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Tuberculosis in England

2015 report (presenting data to end of 2014) version 1.1

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Contents

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Errata, January 2016

- Chapter 6, page 50, Table 6.5: the number of rifampicin resistant cases with intial resistance between 2005 and 2014 was **120**, not 116 as previously reported. The total number of rifiampicin resistant cases between 2005 and 2014 was **126**, not 122 as previously reported

- Chapter 7, page 57, Table 7.1: contains cases from the entire drug sensitive cohort and does not exclude those with CNS, spinal, miliary or cryptic disseminated TB, as previously stated

Notes on the report

This report presents detailed data on TB case notifications made to the Enhanced Tuberculosis Surveillance system (ETS) in England to the end of 2014. This is a change in presentation compared with previous TB annual reports produced by the Health Protection Agency (HPA) and Public Health England (PHE), which reported detailed surveillance data for the whole of the UK. This change is consistent with the newly launched Collaborative TB Strategy for England 2015-2020 [1], and the fact that TB control activities, along with other health services, are devolved to Scotland, Wales and Northern Ireland. The one exception is the United Kingdom tuberculosis pre-entry screening programme (chapter 10), which is conducted for the whole of the UK.

High-level data on TB notifications in the UK to the end of 2014, and breakdowns by country, can be found in the Official Statistic for TB, 'Reports of cases of tuberculosis to enhanced tuberculosis surveillance systems: United Kingdom, 2000 to 2014'. 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 have been developed (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/403231/Collaborative_TB_Strategy_for_England_2015_2020_.pdf). Where data for these indicators are presented in this report, the indicator name is shown, and a summary table of national-level indicators is presented in Appendix V.

Data for indicators which are presented at Upper Tier Local Authority can be found at http://fingertips.phe.org.uk/profile/tb-monitoring and will be updated with data for 2014 on 6th October 2015. Hyperlinks (in green) for specific indicators are also shown throughout the report where data are presented.

TB data from 2000 are updated annually to take into account denotifications, late notifications and other updates. The data from the current year's report supersedes data in previous reports.

Key points and recommendations

This report presents detailed data on the occurrence and management of tuberculosis (TB) in England to the end of 2014, which should be used to inform the implementation of the Collaborative TB Strategy for England 2015-2020.

- in the past three years there has been a year on year decline in the number of TB cases in England, down to 6,520 in 2014, a rate of 12.0 per 100,000
  - despite this decline, the number of TB cases in England is still unacceptably high

- the recent reduction in TB cases is mainly due to a reduction in cases in the non-UK born population, which make up nearly three-quarters of all TB cases in England
  - this reduction is likely in part to reflect recent declines in the number of migrants from high TB burden countries and the impact of pre-entry TB screening
  - the majority of non-UK born cases (86%) are now notified more than two years after entering the UK, and are likely to be due to reactivation of latent TB infection
  - the roll out of latent TB testing and treatment, and further strengthening of TB services is required to ensure that the decline in non-UK born cases is sustained

- there has been no downward trend in the incidence of TB in the UK born population in the past decade, with a rate of 3.9 per 100,000 in 2014
  - 15% of cases in the UK born population had at least one social risk factor, and 38% were from minority ethnic groups

- there is some evidence of a recent reduction in transmission of TB in England, with a decline in TB incidence in UK born children in the past six years
  - more substantial reductions in transmission will require improvements in early diagnosis, contact tracing and further improvements in treatment completion

- treatment completion for drug sensitive cases has been improving over the past decade, with corresponding reductions in deaths and losses to follow-up

- there has been a recent reduction in the number of new cases of multi-drug resistant TB (MDR-TB), with 52 new cases diagnosed in 2014

- nearly half of drug resistant cases with MDR/rifampicin resistant-TB (MDR/RR-TB) notified in 2012 had not completed treatment by 24 months; these patients require specialised clinical management and considerable social support to achieve favourable outcomes

- the average delay from symptom onset to treatment start is unacceptably long and increasing; nearly one-third of pulmonary TB cases had a delay of more than four months in 2014
    - to reduce this delay, improved awareness in affected communities and among health professionals, and improved access to high quality services are required

- nearly one in ten TB cases in 2014 had at least one social risk factor, and there has been no reduction in the number of cases with social risk factors over the past five years
    - a higher proportion of those with social risk factors have drug resistant TB and worse TB outcomes, which highlights the added importance of tackling TB in this group, including through targeted outreach services

- to achieve further reductions in TB in England over the next five years, including in new and settled migrant populations, in the UK born population, and among the most vulnerable groups, we need to build upon existing achievements and address gaps in current service provision; this will require the sustained and co-ordinated action of all key stakeholders, supported and overseen by the newly established TB control boards and national TB programme office

1. TB notifications and incidence

Key messages

- a total of 6,520 cases of TB were notified in England in 2014, a rate of 12.0 per 100,000 population, which is a further reduction since the peak of 8,276 cases in 2011 (15.6 per 100,000)
- the rate of TB in the non-UK born population was fifteen times higher than in the UK born population, and 72% of cases were non-UK born
- 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 in the past two years
- the decline in non-UK born cases has mainly occurred among new migrants who have been in the country for less than six years; the majority (60%) of non-UK born cases now occur among those who have lived in the UK for more than six years
- the number of TB cases born in India, Pakistan and Somalia has shown a particularly large decrease in the past two years
- the rate of TB in the UK born population has not declined, remaining stable at 4 per 100,000 population over the past decade
- the majority (62%) of UK born cases were from the White ethnic group, although rates in non-White ethnic groups were between two and thirteen times higher

Overall numbers, rates and geographical distribution

In 2014 in England, 6,520 cases of TB were notified, a rate of 12.0 cases per 100,000 population (95% confidence interval (CI) 11.7-12.3) (Figure 1.1, Appendix I Table A1.1). In the past three years, there has been an annual decline in the number of cases and rate of TB, with a reduction in the rate of 10.6% between 2012 and 2013 and 11.1% between 2013 and 2014 (Table A1.1).

Figure 1.1: TB case notifications and rates, England, 2000-2014

As in previous years, the main burden of disease was concentrated in large urban areas. In 2014, 45.7% (149/326) of local authority districts in England had a rate less than 5.0 per 100,000 (Figure 1.2, Table AII.1).

Following the launch of the Collaborative TB Strategy for England in 2015, seven TB control boards were established in England. The number of TB cases notified in each of these TB control board areas in 2014 is shown in Figure 1.3.

Figure 1.2: Three-year average TB rates by local authority district, England, 2012-2014 (box shows enlarged map of London area)

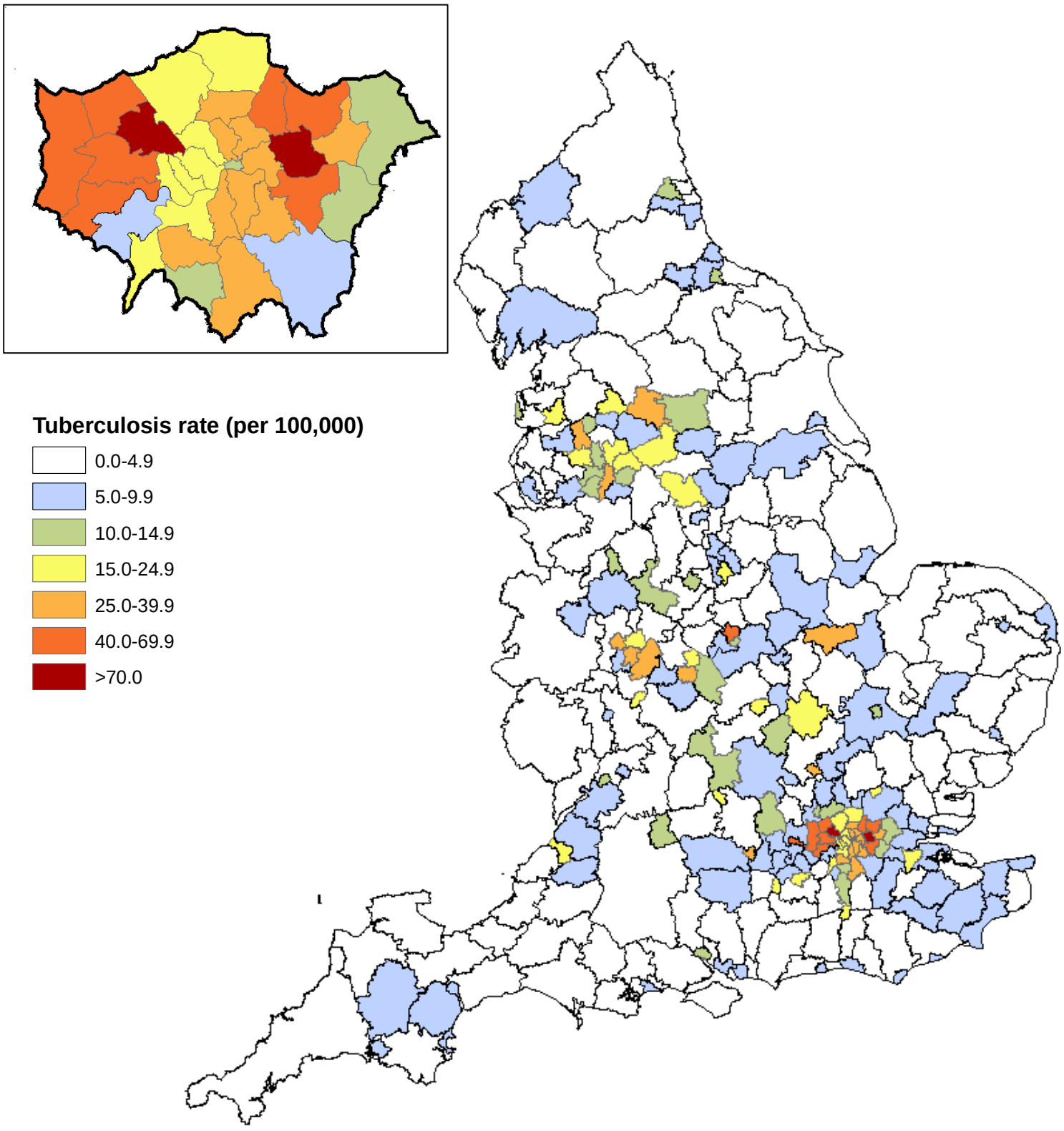
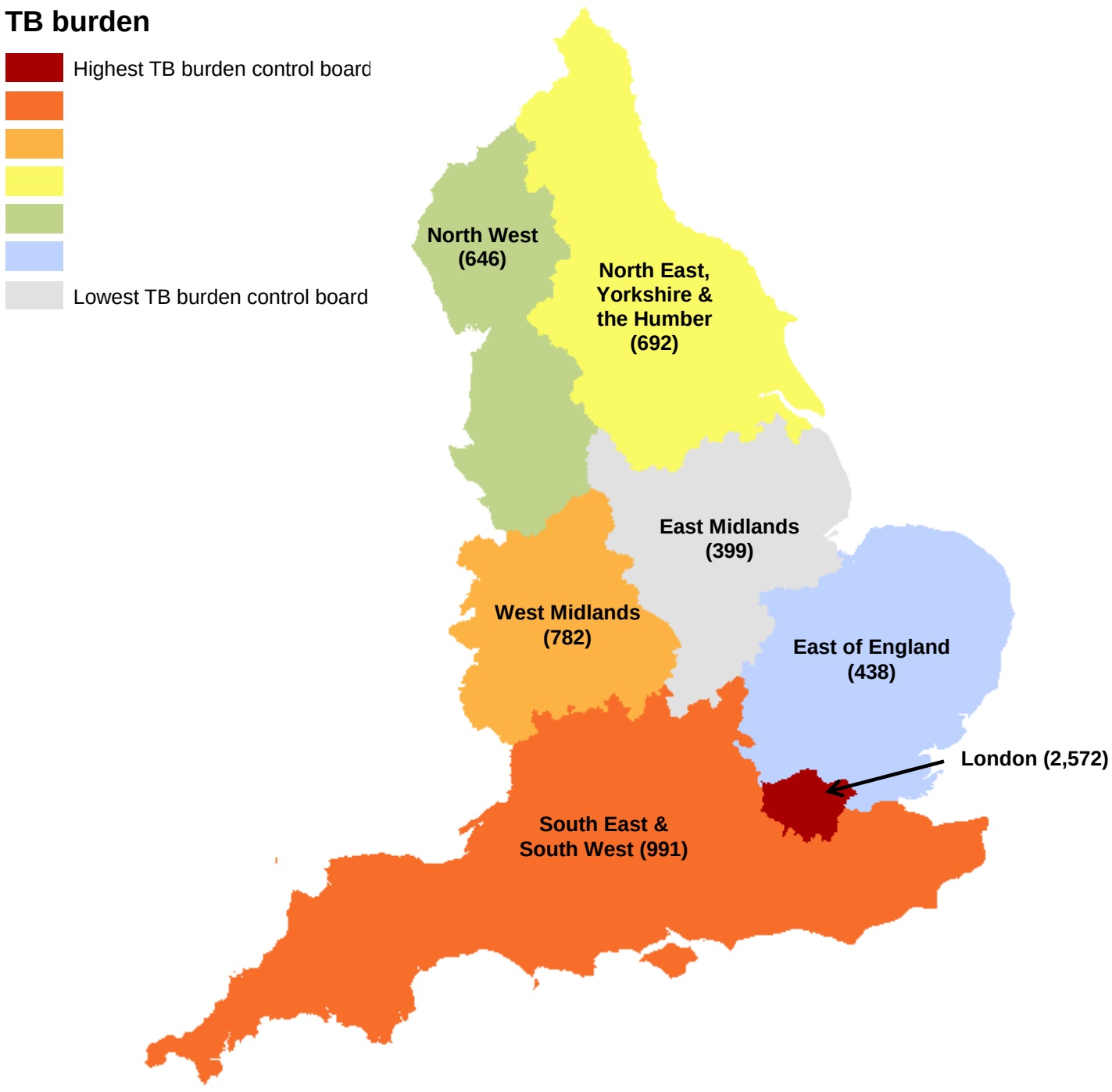


Figure 1.3: Number of TB case notifications by TB control board[1], England, 2014 (shown by TB burden)



[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 East and South West TBCB

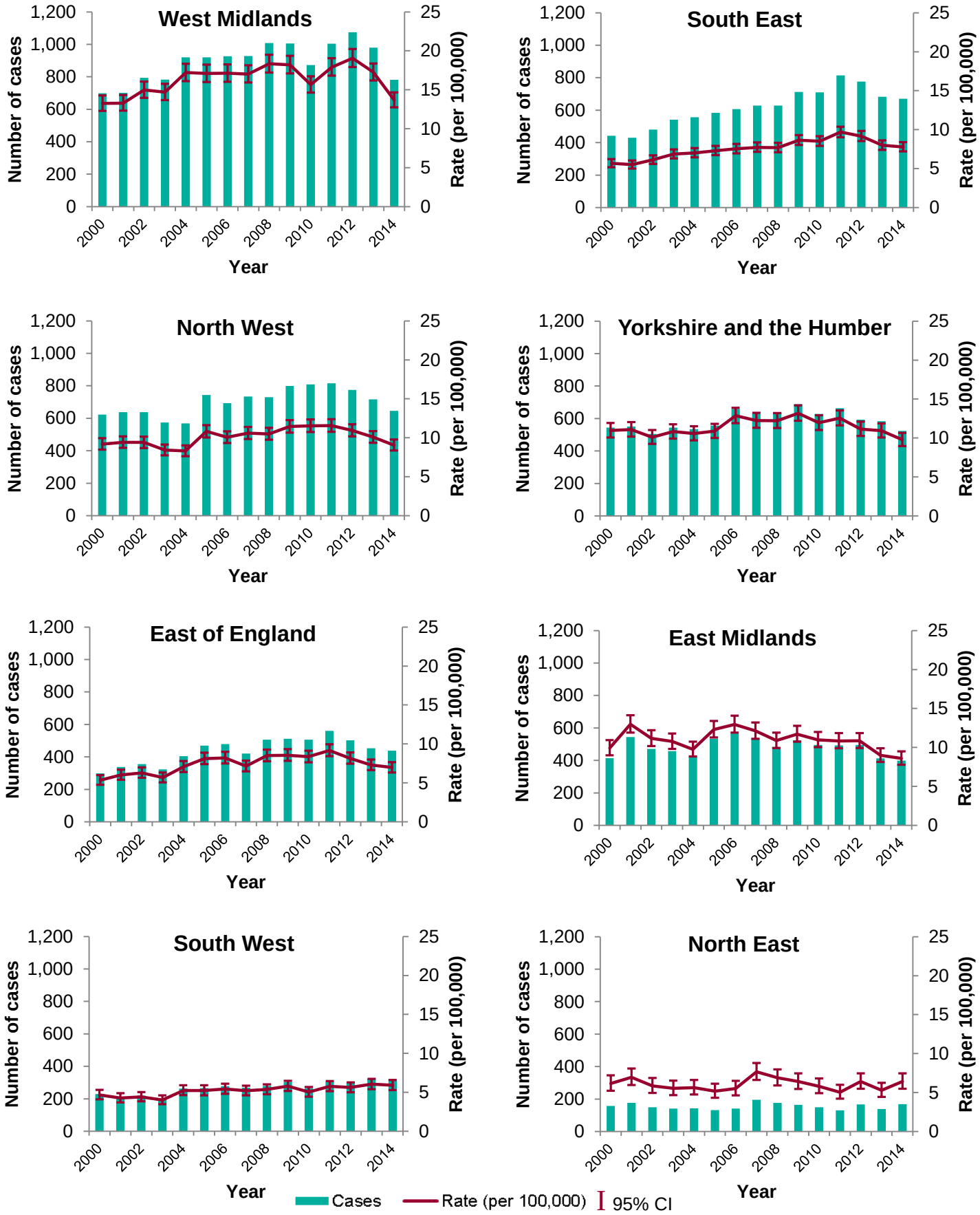
As in previous years, London PHE Centre (PHEC) accounted for the highest proportion of cases in England (39.4%, 2,572/6,520) with a rate of 30.1 cases per 100,000 (95% CI 29.0-31.3), followed by the West Midlands PHEC (12.0%, 782) with a rate of 13.7 per 100,000 (95% CI 12.7-14.7). TB rates have declined in most PHECs in the past year or two, most noticeably in London (2012-2013: -13.9%, 2013-2014: -14.5%) and the West Midlands (2012-2013: -9.4%, 2013-2014: -20.8%). The North East and South West, the PHECs with the lowest TB incidence in the country, are the only two areas that have not seen a recent decline in rates (Figure 1.4, Table A1.2).

Figure 1.4: TB case notifications and rates by Public Health England centre, 2000-2014

Please note that the London graph in this figure has different axes compared with the other PHEC graphs due to the much higher number of cases and rate of TB

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

Figure 1.4: TB case notifications and rates by Public Health England centre, 2000-2014 continued



Demographic characteristics

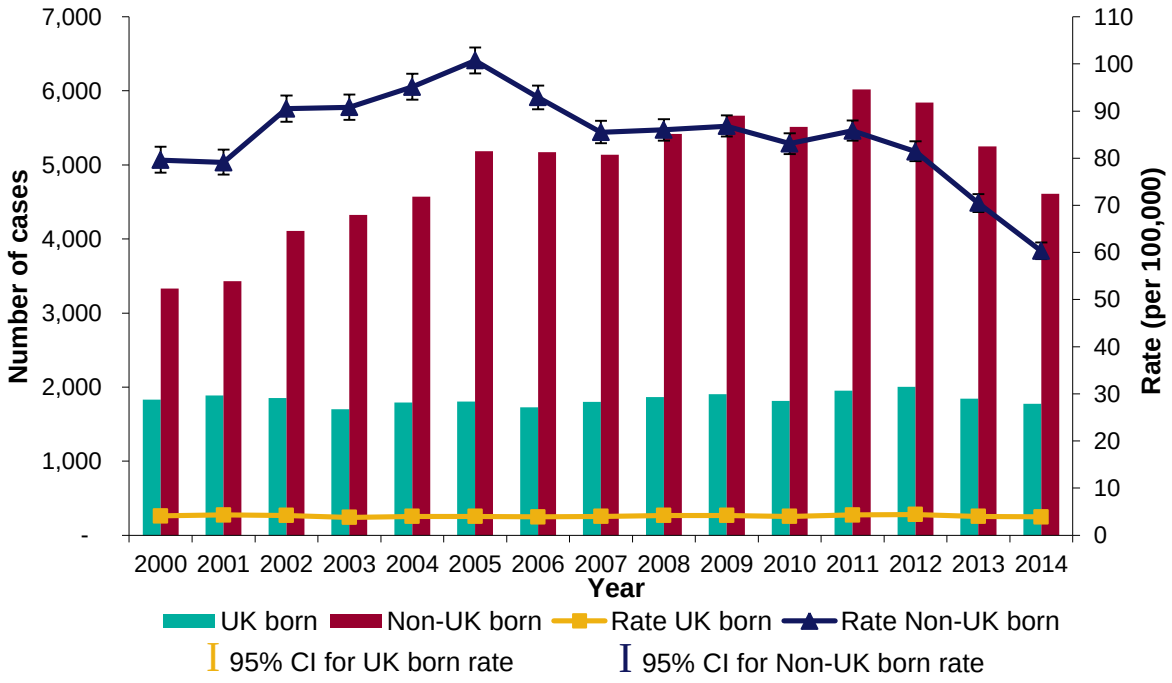
Age and sex

In 2014, 58.8% (3,831/6,520) of all cases were male and 57.3% (3,734/6,520) of all cases were aged 15 to 44 years old. The rate of TB was highest in those aged 30 to 34 years (23.4 per 100,000, 95% CI 21.8-25.0), followed closely by those aged 25 to 29 years (21.7 per 100,000, 95% CI 20.3-23.3). Similar to previous years, TB rates were lowest in children, with a rate of 2.5 per 100,000 (95% CI 2.0-3.1) in those aged 0 to 4 years, 2.4 per 100,000 (95% CI 1.9-3.0) in those aged 5 to 9 years and 3.3 per 100,000 (95% CI 2.6-4.0) in those aged 10 to 14 years. There were a total of 263 cases notified in children aged 0 to 14 years in 2014 (Table A1.3). For the rate of TB in UK born children over time, an indirect indicator of TB transmission in England, see Chapter 3.

Non-UK born TB cases

Place of birth (UK born/non-UK born) was known for 97.9% (6,384/6,520) of cases notified in England in 2014; 72.2% (4,610/6,384) of these cases were born outside the UK. Of those with a known place of birth, country of birth was known for 98.6% (6,297/6,384).

Figure 1.5: TB case notifications and rates by place of birth, England, 2000-2014



Confidence intervals around the UK born population are small therefore not visible on the graph.

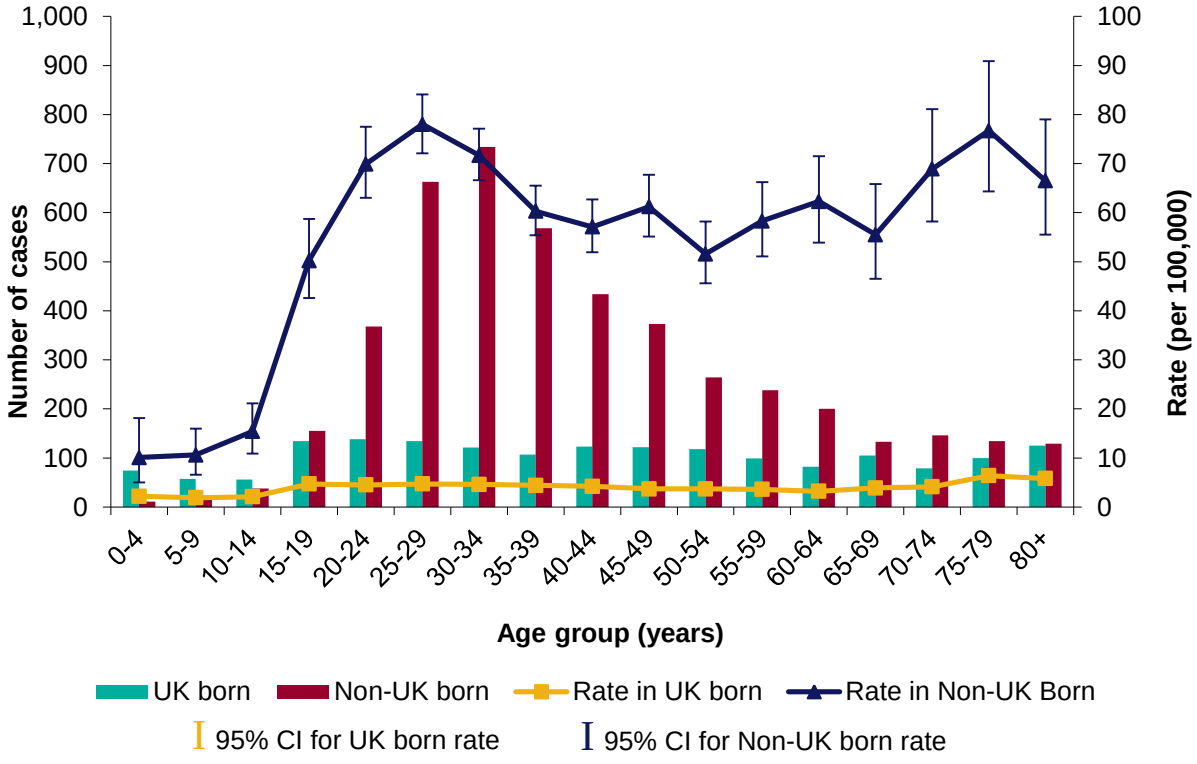
TB Monitoring Indicator 2: TB incidence in UK born and non-UK born populations (England)

The number of non-UK born TB cases has declined year on year over the past three years, from a peak of 6,019 cases in 2011 to 4,610 in 2014 (Figure 1.5, Table A1.4). 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 (95% CI 98.0-103.5) in 2005 to 60.3 per 100,000 (95% CI 58.6-62.1) in 2014. In 2014, the rate of TB in the non-UK born population was at its lowest since it was first possible to calculate rates by country of birth in 2000[2] (Figure 1.5, Table A1.4).

Despite the recent decline in TB in the non-UK born population, in 2014 the rate of TB in this population was 15 times higher than the rate in the UK born population. In 2014, the highest rate of TB in the non-UK born population was in those aged 25 to 29 years (78.0 per 100,000), followed closely by those aged 75 to 79 years (76.7 per 100,000, 95% CI 64.3-90.9) (Figure 1.6, Table A1.3).

In 2014, as in previous years, India, Pakistan and Somalia were the most frequent countries of birth for non-UK born cases notified in England (20.5%, 1,288/6,297; 12.6%, 791/6,297 and 3.7%, 230/6,297 of cases respectively) (Table 1.1).

Figure 1.6: TB case notifications and rates by age group and place of birth, England, 2014



Confidence intervals around the UK born population are small therefore not visible on the graph

[2] Data are only available from 2000 onwards

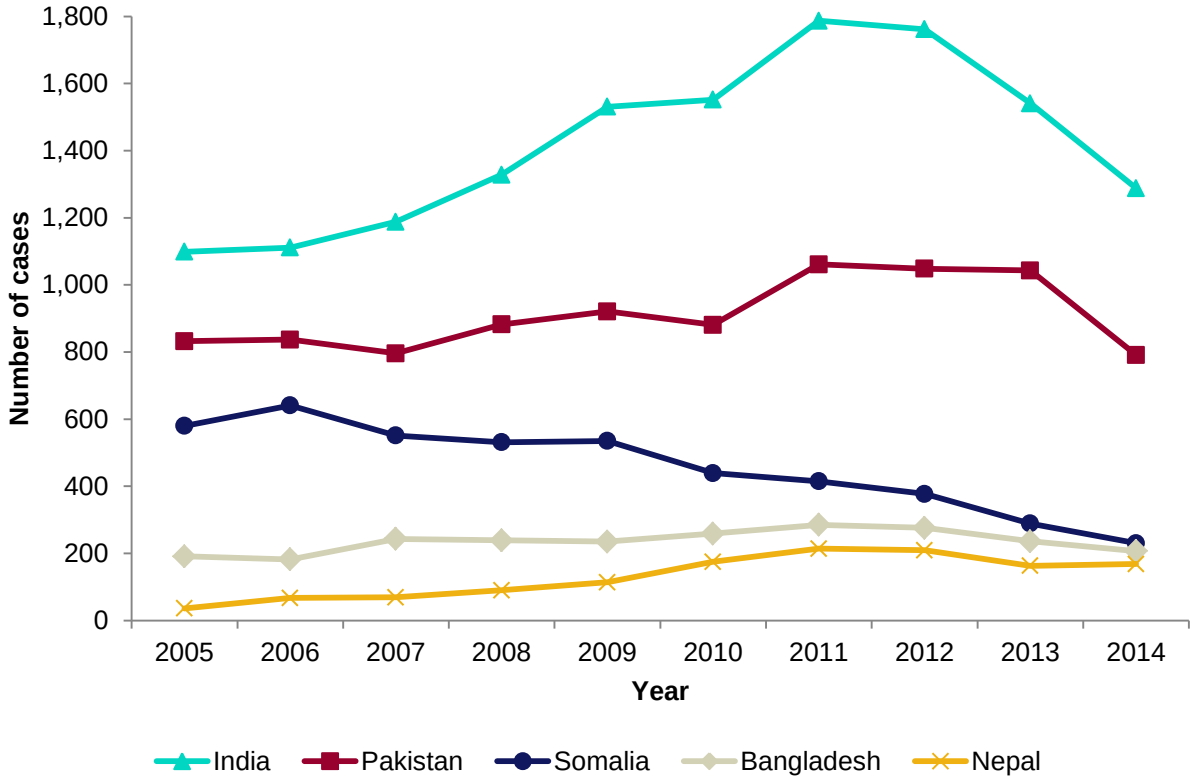
Table 1.1: Most frequent countries of birth for TB cases and time between entry to the UK and TB notification (for non-UK born cases), England, 2014

Country of birth	Number of cases	Percentage of cases (%)*	Median time since entry to UK (IQR)**
UK	1,774	28.2	-
India	1,288	20.5	7 (3 - 14)
Pakistan	791	12.6	10 (3 - 25)
Somalia	230	3.7	10 (3 - 14)
Bangladesh	207	3.3	8 (4 - 19)
Nepal	168	2.7	4 (3 - 9)
Nigeria	118	1.9	7 (2 - 17)
Philippines	111	1.8	9 (4 - 13)
Zimbabwe	107	1.7	11 (9 - 12)
Afghanistan	96	1.5	8 (4 - 13)
Romania	88	1.4	1 (0 - 6)
Eritrea	83	1.3	3 (0 - 8)
Kenya	81	1.3	19 (8 - 41)
Sri Lanka	78	1.2	11 (4 - 15)
Poland	70	1.1	6 (2 - 8)
Others (each <1%)	1,007	15.8	8 (3 -16)
Total*	**6,297**	**100.0**	**9 (3 -20)**

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

Since 2013, the number of cases born in Pakistan (2013: 1,043, -24.2%) and Nigeria (2013: 156, -24.4%) have decreased by almost one-quarter, those born in Somalia have decreased by one-fifth (2013: 289, -20.4%) and those born in India by one-sixth (2013: 1,541, -16.4%). The reduction in the number of cases born in India, Pakistan and Somalia accounts for 71.3% (878/1,231) of the decrease in numbers of non-UK born cases since 2012 (Figure 1.7). In contrast, the number of cases born in Eritrea (2013: 58, 43.1%) and Afghanistan (2013: 66, 45.5%) has increased by almost half since 2013 and in those born in Romania by nearly one-third (2013: 69, 27.5%), although the numbers of cases from these countries of origin are still relatively low (Table A1.5).

Figure 1.7 Trend in TB case notifications for the top five countries of birth* of non-UK born cases, England, 2005-2014



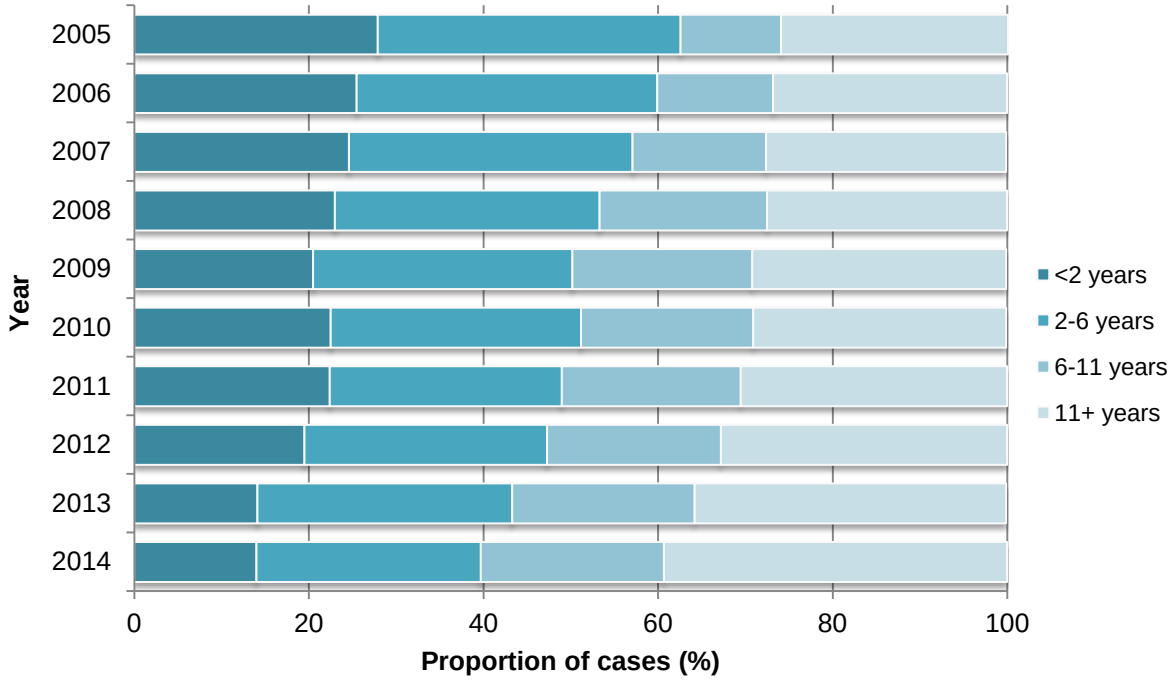
* Five most frequent countries of birth in 2014

In 2014, the time between entry to the UK and TB notification was known for 91.5% (4,216/4,610) of non-UK born cases in England. Of these, 14.0% (591) were notified within two years of entering and 39.7% (1,674) within six years of entering the UK (Figure 1.8, Table A1.6).

The recent decrease in the number of TB cases in the non-UK born population has mainly occurred among new migrants (notified within six years of entering the UK), with a 20.2% (2013: 2,097 versus 2014: 1,674) decrease since 2013. 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 eleven years since entering the UK (Figure 1.8, Table A1.6).

In 2014, cases born in Romania had the shortest time between entry to the UK and TB notification (1 year; IQR: 0-6 years), a decrease from 2013 (2 years; IQR: 0-4 years) (Table 1.1).

Figure 1.8: Time between entry to the UK and TB notification for non-UK born cases by year, England, 2005-2014



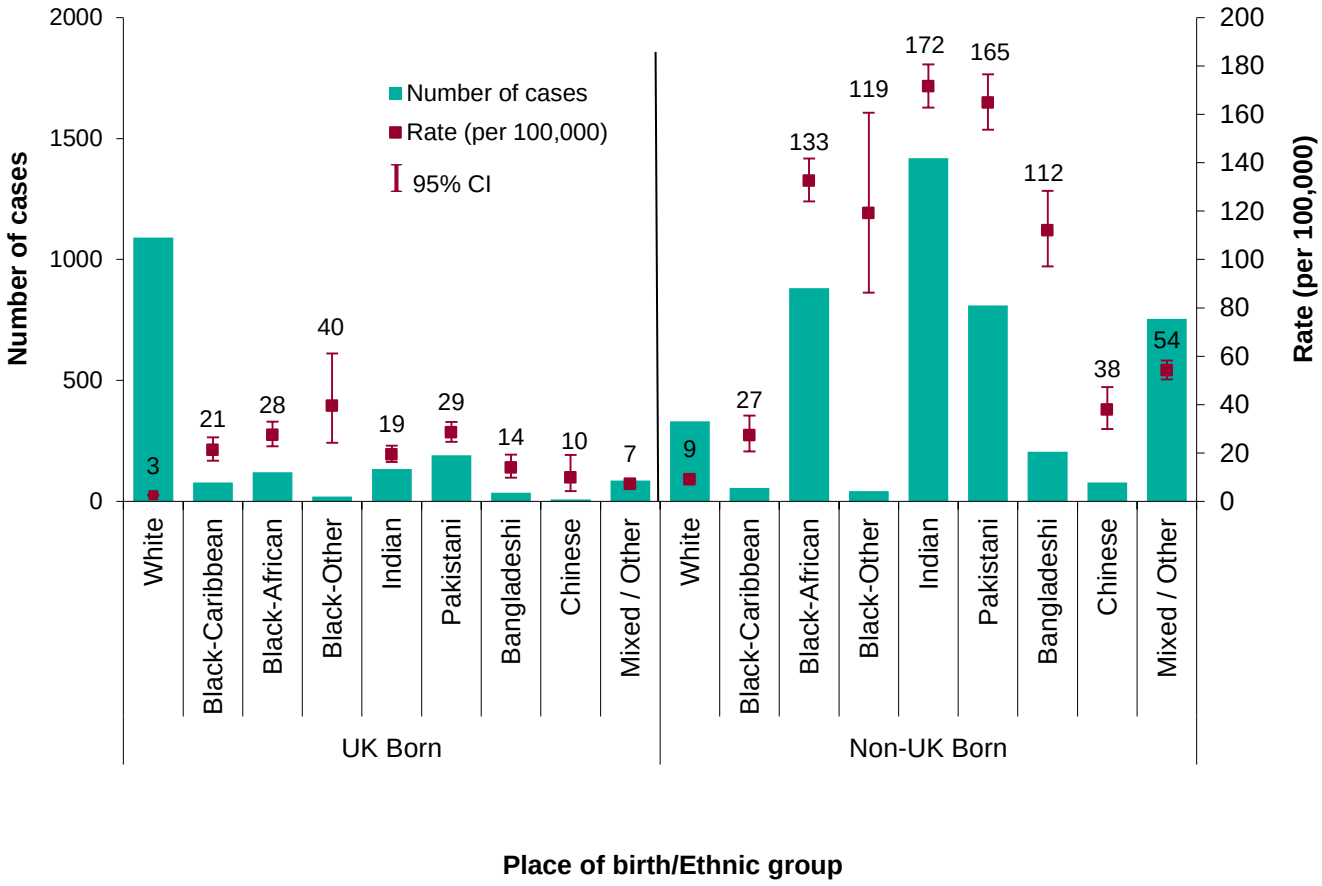
UK born TB cases

In contrast to the recent decline in the rate of TB in the non-UK born population, the rate of TB in the UK born population in England has remained relatively stable over the past decade, with small fluctuations in the numbers of cases each year. In 2014 there were 1,774 cases, a rate of 3.9 per 100,000 (95% CI 3.7-4.1) (Figure 1.5, Table A1.4).

