Public Health England

Protecting and improving the nation's health

Tuberculosis in England

2016 report
(presenting data to end of 2015)

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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 TB patients, commissioners involved in planning and financing TB services, public health professionals working in the control of TB or health of at-risk populations, researchers with an interest in TB, and government and non-governmental organisations working in the field of TB.

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 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*.

Data sources

This report presents detailed data on TB case notifications made to the Enhanced Tuberculosis Surveillance system (ETS) in England to the end of 2015. Data from notifications made to ETS from 2000 is updated annually to take into account denotifications, late notifications and other updates. The data presented in the current year's report supersedes data in previous reports.

Additionally, data is presented from the pre-entry screening database (UK) to the end of 2015 and the LTBI screening database (England) from between April 2015 and May 2016.

Experimental BCG coverage data for areas with universal BCG vaccination is presented using the Cover of Vaccination Evaluated Rapidly (COVER) programme data from April 2015 to March 2016.

Other data displays

High-level data on TB notifications in the UK to the end of 2015, 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 2015*. 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*, a suite of TB Strategy Monitoring Indicators has been developed (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/403231/Collaborative_TB_Strategy_for_England_2015_2020_.pdf). Where data for these indicators 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 2015 on 4 October 2016. Hyperlinks (in red boxes) for specific indicators are also shown throughout the report where data is presented.

Background

In January 2015, Public Health England and NHS England jointly launched the *Collaborative Tuberculosis Strategy for England 2015-2020* [1]. The strategy aims to achieve a year-on-year decrease in TB incidence, a reduction in health inequalities, and ultimately the elimination of TB as a public health problem in England.

To achieve these aims and deliver significant improvements in TB control the strategy sets out 10 key areas for action:

1. Improve access and earlier diagnosis
2. Provide universal high-quality diagnostics
3. Improve treatment and care services
4. Ensure comprehensive contact tracing
5. Improve BCG vaccination uptake
6. Reduce drug resistant TB
7. Tackle TB in under-served populations
8. Implement new entrant latent TB (LTBI) screening
9. Strengthen surveillance and monitoring
10. 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, these steps have led to:

- the creation of a national TB programme, with a national TB office and seven multi-agency TB control boards (TBCBs)
- the development of a national TB service specification
- the provision of a new online resource of comprehensive TB data using the PHE Fingertips tool to support TB commissioning and monitoring
- the roll-out of 54 CCG new migrant LTBI programmes funded by NHS England (£10m in 2015/16 and £10m in 2016/17)
- the updating of TB awareness-raising material in collaboration with TB Alert and the launch of a toolkit to support LTBI programme delivery
- a review of the TB nursing workforce with work underway to take forward its recommendations and help support a more professionalised workforce
- the establishment of five ‘task and finish’ groups to take forward work on the areas for action: high-quality diagnostics, LTBI testing and treatment, drug resistant TB, TB in under-served populations and ensure an appropriate workforce

This year’s annual TB report describes the epidemiology of TB in England since the launch of the strategy, and provides data on the implementation of the UK pre-entry TB screening programme, the national roll-out of systematic LTBI testing and BCG vaccination coverage estimates. On the basis of data presented in this report, recommendations are made on the further work required to deliver the aims of the strategy and, ultimately, lead to improved TB control in England.

Key points

- there has been a year-on-year decline in the incidence of TB in England over the past four years, down to 10.5 per 100,000 (5,758 cases) in 2015, a reduction of one-third since the peak of 15.6 per 100,000 (8,280 cases) in 2011

- the reduction in the number of TB cases in England in the past year has occurred in both the non-UK born population and the UK born population, and in all regions of the country

- the decline in the number of cases in the non UK-born population has occurred particularly among new migrants, and 60% of non-UK born TB cases now occur among those who have lived in the UK for more than six years

- the rate of TB in the non-UK born population is still 15 times higher than in the UK born population, and 73% of all TB cases notified in 2015 (4,087) were born abroad

- it is now also possible to see a consistent downward trend in the number of TB cases in the UK born population, down from 2,005 in 2012 to 1,550 in 2015

- there is evidence of a reduction in TB transmission in England in recent years, with reducing rates of TB in UK born children, and a reduction in the proportion of TB cases in a strain-typing cluster

- the number and proportion of TB cases with multi-drug resistance/rifampicin resistance (MDR/RR-TB) has decreased since 2011, with 54 cases (1.6%) with initial MDR/RR-TB in 2015. Ten of these cases had XDR-TB

- there has been a continued reduction in the number and proportion of TB cases co-infected with HIV, down from the peak of 566 cases (7.8%) in 2005 to 197 cases (3.2%) in 2014. The majority of TB-HIV co-infected cases were born in countries with high rates of both TB and HIV

- in 2015, there has been a small reduction in the proportion of non-UK born cases who experienced a delay of more than four months from date of reported symptom onset to treatment start. However, long delays are still reported, with over a quarter of pulmonary cases having a delay of more than four months in 2015

- following more than ten consecutive years of improving outcomes for TB cases, in the past year there has been a slight reduction in the proportion of drug sensitive TB cases who had completed treatment by 12 months, from 85.4% to 84.5%

- despite the reduction in overall TB cases, the number of cases with social risk factors (homelessness, drug or alcohol misuse or imprisonment) has not declined. The proportion of cases with at least one of these risk factors increased from 9.8% in 2014 to 11.8% in 2015

- TB cases with social risk factors are more likely to have pulmonary disease and drug resistance, and have worse TB outcomes; cases notified in 2014 with at least one social risk factor were more than twice as likely to have died or be lost to follow-up at 12 months compared with cases with no social risk factors

- the recent decline in the incidence of TB in England is likely to reflect a combination of:
    - the impact of the UK TB pre-entry screening programme, which identified 382 cases of active pulmonary TB in 2015
    - a reduction in the number of new migrants from high TB burden countries
    - improvements in TB control leading to a reduction in TB transmission
    - the early impact of testing and treating patients with latent TB infection (LTBI)

- to continue to achieve year-on-year reductions in TB incidence, and the eventual elimination of TB as a public health problem in England, sustained work is required to deliver all 10 key areas for action in the *Collaborative TB Strategy for England 2015-2020.* Recommendations to achieve this are outlined at the end of this report. Specifically, it will be important to focus on:
    - reducing TB among migrants through LTBI testing and treatment
    - reducing diagnostic delay through awareness raising and improving accessibility of services
    - maintaining the quality of TB treatment and care services to ensure continued high treatment completion
    - addressing the social factors associated with TB, including the specific needs of under-served populations

1. TB notifications and incidence

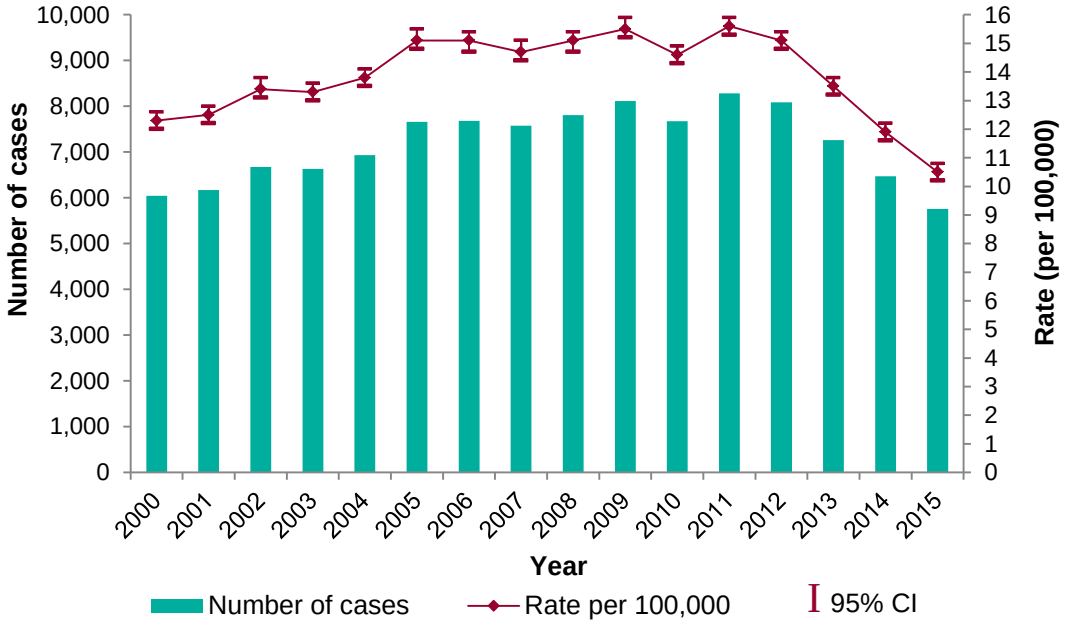
Key messages

- a total of 5,758 TB cases were notified in England in 2015, a rate of 10.5 per 100,000 population, a further reduction since the peak of 8,280 cases in 2011 (15.6 per 100,000)
- the number of cases and rate of TB in the non-UK born population in England have declined year-on-year since 2011, with a decrease of more than 10% each year since 2012
- the rate of TB in the non-UK born population was 15 times higher than in the UK born population in 2015, and 73% of cases were non-UK born
- the majority (60%) of non-UK born cases occurred among those who have lived in the UK more than six years
- the rate of TB in the UK born population declined in 2015, with a decrease of 23% since the peak in 2012
- the majority (60%) of UK born cases were from the White ethnic group, although rates in non-White ethnic groups were between three and 19 times higher

Overall numbers, rates and geographical distribution

In 2015, 5,758 TB cases were notified in England, a rate of 10.5 per 100,000 population (95% confidence interval (CI) 10.2-10.8) (Figure 1.1, Appendix I Table Ai.1.1).

Figure 1.1: TB case notifications and rates, England, 2000-2015



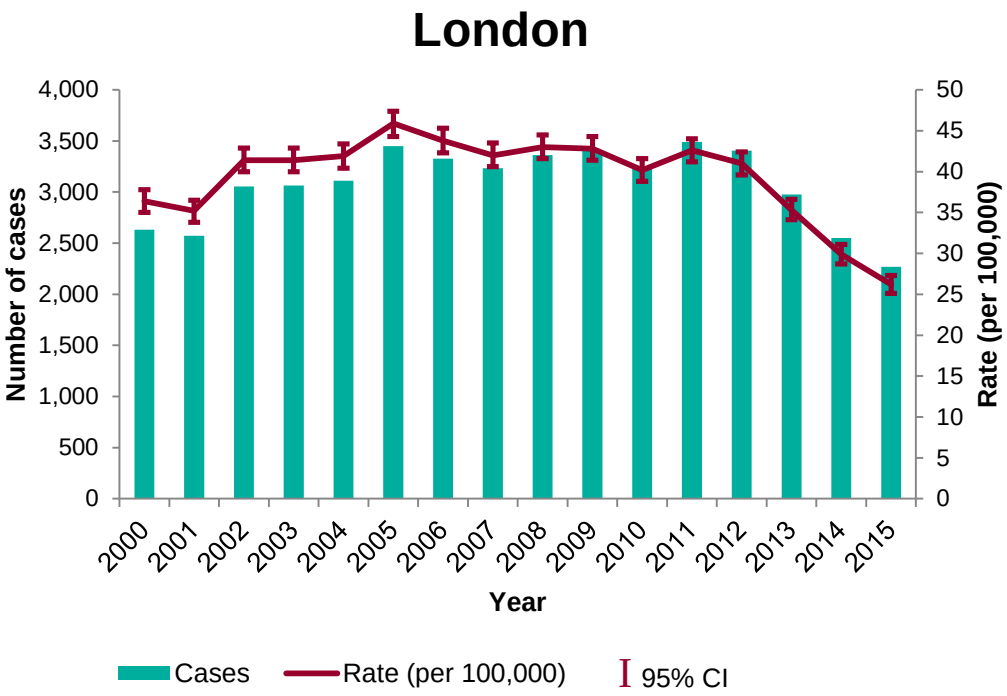
TB Monitoring Indicator 1: Overall TB incidence per 100,000 population (England and PHEC)

In the past four years, there has been an annual decline in the number of cases and the rate of TB, with an overall reduction in the rate of almost one-third (32.7%) since 2011 (Table Ai.1.1).

As in previous years, the main burden of disease was concentrated in large urban areas. London PHE Centre (PHEC) accounted for the highest proportion of cases in England (39.4%, 2,269/5,758) with a rate of 26.2 cases per 100,000 (95% CI 25.1-27.3). In 2015, TB rates have declined in all PHECs, with particularly large year-on-year declines in London and the West Midlands since 2011 (Figure 1.2, Table Ai.1.2). In 2015, 48.2% (157/326) of local authority districts in England had a rate less than 5.0 per 100,000 (Figure 1.3, Appendix II Table Aii.1.1).

Seven TB control boards have been functioning in England since September 2015. The number of TB cases notified in each of these TB control board areas in 2015 is shown in Figure 1.4.

Figure 1.2: TB case notifications and rates by PHE Centre, 2000-2015



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

Figure 1.2: TB case notifications and rates by PHE Centre, 2000-2015 continued

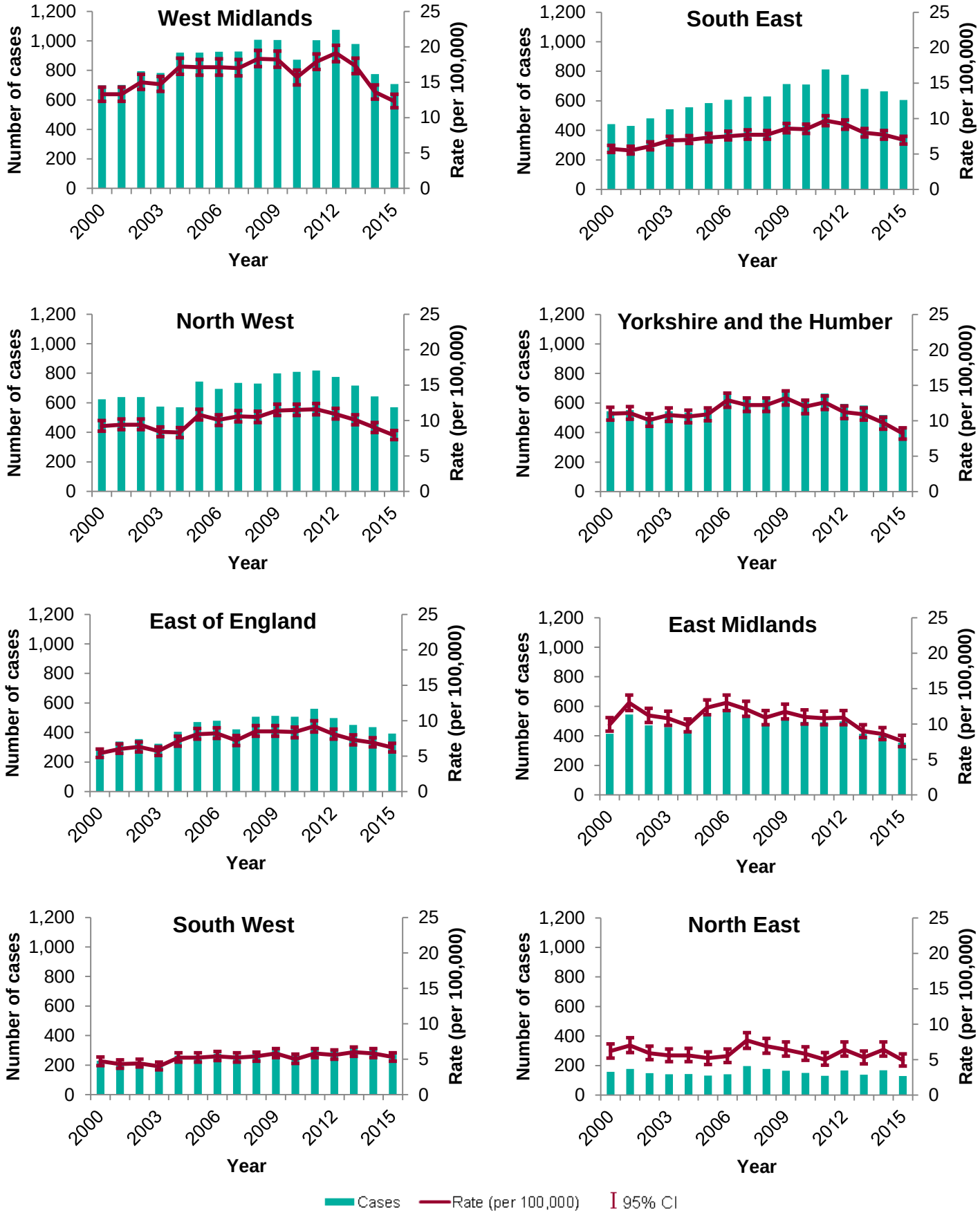


Figure 1.3: Three-year average TB rates by local authority district, England, 2013-2015 (box shows enlarged map of London area)

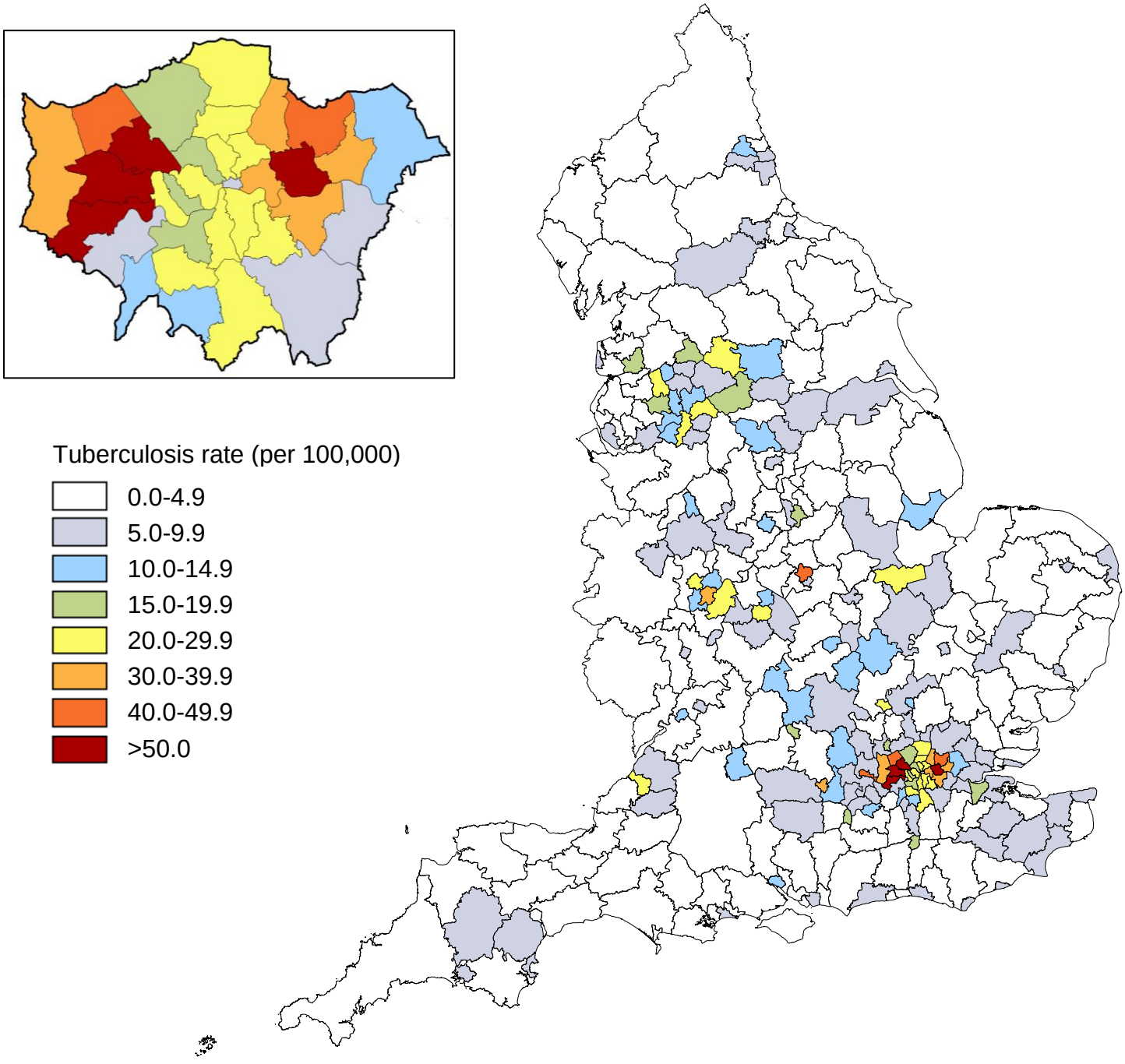
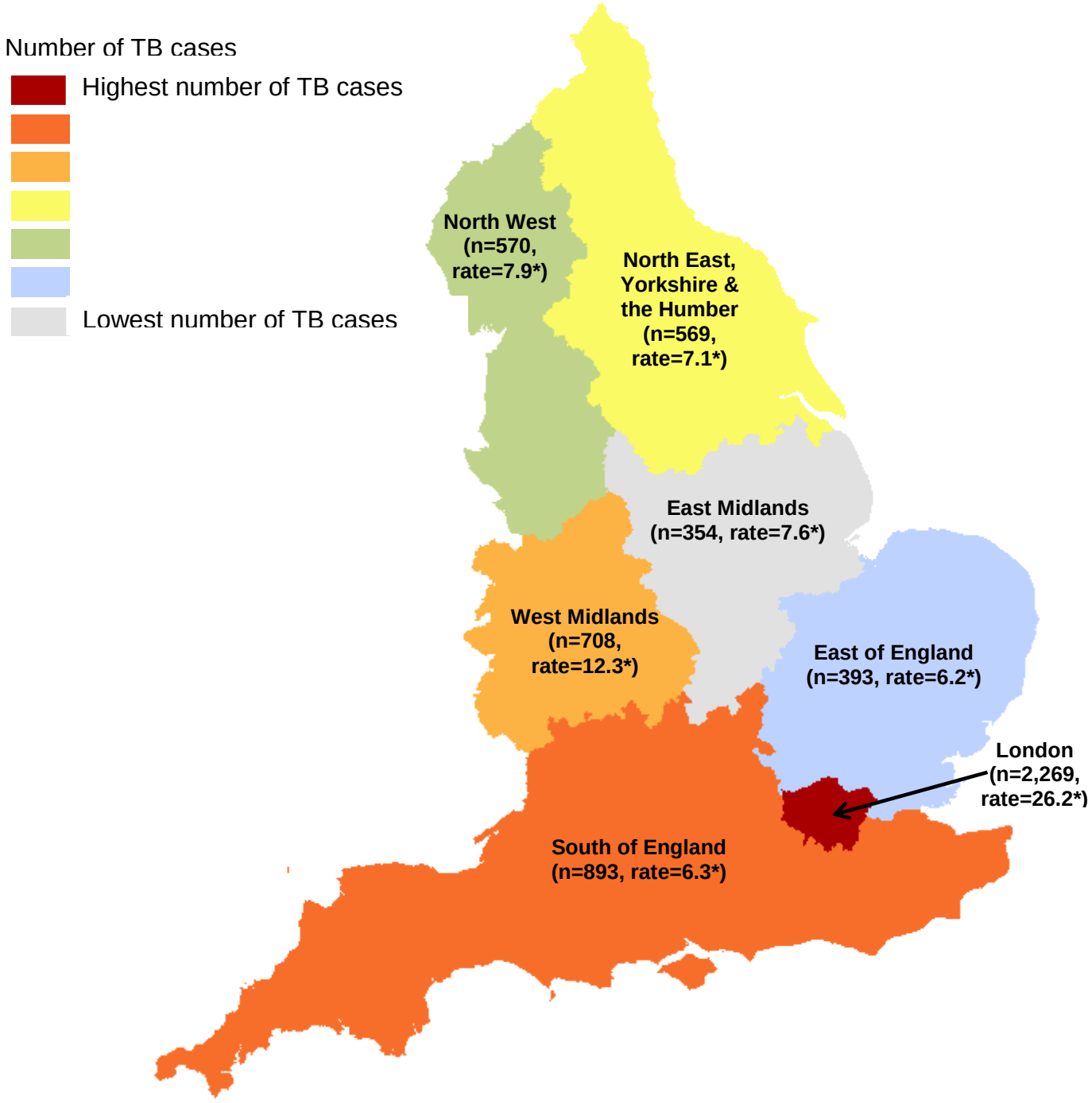


Figure 1.4: TB case notifications and rates by TB control board[1], England, 2015



* per 100,000

1 The TB Control Boards (TBCBs) are aligned with PHEC boundaries other than North East and the 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

Demographic characteristics

Age and sex

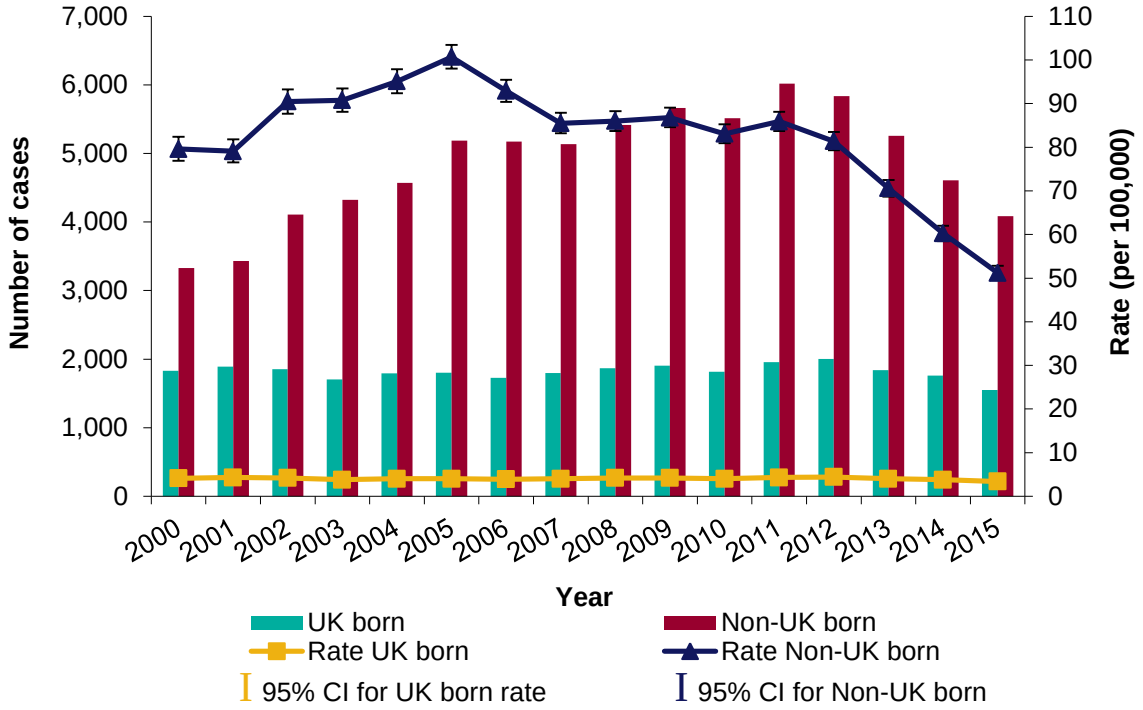
In 2015, 59.2% (3,407/5,758) of all cases were male and 58.0% (3,338/5,758) of all cases were aged 15 to 44 years old. The rate of TB was highest in those aged 25 to 29 years (20.3 per 100,000), followed closely by those aged 35 to 39 years (19.6 per 100,000), and was lowest in children aged 5 to 9 years (1.5 per 100,000). A total of 220 cases were notified in children aged 0 to 14 years in 2015 (Table Ai.1.3). For the rate of TB in UK born children over time, a proxy of TB transmission in England, see Chapter 3.

Non-UK born TB cases

In 2015, 72.5% (4,087/5,637) of TB cases with a known place of birth, were born outside the UK. The number of non-UK born TB cases has declined year-on-year since 2011, from a peak of 6,021 cases in 2011 to 4,087 in 2015 (Figure 1.5, Table Ai.1.4). The rate of TB in the non-UK born population has been declining over a more prolonged period, from a peak of 100.7 per 100,000 in 2005 to 51.2 per 100,000 in 2015. In 2015, the rate of TB in the non-UK born population was at its lowest since 2000 (Figure 1.5, Table Ai.1.4).

In 2015, the rate of TB in this population remained 15 times higher than the rate in the UK born population. In 2015, the highest rate of TB in the non-UK born population was in those aged 25 to 29 years (73.9 per 100,000), and those aged 75 to 79 years (72.1 per 100,000) (Figure 1.6, Table Ai.1.3).

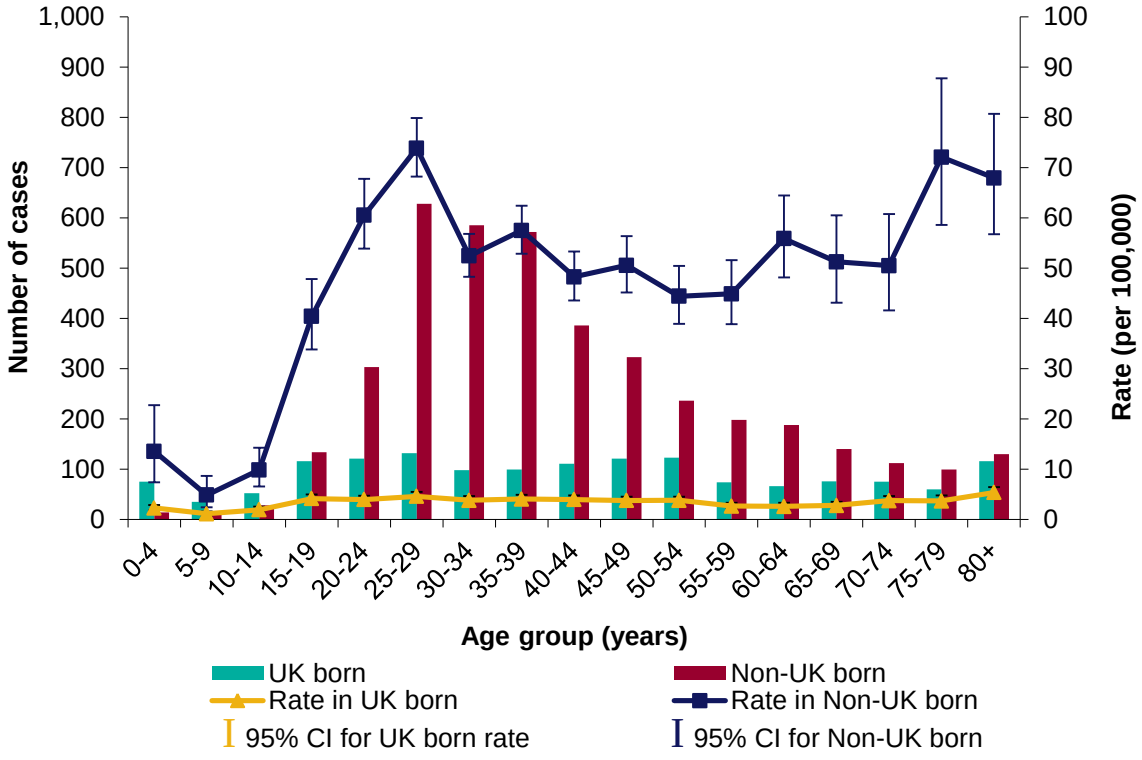
Figure 1.5: TB case notifications and rates by place of birth, England, 2000-2015



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

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

Figure 1.6: TB case notifications and rates by age group and place of birth, England, 2015



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

In 2015, the highest rates of TB in the non-UK born population were in the West Midlands PHEC (62.3 per 100,000), Yorkshire and the Humber PHEC (59.8 per 100,000), and North East PHEC (58.3 per 100,000) (Figure 1.7, Table Ai.1.5).

Figure 1.7: TB case notifications and rates by PHE Centre and place of birth, 2000-2015

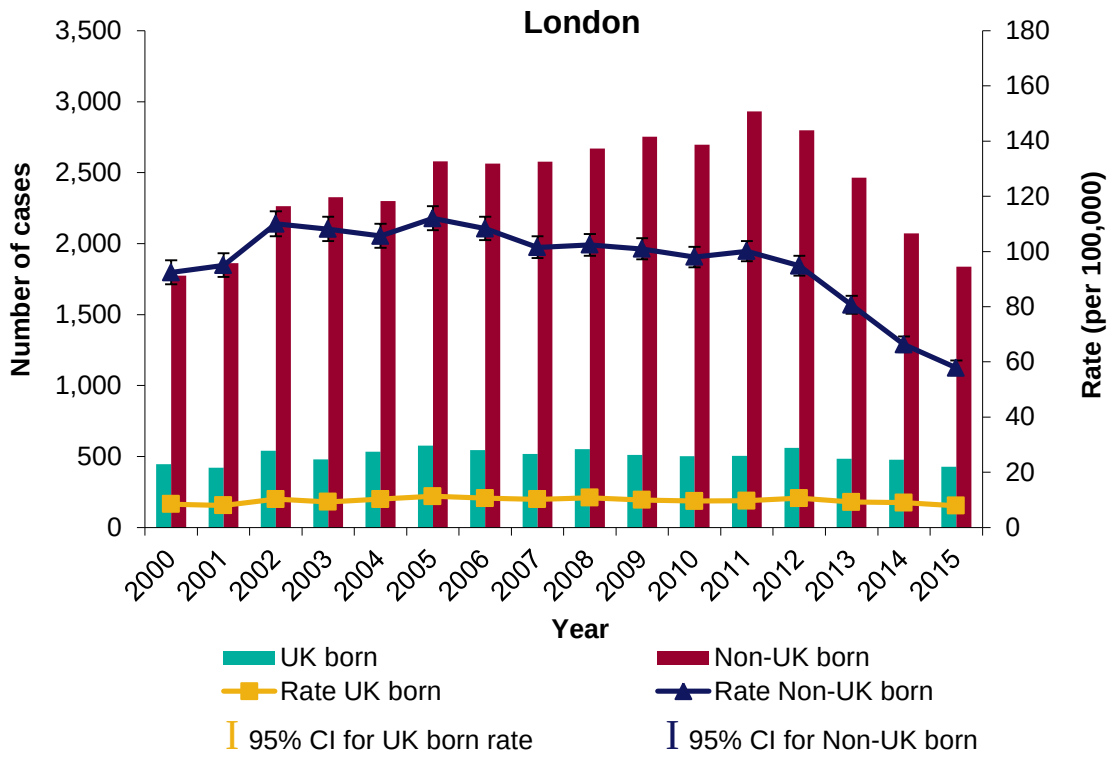
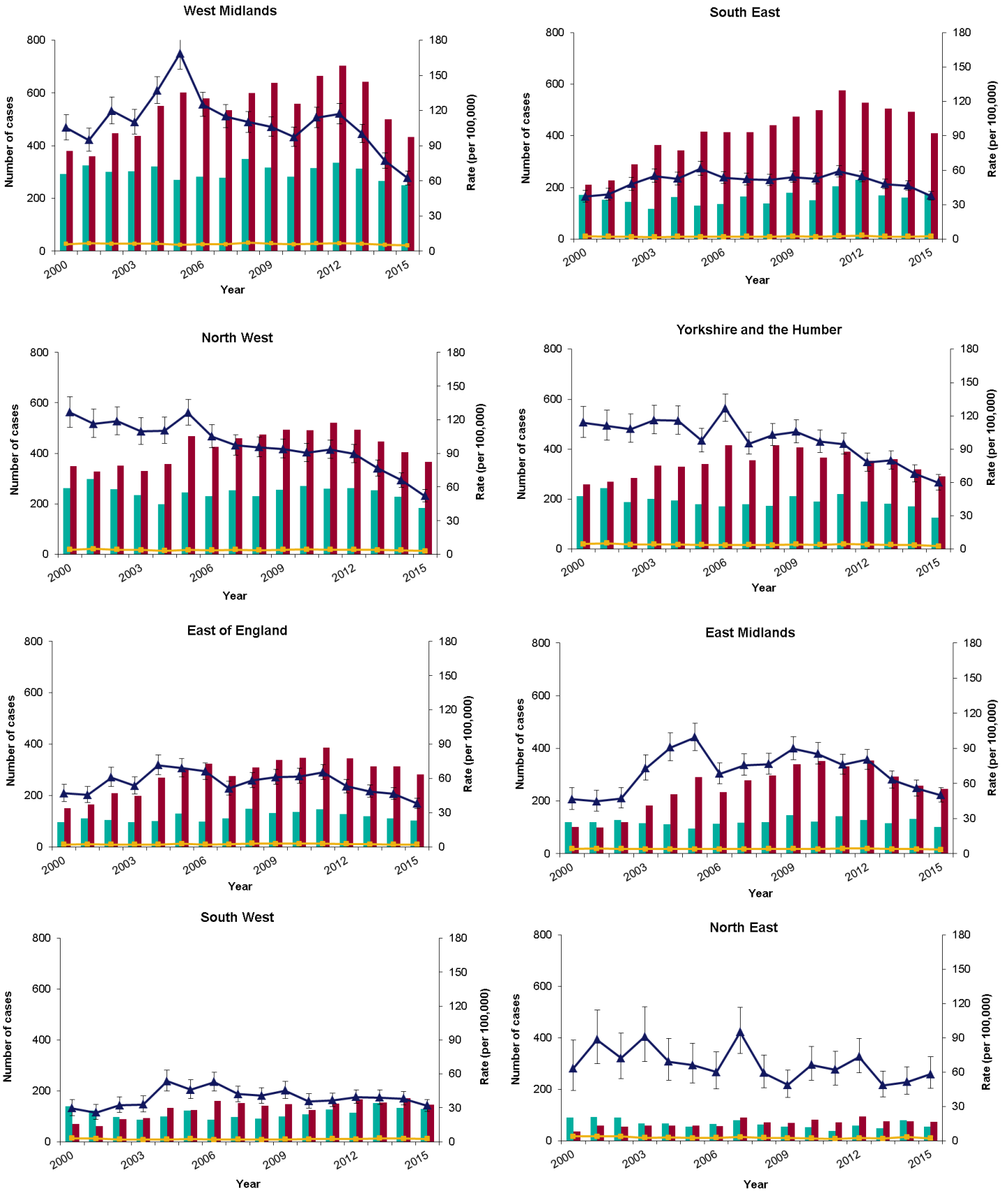
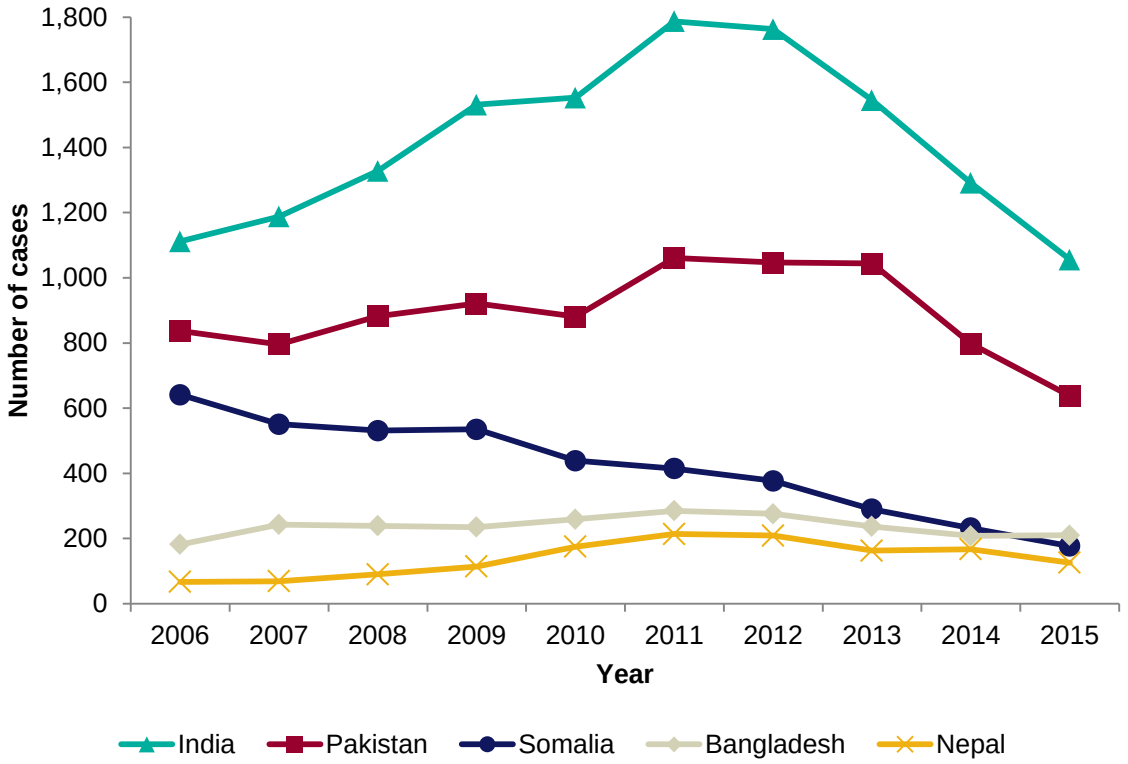


Figure 1.7: TB case notifications and rates by PHE Centre and place of birth, 2000-2015 continued



In 2015, as in previous years, the most frequent countries of birth for non-UK born cases were India, Pakistan, Bangladesh and Somalia (26.3%, 15.9%, 5.2% and 4.4%, respectively) (Table Ai.1.6). The reduction in the number of cases born in these four countries accounted for 81.0% (1,382/1,707) of the decrease in numbers of non-UK born cases[2] between 2012 and 2015 (Figure 1.8). In contrast, the number of cases born in Romania has increased by a half since 2012 (53.2%), although the number of cases born there is still relatively low (2012: 77 versus 2015: 118) (Table Ai.1.6).

Figure 1.8: Trend in TB case notifications for the top five countries of birth* of non-UK born cases, England, 2006-2015



* Five most frequent countries of birth in 2015

Fifteen per cent (15.2%, 587/3,854) of non-UK born cases[3] were notified within two years of entering and 37.6% (1,450/3,854) within six years of entering the UK (Figure 1.9, Table Ai.1.7). There is a large variation in time between entry to the UK and TB notification by country of birth (Table 1.1). The decrease in the number of cases in the non-UK born population between 2012 and 2015 has mainly occurred among migrants notified within six years of entering the UK, with a 41.6% (2012: 2,482 versus 2015: 1,450) decrease during this time period. This has led to a progressively smaller proportion of non-UK born cases being notified within six years, and a correspondingly larger proportion of cases notified more than 11 years since entering the UK (Figure 1.9, Table Ai.1.7).

