95.1-116.6)	172	2.4 (2.0-2.7)	210	37.1 (32.2-42.5)
2001	422	8.0 (7.2-8.8)	1,862	95.0 (90.8-99.4)	325	6.7 (6.0-7.5)	359	94.7 (85.2-105.1)	152	2.1 (1.8-2.4)	228	38.9 (34.0-44.3)
2002	540	10.3 (9.5-11.2)	2,264	110.0 (105.5-114.6)	300	6.2 (5.5-6.9)	448	119.7 (108.8-131.3)	145	2.0 (1.7-2.3)	290	48.0 (42.7-53.9)
2003	480	9.3 (8.5-10.1)	2,326	108.1 (103.8-112.6)	302	6.2 (5.5-6.9)	438	110.0 (99.9-120.8)	118	1.6 (1.3-1.9)	364	55.1 (49.6-61.1)
2004	535	10.3 (9.5-11.2)	2,299	105.6 (101.3-110.0)	322	6.6 (5.9-7.4)	551	137.2 (126.0-149.1)	163	2.2 (1.9-2.6)	344	52.7 (47.3-58.6)
2005	578	11.3 (10.4-12.2)	2,579	112.0 (107.7-116.4)	270	5.4 (4.8-6.1)	602	168.6 (155.4-182.6)	129	1.7 (1.5-2.1)	416	61.5 (55.7-67.7)
2006	546	10.6 (9.7-11.5)	2,564	108.3 (104.1-112.6)	282	5.8 (5.1-6.5)	580	125.0 (115.0-135.6)	135	1.8 (1.5-2.2)	415	53.5 (48.5-58.9)
2007	519	10.2 (9.4-11.1)	2,577	101.5 (97.6-105.5)	278	5.7 (5.0-6.4)	535	114.9 (105.4-125.1)	164	2.2 (1.9-2.6)	415	52.2 (47.3-57.4)
2008	553	10.8 (9.9-11.7)	2,669	102.4 (98.5-106.3)	350	7.2 (6.4-8.0)	599	110.1 (101.4-119.2)	138	1.9 (1.6-2.2)	442	51.4 (46.7-56.4)
2009	511	10.0 (9.1-10.9)	2,754	100.9 (97.2-104.8)	317	6.5 (5.8-7.3)	638	106.0 (97.9-114.6)	180	2.4 (2.1-2.8)	474	53.9 (49.2-59.0)
2010	503	9.6 (8.8-10.5)	2,696	98.0 (94.3-101.7)	283	5.7 (5.1-6.5)	559	97.4 (89.5-105.8)	150	2.0 (1.7-2.4)	499	52.6 (48.1-57.4)
2011	504	9.7 (8.9-10.6)	2,931	100.1 (96.5-103.8)	316	6.4 (5.7-7.1)	664	113.9 (105.4-122.9)	204	2.7 (2.4-3.1)	577	59.0 (54.2-64.0)
2012	560	10.6 (9.8-11.5)	2,798	94.8 (91.3-98.3)	335	6.7 (6.0-7.5)	704	117.3 (108.8-126.3)	230	3.0 (2.6-3.4)	530	54.7 (50.2-59.6)
2013	485	9.2 (8.4-10.1)	2,465	80.5 (77.4-83.8)	313	6.3 (5.6-7.0)	643	100.1 (92.5-108.2)	172	2.3 (1.9-2.6)	506	48.2 (44.1-52.6)
2014	477	9.0 (8.2-9.8)	2,075	66.2 (63.4-69.1)	267	5.3 (4.7-6.0)	501	77.0 (70.4-84.0)	160	2.1 (1.8-2.4)	493	46.6 (42.6-50.9)
2015	419	7.8 (7.0-8.5)	1,844	57.9 (55.2-60.6)	253	5.1 (4.5-5.7)	440	63.2 (57.4-69.4)	168	2.2 (1.9-2.5)	405	37.3 (33.7-41.1)
2016	397	7.4 (6.7-8.2)	1,780	52.5 (50.1-55.0)	227	4.5 (4.0-5.2)	485	68.3 (62.4-74.7)	131	1.7 (1.4-2.0)	420	35.8 (32.5-39.4)
2017	378	6.9 (6.3-7.7)	1,518	44.3 (42.1-46.6)	248	5.0 (4.4-5.6)	408	55.2 (49.9-60.8)	155	2.0 (1.7-2.3)	374	31.1 (28.0-34.4)

CI - confidence intervals

Denominator data used to calculate rates among people born in the UK and those born outside the UK are based on survey data, which have known limitations when broken down into smaller geographical areas, therefore rates and annual changes in rates should be interpreted with caution. For further information, see Appendix III: Methods.

Table Ai.1.5: Number of TB notifications and rates by place of birth and PHE Centre, England, 2000-2017 continued

Year	North West				East of England				East Midlands			
	UK born		Non-UK born		UK born		Non-UK born		UK born		Non-UK born	
	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)
2000	261	4.1 (3.6-4.6)	348	126.4 (113.4-140.4)	97	1.9 (1.6-2.4)	150	46.8 (39.6-54.9)	120	3.1 (2.6-3.7)	101	46.4 (37.8-56.4)
2001	299	4.7 (4.2-5.2)	327	116.1 (103.9-129.4)	111	2.2 (1.8-2.7)	164	45.4 (38.7-52.9)	120	3.1 (2.5-3.7)	100	44.7 (36.4-54.4)
2002	258	4.0 (3.6-4.6)	352	118.5 (106.5-131.6)	105	2.1 (1.7-2.5)	209	60.7 (52.8-69.5)	127	3.2 (2.7-3.9)	119	47.2 (39.1-56.5)
2003	235	3.7 (3.2-4.2)	330	109.5 (98.0-122.0)	97	1.9 (1.6-2.4)	198	53.4 (46.2-61.3)	116	2.9 (2.4-3.5)	182	72.9 (62.7-84.3)
2004	198	3.1 (2.7-3.5)	358	110.4 (99.3-122.5)	101	2.0 (1.6-2.4)	270	71.5 (63.2-80.5)	111	2.8 (2.3-3.4)	225	90.4 (78.9-103.0)
2005	244	3.8 (3.3-4.3)	468	126.1 (114.9-138.1)	129	2.6 (2.1-3.0)	304	69.0 (61.4-77.2)	95	2.4 (1.9-2.9)	291	99.4 (88.3-111.5)
2006	229	3.6 (3.1-4.1)	426	104.9 (95.2-115.4)	98	1.9 (1.6-2.4)	324	66.0 (59.0-73.6)	114	2.9 (2.4-3.5)	233	68.3 (59.8-77.6)
2007	253	4.0 (3.5-4.5)	458	96.8 (88.1-106.1)	111	2.2 (1.8-2.7)	275	51.1 (45.3-57.5)	118	3.0 (2.5-3.6)	278	75.7 (67.1-85.2)
2008	231	3.6 (3.2-4.1)	474	95.4 (87.0-104.4)	148	2.9 (2.5-3.4)	309	58.0 (51.8-64.9)	119	3.0 (2.5-3.6)	296	76.5 (68.0-85.7)
2009	255	4.0 (3.5-4.5)	494	93.8 (85.8-102.5)	132	2.6 (2.2-3.1)	339	60.9 (54.6-67.7)	146	3.6 (3.1-4.3)	340	89.8 (80.5-99.8)
2010	270	4.2 (3.7-4.8)	491	90.5 (82.7-98.9)	135	2.6 (2.2-3.1)	347	61.7 (55.4-68.6)	122	3.0 (2.5-3.6)	351	85.3 (76.6-94.8)
2011	259	4.0 (3.6-4.6)	521	93.3 (85.4-101.7)	147	2.8 (2.4-3.3)	387	65.1 (58.8-71.9)	142	3.5 (3.0-4.1)	331	76.1 (68.1-84.8)
2012	262	4.1 (3.6-4.6)	494	89.5 (81.7-97.7)	128	2.5 (2.1-2.9)	345	52.9 (47.4-58.7)	127	3.1 (2.6-3.7)	354	80.3 (72.1-89.1)
2013	255	4.0 (3.5-4.5)	447	76.7 (69.8-84.2)	120	2.3 (1.9-2.7)	314	48.4 (43.2-54.1)	116	2.8 (2.4-3.4)	292	63.3 (56.2-71.0)
2014	226	3.5 (3.1-4.0)	405	66.1 (59.8-72.9)	110	2.1 (1.7-2.5)	313	46.3 (41.3-51.8)	132	3.2 (2.7-3.8)	258	55.8 (49.2-63.0)
2015	185	2.9 (2.5-3.3)	368	52.1 (46.9-57.7)	102	1.9 (1.6-2.4)	279	37.4 (33.1-42.0)	99	2.4 (2.0-2.9)	251	50.9 (44.8-57.6)
2016	209	3.2 (2.8-3.7)	368	55.4 (49.9-61.4)	119	2.2 (1.9-2.7)	302	42.0 (37.4-47.0)	94	2.3 (1.8-2.8)	242	48.2 (42.3-54.7)
2017	177	2.7 (2.4-3.2)	336	48.7 (43.6-54.2)	124	2.3 (1.9-2.8)	278	36.6 (32.4-41.1)	113	2.8 (2.3-3.3)	226	37.6 (32.9-42.9)

CI - confidence intervals

Denominator data used to calculate rates among people born in the UK born and those born outside the UK are based on survey data, which have known limitations when broken down into smaller geographical areas, therefore rates and annual changes in rates should be interpreted with caution. For further information, see Appendix III: Methods.

Table Ai.1.5: Number of TB notifications and rates by place of birth and PHE Centre, England, 2000-2017 continued

Year	Yorkshire and the Humber				South West				North East			
	UK born		Non-UK born		UK born		Non-UK born		UK born		Non-UK born	
	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)
2000	212	4.5 (4.0-5.2)	259	114.0 (100.5-128.7)	139	3.0 (2.5-3.6)	70	29.6 (23.1-37.5)	90	3.7 (2.9-4.5)	35	63.4 (44.2-88.2)
2001	245	5.2 (4.6-5.9)	270	111.1 (98.3-125.2)	123	2.7 (2.2-3.2)	61	25.8 (19.7-33.1)	92	3.8 (3.0-4.6)	59	88.5 (67.4-114.2)
2002	188	4.0 (3.5-4.6)	284	108.2 (96.0-121.6)	98	2.1 (1.7-2.6)	89	32.3 (25.9-39.7)	90	3.7 (3.0-4.6)	55	72.3 (54.5-94.1)
2003	201	4.3 (3.7-4.9)	334	116.1 (104.0-129.3)	87	1.9 (1.5-2.3)	93	33.0 (26.6-40.4)	67	2.7 (2.1-3.5)	60	91.0 (69.5-117.2)
2004	194	4.1 (3.6-4.7)	330	115.6 (103.5-128.8)	98	2.1 (1.7-2.5)	134	53.5 (44.8-63.3)	68	2.8 (2.2-3.6)	59	69.3 (52.8-89.4)
2005	180	3.8 (3.3-4.4)	341	97.7 (87.6-108.7)	123	2.6 (2.2-3.1)	124	46.0 (38.3-54.9)	55	2.3 (1.7-3.0)	60	66.3 (50.6-85.4)
2006	172	3.6 (3.1-4.2)	415	126.7 (114.8-139.5)	87	1.8 (1.5-2.3)	160	52.8 (44.9-61.7)	66	2.7 (2.1-3.5)	57	60.0 (45.4-77.7)
2007	179	3.8 (3.3-4.4)	356	95.0 (85.4-105.4)	97	2.1 (1.7-2.5)	151	42.1 (35.6-49.3)	79	3.2 (2.6-4.0)	90	95.1 (76.5-116.9)
2008	174	3.7 (3.2-4.3)	415	102.9 (93.2-113.3)	91	1.9 (1.5-2.3)	141	40.7 (34.2-47.9)	63	2.6 (2.0-3.3)	72	59.4 (46.5-74.8)
2009	212	4.4 (3.9-5.1)	406	105.7 (95.7-116.5)	99	2.1 (1.7-2.5)	147	45.2 (38.2-53.2)	55	2.3 (1.7-3.0)	70	48.9 (38.1-61.7)
2010	190	3.9 (3.4-4.6)	366	96.9 (87.2-107.4)	108	2.2 (1.8-2.7)	125	35.8 (29.8-42.6)	53	2.2 (1.6-2.9)	81	66.4 (52.7-82.5)
2011	220	4.6 (4.0-5.2)	389	94.6 (85.5-104.5)	127	2.6 (2.2-3.2)	150	36.7 (31.0-43.0)	39	1.6 (1.1-2.2)	71	62.2 (48.6-78.5)
2012	189	3.9 (3.4-4.5)	354	78.3 (70.3-86.9)	114	2.4 (2.0-2.8)	167	39.6 (33.8-46.0)	58	2.4 (1.8-3.1)	95	73.4 (59.4-89.7)
2013	182	3.8 (3.2-4.4)	360	79.8 (71.8-88.5)	151	3.1 (2.6-3.6)	156	39.4 (33.4-46.0)	48	2.0 (1.5-2.6)	75	48.6 (38.2-60.9)
2014	171	3.5 (3.0-4.1)	320	67.9 (60.7-75.8)	133	2.7 (2.3-3.2)	171	38.2 (32.7-44.3)	80	3.3 (2.6-4.1)	75	51.4 (40.4-64.4)
2015	126	2.6 (2.2-3.1)	292	59.8 (53.1-67.1)	123	2.5 (2.1-3.0)	146	31.9 (26.9-37.5)	55	2.2 (1.7-2.9)	72	57.6 (45.1-72.5)
2016	132	2.7 (2.3-3.2)	287	55.0 (48.8-61.7)	95	1.9 (1.5-2.3)	138	31.1 (26.1-36.8)	50	2.1 (1.5-2.7)	71	42.2 (33.0-53.2)
2017	102	2.1 (1.7-2.6)	234	44.4 (38.9-50.4)	109	2.2 (1.8-2.7)	120	22.2 (18.4-26.5)	48	2.0 (1.5-2.6)	62	35.2 (27.0-45.1)

CI - confidence intervals

Denominator data used to calculate rates among people born in the UK born and those born outside the UK are based on survey data, which have known limitations when broken down into smaller geographical areas, therefore rates and annual changes in rates should be interpreted with caution. For further information, see Appendix III: Methods.

Table Ai.1.6: Number and proportion of people with TB by most frequent country of birth for those born outside the UK, England, 2000-2017

Year	Country of birth[a]																		
	India		Pakistan		Romania		Bangladesh		Somalia		Nigeria		Eritrea		Nepal		Philippines		Total[b]
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n
2000	722	23.2	676	21.7	5	0.2	102	3.3	362	11.6	47	1.5	26	0.8	19	0.6	28	0.9	3,115
2001	668	20.6	715	22.1	5	0.2	109	3.4	360	11.1	47	1.5	18	0.6	28	0.9	35	1.1	3,236
2002	780	19.9	774	19.8	8	0.2	159	4.1	428	10.9	89	2.3	26	0.7	33	0.8	51	1.3	3,913
2003	789	19.3	729	17.9	11	0.3	182	4.5	473	11.6	116	2.8	43	1.1	34	0.8	52	1.3	4,083
2004	904	20.8	700	16.1	8	0.2	183	4.2	532	12.3	136	3.1	33	0.8	37	0.9	74	1.7	4,339
2005	1,099	22.4	832	16.9	11	0.2	191	3.9	581	11.8	153	3.1	43	0.9	36	0.7	69	1.4	4,917
2006	1,112	22.6	837	17.0	6	0.1	182	3.7	641	13.0	154	3.1	64	1.3	67	1.4	86	1.7	4,930
2007	1,187	24.3	796	16.3	15	0.3	243	5.0	551	11.3	150	3.1	66	1.4	69	1.4	92	1.9	4,886
2008	1,328	25.6	882	17.0	19	0.4	239	4.6	531	10.3	165	3.2	86	1.7	90	1.7	111	2.1	5,178
2009	1,531	28.2	921	16.9	25	0.5	235	4.3	535	9.8	174	3.2	93	1.7	114	2.1	114	2.1	5,436
2010	1,553	29.2	881	16.5	44	0.8	259	4.9	439	8.2	169	3.2	81	1.5	175	3.3	131	2.5	5,325
2011	1,787	30.4	1,061	18.0	54	0.9	285	4.8	415	7.1	190	3.2	98	1.7	214	3.6	101	1.7	5,884
2012	1,763	30.8	1,048	18.3	77	1.3	276	4.8	377	6.6	174	3.0	78	1.4	209	3.6	126	2.2	5,728
2013	1,548	30.0	1,045	20.2	69	1.3	237	4.6	290	5.6	156	3.0	58	1.1	163	3.2	123	2.4	5,164
2014	1,291	28.5	798	17.6	89	2.0	207	4.6	233	5.1	117	2.6	85	1.9	167	3.7	113	2.5	4,533
2015	1,068	26.5	640	15.9	120	3.0	209	5.2	178	4.4	120	3.0	90	2.2	125	3.1	106	2.6	4,037
2016	998	24.8	635	15.8	175	4.3	174	4.3	210	5.2	99	2.5	102	2.5	109	2.7	106	2.6	4,025
2017	882	25.3	507	14.5	206	5.9	139	4.0	130	3.7	98	2.8	97	2.8	95	2.7	79	2.3	3,485
Total	**21,010**	**25.6**	**14,477**	**17.6**	**947**	**1.2**	**3,611**	**4.4**	**7,266**	**8.8**	**2,354**	**2.9**	**1,187**	**1.4**	**1,784**	**2.2**	**1,597**	**1.9**	**82,214**

[a] Countries ordered by decreasing total number of TB notifications in 2017

[b] Total number of people notified with TB born outside the UK where country of birth was known

Table Ai.1.6: Number and proportion of people with TB by most frequent country of birth for those born outside the UK, England, 2000-2017 continued

Year	Country of birth[a]																		
	Poland		Afghanistan		Zimbabwe		Sudan		Sri Lanka		Kenya		Ethiopia		Lithuania		Other		Total[b]
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n
2000	10	0.3	43	1.4	78	2.5	7	0.2	50	1.6	92	3.0	29	0.9	1	0.0	818	26.3	3,115
2001	9	0.3	66	2.0	110	3.4	10	0.3	66	2.0	109	3.4	37	1.1	3	0.1	841	26.0	3,236
2002	10	0.3	100	2.6	240	6.1	10	0.3	82	2.1	110	2.8	52	1.3	3	0.1	958	24.5	3,913
2003	15	0.4	65	1.6	275	6.7	17	0.4	66	1.6	109	2.7	48	1.2	5	0.1	1,054	25.8	4,083
2004	13	0.3	78	1.8	270	6.2	20	0.5	81	1.9	130	3.0	55	1.3	2	0.0	1,083	25.0	4,339
2005	12	0.2	83	1.7	269	5.5	23	0.5	85	1.7	134	2.7	44	0.9	6	0.1	1,246	25.3	4,917
2006	30	0.6	73	1.5	242	4.9	27	0.5	62	1.3	106	2.2	45	0.9	12	0.2	1,184	24.0	4,930
2007	36	0.7	83	1.7	203	4.2	37	0.8	92	1.9	126	2.6	64	1.3	13	0.3	1,063	21.8	4,886
2008	53	1.0	92	1.8	201	3.9	34	0.7	86	1.7	124	2.4	52	1.0	11	0.2	1,074	20.7	5,178
2009	43	0.8	97	1.8	158	2.9	20	0.4	91	1.7	110	2.0	54	1.0	18	0.3	1,103	20.3	5,436
2010	48	0.9	95	1.8	189	3.5	27	0.5	86	1.6	96	1.8	48	0.9	27	0.5	977	18.3	5,325
2011	61	1.0	104	1.8	152	2.6	24	0.4	107	1.8	116	2.0	58	1.0	27	0.5	1,030	17.5	5,884
2012	60	1.0	76	1.3	129	2.3	21	0.4	97	1.7	95	1.7	54	0.9	31	0.5	1,037	18.1	5,728
2013	63	1.2	66	1.3	105	2.0	33	0.6	96	1.9	85	1.6	33	0.6	36	0.7	958	18.6	5,164
2014	71	1.6	95	2.1	107	2.4	21	0.5	76	1.7	80	1.8	37	0.8	55	1.2	891	19.7	4,533
2015	72	1.8	69	1.7	102	2.5	32	0.8	59	1.5	61	1.5	37	0.9	49	1.2	900	22.3	4,037
2016	70	1.7	54	1.3	83	2.1	52	1.3	83	2.1	59	1.5	40	1.0	45	1.1	931	23.1	4,025
2017	73	2.1	70	2.0	70	2.0	64	1.8	53	1.5	53	1.5	52	1.5	49	1.4	768	22.0	3,485
Total	**749**	**0.9**	**1,409**	**1.7**	**2,983**	**3.6**	**479**	**0.6**	**1,418**	**1.7**	**1,795**	**2.2**	**839**	**1.0**	**393**	**0.5**	**17,916**	**21.8**	**82,214**

[a] Countries ordered by decreasing total number of TB notifications in 2017

[b] Total number of people notified with TB born outside the UK where country of birth was known

Table Ai.1.7: Time between entry to the UK and TB notification for people with TB born outside the UK by year, England, 2008-2017

Year	Time (years) between entry to the UK and TB notification								
	<2		2-5		6-10		11+		Total[a]
	n	%	n	%	n	%	n	%	n
2008	1,008	23.0	1,328	30.3	844	19.2	1,209	27.5	4,389
2009	967	20.5	1,398	29.7	971	20.6	1,371	29.1	4,707
2010	1,071	22.5	1,368	28.7	938	19.7	1,382	29.0	4,759
2011	1,185	22.4	1,408	26.6	1,087	20.5	1,612	30.5	5,292
2012	1,021	19.4	1,460	27.8	1,047	19.9	1,726	32.9	5,254
2013	688	14.2	1,418	29.3	1,014	20.9	1,726	35.6	4,846
2014	604	14.1	1,101	25.8	898	21.0	1,668	39.1	4,271
2015	597	15.3	878	22.5	785	20.1	1,647	42.2	3,907
2016	650	16.7	780	20.1	731	18.8	1,727	44.4	3,888
2017	528	16.2	672	20.6	586	18.0	1,470	45.1	3,256

[a] Total number of people notified with TB in the population born outside the UK where year of entry to the UK is known

Table Ai.1.8: Number of TB notifications and rates by ethnic group and place of birth, England, 2017

Ethnic group	Place of birth			
	UK born		Non-UK born	
	Number of people	Rate per 100,000 (95% CI)	Number of people	Rate per 100,000 (95% CI)
White	919	2.2 (2.0-2.3)	420	10.1 (9.1-11.1)
Black-Caribbean	73	18.0 (14.1-22.6)	46	22.4 (16.4-29.9)
Black-African	99	20.4 (16.6-24.8)	746	93.1 (86.5-100.0)
Black-Other	15	19.2 (10.7-31.7)	31	56.2 (38.2-79.8)
Indian	113	16.0 (13.2-19.3)	955	105.1 (98.6-112.0)
Pakistani	132	18.3 (15.3-21.7)	528	103.8 (95.1-113.0)
Bangladeshi	30	10.5 (7.1-14.9)	141	53.9 (45.4-63.6)
Chinese	2	2.8 (0.3-10.3)	57	25.5 (19.3-33.1)
Mixed / Other	67	4.9 (3.8-6.2)	601	39.8 (36.7-43.1)

CI - confidence intervals

Table Ai.1.9: Number of people with TB born in the UK over time by ethnic group, England, 2000-2017

Year	White	Black[a]	South Asian[b]	Mixed/other[c]
	n	n	n	n
2000	1,262	173	346	35
2001	1,309	151	367	48
2002	1,229	178	391	38
2003	1,191	127	335	36
2004	1,164	204	345	59
2005	1,117	197	399	69
2006	1,094	189	373	62
2007	1,051	240	425	70
2008	1,049	235	483	81
2009	1,115	232	432	86
2010	1,054	225	436	70
2011	1,138	233	462	85
2012	1,182	242	474	83
2013	1,093	218	419	90
2014	1,073	224	363	89
2015	917	205	328	78
2016	885	190	296	77
2017	919	187	275	69

[a] People from Black-Caribbean, Black-African and Black-Other ethnic groups were grouped as ‘Black’
[b] People from Indian, Pakistani and Bangladeshi ethnic groups were grouped as ‘South Asian’
[c] People from Mixed/Other and Chinese ethnic groups were grouped as ‘Mixed/other’

Table Ai.1.10: Number and proportion of people with TB by site of disease and place of birth, England, 2008-2017

Year	All people with TB[a]					UK born					Non-UK born				
	Pulmonary[b]		Extra-pulmonary only[c]		Total	Pulmonary[b]		Extra-pulmonary only[c]		Total	Pulmonary[b]		Extra-pulmonary only[c]		Total
	n	%	n	%	n	n	%	n	%	n	n	%	n	%	n
2008	4,285	55.3	3,465	44.7	7,750	1,328	71.5	529	28.5	1,857	2,663	49.5	2,719	50.5	5,382
2009	4,416	54.8	3,643	45.2	8,059	1,351	71.4	541	28.6	1,892	2,746	48.7	2,898	51.3	5,644
2010	4,069	53.2	3,576	46.8	7,645	1,247	69.0	559	31.0	1,806	2,589	47.1	2,909	52.9	5,498
2011	4,288	52.0	3,952	48.0	8,240	1,373	71.0	561	29.0	1,934	2,746	45.7	3,263	54.3	6,009
2012	4,187	52.1	3,850	47.9	8,037	1,359	68.3	630	31.7	1,989	2,695	46.3	3,130	53.7	5,825
2013	3,719	51.5	3,508	48.5	7,227	1,248	68.3	578	31.7	1,826	2,381	45.4	2,861	54.6	5,242
2014	3,399	52.6	3,059	47.4	6,458	1,189	67.9	563	32.1	1,752	2,143	46.6	2,458	53.4	4,601
2015	3,030	53.0	2,689	47.0	5,719	1,071	70.2	455	29.8	1,526	1,900	46.4	2,191	53.6	4,091
2016	3,010	53.7	2,597	46.3	5,607	985	67.9	465	32.1	1,450	1,984	48.5	2,106	51.5	4,090
2017	2,767	54.4	2,320	45.6	5,087	1,002	69.2	446	30.8	1,448	1,715	48.3	1,836	51.7	3,551

