Public Health England

Protecting and improving the nation's health

Tuberculosis in South East Centre: Annual review (2015 data)

Data from 2000 to 2015

About Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. We do this through world-class science, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. We are an executive agency of the Department of Health, and are a distinct delivery organisation with operational autonomy to advise and support government, local authorities and the NHS in a professionally independent manner.

Public Health England, Wellington House, 133-155 Waterloo Road, London SE1 8UG
Tel: 020 7654 8000 www.gov.uk/phe
Twitter: @PHE_uk Facebook: www.facebook.com/PublicHealthEngland

About the Field Epidemiology Service

The Field Epidemiology Service (FES) supports Public Health England Centres and partner organisations through the application of epidemiological methods to inform public health action. FES does this in two main ways. Firstly, by providing a flexible expert resource, available, as and when needed, to undertake epidemiological investigations for key health protection work. Secondly, through the expert analysis, interpretation and dissemination of surveillance information to PHE Centres, local health partners, service providers and commissioners of services. Within the FES network, excellence and innovation is encouraged. We foster academic collaborations and take active part and lead in research, development and training. You can contact your local FES team at: FES.SEaL@phe.gov.uk Prepared by Field Epidemiology Service. For queries relating to this document please contact: se.TBsupport@phe.gov.uk

Published: March 2017.
PHE publications gateway number: 2016694.

Contents

The data presented in this report are correct as at August 2016.

Acknowledgements

We are grateful to all those who contribute information on tuberculosis cases in South East England, including nurses, physicians, microbiologists, scientists, outreach and social care and administrative staff. We also acknowledge colleagues at the Public Health England (PHE) National Mycobacterium Reference Laboratory for information on culture confirmation and drug susceptibility testing. Further thanks are due to colleagues at the national Centre for Infectious Disease Surveillance and Control for matching the clinical and laboratory information, the South East Centre Health Protection teams, and the Field Epidemiology South East and London team for their work supporting Enhanced Tuberculosis Surveillance.

Authors

This report was prepared by Daniele Curtis, Clare Sawyer, Neil Macdonald and Charlotte Anderson of the Field Epidemiology Service (South East and London team), National Infection Service, PHE.

Suggested citation

Public Health England (February 2017). Tuberculosis in South East Centre: Annual review (2015 data), 2017. Public Health England: London.

Notes on the report

Intended audience

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

Aim of report

This report describes the recent epidemiology of TB in the South East of England, providing an update on local trends, identifying areas of high burden of disease, at risk population groups, and opportunities for interventions and prevention of future cases.

Data sources

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

Other data displays

The national report presenting recent epidemiology of TB in England is available at: www.gov.uk/government/uploads/system/uploads/attachment_data/file/564656/TB_annual_report_2016.pdf

Additional high-level UK data on TB notifications to the end of 2015, 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 2015': 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: www.gov.uk/government/uploads/system/uploads/attachment_data/file/403231/Collaborative_TB_Strategy_for_England_2015_2020_.pdf

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

Executive summary

In 2015, 605 cases of tuberculosis (TB) were notified among South East of England residents, a rate of 7.0 per 100,000 population; below the England average of 10.5 per 100,000 population. As seen across England, there has been a year-on-year decline in the rate of TB in the South East since the peak of 9.7 per 100,000 in 2011.[1]

The decrease was driven by a reduction in numbers and rates among residents of Thames Valley. Rates were stable or increasing slightly elsewhere in the South East. Even within Thames Valley, however, the trend was variable. Rates were highest in Slough (49 per 100,000 population) and had increased compared to 2014. Although rates were second highest in Reading (23 per 100,000 population), these had almost halved compared to 2014. In most local authorities across the South East, rates remain below the national average.

TB notification rates were highest among adults 20 to 39 years of age. Rates in this age group have decreased since 2011, while rates remained low but stable in other age groups.

Rates have steadily decreased among the non-UK born population since 2011, and fell by 19% compared to 2014. From 2012 to 2013 this decrease was mostly among very recent entrants (arrived less than two years before diagnosis), and from 2013 to 2015 mostly among those who had arrived two to five years previously. This was the first year of a decrease in those who had arrived six to six to ten or 11 or more years earlier. The most common countries of birth were India, Pakistan and Nepal, but numbers from these countries decreased by as much as a third compared to 2014.

In the South East, 30% of cases were among those born in the UK, and rates in this population remain stable but below the England average.[1] White was the most common ethnic group in 2015 and numbers in this group increased compared to 2014. These were mostly born in the UK, central or western Europe.

Just over half of TB patients had pulmonary disease; a quarter had extra-thoracic lymph node TB. Patients with pulmonary disease were more likely to be culture confirmed (75% vs. 44% of those with exclusively extra-pulmonary TB). Where known, 61% of pulmonary patients had sputum smear positive disease (unknown for 45% of pulmonary patients).

Pulmonary patients in the South East experienced the longest delays in the country from first having symptoms to starting treatment. The median time was 91 days, nearly three weeks longer than the England average of 72 days[1]. More than one in three

patients (37%) had a delay of more than four months. Delays were more common among females, older, white and UK born patients.

While 86% of patients in 2014 with rifampicin sensitive and non-CNS, spinal, miliary or cryptic disseminated disease completed treatment within 12 months, treatment completion was lower among males, older patients, and the white UK born. Among the UK born, treatment completion was particularly low in those with social risk factors.

In 2015, the proportion of confirmed TB cases resistant to one or more first line drug decreased relative to 2014, reflecting a decrease seen in the proportion resistant to isoniazid. The majority of patients in 2015 who had resistance to any first line drug had been born abroad and were between the ages of 15 to 44, but there was little difference in first line drug resistance between the sexes.

Six individuals in the South East had multi-drug resistant (MDR) TB in 2015, two of whom were extensively-drug resistant (XDR). Four of the six MDR cases were born outside the UK, all in different countries. The proportion of women with MDR was higher than the proportion of men, and both cases of XDR-TB were in women. One XDR-TB patient had a social risk factor, and none of the drug resistant, MDR or XDR patients had any previous history of TB.

An increasing number and proportion of patients in the South East had one or more social risk factor (11% in 2015), most commonly homelessness. These were more common among the UK born, males, and patients of white ethnicity. Individuals with social risk factors were more likely to have infectious forms of TB, and be hospitalised.

HIV testing is slightly below the national average in the South East, but has improved in recent years. Co-infection rates with TB/HIV were estimated to be low in the South East.

In conclusion, recent trends show sustained reductions in overall TB case numbers in the South East, although there remains variation by geographic locality. These reductions were predominantly among those born abroad. This is likely to be due in part to the implementation of pre-entry screening, but will also be affected by changes in migration patterns (particularly decreasing numbers of migrants from high TB burden countries), as well as a reflection of decreasing rates of TB worldwide. The decrease in the rate of TB in UK born children under 15 years of age (although very small numbers), and reduction in the proportion of cases that cluster with at least one other South East case, suggests a reduction in TB transmission in the South East, as seen elsewhere in England.

While TB services' contribution to decreased transmission should be commended, much of the decrease is likely to be due to factors outside of the UK. As cases become

more concentrated in under-served populations, services will need to sustain and adapt their efforts to continue to tackle TB across this mostly very low incidence area.

Recommendations

Locally driven reviews of the lengthy delays experienced by South East residents should be carried out, with support and review by the South TB Control Board.

The South TB Control Board should prioritise and work with wider stakeholders to develop strategies to improve outcomes for under-served populations.

Continued support by NHS, PHE and allied services of cohort review as the tool to quality assure TB case and contact management according to national guidance.[9] Issues and themes identified at cohort reviews across the South East to be reported to the South TB Control Board in a systematic way.

Close monitoring of multi-drug resistant TB between NHS and PHE, including the use of BTS MDR advisory service and MDR-specific TB cohort reviews.

The South TB Control Board to monitor the implementation of LTBI testing and treatment, and use local epidemiology to inform future developments.