[2] Where country of birth was known
[3] Where time between entry to the UK and notification is known

Figure 1.9: Time between entry to the UK and TB notification for non-UK born cases, England, 2006-2015

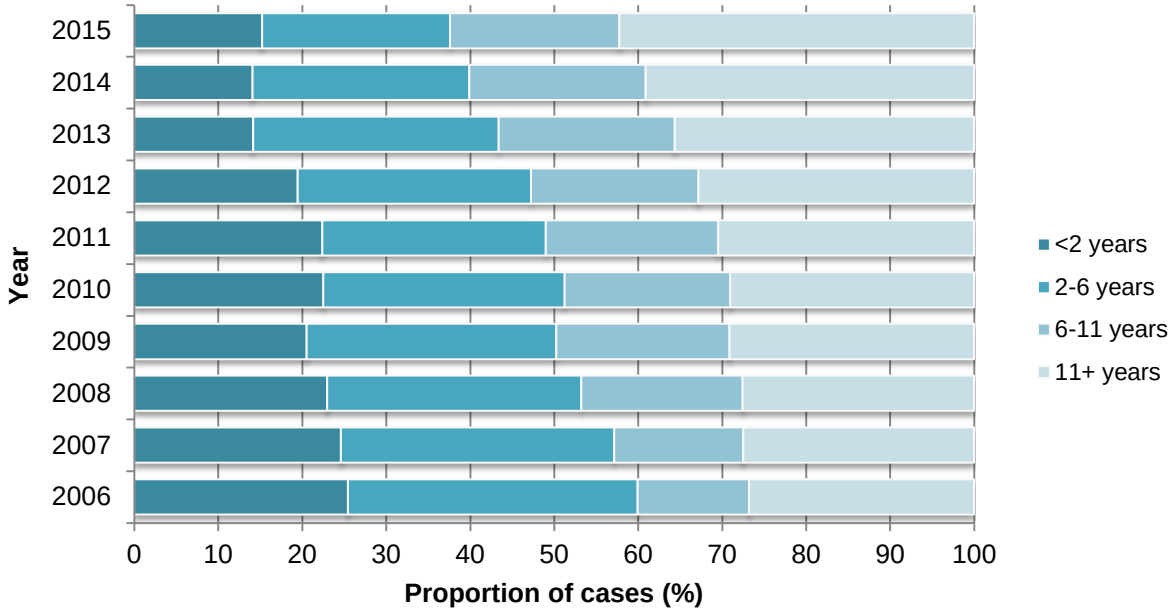


Table 1.1: Most frequent countries of birth for TB cases and time between entry to the UK and TB notification, England, 2015

Country of birth	Number of cases	Proportion of cases (%)*	Median time since entry to UK (IQR)**
United Kingdom	1,550	27.8	-
India	1,056	19.0	8 (3-18)
Pakistan	638	11.5	10 (4-25)
Bangladesh	210	3.8	10 (5-22)
Somalia	177	3.2	11 (5-16)
Nepal	126	2.3	5 (3-8)
Nigeria	118	2.1	8 (4-13)
Romania	118	2.1	1 (0-5)
Philippines	105	1.9	9 (5-14)
Zimbabwe	102	1.8	13 (11-14)
Eritrea	91	1.6	1 (0-6)
Poland	72	1.3	5 (2-9)
Afghanistan	69	1.2	8 (4-14)
Kenya	60	1.1	18 (10-43)
Sri Lanka	57	1.0	9 (5-16)
Other (each <1%)	1,023	18.4	9 (3-19)
Total*	**5,572**	**100.0**	**9 (3-16)**

* Where country of birth was known
** Years, IQR refers to interquartile range

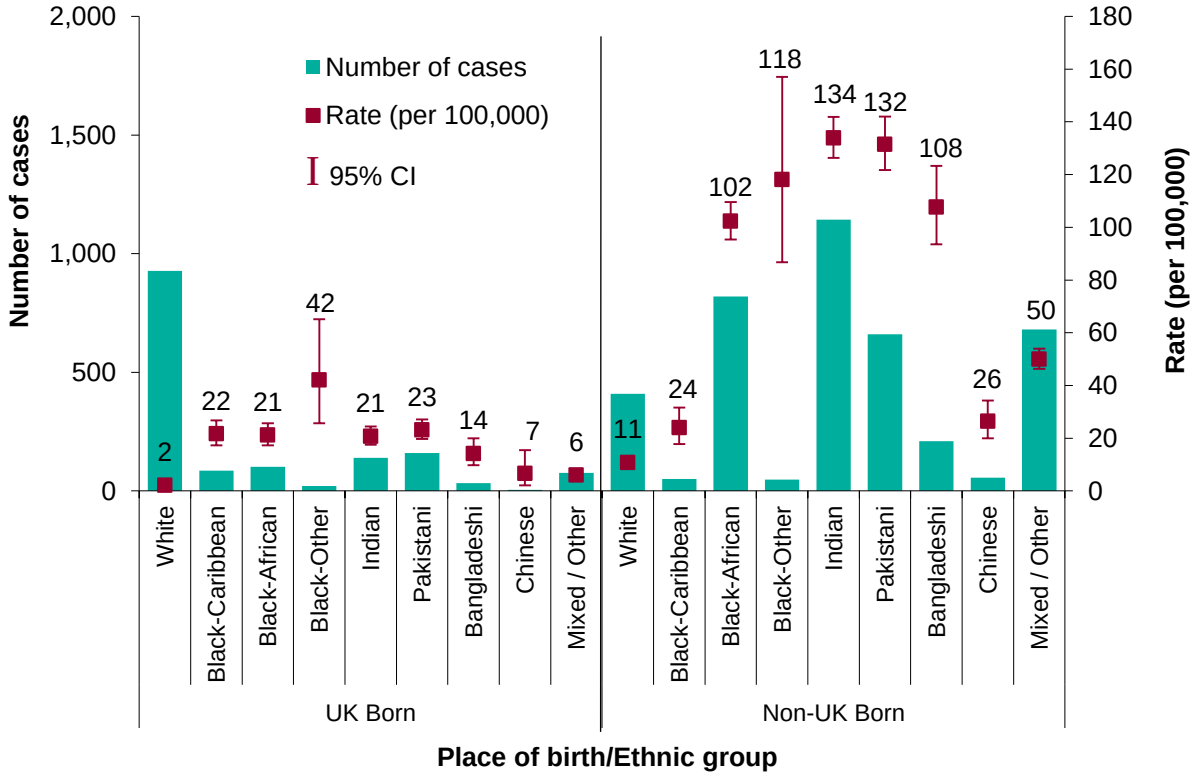
UK born TB cases

In 2015, there were 1,550 TB cases among the UK born population, a rate of 3.4 per 100,000 (Figure 1.5, Table Ai.1.4). Since 2012, there has been a 22.7% decrease in both the number and the rate of TB cases in the UK born population. The largest decline in the rate occurred between 2014 and 2015 (-10.5%).

The age distribution of UK born cases differs substantially to that of non-UK born cases, with a fairly even number of cases in all the adult age groups, and the highest rate in the population aged 80 years and older (5.4 per 100,000, 95% CI 4.4-6.4) (Figure 1.6, Table Ai.1.3).

Of the UK born TB cases notified in 2015 where ethnic group was known, the majority (60.0%, 928/1,547) were from the White ethnic group, 21.5% (332/1,547) from South Asian ethnic groups (Indian, Pakistani and Bangladeshi) and 13.3% (206/1,547) from Black ethnic groups (Black-Caribbean, Black-African and Black-Other). However, the rates were highest in the non-White ethnic groups, with rates between three and nineteen times higher than in the White ethnic group (Figure 1.10, Table Ai.1.8).

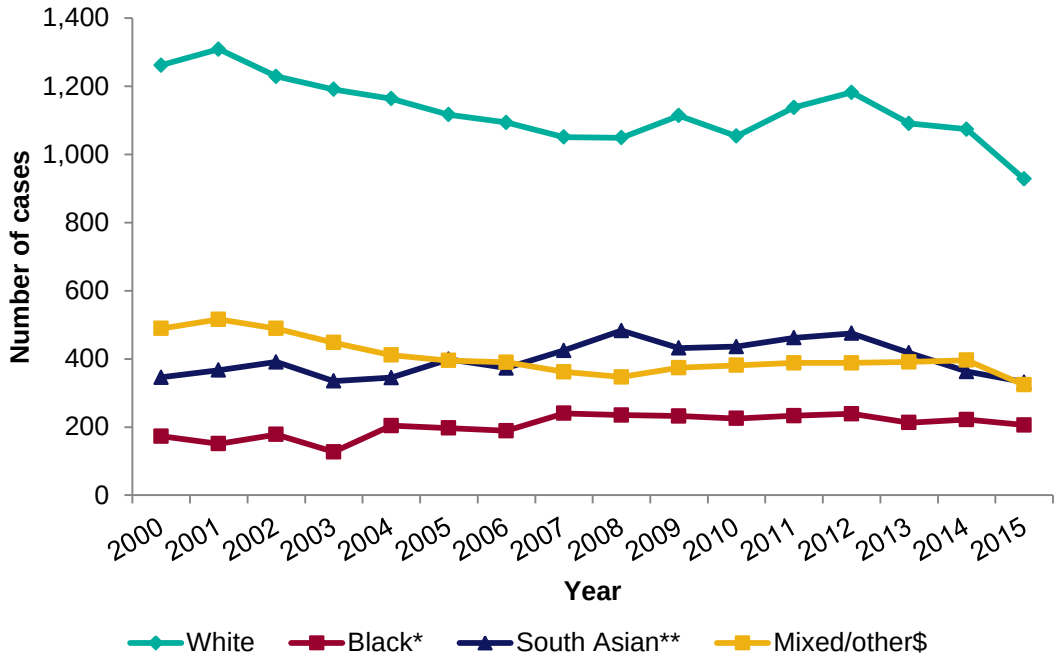
Figure 1.10: TB case notifications and rates by place of birth and ethnic group, England, 2015



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

The decline in the number of cases in the UK born population since 2012 has occurred among all ethnic groups, with the largest decline in the White (-21.5%) and South Asian (-30.1%) ethnic groups (Figure 1.11, Table Ai.1.9).

Figure 1.11: Number of UK born TB cases over time by ethnic group, England, 2000-2015



* Cases with Black-Caribbean, Black-African and Black-Other ethnic groups were grouped as 'Black'
** Cases with Indian, Pakistani and Bangladeshi ethnic groups were grouped as 'South Asian'
$ Cases with Mixed/Other and Chinese ethnic groups were grouped as 'Mixed/other'

Occupation

Among cases notified in 2015 aged between 16 and 64 with a known occupation, 34.6% (1,509/4,358) were not in education or employment (for further information see Chapter 7); 11.1% (485) were either studying or working in education, 6.9% (300) were healthcare workers, and the remaining cases (47.4%, 2,064) were classed as working in other occupations.

Clinical characteristics

Site of disease

Over half of cases[4] notified in 2015, had pulmonary disease (53.4%, 3,065/5,744) (Table 1.2) and over one-fifth (21.9%, 672/3,065) of these also had extra-pulmonary disease in at least one other site. A much higher proportion of non-UK born cases had extra-pulmonary disease only (53.1%, 2,166/4,079 in 2015), compared with UK born cases (30.1%, 465/1,546 in 2015) (Table Ai.1.10).

[4] Where site of disease was known

Table 1.2: TB case notifications by site of disease, England, 2015

Site of disease*	Number of cases	Proportion (%)**
Pulmonary	3,065	53.4
Miliary	181	3.2
Laryngeal	14	0.2
Extra-pulmonary	3,351	58.3
Extra-thoracic lymph nodes	1,328	23.1
Intra-thoracic lymph nodes	771	13.4
Unknown extra-pulmonary	567	9.9
Pleural	472	8.2
Other extra-pulmonary	396	6.9
Gastrointestinal	337	5.9
Bone – spine	258	4.5
Bone – not spine	128	2.2
CNS – meningitis	141	2.5
Genitourinary	118	2.1
CNS – other	109	1.9
Cryptic disseminated	47	0.8

* With or without disease at another site
** Proportion of cases with known sites of disease (5,744), total exceeds 100% due to disease at more than one site
CNS - Central Nervous System

Directly observed therapy (DOT)

Information on whether a case received DOT[5] was known for 94.1% of cases (5,416/5,758) notified in 2015. Of these, 13.8% (746) were reported to have received DOT (for further information see Chapter 7). In 2015, 29.4% (59/201) of cases aged 0 to 14 years received DOT (Table Ai.1.11).

Previous history of TB

For cases[6] notified in 2015, 6.7% (370/5,543) had a previous diagnosis of TB more than 12 months before their current notification. Among those with a previous diagnosis of TB, 92.6% (263/284) had previously been treated for TB and 33.5% (114/340) received DOT during their current notification of TB. Time since previous diagnosis was known for 91.1% (337/370) of these cases, with a median time since previous diagnosis of 7 years (IQR 3-22 years).

[5] 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”.
[6] With known previous history of TB

Smoking status

Information on current smoking status at onset of symptoms, presentation or during care was collected from 2 July 2015. Between 2 July 2015 and 31 December 2015 information on smoking status was known for 76.0% (1,342/1,766) of notified TB cases. Where information was known, 19.3% (259/1,342) were current smokers.

Travel and visitor risk factors

History of travel to and visitors received from a country outside the UK (excluding Western Europe, US, Canada, New Zealand and Australia) in the last two years prior to TB diagnosis has been collected since 13 May 2015. Between 13 May 2015 and 31 December 2015, information on travel history and visitor history was known for 65.0% and 55.1% of notified TB cases, respectively. Where information was known, 23.2% (342/1,476) of TB cases had travelled outside the UK and 6.8% (85/1,252) had received a visitor from outside the UK. Where the country of travel or origin of visitor was known, 75.1% (244/325) of cases travelled to their country of birth and 77.5% (62/80) of cases had received a visitor from their country of birth.

2. Laboratory confirmation of TB

Key messages

- the proportion of TB cases that were culture confirmed has remained stable over the past decade (58%-61%)
- a higher proportion of pulmonary TB cases were culture confirmed compared with extra-pulmonary TB cases (73% versus 46%)
- culture confirmation was lowest (23%) among cases aged 0 to 14 years
- only 62% of all pulmonary TB cases had a sputum smear result reported, and half of these (52%) were positive
- 32% of all cases were not confirmed by any laboratory method (culture, microscopy, histology or PCR)

Laboratory tests data collection

Data for all culture confirmed TB isolates from the Mycobacteria Reference Laboratories, including speciation, drug susceptibility testing and Mycobacterial Interspersed Repetitive Unit-Variable Number Tandem Repeats (MIRU-VNTR) typing were matched to TB case notifications (see Appendix III: Methods), and the results were used to report culture confirmation. Results for microscopy, PCR and histology were also collected in ETS (see Appendix III: Methods).

Culture confirmation

Of the TB cases notified in 2015, 60.1% (3,460/5,758) were culture confirmed. Over the past decade, the proportion of TB cases that were culture confirmed remained relatively stable (Table Ai.2.1). In 2015, as in previous years, a higher proportion of pulmonary cases were culture confirmed compared with extra-pulmonary cases (72.7%, 2,228/3,065 versus 45.9%, 1,231/2,679).

Culture confirmation varied by PHEC, with the highest proportion of culture confirmed cases in the East Midlands (66.9%, 237/354) and the lowest in the West Midlands (56.8%, 402/708) (Table Ai.2.1). Culture confirmation of pulmonary cases was also highest in the East Midlands (78.2%, 165/211), and was lowest in the South West PHEC (63.0%, 121/192) (Table Ai.2.2).

In 2015, as in previous years, the proportion of culture confirmation was lower among TB cases aged 0 to 14 years (22.7%, 50/220) compared with those aged 15 to 44 years (63.5%, 2,121/3,338), 45 to 64 years (57.4%, 778/1,355) and 65 years and older (60.5%, 511/845).

Among culture confirmed TB cases notified in 2015 (3,460), 97.2% (3,364) were identified as *Mycobacterium tuberculosis (M. tuberculosis*), 0.9% (32) *Mycobacterium bovis (M. bovis),* 1.6% (56) *Mycobacterium africanum (M. africanum)* and 0.2% (8) *Mycobacterium tuberculosis complex* (MTBC), which were not further differentiated (Table Ai.2.3).

Sputum smear test results

Of all pulmonary TB cases notified in 2015, only 61.6% (1,888/3,065) had a sputum smear (microscopy) result reported, of which half (52.4%, 990/1,888) were positive. Ninety three percent (93.4%, 925/990) of those with a positive sputum smear were also culture confirmed, compared with only 63.4% (569/898) of sputum smear negative cases. Fifteen percent (14.5%, 443/3,065) of pulmonary TB cases had no sputum smear result or culture confirmation.

Other laboratory test results

In 2015, 18.7% (429/2,298) of TB cases that were not culture confirmed had an alternative positive laboratory test (microscopy, histology or PCR) result indicative of TB, with the highest proportion (12.1%, 279/2,298) histology positive (Table 2.1). A high proportion (81.3%, 1,869/2,298) of cases that were not culture confirmed did not have any other known positive test result reported. Overall, almost one-third (32.5%, 1,869 /5,758) of all cases were not confirmed by any laboratory method (culture, microscopy, histology or PCR), similar to the proportion in 2014 (32.2%, 2,082/6,472).

Table 2.1: Number and proportion of non-culture confirmed TB cases by other lab diagnostic confirmation, England, 2015

Laboratory test results*	Pulmonary		Extra-pulmonary		All cases**	
	n (837)#	%	n (1,448)#	%	n (2,298)#	%
Sputum smear positive	65	7.8	0	0.0	65	2.8
Smear positive (not sputum)	29	3.8	40	2.8	69	3.1
Histology positive	48	5.7	231	16.0	279	12.1
PCR positive	10	1.2	22	1.5	32	1.4
No known positive lab result	691	82.6	1,165	80.5	1,869	81.3

* Some cases may have more than one test result therefore the total percentage may exceed 100%
** Total cases including those with an unknown site of disease
# Total number of non-culture confirmed TB cases, used as the denominator in proportion of laboratory test results shown

TB isolates[7] not matched to notified cases

The number and proportion of isolates received from Mycobacteria Reference Laboratories that could not be matched to a notified case in the previous, same or subsequent year, have decreased from 471 isolates (9.2%) in 2006 to 99 isolates (2.5%) in 2014 (Table 2.2). In 2015, isolates from 259 (7.3%) individuals could not be matched to a case notified in the previous or same year (Table 2.2). As in previous years, the proportion of unmatched isolates for 2015 is likely to decrease further once matched to 2016 notifications.

Unmatched isolates may be due to TB cases that were not notified to the surveillance system, thereby providing an estimate of under-reporting. Although isolates may have failed to match to a notified case if personal identifiers were incomplete or inaccurate and a small number may represent contaminants (which were not identified as contaminants in surveillance reporting).

Table 2.2: Unmatched isolates by specimen year, England, 2006-2015

Specimen year	Unmatched to a case within the previous or same year		Unmatched to a case within the previous, same or subsequent year		All isolates*
	n	%	n	%	n
2006	660	12.9	471	9.2	5,134
2007	603	12.3	416	8.5	4,890
2008	665	13.3	424	8.5	5,015
2009	582	11.6	353	7.0	5,038
2010	475	9.7	237	4.8	4,906
2011	493	9.3	205	3.8	5,327
2012	418	8.3	153	3.0	5,022
2013	358	7.9	151	3.4	4,505
2014	261	6.6	99	2.5	3,953
2015	259	7.3	-	-	3,548

* Deduplicated based on patient identifiers to represent one isolate per case per notification period

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

3. TB transmission

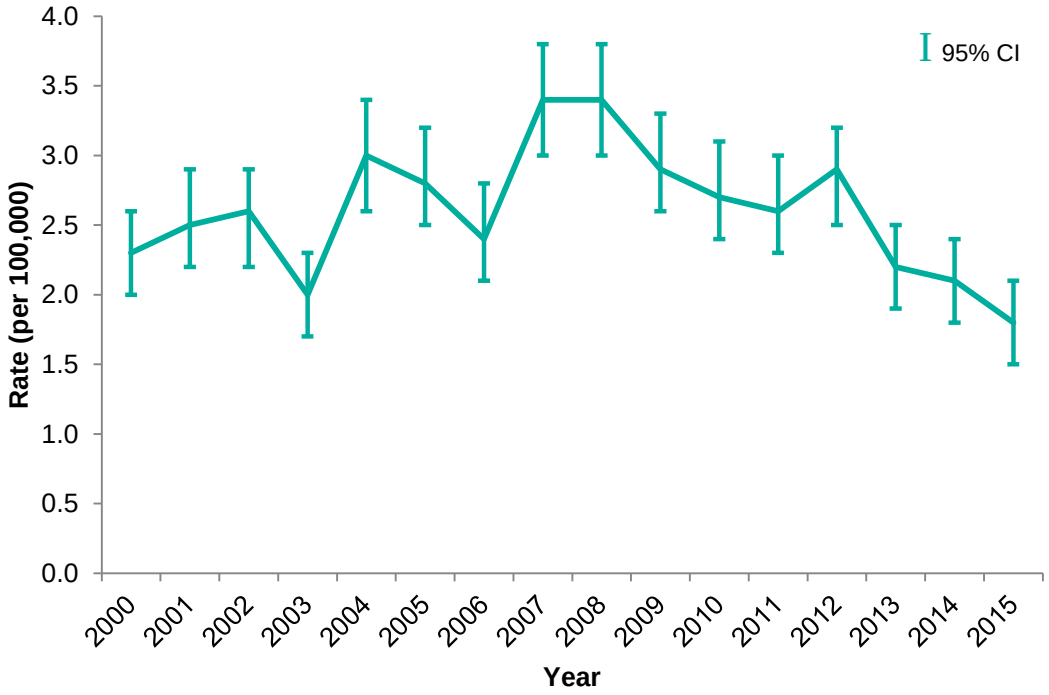
Key messages

- in 2015, the rate of TB in UK born children, a proxy for recent transmission in England, continued to decline to 1.8 per 100,000; this is a 47% reduction from the peak of 3.4 per 100,000 in 2008
- the proportion of MIRU-VNTR strain typed TB cases that clustered has decreased from 61% in 2012 to 56% in 2015, and the number of new clusters formed each year has also decreased over this time period
- the majority of strain type clusters between 2010 and 2015 were small, with almost half (46%) containing only two cases

Rate of TB in UK born children

In 2015, the rate of TB in UK born children under 15 years of age, a proxy for recent transmission within England, was 1.8 per 100,000 (95% CI 1.5-2.1). There has been a 47.1% reduction in this rate since the peak of 3.4 per 100,000 (95% CI 3.0-3.8) in 2007 and 2008 (Figure 3.1, Table Ai.3.1).

Figure 3.1: Rate of TB in UK born children*, England, 2000-2015



* Aged 0 to 14 years

TB Monitoring Indicator 5: Incidence of TB in UK born children aged under fifteen years (England)

Strain typing and clustering

The National TB Strain Typing Service in England, established in 2010, prospectively types TB isolates using 24 loci MIRU-VNTR. Clustered cases (with indistinguishable MIRU-VNTR strain types) may reflect cases that are part of the same chain of transmission, but could also reflect common endemic strains circulating either within England or abroad. MIRU-VNTR strain typing can be used to refute transmission between individuals who have distinguishable strain types, but an indistinguishable strain type does not confirm transmission; additional epidemiological information is required to assess whether cases with indistinguishable strain types are likely to reflect recent transmission.

In 2015, 60.1% (3,460/5,758) of notified TB cases were culture confirmed and of those, 87.7% (3,034/3,460) had an isolate with at least 23 loci typed (Table 3.1). For culture confirmed cases notified between 2010 and 2015, 83.0% (21,839/26,314) had strain typing completed for at least 23 loci, and 58.4% (12,752/21,839) of these cases clustered in 2,539 molecular clusters and 41.6% (9,087) had a unique strain type (Table 3.1, Table Ai.3.2). The proportion of clustered cases varied by PHEC; the areas with the largest number of cases generally had the highest proportion of clustered cases (Table Ai.3.2).

Table 3.1: Number and proportion of clustered cases and new clusters by place of birth and year, England, 2010-2015

Year	Culture confirmed cases	≥23 loci typed cases*		Clustered cases**		Non-UK born clustered cases		UK born clustered cases		New clusters (per year)#
	n	n	%	n	%	n	%	n	%	n
2010	4,609	3,224	70.0	1,884	58.4	1,308	55.4	491	68.1	367
2011	5,031	4,268	84.8	2,484	58.2	1,695	54.1	714	72.0	539
2012	4,897	4,304	87.9	2,606	60.5	1,793	56.8	740	73.1	535
2013	4,393	3,662	83.4	2,194	59.9	1,512	56.0	641	71.6	405
2014	3,924	3,347	85.3	1,901	56.8	1,293	52.9	574	67.5	413
2015	3,460	3,034	87.7	1,683	55.5	1,139	52.0	517	65.6	280
Total	**26,314**	**21,839**	**83.0**	**12,752**	**58.4**	**8,740**	**54.7**	**3,677**	**69.9**	**2,539**

* % ≥23 loci is the proportion of culture confirmed cases which have had at least 23 loci typed
** Clustered in time period (2010-2015), clustered cases notified in year
# A new cluster forms at the point when a second case is notified with indistinguishable MIRU-VNTR strain type as an existing case

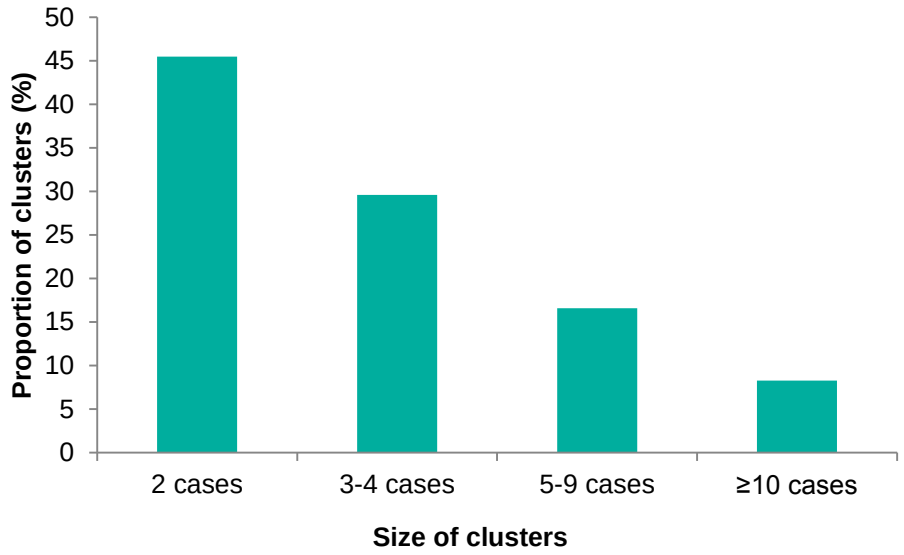
The proportion of cases that clustered with at least one other case within the six year period from 2010 to 2015 increased from 58.4% (1,884/3,224) in 2010 to 60.5% (2,606/4,304) in 2012, and has since declined to 55.5% (1,683/3,034) in 2015 (Table 3.1). The number of new clusters that formed each year[8] peaked at 539 in 2011, and

[8] A new cluster forms at the point when a second case is notified with an indistinguishable MIRU-VNTR strain type as an existing case

has subsequently reduced to 280 new clusters in 2015. Over the last six years a higher proportion of UK born TB cases clustered with at least one other case (69.9%, 3,677/5,257), compared with non-UK born TB cases (54.7%, 8,740/15,983).

Over the six year period 2010 to 2015, there were a total of 2,539 clusters in England, with a median cluster size of three cases (range 2-226). The majority of clusters (75.1%; 1,906/2,539) were small in size (<5 cases), with 45.5% (1,154) having only two cases in the cluster (Figure 3.2, Table Ai.3.2).

Figure 3.2: Proportion of clusters by size, England, 2010-2015



The reduction in the rate of TB among UK born children, the decrease in the proportion of clustered cases and the reduction in the number of new clusters each year all suggest that there has been a decrease in TB transmission within England in recent years.

Whole genome sequencing

Whole genome sequencing (WGS) of *Mycobacterium tuberculosis* complex isolates provides information on Single Nucleotide Polymorphism (SNP) differences between isolates, which provides more information than the currently deployed method (MIRU-VNTR strain typing) on how isolates are related to each other. WGS will provide greater understanding of whether isolates are likely to be part of the same transmission chain, and may also help determine the timing and direction of transmission [2, 3, 4].

PHE is close to deploying the use of WGS for TB throughout England. This new technology will add to our understanding of TB transmission by providing robust genomic information to be used in conjunction with epidemiological and surveillance information.

4. Delay from symptom onset to treatment start

Key messages

- in 2015, the median time between symptom onset and treatment start for pulmonary cases was 72 days
- in 2015, more than a quarter of pulmonary cases (28%) experienced a delay of more than four months between symptom onset and treatment start
- a higher proportion of UK born cases (33%) experienced a delay of more than four months compared with non-UK born cases (25%)
- there has been a small reduction in the proportion of non-UK born cases with a delay of more than four months in 2015 (from 29% in 2014)
- a low proportion (10%) of children aged 0 to 14 years old experienced a delay of more than four months; in contrast, 35% of those aged 65 years and older experienced a delay of more than four months

Time from symptom onset to treatment start for pulmonary TB cases

Information on time from symptom onset to treatment start was available for 92.4% (2,771/2,999) of pulmonary cases notified in 2015. Data on the time from symptom onset to treatment start has been available for more than two-thirds of cases since 2011 and data completion has improved during this period. Current data completeness on date of first presentation to health services does not enable us to distinguish late presentation to health services from delays occurring within the health service.

In 2015, the median time between symptom onset and treatment start was 72 days (interquartile range (IQR) 36-132). Forty three percent (1,186/2,771) of pulmonary cases started treatment within two months, and 29.4% (816/2,771) between two and four months from symptom onset. Since 2011, at least one-quarter of pulmonary cases had a delay from symptom onset to treatment start of more than four months; in 2015, 27.8% (769/2,771) of pulmonary cases had a delay of more than four months (Table 4.1).

As in previous years, the proportion of cases in 2015 that experienced a delay of more than four months increased with age (0-14: 9.8%, 15-44: 25.5%, 45-64: 30.8%, over 65: 35.3%) (Table 4.2).

Table 4.1: Number and proportion of pulmonary TB cases by time from symptom onset to treatment start, England, 2011-2015

Year	0-2 months		2-4 months		>4 months		Total*
	n	%	n	%	n	%	n
2011	1,318	45.0	855	29.2	754	25.8	**2,927**
2012	1,368	44.0	923	29.7	815	26.2	**3,106**
2013	1,224	41.2	898	30.3	846	28.5	**2,968**
2014	1,158	39.5	888	30.3	888	30.3	**2,934**
2015	1,186	42.8	816	29.4	769	27.8	**2,771**

* The number of pulmonary cases with time between symptom onset to start of TB treatment available, excluding those diagnosed post-mortem and those who did not start treatment

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

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

Table 4.2: Number and proportion of pulmonary TB cases by time from symptom onset to treatment start by age group, England, 2015

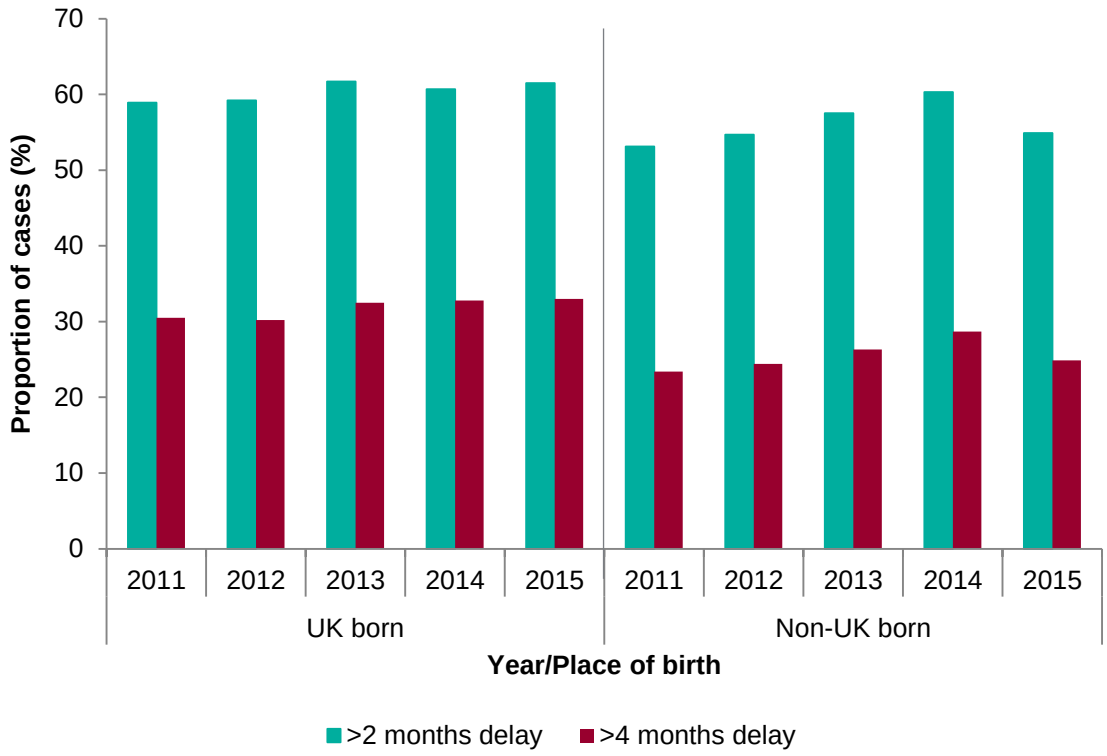
Time from symptom onset to treatment start	Age group									
	0-14 years		15-44 years		45-64 years		65+ years		All*	
	n	%	n	%	n	%	n	%	n	%
0-2 months	75	73.5	676	43.1	264	39.9	171	39.0	1,186	42.8
2-4 months	17	16.7	492	31.4	194	29.3	113	25.7	816	29.4
>4 months	10	9.8	400	25.5	204	30.8	155	35.3	769	27.8
Total	**102**	**100.0**	**1,568**	**100.0**	**662**	**100.0**	**439**	**100.0**	**2,771**	**100.0**

* The number of pulmonary cases with time between symptom onset to start of TB treatment available, excluding those diagnosed post-mortem and those who did not start treatment

The proportion of pulmonary cases with a delay of more than four months varied by PHE Centre, with the highest proportion in the South East (37.4%, 111/297) and the lowest proportion in the North East (18.0%, 11/61) (Table Ai.4.1).

UK born cases have consistently experienced a longer delay from symptom onset to treatment start than non-UK born cases (Figure 4.1 and Table Ai.4.2). Among non-UK born cases there was an annual increase in the proportion of cases with a delay of more than four months from 2011 (23.4%) to 2014 (28.7%) , followed by a small decrease in 2015 (24.9%, 440/1,765).

Figure 4.1: Proportion of pulmonary TB cases with a delay from symptom onset to treatment start by place of birth, England, 2011-2015



5. TB outcomes in the drug sensitive cohort

Key messages

- following a year-on-year improvement, there has been a slight reduction in the proportion of TB cases (with an expected treatment duration of less than 12 months) who had completed treatment by 12 months, from 85.4% of cases notified in 2013 to 84.5% of cases notified in 2014
- the number and proportion of all drug sensitive cases who had died at the last recorded outcome has slightly increased from 4.7% (336) of those notified in 2013 to 5.5% (351) of those notified in 2014
- the proportion of all drug sensitive cases who were lost to follow-up at last recorded outcome was similar in 2013 (4.1%, 295) and 2014 (4.2%, 266)

Drug sensitive cohort, 2005-2014

For the purposes of international TB outcome reporting, the drug sensitive cohort is defined as excluding all cases in the drug resistant cohort. The drug resistant cohort comprises of TB cases with rifampicin resistant TB (initial or acquired) including MDR-TB (initial or acquired), and non-culture confirmed cases treated with an MDR-TB regimen [5]. Under this definition, cases with resistance to isoniazid, ethambutol and/or pyrazinamide but *without* resistance to rifampicin are included in the drug sensitive cohort. 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 cases with an expected duration of treatment less than 12 months, TB outcomes at 12 months are reported. This group excludes cases with CNS disease, who have an expected duration of treatment of 12 months. In addition, those with spinal, cryptic disseminated or miliary disease are excluded from this group, as CNS involvement cannot be reliably ruled out for the purposes of reporting.
- for cases with CNS, spinal, cryptic disseminated or miliary disease, the last recorded TB outcome is reported.

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

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

Information on TB outcomes at 12 months was available for 99.1% (5,667/5,716) of cases notified in 2014 in this cohort (Table 5.1).

Treatment completion

Table 5.1: TB outcome at 12 months for drug sensitive cases with expected treatment duration <12 months*, England, 2014

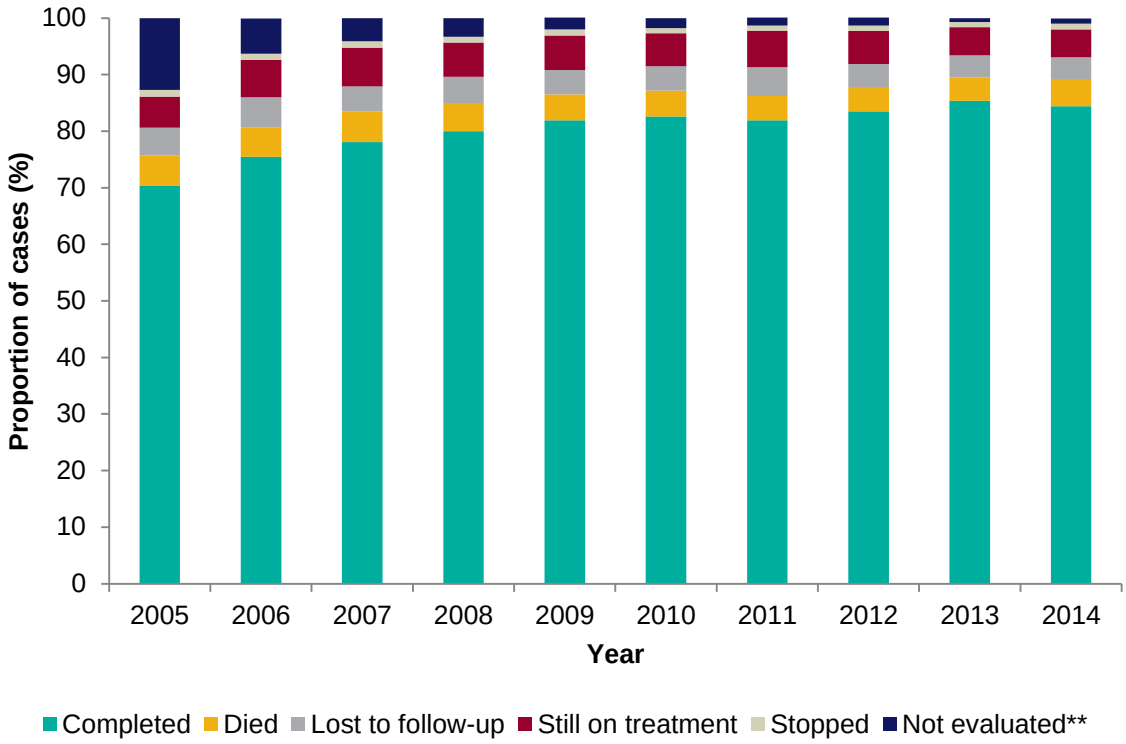
TB outcome	n	%
Completed	4,827	84.4
Died	277	4.8
Lost to follow-up	223	3.9
Still on treatment	280	4.9
Stopped	60	1.0
Not evaluated**	49	0.9
Total	**5,716**	**100.0**

* Excludes cases in the drug resistant cohort and those with CNS, spinal, miliary or cryptic disseminated TB
** Not evaluated includes missing, unknown and transferred out

There has been a year-on-year improvement in the proportion of cases completing treatment within 12 months from 2005 (70.3%) to 2013 (85.4%), followed by a slight reduction for cases notified in 2014 (84.4%, 4,827/5,716) (Figure 5.1, Table Ai.5.1). A further 2.2% (124/5,716) of cases notified in 2014 are known to have completed treatment after 12 months, bringing the overall treatment completion to 86.6% (4,951/5,716) at the last recorded outcome (Table Ai.5.2).

Time to completion at the last recorded outcome was known for 98.2% (4,862/4,951) of cases notified in 2014, of which 97.7% (4,748/4,862) completed treatment within 12 months. The majority (73.3%, 3,563/4,862) of these cases completed treatment between six and eight months. However, 5.5% (268/4,862) of cases completed treatment in less than six months (168 days), which is less than a full course of short-course treatment (Table Ai.5.3).

Figure 5.1: TB outcomes at 12 months for drug sensitive cases with expected treatment duration <12 months*, England, 2005-2014



* Excludes cases in the drug resistant cohort and those with CNS, spinal, miliary or cryptic disseminated TB
** Not evaluated includes missing, unknown and transferred out

As in previous years, the proportion of cases who completed treatment within 12 months decreased with age, from 93.5% (231/247) in those aged 0 to 14 years to 69.6% (592/851) in those aged 65 years or older (Table Ai.5.4). For cases aged 0 to 14 years, there was an improvement in treatment completion between 2011 (85.2%, 300/352) and 2014 (93.5%, 231/247). Treatment completion within 12 months was similar in females (86.4%, 2,039/2,361) and males (83.1%, 2,788/3,355).

Treatment completion at 12 months was lower in those with pulmonary disease only, compared to those with extra-pulmonary disease only (81.9%, 2,021/2,468 versus 88.0%, 2,305/2,618, respectively).

Treatment completion at 12 months varied by PHEC; from 87.2% (1,946/2,232) in London to 75.3% (219/291) in the South West (Table Ai.5.5). This variation in treatment completion at 12 months by PHEC was similar to previous years (Table Ai.5.6).

Still on treatment

Five percent (4.9%, 280/5,716) of cases were still on treatment at 12 months (Table 5.1, Table Ai.5.1), although it is known from the last recorded outcome that nearly half of these (44.3%, 124/280) eventually completed treatment. Just over one-third (33.9%, 66/195) of cases still on treatment at 12 months with known drug sensitivity results were resistant to isoniazid without MDR-TB.