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 75 and 79 years (6.4 per 100,000, 95% CI 5.2-7.8) (Figure 1.6, Table A1.3).

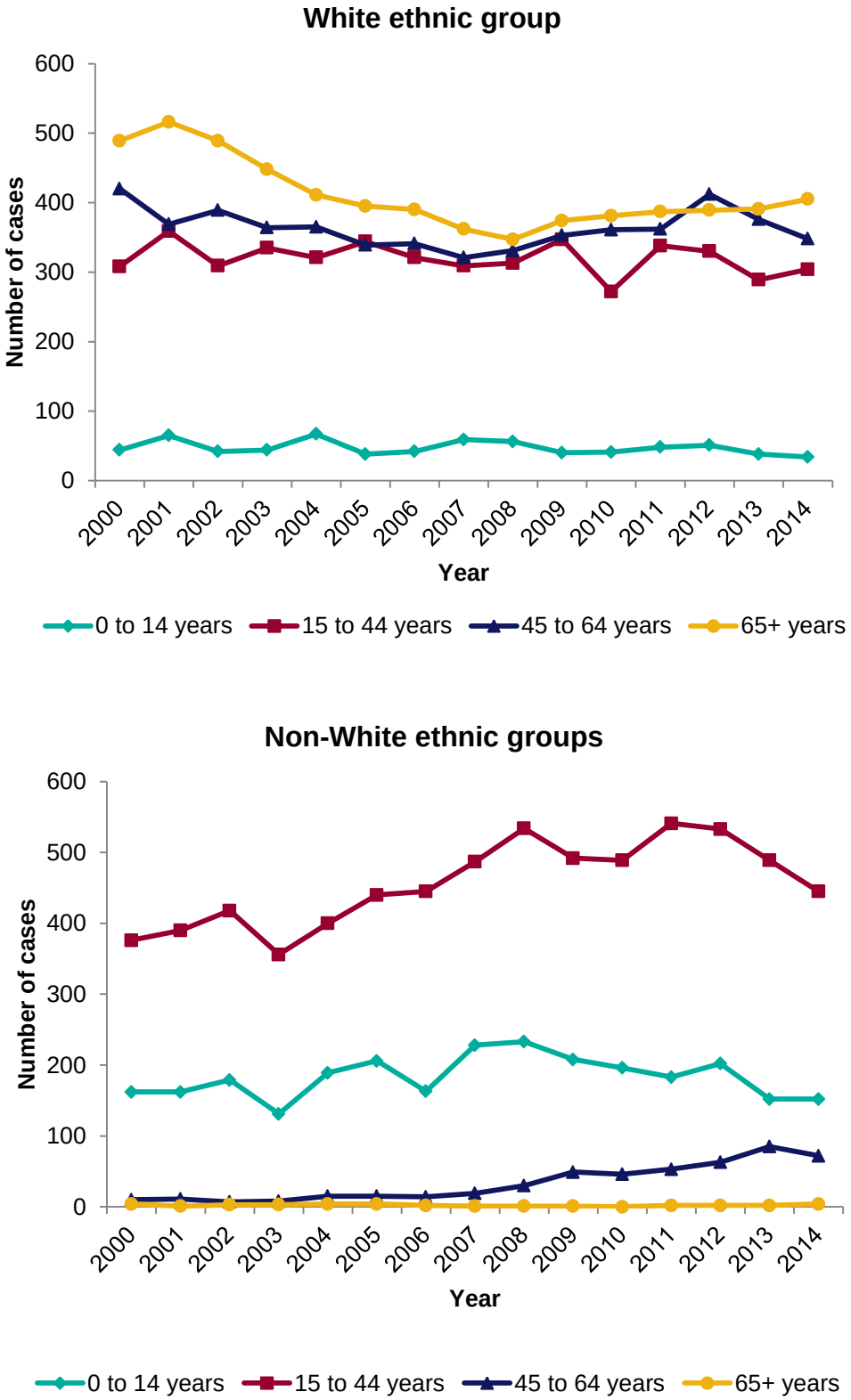
Of the UK born TB cases notified in 2014, 61.8% (1,091/1,764) were from the White ethnic group, 20.5% (361/1,764) from South Asian ethnic groups (Indian, Pakistani and Bangladeshi), 12.4% (218/1,764) from Black ethnic groups (Black-Caribbean, Black-African and Black-Other) and 5.3% (94/1,764) from Mixed/Other ethnic groups (including Chinese). However, the rates were highest in the non-White ethnic groups, with rates between two and thirteen times higher than in the White ethnic group (Figure 1.9, Table A1.7).

Figure 1.9: TB case notifications and rates by place of birth and ethnic group, England, 2014



In 2014, the distribution of UK born TB cases by age varied considerably by ethnic group, with almost all of those aged 65 years and older, and the majority of 45 to 64 year olds in the White ethnic group (99.0%, 405/409 and 82.9%, 348/420 respectively), and the majority of children aged 0 to 14 years in the non-White ethnic group (81.7%, 152/186). There have been some changes in the ethnic and age group composition of UK born TB cases over the past 14 years, with a small decrease in the number of cases from the White ethnic group aged 65 years and older and a small increase in the number of cases in non-White ethnic groups aged 15 to 44 years and 45 to 64 years (Figure 1.10, Table A1.8).

Figure 1.10 Trend of TB case notifications by age group and ethnic group* in UK born cases, England, 2000-2014



* Cases with Black-Caribbean, Black-African, Black-Other, Indian, Pakistani, Bangladeshi, Chinese and Mixed/Other ethnic groups were grouped as 'non-White'

Occupation

In 2014, information on occupation was known for 92.2% (4,803/5,207) of cases aged between 16 and 64 years. Of those with known occupation, 34.1% (1,639) were not in education or employment; 11.8% (566) were either studying or working in education, 6.9% (331) were healthcare workers, and the remaining cases (47.2%, 2,267) were classed as working in other occupations.

Clinical characteristics

Site of disease

In 2014, information on site of disease was known for 99.6% (6,493/6,520) of cases. Just over half of TB cases notified in 2014 where site of disease was known had pulmonary disease (52.9%, 3,434/6,493) (Table 1.2). Almost one-quarter of cases (23.6%, 809/3,434) with pulmonary disease were also reported to have extra-pulmonary disease in at least one other site. The proportion of cases with only extra-pulmonary disease has increased between 2005 and 2014 (from 43.4% to 47.1%) (Table A1.9). A much higher proportion of non-UK born cases had only extra-pulmonary disease (53.1% in 2014), compared with the UK born (32.0% in 2014) (Table A1.9).

Table 1.2: TB case notifications by site of disease, England, 2014

Site of disease*	Number of cases	Percentage**
Pulmonary	3,434	52.9
Extra-thoracic lymph nodes	1,445	22.3
Intra-thoracic lymph nodes	863	13.3
Unknown extra-pulmonary	638	9.8
Pleural	566	8.7
Other extra-pulmonary	504	7.8
Gastrointestinal	368	5.7
Bone – spine	310	4.8
Miliary	179	2.8
Bone – not spine	168	2.6
CNS – meningitis	148	2.3
Genitourinary	129	2.0
CNS – other	99	1.5
Cryptic disseminated	39	0.6
Laryngeal	16	0.2

* With or without disease at another site
** Percentage of cases with known sites of disease (6,493), total percentage 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[3] was known for 92.9% of cases (6,059/6,520) notified in 2014. Of these, 12.2% (741) were reported to have received DOT, an increase compared with 10.4% (705/6,806) in 2013. In 2014, 30.0% (74/247) of cases aged 0 to 14 years received DOT, with the proportion of cases that had received DOT within this age group increasing from 20.4% (72/353) in 2011 (Table A1.10).

Previous history of TB

Information on previous history of TB was available for 95.1% (6,201/6,520) of cases notified in 2014; of these 6.8% (419) had a previous diagnosis of TB more than 12 months before their current notification. For those with a previous diagnosis of TB reported, information on previous history of TB treatment was known for 79.2% (332/419). Among cases known to have a previous diagnosis of TB, 74.5% (312/419) had been previously treated for TB and 31.4% (121/385) received DOT during their current notification of TB.

BCG vaccination

In 2014, information on BCG vaccination status was known for 67.7% (4,415/6,520) of cases, 71.1% (3,139/4,415) of which had previously received BCG vaccination. Almost three-quarters (73.8%, 163/221) of cases aged 0 to 14 years received BCG vaccination; the proportion of children who had received BCG vaccination was higher in non-UK born children (84.6%, 44/52) than in UK born children (70.0%, 115/165).

[3] 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”.

2. Microscopy and culture confirmation

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 cases were culture confirmed compared with extra-pulmonary cases (72% versus 47%)
- 61% of all pulmonary TB cases had a sputum smear result reported
- 15% of all pulmonary TB cases had no sputum smear result and were not culture confirmed

Laboratory tests

Data for all culture confirmed TB isolates from the Mycobacterium 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 II: Methods), and the results were used to report culture confirmation. Results for microscopy, PCR and histology were also collected in ETS (see Appendix II: Methods).

Culture confirmation

Of the TB cases notified in 2014, 60.0% (3,914/6,520) were culture confirmed. Over the past decade, the proportion of TB cases that were culture confirmed remained relatively stable (Table A2.1). A higher proportion of pulmonary cases were culture confirmed compared with extra-pulmonary cases (72.3%, 2,482/3,434 versus 46.7%, 1,430/3,059).

Culture confirmation varied by PHEC, with the highest proportion of culture confirmed cases in the North East (67.9%, 114/168), and the lowest in the South West (55.1%, 177/321) and West Midlands (54.1%, 423/782) (Table A2.1). This is a similar trend to that seen in previous years over the past decade. The East of England PHEC had the highest increase in the proportion with culture confirmation in recent years from 57.4% (294/512) in 2009 to 65.8% (288/438) in 2014.

In 2014, culture confirmation of pulmonary cases was highest in South East (80.9%, 283/350), East of England (79.0%, 180/228) and North East PHECs (74.4%, 61/82), and was lowest in the South West PHEC (57.9%, 114/197) (Table A2.2).

Since 2005, the proportion of culture confirmed cases aged between 0 and 14 years has been consistently two to three times lower (range 22-29%) than in 15 to 44 year

olds (range 62-66%). The proportion of culture confirmed cases in the 15 to 44 years age group was slightly higher than the proportion in those aged 45 to 64 and 65 years and older (2014: 64.5%, 56.7% and 58.4% respectively).

Speciation

Among all culture confirmed TB cases notified in 2014 (3,914), 97.7% (3,824) were identified with *Mycobacterium tuberculosis (M. tuberculosis*) infection, 0.9% (35) with *Mycobacterium bovis (M. bovis),* 1.2% (46) with *Mycobacterium africanum (M. africanum)* and 0.2% (9) with *Mycobacterium tuberculosis complex* (MTBC) bacteria which were not further differentiated. There were no cases of *Mycobacterium microti* (Table A2.3).

The proportion of cases classified as MTBC has decreased from 0.5% (23/4,609) in 2010 to 0.2% (9/3,914) in 2014. This may be explained by improvements in speciation techniques such as the introduction of MIRU-VNTR typing in 2010.

Sputum smear status for pulmonary cases

Of all pulmonary TB cases notified in 2014, 60.7% (2,085/3,434) had a sputum smear (microscopy) result reported, of which half (50.3%, 1,049/2,085) were positive. Ninety five percent (94.8%, 994/1,049) of those with a positive sputum smear were also culture confirmed, compared with only 64.0% (663/1,036) of sputum smear negative cases. Fifteen percent (15.3%, 524/3,434) of pulmonary TB cases had no sputum smear result or culture confirmation.

Other laboratory test results for TB cases

In 2014, 48.9% (3,188/6,520) of cases had a positive smear microscopy result on a sample other than sputum. Fourteen percent (14.1%, 450/3,188) of these non-sputum samples were smear positive, of which the majority (80.9%, 364/450) were also culture confirmed.

In 2014, 589 cases were reported to have had histological samples taken, of which 83.5% (492/589) were reported to be positive. A high proportion (61.4%, 302/492) of these histology positive cases were not culture confirmed. The majority (76.8%, 232/302) of cases with positive histology but no culture confirmation were extra-pulmonary cases.

Only a small proportion (4.1%, 268/6,520) of cases had a PCR result reported, of which the majority (81.0%, 217/268) were PCR positive. Of those with a positive PCR test, 83.9% (182/217) were culture confirmed.

In 2014, 18.3% (478/2,606) of TB cases that were not culture confirmed had a positive laboratory test (microscopy, histology or PCR) result indicative of tuberculosis, with the highest proportion (11.6%, 302/2,606) histology positive (Table 2.1). A high proportion of both pulmonary (83.5%, 795/952) and extra-pulmonary (81.6%, 1,330/1,629) cases that were not culture confirmed, did not have any other known positive test result reported. One-third (32.9%, 2,148/6,520) of all cases were not confirmed by any laboratory method (culture, microscopy, histology or PCR).

Table 2.1 Number and proportion of non-culture confirmed TB cases by another laboratory method other than culture, England, 2014

Laboratory test results*	Pulmonary cases		Extra-pulmonary cases		All cases	
	n (952)**	%	n (1,629)**	%	n (2,606)**	%
Sputum smear positive	55	5.8	0	0.0	55	2.1
Smear positive (not sputum)	31	3.3	55	3.4	86	3.3
Histology positive	68	7.1	232	14.2	302	11.6
PCR positive	10	1.1	25	1.5	35	1.3
No known positive result	795	83.5	1,330	81.6	2,148	82.4

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

TB isolates 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 over the past decade from 507 isolates (10.0%) in 2005 to 178 isolates (3.9%) in 2013 (Table 2.2). In 2014, isolates from 245 (6.3%) individuals could not be matched to a case notified in the previous or same year, continuing the downward trend seen over the past decade (Table 2.2). As in previous years, the proportion of unmatched isolates for 2014 is likely to decrease further once matched to 2015 notifications.

Unmatched isolates may be due to TB cases that were not notified to the surveillance system or isolates may have failed to match to a notified case if personal identifiers were incomplete or inaccurate; a small number may represent contaminants (which were not identified as contaminants in surveillance reporting).

The majority of unmatched isolates in 2014 were *M. tuberculosis* (93.5%, 229/245), 3.7% (9/245) were MTBC, 1.2% (3/245) were *M. bovis* and 1.6% (4/245) were *M. africanum*. A higher proportion of unmatched isolates were not speciated (MTBC) compared with matched isolates (0.6%, 22/3,642).

Table 2.2: Unmatched isolates by specimen year, England, 2005-2014

Specimen date year	All isolates	Unmatched to a case within the previous or same year		Unmatched to a case within the previous, same or subsequent year	
	n	n	%	n	%
2005	5,059	703	13.9	507	10.0
2006	5,123	655	12.8	466	9.1
2007	4,890	604	12.4	417	8.5
2008	5,022	667	13.3	425	8.5
2009	5,042	581	11.5	351	7.0
2010	4,870	483	9.9	248	5.1
2011	5,305	495	9.3	210	4.0
2012	4,998	428	8.6	173	3.5
2013	4,508	373	8.3	178	3.9
2014	3,887	245	6.3	-	-

3. TB transmission

Key messages

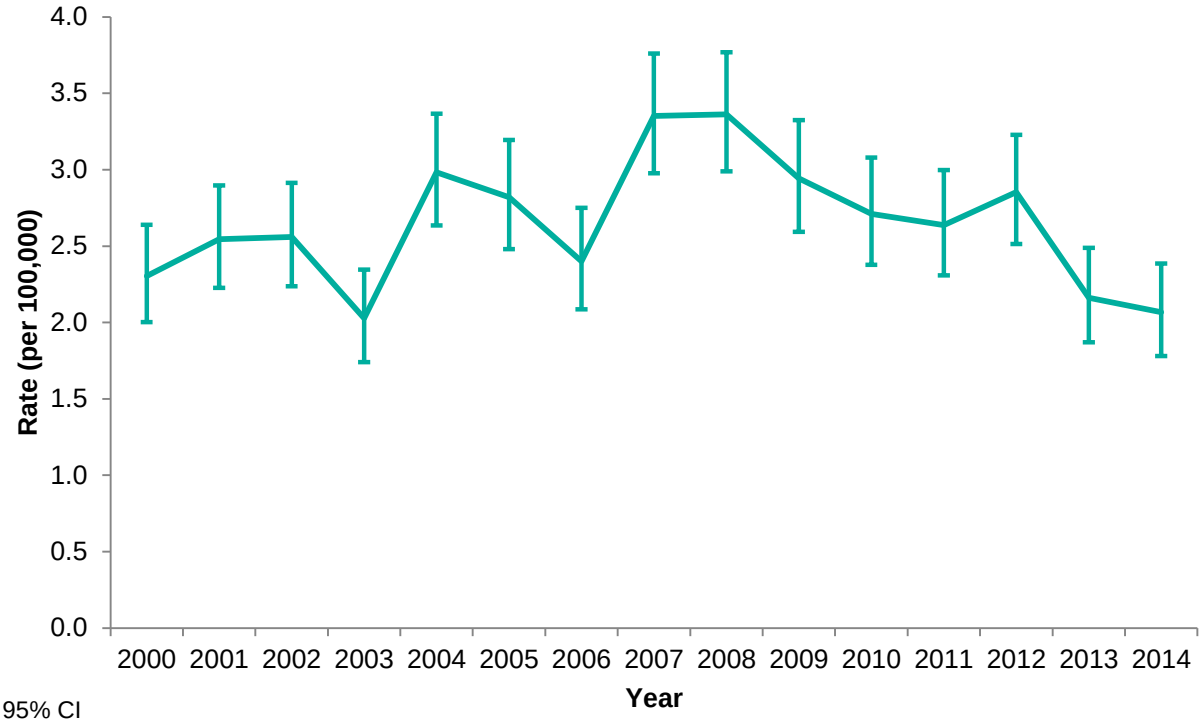
- in 2014, the rate of TB in UK born children, an indirect indicator of recent transmission in England, continued to decline to 2.1 per 100,000
- between 2010 and 2014, the proportion of MIRU-VNTR strain typed TB cases that clustered was 57%, although it is not possible to estimate what proportion of these clusters represent recent transmission
- the majority of strain type clusters were small, with almost half (47%) containing only two cases
- PHE is piloting the use of whole genome sequencing for TB; it is hoped that roll out of this technology will improve our understanding of TB transmission in England

It is not currently possible to directly measure TB transmission at a population level, so proxy measures are required. The rate of TB in children is widely accepted to be a good indicator of TB transmission in a community. Genotyping methods such as 24 loci Mycobacterial Interspersed Repetitive Unit-Variable Number Tandem Repeats (MIRU-VNTR) strain typing identifies clusters of cases with indistinguishable strains that may be due to recent transmission. It is hoped that the higher level of resolution provided by whole genome sequencing (WGS) will soon help improve our understanding of TB transmission in England.

Rate of TB in UK born children

In 2014, the rate of TB in UK born children under 15 years of age, an indirect indicator of recent transmission within England, was 2.1 per 100,000. There has been a reduction in this rate since the peak of 3.4 per 100,000 in 2007 and 2008 (Figure 3.1).

Figure 3.1: Rate of TB in UK born children*, England, 2000-2014



* 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 MIRU-VNTR. Clusters of TB cases with indistinguishable MIRU-VNTR strain types (clustered cases) 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 different strain types, but a common strain type does not confirm transmission; additional epidemiological information is required to assess whether a common strain type is likely to reflect recent transmission.

In 2014, 98.8% (3,868/3,914) of culture confirmed notified cases had an isolate with a MIRU-VNTR strain typed and 84.8% (3,319/3,914) of culture confirmed cases had at least 23 loci typed (Table 3.1). Overall, for culture confirmed cases notified between 2010 and 2014, 82.2% (18,772/22,837) of isolates had strain typing completed for at least 23 loci; 57.2% (10,743) were in 2,245 molecular clusters and 42.8% (8,029) had a unique strain type (Table A3.1). 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 A3.1).

Table 3.1: Number and proportion of culture confirmed cases typed, or with 23 or 24 loci typed, England, 2010-2014

Year	Notified cases	Culture confirmed cases		Typed cases*		≥23 loci typed cases**		24 loci typed cases[#]	
	n	n	%	n	%	n	%	n	%
2010	7,677	4,609	60.0	4,168	90.4	3,229	70.1	2,173	47.1
2011	8,276	5,029	60.8	5,004	99.5	4,267	84.8	3,008	59.8
2012	8,086	4,895	60.5	4,864	99.4	4,301	87.9	3,164	64.6
2013	7,257	4,390	60.5	4,335	98.7	3,656	83.3	2,617	59.6
2014	6,520	3,914	60.0	3,868	98.8	3,319	84.8	2,430	62.1
Total	**37,816**	**22,837**	**60.4**	**22,239**	**97.4**	**18,772**	**82.2**	**13,392**	**58.6**

* % typed is the proportion of culture confirmed cases which have had at least one loci typed
** % ≥23 loci is the proportion of culture confirmed cases which have had at least 23 loci typed
[#] % 24 loci is the proportion of culture confirmed cases which have had all 24 loci typed

The proportion of cases that clustered with at least one other case within the five year period of 2010 to 2014 was relatively stable by year (range 54.4 to 59.2) (Table 3.2). The number of new clusters that formed each year[4] ranged from 366 in 2010 to 536 in 2011, in 2014 there were 408 new clusters.

Table 3.2: Number and proportion of unique cases, clustered cases and new clusters by year, England, 2010-2014

Year	Notified cases	Culture confirmed cases		Strain typed cases (≥23 loci)		Unique cases		Clustered cases *		New clusters (per year) **
	n	n	%	n	%	n	%	n	%	n
2010	7,677	4,609	60.0	3,229	70.1	1,391	43.1	1,838	56.9	366
2011	8,276	5,029	60.8	4,267	84.8	1,846	43.3	2,421	56.7	536
2012	8,086	4,895	60.5	4,301	87.9	1,754	40.8	2,547	59.2	534
2013	7,257	4,390	60.5	3,656	83.3	1,526	41.7	2,130	58.3	401
2014	6,520	3,914	60.0	3,319	84.8	1,512	45.6	1,807	54.4	408
Total	**37,816**	**22,837**	**60.4**	**18,772**	**82.2**	**8,029**	**42.8**	**10,743**	**57.2**	**2,245**

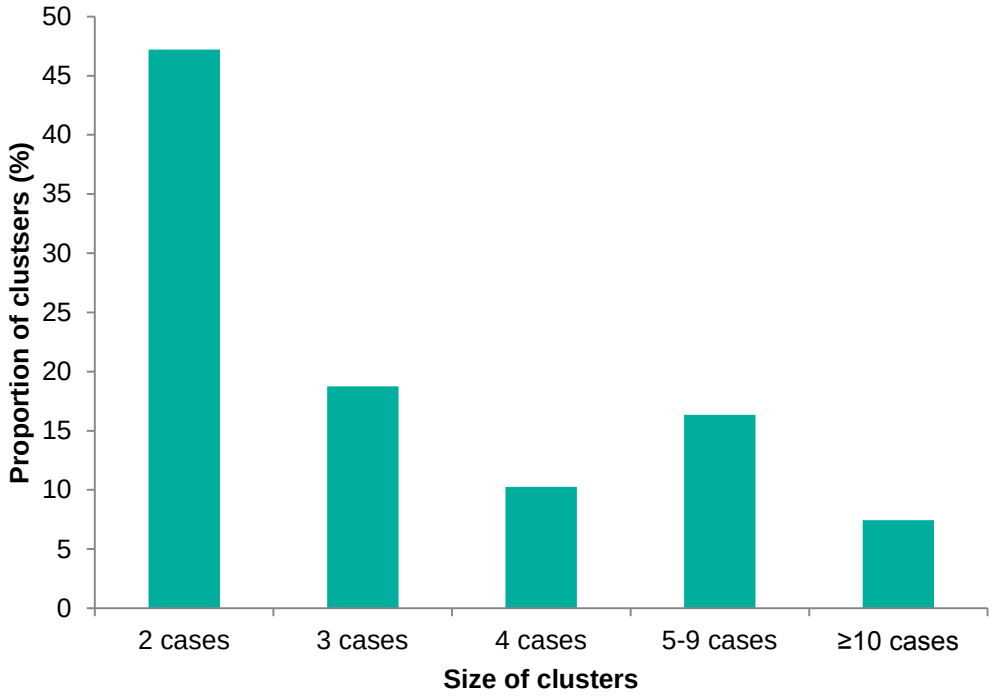
* Clustered in time period (2010-2014), clustered cases notified in year
** A new cluster forms at the point when a second case is notified with the same MIRU-VNTR strain type as an existing case

Over the five year period of 2010 to 2014, there were a total of 2,245 clusters in England, with a median cluster size of three cases (range 2-194). The majority of clusters (76.2%; 1,711/2,245) were small in size (<5 cases), with 47.2% (1,060) of clusters having only two cases in the cluster. A further 16.3% (367) of clusters were

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

medium sized (5-9 cases), and 7.4% (167) were large (>10 cases), of which 12 clusters were very large (>50 cases) (Table A3.1, Figure 3.2).

Figure 3.2: Proportion of clusters by size, England, 2010-2014



Whole genome sequencing

Whole genome sequencing (WGS) of *Mycobacterium tuberculosis* complex (MTBC) 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 may therefore 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].

A pilot for WGS of Mycobacterial isolates at the Public Health England Regional Centre for Mycobacteriology, Public Health Laboratory, Birmingham (RCM Birmingham), was approved by the PHE Genomics Steering group and was further endorsed by Genomics England Ltd. for 12 months from July 2014. RCM Birmingham sequenced all new mycobacterial isolates obtained from cultures referred to the laboratory in parallel with the existing methods for species identification, resistance profiling and relatedness by MIRU-VNTR. From April 2015, sequences were analysed and released in real time and in a draft report format, allowing comparison of the performance of new versus existing laboratory methods. Additionally, as part of the project, retrospective samples obtained

in previous years have been sequenced to gain information on relatedness of TB strains and to inform transmission networks.

The full results from the pilot are currently being analysed, so data are not presented in this report. In preparation for this work, isolates from 247 of 268 culture confirmed cases from Oxfordshire between 2007 and 2012 were sequenced. Isolates from 208 of the 247 cases were found not to be related to any of the other isolates within the study, and 39 cases were genomically linked within 13 clusters, with 26 plausible transmission events identified [5]. Of these 26 transmission events, only 11 events had previously been identified through traditional contact tracing.

The pilot project will provide evidence to validate the processes to the standard required by the UK Accreditation Service (UKAS) for accreditation of a clinical service.

In summary, PHE is close to deploying the use of whole genome sequencing for TB for the NHS throughout England. It is hoped that this new technology will continue to add to the learning 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

- the median time between symptom onset and treatment start for pulmonary cases was 74 days in 2014, a continued deterioration from 66 days in 2011
- the proportion of cases with a delay of more than four months has increased to 30%, compared with 26% in 2011
- children aged 0 to 14 years old experienced the shortest delays between symptom onset and treatment start, and the proportion of this age group that experienced a delay of more than four months has decreased to 5% in 2014
- those aged 65 years and older experienced the longest delays, with 41% having a delay of more than four months
- a higher proportion of UK born cases (33%) experienced a delay of more than four months compared with non-UK born cases (29%)

Time from symptom onset to treatment start for pulmonary TB cases

Information on time from symptom onset to treatment start was available for 86.6% (2,875/3,319) of pulmonary cases notified in 2014. Data on the time from symptom onset to treatment start has been available for more than two-thirds of cases since 2011 only, and data completion has improved during this period. Current data completeness does not enable us to distinguish late presentation to health services from delays occurring within the health service.

In 2014, the median time between the symptom onset and the treatment start was 74 days (interquartile range (IQR) 39-139), a deterioration from 66 days (IQR 34-123) in 2011 to 72 days (IQR 36-131) in 2013.

In 2014, only 39.5% (1,137/2,875) of cases started treatment within two months and 69.7% (2,005/2,875) within four months of symptom onset (Table 4.1). The proportion of cases who started treatment within two months and four months of symptom onset has decreased over the past four years, with a greater proportion of cases starting treatment more than four months after symptom onset (Table 4.1).

Table 4.1: Number and proportion of pulmonary TB cases by delay from symptom onset to treatment start, England, 2011-2014

Year	0-2 months		2-4 months		>4 months		Total*
	n	%	n	%	n	%	n
2011	1,317	45.0	856	29.3	753	25.7	**2,926**
2012	1,369	44.0	925	29.8	814	26.2	**3,108**
2013	1,222	41.2	900	30.4	841	28.4	**2,963**
2014	1,137	39.5	868	30.2	870	30.3	**2,875**

* The number of pulmonary cases with time between symptom onset to start of TB treatment available, excluding those diagnosed post-mortem and those that were known to 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)

Delay from symptom onset to treatment start varied by PHEC, with the shortest delay recorded in the North East, (47.9%, 34/71 and 74.6%, 53/71 of cases started treatment within 2 and 4 months respectively) (Table A4.1). The longest delay was in the South East (30.7%, 97/316 and 63.6%, 201/316 of cases started treatment within 2 and 4 months respectively) (Table A4.1). However, only 88.8% (71/80) of notifications from the North East PHEC had symptom onset dates and/or treatment start date completed, compared with high completeness of dates in both the South East PHEC (93.8%, 316/337) and very high in the East Midlands PHEC (99.5%, 206/207) (for overall data completeness, see Appendix IV: Data completeness).

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

In 2014, as in previous years, the proportion of cases that experienced a delay from symptom onset to treatment start of more than four months increased with age (0-14: 5.2%, 15-44: 27.6%, 45-64: 33.4%, over 65: 40.5%) (Figure 4.1, Table A4.2). The proportion of cases aged 0 to 14 years with delay of more than four months decreased from 14.3% (17/119) in 2013 to 5.2% (6/115) in 2014 (Figure 4.1, Table A4.2).

As in previous years, in 2014 the proportion of cases with a delay of more than four months was higher among UK born cases compared with non-UK born (33.0%, 332/1,006 versus 28.7%, 524/1,824) (Figure 4.2 and Table A4.3). However, there has been a greater increase in the proportion of cases with a delay of more than four months in non-UK born cases compared with UK born cases over the past four years (Table A4.3).

Figure 4.1: Proportion of pulmonary cases with a delay from symptom onset to treatment start of more than four months by age group, England, 2011-2014

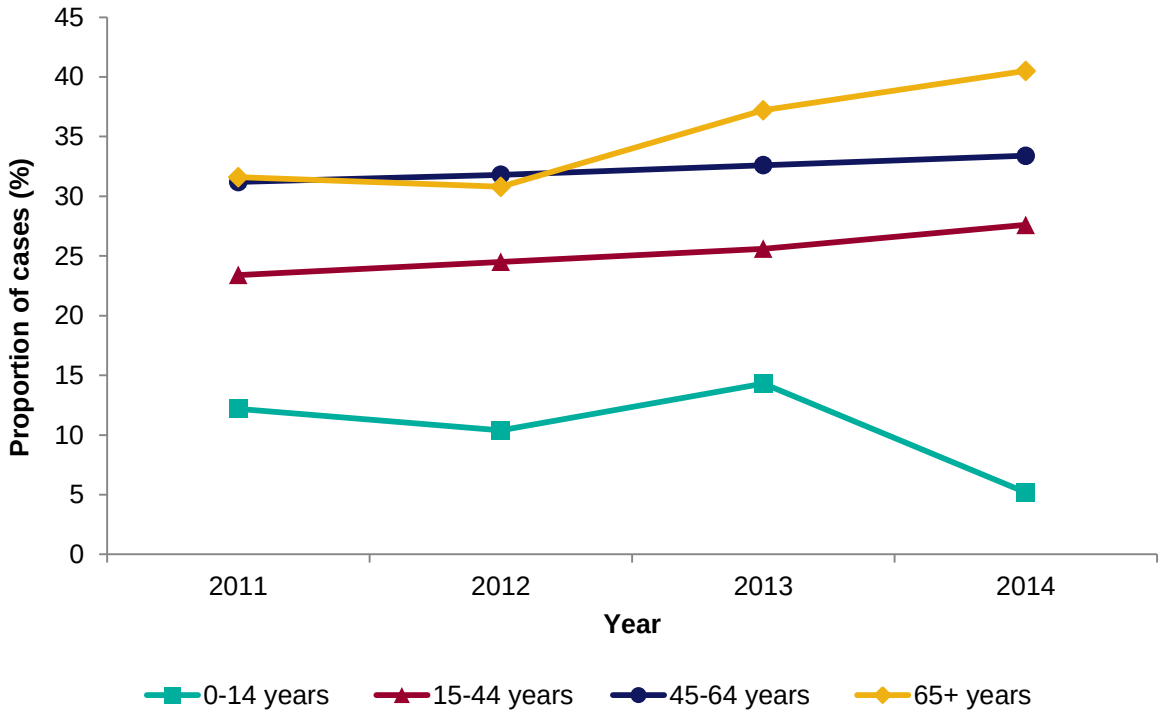
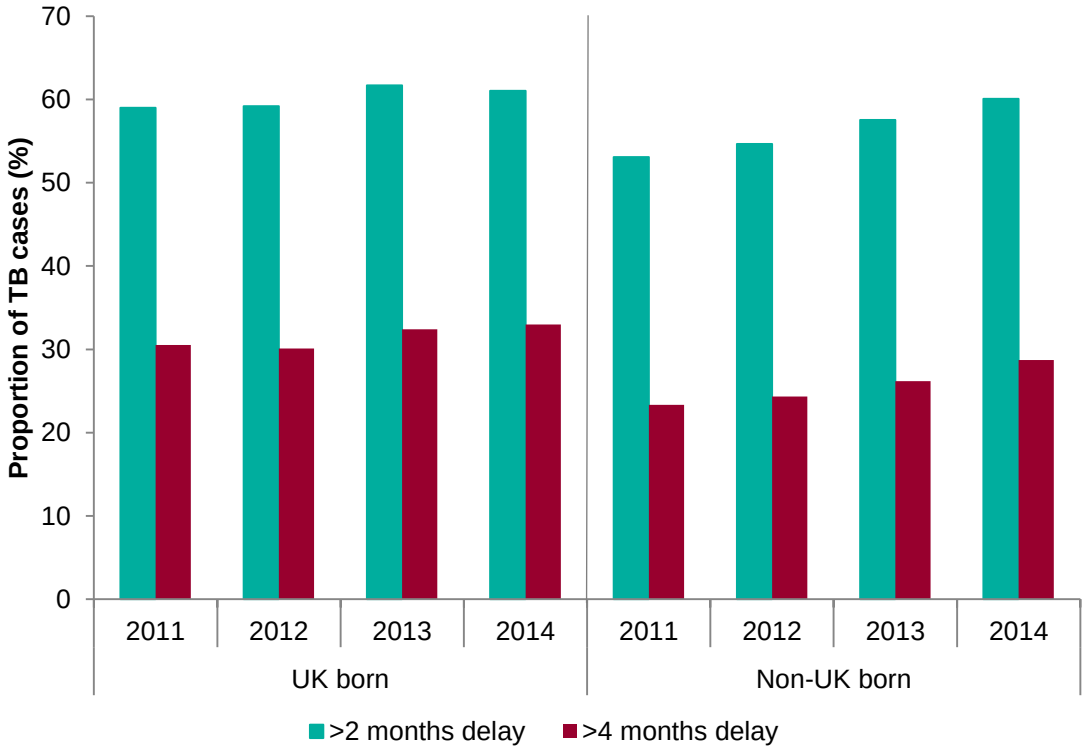


Figure 4.2: Proportion of cases with a delay from symptom onset to treatment start by place of birth, England, 2011-2014



5. TB outcomes in the drug sensitive cohort

Key messages

- the proportion of cases with an expected treatment duration of less than 12 months who had completed treatment by 12 months has continued to increase, to 85% in those notified in 2013
- the proportion of all drug sensitive cases who died at last reported outcome has continued to decrease, to 4.6% in those notified in 2013
- the proportion of all drug sensitive cases who were lost to follow-up at last reported outcome has continued to decrease, to 3.9% in those notified in 2013; the majority of these were lost to follow-up abroad

Drug sensitive cohort, 2004-2013

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

In addition, 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 outcome 12 months after starting treatment was available for 98.5% (6,327/6,422) of cases in this cohort notified in 2013 (Table 5.1).