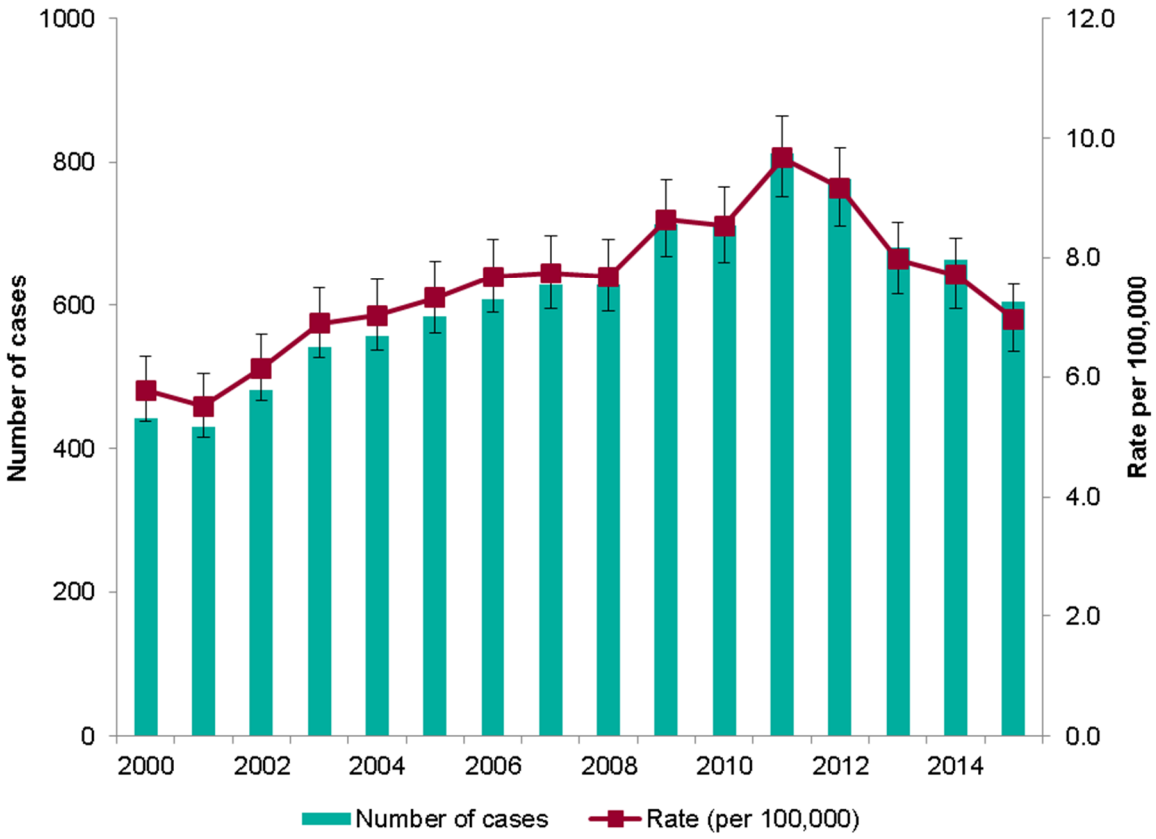
1. TB notifications and incidence

Overall numbers, rates and geographical distribution

In 2015, 605 cases of tuberculosis (TB) were notified among South East of England residents, a rate of 7.0 per 100,000 population. This was a 10% decrease from the rate in 2014, and a 28% decrease from the peak of 9.7 per 100,000 in 2011, which followed a decade of increasing case numbers and rates (Figure 1). There was substantial geographic variation in the rate of notifications, with very few cases occurring across most of the South East.

South East England was the PHE Centre with the fourth lowest notification rate (below the England average of 10.5 per 100,000 population) and accounted for 11% of the 5,758 TB cases in England.[1]

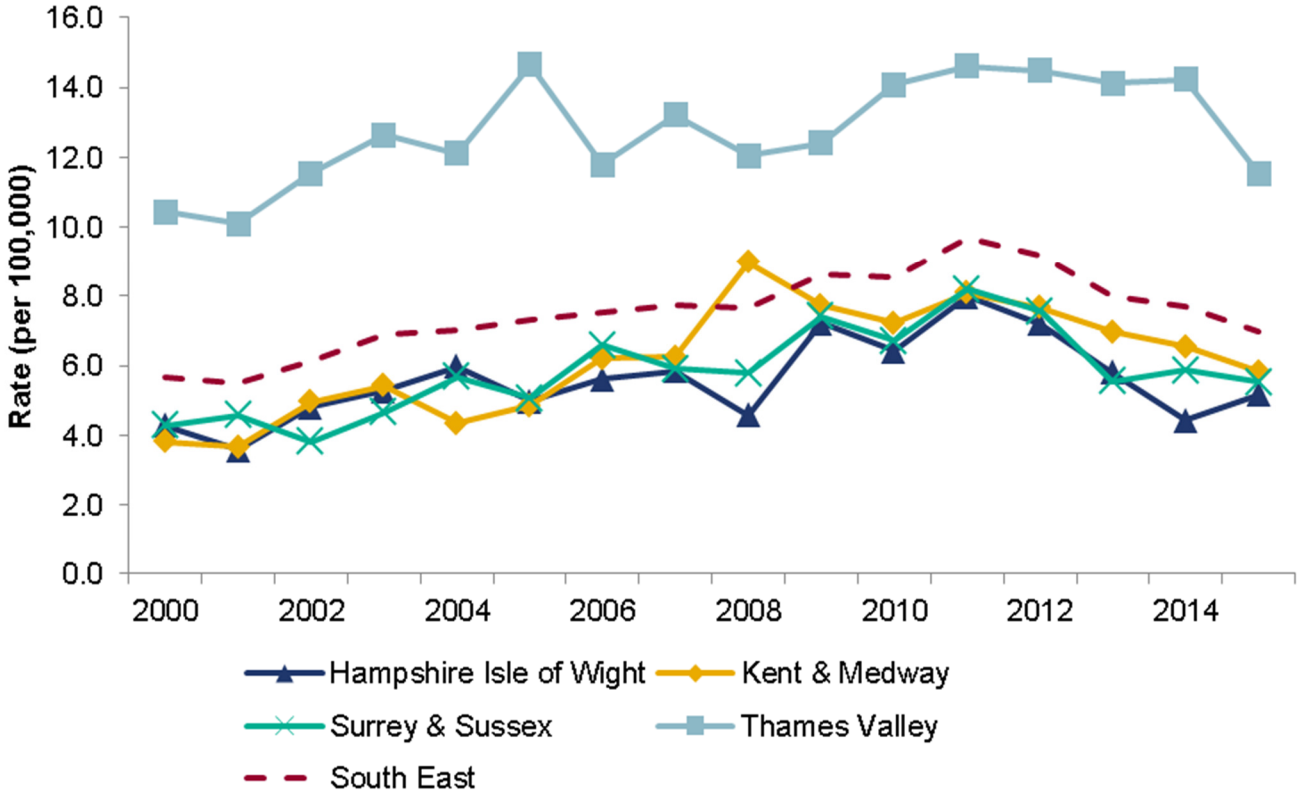
Figure 1: TB case reports and rate, South East, 2000 to 2015 (TB Monitoring Indicator 1)



As in previous years, numbers and rates were higher among residents of Thames Valley compared to those of other health protection team areas (Figure 2). Rates in Thames Valley, however, decreased by 19% compared to 2014. This was the first year of a marked decrease since rates stabilised at 14 per 100,000 population in 2010.

Relative to 2014, rates remained stable in Kent and Medway and Surrey and Sussex. Although rates increased by 17% in Hampshire and the Isle of Wight, numbers in this area remain small. Overall since 2011, rates had reduced across all these areas.

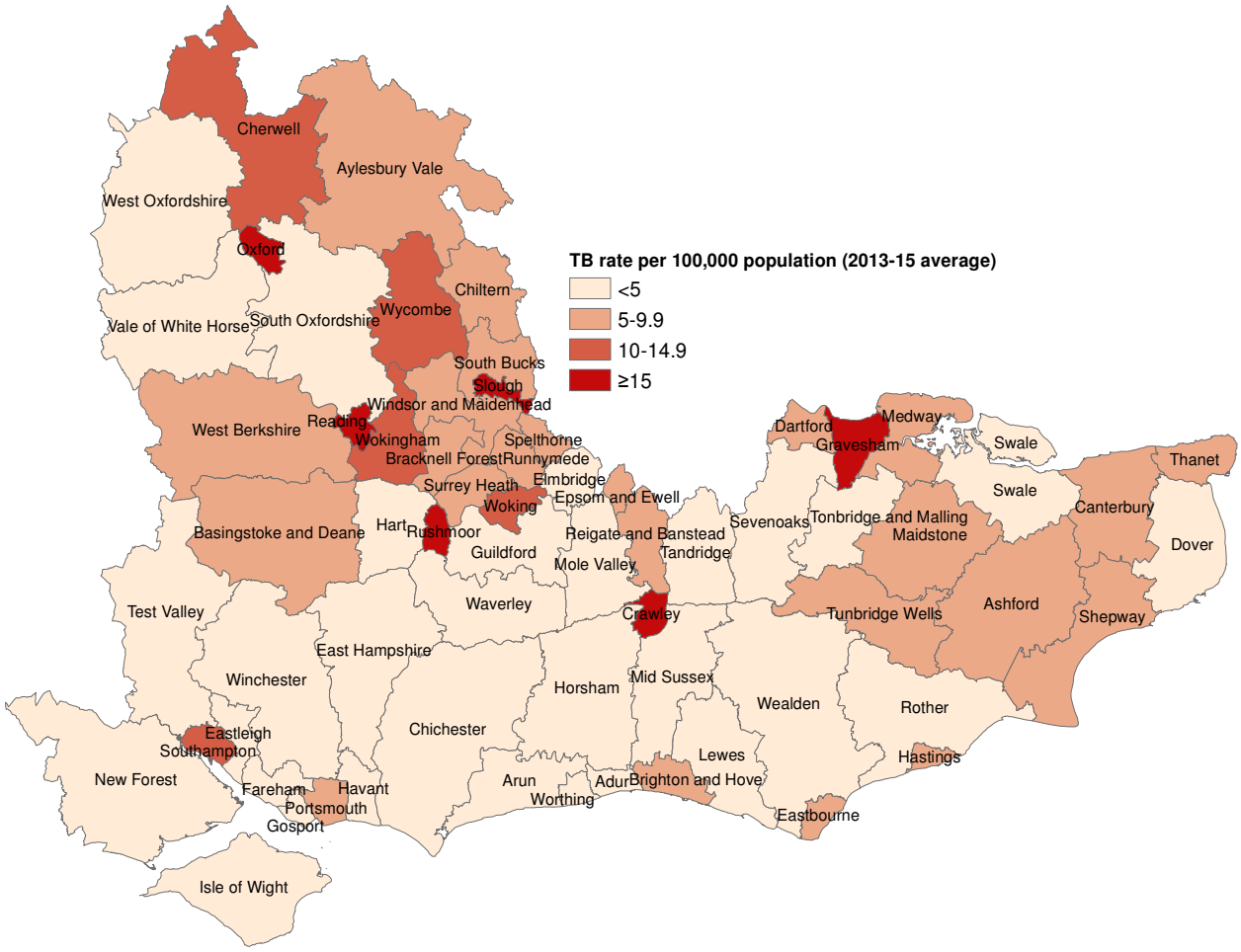
Figure 2: TB case rate by health protection team area of residence, South East, 2000 to 2015



In 2015, as in previous years, residents of Slough experienced the highest burden of TB disease (71 cases, 49 per 100,000). Rates in Slough increased by 21% relative to 2014 but remained below those observed in recent years. At 23 per 100,000 population, the second highest rate of TB disease was among residents of Reading, but this was a 43% decrease from the rate in 2014. With the exception of Wokingham (18 cases, 11.2 per 100,000), TB notification rates in all other upper tier local authorities were below the national average of 10.5 per 100,000 population in 2015.