Information on the reason for still being on treatment at 12 months was recorded for 84.3% (236/280) of cases notified in 2014, of which, 21.6% (51/236) had their treatment changed, 59.8% (141/236) were known to be on a regimen exceeding 12 months, and 18.6% (44/236) had their treatment interrupted. For those with more detailed information on the reason for still being on treatment, 35 cases were reported to still be on treatment due to intolerance or side-effects, 12 had a poor clinical response to treatment and 6 had been non-compliant with treatment.

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

Information on TB outcome at the last recorded outcome was available for 98.8% (681/689) of cases notified in 2014 (Table 5.2).

Table 5.2: Last recorded TB outcome for drug sensitive cohort with CNS, spinal, miliary or cryptic disseminated* TB, England, 2014

TB outcome	n	%
Treatment completed	463	67.2
Died	72	10.4
Lost to follow-up	42	6.1
Still on treatment	93	13.5
Treatment stopped	11	1.6
Not evaluated**	8	1.2
Total	**689**	**100.0**

* Excludes cases in the drug resistant cohort and only includes drug sensitive TB cases with CNS, spinal, miliary or cryptic disseminated TB
** Not evaluated includes missing, unknown and transferred out

At the last recorded outcome, 67.2% (463/689) of cases notified in 2014 had completed treatment and 13.5% (93/689) were still on treatment (Table 5.2, Table Ai.5.7). There is a shorter follow-up period for cases notified in 2014, so the proportion who finally complete treatment is expected to increase, as seen in previous years. For cases notified in 2013, 82.8% (624/754) completed treatment at the last recorded outcome (Table Ai.5.7).

TB outcomes in the entire drug sensitive cohort

Overall, for the entire drug sensitive cohort (including those with CNS, spinal, miliary or cryptic disseminated TB), information on TB outcome at the last recorded outcome was available for 99.1% (6,348/6,405) of cases notified in 2014 (Table 5.3).

Eighty five percent (5,414/6,405) of cases in this cohort had completed treatment, 5.5% (351/6,405) had died and 4.2% (266/6,405) were lost to follow-up at the last recorded outcome (Table 5.3, Table Ai.5.8).

Table 5.3: Last recorded TB outcome for the entire drug sensitive cohort*, England, 2014

TB outcome	n	%
Treatment completed	5,414	84.5
Died	351	5.5
Lost to follow-up	266	4.2
Still on treatment	246	3.8
Treatment stopped	71	1.1
Not evaluated**	57	0.9
Total	**6,405**	**100.0**

* Excludes cases in the drug resistant cohort
** Not evaluated includes missing, unknown and transferred out

Death in the entire drug sensitive cohort

Six percent (5.5%, 351/6,405) of cases notified in 2014 were reported to have died at the last recorded outcome, a slight increase compared with 2013 (4.7%, 336/7,178) (Table Ai.5.8). For cases notified in 2014 that had died at the last recorded outcome, TB caused or contributed to 31.9% (112/351) of deaths, TB was incidental to 20.5% (72/351) of deaths, and the relationship between TB and death was unknown in 47.6% (167/351) of deaths (Table Ai.5.9). Among those reported to have died, 18.2% (64/351) were diagnosed post-mortem.

The majority (66.4%, 233/351) of those who died were aged 65 years or older and a high proportion were male (65.2%, 229/351). A higher proportion of cases with pulmonary disease had died at the last recorded outcome compared with extra-pulmonary disease only (7.2%, 221/3,087 versus 2.2%, 57/2,618, respectively) (Table Ai.5.10).

Excluding those diagnosed post-mortem, time to death was known for 84.3% (242/287) of those who died. The median time to death after starting treatment was 40 days (range 0-663 days); 60.3% (146/242) died within two months of starting treatment.

The proportion of deaths was 2.7 times higher in cases with a previous diagnosis of TB (10.8%, 44/408), compared with cases without a previous diagnosis of TB (4.0%, 231/5,714). The proportion of deaths varied by PHEC; from 3.0% (75/2,528) in London to 8.8% (56/634) in North West (Table Ai.5.11).

Lost to follow-up in the entire drug sensitive cohort

Four percent (4.2%, 266/6,405) of cases notified in 2014 were lost to follow-up at the last recorded outcome, of which 86.5% (230/266) were non-UK born (Table 5.3, Ai.5.12). Where the reason for lost to follow-up was recorded, 63.0% (145/230) of those born abroad had left the UK (Table Ai.5.12). The majority (72.2%, 192/266) of lost to follow-up cases occurred in those aged 15 to 44 years; overall, 5.2% (192/3,673) of this age group were lost to follow-up. Over half (57.5%, 153/266) of cases who were lost to follow-up had pulmonary disease, and ten cases were known to have been lost to follow-up before any treatment was started.

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

Key messages

- the proportion of TB cases with initial resistance to isoniazid without MDR-TB has remained fairly stable over the past decade, at around 6%
- the number (54) and proportion (1.6%) of TB cases with initial MDR/RR-TB has decreased since the peak in 2011 (89, 1.8%)
- in 2015, a high proportion of cases with resistance to isoniazid without MDR-TB (19%) and MDR/RR-TB cases (17%) had at least one social risk factor
- ten cases of XDR-TB were notified in 2015, three of whom were born in the UK; this is the highest number of XDR-TB cases notified in one year in the last decade
- the proportion of MDR/RR-TB cases notified in 2013 who had completed treatment by 24 months was low (58%), with many still on treatment (21%)
- at the last recorded outcome, 13% of drug resistant TB cases notified in 2013 were lost to follow-up, all of which were lost to follow-up abroad, and 5% had died.

Initial[9] first line drug resistance

In 2015, drug susceptibility test (DST) results for at least isoniazid and rifampicin were available for 99.4% (3,440/3,460) of culture confirmed notified cases, a similar proportion to previous years (Table Ai.6.1). Of these, 6.9% (238/3,440) were resistant to isoniazid, 1.6% (54/3,440) were resistant to rifampicin, 0.8% (27/3,436) were resistant to ethambutol and 0.7% (24/3,388) were resistant to pyrazinamide (Table Ai.6.2). Seven percent (7.4%, 255/3,440) were resistant to at least one first line antibiotic and 1.3% (46/3,440) had multidrug resistant TB (MDR-TB), with resistance to at least isoniazid and rifampicin (Table Ai.6.3).

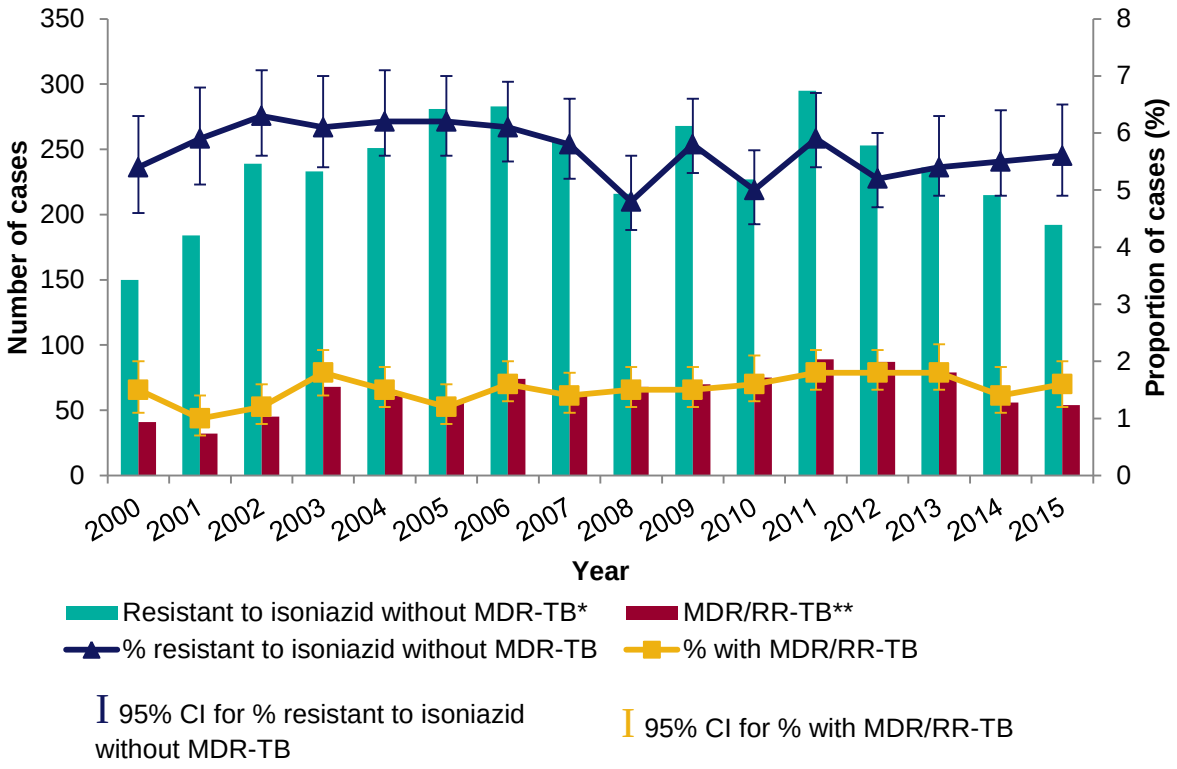
Initial isoniazid resistance without MDR-TB

In 2015, 5.6% (192/3,440) of TB cases had initial resistance to isoniazid without MDR-TB, which is similar to previous years (Figure 6.1, Table Ai.6.3). Compared to all other

[9] Initial resistance is classed as resistance identified within three months of the first specimen date. However, cases with a change from a sensitive to resistant result following treatment are reclassified as acquired resistance, even if this is within the three-month period.

age groups, those aged 45 to 64 years had the highest proportion (6.3%, 49/775) of cases resistant to isoniazid without MDR-TB (Table 6.1). The most frequent countries of birth of cases resistant to isoniazid without MDR-TB were India (41), the UK (37) and Pakistan (19) (Table 6.2).

Figure 6.1: Number and proportion of TB cases with initial drug resistance, England, 2000-2015



* Culture confirmed cases with DST results for at least isoniazid and rifampicin resistant to isoniazid without MDR-TB
** Culture confirmed cases with DST results for at least isoniazid and rifampicin resistant to rifampicin, including those with MDR-TB

Where social risk factor information was known, a high proportion (19.3%, 33/171) of cases resistant to isoniazid without MDR-TB had at least one known social risk factor (current or history of drug misuse (8.4%, 15/179), alcohol misuse (8.8%, 16/181), imprisonment (8.1%, 14/173) or homelessness (10.0%, 18/180)). A higher proportion of non-UK born TB cases with isoniazid resistance without MDR-TB had a previous diagnosis compared with UK born TB cases (6.7%, 10/149 versus 2.8%, 1/36).

In the five years from 2011 to 2015, the London PHEC had the highest number and proportion of TB cases resistant to isoniazid without MDR-TB (6.3%, 553/8,757) (Table Ai.6.4). The North East PHEC had the lowest number and proportion of TB cases resistant to isoniazid without MDR-TB (3.4%, 18/523).

Table 6.1: Number and proportion of TB cases with drug resistance by characteristics, England, 2015

Characteristic	Resistant to isoniazid without MDR-TB*		MDR/RR-TB**		XDR-TB[#]		Total[$]
	n	%	n	%	n	%	n
Sex							
Female	69	5.3	23	1.8	4	0.3	1,298
Male	123	5.7	31	1.4	6	0.3	2,142
Age (years)							
0-14	1	2.0	0	0.0	0	0.0	50
15-44	123	5.8	43	2.0	6	0.3	2,110
45-64	49	6.3	6	0.8	2	0.3	775
65+	19	3.8	5	1.0	2	0.4	505
Place of birth							
Non-UK born	153	6.1	48	1.9	7	0.3	2,503
UK born	37	4.3	5	0.6	3	0.3	865
At least one social risk factor	33	7.7	8	1.9	3	0.7	429
Previous TB diagnosis	11	5.9	9	4.8	1	0.5	188

* Culture confirmed cases with DST results for at least isoniazid and rifampicin who are resistant to isoniazid without MDR-TB
** Culture confirmed cases with DST results for at least isoniazid and rifampicin who are resistant to rifampicin, including those with MDR-TB
[#] Culture confirmed cases with DST results for at least isoniazid and rifampicin who are resistant to isoniazid and rifampicin, at least one injectable agent and at least one fluoroquinolone
[$] All culture confirmed cases with DST results for at least isoniazid and rifampicin

Initial multi-drug resistant/rifampicin resistant (MDR/RR) TB

The number and proportion of MDR-TB cases with initial resistance increased from 0.7% (22/3,145) in 2001 to a peak of 1.6% (81/4,967) in 2011, and has since decreased to 1.3% (46/3,440) in 2015 (Table Ai.6.3).

TB cases with any resistance to rifampicin, including those with MDR-TB, are hereafter referred to as multi-drug resistant/rifampicin resistant TB (MDR/RR-TB). The number and proportion of MDR/RR-TB cases increased from 32 (1.0%) in 2001 to a peak of 89 (1.8%) in 2011, and has since decreased to 54 (1.6%) in 2015 (Figure 6.1, Table Ai.6.3).

In 2015, the majority of MDR/RR-TB cases were aged 15 to 44 years (79.6%, 43/54) (Table 6.1). There were no laboratory confirmed cases of MDR/RR-TB in children aged 0 to 14 years between 2013 and 2015.

Table 6.2: Most frequent countries of birth of TB cases with drug resistance, England, 2015

Country of birth*	Total**	Resistant to isoniazid without MDR-TB[#]		MDR/RR-TB[$]	
	n	n	%	n	%
United Kingdom	865	37	4.3	5	0.6
India	626	41	6.5	7	1.1
Pakistan	357	19	5.3	3	0.8
Somalia	110	9	8.2	2	1.8
Bangladesh	98	5	5.1	2	2.0
Romania	94	5	5.3	2	2.1
Philippines	74	8	10.8	2	2.7
Nigeria	70	6	8.6	1	1.4
Eritrea	65	2	3.1	4	6.2
Afghanistan	45	4	8.9	1	2.2
Lithuania	37	3	8.1	6	16.2
China	21	1	4.8	2	9.5
Latvia	20	8	40.0	2	10.0

* Top 13 countries of birth for cases resistant to isoniazid without MDR-TB and MDR/RR-TB cases in 2015
** Culture confirmed cases with DST results for at least isoniazid and rifampicin
[#] Culture confirmed cases with DST results for at least isoniazid and rifampicin who are resistant to isoniazid without MDR-TB
[$] Culture confirmed cases with DST results for at least isoniazid and rifampicin who are resistant to rifampicin, including those with MDR-TB

The majority of MDR/RR-TB cases notified in 2015 were non-UK born (90.6%, 48/53), and for those where year of entry to the UK was known, 56.8% (25/44) had entered the UK within the past six years. The most frequent countries of birth of MDR/RR-TB cases were India (7), Lithuania (6) and the UK (5) (Table 6.2). Cases born in Lithuania had the highest proportion of MDR/RR-TB (16.2%, 6/37).

The proportion of cases with MDR/RR-TB was higher in those with a previous diagnosis of TB compared to those without (4.8%, 9/188 versus 1.3%, 42/3,114). A high proportion of MDR/RR-TB cases in 2015 had at least one social risk factor (16.7%, 8/48).

In the five years from 2011 to 2015, London had the highest number of TB cases with MDR/RR-TB (1.9%, 163/8,757) (Table Ai.6.4).

In 2015, in addition to the culture confirmed MDR-TB cases, six TB cases notified in England were non-culture confirmed cases treated with an MDR-TB regimen (Table 6.3), including one child aged 0 to 14 years. One case was a contact of a culture

confirmed MDR-TB case, one case entered the UK having had culture and DSTs performed abroad, one case had genotyping results to confirm drug resistant TB but the sample could not be culture confirmed and three cases received an MDR-TB regimen for other clinical reasons.

Table 6.3: Number of TB cases with initial and acquired resistance to rifampicin and MDR-TB, England, 2006-2015

Year	Rifampicin resistant cases*			MDR-TB cases				Drug resistant cohort**
	Initial resistance	Acquired resistance	Total	Initial resistance	Acquired resistance	Treated with an MDR-TB regimen	Total	
2006	20	0	20	54	4	2	60	80
2007	13	2	15	49	5	2	56	71
2008	18[#]	0	18	50	6	6	62	78
2009	11	1	12	59	2	3	64	76
2010	10	1	11	65	2	1	68	79
2011	8	0	8	81	4	2	87	95
2012	10	0	10	77	2	4	83	93
2013	10	0	10	69	0	4	73	83
2014	4	0	4	52	3	8	63	67
2015	8	1	9	46	0	6	52	61
Total	**112**	**5**	**117**	**602**	**28**	**38**	**668**	**783**

* Culture confirmed cases with DST results for at least isoniazid and rifampicin who are resistant to rifampicin without MDR-TB
** Culture confirmed cases with DST results for at least isoniazid and rifampicin who are initial or acquired MDR/RR-TB cases and those treated with an MDR-TB regimen. The drug resistant cohort is used for TB outcome reporting
[#] Two cases with initial resistance to rifampicin in 2008 acquired to MDR-TB; these cases have been included in both initial rifampicin resistant cases and MDR-TB acquired resistance. The total number in the drug resistant cohort for 2008 only counts these two cases once

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

All but one of the MDR/RR-TB cases (98.2%, 53/54) in 2015 were tested for all first line drugs (isoniazid, rifampicin, ethambutol and pyrazinamide), of which 22.6% (12/53) were resistant to all four. Among MDR/RR-TB cases, 12 were resistant to at least one injectable agent (amikacin, capreomycin or kanamycin) and 15 were resistant to a fluoroquinolone (ofloxacin, moxifloxacin or ciprofloxacin) (Table Ai.6.5).

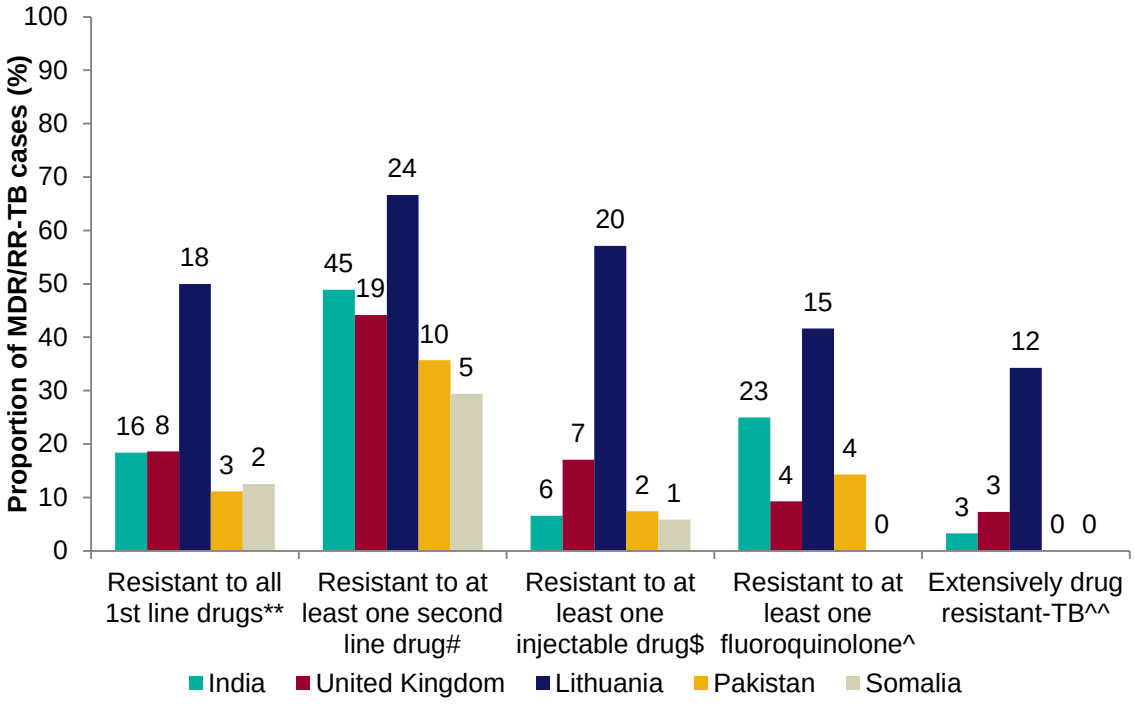
The proportion of MDR/RR-TB cases resistant to an injectable agent has increased over the past 10 years, and was at the highest level in 2015 (22.2%, 12/54) (Table Ai.6.5). During the past decade, the proportion of MDR/RR-TB cases with fluoroquinolone resistance has fluctuated (0%-28%) (Table Ai.6.5). The resistance patterns of MDR/RR-

TB cases resistant to an injectable agent or a fluoroquinolone is strongly influenced by the country of birth of MDR/RR-TB cases each year (Figure 6.2, Table Ai.6.6).

There were ten initial XDR-TB cases notified in 2015, the highest annual number recorded (Table Ai.6.3). The majority were aged 15 to 44 years (6/10) and non-UK born (7/10) (Table 6.1). Of the seven non-UK born XDR-TB cases, four had entered the UK more than 11 years prior to TB notification. All of the XDR-TB cases had pulmonary TB, and only one had a previous history of TB diagnosis. Three of the XDR-TB cases had at least one social risk factor reported. In 2015, three had both an epidemiological and a molecular (MIRU-VNTR clustering) link to another XDR-TB case in England, providing evidence that they acquired TB from recent transmission in England.

Overall between 2011 and 2015, the highest number of XDR-TB cases were born in Lithuania (12), followed by a small number from India (3) and the UK (3) (Figure 6,2, Table Ai.6.6).

Figure 6.2: Number* and proportion of MDR/RR-TB cases with second-line drug resistance by most frequent country of birth, England, 2011-2015



*Number of MDR/RR-TB cases shown as data labels in figure
** Culture confirmed cases with DST results for isoniazid, rifampicin, ethambutol and pyrazinamide
# Culture confirmed cases with DST results for at least isoniazid, rifampicin and at least one second line drug
$ Culture confirmed cases with DST results for at least isoniazid, rifampicin and at least one injectable
^ Culture confirmed cases with DST results for at least isoniazid, rifampicin and at least one fluoroquinolone
^^ Culture confirmed cases with DST results for at least isoniazid, rifampicin and at least one injectable and at least one fluoroquinolone

Acquired drug resistance[10] on repeat culture

Acquired drug resistance is defined as resistance identified on repeat culture after three months of the first specimen date. In addition, cases with a change from a sensitive to resistant result following treatment start are reclassified as acquired resistance, even if this is within the three month period.

Six culture confirmed cases notified in 2015 had acquired resistance on repeat DST. No cases acquired MDR-TB. However, two MDR-TB cases acquired resistance to either a fluoroquinolone or an injectable agent to become pre-XDR TB cases.

Among cases that were notified between 2006 and 2015, 127 cases were known to have acquired resistance while on treatment in England, of which 24.4% (31) acquired resistance to rifampicin and 28.3% (36) acquired resistance to isoniazid. During this time period, a total of 28 cases acquired MDR-TB (Table 6.3), of which 10 cases acquired MDR-TB after being sensitive to all first line drugs on initial culture. Of those with a treatment start date recorded between 2006 and 2015 (25), the median time for cases to acquire MDR-TB after starting treatment was 260 days (range 123-363).

It should be noted that cases who acquire resistance are recorded in the year that they were notified, not the year that they acquired resistance, therefore the numbers for recent years may still increase for those still on treatment.

TB outcomes for the drug resistant cohort

For the purposes of TB outcome reporting, the drug resistant cohort includes MDR/RR-TB (initial and acquired) cases, as well as those treated with an MDR-TB regimen [5]. There were 83 cases in the drug resistant cohort notified in 2013; of these, ten had initial rifampicin resistance without MDR-TB, 69 had initial MDR-TB, of which three had XDR-TB and four were not culture confirmed but were treated with an MDR-TB regimen (Table 6.3). Information on 24 month TB outcome was available for all of the cases (100.0%, 83/83) in the drug resistant cohort notified in 2013 (Table 6.4, Table Ai.6.7).

Treatment completion

Only 57.8% (48/83) of the cases in the drug resistant cohort notified in 2013 had completed treatment within 24 months (Figure 6.3, Table 6.4, Table Ai.6.5). A further 12 cases are known to have completed treatment after 24 months, bringing overall treatment completion for cases notified in 2013 to 72.3% (60/83) (Table 6.4, Table Ai.6.8).

[10] Referred to as “amplified resistance” in previous annual reports

Among drug resistant cases who were notified in 2013 and known to have completed treatment at the last recorded outcome, 18.3% (11/60) had less than 18 months of treatment, of which three had less than 12 months of treatment. One-fifth (20.0%, 12/60) were on treatment for more than 24 months (Table Ai.6.8, Table Ai.6.9).

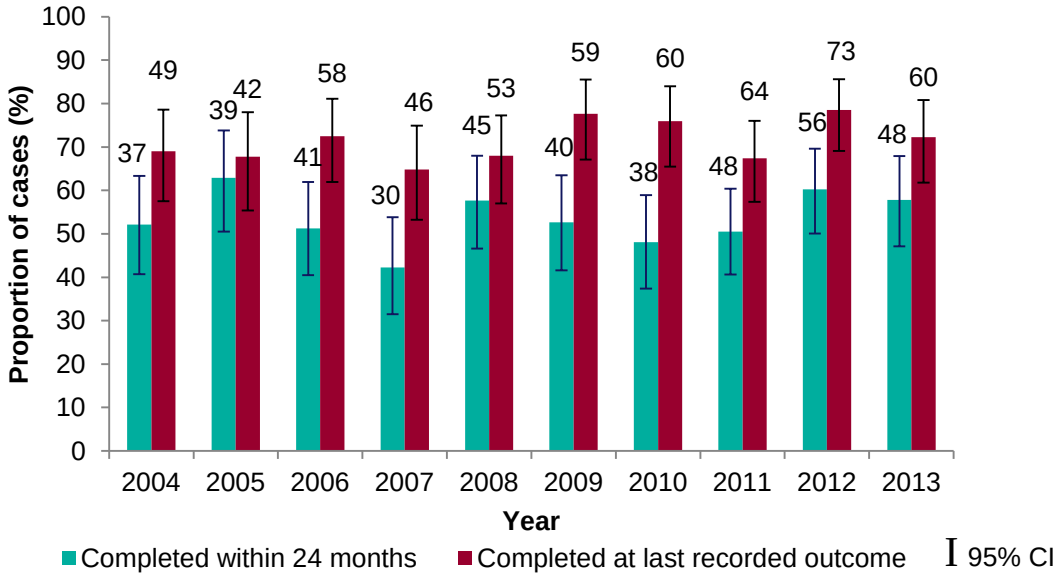
Of the three XDR-TB cases notified in 2013, two had completed treatment, and one was still on treatment at the last recorded outcome.

Table 6.4: 24-month and last recorded TB outcome for the drug resistant cohort*, England, 2013

TB outcome	At 24 months		At last recorded outcome	
	n	%	n	%
Treatment completed	48	57.8	60	72.3
Died	4	4.8	4	4.8
Lost to follow-up	10	12.0	11	13.3
Still on treatment	18	21.7	5	6.0
Treatment stopped	3	3.6	3	3.6
Not evaluated**	0	0.0	0	0.0
Total	**83**	**100.0**	**83**	**100.0**

* Includes initial and acquired MDR/RR-TB and cases treated with an MDR-TB regimen
** Not evaluated includes missing, unknown and transferred out

Figure 6.3: Treatment completion for drug resistant TB cases*, England, 2004-2013



* Includes initial and acquired MDR/RR-TB and cases treated with an MDR-TB regimen
Data labels display the number of cases completing treatment

Deaths at the last recorded TB outcome

Four (4.8%, 4/83) of the drug resistant cases notified in 2013 had died at their last recorded outcome (Table 6.4). Three of the cases who had died were not started on treatment. The relationship between TB and death was known for two of the cases; TB contributed to the death of one and was incidental to the death of the other.

Lost to follow-up at last recorded TB outcome

For drug resistant cases notified in 2013, the most common reason for not completing treatment at the last recorded TB outcome was loss to follow-up, accounting for 11 (13.3%) of the drug resistant cases (Table 6.4, Table Ai.6.8). All 11 of the cases lost to follow-up were aged 15 to 44 years and were non-UK born, of which eight cases were reported to have been lost to follow-up abroad (Table Ai.6.10). Ten of the 11 cases lost to follow-up had pulmonary TB.

7. TB in under-served populations

Key messages

- in 2015, there was an increase in both the number and proportion of TB cases with at least one social risk factor (SRF); overall 12% (579) of TB cases had at least one SRF in 2015 compared with 10% (538) in 2014
- the proportion of UK born cases with at least one SRF (22%) was nearly three times higher than that of non-UK born cases (8%)
- a higher proportion of cases with at least one SRF had pulmonary disease (77%) and received directly observed therapy (DOT) (56%) compared to those without a SRF (49% and 8%, respectively)
- a higher proportion of cases with at least one SRF were resistant to isoniazid without MDR-TB (7.8%) compared to those without a SRF (5.4%)
- a similar proportion of cases with at least one SRF had MDR/RR-TB (1.9%) compared to those without a SRF (1.6%)
- outcomes in drug sensitive cases with at least one SRF were worse compared to those without a SRF; 8.6% died, 6.8% were lost to follow-up and 1.7% had their treatment stopped, compared to 4.1%, 3.4% and 1.0%, respectively, in those without a SRF

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 or history of homelessness, imprisonment[11], and drug misuse, and current alcohol misuse. This chapter presents data for TB cases with SRFs and in addition, for TB cases 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 TB cases aged 15 years and older.

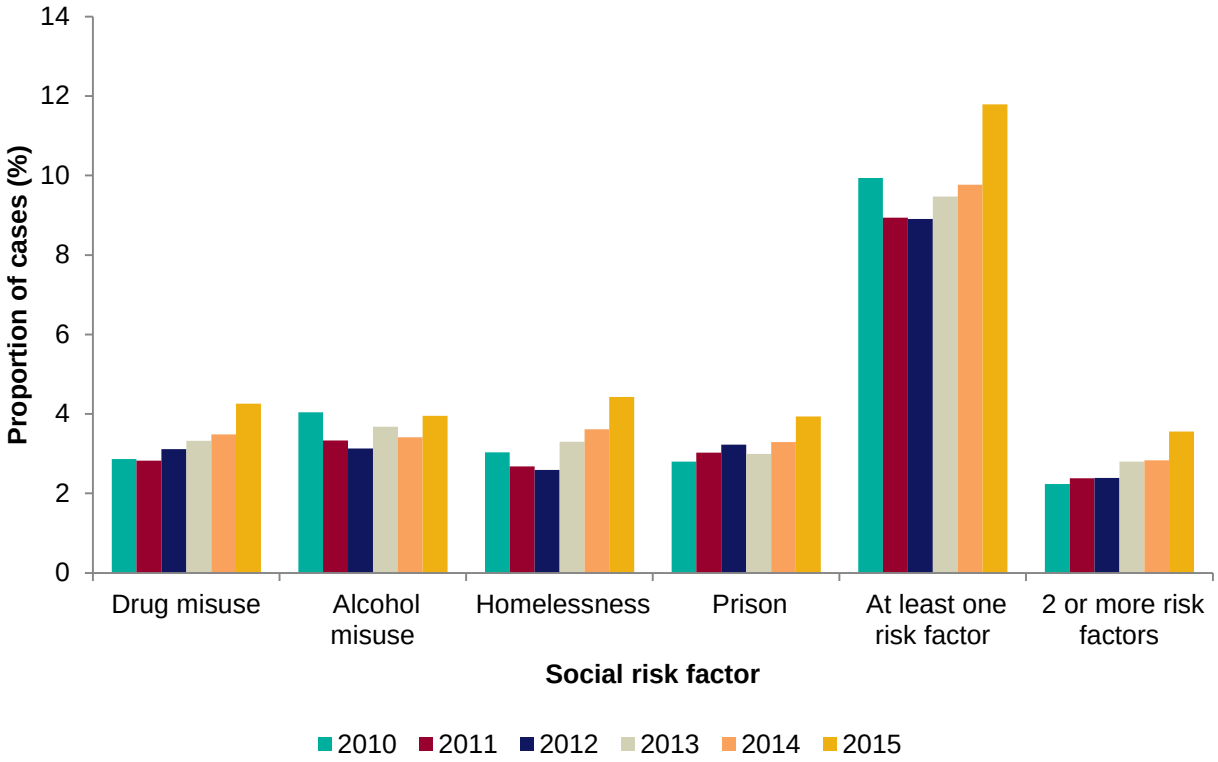
Social risk factors

In 2015, among TB cases aged 15 years and older with known SRF information, 4.3% (221/5,189) had current or a history of drug misuse, 3.9% (205/5,191) of alcohol misuse, 4.4% (229/5,171) of homelessness, and 3.9% (198/5,033) of imprisonment (Table Ai.7.1). In 2015, a total of 11.8% (579/4,910) of TB cases had at least one SRF, compared with 9.8% (538/5,517) in 2014. Between 2014 and 2015, there was an increase in both the number and proportion of cases with each of the individual SRFs

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

(Figure 7.1, Table Ai.7.1). Just over one-third (33.9%, 196/579) of cases in 2015 with at least one SRF had more than one SRF.

Figure 7.1: Proportion of TB cases with at least one social risk factor*, England, 2010-2015



* Includes those aged 15 years and older

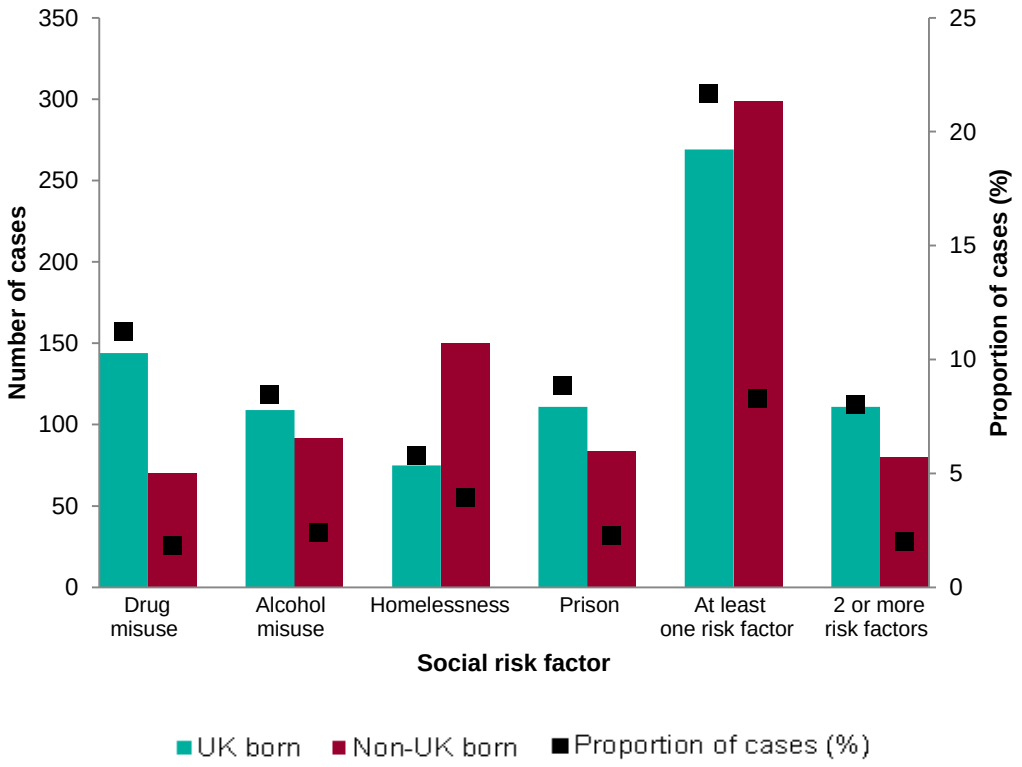
In 2015, 61.0% (135/221) of those with current or history of drug misuse had known information about the timing of their drug misuse, of which 40.7% (55/135) were reported to have current drug misuse. Seventy-one percent (71.2%, 163/229) of those with current or history of homelessness had known information about the timing of their homelessness, of which 50.9% (83/163) were reported to be homeless during treatment. Seventy percent (69.7%, 138/198) of those currently in prison or with a history of imprisonment were reported to have been in prison in the UK, of which 31 cases were currently in prison.

Demographic characteristics

The majority of cases notified in 2015 with at least one SRF were male (83.9%, 486/579) and 60.6% (351/579) were aged 15 to 44 years. The proportion of cases with at least one SRF was nearly four times higher in males (16.8%, 486/2,886) compared with females (4.6% 93/2,024) (Table 7.1). The proportion of UK born cases with at least one SRF was 2.6 times higher compared with non-UK born cases (21.7%, 269/1,241

versus 8.3%, 299/3,616) (Figure 7.2, Table 7.1). A higher proportion of UK born cases than non-UK born cases had each of the four SRFs. There are more non-UK born cases (123) than UK born cases (70) with current or a history of homelessness (Figure 7.2, Table 7.1).

Figure 7.2: Proportion of TB cases with social risk factors* by place of birth, England, 2015



* Includes those aged 15 years and older

Among UK born cases notified between 2010 and 2015, the Black-Caribbean and White ethnic groups had the highest proportion of cases with at least one SRF (33.0%, 140/424 and 20.6%, 1,083/5,267, respectively) (Table Ai.7.2). The Black-Caribbean ethnic group had a high proportion of cases with drug misuse (19.2%, 85/442) and a history of imprisonment (18.4% (80/435). In non-UK born cases notified between 2010 and 2015, the largest number with at least one SRF were born in India (252), Somalia (191) and Pakistan (115), but the countries of birth with the highest proportion of cases with at least one SRF were Lithuania (33.7%, 64/190), Poland (32.2%, 99/307) and Ireland (28.2%, 49/174) (Table Ai.7.2). The countries of birth with the highest number of TB cases who were homeless were Somalia (84) and Eritrea (71).

Table 7.1: Demographic characteristics of TB cases with social risk factors*, England, 2015

Demographic characteristics	Drug misuse		Alcohol misuse		Homeless		Prison		At least 1 SRF		2 or more SRF	
	n	%	n	%	n	%	n	%	n	%	n	%
Sex												
Female	42	2.0	32	1.5	37	1.7	20	0.9	93	4.6	29	1.3
Male	179	5.9	173	5.7	192	6.3	178	6.1	486	16.8	167	5.1
Age group (years)												
15-44	144	4.6	84	2.7	155	4.9	116	3.8	351	11.7	114	3.4
45-64	76	5.9	100	7.9	69	5.5	71	5.8	196	16.2	78	5.8
65+	1	0.1	21	2.8	5	0.6	11	1.5	32	4.6	4	0.5
Place of birth												
UK Born	144	11.2	109	8.4	75	5.8	111	8.9	269	21.7	111	8.0
Non-UK Born	70	1.8	92	2.4	150	3.9	84	2.3	299	8.3	80	2.0

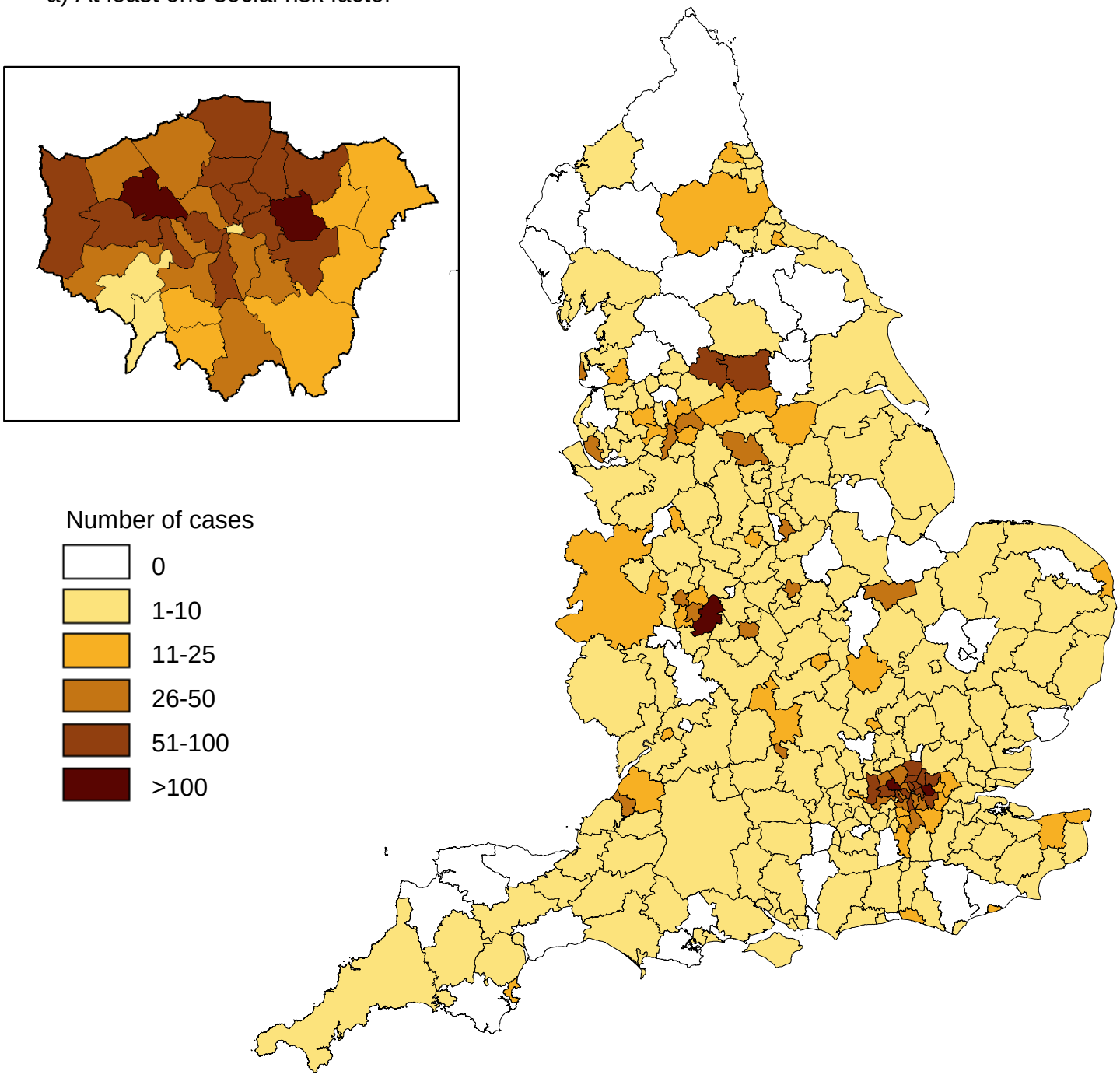
* Includes those aged 15 years and older

Geographical distribution

Between 2010 and 2015, there was considerable geographical variation in the number of TB cases with at least one SRF by local authority (Figure 7.3), each of the four SRFs had a different geographical distribution. In 2015, the South West (13.9%, 32/230) and the North West (13.8%, 59/426) PHECs had the highest proportion of TB cases with at least one SRF (Figure 7.4, Table Ai.7.3).