[a] Total number of people with TB including those with an unknown place of birth
[b] With or without extra-pulmonary disease
[c] Extra-pulmonary disease only

Table Ai.1.11: Number of people with TB receiving directly observed therapy (DOT) by age group, England, 2008-2017

Year	Age group (years)								Total[a]
	0-14		15-44		45-64		65+		
	n	%	n	%	n	%	n	%	
2008	77	19.2	264	6.1	81	6.1	52	6.2	6,900
2009	58	22.8	293	9.0	116	10.8	54	8.4	5,224
2010	67	24.7	281	7.4	117	9.4	71	9.3	6,095
2011	72	20.3	364	7.6	145	9.2	100	10.8	7,654
2012	100	28.0	372	8.0	166	10.9	109	11.7	7,445
2013	65	24.3	349	8.4	183	12.1	113	13.0	6,817
2014	79	31.9	387	10.9	193	13.6	110	12.8	6,076
2015	57	28.6	380	11.8	196	15.3	131	17.6	5,447
2016	61	31.1	360	11.9	227	16.8	115	14.9	5,331
2017	53	31.0	305	11.3	185	15.1	108	14.4	4,836

[a] Total number of people with TB where information on whether they received DOT was known

Table Ai.2.1: Number and proportion of all people with TB who were culture confirmed by PHE Centre, England, 2008-2017

PHE Centre[a]	2008		2009		2010		2011		2012		2013		2014		2015		2016		2017	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
London	1,935	57.6	1,909	56.1	1,950	60.2	2,089	59.8	2,092	61.5	1,773	59.6	1,540	60.3	1,360	59.7	1,382	62.9	1,170	61.0
West Midlands	542	53.8	583	58.0	524	60.1	615	61.3	590	54.8	550	56.2	424	54.7	400	57.2	416	58.0	414	62.4
South East	381	60.6	420	59.0	437	61.5	490	60.3	488	62.7	440	64.3	429	64.6	366	61.8	379	67.7	340	63.1
North West	427	58.5	481	60.2	490	60.6	507	62.0	469	60.5	447	62.4	392	61.1	359	63.2	379	64.3	324	60.9
East of England	304	60.1	294	57.4	308	60.9	352	62.9	311	62.6	283	62.7	285	65.4	242	62.2	277	64.1	261	63.8
East Midlands	285	59.0	279	53.2	298	60.3	296	60.2	298	60.0	243	58.8	239	59.8	241	67.5	211	61.9	214	61.0
Yorkshire and the Humber	357	56.2	400	58.1	363	57.8	379	57.1	345	58.2	365	62.6	325	63.0	267	61.2	305	72.4	210	60.9
South West	191	68.5	195	64.4	142	53.6	200	65.1	190	63.3	186	57.1	174	55.1	172	60.4	151	63.2	144	61.5
North East	115	65.0	108	65.1	97	64.7	104	79.4	114	68.3	106	76.8	115	68.5	85	66.4	86	71.1	76	69.1
England[b]	**4,537**	**58.1**	**4,669**	**57.6**	**4,609**	**60.0**	**5,032**	**60.8**	**4,897**	**60.6**	**4,393**	**60.5**	**3,923**	**60.6**	**3,492**	**60.9**	**3,586**	**63.9**	**3,153**	**61.8**

[a] Ordered by decreasing total number of TB notifications in 2017
[b] Total number including those with an unknown PHE Centre of residence

Table Ai.2.2: Species identification for people with culture confirmed TB, England, 2009-2017

Year[a]	*M. tuberculosis*		*M. bovis*		*M. africanum*		*M. microti*		MTBC		Total
	n	%	n	%	n	%	n	%	n	%	n
2009	4,615	98.8	17	0.4	31	0.7	0	0.0	6	0.1	4,669
2010	4,515	98.0	31	0.7	15	0.3	2	0.0	46	1.0	4,609
2011	4,937	98.1	30	0.6	36	0.7	0	0.0	29	0.6	5,032
2012	4,800	98.0	30	0.6	42	0.9	2	0.0	23	0.5	4,897
2013	4,294	97.7	24	0.5	53	1.2	1	0.02	21	0.5	4,393
2014	3,844	98.0	32	0.8	38	1.0	0	0.0	9	0.2	3,923
2015	3,408	97.6	27	0.8	48	1.4	0	0.0	9	0.3	3,492
2016	3,488	97.3	33	0.9	51	1.4	3	0.1	11	0.3	3,586
2017	3,063	97.1	35	1.1	47	1.5	3	0.1	5	0.2	3,153

[a] Data are only presented from 2009 onwards as all MTBCs were recorded as *M. tuberculosis* prior to 2009

Table Ai.2.3: Number and proportion of people with pulmonary TB who were culture confirmed by PHE Centre, England, 2008-2017

PHE Centre[a]	2008		2009		2010		2011		2012		2013		2014		2015		2016		2017	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
London	1,177	67.1	1,175	66.7	1,148	71.5	1,192	72.6	1,185	72.7	1,044	74.6	943	74.5	816	75.3	839	77.9	741	76.7
West Midlands	366	64.4	382	67.9	333	70.6	407	72.2	368	64.9	352	66.3	273	65.2	267	68.6	277	70.1	282	73.8
South East	266	69.5	274	69.2	261	68.0	309	70.7	307	72.4	266	79.2	280	81.6	242	77.1	237	80.9	222	74.5
North West	277	74.9	317	72.7	312	73.8	298	72.5	286	73.3	265	74.9	255	72.6	238	78.5	247	73.3	180	75.0
East of England	202	63.7	200	67.6	204	68.0	220	72.4	180	69.2	176	75.5	181	78.4	154	71.6	187	75.4	201	77.6
East Midlands	198	70.2	193	68.9	195	78.6	201	72.3	188	66.0	172	71.4	161	72.2	168	79.2	151	78.6	144	73.1
Yorkshire and the Humber	213	63.4	263	66.9	255	67.1	248	65.4	222	67.3	229	68.8	218	74.7	183	71.8	210	86.1	146	69.5
South West	130	74.7	133	69.3	99	56.9	141	70.1	143	70.1	131	63.9	113	58.5	125	65.4	108	69.7	107	68.6
North East	75	73.5	69	69.7	60	73.2	59	81.9	70	72.9	76	87.4	62	75.6	53	77.9	58	84.1	43	72.9
England[b]	**2,904**	**67.8**	**3,006**	**68.1**	**2,867**	**70.5**	**3,075**	**71.7**	**2,949**	**70.4**	**2,711**	**72.9**	**2,486**	**73.1**	**2,246**	**74.1**	**2,314**	**76.9**	**2,066**	**74.7**

[a] Ordered by decreasing total number of TB notifications in 2017
[b] Total number including those with an unknown PHE Centre of residence

TB Monitoring Indicator 8: Proportion of pulmonary TB cases that were culture confirmed (England, PHEC, UTLA, NHS sub-region and CCG data shown on Fingertips)

Table Ai.3.1: Numbers and rate of TB in children (<15 years) born in the UK, England, 2000-2017

Year	Number of people	Rate per 100,000 (95% CI)
2000	209	2.3 (2.0-2.6)
2001	229	2.5 (2.2-2.9)
2002	228	2.6 (2.2-2.9)
2003	179	2.0 (1.7-2.3)
2004	264	3.0 (2.6-3.4)
2005	247	2.8 (2.5-3.2)
2006	209	2.4 (2.1-2.8)
2007	290	3.4 (3.0-3.8)
2008	294	3.4 (3.0-3.8)
2009	257	2.9 (2.6-3.3)
2010	238	2.7 (2.4-3.1)
2011	234	2.6 (2.3-3.0)
2012	254	2.9 (2.5-3.2)
2013	195	2.2 (1.9-2.5)
2014	187	2.1 (1.8-2.4)
2015	156	1.7 (1.4-2.0)
2016	162	1.8 (1.5-2.0)
2017	130	1.4 (1.2-1.7)

CI - confidence interval

Table Ai.4.1: Number and proportion of people with pulmonary TB by time from symptom onset to treatment start and place of birth, England, 2011-2017

Place of birth	Year	TIme from symptom onset to treatment start						
		0-2 months		2-4 months		>4 months		Total[a]
		n	%	n	%	n	%	n
UK born	2011	392	41.0	272	28.5	291	30.5	**955**
	2012	414	40.9	293	29.0	304	30.1	**1,011**
	2013	381	38.3	291	29.2	324	32.5	**996**
	2014	402	39.4	284	27.8	335	32.8	**1,021**
	2015	374	38.4	281	28.9	318	32.7	**973**
	2016	325	36.7	254	28.7	307	34.7	**886**
	2017	328	36.4	242	26.9	330	36.7	**900**
Non-UK born	2011	885	46.9	561	29.7	441	23.4	**1,887**
	2012	925	45.4	616	30.2	496	24.3	**2,037**
	2013	822	42.5	602	31.1	510	26.4	**1,934**
	2014	744	39.6	593	31.6	540	28.8	**1,877**
	2015	793	44.3	543	30.3	455	25.4	**1,791**
	2016	732	39.3	578	31.0	553	29.7	**1,863**
	2017	630	39.9	502	31.8	445	28.2	**1,577**

[a] The number of people with pulmonary TB for whom time between symptom onset to treatment start was known

Table Ai.4.2: Number and proportion of people with pulmonary TB by time from symptom onset to treatment start and PHE Centre[a], England, 2011-2017

Year	London							West Midlands							South East						
	Time from symptom onset to treatment start							Time from symptom onset to treatment start							Time from symptom onset to treatment start						
	0-2 months		2-4 months		>4 months		Total[b]	0-2 months		2-4 months		>4 months		Total[b]	0-2 months		2-4 months		>4 months		Total[b]
	n	%	n	%	n	%	n	n	%	n	%	n	%	n	n	%	n	%	n	%	n
2011	489	50.7	289	29.9	187	19.4	**965**	210	44.6	135	28.7	126	26.8	**471**	144	40.1	101	28.1	114	31.8	**359**
2012	548	49.4	334	30.1	227	20.5	**1,109**	201	42.1	138	28.9	138	28.9	**477**	146	39.8	113	30.8	108	29.4	**367**
2013	500	45.5	322	29.3	278	25.3	**1,100**	173	38.7	146	32.7	128	28.6	**447**	119	38.1	92	29.5	101	32.4	**312**
2014	441	42.2	315	30.1	289	27.7	**1,045**	155	41.8	97	26.1	119	32.1	**371**	99	31.4	103	32.7	113	35.9	**315**
2015	461	45.8	305	30.3	240	23.9	**1,006**	145	40.1	99	27.3	118	32.6	**362**	103	35.0	82	27.9	109	37.1	**294**
2016	404	40.8	309	31.2	276	27.9	**989**	131	36.0	115	31.6	118	32.4	**364**	103	36.0	84	29.4	99	34.6	**286**
2017	367	41.6	281	31.9	234	26.5	**882**	139	39.7	109	31.1	102	29.1	**350**	112	40.3	74	26.6	92	33.1	**278**

Year	North West							East of England							East Midlands						
	Time from symptom onset to treatment start							Time from symptom onset to treatment start							Time from symptom onset to treatment start						
	0-2 months		2-4 months		>4 months		Total[b]	0-2 months		2-4 months		>4 months		Total[b]	0-2 months		2-4 months		>4 months		Total[b]
	n	%	n	%	n	%	n	n	%	n	%	n	%	n	n	%	n	%	n	%	n
2011	125	44.6	78	27.9	77	27.5	**280**	73	41.5	54	30.7	49	27.8	**176**	75	40.8	57	31.0	52	28.3	**184**
2012	125	43.4	79	27.4	84	29.2	**288**	76	42.5	50	27.9	53	29.6	**179**	69	35.0	63	32.0	65	33.0	**197**
2013	95	38.2	66	26.5	88	35.3	**249**	65	32.5	66	33.0	69	34.5	**200**	75	41.7	61	33.9	44	24.4	**180**
2014	120	39.3	99	32.5	86	28.2	**305**	73	36.5	62	31.0	65	32.5	**200**	74	36.1	57	27.8	74	36.1	**205**
2015	108	40.1	82	30.5	79	29.4	**269**	80	41.2	59	30.4	55	28.4	**194**	79	39.9	65	32.8	54	27.3	**198**
2016	117	40.3	83	28.6	90	31.0	**290**	77	33.3	61	26.4	93	40.3	**231**	71	39.4	57	31.7	52	28.9	**180**
2017	68	35.2	54	28.0	71	36.8	**193**	71	31.6	71	31.6	83	36.9	**225**	62	34.1	60	33.0	60	33.0	**182**

[a] Ordered by decreasing total number of TB notifications in 2017
[b] The number of people with pulmonary TB for whom time between symptom onset to treatment start was known

Table Ai.4.2: Number and proportion of people with pulmonary TB by time from symptom onset to treatment start and PHE Centre[a], England, 2011-2017 continued

Year	Yorkshire and the Humber							South West							North East						
	Time from symptom onset to treatment start							Time from symptom onset to treatment start							Time from symptom onset to treatment start						
	0-2 months		2-4 months		>4 months		Total[b]	0-2 months		2-4 months		>4 months		Total[b]	0-2 months		2-4 months		>4 months		Total[b]
	n	%	n	%	n	%	n	n	%	n	%	n	%	n	n	%	n	%	n	%	n
2011	113	39.2	89	30.9	86	29.9	**288**	61	38.9	43	27.4	53	33.8	**157**	27	60.0	9	20.0	9	20.0	**45**
2012	117	44.0	75	28.2	74	27.8	**266**	54	35.1	49	31.8	51	33.1	**154**	35	50.0	21	30.0	14	20.0	**70**
2013	108	40.9	90	34.1	66	25.0	**264**	51	35.4	39	27.1	54	37.5	**144**	38	52.1	16	21.9	19	26.0	**73**
2014	99	39.9	75	30.2	74	29.8	**248**	64	37.0	59	34.1	50	28.9	**173**	34	47.2	20	27.8	18	25.0	**72**
2015	101	43.9	71	30.9	58	25.2	**230**	65	35.7	60	33.0	57	31.3	**182**	39	65.0	11	18.3	10	16.7	**60**
2016	94	41.6	68	30.1	64	28.3	**226**	48	33.1	40	27.6	57	39.3	**145**	24	39.3	21	34.4	16	26.2	**61**
2017	81	41.1	55	27.9	61	31.0	**197**	48	32.9	30	20.5	68	46.6	**146**	23	46.0	16	32.0	11	22.0	**50**

[a] Ordered by decreasing total number of TB notifications in 2017
[b] The number of people with pulmonary TB for whom time between symptom onset to treatment start was known

Table Ai.5.1: TB outcome at 12 months for people with drug sensitive TB with expected treatment duration <12months[a], England, 2007-2016

Year	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated[b]		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
2007	5,296	78.2	362	5.3	300	4.4	464	6.8	73	1.1	281	4.1	6,776
2008	5,605	80.3	351	5.0	318	4.6	408	5.8	68	1.0	234	3.4	6,984
2009	5,920	81.9	333	4.6	309	4.3	433	6.0	77	1.1	159	2.2	7,231
2010	5,652	82.9	312	4.6	290	4.3	381	5.6	60	0.9	122	1.8	6,817
2011	6,031	82.1	314	4.3	373	5.1	458	6.2	64	0.9	107	1.5	7,347
2012	6,022	83.8	308	4.3	296	4.1	400	5.6	68	0.9	94	1.3	7,188
2013	5,511	85.6	264	4.1	253	3.9	315	4.9	54	0.8	39	0.6	6,436
2014	4,855	84.9	277	4.8	227	4.0	268	4.7	60	1.0	31	0.5	5,718
2015	4,189	83.7	264	5.3	206	4.1	267	5.3	49	1.0	30	0.6	5,005
2016	4,201	84.4	248	5.0	196	3.9	219	4.4	47	0.9	64	1.3	4,975
Total	**53,282**	**82.6**	**3,033**	**4.7**	**2,768**	**4.3**	**3,613**	**5.6**	**620**	**1.0**	**1,161**	**1.8**	**64,477**

[a] Excludes people in the drug resistant cohort and those with CNS, spinal, miliary or cryptic disseminated TB
[b] Not evaluated includes unknown and transferred out

TB Monitoring Indicator 10: Proportion of drug sensitive TB cases who had completed a full course of treatment by 12 months (England, PHEC, NHS sub-region, UTLA, NHS sub-region and CCG data shown on Fingertips)

Table Ai.5.2: Last recorded TB outcome for people with drug sensitive TB with expected treatment duration <12months[a], England, 2007-2016

Year	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated[b]		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
2007	5,591	82.5	367	5.4	302	4.5	161	2.4	74	1.1	281	4.1	6,776
2008	5,892	84.4	355	5.1	325	4.7	107	1.5	71	1.0	234	3.4	6,984
2009	6,240	86.3	342	4.7	310	4.3	101	1.4	79	1.1	159	2.2	7,231
2010	5,925	86.9	317	4.7	295	4.3	96	1.4	62	0.9	122	1.8	6,817
2011	6,476	88.1	317	4.3	375	5.1	5	0.1	67	0.9	107	1.5	7,347
2012	6,390	88.9	316	4.4	309	4.3	7	0.1	72	1.0	94	1.3	7,188
2013	5,810	90.3	268	4.2	255	4.0	2	0.0	62	1.0	39	0.6	6,436
2014	5,113	89.4	282	4.9	230	4.0	1	0.0	61	1.1	31	0.5	5,718
2015	4,437	88.7	268	5.4	213	4.3	6	0.1	51	1.0	30	0.6	5,005
2016[c]	4,340	87.2	250	5.0	197	4.0	77	1.5	47	0.9	64	1.3	4,975
Total	**56,214**	**87.2**	**3,082**	**4.8**	**2,811**	**4.4**	**563**	**0.9**	**646**	**1.0**	**1,161**	**1.8**	**64,477**

[a] Excludes people in the drug resistant cohort and those with CNS, spinal, miliary or cryptic disseminated TB
[b] Not evaluated includes unknown and transferred out
[c] Reduced follow-up period for this group, therefore proportion completed expected to increase and proportion still on treatment expected to decrease in future reporting

Table Ai.5.3: Time to treatment completion for people with drug sensitive TB with expected treatment duration <12months[a], England, 2007-2016

Year	<6 months to complete[b]		6-8 months to complete[b]		8-10 months to complete		10-12 months to complete		>12 months to complete		Completion time known		Treatment completed[c]
	n	%	n	%	n	%	n	%	n	%	n	%	N
2007	298	6.6	3,242	72.2	434	9.7	243	5.4	271	6.0	4,488	80.3	5,591
2008	273	5.6	3,523	72.7	513	10.6	273	5.6	264	5.4	4,846	82.2	5,892
2009	372	6.7	3,981	71.5	563	10.1	360	6.5	295	5.3	5,571	89.3	6,240
2010	321	5.9	3,998	72.9	583	10.6	334	6.1	250	4.6	5,486	92.6	5,925
2011	326	5.4	4,358	71.6	666	10.9	317	5.2	418	6.9	6,085	94.0	6,476
2012	304	5.0	4,425	73.0	614	10.1	368	6.1	350	5.8	6,061	94.9	6,390
2013	303	5.4	4,038	72.6	569	10.2	377	6.8	276	5.0	5,563	95.7	5,810
2014	268	5.3	3,580	71.2	538	10.7	391	7.8	249	5.0	5,026	98.3	5,113
2015	221	5.1	3,155	72.4	475	10.9	265	6.1	244	5.6	4,360	98.3	4,437
2016	241	5.6	3,113	72.6	548	12.8	254	5.9	134	3.1	4,290	98.8	4,340
Total	**2,927**	**5.7**	**37,413**	**72.3**	**5,503**	**10.6**	**3,182**	**6.1**	**2,751**	**5.3**	**51,776**	**92.1**	**56,214**

[a] Excludes people in the drug resistant cohort and those with CNS, spinal, miliary or cryptic disseminated TB
[b] People with completion between 168 and 180 days are included in the 6-8 months category
[c] Treatment completed at last recorded outcome

Table Ai.5.4: Treatment completion at 12 months by age group for people with drug sensitive TB with expected treatment duration <12months[a], England, 2007-2016

Year	Age group (years)							
	0-14		15-44		45-64		65+	
	n	%	N	%	n	%	n	%
2007	366	86.5	3,369	80.9	1,005	78.9	556	60.9
2008	380	90.5	3,602	82.7	1,073	81.2	548	62.1
2009	346	92.5	3,731	84.7	1,186	80.8	657	66.6
2010	301	91.8	3,568	85.7	1,151	82.4	632	68.0
2011	301	85.5	3,806	84.7	1,289	82.9	635	67.1
2012	337	91.6	3,785	86.4	1,252	84.2	648	68.0
2013	250	91.9	3,363	87.8	1,253	86.6	645	72.7
2014	232	94.3	2,917	88.2	1,112	84.4	594	70.0
2015	186	95.9	2,555	87.5	1,000	84.2	448	63.6
2016	179	96.2	2,438	87.8	1,065	84.8	519	68.6
Total	**2,878**	**91.0**	**33,134**	**85.4**	**11,386**	**83.1**	**5,882**	**66.8**

[a] Excludes people in the drug resistant cohort and those with CNS, spinal, miliary or cryptic disseminated TB

Table Ai.5.5: TB outcome at 12 months for people with drug sensitive TB with expected treatment duration <12 months[a] by age and sex, England, 2016

Age group (years)	Sex	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated[b]		Total
		n	%	n	%	n	%	n	%	n	%	n	%	N
0-14	Female	97	96.0	0	0.0	0	0.0	1	1.0	0	0.0	3	3.0	101
	Male	82	96.5	0	0.0	1	1.2	2	2.4	0	0.0	0	0.0	85
15-44	Female	1,009	89.7	8	0.7	46	4.1	42	3.7	6	0.5	14	1.2	1,125
	Male	1,429	86.6	15	0.9	103	6.2	77	4.7	6	0.4	21	1.3	1,651
45-64	Female	412	87.5	12	2.5	13	2.8	23	4.9	8	1.7	3	0.6	471
	Male	653	83.2	45	5.7	28	3.6	42	5.4	7	0.9	10	1.3	785
65+	Female	254	75.6	53	15.8	2	0.6	13	3.9	10	3.0	4	1.2	336
	Male	265	62.9	115	27.3	3	0.7	19	4.5	10	2.4	9	2.1	421
Total		**4,201**	**84.4**	**248**	**5.0**	**196**	**3.9**	**219**	**4.4**	**47**	**0.9**	**64**	**1.3**	**4,975**

[a] Excludes people in the drug resistant cohort and those with CNS, spinal, miliary or cryptic disseminated TB
[b] Not evaluated includes unknown and transferred out

Table Ai.5.6: Last recorded TB outcome for the entire drug sensitive cohort[a] by site of disease, 2016

Site of disease[b]	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated[c]		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
Pulmonary	2,444	82.5	226	7.6	142	4.8	76	2.6	20	0.7	54	1.8	2,962
Pulmonary only	1,836	83.5	170	7.7	101	4.6	37	1.7	18	0.8	37	1.7	2,199
Miliary	111	68.5	22	13.6	7	4.3	16	9.9	0	0.0	6	3.7	162
Laryngeal	15	88.2	1	5.9	1	5.9	0	0.0	0	0.0	0	0.0	17
Extra-pulmonary	2,914	87.2	132	4.0	118	3.5	92	2.8	33	1.0	51	1.5	3,340
Extra-pulmonary only	2,306	89.5	76	2.9	77	3.0	53	2.1	31	1.2	34	1.3	2,577
Extra-thoracic lymph nodes	1,207	90.9	21	1.6	56	4.2	16	1.2	15	1.1	13	1.0	1,328
Intra-thoracic lymph nodes	676	91.1	21	2.8	18	2.4	14	1.9	5	0.7	8	1.1	742
Unknown extra-pulmonary	575	89.6	13	2.0	22	3.4	18	2.8	3	0.5	11	1.7	642
Pleural	384	82.1	42	9.0	21	4.5	11	2.4	4	0.9	6	1.3	468
Other extra-pulmonary	333	88.3	8	2.1	11	2.9	10	2.7	6	1.6	9	2.4	377
Gastrointestinal	270	86.8	20	6.4	9	2.9	7	2.3	2	0.6	3	1.0	311
Bone – spine	165	77.5	8	3.8	10	4.7	17	8.0	3	1.4	10	4.7	213
Bone – other	104	84.6	3	2.4	4	3.3	6	4.9	2	1.6	4	3.3	123
CNS – meningitis	63	54.8	18	15.7	8	7.0	17	14.8	0	0.0	9	7.8	115
Genitourinary	76	85.4	7	7.9	3	3.4	1	1.1	1	1.1	1	1.1	89
CNS – other	74	64.3	15	13.0	3	2.6	13	11.3	1	0.9	9	7.8	115
Cryptic	43	76.8	7	12.5	0	0.0	4	7.1	0	0.0	2	3.6	56

[a] Excludes people in the drug resistant cohort
[b] With or without disease at another site
[c] Not evaluated includes unknown and transferred out

Table Ai.5.7: TB outcome at 12 months for people with drug sensitive TB with expected treatment duration <12 months by PHE Centre[a], England, 2016