Residents of Slough (48 per 100,000) and Reading (35 per 100,000) also reported the highest three-year average TB rates (Figure 3). These were followed by the lower tier local authority areas of Oxford in Thames Valley (20 per 100,000), Rushmoor in Hampshire (19 per 100,000), Crawley in Sussex (19 per 100,000) and Gravesham in Kent (16 per 100,000).

Figure 3: Three-year average TB case rate by lower tier local authority of residence, South East, 2013 to 2015



Demographic characteristics

Age and sex

In 2015, 58% (349) of TB cases were male. Rates were slightly higher among males than females (8 per 100,000 vs 6 per 100,000) as seen in previous years.

TB notification rates were highest among adults 20 to 39 years of age, irrespective of gender (Figure 4). Rates in this age group have decreased since approximately 2011, while rates remained low but stable in all other age groups (Figure 5).

In 2015, 15 children under the age of 16 were notified in the South East. This was the lowest number of cases reported for this age group since 2006, and almost half the number reported in 2014 (27 cases). Country of birth data was incomplete, but where known, half of these cases were UK born (6/12). Only four cases of TB were notified in

children aged less than five years. All were UK born of different ethnicities. Of these, two had not received BCG vaccination.

Figure 4: TB case reports and rate by age and sex, South East, 2015

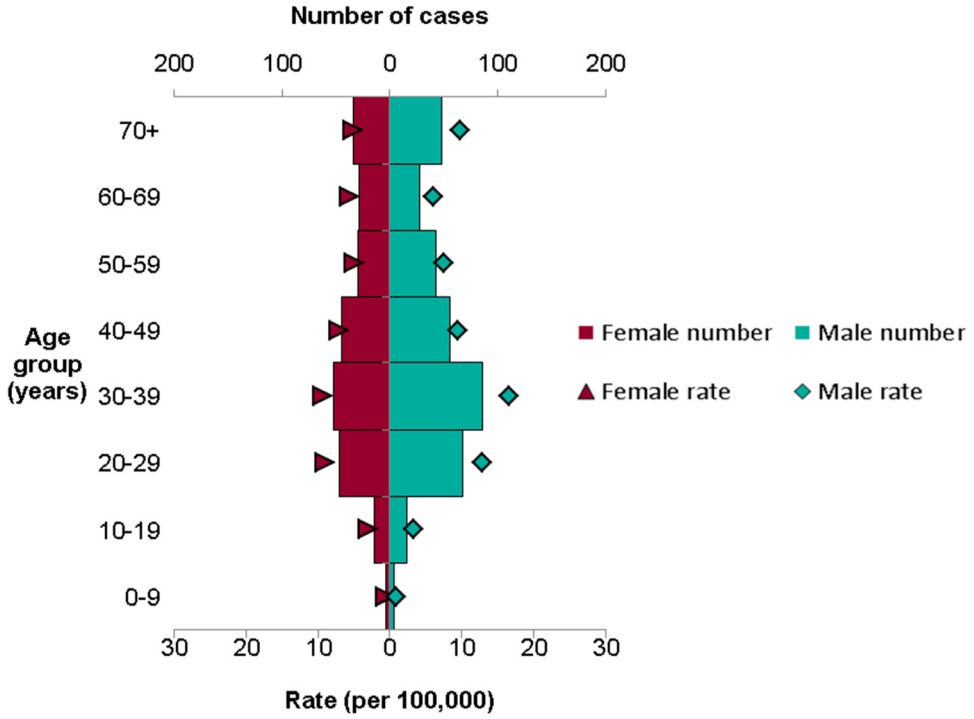
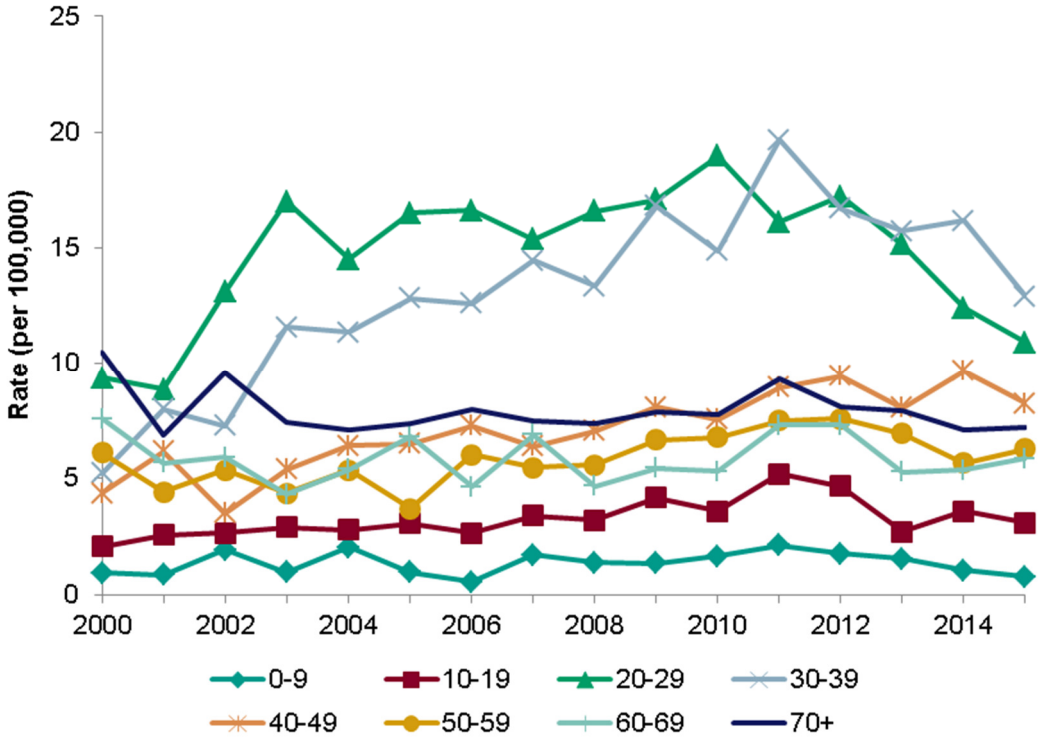


Figure 5: TB case rates by age group, South East, 2000 to 2015

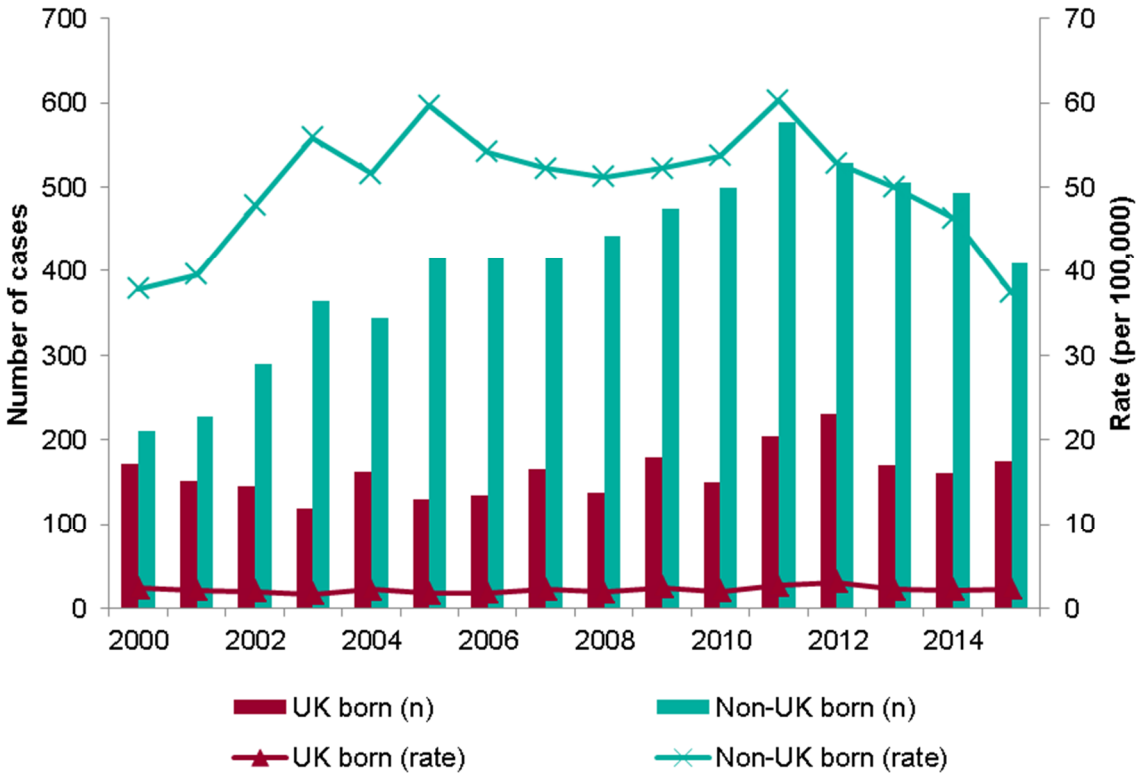


Place of birth and time since entry

In 2015, 70% (410/585) of cases with a known place of birth were born outside of the UK. This was slightly less than the proportion observed in 2014 (75%), but consistent with recent epidemiology. In line with national trends, the rate of TB in the non-UK born population (37 per 100,000) was at its lowest since 2000[1]. Specifically, the rate decreased by 19% since 2014; continuing the trend seen since 2011 when rates were at their highest (Figure 6).