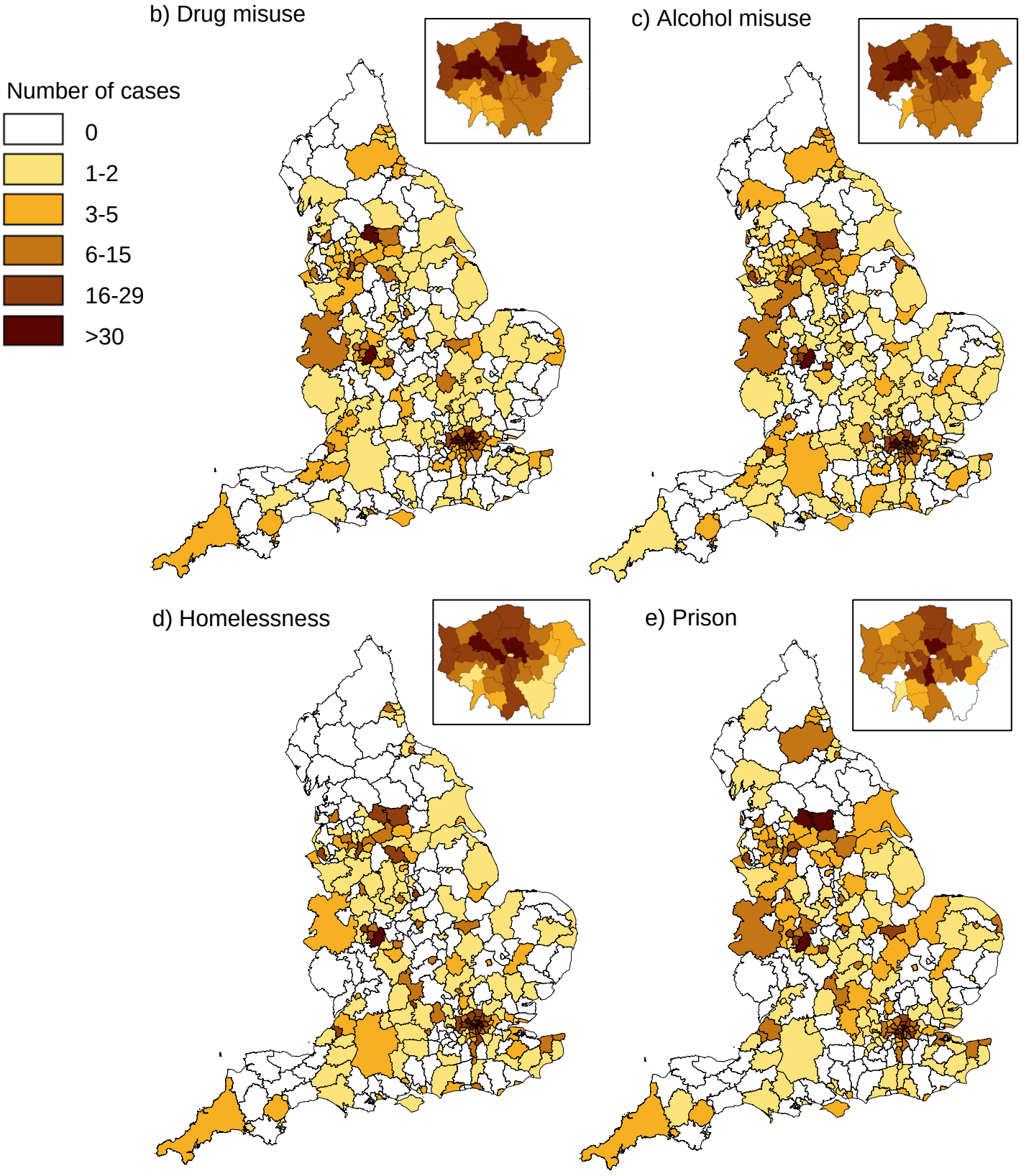
Figure 7.3: Number of TB cases with at least one SRF*, drug misuse, homelessness, imprisonment and alcohol misuse by local authority, England, 2010-2015 (box shows enlarged map of London area)

a) At least one social risk factor



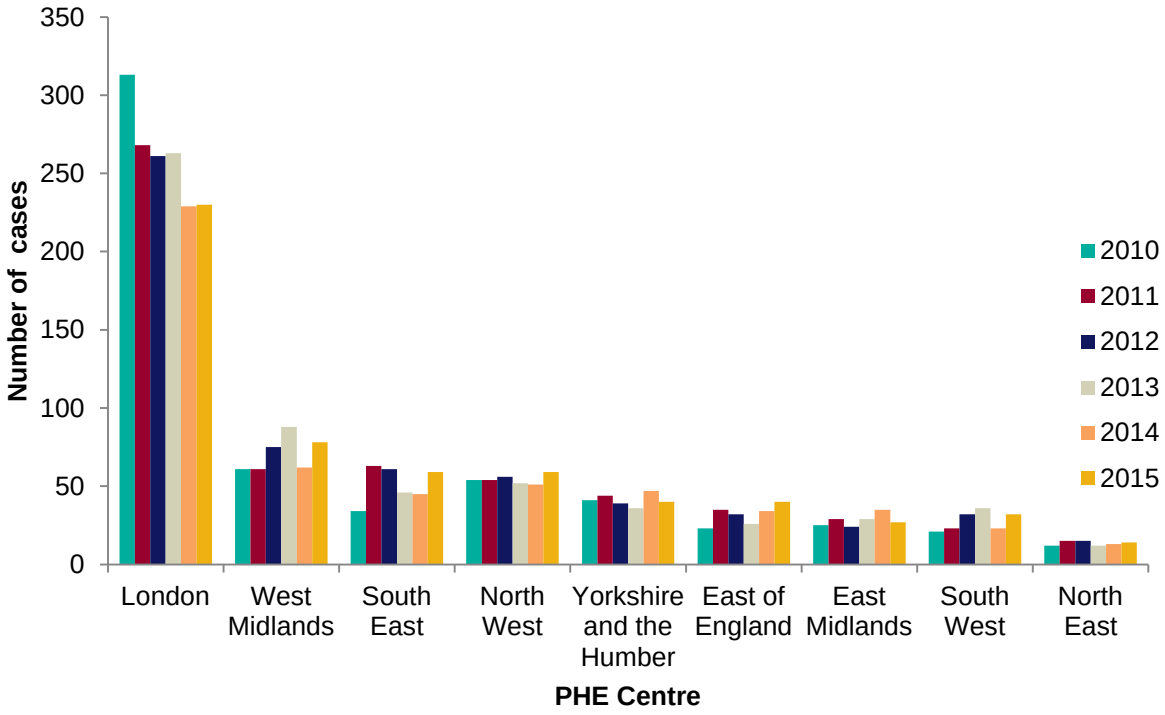
* Includes those aged 15 years and older

Figure 7.3: Number of TB cases with at least one SRF*, drug misuse, homelessness, imprisonment and alcohol misuse by local authority, England, 2010-2015 continued (box shows enlarged map of London area)



* Includes those aged 15 years and older

Figure 7.4: Number of TB cases with at least one social risk factor* by PHE Centre, England, 2010-2015



* Includes those aged 15 years and older

Clinical characteristics

In 2015, a higher proportion of cases with at least one SRF had a previous history of TB compared to cases with no known SRFs (11.1%, 62/557 versus 6.2%, 267/4,289). The majority (76.7%, 444/579) of cases with at least one SRF had pulmonary TB (Table Ai.7.4).

Over half (55.5%, 298/537) of cases with at least one SRF received DOT in 2015, compared with just 7.7% (325/4,198) of those without a SRF. The highest proportion of cases receiving DOT was among those with current alcohol misuse (69.5%, 130/187), followed by those with current or a history of drug misuse (61.7%, 127/206), homelessness (61.0%, 130/213), and imprisonment (58.2%, 106/182) (Table Ai.7.4). Thirty-one cases notified in 2015 were in prison during treatment, and 96.2% (25/26) of cases in prison with known information on DOT were known to have received DOT.

In 2015, the proportion of pulmonary cases with at least one SRF that experienced a delay from symptom onset to treatment start of more than four months (27.5%, 108/393) was similar to those without a SRF (28.5%, 568/1,990) (Table Ai.7.4).

Sixty-one percent (84/137) of TB cases with at least one SRF were current smokers, compared to 13.0% (130/999) of cases without a SRF.

Drug resistance

In 2015, 7.8% (33/422) of TB cases with at least one SRF were resistant to isoniazid without MDR-TB compared to 5.4% (137/2,528) of those without a SRF. A similar proportion of TB cases with at least one SRF had initial MDR/RR-TB (1.9%, 8/429), compared to cases without a SRF (1.6%, 40/2,564).

TB outcomes

In 2014, treatment completion was lower for drug sensitive cases with at least one SRF (75.6%, 399/528) compared to cases without a SRF (87.0%, 4,287/4,928). A higher proportion of drug sensitive cases with at least one SRF notified in 2014 had died, were lost to follow-up or had treatment stopped as their last recorded outcome compared to cases with no SRFs (Table 7.2). The proportion of cases that had died at their last recorded outcome was three times higher in those with alcohol misuse (12.9%, 25/194) compared to those with no alcohol misuse (4.3%, 235/5,513), and double in those with current or history of homelessness (10.6%, 22/208) than those with no history of homelessness (4.4%, 244/5,540).

Table 7.2: Last recorded TB outcome for the entire drug sensitive cohort by social risk factor*, England, 2014

TB outcome	At least 1 SRF		No SRF		Total**
	n	%	n	%	N
Treatment completed	399	75.6	4,287	87.0	4,686
Died	45	8.5	203	4.1	248
Lost to follow up	36	6.8	167	3.4	203
Still on treatment	31	5.9	182	3.7	213
Treatment stopped	9	1.7	51	1.0	60
Not evaluated#	8	1.5	38	0.8	46
Total	**528**	**100.0**	**4,928**	**100.0**	**5,456**

* Includes those aged 15 years and older but excludes cases in drug resistant cohort
** Total cases with reported information on at least one social risk factor reported
# Not evaluated includes missing, unknown and transferred out

TB Monitoring Indicator 17: Proportion of drug sensitive TB cases with at least one social risk factor who completed treatment within 12 months (England and PHEC)

For MDR/RR-TB cases notified in 2013, 62.5% (10/16) of those with at least one SRF had completed treatment by last recorded outcome compared with 77.2% (44/57) of those with no SRFs, although there were only a small number of cases with at least one SRF that were drug resistant.

TB cases that were unemployed, asylum seekers or remanded in an immigration removal centre

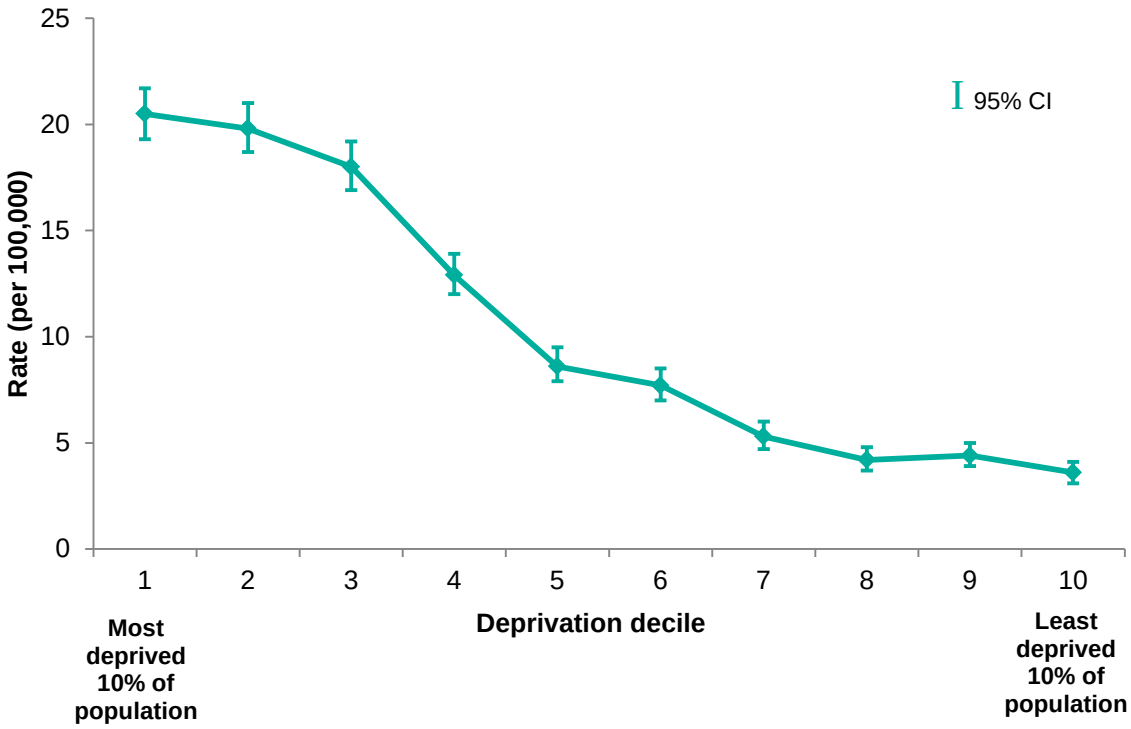
In 2015, sixteen percent (16.3%, 847/5,183) of TB cases notified with known information were recorded as being unemployed at notification. One-third (32.7%, 256/783) of those that were unemployed had at least one SRF.

In 2015, 58 TB cases were recorded as being asylum seekers and seven cases were recorded as being in an immigration removal centre. A total of 81 cases were recorded as being in an immigration removal centre between 2010 and 2015 (range 7-19 per year).

Deprivation

In 2015, the rate of TB was 20.5 per 100,000 in the 10% of the population living in the most deprived areas compared with only 3.6 per 100,000 in the 10% of the population living in the least deprived areas[12], with a clear trend of an increasing rate of TB with increasing deprivation (Figure 7.5).

Figure 7.5: Rate of TB by deprivation decile, England, 2015



[12] 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 among TB cases

Key messages

- in 2014, 3.1% of notified TB cases were co-infected with HIV, a continuation of the downward trend observed since the peak of 7.8% in 2003
- the proportion of TB cases with HIV co-infection was highest in those aged 45 to 54 years (6.2%) and lowest in those aged 65 years and older (0.6%)
- 87% of TB-HIV co-infected cases notified with TB between 2010 and 2014 were non-UK born; the majority were born in sub-Saharan African countries
- 94% of TB cases notified in 2014 with a previously unknown HIV status were offered and received HIV testing; however, this was much lower for those aged 0 to 14 years (68%)

TB-HIV co-infection

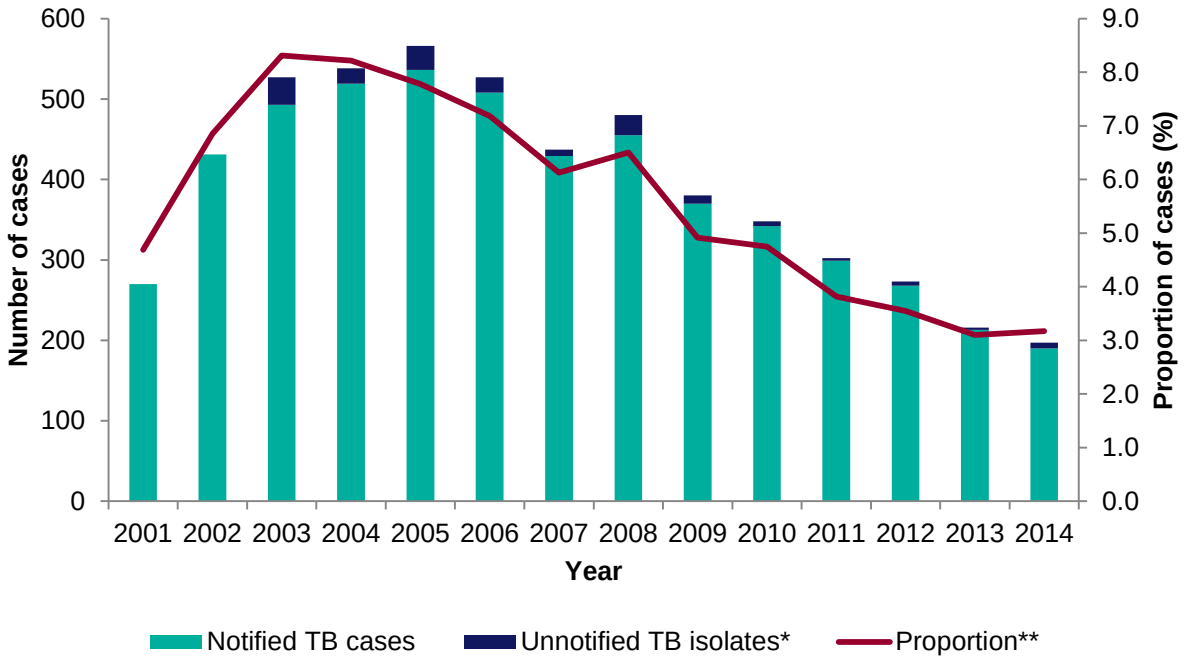
HIV status is not collected in the Enhanced TB Surveillance system. To estimate TB-HIV co-infection, TB and HIV surveillance data are matched annually for cases aged 15 years and older (see Appendix III: Methods).

The most recent year for which TB-HIV co-infection data are available for England is 2014. In 2014, 3.2% (197/6,209) of TB cases aged 15 years and older were estimated to be co-infected with HIV (Figure 8.1, Table Ai.8.1). This is a continuation of the downward trend observed since the peak of 8.3% in 2003.

Of the 197 TB-HIV co-infected cases in 2014, 190 were notified TB cases and seven were un-notified MTBC positive isolates cultured in 2014 that matched to an HIV case (see Appendix III: Methods for further information). TB-HIV co-infection varied by PHEC; the highest proportion of co-infection among TB cases was in the East of England (5.2%, 22/422) and the lowest in West Midlands (2.4%, 18/750) (Table Ai.8.2).

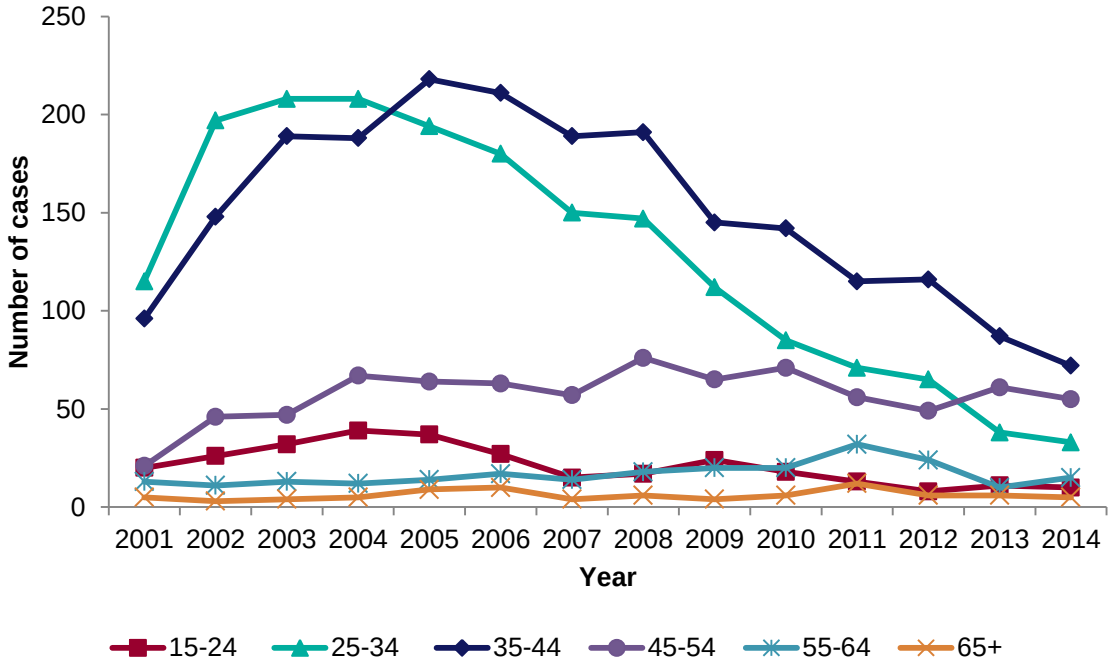
In the past decade, the age group distribution of cases with TB-HIV co-infection has changed, with a reduction in the number of cases aged 25 to 44 years and an increase in the number of cases aged 45 to 54 years (Figure 8.2, Table Ai.8.3). The median age of TB-HIV co-infected cases increased over time from 34.5 years (IQR 30-41) in 2001 to 42.5 years (IQR 36-49) in 2014. In 2014, the proportion of HIV co-infection was highest among TB cases aged 35 to 44 year olds (5.8%, 72/1,240) and 45 to 54 years (6.2%, 55/891).

Figure 8.1: Number and proportion of TB cases with HIV co-infection, England, 2001-2014



* Only available from 2003 onwards.
** Proportion is calculated using the number of notified TB cases with HIV co-infection plus the number of un-notified MTBC isolates which matched to an HIV case as the numerator, and the number of all notified TB cases (with or without HIV co-infection) plus the number of un-notified TB isolates which matched to an HIV case as the denominator.

Figure 8.2: Number of TB-HIV co-infected case notifications by age group*, England, 2001-2014



* Based on age at TB notification

Between 2010 and 2014, 86.8% (1,080/1,244) of TB-HIV co-infected cases were non-UK born; the majority 77.5% (837/1,080) were born in sub-Saharan African countries.

In 2014, 5.4% (7/129) of TB-HIV co-infected cases with TB notifications had isoniazid resistance without MDR-TB and 3.7% had MDR/RR-TB (5/134).

Testing for HIV in notified TB cases

Information on HIV testing was reported for 92.2% (5,016/5,442) of TB cases notified in 2015 with previously unknown HIV status. Of these, 93.5% (4,692) of cases were offered and received HIV testing, 3.8% (191) of cases were not offered testing, and 2.7% (133) were offered HIV testing but did not receive it, of which 30.1% (40) declined testing (Table 8.2). The proportion of cases that had HIV testing offered and received has improved slightly since 2011 (when data collection was introduced). The proportion of cases who had HIV testing offered and received varied by PHEC; in 2015, the highest was in London (97.3%, 2,107/2,165) and lowest in the North East (83.8%, 93/111) (Table Ai.8.4). The North East and South West had a high proportion of cases not offered HIV testing (13.5%, 15/111 and 10.7%, 24/225, respectively).

Table 8.2: HIV testing in notified TB cases, England, 2011-2015

Year	HIV testing								
	Not offered		Offered and received		Offered but not received		Offered but refused		Total*
	n	%	n	%	n	%	n	%	n
2011	221	6.0	3,306	89.3	121	3.3	56	1.5	3,704
2012	379	6.8	4,904	87.9	195	3.5	104	1.9	5,582
2013	399	6.5	5,508	89.1	166	2.7	109	1.8	6,182
2014	261	4.6	5,244	92.7	95	1.7	57	1.0	5,657
2015	191	3.8	4,692	93.5	93	1.9	40	0.8	5,016
Total	**1,451**	**5.6**	**23,654**	**90.5**	**670**	**2.6**	**366**	**1.4**	**26,141**

* 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 and CCG data shown on Fingertips)

The proportion of cases who were offered and received HIV testing in those aged 0 to 14 (67.9%, 129/190) and 65 years and older (86.3%, 603/699) was lower compared with other age groups (Table 8.3).

Table 8.3: HIV testing in notified TB cases by age group, England, 2015

Age group (years)	HIV testing								
	Not offered		Offered and received		Offered but not received		Offered but refused		Total*
	n	%	n	%	n	%	n	%	n
0-14	55	28.9	129	67.9	4	2.1	2	1.1	190
15-44	44	1.5	2,855	96.6	38	1.3	17	0.6	2,954
45-64	30	2.6	1,105	94.2	25	2.1	13	1.1	1,173
65+	62	8.9	603	86.3	26	3.7	8	1.1	699
Total	**191**	**3.8**	**4,692**	**93.5**	**93**	**1.9**	**40**	**0.8**	**5,016**

* Total with previously unknown HIV status where HIV testing is known and excluding those diagnosed post-mortem.

9. BCG vaccination

Key messages

- this is the first year that PHE is publishing BCG vaccine coverage estimates, based on experimental data from Child Health Information Systems (CHISs) for areas offering a universal neonatal programme
- universal vaccination at birth is recommended for infants living in high TB incidence, elsewhere BCG is recommended to high risk individuals (selective programme); we report coverage only for universal vaccination programme areas
- there are 11 high incidence areas in the UK, where universal vaccination is recommended; nine of these are in London, although there is a recommendation for a universal programme for all 32 London local authorities (LAs)
- estimated BCG coverage in London ranged from 32% to 92% in high incidence LAs
- of two LAs outside London with high TB incidence, one had a universal BCG programme in 2015
- of all TB cases notified in 2015, the vaccination status was known in 69% (3,977/5,758)
- of all TB cases with known vaccination status, 71% (2,832/3,977) had been previously vaccinated and 70% (133/190) of TB cases aged 0 to 14 were vaccinated

BCG vaccine coverage data

The BCG immunisation programme is a risk-based programme. The vaccine is recommended for individuals at higher risk of exposure to TB, particularly to protect against serious forms of disease in infants [6]. In addition to this selective approach all infants (0-12 months old) living in an area where the incidence of TB is greater than 40 per 100,000 should be offered BCG vaccine [6]. Because of large cross-boundary movements, a decision was taken to offer universal vaccination across all London boroughs.

From April 2015, as part of the COVER (Cover of Vaccination Evaluated Rapidly) programme, neonatal BCG has been 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 of age. This provides an opportunity for BCG vaccine coverage to be estimated for local authorities offering a universal neonatal programme [7]. It is not possible to calculate coverage for the selective programme offered in the rest of England as the denominator is not defined in the CHIS.

BCG coverage is measured as the number of babies who receive vaccination at first birthday out of all babies recorded in the CHISs for each given local authority.

There were 11 local authorities in England with a TB incidence greater than 40 per 100,000 in the period 2012-14. Of these, 10 reported offering a universal BCG programme in 2015. In London, all local authorities reported offering universal BCG, as part of the London-wide universal vaccination. Based on data submitted by CHISs to COVER, estimated coverage among the nine London local authorities with high TB incidence, ranged from 32.3% to 91.6%, whereas in the remaining London 24 local authorities who reported having a universal programme it ranged from 2.4% to 94.7% (Table 9.1).

Since the COVER returns for BCG have only been recently established, data is of variable quality. Estimates of low coverage may therefore in part reflect poor data quality, and future reports may provide more robust estimates. Since we report on the birth cohort 1 April 2014 and 31 March 2015, the shortage of BCG vaccine from May 2015 would have had limited impact on BCG coverage.

BCG vaccination status of TB cases

BCG vaccination status is recorded for TB case notifications in the Enhanced Tuberculosis Surveillance system (ETS).

In 2015, information on BCG vaccination status was known for 69.1% (3,977/5,758) of cases, of which 71.2% (2,832/3,977) had previously received BCG vaccination. Seventy percent (70.0%, 133/190) of the cases aged 0 to 14 years had received BCG vaccination. Where vaccination status was known, the proportion of children who had received BCG vaccination was similar for non-UK born (69.6%, 32/46) and UK born children (70.6%, 101/143).

Table 9.1: BCG vaccine coverage estimates from CHISs for upper tier local authorities, England, April 2015 to March 2016

Upper Tier Local Authority	TB rate (per 100,000) 2012-14 estimates*	Number of eligible children (1st birthday in 2015-16)**	Proportion of universal BCG coverage from CHIS (%)
(a) TB incidence ≥40/100,00 and universal BCG vaccination policy			
Newham	100.0	5,711	91.2
Brent	82.9	4,672	32.3
Ealing	65.3	5,059	59.3
Hounslow	64.0	3,931	87.4
Harrow	60.4	3,327	40.1
Slough	51.5	2,384	not available
Redbridge	50.5	4,607	81.7
Greenwich	42.0	4,483	82.1
Hillingdon	41.9	4,138	73.2
Waltham Forest	41.3	4,521	87.4
(b) TB incidence ≥40/100,00 and selective BCG vaccination policy			
Leicester	48.0	5,207	selective programme
(c) Other London boroughs with incidence <40/100,000 and universal BCG policy			
Tower Hamlets	38.3	4,290	91.6
Barking and Dagenham	35.0	3,640	70.1
Haringey	33.2	3,940	15.2
Hackney	32.4	4,335	68.3
Southwark	31.7	4,384	not available
Merton	29.6	2,903	28.7
Islington	29.3	2,667	77.2
Croydon	27.6	5,629	not available
Lambeth	26.6	4,686	not available
Lewisham	25.9	4,473	69.6
Hammersmith and Fulham	24.2	2,385	39.2
Westminster	24.0	2,647	41.9
Barnet	23.2	5,377	37.9
Enfield	22.5	4,388	2.4
Kensington and Chelsea	22.2	2,325	42.0
Camden	21.8	2,483	77.7
Wandsworth	21.7	5,180	50.8
Kingston upon Thames	15.8	2,566	21.7
Sutton	13.3	2,701	28.7
City of London	12.9	59	37.3
Havering	10.9	3,275	26.5
Bexley	10.7	3,106	61.8
Bromley	8.1	4,102	24.1
Richmond upon Thames	5.9	2,592	34.0

* Based 2012-14 TB rates, on which the BCG vaccination programme was based, as published in last year's annual report

** Cohort born between 1st April 2014 and 31st March 2015

10. Latent TB infection testing and treatment

Key messages

- the national roll-out of the systematic latent TB infection (LTBI) testing and treatment of eligible new migrants started in April 2015, prioritising 59 high TB burden clinical commissioning groups (CCGs) in England
- as of June 2016, 30 CCGs in England started to systematically test and treat eligible populations for LTBI
- among the 22 CCGs where information was available, 5,622 eligible persons were identified, of which 2,904 (51%) were tested

Implementing systematic LTBI testing and treatment in England

The roll-out of the national systematic testing and treatment of new migrants for LTBI began in April 2015 by prioritising 59 out of 209 CCGs with the highest incidence and burden of TB in England[13]. Eligibility for the national LTBI testing programme is limited to persons 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 been previously living in that high incidence country for six months or longer.

Persons eligible for testing are primarily identified by GP practices either prospectively during the new patient registration process or retrospectively through searches in GP clinical system. A small number of CCGs use community or secondary care services for identification. Tests used for the national programme include one of two commercial interferon gamma release assays (IGRAs) – QuantiFERON-TB Gold In Tube® (QFT, Cellestis) or T-Spot.TB® (Oxford Immunotec). Laboratory testing providers were selected for each CCG area following a national NHS procurement process and establishing a laboratory provider framework [8]. As per national programme clinical guidelines, persons with a positive IGRA test result are referred to secondary care to rule out active TB disease and to initiate treatment for LTBI [9].

LTBI data collection and information governance

The data presented in this chapter is preliminary and was reported from 22 CCGs representing four TB control board areas in England. Clinical and demographic

[13] High TB incidence is defined as incidence more than 20.0 per 100,000 and high TB burden is defined as 0.5% of TB case burden or more in England

information was available from GP clinical systems (EMISWeb and SystmOne) and data was collected using bespoke clinical templates. Treatment data from secondary care was reported to PHE using either a secure PHE web-based portal or a bespoke MS Excel worksheet, which was securely sent to PHE.

In February 2016, the national LTBI programme received an Information Standard notice (SCCI2108) from the Standardisation Committee for Care Information (SCCI) [10]. The collection was accepted as mandatory under Regulation 3 of the Health Service (Control of Patient Information) Regulations 2002 (as made under section 60 of the Health and Social Care Act 2001 and amended by section 251 of the NHS Act 2006). The data allows for the monitoring and evaluation of the effectiveness and safety of the programme.

The data presented in this chapter is only a subset of LTBI screening activities, because no data is presented from previous LTBI pilots (see previous annual report) [11] and Newham data is restricted to activities among 16 to 35 year olds from April 2015. In addition, a number of areas with larger screening volumes have not yet submitted data and only some outcome data is available.

LTBI data limitations

In this early phase of the programme it is important to note that there are several limitations to the data presented here. The data should therefore be interpreted with caution. Much of the data comes from Newham CCG, which was the programme's pilot site, and outcomes for the national indicators may not be generalisable to the rest of England, particularly considering differences in treatment settings (e.g. treatment in primary care). In addition, and perhaps more importantly, recording of key variables such as laboratory test results in GP clinical systems was not optimal, with a lot of missing data. Data from laboratory services is not currently routinely collected by PHE, therefore could not be used to assess completeness of records in GP clinical systems for England overall.

Further analysis on data completeness by CCG and TB control area will be presented once more robust national LTBI data is available.

CCG implementation status

NHS England has allocated £10 million for each of the financial years (FY) 2015/16 and 2016/2017 to support delivery of the LTBI programme. The first CCG to be funded was Newham, which in 2015 reported the highest incidence of TB in England with a rate of 86.4 per 100,000 (Table Aii.1.2). Newham also served as a pilot site for the national programme and received its funding in April 2015. Between May and October 2015 the

remaining 58 priority CCGs, with approval from their local TB Control Board, prepared and submitted implementation plans to NHS England for approval. As of June 2016, 54 of the 59 priority CCGs (91.5%) have received funding from NHS England. Of these, 30 (55.5%) have reported to have an operational LTBI programme that is systematically testing and treating eligible new migrants for LTBI (Figure 10.1 and Figure 10.2).

Figure 10.1: Timeline (by LTBI testing start of CCG) of the national LTBI testing and treatment programme roll-out April 2015 - June 2016

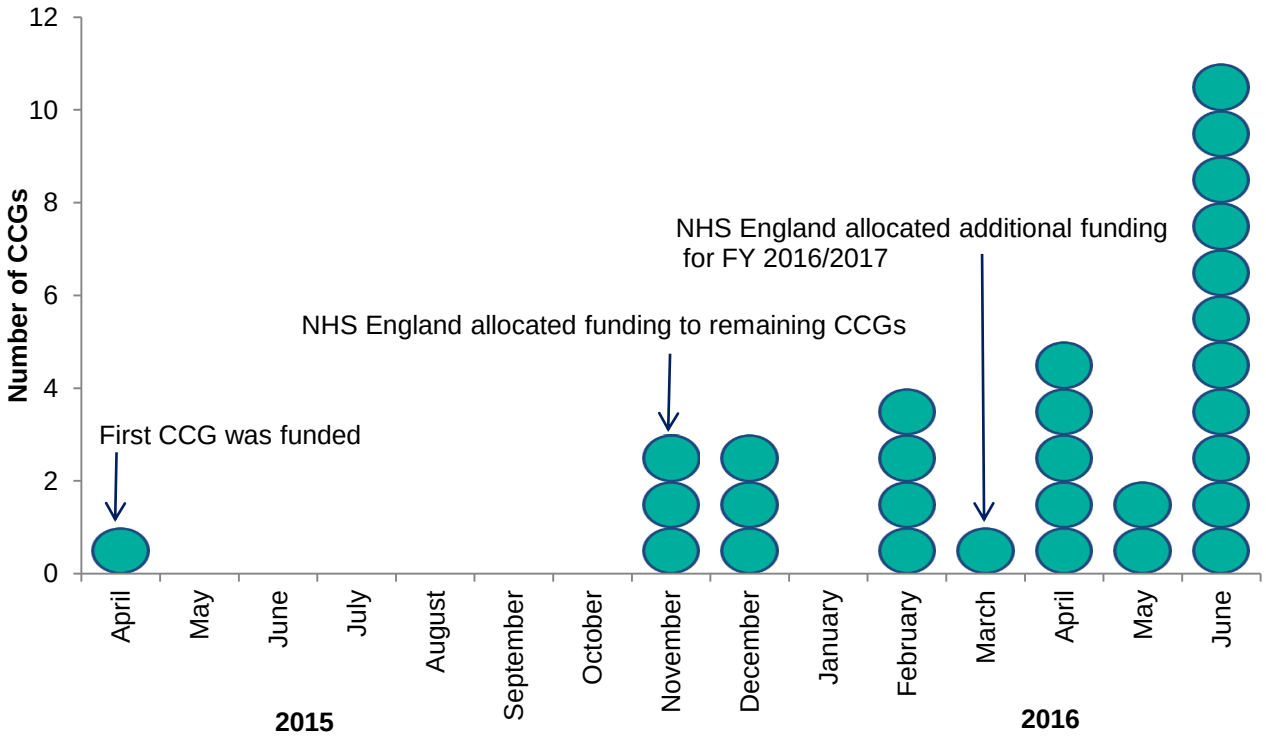
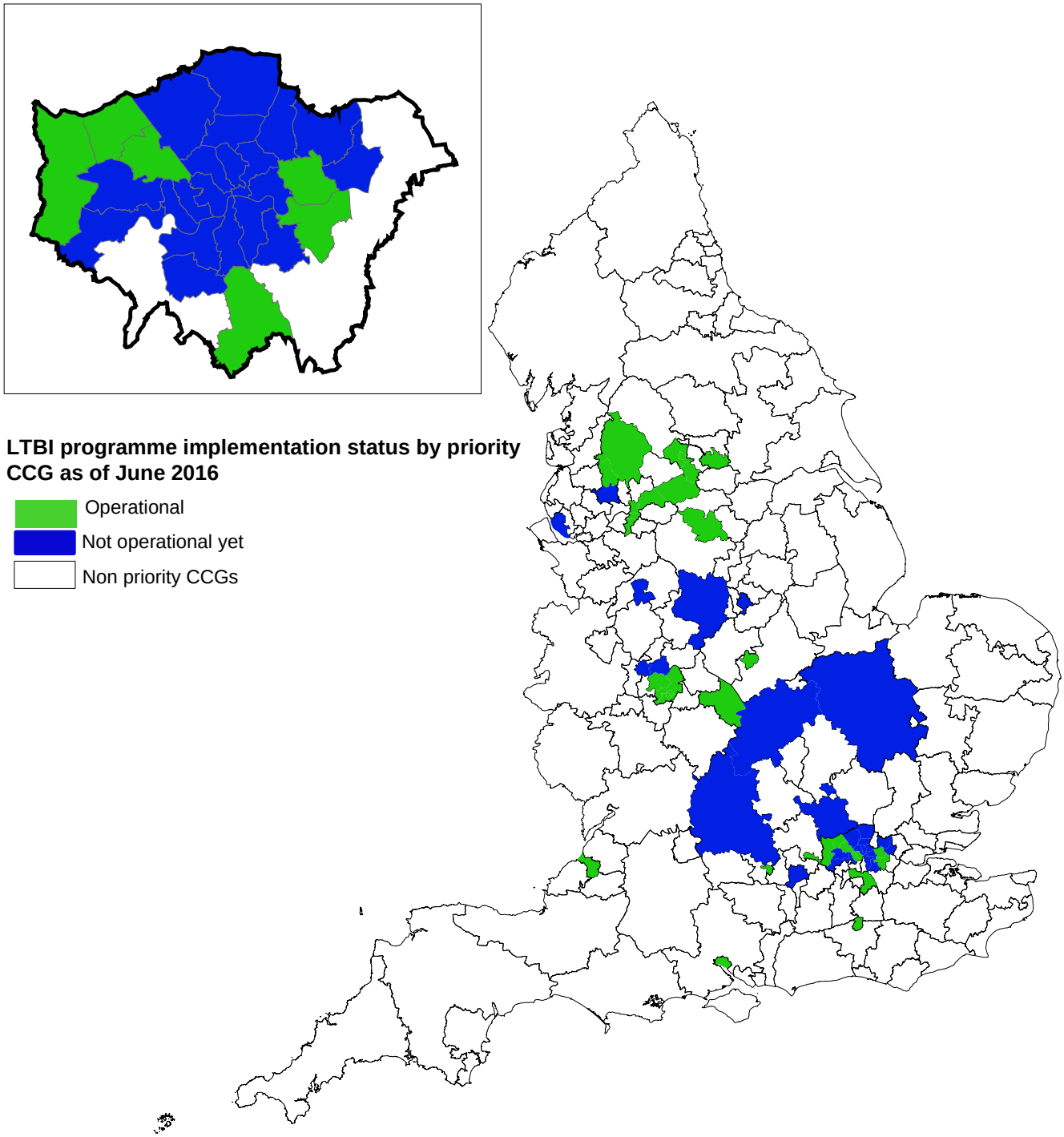


Figure 10.2: Status of national systematic LTBI testing and treatment programme by CCG, 2015-2016



LTBI Indicator 1: The number of CCGs that have a systematic new entrant LTBI testing and treatment initiative in place (England)

Overall number, proportion and geographical distribution

Between April 2015 and June 2016, a total of 5,622 eligible migrants were offered a test for LTBI. The majority, 88.4% (4,971/5,622) were identified in Newham. Fifty-one percent (2,904/5,622) of all individuals who were offered testing received a test for LTBI. Data from laboratory providers was available for Newham CCG and was used to supplement clinical record data to calculate the proportion tested because of the large amount of missing data in GP clinical records. An assessment by Newham CCG showed that 38.0% (918/2,413) of test results, mostly negative results, were not coded in GP clinical system, leading to under-ascertainment of negative results and screening uptake. The proportion of individuals tested varied across TB control board areas from 20.3% in the North West to 99.3% in the South East (Table 10.1).

Table 10.1: Number and proportion of individuals offered and tested for LTBI by TB control board, 2015-2016

TB control board	Number offered test	Number tested	Proportion tested (%)
London - Newham CCG only*	4,971	2,413	48.5
London - excluding Newham CCG	67	56	83.6
North East & Yorkshire & the Humber	313	267	85.3
North West	128	26	20.3
South East & South West	143	142	99.3
Total	**5,622**	**2,904**	**51.6**

* Due to missing data in GP clinical records, Newham data was supplemented and number of tests calculated using laboratory provider data.