PHE Centre[b]	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated[c]		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
London	1,661	86.8	62	3.2	80	4.2	84	4.4	13	0.7	14	0.7	1,914
West Midlands	543	83.7	45	6.9	24	3.7	26	4.0	8	1.2	3	0.5	649
South East	422	84.1	27	5.4	13	2.6	25	5.0	2	0.4	13	2.6	502
North West	452	85.0	34	6.4	25	4.7	16	3.0	4	0.8	1	0.2	532
East of England	320	84.0	22	5.8	14	3.7	16	4.2	7	1.8	2	0.5	381
East Midlands	228	74.8	23	7.5	14	4.6	26	8.5	4	1.3	10	3.3	305
Yorkshire and the Humber	321	86.1	20	5.4	13	3.5	11	2.9	4	1.1	4	1.1	373
South West	167	78.8	8	3.8	11	5.2	11	5.2	4	1.9	11	5.2	212
North East	87	81.3	7	6.5	2	1.9	4	3.7	1	0.9	6	5.6	107
England[d]	**4,201**	**84.4**	**248**	**5.0**	**196**	**3.9**	**219**	**4.4**	**47**	**0.9**	**64**	**1.3**	**4,975**

[a] Excludes people in the drug resistant cohort and those with CNS, spinal, miliary or cryptic disseminated TB
[b] Ordered by decreasing total number of TB notifications in 2017
[c] Not evaluated includes unknown and transferred out
[d] Total number of people with TB including those with an unknown PHE Centre of residence

Table Ai.5.8: Treatment completion at 12 months for people with drug sensitive TB with expected treatment duration <12months[a] by PHE Centre, England, 2007-2016

PHE Centre[b]	2007		2008		2009		2010		2011		2012		2013		2014		2015		2016	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
London	2,337	82.8	2,539	85.4	2,580	86.4	2,435	86.0	2,619	85.5	2,573	86.1	2,253	86.7	1,953	87.5	1,708	86.8	1,661	86.8
West Midlands	674	77.3	761	83.0	743	81.6	634	80.1	725	81.2	826	85.7	738	85.8	575	83.2	516	83.0	543	83.7
South East	405	70.7	414	74.6	507	79.6	516	80.8	607	83.7	585	83.0	536	88.2	526	87.4	433	82.8	422	84.1
North West	490	74.7	515	77.9	591	81.0	602	84.8	596	81.1	579	84.3	544	84.0	471	84.0	415	83.8	452	85.0
East of England	294	78.4	325	71.9	353	77.9	373	80.7	406	82.2	351	79.2	340	84.4	318	80.9	274	78.7	320	84.0
East Midlands	382	80.3	333	77.6	392	81.2	371	85.3	363	82.5	354	80.8	317	88.1	278	82.0	233	76.9	228	74.8
Yorkshire and the Humber	406	71.0	436	76.1	468	77.2	428	75.8	431	72.7	442	82.5	459	86.4	401	85.0	324	85.0	321	86.1
South West	169	68.1	160	62.3	173	63.4	179	74.0	194	68.8	193	70.4	224	73.9	221	75.7	193	77.8	167	78.8
North East	139	78.1	122	73.5	113	73.4	114	81.4	90	73.8	119	78.3	100	81.3	112	82.4	93	79.5	87	81.3
England[c]	**5,296**	**78.2**	**5,605**	**80.3**	**5,920**	**81.9**	**5,652**	**82.9**	**6,031**	**82.1**	**6,022**	**83.8**	**5,511**	**85.6**	**4,855**	**84.9**	**4,189**	**83.7**	**4,201**	**84.4**

[a] Excludes people in the drug resistant cohort and those with CNS, spinal, miliary or cryptic disseminated TB
[b] Ordered by decreasing total number of TB notifications in 2017
[c] Total number of people with TB including those with an unknown PHE Centre of residence

Table Ai.5.9: Last recorded TB outcome by end of follow-up period for people with drug sensitive CNS, spinal, miliary or cryptic disseminated TB[a], England, 2007-2016

Year	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated[b]		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
2007	517	70.8	65	8.9	43	5.9	64	8.8	7	1.0	34	4.7	730
2008	528	70.7	81	10.8	43	5.8	49	6.6	7	0.9	39	5.2	747
2009	598	74.4	77	9.6	44	5.5	53	6.6	8	1.0	24	3.0	804
2010	581	74.5	65	8.3	47	6.0	60	7.7	10	1.3	17	2.2	780
2011	694	82.8	65	7.8	50	6.0	0	0.0	10	1.2	19	2.3	838
2012	652	81.3	74	9.2	56	7.0	4	0.5	6	0.7	10	1.2	802
2013	620	83.3	68	9.1	42	5.6	2	0.3	6	0.8	6	0.8	744
2014	553	80.7	72	10.5	45	6.6	0	0.0	12	1.8	3	0.4	685
2015	532	80.7	78	11.8	37	5.6	4	0.6	3	0.5	5	0.8	659
2016[c]	416	72.6	54	9.4	22	3.8	52	9.1	4	0.7	25	4.4	573
Total	**5,691**	**77.3**	**699**	**9.5**	**429**	**5.8**	**288**	**3.9**	**73**	**1.0**	**182**	**2.5**	**7,362**

[a] Excludes people in the drug resistant cohort
[b] Not evaluated includes unknown and transferred out
[c] Reduced follow-up period for this group, therefore proportion completed expected to increase and proportion still on treatment expected to decrease in future reporting

Table Ai.5.10: Last recorded TB outcome by end of follow-up period for the entire drug sensitive cohort[a], England, 2007-2016

Year	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated[b]		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
2007	6,108	81.4	432	5.8	345	4.6	225	3.0	81	1.1	315	4.2	7,506
2008	6,420	83.0	436	5.6	368	4.8	156	2.0	78	1.0	273	3.5	7,731
2009	6,838	85.1	419	5.2	354	4.4	154	1.9	87	1.1	183	2.3	8,035
2010	6,506	85.6	382	5.0	342	4.5	156	2.1	72	0.9	139	1.8	7,597
2011	7,170	87.6	382	4.7	425	5.2	5	0.1	77	0.9	126	1.5	8,185
2012	7,042	88.1	390	4.9	365	4.6	11	0.1	78	1.0	104	1.3	7,990
2013	6,430	89.6	336	4.7	297	4.1	4	0.1	68	0.9	45	0.6	7,180
2014	5,666	88.5	354	5.5	275	4.3	1	0.0	73	1.1	34	0.5	6,403
2015	4,969	87.7	346	6.1	250	4.4	10	0.2	54	1.0	35	0.6	5,664
2016[c]	4,756	85.7	304	5.5	219	3.9	129	2.3	51	0.9	89	1.6	5,548
Total	**61,905**	**86.2**	**3,781**	**5.3**	**3,240**	**4.5**	**851**	**1.2**	**719**	**1.0**	**1,343**	**1.9**	**71,839**

[a] Excludes people in the drug resistant cohort
[b] Not evaluated includes unknown and transferred out
[c] Reduced follow-up period for this group, therefore proportion completed expected to increase and proportion still on treatment expected to decrease in future reporting

TB Monitoring Indicator 11: Proportion of drug sensitive TB cases who were lost to follow-up at last recorded outcome (England, PHEC, NHS sub-region, UTLA, NHS sub-region and CCG data shown on Fingertips)

TB Monitoring Indicator 12: Proportion of drug sensitive TB cases who had died at last recorded outcome (England, PHEC, NHS sub-region, UTLA, NHS sub-region and CCG data shown on Fingertips)

Table Ai.5.11: Relationship with TB for people in the entire drug sensitive cohort[a] who died at last recorded outcome, England, 2007-2016

Year	TB caused or contributed to death		TB incidental to death		Unknown		Total deaths		Total
	n	%	n	%	n	%	n	%	n
2007	142	32.9	85	19.7	205	47.5	432	5.8	7,506
2008	145	33.3	97	22.2	194	44.5	436	5.6	7,731
2009	149	35.6	88	21.0	182	43.4	419	5.2	8,035
2010	103	27.0	100	26.2	179	46.9	382	5.0	7,597
2011	105	27.5	88	23.0	189	49.5	382	4.7	8,185
2012	115	29.5	87	22.3	188	48.2	390	4.9	7,990
2013	109	32.4	71	21.1	156	46.4	336	4.7	7,180
2014	112	31.6	72	20.3	170	48.0	354	5.5	6,403
2015	123	35.5	98	28.3	125	36.1	346	6.1	5,664
2016[b]	107	35.2	76	25.0	121	39.8	304	5.5	5,548
Total	**1,210**	**32.0**	**862**	**22.8**	**1,709**	**45.2**	**3,781**	**5.3**	**71,839**

[a] Excludes people in the drug resistant cohort
[b] Reduced follow-up period for this group, therefore proportion expected to increase in future reporting

Table Ai.5.12: Last recorded TB outcome for the entire drug sensitive cohort[a] by PHE Centre, England, 2016

PHE Centre[b]	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated[c]		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
London	1,915	87.9	88	4.0	92	4.2	40	1.8	15	0.7	29	1.3	2,179
West Midlands	605	85.2	50	7.0	27	3.8	16	2.3	8	1.1	4	0.6	710
South East	471	85.2	33	6.0	15	2.7	17	3.1	2	0.4	15	2.7	553
North West	501	86.1	39	6.7	27	4.6	8	1.4	5	0.9	2	0.3	582
East of England	359	84.7	25	5.9	17	4.0	13	3.1	7	1.7	3	0.7	424
East Midlands	262	79.2	28	8.5	14	4.2	13	3.9	4	1.2	10	3.0	331
Yorkshire and the Humber	355	85.5	22	5.3	14	3.4	14	3.4	4	1.0	6	1.4	415
South West	190	80.9	11	4.7	11	4.7	6	2.6	4	1.7	13	5.5	235
North East	98	82.4	8	6.7	2	1.7	2	1.7	2	1.7	7	5.9	119
England	**4,756**	**85.7**	**304**	**5.5**	**219**	**3.9**	**129**	**2.3**	**51**	**0.9**	**89**	**1.6**	**5,548**

[a] Excludes people in the drug resistant cohort
[b] Ordered by decreasing total number of TB notifications in 2017
[c] Not evaluated includes unknown and transferred out

Table Ai.6.1: Number and proportion of people with TB with first line drug results, England, 2000-2017

Year	Results for isoniazid and rifampicin[a]		Results for all first line drugs[b]		People with culture confirmed TB
	n	%	n	%	n
2000	2,797	100.0	2,779	99.4	2,797
2001	3,142	99.8	3,123	99.2	3,149
2002	3,823	99.4	3,793	98.6	3,847
2003	3,825	99.9	3,799	99.2	3,830
2004	4,037	99.0	4,020	98.6	4,078
2005	4,549	99.3	4,532	98.9	4,582
2006	4,631	99.2	4,607	98.7	4,668
2007	4,398	98.9	4,366	98.2	4,448
2008	4,480	98.7	4,429	97.6	4,537
2009	4,598	98.5	4,520	96.8	4,669
2010	4,559	98.9	4,513	97.9	4,609
2011	4,968	98.7	4,896	97.3	5,032
2012	4,852	99.1	4,786	97.7	4,897
2013	4,332	98.6	4,286	97.6	4,393
2014	3,898	99.4	3,831	97.7	3,923
2015	3,474	99.5	3,426	98.1	3,492
2016	3,545	98.9	3,445	96.1	3,586
2017	3,115	98.8	3,045	96.6	3,153

[a] People with culture confirmed TB with a result (DST or WGS) for isoniazid and rifampicin
[b] People with culture confirmed TB with a result (DST or WGS) for isoniazid, rifampicin, ethambutol and pyrazinamide.

TB Monitoring Indicator 9: Proportion of microbiologically confirmed cases with drug susceptibility testing reported for the four first line agents (England, PHEC, NHS sub-region, UTLA, NHS sub-region and CCG data shown on Fingertips)

Table Ai.6.2: Number and proportion of people with TB with first line drug resistance[a], England, 2000-2017

Year	Isoniazid resistant		Rifampicin resistant		Ethambutol resistant		Pyrazinamide resistant[b]		Resistant to any first line drug	
	n	%	n	%	n	%	n	%	n	%
2000	178	6.4	41	1.5	10	0.4	14	0.5	193	6.9
2001	206	6.6	32	1.0	12	0.4	16	0.5	224	7.1
2002	274	7.2	45	1.2	18	0.5	29	0.8	297	7.8
2003	282	7.4	68	1.8	17	0.4	19	0.5	308	8.1
2004	296	7.3	61	1.5	17	0.4	26	0.6	326	8.1
2005	322	7.1	56	1.2	18	0.4	14	0.3	346	7.6
2006	337	7.3	74	1.6	25	0.5	22	0.5	370	8.0
2007	305	6.9	62	1.4	26	0.6	26	0.6	332	7.5
2008	266	5.9	68	1.5	34	0.8	35	0.8	305	6.8
2009	327	7.1	70	1.5	27	0.6	49	1.1	369	8.0
2010	292	6.4	75	1.6	34	0.7	40	0.9	321	7.0
2011	376	7.6	89	1.8	55	1.1	46	0.9	413	8.3
2012	330	6.8	87	1.8	48	1.0	44	0.9	358	7.4
2013	305	7.0	78	1.8	41	0.9	38	0.9	332	7.7
2014	267	6.8	56	1.4	42	1.1	30	0.8	286	7.3
2015	236	6.8	53	1.5	27	0.8	23	0.7	253	7.3
2016	245	6.9	60	1.7	47	1.3	20	0.6	263	7.4
2017	222	7.1	55	1.8	53	1.7	58	1.9	265	8.5

[a] People with culture confirmed TB with a result (DST or WGS) for isoniazid and rifampicin. A person may have resistance to more than one of the first line drugs

[b] Excludes people with *M. bovis*, which is inherently resistant to pyrazinamide

TB Monitoring Indicator 18: Number and proportion of culture confirmed TB cases with any first line drug resistance (England, PHEC, NHS sub-region, UTLA, NHS sub-region and CCG data shown on Fingertips)

Table Ai.6.3: Number and proportion of people with TB[a] with initial drug resistance, England, 2000-2017

Year	Isoniazid resistance without MDR-TB		Rifampicin resistance without MDR-TB		MDR-TB (including XDR)		MDR/RR-TB (including XDR)		XDR-TB	
	n	%	n	%	n	%	n	%	n	%
2000	150	5.4	13	0.5	28	1.0	41	1.5	0	0.0
2001	184	5.9	10	0.3	22	0.7	32	1.0	0	0.0
2002	239	6.3	10	0.3	35	0.9	45	1.2	0	0.0
2003	233	6.1	19	0.5	49	1.3	68	1.8	1	0.03
2004	251	6.2	16	0.4	45	1.1	61	1.5	0	0.0
2005	281	6.2	15	0.3	41	0.9	56	1.2	0	0.0
2006	283	6.1	20	0.4	54	1.2	74	1.6	0	0.0
2007	256	5.8	13	0.3	49	1.1	62	1.4	0	0.0
2008	216	4.8	18	0.4	50	1.1	68	1.5	2	0.04
2009	268	5.8	11	0.2	59	1.3	70	1.5	2	0.04
2010	227	5.0	10	0.2	65	1.4	75	1.6	2	0.04
2011	295	5.9	8	0.2	81	1.6	89	1.8	6	0.12
2012	253	5.2	10	0.2	77	1.6	87	1.8	2	0.04
2013	237	5.5	10	0.2	68	1.6	78	1.8	3	0.07
2014	215	5.5	4	0.1	52	1.3	56	1.4	3	0.08
2015	191	5.5	8	0.2	45	1.3	53	1.5	10	0.29
2016	192	5.4	7	0.2	53	1.5	60	1.7	7	0.20
2017	177	5.7	10	0.3	45	1.4	55	1.8	3	0.10

[a] People with culture confirmed TB with a result (DST or WGS) for isoniazid and rifampicin

TB Monitoring Indicator 19: Number and proportion of culture confirmed TB cases with multi-drug resistance TB (England)

Table Ai.6.4: Number and proportion of people with TB with drug resistance by Public Health England Centre, England, 2013-2017

PHE Centre[a]	Isoniazid resistance without MDR-TB		MDR-TB		MDR/RR-TB		XDR-TB		Total[b]
	n	%	n	%	n	%	n	%	n
London	444	6.2	102	1.4	115	1.6	7	0.1	7,164
West Midlands	87	4.0	32	1.5	39	1.8	2	0.1	2,164
South East	98	5.1	19	1.0	20	1.0	2	0.1	1,928
North West	95	5.0	20	1.1	25	1.3	4	0.2	1,895
East of England	87	6.5	21	1.6	26	1.9	2	0.1	1,336
East Midlands	61	5.4	21	1.9	24	2.1	3	0.3	1,133
Yorkshire and the Humber	73	5.0	29	2.0	33	2.3	4	0.3	1,457
South West	50	6.1	11	1.3	12	1.5	2	0.2	819
North East	17	3.6	8	1.7	8	1.7	0	0.0	468
England	**1,012**	**5.5**	**263**	**1.4**	**302**	**1.6**	**26**	**0.1**	**18,364**

[a] Ordered by decreasing total number of TB notifications in 2017 which is not the same as the order based on the total column in this table
[b] People with culture confirmed TB with a result (DST or WGS) for isoniazid and rifampicin

Table Ai.6.5: Number and proportion of people with MDR/RR-TB with resistance to an injectable agent or a fluoroquinolone, England, 2000-2017

Year	MDR/RR-TB	Tested for at least one injectable agent		Resistant to an injectable agent		Tested for at least one fluoroquinolone		Resistant to a fluoroquinolone	
	n	n	%	n	%	n	%	n	%
2000	41	1	2.4	0	0.0	1	2.4	0	0.0
2001	32	0	0.0	0	0.0	0	0.0	0	0.0
2002	45	34	75.6	1	2.9	37	82.2	1	2.7
2003	68	50	73.5	2	4.0	62	91.2	4	6.5
2004	61	48	78.7	1	2.1	45	73.8	3	6.7
2005	56	42	75.0	0	0.0	48	85.7	2	4.2
2006	74	58	78.4	3	5.2	73	98.6	0	0.0
2007	62	52	83.9	2	3.8	61	98.4	4	6.6
2008	68	62	91.2	3	4.8	67	98.5	11	16.4
2009	70	64	91.4	5	7.8	68	97.1	7	10.3
2010	75	70	93.3	11	15.7	71	94.7	9	12.7
2011	89	88	98.9	14	15.9	89	100.0	21	23.6
2012	87	85	97.7	14	16.5	86	98.9	4	4.7
2013	78	74	94.9	12	16.2	78	100.0	11	14.1
2014	56	56	100.0	7	12.5	56	100.0	14	25.0
2015	53	53	100.0	13	24.5	53	100.0	15	28.3
2016	60	58	96.7	13	22.4	60	100.0	14	23.3
2017	55	51	92.7	7	13.7	53	96.4	18	34.0

Table Ai.6.6: The number and proportion of people with MDR/RR-TB resistant to at least one injectable agent or at least one fluoroquinolone by most frequent country of birth, England, 2013-2017

Country of birth[a]	MDR/RR-TB	Pre-XDR				XDR-TB	
		Resistant to an injectable agent		Resistant to a fluoroquinolone			
	n	n	%[b]	n	%[b]	n	%[b]
India	64	3	4.9	21	32.8	3	4.7
United Kingdom	44	11	26.2	10	22.7	6	13.6
Lithuania	38	15	39.5	15	39.5	10	26.3
Pakistan	18	2	11.1	4	22.2	0	0.0
Romania	10	3	30.0	3	30.0	2	20.0
Somalia	9	1	11.1	1	11.1	0	0.0
Philippines	9	0	0.0	0	0.0	0	0.0

[a] The table shows the top 7 countries of birth for people with MDR/RR-TB who are resistant to at least one injectable agent or at least one fluoroquinolone with nine or more people with MDR/RR-TB from that country in 2013-2017. For these countries, the total number and proportion of people with resistant TB are shown

[b] Proportion of people with MDR/RR-TB who are resistant to an injectable agent or a fluoroquinolone (of those tested), born in the respective country

Table Ai.6.7: TB outcome at 24 months after treatment start for the drug resistant cohort[a], England, 2006-2015

Year	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated[b]		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
2006	40	50.0	2	2.5	8	10.0	23	28.7	3	3.8	4	5.0	80
2007	30	42.3	10	14.1	6	8.5	20	28.2	5	7.0	0	0.0	71
2008	45	57.7	6	7.7	10	12.8	10	12.8	4	5.1	3	3.8	78
2009	40	51.9	4	5.2	11	14.3	19	24.7	1	1.3	2	2.6	77
2010	38	48.1	0	0.0	9	11.4	25	31.6	4	5.1	3	3.8	79
2011	48	50.5	4	4.2	17	17.9	23	24.2	3	3.2	0	0.0	95
2012	58	61.7	3	3.2	9	9.6	16	17.0	5	5.3	3	3.2	94
2013	50	58.8	4	4.7	13	15.3	16	18.8	2	2.4	0	0.0	85
2014	36	52.2	2	2.9	13	18.8	13	18.8	4	5.8	1	1.4	69
2015	39	58.2	5	7.5	5	7.5	12	17.9	1	1.5	5	7.5	67
Total	**424**	**53.3**	**40**	**5.0**	**101**	**12.7**	**177**	**22.3**	**32**	**4.0**	**21**	**2.6**	**795**

[a] Includes people with initial and acquired MDR/RR-TB and people treated with a second line regimen
[b] Not evaluated includes unknown and transferred out

TB Monitoring Indicator 13: Proportion of TB cases with rifampicin resistance or MDR-TB who had completed treatment at 24 months (England)

Table Ai.6.8: Last recorded TB outcome for the drug resistant cohort[a], England, 2006-2015

Year	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated[b]		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
2006	56	70.0	3	3.8	8	10.0	9	11.3	3	3.8	1	1.3	80
2007	46	64.8	10	14.1	6	8.5	4	5.6	5	7.0	0	0.0	71
2008	53	67.9	7	9.0	10	12.8	4	5.1	4	5.1	0	0.0	78
2009	59	76.6	4	5.2	11	14.3	1	1.3	1	1.3	1	1.3	77
2010	60	75.9	1	1.3	9	11.4	4	5.1	5	6.3	0	0.0	79
2011	64	67.4	6	6.3	18	18.9	4	4.2	3	3.2	0	0.0	95
2012	72	76.6	4	4.3	10	10.6	3	3.2	5	5.3	0	0.0	94
2013	65	76.5	4	4.7	14	16.5	0	0.0	2	2.4	0	0.0	85
2014	45	65.2	2	2.9	13	18.8	3	4.3	5	7.2	1	1.4	69
2015[c]	46	68.7	5	7.5	5	7.5	9	13.4	1	1.5	1	1.5	67
Total	**566**	**71.2**	**46**	**5.8**	**104**	**13.1**	**41**	**5.2**	**34**	**4.3**	**4**	**0.5**	**795**

[a] Includes people with initial and acquired MDR/RR-TB and people treated with a second line regimen
[b] Not evaluated includes unknown and transferred out
[c] Reduced follow-up period for this group, therefore proportion completed expected to increase and proportion still on treatment expected to decrease in future reporting

TB Monitoring Indicator 14: Proportion of TB cases with rifampicin resistance or MDR-TB who are lost to follow-up at reported outcome (England)

TB Monitoring Indicator 15: Proportion of TB cases with rifampicin resistance or MDR-TB who had died at last reported outcome (England)

Table Ai.6.9: Time to TB treatment completion[a] for the drug resistant cohort[b], England, 2006-2015

Year	<12 months to complete[c]		12-18 months to complete[c]		18-20 months to complete		20-24 months to complete		>24 months to complete		Completion time known		Treatment completed[c]
	n	%	n	%	n	%	n	%	n	%	n	%	n
2006	1	2.5	6	15.0	13	32.5	5	12.5	15	37.5	40	71.4	56
2007	2	5.7	5	14.3	6	17.1	8	22.9	14	40.0	35	76.1	46
2008	1	3.0	6	18.2	8	24.2	11	33.3	7	21.2	33	62.3	53
2009	1	2.2	2	4.3	11	23.9	17	37.0	15	32.6	46	78.0	59
2010	1	2.0	4	8.2	14	28.6	12	24.5	18	36.7	49	81.7	60
2011	1	1.7	8	13.6	11	18.6	23	39.0	16	27.1	59	92.2	64
2012	3	5.1	5	8.5	17	28.8	20	33.9	14	23.7	59	81.9	72
2013	4	6.3	8	12.5	15	23.4	23	35.9	14	21.9	64	98.5	65
2014	3	7.3	4	9.8	8	19.5	18	43.9	8	19.5	41	91.1	45
2015	4	9.1	12	27.3	9	20.5	12	27.3	7	15.9	44	95.7	46
Total	**21**	**4.5**	**60**	**12.8**	**112**	**23.8**	**149**	**31.7**	**128**	**27.2**	**470**	**83.0**	**566**

[a] Time to completion is from MDR/RR-TB treatment start date until completion date
[b] Includes people with initial and acquired MDR/RR-TB and people treated with a second line regimen
[c] Treatment completed at last recorded outcome

Table Ai.7.1: Number and proportion of people with TB (≥15 years) with a social risk factor (SRF) by place of birth, England, 2010-2017