Table 5.1: TB outcome at 12 months for drug sensitive cases with expected treatment duration < 12 months*, England, 2013

TB outcome	n	%
Treatment completed	5,445	84.8
Died	260	4.0
Lost to follow-up	239	3.7
Still on treatment	327	5.1
Treatment stopped	56	0.9
Not evaluated**	95	1.5
Total	**6,422**	**100.0**

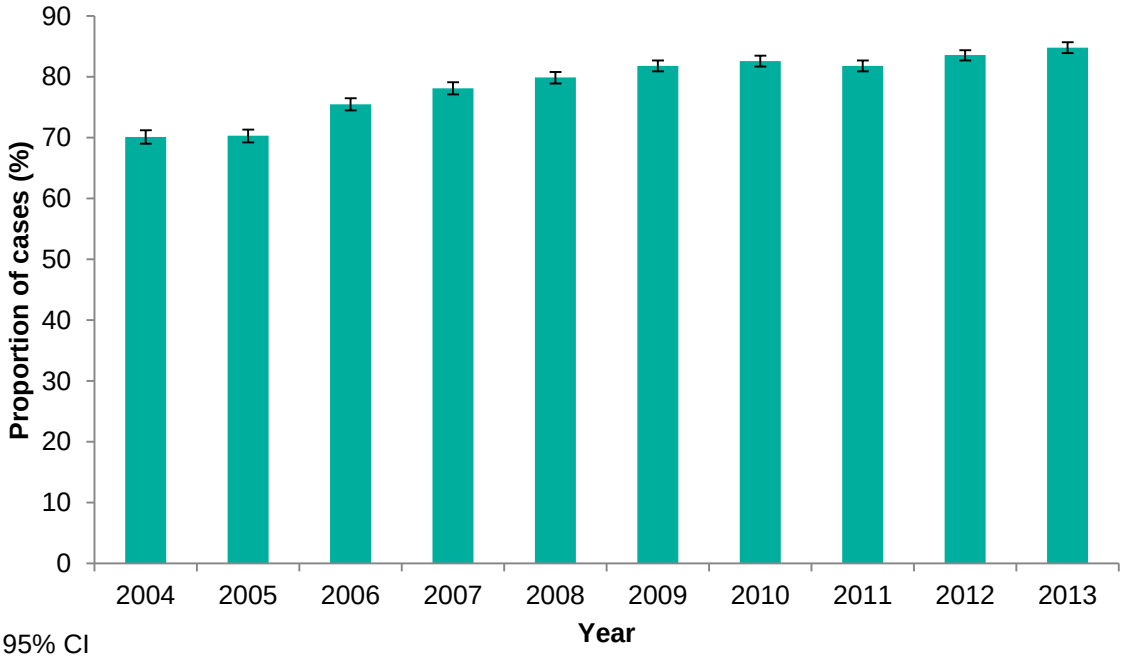
* Excludes initial and amplified to rifampicin resistant TB and MDR-TB cases and MDR-TB treated cases and those with CNS, spinal, miliary or cryptic disseminated TB
** Not evaluated includes missing, unknown and transferred out

The proportion of these cases notified in 2013 who completed treatment within 12 months was 84.8% (5,445/6,422), compared with 83.6% (6,007/7,186) in 2012 (Figure 5.1, Table A5.1). A further 2.4% (155) of cases are known to have completed treatment after 12 months, bringing overall treatment completion for 2013 cases to 87.2% (5,600/6,422) (Table A5.2).

There has been a year on year improvement in the proportion of cases with known time to completion since 2004 (2013: 95.8% 5,362/5,600) (Table A5.3). Of those notified in 2013, almost three-quarters of cases (3,995/5,362) completed treatment between six and eight months after treatment start. However, 5.6% (302/5,362) of cases completed treatment in less than six months (168 days), which is less than a full course of short-course treatment (Figure 5.2, Table A5.3).

Between 2004 and 2013, there was an increase in the proportion of cases reported to have completed treatment within 12 months (Figure 5.1,Table A5.1), and a decrease in the proportion of outcomes not evaluated. For cases notified in 2013, 97.5% (5,277/5,362) of those with a known time to completion completed treatment within 12 months, an improvement on previous years (Figure 5.2, Table A5.3).

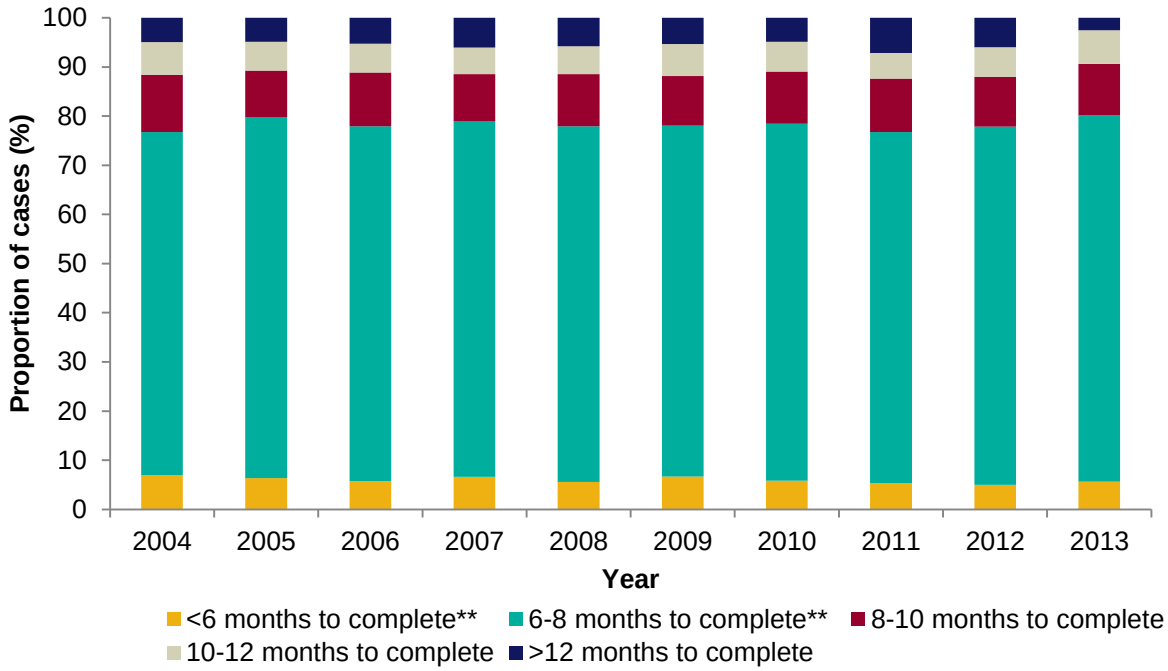
Figure 5.1: Treatment completion at 12 months for drug sensitive cases with expected treatment duration < 12 months*, England, 2004-2013



I 95% CI

* Excludes initial and amplified to rifampicin resistant TB and MDR-TB cases and MDR-TB treated cases and those with CNS, spinal, miliary or cryptic disseminated TB

Figure 5.2: Time to complete treatment for drug sensitive cases with known time to completion and with expected treatment duration <12 months*, England, 2004-2013



* Excludes initial and amplified to rifampicin resistant TB and MDR-TB cases and MDR-TB treated cases and those with CNS, spinal, miliary or cryptic disseminated TB

** Cases with completion between 168 and 180 days are included in the 6-8 months category

The proportion of cases who completed treatment by 12 months decreased with age (Table A5.4); in 2013 treatment completion was 90.8% (246/271) in 0 to 14 year olds compared with 72.0% (639/888) in those aged 65 years and older. There was an improvement in treatment completion between 2012 and 2013 in those aged 65 years and older (68.0%, 647/952 compared with 72.0%, 639/888, respectively).

In 2013, the proportion of cases that completed treatment was slightly higher for females (85.8%, 2,367/2,759) than males (84.0%, 3,078/3,663) (Table A5.5). There has been an improvement in treatment completion in males over the past decade, and the gap between treatment completion in males and females has reduced.

Treatment completion at 12 months was higher in those with extra-pulmonary disease only compared with pulmonary disease only (87.5%, 2,656/3,035 versus 82.8%, 2,222/2,685 respectively). Specifically, completion was highest in those with lymph node TB (intra-thoracic lymph node 89.9%, 750/834 and extra-thoracic lymph node 87.7%, 1,487/1,695) (Table A5.6).

Treatment completion at 12 months varied by PHEC, from 71.5% (216/302) in the South West to 88.1% (317/360) in the East Midlands for cases notified in 2013 (Table A5.7). There was an improvement in treatment completion at 12 months between 2012 and 2013 in all PHECs apart from London and the North West (Table A5.8).

Five percent (5.1%, 327/6,422) of cases notified in 2013 were still on treatment at 12 months (Table 5.1, Table A5.1). It is known from the last reported outcome that many of these eventually completed treatment (47.4%, 155/327). Thirty percent (30.2%, 67/222) of those still on treatment at 12 months who had DST results were resistant to isoniazid. The reason for still being on treatment 12 months after starting was not recorded for one-quarter of cases (24.2%, 79/327). Where the reason for still being on treatment at 12 months was recorded, 29.0% (72/248) had had their treatment changed, 53.2% (132/248) were known to be on a regimen exceeding 12 months, and 17.7% (44/248) had their treatment interrupted. Almost 18 percent (44/248) were still on treatment due to intolerance or side-effects, 7.7% (19/248) had a poor clinical response to treatment and 3.6% (9/248) had been non-compliant with treatment.

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

The proportion of cases in this group notified in 2013 who had completed treatment at the last recorded outcome was 67.1% (504/751) (Table 5.2, Table A5.9). Treatment duration was recorded for 94.8% (478/504) of those who completed treatment; the majority of cases (81.8%, 391/478) completed treatment within 12 months, while 18.2% (87/478) completed in more than 12 months (Table A5.10). There is a reduced follow-up period for this group, so the proportion who finally complete treatment in this group is

expected to increase once further follow-up data is available. For those who were notified in 2012, completion at last known outcome was 80.9% (652/806) (Table A5.9), and for those with known time to completion (95.4%, 622/652), 40.2% (250/622) completed treatment in more than 12 months (Table A5.10).

Table 5.2: Last recorded TB outcome for drug sensitive cohort with CNS, spinal, miliary or cryptic disseminated* TB, England, 2013

TB outcome	n	%
Treatment completed	504	67.1
Died	67	8.9
Lost to follow-up	43	5.7
Still on treatment	101	13.4
Treatment stopped	6	0.8
Not evaluated**	30	4.0
Total	**751**	**100.0**

* Excludes initial and amplified to rifampicin resistant TB and MDR-TB cases and MDR-TB treatment cases and only includes drug sensitive TB cases with CNS, spinal, military or cryptic disseminated TB
** Not evaluated includes missing, unknown and transferred out

Thirteen percent (13.4%, 101/751) of cases notified in 2013 were still on treatment at last reported outcome (Table 5.2, Table A5.9); a further proportion of these cases are expected to go on to complete treatment.

TB outcomes in the entire drug sensitive cohort

In the entire drug sensitive cohort, 85.1% (6,104/7,173) of cases notified in 2013 were known to have completed treatment at last recorded outcome, 4.6% (330/7,173) had died and 3.9% (283/7,173) were lost to follow-up (Table 5.3, Table A5.11).

Table 5.3: Last recorded TB outcome for the entire drug sensitive cohort*, England, 2013

TB outcome	n	%
Treatment completed	6,104	85.1
Died	330	4.6
Lost to follow-up	283	3.9
Still on treatment	267	3.7
Treatment stopped	64	0.9
Not evaluated**	125	1.7
Total	**7,173**	**100.0**

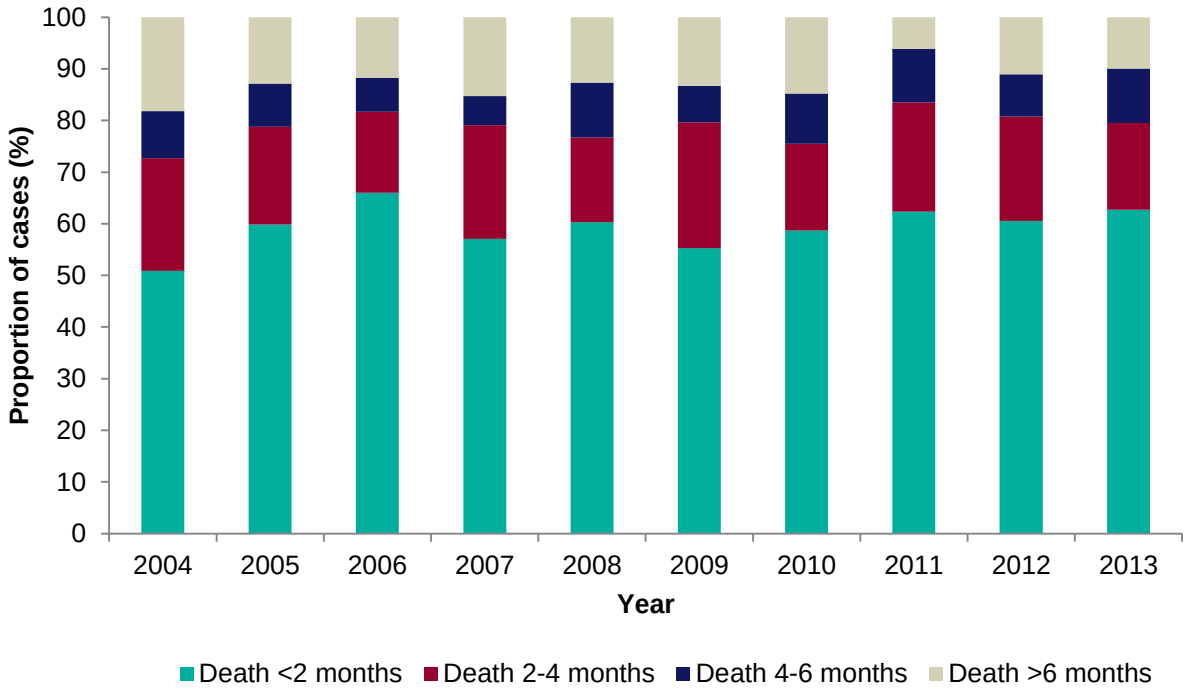
* Excludes initial and amplified to rifampicin resistant TB and MDR-TB cases and MDR-TB treatment cases
** Not evaluated includes missing, unknown and transferred out

Death in the entire drug sensitive cohort

Between 2004 and 2013, the proportion of cases reported to have died at the last reported outcome in the entire drug sensitive cohort (including those with CNS, spinal, miliary or cryptic disseminated TB) decreased from 5.9% to 4.6% (Table A5.12). For those notified in 2013, 330 cases were reported to have died; TB caused or contributed to 33.0% (109/330) of deaths, was incidental to death in 21.5% (71/330), and the relationship between TB and death was unknown in 45.5% (150/330) (Table A5.12). Among those reported to have died, 17.3% (57/330) were diagnosed post-mortem.

The majority (65.2%, 215/330) of those who died were aged 65 years or older. Almost two-thirds (63.6%, 210/330) of those who died were male. By site of disease, death occurred most frequently in those with miliary TB (19.8%, 38/192), and CNS TB (CNS meningitis 9.9%, 15/152 and CNS other 9.8%, 12/122) (Table A5.13). Excluding those diagnosed post-mortem, the median time to death after starting treatment was 38 days (range 0-557 days); 62.7% (101/161) of these cases died within two months of starting treatment (Figure 5.3, Table A5.14). Eight percent (34/454) of those with a previous diagnosis of TB died compared with 3.5% (224/6,423) without a previous diagnosis of TB. The proportion of deaths varied by PHEC, from 3.3% (96/2,921) in London to 6.7% (9/134) in North East (Table A5.15).

Figure 5.3: Time between treatment start and death for the entire drug sensitive cohort*, England, 2004-2013



* Excludes initial and amplified to rifampicin resistant TB and MDR-TB and MDR-TB treatment cases. Also excludes cases diagnosed post-mortem.

Lost to follow-up in the entire drug sensitive cohort

In 2013, 3.9% (283/7,173) of all drug sensitive TB cases (including those with CNS, spinal, miliary or cryptic disseminated TB) were lost to follow-up at the last reported outcome, of which 89.8% (254/283) were non-UK born (Table 5.3, A5.16). Where the reason for lost to follow-up was recorded, 63.5% (148/233) of those born abroad had left the UK (Table A5.16). Seventy nine percent (78.8%, 223/283) of lost to follow-up cases occurred in those aged 15 to 44 years; a total of 5.2% (223/4,281) of this age group were lost to follow-up (Table A5.17). Fifty percent (141/283) of cases lost to follow-up had pulmonary disease. Seven 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 cases with initial resistance to isoniazid without MDR-TB has remained fairly stable over the past decade, at around 6%
- initial resistance to isoniazid without MDR-TB occurred most frequently in those with a previous history of TB and a high proportion (18%) of cases with resistance had at least one social risk factor
- the number and proportion of initial MDR/RR-TB cases (56, 1.4%) has decreased since the peak in 2011 (88, 1.8%)
- three cases of initial XDR-TB were notified in 2014, similar to previous years
- the majority of cases with MDR/RR-TB (89%) were non-UK born; the highest number of cases were from Lithuania (11) and India (10)
- a high proportion of MDR/RR-TB cases (16%) had at least one social risk factor
- two cases notified during 2014 amplified to MDR-TB while on treatment in England; over the past decade, 31 cases are known to have amplified to MDR-TB, including one known to have amplified to XDR-TB
- the proportion of MDR/RR-TB cases notified in 2012 who had completed treatment by 24 months was low (56%), with many still on treatment (25%); and by the last recorded outcome nearly one in ten were lost to follow-up, although the majority of these were lost to follow-up abroad
- only 4% of MDR/RR-TB cases notified in 2012 had died at last reported outcome

Initial[5] first line drug resistance

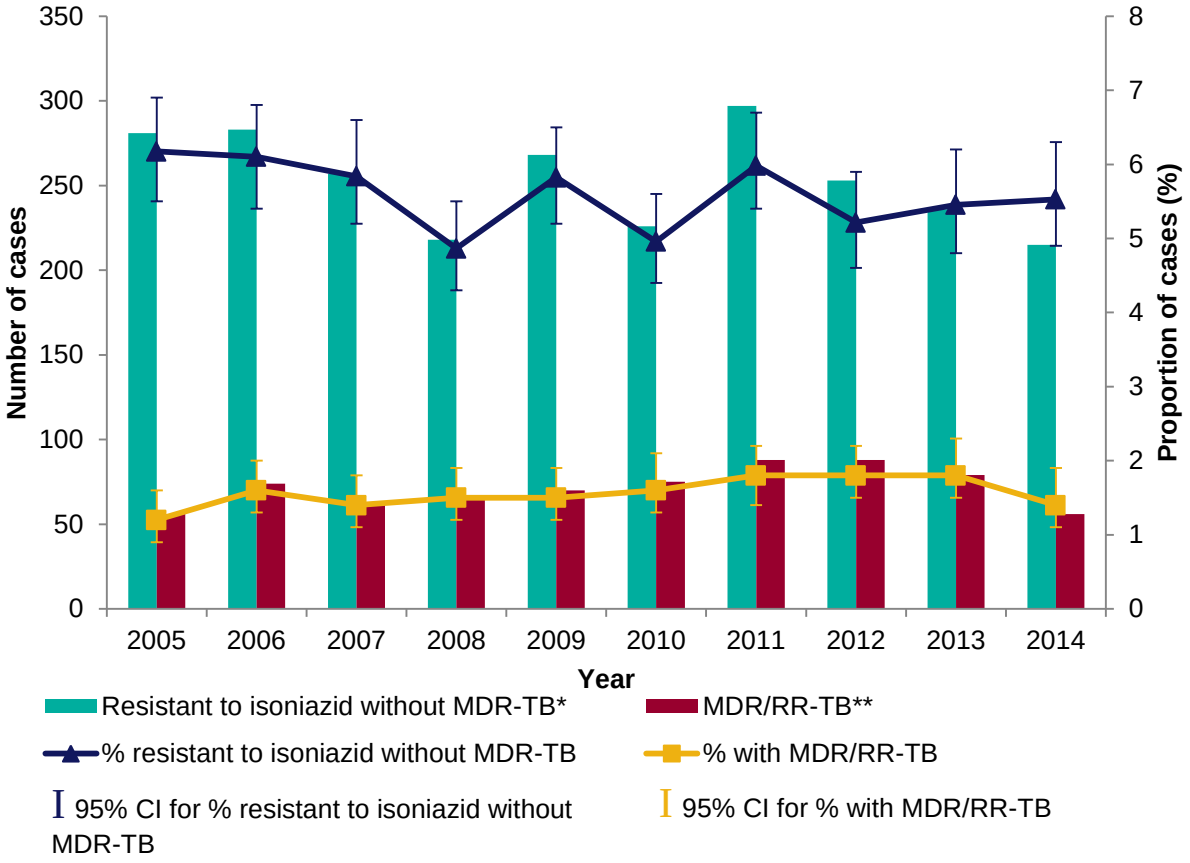
In 2014, drug susceptibility test (DST) results for at least isoniazid and rifampicin were available for 99.4% (3,889/3,914) of culture confirmed notified cases, a similar proportion to previous years (Table A6.1). Of these, 6.9% (267/3,889) were resistant to isoniazid, 1.4% (56/3,889) were resistant to rifampicin, 1.1% (42/3,880) were resistant to ethambutol and 0.8% (31/3,829) were resistant to pyrazinamide. Seven percent (7.4%, 286/3,889) were resistant to at least one first line antibiotic (Table A6.2) and 1.3% (52/3,889) had multidrug resistant TB (MDR-TB), with resistance to at least isoniazid and rifampicin (Table A6.3).

[5] 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 amplified resistance, even if this is within the three month period.

Initial isoniazid resistance without MDR-TB

In 2014, 5.5% (215/3,889) of TB cases had initial resistance to isoniazid without MDR-TB, which is similar to previous years (Figure 6.1, Table A6.3). There was no difference in the proportion of cases resistant to isoniazid without MDR-TB by sex (5.7%, 133/2,356 in males versus 5.3%, 82/1,533 in females). Of those aged 35 to 44 years, 6.8% (51/746) were resistant to isoniazid without MDR-TB, which was a higher proportion than in other age groups (Table 6.1).

Figure 6.1: Number and proportion of TB cases with initial drug resistance, England, 2005-2014



* 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

In 2014, the proportion of cases resistant to isoniazid without MDR-TB was similar in UK born and non-UK born cases (5.4%, 52/967 versus 5.7%, 162/2,833). The most frequent countries of birth of non-UK born cases resistant to isoniazid without MDR-TB were India (40) and Pakistan (27) (Table 6.2).

Table 6.1: Number and proportion of TB cases with drug resistance by age group, England, 2014

Age group (years)	Resistant to isoniazid without MDR-TB cases*		MDR/RR-TB cases**		Total cases[#]
	n	%	n	%	n
0-4	0	0.0	0	0.0	**12**
5-14	2	4.3	0	0.0	**46**
15-24	31	5.6	9	1.6	**558**
25-34	62	5.7	24[$]	2.2	**1,088**
35-44	51	6.8	11[$]	1.5	**746**
45-54	33	6.3	7	1.3	**525**
55-64	20	5.9	4	1.2	**339**
65+	16	2.8	1	0.2	**575**
Total	**215**	**5.5**	**56**	**1.4**	**3,889**

* 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
[#] All culture confirmed cases with DST results for at least isoniazid and rifampicin
[$] Three cases aged 25-34 and one case aged 35-44 were resistant to rifampicin without MDR-TB

Where social risk factor information was known, a high proportion (18.4%, 34/185) of cases resistant to isoniazid without MDR-TB had at least one known social risk factor (current or history of drug misuse (9.3%, 18/194), alcohol misuse (6.5%, 13/199), imprisonment (6.9%, 13/188) or homelessness (4.6%, 9/198)). For both UK and non-UK born cases, the proportion of cases resistant to isoniazid without MDR-TB was higher in those with a previous history of TB compared with those without a history of TB (UK born: 8.0%, 4/50 versus 5.4%, 47/873; non-UK born: 6.9%, 9/130 versus 5.5%, 143/2,579).

Table 6.2: Most frequent countries of birth of TB cases with drug resistance, England, 2014

Country of birth*	Total cases**	Resistant to isoniazid without MDR-TB cases #		MDR/RR-TB cases $	
	n	n	%	n	%
UK	967	52	5.4	6	0.6
India	780	40	5.1	10^	1.3
Pakistan	469	27	5.8	3	0.6
Somalia	129	10	7.8	0	0.0
Philippines	75	7	9.3	2	2.7
Afghanistan	59	7	11.9	1	1.7
Bangladesh	107	7	6.5	0	0.0
Nepal	113	6	5.3	2	1.8
Lithuania	46	5	10.9	11	23.9
Eritrea	53	5	9.4	0	0.0
Nigeria	81	4	4.9	3^	3.7
Zimbabwe	69	2	2.9	3	4.3
Ethiopia	27	1	3.7	3	11.1
Latvia	15	1	6.7	3	20.0

* Top 14 countries of birth for cases resistant to isoniazid without MDR-TB and MDR/RR-TB cases in 2014
** 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
^ Two cases from Nigeria and one case from India were resistant to rifampicin without MDR-TB

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

Multi-drug resistant TB cases are resistant to both rifampicin and isoniazid. The number of TB cases with initial resistance to rifampicin without MDR-TB has decreased over the past decade, from a peak of 20 cases in 2006 to four cases in 2014 (Table A6.3). The number and proportion of MDR-TB cases with initial resistance increased from 41 (0.9%) in 2005 to a peak of 80 (1.6%) in 2011, and has since decreased to 52 (1.3%) in 2014.

Overall, there were 56 cases with resistance to rifampicin including those with MDR-TB (hereafter referred to as multi-drug resistant/rifampicin resistant TB (MDR/RR-TB)) notified in 2014 (Figure 6.1). Out of the MDR/RR-TB cases, the proportion of cases that were resistant to rifampicin without MDR-TB has decreased over the past decade from 26.8% (15/56) in 2005 to 7.1% (4/56) in 2014, so in recent years the vast majority of cases with rifampicin resistance had MDR-TB.

In 2014, a similar proportion of female and male cases had MDR/RR-TB (1.6%, 24/1,533 versus 1.4%, 32/2,356). Two percent (24/1,088) of those aged 25 to 34 years were MDR/RR-TB cases, a higher proportion than in other age groups (Table 6.1). There were no laboratory confirmed cases of MDR/RR-TB in children aged 0 to 14 years in 2013 or 2014, compared with an annual number of one to seven cases a year (median two cases) from 2005 to 2012.

The majority of MDR/RR-TB cases notified in 2014 were non-UK born (88.9%, 48/54) and had entered the UK within the past five years (56.8%, 25/44). Nearly one-third, (31.8%, 14/44) were notified within two years of entering the UK. The most frequent countries of birth of MDR/RR-TB cases were Lithuania (11), India (10), UK (6), Ethiopia (3), Latvia (3), Pakistan (3) and Zimbabwe (3) (Table 6.2). Lithuania had the highest proportion of MDR/RR-TB cases (23.9%, 11/46). The four cases notified in 2014 resistant to rifampicin without MDR-TB were from Nigeria (2), India (1) and China (1).

The proportion of cases with MDR/RR-TB was higher in those with a previous diagnosis of TB compared to those without (3.7%, 7/187 versus 1.2%, 41/3,493). A high proportion of MDR/RR-TB cases in 2014 had at least one social risk factor (16.3%, 8/49). This proportion was higher in those with a current or a history of imprisonment (7.7%, 4/52) compared with alcohol misuse (4.0%, 2/50), drug misuse (3.9%, 2/52) and homelessness (3.7%, 2/54). In 2014, 19.0% (8/42) of non-UK born MDR/RR-TB cases had at least one social risk factor, compared with none among the UK born MDR/RR-TB cases.

In addition to the culture confirmed MDR-TB cases, three TB cases notified in 2014 who were not culture confirmed in England received MDR-TB treatment. One case was a contact of a culture confirmed MDR-TB case, and the other two entered the UK having had culture and DSTs performed abroad.

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

All 56 MDR/RR-TB cases in 2014 were tested for all first line drugs (isoniazid, rifampicin, ethambutol and pyrazinamide); one-quarter (14/56) were resistant to all four and nearly half (24/56) were resistant to at least one second line drug. All of the MDR/RR-TB cases were tested for at least one injectable agent (amikacin, capreomycin or kanamycin) and at least one fluoroquinolone (either ofloxacin or moxifloxacin) (Table 6.3). In 2014, one case resistant to rifampicin without MDR-TB was also resistant to a fluoroquinolone. Among initial MDR-TB cases, seven were resistant to at least one injectable agent and ten were resistant to a fluoroquinolone; in total there were 11 pre-XDR-TB cases and three XDR-TB cases notified in 2014.

The proportion of MDR/RR-TB cases resistant to an injectable agent decreased in 2014 compared with 2013 (12.5% versus 16.2%, respectively) (Table 6.3). During the past

decade, the proportion of cases with fluoroquinolone resistance fluctuated (0.0%-23.0%) (Table 6.3). The annual fluctuation in the proportion 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 (Table 6.4 for years 2010-2014 combined).

Table 6.3: Number and proportion of MDR/RR-TB cases with resistance to an injectable agent or a fluoroquinolone, England, 2005-2014

Year	MDR/RR-TB cases	Tested for at least one injectable agent		Resistant to an injectable agent		Tested for at least one fluoroquinolone		Resistant to a fluoroquinolone	
	n	n	%	n	%	n	%	n	%
2005	56	42	75.0	0	0.0	1	1.8	0	0.0
2006	74	58	78.4	3	5.2	1	1.4	0	0.0
2007	62	52	83.9	2	3.8	28	45.2	3	10.7
2008	67	61	91.0	3	4.9	55	82.1	9	16.4
2009	70	64	91.4	5	7.8	61	87.1	7	11.5
2010	75	70	93.3	11	15.7	69	92.0	9	13.0
2011	88	87	98.9	14	16.1	87	98.9	20	23.0
2012	88	86	97.7	14	16.3	86	97.7	4	4.7
2013	79	74	93.7	12	16.2	74	93.7	11	14.9
2014	56	56	100.0	7	12.5	56	100.0	11	19.6
Total	**715**	**650**	**90.9**	**71**	**10.9**	**518**	**72.4**	**74**	**14.3**

There were three initial XDR-TB cases notified in 2014, who were born in India, Lithuania and Romania. This is similar to the two to three cases notified each year between 2008 and 2013 (with the exception of 2011 when there were six cases). Half (10/20) of XDR-TB cases notified between 2008 and 2014 were born in Lithuania, with small numbers from India (3/20, 15.0%) and China (2/20, 10.0%). No initial XDR-TB cases have occurred among the UK born over the past seven years.

Ninety percent (18/20) of XDR-TB cases notified between 2008 and 2014 were aged 15 to 44 years and the majority (12/20, 60.0%) were male. Almost all (18/20, 90.0%) XDR-TB cases had pulmonary TB. One-third (6/18) of XDR-TB cases had a previous history of TB. Nearly half (7/16, 43.8%) of XDR-TB cases had at least one social risk factor, with five reporting current or a history of homelessness, three of whom were homeless at the time of notification.

Table 6.4: 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, 2010-2014

Country of birth*	MDR/RR-TB cases	Resistant to an injectable agent		Resistant to a fluoroquinolone	
	n	n	%**	n	%**
India	102	7	7.0	23	23.2
UK	49	5	10.9	1	2.2
Lithuania	33	19	57.6	10	30.3
Pakistan	30	2	6.7	1	3.3
Nigeria	12	1	8.3	1[#]	8.3
Romania	10	3	30.0	2	20.0
Latvia	10	5	50.0	0	0.0
Nepal	10	0	0.0	2	20.0
Afghanistan	6	1	16.7	1	16.7
China	5	2	40.0	3	60.0
Myanmar	4	0	0.0	2	50.0
Russia	3	3	100.0	1	33.3

* The table shows the top 11 countries of birth for the number of MDR/RR-TB cases that are resistant to at least one injectable agent or at least one fluoroquinolone with more than one MDR/RR-TB case from that country in 2010-2014. For these countries, the total number of cases and proportions with resistance are shown.
** Proportion of MDR/RR-TB cases that are resistant to an injectable agent or a fluoroquinolone, born in the respective country
[#] One case from Nigeria in 2014 resistant to rifampicin without MDR/RR-TB was also resistant to at least one fluoroquinolone

Amplification of drug resistance on repeat culture

Amplification of resistance is classed 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 amplified resistance, even if this is within the three month period.

Nine culture confirmed cases notified in 2014 amplified resistance on repeat DST. One case amplified resistance to ethambutol, three cases amplified resistance to isoniazid, two cases with initial isoniazid resistance amplified resistance to rifampicin and therefore amplified to MDR-TB, and three MDR-TB cases amplified resistance to ethambutol and/or pyrazinamide (Table 6.5). No cases amplified to XDR-TB in this cohort, although some MDR-TB cases may still amplify resistance in the future.

Among cases that were notified between 2005 and 2014, there were 123 cases known to have amplified resistance while on treatment in England, of which 28.5% (35 cases) amplified resistance to rifampicin and 29.3% (36 cases) amplified resistance to

isoniazid. During this time period, a total of 31 cases amplified to MDR-TB because of amplified resistance to isoniazid and/or rifampicin, of which 13 cases amplified to MDR-TB after being sensitive to all drugs on initial culture. The average number of cases with amplified MDR-TB decreased over time from five cases per year between 2005 and 2008 to two cases per year between 2009 and 2014. However, it should be noted that cases who amplify resistance are recorded in the year that they were notified, not the year that they amplified resistance, therefore the numbers for recent years may still increase for those still on treatment. Of those with a treatment start date recorded between 2005 and 2014 (28 cases), the median time for MDR-TB amplification after starting treatment was 279 days (range 123-532).

Table 6.5 Number of TB cases with initial and amplified rifampicin and MDR-TB, England, 2005-2014

Year	Rifampicin resistant cases*			MDR-TB cases				Drug resistant cohort**
	Initial resistance	Amplified resistance	Total	Initial resistance	Amplified resistance	Treated as an MDR-TB case	Total	
2005	15	1	16	41	4	0	45	61
2006	20	0	20	54	4	1	59	79
2007	13	2	15	49	5	1	55	70
2008	18[#]	0	18	49	6	2	57	73
2009	11	1	12	59	2	0	61	73
2010	10	1	11	65	2	0	67	78
2011	8	0	8	80	4	0	84	92
2012	10	0	10	78	2	4	84	94
2013	11	1	12	68	0	4	72	84
2014	4	0	4	52	2	3	57	61
Total	**120**	**6**	**126**	**595**	**31**	**15**	**641**	**765**

* 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 amplified MDR/RR-TB cases and those treated as an MDR-TB case. The drug resistant cohort is used for TB outcome reporting.
[#] Two cases with initial resistance to rifampicin in 2008 amplified to MDR-TB; these cases have been included in both initial rifampicin resistant cases and MDR-TB amplified resistance. The total number in the drug resistant cohort for 2008 only counts these two cases once.

TB outcomes for the drug resistant cohort, 2004-2012[6]

For the purposes of outcome reporting, the drug resistant cohort includes MDR/RR-TB (initial and amplified) cases, as well as those without culture confirmation treated for MDR-TB. Information on 24 month outcome was available for 98.9% (93/94) of the cases in the drug resistant cohort notified in 2012 (Table 6.6, Table A6.4). Of the 94 cases, ten had initial rifampicin resistance only, eighty four had MDR-TB (78 with initial resistance, two amplified to resistant, and four cases were treated for MDR-TB without culture confirmation) (Table 6.5). Two of the MDR-TB cases had XDR-TB.