The TB notification rate in the UK born population has remained relatively stable since 2000. At 2.3 per 100,000 population, TB rates in the UK born population of the South East were lower than those in the UK born population of England overall[1].

Figure 6: TB case reports and rate by place of birth, South East, 2000 to 2015 (TB monitoring indicator 2)

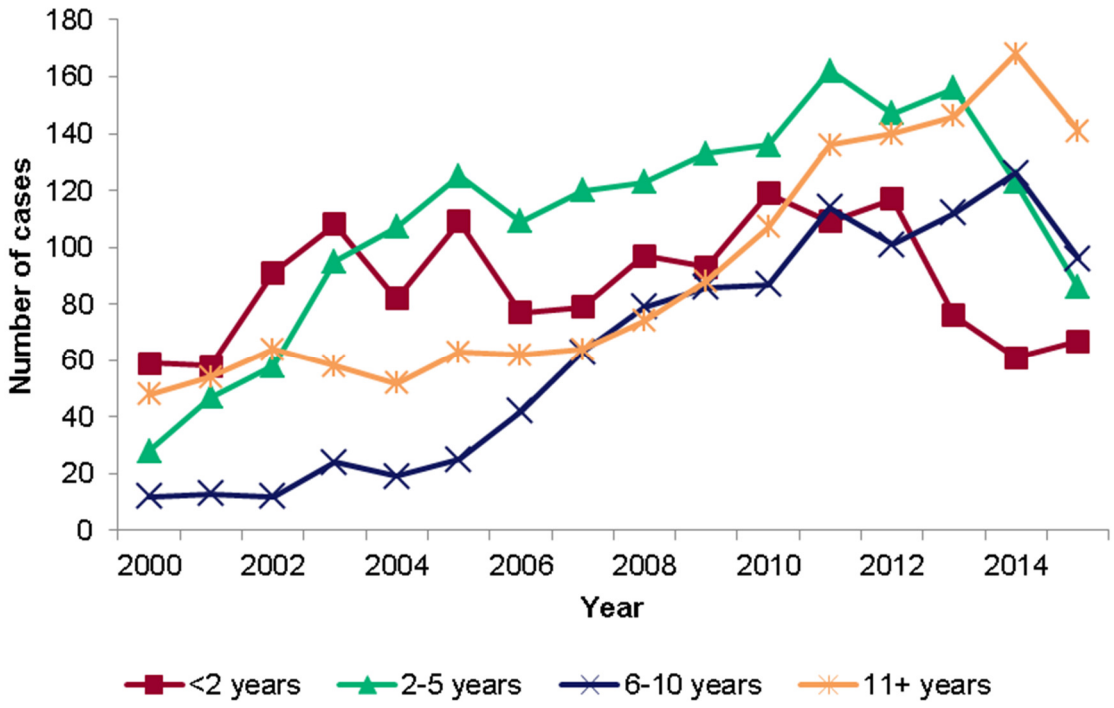


In 2015, information on the time between entry to the UK and TB notification was available for 95% (390) of those born abroad. After a decrease from 2012 to 2014, the number of cases among recent entrants to the UK (diagnosed less than two years after entry) remained similar to 2014: 61 (13% of 478 born abroad) in 2014 vs. 67 (17% of 390 born abroad) in 2015.

Numbers decreased, however, among those whom had arrived two or more years previously (Figure 7). For those diagnosed two to four years since entry, numbers

decreased by 30% relative to 2014. The second consecutive year of a marked decrease in this group. This was the first year in over a decade that numbers fell among those diagnosed 11 or more years since entry (from 168 in 2014 to 141 in 2015).

Figure 7: Time between entry to the UK and TB notification for non-UK born cases by year, South East, 2000 to 2015



In 2015, country of birth was known for all but one of those born abroad. As in previous years, India, Pakistan and Nepal were the most common countries of birth (Table 1). Together, these countries were the place of origin of nearly half (49%, 201/409) of non-UK born cases and a third of all TB patients in the South East.

Relative to 2014, however, the number of cases born in India, Pakistan and Nepal decreased by 33%, 26% and 17% respectively. Among those from India and Nepal the median time between entry to the UK and TB notification was the same as that observed in 2014. For those born in Pakistan, however, the median time since entry increased from eight years in 2014 to 10.5 years in 2015.

This compares with the most common countries of birth in the non-UK born general population of South East England, which in 2015 were India, Poland and South Africa.[3]

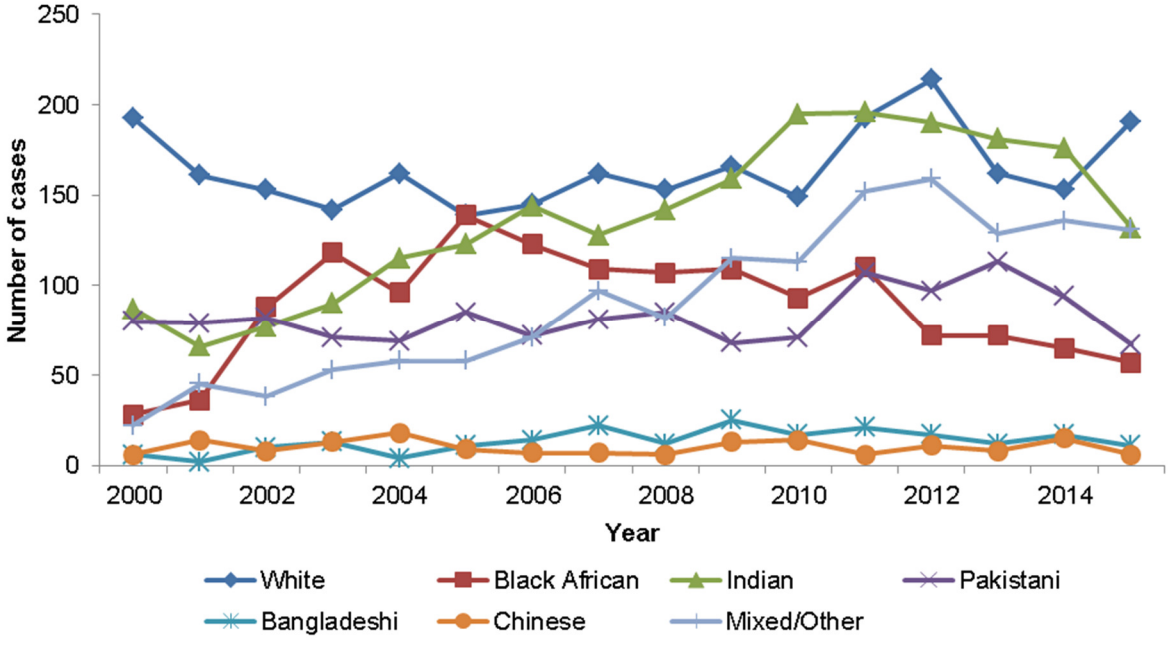
Table 1: Ten most common countries of birth of non-UK born TB cases, South East, 2015

Country of birth	n	% of non-UK born patients	median years since entry
India	104	25	7
Pakistan	53	13	10.5
Nepal	44	11	6
Philippines	17	4	9
Nigeria	11	3	5.5
Zimbabwe	11	3	11
Bangladesh	10	2	9
Romania	10	2	2
Hong Kong	9	2	6.5
South Africa	9	2	10

Ethnicity

White was the most common ethnic group in 2015 (32%, 191/595). Most were born in the UK (75%, 132/186), followed by Central (13%, 24) or Western Europe (11%, 20). The second most common ethnic group was Indian (22%, 132 cases; 85% of whom were known to be born abroad) and mixed/other (22%, 131 cases; 92% of whom were known to be born abroad). The most common country of birth of those of mixed/other ethnicity was Nepal (33%, 43). Numbers of those of Indian or Pakistani ethnicity reduced in 2015 compared to 2014, while those of white ethnicity increased (Figure 8).

Figure 8: TB case numbers by ethnic group, South East, 2001 to 2015



*Cases with mixed/other, black Caribbean and black other ethnic groups were grouped as 'Mixed/Other'.

Occupation

In 2015, occupation was known for 97% (563) of the 578 cases aged 18 years or older (Table 2). Of these, 227 (40%) occurred in those not currently working, of whom half were retired and a quarter unemployed. The majority of the healthcare workers diagnosed with TB were non-UK born (85%, 35/41). Similarly, of the 39 cases working or engaged in education, 76% (29/38) were known to have been born abroad.

Table 2: Occupational category of persons with TB aged 18 years and older, South East, 2015

Occupation	n	%
Health care worker	42	7
Education	39	7
Agricultural/animal care worker	<5	<1
Social service/prisoner worker	<5	<1
Other	250	44
None	227	40
Total	**563**	

Clinical characteristics

Previous history of tuberculosis

In 2015, data on previous diagnosis was available for 96% (579) of cases. As in recent years, a very small number of cases (5%, 27) were previously diagnosed with TB. The median time between diagnoses was ten years with an Interquartile range (IQR) of four to 36 years.

Site of disease

Similar to recent years, just over half (53%, 321/602) of TB patients in 2015 had pulmonary disease (Table 3). The second most common site was extra-thoracic lymph node TB, accounting for almost a quarter of cases (24%, 147/605).

Pulmonary TB was more common among UK born (69%, 120/174) than non-UK born patients (47%, 192/409). It was also more common among those of white ethnicity (74%, 141/191).