LTBI Indicator 2: Proportion of eligible new entrants who accept LTBI testing (England)

Demographic characteristics

Age and sex

GP clinical records were available for 68.3% (1,986/2,904) of persons reported to have received a test for LTBI. Of these, demographic information was available for 94.7% (1,881/1,986) and date of birth was known for 94.7% (1,877/1,986). In 2016, 52.9% (994/1,881) of those tested for LTBI were male and 47.0% (883/1,881) were female (Table 10.2). In females, the proportion tested was highest in those 21 to 25 years (57.8%, 248/429) followed by those 26 to 30 years (54.7%, 397/726). In males, the highest proportion tested was in those 26 to 30 years (45.3, 329/726) and in those 31 to 35 years (52.7%, 305/579).

Table 10.2: Persons tested for LTBI by age group and sex, England, 2015-2016

Age groups (years)	Female		Male		Total	
	n	%	n	%	n	%
16-20	75	52.4	68	47.6	143	7.6
21-25	248	57.8	181	42.2	429	22.9
26-30	397	54.7	329	45.3	726	38.7
31-35	274	47.3	305	52.7	579	30.8
Total	**994**	**52.9**	**883**	**47.0**	**1,877**	**100.0**

Place of birth

Place of birth was known for 92.3% (1,834/1,985) of individuals tested for LTBI. India, Bangladesh and Pakistan were the most frequent countries of birth and accounted for 36.6% (671/1,834), 22.2% (407/1,834) and 16.1% (295/1,834), respectively (Table 10.3).

Table 10.3: Most frequent countries of birth for individuals with LTBI, 2015-2016

Country of birth*	Number	Proportion (%)
India	671	36.6
Bangladesh	407	22.2
Pakistan	295	16.1
Nigeria	139	7.6
Pakistan	70	3.8
Ghana	46	2.5
Afghanistan	38	2.1
Somalia	24	1.3
Philippines	21	1.1
Nepal	20	1.1
Other (each <1%)	103	5.6
Total	**1,834**	**100.0**

* Where country of birth was known

Positive tests for LTBI

GP clinical records show that 25.7% (510/1,986) of all eligible migrants who received a test for LTBI in England between April 2015 and June 2016 were positive, 72.2% (1,433/1,986) were negative and 2.1% (42/1,986) were indeterminate. The majority of results were reported from Newham CCG, which also had the highest proportion (29.0%, 435/1,494) of persons with a positive test for LTBI.

Table 10.4: Number and proportion of IGRA test results by TB control board area, 2015-2016

TB control board	Indeterminate		Negative		Positive		Total
	n	%	n	%	n	%	n
London - Newham CCG only	35	2.3	1,025	68.6	434	29.0	1,494
London - excluding Newham CCG	4	7.1	37	66.1	15	26.8	56
North East, Yorkshire & the Humber	1	0.4	228	85.4	38	14.2	267
North West	0	0.0	22	84.6	4	15.4	26
South East & South West	2	1.4	121	85.2	19	13.4	142
Total	**42**	**2.1**	**1,433**	**72.2**	**510**	**25.7**	**1,985**

LTBI Indicator 3: Proportion of results positive, negative, indeterminate (England)

Treatment for LTBI

Treatment started

Once TB disease was excluded, treatment for LTBI was offered to all eligible persons unless medically contraindicated. Individuals were started on either three months of isoniazid/rifampicin combination therapy (Rifnah®) or six months of isoniazid. In the early stages of the programme, treatment data was available from 22 CCGs, with the majority from Newham CCG. At this stage, therefore, treatment outcome indicators cannot be generalised to England overall.

Treatment acceptance was recorded for 256 of the 510 (50.2%) persons with a positive test for LTBI. Eleven persons (2.1%) refused treatment (Table 10.5). The majority of these 92.5% (237/256) were from Newham CCG. The most common treatment regimen prescribed was three months of isoniazid/rifampicin combination therapy (Rifnah®, 95.7% (245/256).

Table 10.5: LTBI treatment acceptance* status England, 2015-2016

Treatment status for LTBI	Number	Proportion (%)
Accepted	256	50.2
Refused	11	2.1
Total	267	52.3

* Where a treatment status was recorded GP clinical systems

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

LTBI Indicator 5: Proportion of individuals who complete LTBI treatment amongst those who start (England)

As most CCGs have recently started implementation of LTBI programmes treatment completion data will come through in the autumn of 2016. Treatment completion data was available from Newham which is a primary care based programme and treatment is managed by accredited pharmacies. This is in contrast to most other CCGs where treatment takes place in secondary care.

Treatment information from Webstar Health, a pharmacy information and management system was used to calculate treatment completion rate for Newham CCG for 2015-16. Of the 237 person who accepted treatment, 59.9% (142/237) had a record of starting treatment. Of these, 57.0%, (81/142) completed a full course of treatment for LTBI.

Nationally, significant adverse reaction to LTBI treatment was reported for one person (<1% of the 142 persons with records on started treatment).

LTBI Indicator 6. The proportion of persons 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 or above are required to undergo screening for active pulmonary TB prior to entry to the UK
- over one million screening episodes were recorded to have taken place between October 2005 and December 2015
- a total of 382 TB cases were detected through pre-entry screening in 2015
- as more cases were detected overseas, the number of prevalent pulmonary TB cases notified in the UK (within one year of entry to the UK) from countries within the pre-entry scheme decreased from 380 in 2006 to 88 in 2015

Based on a successful pilot in 15 high TB incidence countries carried out in collaboration with the International Organisation of Migration (IOM) between 2005 and 2012, the UK replaced port based on-entry screening with pre-entry screening. 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. This chest x-ray based active pulmonary TB screening is mandatory for all migrants from countries with a TB incidence over 40 per 100,000 who apply for a UK visa for more than six months and is carried out by appointed panel clinics either in the country of origin or in neighbouring countries [12].

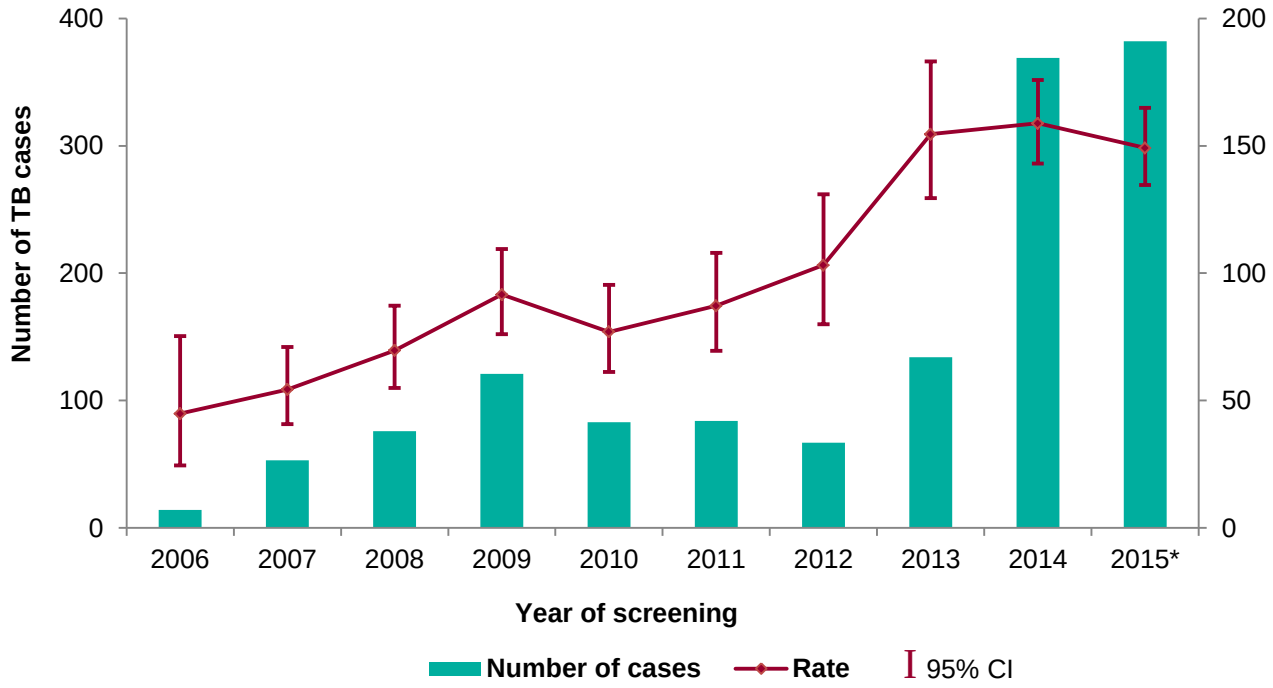
The number of applicants screened and the number of TB cases detected has increased as more countries have joined the TB pre-entry scheme. A total of 1,217,842 screening episodes took place between October 2005 and December 2015, with 256,115 performed in 2015. In 2015, the majority of applicants were female (56.0%, 118,316/211,261) and 44.0% (92,945/211,261) were male (where sex was known). The majority of applicants were young adults, aged 15 to 34 years old (77.3%, 164,661/212,933) (where age was known). The largest number of screening episodes took place in China (27.3%, 69,845), India (16.6%, 42,431), Pakistan (8.6%, 22,043/256,115) and South Korea (6.1%, 15,608).

In total, 382 TB cases were detected in 2015, giving an overall TB yield of 149.2 per 100,000 applications. The TB rate was similar for female and male applicants. The majority of TB cases were found among applicants aged 15 to 34 years old (46.6%, 178/382) although older age groups had higher TB rates (108.1 per 100,000 in 15-34 year olds versus 658.1 per 100,000 in those aged 55 or over). The number of TB cases

diagnosed through the pre-entry screening programme has increased from 14 in 2006 to 382 in 2015. Over the same time period, the TB detection rate has increased from 45 per 100,000 to 149.5 per 100,000 (Figure 11.1, Table Ai.11.1). The trends in pre-entry screening reflect both increased activity in a fully rolled out programme as well as improved detection due to the increased use of sputum culture in line with changes to the UK technical instructions [12].

Over the same period (2006 to 2015), pulmonary TB cases notified in the UK within one year of entry into the UK from countries covered by the programme (101 countries) has decreased from 380 in 2006 to 88 in 2015 (Figure 11.2, Table Ai.11.2).

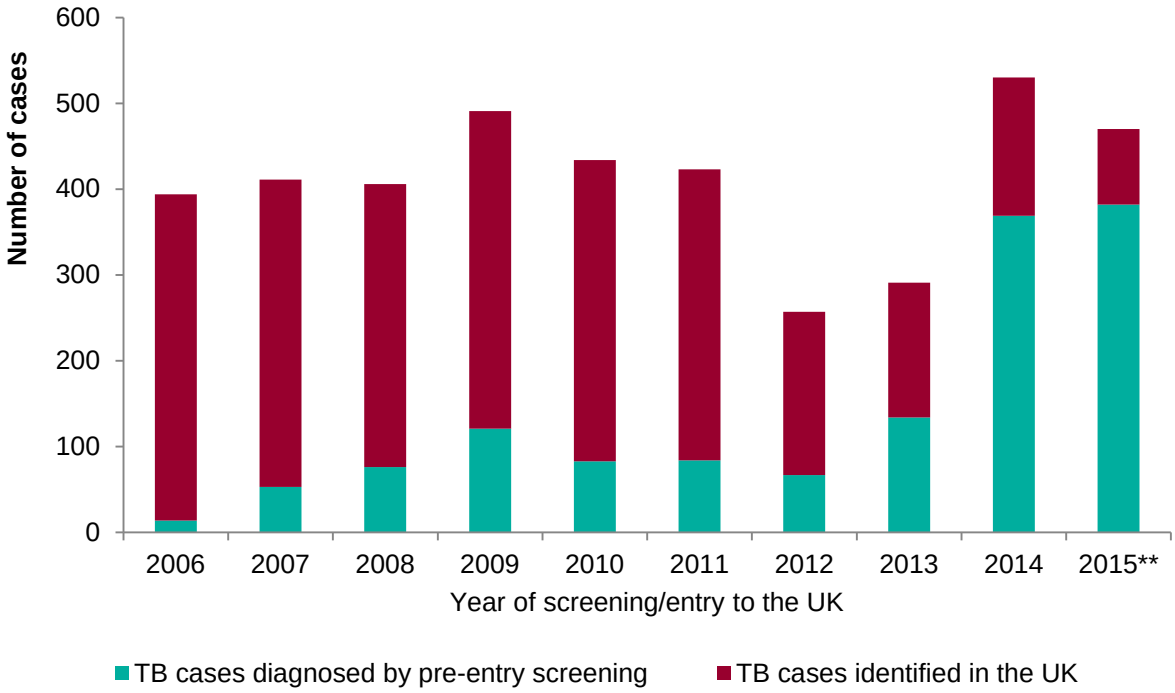
Figure 11.1: Number and rate of TB cases detected in high incidence countries through the UK pre-entry screening programme, 2006 to 2015[14]



* As of May 2016, 513 sputum samples are pending and the rate may increase when final results are available. We also improved operationalising the case definition in 2015, in keeping with improved data completion.

[14] 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.

Figure 11.2: Number of pulmonary TB cases diagnosed by pre-entry screening in the 101 programme countries and those identified within one year of UK entry*, 2006 to 2015[15]



* The number of pulmonary TB cases identified within one year of entry into the UK was from all 101 high incidence countries but the number of TB cases diagnosed 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).
** As of May 2016, 513 sputum samples are pending and the rate may increase when final results are available.

[15] For countries, which only 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

12. Conclusion

There has been a year-on-year decline in the incidence of TB in England over the past four years, down to 10.5 per 100,000 (5,758 cases) in 2015. This represents a decline of one-third since the peak incidence of 15.6 per 100,000 (8,280 cases) in 2011. This is the lowest TB incidence in England since the start of enhanced TB surveillance in 2000.

In the past year, the decline in the number of TB cases has been seen in both the non-UK born and UK born populations, and in all PHE Centres. However, the pattern of decline differs in different population subgroups.

The reduction in the number of TB cases in the past four years has been particularly marked in the non-UK born population, especially among new migrants. The majority of non-UK born TB cases (60%) now occur among those who have lived in the UK for more than six years. However, the rate of TB in the non-UK born population is still 15 times higher than in the UK born population, and 73% of all TB cases notified in 2015 were born abroad.

It is now also possible to see a consistent downward trend in the number of TB cases in the UK born population since 2012. Within the UK born population, the majority (60%) of cases notified in 2015 occurred in the White ethnic group, although the rate in this group (2.2 per 100,000) was more than ten times lower than in the Black, Indian and Pakistani ethnic groups.

The recent decline in the number of TB cases is likely to reflect a combination of factors. The reduction in the number of TB cases in the non-UK born population, particularly in new migrants, will in part reflect the success of the UK pre-entry screening programme. We may also be starting to see the early impact of the increase in detection and treatment of latent TB infection in this group. Some reduction in the number of TB cases is also to be expected following reductions in the number of migrants from the highest TB burden countries in recent years. In addition, there is now clear evidence of a reduction in TB transmission in England, with reducing rates of TB in the UK born population, including in UK born children, and a reduction in the proportion of TB cases in a strain-typing cluster. This is likely to reflect overall improvements in TB control, in addition to a reduction in the potential for transmission with reduced case numbers.

In terms of geographical distribution, TB continued to be concentrated in large urban areas. As in previous years, the London PHE Centre accounted for nearly 40% of cases, followed by the West Midlands PHE Centre with 12% of cases. However, TB rates have shown particularly large declines in these areas, with a reduction of 35% and 29% in the past four years respectively.

The number and proportion of TB cases with multi-drug resistance/rifampicin resistance (MDR/RR-TB) has decreased since the peak of 89 cases 2011, with 54 cases (1.6%) with initial MDR/RR-TB in 2015. However, ten of these cases had XDR-TB, which requires even more lengthy and complex management.

There has been a continued reduction in the number and proportion of TB cases co-infected with HIV, from the peak of 566 cases (7.8%) in 2005 to 197 cases (3.2%) in 2014. The majority of TB-HIV co-infected cases continue to be among those born in countries in Africa with a high HIV prevalence.

In 2015, there was a small reduction in the proportion of non-UK born cases who experienced a delay of more than four months from date of reported symptom onset to treatment start. However, long delays are still reported, with over a quarter of non-UK born pulmonary cases and over a third of UK born pulmonary cases having a delay of more than four months in 2015.

Following ten consecutive years of improving outcomes for TB cases, in the past year there has been a slight reduction in the proportion of drug sensitive TB cases who had completed treatment by 12 months, from 85.4% to 84.5%. This is mainly due to a small increase in the proportion of cases who had died (from 4.1% to 4.8%). As in previous years, the majority of those who died were aged 65 years or older.

Despite the overall decline in the number of TB cases in England, there has not been a corresponding reduction in the number of cases with social risk factors. In the past year, the proportion of cases with current or a history of homelessness, drug or alcohol misuse or imprisonment has increased slightly, from 9.8% to 11.8%. People with social risk factors are not only much more at risk of developing TB, but TB cases with social risk factors are more likely to have drug resistance and to have worse TB outcomes, being more than twice as likely to have been lost to follow up or to have died.

In summary, it is very encouraging that TB rates have declined for the fourth consecutive year in England. However, it is important to note that despite significant reductions in overall case numbers, there has been a small increase in the number of cases with social risk factors, who have more complex clinical and social needs. This demonstrates the ongoing need to tackle the social and economic factors associated with TB, in addition to improving TB services, if the overall aim of eliminating TB as a public health problem in England is to be achieved.

13. Recommendations

It is very encouraging that the number of TB cases and the rate of TB have declined for the fourth consecutive year in England, and that this decline is now seen in the UK born, as well as the non-UK born, population, and in every area of the country. This welcome trend is likely to reflect recent improvements in TB control in England building up to and since the launch of the *Collaborative TB Strategy for England 2015-2020* [1] in January 2015, in addition to other factors.

To build on these achievements, and ensure that we continue to see an ongoing decline in TB in England, further work is needed to take forward the strategy's 10 areas for action (AfA). 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* [1].

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

Although the delay between symptom onset and treatment start date for pulmonary TB cases has shown a slight improvement in the past year, delays are still unacceptably long.

Recommendations to reduce diagnostic delay:

- TBCBs, CCGs and TB clinical teams to raise awareness of TB among healthcare workers by utilising the recently updated TB resources of leading national TB charity, TB Alert http://www.thetruthabouttb.org/professionals/professional-education/
- TBCBs, CCGs and primary care to raise awareness of TB and encourage use of the RCGP TB e-learning module in primary care http://elearning.rcgp.org.uk/course/info.php?id=107
- TB clinical teams to use the recently updated TB resources for patients available on TB Alerts website http://www.thetruthabouttb.org/

To provide universal access to high quality diagnostics (AfA2)

In 2015, 32% of all TB cases were not confirmed by any laboratory method. As we move into a new era of TB diagnostics with whole genome sequencing (WGS) on the horizon, we need to maximise the benefits of all diagnostic technologies.

Recommendations to improve TB diagnostics:

- TB clinical teams to obtain diagnostic samples wherever possible

- national TB office, through its diagnostics task and finish group, to undertake a review of TB diagnostics across the NHS, and use this to define a minimum standard of best practice for TB diagnostics in hospital laboratories
- TBCBs and lead TB microbiologists to work with local laboratories to encourage use of the TB diagnostics standard of best practice, once defined

To improve treatment and care services (AfA3)

To ensure the continuing decline in TB case numbers and low proportion of cases with drug resistance, TBCBs, CCGs, TB services and wider TB stakeholders need to work collectively to further improve treatment and care for patients.

Recommendations to improve TB treatment and care:

- TBCBs to encourage CCGs to use the national TB service specification to commission local TB services
- TB clinicians, local stakeholders and TBCBs to support and improve local TB clinical networks, and in due course consider the need for regional MDR-TB MDTs
- TBCBs are encouraged to complete their gap-analysis of local TB services against the national TB service specification and use this to prepare local action plans to meet these gaps
- CCGs to commission and support highly-targeted case finding and prevention activities, which focus on high-risk groups
- TB clinical teams to continue their excellent case management and support to complex TB patients, and to offer DOT where indicated
- TB clinical teams to continue cohort review as a tool to improve local TB control and as a measure of treatment outcomes and contact tracing activity

To reduce drug-resistant TB (AfA6)

Although the number of new MDR-TB cases has declined since 2011, in the past year there has been a small increase in those with XDR-TB, who are particularly complex to treat.

Recommendations to continue the reduction in drug resistant TB:

- clinical teams to continue their hard work to support patients complete their treatment course, using DOT where indicated
- TB clinicians are encouraged to discuss each MDR-TB case with the BTS MDR-TB Advisory Service
- TBCBs should work with local stakeholders to consider the need for regional MDR-TB MDTs
- national TB office to work with NHS England to develop a service specification for MDR/XDR TB as part of the Infectious Disease Service Review

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

As the number and proportion of TB cases with social risk factors (SRFs) has increased slightly in 2015, and patients with SRFs have more complex needs and worse TB outcomes, an enhanced focus on preventing TB in USPs and improving the support available to patients with SRFs is required. This should, in turn, help to reduce health inequalities, one of the key aims of the strategy.

Recommendations to improve TB control amongst USPs:

- national TB office, through its USP task and finish group, to launch a TB resource to help tackle TB in USPs for TBCBs, clinical teams and organisations who work with USPs
- TBCBs and the wider TB workforce to use the USP TB resource to take action locally
- TBCBs, CCGs, primary care and local authority public health to raise TB awareness in health care workers, allied professionals working with USPs and USPs themselves
- TB commissioners in both CCGs and local authorities to ensure appropriate access to services and treatment and support to enable patients to complete treatment

To implement new entrant latent TB screening (AfA8)

As the rate of TB in the non-UK born population remains considerably higher than in the UK born population, and nearly three-quarters of all TB cases notified in 2015 were 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. It is encouraging to see the progressive roll-out of the programme.

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

- in high TB burden areas, TBCBs should continue to work with CCGs to facilitate the roll-out of LTBI programmes, facilitate data returns and encourage the use of the recently launched LTBI toolkit to support this work http://www.tbalert.org/health-professionals/ltbi-toolkit/
- in high TB burden areas, CCG, primary and secondary care staff are encouraged to drive forward the roll-out of LTBI programmes, invite people for testing and encourage those with LTBI to consider treatment
- healthcare staff are encouraged to use the recently launched LTBI toolkit to enhance the delivery of their LTBI programmes
- CCGs, primary and secondary care staff of LTBI programmes to ensure data entry is robust and complete and to facilitate data transfer
- national TB office to work with NHS England to sustain the funding for LTBI testing and treatment programmes through to 2020

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

- TBCBs are encouraged to continue their work providing over-arching 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

The strategy is to be delivered over five years. This year's annual report provides evidence of a very positive start to early implementation, however, there is much still to do. None of what has been achieved so far could have been done without the hard work of front-line TB service staff, TB control boards and their constituent members and NHS England. Ultimately, improved TB control will be achieved through collective participation and commitment of stakeholders and through the continued implementation of the TB strategy.

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Appendix I. Supplementary tables

Table Ai.1.1: TB case notifications, rates and annual percentage change, England, 2000-2015

Year	Total		Annual change in case numbers (%)	Annual change in rate (%)
	Number of cases	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	6,929	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	7,578	14.7 (14.4-15.1)	-1.4	-2.6
2008	7,809	15.1 (14.7-15.4)	3.0	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	8,086	15.1 (14.8-15.4)	-2.3	-3.2
2013	7,261	13.5 (13.2-13.8)	-10.2	-10.6
2014	6,472	11.9 (11.6-12.2)	-10.9	-11.9
2015	5,758	10.5 (10.2-10.8)	-11.0	-11.8

CI - confidence intervals

Table Ai.1.2: TB case notifications and rates by PHE Centre, England, 2000-2015

Year	London		West Midlands		South East		North West		Yorkshire and the Humber	
	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	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)	544	11.0 (10.1-11.9)
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)	551	11.1 (10.2-12.0)
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)	505	10.1 (9.2-11.0)
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)	544	10.8 (9.9-11.8)
2004	3,111	41.9 (40.4-43.4)	920	17.2 (16.1-18.4)	556	7.0 (6.5-7.6)	569	8.3 (7.6-9.0)	535	10.6 (9.7-11.5)
2005	3,448	45.9 (44.3-47.4)	920	17.1 (16.0-18.2)	584	7.3 (6.7-7.9)	743	10.8 (10.1-11.6)	556	10.9 (10.0-11.8)
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)	661	12.9 (11.9-13.9)
2007	3,234	42.0 (40.6-43.5)	928	17.0 (15.9-18.2)	628	7.7 (7.1-8.4)	734	10.6 (9.8-11.4)	632	12.2 (11.3-13.2)
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)	635	12.2 (11.3-13.2)
2009	3,402	42.8 (41.4-44.3)	1,006	18.2 (17.1-19.4)	713	8.6 (8.0-9.3)	799	11.4 (10.7-12.3)	688	13.2 (12.2-14.2)
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)	628	12.0 (11.0-12.9)
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)	664	12.6 (11.6-13.5)
2012	3,405	41.0 (39.6-42.4)	1,075	19.1 (17.9-20.2)	777	9.2 (8.5-9.8)	775	10.9 (10.2-11.7)	593	11.2 (10.3-12.1)
2013	2,975	35.3 (34.1-36.6)	979	17.3 (16.2-18.4)	681	8.0 (7.4-8.6)	716	10.1 (9.4-10.8)	583	10.9 (10.1-11.8)
2014	2,552	29.9 (28.7-31.1)	775	13.6 (12.6-14.6)	664	7.7 (7.1-8.3)	643	9.0 (8.3-9.7)	518	9.7 (8.8-10.5)
2015	2,269	26.2 (25.1-27.3)	708	12.3 (11.4-13.3)	605	7.0 (6.4-7.5)	570	7.9 (7.3-8.6)	440	8.2 (7.4-9.0)

CI - confidence intervals

Table Ai.1.2: TB case notifications and rates by PHE Centre, England, 2000-2015 continued

Year	East of England		East Midlands		South West		North East	
	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)
2000	299	5.4 (4.8-6.0)	414	9.9 (9.0-10.9)	230	4.7 (4.1-5.3)	157	6.2 (5.2-7.2)
2001	338	6.0 (5.4-6.7)	544	13.0 (11.9-14.1)	211	4.3 (3.7-4.9)	177	7.0 (6.0-8.1)
2002	355	6.3 (5.6-7.0)	471	11.2 (10.2-12.2)	220	4.4 (3.9-5.0)	149	5.9 (5.0-6.9)
2003	323	5.7 (5.1-6.3)	458	10.8 (9.8-11.8)	201	4.0 (3.5-4.6)	141	5.6 (4.7-6.5)
2004	405	7.1 (6.4-7.8)	419	9.8 (8.9-10.7)	264	5.2 (4.6-5.9)	143	5.6 (4.7-6.6)
2005	470	8.1 (7.4-8.9)	533	12.3 (11.3-13.4)	266	5.2 (4.6-5.9)	132	5.2 (4.3-6.1)
2006	479	8.2 (7.5-9.0)	566	13.0 (11.9-14.1)	278	5.4 (4.8-6.1)	141	5.5 (4.6-6.5)
2007	421	7.2 (6.5-7.9)	534	12.1 (11.1-13.2)	269	5.2 (4.6-5.9)	196	7.7 (6.6-8.8)
2008	506	8.5 (7.8-9.3)	483	10.9 (9.9-11.9)	279	5.4 (4.7-6.0)	177	6.9 (5.9-8.0)
2009	512	8.5 (7.8-9.3)	524	11.7 (10.7-12.8)	303	5.8 (5.2-6.5)	165	6.4 (5.5-7.5)
2010	506	8.4 (7.6-9.1)	494	11.0 (10.0-12.0)	265	5.0 (4.4-5.7)	150	5.8 (4.9-6.8)
2011	560	9.2 (8.4-10.0)	492	10.8 (9.9-11.8)	307	5.8 (5.2-6.5)	131	5.0 (4.2-6.0)
2012	497	8.1 (7.4-8.8)	497	10.9 (9.9-11.9)	300	5.6 (5.0-6.3)	167	6.4 (5.5-7.5)
2013	451	7.3 (6.6-8.0)	413	9.0 (8.1-9.9)	325	6.0 (5.4-6.7)	138	5.3 (4.4-6.2)
2014	436	6.9 (6.3-7.6)	400	8.6 (7.8-9.5)	316	5.8 (5.2-6.5)	168	6.4 (5.5-7.5)
2015	393	6.2 (5.6-6.8)	354	7.6 (6.8-8.4)	290	5.3 (4.7-5.9)	129	4.9 (4.1-5.8)

CI - confidence intervals

Table Ai.1.3 TB case notifications and rates by age group and place of birth, England, 2015

Age group (years)	Place of Birth				Total*	
	UK born		Non-UK born			
	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)
0-4	75	2.3 (1.8-2.8)	14	13.6 (7.4-22.7)	89	2.6 (2.1-3.2)
5-9	35	1.1 (0.8-1.6)	11	4.8 (2.4-8.7)	49	1.5 (1.1-1.9)
10-14	52	1.9 (1.4-2.5)	28	9.9 (6.5-14.2)	82	2.8 (2.2-3.4)
15-19	116	4.1 (3.4-5.0)	134	40.4 (33.8-47.8)	256	8.2 (7.2-9.2)
20-24	121	4.0 (3.3-4.7)	303	60.5 (53.9-67.7)	431	12.1 (11.0-13.3)
25-29	132	4.6 (3.8-5.4)	628	73.9 (68.2-79.9)	764	20.5 (19.1-22.0)
30-34	98	3.8 (3.1-4.6)	585	52.4 (48.3-56.8)	698	18.9 (17.5-20.3)
35-39	99	4.0 (3.3-4.9)	572	57.5 (52.9-62.4)	682	19.8 (18.4-21.4)
40-44	111	3.9 (3.2-4.8)	386	48.2 (43.5-53.3)	507	14.0 (12.8-15.3)
45-49	121	3.8 (3.1-4.5)	323	50.5 (45.2-56.4)	448	11.6 (10.5-12.7)
50-54	123	3.8 (3.1-4.5)	236	44.4 (38.9-50.4)	371	9.8 (8.8-10.9)
55-59	74	2.6 (2.1-3.3)	198	44.9 (38.9-51.6)	276	8.5 (7.5-9.6)
60-64	66	2.6 (2.0-3.3)	188	55.9 (48.2-64.5)	260	9.0 (7.9-10.2)
65-69	76	2.8 (2.2-3.5)	140	51.3 (43.1-60.5)	220	7.4 (6.4-8.4)
70-74	75	3.7 (2.9-4.7)	112	50.5 (41.6-60.8)	193	8.6 (7.5-9.9)
75-79	60	3.7 (2.8-4.7)	99	72.1 (58.6-87.7)	172	9.7 (8.3-11.3)
80+	116	5.4 (4.4-6.4)	130	67.9 (56.8-80.7)	260	11.0 (9.7-12.4)

* Total cases including those with an unknown place of birth

CI - confidence intervals

Table Ai.1.4: TB case notifications, rates and annual percentage change by place of birth, England, 2000-2015

Year	Place of birth							
	UK born				Non-UK born			
	Number of cases	Rate per 100,000 (95% CI)	Annual change in case numbers (%)	Annual change in rate (%)	Number of cases	Rate per 100,000 (95% CI)	Annual change in case 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	4,570	95.1 (92.4 -97.9)	5.6	4.7
2005	1,804	4.0 (3.8 -4.2)	0.7	0.0	5,186	100.7 (98.0 -103.5)	13.5	5.9
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	5,136	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	1,906	4.2 (4.1 -4.4)	2.1	0.0	5,663	86.8 (84.6 -89.1)	4.5	0.9
2010	1,814	4.0 (3.8 -4.2)	-4.8	-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	2,005	4.4 (4.2 -4.6)	2.4	2.3	5,839	81.4 (79.3 -83.5)	-3.0	-5.2
2013	1,840	4.0 (3.8 -4.2)	-8.2	-9.1	5,256	70.6 (68.7 -72.5)	-10.0	-13.3
2014	1,759	3.8 (3.7 -4.0)	-4.4	-5.0	4,607	60.3 (58.5 -62.0)	-12.3	-14.6
2015	1,550	3.4 (3.2 -3.5)	-11.9	-10.5	4,087	51.2 (49.7 -52.8)	-11.3	-15.1

CI - confidence intervals

Table Ai.1.5: TB case notifications and rates by place of birth and PHE Centre, England, 2000-2015

Year	London				West Midlands				South East			
	UK born		Non-UK born		UK born		Non-UK born		UK born		Non-UK born	
	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	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)	162	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)	130	1.8 (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)	165	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)	475	54.1 (49.3-59.1)
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	561	10.6 (9.8-11.5)	2,799	94.8 (91.3-98.4)	335	6.7 (6.0-7.5)	703	117.2 (108.7-126.2)	230	3.0 (2.6-3.4)	529	54.6 (50.1-59.5)
2013	485	9.2 (8.4-10.1)	2,465	80.6 (77.5-83.9)	314	6.3 (5.6-7.1)	643	100.1 (92.5-108.1)	170	2.2 (1.9-2.6)	505	48.1 (44.0-52.5)
2014	478	9.0 (8.2-9.8)	2,071	66.3 (63.5-69.2)	267	5.4 (4.7-6.0)	501	77.1 (70.5-84.1)	160	2.1 (1.8-2.4)	493	46.6 (42.6-50.9)
2015	428	7.9 (7.2-8.7)	1,838	57.8 (55.2-60.5)	249	5.0 (4.4-5.7)	434	62.3 (56.6-68.5)	175	2.3 (1.9-2.6)	410	37.7 (34.1-41.5)

CI - confidence intervals

Table Ai.1.5: TB case notifications and rates by place of birth and PHE Centre, England, 2000-2015 continued

Year	North West				Yorkshire and the Humber				East of England			
	UK born		Non-UK born		UK born		Non-UK born		UK born		Non-UK born	
	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)
2000	261	4.1 (3.6-4.6)	348	126.4 (113.4-140.4)	212	4.5 (4.0-5.2)	259	114.0 (100.5-128.7)	97	1.9 (1.6-2.4)	150	46.8 (39.6-54.9)
2001	299	4.7 (4.2-5.2)	327	116.1 (103.9-129.4)	245	5.2 (4.6-5.9)	270	111.1 (98.3-125.2)	111	2.2 (1.8-2.7)	164	45.4 (38.7-52.9)
2002	258	4.0 (3.6-4.6)	352	118.5 (106.5-131.6)	188	4.0 (3.5-4.6)	284	108.2 (96.0-121.6)	105	2.1 (1.7-2.5)	209	60.7 (52.8-69.5)
2003	235	3.7 (3.2-4.2)	330	109.5 (98.0-122.0)	201	4.3 (3.7-4.9)	334	116.1 (104.0-129.3)	97	1.9 (1.6-2.4)	198	53.4 (46.2-61.3)
2004	198	3.1 (2.7-3.5)	357	110.1 (99.0-122.2)	194	4.1 (3.6-4.7)	330	115.6 (103.5-128.8)	101	2.0 (1.6-2.4)	270	71.5 (63.2-80.5)
2005	244	3.8 (3.3-4.3)	468	126.1 (114.9-138.1)	180	3.8 (3.3-4.4)	341	97.7 (87.6-108.7)	129	2.6 (2.1-3.0)	304	69.0 (61.4-77.2)
2006	229	3.6 (3.1-4.1)	426	104.9 (95.2-115.4)	172	3.6 (3.1-4.2)	415	126.7 (114.8-139.5)	98	1.9 (1.6-2.4)	324	66.0 (59.0-73.6)
2007	253	4.0 (3.5-4.5)	459	97.0 (88.3-106.3)	179	3.8 (3.3-4.4)	356	95.0 (85.4-105.4)	111	2.2 (1.8-2.7)	275	51.1 (45.3-57.5)
2008	231	3.6 (3.2-4.1)	474	95.4 (87.0-104.4)	174	3.7 (3.2-4.3)	415	102.9 (93.2-113.3)	148	2.9 (2.5-3.4)	309	58.0 (51.8-64.9)
2009	255	4.0 (3.5-4.5)	494	93.8 (85.8-102.5)	212	4.4 (3.9-5.1)	406	105.7 (95.7-116.5)	132	2.6 (2.2-3.1)	339	60.9 (54.6-67.7)
2010	270	4.2 (3.7-4.8)	491	90.5 (82.7-98.9)	190	3.9 (3.4-4.6)	366	96.9 (87.2-107.4)	135	2.6 (2.2-3.1)	347	61.7 (55.4-68.6)
2011	259	4.0 (3.6-4.6)	521	93.3 (85.4-101.7)	220	4.6 (4.0-5.2)	389	94.6 (85.5-104.5)	147	2.8 (2.4-3.3)	387	65.1 (58.8-71.9)
2012	262	4.1 (3.6-4.6)	494	89.5 (81.7-97.7)	190	4.0 (3.4-4.6)	353	78.1 (70.1-86.6)	128	2.5 (2.1-2.9)	345	52.9 (47.4-58.7)
2013	254	3.9 (3.5-4.5)	447	76.6 (69.7-84.0)	182	3.8 (3.2-4.4)	360	79.8 (71.8-88.5)	120	2.3 (1.9-2.7)	314	48.4 (43.2-54.0)
2014	227	3.5 (3.1-4.0)	405	66.0 (59.7-72.7)	172	3.6 (3.1-4.1)	320	67.9 (60.6-75.7)	110	2.1 (1.7-2.5)	313	46.4 (41.4-51.9)
2015	184	2.9 (2.5-3.3)	366	51.9 (46.7-57.5)	127	2.6 (2.2-3.1)	292	59.8 (53.2-67.1)	103	2.0 (1.6-2.4)	282	37.8 (33.5-42.5)

CI - confidence intervals

Table Ai.1.5: TB case notifications and rates by place of birth and PHE Centre, England, 2000-2015 continued

Year	East Midlands				South West				North East			
	UK born		Non-UK born		UK born		Non-UK born		UK born		Non-UK born	
	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)
2000	120	3.1 (2.6-3.7)	101	46.4 (37.8-56.4)	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	120	3.1 (2.5-3.7)	100	44.7 (36.4-54.4)	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	127	3.2 (2.7-3.9)	119	47.2 (39.1-56.5)	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	116	2.9 (2.4-3.5)	182	72.9 (62.7-84.3)	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	111	2.8 (2.3-3.4)	226	90.8 (79.3-103.4)	99	2.1 (1.7-2.6)	134	53.5 (44.8-63.3)	68	2.8 (2.2-3.6)	59	69.3 (52.8-89.4)
2005	95	2.4 (1.9-2.9)	291	99.4 (88.3-111.5)	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	114	2.9 (2.4-3.5)	233	68.3 (59.8-77.6)	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	118	3.0 (2.5-3.6)	278	75.7 (67.1-85.2)	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	119	3.0 (2.5-3.6)	296	76.5 (68.0-85.7)	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	146	3.6 (3.1-4.3)	340	89.8 (80.5-99.8)	99	2.1 (1.7-2.5)	147	45.2 (38.2-53.2)	54	2.3 (1.7-2.9)	70	48.9 (38.1-61.7)
2010	122	3.0 (2.5-3.6)	351	85.3 (76.6-94.8)	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	142	3.5 (3.0-4.1)	331	76.1 (68.1-84.8)	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	127	3.1 (2.6-3.7)	354	80.3 (72.1-89.1)	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	116	2.9 (2.4-3.4)	292	63.3 (56.2-70.9)	151	3.1 (2.6-3.6)	155	39.1 (33.2-45.8)	48	2.0 (1.5-2.6)	75	48.7 (38.3-61.0)
2014	132	3.2 (2.7-3.8)	258	55.9 (49.2-63.1)	133	2.7 (2.3-3.2)	171	38.2 (32.7-44.4)	80	3.3 (2.6-4.1)	75	51.5 (40.5-64.5)
2015	101	2.5 (2.0-3.0)	246	50.0 (43.9-56.6)	128	2.6 (2.2-3.1)	146	31.9 (26.9-37.5)	55	2.2 (1.7-2.9)	73	58.3 (45.7-73.4)

CI - confidence intervals

Table Ai.1.6: Number and proportion of TB case notifications by most frequent country of birth in non-UK born population, England, 2000-2015

Year	Country of birth																
	India		Pakistan		Bangladesh		Somalia		Nepal		Nigeria		Romania		Philippines		Total*
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n
2000	722	23.2	676	21.7	102	3.3	362	11.6	19	0.6	47	1.5	5	0.2	28	0.9	3,115
2001	668	20.6	715	22.1	109	3.4	360	11.1	28	0.9	47	1.5	5	0.2	35	1.1	3,236
2002	780	19.9	774	19.8	159	4.1	428	10.9	33	0.8	89	2.3	8	0.2	51	1.3	3,913
2003	789	19.3	729	17.9	182	4.5	473	11.6	34	0.8	116	2.8	11	0.3	52	1.3	4,083
2004	904	20.8	699	16.1	183	4.2	532	12.3	37	0.9	136	3.1	8	0.2	74	1.7	4,338
2005	1,099	22.4	832	16.9	191	3.9	581	11.8	36	0.7	153	3.1	11	0.2	69	1.4	4,917
2006	1,112	22.6	837	17.0	182	3.7	641	13.0	67	1.4	154	3.1	6	0.1	86	1.7	4,930
2007	1,188	24.3	796	16.3	243	5.0	551	11.3	69	1.4	150	3.1	15	0.3	92	1.9	4,887
2008	1,328	25.6	882	17.0	239	4.6	531	10.3	90	1.7	165	3.2	19	0.4	111	2.1	5,178
2009	1,531	28.2	921	16.9	235	4.3	535	9.8	114	2.1	174	3.2	25	0.5	114	2.1	5,437
2010	1,553	29.2	881	16.5	259	4.9	439	8.2	175	3.3	169	3.2	44	0.8	131	2.5	5,325
2011	1,787	30.4	1,061	18.0	285	4.8	415	7.1	214	3.6	190	3.2	54	0.9	101	1.7	5,884
2012	1,763	30.8	1,047	18.3	276	4.8	377	6.6	209	3.6	174	3.0	77	1.3	125	2.2	5,729
2013	1,545	29.9	1,044	20.2	237	4.6	290	5.6	163	3.2	156	3.0	69	1.3	125	2.4	5,162
2014	1,291	28.5	798	17.6	208	4.6	232	5.1	167	3.7	116	2.6	88	1.9	112	2.5	4,530
2015	1,056	26.3	638	15.9	210	5.2	177	4.4	126	3.1	118	2.9	118	2.9	105	2.6	4,022
Total	**19,116**	**25.6**	**13,330**	**17.8**	**3,300**	**4.4**	**6,924**	**9.3**	**1,581**	**2.1**	**2,154**	**2.9**	**563**	**0.8**	**1,411**	**1.9**	**74,686**