Table 6.6: TB outcome at 24 months after treatment start for drug resistant cohort, England, 2012*

TB outcome	n	%
Treatment completed	53	56.4
Died	3	3.2
Lost to follow-up	9	9.6
Still on treatment	23	24.5
Treatment stopped	5	5.3
Not evaluated**	1	1.1
Total	**94**	**100.0**

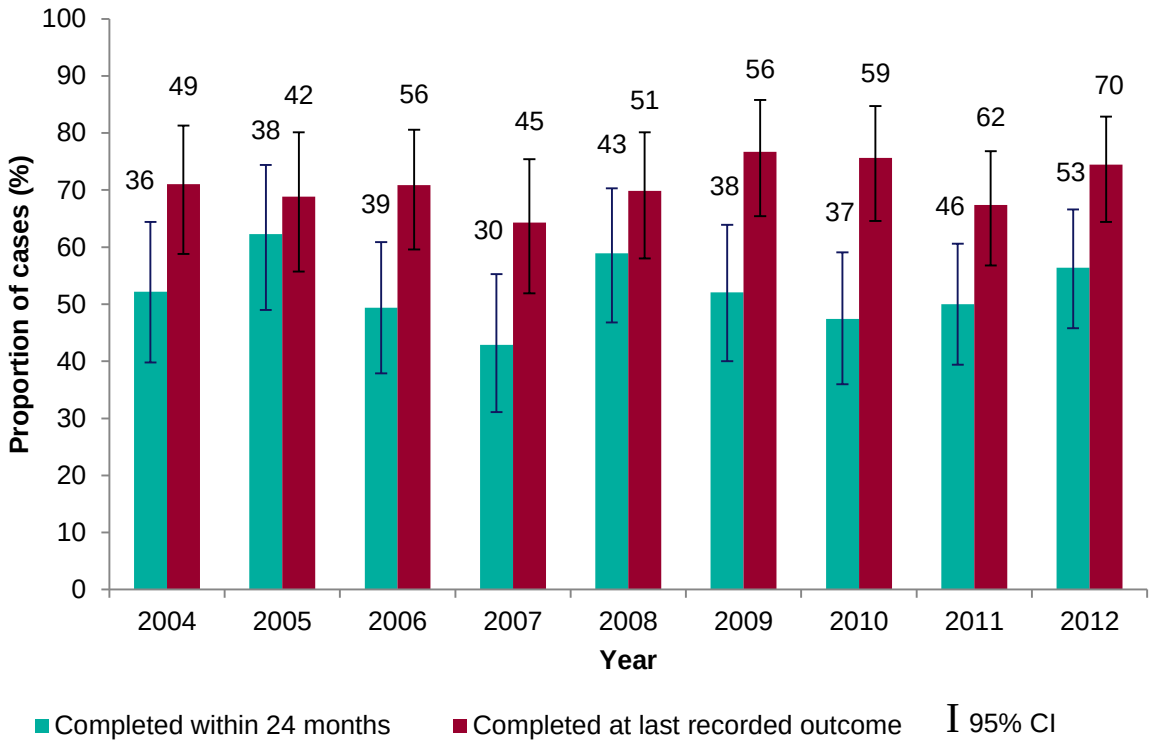
* Includes initial and amplified MDR/RR-TB and MDR-TB treatment cases only
** Not evaluated includes missing, unknown and transferred out

Treatment completion in the drug resistant cohort

Only 56.4% (53/94) of the cases in the drug resistant cohort notified in 2012 had completed treatment within 24 months of starting treatment (Figure 6.2, Table A6.4). A further 17 cases are known to have completed treatment after 24 months, bringing overall treatment completion for cases notified in 2012 to 74.5% (70/94) (Table 6.7).

[6] 24 month outcomes are only available as far back as 2004

Figure 6.2: Treatment completion for drug resistant TB cases, England, 2004-2012*



* Includes initial and amplified MDR/RR-TB and MDR-TB treatment cases only
Data labels display the number of cases completing treatment

Treatment duration[7] was recorded for 93.4% (57/61) of the cases with MDR-TB notified in 2012 known to have completed treatment. Five percent (5.4%, 3/57) of those with known treatment duration had less than 12 months of treatment, a further 8.8% (5/57) had between 12 and 18 months of treatment, 28.1% (16/57) had between 18 and 20 months of treatment 29.8% (17/57) had between 20 and 24 months of treatment and the remaining 28.1% (16/57) had more than two years of treatment (Table A6.5). Of the two XDR-TB cases notified in 2012, one had completed treatment, and one had died at the last recorded outcome.

Twenty five percent (23/94) of cases in the drug resistant cohort were still on treatment at 24 months (Table A6.4), with a planned course of treatment exceeding 24 months for 56.5% (13/23) of cases. The last recorded outcome shows that the majority (73.9%, 17/23) of those still on treatment at 24 months went on to complete treatment.

[7] Treatment duration is presented only for MDR-TB cases, and is the time between the MDR-TB treatment start date and the treatment completion date

Deaths in the drug resistant cohort

Four percent (4/94) of cases notified in 2012 had died by their last recorded outcome; all four had pulmonary TB, with one also having CNS TB (Table 6.7). In all four deaths, TB was reported to have caused or contributed to the death. Two of the cases were UK born and the other two were non-UK born. Two of the cases had a previous TB diagnosis, one of whom had initial XDR-TB during this notification. Two of the cases were started on short course treatment and died within a month of starting treatment and before DST results were available. The two cases who started on MDR-TB treatment died four months and 28 months after starting MDR-TB treatment. Only one of the four cases had social risk factors, which were homelessness, drug misuse and a history of imprisonment. Although the proportion of drug resistant cases known to have died has fluctuated over time (Table A6.6), the proportion has been 5% or lower since 2009, which is similar to the proportion known to have died in the drug sensitive cohort (Table A5.12).

Table 6.7: Last recorded TB outcome for the entire drug resistant cohort, England, 2012*

TB outcome	n	%
Treatment completed	70	74.5
Died	4	4.3
Lost to follow-up	9	9.6
Still on treatment	6	6.4
Treatment stopped	5	5.3
Total	**94**	**100.0**

* Includes initial and amplified MDR/RR-TB cases and MDR-TB treatment cases only

Lost to follow-up in the drug resistant cohort

The most common reason for MDR/RR-TB cases not completing treatment at the last recorded TB outcome was loss to follow-up (Table 6.7). In 2012, 9.6% (9/94) of drug resistant TB cases were lost to follow-up. Eight of the drug resistant TB cases lost to follow-up were non-UK born, of which six were documented to have been lost to follow-up abroad (Table A6.7). Eight of the cases lost to follow-up were aged 15 to 44 years. Seven cases lost to follow-up had pulmonary disease. The proportion of cases from the 2012 cohort lost to follow-up was lower than in previous years (Table A6.7)

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

Key messages

- there has been no reduction in the number of cases with social risk factors over the past five years; in 2014 almost 10% of TB cases had at least one social risk factor
- the proportion of UK born cases with at least one social risk factor (15%) was more than double that of the non-UK born population (7%)
- the majority of those with at least one social risk factor were male and aged 15 to 44 years
- a higher proportion of drug sensitive cases with at least one social risk factor died (5%), were lost to follow-up (8%) or had treatment stopped (3%), compared to those without a social risk factor
- a higher proportion of cases with at least one social risk factor were resistant to isoniazid without MDR-TB (9%) or had MDR/RR-TB (2%) compared to those without a social risk factor
- in 2014, TB remained concentrated in the most deprived communities with a rate almost 7 times higher in the most deprived compared with the least deprived populations

Social risk factors

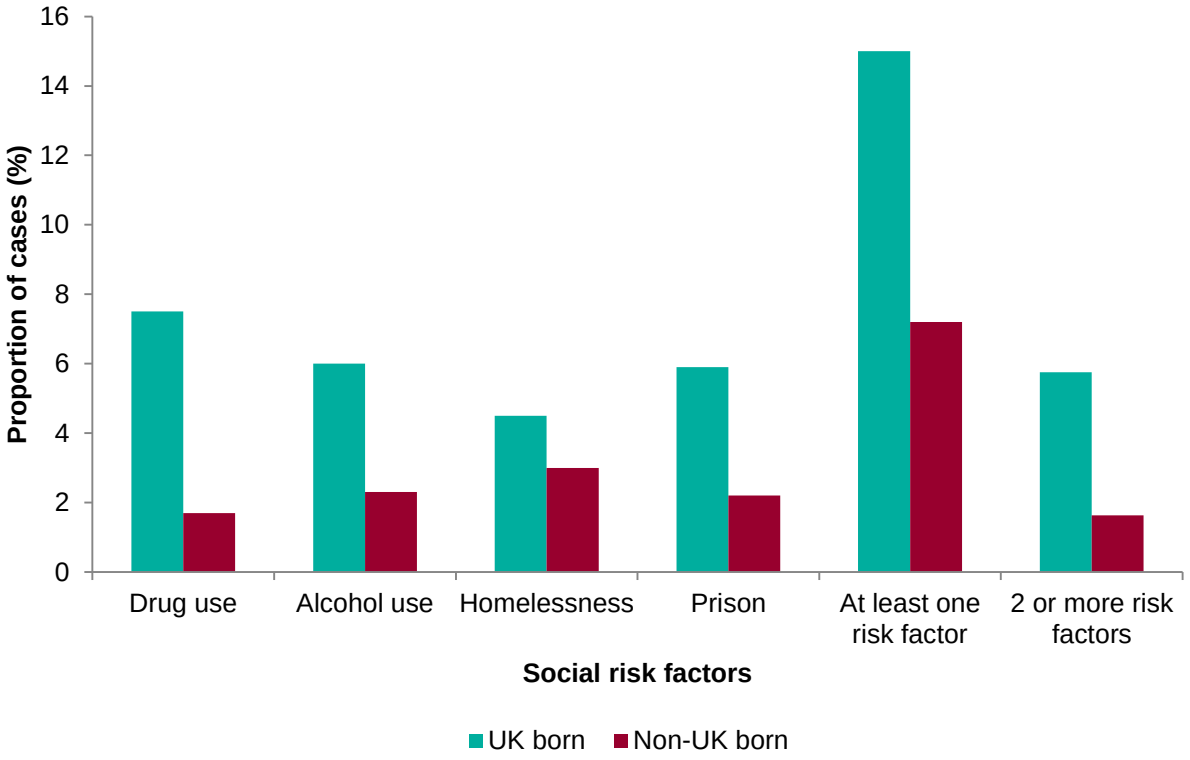
In the Enhanced TB Surveillance system (ETS), data are collected on the presence or absence of four social risk factors known to increase the risk of TB: a current or history of homelessness, imprisonment[8], drug misuse, and alcohol misuse. In 2014, among cases with known social risk factor information, 3.4% (206/6,062) had a current or a history of homelessness, 3.3% (192/5,903) of imprisonment, 3.3% (201/6,031) of drug misuse and 3.3% (198/5,988) of alcohol misuse (Table A7.1). Seventy two percent (138/192) of those currently in prison or with a history of imprisonment were reported to have been in prison in the UK, of which 41 cases were in prison at the time of notification. A total of 9.4% of cases (538/5,708) had at least one of these social risk factors (Table A7.1).

The majority of cases with at least one social risk factor were male (83.6%, 450/538) and 60.4% (325/538) were aged 15 to 44 years. Similar to previous years, in 2014, a higher proportion of UK born cases compared with non-UK born cases had at least one

[8] 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.

social risk factor (15.0%, 234/1,556 versus 7.2%, 293/4,081) (Figure 7.1, Table A7.1). In UK born cases, the highest proportion of cases with at least one social risk factor was among Black-Caribbean (31.9%, 23/72) and White (18.3%, 171/936) ethnic groups. In non-UK born cases, the highest proportion with at least one social risk factor was among White (17.7%, 52/294) and Black-African (13.8%, 104/753) ethnic groups.

Figure 7.1 Proportion of TB cases with a social risk factor by place of birth, England, 2014



In the non-UK born cases with at least one social risk factor, the largest number of cases were born in India (41/1,163, 3.5%), Somalia (29/200, 14.5%) and Eritrea (19/73, 26.0%), but the highest proportion were born in Ethiopia (11/30, 36.7%), Latvia (5/15, 33.3%) and Poland (18/60, 30.0%)[9].

Compared to cases with no known social risk factors, a higher proportion of cases with at least one social risk factor had a previous history of TB (9.0%, 46/510 versus 6.1%, 310/5,107). The majority (78.5%, 421/536) of cases with at least one social risk factor had pulmonary TB.

[9] Only countries with greater than five cases were included.

Delay from symptom onset to treatment start

The proportion of pulmonary cases with at least one social risk factor that experienced a delay from symptom onset to treatment start of more than four months notified in 2014 (31.9%, 114/357) was similar to those without a social risk factor (30.6%, 672/2,199). The highest proportion (36.4%, 51/140) of cases with a delay of more than four months was in those with current or history of imprisonment, of which three (3/28, 10.7%) were known to be in prison at notification.

Of the 28 TB cases with at least one social risk factor and a previous diagnosis of TB, 11 (39.3%) experienced a delay from symptom onset to treatment start of more than four months.

Directly observed therapy (DOT)

Over half (56.6%, 277/489) of cases with at least one social risk factor received DOT in 2014. The highest proportion of cases receiving DOT was among those with current or a history of alcohol misuse (71.6%, 131/183), followed by those with current or a history of homelessness (64.3%, 117/182), imprisonment (64.0%, 114/178) and drug misuse (62.8%, 120/191). Forty one cases notified in 2014 were in prison at notification and 92.7% (38/41) of these cases received DOT.

TB outcomes in the drug sensitive cohort

A higher proportion of drug sensitive cases with at least one social risk factor notified in 2013 died, were lost to follow-up or had treatment stopped as their last recorded outcome compared to cases with no social risk factors (Table 7.1). The proportion of cases that had died at their last recorded outcome was almost three times higher in those with alcohol misuse (8.6%, 19/221) compared to those with no alcohol misuse (3.1%, 182/5,786), and double in those with drug misuse (6.7%, 13/194) than those with no drug misuse (3.3%, 193/5,839).

Table 7.1: Last recorded TB outcome for the entire drug sensitive cohort by social risk factor*, England, 2013

Last recorded outcome	With at least one social risk factor		With no social risk factor	
	n	%	n	%
Treatment completed	409	78.2	4,664	89.3
Died	28	5.4	165	3.2
Lost to follow-up	42	8.0	155	3.0
Still on treatment	19	3.6	135	2.6
Treatment stopped	14	2.7	37	0.7
Not evaluated**	11	2.1	69	1.3
Total	**523**	**100.0**	**5,225**	**100.0**

* Excludes initial and amplified to rifampicin resistant TB and MDR-TB cases and MDR-TB treated cases
** 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)

Drug resistant TB and outcomes

In 2014, 8.6% (34/396) of TB cases with at least one social risk factor were resistant to isoniazid without MDR-TB, no cases were resistant to rifampicin without MDR-TB, 2.0% (8/396) had initial MDR/RR-TB, one case amplified to MDR-TB and no cases had XDR-TB. Over time these proportions have remained relatively stable (Table 7.2).

Table 7.2 Number and proportion of TB cases with at least one social risk factor by drug resistance, England, 2010-2014

Year	Resistant to isoniazid without MDR-TB cases*		MDR/RR-TB cases**		XDR-TB cases		Total cases with at least one social risk factor
	n	%	n	%	n	%	n
2010	36	8.1	14	3.2	1	0.2	443
2011	41	9.2	6	1.4	1	0.2	445
2012	32	7.4	11	2.6	2	0.5	430
2013	34	7.7	16[#]	3.6	2	0.5	443
2014	34	8.6	8	2.0	0	0.0	396
Total	**177**	**8.2**	**55**	**2.5**	**6**	**0.3**	**2,157**

* 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
[#] All rifampicin resistant cases had MDR-TB, apart from 2013 when there was 2 cases resistant to rifampicin without MDR-TB

A higher proportion of those with at least one social risk factor were resistant to isoniazid without MDR-TB compared to those without a social risk factor (8.6%, 34/396 versus 5.1%, 151/2,963). Among cases with at least one social risk factor, the highest proportion resistant to isoniazid without MDR-TB occurred in those with a current or history of drug misuse (11.3%, 18/159) and imprisonment (9.2%, 13/141).

Similarly, a higher proportion of cases with any social risk factor had MDR/RR-TB compared to those without social risk factors (2.0%, 8/396 versus 1.4%, 41/2,963). All of the cases with at least one social risk factor and MDR/RR-TB were non-UK born. In total, 3.7% (8/215) of non-UK born cases with at least one social risk factor had MDR/RR-TB (Table 7.3).

Table 7.3: Number and proportion of TB cases with at least one social risk factor by place of birth and drug resistance, England, 2010-2014

Year	Resistant to isoniazid without MDR-TB cases*				MDR/RR-TB cases**			
	UK born		Non-UK born		UK born		Non-UK born	
	n	%	n	%	n	%	n	%
2010	16	9.0	17	6.9	2	1.1	12	4.8
2011	21	9.8	18	8.3	0	0.0	6	2.8
2012	13	7.0	18	8.0	1	0.5	10	4.4
2013	13	6.5	19	8.0	5	2.5	11	4.6
2014	17	9.8	17	7.9	0	0.0	8	3.7
Total	**80**	**8.4**	**89**	**7.8**	**8**	**0.8**	**47**	**4.1**

* 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

For MDR/RR-TB cases notified in 2012, less than half (5/11, 45.5%) of those with at least one social risk factor had completed treatment by last reported outcome compared with three-quarters (54/71, 76.1%) of those with no social risk factors (Table 7.4). A higher proportion of cases had died, were lost to follow-up or were still on treatment at their last recorded outcome in those with at least one social risk factor compared to those with no social risk factor, although there were a small number of cases with at least one social risk factor that were drug resistant (Table 7.4).

Table 7.4: TB outcomes for drug resistant cases* at last reported outcome by social risk factor, England, 2012

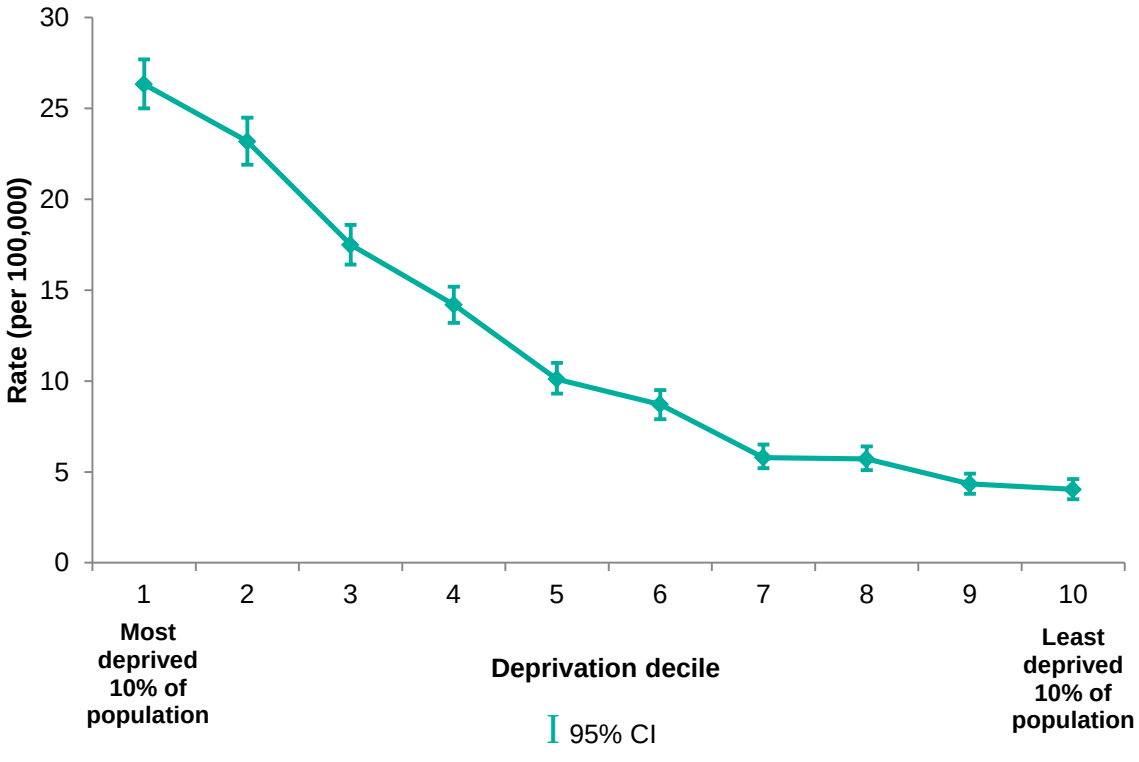
Last recorded outcome	With at least one social risk factor		With no social risk factor	
	n	%	n	%
Treatment completed	5	45.5	54	76.1
Died	1	9.1	2	2.8
Lost to follow-up	4	36.4	5	7.0
Still on treatment	1	9.1	5	7.0
Treatment stopped	0	0.0	5	7.0
Total	**11**	**100.0**	**71**	**100.0**

* Includes initial and amplified MDR/RR-TB cases and MDR-TB treatment cases only

Deprivation

In England in 2014, the rate of TB was 26.3 per 100,000 in the 10% of the population living in the most deprived areas compared with only 4.0 per 100,000 in the 10% of the population living in the least deprived areas[10], with a clear trend of an increasing rate of TB with increasing deprivation (Figure 7. 2).

Figure 7.2: Rate of TB by deprivation decile, England, 2014



[10] The Index of Multiple Deprivation (IMD) 2010, 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/6871/1871208.pdf]

8. Testing for HIV and TB-HIV co-infection

Key messages

- 92% of TB cases notified in 2014 were offered and received HIV testing; however, this was much lower for those aged 0 to 14 years (66%) and 65 years and older (82%)
- 3% of TB notified cases and unnotified isolates in 2013 were co-infected with HIV, a continuation of the downward trend observed since the peak of 8% in 2004
- the proportion of TB cases with HIV co-infection was highest in those aged 45 to 64 years (5%) and lowest in those aged 65 years and older (0.6%)
- 84% of TB-HIV co-infected cases with TB notifications in 2013 were non-UK born; the majority were born in Africa

Information on testing for HIV is collected routinely as part of the Enhanced TB Surveillance system (ETS), but HIV test results are not collected. To estimate TB-HIV co-infection, matching of TB and HIV data is performed yearly for those aged 15 and above (see Appendix III. Methods).

Testing for HIV in notified TB cases

Information on HIV testing was known for 89.3% (5,593/6,264) of TB cases notified in 2014 with previously unknown HIV status. Of these, 92.2% (5,157) of cases were offered and received HIV testing, 5.1% (288) of cases were not offered testing, and 2.6% (148) were offered HIV testing but did not receive it, of which 34.5% (51) declined (Table 8.1). The proportion of cases who had HIV testing offered and done has improved slightly over time. The proportion of cases who were offered and received HIV testing in those aged 0 to 14 (66.1%, 146/221) and 65 years and older (82.0%, 654/798) was lower compared with other age groups (Table 8.2).

Table 8.1: HIV testing in notified TB cases, England, 2011-2014

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	3,307	89.3	121	3.3	56	1.5	3,705
2012	398	7.1	4,906	87.5	196	3.5	104	1.9	5,604
2013	418	6.7	5,511	88.8	166	2.7	109	1.8	6,204
2014	288	5.1	5,157	92.2	97	1.7	51	0.9	5,593
Total	**1,325**	**6.3**	**18,881**	**89.5**	**580**	**2.7**	**320**	**1.5**	**21,106**

* Total with previously unknown HIV status where HIV testing is known

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

Table 8.2: HIV testing in notified TB cases by age group, England, 2014

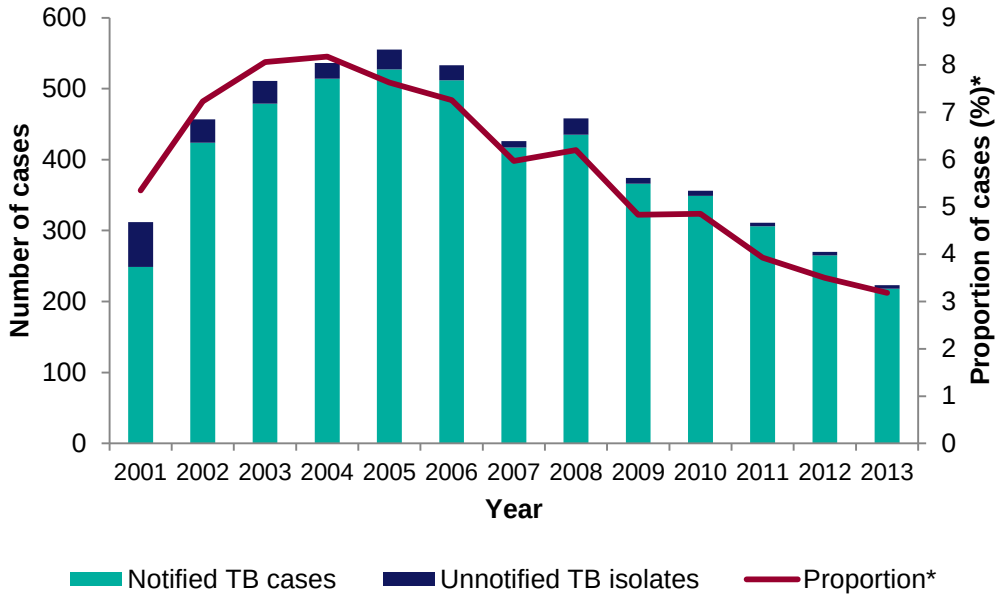
Age group (years)	HIV testing								
	Not offered		Offered and received		Offered but not received		Offered but refused		Total*
	n	%	n	%	n	%	n	%	n
0-14	68	30.8	146	66.1	5	2.3	2	0.9	221
15-44	72	2.2	3,130	95.8	42	1.3	22	0.7	3,266
45-64	42	3.2	1,227	93.8	24	1.8	15	1.1	1,308
65+	106	13.3	654	82.0	26	3.3	12	1.5	798
Total	**288**	**5.1**	**5,157**	**92.2**	**97**	**1.7**	**51**	**0.9**	**5,593**

* Total with previously unknown HIV status where HIV testing is known

TB-HIV co-infection

The most recent year for which TB-HIV co-infection data are available for England is 2013. In 2013, 3.2% (223/6,998) of TB cases aged 15 years and over (including both notified TB cases and unnotified TB isolates) were estimated to be co-infected with HIV (Figure 8.1, Table A8.1). This is a continuation of the downward trend observed since the peak of 8.2% in 2004.

Figure 8.1: Number and proportion of TB cases with HIV co-infection, England, 2001-2013

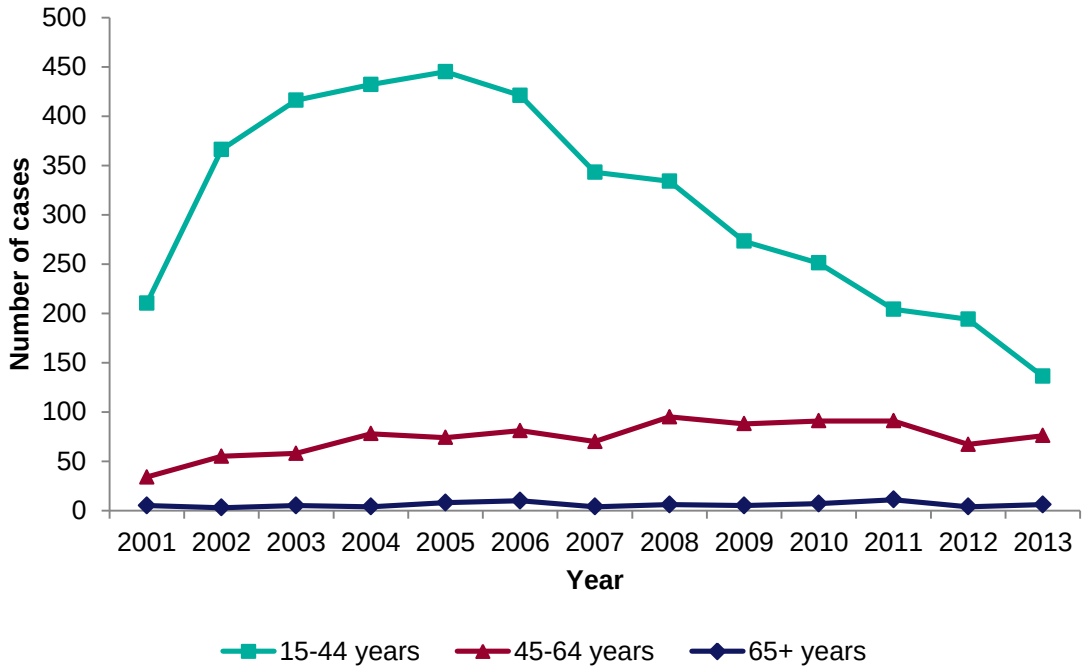


* Proportion is calculated using the number of notified TB cases with HIV co-infection plus the number of unnotified TB isolates with HIV co-infection as the numerator, and the number of all notified TB cases (with or without HIV co-infection) plus the number of unnotified TB isolates with HIV co-infection as the denominator.

Out of the 223 TB-HIV co-infected cases in 2013, 218 were notified TB cases and five were HIV cases which had MTBC isolates cultured in 2013, but could not be matched to a notified TB case. The number of HIV cases matched to a TB isolate which were not notified has decreased to only five cases per year since 2011, compared with 63 in 2001 (Table A8.1).

The proportion of TB cases notified in 2013 with HIV co-infection was 3.1% (136/4,355) in those aged 15 to 44 years, 4.7% (76/1,628) in those aged 45 to 64 years and 0.6% (6/1,010) in those aged 65 years and older. The majority (62.4%, 136/218) of TB-HIV co-infected cases with a TB notification in 2013 were aged 15 to 44 years (Figure 8.2, Table A8.2). The age of TB-HIV co-infected cases has increased since 2002, with 34.9% (76/218) of cases aged 45 to 64 years in 2013 compared with 13.0% (55/424) in 2002 (Table A8.2).

Figure 8.2 Number of TB-HIV co-infected case notifications by age group, England, 2001-2013



Eighty four percent (179/213) of TB-HIV co-infected cases with TB notifications in 2013 were non-UK born. The majority of TB-HIV co-infected cases with known place of birth were born in Africa (62.0%, 129/208), followed by Europe (26.9%, 56/208).

In 2013, 4.4% (6/137) of TB-HIV co-infected cases with TB notifications had isoniazid resistance without MDR-TB and 3.6% had MDR-TB/RR-TB (5/137) (Table A8.3), twice as high as in non-HIV co-infected TB cases.

9. Latent TB infection testing and treatment

Key messages

- LTBI testing and treatment is one of the key interventions supporting the Collaborative TB Strategy for England
- there have been a number of successful local pilots of LTBI testing and treatment, with 27 local initiatives covering 34 CCGs across England in 2014
- a systematic national LTBI testing and treatment programme is currently being rolled out in England

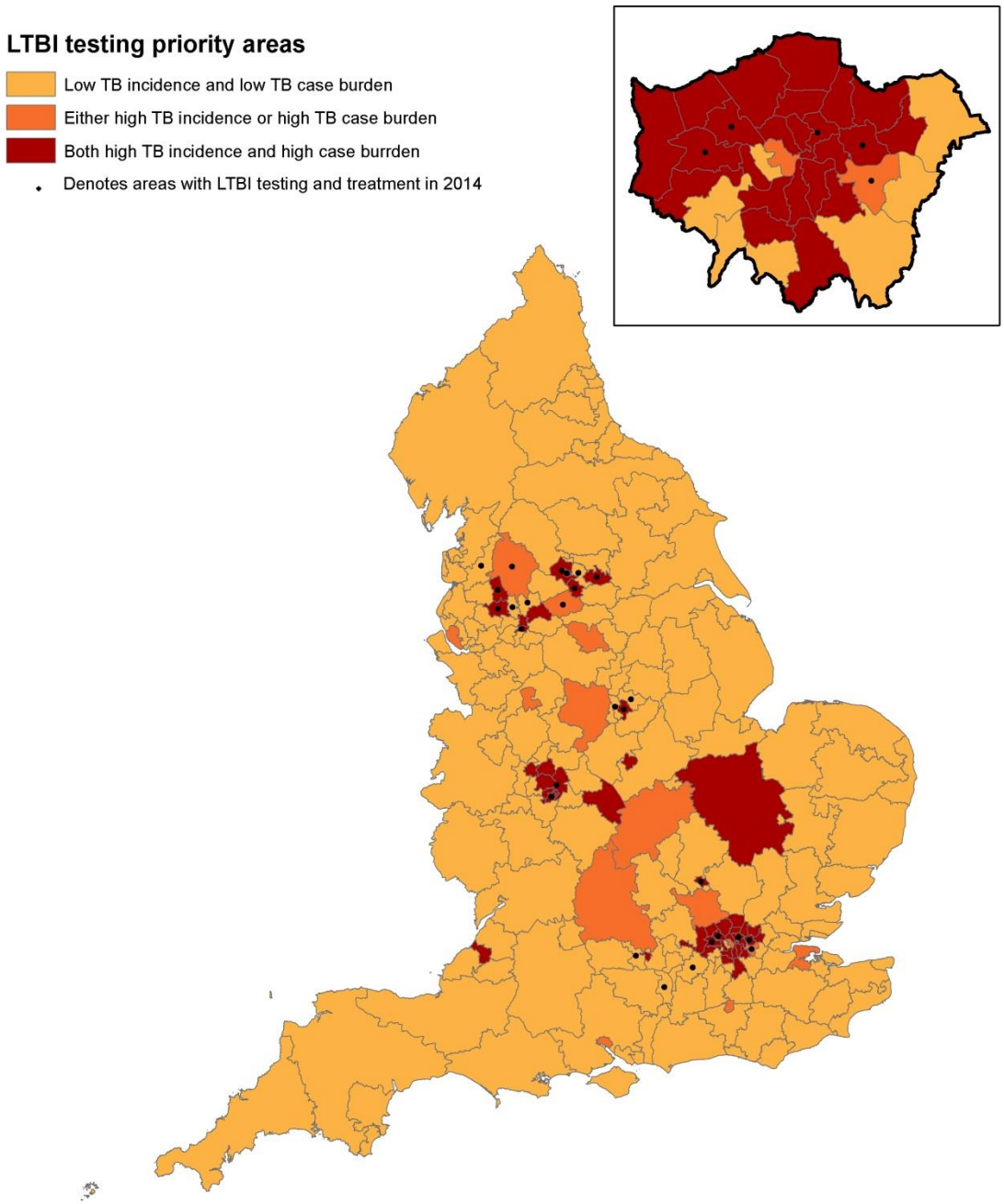
Systematic and co-ordinated testing and treatment for latent TB infection (LTBI) among migrants from high incidence countries is a fully funded key intervention recommended by the Collaborative TB Strategy for England [1].

LTBI initiatives before implementation of the Collaborative TB Strategy

An England wide survey found that in 2014 there were LTBI testing and treatment initiatives in 27 localities covering 34 Clinical Commissioning Group (CCGs) areas. Most of these were time-limited pilot initiatives; however 24 of these 27 were still ongoing in 2015. The initiatives were based in the North West (11), London (5), the South East of England (4), Yorkshire and the Humber (3), West Midlands (2), East of England (1), and the East Midlands (1). These initiatives varied significantly in size and scope, ranging from covering single GP practices to entire CCG areas, and offering testing to between a few hundred to a few thousand individuals. Figure 9.1 shows the location of LTBI testing and treatment initiatives across CCGs in 2014.

The LTBI testing and treatment initiatives also varied widely with respect to testing eligibility criteria, setting and tests used. Eligibility criteria by age differed, although most offered testing up to 35 years old. Both interferon gamma release assay (IGRA) and tuberculin skin tests (TST) were used for testing either alone or in combination. Country of birth was used to determine testing eligibility, but WHO TB incidence threshold levels by LTBI initiatives varied between 40 per 100,000 to 160 per 100,000 population. Migrants who had arrived either in the past five or 10 years were tested. The majority of initiatives were based in secondary care, although about one-third of initiatives were based in primary care and about one-fifth done as community outreach. For all initiatives, LTBI treatment took place in secondary care, except in Newham where treatment was given in primary care.

Figure 9.1: Clinical commissioning group areas which had LTBI testing and treatment initiatives in 2014 by areas of high TB incidence and/or burden* (box shows enlarged map of London area)



*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

Implementing systematic LTBI testing and treatment in England

Co-ordinated LTBI testing and treatment is currently being rolled out to migrants aged 16 to 35 years who arrived from a high TB incidence country (>150 per 100,000 or Sub-Saharan Africa) within the previous five years. Eligible persons will be offered testing for LTBI with a single IGRA test in primary care. Individuals found to have LTBI will be referred to secondary care for treatment. LTBI testing and treatment will be provided consistently across all high incidence areas in England, and subject to robust monitoring and evaluation [7].

Since April 2015, roll out of the LTBI testing and treatment programme has started, prioritising local programmes based on the CCG TB incidence and TB burden. CCG areas with an incidence of 20.0 per 100,000 and above, which also have more than 0.5% of the TB cases in England are the highest priority (46), followed by CCG areas which have either a high TB incidence or a high TB burden (13). Data on average annual number of TB cases and incidence by CCG in 2011 to 2013 were used for prioritisation. Revised data for 2012 to 2014 is presented in Table AII.2.

As of 11 September 2015, 36 of 46 (78.3%) high priority CCG areas, as well as 8 of 13 (61.5%) medium priority CCG areas have submitted LTBI initiative funding bids for consideration by their TB control board. Early implementers have adopted LTBI testing and treatment in their areas from April 2015, with the majority of areas expected to come on line between October and December 2015. LTBI testing and treatment monitoring and evaluation system is also being rolled out, and expected to start reporting from early 2016.