	Year	Drug use		Alcohol use		Homelessness		Prison		≥ 1 SRF		≥ 2 SRF	
		n	%	n	%	n	%	n	%	n	%	n	%
All people with TB	2010	188	2.9	257	4.0	201	3.0	177	2.8	584	9.9	164	2.8
	2011	204	2.8	236	3.3	196	2.7	212	3.0	592	8.9	188	2.8
	2012	220	3.1	220	3.1	185	2.6	224	3.2	593	8.9	184	2.8
	2013	217	3.3	239	3.7	216	3.3	193	3.0	587	9.4	195	3.1
	2014	203	3.5	197	3.4	210	3.6	188	3.3	540	9.8	176	3.2
	2015	219	4.2	207	4.0	234	4.5	203	4.0	583	11.8	202	4.1
	2016	229	4.5	187	3.6	211	4.1	203	4.1	538	11.0	199	4.1
	2017	229	5.0	188	4.1	217	4.7	197	4.4	549	12.6	202	4.7
UK born	2010	114	8.1	113	8.2	71	5.0	83	6.2	235	18.4	100	7.8
	2011	134	8.6	121	7.8	62	3.9	126	8.4	271	18.6	125	8.6
	2012	129	8.0	99	6.2	54	3.3	106	6.8	254	16.7	94	6.2
	2013	133	8.6	130	8.5	70	4.5	100	6.7	259	17.5	115	7.8
	2014	124	8.5	98	6.8	74	5.1	94	6.7	236	17.0	101	7.3
	2015	146	11.4	112	8.7	76	5.9	114	9.1	271	21.8	117	9.4
	2016	141	11.7	97	8.1	59	4.9	99	8.5	235	20.3	104	9.0
	2017	154	12.4	84	6.8	72	5.8	106	8.8	249	20.8	117	9.8
Non-UK born	2010	68	1.4	134	2.8	123	2.5	83	1.7	328	7.4	58	1.3
	2011	63	1.1	106	2.0	128	2.3	78	1.5	301	6.0	58	1.2
	2012	86	1.6	111	2.1	124	2.3	111	2.1	315	6.2	86	1.7
	2013	81	1.6	104	2.1	144	2.9	92	1.9	320	6.8	77	1.6
	2014	76	1.8	96	2.2	132	3.1	92	2.2	295	7.2	72	1.8
	2015	68	1.8	91	2.3	156	4.1	88	2.3	304	8.3	81	2.2
	2016	84	2.2	87	2.2	150	3.9	104	2.7	298	8.1	92	2.5
	2017	71	2.1	100	3.0	143	4.3	89	2.8	292	9.4	83	2.7

Table Ai.7.2: Number and proportion of people with TB (≥15 years) with a social risk factor (SRF), by ethnicity and country of birth, England, 2013-2017

Demographic Characteristic		Drug use		Alcohol use		Homelessness		Prison		≥ 1 SRF		≥ 2 SRF	
		n	%	n	%	n	%	n	%	n	%	n	%
Ethnicity (UK born)	White	480	11.1	427	9.9	274	6.3	349	8.5	904	21.9	413	10.0
	Black-Caribbean	83	23.6	33	9.4	35	10.0	65	18.3	128	36.9	55	15.9
	Black-African	14	4.8	6	2.1	6	2.0	12	4.1	27	9.5	7	2.5
	South Asian	74	5.4	34	2.5	11	0.8	46	3.3	113	8.5	40	3.0
	Other	47	13.9	20	5.9	24	7.1	40	11.8	76	22.5	38	11.2
Country of birth (Non-UK born)[a]	India	21	0.4	96	1.7	54	1.0	34	0.6	162	3.1	38	0.7
	Somalia	31	3.1	23	2.3	54	5.5	42	4.3	115	12.3	27	2.9
	Eritrea	4	1.0	5	1.3	81	21.0	38	9.9	104	27.9	17	4.6
	Poland	26	8.3	55	17.6	52	16.8	40	13.4	100	33.6	52	17.4
	Pakistan	24	0.7	32	0.9	38	1.1	33	1.0	97	3.0	23	0.7
	Romania	28	4.7	18	3.0	47	7.9	26	4.5	88	15.5	23	4.0
	Lithuania	19	9.1	26	12.7	33	16.0	24	12.0	63	31.7	32	16.1
	Sudan	1	0.5	0	0.0	46	24.0	10	5.6	51	28.5	6	3.4
	Ireland	20	14.7	24	17.4	11	8.1	15	11.8	42	32.1	19	14.5
	Ethiopia	4	2.1	4	2.2	27	14.6	12	6.6	38	21.3	7	3.9

[a] The top ten countries of birth by the number of people with TB with ≥1 SRF were included
[b] People from Indian, Pakistani and Bangladeshi ethnic groups were grouped as ‘South Asian’

Table Ai.7.3: Number and proportion of people with TB (≥15 years) with social risk factors (SRF) by PHE Centre, England, 2017

PHE Centre[a]	Drug use		Alcohol use		Homelessness		Prison		≥ 1 SRF		≥ 2 SRF	
	n	%	n	%	n	%	n	%	n	%	n	%
London	78	4.3	94	5.2	91	5.0	64	3.5	215	12.0	80	4.5
West Midlands	44	7.3	24	4.0	26	4.3	37	6.2	81	14.1	37	6.4
South East	20	4.1	15	3.1	24	5.0	23	4.9	50	11.0	23	5.0
North West	19	4.4	5	1.2	8	1.9	18	4.9	39	10.7	9	2.5
East of England	17	4.6	9	2.4	15	4.0	16	4.4	40	11.3	12	3.4
East Midlands	18	5.9	15	5.0	23	7.8	11	4.2	49	19.1	14	5.5
Yorkshire and the Humber	12	4.1	14	4.7	10	3.4	11	4.0	35	12.9	9	3.3
South West	15	7.5	8	4.0	11	5.7	12	6.4	25	14.0	12	6.7
North East	6	6.0	4	4.0	9	8.9	5	5.3	15	15.8	6	6.3

[a] Ordered by decreasing total number of TB notifications in 2017

Table Ai.7.4: Number and proportion of people with TB (≥15 years) with a social risk factor by PHE Centre, England, 2010-2017

PHE Centre[a]	2010		2011		2012		2013		2014		2015		2016		2017	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
London	313	11.8	268	9.0	259	8.8	263	9.8	230	9.9	228	10.8	209	10.2	215	12.0
West Midlands	61	8.9	61	7.4	75	8.4	87	10.5	62	9.3	78	12.6	62	9.7	81	14.1
South East	34	6.7	63	9.4	61	9.0	46	7.4	45	7.6	59	11.3	49	10.3	50	11.0
North West	54	10.6	54	10.5	56	10.3	52	9.4	52	10.7	63	14.4	51	12.1	39	10.7
East of England	23	6.1	35	7.6	32	7.3	26	6.7	34	9.1	39	12.7	57	15.4	40	11.3
East Midlands	25	6.5	29	8.0	24	6.6	29	9.5	34	12.4	30	11.0	30	11.3	49	19.1
Yorkshire and the Humber	41	8.9	44	8.5	39	8.6	36	8.0	47	11.2	40	11.7	35	10.2	35	12.9
South West	21	12.4	23	11.3	32	14.1	36	13.8	23	9.0	32	13.9	28	14.7	25	14.0
North East	12	9.5	15	13.4	15	11.0	12	10.1	13	9.4	14	13.0	17	16.2	15	15.8
England	584	9.9	592	8.9	593	8.9	587	9.4	540	9.8	583	11.8	538	11.0	549	12.6

[a] Ordered by decreasing total number of TB notifications in 2017

Table Ai.7.5: Number and proportion of people with TB (≥15 years) with specific clinical and disease characteristics, according to the presence of social risk factors (SRF), England, 2017

Social risk factor status	Clinical characteristics						Time from symptom onset until treatment start[b]						Initial drug resistance			
	Previous TB diagnosis		Pulmonary[a]		On DOT		0-2 months treatment delay		2-4 months treatment delay		>4 months treatment delay		INH-R without MDR		MDR/RR-TB	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Drug misuse	19	8.7	195	85.5	114	54.6	66	35.6	41	22.7	74	40.9	10	5.8	4	2.3
Alcohol misuse	20	11.4	146	77.7	119	68.4	50	38.2	37	28.2	44	33.6	12	8.5	6	4.1
Homeless	20	9.6	170	78.3	122	60.4	55	34.6	48	30.2	56	35.2	14	8.5	3	1.8
Prison	11	5.9	157	80.1	95	50.3	54	36.7	31	21.1	62	42.2	6	4.0	3	2.0
≥ 1 SRF	44	8.5	420	76.6	252	49.6	143	37.3	110	28.7	130	33.9	23	5.8	11	2.7
≥ 2 SRF	19	9.9	175	87.1	137	72.1	60	36.6	36	22.0	68	41.5	11	6.8	4	2.4
No SRF	200	5.3	1,922	50.8	288	7.8	665	37.0	565	31.4	568	31.6	130	5.7	35	1.5

[a] With or without extrapulmonary disease
[b] For pulmonary cases excluding those diagnosed post-mortem and those who did not start treatment

Table Ai.7.6: TB notifications and rates by deprivation decile[a], England, 2017

Deprivation decile	Number of people	Rate per 100,000 (95% CI)
1 (10% most deprived)	1,021	18.4 (17.3 - 19.5)
2	948	16.7 (15.6 - 17.8)
3	811	14.2 (13.2 - 15.2)
4	622	11.0 (10.1 - 11.9)
5	472	8.5 (7.8 - 9.3)
6	363	6.6 (5.9 - 7.3)
7	285	5.2 (4.6 - 5.9)
8	244	4.5 (3.9 - 5.1)
9	199	3.7 (3.2 - 4.2)
10 (10% least deprived)	132	2.5 (2.1 - 3.0)

CI - confidence interval

Table Ai.8.1: Number and proportion of people (notified and un-notified) with TB-HIV co-infection[a], England, 2001-2017

Year	TB notifications	TB notifications matched to HIV notifications		Un-notified people with TB with an isolate matched an HIV notification	Total people with TB matched to HIV notifications[b]	
	n	n	%	n	n	%
2001	5,761	270	4.7	118	388	6.6
2002	6,289	427	6.8	27	454	7.2
2003	6,308	485	7.7	32	517	8.2
2004	6,528	522	8.0	26	548	8.4
2005	7,243	545	7.5	27	572	7.9
2006	7,320	512	7.0	18	530	7.2
2007	7,121	435	6.1	10	445	6.2
2008	7,358	444	6.0	24	468	6.3
2009	7,720	381	4.9	12	393	5.1
2010	7,321	350	4.8	5	355	4.8
2011	7,904	307	3.9	4	311	3.9
2012	7,688	272	3.5	3	275	3.6
2013	6,974	217	3.1	2	219	3.1
2014	6,209	197	3.2	2	199	3.2
2015	5,517	204	3.7	3	207	3.8
2016	5,410	156	2.9	0	156	2.9
2017	4,922	137	2.8	2	139	2.8

[a] Includes people with TB-HIV co-infection aged 15 years and older.
[b] Proportion is calculated using the number of TB notifications with HIV co-infection plus the number who are un-notified with an MTBC isolate which matched to a person with HIV as the numerator, and the number of all TB notifications (with or without HIV co-infection) plus the number of un-notified TB isolates which matched to a person with HIV as the denominator.

Table Ai.8.2: Number and proportion of people (notified and un-notified) with TB-HIV co-infection[a] by PHE Centre, England, 2001-2017

Year	PHE Centre[b]																	
	London		West Midlands		South East		North West		East of England		East Midlands		Yorkshire and the Humber		South West		North East	
	n	%[c]	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
2001	264	10.5	5	0.8	32	7.5	18	2.9	26	7.9	11	2.3	15	3.1	3	1.4	10	6.0
2002	254	8.7	24	3.3	50	10.9	21	3.4	47	13.6	22	4.9	15	3.3	10	4.7	9	6.3
2003	271	9.3	35	4.8	67	12.5	24	4.3	47	15.0	21	4.8	29	5.7	15	7.6	7	5.1
2004	263	9.0	46	5.4	45	8.5	36	6.6	62	15.9	34	8.5	34	6.8	18	7.1	10	7.2
2005	282	8.7	44	5.0	60	10.5	44	6.2	45	10.0	39	7.7	37	7.2	13	5.0	6	4.8
2006	235	7.4	39	4.4	50	8.4	42	6.3	55	11.9	40	7.3	40	6.4	21	7.7	7	5.5
2007	179	5.9	33	3.8	51	8.5	42	6.1	42	11.0	35	6.8	34	5.8	14	5.4	15	8.0
2008	206	6.5	35	3.7	46	7.5	38	5.6	45	9.5	38	8.2	37	6.2	15	5.5	7	4.0
2009	166	5.1	34	3.6	48	7.0	34	4.5	39	7.9	21	4.2	26	4.0	16	5.6	7	4.5
2010	147	4.7	25	3.0	37	5.4	38	5.0	35	7.3	30	6.3	28	4.8	11	4.3	4	2.8
2011	130	3.9	33	3.4	31	4.0	21	2.8	32	5.9	22	4.6	26	4.3	13	4.3	3	2.3
2012	126	3.9	29	2.8	32	4.3	21	2.9	20	4.1	23	4.8	15	2.8	8	2.8	1	0.6
2013	101	3.5	33	3.5	19	2.9	17	2.5	22	5.1	6	1.5	12	2.3	7	2.2	2	1.5
2014	70	2.9	23	3.1	26	4.0	19	3.1	22	5.2	8	2.1	16	3.2	9	3.0	6	3.8
2015	89	4.1	18	2.7	17	2.9	22	4.0	12	3.2	13	3.8	19	4.6	12	4.3	5	4.1
2016	63	3.0	15	2.2	15	2.7	17	3.1	11	2.6	16	5.0	9	2.2	6	2.5	4	3.5
2017	50	2.7	16	2.5	23	4.4	14	2.8	14	3.5	10	3.0	6	1.8	5	2.2	1	1.0

[a] Includes people with TB and HIV co-infection aged 15 years and older
[b] Ordered by decreasing total number of TB notifications in 2017
[c] Proportion is calculated using the number of TB notifications with HIV co-infection plus the number who are un-notified with an MTBC isolate which matched to a person with HIV as the numerator, and the number of all TB notifications (with or without HIV co-infection) plus the number of un-notified TB isolates which matched to a person with HIV as the denominator.

Table Ai 8.3: Number and proportion[a] of people notified with TB who had HIV co-infection by age group, England, 2001-2017

Year	Age group (years)											
	15-24		25-34		35-44		45-54		55-64		65+	
	n	%	n	%	n	%	n	%	n	%	n	%
2001	20	7.4	115	42.6	97	35.9	24	8.9	10	3.7	4	1.5
2002	21	4.9	198	46.4	151	35.4	45	10.5	11	2.6	1	0.2
2003	30	6.2	212	43.7	179	36.9	46	9.5	13	2.7	5	1.0
2004	39	7.5	208	39.8	188	36.0	71	13.6	13	2.5	3	0.6
2005	40	7.3	197	36.1	219	40.2	69	12.7	15	2.8	5	0.9
2006	25	4.9	179	35.0	215	42.0	67	13.1	17	3.3	9	1.8
2007	16	3.7	148	34.0	194	44.6	59	13.6	14	3.2	4	0.9
2008	16	3.6	139	31.3	188	42.3	78	17.6	19	4.3	4	0.9
2009	23	6.0	115	30.2	147	38.6	70	18.4	21	5.5	5	1.3
2010	19	5.4	87	24.9	145	41.4	71	20.3	21	6.0	7	2.0
2011	17	5.5	72	23.5	113	36.8	63	20.5	31	10.1	11	3.6
2012	9	3.3	65	23.9	121	44.5	48	17.6	23	8.5	6	2.2
2013	10	4.6	34	15.7	84	38.7	69	31.8	14	6.5	6	2.8
2014	12	6.1	34	17.3	75	38.1	55	27.9	18	9.1	3	1.5
2015	8	3.9	42	20.6	80	39.2	52	25.5	15	7.4	7	3.4
2016	8	5.1	31	19.9	55	35.3	44	28.2	14	9.0	4	2.6
2017	4	2.9	25	18.2	43	31.4	48	35.0	14	10.2	3	2.2

[a] Proportion of all people with TB in age group

Table Ai.8.4: HIV testing in people notified with TB by PHE Centre, England, 2017

PHE Centre[b]	HIV testing[a]								
	Not offered		Offered and received		Offered but not received		Offered but declined		Total[a]
	n	%	n	%	n	%	n	%	n
London	27	1.5	1,773	97.0	23	1.3	5	0.3	1,828
West Midlands	22	4.0	506	92.7	14	2.6	4	0.7	546
South East	28	5.6	449	90.3	15	3.0	5	1.0	497
North West	24	5.1	437	93.2	6	1.3	2	0.4	469
East of England	18	5.0	300	83.3	41	11.4	1	0.3	360
East Midlands	22	6.8	296	91.6	5	1.5	0	0.0	323
Yorkshire and the Humber	17	5.5	285	92.2	5	1.6	2	0.6	309
South West	11	5.7	181	93.3	2	1.0	0	0.0	194
North East	11	10.9	88	87.1	1	1.0	1	1.0	101
England	**180**	**3.9**	**4,315**	**93.3**	**112**	**2.4**	**20**	**0.4**	**4,627**

[a] Total with previously unknown HIV status where HIV testing is known and excluding those diagnosed post-mortem
[b] Ordered by decreasing total number of TB notifications in 2017

Table Ai 9.1: Number of children vaccinated with BCG at 12 months of age, by upper tier local authority, financial years 2016-2017 and 2017-2018

Upper tier Local Authority	Number vaccinated with BCG at 12 months of age in financial year 2016-2017	Number vaccinated with BCG at 12 months of age in financial year 2017-2018
Barking and Dagenham	636	1322
Barnet	1819	571
Barnsley	140	141
Bath and North East Somerset	96	Not Available
Bedford	532	571
Bexley	1825	143
Birmingham	6095	7114
Blackburn with Darwen	Not Available	Not Available
Blackpool	Not Available	Not Available
Bolton	1221	1334
Bournemouth	315	326
Bracknell Forest	155	Not Available
Bradford	Not Available	Not Available
Brent	1142	1392
Brighton and Hove	343	355
Bristol	941	945
Bromley	888	332
Buckinghamshire	Not Available	Not Available
Bury	327	311
Calderdale	363	390
Cambridgeshire	1016	975
Camden	1187	954
Central Bedfordshire	365	228
Cheshire East	240	240
Cheshire West and Chester	83	650
City of London	20	Included in Hackney
Cornwall	Not Available	0
County Durham	123	136
Coventry	1360	1805
Croydon	1377	1030
Cumbria	Not Available	29
Darlington	54	71
Derby	836	820
Derbyshire	232	225
Devon	268	220
Doncaster	278	272
Dorset	112	107
Dudley	589	562
Ealing	2283	2020

Table Ai 9.1: Number of children vaccinated with BCG at 12 months of age, by upper tier local authority, financial years 2016-2017 and 2017-2018 (continued)

Upper tier Local Authority	Number vaccinated with BCG at 12 months of age in financial year 2016-2017	Number vaccinated with BCG at 12 months of age in financial year 2017-2018
East Riding of Yorkshire	113	93
East Sussex	320	357
Enfield	256	1319
Essex	1656	1556
Gateshead	Not Available	Not Available
Gloucestershire	468	Not Available
Greenwich	3193	396
Hackney	2507	1101
Halton	49	46
Hammersmith and Fulham	749	167
Hampshire	1171	980
Haringey	397	1355
Harrow	876	1065
Hartlepool	41	37
Havering	190	640
Herefordshire	63	132
Hertfordshire	2635	1565
Hillingdon	1996	680
Hounslow	2636	2100
Isle of Wight	50	50
Isles of Scilly	Not Available	0
Islington	Not Available	1966
Kensington and Chelsea	540	172
Kent	1821	1814
Kingston upon Hull	368	366
Kingston upon Thames	324	361
Kirklees	1532	1541
Knowsley	38	56
Lambeth	Not Available	662
Lancashire	Not Available	Not Available
Leeds	1502	1640
Leicester	2519	2335
Leicestershire	824	770
Lewisham	2484	381
Lincolnshire	Not Available	Not Available
Liverpool	Not Available	Not Available
Luton	2960	1324
Manchester	3007	2343
Medway	187	349
Merton	630	197
Middlesbrough	376	345

Table Ai 9.1: Number of children vaccinated with BCG at 12 months of age, by upper tier local authority, financial years 2016-2017 and 2017-2018 (continued)

Upper tier Local Authority	Number vaccinated with BCG at 12 months of age in financial year 2016-2017	Number vaccinated with BCG at 12 months of age in financial year 2017-2018
Milton Keynes	1191	1182
Newcastle upon Tyne	Not Available	Not Available
Newham	4737	4369
Norfolk	878	883
North East Lincolnshire	115	107
North Lincolnshire	154	199
North Somerset	66	111
North Tyneside	100	101
North Yorkshire	Not Available	232
Northamptonshire	919	591
Northumberland	59	68
Nottingham	1091	1195
Nottinghamshire	503	603
Oldham	978	1066
Oxfordshire	1231	Not Available
Peterborough	1023	957
Plymouth	144	161
Poole	98	123
Portsmouth	489	437
Reading	231	Not Available
Redbridge	1360	2061
Redcar and Cleveland	44	38
Richmond upon Thames	608	448
Rochdale	629	720
Rotherham	378	339
Rutland	22	17
Salford	456	302
Sandwell	1036	1633
Sefton	Not Available	Not Available
Sheffield	1468	1493
Shropshire	138	147
Slough	272	634
Solihull	265	357
Somerset	193	202
South Gloucestershire	242	262
South Tyneside	Not Available	Not Available
Southampton	653	678
Southend-on-Sea	261	256
Southwark	Not Available	556
St. Helens	91	91
Staffordshire	627	713

Table Ai 9.1: Number of children vaccinated with BCG at 12 months of age, by upper tier local authority, financial years 2016-2017 and 2017-2018 (continued)

Upper tier Local Authority	Number vaccinated with BCG at 12 months of age in financial year 2016-2017	Number vaccinated with BCG at 12 months of age in financial year 2017-2018
Stockport	375	324
Stockton-on-Tees	180	214
Stoke-on-Trent	692	754
Suffolk	709	667
Sunderland	169	183
Surrey	468	2146
Sutton	586	208
Swindon	Not Available	Not Available
Tameside	360	425
Telford and Wrekin	257	240
Thurrock	598	626
Torbay	45	11
Tower Hamlets	3808	2550
Trafford	488	246
Wakefield	215	350
Walsall	727	1046
Waltham Forest	1432	1660
Wandsworth	1213	303
Warrington	233	219
Warwickshire	546	548
West Berkshire	57	Not Available
West Sussex	1149	1036
Westminster	584	205
Wigan	240	271
Wiltshire	269	266
Windsor and Maidenhead	134	Not Available
Wirral	Not Available	Not Available
Wokingham	85	Not Available
Wolverhampton	1356	1352
Worcestershire	420	467
York	Not Available	140

Table Ai.10.1: Availability of data by source and CCG for latent TB testing

CCG	Testing	Treatment	Laboratory
Barking and Dagenham			
Barnet			
Bedfordshire			
Birmingham Crosscity			
Birmingham South and Central			
Blackburn with Darwen & East Lancashire			
Bolton			
Bradford City			
Bradford Districts			
Brent			
Bristol			
Cambridge & Peterborough			
Camden			
Central London (Westminster)			
City and Hackney			
Coventry & Rugby			
Crawley			
Croydon			
Ealing			
Enfield			
Find & Treat			
Greater Huddersfield			
Greenwich			
Hammersmith & Fulham			
Haringey			
Harrow			
Herts Valleys			
Hillingdon			
Hounslow			
Islington			
Lambeth			
Leeds South and East			
Leicester City			
Lewisham			
Liverpool			
Luton			
Merton			
Nene			
Newham			

No data submitted

Data submitted for all years 2016, 2017 and 2018

Some data submitted but not for all reporting periods/ Have stopped reporting

Table Ai.10.1: Availability of data by source and CCG for latent TB testing (continued)

CCG	Testing	Treatment	Laboratory
North and Central Manchester			
North Kirklees			
Nottingham City			
Oldham			
Oxfordshire			
Redbridge			
Sandwell and West Birmingham			
Sheffield			
Slough			
South Reading			
Southampton			
Southern Derbyshire			
Southwark			
Stoke on Trent			
Tower Hamlets			
Walsall			
Waltham Forest			
Wandsworth			
West London			
Wolverhampton			

No data submitted

Data submitted for all years 2016, 2017 and 2018

Some data submitted but not for all reporting periods/ Have stopped reporting

Table Ai.10.2: Number of LTBI tests by CCG and year, 2016-2017

Clinical commissioning group (CCG)	2016	2017
NHS Bedfordshire CCG	5	110
NHS Birmingham Crosscity CCG	352	438
NHS Birmingham South And Central CCG	891	854
NHS Blackburn And Darwen CCG & East Lancashire	388	286
NHS Bolton CCG	4	139
NHS Bradford City And Districts CCG	569	824
NHS Brent CCG	583	1,223
NHS Bristol CCG	104	152
NHS Cambridgeshire And Peterborough CCG	298	146
NHS Central London (Westminster) CCG	1	3
NHS City And Hackney CCG	0	14
NHS Coventry And Rugby CCG	0	48
NHS Crawley CCG	68	82
NHS Croydon CCG	12	56
NHS Ealing CCG	155	629
NHS Greater Huddersfield CCG	312	417
NHS Greenwich CCG	64	778
NHS Hammersmith CCG	0	7
NHS Harrow CCG	121	262
NHS Herts Valley CCG	6	179
NHS Hillingdon CCG	100	77
NHS Hounslow CCG	63	475
NHS Islington CCG	0	1
NHS Lambeth CCG	0	29
NHS Leeds South And East CCG	22	378
NHS Leicester City CCG	426	1,566
NHS Lewisham CCG	7	27
NHS Luton CCG	121	111
NHS Merton CCG	6	50
NHS Milton Keynes CCG	45	16
NHS Newham CCG	2,132	2,316
NHS North And Central Manchester CCG	195	405
NHS North Kirklees CCG	156	152
NHS Nottingham City CCG	218	40
NHS Sandwell And West Birmingham CCG	440	544
NHS Sheffield CCG	364	469
NHS Slough CCG	73	477
NHS Southampton CCG	227	534
NHS Southern Derbyshire CCG	33	13

[a] NHS Bradford City and Districts CCGs submit a joint dataset

Table Ai.10.2: Number of LTBI tests by CCG and year, 2016-2017 (continued)