* Total number of non-UK born cases where country of birth was known

Table Ai.1.6: Number and proportion of TB case notifications by most frequent country of birth in non-UK born population, England, 2000-2015 continued

Year	Country of birth														
	Zimbabwe		Eritrea		Poland		Afghanistan		Kenya		Sri Lanka		Other		Total*
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n
2000	78	2.5	26	0.8	10	0.3	43	1.4	92	3.0	50	1.6	855	27.4	3,115
2001	110	3.4	18	0.6	9	0.3	66	2.0	109	3.4	66	2.0	891	27.5	3,236
2002	240	6.1	26	0.7	10	0.3	100	2.6	110	2.8	82	2.1	1,023	26.1	3,913
2003	275	6.7	43	1.1	15	0.4	65	1.6	109	2.7	66	1.6	1,124	27.5	4,083
2004	270	6.2	33	0.8	13	0.3	78	1.8	130	3.0	81	1.9	1,160	26.7	4,338
2005	269	5.5	43	0.9	12	0.2	83	1.7	134	2.7	85	1.7	1,319	26.8	4,917
2006	242	4.9	64	1.3	30	0.6	73	1.5	106	2.2	62	1.3	1,268	25.7	4,930
2007	203	4.2	66	1.4	36	0.7	83	1.7	126	2.6	92	1.9	1,177	24.1	4,887
2008	201	3.9	86	1.7	53	1.0	92	1.8	124	2.4	86	1.7	1,171	22.6	5,178
2009	158	2.9	93	1.7	43	0.8	97	1.8	110	2.0	91	1.7	1,196	22.0	5,437
2010	189	3.5	81	1.5	48	0.9	95	1.8	96	1.8	86	1.6	1,079	20.3	5,325
2011	152	2.6	98	1.7	61	1.0	104	1.8	116	2.0	107	1.8	1,139	19.4	5,884
2012	129	2.3	78	1.4	60	1.0	76	1.3	95	1.7	97	1.7	1,146	20.0	5,729
2013	105	2.0	58	1.1	63	1.2	66	1.3	85	1.6	96	1.9	1,060	20.5	5,162
2014	107	2.4	85	1.9	70	1.5	95	2.1	80	1.8	76	1.7	1,005	22.2	4,530
2015	102	2.5	91	2.3	72	1.8	69	1.7	60	1.5	57	1.4	1,023	25.4	4,022
Total	**2,830**	**3.8**	**989**	**1.3**	**605**	**0.8**	**1,285**	**1.7**	**1,682**	**2.3**	**1,280**	**1.7**	**17,636**	**23.5**	**74,686**

* Total number of cases in the non-UK born population where country of birth was known

Table Ai.1.7: Time between entry to the UK and TB notification for non-UK born cases by year, England, 2006-2015

Year	Time (years) between entry to the UK and TB notification								
	<2		2-6		6-11		11+		Total*
	n	%	n	%	n	%	n	%	n
2006	1,112	25.5	1,504	34.5	580	13.3	1,169	26.8	4,365
2007	1,097	24.6	1,449	32.5	683	15.3	1,224	27.5	4,453
2008	1,008	23.0	1,328	30.3	844	19.2	1,209	27.5	4,389
2009	967	20.5	1,399	29.7	971	20.6	1,371	29.1	4,708
2010	1071	22.5	1,368	28.7	938	19.7	1,382	29.0	4,759
2011	1,185	22.4	1,408	26.6	1087	20.5	1,612	30.5	5,292
2012	1,022	19.5	1,460	27.8	1,047	19.9	1,724	32.8	5,253
2013	686	14.2	1,417	29.3	1,014	20.9	1,726	35.6	4,843
2014	602	14.1	1,100	25.8	896	21.0	1,668	39.1	4,266
2015	587	15.2	863	22.4	777	20.2	1,627	42.2	3,854

* Total number of cases in the non-UK born population where year of entry to the UK is known

Table Ai.1.8: TB case notifications and rates by ethnic group and place of birth, England, 2015

Ethnic group	Place of birth			
	UK born		Non-UK born	
	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)
White	928	2.2 (2.1-2.3)	409	10.8 (9.7-11.9)
Black-Caribbean	85	21.7 (17.3-26.8)	50	24.0 (17.8-31.6)
Black-African	101	21.2 (17.3-25.7)	819	102.3 (95.4-109.6)
Black-Other	20	42.1 (25.7-65.1)	47	118.1 (86.7-157.0)
Indian	140	20.8 (17.5-24.5)	1,143	133.9 (126.3-141.9)
Pakistani	159	23.2 (19.7-27.1)	660	131.5 (121.7-142.0)
Bangladeshi	33	14.2 (9.8-19.9)	209	107.7 (93.6-123.3)
Chinese	5	6.6 (2.1-15.4)	56	26.4 (19.9-34.3)
Mixed/Other	76	6.1 (4.8-7.6)	680	50.0 (46.3-53.9)

CI - confidence intervals

Table Ai.1.9: Number of UK born TB case over time by ethnic groupings, England, 2000-2015

Year	White	Black*	South Asian**	Mixed/other[$]
	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	1,114	232	432	86
2010	1,054	225	436	70
2011	1,138	233	462	85
2012	1,182	239	475	87
2013	1,091	213	418	97
2014	1,074	222	363	93
2015	928	206	332	81

* Cases with Black-Caribbean, Black-African and Black-Other ethnic groups were grouped as ‘Black’

** Cases with Indian, Pakistani and Bangladeshi ethnic groups were grouped as ‘South Asian’

[$] Cases with Mixed/Other and Chinese ethnic groups were grouped as ‘Mixed/other’

Table Ai.1.10: Number and proportion of TB case notifications by site of disease and place of birth, England, 2006-2015

Year	All cases*					UK born					Non-UK born				
	Pulmonary**		Extra-pulmonary only#		Total	Pulmonary**		Extra-pulmonary only#		Total	Pulmonary**		Extra-pulmonary only#		Total
	n	%	n	%	n	n	%	n	%	n	n	%	n	%	n
2006	4,297	56.1	3,361	43.9	7,658	1,239	72.0	482	28.0	1,721	2,630	50.9	2,537	49.1	5,167
2007	4,148	54.9	3,403	45.1	7,551	1,227	68.5	563	31.5	1,790	2,538	49.5	2,590	50.5	5,128
2008	4,286	55.3	3,464	44.7	7,750	1,328	71.5	529	28.5	1,857	2,664	49.5	2,718	50.5	5,382
2009	4,416	54.8	3,643	45.2	8,059	1,350	71.4	541	28.6	1,891	2,747	48.7	2,898	51.3	5,645
2010	4,070	53.2	3,575	46.8	7,645	1,248	69.1	558	30.9	1,806	2,589	47.1	2,909	52.9	5,498
2011	4,290	52.1	3,950	47.9	8,240	1,375	71.1	559	28.9	1,934	2,746	45.7	3,263	54.3	6,009
2012	4,191	52.1	3,860	47.9	8,051	1,361	68.3	633	31.7	1,994	2,694	46.2	3,137	53.8	5,831
2013	3,718	51.4	3,514	48.6	7,232	1,245	68.1	583	31.9	1,828	2,383	45.4	2,862	54.6	5,245
2014	3,402	52.7	3,059	47.3	6,461	1,190	67.8	565	32.2	1,755	2,144	46.6	2,456	53.4	4,600
2015	3,065	53.4	2,679	46.6	5,744	1,081	69.9	465	30.1	1,546	1,913	46.9	2,166	53.1	4,079

* Total cases including those with an unknown place of birth

** With or without extra-pulmonary disease

Extra-pulmonary disease only

Table Ai.1.11: Number of TB cases receiving directly observed therapy (DOT) by age group, England, 2006-2015

Year	Age group (years)								Total*
	0-14		15-44		45-64		65+		
	n	%	n	%	n	%	n	%	
2006	47	13.0	249	5.20	83	5.8	45	4.3	7,664
2007	53	11.7	234	5.00	76	5.4	48	4.8	7,502
2008	77	19.2	264	6.10	81	6.1	52	6.2	6,903
2009	58	22.8	293	9.00	116	10.8	54	8.4	5,224
2010	67	24.7	282	7.40	117	9.4	71	9.3	6,096
2011	72	20.3	364	7.60	145	9.2	100	10.8	7,654
2012	100	28.0	372	8.00	166	10.9	110	11.8	7,448
2013	65	24.3	349	8.40	183	12.1	113	13.0	6,813
2014	79	31.9	387	10.90	192	13.5	111	12.9	6,074
2015	59	29.4	364	11.40	192	15.1	131	17.5	5,416

* Total number of cases where information on whether a case received DOT is known

Table Ai.2.1: Number and proportion of culture confirmed TB cases by PHE Centre, England, 2006-2015

PHE Centre*	2006		2007		2008		2009		2010		2011		2012		2013		2014		2015	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
London	2,016	60.6	1,834	56.7	1,935	57.6	1,908	56.1	1,950	60.2	2,089	59.8	2,092	61.4	1,773	59.6	1,540	60.3	1,339	59.0
West Midlands	539	58.1	555	59.8	542	53.8	584	58.1	524	60.1	615	61.3	590	54.9	550	56.2	424	54.7	402	56.8
South East	413	68.0	396	63.1	381	60.6	420	58.9	437	61.5	490	60.3	488	62.8	440	64.6	429	64.6	365	60.3
North West	415	59.8	430	58.6	427	58.5	481	60.2	490	60.6	507	62.0	468	60.4	447	62.4	392	61.0	355	62.3
Yorkshire and the Humber	394	59.6	382	60.4	357	56.2	401	58.3	363	57.8	378	56.9	346	58.3	365	62.6	326	62.9	264	60.0
East of England	308	64.3	253	60.1	304	60.1	294	57.4	308	60.9	352	62.9	311	62.6	283	62.7	285	65.4	243	61.8
East Midlands	311	54.9	309	57.9	285	59.0	279	53.2	298	60.3	296	60.2	298	60.0	243	58.8	239	59.8	237	66.9
South West	170	61.2	160	59.5	191	68.5	195	64.4	142	53.6	200	65.1	190	63.3	186	57.2	174	55.1	171	59.0
North East	101	71.6	127	64.8	115	65.0	108	65.5	97	64.7	104	79.4	114	68.3	106	76.8	115	68.5	84	65.1
England**	**4,668**	**60.8**	**4,448**	**58.7**	**4,537**	**58.1**	**4,670**	**57.6**	**4,609**	**60.0**	**5,031**	**60.8**	**4,897**	**60.6**	**4,393**	**60.5**	**3,924**	**60.6**	**3,460**	**60.1**

* Ordered by decreasing total number of cases in 2015

** Total cases including those with an unknown PHE Centre of residence

Table Ai.2.2: Number and proportion of pulmonary culture confirmed TB cases by PHE Centre, England, 2006-2015

PHE Centre*	2006		2007		2008		2009		2010		2011		2012		2013		2014		2015	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
London	1,287	71.1	1,121	67.2	1,177	67.1	1,175	66.8	1,148	71.5	1,193	72.6	1,184	72.5	1,045	74.6	945	74.6	809	73.9
West Midlands	359	65.2	357	68.9	366	64.4	383	68.0	333	70.6	407	72.2	368	64.9	352	66.3	273	65.2	267	67.4
South East	246	73.4	266	74.7	266	69.3	274	69.0	261	67.8	309	70.7	307	72.4	266	79.6	280	81.9	241	75.1
North West	264	71.9	293	72.7	277	74.9	317	72.7	312	73.8	298	72.3	285	73.1	265	74.9	255	72.6	234	77.0
Yorkshire and the Humber	250	67.2	245	65.7	213	63.4	264	67.0	255	67.1	247	65.2	222	67.5	229	68.8	219	74.5	182	70.8
East of England	201	72.8	157	68.9	202	63.7	200	67.6	204	68.0	220	72.4	182	69.5	176	75.5	181	78.7	156	70.9
East Midlands	193	60.3	218	69.9	198	70.2	193	68.9	195	78.6	201	72.3	188	66.0	172	71.4	161	72.2	165	78.2
South West	111	64.2	107	63.3	130	74.7	133	69.3	99	56.9	141	70.1	143	70.1	131	63.9	113	58.2	121	63.0
North East	68	73.9	85	70.2	75	73.5	69	70.4	60	73.2	59	81.9	70	72.9	76	87.4	62	75.6	53	76.8
England**	**2,980**	**69.4**	**2,850**	**68.7**	**2,904**	**67.8**	**3,008**	**68.1**	**2,867**	**70.4**	**3,075**	**71.7**	**2,949**	**70.4**	**2,712**	**72.9**	**2,489**	**73.2**	**2,228**	**72.7**

* Ordered by decreasing total number of cases in 2015

** Total cases 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 and CCG data shown on Fingertips)

Table Ai.2.3: Species identification for culture confirmed TB cases, England, 2009-2015

Year*	*M. tuberculosis*		*M. bovis*		*M. africanum*		*M. microti*		MTBC		Total
	n	%	n	%	n	%	n	%	n	%	n
2009	4,616	98.8	17	0.4	31	0.7	0	0.0	6	0.1	4,670
2010	4,503	97.7	31	0.7	26	0.6	2	<0.1	47	1.0	4,609
2011	4,905	97.5	32	0.6	63	1.3	0	0.0	31	0.6	5,031
2012	4,770	97.4	32	0.7	70	1.4	2	<0.1	23	0.5	4,897
2013	4,284	97.5	24	0.5	62	1.4	1	<0.1	22	0.5	4,393
2014	3,834	97.7	34	0.9	47	1.2	0	0.0	9	0.2	3,924
2015	3,364	97.2	32	0.9	56	1.6	0	0.0	8	0.2	3,460

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

Table Ai.3.1: Numbers and rate of TB in UK born children*, England, 2000-2015

Year	Number of cases	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	162	1.8 (1.5-2.1)

* Aged 0 to 14 years

CI - confidence intervals

Table Ai.3.2: Number of TB clusters and proportion clustered cases by PHE Centre, England, 2010-2015

PHE Centre*	Notified cases	Culture confirmed cases		≥23 loci typed cases**		Clustered cases#		Number of clusters	Clusters by cluster size							
									2		3-4		5-9		≥10	
	n	n	%	n	%	n	%	n	n	%	n	%	n	%	n	%
London	17,933	10,783	60.1	9,406	87.2	4,845	51.5	1,108	548	49.5	327	29.5	161	14.5	72	6.5
West Midlands	5,413	3,105	57.4	2,611	84.1	1,280	49.0	295	157	53.2	84	28.5	34	11.5	20	6.8
South East	4,251	2,649	62.3	2,290	86.4	797	34.8	239	139	58.2	64	26.8	29	12.1	7	2.9
North West	4,331	2,659	61.4	1,832	68.9	621	33.9	156	79	50.6	53	34.0	14	9.0	10	6.4
Yorkshire and the Humber	3,426	2,042	59.6	1,496	73.3	515	34.4	130	71	54.6	34	26.2	17	13.1	8	6.2
East of England	2,843	1,782	62.7	1,545	86.7	457	29.6	150	89	59.3	46	30.7	11	7.3	4	2.7
East Midlands	2,650	1,611	60.8	1,345	83.5	465	34.6	132	66	50.0	41	31.1	17	12.9	8	6.1
South West	1,803	1,063	59.0	884	83.2	288	32.6	75	37	49.3	21	28.0	15	20.0	2	2.7
North East	883	620	70.2	430	69.4	114	26.5	34	16	47.1	12	35.3	5	14.7	1	2.9
England[$]	**43,533**	**26,314**	**60.4**	**21,839**	**83.0**	**12,752**	**58.4**	**2,539**	**1,154**	**45.5**	**752**	**29.6**	**422**	**16.6**	**211**	**8.3**

* Ordered by decreasing total number of cases in 2015
** Culture confirmed cases with a MIRU-VNTR profile with at least 23 complete loci
[#] Clustered cases are clustered with each other within the same geographical area
[$] The number of clusters in England is higher than the sum of all PHE Centre clusters because it includes clusters that span more than one PHE Centre

Table Ai.4.1: Number and proportion of pulmonary TB cases by time from symptom onset to treatment start and PHE Centre, England, 2015

PHE Centre*	0-2 months		2-4 months		>4 months		Total**
	n	%	n	%	n	%	n
London	475	46.9	300	29.6	238	23.5	**1,013**
West Midlands	138	40.1	93	27.0	113	32.8	**344**
South East	105	35.4	81	27.3	111	37.4	**297**
North West	108	40.3	82	30.6	78	29.1	**268**
Yorkshire and the Humber	101	44.3	72	31.6	55	24.1	**228**
East of England	74	40.7	57	31.3	51	28.0	**182**
East Midlands	80	41.0	61	31.3	54	27.7	**195**
South West	66	36.1	59	32.2	58	31.7	**183**
North East	39	63.9	11	18.0	11	18.0	**61**
England	**1,186**	**42.8**	**816**	**29.4**	**769**	**27.8**	**2,771**

* Ordered by decreasing total number of cases in 2015
* The number of pulmonary cases with time between symptom onset to start of TB treatment available, excluding those diagnosed post-mortem and those who did not start treatment

Table Ai.4.2: Number and proportion of pulmonary TB cases by time from symptom onset to treatment start and place of birth, England, 2011-2015

Place of birth	Year	Time from symptom onset to treatment start						
		0-2 months		2-4 months		>4 months		Total*
		n	%	n	%	n	%	n
UK born	2011	393	41.1	272	28.4	292	30.5	**957**
	2012	413	40.9	293	29.0	305	30.2	**1,011**
	2013	381	38.3	290	29.2	323	32.5	**994**
	2014	402	39.3	285	27.9	336	32.8	**1,023**
	2015	371	38.5	274	28.5	318	33.0	**963**
Non-UK born	2011	885	46.9	561	29.7	441	23.4	**1,887**
	2012	923	45.4	616	30.3	496	24.4	**2,035**
	2013	822	42.5	604	31.2	510	26.3	**1,936**
	2014	743	39.6	593	31.6	539	28.7	**1,875**
	2015	796	45.1	529	30.0	440	24.9	**1,765**

* The number of pulmonary cases with time between symptom onset to start of TB treatment available, excluding those diagnosed post-mortem and those who did not start treatment

Table Ai.5.1: TB outcome at 12 months for drug sensitive cases with expected treatment duration <12months*, England, 2005-2014

Year	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated**		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
2005	4,875	70.3	373	5.4	342	4.9	383	5.5	80	1.2	880	12.7	6,933
2006	5,214	75.5	353	5.1	372	5.4	457	6.6	79	1.1	428	6.2	6,903
2007	5,286	78.1	362	5.4	300	4.4	465	6.9	73	1.1	280	4.1	6,766
2008	5,585	80.0	352	5.0	318	4.6	424	6.1	68	1.0	233	3.3	6,980
2009	5,912	81.9	333	4.6	308	4.3	437	6.1	77	1.1	155	2.1	7,222
2010	5,632	82.6	314	4.6	290	4.3	398	5.8	60	0.9	121	1.8	6,815
2011	6,004	81.9	314	4.3	371	5.1	476	6.5	64	0.9	106	1.4	7,335
2012	6,001	83.5	308	4.3	293	4.1	417	5.8	69	1.0	99	1.4	7,187
2013	5,487	85.4	265	4.1	249	3.9	323	5.0	55	0.9	45	0.7	6,424
2014	4,827	84.4	277	4.8	223	3.9	280	4.9	60	1.0	49	0.9	5,716
Total	**54,823**	**80.3**	**3,251**	**4.8**	**3,066**	**4.5**	**4,060**	**5.9**	**685**	**1.0**	**2,396**	**3.5**	**68,281**

* Excludes cases in the drug resistant cohort and those with CNS, spinal, miliary or cryptic disseminated TB
** Not evaluated includes missing, 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, UTLA and CCG data shown on Fingertips)

Table Ai.5.2: Last recorded TB outcome for drug sensitive cases with expected treatment duration <12months*, England, 2005-2014

Year	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated**		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
2005	5,079	73.3	377	5.4	342	4.9	175	2.5	80	1.2	880	12.7	6,933
2006	5,463	79.1	359	5.2	375	5.4	198	2.9	80	1.2	428	6.2	6,903
2007	5,582	82.5	367	5.4	302	4.5	161	2.4	74	1.1	280	4.1	6,766
2008	5,888	84.4	356	5.1	325	4.7	107	1.5	71	1.0	233	3.3	6,980
2009	6,235	86.3	341	4.7	309	4.3	104	1.4	78	1.1	155	2.1	7,222
2010	5,923	86.9	318	4.7	295	4.3	96	1.4	62	0.9	121	1.8	6,815
2011	6,467	88.2	317	4.3	373	5.1	5	0.1	67	0.9	106	1.4	7,335
2012	6,387	88.9	317	4.4	306	4.3	5	0.1	73	1.0	99	1.4	7,187
2013	5,788	90.1	268	4.2	252	3.9	8	0.1	63	1.0	45	0.7	6,424
2014[#]	4,951	86.6	279	4.9	224	3.9	153	2.7	60	1.0	49	0.9	5,716
Total	**57,763**	**84.6**	**3,299**	**4.8**	**3,103**	**4.5**	**1,012**	**1.5**	**708**	**1.0**	**2,396**	**3.5**	**68,281**

* Excludes cases in the drug resistant cohort and those with CNS, spinal, miliary or cryptic disseminated TB
** Not evaluated includes missing, unknown and transferred out
[#] 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, UTLA 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, UTLA and CCG data shown on Fingertips)

Table Ai.5.3: Time to treatment completion for drug sensitive cases with expected treatment duration <12months*, England, 2005-2014

Year	<6 months to complete[#]		6-8 months to complete[#]		8-10 months to complete		10-12 months to complete		>12 months to complete		Completion time known		Treatment completed**
	n	%	n	%	n	%	n	%	n	%	n	%	N
2005	251	6.4	2,902	73.4	373	9.4	232	5.9	194	4.9	3,952	77.8	5,079
2006	249	5.8	3,116	72.1	475	11.0	252	5.8	228	5.3	4,320	79.1	5,463
2007	298	6.6	3,239	72.3	432	9.6	242	5.4	272	6.1	4,483	80.3	5,582
2008	269	5.6	3,509	72.5	514	10.6	272	5.6	279	5.8	4,843	82.3	5,888
2009	372	6.7	3,974	71.4	562	10.1	360	6.5	299	5.4	5,567	89.3	6,235
2010	321	5.9	3,981	72.6	581	10.6	332	6.1	267	4.9	5,482	92.6	5,923
2011	325	5.3	4,343	71.5	662	10.9	315	5.2	432	7.1	6,077	94.0	6,467
2012	303	5.0	4,405	72.7	614	10.1	367	6.1	366	6.0	6,055	94.8	6,387
2013	303	5.5	4,022	72.5	567	10.2	375	6.8	278	5.0	5,545	95.8	5,788
2014	268	5.5	3,563	73.3	536	11.0	381	7.8	114	2.3	4,862	98.2	4,951
Total	**2,959**	**5.8**	**37,054**	**72.4**	**5,316**	**10.4**	**3,128**	**6.1**	**2,729**	**5.3**	**51,186**	**88.6**	**57,763**

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

Table Ai.5.4: Treatment completion at 12 months by age group for drug sensitive cases with expected treatment duration <12months*, England, 2005-2014

Year	Age group (years)							
	0-14		15-44		45-64		65+	
	n	%	n	%	n	%	n	%
2005	303	79.5	3,221	74.0	811	65.5	539	56.3
2006	286	85.4	3,398	78.5	978	76.2	552	57.6
2007	364	86.1	3,362	80.9	1004	78.8	556	60.9
2008	375	89.3	3,592	82.5	1,071	81.1	545	61.8
2009	346	92.5	3,726	84.7	1,185	80.9	655	66.6
2010	301	91.8	3,556	85.5	1,147	82.1	628	67.6
2011	300	85.2	3,791	84.5	1,281	82.6	632	66.9
2012	334	91.0	3,770	86.1	1,250	84.1	647	67.9
2013	249	91.9	3,348	87.6	1,248	86.5	642	72.4
2014	231	93.5	2,900	87.8	1,104	84.0	592	69.6
Total	**3,089**	**88.3**	**34,664**	**83.0**	**11,079**	**80.4**	**5,988**	**64.7**

* Excludes cases 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 drug sensitive cases with expected treatment duration <12 months by PHE Centre*, England, 2014

PHE Centre**	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated[#]		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
London	1,946	87.2	54	2.4	86	3.9	120	5.4	19	0.9	7	0.3	2,232
West Midlands	575	83.1	47	6.8	28	4.0	27	3.9	12	1.7	3	0.4	692
South East	517	86.0	29	4.8	19	3.2	19	3.2	5	0.8	12	2.0	601
North West	470	83.9	42	7.5	14	2.5	25	4.5	6	1.1	3	0.5	560
Yorkshire and the Humber	396	83.5	31	6.5	12	2.5	20	4.2	7	1.5	8	1.7	474
East of England	316	80.8	25	6.4	20	5.1	20	5.1	2	0.5	8	2.0	391
East Midlands	276	81.4	20	5.9	18	5.3	19	5.6	3	0.9	3	0.9	339
South West	219	75.3	22	7.6	19	6.5	24	8.2	3	1.0	4	1.4	291
North East	112	82.4	7	5.1	7	5.1	6	4.4	3	2.2	1	0.7	136
England[$]	**4,827**	**84.4**	**277**	**4.8**	**223**	**3.9**	**280**	**4.9**	**60**	**1.0**	**49**	**0.9**	**5,716**

* Excludes cases in the drug resistant cohort and those with CNS, spinal, miliary or cryptic disseminated TB
** Ordered by decreasing total number of cases in 2015
[#] Not evaluated includes missing, unknown and transferred out
[$] Total cases including those with an unknown PHE Centre of residence

Table Ai.5.6: Treatment completion at 12 months for drug sensitive cases with expected treatment duration <12months* by PHE Centre, England, 2005-2014

PHE Centre**	2005		2006		2007		2008		2009		2010		2011		2012		2013		2014	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
London	2,440	78.8	2,428	81.9	2,338	82.8	2,539	85.4	2,580	86.4	2,435	86.0	2,617	85.5	2,573	85.9	2,249	86.6	1,946	87.2
West Midlands	570	68.7	565	67.7	672	77.2	758	82.7	743	81.8	633	80.0	723	81.1	823	85.6	735	85.8	575	83.1
South East	373	69.6	382	70.0	405	70.7	417	75.1	507	79.8	510	79.8	603	83.3	583	83.0	528	87.1	517	86.0
North West	469	68.9	476	75.9	490	74.7	507	76.8	588	80.8	601	84.6	589	80.5	574	83.6	542	83.8	470	83.9
Yorkshire and the Humber	354	71.5	420	72.4	402	70.4	427	74.8	467	77.1	425	75.2	428	72.4	435	81.2	457	86.4	396	83.5
East of England	310	72.8	328	75.8	291	78.2	325	71.9	352	78.0	369	80.0	402	81.5	348	78.7	338	83.9	316	80.8
East Midlands	138	28.0	389	74.8	382	80.6	332	77.4	390	80.7	369	84.8	359	81.8	351	80.1	317	88.1	276	81.4
South West	142	57.7	128	49.6	167	67.9	160	62.3	174	63.7	179	74.0	194	68.8	194	70.8	222	73.5	219	75.3
North East	77	61.1	98	71.0	139	78.1	120	72.7	111	72.5	111	79.3	89	73.6	120	78.9	99	81.1	112	82.4
England[#]	**4,875**	**70.3**	**5,214**	**75.5**	**5,286**	**78.1**	**5,585**	**80.0**	**5,912**	**81.9**	**5,632**	**82.6**	**6,004**	**81.9**	**6,001**	**83.5**	**5,487**	**85.4**	**4,827**	**84.4**

* Excludes cases in the drug resistant cohort and those with CNS, spinal, miliary or cryptic disseminated TB
** Ordered by decreasing total number of cases in 2015
[#] Total cases including those with an unknown PHE Centre of residence

Table Ai.5.7: Last recorded TB outcome by end of follow-up period for drug sensitive cases with CNS, spinal, miliary or cryptic disseminated TB*, England, 2005-2014

Year	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated**		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
2005	385	58.1	70	10.6	38	5.7	43	6.5	7	1.1	120	18.1	663
2006	463	66.2	71	10.2	38	5.4	58	8.3	10	1.4	59	8.4	699
2007	528	71.3	65	8.8	43	5.8	64	8.6	8	1.1	33	4.5	741
2008	531	70.7	81	10.8	43	5.7	50	6.7	7	0.9	39	5.2	751
2009	603	74.1	79	9.7	45	5.5	54	6.6	8	1.0	25	3.1	814
2010	583	74.6	65	8.3	47	6.0	60	7.7	10	1.3	17	2.2	782
2011	703	82.7	67	7.9	52	6.1	0	0.0	10	1.2	18	2.1	850
2012	657	81.5	74	9.2	56	6.9	2	0.2	7	0.9	10	1.2	806
2013	624	82.8	68	9.0	43	5.7	5	0.7	7	0.9	7	0.9	754
2014[#]	463	67.2	72	10.4	42	6.1	93	13.5	11	1.6	8	1.2	689
Total	**5,540**	**73.4**	**712**	**9.4**	**447**	**5.9**	**429**	**5.7**	**85**	**1.1**	**336**	**4.5**	**7,549**

* Excludes cases in the drug resistant cohort
** Not evaluated includes missing, unknown and transferred out
[#] 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.5.8: Last recorded TB outcome by end of follow-up period for the entire drug sensitive cohort*, England, 2005-2014

Year	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated**		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
2005	5,464	71.9	447	5.9	380	5.0	218	2.9	87	1.1	1,000	13.2	7,596
2006	5,926	78.0	430	5.7	413	5.4	256	3.4	90	1.2	487	6.4	7,602
2007	6,110	81.4	432	5.8	345	4.6	225	3.0	82	1.1	313	4.2	7,507
2008	6,419	83.0	437	5.7	368	4.8	157	2.0	78	1.0	272	3.5	7,731
2009	6,838	85.1	420	5.2	354	4.4	158	2.0	86	1.1	180	2.2	8,036
2010	6,506	85.6	383	5.0	342	4.5	156	2.1	72	0.9	138	1.8	7,597
2011	7,170	87.6	384	4.7	425	5.2	5	0.1	77	0.9	124	1.5	8,185
2012	7,044	88.1	391	4.9	362	4.5	7	0.1	80	1.0	109	1.4	7,993
2013	6,412	89.3	336	4.7	295	4.1	13	0.2	70	1.0	52	0.7	7,178
2014[#]	5,414	84.5	351	5.5	266	4.2	246	3.8	71	1.1	57	0.9	6,405
Total	**63,303**	**83.5**	**4,011**	**5.3**	**3,550**	**4.7**	**1,441**	**1.9**	**793**	**1.0**	**2,732**	**3.6**	**75,830**

* Excludes cases in the drug resistant cohort
** Not evaluated includes missing, unknown and transferred out
[#] 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.5.9: Died at last recorded outcome for the entire drug sensitive cohort*, England, 2005-2014

Year	TB caused or contributed to death		TB incidental to death		Unknown		Total deaths		Cases reported
	n	%	n	%	n	%	n	%	n
2005	141	31.5	102	22.8	204	45.6	447	5.9	7,596
2006	138	32.1	88	20.5	204	47.4	430	5.7	7,602
2007	142	32.9	85	19.7	205	47.5	432	5.8	7,507
2008	145	33.2	97	22.2	195	44.6	437	5.7	7,731
2009	149	35.5	88	21.0	183	43.6	420	5.2	8,036
2010	103	26.9	101	26.4	179	46.7	383	5.0	7,597
2011	105	27.3	88	22.9	191	49.7	384	4.7	8,185
2012	116	29.7	87	22.3	188	48.1	391	4.9	7,993
2013	109	32.4	70	20.8	157	46.7	336	4.7	7,178
2014**	112	31.9	72	20.5	167	47.6	351	5.5	6,405
Total	**1,260**	**31.4**	**878**	**21.9**	**1,873**	**46.7**	**4,011**	**5.3**	**75,830**

* Excludes cases in the drug resistant cohort
** Reduced follow-up period for this group, therefore proportion expected to increase in future reporting

Table Ai.5.10: Last recorded TB outcome for the entire drug sensitive cohort* by site of disease, 2014

Site of disease	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated**		Total[#]
	n	%	n	%	n	%	n	%	n	%	n	%	n
Expected treatment duration of <12 months													
Pulmonary only	2,075	84.1	183	7.4	102	4.1	63	2.6	23	0.9	22	0.9	2,468
Pulmonary, with or without EP	2,583	83.7	221	7.2	135	4.4	92	3.0	28	0.9	28	0.9	3,087
Extra-pulmonary only	2,359	90.1	57	2.2	89	3.4	61	2.3	31	1.2	21	0.8	2,618
Extra-thoracic lymph nodes	1,253	90.4	17	1.2	51	3.7	38	2.7	12	0.9	15	1.1	1,386
Intra-thoracic lymph nodes	731	88.4	20	2.4	39	4.7	20	2.4	6	0.7	11	1.3	827
Pleural	482	87.0	32	5.8	25	4.5	8	1.4	5	0.9	2	0.4	554
Bone – not spine	116	80.6	7	4.9	4	2.8	14	9.7	1	0.7	2	1.4	144
All other EP sites[$]	1,062	87.3	45	3.7	38	3.1	43	3.5	16	1.3	12	1.0	1,216
Total	**4,951**	**86.6**	**279**	**4.9**	**224**	**3.9**	**153**	**2.7**	**60**	**1.0**	**49**	**0.9**	**5,716**
Cases of CNS, spinal, miliary or cryptic disseminated TB^													
Bone – spine	226	72.9	18	5.8	21	6.8	40	12.9	4	1.3	1	0.3	310
CNS Meningitis	83	55.7	27	18.1	9	6.0	25	16.8	2	1.3	3	2.0	149
CNS Other	62	55.9	14	12.6	9	8.1	19	17.1	4	3.6	3	2.7	111
Miliary	114	64.0	28	15.7	11	6.2	23	12.9	1	0.6	1	0.6	178
Cryptic disseminated	27	71.1	5	13.2	0	0.0	5	13.2	0	0.0	1	2.6	38
Total	**463**	**67.2**	**72**	**10.4**	**42**	**6.1**	**93**	**13.5**	**11**	**1.6**	**8**	**1.2**	**689**

* Excludes cases in the drug resistant cohort
** Not evaluated includes missing, unknown and transferred out
[#] Multiple sites of disease can be reported so does not add up to the total number of cases
[$] All other EP sites - includes gastrointestinal, genitourinary, other and unknown extra-pulmonary (EP) disease
^ Cases may have an additional site of disease not shown (i.e. pulmonary, lymph node, pleural, bone (not spine) or other EP sites)

Table Ai.5.11: Last recorded TB outcome for the entire drug sensitive cohort* by PHE Centre, England, 2014

PHE Centre**	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated[#]		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
London	2,173	86.0	75	3.0	103	4.1	149	5.9	21	0.8	7	0.3	2,528
West Midlands	656	85.4	55	7.2	30	3.9	11	1.4	13	1.7	3	0.4	768
South East	572	86.5	37	5.6	22	3.3	11	1.7	5	0.8	14	2.1	661
North West	530	83.6	56	8.8	18	2.8	17	2.7	9	1.4	4	0.6	634
Yorkshire and the Humber	433	84.9	33	6.5	16	3.1	9	1.8	8	1.6	11	2.2	510
East of England	350	81.8	28	6.5	24	5.6	15	3.5	3	0.7	8	1.9	428
East Midlands	318	80.3	28	7.1	24	6.1	18	4.5	4	1.0	4	1.0	396
South West	248	79.0	27	8.6	21	6.7	11	3.5	3	1.0	4	1.3	314
North East	134	80.7	12	7.2	8	4.8	5	3.0	5	3.0	2	1.2	166
England	**5,414**	**84.5**	**351**	**5.5**	**266**	**4.2**	**246**	**3.8**	**71**	**1.1**	**57**	**0.9**	**6,405**

* Excludes cases in the drug resistant cohort
** Ordered by decreasing total number of cases in 2015
[#] Not evaluated includes missing, unknown and transferred out

Table: Ai.5.12: Lost to follow-up at last recorded outcome for the entire drug sensitive cohort*, 2005-2014

Year	Lost to follow-up								Total cases
	UK born cases		Non UK born cases		Lost to follow up abroad**		Total cases lost to follow up		
	n	%	n	%	n	%	n	%	N
2005	46	12.1	305	80.3	64	21.0	380	5.0	7,596
2006	50	12.1	329	79.7	95	28.9	413	5.4	7,602
2007	46	13.3	265	76.8	80	30.2	345	4.6	7,507
2008	40	10.9	298	81.0	162	54.4	368	4.8	7,731
2009	38	10.7	288	81.4	150	52.1	354	4.4	8,036
2010	29	8.5	300	87.7	174	58.0	342	4.5	7,597
2011	44	10.4	361	84.9	220	60.9	425	5.2	8,185
2012	30	8.3	311	85.9	192	61.7	362	4.5	7,993
2013	22	7.5	264	89.5	158	59.8	295	4.1	7,178
2014[#]	26	9.8	230	86.5	145	63.0	266	4.2	6,405
Total	**371**	**10.5**	**2,951**	**83.1**	**1,440**	**48.8**	**3,550**	**4.7**	**75,830**

* Excludes cases in the drug resistant cohort
** Non-UK born cases with a known reason of lost to follow-up
[#] Reduced follow-up period for this group, therefore proportion lost to follow-up could increase in future reporting

Table Ai.6.1: Number and proportion of TB cases with first line drug susceptibility results, England, 2006-2015

Year	Culture confirmed cases		Drug susceptibility testing (2 first line drugs)*		Drug susceptibility testing (all first line drugs)**	
	n	%	n	%	n	%
2006	4,668	60.8	4,631	99.2	4,607	98.7
2007	4,448	58.7	4,398	98.9	4,366	98.2
2008	4,537	58.1	4,480	98.7	4,429	97.6
2009	4,670	57.6	4,599	98.5	4,521	96.8
2010	4,609	60.0	4,559	98.9	4,517	98.0
2011	5,031	60.8	4,967	98.7	4,895	97.3
2012	4,897	60.6	4,852	99.1	4,787	97.8
2013	4,393	60.5	4,332	98.6	4,287	97.6
2014	3,924	60.6	3,898	99.3	3,832	97.7
2015	3,460	60.1	3,440	99.4	3,385	97.8
Total	**44,637**	**59.7**	**44,156**	**98.9**	**43,626**	**97.7**

* Culture confirmed cases that have been tested for isoniazid and rifampicin
** Culture confirmed cases that have been tested 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 and UTLA data shown on Fingertips)

Table Ai.6.2: Number and proportion of TB cases with first line drug resistance*, England, 2006-2015

Year	Isoniazid resistant		Rifampicin resistant		Ethambutol resistant		Pyrazinamide resistant**		Resistant to any first line drug	
	n	%	n	%	n	%	n	%	n	%
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	412	8.3
2012	330	6.8	87	1.8	48	1.0	44	0.9	358	7.4
2013	305	7.0	79	1.8	40	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	238	6.9	54	1.6	27	0.8	24	0.7	255	7.4
Total	**3,046**	**6.9**	**714**	**1.6**	**358**	**0.8**	**355**	**0.8**	**3,344**	**7.6**

* Of culture confirmed cases with drug susceptibility results for at least isoniazid and rifampicin
** Excludes *M. bovis* cases, which are inherently resistant to pyrazinamide

TB Monitoring Indicator 18: Number and proportion of culture confirmed TB cases with any first line drug resistance (England and PHEC)

Table Ai.6.3: Number and proportion of TB cases with drug resistance, England, 2000-2015

Year	Isoniazid resistance without MDR-TB cases*		Rifampicin resistance without MDR-TB cases**		MDR-TB cases		MDR/RR-TB cases[#]		Proportion of MDR/RR-TB cases that are rifampicin resistant cases without MDR-TB	XDR-TB cases	
	n	%	n	%	n	%	n	%	%	n	%
2000	150	5.4	13	0.5	28	1.0	41	1.5	31.7	0	0.0
2001	184	5.9	10	0.3	22	0.7	32	1.0	31.3	0	0.0
2002	239	6.3	10	0.3	35	0.9	45	1.2	22.2	0	0.0
2003	233	6.1	19	0.5	49	1.3	68	1.8	27.9	1	0.03
2004	251	6.2	16	0.4	45	1.1	61	1.5	26.2	0	0.0
2005	281	6.2	15	0.3	41	0.9	56	1.2	26.8	0	0.0
2006	283	6.1	20	0.4	54	1.2	74	1.6	27.0	0	0.0
2007	256	5.8	13	0.3	49	1.1	62	1.4	21.0	0	0.0
2008	216	4.8	18	0.4	50	1.1	68	1.5	26.5	2	0.0
2009	268	5.8	11	0.2	59	1.3	70	1.5	15.7	2	0.04
2010	227	5.0	10	0.2	65	1.4	75	1.6	13.3	2	0.04
2011	295	5.9	8	0.2	81	1.6	89	1.8	9.0	6	0.12
2012	253	5.2	10	0.2	77	1.6	87	1.8	11.5	2	0.0
2013	236	5.4	10	0.2	69	1.6	79	1.8	12.7	3	0.07
2014	215	5.5	4	0.1	52	1.3	56	1.4	7.1	3	0.1
2015	192	5.6	8	0.2	46	1.3	54	1.6	14.8	10	0.3
Total	**3,779**	**5.7**	**195**	**0.3**	**822**	**1.2**	**1,017**	**1.5**	**19.2**	**31**	**0.05**

* Culture confirmed cases with DST results for at least isoniazid and rifampicin who are resistant to isoniazid without MDR-TB
** Culture confirmed cases with DST results for at least isoniazid and rifampicin who are resistant to rifampicin without MDR-TB
[#] Culture confirmed cases with DST results for at least isoniazid and rifampicin who are resistant to rifampicin, including those with MDR-TB

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 TB cases with drug resistance by PHE Centre, England, 2011-2015