Table 3: Site of TB disease, South East, 2015

Site of Disease	n	%
Pulmonary	321	53
Lymph Nodes (extra thoracic)	147	24
Lymph Nodes (intra thoracic)	79	13
Other	41	7
Gastrointestinal/Peritoneal	40	7
Pleural	39	6
Bone/Joint (spine)	25	4
Miliary	23	4
Genitourinary	15	2
CNS (meningitis)	14	2
Bone/Joint (other - not spine)	13	2
CNS (other - not meningitis)	8	1
Cryptic Disseminated	3	0.5
Laryngeal	1	0.2

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

2. Laboratory confirmation of TB

Laboratory tests data collection

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). 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 and speciation

In 2015, 60% (365/605) of cases were culture confirmed. This was higher among those with pulmonary TB (75%, 241/321 vs. 44%, 124/281 of patients with exclusively extra-pulmonary TB).

Of those cases that were culture confirmed, the vast majority were *Mycobacterium tuberculosis* (97%, 355), with 10 cases of *M. africanum*.

Of the 240 cases without culture confirmation, 38 had positive histology, 16 had positive microscopy and two had positive PCR (one had both positive microscopy and PCR). In total, 185 cases, 31% of 605 cases in 2015, had no recorded laboratory evidence of TB.

Sputum smear

In 2015, sputum-smear results were available for 55% (178/321) of patients with pulmonary TB. Of these, 61% (108) were smear-positive.

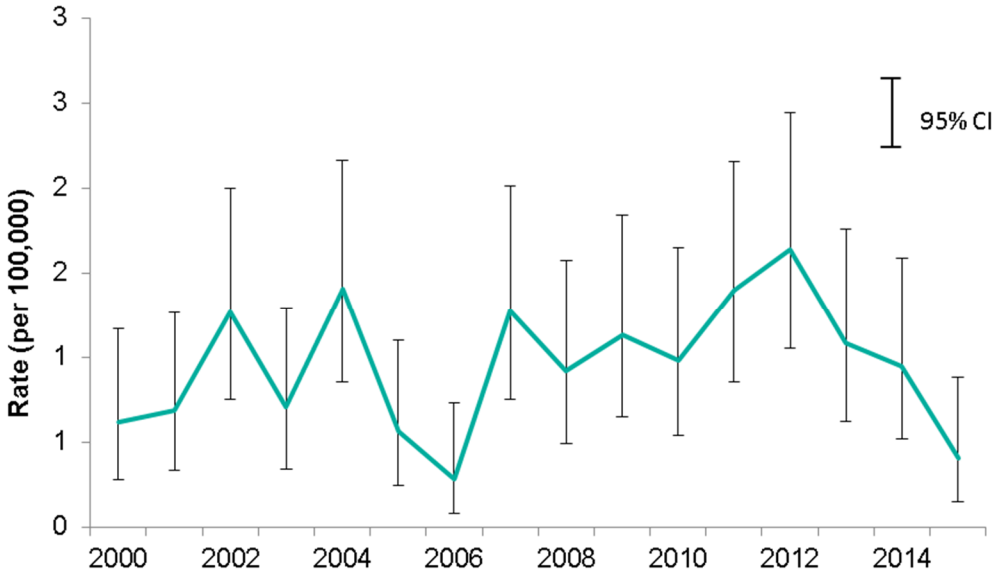
3. TB transmission

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

Rate of TB in UK born children

In 2015, the rate of TB in UK born children under 15 years of age in the South East, an indirect indicator of recent transmission, was estimated at 0.4 per 100,000. Cases of TB in children under 15 are very few in the South East, so year on year changes should be interpreted with caution (Figure 9).

Figure 9: Rate of TB in UK born children aged less than 15 years, South East, 2000 to 2015 (TB Monitoring Indicator 5)



Strain typing and clustering

The National TB Typing service in England was established in 2010. Since that time all TB isolates have been typed using 24 loci Mycobacterial Interspersed Repetitive Unit-Variable Number Tandem Repeats (MIRU-VNTR). Such strain typing identifies clusters of cases with indistinguishable strains that may be due to recent transmission.[4]

While these clustered cases may reflect cases that are part of the same chain of recent transmission, this could also reflect common endemic strains circulating either within England or abroad. Thus, the detection of a common strain type among cases does not

confirm recent transmission. Additional epidemiological information is required to assess whether a common strain type is likely to reflect recent transmission. MIRU-VNTR strain typing can be used to refute transmission between individuals who have different strain types. It is hoped that a higher level of resolution provided by whole genome sequencing (WGS) will improve our understanding of TB transmission in England.

Proportion of cases clustered and geographical distribution

In 2015, 99.7% (364/365) of culture confirmed cases in South East residents had an isolate that was strain typed and 93% had at least 23 loci typed (Table 4). Overall, between 2010 and 2015, 86% of isolates were typed with at least 23 loci and 35% were identified as belonging to 239 South East clusters. Although the remaining 65% (1,493) had a unique strain in South East, 518 (23%) were clustered with another case outside of South East, bringing the total number of national clusters that included at least one South East case to 729.

Table 4: Number and proportion of clustered cases and new clusters by place of birth and year, South East, 2010 to 2015

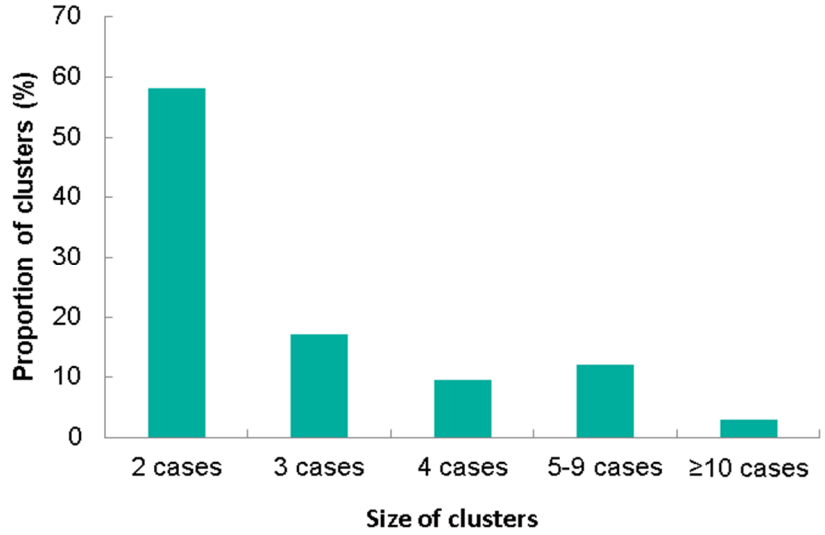
Year	Culture confirmed cases	≥23 loci typed cases[a]		Cases in clusters[b]		Cases in cluster: Non-UK born		Cases in cluster: UK born		New clusters (per year)[c]
	n	n	%	n	%	n	%	n	%	n
2010	437	291	67	103	35	63	61	29	28	17
2011	490	428	87	155	36	106	68	47	30	51
2012	488	446	91	144	32	84	58	57	40	45
2013	440	392	89	136	35	87	64	48	35	47
2014	429	394	92	138	35	94	68	41	30	42
2015	365	339	93	121	36	71	59	48	40	37
Total	2,649	2,290	86	797	35	505	63	270	34	239

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

The proportion of cases that clustered with at least one other case in South East has remained at around 35% between 2010 and 2015. The number of new clusters that formed each year fell from 51 in 2011 to 37 in 2015.

Size of clusters

Figure 10: Proportion of clusters by size, South East, 2010 to 2015



The median cluster size was three cases (range 2-118). The majority of clusters (85%; 203/239) were small in size (<5 cases), with 58% (139) containing only two cases (Figure 10). Two South East clusters composed 20 or more cases. The largest contributed 31 cases to a national Beijing lineage cluster of 125, where 57% (17 of 30 where country of birth was recorded) were born in Nepal. This is likely to reflect a common strain in Nepal, but also include cases due to recent transmission in the UK. The second largest, with 21 cases in the South East (26 nationally; two in London and three in the South West) was a predominantly Southampton centred cluster of Euro American lineage.

Cluster Lineage

Table 5: Cluster lineage and size, South East 2010 to 2015

Cluster size	No. of clusters	Euro American		Central Asian		East African Indian		Beijing		Other*	
	n	n	%	n	%	n	%	n	%	n	%
2	139	55	59	43	64	17	61	10	38	14	56
3	41	16	17	9	13	5	18	7	27	4	16
4	23	9	10	6	9	1	4	6	23	1	4
5 - 9	29	12	13	6	9	4	14	1	4	6	24
≥10	7	1	1	3	4	1	4	2	8	0	0
Total	239	93		67		28		26		25	

The most common lineage was the Euro American lineage, which accounted for 39% (93/239) of clusters between 2010 and 2015 (Table 5). The next most common was Central Asian lineage (28%, 67), followed by East African Indian (12%, 28) and Beijing

(11%, 26). The distribution of cluster size in South East tended to be similar across lineages (median cluster size 2 to 3).

Whole genome sequencing

Whole genome sequencing (WGS) of M. tuberculosis complex isolates provides information on Single Nucleotide Polymorphism (SNP) differences between isolates. This provides more information than the currently deployed method (MIRU-VNTR strain typing) on how isolates are related to each other. PHE is close to deploying the use of WGS for TB throughout England. This new technology will add to our understanding of TB transmission by providing robust genomic information to be used in conjunction with epidemiological and surveillance information.

4. Delay from onset of symptoms to start of treatment

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

Information on delay from symptom onset to treatment start was available for 92% (296/321) of pulmonary TB cases in 2015. None were asymptomatic at diagnosis, and none diagnosed post-mortem. In 2015, the median time symptomatic was 91 days (IQR 45-165), three weeks longer than for pulmonary patients in England overall (72 days, IQR 36-132). Over the past two years, the median delay in the South East increased by more than two weeks (from 74 days in 2013). This was inconsistent with national trends in median delay time, which have remained relatively stable since 2013.[1]

Table 6: Time between symptom onset and treatment start in pulmonary TB cases*, South East, 2012 to 2015 (TB Monitoring Indicators 6 and 7)

	0-2 months		2-4 months		>4 months		Total
Year	n	%	n	%	n	%	**n**
2012	145	40	112	31	108	30	365
2013	117	38	90	29	100	33	307
2014	96	31	102	33	113	36	311
2015	104	35	81	27	111	38	296

*Excluding those with missing onset and treatment start dates.