Clinical commissioning group (CCG)	2016	2017
NHS South Reading CCG	108	240
NHS Southwark CCG	0	3
NHS Stoke On Trent CCG	0	11
NHS Tower Hamlets CCG	0	11
NHS Walsall CCG	0	0
NHS Waltham Forest CCG	0	34
NHS Wandsworth CCG	37	104
NHS West London CCG	2	5
NHS Wolverhampton CCG	100	44
Find And Treat[b]	0	220
Unknown	10	225
Total	**8,818**	**15,224**

[b] Find and treat is not a CCG but funded as part of the LTBI programme

Table Ai.10.3: Number and proportion of people tested for LTBI by country of birth, 2016-June 2017

Country of birth	2016		2017	
	Number tested	Proportion (%)	Number tested	Proportion (%)
India	1,096	28.2	2495	32.3
Pakistan	1,327	34.1	1996	25.8
Bangladesh	216	5.6	492	6.4
Afghanistan	163	4.2	350	4.5
Nigeria	132	3.4	286	3.7
Eritrea	100	2.6	223	2.9
Sudan	93	2.4	208	2.7
Ghana	91	2.3	203	2.6
Nepal	49	1.3	178	2.3
Somalia	35	0.9	161	2.1
Ethiopia	31	0.8	87	1.1
Philippines	14	0.4	73	0.9
Indonesia	55	1.4	39	0.5
East Timor	81	2.1	15	0.2
Kenya	22	0.6	53	0.7
Sri Lanka	15	0.4	37	0.5
Zimbabwe	21	0.5	45	0.6
South Africa	15	0.4	44	0.6
Congo	6	0.2	40	0.5
Thailand	17	0.4	25	0.3
Mali	20	0.5	21	0.3
Uganda	12	0.3	27	0.3
Cameroon	10	0.3	33	0.4
Gambia, The	7	0.2	14	0.2
Guinea-Bissau	5	0.1	14	0.2
Mauritius	11	0.3	15	0.2
Burma	10	0.3	14	0.2
Angola	8	0.2	15	0.2
Tanzania	11	0.3	10	0.1
Senegal	2	0.1	9	0.1
Gambia	8	0.2	10	0.1
Sierra Leone	7	0.2	12	0.2
Congo (Democratic Republic)	1	0.0	8	0.1
Guinea	3	0.1	12	0.2
Others	193	5.0	468	6.1
Total	**3,887**	**100.0**	**7,732**	**100.0**

Table Ai.10.4: Number and proportion of people that tested positive for LTBI by CCG and year, 2016 - 2017

Clinical commissioning group (CCG)	2016			2017		
	Total tested with result (n)	LTBI positive		Total tested with result (n)	LTBI positive	
		n	%		n	%
NHS Bedfordshire CCG	0	0	-	110	11	10.0
NHS Birmingham Crosscity CCG	321	39	12.1	411	51	12.4
NHS Birmingham South And Central CCG	864	141	16.3	833	124	14.9
NHS Blackburn And Darwen CCG & East Lancashire	388	84	21.6	286	48	16.8
NHS Bolton CCG	4	4	100.0	139	53	38.1
NHS Bradford City CCG	566	107	18.9	820	107	13.0
NHS Brent CCG	566	119	21.0	1,195	196	16.4
NHS Bristol CCG	104	14	13.5	151	31	20.5
NHS Cambridgeshire And Peterborough CCG	297	41	13.8	141	27	19.1
NHS Central London (Westminster) CCG	1	0	0.0	2	0	0.0
NHS City And Hackney CCG	0	0	-	14	3	21.4
NHS Coventry And Rugby CCG	0	0	-	48	6	12.5
NHS Crawley CCG	67	11	16.4	82	11	13.4
NHS Croydon CCG	12	2	16.7	48	3	6.3
NHS Ealing CCG	150	32	21.3	609	98	16.1
NHS Greater Huddersfield CCG	309	55	17.8	415	54	13.0
NHS Greenwich CCG	63	10	15.9	767	164	21.4
NHS Hammersmith CCG	0	0	-	5	0	0.0
NHS Harrow CCG	113	29	25.7	247	48	19.4
NHS Herts Valley CCG	6	1	16.7	169	16	9.5
NHS Hillingdon CCG	83	12	14.5	69	10	14.5
NHS Hounslow CCG	59	12	20.3	450	81	18.0

[a] NHS Bradford City and Districts CCGs submit a joint dataset

Table Ai.10.4: Number and proportion of people that tested positive for LTBI by CCG and year, 2016 – 2017 continued

Clinical commissioning group (CCG)	2016			2017		
	Total tested with result (n)	LTBI positive		Total testedwith result (n)	LTBI positive	
		n	%		n	%
NHS Islington CCG	0	0	-	1	0	0.0
NHS Lambeth CCG	0	0	-	27	5	18.5
NHS Leeds South And East CCG	22	7	31.8	378	69	18.3
NHS Leicester City CCG	426	57	13.4	1,566	267	17.0
NHS Lewisham CCG	7	0	0.0	27	5	18.5
NHS Luton CCG	121	15	12.4	108	12	11.1
NHS Merton CCG	6	0	0.0	48	10	20.8
NHS Milton Keynes CCG	44	7	15.9	16	4	25.0
NHS Newham CCG	2,132	447	21.0	2,302	417	18.1
NHS North And Central Manchester CCG	194	36	18.6	361	65	18.0
NHS North Kirklees CCG	156	20	12.8	152	20	13.2
NHS Nottingham City CCG	218	22	10.1	40	7	17.5
NHS Sandwell And West Birmingham CCG	432	96	22.2	519	95	18.3
NHS Sheffield CCG	353	53	15.0	464	69	14.9
NHS Slough CCG	73	8	11.0	477	64	13.4
NHS Southampton CCG	227	35	15.4	533	79	14.8
NHS Southern Derbyshire CCG	33	4	12.1	13	2	15.4
NHS South Reading CCG	208	16	7.7	240	48	20.0
NHS Southwark CCG	0	0	-	2	0	0.0
NHS Stoke On Trent CCG	0	0	-	11	6	54.5
NHS Tower Hamlets CCG	0	0	-	10	2	20.0
NHS Waltham Forest CCG	0	0	-	31	2	6.5

Table Ai.10.4: Number and proportion of people that tested positive for LTBI by CCG and year, 2016 – 2017 continued

Clinical commissioning group (CCG)	2016			2017		
	Total tested with result (n)	LTBI positive		Total tested with result (n)	LTBI positive	
		n	%		n	%
NHS Wandsworth CCG	34	3	8.8	85	12	14.1
NHS West London CCG	2	1	50.0	5	2	40.0
NHS Wolverhampton CCG	94	32	34.0	44	10	22.7
Find and Treat	0	0	-	219	61	27.9
Unknown	10	0	0.0	217	32	14.7
Total	**8765**	**1572**	**17.9**	**14907**	**2507**	**16.8**

[b] Find and treat is not a CCG but funded as part of the LTBI programme

Table Ai.11.1: Number and rate of people with TB detected in high incidence countries through the UK pre-entry screening programme, 2006 to 2017

Year	Number of people with TB	Rate per 100,000 (95% CI)
2006	14	44.8 (24.5 - 75.3)
2007	53	54.3 (40.7 - 71.0)
2008	76	69.7 (54.9 - 87.2)
2009	121	91.6 (76.0 - 109.45)
2010	83	76.9 (61.3 - 95.4)
2011	84	87.2 (69.6 - 108.0)
2012	70	107.7 (84.0 - 136.1)
2013	140	161.4 (135.8 - 190.5)
2014	393	168.4 (152.1 - 185.9)
2015	377	152.3 (137.3 - 168.5)
2016	259	104.6 (92.2 - 118.1)
2017	298	116.6 (103.8 - 130.7)

Table Ai.11.2: Number of people with pulmonary TB detected by pre-entry screening[a] and those identified within one year of UK entry[b], 2006 to 2017

Year of screening/entry to the UK	Number of people detected with TB by pre-entry screening	Number of people identified with TB in the UK
2006	14	366
2007	53	342
2008	76	310
2009	121	342
2010	83	321
2011	84	314
2012	70	178
2013	140	145
2014	393	154
2015	377	162
2016	259	122
2017	298	51
2017[c]	377	88

[a] The number of people with pulmonary TB identified within one year of entry into the UK includes all 101 high incidence countries. The number of people detected with TB by pre-entry screening were from an increasing number of countries as screening was rolled out; 5 pilot countries (2006), 15 pilot countries (2007 and 2012), 101 countries (by 2014).
[b] As of 1st May 2018, 794 sputum samples are pending and the rate may increase when final results are available.
[c] The predicted number of people with TB is based on the assumption that 10% of the pending sputum cultures will be positive while there will be 72% more people with TB detected in the UK for 2017 in 2018 as the proxy entry date is set at 2nd July each year.

Table Ai.11.3: Drug susceptibility testing of sputum cultures from people detected with TB, 2006 to 2017

Drug susceptibility category	Number of people with TB	% Total
Sensitive to all first line drugs	586	83.5
Resistant to isoniazid	16	2.3
Resistant to two or more first-line drugs, without MDR	25	3.6
MDR-TB	22	3.1
Resistant to one first-line drug, other than isoniazid and rifampicin	39	5.6
XDR-TB	1	0.1
RR-TB	13	1.9
Total	**702**	**100.0**

Appendix II. Supplementary tables of local level data

Table Aii.1.1: Three year average number of people with TB and rates by upper tier local authority and local authority district, England, 2015-2017

PHE Centre[a]	Upper tier local authority and local authority district[b]	Average annual number of people[c]	Average annual rate per 100,000 (95% CI)
London		**2131**	**24.3 (23.7-24.9)**
	Barking and Dagenham	53	25.7 (21.9-30.0)
	Barnet	71	18.4 (16.0-21.1)
	Bexley	28	11.3 (9.0-14.0)
	Brent	169	51.7 (47.3-56.4)
	Bromley	23	7.0 (5.5-8.9)
	Camden	44	17.6 (14.7-20.8)
	City of London	1	13.9 (2.9-40.6)
	Croydon	82	21.3 (18.7-24.2)
	Ealing	136	39.4 (35.7-43.5)
	Enfield	63	19.1 (16.5-22.0)
	Greenwich	74	26.5 (23.2-30.3)
	Hackney	63	23.2 (20.0-26.8)
	Hammersmith and Fulham	35	19.4 (15.9-23.4)
	Haringey	65	24.2 (20.9-27.8)
	Harrow	86	34.7 (30.6-39.2)
	Havering	26	10.3 (8.1-12.8)
	Hillingdon	84	27.9 (24.6-31.6)
	Hounslow	106	39.7 (35.5-44.3)
	Islington	44	19.0 (15.9-22.5)
	Kensington and Chelsea	24	15.1 (11.8-19.0)
	Kingston upon Thames	13	7.3 (5.2-10.0)
	Lambeth	56	17.5 (14.9-20.3)
	Lewisham	58	19.5 (16.8-22.7)
	Merton	44	21.3 (17.9-25.3)
	Newham	200	58.2 (53.7-63.1)
	Redbridge	115	38.4 (34.5-42.7)
	Richmond upon Thames	12	6.0 (4.2-8.3)
	Southwark	75	24.2 (21.1-27.6)
	Sutton	21	10.4 (8.0-13.3)
	Tower Hamlets	79	26.4 (23.1-29.9)
	Waltham Forest	88	32.3 (28.5-36.4)
	Wandsworth	55	17.0 (14.5-19.8)
	Westminster	38	15.6 (12.8-18.7)

PHE Centre[a]	Upper tier local authority and local authority district[b]	Average annual number of people[c]	Average annual rate per 100,000 (95% CI)
West Midlands		**693**	**11.9 (11.4-12.5)**
	Birmingham	256	22.8 (21.2-24.4)
	Coventry	83	23.6 (20.8-26.8)
	Dudley	25	7.8 (6.1-9.7)
	Herefordshire, County of	4	2.3 (1.2-3.9)
	Sandwell	88	27.2 (24.0-30.7)
	Shropshire	5	1.6 (0.9-2.6)
	Solihull	11	5.3 (3.7-7.5)
	Staffordshire	37	4.2 (3.5-5.1)
	Cannock Chase	2	2.4 (1.0-4.9)
	East Staffordshire	8	6.6 (4.2-9.8)
	Lichfield	4	3.9 (2.0-6.8)
	Newcastle-under-Lyme	6	4.7 (2.8-7.4)
	South Staffordshire	6	5.1 (3.0-8.2)
	Stafford	7	5.0 (3.0-7.7)
	Staffordshire Moorlands	2	2.0 (0.7-4.4)
	Tamworth	2	3.0 (1.2-6.3)
	Stoke-on-Trent	27	10.8 (8.6-13.4)
	Telford and Wrekin	6	3.6 (2.2-5.7)
	Walsall	43	15.5 (13.0-18.5)
	Warwickshire	31	5.5 (4.5-6.8)
	North Warwickshire	1	2.1 (0.6-5.4)
	Nuneaton and Bedworth	8	6.5 (4.2-9.6)
	Rugby	7	7.0 (4.4-10.5)
	Stratford-on-Avon	4	3.0 (1.5-5.3)
	Warwick	10	7.4 (5.0-10.5)
	Wolverhampton	57	22.2 (19.0-25.8)
	Worcestershire	18	3.1 (2.4-4.1)
	Bromsgrove	3	2.8 (1.2-5.4)
	Malvern Hills	2	2.2 (0.7-5.1)
	Redditch	4	4.7 (2.4-8.2)
	Worcester	4	4.3 (2.3-7.3)
	Wychavon	4	3.5 (1.9-6.0)
	Wyre Forest	1	1.3 (0.4-3.4)

PHE Centre[a]	Upper tier local authority and local authority district[b]	Average annual number of people[c]	Average annual rate per 100,000 (95% CI)
South East		**564**	**6.4 (6.1-6.8)**
	Bracknell Forest	5	4.2 (2.3-6.9)
	Brighton and Hove	20	6.9 (5.2-8.9)
	Buckinghamshire	46	8.6 (7.3-10.2)
	Aylesbury Vale	12	6.1 (4.2-8.4)
	Chiltern	8	8.1 (5.1-12.1)
	South Bucks	5	6.7 (3.7-11.2)
	Wycombe	22	12.6 (9.7-16.0)
	East Sussex	20	3.6 (2.7-4.6)
	Eastbourne	6	5.8 (3.5-9.2)
	Hastings	5	5.0 (2.8-8.5)
	Lewes	3	3.3 (1.6-6.0)
	Rother	2	1.8 (0.6-4.1)
	Wealden	4	2.5 (1.3-4.4)
	Hampshire	58	4.3 (3.6-4.9)
	Basingstoke and Deane	10	5.9 (4.0-8.4)
	East Hampshire	3	2.5 (1.2-4.8)
	Eastleigh	4	2.8 (1.4-5.1)
	Fareham	2	1.7 (0.6-3.8)
	Gosport	1	1.2 (0.2-3.4)
	Hart	1	1.1 (0.2-3.1)
	Havant	3	2.4 (1.1-4.6)
	New Forest	4	2.0 (1.0-3.7)
	Rushmoor	21	21.9 (16.9-28.1)
	Test Valley	5	4.1 (2.3-6.7)
	Winchester	4	3.5 (1.9-6.0)
	Isle of Wight	2	1.2 (0.4-2.8)
	Kent	93	6.1 (5.4-6.8)
	Ashford	11	8.7 (6.0-12.3)
	Canterbury	9	5.3 (3.5-7.8)
	Dartford	9	8.5 (5.6-12.4)
	Dover	5	4.7 (2.7-7.6)
	Gravesham	17	16.3 (12.2-21.4)
	Maidstone	14	8.2 (5.9-11.2)
	Sevenoaks	4	3.4 (1.7-5.9)
	Shepway	4	3.6 (1.9-6.3)
	Swale	5	3.5 (1.9-5.7)
	Thanet	8	5.5 (3.5-8.2)
	Tonbridge and Malling	4	2.9 (1.4-5.2)
	Tunbridge Wells	4	3.4 (1.8-6.0)
	Medway	12	4.5 (3.1-6.1)

PHE Centre[a]	Upper tier local authority and local authority district[b]	Average annual number of people[c]	Average annual rate per 100,000 (95% CI)
South East	**Oxfordshire**	43	6.3 (5.2-7.5)
continued	Cherwell	11	7.5 (5.2-10.5)
	Oxford	23	14.6 (11.4-18.6)
	South Oxfordshire	2	1.7 (0.7-3.5)
	Vale of White Horse	3	2.6 (1.2-4.8)
	West Oxfordshire	3	3.1 (1.5-5.6)
	Portsmouth	13	6.3 (4.5-8.5)
	Reading	34	20.9 (17.1-25.4)
	Slough	56	37.7 (32.2-43.9)
	Southampton	30	12.2 (9.8-14.9)
	Surrey	64	5.4 (4.7-6.2)
	Elmbridge	4	2.9 (1.5-5.1)
	Epsom and Ewell	6	8.0 (4.8-12.5)
	Guildford	7	4.5 (2.8-7.0)
	Mole Valley	2	2.3 (0.8-5.0)
	Reigate and Banstead	8	5.3 (3.3-7.9)
	Runnymede	4	5.0 (2.7-8.6)
	Spelthorne	9	9.1 (6.0-13.3)
	Surrey Heath	5	5.6 (3.2-9.3)
	Tandridge	3	3.9 (1.8-7.1)
	Waverley	5	4.0 (2.2-6.6)
	Woking	10	10.2 (6.9-14.5)
	West Berkshire	6	4.0 (2.4-6.3)
	West Sussex	38	4.5 (3.7-5.4)
	Adur	1	2.1 (0.6-5.4)
	Arun	5	3.0 (1.6-5.0)
	Chichester	3	2.5 (1.2-4.8)
	Crawley	18	15.9 (11.9-20.8)
	Horsham	3	2.2 (1.0-4.1)
	Mid Sussex	4	2.7 (1.4-4.7)
	Worthing	5	4.3 (2.3-7.2)
	Windsor and Maidenhead	10	6.9 (4.7-9.8)
	Wokingham	13	8.2 (5.8-11.1)

PHE Centre[a]	Upper tier local authority and local authority district[b]	Average annual number of people[c]	Average annual rate per 100,000 (95% CI)
North West		**563**	**7.8 (7.4-8.2)**
	Blackburn with Darwen	35	23.6 (19.3-28.6)
	Blackpool	11	8.1 (5.6-11.3)
	Bolton	46	16.1 (13.5-19.0)
	Bury	16	8.3 (6.1-11.0)
	Cheshire East	14	3.7 (2.7-5.0)
	Cheshire West and Chester	9	2.6 (1.7-3.8)
	Cumbria	7	1.4 (0.9-2.1)
	Allerdale	2	2.4 (1.0-5.0)
	Barrow-in-Furness	1	2.0 (0.5-5.1)
	Carlisle	1	1.2 (0.3-3.2)
	Copeland	1	1.0 (0.1-3.5)
	Eden	0	0.0 (0.0-0.0)
	South Lakeland	1	1.3 (0.3-3.3)
	Halton	1	1.0 (0.3-2.7)
	Knowsley	1	0.7 (0.1-2.0)
	Lancashire	65	5.4 (4.7-6.3)
	Burnley	6	7.2 (4.4-11.3)
	Chorley	3	2.3 (1.0-4.6)
	Fylde	0	0.4 (0.0-2.4)
	Hyndburn	7	8.3 (5.1-12.8)
	Lancaster	6	4.0 (2.3-6.4)
	Pendle	11	12.2 (8.4-17.1)
	Preston	21	14.7 (11.2-18.8)
	Ribble Valley	2	2.8 (0.9-6.6)
	Rossendale	3	4.3 (2.0-8.2)
	South Ribble	3	2.4 (1.0-4.8)
	West Lancashire	2	1.5 (0.5-3.4)
	Wyre	3	2.4 (1.0-4.8)
	Liverpool	38	7.8 (6.4-9.4)
	Manchester	126	23.4 (21.1-25.9)
	Oldham	43	18.7 (15.6-22.2)
	Rochdale	27	12.6 (10.0-15.7)
	Salford	27	11.0 (8.8-13.7)
	Sefton	6	2.3 (1.4-3.6)
	St. Helens	2	1.1 (0.4-2.4)
	Stockport	15	5.2 (3.8-6.9)
	Tameside	22	10.0 (7.8-12.7)
	Trafford	22	9.4 (7.3-11.9)
	Warrington	7	3.5 (2.2-5.3)
	Wigan	11	3.5 (2.4-4.9)
	Wirral	10	3.0 (2.0-4.3)

PHE Centre[a]	Upper tier local authority and local authority district[b]	Average annual number of people[c]	Average annual rate per 100,000 (95% CI)
East of England		**410**	**6.4 (6.1-6.8)**
	Bedford	17	10.3 (7.7-13.5)
	Cambridgeshire	37	5.7 (4.7-6.9)
	Cambridge	15	11.7 (8.5-15.8)
	East Cambridgeshire	2	2.3 (0.8-4.9)
	Fenland	3	3.3 (1.6-6.1)
	Huntingdonshire	8	4.5 (2.9-6.8)
	South Cambridgeshire	9	5.6 (3.6-8.2)
	Central Bedfordshire	6	2.2 (1.3-3.4)
	Essex	60	4.1 (3.5-4.8)
	Basildon	12	6.7 (4.7-9.3)
	Braintree	2	1.5 (0.6-3.2)
	Brentwood	4	5.2 (2.7-9.1)
	Castle Point	2	2.2 (0.8-4.9)
	Chelmsford	5	3.1 (1.7-5.0)
	Colchester	8	4.1 (2.6-6.1)
	Epping Forest	5	3.8 (2.2-6.3)
	Harlow	11	12.4 (8.5-17.6)
	Maldon	2	3.2 (1.2-6.9)
	Rochford	2	1.9 (0.6-4.5)
	Tendring	3	2.3 (1.1-4.3)
	Uttlesford	4	4.2 (2.1-7.6)
	Hertfordshire	85	7.2 (6.4-8.2)
	Broxbourne	8	8.3 (5.3-12.3)
	Dacorum	7	4.8 (3.0-7.3)
	East Hertfordshire	6	4.3 (2.6-6.8)
	Hertsmere	11	10.6 (7.3-14.9)
	North Hertfordshire	8	6.3 (4.1-9.3)
	St Albans	6	4.3 (2.6-6.7)
	Stevenage	7	8.0 (5.0-12.3)
	Three Rivers	5	5.4 (3.0-8.9)
	Watford	16	16.2 (11.9-21.6)
	Welwyn Hatfield	10	8.3 (5.6-11.9)
	Luton	57	26.7 (22.9-31.0)
	Milton Keynes	24	9.2 (7.2-11.5)
	Norfolk	35	3.9 (3.2-4.8)
	Breckland	3	1.9 (0.8-3.8)
	Broadland	0	0.3 (0.0-1.5)
	Great Yarmouth	11	11.4 (7.9-16.0)
	King's Lynn and West Norfolk	6	4.2 (2.5-6.5)
	North Norfolk	1	1.0 (0.2-2.8)
	Norwich	11	7.9 (5.4-11.1)
	South Norfolk	2	1.8 (0.7-3.6)

PHE Centre[a]	Upper tier local authority and local authority district[b]	Average annual number of people[c]	Average annual rate per 100,000 (95% CI)
East of England	Peterborough	38	19.3 (16.0-23.2)
continued	Southend-on-Sea	12	6.5 (4.5-9.0)
	Suffolk	26	3.4 (2.7-4.3)
	Babergh	2	2.6 (1.0-5.3)
	Forest Heath	3	4.2 (1.8-8.2)
	Ipswich	8	5.5 (3.5-8.3)
	Mid Suffolk	2	2.0 (0.7-4.3)
	St Edmundsbury	4	3.5 (1.8-6.2)
	Suffolk Coastal	2	1.6 (0.6-3.4)
	Waveney	5	4.3 (2.4-7.0)
	Thurrock	13	7.7 (5.5-10.6)
East Midlands		**350**	**7.4 (7.0-7.9)**
	Derby	31	12.0 (9.7-14.7)
	Derbyshire	12	1.6 (1.1-2.2)
	Amber Valley	2	1.3 (0.4-3.1)
	Bolsover	0	0.0 (0.0-0.0)
	Chesterfield	3	3.2 (1.5-5.9)
	Derbyshire Dales	1	1.4 (0.3-4.1)
	Erewash	3	2.9 (1.4-5.3)
	High Peak	1	1.5 (0.4-3.7)
	North East Derbyshire	1	1.0 (0.2-2.9)
	South Derbyshire	1	0.7 (0.1-2.4)
	Leicester	131	37.4 (33.8-41.3)
	Leicestershire	25	3.7 (2.9-4.7)
	Blaby	4	3.8 (1.9-6.7)
	Charnwood	10	5.4 (3.6-7.8)
	Harborough	3	3.3 (1.5-6.3)
	Hinckley and Bosworth	2	1.8 (0.7-4.0)
	Melton	0	0.7 (0.0-3.6)
	North West Leicestershire	2	1.7 (0.5-3.9)
	Oadby and Wigston	5	8.9 (5.0-14.6)
	Lincolnshire	32	4.3 (3.4-5.2)
	Boston	10	14.3 (9.6-20.5)
	East Lindsey	5	3.6 (2.0-5.9)
	Lincoln	4	4.1 (2.1-7.2)
	North Kesteven	2	2.1 (0.8-4.2)
	South Holland	4	4.7 (2.5-8.0)
	South Kesteven	5	3.3 (1.8-5.6)
	West Lindsey	2	1.8 (0.6-4.1)