10. United Kingdom tuberculosis pre-entry screening programme

Key messages

- all visa applicants from countries with an estimated incidence of 40 per 100,000 and above are required to undergo screening for active pulmonary TB before entry to the UK
- almost one million screens were recorded to have taken place between October 2005 and December 2014, with a total of 1,009 TB cases detected during this period
- TB detection rates have increased from 45 per 100,000 to 159 per 100,000 between 2006 and 2014
- in 2014, 369 cases of pulmonary TB were detected through pre-entry screening

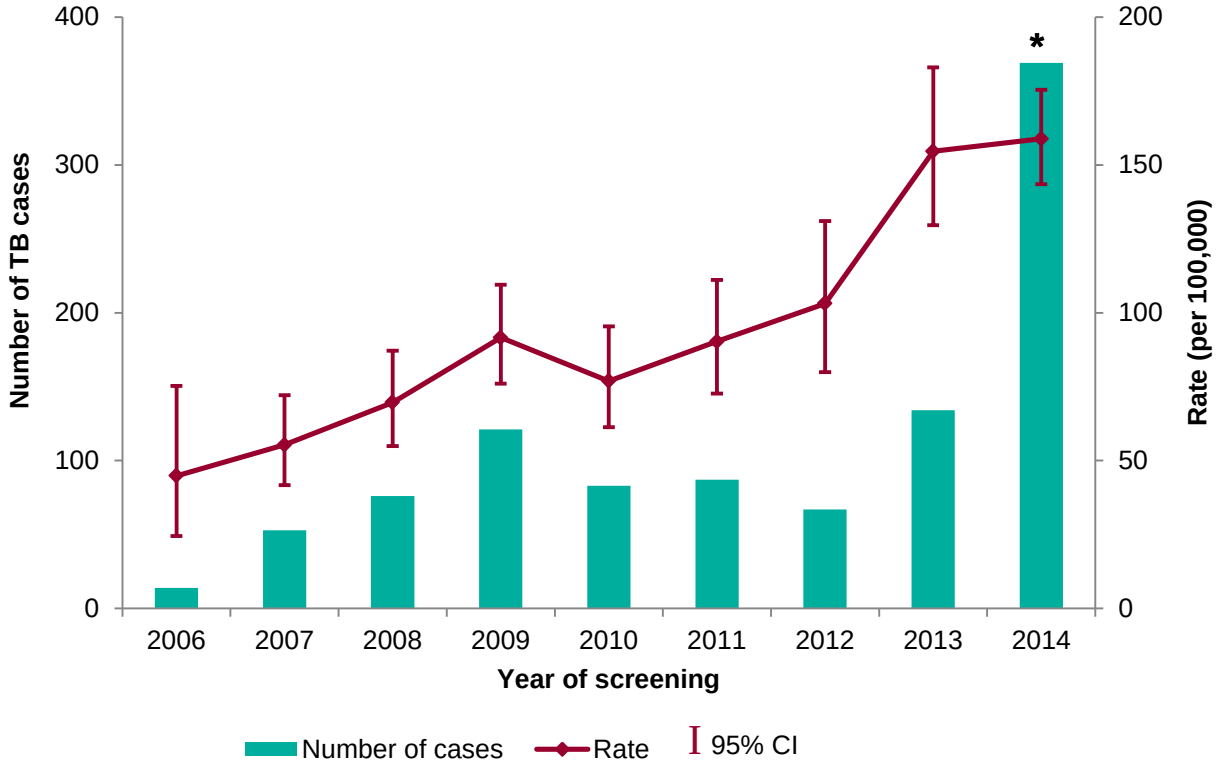
Based on a successful pilot in 15 high TB incidence countries carried out in collaboration with the International Organization of Migration (IOM) between 2005 and 2012, the UK decided to replace port based on-entry TB screening with pre-entry screening. The chest x-ray based active pulmonary TB screening has been rolled out to 101 high incidence countries between September 2012 and April 2014, when on-entry screening ceased. 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 in the country of origin [8].

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 961,725 screens took place between October 2005 and December 2014, of which 233,251 took place in 2014. The majority of the applicants were male (60.5%) and aged 15 to 34 (63.0%).

In total, 1,009 TB cases were detected between October 2005 and December 2014, giving an overall TB yield of 105 per 100,000 applications. The rate of TB was higher among females than males (121 and 85 per 100,000 applications, respectively). The majority of TB cases were detected among applicants aged 15 to 34 years old (633/1,009, 63.0%) although older age groups had higher rates. The number of TB cases diagnosed through the pre-entry screening programme has increased from 14 in 2006 to 369 in 2014, when the full roll out was completed. Over the same time period, the TB detection rate has increased from 45 per 100,000 to 159 per 100,000 (Figure 10.1, Table A10.1). These trends 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 [8]. Over the same time period,

pulmonary TB cases identified[11] within one year of entry into the UK from countries covered by the TB pre-entry programme (101 countries) has decreased from 380 in 2006 to 88 in 2014 (Figure 10.2, Table A10.2).

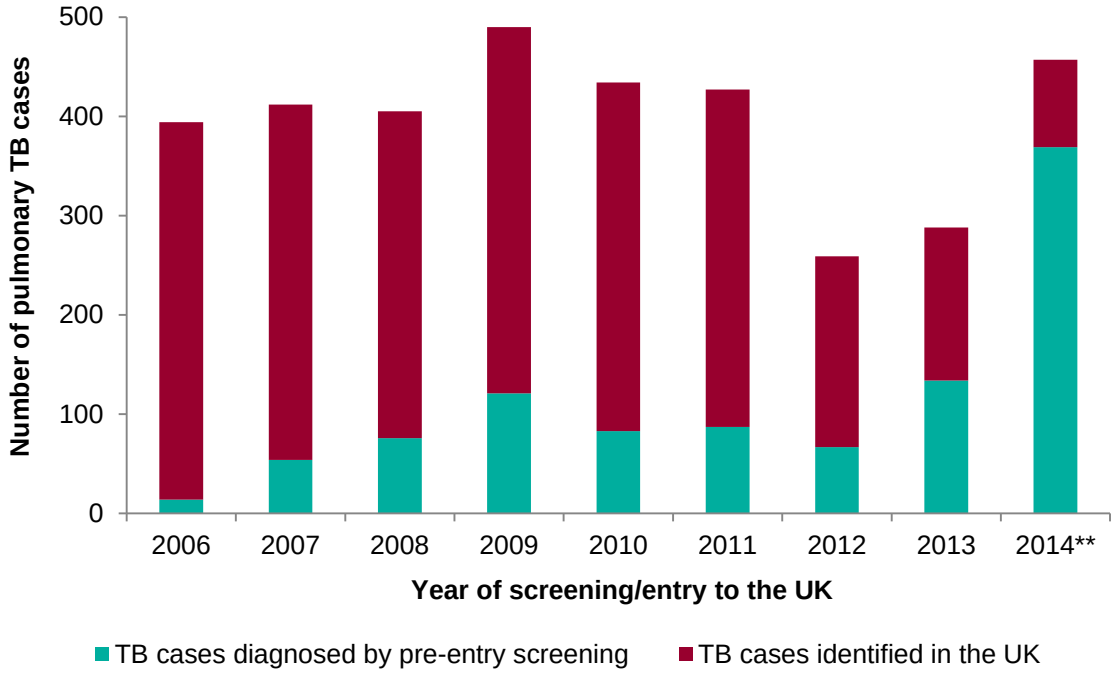
Figure 10.1: Number and rate of TB cases detected in high incidence countries through the UK pre-entry screening programme, 2006 to 2014[12]



* As of June 2015, 665 sputum samples are pending and the rate may increase when final results are available.

[11] Identified refers to the earliest date out of: notification, presentation to healthcare services, diagnosis, specimen, death and treatment start.
[12] For countries which only became part of pre-entry screening during the global roll out in 2012 to 2013, there is a possibility of under-ascertainment as clinics were establishing reporting systems during this transition phase.

Figure 10.2: Number of pulmonary TB cases diagnosed by pre-entry screening and identified within one year of UK entry*, 2006 to 2014[13]



* The number of pulmonary TB cases identified within one year of entry into the UK was from all 101 high incidence countries included in the pre-entry screening programme, but the number of TB cases diagnosed by pre-entry screening were from an increasing number of countries as screening was rolled out; 5 countries (2006), 15 countries (2007 to 2012), 101 countries (by 2014).
** As of June 2015, 665 sputum sample results are pending, and the rate may increase when final results are available.

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

11. Discussion

In January 2015, PHE and NHS England published the Collaborative TB Strategy for England 2015-2020 [1], which sets out the actions required to achieve a year on year reduction in TB incidence and a reduction in the health inequalities associated with the disease. This report of TB surveillance data for England up until the end of 2014 provides a comprehensive overview of the epidemiology of TB in England before implementation of the strategy.

The number of cases and the rate of TB in England have started to show a decline in the past three years. However, England is still the country with the highest number of TB cases in Western Europe [9, 10], with 6,520 cases, a rate of 12.0 per 100,000 population. TB continues to be concentrated in large urban centres and among the most deprived populations, with a rate almost seven times higher in the most deprived compared with the least deprived populations.

The decline in the number of TB cases and the rate over the past three years has occurred due to a decrease in the number of cases in the non-UK born population only, with particularly large reductions in the number of cases born in India, Pakistan and Somalia. These reductions are likely in part to reflect the decrease in the number of new migrants from these high TB burden countries in recent years [11], combined with the impact of pre-entry screening [12]. In 2014, UK pre-entry TB screening led to the diagnosis and treatment of 369 cases of active pulmonary TB in visa applicants, each of which represents a case of infectious TB averted in the UK. There have also been small reductions in the TB incidence in some high burden countries of origin over the past decade, which may have made a small contribution to this decline [9, 13].

Despite the reduction in the number of cases in the non-UK born population, TB rates in this population are still 15 times higher than in the UK born. While we have seen a recent reduction in the number of TB cases diagnosed among new migrants, TB continues to be diagnosed in large numbers in the settled migrant population, and the majority of cases now occur among those who have lived in the UK for more than six years. These cases can mainly be attributed to reactivation of latent TB infection (LTBI) acquired before entry to England many years earlier; the roll out of systematic testing and treatment of migrants with LTBI is therefore crucial to preventing the build-up of further reservoirs of LTBI and ongoing reactivations in future years.

In the UK born population, the incidence of TB has not declined in the past decade, in contrast to the steady decline seen in many other western countries [9]. The incidence of TB in the UK born population in England, at 3.9 per 100,000, is now three times higher than in the native born population in the United States [14]. A relatively high proportion of cases in the UK born population have social risk factors for TB (15%), and

the number of these vulnerable cases has not declined in recent years. In addition, non-White ethnic groups in the UK born have rates of TB between two and thirteen times higher than the White ethnic group, which is likely to reflect the increased risks associated with travel or exposure to people from high TB burden countries.

The rate of TB in the UK born population under 15 years of age has shown a steady decline over the past six years, which suggests a reduction of recent TB transmission in England. Improvements in early diagnosis, TB treatment completion and comprehensive contact tracing, with a particular focus on the most vulnerable populations, will be required to achieve more marked reductions in TB transmission.

It is of concern that the delay between symptom onset and starting treatment for pulmonary TB cases has lengthened over the four years during which monitoring data has been available. Nearly one-third of cases start treatment more than four months after symptom onset, which increases the opportunities for TB transmission. Current data completeness does not enable us to distinguish late presentation to health services from delays occurring within the health service. The Collaborative TB Strategy sets out the actions required to raise awareness of TB among communities and health professionals, and to ensure services are accessible to affected communities. It is also crucial that migrant communities are aware of their entitlement to free diagnostic and treatment services for TB irrespective of immigration status [15], so that they are not deterred from seeking the services they require.

It is encouraging that TB outcomes among drug sensitive cases have continued to improve, with nearly 85% of those expected to complete treatment by 12 months having done so, and a continuing reduction in the proportion of cases who died or were lost to follow-up. Improved staffing with an appropriate skill mix and stronger co-ordination and oversight of TB services, as required by the Collaborative TB Strategy, is expected to lead to further improvements.

The number of cases with MDR-TB on initial testing has decreased to 52 in 2014, with three of these cases having extensively drug resistant disease (XDR-TB). In addition to these newly notified cases, in 2014 two TB cases amplified to MDR-TB while on treatment in England. While the number of new MDR-TB cases diagnosed each year is small, the significant burden posed by MDR-TB should not be underestimated. Of the cohort of MDR-TB cases diagnosed in 2012, nearly half had not completed treatment by 24 months. MDR-TB treatment comprises complex regimens of multiple antibiotics with high toxicity, so patients require considerable social and clinical support to achieve a favourable outcome. Infection control for MDR-TB patients can also be challenging, as they remain infectious for considerably longer than drug sensitive patients. Services dealing with MDR-TB patients require facilities which address their infection control requirements at the same time as meeting their complex clinical and social needs.

TB continues to disproportionately affect the most vulnerable people in society, and the most vulnerable patients with TB continue to have the poorest outcomes. Almost one in ten TB cases had a past or current history of homelessness, drug or alcohol misuse or imprisonment. Drug sensitive TB cases with at least one of these social risk factors were more likely to die or be lost to follow-up than those without social risk factors. Cases with social risk factors were also more likely to have MDR-TB, and MDR-TB cases with social risk factors had worse outcomes. This highlights the crucial importance of tackling TB in the most under-served populations through systematic joined-up care between health and social services, the third sector, public health and housing, in addition to tackling the social and economic risk factors associated with TB.

The continued decline in the proportion of TB cases with HIV co-infection, to 3% in TB cases aged 15 years and older in 2013 is very welcome, and is likely to reflect the reduction in new HIV infections in England since 2005 [16], and the reduction in proportion of new TB patients from the highest risk communities in sub-Saharan Africa. It is encouraging that the proportion of TB cases offered and receiving an HIV test has continued to increase, to 92% in 2014; however, it is of concern that this figure is much lower for children aged under 15 years, of whom nearly one-third were not offered an HIV test. Given the importance of early diagnosis of HIV in children, it is important that paediatricians identify and overcome the barriers to offering HIV testing to this vulnerable group.

Following a successful pilot, PHE is finalising the accreditation for whole genome sequencing of TB, and planning the full deployment of this new technology. This is expected to improve our understanding of the epidemiology of TB transmission in England, as well as leading to faster speciation and resistance prediction, which should have a direct impact on patient care.

In summary, this report on the epidemiology of TB in England before the implementation of the Collaborative TB Strategy 2015-2020 demonstrates encouraging trends in overall TB rates and numbers, and ongoing improvements in some indicators of service quality. However, it is important to be aware that reductions in TB numbers and rates have been limited to the non-UK born population, particularly new migrants, and some indicators of service quality have not improved.

To achieve reductions in TB in England over the next five years, including in both new and settled migrants, in the UK born population and among the most vulnerable groups, will require us to build upon existing achievements and address gaps in current service provision. This will require the sustained and co-ordinated action of all key stakeholders, supported and overseen by the newly established TB control boards and national TB programme office.

References

1. Collaborative tuberculosis strategy for England: 2015-2020 https://www.gov.uk/government/publications/collaborative-tuberculosis-strategy-for-england

2. Schurch AC, Kremer K, Daviena O, et al. *High-resolution typing by integration of genome sequencing data in a large tuberculosis cluster*. J Clin Microbiol. 2010; 48: 3403–06.

3. Gardy JL, Johnston JC, Sui SJH, et al. *Whole-genome sequencing and social-network analysis of a tuberculosis outbreak*. N Engl J Med. 2011; 364: 730–39.

4. Walker TM, Ip CL, Harrell RH, et al. *Whole-genome sequencing to delineate Mycobacterium tuberculosis outbreaks: a retrospective observational study*. The Lancet Infectious Diseases. 2013; 13(2):137-46.

5. Walker, TM, Lalor MK, Broda A, et al. *Assessment of Mycobacterium tuberculosis transmission in Oxfordshire, UK, 2007–12, with whole pathogen genome sequences: an observational study*. The Lancet Respiratory Medicine. 2014; 2(4): 285-292.

6. Definitions and reporting framework for tuberculosis – 2013 revision. WHO 2013. http://apps.who.int/iris/bitstream/10665/79199/1/9789241505345_eng.pdf

7. Latent TB testing and treatment for migrants: a practical guide for commissioners and practitioners https://www.gov.uk/government/publications/latent-tb-infection-ltbi-testing-and-treatment

8. UK tuberculosis technical instructions (UKTBTI) https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/245009/UK_tuberculosis_technical_instructions.pdf

9. World Health Organisation Global Tuberculosis Report 2014 http://apps.who.int/iris/bitstream/10665/137094/1/9789241564809_eng.pdf?ua=1

10. Tuberculosis surveillance and monitoring in Europe 2015. European Centre for Disease Control. http://ecdc.europa.eu/en/publications/Publications/tuberculosis-surveillance-monitoring-Europe-2015.pdf

11. Home Office Immigration Statistics, January to March 2015: data tables https://www.gov.uk/government/statistics/immigration-statistics-january-to-march-2015-data-tables

12. United Kingdom Pre-entry Tuberculosis Screening Report 2014 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/442201/UK_pre-entry_tuberculosis_screening_report_2014_gateway_approved.pdf

13. The World Bank World Development Indicators. TB incidence per 100,000 people. http://data.worldbank.org/indicator/SH.TBS.INCD

14. Reported tuberculosis in the United States 2013, Centre for Disease Control. http://www.cdc.gov/tb/statistics/reports/2013/pdf/report2013.pdf

15. Department of Health. Guidance on implementing the overseas visitor hospital charging regulations 2015. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/418634/Implementing_overseas_charging_regulations_2015.pdf

16. Yin Z, Brown AE, Hughes G, Nardone A, Gill ON, Delpech VC & contributors. HIV in the United Kingdom 2014 Report: data to end 2013. November 2014. Public Health England, London. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/401662/2014_PHE_HIV_annual_report_draft_Final_07-01-2015.pdf

17. Aldridge RW, Shaji K, Hayward AC, Abubakar I. Accuracy of probabilistic linkage using the enhanced matching system for public health and epidemiological studies. PLOS one 2015; 10(8): e0136179.

18. TB Strain Typing Cluster Investigation Handbook, 3rd Edition, 2014. http://webarchive.nationalarchives.gov.uk/20140714084352/http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1317140774833

19. Department of Health. Tuberculosis prevention and treatment: a toolkit for planning, commissioning and delivering high-quality services in England, 2007. http://webarchive.nationalarchives.gov.uk/20130107105354/http:/www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_075621

Appendix I. Supplementary tables

Table A1.1: TB case notifications, rates and annual percentage change, England, 2000-2014

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	6,170	12.5 (12.2 -12.8)	2.1	1.6
2002	6,674	13.4 (13.1 -13.8)	8.2	7.2
2003	6,630	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	7,681	15.1 (14.7 -15.4)	0.3	0.0
2007	7,578	14.7 (14.4 -15.1)	-1.3	-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	7,677	14.6 (14.3 -14.9)	-5.4	-5.8
2011	8,276	15.6 (15.2 -15.9)	7.8	6.8
2012	8,086	15.1 (14.8 -15.4)	-2.3	-3.2
2013	7,257	13.5 (13.2 -13.8)	-10.3	-10.6
2014	6,520	12.0 (11.7 -12.3)	-10.2	-11.1

CI - confidence intervals

Table A1.2: TB case notifications and rates by PHE centre, England, 2000-2014

Year	PHE Centre									
	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)	623	9.2 (8.5 -9.9)	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)	480	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)	541	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	3,449	45.9 (44.4 -47.4)	920	17.1 (16.0 -18.2)	583	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)	660	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	3,242	40.2 (38.8 -41.6)	872	15.7 (14.6 -16.7)	710	8.5 (7.9 -9.2)	809	11.5 (10.7 -12.3)	628	12.0 (11.0 -12.9)
2011	3,489	42.5 (41.1 -44.0)	1,004	17.9 (16.8 -19.0)	814	9.7 (9.0 -10.4)	816	11.6 (10.8 -12.4)	664	12.6 (11.6 -13.5)
2012	3,402	40.9 (39.6 -42.3)	1,075	19.1 (17.9 -20.2)	776	9.2 (8.5 -9.8)	775	10.9 (10.2 -11.7)	593	11.2 (10.3 -12.1)
2013	2,965	35.2 (34.0 -36.5)	980	17.3 (16.2 -18.4)	682	8.0 (7.4 -8.6)	717	10.1 (9.4 -10.9)	584	10.9 (10.1 -11.9)
2014	2,572	30.1 (29.0 -31.3)	782	13.7 (12.7 -14.7)	670	7.8 (7.2 -8.4)	646	9.1 (8.4 -9.8)	524	9.8 (9.0 -10.7)

CI - confidence intervals

Table A1.2: TB case notifications and rates by PHE centre, England, 2000-2014 continued

Year	PHE Centre							
	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)	495	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)	306	5.8 (5.1 -6.5)	131	5.0 (4.2 -6.0)
2012	502	8.1 (7.5 -8.9)	496	10.9 (9.9 -11.9)	300	5.6 (5.0 -6.3)	167	6.4 (5.5 -7.5)
2013	453	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	438	7.0 (6.3 -7.7)	399	8.6 (7.8 -9.5)	321	5.9 (5.3 -6.6)	168	6.4 (5.5 -7.5)

CI - confidence intervals

Table A1.3 TB case notifications and rates by age group and place of birth, England, 2014

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	74	2.2 (1.8 -2.8)	11	10.1 (5.0 -18.1)	87	2.5 (2.0 - 3.1)
5-9	57	1.9 (1.4 -2.4)	22	10.6 (6.6 -16.0)	79	2.4 (1.9 - 3.0)
10-14	56	2.1 (1.6 -2.7)	38	15.4 (10.9 -21.1)	97	3.3 (2.6 - 4.0)
15-19	134	4.7 (4.0 -5.6)	155	50.2 (42.6 -58.7)	295	9.1 (8.1 -10.2)
20-24	138	4.5 (3.8 -5.4)	368	69.9 (63.0 -77.5)	515	14.3 (13.1 -15.6)
25-29	134	4.7 (4.0 -5.6)	663	78.0 (72.1 -84.1)	808	21.7 (20.3 -23.3)
30-34	121	4.6 (3.8 -5.5)	734	71.7 (66.6 -77.1)	866	23.4 (21.8 - 25.0)
35-39	107	4.4 (3.6 -5.3)	568	60.3 (55.4 -65.5)	685	20.2 (18.7 - 21.7)
40-44	123	4.2 (3.5 -5.0)	434	57.1 (51.9 -62.7)	565	15.2 (14.0 -16.5)
45-49	122	3.7 (3.1 -4.4)	373	61.2 (55.1 -67.7)	501	12.8 (11.7 -14.0)
50-54	118	3.7 (3.1 -4.5)	264	51.6 (45.6 -58.2)	396	10.7 (9.6 -11.8)
55-59	99	3.6 (2.9 -4.4)	238	58.3 (51.1 -66.2)	340	10.7 (9.6 -11.9)
60-64	82	3.2 (2.5 -4.0)	200	62.3 (53.9 -71.5)	291	10.0 (8.9 -11.2)
65-69	105	3.9 (3.2 -4.7)	133	55.5 (46.5 -65.8)	243	8.2 (7.2 - 9.3)
70-74	79	4.1 (3.2 -5.1)	146	68.9 (58.2 -81.1)	233	10.7 (9.3 -12.1)
75-79	100	6.4 (5.2 -7.8)	134	76.7 (64.3 -90.9)	248	13.9 (12.2 -15.7)
80+	125	5.8 (4.9 -7.0)	129	66.5 (55.5 -79.0)	271	10.5 (9.3-11.8)

* Total cases including those with an unknown place of birth

CI - confidence intervals

Table A1.4: TB case notifications, rates and annual percentage change by place of birth, England, 2000-2014

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	3,432	79.1 (76.5 -81.8)	3.1	-0.6
2002	1,852	4.2 (4.0 -4.4)	-2.0	-2.3	4,110	90.5 (87.7 -93.3)	19.8	14.4
2003	1,703	3.8 (3.6 -4.0)	-8.0	-9.5	4,327	90.8 (88.1 -93.5)	5.3	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	5,174	92.9 (90.4 -95.4)	-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)	-0.7	-8.0
2008	1,865	4.2 (4.0 -4.4)	3.7	5.0	5,417	86.0 (83.7 -88.3)	5.5	0.6
2009	1,906	4.2 (4.1 -4.4)	2.2	0.0	5,663	86.8 (84.6 -89.1)	4.5	0.9
2010	1,815	4.0 (3.8 -4.2)	-4.8	-4.8	5,515	83.1 (80.9 -85.3)	-2.6	-4.3
2011	1,954	4.3 (4.1 -4.5)	7.7	7.5	6,019	85.8 (83.7 -88.0)	9.1	3.2
2012	2,005	4.4 (4.2 -4.6)	2.6	2.3	5,841	81.4 (79.4 -83.6)	-3.0	-5.1
2013	1,843	4.0 (3.9 -4.2)	-8.1	-9.1	5,249	70.5 (68.6 -72.4)	-10.1	-13.4
2014	1,774	3.9 (3.7 -4.1)	-3.7	-2.5	4,610	60.3 (58.6 -62.1)	-12.2	-14.5

CI - confidence intervals

Table A1.5: Number and proportion of TB case notifications by most frequent country of birth in non-UK born population, England, 2000-2014

	Country of birth																
	India		Pakistan		Somalia		Bangladesh		Nepal		Nigeria		Philippines		Zimbabwe		Total*
Year	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n
2000	722	23.2	676	21.7	362	11.6	102	3.3	19	0.6	47	1.5	28	0.9	78	2.5	3,115
2001	668	20.6	716	22.1	360	11.1	109	3.4	28	0.9	47	1.5	35	1.1	110	3.4	3,237
2002	780	19.9	774	19.8	428	10.9	158	4.0	33	0.8	89	2.3	51	1.3	240	6.1	3,911
2003	789	19.3	729	17.9	473	11.6	182	4.5	34	0.8	116	2.8	52	1.3	275	6.7	4,083
2004	904	20.8	699	16.1	532	12.3	183	4.2	37	0.9	136	3.1	74	1.7	270	6.2	4,338
2005	1,099	22.4	832	16.9	580	11.8	191	3.9	36	0.7	153	3.1	69	1.4	269	5.5	4,917
2006	1,111	22.5	837	17.0	641	13.0	182	3.7	67	1.4	154	3.1	86	1.7	242	4.9	4,929
2007	1,188	24.3	796	16.3	551	11.3	243	5.0	69	1.4	150	3.1	92	1.9	203	4.2	4,887
2008	1,328	25.6	882	17.0	531	10.3	239	4.6	90	1.7	165	3.2	111	2.1	201	3.9	5,178
2009	1,531	28.2	921	16.9	535	9.8	235	4.3	114	2.1	174	3.2	114	2.1	158	2.9	5,437
2010	1,552	29.1	881	16.5	439	8.2	259	4.9	175	3.3	169	3.2	131	2.5	189	3.5	5,325
2011	1,787	30.4	1,061	18.0	415	7.1	285	4.8	214	3.6	190	3.2	100	1.7	152	2.6	5,882
2012	1,762	30.7	1,048	18.3	377	6.6	276	4.8	209	3.6	174	3.0	125	2.2	129	2.3	5,731
2013	1,541	29.9	1,043	20.2	289	5.6	236	4.6	163	3.2	156	3.0	125	2.4	105	2.0	5,155
2014	1,288	28.5	791	17.5	230	5.1	207	4.6	168	3.7	118	2.6	111	2.5	107	2.4	4,523
Total	**18,050**	**25.5**	**12,686**	**18.0**	**6,743**	**9.5**	**3,087**	**4.4**	**1,456**	**2.1**	**2,038**	**2.9**	**1,304**	**1.8**	**2,728**	**3.9**	**70,648**

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

Table A1.5: Number and proportion of TB case notifications by most frequent country of birth in non-UK born population, England, 2000-2014 continued

	Country of birth														
	Afghanistan		Romania		Eritrea		Kenya		Sri Lanka		Poland		Other		Total*
Year	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n
2000	43	1.4	5	0.2	26	0.8	92	3.0	50	1.6	10	0.3	855	27.4	3,115
2001	66	2.0	5	0.2	18	0.6	109	3.4	66	2.0	9	0.3	891	27.5	3,237
2002	100	2.6	8	0.2	26	0.7	110	2.8	82	2.1	10	0.3	1,022	26.1	3,911
2003	65	1.6	11	0.3	43	1.1	109	2.7	66	1.6	15	0.4	1,124	27.5	4,083
2004	78	1.8	8	0.2	33	0.8	130	3.0	81	1.9	13	0.3	1,160	26.7	4,338
2005	83	1.7	11	0.2	43	0.9	134	2.7	85	1.7	12	0.2	1,320	26.8	4,917
2006	73	1.5	6	0.1	64	1.3	106	2.2	62	1.3	30	0.6	1,268	25.7	4,929
2007	83	1.7	15	0.3	66	1.4	126	2.6	92	1.9	36	0.7	1,177	24.1	4,887
2008	92	1.8	19	0.4	86	1.7	124	2.4	86	1.7	53	1.0	1,171	22.6	5,178
2009	97	1.8	25	0.5	93	1.7	110	2.0	91	1.7	43	0.8	1,196	22.0	5,437
2010	95	1.8	44	0.8	81	1.5	96	1.8	86	1.6	48	0.9	1,080	20.3	5,325
2011	104	1.8	54	0.9	98	1.7	116	2.0	107	1.8	61	1.0	1,138	19.3	5,882
2012	76	1.3	77	1.3	78	1.4	95	1.7	97	1.7	62	1.1	1,146	20.0	5,731
2013	66	1.3	69	1.3	58	1.1	85	1.6	95	1.8	63	1.2	1,061	20.6	5,155
2014	96	2.1	88	1.9	83	1.8	81	1.8	78	1.7	70	1.5	1,007	22.3	4,523
Total	**1,217**	**1.7**	**445**	**0.6**	**896**	**1.3**	**1,623**	**2.3**	**1,224**	**1.7**	**535**	**0.8**	**16,616**	**23.5**	**70,648**

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

Table A1.6: Time between entry to the UK and TB notification for non-UK born cases by year, England, 2005-2014

	Time (years) between entry to the UK and TB notification								
	<2		2-6		6-11		11+		Total*
Year	n	%	n	%	n	%	n	%	n
2005	1,256	27.9	1,562	34.7	516	11.5	1,169	26.0	4,503
2006	1,112	25.5	1,503	34.4	580	13.3	1,169	26.8	4,364
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	1,072	22.5	1,367	28.7	938	19.7	1,382	29.0	4,759
2011	1,184	22.4	1,408	26.6	1,087	20.5	1,611	30.5	5,290
2012	1,022	19.5	1,462	27.8	1,047	19.9	1,723	32.8	5,254
2013	684	14.1	1,413	29.2	1,012	20.9	1,726	35.7	4,835
2014	591	14.0	1,083	25.7	886	21.0	1,656	39.3	4,216

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

Table A1.7 TB case notifications and rates by ethnic group and place of birth, England, 2014

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	1,091	2.6 (2.4 - 2.8)	331	9.1 (8.2 - 10.2)
Black-Caribbean	78	21.3 (16.8 - 26.5)	55	27.3 (20.6 - 35.5)
Black-African	120	27.5 (22.8 - 32.9)	882	132.6 (124.0 - 141.7)
Black-Other	20	39.5 (24.2 - 61.1)	43	119.2 (86.3 - 160.6)
Indian	134	19.4 (16.3 - 23.0)	1,419	171.6 (162.8 - 180.7)
Pakistani	191	28.5 (24.6 - 32.8)	810	164.8 (153.6 - 176.5)
Bangladeshi	36	14.0 (9.8 - 19.3)	205	112.0 (97.2 - 128.4)
Chinese	8	9.8 (4.2 - 19.2)	78	37.9 (29.9 - 47.3)
Mixed / Other	86	7.2 (5.8 - 8.9)	754	54.2 (50.4 - 58.2)

CI - confidence intervals

Table A1.8 TB case notifications by age group and ethnic group in UK born cases, England, 2000-2014

Year	White ethnic group									Non-White ethnic groups*								
	Age group (years)								Total	Age group (years)								Total
	0-14		15-44		45-64		65+			0-14		15-44		45-64		65+		
	n	%	n	%	n	%	n	%		n	%	n	%	n	%	n	%	
2000	44	3.5	308	24.4	420	33.3	489	38.8	1,261	162	29.3	376	68.1	10	1.8	4	0.7	552
2001	65	5.0	359	27.4	369	28.2	516	39.4	1,309	162	28.7	390	69.1	11	2.0	1	0.2	564
2002	42	3.4	309	25.1	389	31.7	489	39.8	1,229	179	29.5	418	68.9	7	1.2	3	0.5	607
2003	44	3.7	335	28.1	364	30.6	448	37.6	1,191	131	26.3	356	71.5	8	1.6	3	0.6	498
2004	67	5.8	321	27.6	365	31.4	411	35.3	1,164	189	31.1	400	65.8	15	2.5	4	0.7	608
2005	38	3.4	344	30.8	339	30.4	395	35.4	1,116	206	31.0	440	66.2	15	2.3	4	0.6	665
2006	42	3.8	321	29.3	341	31.2	390	35.6	1,094	163	26.1	445	71.3	14	2.2	2	0.3	624
2007	59	5.6	309	29.4	321	30.5	362	34.4	1,051	228	31.0	487	66.3	19	2.6	1	0.1	735
2008	56	5.3	313	29.9	331	31.6	347	33.1	1,047	233	29.2	534	66.9	30	3.8	1	0.1	798
2009	40	3.6	347	31.1	353	31.7	374	33.6	1,114	208	27.7	492	65.6	49	6.5	1	0.1	750
2010	41	3.9	272	25.8	361	34.2	381	36.1	1,055	196	26.8	489	66.9	46	6.3	0	0.0	731
2011	48	4.2	338	29.8	362	31.9	387	34.1	1,135	183	23.5	541	69.4	53	6.8	2	0.3	779
2012	51	4.3	330	27.9	412	34.9	389	32.9	1,182	202	25.3	533	66.6	63	7.9	2	0.3	800
2013	38	3.5	289	26.4	376	34.4	391	35.7	1,094	152	20.9	489	67.2	85	11.7	2	0.3	728
2014	34	3.1	304	27.9	348	31.9	405	37.1	1,091	152	22.6	445	66.1	72	10.7	4	0.6	673
Total	**709**	**4.1**	**4,799**	**28.0**	**5,451**	**31.8**	**6,174**	**36.0**	**17,133**	**2746**	**27.2**	**6,835**	**67.6**	**497**	**4.9**	**34**	**0.3**	**10,112**

* Cases with Black-Caribbean, Black-African, Black-Other, Indian, Pakistani, Bangladeshi, Chinese and Mixed/Other ethnic groups were grouped as ‘non-White’.