In 2015, 35% (104/296) of South East residents with pulmonary TB started treatment within two months of symptom onset (Table 6), compared to 43% for England[1]. By four months, 63% (185) of South East residents had started treatment; less than the 72% for England overall[1]. South East England was the PHE Centre with the highest proportion of pulmonary cases who waited in excess of four months to start treatment.

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

Nearly half of female pulmonary TB cases experienced a greater than four-month delay between symptom onset and treatment start (47%, 54/114 vs. 31%, 57/182 in males). This was, however, inconsistent with recent years, where delays were either more common among males, or similar between the sexes. As in recent years, the proportion of cases that experienced a delay of more than four months was higher in older age groups, with half of cases (50%, 32/64) aged 45 to 64 experiencing delays in excess of

four months. It was also more common among UK born cases (49%, 56/115 vs. 31%, 54/177 in non-UK born cases), as it was for those of white ethnicity (50%, 66/131 vs.28%, 45/162 among those of non-white ethnicity). Delays were also more common among those with social risk factors (53%, 20/38) compared to those without (37%, 84/228).

Table 7: Proportion of pulmonary TB cases with a delay from onset of symptoms to treatment of more than four months, by PHE Health Protection Team area, sex and place of birth, 2015

		Kent n=62		Surrey & Sussex n=81		Hampshire & Isle of Wight n=49		Thames Valley n=104		Total n=296	
		n	%	n	%	n	%	n	%	n	%
Sex	Male	15	38	17	35	6	22	19	28	57	31
	Female	11	50	16	48	9	41	18	49	54	47
Place of birth	UK Born	16	55	18	47	8	57	14	41	56	49
	Non-UK born	10	30	14	36	7	20	23	33	54	28
Overall delayed		26	42	33	41	15	31	37	36	111	37

Table 7 shows the proportion of patients who experienced delays in treatment of over four months by PHE Health Protection Team area. The longest delays were among patients in Kent, followed by Surrey and Sussex, with 42% and 41% of pulmonary patients having more than four months from symptom onset to treatment. Women in all the defined areas were more likely to be delayed compared to men, as were those born in the UK compared to those born abroad.

5. TB outcome in drug sensitive cohort

Drug sensitive cohort

For the purposes of TB outcome reporting the drug sensitive cohort excludes all TB cases with rifampicin resistant TB (initial or amplified) including MDR-TB (initial or amplified), and non-culture confirmed cases treated as MDR-TB[2]. Under this definition, cases with resistance to isoniazid, ethambutol and/or pyrazinamide but without resistance to rifampicin are included in the drug sensitive cohort. For TB outcomes in the drug resistant cohort, see Chapter 6.

Treatment 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, miliary or cryptic disseminated disease are excluded from this group, as CNS involvement cannot be reliably ruled out for the purposes of reporting

- for cases with CNS, spinal, miliary or cryptic disseminated disease, the last recorded treatment outcome is reported. For cases notified in 2014, however, information on final outcome was collected in 2015 so may be only one year after start for many patients

In 2014, 664 cases of TB were notified, all but three of whom were sensitive to rifampicin and therefore included in the drug sensitive cohort.

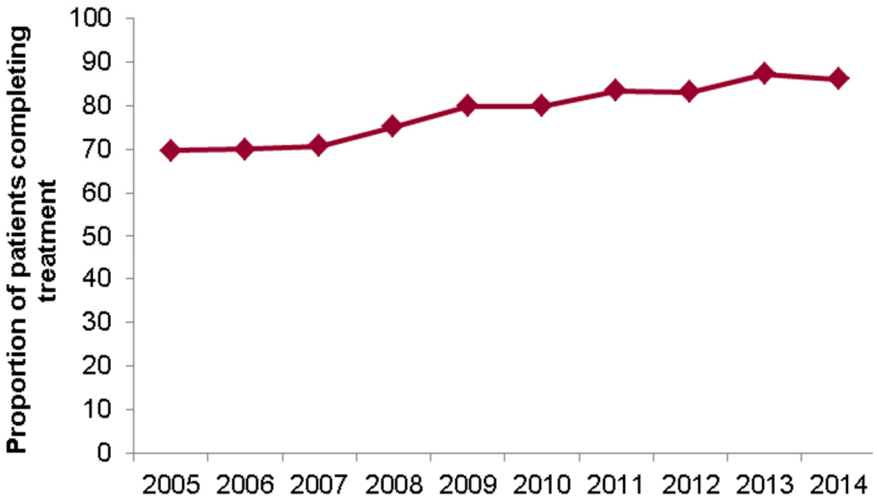
1: Outcomes for TB patients with expected duration of treatment less than 12 months

The majority (91%, 601/661) of those notified with rifampicin-sensitive TB in 2014 did not have CNS, spinal, miliary or cryptic disseminated disease. Of these, 86% (517/601) had completed treatment at 12 months, similar to 2013 (Table 8).

The overall trend in treatment completion in the South East has improved over time, from just 70% in 2005 to 86% in 2014.

Table 8: Number and proportion completing treatment at 12 months, South East, 2002 to 2014*

	TB patients		
	n	%	Total
2005	373	70	536
2006	382	70	546
2007	405	71	573
2008	417	75	555
2009	507	80	635
2010	510	80	639
2011	603	83	724
2012	583	83	702
2013	528	87	606
2014	517	86	601



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

At 12 months, 3% (19) of patients were still on treatment, the reason for which was provided for half (9). Of these, five were on a planned treatment regime that exceeded 12 months (none of whom were reported as being resistant to isoniazid), three had their treatment interrupted (two due to intolerance/side effects) and one had their treatment changed due to initial drug resistance (Table 9).

Table 9: TB outcome at 12 months, South East, cases diagnosed in 2014*

Outcome at 12 months	n	%
Completed	517	86
Died	29	5
Lost to follow up	19	3
Still on treatment	19	3
Treatment stopped	5	1
Not evaluated	12	2
Total	**601**	**100**

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

As in recent years, treatment completion was slightly lower among males (84%, 278/330 vs. 88% for females, 239/271) and a higher proportion remained on treatment (4.2%, 14/330 vs. 1.9%, 5/271 among females). Treatment completion decreased with age, with all but one child less than 15 years of age completing treatment within 12 months (95%, 18/19), compared with 69% (63/91) of adults 65 years and older. Unlike recent years, in 2014, treatment completion was worse among UK born compared with non-UK born cases (76%, 110/144 vs. 90%, 403/447), particularly those of white

ethnicity (72%, 79/110 vs. 91%, 31/34 of non-white UK born cases). Among UK born cases, treatment completion was worse in those with at least one social risk factor (60%, 15/25 vs. 80%, 89/111 of UK born cases without risk factors). There was little difference, however, among those born abroad (94% 17/18 vs. 90%, 361/399 of non-UK born cases without risk factors).

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

Of the 60 cases of CNS, spinal, miliary or cryptic disseminated disease in 2014, 60% (36) had completed treatment at 12 months (Table 10). This increased to 70% (42) by the last recorded outcome with five cases (8%) still on treatment. Among the 41 cases for whom duration of treatment was known, the median treatment time was 361 days (IQR 227-365).

Table 10: Overall outcome for patients with rifampicin sensitive CNS, spinal, miliary or cryptic disseminated disease, South East, cases diagnosed in 2014*

Overall outcome	n	%
Completed	42	70
Died	8	13
Lost to follow up	3	5
Still on treatment	5	8
Not evaluated	2	3
Total	**60**	**100**

*Excludes rifampicin resistant TB.

At 12 months, treatment completion was better among males (66%, 23/35) than females (52%, 13/25), although this difference was less pronounced by the time of last recorded outcome. Treatment completion within 12 months was also more common among those born in the UK (69%, 11/16) compared with those born abroad (58%, 25/43). Only two of the 54 cases for whom social risk factor information was complete had at least one social risk factor. Of these, one had completed treatment at 12 months.

Deaths and lost to follow up in the drug sensitive cohort

Similar to recent years, 5.6% (37/661) of rifampicin sensitive cases diagnosed in 2014 died before completing treatment. Death was more common in patients with CNS, spinal, miliary or cryptic disseminated disease (13%, 8/60). TB was reported to have caused or contributed to nearly a third of these deaths (30%, 11/37), been incidental to nine (24%) and had an unknown relationship to the remaining 17 (46%). Seven cases were diagnosed post-mortem. The median age at death was 75 years (IQR 59-85), but

TB caused or contributed to the death of four individuals under the age of 59 (three born in India). As in recent years, death was more common among the UK born (11%, 18/160 vs. 3%, 16/490), although this patient population was also a slightly older age cohort (median age of 47 vs 37 in non-UK born). Death was nearly twice as common among those with at least one social risk factor (8.9%, 4/45 vs. 4.8%, 27/564 in those without any risk factors). Of these, TB contributed to the deaths of two, was incidental to one, and had an unknown relationship to another.

Consistent with recent years, 3% (22/661) of rifampicin sensitive cases notified in 2014 were lost to follow up within 12 months. Where known, the majority of those lost to follow up had left the UK (75%, 15/20 loss to follow up was only slightly more common among the non-UK born (3.1%, 15/490 vs. 2.5%, 4/160 among the UK born). It was, however, more than three times as common among those with at least one social risk factor (6.7%, 3/45) compared to those without any risk factors (2.1%, 12/564).