PHE Centre*	Isoniazid resistance without MDR-TB cases		MDR-TB cases		MDR/RR-TB cases		XDR-TB cases		Total**
	n	%	n	%	n	%	n	%	n
London	553	6.3	143	1.6	163	1.9	8	0.1	8,757
West Midlands	112	4.4	43	1.7	49	1.9	2	0.1	2,525
South East	122	5.6	23	1.0	27	1.2	2	0.1	2,191
North West	99	4.6	29	1.3	33	1.5	2	0.1	2,169
Yorkshire and the Humber	79	4.8	33	2.0	36	2.2	4	0.2	1,661
East of England	91	6.2	29	2.0	29	2.0	5	0.3	1,459
East Midlands	62	4.8	10	0.8	12	0.9	0	0.0	1,296
South West	55	6.1	7	0.8	8	0.9	1	0.1	908
North East	18	3.4	8	1.5	8	1.5	0	0.0	523
England	**1,191**	**5.5**	**325**	**1.5**	**365**	**1.7**	**24**	**0.1**	**21,489**

* Ordered by decreasing total number of TB cases in 2015
** Culture confirmed cases with drug susceptibility results for at least isoniazid and rifampicin

Table Ai.6.5: Number and proportion of MDR/RR-TB cases with resistance to an injectable agent or a fluoroquinolone, England, 2006-2015

Year	MDR/RR-TB cases	Tested for resistance to at least one injectable agent		Resistant to an injectable agent		Tested for resistance to at least one fluoroquinolone		Resistant to a fluoroquinolone	
	n	n	%	n	%	n	%	n	%
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	79	75	94.9	12	16.0	79	100.0	11	13.9
2014	56	56	100.0	7	12.5	56	100.0	14	25.0
2015	54	52	96.3	12	23.1	54	100.0	15	27.8
Total	**714**	**662**	**92.7**	**83**	**12.5**	**704**	**98.6**	**96**	**13.6**

Table Ai.6.6: The number and proportion of MDR/RR-TB cases resistant to at least one injectable agent or at least one fluoroquinolone by most frequent country of birth, England, 2011-2015

Country of birth*	MDR/RR-TB cases	Resistant to an injectable agent		Resistant to a fluoroquinolone		XDR-TB	
	n	n	%**	n	%[#]	n	%[$]
India	92	6	6.6	23	25.0	3	3.3
United Kingdom	44	7	17.1	4	9.3	3	7.3
Lithuania	36	20	57.1	15	41.7	12	34.3
Pakistan	28	2	7.4	4	14.3	0	0.0
Somalia	17	1	5.9	0	0.0	0	0.0
Latvia	11	5	45.5	1	9.1	0	0.0
Nigeria	11	0	0.0	1	9.1	0	0.0
Romania	10	4	40.0	3	30.0	2	20.0

* The table shows the top 8 countries of birth for MDR/RR-TB cases that are resistant to at least one injectable agent or at least one fluoroquinolone with more than ten MDR/RR-TB case from that country in 2011-2015. For these countries, the total number of cases and proportions with resistance are shown.
** Culture confirmed cases with DST results for at least isoniazid, rifampicin and at least one injectable, born in the respective country
[#] Culture confirmed cases with DST results for at least isoniazid, rifampicin and at least one fluoroquinolone, born in the respective country
[$] Culture confirmed cases with DST results for at least isoniazid, rifampicin and at least one injectable and at least one fluoroquinolone

Table Ai.6.7: TB outcome at 24 months for drug resistant TB cases*, England, 2004-2013

Year	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated**		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
2004	37	52.1	4	5.6	9	12.7	12	16.9	3	4.2	6	8.5	71
2005	39	62.9	4	6.5	8	12.9	5	8.1	4	6.5	2	3.2	62
2006	41	51.2	2	2.5	8	10.0	24	30.0	3	3.8	2	2.5	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	52.6	4	5.3	11	14.5	19	25.0	1	1.3	1	1.3	76
2010	38	48.1	0	0.0	9	11.4	26	32.9	4	5.1	2	2.5	79
2011	48	50.5	4	4.2	17	17.9	23	24.2	3	3.2	0	0.0	95
2012	56	60.2	3	3.2	10	10.8	19	20.4	5	5.4	0	0.0	93
2013	48	57.8	4	4.8	10	12.0	18	21.7	3	3.6	0	0.0	83
Total	**422**	**53.6**	**41**	**5.2**	**98**	**12.4**	**176**	**22.3**	**35**	**4.4**	**16**	**2.0**	**788**

* Includes initial and acquired MDR/RR-TB cases and and cases treated with an MDR-TB regimen only
** Not evaluated includes missing, 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 drug resistant TB cases*, England, 2004-2013

Year	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated**		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
2004	49	69.0	4	5.6	9	12.7	4	5.6	3	4.2	2	2.8	71
2005	42	67.7	4	6.5	9	14.5	3	4.8	4	6.5	0	0.0	62
2006	58	72.5	3	3.8	8	10.0	7	8.8	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	77.6	4	5.3	11	14.5	0	0.0	1	1.3	1	1.3	76
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	73	78.5	4	4.3	11	11.8	0	0.0	5	5.4	0	0.0	93
2013[#]	60	72.3	4	4.8	11	13.3	5	6.0	3	3.6	0	0.0	83
Total	**564**	**71.6**	**47**	**6.0**	**102**	**12.9**	**35**	**4.4**	**36**	**4.6**	**4**	**0.5**	**788**

* Includes initial and acquired MDR/RR-TB cases and cases treated with an MDR-TB regimen only
** Not evaluated includes missing, unknown and transferred out
[#] 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 treatment completion* for drug resistant TB cases**, England, 2004-2013

Year	< 12 months to complete		12-18 months to complete		18-20 months to complete		20-24 months to complete		>24 months to complete		Completion time known		Treatment completed[#]
	n	%	n	%	n	%	n	n	n	%	n	%	n
2004	4	11.8	3	8.8	14	41.2	4	11.8	9	26.5	34	69.4	49
2005	2	6.9	6	20.7	13	44.8	5	17.2	3	10.3	29	69.0	42
2006	1	2.4	6	14.6	14	34.1	4	9.8	16	39.0	41	70.7	58
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	4.8	5	8.1	17	27.4	20	32.3	17	27.4	62	84.9	73
2013	3	5.0	8	13.3	14	23.3	23	38.3	12	20.0	60	100.0	60
Total	**19**	**4.2**	**53**	**11.8**	**122**	**27.2**	**127**	**28.3**	**127**	**28.3**	**448**	**79.4**	**564**

* Completion time is from MDR/RR-TB start date until completion date
** Includes initial and acquired MDR/RR-TB cases and cases treated with an MDR-TB regimen only
[#] Treatment completed at last recorded outcome

Table Ai.6.10: Drug resistant* TB cases reported as lost to follow-up at last recorded outcome by place of birth, England, 2004-2013

Year	Lost to follow-up								Total cases
	UK born		Non UK born		Lost to follow up abroad**		Total cases lost to follow up		
	n	%	n	%	n	%	n	%	N
2004	0	0.0	8	88.9	4	57.1	9	12.7	71
2005	1	11.1	8	88.9	4	66.7	9	14.5	62
2006	1	12.5	7	87.5	4	80.0	8	10.0	80
2007	0	0.0	6	100.0	5	100.0	6	8.5	71
2008	0	0.0	10	100.0	8	80.0	10	12.8	78
2009	0	0.0	10	90.9	7	77.8	11	14.5	76
2010	0	0.0	9	100.0	9	100.0	9	11.4	79
2011	0	0.0	18	100.0	15	83.3	18	18.9	95
2012	1	9.1	10	90.9	7	77.8	11	11.8	93
2013[#]	0	0.0	11	100.0	8	80.0	11	13.3	83
Total	**3**	**2.9**	**97**	**95.1**	**71**	**80.7**	**102**	**12.9**	**788**

* Includes initial and acquired MDR/RR-TB cases and cases treated with an MDR-TB regimen only
** Non-UK born cases with a known reason for lost to follow-up
[#] Reduced follow-up period for this group, therefore proportion lost to follow-up is expected to increase in future reporting

Table Ai.7.1: Number and proportion of TB cases with social risk factors* by place of birth, England, 2010-2015

	Year	Drug misuse		Alcohol misuse		Homelessness		Prison		At least 1 SRF		2 or more SRF	
		n	%	n	%	n	%	n	%	n	%	n	%
All cases	2010	188	2.9	257	4.0	200	3.0	177	2.8	584	9.9	164	2.2
	2011	204	2.8	236	3.3	195	2.7	213	3.0	592	8.9	188	2.4
	2012	220	3.1	219	3.1	185	2.6	225	3.2	593	8.9	184	2.4
	2013	217	3.3	239	3.7	217	3.3	192	3.0	588	9.5	195	2.8
	2014	202	3.5	197	3.4	210	3.6	186	3.3	538	9.8	175	2.8
	2015	221	4.3	205	3.9	229	4.4	198	3.9	579	11.8	196	3.5
UK born	2010	114	8.1	113	8.2	70	4.9	83	6.2	235	18.4	100	6.3
	2011	134	8.6	121	7.8	61	3.9	127	8.5	271	18.6	125	7.3
	2012	129	8.0	98	6.1	54	3.3	106	6.8	253	16.7	94	5.4
	2013	133	8.6	130	8.5	70	4.5	99	6.6	259	17.6	115	7.0
	2014	124	8.5	98	6.8	74	5.1	94	6.7	236	17.0	101	6.4
	2015	144	11.2	109	8.4	75	5.8	111	8.9	269	21.7	111	8.0
Non-UK born	2010	68	1.4	134	2.8	123	2.5	83	1.7	328	7.4	58	1.1
	2011	63	1.1	106	2.0	128	2.3	78	1.5	301	6.0	58	1.0
	2012	86	1.6	111	2.1	124	2.3	112	2.1	316	6.2	86	1.5
	2013	81	1.6	104	2.1	145	2.9	92	1.9	321	6.9	77	1.5
	2014	75	1.7	96	2.2	132	3.1	90	2.1	293	7.2	71	1.6
	2015	70	1.8	92	2.4	150	3.9	84	2.3	299	8.3	79	2.0

* Includes those aged 15 years and older

Table Ai.7.2: Characteristics of TB cases with social risk factors*, England, 2010-2015

Characteristics		Drug misuse		Alcohol misuse		Homeless		Prison		At least 1 SRF		2 or more SRF	
		n	%	n	%	n	%	n	%	n	%	n	%
Ethnicity (UK born)	White	525	9.3	548	9.8	329	5.8	406	7.6	1,083	20.6	488	7.8
	Black Caribbean	85	19.2	31	7.1	38	8.5	80	18.4	140	33.0	63	13.1
	Black-African	14	4.1	11	3.3	8	2.3	23	6.6	40	12.1	11	3.0
	Indian, Pakistani, Bangladeshi	97	5.0	48	2.5	10	0.5	65	3.3	161	8.7	46	2.2
	Other	50	12.6	26	6.5	17	4.2	39	9.7	84	21.6	33	7.8
Country of birth (Non-UK born)**	India	22	0.3	164	2.0	64	0.8	42	0.5	252	3.2	36	0.4
	Somalia	56	3.2	46	2.7	84	4.8	67	3.9	191	11.9	44	2.4
	Pakistan	27	0.5	38	0.8	39	0.8	36	0.7	115	2.5	21	0.4
	Poland	22	6.9	50	15.9	56	17.3	24	7.8	99	32.2	44	11.9
	Eritrea	5	1.2	4	0.9	71	16.6	28	6.7	90	22.6	15	3.2
	Romania	13	3.3	14	3.5	36	9.3	20	5.2	66	17.8	13	3.0
	Lithuania	20	10.2	26	13.6	39	19.8	31	16.3	64	33.7	38	17.6
	Nigeria	8	1.0	14	1.7	27	3.2	19	2.3	59	7.6	7	0.8
	Bangladesh	23	1.7	15	1.1	13	0.9	15	1.1	54	4.2	9	0.6
	Ireland	21	11.5	34	18.8	14	7.7	13	7.5	49	28.2	22	11.2

* Includes those aged 15 years and older
** The top ten countries of birth by the number of cases with at least 1 SRF were included

Table Ai.7.3: Number and proportion of TB cases with social risk factors* by PHE Centre, England, 2015

PHE Centre**	Drug misuse		Alcohol misuse		Homeless		Prison		At least 1 SRF		2 or more SRF	
	n	%	n	%	n	%	n	%	n	%	n	%
London	96	4.5	87	4.1	91	4.3	53	2.5	230	11.0	71	3.3
West Midlands	33	5.3	30	4.8	22	3.5	43	6.8	78	12.9	35	5.2
South East	21	3.8	15	2.7	29	5.2	18	3.3	59	11.2	15	2.5
North West	19	4.0	26	5.3	20	4.2	25	5.7	59	13.8	25	4.6
Yorkshire and the Humber	14	3.6	11	2.8	15	4.0	18	5.0	40	11.7	13	3.1
East of England	13	3.9	10	3.1	14	4.3	15	4.8	40	13.0	8	2.1
East Midlands	8	2.6	7	2.2	16	5.3	10	3.7	27	10.1	10	2.9
South West	13	5.1	14	5.3	17	6.7	8	3.3	32	13.9	14	4.9
North East	4	3.6	5	4.3	5	4.3	8	7.2	14	12.8	5	4.1

* Includes those aged 15 years and older
** Ordered by decreasing total number of TB cases in 2015

Table Ai.7.4: Clinical characteristics of TB cases with at least one social risk factor*, England, 2015

Clinical Characteristics	Drug misuse		Alcohol misuse		Homeless		Prison		At least 1 SRF		2 or more SRF		No SRF	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Previous TB diagnosis	23	10.7	24	12.7	24	10.9	23	11.9	62	11.1	23	12.3	267	6.2
Pulmonary, with or without EP	176	79.6	165	80.5	178	77.7	160	80.8	444	76.7	166	84.7	2,125	49.2
On DOT	127	61.7	130	69.5	130	61.0	106	58.2	298	55.5	132	73.3	325	7.7
Time from symptom onset to treatment start														
0-2 months	75	38.1	72	41.1	85	40.9	61	33.7	201	38.9	65	38.2	1,448	35.7
2-4 months	61	31.0	50	28.6	70	33.7	60	33.2	159	30.8	59	34.5	1,179	29.1
>4 months	61	31.0	53	30.3	53	25.5	60	33.2	157	30.4	46	26.9	1,432	35.3
Drug resistance														
INH-R without MDR-TB	15	9.7	16	10.0	18	11.0	14	9.3	33	7.8	19	12.8	137	5.4
MDR/RR-TB	3	1.9	1	0.6	6	3.6	3	2.0	8	1.9	4	2.6	40	1.6

* Includes those aged 15 years and older
EP - extra-pulmonary

Table Ai.8.1: Number and proportion of notified and un-notified TB cases matched to an HIV case*, England, 2001-2014

Year	Notified TB cases	Notified TB cases matched to HIV case		Un-notified TB isolates matched to HIV case**	Total TB cases matched to HIV case[#]	
	n	n	%	n	n	%
2001	5,761	270	4.7	-	270	4.7
2002	6,289	431	6.9	-	431	6.9
2003	6,308	493	7.8	34	527	8.3
2004	6,527	519	8.0	19	538	8.2
2005	7,243	536	7.4	30	566	7.8
2006	7,320	508	6.9	19	527	7.2
2007	7,122	429	6.0	8	437	6.1
2008	7,358	455	6.2	25	480	6.5
2009	7,720	370	4.8	10	380	4.9
2010	7,321	342	4.7	6	348	4.7
2011	7,904	299	3.8	3	302	3.8
2012	7,690	268	3.5	5	273	3.5
2013	6,970	213	3.1	3	216	3.1
2014	6,209	190	3.1	7	197	3.2
Total	**97,742**	**5,323**	**5.4**	**169**	**5,492**	**5.6**

* Includes TB and HIV co-infected cases aged 15 years and older.
** Only available from 2003 onwards.
[#] Proportion is calculated using the number of notified TB cases with HIV co-infection plus the number of un-notified TB isolates with HIV co-infection as the numerator, and the number of all notified TB cases (with or without HIV co-infection) plus the number of un-notified TB isolates with HIV co-infection as the denominator.

Table Ai.8.2: Number and proportion of notified and un-notified TB cases matched to an HIV case by PHE Centre, England*, 2001-2014

Year	PHE Centre**																	
	London		West Midlands		South East		North West		Yorkshire and the Humber		East of England		East Midlands		South West		North East	
	n	%[#]	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
2001	174	7.2	4	0.6	25	6.0	9	1.5	16	3.3	18	5.6	13	2.7	3	1.4	8	4.9
2002	241	8.3	21	2.9	49	10.8	20	3.3	15	3.3	44	12.8	21	4.7	10	4.7	9	6.3
2003	276	9.4	33	4.6	66	12.3	25	4.5	34	6.6	47	14.9	22	5.1	16	8.0	8	5.9
2004	255	8.7	44	5.2	46	8.7	37	6.8	33	6.6	62	15.9	34	8.5	18	7.1	9	6.6
2005	277	8.5	38	4.3	60	10.5	46	6.5	41	7.9	43	9.6	39	7.7	14	5.4	6	4.8
2006	231	7.3	40	4.5	49	8.2	45	6.7	41	6.5	53	11.4	41	7.5	20	7.4	6	4.7
2007	179	5.9	34	4.0	53	8.8	41	5.9	29	4.9	39	10.2	33	6.4	15	5.7	14	7.4
2008	214	6.8	36	3.8	47	7.6	39	5.7	36	6.1	48	10.1	38	8.2	16	5.9	6	3.4
2009	159	4.9	37	3.9	45	6.5	36	4.8	24	3.7	39	7.9	19	3.8	14	4.9	6	3.8
2010	143	4.6	25	3.0	38	5.6	39	5.2	26	4.4	32	6.7	30	6.3	12	4.7	3	2.1
2011	121	3.6	32	3.3	32	4.1	21	2.8	27	4.5	33	6.1	25	5.2	9	3.0	2	1.5
2012	123	3.8	28	2.8	30	4.0	20	2.8	17	3.1	19	3.9	27	5.6	8	2.8	1	0.6
2013	98	3.4	31	3.3	18	2.7	16	2.3	14	2.6	23	5.3	6	1.5	8	2.6	2	1.5
2014	69	2.8	18	2.4	28	4.4	21	3.4	15	3.0	22	5.2	10	2.6	9	3.0	5	3.2
Total	**2,560**	**6.1**	**421**	**3.5**	**586**	**6.9**	**415**	**4.4**	**368**	**4.8**	**522**	**9.0**	**358**	**5.5**	**172**	**4.7**	**85**	**4.1**

* Includes TB and HIV co-infected cases aged 15 years and older.
** Ordered by decreasing total number of TB cases in 2015.
[#] Proportion is calculated using the number of notified TB cases with HIV co-infection plus the number of un-notified TB isolates with HIV co-infection as the numerator, and the number of all notified TB cases (with or without HIV co-infection) plus the number of un-notified TB isolates with HIV co-infection as the denominator.

Table Ai.8.3: Number and proportion of TB-HIV co-infected case notifications by age group, England, 2001-2014

Year	Age group (years)												Total
	15-24		25-34		35-44		45-54		55-64		65+		
	n	%	n	%	n	%	n	%	n	%	n	%	n
2001	20	7.4	115	42.6	96	35.6	21	7.8	13	4.8	5	1.9	270
2002	26	6.0	197	45.7	148	34.3	46	10.7	11	2.6	3	0.7	431
2003	32	6.5	208	42.2	189	38.3	47	9.5	13	2.6	4	0.8	493
2004	39	7.5	208	40.1	188	36.2	67	12.9	12	2.3	5	1.0	519
2005	37	6.9	194	36.2	218	40.7	64	11.9	14	2.6	9	1.7	536
2006	27	5.3	180	35.4	211	41.5	63	12.4	17	3.3	10	2.0	508
2007	15	3.5	150	35.0	189	44.1	57	13.3	14	3.3	4	0.9	429
2008	17	3.7	147	32.3	191	42.0	76	16.7	18	4.0	6	1.3	455
2009	24	6.5	112	30.3	145	39.2	65	17.6	20	5.4	4	1.1	370
2010	18	5.3	85	24.9	142	41.5	71	20.8	20	5.8	6	1.8	342
2011	13	4.3	71	23.7	115	38.5	56	18.7	32	10.7	12	4.0	299
2012	8	3.0	65	24.3	116	43.3	49	18.3	24	9.0	6	2.2	268
2013	11	5.2	38	17.8	87	40.8	61	28.6	10	4.7	6	2.8	213
2014	10	5.3	33	17.4	72	37.9	55	28.9	15	7.9	5	2.6	190
Total	**297**	**5.6**	**1,803**	**33.9**	**2,107**	**39.6**	**798**	**15.0**	**233**	**4.4**	**85**	**1.6**	**5,323**

Table Ai.8.4: HIV testing in notified TB cases by PHE Centre, England, 2015

PHE Centre**	HIV testing*								
	Not offered		Offered and received		Offered but not received		Offered but refused		Total*
	n	%	n	%	n	%	n	%	n
London	27	1.2	2,107	97.3	23	1.1	8	0.4	2,165
West Midlands	27	4.7	520	91.1	16	2.8	8	1.4	571
South East	19	3.5	499	92.6	14	2.6	7	1.3	539
North West	17	3.7	440	94.8	4	0.9	3	0.6	464
Yorkshire and the Humber	19	6.0	286	90.8	6	1.9	4	1.3	315
East of England	22	6.9	277	86.6	18	5.6	3	0.9	320
East Midlands	21	6.9	278	90.8	4	1.3	3	1.0	306
South West	24	10.7	192	85.3	5	2.2	4	1.8	225
North East	15	13.5	93	83.8	3	2.7	0	0.0	111
England	**191**	**3.8**	**4,692**	**93.5**	**93**	**1.9**	**40**	**0.8**	**5,016**

* Total with previously unknown HIV status where HIV testing is known and excluding those diagnosed post-mortem
** Ordered by decreasing total number of TB cases in 2015

Table Ai.11.1: Number and rate of TB cases detected in high incidence countries through the UK pre-entry screening programme, 2006 to 2015

Year	Number of cases	Rate per 100,000 (95% CI)
2006	14	44.8 (24.5 - 75.2)
2007	53	54.3 (40.7 - 71.0)
2008	73	67.0 (52.5 - 84.2)
2009	117	88.4 (73.1 - 105.9)
2010	83	77.1 (61.4 - 95.6)
2011	83	86.4 (68.9 - 107.1)
2012	63	97.1 (74.6 - 124.3)
2013	118	136.1 (112.7 - 163.0)
2014	334	128.8 (115.4 - 143.4)
2015	382	149.2 (134.6 - 165.0)

CI - confidence intervals

Table Ai.11.2: Number of pulmonary TB cases diagnosed by pre-entry screening* and identified within one year of UK entry**, 2006 to 2015

Year of screening/ entry to the UK	TB cases diagnosed by pre-entry screening	TB cases identified in the UK
2006	14	380
2007	53	358
2008	76	330
2009	121	370
2010	83	351
2011	84	339
2012	67	190
2013	134	157
2014	369	161
2015	382	88

* The number of pulmonary TB cases identified within one year of entry into the UK was from all 101 high incidence countries but the number of TB cases diagnosed 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)
** As of May 2016, 513 sputum samples are pending and the rate may increase when final results are available

Appendix II. Supplementary tables of local level data

Table Aii.1.1: Three-year average number of TB case notifications and rates by upper tier local authority and local authority district, England, 2013-2015

PHE Centre*	Upper tier local authority and local authority district**	Average annual number of cases#	Average annual rate per 100,000 (95% CI)
London		**2,599**	**30.4 (29.7-31.1)**
	Barking and Dagenham	60	30.1 (25.9-34.9)
	Barnet	73	19.5 (17.0-22.2)
	Bexley	23	9.7 (7.6-12.3)
	Brent	217	67.6 (62.5-73.0)
	Bromley	24	7.5 (5.8-9.4)
	Camden	42	17.9 (14.9-21.3)
	City of London	1	8.2 (1.0-29.5)
	Croydon	92	24.5 (21.7-27.5)
	Ealing	194	56.6 (52.1-61.4)
	Enfield	70	21.5 (18.7-24.6)
	Greenwich	97	35.9 (31.9-40.3)
	Hackney	73	27.7 (24.2-31.7)
	Hammersmith and Fulham	42	23.3 (19.4-27.8)
	Haringey	76	28.4 (24.8-32.3)
	Harrow	114	46.4 (41.6-51.6)
	Havering	26	10.4 (8.2-13.1)
	Hillingdon	107	36.5 (32.6-40.7)
	Hounslow	143	53.7 (48.7-59.1)
	Islington	56	25.4 (21.7-29.6)
	Kensington and Chelsea	31	19.6 (15.8-24.0)
	Kingston upon Thames	24	14.1 (11.0-17.8)
	Lambeth	71	22.3 (19.4-25.5)
	Lewisham	67	23.0 (19.9-26.4)
	Merton	52	25.4 (21.5-29.7)
	Newham	278	85.6 (79.9-91.6)
	Redbridge	131	44.9 (40.5-49.5)
	Richmond upon Thames	11	5.9 (4.1-8.2)
	Southwark	82	27.1 (23.9-30.8)
	Sutton	24	11.9 (9.3-15.1)
	Tower Hamlets	92	32.5 (28.8-36.6)
	Waltham Forest	101	37.8 (33.6-42.3)
	Wandsworth	58	18.5 (15.8-21.4)
	Westminster	48	20.6 (17.4-24.3)

PHE Centre*	Upper tier local authority and local authority district**	Average annual number of cases[#]	Average annual rate per 100,000 (95% CI)
West Midlands		**821**	**14.4 (13.8-14.9)**
	Birmingham	320	29.0 (27.2-30.9)
	Coventry	93	27.6 (24.4-31.0)
	Dudley	32	10.0 (8.1-12.3)
	Herefordshire, County of	4	2.0 (1.0-3.5)
	Sandwell	98	31.0 (27.6-34.8)
	Shropshire	9	3.0 (2.0-4.4)
	Solihull	15	7.0 (5.1-9.4)
	Staffordshire	36	4.2 (3.5-5.1)
	Cannock Chase	0	0.3 (0.0-1.9)
	East Staffordshire	10	8.4 (5.6-12.0)
	Lichfield	4	3.9 (2.0-6.8)
	Newcastle-under-Lyme	5	4.2 (2.4-6.9)
	South Staffordshire	3	3.0 (1.4-5.5)
	Stafford	10	7.3 (4.9-10.5)
	Staffordshire Moorlands	3	3.4 (1.6-6.3)
	Tamworth	1	0.9 (0.1-3.1)
	Stoke-on-Trent	30	12.1 (9.7-14.8)
	Telford and Wrekin	9	5.1 (3.3-7.5)
	Walsall	40	14.7 (12.2-17.6)
	Warwickshire	41	7.4 (6.2-8.9)
	North Warwickshire	2	2.7 (0.9-6.2)
	Nuneaton and Bedworth	16	12.4 (9.1-16.5)
	Rugby	10	9.4 (6.3-13.6)
	Stratford-on-Avon	3	2.2 (1.0-4.3)
	Warwick	11	8.1 (5.6-11.4)
	Wolverhampton	68	26.7 (23.2-30.7)
	Worcestershire	26	4.5 (3.5-5.6)
	Bromsgrove	2	2.1 (0.8-4.6)
	Malvern Hills	2	2.2 (0.7-5.1)
	Redditch	7	8.7 (5.4-13.1)
	Worcester	7	7.3 (4.6-11.0)
	Wychavon	5	4.2 (2.3-6.9)
	Wyre Forest	2	2.4 (0.9-4.9)
South East		**650**	**7.5 (7.2-7.9)**
	Bracknell Forest	9	7.6 (5.0-11.1)
	Brighton and Hove	21	7.3 (5.6-9.4)
	Buckinghamshire	43	8.2 (6.9-9.8)
	Aylesbury Vale	13	6.9 (4.9-9.4)
	Chiltern	5	5.3 (3.0-8.8)
	South Bucks	6	9.2 (5.6-14.4)

PHE Centre*	Upper tier local authority and local authority district**	Average annual number of cases[#]	Average annual rate per 100,000 (95% CI)
South East continued	Wycombe	19	10.9 (8.2-14.1)
	East Sussex	23	4.2 (3.3-5.3)
	Eastbourne	6	6.2 (3.8-9.7)
	Hastings	7	7.3 (4.5-11.3)
	Lewes	3	3.3 (1.6-6.1)
	Rother	3	3.6 (1.7-6.7)
	Wealden	3	1.9 (0.9-3.7)
	Hampshire	52	3.8 (3.3-4.5)
	Basingstoke and Deane	10	6.0 (4.1-8.5)
	East Hampshire	2	1.4 (0.5-3.3)
	Eastleigh	4	2.9 (1.4-5.1)
	Fareham	5	4.1 (2.2-6.9)
	Gosport	1	1.2 (0.2-3.5)
	Hart	2	2.1 (0.8-4.7)
	Havant	3	2.2 (0.9-4.3)
	New Forest	2	1.3 (0.5-2.7)
	Rushmoor	18	19.3 (14.5-25.1)
	Test Valley	2	1.7 (0.6-3.6)
	Winchester	3	2.5 (1.1-4.8)
	Isle of Wight	2	1.2 (0.4-2.8)
	Kent	100	6.6 (5.9-7.4)
	Ashford	11	8.7 (5.9-12.2)
	Canterbury	8	5.3 (3.4-7.8)
	Dartford	10	9.5 (6.3-13.6)
	Dover	4	3.5 (1.8-6.2)
	Gravesham	17	16.2 (12.0-21.3)
	Maidstone	13	7.8 (5.5-10.7)
	Sevenoaks	5	4.5 (2.6-7.4)
	Shepway	6	5.5 (3.2-8.7)
	Swale	5	3.6 (2.0-5.9)
	Thanet	11	8.0 (5.5-11.2)
	Tonbridge and Malling	4	2.9 (1.5-5.3)
	Tunbridge Wells	6	5.5 (3.3-8.5)
	Medway	15	5.6 (4.1-7.5)
	Oxfordshire	63	9.4 (8.1-10.8)
	Cherwell	17	12.0 (9.0-15.7)
	Oxford	31	19.7 (15.9-24.1)
	South Oxfordshire	5	3.4 (1.9-5.7)
	Vale of White Horse	5	3.7 (2.0-6.3)
	West Oxfordshire	5	4.9 (2.8-8.0)
	Portsmouth	16	7.5 (5.5-9.9)
	Reading	56	34.7 (29.6-40.3)

PHE Centre*	Upper tier local authority and local authority district**	Average annual number of cases[#]	Average annual rate per 100,000 (95% CI)
South East continued	Slough	69	47.8 (41.5-54.7)
	Southampton	31	12.5 (10.1-15.3)
	Surrey	68	5.8 (5.1-6.7)
	Elmbridge	5	3.5 (1.9-5.9)
	Epsom and Ewell	6	8.1 (4.9-12.7)
	Guildford	7	4.7 (2.8-7.2)
	Mole Valley	1	1.5 (0.4-4.0)
	Reigate and Banstead	13	9.1 (6.5-12.4)
	Runnymede	5	6.3 (3.6-10.2)
	Spelthorne	8	8.2 (5.2-12.1)
	Surrey Heath	6	6.5 (3.8-10.4)
	Tandridge	2	2.0 (0.6-4.6)
	Waverley	2	1.9 (0.8-3.9)
	Woking	13	12.7 (9.0-17.5)
	West Berkshire	8	5.1 (3.3-7.6)
	West Sussex	48	5.8 (4.9-6.8)
	Adur	1	1.6 (0.3-4.6)
	Arun	8	5.0 (3.1-7.5)
	Chichester	4	3.5 (1.8-6.0)
	Crawley	21	19.1 (14.7-24.4)
	Horsham	4	3.0 (1.5-5.2)
	Mid Sussex	6	3.9 (2.3-6.3)
	Worthing	5	4.4 (2.4-7.3)
	Windsor and Maidenhead	12	8.4 (5.9-11.6)
	Wokingham	16	10.3 (7.6-13.6)
North West		**643**	**9.0 (8.6-9.4)**
	Blackburn with Darwen	43	29.0 (24.2-34.5)
	Blackpool	13	9.5 (6.8-12.9)
	Bolton	52	18.6 (15.8-21.8)
	Bury	19	10.3 (7.8-13.3)
	Cheshire East	17	4.5 (3.4-6.0)
	Cheshire West and Chester	11	3.4 (2.4-4.8)
	Cumbria	12	2.4 (1.7-3.3)
	Allerdale	3	2.8 (1.2-5.4)
	Barrow-in-Furness	2	2.5 (0.8-5.7)
	Carlisle	3	2.5 (1.1-4.9)
	Copeland	1	1.4 (0.3-4.2)
	Eden	1	1.3 (0.2-4.6)
	South Lakeland	3	3.2 (1.5-5.9)
	Halton	3	2.4 (1.1-4.5)
	Knowsley	3	2.3 (1.1-4.2)

PHE Centre*	Upper tier local authority and local authority district**	Average annual number of cases#	Average annual rate per 100,000 (95% CI)
North West continued	**Lancashire**	75	6.3 (5.5-7.2)
	Burnley	5	5.4 (2.9-9.0)
	Chorley	4	3.9 (2.1-6.6)
	Fylde	2	2.6 (1.0-5.7)
	Hyndburn	9	11.2 (7.4-16.3)
	Lancaster	3	2.4 (1.1-4.3)
	Pendle	15	17.0 (12.5-22.7)
	Preston	22	15.9 (12.3-20.2)
	Ribble Valley	1	1.7 (0.4-5.0)
	Rossendale	4	5.3 (2.6-9.5)
	South Ribble	5	4.3 (2.3-7.2)
	West Lancashire	2	2.1 (0.8-4.3)
	Wyre	2	1.8 (0.7-4.0)
	Liverpool	40	8.4 (7.0-10.1)
	Manchester	141	27.0 (24.5-29.7)
	Oldham	50	21.8 (18.5-25.6)
	Rochdale	29	13.6 (10.9-16.8)
	Salford	29	12.1 (9.7-14.9)
	Sefton	7	2.6 (1.6-3.9)
	St. Helens	3	1.9 (0.9-3.5)
	Stockport	16	5.7 (4.2-7.5)
	Tameside	19	8.7 (6.6-11.3)
	Trafford	26	11.4 (9.0-14.1)
	Warrington	10	5.0 (3.4-7.1)
	Wigan	13	4.1 (2.9-5.5)
	Wirral	9	2.8 (1.8-4.1)
Yorkshire and the Humber		**514**	**9.6 (9.1-10.1)**
	Barnsley	8	3.5 (2.3-5.2)
	Bradford	118	22.3 (20.0-24.7)
	Calderdale	17	8.2 (6.1-10.8)
	Doncaster	22	7.3 (5.7-9.3)
	East Riding of Yorkshire	6	1.7 (1.0-2.7)
	Kingston upon Hull, City of	17	6.5 (4.8-8.5)
	Kirklees	75	17.3 (15.1-19.7)
	Leeds	100	13.0 (11.6-14.5)
	North East Lincolnshire	5	2.9 (1.6-4.9)
	North Lincolnshire	11	6.3 (4.3-8.9)

PHE Centre*	Upper tier local authority and local authority district**	Average annual number of cases#	Average annual rate per 100,000 (95% CI)
Yorkshire and the Humber continued	**North Yorkshire**	15	2.5 (1.8-3.3)
	Craven	2	3.0 (1.0-7.0)
	Hambleton	1	1.5 (0.4-3.8)
	Harrogate	5	3.0 (1.6-5.0)
	Richmondshire	3	5.0 (2.2-9.9)
	Ryedale	1	1.3 (0.2-4.6)
	Scarborough	3	2.8 (1.3-5.3)
	Selby	1	1.2 (0.2-3.4)
	Rotherham	14	5.5 (4.0-7.4)
	Sheffield	83	14.7 (12.9-16.6)
	Wakefield	19	5.6 (4.3-7.3)
	York	5	2.6 (1.5-4.2)
East of England		**427**	**6.8 (6.4-7.2)**
	Bedford	22	13.4 (10.4-17.1)
	Cambridgeshire	38	6.0 (4.9-7.2)
	Cambridge	13	9.8 (7.0-13.5)
	East Cambridgeshire	2	2.7 (1.1-5.5)
	Fenland	8	7.8 (5.0-11.8)
	Huntingdonshire	9	5.0 (3.3-7.3)
	South Cambridgeshire	7	4.6 (2.8-7.0)
	Central Bedfordshire	8	3.1 (2.0-4.6)
	Essex	60	4.2 (3.6-4.9)
	Basildon	13	7.2 (5.1-9.9)
	Braintree	3	2.0 (0.9-3.8)
	Brentwood	6	8.0 (4.7-12.6)
	Castle Point	3	3.8 (1.8-6.9)
	Chelmsford	6	3.3 (1.9-5.3)
	Colchester	6	3.1 (1.8-5.0)
	Epping Forest	8	6.5 (4.2-9.6)
	Harlow	8	9.5 (6.1-14.1)
	Maldon	1	1.6 (0.3-4.7)
	Rochford	1	0.8 (0.1-2.8)
	Tendring	3	2.1 (1.0-4.1)
	Uttlesford	3	3.2 (1.4-6.3)

PHE Centre*	Upper tier local authority and local authority district**	Average annual number of cases[#]	Average annual rate per 100,000 (95% CI)
East of England continued	**Hertfordshire**	78	6.8 (5.9-7.7)
	Broxbourne	7	7.0 (4.3-10.8)
	Dacorum	6	4.0 (2.4-6.3)
	East Hertfordshire	5	3.3 (1.8-5.5)
	Hertsmere	9	8.5 (5.5-12.4)
	North Hertfordshire	8	6.1 (3.9-9.1)
	St Albans	7	4.6 (2.8-7.1)
	Stevenage	9	10.1 (6.6-14.8)
	Three Rivers	6	6.3 (3.6-10.0)
	Watford	15	15.8 (11.5-21.1)
	Welwyn Hatfield	8	7.2 (4.6-10.6)
	Luton	63	29.8 (25.7-34.4)
	Milton Keynes	26	10.2 (8.1-12.7)
	Norfolk	35	4.0 (3.3-4.9)
	Breckland	3	2.5 (1.2-4.6)
	Broadland	2	1.6 (0.6-3.5)
	Great Yarmouth	9	8.8 (5.8-12.9)
	King's Lynn and West Norfolk	6	3.8 (2.2-6.0)
	North Norfolk	2	2.3 (0.9-4.7)
	Norwich	11	8.0 (5.5-11.2)
	South Norfolk	2	1.8 (0.7-3.7)
	Peterborough	44	23.2 (19.4-27.5)
	Southend-on-Sea	13	7.5 (5.4-10.2)
	Suffolk	28	3.8 (3.1-4.7)
	Babergh	2	1.9 (0.6-4.4)
	Forest Heath	3	4.8 (2.2-9.1)
	Ipswich	9	6.4 (4.2-9.4)
	Mid Suffolk	2	2.4 (0.9-4.9)
	St Edmundsbury	6	5.1 (2.9-8.1)
	Suffolk Coastal	3	2.1 (0.9-4.2)
	Waveney	4	3.7 (2.0-6.4)
	Thurrock	9	5.3 (3.5-7.8)
East Midlands		**389**	**8.4 (7.9-8.9)**
	Derby	35	13.8 (11.3-16.8)
	Derbyshire	22	2.8 (2.2-3.6)
	Amber Valley	4	3.5 (1.9-6.0)
	Bolsover	1	1.7 (0.5-4.4)
	Chesterfield	5	5.1 (2.9-8.3)
	Derbyshire Dales	1	0.9 (0.1-3.4)
	Erewash	4	3.5 (1.8-6.1)
	High Peak	2	2.2 (0.8-4.8)
	North East Derbyshire	1	1.0 (0.2-2.9)
	South Derbyshire	3	3.4 (1.6-6.2)

PHE Centre*	Upper tier local authority and local authority district**	Average annual number of cases#	Average annual rate per 100,000 (95% CI)
East Midlands continued	Leicester	141	41.8 (37.9-46.0)
	Leicestershire	27	4.0 (3.2-5.0)
	Blaby	5	4.9 (2.7-8.2)
	Charnwood	7	3.8 (2.3-5.9)
	Harborough	4	4.9 (2.6-8.4)
	Hinckley and Bosworth	3	2.8 (1.3-5.3)
	Melton	0	-
	North West Leicestershire	3	3.5 (1.7-6.4)
	Oadby and Wigston	5	8.9 (5.0-14.7)
	Lincolnshire	32	4.4 (3.6-5.4)
	Boston	8	12.0 (7.7-17.9)
	East Lindsey	6	4.1 (2.4-6.6)
	Lincoln	4	4.2 (2.1-7.3)
	North Kesteven	2	1.5 (0.5-3.5)
	South Holland	2	2.6 (1.0-5.3)
	South Kesteven	7	5.3 (3.3-8.1)
	West Lindsey	3	3.6 (1.7-6.7)
	Northamptonshire	47	6.6 (5.5-7.8)
	Corby	3	5.1 (2.4-9.4)
	Daventry	3	3.4 (1.5-6.6)
	East Northamptonshire	3	3.0 (1.3-5.9)
	Kettering	4	4.1 (2.1-7.2)
	Northampton	27	12.3 (9.8-15.3)
	South Northamptonshire	1	1.5 (0.4-3.9)
	Wellingborough	6	7.8 (4.6-12.4)
	Nottingham	54	17.1 (14.5-19.9)
	Nottinghamshire	29	3.6 (2.9-4.5)
	Ashfield	5	3.8 (2.1-6.4)
	Bassetlaw	3	2.6 (1.2-5.0)
	Broxtowe	6	5.4 (3.2-8.5)
	Gedling	5	4.3 (2.4-7.1)
	Mansfield	5	4.4 (2.4-7.4)
	Newark and Sherwood	2	2.0 (0.8-4.1)
	Rushcliffe	3	2.9 (1.4-5.4)
	Rutland	2	4.4 (1.4-10.3)
South West		**311**	**5.7 (5.4-6.1)**
	Bath and North East Somerset	14	7.5 (5.4-10.2)
	Bournemouth	13	7.0 (5.0-9.5)
	Bristol, City of	91	20.6 (18.2-23.2)
	Cornwall	13	2.4 (1.7-3.3)

PHE Centre*	Upper tier local authority and local authority district**	Average annual number of cases#	Average annual rate per 100,000 (95% CI)
South West continued	**Devon**	29	3.8 (3.1-4.7)
	East Devon	2	1.2 (0.4-2.9)
	Exeter	6	4.6 (2.7-7.3)
	Mid Devon	2	2.5 (0.9-5.5)
	North Devon	3	3.5 (1.7-6.5)
	South Hams	3	3.6 (1.6-6.8)
	Teignbridge	10	7.6 (5.1-10.9)
	Torridge	1	1.0 (0.1-3.7)
	West Devon	3	6.2 (2.9-11.3)
	Dorset	10	2.3 (1.5-3.3)
	Christchurch	0	0.7 (0.0-3.8)
	East Dorset	2	2.6 (1.1-5.4)
	North Dorset	1	1.9 (0.5-4.9)
	Purbeck	1	2.2 (0.5-6.4)
	West Dorset	2	1.7 (0.5-3.9)
	Weymouth and Portland	3	4.6 (2.1-8.7)
	Gloucestershire	34	5.6 (4.6-6.8)
	Cheltenham	8	7.2 (4.6-10.6)
	Cotswold	2	2.0 (0.6-4.6)
	Forest of Dean	1	1.2 (0.2-3.5)
	Gloucester	14	10.9 (7.8-14.7)
	Stroud	6	4.9 (2.9-7.9)
	Tewkesbury	4	4.7 (2.4-8.2)
	Isles of Scilly	0	-
	North Somerset	8	4.0 (2.6-5.9)
	Plymouth	14	5.4 (3.9-7.2)
	Poole	5	3.3 (1.9-5.5)
	Somerset	14	2.5 (1.8-3.4)
	Mendip	5	4.2 (2.3-7.1)
	Sedgemoor	3	2.2 (1.0-4.4)
	South Somerset	5	2.8 (1.6-4.8)
	Taunton Deane	2	1.5 (0.5-3.4)
	West Somerset	0	-
	South Gloucestershire	18	6.6 (5.0-8.6)
	Swindon	23	10.7 (8.3-13.5)
	Torbay	8	6.0 (3.9-9.0)
	Wiltshire	15	3.2 (2.3-4.2)
North East		**145**	**5.5 (5.0-6.1)**
	County Durham	10	1.9 (1.3-2.7)
	Darlington	5	5.1 (2.9-8.2)
	Gateshead	14	6.8 (4.9-9.2)
	Hartlepool	4	4.0 (2.0-7.1)

PHE Centre*	Upper tier local authority and local authority district*8	Average annual number of cases[#]	Average annual rate per 100,000 (95% CI)
North East continued	Middlesbrough	14	9.8 (7.0-13.3)
	Newcastle upon Tyne	41	14.1 (11.8-16.9)
	North Tyneside	10	4.8 (3.2-6.9)
	Northumberland	8	2.5 (1.6-3.8)
	Redcar and Cleveland	4	3.0 (1.5-5.2)
	South Tyneside	8	5.6 (3.6-8.3)
	Stockton-on-Tees	9	4.6 (3.1-6.7)
	Sunderland	19	6.9 (5.2-8.9)

* Ordered by decreasing total number of cases in 2015
** 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.
[#] Average number of cases in a local authority district may not be the same as the sum of the average number of cases in the corresponding upper tier local authority due to rounding.