Table A1.9: Number and proportion of TB case notifications by site of disease and place of birth, England, 2005-2014

Year	All cases*					UK born					Non-UK born				
	Pulmonary**		Extra-pulmonary#		Total	Pulmonary**		Extra-pulmonary#		Total	Pulmonary**		Extra-pulmonary#		Total
	n	%	n	%	n	n	%	n	%	n	n	%	n	%	n
2005	4,319	56.6	3,315	43.4	**7,634**	1,289	71.7	510	28.3	**1,799**	2,685	51.9	2,490	48.1	**5,175**
2006	4,297	56.1	3,360	43.9	**7,657**	1,239	72.0	482	28.0	**1,721**	2,630	50.9	2,536	49.1	**5,166**
2007	4,143	54.9	3,408	45.1	**7,551**	1,224	68.4	566	31.6	**1,790**	2,536	49.5	2,592	50.5	**5,128**
2008	4,280	55.2	3,470	44.8	**7,750**	1,324	71.4	531	28.6	**1,855**	2,660	49.4	2,722	50.6	**5,382**
2009	4,408	54.7	3,651	45.3	**8,059**	1,350	71.4	541	28.6	**1,891**	2,739	48.5	2,906	51.5	**5,645**
2010	4,070	53.2	3,576	46.8	**7,646**	1,250	69.2	557	30.8	**1,807**	2,587	47.1	2,911	52.9	**5,498**
2011	4,285	52.0	3,952	48.0	**8,237**	1,372	71.1	558	28.9	**1,930**	2,743	45.7	3,264	54.3	**6,007**
2012	4,188	52.0	3,862	48.0	**8,050**	1,359	68.2	634	31.8	**1,993**	2,695	46.2	3,138	53.8	**5,833**
2013	3,713	51.4	3,515	48.6	**7,228**	1,245	68.0	586	32.0	**1,831**	2,377	45.4	2,861	54.6	**5,238**
2014	3,434	52.9	3,059	47.1	**6,493**	1,198	68.0	565	32.0	**1,763**	2,155	46.9	2,442	53.1	**4,597**

* Total cases including those with an unknown place of birth

** With or without extra-pulmonary disease

Extra-pulmonary disease only

Table A1.10: Number of TB cases receiving directly observed therapy (DOT) by age group, England, 2005-2014

Year	Age group (years)								Total*
	0-14		15-44		45-64		65+		
	n	%	n	%	n	%	n	%	n
2005	46	11.1	331	6.9	86	6.3	63	6.0	**526**
2006	47	13.0	249	5.2	83	5.8	45	4.3	**424**
2007	53	11.7	234	5.0	76	5.4	48	4.8	**411**
2008	77	19.2	264	6.1	81	6.1	52	6.1	**474**
2009	58	22.7	293	9.0	116	10.8	54	8.4	**521**
2010	67	24.7	282	7.4	117	9.4	71	9.3	**537**
2011	72	20.4	363	7.6	145	9.2	100	10.8	**680**
2012	100	28.0	370	8.0	167	10.9	110	11.8	**747**
2013	65	24.3	344	8.3	184	12.2	112	12.9	**705**
2014	74	30.0	375	10.7	187	13.1	105	12.1	**741**

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

Table A2.1 Number and proportion of culture confirmed TB cases 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	2,043	59.2	2,019	60.7	1,836	56.8	1,935	57.6	1,909	56.1	1,953	60.2	2,088	59.9	2,090	61.4	1,768	59.6	1,530	59.5
West Midlands	525	57.1	539	58.1	556	59.9	542	53.8	584	58.1	524	60.1	614	61.2	589	54.8	551	56.2	423	54.1
South East	381	65.4	413	68.0	396	63.1	381	60.6	420	58.9	435	61.3	490	60.2	487	62.8	440	64.5	431	64.3
North West	414	55.7	418	60.2	430	58.6	427	58.5	481	60.2	490	60.6	506	62.0	469	60.5	448	62.5	389	60.2
Yorkshire and the Humber	339	61.0	393	59.6	383	60.6	357	56.2	401	58.3	363	57.8	379	57.1	346	58.4	365	62.5	328	62.6
East of England	318	67.7	309	64.5	253	60.1	304	60.1	294	57.4	307	60.7	352	62.9	312	62.2	283	62.5	288	65.8
East Midlands	291	54.6	311	55.0	309	57.9	286	59.2	280	53.4	298	60.2	296	60.2	297	59.9	243	58.8	234	58.7
South West	175	65.8	170	61.2	160	59.5	191	68.5	195	64.4	142	53.6	200	65.4	190	63.3	186	57.2	177	55.1
North East	96	72.7	101	71.6	127	64.8	115	65.0	109	66.1	97	64.7	104	79.4	115	68.9	106	76.8	114	67.9
England	**4,585**	**59.9**	**4,674**	**60.9**	**4,452**	**58.8**	**4,538**	**58.1**	**4,673**	**57.6**	**4,609**	**60.0**	**5,029**	**60.8**	**4,895**	**60.5**	**4,390**	**60.5**	**3,914**	**60.0**

* Ordered by decreasing total number of cases in 2014

Table A2.2 Number and proportion of pulmonary culture confirmed TB cases 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	1,313	70.1	1,289	71.2	1,121	67.3	1,176	67.2	1,176	66.9	1,150	71.5	1,190	72.6	1,184	72.5	1,042	74.9	940	73.2
West Midlands	340	65.3	359	65.2	357	69.1	366	64.4	383	68.0	332	70.5	406	72.0	367	64.8	352	66.4	272	64.9
South East	260	74.7	246	73.7	266	74.7	265	69.2	270	68.9	259	67.6	309	70.5	306	72.3	266	79.4	283	80.9
North West	271	66.3	267	72.6	293	72.9	277	74.9	317	72.7	312	73.8	296	72.2	285	73.3	265	74.9	253	71.7
Yorkshire and the Humber	218	68.8	249	67.1	246	66.0	213	63.6	264	67.2	255	67.1	247	65.2	221	67.4	229	68.6	220	73.8
East of England	215	73.1	202	72.9	157	69.2	202	63.7	200	67.6	204	68.0	220	72.4	183	68.8	176	74.9	180	78.9
East Midlands	178	64.5	193	60.3	218	69.9	199	70.6	194	69.3	195	78.3	201	72.3	187	65.8	172	71.4	159	71.3
South West	127	66.1	111	64.2	107	63.3	130	74.7	133	69.3	99	56.9	142	70.6	143	70.1	131	63.9	114	57.9
North East	64	77.1	68	73.9	85	70.2	74	74.0	70	71.4	60	73.2	59	81.9	70	72.9	76	87.4	61	74.4
England	**2,989**	**69.2**	**2,985**	**69.5**	**2,851**	**68.8**	**2,902**	**67.8**	**3,007**	**68.2**	**2,866**	**70.4**	**3,070**	**71.6**	**2,946**	**70.3**	**2,709**	**73.0**	**2,482**	**72.3**

* Ordered by decreasing total number of cases in 2014

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

Table A2.3 Species identification for culture confirmed TB cases, England, 2009-2014

Year	*M. tuberculosis*		*M. bovis*		*M. africanum*		*M. microti*		MTBC		Total
	n	%	n	%	n	%	n	%	n	%	n
2009	4,621	98.9	17	0.4	31	0.7	0	0.0	4	0.1	**4,673**
2010	4,517	98.0	32	0.7	35	0.8	2	<0.1	23	0.5	**4,609**
2011	4,908	97.6	31	0.6	68	1.4	0	0.0	22	0.4	**5,029**
2012	4,768	97.4	32	0.7	75	1.5	2	<0.1	18	0.4	**4,895**
2013	4,281	97.5	24	0.6	63	1.4	0	0.0	22	0.5	**4,390**
2014	3,824	97.7	35	0.9	46	1.2	0	0.0	9	0.2	**3,914**

Table A3.1: Number of tuberculosis clusters and proportion clustered by PHE centre, England, 2010-2014

PHE Centre*	Notified cases	Culture confirmed cases		Culture confirmed with a strain type**		Cases with a unique strain		Cases clustered#		Number of clusters	Clusters by cluster size									
											2		3		4		5-9		≥10	
	n	n	%	n	%	n	%	n	%	n	n	%	n	%	n	%	n	%	n	%
London	15,670	9,429	60.2	8,148	86.4	4,019	49.3	4,129	50.7	996	522	52.4	197	19.8	85	8.5	135	13.6	57	5.7
West Midlands	4,713	2,701	57.3	2,258	83.6	1,192	52.8	1,066	47.2	249	129	51.8	42	16.9	34	13.7	27	10.8	17	6.8
South East	3,652	2,283	62.5	1,951	85.5	1,318	67.6	633	32.4	201	118	58.7	42	20.9	17	8.5	18	9.0	6	3.0
North West	3,763	2,302	61.2	1,570	68.2	1,046	66.6	524	33.4	141	76	53.9	32	22.7	10	7.1	14	9.9	9	6.4
Yorkshire and the Humber	2,993	1,781	59.5	1,292	72.5	846	65.5	446	34.5	116	64	55.2	18	15.5	14	12.1	14	12.1	6	5.2
East of England	2,459	1,542	62.7	1,318	85.5	954	72.4	364	27.6	124	75	60.5	25	20.2	14	11.3	8	6.5	2	1.6
East Midlands	2,295	1,368	59.6	1,142	83.5	759	66.5	383	33.5	115	61	53.0	28	24.3	8	7.0	11	9.6	7	6.1
South West	1,517	895	59.0	728	81.3	506	69.5	222	30.5	62	28	45.2	16	25.8	6	9.7	10	16.1	2	3.2
North East	754	536	71.1	365	68.1	260	71.2	105	28.8	33	19	57.6	4	12.1	6	18.2	3	9.1	1	3.0
England$	**37,816**	**22,837**	**60.4**	**18,772**	**82.2**	**8,029**	**42.8**	**10,743**	**57.2**	**2,245**	**1,060**	**47.2**	**421**	**18.8**	**230**	**10.2**	**367**	**16.3**	**167**	**7.4**

* Ordered by decreasing total number of cases in 2014
** 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 PHEC clusters because it includes clusters that span more than one PHEC

Table A4.1: Number and proportion of pulmonary TB cases by delay from symptom onset to treatment start by PHE centre, England 2014

PHE Centre*	Delay from symptom onset to treatment start						
	0-2 months		2-4 months		>4 months		Total**
	n	%	n	%	n	%	n
London	427	42.7	296	29.6	276	27.6	**999**
West Midlands	156	42.9	93	25.6	115	31.6	**364**
South East	97	30.7	104	32.9	115	36.4	**316**
North West	111	37.4	98	33.0	88	29.6	**297**
Yorkshire and the Humber	100	39.8	77	30.7	74	29.5	**251**
East of England	73	37.4	62	31.8	60	30.8	**195**
East Midlands	74	35.9	58	28.2	74	35.9	**206**
South West	65	36.9	61	34.7	50	28.4	**176**
North East	34	47.9	19	26.8	18	25.4	**71**
England	**1,137**	**39.5**	**868**	**30.2**	**870**	**30.3**	**2,875**

* Ordered by decreasing total number of cases in 2014
** The number of pulmonary cases with time between symptom onset to start of TB treatment available, excluding those diagnosed post-mortem and those that were known to not start treatment

Table A4.2: Number and proportion of pulmonary TB cases with delay from symptom onset to treatment start by age group, England, 2011-2014

Year	Delay in treatment	Age group (years)									
		0-14		15-44		45-64		65+		All*	
		n	%	n	%	n	%	n	%	n	%
2011	0-2 months	75	65.2	816	45.8	252	42.1	174	40.4	1,317	45.0
	2-4 months	26	22.6	549	30.8	160	26.7	121	28.1	856	29.3
	>4 months	14	12.2	416	23.4	187	31.2	136	31.6	753	25.7
	Total	**115**	**100.0**	**1,781**	**100.0**	**599**	**100.0**	**431**	**100.0**	**2,926**	**100.0**
2012	0-2 months	115	70.6	826	44.5	249	39.0	179	40.0	1,369	44.1
	2-4 months	31	19.0	576	31.0	187	29.3	131	29.2	925	29.8
	>4 months	17	10.4	456	24.5	203	31.8	138	30.8	814	26.2
	Total	**163**	**100.0**	**1,858**	**100.0**	**639**	**100.0**	**448**	**100.0**	**3,108**	**100.0**
2013	0-2 months	78	65.6	743	42.5	248	37.8	153	34.9	1,222	41.2
	2-4 months	24	20.2	559	32.0	195	29.7	122	27.9	900	30.4
	>4 months	17	14.3	447	25.6	214	32.6	163	37.2	841	28.4
	Total	**119**	**100.0**	**1,749**	**100.0**	**657**	**100.0**	**438**	**100.0**	**2,963**	**100.0**
2014	0-2 months	87	75.7	640	40.7	257	35.9	153	32.3	1,137	39.6
	2-4 months	22	19.1	498	31.7	219	30.6	129	27.2	868	30.2
	>4 months	6	5.2	433	27.6	239	33.4	192	40.5	870	30.3
	Total	**115**	**100.0**	**1,571**	**100.0**	**715**	**100.0**	**474**	**100.0**	**2,875**	**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 that were known to not start treatment

Table A4.3: Number and proportion of pulmonary TB cases with delay from symptom onset to treatment start by place of birth, England, 2011-2014

Year	Delay in treatment	Place of Birth					
		Non-UK Born		UK Born		All*	
		n	%	n	%	n	%
2011	0-2 months	885	46.9	392	41.0	1,277	44.9
	2-4 months	561	29.8	272	28.5	833	29.3
	>4 months	440	23.3	292	30.5	732	25.8
	Total	**1,886**	**100.0**	**956**	**100.0**	**2,842**	**100.0**
2012	0-2 months	924	45.4	413	40.9	1,337	43.9
	2-4 months	617	30.3	294	29.1	911	29.9
	>4 months	496	24.4	304	30.1	800	26.3
	Total	**2,037**	**100.0**	**1,011**	**100.0**	**3,048**	**100.0**
2013	0-2 months	820	42.5	381	38.3	1,201	41.1
	2-4 months	605	31.4	291	29.3	896	30.6
	>4 months	505	26.2	322	32.4	827	28.3
	Total	**1,930**	**100.0**	**994**	**100.0**	**2,924**	**100.0**
2014	0-2 months	728	39.9	392	39.0	1,120	39.6
	2-4 months	572	31.4	282	28.0	854	30.2
	>4 months	524	28.7	332	33.0	856	30.3
	Total	**1,824**	**100.0**	**1,006**	**100.0**	**2,830**	**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 that were known to not start treatment

Table A5.1: TB outcome by 12 months after treatment start for drug sensitive cases with expected treatment duration <12months*, 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	4,425	70.1	327	5.2	304	4.8	299	4.7	74	1.2	884	14.0	6,313
2005	4,873	70.3	374	5.4	343	4.9	383	5.5	80	1.2	881	12.7	6,934
2006	5,214	75.5	353	5.1	372	5.4	457	6.6	79	1.1	428	6.2	6,903
2007	5,285	78.1	363	5.4	300	4.4	465	6.9	72	1.1	283	4.2	6,768
2008	5,580	79.9	348	5.0	318	4.6	430	6.2	69	1.0	239	3.4	6,984
2009	5,911	81.8	327	4.5	308	4.3	444	6.1	77	1.1	157	2.2	7,224
2010	5,633	82.6	312	4.6	290	4.3	399	5.9	60	0.9	122	1.8	6,816
2011	6,000	81.8	310	4.2	371	5.1	481	6.6	64	0.9	108	1.5	7,334
2012	6,007	83.6	305	4.2	287	4.0	416	5.8	72	1.0	99	1.4	7,186
2013	5,445	84.8	260	4.0	239	3.7	327	5.1	56	0.9	95	1.5	6,422
Total	**54,373**	**78.9**	**3,279**	**4.8**	**3,132**	**4.5**	**4,101**	**6.0**	**703**	**1.0**	**3,296**	**4.8**	**68,884**

* Excludes initial and amplified MDR/RR-TB cases and MDR-TB treated cases 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 and UTLA data shown on Fingertips)

Table A5.2: Last recorded TB outcome for drug sensitive cases with expected treatment duration <12months*, 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	4,580	72.5	328	5.2	305	4.8	141	2.2	75	1.2	884	14	6,313
2005	5,077	73.2	378	5.5	343	4.9	175	2.5	80	1.2	881	12.7	6,934
2006	5,462	79.1	359	5.2	375	5.4	199	2.9	80	1.2	428	6.2	6,903
2007	5,580	82.4	367	5.4	302	4.5	163	2.4	73	1.1	283	4.2	6,768
2008	5,885	84.3	355	5.1	325	4.7	108	1.5	72	1.0	239	3.4	6,984
2009	6,234	86.3	341	4.7	309	4.3	105	1.5	78	1.1	157	2.2	7,224
2010	5,923	86.9	317	4.7	294	4.3	98	1.4	62	0.9	122	1.8	6,816
2011	6,464	88.1	315	4.3	373	5.1	7	0.1	67	0.9	108	1.5	7,334
2012	6,387	88.9	314	4.4	300	4.2	10	0.1	76	1.1	99	1.4	7,186
2013[#]	5,600	87.2	263	4.1	240	3.7	166	2.6	58	0.9	95	1.5	6,422
Total	**57,192**	**83.0**	**3,337**	**4.8**	**3,166**	**4.6**	**1,172**	**1.7**	**721**	**1.0**	**3,296**	**4.8**	**68,884**

* Excludes initial and amplified MDR/RR-TB cases and MDR-TB treated cases 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 14: Proportion of drug sensitive TB cases who were lost to follow-up at last reported outcome (England, PHEC and UTLA data shown on Fingertips)
TB Monitoring Indicator 15: Proportion of drug sensitive TB cases who had died at last reported outcome (England, PHEC and UTLA data shown on Fingertips)

Table A5.3: Time to treatment completion for drug sensitive cases with expected treatment duration <12months*, England, 2004-2013

Year	Treatment completed **	Time to complete treatment known[#]		<6 months to complete[#]		6-8 months to complete[#]		8-10 months to complete		10-12 months to complete		>12 months to complete	
	n	n	%	n	%	n	%	n	%	n	%	n	%
2004	4,580	2,953	64.5	206	7.0	2,060	69.8	346	11.7	196	6.6	145	4.9
2005	5,077	3,950	77.8	251	6.4	2,903	73.5	373	9.4	231	5.8	192	4.9
2006	5,462	4,319	79.1	249	5.8	3,116	72.1	475	11.0	252	5.8	227	5.3
2007	5,580	4,481	80.3	298	6.7	3,238	72.3	432	9.6	242	5.4	271	6.0
2008	5,885	4,842	82.3	269	5.6	3,506	72.4	514	10.6	272	5.6	281	5.8
2009	6,234	5,565	89.3	372	6.7	3,973	71.4	563	10.1	360	6.5	297	5.3
2010	5,923	5,481	92.5	321	5.9	3,981	72.6	581	10.6	331	6.0	267	4.9
2011	6,464	6,076	94.0	325	5.3	4,341	71.4	661	10.9	315	5.2	434	7.1
2012	6,387	6,056	94.8	304	5.0	4,411	72.8	614	10.1	367	6.1	360	5.9
2013	5,600	5,362	95.8	302	5.6	3,995	74.5	562	10.5	368	6.9	135	2.5
Total	**57,192**	**49,085**	**85.8**	**2,897**	**5.9**	**35,524**	**72.4**	**5,121**	**10.4**	**2,934**	**6.0**	**2,609**	**5.3**

* Excludes initial and amplified MDR/RR-TB cases and MDR-TB treated cases 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 A5.4: Treatment completion at 12 months by age group for drug sensitive cases with expected treatment duration <12months*, England, 2004-2013

Year	Age group (years)							
	0-14		15-44		45-64		65+	
	n	%	n	%	n	%	n	%
2004	298	79.7	2,826	73.1	830	69.7	471	53.4
2005	303	79.5	3,220	74.0	811	65.5	538	56.2
2006	286	85.4	3,398	78.5	978	76.2	552	57.6
2007	364	85.8	3,362	80.9	1,003	78.7	556	60.9
2008	375	89.3	3,589	82.4	1,070	80.9	544	61.7
2009	346	92.5	3,725	84.6	1,185	80.9	655	66.6
2010	301	91.8	3,556	85.5	1,148	82.1	628	67.6
2011	300	85.2	3,788	84.4	1,280	82.6	632	66.9
2012	334	91.0	3,774	86.2	1,252	84.1	647	68.0
2013	246	90.8	3,319	86.9	1,241	86.0	639	72.0
Total	**3,153**	**87.0**	**34,557**	**81.7**	**10,798**	**79.1**	**5,862**	**63.1**

* Excludes initial and amplified MDR/RR-TB cases and MDR-TB treated cases and those with CNS, spinal, miliary or cryptic disseminated TB

Table A5.5: Treatment completion at 12 months by sex for drug sensitive cases with expected treatment duration <12months*, England, 2004-2013

Year	Male		Female	
	n	%	n	%
2004	2,411	69.2	2,012	71.3
2005	2,609	68.3	2,261	72.8
2006	2,739	73.5	2,466	78.0
2007	2,838	76.4	2,435	80.1
2008	2,949	78.5	2,614	81.6
2009	3,159	80.2	2,720	83.8
2010	3,100	81.7	2,506	83.9
2011	3,280	79.2	2,702	85.2
2012	3,338	82.0	2,669	85.7
2013	3,078	84.0	2,367	85.8
Total	**29,501**	**77.4**	**24,752**	**80.9**

* Excludes initial and amplified MDR/RR-TB cases and MDR-TB treated cases and those with CNS, spinal, miliary or cryptic disseminated TB

Table A5.6: TB outcome at 12 months by site of disease for drug sensitive cases with expected treatment duration <12months*, England, 2013

Site of disease	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated**		Total[#]
	n	%	n	%	n	%	n	%	n	%	n	%	n
Pulmonary only	2,222	82.8	176	6.6	93	3.5	131	4.9	19	0.7	44	1.6	2,685
Pulmonary, with or without EP	2,767	82.4	206	6.1	129	3.8	175	5.2	28	0.8	53	1.6	3,358
Extra-pulmonary only	2,656	87.5	53	1.7	110	3.6	149	4.9	28	0.9	39	1.3	3,035
Extra-thoracic lymph nodes	1,487	87.7	15	0.9	59	3.5	85	5.0	19	1.1	30	1.8	1,695
Intra-thoracic lymph nodes	750	89.9	10	1.2	32	3.8	30	3.6	7	0.8	5	0.6	834
Pleural	516	86.4	30	5.0	17	2.8	23	3.9	5	0.8	6	1.0	597
Bone – not spine	140	82.4	1	0.6	8	4.7	18	10.6	2	1.2	1	0.6	170
All other EP sites[$]	1,282	83.8	46	3.0	73	4.8	96	6.3	15	1.0	18	1.2	1,530
Unknown site	40	76.9	2	3.8	2	3.8	5	9.6	0	0.0	3	5.8	52
Total	**5,445**	**84.8**	**260**	**4.0**	**239**	**3.7**	**327**	**5.1**	**56**	**0.9**	**95**	**1.5**	**6,422**

* Excludes initial and amplified MDR/RR-TB cases and MDR-TB treated cases and those with CNS, spinal, miliary or cryptic disseminated TB
** 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, laryngeal, other and unknown extra-pulmonary (EP) disease

Table A5.7: TB outcome at 12 months for drug sensitive cases with expected treatment duration <12 months by PHE centre*, England, 2013

PHE Centre**	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated[#]		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
London	2,232	86.1	73	2.8	105	4.1	146	5.6	22	0.8	13	0.5	2,591
West Midlands	736	85.9	36	4.2	30	3.5	39	4.6	13	1.5	3	0.4	857
South East	523	86.2	26	4.3	17	2.8	29	4.8	2	0.3	10	1.6	607
North West	536	82.7	40	6.2	20	3.1	29	4.5	9	1.4	14	2.2	648
Yorkshire and the Humber	452	85.3	24	4.5	25	4.7	14	2.6	5	0.9	10	1.9	530
East of England	335	82.7	20	4.9	14	3.5	26	6.4	2	0.5	8	2.0	405
East Midlands	317	88.1	17	4.7	12	3.3	12	3.3	0	0.0	2	0.6	360
South West	216	71.5	18	6.0	13	4.3	25	8.3	2	0.7	28	9.3	302
North East	98	80.3	6	4.9	3	2.5	7	5.7	1	0.8	7	5.7	122
England	**5,445**	**84.8**	**260**	**4.0**	**239**	**3.7**	**327**	**5.1**	**56**	**0.9**	**95**	**1.5**	**6,422**

* Excludes initial and amplified MDR/RR-TB cases and MDR-TB treated cases and those with CNS, spinal, miliary or cryptic disseminated TB
** Ordered by decreasing total number of cases in 2014
[#] Not evaluated includes missing, unknown and transferred out

Table A5.8: Treatment completion at 12 months for drug sensitive cases with expected treatment duration <12months* by PHE centre, England, 2003-2013*

PHE Centre**	2004		2005		2006		2007		2008		2009		2010		2011		2012		2013	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
London	2,182	78.3	2,441	78.8	2,428	81.9	2,338	82.8	2,539	85.3	2,580	86.4	2,436	86.0	2,616	85.5	2,574	86.1	2,232	86.1
West Midlands	631	73.0	570	68.7	565	67.7	671	77.0	757	82.5	743	81.8	633	80.0	722	80.9	823	85.6	736	85.9
South East	337	65.4	372	69.5	382	70.0	405	70.7	414	74.6	507	79.8	509	79.8	604	83.2	583	83.2	523	86.2
North West	319	61.2	468	68.6	476	75.9	490	74.7	507	76.8	588	80.8	601	84.6	588	80.4	574	83.6	536	82.7
Yorkshire and the Humber	303	62.5	354	71.5	420	72.5	402	70.4	426	74.5	467	77.1	425	75.2	428	72.4	436	81.3	452	85.3
East of England	275	72.4	309	72.5	328	75.6	292	78.3	325	71.9	352	78.0	369	80.0	402	81.5	353	79.0	335	82.7
East Midlands	140	36.2	138	28.0	389	74.8	382	80.4	332	77.4	390	80.6	370	84.9	359	81.8	351	80.3	317	88.1
South West	142	58.9	142	57.7	128	49.6	166	67.5	160	62.3	173	63.4	179	74.0	192	68.3	193	70.4	216	71.5
North East	96	75.0	77	61.1	98	71.0	139	78.1	120	72.3	111	72.5	111	79.3	89	73.6	120	78.9	98	80.3
England	**4,425**	**70.2**	**4,871**	**70.3**	**5,214**	**75.5**	**5,285**	**78.1**	**5,580**	**79.9**	**5,911**	**81.8**	**5,633**	**82.6**	**6,000**	**81.8**	**6,007**	**83.6**	**5,445**	**84.8**

* Excludes initial and amplified MDR/RR-TB cases and MDR-TB treated cases and those with CNS, spinal, miliary or cryptic disseminated TB
** Ordered by decreasing total number of cases in 2014

Table A5.9: Last recorded TB outcome by end of follow-up period for drug sensitive cases with CNS, spinal, miliary or cryptic disseminated 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	304	55.6	74	13.5	28	5.1	32	5.9	8	1.5	101	18.5	547
2005	385	58.1	70	10.6	38	5.7	43	6.5	7	1.1	120	18.1	663
2006	462	66.1	71	10.2	38	5.4	59	8.4	10	1.4	59	8.4	699
2007	525	70.9	64	8.6	43	5.8	64	8.6	8	1.1	36	4.9	740
2008	531	70.6	81	10.8	43	5.7	50	6.6	7	0.9	40	5.3	752
2009	604	74.1	79	9.7	45	5.5	54	6.6	8	1.0	25	3.1	815
2010	584	74.6	65	8.3	47	6.0	60	7.7	10	1.3	17	2.2	783
2011	701	82.5	67	7.9	53	6.2	2	0.2	10	1.2	17	2.0	850
2012	652	80.9	73	9.1	55	6.8	7	0.9	8	1.0	11	1.4	806
2013[#]	504	67.1	67	8.9	43	5.7	101	13.4	6	0.8	30	4.0	751
Total	**5,252**	**70.9**	**711**	**9.6**	**433**	**5.8**	**472**	**6.4**	**82**	**1.1**	**456**	**6.2**	**7,406**

* Excludes initial and amplified MDR/RR-TB cases and MDR-TB treated cases
** 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 A5.10: Median time to treatment completion for drug sensitive cases with CNS, spinal, miliary or cryptic disseminated TB cases*, UK, 2004-2013

Year	Completed**	Time to complete treatment known		<6 months to complete[#]		6-8 months to complete[#]		8-10 months to complete		10-12 months to complete		>12 months to complete	
	n	n	%	n	%	n	%	n	%	n	%	n	%
2004	304	202	66.4	7	3.5	82	40.6	24	11.9	44	21.8	45	22.3
2005	385	298	77.4	14	4.7	87	29.2	54	18.1	67	22.5	76	25.5
2006	462	366	79.2	11	3.0	131	35.8	54	14.8	87	23.8	83	22.7
2007	525	433	82.5	17	3.9	133	30.7	47	10.9	95	21.9	141	32.6
2008	531	447	84.2	14	3.1	113	25.3	51	11.4	129	28.9	140	31.3
2009	604	532	88.1	18	3.4	133	25.0	71	13.3	170	32.0	140	26.3
2010	584	547	93.7	13	2.4	139	25.4	61	11.2	178	32.5	156	28.5
2011	701	653	93.2	11	1.7	141	21.6	88	13.5	135	20.7	278	42.6
2012	652	622	95.4	9	1.4	124	19.9	75	12.1	164	26.4	250	40.2
2013	504	478	94.8	8	1.7	107	22.4	76	15.9	200	41.8	87	18.2
Total	**5,252**	**4,578**	**87.2**	**122**	**2.7**	**1,190**	**26.0**	**601**	**13.1**	**1,269**	**27.7**	**1,396**	**30.5**

* Excludes initial and amplified MDR/RR-TB cases and MDR-TB treated cases
** Treatment completed at last recorded outcome
[#] Cases with completion between 168 and 180 days are included in the 6-7 months category

Table A5.11: Last recorded TB outcome for the entire drug sensitive cohort*, 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	4,580	72.5	328	5.2	305	4.8	141	2.2	75	1.2	884	14.0	6,313
2005	5,077	73.2	378	5.5	343	4.9	175	2.5	80	1.2	881	12.7	6,934
2006	5,462	79.1	359	5.2	375	5.4	199	2.9	80	1.2	428	6.2	6,903
2007	5,580	82.4	367	5.4	302	4.5	163	2.4	73	1.1	283	4.2	6,768
2008	5,885	84.3	355	5.1	325	4.7	108	1.5	72	1.0	239	3.4	6,984
2009	6,234	86.3	341	4.7	309	4.3	105	1.5	78	1.1	157	2.2	7,224
2010	5,923	86.9	317	4.7	294	4.3	98	1.4	62	0.9	122	1.8	6,816
2011	6,464	88.1	315	4.3	373	5.1	7	0.1	67	0.9	108	1.5	7,334
2012	6,387	88.9	314	4.4	300	4.2	10	0.1	76	1.1	99	1.4	7,186
2013[#]	5,600	87.2	263	4.1	240	3.7	166	2.6	58	0.9	95	1.5	6,422
Total	**57,192**	**83.0**	**3,337**	**4.8**	**3,166**	**4.6**	**1,172**	**1.7**	**721**	**1.0**	**3,296**	**4.8**	**68,884**

* Excludes initial and amplified MDR/RR-TB cases and MDR-TB treated cases
** 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 A5.12: The entire drug sensitive cohort* reported to have died at last recorded outcome, England, 2004-2013

Year	Cases reported	Total deaths		TB caused or contributed to death		TB incidental to death		Unknown	
		n	%	n	%	n	%	n	%
2004	6,860	402	5.9	147	36.6	103	25.6	152	37.8
2005	7,597	448	5.9	141	31.5	102	22.8	205	45.8
2006	7,602	430	5.7	137	31.9	89	20.7	204	47.4
2007	7,508	431	5.7	142	32.9	86	20.0	203	47.1
2008	7,736	436	5.6	146	33.5	98	22.5	192	44.0
2009	8,039	420	5.2	148	35.2	88	21.0	184	43.8
2010	7,599	382	5.0	103	27.0	101	26.4	178	46.6
2011	8,184	382	4.7	107	28.0	88	23.0	187	49.0
2012	7,992	387	4.8	118	30.5	89	23.0	180	46.5
2013**	7,173	330	4.6	109	33.0	71	21.5	150	45.5
Total	**76,290**	**4,048**	**5.3**	**1,298**	**32.1**	**915**	**22.6**	**1,835**	**45.3**

* Excludes initial and amplified MDR/RR-TB cases and MDR-TB treated cases
** Reduced follow-up period for this group, therefore proportion expected to increase in future reporting

Table A5.13: Last recorded TB outcome for the entire drug sensitive cohort* by site of disease, 2013

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	2,279	84.9	177	6.6	93	3.5	73	2.7	19	0.7	44	1.6	2,685
Pulmonary, with or without EP	2,849	84.8	208	6.2	129	3.8	90	2.7	29	0.9	53	1.6	3,358
Extra-pulmonary only	2,726	89.8	54	1.8	111	3.7	76	2.5	29	1.0	39	1.3	3,035
Extra-thoracic lymph nodes	1,530	90.3	15	0.9	60	3.5	40	2.4	20	1.2	30	1.8	1,695
Intra-thoracic lymph nodes	764	91.6	10	1.2	32	3.8	16	1.9	7	0.8	5	0.6	834
Pleural	527	88.3	32	5.4	17	2.8	9	1.5	6	1.0	6	1.0	597
Bone – not spine	147	86.5	1	0.6	8	4.7	11	6.5	2	1.2	1	0.6	170
All other EP sites[$]	1,327	86.7	46	3.0	74	4.8	49	3.2	16	1.0	18	1.2	1,530
Unknown site	45	86.5	2	3.8	2	3.8	0	0.0	0	0.0	3	5.8	52
Total	**5,600**	**87.2**	**263**	**4.1**	**240**	**3.7**	**166**	**2.6**	**58**	**0.9**	**95**	**1.5**	**6,422**
Cases of CNS, spinal, miliary or cryptic disseminated TB^													
Bone – spine	248	73.4	10	3.0	26	7.7	35	10.4	4	1.2	15	4.4	338
CNS Meningitis	86	56.6	15	9.9	12	7.9	33	21.7	1	0.7	5	3.3	152
CNS Other	69	56.6	12	9.8	8	6.6	26	21.3	1	0.8	6	4.9	122
Miliary	126	65.6	38	19.8	6	3.1	15	7.8	1	0.5	6	3.1	192
Cryptic disseminated	36	78.3	4	8.7	0	0.0	5	10.9	0	0.0	1	2.2	46
Total	**504**	**67.1**	**67**	**8.9**	**43**	**5.7**	**101**	**13.4**	**6**	**0.8**	**30**	**4.0**	**751**

* Excludes initial and amplified MDR/RR-TB cases and MDR-TB treated cases
** 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, laryngeal, other and unknown extra-pulmonary (EP) disease
^ Cases may have an additional site of disease not shown (ie pulmonary, lymph node, pleural, bone (not spine) or other EP sites)

Table A5.14 Time between treatment start and death for the entire drug sensitive cohort*, England, 2004-2013

Year	Cases died	Time to death known		Death <2 months		Death 2-4 months		Death 4-6 months		Death >6 months	
	n	n	%	n	%	n	%	n	%	n	%
2004	287	55	19.2	28	50.9	12	21.8	5	9.1	10	18.2
2005	359	132	36.8	79	59.8	25	18.9	11	8.3	17	12.9
2006	323	153	47.4	101	66.0	24	15.7	10	6.5	18	11.8
2007	351	177	50.4	101	57.1	39	22.0	10	5.6	27	15.3
2008	345	189	54.8	114	60.3	31	16.4	20	10.6	24	12.7
2009	374	226	60.4	125	55.3	55	24.3	16	7.1	30	13.3
2010	317	196	61.8	115	58.7	33	16.8	19	9.7	29	14.8
2011	317	194	61.2	121	62.4	41	21.1	20	10.3	12	6.2
2012	319	208	65.2	126	60.6	42	20.2	17	8.2	23	11.1
2013	273	161	59.0	101	62.7	27	16.8	17	10.6	16	9.9
Total	**3,265**	**1,691**	**51.8**	**1,011**	**59.8**	**329**	**19.5**	**145**	**8.6**	**206**	**12.2**

* Excludes initial and amplified MDR/RR-TB cases and MDR-TB treated cases. Also excludes cases diagnosed at post-mortem.