PHE Centre[a]	Upper tier local authority and local authority district[b]	Average annual number of people[c]	Average annual rate per 100,000 (95% CI)
East Midlands	**Northamptonshire**	45	6.2 (5.2-7.3)
continued	Corby	3	4.4 (2.0-8.3)
	Daventry	2	2.1 (0.7-4.8)
	East Northamptonshire	3	2.9 (1.3-5.7)
	Kettering	6	6.4 (3.9-10.0)
	Northampton	24	10.6 (8.3-13.3)
	South Northamptonshire	2	2.2 (0.8-4.8)
	Wellingborough	6	7.7 (4.5-12.1)
	Nottingham	48	14.8 (12.5-17.4)
	Nottinghamshire	24	3.0 (2.3-3.8)
	Ashfield	5	4.3 (2.4-6.9)
	Bassetlaw	1	1.2 (0.3-3.0)
	Broxtowe	4	3.6 (1.8-6.2)
	Gedling	5	4.3 (2.4-7.1)
	Mansfield	2	2.2 (0.9-4.5)
	Newark and Sherwood	3	2.2 (1.0-4.4)
	Rushcliffe	4	3.2 (1.6-5.7)
	Rutland	1	3.4 (0.9-8.8)
Yorkshire and the Humber		**401**	**7.4 (7.0-7.8)**
	Barnsley	7	3.0 (1.9-4.6)
	Bradford	94	17.7 (15.7-19.8)
	Calderdale	12	5.9 (4.2-8.1)
	Doncaster	15	4.8 (3.5-6.4)
	East Riding of Yorkshire	5	1.6 (0.9-2.6)
	Kingston upon Hull, City of	15	5.9 (4.3-7.9)
	Kirklees	59	13.6 (11.6-15.7)
	Leeds	79	10.1 (8.8-11.5)
	North East Lincolnshire	6	3.8 (2.2-5.9)
	North Lincolnshire	8	4.7 (3.0-7.0)
	North Yorkshire	15	2.4 (1.7-3.2)
	Craven	1	1.2 (0.1-4.3)
	Hambleton	2	1.8 (0.6-4.3)
	Harrogate	3	2.1 (1.0-3.8)
	Richmondshire	3	6.2 (3.0-11.5)
	Ryedale	1	1.2 (0.1-4.5)
	Scarborough	3	3.1 (1.5-5.7)
	Selby	2	1.9 (0.6-4.5)
	Rotherham	13	4.8 (3.4-6.6)
	Sheffield	57	9.9 (8.5-11.5)
	Wakefield	13	3.9 (2.7-5.3)
	York	3	1.3 (0.6-2.5)

PHE Centre[a]	Upper tier local authority and local authority district[b]	Average annual number of people[c]	Average annual rate per 100,000 (95% CI)
South West		**253**	**4.6 (4.3-4.9)**
	Bath and North East Somerset	7	3.6 (2.2-5.5)
	Bournemouth	12	6.2 (4.3-8.6)
	Bristol, City of	69	15.2 (13.2-17.4)
	Cornwall	12	2.2 (1.5-3.0)
	Devon	24	3.0 (2.4-3.8)
	East Devon	2	1.7 (0.7-3.4)
	Exeter	6	4.7 (2.8-7.4)
	Mid Devon	3	3.3 (1.4-6.6)
	North Devon	2	2.5 (1.0-5.1)
	South Hams	2	2.4 (0.9-5.1)
	Teignbridge	8	5.9 (3.7-8.8)
	Torridge	0	0.5 (0.0-2.8)
	West Devon	0	0.6 (0.0-3.4)
	Dorset	9	2.0 (1.3-3.0)
	Christchurch	1	2.7 (0.7-6.9)
	East Dorset	3	3.7 (1.8-6.9)
	North Dorset	2	2.8 (1.0-6.1)
	Purbeck	1	1.4 (0.2-5.2)
	West Dorset	0	0.0 (0.0-0.0)
	Weymouth and Portland	1	2.0 (0.6-5.2)
	Gloucestershire	23	3.6 (2.8-4.6)
	Cheltenham	4	3.4 (1.8-6.0)
	Cotswold	1	1.2 (0.2-3.4)
	Forest of Dean	1	1.6 (0.4-4.0)
	Gloucester	9	6.8 (4.4-9.9)
	Stroud	3	2.8 (1.4-5.2)
	Tewkesbury	4	4.9 (2.6-8.4)
	Isles of Scilly	0	0.0 (0.0-0.0)
	North Somerset	7	3.5 (2.2-5.2)
	Plymouth	19	7.2 (5.5-9.4)
	Poole	6	4.2 (2.5-6.6)
	Somerset	8	1.4 (0.9-2.1)
	Mendip	3	2.4 (1.0-4.7)
	Sedgemoor	2	1.4 (0.4-3.2)
	South Somerset	1	0.8 (0.2-2.1)
	Taunton Deane	2	1.4 (0.5-3.4)
	West Somerset	0	1.0 (0.0-5.4)
	South Gloucestershire	14	5.2 (3.8-7.0)
	Swindon	26	11.7 (9.3-14.7)
	Torbay	6	4.2 (2.5-6.7)
	Wiltshire	12	2.4 (1.7-3.4)

PHE Centre[a]	Upper tier local authority and local authority district[b]	Average annual number of people[c]	Average annual rate per 100,000 (95% CI)
North East		**120**	**4.5 (4.1-5.0)**
	County Durham	9	1.7 (1.1-2.4)
	Darlington	5	4.4 (2.4-7.4)
	Gateshead	11	5.4 (3.7-7.6)
	Hartlepool	3	3.2 (1.5-6.1)
	Middlesbrough	15	10.9 (8.0-14.6)
	Newcastle upon Tyne	37	12.7 (10.5-15.3)
	North Tyneside	4	2.0 (1.0-3.4)
	Northumberland	5	1.6 (0.9-2.6)
	Redcar and Cleveland	3	2.2 (1.0-4.2)
	South Tyneside	4	2.9 (1.5-5.0)
	Stockton-on-Tees	10	5.3 (3.6-7.5)
	Sunderland	13	4.7 (3.3-6.4)

[a] Ordered by decreasing total number TB notifications in 2017
[b] Those highlighted in bold are upper tier local authority only, those indented are local authority district only, and those neither highlighted nor indented are both an upper tier local authority and a local authority district
[c] Average number of people with TB in a local authority may not be the same as the sum of the average number of people with TB in the corresponding upper tier local authority due to rounding

CI – confidence intervals

Table Aii.1.2: Three-year average number of people with TB and rates by clinical commissioning group (CCG), England, 2015-2017

Clinical Commissioning Group	Average annual number of people	Average annual rate per 100,000 (95% CI)
NHS Airedale, Wharfedale and Craven CCG	9	5.6 (3.7-8.2)
NHS Ashford CCG	11	8.8 (6.0-12.3)
NHS Barking and Dagenham CCG	53	26.0 (22.1-30.4)
NHS Barnet CCG	71	18.4 (16.0-21.1)
NHS Barnsley CCG	7	3.0 (1.9-4.6)
NHS Basildon and Brentwood CCG	16	6.3 (4.7-8.3)
NHS Bassetlaw CCG	1	1.2 (0.3-3.0)
NHS Bath and North East Somerset CCG	7	3.6 (2.2-5.5)
NHS Bedfordshire CCG	23	5.2 (4.1-6.6)
NHS Berkshire West CCG	54	11.2 (9.5-13.0)
NHS Bexley CCG	28	11.3 (9.0-14.1)
NHS Birmingham and Solihull CCG	183	15.8 (14.5-17.2)
NHS Blackburn with Darwen CCG	35	23.8 (19.5-28.8)
NHS Blackpool CCG	11	8.1 (5.6-11.4)
NHS Bolton CCG	46	16.2 (13.6-19.1)
NHS Bradford City CCG	42	49.7 (41.4-59.1)
NHS Bradford Districts CCG	44	12.9 (10.8-15.3)
NHS Brent CCG	169	51.6 (47.2-56.3)
NHS Brighton and Hove CCG	20	6.8 (5.2-8.8)
NHS Bristol, North Somerset and South Gloucestershire CCG	91	9.6 (8.5-10.9)
NHS Bromley CCG	23	7.1 (5.5-8.9)
NHS Buckinghamshire CCG	46	8.5 (7.2-10.1)
NHS Bury CCG	16	8.3 (6.1-11.1)
NHS Calderdale CCG	12	5.9 (4.1-8.1)
NHS Cambridgeshire and Peterborough CCG	76	8.7 (7.6-9.9)
NHS Camden CCG	44	17.9 (14.9-21.2)
NHS Cannock Chase CCG	3	2.0 (0.9-3.9)
NHS Canterbury and Coastal CCG	9	4.3 (2.8-6.2)
NHS Castle Point and Rochford CCG	4	2.1 (1.0-3.7)
NHS Central London (Westminster) CCG	25	14.3 (11.3-17.9)
NHS Chorley and South Ribble CCG	4	2.5 (1.3-4.3)
NHS City and Hackney CCG	64	22.9 (19.8-26.3)
NHS Coastal West Sussex CCG	14	2.9 (2.1-3.9)
NHS Corby CCG	3	4.4 (2.0-8.4)
NHS Coventry and Rugby CCG	91	20.0 (17.7-22.5)
NHS Crawley CCG	18	15.9 (11.9-20.8)
NHS Croydon CCG	82	21.4 (18.8-24.3)

Clinical Commissioning Group	Average annual number of people	Average annual rate per 100,000 (95% CI)
NHS Darlington CCG	5	4.4 (2.4-7.4)
NHS Dartford, Gravesham and Swanley CCG	28	10.9 (8.7-13.5)
NHS Doncaster CCG	15	4.8 (3.5-6.4)
NHS Dorset CCG	27	3.5 (2.8-4.4)
NHS Dudley CCG	25	7.8 (6.1-9.8)
NHS Durham Dales, Easington and Sedgefield CCG	3	1.2 (0.6-2.2)
NHS Ealing CCG	136	39.5 (35.8-43.6)
NHS East Berkshire CCG	71	16.7 (14.6-19.1)
NHS East Lancashire CCG	29	7.6 (6.1-9.4)
NHS East Leicestershire and Rutland CCG	13	4.1 (2.9-5.5)
NHS East Riding of Yorkshire CCG	5	1.7 (1.0-2.7)
NHS East Staffordshire CCG	8	6.3 (4.1-9.4)
NHS East Surrey CCG	8	4.6 (2.9-6.7)
NHS East and North Hertfordshire CCG	39	6.9 (5.7-8.2)
NHS Eastbourne, Hailsham and Seaford CCG	8	4.2 (2.7-6.3)
NHS Eastern Cheshire CCG	9	4.4 (2.9-6.5)
NHS Enfield CCG	63	19.2 (16.5-22.1)
NHS Erewash CCG	3	3.1 (1.4-5.9)
NHS Fareham and Gosport CCG	3	1.5 (0.7-2.8)
NHS Fylde and Wyre CCG	3	1.6 (0.7-3.0)
NHS Gloucestershire CCG	23	3.6 (2.8-4.6)
NHS Great Yarmouth and Waveney CCG	16	7.6 (5.6-10.0)
NHS Greater Huddersfield CCG	32	12.9 (10.5-15.8)
NHS Greater Preston CCG	22	10.7 (8.3-13.7)
NHS Greenwich CCG	74	26.6 (23.2-30.3)
NHS Guildford and Waverley CCG	9	4.5 (3.0-6.5)
NHS Halton CCG	1	1.1 (0.3-2.7)
NHS Hambleton, Richmondshire and Whitby CCG	5	3.5 (2.0-5.7)
NHS Hammersmith and Fulham CCG	35	19.7 (16.1-23.8)
NHS Hardwick CCG	1	0.9 (0.2-2.6)
NHS Haringey CCG	65	23.6 (20.4-27.2)
NHS Harrogate and Rural District CCG	3	2.1 (1.0-3.9)
NHS Harrow CCG	86	34.6 (30.5-39.1)
NHS Hartlepool and Stockton-on-Tees CCG	13	4.6 (3.3-6.3)
NHS Hastings and Rother CCG	6	3.4 (2.1-5.3)
NHS Havering CCG	26	10.3 (8.2-12.9)
NHS Herefordshire CCG	4	2.3 (1.2-3.9)
NHS Herts Valleys CCG	45	7.7 (6.4-9.1)
NHS Heywood, Middleton and Rochdale CCG	27	12.7 (10.1-15.7)
NHS High Weald Lewes Havens CCG	5	3.1 (1.8-5.0)

Clinical Commissioning Group	Average annual number of people	Average annual rate per 100,000 (95% CI)
NHS Hillingdon CCG	84	27.8 (24.5-31.5)
NHS Horsham and Mid Sussex CCG	6	2.7 (1.6-4.3)
NHS Hounslow CCG	106	39.3 (35.1-43.9)
NHS Hull CCG	15	5.9 (4.3-7.9)
NHS Ipswich and East Suffolk CCG	12	3.1 (2.2-4.2)
NHS Isle of Wight CCG	2	1.2 (0.4-2.8)
NHS Islington CCG	44	19.0 (15.9-22.6)
NHS Kernow CCG	12	2.2 (1.5-3.0)
NHS Kingston CCG	13	7.2 (5.1-9.9)
NHS Knowsley CCG	1	0.7 (0.1-2.0)
NHS Lambeth CCG	56	17.0 (14.6-19.8)
NHS Leeds CCG	79	10.1 (8.8-11.5)
NHS Leicester City CCG	131	37.7 (34.1-41.6)
NHS Lewisham CCG	58	19.3 (16.5-22.4)
NHS Lincolnshire East CCG	16	6.7 (4.9-8.9)
NHS Lincolnshire West CCG	7	2.8 (1.7-4.4)
NHS Liverpool CCG	38	7.9 (6.5-9.5)
NHS Luton CCG	57	26.5 (22.7-30.8)
NHS Manchester CCG	126	23.5 (21.2-26.0)
NHS Mansfield and Ashfield CCG	6	2.9 (1.7-4.6)
NHS Medway CCG	12	4.4 (3.1-6.1)
NHS Merton CCG	44	21.5 (18.0-25.5)
NHS Mid Essex CCG	10	2.5 (1.7-3.6)
NHS Milton Keynes CCG	25	9.1 (7.2-11.5)
NHS Morecambe Bay CCG	8	2.5 (1.6-3.7)
NHS Nene CCG	42	6.5 (5.4-7.7)
NHS Newark and Sherwood CCG	3	2.2 (1.0-4.4)
NHS Newcastle Gateshead CCG	48	9.7 (8.2-11.5)
NHS Newham CCG	200	59.0 (54.4-64.0)
NHS North Cumbria CCG	4	1.4 (0.7-2.3)
NHS North Derbyshire CCG	5	1.8 (1.0-3.0)
NHS North Durham CCG	5	2.2 (1.2-3.5)
NHS North East Essex CCG	11	3.4 (2.3-4.7)
NHS North East Hampshire and Farnham CCG	24	11.6 (9.1-14.6)
NHS North East Lincolnshire CCG	6	3.8 (2.2-6.0)
NHS North Hampshire CCG	12	5.3 (3.7-7.3)
NHS North Kirklees CCG	27	14.3 (11.4-17.7)
NHS North Lincolnshire CCG	8	4.7 (3.0-7.0)
NHS North Norfolk CCG	1	0.8 (0.2-2.0)
NHS North Staffordshire CCG	7	3.4 (2.1-5.1)

Clinical Commissioning Group	Average annual number of people	Average annual rate per 100,000 (95% CI)
NHS North Tyneside CCG	4	2.0 (1.0-3.4)
NHS North West Surrey CCG	26	7.6 (6.0-9.4)
NHS Northern, Eastern and Western Devon CCG	35	3.9 (3.2-4.8)
NHS Northumberland CCG	5	1.6 (0.9-2.6)
NHS Norwich CCG	11	5.1 (3.5-7.2)
NHS Nottingham City CCG	48	14.9 (12.5-17.5)
NHS Nottingham North and East CCG	7	4.7 (2.9-7.1)
NHS Nottingham West CCG	4	3.6 (1.8-6.2)
NHS Oldham CCG	43	18.7 (15.6-22.2)
NHS Oxfordshire CCG	43	6.4 (5.3-7.6)
NHS Portsmouth CCG	13	6.2 (4.5-8.5)
NHS Redbridge CCG	115	38.6 (34.7-42.9)
NHS Redditch and Bromsgrove CCG	7	3.7 (2.2-5.7)
NHS Richmond CCG	12	6.0 (4.2-8.3)
NHS Rotherham CCG	13	4.8 (3.4-6.6)
NHS Rushcliffe CCG	4	3.2 (1.6-5.7)
NHS Salford CCG	27	11.0 (8.8-13.7)
NHS Sandwell and West Birmingham CCG	172	34.9 (32.0-38.1)
NHS Scarborough and Ryedale CCG	3	2.4 (1.0-4.7)
NHS Sheffield CCG	57	9.9 (8.5-11.5)
NHS Shropshire CCG	5	1.6 (0.9-2.6)
NHS Somerset CCG	8	1.4 (0.9-2.1)
NHS South Cheshire CCG	5	3.0 (1.7-4.8)
NHS South Devon and Torbay CCG	13	4.7 (3.3-6.4)
NHS South East Staffordshire and Seisdon Peninsula CCG	11	4.9 (3.4-6.9)
NHS South Eastern Hampshire CCG	5	2.2 (1.2-3.7)
NHS South Kent Coast CCG	9	4.5 (3.0-6.5)
NHS South Lincolnshire CCG	6	3.8 (2.2-6.2)
NHS South Norfolk CCG	4	1.7 (0.9-3.1)
NHS South Sefton CCG	5	2.9 (1.6-4.9)
NHS South Tees CCG	18	6.7 (5.0-8.7)
NHS South Tyneside CCG	4	2.9 (1.5-5.0)
NHS South Warwickshire CCG	14	5.3 (3.8-7.2)
NHS South West Lincolnshire CCG	4	2.9 (1.5-5.3)
NHS South Worcestershire CCG	10	3.4 (2.3-4.9)
NHS Southampton CCG	30	12.0 (9.7-14.7)
NHS Southend CCG	12	6.5 (4.5-9.0)
NHS Southern Derbyshire CCG	34	6.5 (5.3-7.8)
NHS Southport and Formby CCG	2	1.4 (0.5-3.4)
NHS Southwark CCG	75	24.2 (21.1-27.5)

Clinical Commissioning Group	Average annual number of people	Average annual rate per 100,000 (95% CI)
NHS St Helens CCG	2	1.1 (0.4-2.4)
NHS Stafford and Surrounds CCG	7	4.6 (2.8-7.0)
NHS Stockport CCG	15	5.2 (3.8-6.9)
NHS Stoke on Trent CCG	28	10.7 (8.6-13.3)
NHS Sunderland CCG	13	4.7 (3.3-6.4)
NHS Surrey Downs CCG	12	4.3 (3.0-5.9)
NHS Surrey Heath CCG	5	5.2 (2.9-8.6)
NHS Sutton CCG	21	10.4 (8.0-13.3)
NHS Swale CCG	5	4.1 (2.2-6.9)
NHS Swindon CCG	26	11.5 (9.1-14.4)
NHS Tameside and Glossop CCG	22	8.7 (6.8-11.1)
NHS Telford and Wrekin CCG	6	3.7 (2.2-5.7)
NHS Thanet CCG	8	5.5 (3.5-8.2)
NHS Thurrock CCG	13	7.8 (5.6-10.7)
NHS Tower Hamlets CCG	79	26.3 (23.1-29.9)
NHS Trafford CCG	22	9.4 (7.3-12.0)
NHS Vale Royal CCG	3	2.6 (1.1-5.1)
NHS Vale of York CCG	5	1.5 (0.9-2.4)
NHS Wakefield CCG	13	3.9 (2.8-5.3)
NHS Walsall CCG	43	15.6 (13.0-18.5)
NHS Waltham Forest CCG	88	32.2 (28.4-36.3)
NHS Wandsworth CCG	54	17.1 (14.6-20.0)
NHS Warrington CCG	7	3.5 (2.2-5.3)
NHS Warwickshire North CCG	10	5.1 (3.4-7.3)
NHS West Cheshire CCG	6	2.6 (1.5-4.1)
NHS West Essex CCG	19	6.4 (4.9-8.3)
NHS West Hampshire CCG	17	3.0 (2.2-3.9)
NHS West Kent CCG	23	4.9 (3.8-6.1)
NHS West Lancashire CCG	2	1.5 (0.5-3.4)
NHS West Leicestershire CCG	13	3.4 (2.4-4.6)
NHS West London CCG	36	15.9 (13.1-19.2)
NHS West Norfolk CCG	7	4.2 (2.6-6.4)
NHS West Suffolk CCG	8	3.7 (2.4-5.4)
NHS Wigan Borough CCG	11	3.5 (2.4-4.9)
NHS Wiltshire CCG	12	2.5 (1.7-3.4)
NHS Wirral CCG	10	3.0 (2.0-4.3)
NHS Wolverhampton CCG	57	22.4 (19.2-26.0)
NHS Wyre Forest CCG	1	1.3 (0.4-3.4)

CI – confidence intervals

Appendix III. Methods

Data production

TB Notifications

People who are diagnosed with TB in England must be notified through the Enhanced Tuberculosis Surveillance system (ETS), other than in London where the London TB Register (LTBR) is used. Data from the LTBR is imported weekly to ETS. ETS is also used in Wales and Northern Ireland, but only people resident in England, treated in England and are homeless or visiting England from abroad are included in this report.

Data for TB notifications between 2000 and 2017 was extracted from ETS at the beginning of April 2018, then cleaned and validated by end of July 2018.

Matching laboratory isolates to case notifications

Data from all TB isolates sent to National Mycobacterium Reference Service laboratories for culture between January 2016 and March 2018 was deduplicated and a summary record was generated from all the isolates from the same person within a 12-month period. In the instance that a patient received treatment for longer than 12 months, the summary record was generated from all the isolates that existed within the treatment period, even if this was outwith the 12-month period.

Isolates and notifications are matched in ETS; automatically where person identifiers are identical or manually by users where differences in person identifiers occur. For the production of the full dataset, these matches were included. For isolates that were not matched in ETS, these data were then matched to TB notifications from 2016 and 2017, through a probabilistic matching process based on person identifiers common to both the laboratory isolate and the notification [17]. Matches were also subject to manual review to identify any false positive or false negative matches. For notifications prior to 2016, results from matching conducted in prior years (using the same process described above) were retained and included in the final dataset.

Matching TB and HIV data

Data from TB notifications between 2001 and 2017 and data from unmatched laboratory TB isolates with specimen dates between 2001 and 2017 were matched to HIV data from the HIV & AIDS Reporting System (HARS) for the same time period as above, for those aged 15 years and older in England. Data was matched using a probabilistic matching process based on patient identifiers common to both the TB and HIV datasets, followed by deterministic matching and manual review. The identified matches were all classified as people with TB-HIV co-infection.

Data cleaning to improve data quality

In addition to validation checks at data entry and routine cleaning queries that identify missing or inconsistent data within ETS, the following cleaning was subsequently carried out to produce the dataset used in reporting for TB notifications from 2000 to 2017.

The postcode field (used to map postcodes to geographic areas, including CCGs) was cleaned by identifying postcodes with an incorrect number of characters or those with obvious errors in the postcode (i.e. symbols). Where cleaning was necessary, the correct postcode was identified using the address fields. For people who were homeless or who had a residence outside the UK, but were notified in England, the postcode of the clinic/hospital that they were treated at was assigned to the notification. For people with no postcode or treatment clinic/hospital, the local authority and PHEC were updated using the local authority field recorded in ETS (based on the area that the notifying case manager was located in). Notifications were assigned to PHECs by matching the local authority of residence to the relevant PHEC.

People with BCGosis, on chemoprophylaxis for latent TB infection or with non-tuberculosis mycobacteria who were notified in error were identified using comments fields, and denotified. People with culture confirmation of TB who had been denotified were queried with clinics, and lab contaminations were removed or people were renotified if they were found to have been denotified in error.

The site of disease was reclassified to pulmonary if a positive sputum smear (microscopy) sample was recorded or if a positive culture was grown from a pulmonary laboratory specimen. People with laryngeal TB were included in pulmonary breakdowns, and people with miliary TB were included in both pulmonary and extra-pulmonary breakdowns.

Site of disease for people with culture confirmation was reclassified based on the site in the body from which the specimen was taken. Site of disease classifications were also updated using the free text field for site of disease in ETS.

Occupation was re-categorised into the main occupational groups (agricultural/animal care worker, social service/prison, laboratory/pathology, healthcare worker and education) if the occupation documented in the free text field (which is available within ETS for occupational groups recorded as none or other), could be classified in one of these occupational groups.

The presence or absence of social risk factors (current or a history of drug misuse, alcohol misuse, homelessness and prison) was updated based on information recorded in free text comments fields within ETS. Drug misuse (including if it was current or past use) was updated to “yes” if recorded as unknown but current or past drug misuse was mentioned in the comments fields. Alcohol misuse was updated if alcohol misuse was mentioned in the comments along with evidence that the person was non-compliant or on DOT, in line with the definition that alcohol misuse affects the ability to self-administer treatment. Homelessness was updated to “yes” if mentioned in the comments fields or if the address given was “no fixed abode” or a shelter/hostel for homeless people was named. Prison (including if it was current or in the past) was updated to “yes” if mentioned in the comments fields or if HMP or a prison name was recorded as the address. Data on incident TB cases reported to the Public Health in Prisons (PHiP) log were used to validate people with TB reported with a current imprisonment on ETS and updates were made where required. People with TB who were remanded in an immigration removal centre were identified through the address given at notification, comments fields or occupation field showed the person to be an immigration detainee. People were identified as asylum seekers through the occupation field sub-category under those grouped as having occupation as ‘none’.

Data cleaning of TB outcomes

If a person was reported on ETS to have died without a date of death entered, Office for National Statistics (ONS) mortality data was used where available. If a person was reported on ETS to have died with a date of death entered, this was reviewed and validated against the ONS mortality data. In addition to deaths reported as diagnosed at post-mortem on ETS (where the person was not suspected/diagnosed with TB before death) additional deaths diagnosed post-mortem were identified through review of information in the comments fields, date of diagnosis and date of death. Deaths were re-classified as diagnosed at post-mortem if the date of death was earlier than the date of diagnosis, where date of diagnosis was available. Deaths were re-classified as not diagnosed at post-mortem if a person had a start date of treatment and the TB outcome entered stated that the person died before treatment or while on treatment (indicating that the person was suspected to have TB before death).