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

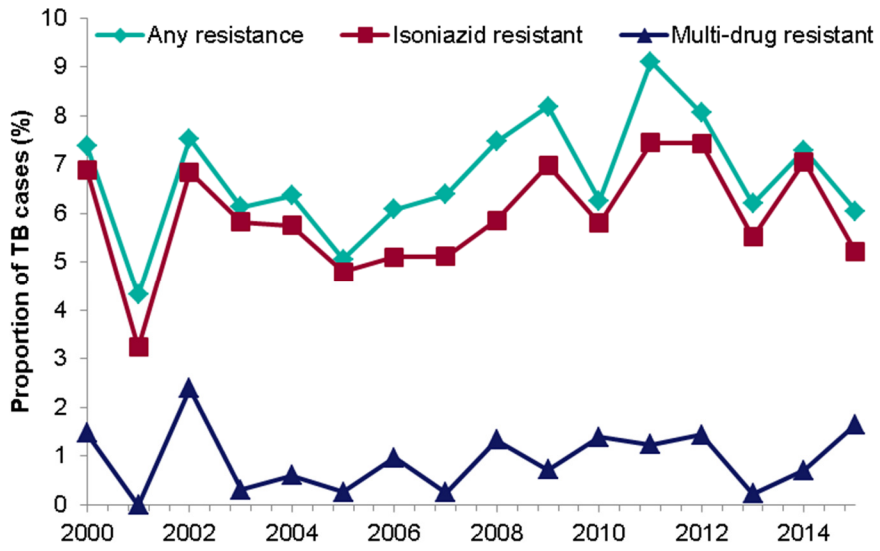
Drug resistance

Overall initial drug resistance and geographical distribution

In 2015, resistance profiles were available for all but one of the 365 culture confirmed cases. The proportion of TB culture confirmed TB cases resistant to one or more first line drug decreased slightly to 6.0% (22/364) relative to 2014 (7.3%, 31/425). This reflected a decrease in the proportion resistant to isoniazid (from 7% to 5.2%). However, increases of around 1% were seen in the proportion of cases resistant to other first line drugs (rifampicin, ethambutol and pyrazinamide), and an increase in MDR cases (from three, 0.7% to six, 1.6%). Overall, since 2000 the proportion resistant to at least one first-line drug has remained between 4% and 9% (Figure 14). Small numbers, however, mean year on year changes should be interpreted with caution.

Both Surrey and Sussex, and Kent saw declines in the proportion of initial drug resistant cases from 2014. In Surrey and Sussex, 4% (4/97) of cases were first line drug resistant, a decline from 7% in 2014 (8/119). There was also a decline in Kent from 2014 to 2015 from 8% (6/72) of cases to 6% (4/67). The highest proportion of first line drug resistance cases in the South East was seen in Thames Valley, where 8.5% of cases were first line drug resistant (12/141).

Figure 11: Proportion of TB cases with initial first line drug resistance, South East, 2000 to 2015



Characteristics of patients with drug resistant TB

Any first line drug resistance

In 2015, similar proportions of males (5%, 12/217) and females (7%, 10/147) with TB were resistant to at least one first line drug. The majority (59%, 13/22) of resistant cases occurred in individuals aged 15 to 44 years of age, although culture confirmation was also more common in this age group (63% vs 58% in older people and only 27% in children less than 15 years of age).

A higher proportion of non-UK born cases had drug resistant disease (7%, 17/246 vs 5%, 5/106 of UK born cases). In recent years there has been little difference in those born in the UK vs abroad. Overall, in 2015, patients of Indian ethnicity had the highest levels of resistance (8%, 7/82), with no resistance observed in patients of black Caribbean, Bangladeshi or Chinese ethnicity. Although numbers in these groups were small. Amongst those born abroad, resistance was most common in those of Indian (10%, 7/69), white (7%, 2/28) or mixed/other (6%, 5/84) ethnicity. The most common countries of birth for all drug resistant cases in 2015 were India (32%, 7/22), the United Kingdom (23%, 3/22) and Romania (14%, 2/22).

Drug resistance was more common among those with pulmonary TB (7%, 17/240) than those with exclusively extra-pulmonary disease (4%, 5/124) and more common among sputum-smear positive cases (10%, 10/101) than smear negative cases (4%, 2/46). In 2015 there were no patients with drug resistant TB who had a previous TB diagnosis (n=15). This is unlike 2014, where 17% (3/17) of cases of drug resistant cases had a previous TB diagnosis, compared to 7% (26/389) of those with no previous TB diagnosis.

In 2015 a higher proportion of drug resistant cases had at least one social risk factor than in 2014 (9.5%, 2/21 vs. 0%, 0/27). Both of the cases were isoniazid resistant and one case was extensively drug resistant (XDR).

Multi-drug resistance (MDR) and extensively drug resistant (XDR) TB

Small numbers mean the following information should be interpreted with caution. In 2015 there were six (1.7%, 6/364) cases of MDR-TB. This was double the number of MDR cases seen in 2014 (0.7%, 3/425). A greater proportion of women than men accounted for MDR cases in 2015: of the six patients, four were female and two were male.

There were no MDR cases among those aged under 14 years: four were among those aged 15 to 44 years and two among those aged 45 or older. Overall in 2015, patients

from a white ethnic background had the highest levels of MDR (2.7%, 3/111) accounting for half of the six MDR cases (3/6).

All of the MDR cases occurred in those with pulmonary TB. There was no previous history of TB for any of the six patients with MDR TB in 2015. One had a social risk factor (17%, 1/6).

There was one other case of MDR-TB in the South East in 2015 in addition to the six described. The patient was treated as MDR due to contact with an MDR patient.

The one individual with MDR TB diagnosed in the South East in 2013 had completed treatment within 24 months.

XDR-TB

In 2015 there were two cases of extensively drug resistant TB in the South East (0.55%, 2/364), one of whom was UK born. Both were females of white ethnicity, one had a social risk factor. Neither had previously been treated for TB and both had pulmonary disease.

7. TB in under-served populations

Social risk factors

In this section, social risk factors are presented for TB cases aged 15 years and older, and are defined as current or history of homelessness, drug use and imprisonment, or current alcohol misuse. In 2015, 11% (59/527) of South East cases aged 15 years and older had one or more social risk factor (Table 11). This was a marked increase from 2014 (7.6%) and was consistent with a nationally increasing trend[1]. Homelessness was the most common risk factor (5.2%, 29/557), followed by drug use (3.8%, 21/554), imprisonment (3.3%, 18/539) and alcohol misuse (2.7%, 15/561). Relative to recent years, there was a marked increase in both the proportion homeless, as well as drug users, although numbers remain small. A quarter of those with at least one risk factor had multiple issues (25%, 15/59).

Table 11: Social risk factors among TB patients, South East, 2009 to 2015

Year	n	%	Total
2009	42	9.2	459
2010	34	6.7	509
2011	63	9.4	670
2012	60	8.8	679
2013	46	7.4	619
2014	45	7.6	592
2015	59	11.2	527

Consistent with recent years, social risk factors were over three times more common among UK born (22%, 33/153) compared with non-UK born cases (6%, 23/367). They were also more than four times more common among males than females (17%, 50/297 vs. 4%, 9/230). Nearly a quarter of white ethnic TB cases had at least one social risk factor, regardless of where they were born (23%, 27/116 among UK born; 24%, 11/46 among non-UK born). Overall, social risk factors were nearly five times more common among those of white compared with non-white ethnicity (24%, 40/165 vs. 5%, 18/359).

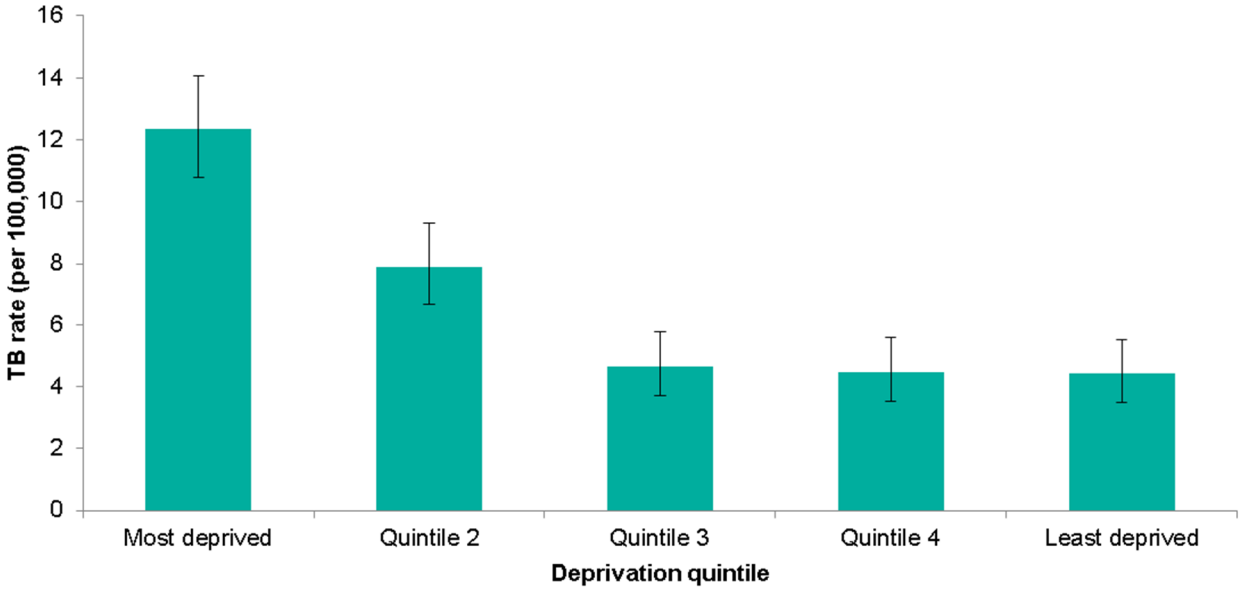
As seen in recent years, individuals with social risk factors were twice as often infectious (36%, 21/59 had sputum smear positive pulmonary TB vs. 16%, 74/468 of those without social risk factors).