CI - confidence intervals

Table Aii.1.2: Three-year average number of TB case notifications and rates by Clinical Commissioning Group (CCG), England, 2013-2015

Clinical Commissioning Group	Average annual number of cases	Average annual rate per 100,000 (95% CI)
NHS Airedale, Wharfedale and Craven	9	5.7 (3.7-8.3)
NHS Ashford	11	8.7 (5.9-12.3)
NHS Aylesbury Vale	13	6.4 (4.6-8.8)
NHS Barking & Dagenham	60	30.3 (26.0-35.1)
NHS Barnet	73	19.6 (17.1-22.3)
NHS Barnsley	8	3.5 (2.3-5.2)
NHS Basildon and Brentwood	19	7.4 (5.6-9.7)
NHS Bassetlaw	3	2.6 (1.2-5.0)
NHS Bath and North East Somerset	14	7.5 (5.4-10.2)
NHS Bedfordshire	30	7.0 (5.7-8.6)
NHS Bexley	23	9.8 (7.6-12.3)
NHS Birmingham CrossCity	164	22.4 (20.5-24.5)
NHS Birmingham South and Central	59	29.1 (25.0-33.7)
NHS Blackburn with Darwen	43	29.0 (24.2-34.5)
NHS Blackpool	13	9.5 (6.8-12.9)
NHS Bolton	52	18.7 (15.9-21.8)
NHS Bracknell and Ascot	10	7.1 (4.8-10.3)
NHS Bradford City	49	59.0 (49.9-69.4)
NHS Bradford Districts	61	18.2 (15.6-21.0)
NHS Brent	217	67.8 (62.7-73.2)
NHS Brighton & Hove	21	7.4 (5.7-9.5)
NHS Bristol	91	20.7 (18.3-23.3)
NHS Bromley	24	7.5 (5.9-9.4)
NHS Bury	19	10.3 (7.8-13.4)
NHS Calderdale	17	8.2 (6.1-10.8)
NHS Cambridgeshire and Peterborough	85	9.9 (8.7-11.1)
NHS Camden	42	18.0 (15.0-21.4)
NHS Cannock Chase	1	0.7 (0.2-2.2)
NHS Canterbury and Coastal	10	4.7 (3.2-6.8)
NHS Castle Point, Rayleigh and Rochford	4	2.3 (1.2-4.0)
NHS Central London (Westminster)	29	17.5 (14.0-21.6)
NHS Central Manchester	75	41.0 (35.8-46.7)
NHS Chiltern	30	9.3 (7.5-11.5)
NHS Chorley and South Ribble	7	3.9 (2.4-6.0)
NHS City and Hackney	74	27.4 (23.9-31.2)
NHS Coastal West Sussex	18	3.8 (2.9-4.9)
NHS Corby	3	5.1 (2.5-9.4)
NHS Coventry and Rugby	103	23.5 (20.9-26.3)
NHS Crawley	21	19.2 (14.7-24.5)
NHS Croydon	92	24.5 (21.7-27.6)
NHS Cumbria	12	2.4 (1.7-3.4)

Clinical Commissioning Group	Average annual number of cases	Average annual rate per 100,000 (95% CI)
NHS Darlington	5	5.1 (2.9-8.2)
NHS Dartford, Gravesham and Swanley	29	11.4 (9.1-14.1)
NHS Doncaster	22	7.3 (5.7-9.3)
NHS Dorset	28	3.7 (2.9-4.6)
NHS Dudley	32	10.0 (8.1-12.3)
NHS Durham Dales, Easington and Sedgefield	4	1.3 (0.7-2.4)
NHS Ealing	194	56.7 (52.2-61.5)
NHS East Lancashire	33	8.9 (7.3-10.9)
NHS East Leicestershire and Rutland	16	4.8 (3.6-6.4)
NHS East Riding of Yorkshire	5	1.7 (1.0-2.7)
NHS East Staffordshire	10	7.7 (5.2-11.1)
NHS East Surrey	10	5.6 (3.8-7.9)
NHS East and North Hertfordshire	35	6.4 (5.3-7.8)
NHS Eastbourne, Hailsham and Seaford	8	4.3 (2.8-6.4)
NHS Eastern Cheshire	9	4.6 (3.0-6.7)
NHS Enfield	70	21.6 (18.7-24.7)
NHS Erewash	4	4.2 (2.2-7.3)
NHS Fareham and Gosport	6	2.9 (1.7-4.6)
NHS Fylde & Wyre	4	2.2 (1.1-3.9)
NHS Gloucestershire	34	5.6 (4.6-6.8)
NHS Great Yarmouth & Waveney	13	6.1 (4.3-8.3)
NHS Greater Huddersfield	35	14.7 (12.0-17.7)
NHS Greater Preston	25	12.4 (9.7-15.5)
NHS Greenwich	97	36.2 (32.1-40.6)
NHS Guildford and Waverley	8	3.7 (2.3-5.5)
NHS Halton	3	2.4 (1.1-4.5)
NHS Hambleton, Richmondshire and Whitby	3	2.2 (1.0-4.0)
NHS Hammersmith and Fulham	42	23.3 (19.4-27.8)
NHS Hardwick	1	0.9 (0.2-2.7)
NHS Haringey	76	28.6 (25.0-32.5)
NHS Harrogate and Rural District	5	3.0 (1.6-5.0)
NHS Harrow	114	46.5 (41.7-51.7)
NHS Hartlepool and Stockton-on-Tees	13	4.4 (3.1-6.1)
NHS Hastings & Rother	10	5.5 (3.7-7.8)
NHS Havering	26	10.5 (8.3-13.1)
NHS Herefordshire	4	2.0 (1.0-3.5)
NHS Herts Valleys	42	7.2 (6.0-8.6)
NHS Heywood, Middleton & Rochdale	29	13.6 (10.9-16.8)
NHS High Weald Lewes Havens	5	2.7 (1.5-4.6)
NHS Hillingdon	107	36.7 (32.8-40.9)
NHS Horsham and Mid Sussex	9	3.8 (2.5-5.6)
NHS Hounslow	143	53.9 (48.9-59.3)
NHS Hull	17	6.5 (4.8-8.5)
NHS Ipswich and East Suffolk	13	3.3 (2.3-4.5)

Clinical Commissioning Group	Average annual number of cases	Average annual rate per 100,000 (95% CI)
NHS Isle of Wight	2	1.2 (0.4-2.8)
NHS Islington	56	25.7 (22.0-29.9)
NHS Kernow	13	2.4 (1.7-3.3)
NHS Kingston	24	14.2 (11.1-17.9)
NHS Knowsley	3	2.3 (1.1-4.2)
NHS Lambeth	71	22.4 (19.5-25.6)
NHS Lancashire North	4	2.3 (1.1-4.1)
NHS Leeds North	23	11.7 (9.1-14.7)
NHS Leeds South and East	50	20.4 (17.2-23.9)
NHS Leeds West	27	8.3 (6.6-10.3)
NHS Leicester City	141	42.0 (38.1-46.2)
NHS Lewisham	67	23.1 (20.0-26.5)
NHS Lincolnshire East	14	6.2 (4.5-8.4)
NHS Lincolnshire West	7	3.2 (2.0-4.8)
NHS Liverpool	40	8.5 (7.0-10.1)
NHS Luton	63	30.0 (25.9-34.6)
NHS Mansfield & Ashfield	8	3.9 (2.5-5.9)
NHS Medway	15	5.6 (4.1-7.5)
NHS Merton	52	25.4 (21.6-29.7)
NHS Mid Essex	10	2.5 (1.7-3.6)
NHS Milton Keynes	26	10.0 (7.9-12.4)
NHS Nene	42	6.7 (5.6-8.0)
NHS Newark & Sherwood	2	1.7 (0.6-3.7)
NHS Newbury and District	7	6.6 (4.1-10.1)
NHS Newcastle Gateshead	55	11.2 (9.5-13.0)
NHS Newham	278	86.4 (80.6-92.4)
NHS North & West Reading	8	7.6 (4.8-11.5)
NHS North Derbyshire	9	3.2 (2.1-4.7)
NHS North Durham	6	2.5 (1.5-3.9)
NHS North East Essex	9	2.7 (1.8-4.0)
NHS North East Hampshire and Farnham	21	9.9 (7.6-12.7)
NHS North East Lincolnshire	5	2.9 (1.6-4.9)
NHS North Hampshire	12	5.3 (3.7-7.4)
NHS North Kirklees	39	20.8 (17.2-24.9)
NHS North Lincolnshire	11	6.3 (4.3-8.9)
NHS North Manchester	45	26.0 (21.8-30.8)
NHS North Norfolk	3	2.0 (0.9-3.6)
NHS North Somerset	8	4.0 (2.6-5.9)
NHS North Staffordshire	8	3.7 (2.4-5.5)
NHS North Tyneside	10	4.8 (3.2-6.9)
NHS North West Surrey	27	8.0 (6.4-9.9)
NHS North, East, West Devon	33	3.8 (3.1-4.6)
NHS Northumberland	8	2.5 (1.6-3.8)
NHS Norwich	12	6.1 (4.3-8.5)

Clinical Commissioning Group	Average annual number of cases	Average annual rate per 100,000 (95% CI)
NHS Nottingham City	54	17.1 (14.6-20.0)
NHS Nottingham North & East	7	4.7 (2.9-7.2)
NHS Nottingham West	6	5.4 (3.2-8.5)
NHS Oldham	50	21.9 (18.5-25.7)
NHS Oxfordshire	63	9.6 (8.3-11.1)
NHS Portsmouth	16	7.5 (5.5-10.0)
NHS Redbridge	131	45.1 (40.7-49.7)
NHS Redditch and Bromsgrove	9	5.2 (3.5-7.5)
NHS Richmond	11	5.9 (4.1-8.2)
NHS Rotherham	14	5.5 (4.0-7.4)
NHS Rushcliffe	3	2.9 (1.4-5.4)
NHS Salford	29	12.2 (9.8-15.0)
NHS Sandwell and West Birmingham	196	40.6 (37.4-44.0)
NHS Scarborough and Ryedale	3	2.7 (1.2-5.2)
NHS Sheffield	83	14.7 (12.9-16.6)
NHS Shropshire	9	3.0 (2.0-4.4)
NHS Slough	69	47.9 (41.6-54.9)
NHS Solihull	15	7.0 (5.1-9.4)
NHS Somerset	14	2.5 (1.8-3.4)
NHS South Cheshire	8	4.5 (2.9-6.7)
NHS South Devon and Torbay	18	6.5 (4.9-8.5)
NHS South East Staffs and Seisdon and Peninsular	7	3.3 (2.0-4.9)
NHS South Eastern Hampshire	4	1.7 (0.9-3.1)
NHS South Gloucestershire	18	6.6 (5.0-8.7)
NHS South Kent Coast	10	4.7 (3.2-6.8)
NHS South Lincolnshire	6	4.2 (2.5-6.6)
NHS South Manchester	21	12.8 (9.8-16.4)
NHS South Norfolk	5	1.9 (1.1-3.3)
NHS South Reading	49	44.6 (37.7-52.4)
NHS South Sefton	3	2.1 (1.0-3.9)
NHS South Tees	18	6.4 (4.8-8.4)
NHS South Tyneside	8	5.6 (3.6-8.3)
NHS South Warwickshire	14	5.4 (3.9-7.3)
NHS South West Lincolnshire	5	3.8 (2.1-6.3)
NHS South Worcestershire	14	4.7 (3.4-6.4)
NHS Southampton	30	12.3 (9.9-15.1)
NHS Southend	13	7.5 (5.4-10.2)
NHS Southern Derbyshire	43	8.3 (7.0-9.9)
NHS Southport and Formby	4	3.2 (1.6-5.7)
NHS Southwark	82	27.3 (24.0-31.0)
NHS St Helens	3	1.9 (0.9-3.5)
NHS Stafford and Surrounds	10	6.4 (4.3-9.1)
NHS Stockport	16	5.7 (4.2-7.5)

Clinical Commissioning Group	Average annual number of cases	Average annual rate per 100,000 (95% CI)
NHS Stoke on Trent	31	12.0 (9.7-14.7)
NHS Sunderland	19	6.9 (5.2-8.9)
NHS Surrey Downs	15	5.4 (3.9-7.2)
NHS Surrey Heath	6	6.3 (3.8-10.0)
NHS Sutton	24	12.0 (9.4-15.1)
NHS Swale	4	3.6 (1.9-6.3)
NHS Swindon	23	10.4 (8.1-13.2)
NHS Tameside and Glossop	19	7.6 (5.8-9.8)
NHS Telford & Wrekin	9	5.1 (3.3-7.5)
NHS Thanet	11	8.0 (5.5-11.2)
NHS Thurrock	9	5.3 (3.5-7.8)
NHS Tower Hamlets	92	32.9 (29.2-37.1)
NHS Trafford	26	11.4 (9.0-14.2)
NHS Vale Royal	4	3.9 (2.0-6.8)
NHS Vale of York	8	2.3 (1.5-3.4)
NHS Wakefield	19	5.6 (4.3-7.3)
NHS Walsall	40	14.7 (12.2-17.6)
NHS Waltham Forest	101	37.9 (33.8-42.4)
NHS Wandsworth	58	18.5 (15.9-21.5)
NHS Warrington	10	5.0 (3.4-7.1)
NHS Warwickshire North	17	9.2 (6.9-12.1)
NHS West Cheshire	7	3.2 (2.0-4.8)
NHS West Essex	19	6.4 (4.9-8.3)
NHS West Hampshire	11	2.0 (1.4-2.8)
NHS West Kent	26	5.5 (4.3-6.8)
NHS West Lancashire	2	2.1 (0.8-4.3)
NHS West Leicestershire	13	3.4 (2.4-4.7)
NHS West London (Kensington and Chelsea, Queen's Park and Paddington)	50	22.6 (19.1-26.5)
NHS West Norfolk	7	3.9 (2.4-6.0)
NHS West Suffolk	11	4.9 (3.4-6.9)
NHS Wigan Borough	13	4.1 (2.9-5.5)
NHS Wiltshire	15	3.1 (2.3-4.2)
NHS Windsor, Ascot and Maidenhead	12	8.5 (6.0-11.8)
NHS Wirral	9	2.8 (1.8-4.1)
NHS Wokingham	16	10.3 (7.6-13.6)
NHS Wolverhampton	68	26.8 (23.2-30.7)
NHS Wyre Forest	2	2.4 (0.9-4.9)

CI - confidence intervals

Appendix III. Methods

Data production

Case notifications

Cases in England are notified to the Enhanced Tuberculosis Surveillance system (ETS), other than in London where cases are notified to the London TB Register (LTBR). Data from the LTBR is routinely imported to ETS. ETS is also used in Wales and Northern Ireland, but only cases resident in England, or those that are homeless or from abroad and assigned to a clinic in England are included in this report.

Data were extracted from ETS at the end of March 2016, then cleaned and validated by end of August 2016.

Matching laboratory isolates to case notifications

Data from all TB isolates sent to Mycobacteria Reference Laboratories for culture between January 2014 and March 2016 was deduplicated and a summary record was generated from all the isolates from the same individual within a 12-month period. Cases that received treatment for longer than 12 months were reviewed and summarised with isolates including those outwith the 12-month period.

These data were then matched to TB case notifications from 2014 and 2015, through a probabilistic matching process based on patient identifiers common to both the laboratory isolate and the case notification [13]. Matches were also subject to manual review to identify any false positive or false negative matches. For TB cases notified before 2014, results from matching conducted in prior years (using the same process described above) were retained and included in the final dataset.

In addition, isolates and cases are matched in ETS; automatically where patient identifiers are identical or manually by users where differences in patient identifiers occur. These matches were included in the production of the full dataset.

Matching TB and HIV data

Data from TB cases notified between 2001 and 2014 and data from unmatched laboratory TB isolates with specimen dates between 2003 and 2014 were matched to HIV data from SOPHID and HANDD for the same time period as above, for those

aged 15 years and above 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. This was done using the TB dataset prepared in 2015, and not with the updated current dataset.

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 cases notified from 2000 to 2015.

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 cases that 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 case. For cases 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). Cases were assigned to PHECs (revised boundaries as of 1st July 2015) by matching the local authority of residence to the relevant PHEC.

Cases of BCGosis, patients with latent TB on chemoprophylaxis and cases of non-tuberculosis mycobacteria who were notified in error were identified using comments fields, and denotified. Cases with culture confirmation who had been denotified were queried with clinics, and lab contaminations were removed or cases 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. Cases with miliary or laryngeal TB were included in pulmonary breakdowns. Site of disease for cases with extra-pulmonary disease was reclassified for culture confirmed cases based on the site in the body where the specimen was taken. Site of disease classifications were also updated using the free text field 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 patient was non-compliant or on DOT, in line with the definition that alcohol 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 past use) 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 cases reported with a current imprisonment on ETS and updates were made where required. Cases remanded in an immigration removal centre were identified through the address given at notification, comments fields or occupation field showed the case to be an immigration detainee.

Data cleaning of TB outcomes

If a case was reported to have died without a date of death, Office for National Statistics (ONS) mortality data was used where available. Where date of death for the TB outcome and post-mortem date of death differed, the correct date of death was identified by validating the data against the ONS mortality data. In addition to cases reported as post-mortem on ETS, post-mortem deaths were identified through review of information in the comments fields and the date of diagnosis and the date of death. Deaths were re-classified as post-mortem deaths if the date of death was earlier than the date of diagnosis, where date of diagnosis was available. Deaths were re-classified as not post-mortem deaths if a case had a start date of treatment and the TB outcome entered stated that the patient died before treatment or while on treatment (indicating that the patient was suspected to have TB before death).

For cases who died and treatment start date was available, cases 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 cases who completed treatment and treatment start date was available, cases were reclassified as completed at 12, 24 or 36 months based on the time between the date of treatment

start and the date of treatment completion. Where treatment start date was not available the notification date was used if appropriate.

For MDR/RR-TB cases, the start date of MDR/RR-TB treatment (collected externally to ETS using paper based questionnaires) was used to reclassify TB outcome at 12, 24 or 36 months. MDR-TB/RR cases that died were reclassified based on the time between date of starting MDR/RR-TB treatment and the date of death. Similarly, for MDR/RR-TB cases that had completed treatment, cases were reclassified using the date of starting MDR-TB treatment and date of treatment completion. Where the MDR/RR-TB treatment start date was not known, MDR/RR-TB cases were not reclassified and the original TB outcome that was recorded on ETS was used.

Comments fields were also used to identify additional outcomes that were not recorded on ETS. For cases who were transferred to another clinic but a duplicate was entered in error, the TB outcome was used from the record where it was recorded and the duplicate was removed.

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, treatment delay, social risk factors and HIV testing. MIRU-VNTR 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 were presented from 2010 when data were 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 2015 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 CCG TB rate per 100,000 and the TB burden (the proportion of cases the CCG contributes to the overall number of cases 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 case number over 0.5% of the total case number in England.

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

Social risk factors and health inequalities

Cases were reported as having at least one social risk factor (yes) if any of the four social risk factors (current or a history of homelessness, drug misuse, alcohol misuse and imprisonment) had “yes” recorded. Cases 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 cases were assigned an Index of Multiple Deprivation 2015 (IMD 2015) rank based on Lower Super Output Area (LSOA) of residence. 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 cases 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 patient had received DOT.

Reporting of *Mycobacterium* species

The species field 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. However, cases with a change from a sensitive to resistant result following treatment were reclassified as acquired resistance, even if this is within the three month period. Any result which changed from sensitive to resistant after the three month period was automatically counted as having acquired resistance. If no drug susceptibility results 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 MDR-TB cases were counted, where the first available drug susceptibility test 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.

Additional non-culture confirmed cases treated with an MDR-TB regimen, were identified using key word searches on the comment fields on the ETS case reports.

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 cases with indistinguishable 24 loci MIRU-VNTR strain types with at least one case with a complete 24 loci profile [14]. Additional cases in the cluster may each have one missing loci. In addition, clusters identified by the Mycobacteria Reference Laboratories where all cases 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 of notification of the second case in the cluster.

Cases that are part of a cluster are referred to as clustered cases. Clustered cases were presented for England and PHEC. Clustered cases within a PHEC were only defined as clustered if they were in a cluster with other cases within the same PHEC.

TB outcome cohorts

TB outcomes are reported for all notified TB cases which includes those who started treatment and those who did not (for example diagnosed post-mortem, died without starting treatment, lost to follow up without starting treatment). For the purposes of TB outcome reporting, the drug sensitive cohort is defined as all TB cases, excluding those with rifampicin resistant TB or MDR-TB (initial or acquired), or non-culture confirmed cases treated with an MDR-TB regimen [5]. In this report, TB outcomes for drug sensitive TB cases were reported separately for the following groups:

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

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

A TB outcome is assigned to each member of 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:

- drug sensitive cohort with expected course of treatment less than 12 months TB outcomes were reported at 12 months, with analysis of treatment completion at 12 months
- drug sensitive cohort with CNS, spinal, miliary or cryptic disseminated TB had outcomes reported for the last recorded outcome
- analysis of deaths in the entire drug sensitive cohort (including CNS, spinal, miliary or cryptic disseminated TB) were presented for the last recorded outcome
- analysis of loss to follow-up in the entire drug sensitive cohort was presented for the last recorded outcome
- drug resistant cohort had TB outcomes reported at 24 months, with analysis of treatment completion at 24 months
- deaths and loss to follow-up of the drug resistant cohort were reported at 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 13. ArcGIS 10.2 was used to produce all maps shown in the report.

Appendix IV. Surveillance data quality

Data completeness

Audits of records are undertaken annually based on the criteria suggested in the 2007 Department of Health TB Toolkit for Commissioners [15] which outlines the minimum quality standards for surveillance. Data presented in the completeness tables are based on data that was entered into the Enhanced TB Surveillance system (ETS) before additional cleaning has been undertaken for presentation in the rest of the report. Table IV.1 shows the level of completeness of the information for the Toolkit fields which have a 95% target. To further categorise completeness <95%, 95-98% and 99-100% completeness are colour coded in the table. The fields “forename”, “surname”, “postcode”, “date of birth” and “sex”, are mandatory fields in ETS. Since May 2015, it has been mandatory for all cases (with the exception of cases notified to LTBR) to either enter a valid NHS number or select “no NHS number”.

In general, data completeness is high and has improved over time for many variables collected in ETS (Table Aiv.1, Aiv.2, Aiv.3 and Aiv.4). However, completeness could still be improved further for some variables.

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

NHS Number

This variable is used for matching TB notifications to TB isolates to ensure information on culture confirmation, drug resistance and strain typing is available for each case. In addition, this data helps identify duplicate notifications. High completion is therefore extremely important.

- completeness was 86% in 2015. There was a 7% decrease in completion between 2014 and 2015, this was mainly caused by a decrease of 15% in London between 2014 and 2015
- in 2015, NHS number completion on TB isolates received from Mycobacterium Reference Laboratories was 80%

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

Previous TB treatment

For those known to have a previous diagnosis, information on previous treatment (yes/no) is also collected. It is important to collect this information to understand if drug resistance occurs in those who were previously treated or in those with no previous treatment. However, given its low completion, previous diagnosis has to be used as a proxy measure when reporting nationally and internationally.

- for those who had a previous diagnosis of TB, (96% known for England), previous TB treatment completeness was low (77%)
- there was a decrease in completeness of 3% between 2014 and 2015

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

Sputum smear status

Results of sputum smear status are collected through manual data entry onto ETS, and completion of this information in ETS is low. While onerous, entry of this data is important as currently no other possible mechanism for collection exists. Sputum smear status among pulmonary cases enables quantification of the number and proportion of TB cases that are likely to be most infectious.

- only 62% of pulmonary cases had a sputum smear status reported in 2015
- there was no improvement in completeness between 2014 and 2015

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; completion was 93% in 2015
- there was a 5% increase in completeness between 2014 and 2015

Date presented completeness[16]

The definition of this variable is the date a case first presented to a healthcare service, 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

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

with healthcare delays, to monitor and improve access to healthcare and early diagnosis.

- completion was only 87% in 2015, 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)
- there was no difference in completeness between 2014 and 2015

New variables introduced to ETS[17]

Travel and visitor risk factor variables (Table Aiv.5)

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

- completeness for reporting on travel and visitor history was 82% and 83%, respectively
- travel history was known for only 65% of cases
- visitor history was known for only 55% cases

Co-morbidities (Table Aiv.6)

The co-morbidity variables were introduced to ETS in July 2015.

- of the co-morbidities collected, diabetes had the highest completion, with 94% reported and 83% known
- hepatitis C had the lowest completion, with 93% reported and only 69% known

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

Table Aiv.1: Percentage completeness of key data fields in ETS by PHE Centre, England, 2015

	Demographic			Clinical				Social risk factor							
	NHS Number	Ethnic group	UK/non-UK born	HIV Testing#	Previous TB diagnosis		Previous TB treatment^	Drug misuse		Alcohol misuse		Homelessness		Prison	
PHE Centre*	Known**	Known	Known	Known	Known	Reported$	Reported	Known	Reported	Known	Reported	Known	Reported	Known	Reported
London	72	100	100	100	99	100	85	98	99	97	99	98	99	97	99
West Midlands	97	100	96	85	96	99	69	92	97	93	97	93	98	93	98
South East	94	98	97	95	96	99	81	94	98	95	99	94	98	92	97
North West	94	99	96	88	93	98	63	87	96	89	96	88	97	81	97
Yorkshire and the Humber	98	98	95	80	95	99	76	95	99	93	98	92	98	88	97
East of England	94	99	98	88	92	96	81	88	94	87	92	86	94	83	94
East Midlands	94	99	98	92	94	98	92	92	99	92	98	89	98	79	98
South West	98	99	94	85	94	97	58	90	94	92	96	90	95	86	95
North East	95	100	99	94	98	100	60	91	98	94	98	94	99	91	99
England	**86**	**99**	**98**	**93**	**96**	**99**	**77**	**94**	**98**	**94**	**98**	**94**	**98**	**91**	**98**

Table Aiv.2: Percentage difference in completeness of key fields in ETS between 2014 and 2015 by PHE Centre, England

	Demographic			Clinical				Social risk factor							
	NHS Number	Ethnic group	UK/non-UK born	HIV Testing#	Previous TB diagnosis		Previous TB treatment^	Drug misuse		Alcohol misuse		Homelessness		Prison	
PHE Centre*	Known**	Known	Known	Known	Known	Reported$	Reported	Known	Reported	Known	Reported	Known	Reported	Known	Reported
London	-15	-	-	-	+1	-	0	+1	0	+2	+1	0	0	-1	0
West Midlands	-1	-	-3	-7	+1	0	-8	-2	-1	0	-2	-1	0	+1	-1
South East	-2	-1	-1	+1	0	0	-4	-1	0	0	+1	-1	-1	-2	-1
North West	-1	+1	-2	-9	+1	0	-8	0	0	+2	0	0	0	0	0
Yorkshire and the Humber	0	0	0	+11	+2	+1	-13	+2	+2	+1	+1	+1	+1	+2	0
East of England	-3	+1	+1	0	-1	-1	0	-3	-1	-5	-3	-5	-2	-7	-2
East Midlands	-1	0	0	+3	+5	-1	+20	+9	+1	+6	+1	+9	0	+6	0
South West	+2	+1	-2	+11	0	-1	+4	+1	-2	+1	-1	-3	-2	+1	-2
North East	-3	+2	+7	+16	+3	+1	-15	0	0	+2	0	+4	+3	+2	+1
England	-7	0	0	+1	0	0	-3	+1	0	+1	0	0	0	0	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. Please note that for NHS number completion, London obtained additional NHS numbers from the Patient Demographic Service (PDS) and updated the data before the extraction of the data, so the proportion completed does not necessarily reflect NHS numbers entered by case managers

* Ordered by decreasing total number of cases in 2015
** Data are reported and has a known value
$ Data are reported but may be reported as unknown
^ Includes cases with previous TB diagnosis only
# Excludes cases diagnosed post-mortem

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 and treatment in ETS by PHE Centre, England, 2015

PHE Centre*	Sputum smear status**	Site of disease$	Symptom onset date^	Date first presented	Date diagnosed^	Start of treatment date^	Date treatment completed†	Treatment Outcome reported at 12 months§		Treatment Outcome reported at 24 months¥	
	Known#	Known	Known	Known	Known	Known	Known	Known	Reported‡	Known	Reported
London	78	100	93	N/A	87	99	100	100	100	100	100
West Midlands	53	99	90	88	96	98	97	99	100	98	100
South East	55	100	96	91	98	98	99	98	99	100	100
North West	54	100	92	87	98	99	99	99	100	97	97
Yorkshire and the Humber	51	100	93	88	98	97	97	97	99	90	95
East of England	46	100	84	75	96	99	98	98	99	100	100
East Midlands	60	100	98	82	88	100	98	99	99	100	100
South West	51	100	95	93	98	99	100	99	99	100	100
North East	46	99	97	96	99	99	97	98	99	100	100
England	**62**	**100**	**93**	**87**	**93**	**99**	**99**	**99**	**100**	**99**	**100**

Table Aiv.4: Percentage difference in completeness of data fields for diagnosis and treatment in ETS between 2014 and 2015 by PHE Centre, England

PHE Centre*	Sputum smear status**	Site of disease$	Symptom onset date^	Date first presented	Date diagnosed^	Start of treatment date^	Date treatment completed†	Treatment Outcome reported at 12 months§		Treatment Outcome reported at 24 months¥	
	Known#	Known	Known	Known	Known	Known	Known	Known	Reported‡	Known	Reported
London	0	-	+12	N/A	+7	-1	-	-	-	+1	-
West Midlands	-1	-1	-3	-5	-2	-1	0	-1	-	-2	-
South East	-2	-	+2	+2	0	-1	+1	-1	0	+4	+4
North West	-4	-	+1	+4	+2	-1	+1	0	-	-3	-3
Yorkshire and the Humber	+3	+1	+2	0	+1	-3	-1	-2	0	-10	-5
East of England	+2	-	-6	-8	0	0	-1	-1	-1	-	-
East Midlands	+3	-	0	+6	+4	+1	-2	0	-1	+10	-
South West	+6	-	+2	+2	+2	0	+5	+6	+5	-	-
North East	+13	-1	+4	+3	+4	0	0	+1	0	-	-
England	**0**	**-**	**+5**	**0**	**+3**	**-1**	**+1**	**0**	**-**	**0**	**-**

For treatment outcome variables - recording of 'not completed', or 'transferred out' are counted as unknown and not reported

* Ordered by decreasing total number of cases in 2015
** Pulmonary cases only
# Data are reported and has a known value
$ For cases with unknown site of disease
† Cases notified in 2014 that have completed treatment only
^ Excludes cases diagnosed post-mortem
§ For cases notified in 2014
‡ Data are reported but may be reported as unknown
¥ For cases notified in 2013 and still on treatment at 12 months

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 travel and visitor risk factors in ETS by PHE Centre, England, 2015*

	Risk factor			
	Travel history outside UK		Visitors from outside UK	
PHE Centre**	Known#	Reported$	Known	Reported
West Midlands	70	90	68	89
South East	70	80	59	78
North West	62	83	56	82
Yorkshire and the Humber	59	86	41	83
East of England	57	74	51	71
East Midlands	72	86	52	83
South West	52	79	37	78
North East	82	91	78	91
England	**65**	**83**	**55**	**82**

Table Aiv.6: Percentage completeness of data fields for comorbidities in ETS by PHE Centre, England, 2015^

	Co-morbidities													
	Diabetes		Hepatitis B		Hepatitis C		Chronic liver disease		Chronic renal disease		Immunosuppression		Smoker	
PHE Centre**	Known#	Reported$	Known	Reported	Known	Reported	Known	Reported	Known	Reported	Known	Reported	Known	Reported
West Midlands	77	98	67	97	67	98	76	98	76	98	75	98	73	98
South East	87	92	73	90	72	89	84	90	86	90	84	91	80	91
North West	90	98	67	97	66	97	83	96	86	97	85	96	82	97
Yorkshire and the Humber	72	94	60	94	60	93	69	94	71	92	71	93	67	94
East of England	78	83	74	83	72	81	76	82	76	82	75	83	76	84
East Midlands	90	96	72	94	70	93	84	93	88	94	84	95	84	96
South West	84	95	74	94	73	93	78	93	78	91	78	94	61	94
North East	99	99	90	99	90	99	93	97	99	99	96	99	88	97
England	**83**	**94**	**70**	**93**	**69**	**93**	**79**	**93**	**81**	**93**	**80**	**93**	**76**	**94**

* Includes all cases notified on or after 13/05/2015 and excludes all London cases as these data fields are not available in LTBR
** Ordered by decreasing total number of cases in 2015
# Data are reported and has a known value
$ Data are reported but may be reported as unknown
^ Includes all cases notified on or after 02/07/2015 and excludes all London cases as these data fields are not available in LTBR

Appendix V. National level data for TB strategy monitoring indicators, England, 2000-2015

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	6,929	13.8	13.5-14.1	1,791	4.0	3.8-4.2	4,570	95.1	92.4-97.9	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	7,578	14.7	14.4-15.1	1,799	4.0	3.8-4.2	5,136	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	1,906	4.2	4.1-4.4	5,663	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	8,086	15.1	14.8-15.4	2,005	4.4	4.2-4.6	5,839	81.4	79.3-83.5	254	2.9	2.5-3.2
2013	7,261	13.5	13.2-13.8	1,840	4.0	3.8-4.2	5,256	70.6	68.7-72.5	195	2.2	1.9-2.5
2014	6,472	11.9	11.6-12.2	1,759	3.8	3.7-4.0	4,607	60.3	58.5-62.0	187	2.1	1.8-2.4
2015	5,758	10.5	10.2-10.8	1,550	3.4	3.2-3.5	4,087	51.2	49.7-52.8	162	1.8	1.5-2.1

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	-	-	-	-	-	-	1,864	52.2	50.5-53.8	2,780	99.3	98.9-99.6
2001	-	-	-	-	-	-	2,040	56.5	54.9-58.1	3,126	99.2	98.8-99.4
2002	-	-	-	-	-	-	2,622	64.9	63.4-66.4	3,793	98.6	98.2-98.9
2003	-	-	-	-	-	-	2,586	66.1	64.6-67.5	3,800	99.2	98.9-99.4
2004	-	-	-	-	-	-	2,740	68.4	66.9-69.8	4,020	98.6	98.2-98.9
2005	-	-	-	-	-	-	2,989	69.1	67.7-70.5	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	66.3-69.1	4,429	97.6	97.1-98.0
2009	-	-	-	-	-	-	3,008	68.1	66.7-69.5	4,521	96.8	96.3-97.3
2010	-	-	-	-	-	-	2,867	70.4	69.0-71.8	4,517	98.0	97.6-98.4
2011	1,318	45.0	43.2-46.8	2,173	74.2	72.6-75.8	3,075	71.7	70.3-73.0	4,895	97.3	96.8-97.7
2012	1,368	44.0	42.3-45.8	2,291	73.8	72.2-75.3	2,949	70.4	69.0-71.7	4,787	97.8	97.3-98.1
2013	1,224	41.2	39.5-43.0	2,122	71.5	69.8-73.1	2,712	72.9	71.5-74.3	4,287	97.6	97.1-98.0
2014	1,158	39.5	37.7-41.2	2,046	69.7	68.0-71.4	2,489	73.2	71.6-74.6	3,832	97.7	97.1-98.1
2015	1,186	42.8	41.0-44.7	2,002	72.2	70.6-73.9	2,228	72.7	71.1-74.2	3,385	97.8	97.3-98.3

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	3,631	63.7	62.4-64.9	237	3.9	3.4-4.4	377	6.1	5.6-6.8
2002	4,111	67.4	66.2-68.5	296	4.5	4.0-5.0	438	6.6	6.0-7.2
2003	4,191	69.6	68.4-70.7	290	4.4	3.9-4.9	407	6.2	5.6-6.8
2004	4,426	70.1	69.0-71.2	333	4.9	4.4-5.4	402	5.9	5.3-6.4
2005	4,875	70.3	69.2-71.4	380	5.0	4.5-5.5	447	5.9	5.4-6.4
2006	5,214	75.5	74.5-76.5	413	5.4	4.9-6.0	430	5.7	5.2-6.2
2007	5,286	78.1	77.1-79.1	345	4.6	4.1-5.1	432	5.8	5.3-6.3
2008	5,585	80.0	79.1-80.9	368	4.8	4.3-5.3	437	5.7	5.2-6.2
2009	5,912	81.9	81.0-82.7	354	4.4	4.0-4.9	420	5.2	4.8-5.7
2010	5,632	82.6	81.7-83.5	342	4.5	4.1-5.0	383	5.0	4.6-5.6
2011	6,004	81.9	81.0-82.7	425	5.2	4.7-5.7	384	4.7	4.3-5.2
2012	6,001	83.5	82.6-84.3	362	4.5	4.1-5.0	391	4.9	4.4-5.4
2013	5,487	85.4	84.5-86.3	295	4.1	3.7-4.6	336	4.7	4.2-5.2
2014	4,827	84.4	83.5-85.4	266	4.2	3.7-4.7	351	5.5	4.9-6.1
2015	-	-	-	-	-	-	`	-	-

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	41	51.3	40.5-61.9	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	52.6	41.6-63.5	11	14.5	8.3-24.1	4	5.3	2.1-12.8
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	56	60.2	50.1-69.6	11	11.8	6.7-19.9	4	4.3	1.7-10.5
2013	48	57.8	47.1-67.9	11	13.3	7.6-22.2	4	4.8	1.9-11.7
2014	-	-	-	-	-	-	-	-	-
2015	-	-	-	-	-	-	-	-	-

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	-	-	-	-	-	-	309	8.1	7.3-9.0	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	-	-	-	-	-	-	306	6.8	6.1-7.6	50	1.1	0.8-1.5
2009	-	-	-	-	-	-	371	8.1	7.3-8.9	59	1.3	1.0-1.7
2010	-	-		372	73.4	69.4-77.0	322	7.1	6.4-7.8	65	1.4	1.1-1.8
2011	-	-		370	71.3	67.3-75.0	412	8.3	7.6-9.1	81	1.6	1.3-2.0
2012	5,209	66.5	65.4-67.5	393	74.6	70.7-78.1	358	7.4	6.7-8.1	77	1.6	1.3-2.0
2013	5,791	82.8	81.9-83.7	405	77.1	73.4-80.5	332	7.7	6.9-8.5	69	1.6	1.3-2.0
2014	5,404	86.9	86.0-87.7	359	74.5	70.4-78.2	286	7.3	6.6-8.2	52	1.3	1.0-1.7
2015	4,829	87.9	87.0-88.7	-	-	-	255	7.4	6.6-8.3	46	1.3	1.0-1.8

Glossary

Acquired resistance

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

BCG

Bacillus Calmette-Guérin vaccination

Cluster

Clusters in this document refer to molecular clusters only. These are defined as two or more patients who are infected with a strain of *Mycobacterium tuberculosis* complex with 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.

Drug resistant cohort

The drug resistant cohort includes any cases with rifampicin resistant TB (initial or acquired), including MDR-TB (initial or acquired), as well as those without culture confirmation treated with an MDR-TB regimen.

Drug sensitive cohort

The drug sensitive cohort excludes all TB cases with rifampicin resistant TB (initial or acquired) including MDR-TB (initial or acquired), and non-culture confirmed cases treated with an MDR-TB regimen.

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 class as resistance identified within three months of the first specimen date.

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 MDR-TB cases.

Post-mortem diagnosis

A case diagnosed at post-mortem is defined as a case where TB 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 pulmonary case is defined as a case with 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.