People who died and had a treatment start date available were reclassified as died at 12, 24 or 36 months based on the time between the date of starting treatment and the date of death. Where the date of treatment start was not available, the notification date

was used. Similarly, for people who completed treatment and a treatment start date was available, reclassification as completed at 12, 24 or 36 months based on the time between the date of treatment start and the date of treatment completion was conducted. Where treatment start date was not available the notification date was used if appropriate.

For people with MDR/RR-TB, the start date of MDR/RR-TB treatment was used to reclassify TB outcome at 12, 24 or 36 months. People with MDR-TB/RR who died were reclassified based on the time between date of starting MDR/RR-TB treatment and the date of death. Similarly, for people with MDR/RR-TB who had completed treatment, reclassification using the date of starting MDR/RR-TB treatment and date of treatment completion was conducted. Where the MDR/RR-TB treatment start date was not known, people with MDR/RR-TB were not reclassified and the original TB outcome recorded on ETS was used.

Comments fields were also used to identify additional outcomes (completed treatment, died, lost to follow-up, treatment stopped) that were not recorded on ETS. For people who were transferred to another clinic but a duplicate notification was entered in error, the TB outcome was used from the record where it was recorded and the duplicate was removed.

LTBI data

Data production

To obtain a more consistent and robust dataset, data from all three sources have been merged using the NHS number, forename and surname. Where no NHS number was provided, the forename, surname and date of birth were used to obtain one from the NHS so that the datasets could be matched.

LTBI data limitations

The recording of some key variables (e.g. ‘test invitation or offer’ and ‘IGRA test result’) has not always been consistent and these fields contain missing data (Table Ai.10.1). Data from laboratory services is now routinely collected by PHE with well completed variables although there may be undereporting 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 two demographic characteristics (age and sex). Other demographic characteristics such as country of birth and ethnicity were only

available for people whose record from laboratory data could be matched to their GP data or treatment data.

LTBI overall number of tests

Lab data was used for number of tests and positives except for NHS Blackburn with Darwen and East Lancashire CCGs, NHS Bolton CCG, NHS Central and North Manchester CCG, NHS Slough CCG, NHS South Reading CCH and Find and treat.

LTBI cohort of positives who should be referred

The minimum (first) and maximum (last) treatment start date reported for each CCG were extracted from the treatment data.Three months (90 days) were subtracted from the minimum date to create a cohort start date. All positive tests between the cohort start date and maximum date were included in the cohort of positives that should be referred for treatment

LTBI number of people started/accessed treatment

This was defined as the number of people that had a treatment start date, a chemo prescription, refused treatment or had a treatment completion date

LTBI cohort who should have completed treatment (column M)

The maximum (last) IGRA date reported for each CCG was extracted. Four months (120 days) were subtracted from the maximum IGRA date to create a 4 months window to enable treatment completion. Only patients that started treatment prior to this 4 months window were included. People who had their treatment discontinued for reasons such as pregnancy were excluded from this cohort.

LTBI number completed treatment

This was defined as the number of people who reported a date of treatment completion

LTBI testing acceptance

LTBI testing acceptance was calculated using the number of people invited for testing as the denominator and the number of tests carried out as the numerator. CCGs were requested to provide the number of people invited per year.

Reporting methodology

Time periods

TB rates are presented from the year 2000, the first year of enhanced surveillance for TB. TB-HIV co-infection trends are presented from 2001 onwards, the first year both TB and HIV data are available. All other trends are presented displaying the 10 most recent years of data, with the following exceptions; Mycobacterium speciation, MIRU-VNTR clustering, WGS clustering, treatment delay, social risk factors and HIV testing. MIRU-VNTR clustering, WGS clustering, social risk factors and HIV testing are presented from the first year data were collected. Mycobacterium speciation is presented from 2009 onwards as MTBC was reclassified as Mycobacterium tuberculosis prior to 2009 and treatment delay is presented from 2011 onward when data completeness for symptom onset data and treatment start date were both above 66%. For social risk factors, data was presented from 2010 when this data was available. Where presenting a single year of data would have resulted in the display of small numbers, five years have been combined.

Tuberculosis rates

Rates are presented from 2000 to 2017 with overall TB rates per 100,000 population, as well as those by age, sex and area of reporting, calculated using the mid-year population estimates provided by ONS. Average annual rates per 100,000 for a three-year period were calculated by dividing the numerator (the number of TB notifications in the three-year period) by the denominator (the sum of the mid-year population estimates for the same three-year period) and multiplying by 100,000.
Rates by place of birth and by ethnic group were calculated using population estimates from the Labour Force Survey (LFS): http://www.esds.ac.uk/findingData/qlfs.asp. The LFS is based on a population sample, so estimates are liable to sampling errors, particularly for small population subgroups, and should be interpreted with caution.

CCGs were placed into priority groups for LTBI testing based on the average CCG TB rate per 100,000 between 2011 and 2014, and the TB burden (the proportion of notifications the CCG contributes to the overall number of notifications for England). High incidence CCGs are defined as those with an incidence of 20.0 per 100,000 or above. High burden CCGs are defined as those with a number of notifications equal to or over 0.5% of the total number of notifications in England.

TB rates detected during pre-entry TB screening were calculated by taking the notifications detected as the numerator and the number of applicants screened in the same year as the denominator.

Social risk factors and health inequalities

People with TB were reported as having at least one social risk factor (yes) if any of the four social risk factors (current alcohol misuse, current or a history of homelessness, drug misuse, and imprisonment) had “yes” recorded. People were only reported to have no social risk factor where all of the four risk factors were recorded as “no”. Information on individual social risk factors was also reported separately, regardless of whether information was known for all four risk factors. Because of this, the denominator for reporting of at least one social risk factor and individual social risk factors may differ.

TB notifications were assigned an Index of Multiple Deprivation (IMD) 2015 rank based on Lower Super Output Area (LSOA) of residence (2011 census). To assign LSOAs to deprivation categories, the LSOAs were first sorted from most to least deprived using the IMD 2015 rank, before being divided into deciles. The LSOA mid-year population estimates were also assigned to these deciles and the rate per decile was calculated by dividing the TB notifications per decile by the population per decile and multiplying by 100,000.

DOT interpretation

The variables for collecting information on DOT are different in ETS and LTBR. In ETS, the relevant variable is “Is the patient to begin a course of treatment under direct observation?”. In LTBR, the relevant variable is
“Patient was taking Directly Observed Therapy at any time during the episode of care”. For the purposes of this report, a report of “yes” for either variable was taken as an indication that the person had received DOT.

Reporting of *Mycobacterium* species

Species was reclassified based on 24 loci MIRU-VNTR phylotypic lineage (see below); those reported as MTBC with a phylotypic lineage of EAI, Beijing, CAS, or Euro-american were reclassified as *M. tuberculosis*. Those reported as *M. tuberculosis* or MTBC with phylotypic lineage of *M. bovis* or *M. africanum* were reclassified as *M. bovis* or *M. africanum*, respectively.

Reporting drug resistance

Initial resistance was classed as resistance identified within three months of the first specimen date. People who had a change from a sensitive to resistant result following treatment were reclassified as having acquired resistance, even if this was within the three month period. If no drug susceptibility results (DST or WGS) were available for isolates cultured in the first three months, any subsequent susceptibility results were not used, unless MDR-TB was identified. To ensure that all people with MDR-TB were

counted, where the first available drug susceptibility result was after the three month cut-off and positive for MDR-TB (with no evidence of acquired resistance), this MDR-TB result was classified as initial resistance.

People with no resistance confirmation (DST or WGS) who were treated with an MDR/RR-TB regimen were identified by recording on ETS that MDR treatment was given (new field in ETS introduced in 2016) or using key word searches on the comments fields.

Strain typing

Strain types were assigned cluster numbers and phylogenetic lineage (based on MIRU-VNTR) using the cluster numbers assigned in the Strain Typing Module (STM) of ETS for those with a strain type with at least 23 loci.

A cluster was defined as two or more notifications with indistinguishable 24 loci MIRU-VNTR strain types with at least one notification with a complete 24 loci profile [18]. Additional notifications in the cluster may each have one missing loci. In addition, clusters identified by the Mycobacteria Reference Laboratories where all notifications in the cluster have one untypable locus at the same locus are designated as “u clusters”. The year a cluster was assigned to being a new cluster was the year the second notification in the cluster was notified.

Whole genome sequencing

The rate of change in DNA sequences of TB has been estimated to be 0.5 single nucleotide polymorphisms (SNPs) per genome per year [ref]. Epidemiologically linked cases involved in transmission are unlikely to be identified at SNP distances of more than 12, hence a distance of 12 SNPs is used to define clusters for public health purposes. Additionally, clusters were presented in this report at a cut-off of 2 and 5 SNPs to illustrate the proportion of cases who are closely related.

Clusters

Cases that are part of a cluster, MIRU-VNTR or WGS, are referred to as clustered cases. Clustered cases were presented for England.

TB outcome cohorts

TB outcomes are reported for all people notified with TB, including those who started treatment and those who did not (for example those diagnosed post-mortem, died without starting treatment or lost to follow-up without starting treatment). For the purposes of TB outcome reporting, the drug sensitive cohort is defined as all people

with TB, excluding those with rifampicin resistant TB or MDR-TB (initial or acquired), or treated with an MDR/RR-TB regimen [4].

In this report, TB outcomes for people with drug sensitive TB were reported separately for the following groups:

- for people with an expected duration of treatment of less than 12 months, TB outcomes at 12 months are reported. This group excludes people 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
- for people with CNS, spinal, cryptic disseminated or miliary disease, the last recorded TB outcome is reported

The drug resistant cohort included any people with MDR/RR-TB (initial or acquired) as well as those without phenotypic DST or WGS confirmation treated with an MDR/RR-TB regimen.

A TB outcome is assigned to each person within these cohorts; those that have an unknown TB outcome, or recorded as transferred to another clinic, are assigned the outcome “not evaluated”.

As well as reporting outcomes at defined time periods (at 12 and 24 months for drug sensitive and drug resistant cohorts, respectively), a last recorded outcome based on the last known outcome was derived and presented for those still on treatment beyond the 12 and 24 month time periods.

Specifically, for this report the following groups have been presented:

- the drug sensitive cohort with an expected course of treatment of less than 12 months have TB outcomes reported at 12 months, with analysis of treatment completion at 12 months
- the drug sensitive cohort with CNS, spinal, miliary or cryptic disseminated TB have outcomes reported for the last recorded outcome
- analysis of deaths in the entire drug sensitive cohort (including CNS, spinal, miliary or cryptic disseminated TB) are presented for the last recorded outcome
- analysis of those lost to follow-up in the entire drug sensitive cohort was presented for the last recorded outcome
- the drug resistant cohort have TB outcomes reported at 24 months, with analysis of treatment completion at 24 months
- deaths and those lost to follow-up in the drug resistant cohort are reported at the last recorded outcome

Confidence intervals

95% confidence intervals for incidence rates were calculated using a Poisson distribution. For proportions a binomial distribution was used.

Software packages

All statistical analysis was carried out using Stata 15. ArcGIS 10.2 was used to produce all maps shown in the report.

Appendix IV. Surveillance data quality

Data completeness overview

Results presented in the completeness tables are based on data entered into the Enhanced TB Surveillance system (ETS) before additional cleaning had been undertaken for presentation in the rest of the report. Tables Aiv.1- Aiv.7 shows the level of completeness for key variables collected in ETS. The fields “forename”, “surname”, “postcode”, “date of birth”, “NHS number” and “sex”, are mandatory fields in ETS, thus completeness is not reported. Since May 2015, it has been mandatory to enter a valid NHS number or select “no NHS number” for all TB notifications (with the exception of those notified to LTBR).

Demographic variables completeness (Table Aiv.1 and Aiv.2)

NHS number

This variable is used for matching TB notifications to TB isolates records to ensure information on, for example, culture confirmation and drug resistance, is available for each notification. In addition, this data helps identify duplicate notifications.

High completion is therefore extremely important:

- in 2017, NHS number completeness was 95% overall, and lowest at 91% in the London PHEC
- NHS number completeness on TB isolates received from Mycobacterium Reference Laboratories was 76%; the largest decrease in completeness between 2016 and 2017 was in North West (-20%) and North East (-17%) PHECs, with the biggest increase in East of England (+9%)

Clinical variables completeness (Table Aiv.1 and Aiv.2)

Previous TB treatment

For people with a known previous TB diagnosis, information on previous treatment is also collected. This is important for understanding the role of previous treatment in drug resistance.

However, until completion of the previous treatment variable improves, previous diagnosis has to be used as a proxy measure when reporting nationally and internationally:

- In 2017, reporting (yes/no/unknown) of previous TB treatment was low (79%); in the East Midlands PHEC it was only 68%

Diagnosis and Treatment variables completeness (Table Aiv.3 and Aiv.4)

Sputum smear status

Sputum smear status among people with pulmonary TB enables quantification of the number and proportion of people that are likely to be most infectious. Results of sputum smear status are collected through manual data entry onto ETS.

While onerous, entry of this data is important as currently there are no automated systems available for data collection:

- in 2017, only 63% of people with pulmonary TB had a sputum smear status reported; a slight decrease from 65% in 2016
- completeness was lowest in the East of England and North East PHECs, being under 50% for both while high in London (81%)
- Yorkshire and the Humber (-13%) and North East (-10%) had the largest decreases in completeness between 2016 and 2017

Symptom onset date completeness

This variable is used in the TB Strategy Monitoring indicators 6 and 7, and is vital to assess diagnostic and treatment delays:

- in 2017 completeness of symptom onset date was 93% and was lowest in the North West PHEC at 85%

Date first presented completeness[29]

The definition of this variable is the date a person first presented to a healthcare service in relation to their TB symptoms, and is not when first presented to TB services (unless this was the first contact with healthcare).

It is important to collect this to assess patient delays in diagnosis compared with healthcare delays, to monitor and improve access to healthcare and early diagnosis:

- in 2017, completeness of date first presented was 87%; the lowest of the four key dates used in delay monitoring (symptom onset date, date first presented, date of diagnosis and date of treatment start)

[29] Completion of this field does not include London cases, as this data field is not available in LTBR

- there was a 2% decrease in completeness between 2016 and 2017, with a substantial decrease in the East of England (-10%)

Death variables completeness

Completion of the date of death variable is important to assess the timing of the death in relation to treatment start. Information on the relationship between TB and death is also important to be able to assess the proportion of people with TB who die where TB is the cause of death:

- in 2017, completeness of date of death was 82% overall; completeness was 100% in the South West and North East PHECs
- completeness of the relationship between TB and death (TB caused death/TB contributed to death/TB incidental to death) was only 70%, and lowest in the East Midlands PHEC at 48%, while only 53% in the London PHEC
- between 2016 and 2017 there was a 7% decrease in completeness for both of these variables

Co-morbidities (Table Aiv.5 and Aiv.6)

The co-morbidity variables (diabetes, hepatitis B, hepatitis C, chronic liver disease, chronic renal disease, immunosuppression) and smoking status were introduced to ETS in mid-2015 and to LTBR in mid-2016.

Data on these co-morbidities is essential to report and understand case complexity:

- in 2017, completeness for reporting (yes/no/unknown) was fairly high for all co-morbidity variables (range 95-97%)
- completeness on known status (yes/no) of each co-morbidity varied; diabetes had the highest completeness (94%), whereas hepatitis B and hepatitis C had the lowest completeness (both 85%)
- between 2016 and 2017, there was an improvement in completeness on known status for each co-morbidity; the highest increase (+6%) was on known status of hepatitis B and hepatitis C

Travel and visitor risk factor variables (Table Aiv.7)[30]

The travel and visitor history risk factor variables were introduced to ETS in May 2015.

- in 2017, completeness for reporting (yes/no/unknown) on travel history and visitor history was 94% for both variables

[30] Completion of this field does not include London notifications, as this data field is not available in LTBR

- in 2017, travel history was known (yes/no) for 80% of people with TB and visitor history was known (yes/no) for 72%

Table Aiv.1: Percentage completeness of key data fields in ETS by PHE Centre, England, 2017

	Demographic				Clinical				Social risk factor							
	NHS Number[b]		Ethnic group	UK/non-UK born	HIV Testing[c]	Previous TB diagnosis		Previous TB treatment[e]	Drug misuse		Alcohol misuse		Homelessness		Prison	
PHE Centre[a]	ETS	Lab	Known	Known	Known	Known	Reported[d]	Reported	Known	Reported	Known	Reported	Known	Reported	Known	Reported
London	91	75	99	99	99	98	100	81	97	99	97	99	98	99	97	99
West Midlands	97	81	100	99	86	96	99	79	95	98	94	97	94	97	93	97
South East	97	86	98	98	98	95	99	78	92	97	93	98	92	98	91	97
North West	98	71	98	96	94	89	95	77	86	95	86	95	83	95	75	93
East of England	96	81	99	98	94	95	97	79	92	96	92	96	92	95	89	95
East Midlands	97	80	98	97	94	93	97	68	91	98	90	97	89	98	79	97
Yorkshire and the Humber	99	79	99	97	95	96	98	70	90	98	92	97	91	97	85	96
South West	97	28	98	97	94	93	97	88	90	96	89	96	87	96	84	95
North East	97	65	100	100	94	96	97	75	97	98	97	98	98	99	93	95
England	**95**	**76**	**99**	**98**	**95**	**96**	**98**	**79**	**94**	**98**	**93**	**98**	**93**	**98**	**90**	**97**

Table Aiv.2: Percentage difference in completeness of key fields in ETS between 2016 and 2017 by PHE Centre, England

	Demographic				Clinical				Social risk factor							
	NHS Number[b]		Ethnic group	UK/non-UK born	HIV Testing[c]	Previous TB diagnosis		Previous TB treatment[e]	Drug misuse		Alcohol misuse		Homelessness		Prison	
PHE Centre[a]	ETS	Lab	Known	Known	Known	Known	Reported[d]	Reported	Known	Reported	Known	Reported	Known	Reported	Known	Reported
London	0	+1	0	0	0	0	-	-2	-1	0	-1	0	0	0	-1	0
West Midlands	0	+2	-	0	-9	-2	-1	+2	-1	-1	-3	-2	-2	-2	-2	-2
South East	-1	+3	0	0	+3	-1	0	-1	-3	-1	0	+1	-3	+1	0	+2
North West	0	-20	0	-2	-4	-2	-1	-1	-3	0	-3	0	-4	+1	-4	0
East of England	-2	+9	+1	+1	+3	-2	-2	-18	0	-1	-2	-1	-1	-3	-1	-2
East Midlands	+1	0	-2	-2	+1	+3	+3	-7	-2	-2	-3	-2	-3	0	-5	-1
Yorkshire and the Humber	0	-11	+1	-3	-2	+1	0	+4	-2	0	-1	0	-1	-1	-3	-1
South West	-1	-1	-1	0	+4	-2	0	+12	0	+2	-5	0	-5	-1	0	+2
North East	+2	-17	-	-	+2	-1	-1	-25	+1	0	+4	+2	+4	+2	0	0
England	**0**	**-1**	**0**	**-1**	**-2**	**0**	**-1**	**-1**	**-1**	**0**	**-2**	**0**	**-2**	**0**	**-2**	**0**

Some of the fields included here are mandatory data entry fields within ETS therefore it is not necessary to show "reported" and "known" for all fields

[a] Ordered by decreasing total number TB notifications in 2017

[b] Data are reported and have a known value

[c] Excludes people diagnosed post-mortem

[d] Data are reported but may be reported as unknown

[e] Includes people with previous TB diagnosis only

Table Aiv.1 key: 99-100% complete | 95-98% complete | <95% complete

Table Aiv.2 key: % increase | No change | % decrease | 100% reached

Table Aiv.3: Percentage completeness of data fields for diagnosis, death and treatment in ETS by PHE Centre, England, 2017

PHE Centre[a]	Diagnosis					Death		Treatment					
	Sputum smear status[b]	Site of disease	Symptom onset date[d]	Date first presented	Date diagnosed[d]	Date of death[e]	Relationship between TB and Death[e]	Start of treatment date[d]	Date treatment completed[f]	Treatment Outcome reported at 12 months[g]		Treatment Outcome reported at 24 months[i]	
	Known[c]	Known	Known	Known	Known	Known	Known	Known	Known	Known	Reported[h]	Known	Reported
London	81	100	93	N/A	88	53	79	98	99	99	100	100	100
West Midlands	57	100	93	93	98	94	55	98	100	99	100	100	100
South East	56	99	96	89	97	94	82	98	99	97	98	100	100
North West	54	99	85	83	95	95	66	95	98	99	100	100	100
East of England	49	100	88	73	95	88	71	98	100	99	100	100	100
East Midlands	50	100	97	89	94	97	48	97	99	97	99	100	100
Yorkshire and the Humber	65	99	97	92	98	82	69	95	98	97	99	84	84
South West	51	100	94	91	97	100	73	97	99	95	97	97	97
North East	39	99	94	98	99	100	83	95	100	94	94	100	100
England	**63**	**100**	**93**	**87**	**93**	**82**	**70**	**98**	**99**	**98**	**99**	**99**	**99**

Table Aiv.4: Percentage difference in completeness of data fields for diagnosis, death and treatment in ETS between 2016 and 2017 by PHE Centre, England

PHE Centre[a]	Diagnosis					Death		Treatment					
	Sputum smear status[b]	Site of disease	Symptom onset date[d]	Date first presented	Date diagnosed[d]	Date of death[e]	Relationship between TB and Death[e]	Start of treatment date[d]	Date treatment completed[f]	Treatment Outcome reported at 12 months[g]		Treatment Outcome reported at 24 months[i]	
	Known[c]	Known	Known	Known	Known	Known	Known	Known	Known	Known	Reported[h]	Known	Reported
London	+3	-	0	N/A	-2	-11	0	-1	-1	0	-	-	-
West Midlands	+4	-	-1	-1	-1	-6	-28	0	+2	-1	-	-	-
South East	-4	-1	-3	0	-2	-2	+5	-1	0	-2	-1	-	-
North West	0	-1	-4	0	-3	-5	-8	-2	+5	-1	-	-	-
East of England	-2	-	-7	-10	-4	-5	-14	-1	-	0	-	+3	-
East Midlands	-8	-	-1	+1	+1	-3	-17	-1	-1	-2	-1	-	-
Yorkshire and the Humber	-13	-1	+2	+1	-1	-13	-7	-3	+1	-2	-1	-16	-16
South West	-8	-	0	+3	-1	+7	-2	+1	0	-4	-3	0	0
North East	-10	+1	0	0	-1	-	+16	-4	+1	-6	-6	-	-
England	**-2**	**0**	**-1**	**-2**	**-2**	**-7**	**-7**	**0**	**0**	**-1**	**-1**	**-1**	**-1**

For treatment outcome variables - recording of 'not completed', or 'transferred out' are counted as unknown and not reported. Date first presented completeness does not include London cases, as this data field is not available in LTBR

[a] Ordered by decreasing total number of TB notifications in 2017
[b] People with pulmonary TB only
[c] Data are reported and have a known value
[d] Excludes people diagnosed post-mortem
[e] People notified in 2015 that have treatment outcome died only
[f] People notified in 2015 that have completed treatment only
[g] For people notified in 2016
[h] Data are reported but may be reported as unknown
[i] For people notified

Table Aiv.3 key: 99-100% complete | 95-98% complete | <95% complete

Table Aiv.4 key: % increase | No change | % decrease | 100% reached

Table Aiv.5: Percentage completeness of data fields for co-morbidities in ETS by PHE Centre, England, 2017

PHE Centre[a]	Co-morbidities													
	Diabetes		Hepatitis B		Hepatitis C		Chronic liver disease		Chronic renal disease		Immunosuppression		Smoker	
	Known[b]	Reported[c]	Known	Reported	Known	Reported	Known	Reported	Known	Reported	Known	Reported	Known	Reported
London	96	97	90	96	90	95	94	96	95	96	94	96	90	94
West Midlands	94	98	87	96	88	97	92	97	91	96	91	97	85	97
South East	92	96	82	94	82	94	90	95	91	95	89	95	89	96
North West	90	95	75	94	74	94	87	95	88	95	85	95	83	95
East of England	94	96	87	94	88	95	89	94	91	95	92	95	89	96
East Midlands	92	97	79	96	78	95	91	95	91	95	92	96	83	94
Yorkshire and the Humber	90	97	80	97	79	97	87	97	88	96	87	97	85	97
South West	94	97	82	95	81	95	92	95	91	94	91	96	88	97
North East	98	99	94	99	93	98	99	99	97	99	99	99	97	99
England	**94**	**97**	**85**	**95**	**85**	**95**	**92**	**96**	**92**	**96**	**91**	**96**	**88**	**95**

Table Aiv.6 Percentage difference in completeness of data fields for co-morbidities in ETS between 2016 and 2017 by PHE centre, England

PHE Centre[a]	Co-morbidities													
	Diabetes		Hepatitis B		Hepatitis C		Chronic liver disease		Chronic renal disease		Immunosuppression		Smoker	
	Known[b]	Reported[c]	Known	Reported	Known	Reported	Known	Reported	Known	Reported	Known	Reported	Known	Reported
London[d]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
West Midlands	0	-1	0	-2	+2	0	-1	-1	-2	-2	0	-1	-7	-2
South East	+3	+5	+4	+5	+3	+4	+4	+5	+4	+6	+2	+5	+4	+6
North West	0	0	0	0	-2	-1	0	0	0	+2	-2	0	-3	0
East of England	+11	+8	+14	+9	+15	+11	+8	+7	+9	+9	+12	+9	+10	+9
East Midlands	+5	+4	+3	+4	+3	+3	+7	+4	+7	+4	+7	+3	+1	+3
Yorkshire and the Humber	+1	0	-1	+1	-2	+1	+3	+2	+2	0	+1	+1	+1	0
South West	+7	+5	+9	+6	+8	+8	+10	+5	+8	+4	+7	+6	+14	+6
North East	+3	+3	+7	+4	+7	+3	+6	+4	+3	+4	+6	+5	+5	+3
England	**+5**	**+3**	**+6**	**+2**	**+6**	**+2**	**+5**	**+3**	**+5**	**+3**	**+5**	**+3**	**+3**	**+1**