Table: A5.15: Last recorded TB outcome for the entire drug sensitive cohort* by PHE centre, England, 2013

PHE Centre**	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated[#]		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
London	2,494	85.4	96	3.3	125	4.3	160	5.5	26	0.9	20	0.7	2,921
West Midlands	832	86.2	49	5.1	39	4.0	27	2.8	15	1.6	3	0.3	965
South East	595	87.4	36	5.3	22	3.2	9	1.3	2	0.3	17	2.5	681
North West	599	84.8	43	6.1	21	3.0	14	2.0	9	1.3	20	2.8	706
Yorkshire and the Humber	494	85.3	27	4.7	26	4.5	11	1.9	5	0.9	16	2.8	579
East of England	388	85.8	24	5.3	19	4.2	9	2.0	3	0.7	9	2.0	452
East Midlands	351	85.4	25	6.1	13	3.2	18	4.4	0	0.0	4	1.0	411
South West	244	75.3	21	6.5	15	4.6	13	4.0	3	0.9	28	8.6	324
North East	107	79.9	9	6.7	3	2.2	6	4.5	1	0.7	8	6.0	134
England	**6,104**	**85.1**	**330**	**4.6**	**283**	**3.9**	**267**	**3.7**	**64**	**0.9**	**125**	**1.7**	**7,173**

* Excludes initial and amplified MDR/RR-TB cases and MDR-TB treated cases
** Ordered by decreasing total number of cases in 2014
[#] Not evaluated includes missing, unknown and transferred out

Table: A5.16: The entire drug sensitive cohort* reported as lost to follow-up at last recorded outcome, England, 2004-2013

Year	Cases reported	Lost to follow-up						Lost to follow-up abroad**	
		All cases		UK born cases		Non-UK born cases			
		n	%	n	%	n	%	n	%
2004	6,860	333	4.9	45	13.5	263	79.0	54	41.5
2005	7,597	381	5.0	46	12.1	306	80.3	64	44.4
2006	7,602	413	5.4	50	12.1	329	79.7	95	57.6
2007	7,508	345	4.6	46	13.3	265	76.8	80	50.6
2008	7,736	368	4.8	40	10.9	298	81.0	162	57.9
2009	8,039	354	4.4	38	10.7	288	81.4	150	55.4
2010	7,599	341	4.5	28	8.2	300	88.0	174	60.2
2011	8,184	426	5.2	44	10.3	361	84.7	220	62.1
2012	7,992	355	4.4	29	8.2	305	85.9	190	67.6
2013[#]	7,173	283	3.9	20	7.1	254	89.8	148	63.5
Total	**76,290**	**3,599**	**4.7**	**386**	**10.7**	**2,969**	**82.5**	**1,337**	**58.0**

* Excludes initial and amplified MDR/RR-TB cases and MDR-TB treated cases
** 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 A5.17: Lost to follow-up at last recorded outcome by age group in the entire drug sensitive cohort*, England, 2004-2013

Year	Age group (years)							
	0-14		15-44		45-64		65+	
	n	%	n	%	n	%	n	%
2004	10	2.5	262	6.2	36	2.8	25	2.6
2005	13	3.1	303	6.4	48	3.5	17	1.6
2006	6	1.7	328	6.9	54	3.8	25	2.4
2007	6	1.3	269	5.8	49	3.5	21	2.1
2008	4	0.9	306	6.4	40	2.7	18	1.8
2009	3	0.8	280	5.7	52	3.2	19	1.7
2010	2	0.6	273	5.9	46	2.9	20	1.9
2011	10	2.7	342	6.8	54	3.1	20	1.9
2012	1	0.3	300	6.2	38	2.3	16	1.5
2013**	3	1.0	223	5.2	42	2.6	15	1.5
Total	**58**	**1.5**	**2,886**	**6.2**	**459**	**3.0**	**196**	**1.9**

* Excludes initial and amplified MDR/RR-TB cases and MDR-TB treated cases
** Reduced follow-up period for this group, therefore proportion lost to follow-up is expected to increase in future reporting

Table A6.1 Number and proportion of TB cases with first line drug susceptibility results, England, 2005-2014

Year	Culture confirmed cases		Drug susceptibility testing (2 first line drugs)*		Drug susceptibility testing (all first line drugs)**	
	n	%	n	%	n	%
2005	4,585	59.9	4,552	99.3	4,535	98.9
2006	4,674	60.9	4,637	99.2	4,613	98.7
2007	4,452	58.8	4,402	98.9	4,370	98.2
2008	4,538	58.1	4,481	98.7	4,430	97.6
2009	4,673	57.6	4,601	98.5	4,523	96.8
2010	4,609	60.0	4,559	98.9	4,513	97.9
2011	5,029	60.8	4,966	98.8	4,894	97.3
2012	4,895	60.5	4,851	99.1	4,784	97.7
2013	4,390	60.5	4,327	98.6	4,282	97.5
2014	3,914	60.0	3,889	99.4	3,821	97.6
Total	**45,759**	**59.7**	**45,265**	**98.9**	**44,765**	**97.8**

* 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 A6.2 Number and proportion of TB cases with first line drug resistance*, England, 2005-2014

Year	Isoniazid resistant		Rifampicin resistant		Ethambutol resistant		Pyrazinamide resistant**		Resistant to any first line drug	
	n	%	n	%	n	%	n	%	n	%
2005	322	7.1	56	1.2	18	0.4	14	0.3	346	7.6
2006	337	7.3	74	1.6	25	0.5	22	0.5	370	8.0
2007	306	7.0	62	1.4	26	0.6	26	0.6	333	7.6
2008	267	6.0	67	1.5	34	0.8	34	0.8	306	6.8
2009	327	7.1	70	1.5	27	0.6	49	1.1	369	8.0
2010	291	6.4	75	1.7	34	0.8	40	0.9	320	7.0
2011	377	7.6	88	1.8	55	1.1	47	1.0	414	8.3
2012	331	6.8	88	1.8	48	1.0	44	0.9	359	7.4
2013	304	7.0	79	1.8	40	0.9	38	0.9	332	7.7
2014	267	6.9	56	1.4	42	1.1	31	0.8	286	7.4
Total	**3,129**	**6.9**	**715**	**1.6**	**349**	**0.8**	**345**	**0.8**	**3,435**	**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 A6.3 Number and proportion of TB cases with drug resistance, England, 2005-2014

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	%
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	257	5.8	13	0.3	49	1.1	62	1.4	21.0	0	0.0
2008	218	4.9	18	0.4	49	1.1	67	1.5	26.9	2	0.04
2009	268	5.8	11	0.2	59	1.3	70	1.5	15.7	2	0.04
2010	226	5.0	10	0.2	65	1.4	75	1.7	13.3	2	0.04
2011	297	6.0	8	0.2	80	1.6	88	1.8	9.1	6	0.1
2012	253	5.2	10	0.2	78	1.6	88	1.8	11.4	2	0.04
2013	236	5.5	11	0.3	68	1.6	79	1.8	13.9	3	0.1
2014	215	5.5	4	0.1	52	1.3	56	1.4	7.1	3	0.1
Total	**2,534**	**5.6**	**120**	**0.3**	**595**	**1.3**	**715**	**1.6**	**16.8**	**20**	**0.04**

* 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 A6.4: TB outcome at 24 months after treatment start for drug resistant TB cases*, England, 2004-2012

Year	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated**		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
2004	36	52.2	4	5.8	9	13.0	13	18.8	3	4.3	4	5.8	69
2005	38	62.3	4	6.6	7	11.5	6	9.8	4	6.6	2	3.3	61
2006	39	49.4	2	2.5	8	10.1	24	30.4	3	3.8	3	3.8	79
2007	30	42.9	10	14.3	6	8.6	19	27.1	5	7.1	0	0.0	70
2008	43	58.9	6	8.2	10	13.7	10	13.7	3	4.1	1	1.4	73
2009	38	52.1	4	5.5	11	15.1	18	24.7	1	1.4	1	1.4	73
2010	37	47.4	0	0.0	9	11.5	25	32.1	4	5.1	3	3.8	78
2011	46	50.0	4	4.3	17	18.5	22	23.9	3	3.3	0	0.0	92
2012	53	56.4	3	3.2	9	9.6	23	24.5	5	5.3	1	1.1	94
Total	**360**	**52.2**	**37**	**5.4**	**86**	**12.5**	**160**	**23.2**	**31**	**4.5**	**15**	**2.2**	**689**

* Includes initial and amplified MDR/RR-TB cases and MDR-TB treated cases 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 A6.5: Time to treatment completion* for MDR-TB cases**, England, 2004-2012

Year	Completed	Completion time known		< 12 months to complete		12-18 months to complete		18-20 months to complete		20-24 months to complete		>2 years to complete	
	n	n	%	n	%	n	%	n	%	n	%	n	%
2004	34	34	100.0	4	11.8	3	8.8	14	41.2	4	11.8	9	26.5
2005	29	28	96.6	2	7.1	6	21.4	13	46.4	5	17.9	2	7.1
2006	41	40	97.6	1	2.5	6	15.0	13	32.5	4	10.0	16	40.0
2007	37	35	94.6	2	5.7	5	14.3	6	17.1	8	22.9	14	40.0
2008	39	33	84.6	1	3.0	6	18.2	8	24.2	11	33.3	7	21.2
2009	47	45	95.7	1	2.2	2	4.4	11	24.4	16	35.6	15	33.3
2010	53	49	92.5	1	2.0	4	8.2	14	28.6	12	24.5	18	36.7
2011	57	55	96.5	1	1.8	5	9.1	11	20.0	22	40.0	16	29.1
2012	61	57	93.4	3	5.3	5	8.8	16	28.1	17	29.8	16	28.1
Total	**398**	**376**	**94.5**	**16**	**4.3**	**42**	**11.2**	**106**	**28.2**	**99**	**26.3**	**113**	**30.1**

* Completion time is from MDR-TB start date until completion date
** Includes initial and amplified MDR/RR-TB cases and MDR-TB treated cases only

Table A6.6: Last recorded TB outcome for drug resistant TB cases*, England, 2004-2012

Year	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated**		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
2004	49	71.0	4	5.8	9	13.0	2	2.9	3	4.3	2	2.9	69
2005	42	68.9	4	6.6	8	13.1	3	4.9	4	6.6	0	0.0	61
2006	56	70.9	3	3.8	8	10.1	9	11.4	3	3.8	0	0.0	79
2007	45	64.3	10	14.3	6	8.6	4	5.7	5	7.1	0	0.0	70
2008	51	69.9	7	9.6	10	13.7	2	2.7	3	4.1	0	0.0	73
2009	56	76.7	4	5.5	11	15.1	0	0.0	1	1.4	1	1.4	73
2010	59	75.6	1	1.3	9	11.5	4	5.1	5	6.4	0	0.0	78
2011	62	67.4	5	5.4	18	19.6	4	4.3	3	3.3	0	0.0	92
2012[#]	70	74.5	4	4.3	9	9.6	6	6.4	5	5.3	0	0.0	94
Total	**490**	**71.1**	**42**	**6.1**	**88**	**12.8**	**34**	**4.9**	**32**	**4.6**	**3**	**0.4**	**689**

* Includes initial and amplified MDR/RR-TB cases and MDR-TB treated cases 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 A6.7: Lost to follow-up at last recorded outcome in drug resistant* TB cases by place of birth, England, 2004-2012

Year	Cases reported	Lost to follow-up						Lost to follow-up abroad**	
		All cases		UK born		Non-UK born			
		n	%	n	%	n	%	n	%
2004	69	9	13.0	0	0.0	8	88.9	4	57.1
2005	61	8	13.1	1	12.5	7	87.5	4	66.7
2006	79	8	10.1	1	12.5	7	87.5	4	80.0
2007	70	6	8.6	0	0.0	6	100.0	5	100.0
2008	73	10	13.7	0	0.0	10	100.0	8	80.0
2009	73	11	15.1	0	0.0	10	90.9	7	77.8
2010	78	9	11.5	0	0.0	9	100.0	9	100.0
2011	92	18	19.6	0	0.0	18	100.0	15	83.3
2012[#]	94	9	9.6	1	11.1	8	88.9	6	75.0
Total	**689**	**88**	**12.8**	**3**	**3.4**	**83**	**94.3**	**62**	**74.7**

* Includes initial and amplified MDR/RR-TB cases and MDR-TB treated cases 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 A7.1: Number and proportion of TB cases with a social risk factor by place of birth, England, 2010-2014

Social risk factor	2010		2011		2012		2013		2014	
	n	%	n	%	n	%	n	%	n	%
UK born										
Drug misuse	114	7.0	133	7.5	130	7.0	133	7.7	122	7.5
Alcohol misuse	114	7.1	121	6.8	99	5.4	130	7.5	97	6.0
Homelessness	71	4.3	62	3.4	55	2.9	72	4.1	74	4.5
Prison	82	5.3	123	7.1	105	5.8	98	5.8	94	5.9
At least one risk factor	237	16.0	269	16.1	254	14.5	260	15.6	234	15.0
More than 1 risk factor	100	5.5	124	6.4	95	4.7	115	6.2	102	5.8
Non-UK born										
Drug misuse	68	1.4	63	1.1	86	1.6	82	1.7	75	1.7
Alcohol misuse	135	2.8	106	1.9	111	2.1	104	2.1	98	2.3
Homelessness	123	2.4	128	2.3	127	2.3	148	3.0	128	3.0
Prison	86	1.8	77	1.4	117	2.2	93	1.9	95	2.2
At least one risk factor	334	7.4	300	5.9	321	6.2	324	6.8	293	7.2
More than 1 risk factor	56	1.0	58	1.0	90	1.5	78	1.5	75	1.6
All cases										
Drug misuse	188	2.7	203	2.7	221	3.0	218	3.2	201	3.3
Alcohol misuse	259	3.9	236	3.2	220	3.0	239	3.5	198	3.3
Homelessness	201	2.9	196	2.6	189	2.5	222	3.2	206	3.4
Prison	179	2.7	207	2.8	228	3.1	192	2.9	192	3.3
At least one risk factor	592	9.6	588	8.5	598	8.5	592	9.1	538	9.4
More than 1 risk factor	162	2.1	187	2.3	189	2.3	196	2.7	180	2.8

Table A8.1: Number and proportion of notified and unnotified TB cases matched to an HIV case, England, 2001-2013

Year	Notified TB cases	Notified TB cases matched to HIV case		Unnotified TB isolates matched to HIV case	Total TB cases matched to HIV case	
	n	n	%	n	n	%
2001	5,767	249	4.3	63	312	5.4
2002	6,289	424	6.7	33	457	7.2
2003	6,307	479	7.6	32	511	8.1
2004	6,530	514	7.9	22	536	8.2
2005	7,246	527	7.3	28	555	7.6
2006	7,323	512	7.0	21	533	7.3
2007	7,126	417	5.9	9	426	6.0
2008	7,361	435	5.9	23	458	6.2
2009	7,727	366	4.7	8	374	4.8
2010	7,321	349	4.8	7	356	4.9
2011	7,907	306	3.9	5	311	3.9
2012	7,702	265	3.4	5	270	3.5
2013	6,993	218	3.1	5	223	3.2
Total	**91,599**	**5,061**	**5.5**	**261**	**5,322**	**5.8**

Table A8.2: Number and proportion of TB-HIV co-infected case notifications by age group, England, 2001-2013

Year	Age group (years)						Total
	15-44		45-64		65+		
	n	%	n	%	n	%	n
2001	210	84.3	34	13.7	5	2.0	249
2002	366	86.3	55	13.0	3	0.7	424
2003	416	86.8	58	12.1	5	1.0	479
2004	432	84.0	78	15.2	4	0.8	514
2005	445	84.4	74	14.0	8	1.5	527
2006	421	82.2	81	15.8	10	2.0	512
2007	343	82.3	70	16.8	4	1.0	417
2008	334	76.8	95	21.8	6	1.4	435
2009	273	74.6	88	24.0	5	1.4	366
2010	251	71.9	91	26.1	7	2.0	349
2011	204	66.7	91	29.7	11	3.6	306
2012	194	73.2	67	25.3	4	1.5	265
2013	136	62.4	76	34.9	6	2.8	218
Total	**4,025**	**79.5**	**958**	**18.9**	**78**	**1.5**	**5,061**

Table A8.3: Number and proportion of TB-HIV co-infected case notifications with drug resistance, England, 2001-2013

Year	Resistant to isoniazid without MDR-TB*		MDR/RR-TB**		Total[#]
	n	%	n	%	n
2001	4	2.6	0	0.0	154
2002	12	4.4	9	3.3	274
2003	14	4.5	11	3.5	314
2004	29	8.6	7	2.1	339
2005	13	3.7	8	2.3	353
2006	26	7.4	11	3.1	351
2007	10	3.7	9	3.3	271
2008	9	3.1	5	1.7	287
2009	8	3.5	6	2.6	231
2010	15	6.4	4	1.7	233
2011	14	7.2	5	2.6	194
2012	7	4.2	8	4.8	168
2013	6	4.4	5	3.6	137
Total	**167**	**5.1**	**88**	**2.7**	**3,306**

* Culture confirmed cases with DST results for at least isoniazid and rifampicin who had resistance to isoniazid without MDR-TB
** Culture confirmed cases with DST results for at least isoniazid and rifampicin who were MDR/RR-TB cases and MDR-TB treated
[#] Culture confirmed cases with DST results for at least isoniazid and rifampicin

Table A10.1: Number and rate of TB cases detected in high incidence countries through the UK pre-entry screening programme, UK, 2006 to 2014

Year	Number of cases	Rate per 100,000 (95% CI)
2006	14	44.9 (24.5 - 75.3)
2007	53	55.4 (71.0 - 16.7)
2008	76	69.7 (54.9 - 87.2)
2009	121	91.6 (76.0 - 109.5)
2010	83	76.9 (61.3 - 95.4)
2011	87	90.3 (69.6 - 108.0)
2012	67	103.1 (79.9 - 131.0)
2013	134	154.6 (128.5 - 181.8)
2014*	369	158.8 (134.5 - 166.4)

CI - confidence intervals
* As of June 2015, 665 sputum samples are pending and the rate may increase when the final results are available

Table A10.2: Number of pulmonary TB cases diagnosed by pre-entry screening* and identified within one year of UK entry**, 2006 to 2014

Year of screening/ entry to the UK	TB cases diagnosed by pre-entry screening	TB cases identified in the UK
2006	14	380
2007	54	358
2008	76	329
2009	121	369
2010	83	351
2011	87	340
2012	67	192
2013	134	154
2014[#]	369	88

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

** Those included in the TB cases identified in the UK are from cases notified in the UK from the 101 high incidence countries where the pre-entry screening programme operates only

[#] As of June 2015, 665 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: Three-year average number of TB case notifications and rates by upper tier local authority and local authority district, England, 2012-2014

Upper tier local authority and local authority district*	Average annual number of cases**	Average annual rate per 100,000 (95% CI)
Barking and Dagenham	68	35.0 (30.3 -40.1)
Barnet	86	23.2 (20.4 -26.2)
Barnsley	6	2.7 (1.6 -4.2)
Bath and North East Somerset	13	7.2 (5.1 -9.9)
Bedford	27	16.9 (13.5 -21.0)
Bexley	25	10.7 (8.4 -13.4)
Birmingham	385	35.2 (33.2 -37.3)
Blackburn with Darwen	50	34.0 (28.7 -39.8)
Blackpool	17	12.0 (9.0 -15.8)
Bolton	54	19.3 (16.4 -22.5)
Bournemouth	14	7.4 (5.3 -10.0)
Bracknell Forest	10	8.6 (5.8 -12.2)
Bradford	141	26.7 (24.2 -29.4)
Brent	263	82.9 (77.2 -88.9)
Brighton and Hove	23	8.3 (6.4 -10.5)
Bristol, City of	95	21.6 (19.2 -24.3)
Bromley	26	8.1 (6.4 -10.1)
Buckinghamshire	**45**	**8.8 (7.4 -10.4)**
Aylesbury Vale	15	8.5 (6.2 -11.3)
Chiltern	4	4.3 (2.2 -7.5)
South Bucks	6	9.3 (5.6 -14.6)
Wycombe	20	11.3 (8.6 -14.6)
Bury	21	11.4 (8.8 -14.6)
Calderdale	20	9.9 (7.5 -12.7)
Cambridgeshire	**40**	**6.4 (5.3 -7.6)**
Cambridge	14	11.0 (8.0 -14.9)
East Cambridgeshire	3	3.1 (1.3 -6.1)
Fenland	8	8.6 (5.6 -12.7)
Huntingdonshire	8	4.5 (2.8 -6.7)
South Cambridgeshire	8	5.0 (3.2 -7.6)
Camden	50	21.8 (18.4 -25.5)
Central Bedfordshire	8	2.9 (1.8 -4.3)
Cheshire East	14	3.8 (2.7 -5.1)
Cheshire West and Chester	10	3.1 (2.1 -4.4)
City of London	1	12.9 (2.7 -37.6)
Cornwall	16	3.0 (2.2 -4.0)
County Durham	12	2.3 (1.6 -3.1)
Coventry	107	32.5 (29.1 -36.3)
Croydon	103	27.6 (24.6 -30.9)

Upper tier local authority and local authority district*	Average annual number of cases**	Average annual rate per 100,000 (95% CI)
Cumbria	**19**	**3.7 (2.8 -4.9)**
Allerdale	3	2.8 (1.2 -5.5)
Barrow-in-Furness	3	3.9 (1.7 -7.7)
Carlisle	6	5.2 (3.1 -8.4)
Copeland	1	1.9 (0.5 -4.9)
Eden	1	1.9 (0.4 -5.6)
South Lakeland	5	5.2 (2.9 -8.4)
Darlington	7	6.3 (3.9 -9.8)
Derby	35	13.9 (11.4 -16.8)
Derbyshire	**27**	**3.5 (2.8 -4.3)**
Amber Valley	5	4.1 (2.3 -6.7)
Bolsover	3	3.5 (1.5 -6.8)
Chesterfield	6	5.8 (3.4 -9.1)
Derbyshire Dales	2	3.3 (1.3 -6.7)
Erewash	4	3.2 (1.6 -5.8)
High Peak	2	2.6 (1.0 -5.3)
North East Derbyshire	1	1.3 (0.4 -3.4)
South Derbyshire	4	3.8 (1.9 -6.8)
Devon	**29**	**3.8 (3.0 -4.7)**
East Devon	1	0.5 (0.1 -1.8)
Exeter	9	7.1 (4.6 -10.4)
Mid Devon	2	3.0 (1.2 -6.1)
North Devon	2	2.5 (1.0 -5.1)
South Hams	2	2.8 (1.1 -5.7)
Teignbridge	6	5.0 (3.0 -7.8)
Torridge	1	2.0 (0.6 -5.2)
West Devon	5	8.6 (4.7 -14.5)
Doncaster	23	7.7 (6.0 -9.7)
Dorset	**12**	**2.8 (2.0 -3.9)**
Christchurch	1	1.4 (0.2 -5.0)
East Dorset	3	3.0 (1.3 -6.0)
North Dorset	2	2.4 (0.8 -5.6)
Purbeck	1	2.9 (0.8 -7.5)
West Dorset	2	2.3 (0.9 -4.8)
Weymouth and Portland	3	4.6 (2.1 -8.8)
Dudley	31	9.9 (8.0 -12.1)
Ealing	223	65.3 (60.4 -70.4)
East Riding of Yorkshire	7	2.0 (1.2 -3.1)
East Sussex	**26**	**4.9 (3.9 -6.1)**
Eastbourne	6	5.6 (3.3 -9.0)
Hastings	8	9.2 (5.9 -13.6)
Lewes	4	4.4 (2.3 -7.4)
Rother	3	3.6 (1.7 -6.7)
Wealden	5	3.1 (1.7 -5.1)
Enfield	72	22.5 (19.6 -25.8)

Upper tier local authority and local authority district*	Average annual number of cases**	Average annual rate per 100,000 (95% CI)
Essex	**67**	**4.7 (4.1 -5.4)**
Basildon	11	6.0 (4.1 -8.4)
Braintree	5	3.4 (1.9 -5.5)
Brentwood	5	6.2 (3.4 -10.5)
Castle Point	3	3.0 (1.3 -5.9)
Chelmsford	5	2.9 (1.6 -4.8)
Colchester	6	3.2 (1.9 -5.1)
Epping Forest	11	8.9 (6.2 -12.4)
Harlow	15	18.4 (13.4 -24.5)
Maldon	1	1.6 (0.3 -4.7)
Rochford	1	1.2 (0.2 -3.5)
Tendring	3	2.4 (1.2 -4.4)
Uttlesford	1	1.2 (0.2 -3.5)
Gateshead	14	7.0 (5.0 -9.5)
Gloucestershire	**34**	**5.7 (4.6 -6.9)**
Cheltenham	8	7.2 (4.6 -10.6)
Cotswold	3	3.6 (1.6 -6.8)
Forest of Dean	1	0.8 (0.1 -2.9)
Gloucester	13	10.7 (7.6 -14.6)
Stroud	6	5.0 (2.9 -7.9)
Tewkesbury	3	4.0 (1.9 -7.3)
Greenwich	111	42.0 (37.6 -46.8)
Hackney	83	32.4 (28.5 -36.6)
Halton	2	1.9 (0.7 -3.8)
Hammersmith and Fulham	43	24.2 (20.2 -28.8)
Hampshire	**56**	**4.2 (3.6 -4.8)**
Basingstoke and Deane	10	5.6 (3.8 -8.1)
East Hampshire	2	1.4 (0.5 -3.3)
Eastleigh	4	3.1 (1.6 -5.5)
Fareham	6	5.3 (3.1 -8.3)
Gosport	1	1.2 (0.2 -3.5)
Hart	3	2.9 (1.2 -5.7)
Havant	2	1.6 (0.6 -3.6)
New Forest	2	1.1 (0.4 -2.4)
Rushmoor	23	23.8 (18.5 -30.2)
Test Valley	1	1.1 (0.3 -2.9)
Winchester	3	2.3 (1.0 -4.4)
Haringey	87	33.2 (29.3 -37.4)
Harrow	147	60.4 (54.9 -66.3)
Hartlepool	5	5.0 (2.8 -8.5)
Havering	26	10.9 (8.6 -13.5)
Herefordshire, County of	5	2.7 (1.5 -4.4)

Upper tier local authority and local authority district*	Average annual number of cases**	Average annual rate per 100,000 (95% CI)
Hertfordshire	**78**	**6.8 (6.0 -7.8)**
Broxbourne	7	7.7 (4.8 -11.7)
Dacorum	7	4.7 (2.9 -7.2)
East Hertfordshire	3	2.4 (1.1 -4.3)
Hertsmere	11	10.5 (7.2 -14.8)
North Hertfordshire	7	5.1 (3.1 -7.9)
St Albans	8	5.4 (3.4 -8.0)
Stevenage	8	9.0 (5.7 -13.5)
Three Rivers	8	8.6 (5.4 -12.8)
Watford	12	12.5 (8.7 -17.3)
Welwyn Hatfield	8	7.3 (4.7 -10.8)
Hillingdon	120	41.9 (37.7 -46.5)
Hounslow	168	64.0 (58.6 -69.9)
Isle of Wight	4	2.6 (1.3 -4.7)
Isles of Scilly	0	-
Islington	63	29.3 (25.3 -33.8)
Kensington and Chelsea	35	22.2 (18.2 -26.9)
Kent	**108**	**7.2 (6.5 -8.1)**
Ashford	10	8.2 (5.5 -11.7)
Canterbury	10	6.2 (4.2 -8.9)
Dartford	10	9.9 (6.7 -14.2)
Dover	4	3.6 (1.8 -6.2)
Gravesham	21	19.9 (15.2 -25.5)
Maidstone	11	7.1 (4.9 -9.9)
Sevenoaks	7	6.0 (3.7 -9.1)
Shepway	11	9.8 (6.7 -13.8)
Swale	4	2.6 (1.3 -4.7)
Thanet	11	8.0 (5.5 -11.3)
Tonbridge and Malling	3	2.7 (1.3 -5.0)
Tunbridge Wells	7	5.8 (3.5 -8.9)
Kingston upon Hull, City of	20	7.6 (5.8 -9.9)
Kingston upon Thames	26	15.8 (12.5 -19.7)
Kirklees	83	19.4 (17.0 -21.9)
Knowsley	3	2.3 (1.1 -4.2)
Lambeth	84	26.6 (23.4 -30.1)

Upper tier local authority and local authority district*	Average annual number of cases**	Average annual rate per 100,000 (95% CI)
Lancashire	**91**	**7.7 (6.8 -8.7)**
Burnley	7	8.4 (5.3 -12.7)
Chorley	6	5.7 (3.5 -9.0)
Fylde	2	3.1 (1.2 -6.3)
Hyndburn	9	11.2 (7.4 -16.3)
Lancaster	6	4.0 (2.3 -6.5)
Pendle	17	19.3 (14.4 -25.3)
Preston	28	20.2 (16.1 -24.9)
Ribble Valley	2	2.9 (0.9 -6.7)
Rossendale	3	4.4 (2.0 -8.3)
South Ribble	4	3.7 (1.9 -6.4)
West Lancashire	2	1.5 (0.5 -3.5)
Wyre	4	4.0 (2.1 -6.8)
Leeds	97	12.7 (11.3 -14.3)
Leicester	160	48.0 (43.8 -52.4)
Leicestershire	**31**	**4.7 (3.8 -5.8)**
Blaby	5	5.3 (2.9 -8.7)
Charnwood	7	4.1 (2.5 -6.3)
Harborough	5	5.3 (2.9 -9.0)
Hinckley and Bosworth	5	4.7 (2.6 -7.7)
Melton	1	1.3 (0.2 -4.7)
North West Leicestershire	3	3.2 (1.4 -6.0)
Oadby and Wigston	6	10.7 (6.3 -16.9)
Lewisham	74	25.9 (22.6 -29.6)
Lincolnshire	**31**	**4.2 (3.4 -5.2)**
Boston	6	9.1 (5.4 -14.4)
East Lindsey	3	2.4 (1.2 -4.5)
Lincoln	5	4.9 (2.7 -8.2)
North Kesteven	2	1.5 (0.5 -3.5)
South Holland	3	3.0 (1.3 -5.9)
South Kesteven	10	7.1 (4.7 -10.2)
West Lindsey	3	2.9 (1.3 -5.8)
Liverpool	41	8.8 (7.3 -10.5)
Luton	73	35.1 (30.6 -40.0)
Manchester	161	31.3 (28.5 -34.2)
Medway	17	6.4 (4.8 -8.4)
Merton	60	29.6 (25.4 -34.2)
Middlesbrough	17	12.5 (9.3 -16.4)
Milton Keynes	33	12.9 (10.5 -15.7)
Newcastle upon Tyne	42	14.8 (12.3 -17.6)
Newham	319	100.0 (93.8 -106.6)

Upper tier local authority and local authority district*	Average annual number of cases**	Average annual rate per 100,000 (95% CI)
Norfolk	**33**	**3.7 (3.0 -4.6)**
Breckland	3	2.3 (1.0 -4.3)
Broadland	3	2.1 (0.9 -4.2)
Great Yarmouth	9	8.9 (5.8 -13.0)
King's Lynn and West Norfolk	5	3.3 (1.9 -5.5)
North Norfolk	2	2.0 (0.7 -4.3)
Norwich	10	7.4 (5.0 -10.5)
South Norfolk	1	1.0 (0.3 -2.7)
North East Lincolnshire	3	1.7 (0.7 -3.3)
North Lincolnshire	13	7.9 (5.6 -10.8)
North Somerset	8	3.9 (2.5 -5.8)
North Tyneside	10	4.9 (3.3 -7.1)
North Yorkshire	**14**	**2.3 (1.7 -3.1)**
Craven	2	4.2 (1.7 -8.7)
Hambleton	1	1.1 (0.2 -3.3)
Harrogate	4	2.7 (1.5 -4.7)
Richmondshire	2	4.4 (1.8 -9.0)
Ryedale	0	0.6 (0.0 -3.5)
Scarborough	2	2.2 (0.9 -4.4)
Selby	1	1.6 (0.4 -4.0)
Northamptonshire	**58**	**8.2 (7.0 -9.5)**
Corby	5	7.3 (4.0 -12.2)
Daventry	4	4.7 (2.3 -8.3)
East Northamptonshire	3	3.0 (1.3 -6.0)
Kettering	4	4.2 (2.2 -7.3)
Northampton	33	15.4 (12.5 -18.7)
South Northamptonshire	3	3.4 (1.6 -6.5)
Wellingborough	6	8.3 (5.0 -13.0)
Northumberland	9	2.8 (1.9 -4.1)
Nottingham	56	18.1 (15.5 -21.0)
Nottinghamshire	**36**	**4.5 (3.7 -5.4)**
Ashfield	6	5.2 (3.1 -8.1)
Bassetlaw	4	3.2 (1.6 -5.8)
Broxtowe	7	6.0 (3.7 -9.3)
Gedling	7	5.8 (3.5 -9.0)
Mansfield	5	4.7 (2.7 -7.8)
Newark and Sherwood	3	2.6 (1.2 -4.9)
Rushcliffe	4	3.8 (2.0 -6.6)
Oldham	49	21.4 (18.1 -25.2)
Oxfordshire	**69**	**10.4 (9.0 -11.9)**
Cherwell	17	11.8 (8.8 -15.6)
Oxford	36	23.2 (19.0 -28.0)
South Oxfordshire	5	3.9 (2.2 -6.4)
Vale of White Horse	6	4.6 (2.7 -7.3)
West Oxfordshire	5	4.9 (2.8 -8.0)

Upper tier local authority and local authority district*	Average annual number of cases**	Average annual rate per 100,000 (95% CI)
Peterborough	54	28.7 (24.4 -33.4)
Plymouth	15	5.7 (4.1 -7.6)
Poole	2	1.6 (0.6 -3.2)
Portsmouth	17	8.3 (6.2 -10.9)
Reading	58	36.3 (31.1 -42.1)
Redbridge	146	50.5 (45.8 -55.4)
Redcar and Cleveland	4	3.2 (1.7 -5.5)
Richmond upon Thames	11	5.9 (4.1 -8.3)
Rochdale	32	15.1 (12.2 -18.4)
Rotherham	22	8.4 (6.5 -10.7)
Rutland	2	5.3 (2.0 -11.6)
Salford	27	11.1 (8.8 -13.9)
Sandwell	106	33.6 (30.0 -37.6)
Sefton	11	3.9 (2.7 -5.5)
Sheffield	90	16.1 (14.2 -18.1)
Shropshire	12	3.8 (2.6 -5.3)
Slough	74	51.5 (44.9 -58.7)
Solihull	18	8.8 (6.6 -11.4)
Somerset	**17**	**3.2 (2.4 -4.2)**
Mendip	4	3.9 (2.1 -6.7)
Sedgemoor	3	2.6 (1.2 -4.8)
South Somerset	6	3.9 (2.3 -6.0)
Taunton Deane	4	3.3 (1.6 -5.9)
West Somerset	0	-
South Gloucestershire	17	6.4 (4.8 -8.5)
South Tyneside	7	4.5 (2.7 -6.9)
Southampton	36	14.9 (12.2 -17.9)
Southend-on-Sea	13	7.6 (5.4 -10.3)
Southwark	95	31.7 (28.2 -35.7)
St. Helens	4	2.5 (1.3 -4.2)
Staffordshire	**33**	**3.9 (3.2 -4.7)**
Cannock Chase	2	1.7 (0.6 -4.0)
East Staffordshire	12	10.4 (7.3 -14.4)
Lichfield	2	2.0 (0.7 -4.3)
Newcastle-under-Lyme	5	3.7 (2.0 -6.3)
South Staffordshire	1	1.2 (0.3 -3.1)
Stafford	8	5.8 (3.7 -8.7)
Staffordshire Moorlands	4	3.8 (1.9 -6.7)
Tamworth	0	0.4 (0.0 -2.4)
Stockport	17	6.0 (4.4 -7.8)
Stockton-on-Tees	10	5.0 (3.4 -7.2)
Stoke-on-Trent	35	13.8 (11.3 -16.8)

Upper tier local authority and local authority district*	Average annual number of cases**	Average annual rate per 100,000 (95% CI)
Suffolk	**30**	**4.1 (3.3 -5.0)**
Babergh	1	1.5 (0.4 -3.9)
Forest Heath	3	4.9 (2.2 -9.2)
Ipswich	8	5.7 (3.6 -8.5)
Mid Suffolk	2	2.0 (0.7 -4.4)
St Edmundsbury	7	6.3 (3.9 -9.6)
Suffolk Coastal	4	2.9 (1.5 -5.3)
Waveney	5	4.6 (2.6 -7.5)
Sunderland	21	7.7 (5.9 -9.9)
Surrey	**78**	**6.7 (5.9 -7.7)**
Elmbridge	5	3.8 (2.1 -6.2)
Epsom and Ewell	7	9.5 (6.0 -14.4)
Guildford	6	4.2 (2.5 -6.7)
Mole Valley	2	2.3 (0.9 -5.1)
Reigate and Banstead	17	12.0 (9.0 -15.8)
Runnymede	7	8.0 (4.9 -12.3)
Spelthorne	7	7.2 (4.4 -11.0)
Surrey Heath	5	5.7 (3.2 -9.5)
Tandridge	1	1.6 (0.4 -4.0)
Waverley	5	3.8 (2.1 -6.4)
Woking	16	15.8 (11.6 -20.9)
Sutton	26	13.3 (10.5 -16.6)
Swindon	22	10.1 (7.8 -12.9)
Tameside	26	11.6 (9.2 -14.5)
Telford and Wrekin	12	6.9 (4.8 -9.6)
Thurrock	8	5.2 (3.3 -7.6)
Torbay	7	5.3 (3.3 -8.1)
Tower Hamlets	105	38.3 (34.2 -42.8)
Trafford	32	13.9 (11.3 -17.0)
Wakefield	22	6.7 (5.2 -8.5)
Walsall	46	16.9 (14.2 -19.9)
Waltham Forest	110	41.3 (37.0 -46.0)
Wandsworth	67	21.7 (18.8 -24.9)
Warrington	11	5.2 (3.6 -7.3)
Warwickshire	**50**	**9.2 (7.8 -10.7)**
North Warwickshire	3	4.3 (1.8 -8.4)
Nuneaton and Bedworth	19	15.1 (11.4 -19.5)
Rugby	12	11.5 (8.0 -16.0)
Stratford-on-Avon	4	3.3 (1.7 -5.8)
Warwick	13	9.4 (6.7 -12.8)
West Berkshire	9	5.8 (3.8 -8.4)

Upper tier local authority and local authority district*	Average annual number of cases**	Average annual rate per 100,000 (95% CI)
West Sussex	**50**	**6.1 (5.2 -7.2)**
Adur	2	2.7 (0.9 -6.2)
Arun	7	4.6 (2.8 -7.0)
Chichester	5	4.1 (2.2 -6.8)
Crawley	21	19.3 (14.8 -24.6)
Horsham	5	3.8 (2.1 -6.2)
Mid Sussex	5	3.7 (2.1 -6.1)
Worthing	6	5.3 (3.1 -8.5)
Westminster	55	24.0 (20.4 -27.9)
Wigan	11	3.5 (2.5 -5.0)
Wiltshire	14	3.0 (2.2 -4.0)
Windsor and Maidenhead	14	9.6 (6.9 -12.9)
Wirral	9	2.9 (1.9 -4.2)
Wokingham	15	9.5 (6.9 -12.7)
Wolverhampton	73	29.1 (25.4 -33.2)
Worcestershire	**33**	**5.7 (4.6 -7.0)**
Bromsgrove	2	1.8 (0.6 -4.1)
Malvern Hills	2	2.2 (0.7 -5.2)
Redditch	16	18.9 (14.0 -25.1)
Worcester	7	7.0 (4.3 -10.7)
Wychavon	4	3.7 (1.9 -6.2)
Wyre Forest	2	2.0 (0.7 -4.4)
York	6	3.1 (1.9 -4.9)

* 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.2: Three-year average number of TB case notifications and rates by Clinical Commissioning Group (CCG), England, 2012-2014

Clinical Commissioning Group	Average annual number of cases	Average annual rate per 100,000 (95% CI)
NHS Airedale, Wharfedale and Craven	12	7.6 (5.3 - 10.5)
NHS Ashford	10	8.3 (5.6 - 11.8)
NHS Aylesbury Vale	16	7.9 (5.8 - 10.5)
NHS Barking & Dagenham	68	35.2 (30.5 - 40.4)
NHS Barnet	86	23.3 (20.6 - 26.4)
NHS Barnsley	6	2.7 (1.6 - 4.2)
NHS Basildon and Brentwood	15	6.1 (4.5 - 8.1)
NHS Bassetlaw	4	3.2 (1.6 - 5.8)
NHS Bath and North East Somerset	13	7.3 (5.2 - 9.9)
NHS Bedfordshire	35	8.3 (6.8 - 10.0)
NHS Bexley	25	10.7 (8.5 - 13.4)
NHS Birmingham CrossCity	199	27.5 (25.3 - 29.8)
NHS Birmingham South and Central	71	35.4 (30.8 - 40.5)
NHS Blackburn with Darwen	50	33.9 (28.7 - 39.8)
NHS Blackpool	17	12.0 (8.9 - 15.8)
NHS Bolton	54	19.3 (16.4 - 22.5)
NHS Bracknell and Ascot	11	8.0 (5.4 - 11.2)
NHS Bradford City	59	71.4 (61.3 - 82.8)
NHS Bradford Districts	72	21.5 (18.8 - 24.6)
NHS Brent	263	83.2 (77.5 - 89.2)
NHS Brighton & Hove	23	8.3 (6.5 - 10.5)
NHS Bristol	95	21.7 (19.3 - 24.4)
NHS Bromley	26	8.1 (6.4 - 10.1)
NHS Bury	21	11.4 (8.8 - 14.6)
NHS Calderdale	20	9.9 (7.6 - 12.7)
NHS Cambridgeshire and Peterborough	96	11.2 (10.0 - 12.6)
NHS Camden	50	21.9 (18.5 - 25.7)
NHS Cannock Chase	2	1.8 (0.7 - 3.6)
NHS Canterbury and Coastal	11	5.3 (3.6 - 7.5)
NHS Castle Point, Rayleigh and Rochford	4	2.1 (1.1 - 3.8)
NHS Central London (Westminster)	32	19.7 (16.0 - 24.1)
NHS Central Manchester	89	48.8 (43.1 - 55.1)
NHS Chiltern	30	9.3 (7.5 - 11.4)
NHS Chorley and South Ribble	8	4.7 (3.0 - 7.0)
NHS City and Hackney	84	32.0 (28.2 - 36.2)
NHS Coastal West Sussex	20	4.1 (3.1 - 5.3)
NHS Corby	5	7.3 (4.0 - 12.3)
NHS Coventry and Rugby	119	27.8 (25.0 - 30.8)
NHS Crawley	21	19.3 (14.8 - 24.7)
NHS Croydon	103	27.7 (24.7 - 31.0)
NHS Cumbria	19	3.7 (2.8 - 4.8)