[a] Ordered by decreasing total number of TB notifications in 2017
[b] Data are reported and have a known value
[c] Data reported but may be reported as unknown
[d] Comparison to 2016 not shown as fields only introduced into LTBR mid-way through 2016

Table Aiv.5 key: 99-100% complete | 95-98% complete | <95% complete

Table Aiv.6 key: % increase | No change | % decrease | 100% reached

Table Aiv.7: Percentage completeness and difference to previous year of data fields for travel and visitor history in ETS by PHE centre, England[a], 2017

PHE Centre[b]	Risk factor							
	Travel history outside the UK[c]				Visitors received from outside the UK[c]			
	Known[d]		Reported[e]		Known[c]		Reported[e]	
	Completed %	Difference %[f]	Completed %	Difference %[f]	Completed %	Difference %[f]	Completed %	Difference %[f]
West Midlands	91	-1	97	-2	90	-1	97	-2
South East	81	0	91	+2	74	-2	92	+2
North West	69	-2	93	-1	63	-4	94	0
East of England	80	+6	88	0	73	+5	88	+1
East Midlands	75	+1	93	+1	61	-1	94	+2
Yorkshire and the Humber	75	-2	97	-1	57	-3	97	-1
South West	75	+2	97	+3	63	0	97	+3
North East	97	+5	98	+2	98	+9	99	+2
England	**80**	**+1**	**94**	**0**	**72**	**-1**	**94**	**0**

[a] Excludes London notifications (as these data fields are not available in LTBR)
[b] Ordered by decreasing total number of TB notifications in 2017
[c] Excluding countries within Western Europe, US, Canada, New Zealand and Australia
[d] Data are reported and has a known value
[e] Data reported but may be reported as unknown
[f] Between 2016 and 2017

Table Aiv.7 key:

Completed%: 99-100% complete | 95-98% complete | <95% complete

Difference%: % increase | No change | % decrease | 100% reached

Appendix V. National level data for TB strategy monitoring indicators, England, 2000-2017

Year	Indicator 1			Indicator 2						Indicator 5		
	Overall TB incidence per 100,000 population			TB incidence in UK born and non-UK born populations						Incidence of TB in UK born children aged under fifteen years		
				UK born			Non- UK born					
	Number of cases	Rate	95% CI	Number of cases	Rate	95% CI	Number of cases	Rate	95% CI	Number of cases	Rate	95% CI
2000	6,044	12.3	12.0-12.6	1,830	4.1	3.9-4.3	3,329	79.6	76.9-82.4	209	2.3	2.0-2.6
2001	6,169	12.5	12.2-12.8	1,889	4.3	4.1-4.4	3,431	79.1	76.5-81.8	229	2.5	2.2-2.9
2002	6,675	13.4	13.1-13.8	1,852	4.2	4.0-4.4	4,111	90.5	87.7-93.3	228	2.6	2.2-2.9
2003	6,631	13.3	13.0-13.6	1,703	3.8	3.6-4.0	4,326	90.8	88.1-93.5	179	2.0	1.7-2.3
2004	6,930	13.8	13.5-14.1	1,791	4.0	3.8-4.2	4,571	95.2	92.4-98.0	264	3.0	2.6-3.4
2005	7,658	15.1	14.8-15.5	1,804	4.0	3.8-4.2	5,186	100.7	98.0-103.5	247	2.8	2.5-3.2
2006	7,682	15.1	14.7-15.4	1,729	3.9	3.7-4.1	5,175	92.9	90.4-95.5	209	2.4	2.1-2.8
2007	7,577	14.7	14.4-15.1	1,799	4.0	3.8-4.2	5,135	85.5	83.2-87.9	290	3.4	3.0-3.8
2008	7,809	15.1	14.7-15.4	1,867	4.2	4.0-4.4	5,417	86.0	83.7-88.3	294	3.4	3.0-3.8
2009	8,112	15.5	15.2-15.9	1,907	4.2	4.1-4.4	5,662	86.8	84.6-89.1	257	2.9	2.6-3.3
2010	7,676	14.6	14.3-14.9	1,814	4.0	3.8-4.2	5,515	83.1	80.9-85.3	238	2.7	2.4-3.1
2011	8,280	15.6	15.3-15.9	1,958	4.3	4.1-4.5	6,021	85.9	83.7-88.1	234	2.6	2.3-3.0
2012	8,084	15.1	14.8-15.4	2,003	4.4	4.2-4.6	5,841	81.4	79.4-83.6	254	2.9	2.5-3.2
2013	7,265	13.5	13.2-13.8	1,842	4.0	3.8-4.2	5,258	70.6	68.7-72.5	195	2.2	1.9-2.5
2014	6,472	11.9	11.6-12.2	1,756	3.8	3.6-4.0	4,611	60.2	58.5-62.0	187	2.1	1.8-2.4
2015	5,731	10.5	10.2-10.7	1,530	3.3	3.2-3.5	4,097	51.3	49.7-52.9	156	1.7	1.4-2.0
2016	5,616	10.2	9.9-10.4	1,454	3.1	3.0-3.3	4,093	49.4	47.9-50.9	162	1.8	1.5-2.0
2017	5,102	9.2	8.9-9.4	1,454	3.1	3.0-3.3	3,556	41.1	39.7-42.4	130	1.4	1.2-1.7

Year	Indicator 6			Indicator 7			Indicator 8			Indicator 9		
	Number and proportion of pulmonary TB cases starting treatment within two months of symptom onset			Number and proportion of pulmonary TB cases starting treatment within four months of symptom onset			Number and proportion of pulmonary TB cases that were culture confirmed			Number and proportion of microbiologically confirmed cases with drug susceptibility testing reported for the four first line agents		
	Number of cases	Proportion (%)	95% CI	Number of cases	Proportion (%)	95% CI	Number of cases	Proportion (%)	95% CI	Number of cases	Proportion (%)	95% CI
2000	-	-	-	-	-	-	1,860	52.1	50.5-53.8	2,779	99.4	99.0-99.6
2001	-	-	-	-	-	-	2,034	56.4	54.8-58.0	3,123	99.2	98.8-99.4
2002	-	-	-	-	-	-	2,622	64.9	63.4-66.4	3,793	98.6	98.2-98.9
2003	-	-	-	-	-	-	2,584	66.1	64.6-67.5	3,799	99.2	98.9-99.4
2004	-	-	-	-	-	-	2,740	68.4	66.9-69.8	4,020	98.6	98.2-98.9
2005	-	-	-	-	-	-	2,985	69.2	67.8-70.5	4,532	98.9	98.6-99.2
2006	-	-	-	-	-	-	2,980	69.4	68.0-70.7	4,607	98.7	98.3-99.0
2007	-	-	-	-	-	-	2,850	68.7	67.3-70.1	4,366	98.2	97.7-98.5
2008	-	-	-	-	-	-	2,904	67.8	66.4-69.2	4,429	97.6	97.1-98.0
2009	-	-	-	-	-	-	3,006	68.1	66.7-69.4	4,520	96.8	96.3-97.3
2010	-	-	-	-	-	-	2,867	70.5	69.0-71.8	4,513	97.9	97.5-98.3
2011	1,317	45.0	43.2-46.8	2,172	74.3	72.6-75.8	3,075	71.7	70.3-73.0	4,896	97.3	96.8-97.7
2012	1,371	44.1	42.4-45.9	2,293	73.8	72.2-75.3	2,949	70.4	69.0-71.8	4,786	97.7	97.3-98.1
2013	1,224	41.2	39.5-43.0	2,122	71.5	69.8-73.1	2,711	72.9	71.4-74.3	4,286	97.6	97.1-98.0
2014	1,159	39.5	37.7-41.3	2,046	69.7	68.0-71.4	2,486	73.1	71.6-74.6	3,831	97.7	97.1-98.1
2015	1,181	42.3	40.4-44.1	2,015	72.1	70.4-73.7	2,246	74.1	72.5-75.7	3,426	98.1	97.6-98.5
2016	1,069	38.6	36.8-40.4	1,907	68.8	67.0-70.5	2,314	76.9	75.3-78.3	3,445	96.1	95.4-96.7
2017	971	38.8	36.9-40.7	1,721	68.8	66.9-70.5	2,066	74.7	73.0-76.3	3,045	96.6	95.9-97.2

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			Number and proportion of drug sensitive TB cases who were lost to follow-up at last reported outcome			Number and proportion of drug sensitive TB cases who had died at last reported outcome		
	Number of cases	Proportion (%)	95% CI	Number of cases	Proportion (%)	95% CI	Number of cases	Proportion (%)	95% CI
2000	-	-	-	-	-	-	-	-	-
2001	3,638	63.6	62.3-64.8	237	3.9	3.4-4.4	377	6.1	5.6-6.8
2002	4,114	67.4	66.2-68.5	296	4.5	4.0-5.0	437	6.6	6.0-7.2
2003	4,197	69.5	68.3-70.6	290	4.4	3.9-4.9	407	6.2	5.6-6.8
2004	4,432	70.1	69.0-71.2	333	4.9	4.4-5.4	402	5.9	5.3-6.4
2005	4,887	70.3	69.2-71.4	380	5.0	4.5-5.5	447	5.9	5.4-6.4
2006	5,217	75.5	74.5-76.5	413	5.4	4.9-6.0	430	5.7	5.2-6.2
2007	5,296	78.2	77.2-79.1	345	4.6	4.1-5.1	432	5.8	5.3-6.3
2008	5,605	80.3	79.3-81.2	368	4.8	4.3-5.3	436	5.6	5.1-6.2
2009	5,920	81.9	81.0-82.7	354	4.4	4.0-4.9	419	5.2	4.7-5.7
2010	5,652	82.9	82.0-83.8	342	4.5	4.1-5.0	382	5.0	4.6-5.5
2011	6,031	82.1	81.2-82.9	425	5.2	4.7-5.7	382	4.7	4.2-5.1
2012	6,022	83.8	82.9-84.6	365	4.6	4.1-5.0	390	4.9	4.4-5.4
2013	5,511	85.6	84.7-86.5	297	4.1	3.7-4.6	336	4.7	4.2-5.2
2014	4,855	84.9	84.0-85.8	275	4.3	3.8-4.8	354	5.5	5.0-6.1
2015	4,189	83.7	82.6-84.7	250	4.4	3.9-5.0	346	6.1	5.5-6.8
2016	4,201	84.4	83.4-85.4	219	3.9	3.5-4.5	304	5.5	4.9-6.1
2017	-	-	-	-	-	-	-	-	-

Year	Indicator 13			Indicator 14			Indicator 15		
	Number and proportion of TB cases with rifampicin resistance or MDR-TB who had completed treatment at 24 months			Number and proportion of TB cases with rifampicin resistance or MDR-TB who were lost to follow-up at last reported outcome			Number and proportion of TB cases with rifampicin resistance or MDR-TB who had died at last reported outcome		
	Number of cases	Proportion (%)	95% CI	Number of cases	Proportion (%)	95% CI	Number of cases	Proportion (%)	95% CI
2000	-	-	-	-	-	-	-	-	-
2001	-	-	-	-	-	-	-	-	-
2002	-	-	-	-	-	-	-	-	-
2003	-	-	-	-	-	-	-	-	-
2004	37	52.1	40.7-63.3	9	12.7	6.8-22.4	4	5.6	2.2-13.6
2005	39	62.9	50.5-73.8	9	14.5	7.8-25.3	4	6.5	2.5-15.4
2006	40	50.0	39.3-60.7	8	10.0	5.2-18.5	3	3.8	1.3-10.5
2007	30	42.3	31.5-53.8	6	8.5	3.9-17.2	10	14.1	7.8-24.0
2008	45	57.7	46.6-68.0	10	12.8	7.1-22.0	7	9.0	4.4-17.4
2009	40	51.9	41.0-62.7	11	14.3	8.2-23.8	4	5.2	2.0-12.6
2010	38	48.1	37.4-58.9	9	11.4	6.1-20.3	1	1.3	0.2-6.8
2011	48	50.5	40.6-60.4	18	18.9	12.3-28.0	6	6.3	2.9-13.1
2012	58	61.7	51.6-70.9	10	10.6	5.9-18.5	4	4.3	1.7-10.4
2013	50	58.8	48.2-68.7	14	16.5	10.1-25.8	4	4.7	1.8-11.5
2014	36	52.2	40.6-63.5	13	18.8	11.4-29.6	2	2.9	0.8-10.0
2015	39	58.2	46.3-69.3	5	7.5	3.2-16.3	5	7.5	3.2-16.3
2016	-	-	-	-	-	-	-	-	-
2017	-	-	-	-	-	-	-	-	-

Year	Indicator 16			Indicator 17			Indicator 18			Indicator 19		
	Number and proportion of TB cases offered an HIV test			Number and proportion of drug sensitive TB cases with at least one social risk factor who completed treatment within 12 months			Number and proportion of culture confirmed TB cases with any first line drug resistance			Number and proportion of culture confirmed TB cases with multi-drug resistance TB		
	Number of cases	Proportion (%)	95% CI	Number of cases	Proportion (%)	95% CI	Number of cases	Proportion (%)	95% CI	Number of cases	Proportion (%)	95% CI
2000	-	-	-	-	-	-	193	6.9	6.0-7.9	28	1.0	0.7-1.4
2001	-	-	-	-	-	-	224	7.1	6.3-8.1	22	0.7	0.5-1.1
2002	-	-	-	-	-	-	297	7.8	7.0-8.7	35	0.9	0.7-1.3
2003	-	-	-	-	-	-	308	8.1	7.2-9.0	49	1.3	1.0-1.7
2004	-	-	-	-	-	-	326	8.1	7.3-9.0	45	1.1	0.8-1.5
2005	-	-	-	-	-	-	346	7.6	6.9-8.4	41	0.9	0.7-1.2
2006	-	-	-	-	-	-	370	8.0	7.2-8.8	54	1.2	0.9-1.5
2007	-	-	-	-	-	-	332	7.5	6.8-8.4	49	1.1	0.8-1.5
2008	-	-	-	-	-	-	305	6.8	6.1-7.6	50	1.1	0.8-1.5
2009	-	-	-	-	-	-	369	8.0	7.3-8.8	59	1.3	1.0-1.7
2010	-	-		371	73.5	69.4-77.1	321	7.0	6.3-7.8	65	1.4	1.1-1.8
2011	-	-		370	71.3	67.3-75.0	413	8.3	7.6-9.1	81	1.6	1.3-2.0
2012	5,204	93.2	92.5-93.8	393	74.9	71.0-78.4	358	7.4	6.7-8.1	77	1.6	1.3-2.0
2013	5,788	93.6	92.9-94.2	401	77.3	73.5-80.7	332	7.7	6.9-8.5	68	1.6	1.2-2.0
2014	5,401	95.4	94.8-95.9	362	74.9	70.9-78.6	286	7.3	6.6-8.2	52	1.3	1.0-1.7
2015	4,947	96.3	95.8-96.8	388	74.9	71.0-78.4	253	7.3	6.5-8.2	45	1.3	1.0-1.7
2016	5,016	97.0	96.5-97.4	366	76.1	72.1-79.7	263	7.4	6.6-8.3	53	1.5	1.1-2.0
2017	4,447	96.1	95.5-96.6	-	-	-	265	8.5	7.6-9.5	45	1.4	1.1-1.9

Metadata for TB Strategy Monitoring Indicators, England

Rates presented are crude rates per 100,000 population. 95% confidence intervals (CI) for rates were calculated assuming a Poisson distribution. The remaining indicators are all presented as proportions, with 95% binomial CIs.

Indicator 1: TB incidence per 100,000 population.
Numerator: Annual TB case notifications, England.
Denominator: Office for National Statistics mid-year population estimate, England.

Indicator 2: TB incidence per 100,000 population by place of birth.
Numerator: Annual TB notifications, England, by place of birth.
Denominator: Labour Force Survey annual population estimates by place of birth, England.

Indicator 5: TB incidence per 100,000 population in UK born children aged under fifteen years.
Numerator: Annual TB case notifications in UK born children aged under fifteen years, England.
Denominator: Labour Force Survey annual population estimate of UK born children aged under fifteen years, England.

Indicator 6: Number and proportion of pulmonary TB cases starting treatment within two months of symptom onset.
Numerator: Annual number of pulmonary TB cases starting treatment within 61 days of symptom onset. Denominator: Annual number of pulmonary TB cases notified.
Exclusions: TB cases with no date of symptom onset or no date of treatment start.

Indicator 7: Number and proportion of pulmonary TB cases starting treatment within four months of symptom onset.
Numerator: Annual number of pulmonary TB cases starting treatment within 121 days of symptom onset. Denominator: Annual number of pulmonary TB cases notified.
Exclusions: TB cases with no date of symptom onset or no date of treatment start.

Indicator 8: Number and proportion of pulmonary TB cases that were culture confirmed.
Numerator: Annual number of pulmonary TB cases with a positive culture for *Mycobacterium tuberculosis* complex.
Denominator: Annual number of notified pulmonary TB cases.

Indicator 9: Number and proportion of culture confirmed TB cases with drug susceptibility testing reported for the four first line agents.
Numerator: Annual number of culture confirmed notified TB cases with drug susceptibility testing reported for all of the following drugs: isoniazid, rifampicin, ethambutol and pyrazinamide.
Denominator: Annual number of culture confirmed notified TB cases.

Indicator 10: Number and proportion of drug sensitive TB cases who had completed a full course of treatment by 12 months.
Numerator: Number of drug sensitive TB cases notified in a given year who had completed a full course of treatment within 12 months of treatment start date.
Denominator: Number of drug sensitive TB cases notified with TB that year.
Exclusions: cases with rifampicin resistance or multi-drug resistant TB (MDR-TB), and cases with CNS, spinal, miliary or disseminated TB who may require longer than the standard 6 month treatment course.

Indicator 11: Number and proportion of drug sensitive TB cases that were lost to follow-up at last reported outcome.
Numerator: Number of drug sensitive TB cases notified in a given year who were lost to follow-up at last reported outcome.
Denominator: Number of drug sensitive TB cases notified in that year.
Exclusions: cases with rifampicin resistance or MDR-TB.

Indicator 12: Number and proportion of drug sensitive TB cases that had died at last reported outcome.
Numerator: Number of drug sensitive TB cases notified in a given year who had died at last reported outcome.
Denominator: Number of drug sensitive TB cases notified in that year.
Exclusions: as for indicator 11.

Indicator 13: Number and proportion of drug resistant TB cases who had completed treatment at 24 months.
Numerator: Annual number of notified TB cases with rifampicin resistance or MDR-TB who had completed treatment within 24 months of start of treatment.
Denominator: Annual number of notified TB cases with rifampicin resistance or MDR-TB.

Indicator 14: Number and proportion of drug resistant TB cases who were lost to follow-up at last reported outcome.
Numerator: Annual number of notified TB cases with rifampicin resistance or MDR-TB who were lost to follow-up at last reported outcome.
Denominator: Annual number of notified TB cases with rifampicin resistance or MDR-TB.

Indicator 15: Number and proportion of drug resistant TB cases who had died at last reported outcome.
Numerator: Annual number of notified TB cases with rifampicin resistance or MDR-TB who had died at last reported outcome.
Denominator: Annual number of notified TB cases with rifampicin resistance or MDR-TB.

Indicator 16: Number and proportion of TB cases offered an HIV test.
Numerator: Annual number of notified TB cases reported to have been offered an HIV test.
Denominator: Annual number of notified TB cases.
Exclusions: cases where HIV status already known, and cases diagnosed post mortem.

Indicator 17: Number and proportion of drug sensitive TB cases with at least one social risk factor who completed treatment within 12 months.
Numerator: Annual number of drug sensitive TB cases with at least one social risk factor (current or past history of drug or alcohol misuse, homelessness or imprisonment) who have completed treatment within 12 months of treatment start date.
Denominator: Number of drug sensitive TB cases with at least one social risk factor notified with TB that year. Exclusions: as for indicator 10.

Indicator 18: Number and proportion of culture confirmed TB cases with any first line drug resistance. Numerator: Annual number of culture confirmed TB cases with resistance to isoniazid, rifampicin, ethambutol or pyrazinamide.
Denominator: Annual number of culture confirmed TB cases.
Exclusions: *Mycobacterium bovis* cases.

Indicator 19: Annual number and proportion of culture confirmed TB cases with MDR-TB.
Numerator: Number of culture confirmed cases with resistance to at least isoniazid and rifampicin. Denominator: Annual number of notified culture confirmed TB cases.

List of acronyms

BCG	Bacillus Calmette-Guérin vaccination
BTS	British Thoracic Society
CCG	Clinical commissioning group
CHIS	Child Health Information systems
CI	Confidence Intervals
COVER	Cover of Vaccination Evaluated Rapidly
CNS	Central nervous system
DOT	Directly Observed Therapy
DST	Drug susceptibility testing
ETS	Enhanced TB Surveillance system
GP	General Practice
HANDD	HIV & AIDS New Diagnosis Database
HIV	Human immunodeficiency virus
HMP	Her Majesty's Prison service
IRC	Immigration removal centre
IGRA	Interferon gamma release assay
INH-R	Isoniazid resistance
IMD	Index of Multiple Deprivation
IOM	International Organisation of Migration
IQR	Inter-quartile range
JSNA	Joint Strategic Needs Assessment
LA	Local authority
LFS	Labour Force Survey
LSOA	Lower Super Output Area
LTBI	Latent TB infection
LTBR	London TB Register
MDR-TB	Multi-drug resistant TB
MDR/RR-TB	Multi-drug resistant/rifampicin resistant TB
MDT	Multidisciplinary team
MIRU-VNTR	Mycobacterial Interspersed Repetitive Uni-Variable Number Tandem Repeats
MTBC	Mycobacterium tuberculosis complex
NHS	National Health Service
ONS	Office for National Statistics
PCR	Polymerase chain reaction
PDS	Personal Demographic Service
PHE	Public Health England
PHEC	Public Health England Centre
PHiP	Public Health in Prisons
RCGP	Royal College of General Practitioners

SNP	Single Nucleotide Polymorphism
SRF	Social risk factor
SCCI	Standardisation Committee for Care Information
SOPHID	Survey of Prevalent HIV Infections Diagnosed
TB	Tuberculosis
TBCBs	TB Control Boards
VOT	Virtually Observed Treatment
USPs	Under-served populations
WGS	Whole genome sequencing
XDR-TB	Extensively drug resistant TB

Glossary

Acquired resistance
Acquired resistance is classed as resistance identified on repeat culture three or more months after the first specimen date. In addition, people with a change from a sensitive to resistant result following treatment start are reclassified as having acquired resistance, even if this is within the three-month period.

Drug resistant cohort
The drug resistant cohort includes any people with rifampicin resistant TB (initial or acquired), including MDR-TB (initial or acquired), as well as cases treated with a second line regimen without confirmation through phenotypic DSTs or WGS resistance predictions.

Drug sensitive cohort
The drug sensitive cohort excludes all people with rifampicin resistant TB (initial or acquired) including MDR-TB (initial, acquired or treated).

Extensively-drug resistant TB (XDR-TB)
XDR-TB is defined as resistance to isoniazid and rifampicin (MDR-TB), at least one injectable agent (capreomycin, kanamycin or amikacin) and at least one fluoroquinolone (moxifloxacin, ofloxacin, ciprofloxacin).

First-line drug resistance
First-line drug resistance is defined as resistance to at least one of the first line drugs (isoniazid, rifampicin, ethambutol, pyrazinamide).

Initial resistance
Initial resistance is classed as resistance identified within three months of the first specimen date.

Latent TB infection (LTBI)
LTBI is defined as a state of persistent immune response to stimulation by Mycobacterium tuberculosis antigens without evidence of active TB disease.

Last recorded outcome
Last known outcome, irrespective of when it occurred compared to treatment start.

MIRU-VNTR cluster
Clusters in this document refer to molecular clusters only. These are defined as two or more people who are infected with a strain of Mycobacterium tuberculosis complex who have indistinguishable MIRU-VNTR profiles. Each cluster must have at least one

person with a full 24 MIRU-VNTR profile, and other members of the cluster may have a maximum of one missing loci.

Multi-drug resistant TB (MDR-TB)

MDR-TB is defined as resistance to at least isoniazid and rifampicin, with or without resistance to other drugs.

Multi-drug resistant/Rifampicin resistant TB (MDR/RR-TB)

MDR/RR-TB is defined as resistance to rifampicin including people with MDR-TB.

Post-mortem diagnosis

A person diagnosed at post-mortem is defined as having TB which was not suspected before death, but a TB diagnosis was made at post-mortem, with pathological and/or microbiological findings consistent with active TB that would have warranted anti-TB treatment if discovered before death.

Pulmonary tuberculosis

A person with pulmonary TB is defined as having TB involving the lungs and/or tracheo-bronchial tree, with or without extra-pulmonary TB diagnosis. In this report, in line with the WHO's recommendation and international reporting definitions, miliary TB is classified as pulmonary TB due to the presence of lesions in the lungs, and laryngeal TB is also classified as pulmonary TB.

Social risk factor

Social risk factors for TB include current alcohol misuse, current or history of homelessness, current or history of imprisonment and current or history of drug misuse.

Under-served populations

Under-served populations refer to people with TB who have a social risk factor (current alcohol misuse, current or history of homelessness, imprisonment and drug misuse), as well as those who were remanded in an immigration removal centre, identified as asylum seekers or unemployed.

WGS cluster

Clusters in this document refer to molecular clusters only. These are defined as two or more people who are infected with a strain of Mycobacterium tuberculosis complex who are within 12 single nucleotide polymorphisms (SNPs).