Clinical Commissioning Group	Average annual number of cases	Average annual rate per 100,000 (95% CI)
NHS Darlington	7	6.3 (3.9 - 9.8)
NHS Dartford, Gravesham and Swanley	35	13.8 (11.3 - 16.7)
NHS Doncaster	23	7.7 (6.0 - 9.7)
NHS Dorset	28	3.7 (3.0 - 4.6)
NHS Dudley	31	9.9 (8.0 - 12.1)
NHS Durham Dales, Easington and Sedgefield	5	1.8 (1.0 - 3.0)
NHS Ealing	223	65.2 (60.4 - 70.4)
NHS East Lancashire	38	10.1 (8.3 - 12.2)
NHS East Leicestershire and Rutland	18	5.7 (4.3 - 7.4)
NHS East Riding of Yorkshire	6	2.0 (1.2 - 3.1)
NHS East Staffordshire	12	9.6 (6.8 - 13.4)
NHS East Surrey	14	7.7 (5.5 - 10.5)
NHS East and North Hertfordshire	33	6.1 (4.9 - 7.4)
NHS Eastbourne, Hailsham and Seaford	8	4.4 (2.8 - 6.5)
NHS Eastern Cheshire	8	3.9 (2.5 - 5.9)
NHS Enfield	72	22.6 (19.7 - 25.9)
NHS Erewash	3	3.5 (1.7 - 6.5)
NHS Fareham and Gosport	7	3.6 (2.2 - 5.4)
NHS Fylde & Wyre	5	3.2 (1.8 - 5.2)
NHS Gateshead	14	7.0 (5.0 - 9.5)
NHS Gloucestershire	34	5.7 (4.6 - 6.9)
NHS Great Yarmouth & Waveney	14	6.6 (4.7 - 8.9)
NHS Greater Huddersfield	37	15.4 (12.7 - 18.6)
NHS Greater Preston	31	15.5 (12.5 - 19.0)
NHS Greenwich	111	42.3 (37.8 - 47.0)
NHS Guildford and Waverley	9	4.3 (2.9 - 6.3)
NHS Halton	2	1.9 (0.7 - 3.8)
NHS Hambleton, Richmondshire and Whitby	3	1.7 (0.7 - 3.4)
NHS Hammersmith and Fulham	43	24.2 (20.2 - 28.7)
NHS Hardwick	2	1.8 (0.7 - 4.0)
NHS Haringey	87	33.3 (29.4 - 37.6)
NHS Harrogate and Rural District	4	2.7 (1.5 - 4.7)
NHS Harrow	147	60.6 (55.1 - 66.5)
NHS Hartlepool and Stockton-on-Tees	14	5.0 (3.6 - 6.8)
NHS Hastings & Rother	12	6.4 (4.5 - 8.9)
NHS Havering	26	10.9 (8.6 - 13.6)
NHS Herefordshire	5	2.7 (1.5 - 4.4)
NHS Herts Valleys	45	7.8 (6.5 - 9.2)
NHS Heywood, Middleton & Rochdale	32	15.1 (12.2 - 18.4)
NHS High Weald Lewes Havens	7	4.0 (2.4 - 6.1)
NHS Hillingdon	120	42.2 (38.0 - 46.8)
NHS Horsham and Mid Sussex	9	4.2 (2.8 - 6.0)
NHS Hounslow	168	64.3 (58.8 - 70.2)
NHS Hull	20	7.6 (5.8 - 9.9)

Clinical Commissioning Group	Average annual number of cases	Average annual rate per 100,000 (95% CI)
NHS Ipswich and East Suffolk	14	3.5 (2.5 - 4.7)
NHS Isle of Wight	4	2.6 (1.3 - 4.7)
NHS Islington	63	29.6 (25.5 - 34.1)
NHS Kernow	16	3.0 (2.2 - 4.0)
NHS Kingston	26	15.9 (12.6 - 19.8)
NHS Knowsley	3	2.3 (1.1 - 4.2)
NHS Lambeth	84	26.7 (23.5 - 30.3)
NHS Lancashire North	7	4.4 (2.7 - 6.7)
NHS Leeds North	23	11.7 (9.1 - 14.8)
NHS Leeds South and East	48	20.0 (16.9 - 23.5)
NHS Leeds West	26	8.0 (6.3 - 10.0)
NHS Leicester City	160	48.1 (43.9 - 52.6)
NHS Lewisham	74	26.1 (22.8 - 29.8)
NHS Lincolnshire East	10	4.4 (2.9 - 6.2)
NHS Lincolnshire West	8	3.3 (2.1 - 5.0)
NHS Liverpool	41	8.8 (7.3 - 10.5)
NHS Luton	73	35.1 (30.6 - 40.0)
NHS Mansfield & Ashfield	9	4.5 (2.9 - 6.6)
NHS Medway	17	6.4 (4.8 - 8.4)
NHS Merton	60	29.6 (25.4 - 34.2)
NHS Mid Essex	11	2.9 (2.0 - 4.1)
NHS Milton Keynes	33	12.7 (10.3 - 15.4)
NHS Nene	52	8.3 (7.0 - 9.7)
NHS Newark & Sherwood	3	2.3 (1.0 - 4.5)
NHS Newbury and District	7	6.9 (4.4 - 10.5)
NHS Newcastle North and East	17	12.1 (9.0 - 15.9)
NHS Newcastle West	25	17.6 (13.8 - 22.0)
NHS Newham	319	100.7 (94.4 - 107.3)
NHS North & West Reading	10	9.7 (6.5 - 13.9)
NHS North Derbyshire	11	4.0 (2.8 - 5.7)
NHS North Durham	7	2.7 (1.7 - 4.2)
NHS North East Essex	9	2.9 (1.9 - 4.1)
NHS North East Hampshire and Farnham	26	12.4 (9.8 - 15.5)
NHS North East Lincolnshire	3	1.7 (0.7 - 3.3)
NHS North Hampshire	11	4.9 (3.4 - 6.9)
NHS North Kirklees	46	24.5 (20.6 - 29.0)
NHS North Lincolnshire	13	7.9 (5.6 - 10.8)
NHS North Manchester	46	27.3 (23.0 - 32.3)
NHS North Norfolk	3	1.8 (0.8 - 3.4)
NHS North Somerset	8	3.9 (2.5 - 5.8)
NHS North Staffordshire	8	3.7 (2.4 - 5.6)
NHS North Tyneside	10	5.0 (3.3 - 7.1)
NHS North West Surrey	31	9.2 (7.5 - 11.3)
NHS North, East, West Devon	36	4.2 (3.4 - 5.0)

Clinical Commissioning Group	Average annual number of cases	Average annual rate per 100,000 (95% CI)
NHS Northumberland	9	2.8 (1.9 - 4.1)
NHS Norwich	12	6.0 (4.2 - 8.3)
NHS Nottingham City	56	18.2 (15.5 - 21.1)
NHS Nottingham North & East	10	6.6 (4.4 - 9.4)
NHS Nottingham West	7	6.0 (3.7 - 9.3)
NHS Oldham	49	21.5 (18.1 - 25.2)
NHS Oxfordshire	69	10.7 (9.3 - 12.2)
NHS Portsmouth	17	8.4 (6.2 - 11.0)
NHS Redbridge	146	50.7 (46.1 - 55.7)
NHS Redditch and Bromsgrove	18	9.9 (7.4 - 12.9)
NHS Richmond	11	5.9 (4.1 - 8.3)
NHS Rotherham	22	8.4 (6.5 - 10.7)
NHS Rushcliffe	4	3.9 (2.1 - 6.6)
NHS Salford	27	11.2 (8.9 - 13.9)
NHS Sandwell and West Birmingham	220	46.0 (42.6 - 49.7)
NHS Scarborough and Ryedale	3	2.4 (1.0 - 4.8)
NHS Sheffield	90	16.1 (14.2 - 18.1)
NHS Shropshire	12	3.8 (2.6 - 5.3)
NHS Slough	74	51.6 (45.1 - 58.9)
NHS Solihull	18	8.8 (6.6 - 11.5)
NHS Somerset	17	3.2 (2.4 - 4.2)
NHS South Cheshire	6	3.6 (2.2 - 5.6)
NHS South Devon and Torbay	14	5.1 (3.7 - 6.9)
NHS South East Staffs and Seisdon and Peninsular	3	1.3 (0.6 - 2.5)
NHS South Eastern Hampshire	4	1.7 (0.9 - 3.1)
NHS South Gloucestershire	17	6.5 (4.8 - 8.5)
NHS South Kent Coast	14	7.0 (5.1 - 9.5)
NHS South Lincolnshire	7	4.9 (3.1 - 7.5)
NHS South Manchester	26	15.9 (12.5 - 19.9)
NHS South Norfolk	4	1.5 (0.8 - 2.8)
NHS South Reading	50	45.8 (38.8 - 53.8)
NHS South Sefton	4	2.7 (1.5 - 4.7)
NHS South Tees	22	7.9 (6.1 - 10.1)
NHS South Tyneside	7	4.5 (2.7 - 6.9)
NHS South Warwickshire	17	6.6 (4.9 - 8.6)
NHS South West Lincolnshire	6	4.9 (2.9 - 7.7)
NHS South Worcestershire	13	4.3 (3.1 - 5.9)
NHS Southampton	36	14.9 (12.2 - 18.0)
NHS Southend	13	7.6 (5.4 - 10.3)
NHS Southern Derbyshire	45	8.7 (7.3 - 10.3)
NHS Southport and Formby	6	5.5 (3.3 - 8.7)
NHS Southwark	95	31.9 (28.3 - 35.8)
NHS St Helens	4	2.5 (1.3 - 4.2)
NHS Stafford and Surrounds	8	5.1 (3.2 - 7.6)

Clinical Commissioning Group	Average annual number of cases	Average annual rate per 100,000 (95% CI)
NHS Stockport	17	6.0 (4.4 - 7.9)
NHS Stoke on Trent	35	13.5 (11.1 - 16.4)
NHS Sunderland	21	7.7 (6.0 - 9.9)
NHS Surrey Downs	17	6.0 (4.5 - 7.9)
NHS Surrey Heath	5	5.7 (3.2 - 9.2)
NHS Sutton	26	13.3 (10.5 - 16.6)
NHS Swale	3	2.7 (1.3 - 5.2)
NHS Swindon	22	9.9 (7.6 - 12.6)
NHS Tameside and Glossop	26	10.4 (8.2 - 12.9)
NHS Telford & Wrekin	12	6.9 (4.8 - 9.6)
NHS Thanet	11	8.1 (5.6 - 11.3)
NHS Thurrock	8	5.2 (3.4 - 7.7)
NHS Tower Hamlets	105	38.8 (34.6 - 43.4)
NHS Trafford	32	13.9 (11.3 - 17.0)
NHS Vale Royal	3	2.6 (1.1 - 5.1)
NHS Vale of York	9	2.5 (1.6 - 3.6)
NHS Wakefield	22	6.7 (5.2 - 8.5)
NHS Walsall	46	16.9 (14.2 - 20.0)
NHS Waltham Forest	110	41.4 (37.1 - 46.2)
NHS Wandsworth	67	21.7 (18.8 - 24.9)
NHS Warrington	11	5.2 (3.6 - 7.4)
NHS Warwickshire North	22	11.5 (8.9 - 14.7)
NHS West Cheshire	8	3.4 (2.1 - 5.0)
NHS West Essex	28	9.5 (7.5 - 11.7)
NHS West Hampshire	10	1.8 (1.2 - 2.6)
NHS West Kent	24	5.2 (4.1 - 6.6)
NHS West Lancashire	2	1.5 (0.5 - 3.5)
NHS West Leicestershire	15	4.0 (2.9 - 5.3)
NHS West London (Kensington and Chelsea, Queen's Park and Paddington)	57	26.1 (22.4 - 30.3)
NHS West Norfolk	6	3.3 (1.9 - 5.3)
NHS West Suffolk	11	4.9 (3.4 - 6.9)
NHS Wigan Borough	11	3.5 (2.5 - 5.0)
NHS Wiltshire	14	2.9 (2.1 - 4.0)
NHS Windsor, Ascot and Maidenhead	14	9.8 (7.0 - 13.3)
NHS Wirral	9	2.9 (1.9 - 4.2)
NHS Wokingham	15	9.5 (6.9 - 12.7)
NHS Wolverhampton	73	29.2 (25.4 - 33.3)
NHS Wyre Forest	2	2.0 (0.7 - 4.4)

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 2015 then cleaned and validated by end of August 2015.

Matching laboratory isolates to case notifications

Data from all TB isolates sent to Mycobacteria Reference Laboratories for culture between January 2013 and March 2015 were deduplicated and a summary record was generated from all the isolates from the same individual within a 12 month period. MDR-TB 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 2013 and 2014, through a probabilistic matching process based on patient identifiers common to both the laboratory isolate and the case notification [17]. Matches were also subject to manual review to identify any false positive or false negative matches. For TB cases notified before 2013, 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 2013 and data from unmatched laboratory TB isolates with specimen dates between 2001 and 2013 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 were 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 2014, 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 2014.

The postcode field (used to map postcodes to geographic areas) was cleaned by identifying postcodes with an incorrect number of characters or those with obvious errors in the postcode (ie 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. 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 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 was updated to yes if mentioned in the comments fields or if HMP or a prison name was recorded as the address.

Data cleaning of TB outcomes

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 Office for National Statistics (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-TB cases, the start date of MDR-TB treatment (collected externally to ETS using paper based questionnaires) was used to reclassify TB outcome at 12, 24 or 36 months. MDR-TB cases that died were reclassified based on the time between date of starting MDR-TB treatment and the date of death. Similarly, for MDR-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-TB treatment start date was not known, MDR-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

Tuberculosis rates

Rates are presented from 2000 to 2014 with overall tuberculosis 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 2010 (IMD 2010) score 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 PHE adjusted IMD 2010 scores http://www.apho.org.uk/resource/item.aspx?RID=125887,

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 amplified 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 amplification. 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 amplification), this MDR-TB result was classified as initial resistance.

In previous TB annual reports data has been presented for all cases resistant to isoniazid including cases with MDR-TB, however, this report presents detailed breakdown of only those resistant to isoniazid excluding MDR-TB. The same methodology has been applied to the presentation of cases with rifampicin resistance excluding MDR-TB where explicitly stated. Due to the similar treatment requirements for patients with rifampicin resistance only and MDR-TB, detailed reporting was done for all cases with rifampicin resistance, including those with MDR-TB (MDR/RR-TB).

MDR-TB Treatment

Additional cases treated for MDR-TB, but not culture confirmed, 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 (from July 2015) or the UK TB Cluster Naming Resource (before July 2015) 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 [18]. 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

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 amplified), or non-culture confirmed cases treated as MDR-TB [6]. 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 amplified) as well as those without culture confirmation treated for MDR-TB.

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 [19] 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 undertaken for presentation in the rest of the report. Table A.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 “Name”, “Postcode”, “Date of birth” and “Sex”, are mandatory fields in ETS.

In general data completeness is high and has improved over time for many variables collected in ETS however completeness could still be improved further.

Demographic variables

NHS number, which is used for matching TB notifications to TB isolates and for identifying duplicate notifications, had overall completeness of 90%. The highest completeness (98%) was in Yorkshire and the Humber and North East PHECs. Although completeness in the East Midlands PHEC increased by 5% between 2013 and 2014, the area still had the lowest completeness in 2014 at 84%. The largest improvement (8%) between 2013 and 2014 was in the West Midlands PHEC and in 2014, the area had the third highest completeness (95%). 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.

Overall completeness of ethnic group was 99%, and varied by PHEC from 97% to 99% with no area having 100% completeness. South West PHEC increased 4% between 2013 and 2014.

Completeness of place of birth (UK/ non-UK born) for England was 98% and was over 95% in all but two PHECs; North East and Yorkshire and the Humber (92% and 93% respectively). Completeness in North East increased 3% between 2013 and 2014 but completeness remained unchanged in Yorkshire and the Humber. London was the only PHEC to have completeness of 100% for this variable.

Clinical variables

Recording of HIV testing for England was 90% and for all PHECs was 90% or less, with the exception of London with completeness at 99%. Completeness in South West, Yorkshire and the Humber and North East increased between 2013 and 2014 (+6%, +9% and +10% respectively); however, Yorkshire and the Humber still have the lowest completeness at 65%.

The recording of previous TB diagnosis was well completed; 99% for England with completeness by PHEC between 97% and 99%. However, once the recording of unknowns was excluded, the proportion of cases that had a known previous TB diagnosis was only 95% for England, and by PHEC completeness was lowest in: East Midlands (90%), North West (92%) and Yorkshire and the Humber (92%). There was no increase in completeness between 2013 and 2014 in any PHEC, with the largest decline of 5% in East Midlands.

The recording of previous TB treatment (for those with a previous TB diagnosis) was low for England (79%). No PHEC had a completeness of over 90% and the lowest completeness was in South West (48%). Between 2013 and 2014 completeness in Yorkshire and the Humber improved by 13% while in East of England completeness decreased 14% .

Social risk factor variables

The proportion of cases with information reported on social risk factors (drug misuse, alcohol misuse, homelessness and prison) was 97% (alcohol misuse) or 98% (all other social risk factors) for England. However, once unknowns were excluded, completeness for England varied between 91% and 93% for the four social risk factors. The lowest completeness was in East Midlands (between 73% and 87% for each social risk factor) and North West (between 81% and 87%). Overall, compared with 2013, in 2014 data completeness for risk factors declined.

Diagnosis

In 2014, the recording of sputum smear status for pulmonary cases in England was only 61%. By PHEC, completeness varied from 32% in North East PHEC to 76% in London. Between 2013 and 2014, completeness in North East PHEC decreased 11% and in East of England decreased 8%, whilst completeness increased 9% in both North West and East Midlands. In contrast, the recording of site of disease was overall 100% for England and was between 99% and 100% for all PHECs.

Date variables

Overall there has been an increase in the completeness of “symptom onset date” between 2013 and 2014, in England and the majority of the PHECs with the exception of South East PHEC and London where there was a decline. The largest increase in completeness was in East Midlands and North West PHECs (23% and 13% respectively). East Midlands had the highest completeness in 2014 at 99%; London had the lowest at 76%.

Data completeness for “symptom onset date”, “date presented to healthcare services” increased between 2013 and 2014 in England and the majority of PHECs (again with the exception of South East PHEC). Additionally, the largest increase in completeness was in East of England (6%), as well as East Midlands (5%) and North West (5%). However, completeness in all PHECs remained below 95% in 2014.

The recording of date diagnosed was 88% in England in 2014. All PHECs had completeness above 95% except London (76%) and East Midlands (84%). Data completeness for treatment start date was 98% for England with the lowest completeness (94%) in Yorkshire and the Humber and highest completeness in London (99%).

The recording of treatment completeness date for cases notified in 2013 was higher than other dates. Completeness for England was 99% and all PHECs have data completeness of 99% to 100% with the exception of West Midlands (98%) and Yorkshire and the Humber (97%).

For cases notified in 2013 with a reported outcome of died, the completeness of date of death was 72% for England. Completeness in the West Midlands was 100%, however, was below 98% in all other PHECs. Completeness was particularly low in London (23%) followed by North East (78%). Completeness of this field had been 100% in the North East in 2013, however it should be noted that there is a small number of deaths in the North East which may account for fluctuations in proportion.

TB outcome variables

For cases notified in 2013, a TB outcome at 12 months was known for 98% of notifications (reported for 99% of notifications). For those still on treatment at 12 months, a TB outcome at 24 months was again known for 98% (reported for 99% of notifications). Completeness was over 95% at both 12 and 24 months in all PHECs except for South West (91% at both 12 and 24 months), North East (94% at 12 months) and East Midlands (90% at 24 months). Known TB outcomes at 36 months for those that were still on treatment at 24 months was high in all PHECs except for Yorkshire

and the Humber PHEC (25%). However, only four cases were still on treatment after 24 months in this area, and outcome for only one case was reported.

Table IV.1 Completeness of key data fields in ETS by PHE centre, England, 2014

	Demographic			Clinical				Risk Factor							
	NHS Number	Ethnic group	UK Born/Non-UK born	HIV Testing#	Previous TB diagnosis		Previous TB treatment^	History of drug abuse		History of alcohol abuse		History of homelessness		History of prison	
PHE Centre*	Reported	Known**	Known	Known	Known	Reported$	Reported	Known	Reported	Known	Reported	Known	Reported	Known	Reported
London	86	99	100	99	98	99	86	94	99	93	98	97	99	97	99
West Midlands	95	99	98	88	94	98	75	91	96	92	97	92	96	91	97
South East	91	99	98	90	96	99	77	94	98	95	97	95	98	93	98
North West	89	98	98	90	92	98	76	87	97	87	97	89	97	81	97
Yorkshire and the Humber	98	97	93	65	92	98	89	91	97	91	97	90	97	86	97
East of England	94	98	97	88	93	97	77	91	95	91	95	90	96	90	96
East Midlands	84	99	97	88	90	99	75	84	98	87	97	80	98	73	99
South West	91	98	96	73	94	98	48	88	96	91	97	92	98	84	98
North East	98	98	92	77	95	98	75	91	98	92	98	90	96	89	98
England	**90**	**99**	**98**	**90**	**95**	**99**	**79**	**93**	**98**	**92**	**97**	**93**	**98**	**91**	**98**

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
* Ordered by decreasing total number of cases in 2014
** Data are reported and has a known value
# Excludes cases diagnosed post-mortem
$ Data are reported but may be reported as unknown
^ Includes cases with previous TB diagnosis only

Key:

99-100% complete	95-98% complete	<95% complete

Table IV.2 Completeness of data fields for diagnosis and treatment in ETS by PHE centre, England, 2014

	Diagnosis and Treatment												
	Sputum smear status**	Site of Disease	Symptom Onset$	Date Presented	Date Diagnosed$	Start of treatment$	Date treatment completed^	Date of Death^	Treatment Outcome reported at 12 months†		Treatment Outcome reported at 24 months‡		Treatment Outcome reported at 36 months¥
PHE Centre*	Known#	Known	Known	Known	Known	Known	Known	Known	Known	Reported§	Known	Reported	Known~
London	76	100	76	-	76	99	100	23	99	100	98	99	100
West Midlands	55	99	91	91	98	97	98	100	100	100	100	100	100
South East	55	99	93	88	97	98	100	89	97	98	100	100	100
North West	58	99	88	82	96	98	99	87	97	98	96	96	100
Yorkshire and the Humber	47	99	89	87	96	94	97	96	97	99	100	100	25β
East of England	43	99	89	82	96	96	99	88	98	99	100	100	100
East Midlands	60	100	99	75	84	98	100	96	99	100	90	100	100
South West	44	99	93	90	96	98	100	90	91	93	91	91	-
North East	32	99	93	93	95	98	100	78ϕ	94	97	100	100	-
England	**61**	**100**	**85**	**86**	**88**	**98**	**99**	**72**	**98**	**99**	**98**	**99**	**90**

* Ordered by decreasing total number of cases in 2014
** Pulmonary cases only
# Data are reported and has a known value
$ Excludes cases diagnosed post-mortem
^ Only includes those who have either completed treatment/died
§ Data are reported but may reported as unknown
† For cases notified in 2013
‡ For cases notified in 2012 & were still on treatment at 12 months
¥ For cases notified in 2011 & were still on treatment at 24 months
β Total number of cases is only 4
~ Data is known or not reported (no cases had 'unknown' as their outcome)
ϕ There are only a small number of deaths in North East PHE centre which may account for fluctuations in completeness
For treatment outcome variables - recording of not completed, or transferred out are counted as unknown and not reported

Key:

99-100% complete	95-98% complete	<95% complete

Table IV.3 Percentage difference in completeness of key fields in ETS between 2013 and 2014 by PHE centre, England

	Demographic			Clinical				Risk Factor							
	NHS Number	Ethnic group	UK Born/Non-UK born	HIV Testing#	Previous TB diagnosis		Previous TB treatment^	History of drug abuse		History of alcohol abuse		History of homelessness		History of prison	
PHE Centre*	Reported	Known**	Known	Known	Known	Reported$	Reported	Known	Reported	Known	Reported	Known	Reported	Known	Reported
London	0	-1	+1	-1	0	0	+5	-3	0	-1	0	-1	0	0	0
West Midlands	+8	+1	0	+2	0	-1	-8	-1	-2	0	0	-2	-2	-1	-2
South East	-1	0	-1	-3	-2	0	+6	-1	0	-1	-1	-1	-1	-3	-1
North West	-3	0	0	-2	-2	0	-4	-2	0	-3	0	-2	0	-3	0
Yorkshire and the Humber	+1	+1	0	+9	-2	-1	+13	-1	-1	-2	-1	-1	-1	-1	-1
East of England	0	0	+1	+1	-1	-1	-14	-1	-2	-2	-3	-2	-3	-1	-2
East Midlands	+5	-1	-2	+1	-5	0	+4	-3	-1	-4	-2	-4	-1	-6	0
South West	-3	+4	+2	+6	-1	-1	-7	-2	-2	-3	-1	0	-1	-1	0
North East	0	+2	+3	+10	-1	-1	-7	+1	+1	-1	+2	-4	-2	-2	0
England	**+1**	**0**	**0**	**+1**	**-1**	**0**	**0**	**-1**	**0**	**-1**	**-1**	**-1**	**-1**	**-1**	**-1**

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
* Ordered by decreasing total number of cases in 2014
** Data are reported and has a known value
# Excludes cases diagnosed post-mortem
$ Data are reported but may be reported as unknown
^ Includes cases with previous TB diagnosis only

Key:

% increase	No change	% decrease

Table IV.4 Percentage difference in completeness of data fields for diagnosis and treatment in ETS between 2013 and 2014 by PHE centre, England

	Diagnosis and Treatment												
	Sputum smear status**	Site of Disease	Symptom Onset$	Date Presented	Date Diagnosed$	Start of treatment$	Date treatment completed^	Date of Death^	Treatment Outcome reported at 12 months†		Treatment Outcome reported at 24 months‡		Treatment Outcome reported at 36 months¥
PHE Centre*	Known#	Known	Known	Known	Known	Known	Known	Known	Known	Reported§	Known	Reported	Known~
London	-1	0	-2	-	0	+2	0	-6	0	0	-2	-1	0
West Midlands	+7	0	+3	+1	+2	+1	+1	0	0	0	+2	+2	0
South East	-6	-1	-2	-4	0	-1	+2	+5	0	+1	0	0	0
North West	+9	-1	+13	+5	+1	+1	+2	+1	-1	-1	+1	+1	0
Yorkshire and the Humber	+3	-1	+4	+4	-1	+2	0	+6	-3	-1	+8	+3	-42β
East of England	-8	0	+3	+6	+2	-1	0	-6	0	0	0	0	0
East Midlands	+9	+1	+23	+5	+3	-1	0	-4	0	0	-10	0	0
South West	-3	0	+7	+2	-1	+12	+6	-2	-1	0	+8	+8	-
North East	-11	0	+6	+1	+2	+1	+4	-22ϕ	-3	-2	0	0	-
England	**+1**	**0**	**+3**	**+2**	**+1**	**+2**	**+1**	**-4**	**-1**	**0**	**0**	**0**	**-4**

* Ordered by decreasing total number of cases in 2014
** Pulmonary cases only
\# Data are reported and has a known value
$ Excludes cases diagnosed post-mortem
^ Only includes those who have either completed treatment/died
§ Data are reported but may reported as unknown
† For cases notified in 2013
‡ For cases notified in 2012 & were still on treatment at 12 months
¥ For cases notified in 2011 & were still on treatment at 24 months
β Total number of cases is only 4
˜ Data is known or not reported (no cases had 'unknown' as their outcome)
ϕ There are only a small number of deaths in North East PHE centre which may account for fluctuations in completeness
For treatment outcome variables - recording of not completed, or transferred out are counted as unknown and not reported

Key:

% increase	No change	% decrease

Appendix V. National level baseline data for TB strategy monitoring indicators, England, 2000-2014

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		
	Number of cases	Rate	95% CI	UK born			Non- UK born			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	6,170	12.5	12.2 - 12.8	1,889	4.3	4.1 - 4.4	3,432	79.1	76.5 - 81.8	229	2.5	2.2 - 2.9
2002	6,674	13.4	13.1 - 13.8	1,852	4.2	4.0 - 4.4	4,110	90.5	87.7 - 93.3	228	2.6	2.2 - 2.9
2003	6,630	13.3	13.0 - 13.6	1,703	3.8	3.6 - 4.0	4,327	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	7,681	15.1	14.7 - 15.4	1,729	3.9	3.7 - 4.1	5,174	92.9	90.4 - 95.4	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	1,865	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	7,677	14.6	14.3 - 14.9	1,815	4.0	3.8 - 4.2	5,515	83.1	80.9 - 85.3	238	2.7	2.4 - 3.1
2011	8,276	15.6	15.2 - 15.9	1,954	4.3	4.1 - 4.5	6,019	85.8	83.7 - 88.0	233	2.6	2.3 - 3.0
2012	8,086	15.1	14.8 - 15.4	2,005	4.4	4.2 - 4.6	5,841	81.4	79.4 - 83.6	254	2.9	2.5 - 3.2
2013	7,257	13.5	13.2 - 13.8	1,843	4.0	3.9 - 4.2	5,249	70.5	68.6 - 72.4	195	2.2	1.9 - 2.5
2014	6,520	12.0	11.7 - 12.3	1,774	3.9	3.7 - 4.1	4,610	60.3	58.6 - 62.1	187	2.1	1.8 - 2.4

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	-	-	-	-	-	-	1,857	52.1	50.5 - 53.8	2,781	99.4	99.0 - 99.6
2001	-	-	-	-	-	-	2,037	56.5	54.8 - 58.1	3,126	99.2	98.8 - 99.4
2002	-	-	-	-	-	-	2,618	65.0	63.5 - 66.4	3,792	98.6	98.2 - 98.9
2003	-	-	-	-	-	-	2,585	66.1	64.6 - 67.5	3,801	99.2	98.9 - 99.5
2004	-	-	-	-	-	-	2,742	68.5	67.1 - 70.0	4,024	98.6	98.2 - 98.9
2005	-	-	-	-	-	-	2,989	69.2	67.8 - 70.6	4,535	98.9	98.6 - 99.2
2006	-	-	-	-	-	-	2,985	69.5	68.1 - 70.8	4,613	98.7	98.3 - 99.0
2007	-	-	-	-	-	-	2,851	68.8	67.4 - 70.2	4,370	98.2	97.7 - 98.5
2008	-	-	-	-	-	-	2,902	67.8	66.4 - 69.2	4,430	97.6	97.1 - 98.0
2009	-	-	-	-	-	-	3,007	68.2	66.8 - 69.6	4,523	96.8	96.2 - 97.3
2010	-	-	-	-	-	-	2,866	70.4	69.0 - 71.8	4,513	97.9	97.5 - 98.3
2011	1,317	45.0	43.2 - 46.8	2,173	74.3	72.7 - 75.8	3,070	71.6	70.3 - 73.0	4,894	97.3	96.8 - 97.7
2012	1,369	44.0	42.3 - 45.8	2,294	73.8	72.2 - 75.3	2,946	70.3	68.9 - 71.7	4,784	97.7	97.3 - 98.1
2013	1,222	41.2	39.5 - 43.0	2,122	71.6	70.0 - 73.2	2,709	73.0	71.5 - 74.4	4,282	97.5	97.0 - 98.0
2014	1,137	39.5	37.8 - 41.3	2,005	69.7	68.0 - 71.4	2,482	72.3	70.8 - 73.7	3,821	97.6	97.1 - 98.1

	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		
Year	Number of cases	Proportion	95% CI	Number of cases	Proportion	95% CI	Number of cases	Proportion	95% CI
2000	-	-	-	-	-	-	-	-	-
2001	3,632	63.7	62.4 - 64.9	238	3.9	3.4 - 4.4	378	6.2	5.6 - 6.8
2002	4,111	67.4	66.2 - 68.5	296	4.5	4.0 - 5.0	439	6.6	6.1 - 7.3
2003	4,191	69.6	68.4 - 70.7	290	4.4	3.9 - 4.9	407	6.2	5.6 - 6.8
2004	4,425	70.1	69.0 - 71.2	333	4.9	4.4 - 5.4	402	5.9	5.3 - 6.4
2005	4,873	70.3	69.2 - 71.3	381	5.0	4.5 - 5.5	448	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	5,285	78.1	77.1 - 79.1	345	4.6	4.1 - 5.1	431	5.7	5.2 - 6.3
2008	5,580	79.9	78.9 - 80.8	368	4.8	4.3 - 5.3	436	5.6	5.1 - 6.2
2009	5,911	81.8	80.9 - 82.7	354	4.4	4.0 - 4.9	420	5.2	4.8 - 5.7
2010	5,633	82.6	81.7 - 83.5	341	4.5	4.0 - 5.0	382	5.0	4.6 - 5.5
2011	6,000	81.8	80.9 - 82.7	426	5.2	4.7 - 5.7	382	4.7	4.2 - 5.1
2012	6,007	83.6	82.7 - 84.4	355	4.4	4.0 - 4.9	387	4.8	4.4 - 5.3
2013	5,445	84.8	83.9 - 85.6	283	3.9	3.5 - 4.4	330	4.6	4.1 - 5.1
2014	-	-	-	-	-	-	-	-	-

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	36	52.2	40.6 - 63.5	9	13.0	7.0 - 23.0	4	5.8	2.3 - 14.0
2005	38	62.3	49.7 - 73.4	8	13.1	6.8 - 23.8	4	6.6	2.6 - 15.7
2006	39	49.4	38.6 - 60.2	8	10.1	5.2 - 18.7	3	3.8	1.3 - 10.6
2007	30	42.9	31.9 - 54.5	6	8.6	4.0 - 17.5	10	14.3	7.9 - 24.3
2008	43	58.9	47.4 - 69.5	10	13.7	7.6 - 23.4	7	9.6	4.7 - 18.5
2009	38	52.1	40.8 - 63.1	11	15.1	8.6 - 25.0	4	5.5	2.2 - 13.3
2010	37	47.4	36.7 - 58.4	9	11.5	6.2 - 20.5	1	1.3	0.2 - 6.9
2011	46	50.0	40.0 - 60.0	18	19.6	12.7 - 28.8	5	5.4	2.3 - 12.1
2012	53	56.4	46.3 - 66.0	9	9.6	5.1 - 17.2	4	4.3	1.7 - 10.4
2013	-	-	-	-	-	-	-	-	-
2014	-	-	-	-	-	-	-	-	-

Year	Indicator 16			Indicator 17			Indicator 18			Indicator 19		
	Number and proportion of TB cases offered an HIV test			Number and proportion of drug sensitive TB cases with at least one social risk factor who completed treatment within 12 months			Number and proportion of culture confirmed TB cases with any first line drug resistance			Number and proportion of culture confirmed TB cases with multi-drug resistance TB		
	Number of cases	Proportion	95% CI	Number of cases	Proportion	95% CI	Number of cases	Proportion	95% CI	Number of cases	Proportion	95% CI
2000	-	-	-	-	-	-	193	6.9	6.0 - 7.9	28	1.0	0.7 - 1.4
2001	-	-	-	-	-	-	224	7.1	6.3 - 8.1	22	0.7	0.5 - 1.1
2002	-	-	-	-	-	-	297	7.8	7.0 - 8.7	35	0.9	0.7 - 1.3
2003	-	-	-	-	-	-	308	8.0	7.2 - 9.0	49	1.3	1.0 - 1.7
2004	-	-	-	-	-	-	326	8.1	7.3 - 8.9	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	-	-	-	-	-	-	333	7.6	6.8 - 8.4	49	1.1	0.8 - 1.5
2008	-	-	-	-	-	-	306	6.8	6.1 - 7.6	49	1.1	0.8 - 1.4
2009	-	-	-	-	-	-	369	8.0	7.3 - 8.8	59	1.3	1.0 - 1.7
2010	-	-		373	72.7	68.7 - 76.4	320	7.0	6.3 - 7.8	65	1.4	1.1 - 1.8
2011	-	-		368	71.2	67.1 - 74.9	414	8.3	7.6 - 9.1	80	1.6	1.3 - 2.0
2012	5,201	66.9	65.9 - 68.0	395	74.7	70.8 - 78.2	359	7.4	6.7 - 8.2	78	1.6	1.3 - 2.0
2013	5,778	83.3	82.4 - 84.2	398	76.1	72.3 - 79.6	332	7.7	6.9 - 8.5	68	1.6	1.2 - 2.0
2014	5,297	85.4	84.5 - 86.3	-	-	-	286	7.4	6.6 - 8.2	52	1.3	1.0 - 1.7

Glossary

Amplified resistance
Amplified 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 amplified 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 a group of 2 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 amplified), including MDR-TB (initial or amplified), as well as those without culture confirmation treated for MDR-TB.

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

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.

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 post-mortem diagnosis is an unexpected diagnosis of TB made after death, usually during an autopsy examination.

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.