Although numbers were very small in some areas, this increase in the number and proportion with social risk factors was observed in all HPT areas of the South East: Hampshire and Isle of Wight increased from 5% (4/81) in 2014 to 7% (6/90) in 2015;

Kent increased from 11% (11/104) to 19% (17/89); Surrey and Sussex increased from 10% (14/138) to 14% (18/126); and Thames Valley increased from 6% (16/269) to 8% (18/222).

Deprivation

Figure 12: TB case rate by deprivation, South East, 2015



Deprivation was assessed using the 2010 Index of Multiple Deprivation. In 2015, over a third of cases (37%, 223/603) were resident in the most deprived quintile of the South East, and another 24% (142) in the second most deprived quintile. Rates were also highest in these areas (12 per 100,000 and 8 per 100,000 respectively). The remaining cases were relatively evenly distributed across the areas that comprised the three least deprived quintiles, and their rates were accordingly similar (approximately 4.5 per 100,000, Figure 12).

8. TB-HIV co-infection and HIV testing among TB cases, hospitalisation and BCG

HIV testing

In 2015, information on HIV testing was available for 94% (547/579) of cases with previously unknown HIV status. Of these, 92% (502) were offered and received testing; slightly below the national figure of 93.5%. Another 3.8% (21) were offered but did not receive testing, of whom a third (7) declined. In South East England, the proportion of cases not offered a test was 4.4% (24), as compared to 3.8% (191/5,016) nationally[1]. The proportion of South East cases offered testing has improved since 2013, when 6.2% (38/609) of cases were not offered an HIV test.

TB-HIV co-infection

The latest available information on TB-HIV co-infection for notified adults 15 years and older, estimated that 3.0% (20) of South East TB cases in 2013 were co-infected with HIV[5]. This continues a decline in the number and proportion co-infected since 2003, when 11% (57) of cases were estimated to be co-infected.

Hospital inpatient and directly observed therapy

Consistent with recent years, 26% (151/577) of cases notified in 2015 had been a hospital inpatient at some point throughout treatment. A higher proportion of adults aged 65 years and older were hospitalised (36%, 39/107), as were children under the age of 15 (50%, 7/14), although numbers in this age group remain small. Those who were resistant to at least one first-line drug were more frequently hospitalised (36%, 8/22), and five of the seven cases treated for MDR TB were an inpatient at some point in care. As seen previously, hospitalisation was more than twice as common among those with social risk factors compared with those without any risk factors (47%, 27/57 vs 22%, 104/472).

Overall, 14% (78/566) of cases notified in 2015 were recorded as having received directly observed therapy (DOT) at some point during treatment. Nearly two thirds of children under the age of 15, however, were placed on DOT (62%, 8/13) as were over half of those with at least one social risk factor (55%, 30/55). DOT was also more common among those with resistance to at least one first-line drug (32%, 7/22), and was received by all seven of the MDR TB cases. Lastly, nearly a quarter (23%, 37/163) of UK born TB cases received DOT, compared to only 10% (39/395) of non-UK born cases.

BCG vaccination

Information on BCG vaccination was available for 433 (72%) South East cases notified in 2015, of whom 77% (333) were vaccinated (Table 12). Consistent with previous years, a higher proportion of non-UK born cases had been vaccinated (82%, 251/306) than UK born cases (66%, 82/124). Two UK born children less than five years of age had not been vaccinated: one was white and the other was of mixed/other ethnicity. These two cases were resident in areas where BCG vaccination would not have been universal. There was no information on country of birth for the parents or grandparents of these children to know if they were eligible for vaccination.

Please refer to the national report for BCG vaccine coverage data: www.gov.uk/government/uploads/system/uploads/attachment_data/file/564656/TB_annual_report_2016.pdf

Table 12: Number and proportion of TB patients with BCG vaccination, South East, 2015

	<5 years old		<15 years old		All ages	
	n(N)	%	n(N)	%	n(N)	%
UK born	2(4)	50.0	3(6)	50.0	82(124)	66.1
Non-UK born	0(0)	-	5(6)	83.3	251(306)	82.0
All cases	2(4)	50.0	8(12)	66.7	333(430)	77.4

Latent TB infection testing and treatment

As of June 2016, 54 priority CCGs received funding from NHS England. Of these, 30 reported to have started testing and treating eligible new migrants.[1] Preliminary data on LTBI testing and treatment was available for 22 Clinical Commissioning Groups across England. Across the South TB Control Board area (South East and South West England), 143 individuals were offered LTBI testing and 142 were tested. Nineteen individuals tested positive (13%).

Please refer to the national report:
www.gov.uk/government/uploads/system/uploads/attachment_data/file/564656/TB_annual_report_2016.pdf

Discussion

As seen across England, TB rates in the South East have reduced since the peak in 2011, to 7.0 per 100,000 population (605 cases), below the England average. Most of South East England has very low rates of TB.[1]

The decrease in 2015 was driven by reductions among Thames Valley residents, with little evidence of decrease in other parts of the South East. Even within Thames Valley, however, some parts such as Slough (the highest incidence area of the South East, with a TB rate of 49 per 100,000 population) had increasing case numbers in 2015.

The decline was in the rate among those born abroad which reduced by 19% compared to 2014. Sharpest decreases in incidence were also among those aged 20 to 39 years old, and those born in India (but also with decreases in those born in Pakistan and Nepal).

The reduction in non-UK born cases was initially mostly attributable to a decrease in the number of notifications in very recent migrants, but more recently driven by decreases in the number of cases among those who arrived two to five years previously. Changes in migration patterns, pre-entrant screening for active TB [6] and falling rates in some high-burden countries are likely to have contributed to this [7]. In addition, 2015 is the first time case numbers in those who arrived six to 10 and 11 or more years earlier have reduced.

Rates in the UK born population of the South East have not changed over the past decade, but remain below the England average[1]. Although white was the most frequent ethnicity of South East TB patients in 2015, this reflects the predominant ethnicity of South East residents, where 90% were white in the 2011 census [3]. Individuals of Indian or mixed/other ethnicity each comprised 22% of the South East TB patient population, despite these ethnic groups accounting for only 2% each of the general South East resident population (in the 2011 census) [3]. This suggests a much higher risk in these ethnic minority populations.

Pulmonary TB patients in the South East typically experienced a nearly three week longer delay to treatment start than in England overall[1]. Reasons for this should be reviewed, as delays lead to worse patient outcomes, as well as increase the risk of others becoming infected, which can result in complex contact tracing and screening exercises. In particular, differentiating between patient delays in presenting to healthcare, and delays to getting the correct diagnosis within the healthcare system itself, is essential to identifying where improvements are needed.

The increasing proportion of patients who complete treatment in the South East is encouraging. Although the low completion among white UK born patients should be further investigated locally.

An increasing number and proportion of TB patients in the South East had a social risk factor, most commonly homelessness. Individuals with social risk factors were more likely to have infectious forms of TB. So delays to diagnosis in this group should be especially investigated, as increasing numbers may reflect ongoing transmission. Patients with social risk factors were also more often hospitalised, which may be a reflection of severity of illness and/or lack of suitable, stable housing. Accommodation should be sought for all homeless people undergoing treatment for active TB, as described in the NICE guidance for vulnerable patients.[9] These patients were also less likely to successfully complete treatment, increasing the risk of developing drug resistance as well as onward transmission and poorer outcomes for the individual.

Conclusion

In conclusion, recent trends show sustained reductions in overall TB case numbers in the South East, although there was much variation by geographic locality. These reductions were predominantly among those born abroad. This is likely to be due in part to the implementation of pre-entry screening, but will also be affected by changes in migration patterns (particularly decreasing numbers of migrants from high TB burden countries), as well as a reflection of decreasing rates of TB worldwide. The decrease in the rate of TB in UK born children under 15 years of age (although very small numbers), and reduction in the proportion of cases that cluster with at least one other South East case, suggests a reduction in TB transmission in the South East, as seen elsewhere in England.

While TB services' contribution to decreased transmission should be commended, much of the decrease is likely to be due to factors outside of the UK. As cases become more concentrated in under-served populations, services will need to sustain and adapt their efforts to continue to tackle TB across this mostly very low incidence area.

Recommendations

Locally driven reviews of the lengthy delays experienced by South East residents should be carried out, with support and review by the South TB Control Board.

The South TB Control Board should prioritise and work with wider stakeholders to develop strategies to improve outcomes for under-served populations.

Continued support by NHS, PHE and allied services of cohort review as the tool to quality assure TB case and contact management according to national guidance.[9]

Issues and themes identified at cohort reviews across the South East to be reported to the South TB Control Board in a systematic way.

Close monitoring of multi-drug resistant TB between NHS and PHE, including the use of BTS MDR advisory service and MDR-specific TB cohort reviews.

PHE to monitor the implementation of LTBI testing and treatment, and use local epidemiology to inform future developments.[8]

References

1. Public Health England. Tuberculosis in England: 2016 report. London: PHE; 2016 September: www.gov.uk/government/uploads/system/uploads/attachment_data/file/564656/TB_annual_report_2016.pdf

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

3. Office for National Statistics. Population of the United Kingdom by country of birth and nationality tables, January 2015 to December 2015. London: ONS; 2016. Table A, Population resident in the United Kingdom excluding some residents.

4. Public Health England. TB strain typing cluster investigation handbook, 3rd Edition, February 2014: www.gov.uk/government/uploads/system/uploads/attachment_data/file/433055/TB_Strain_Typing_Handbook_final_070214__2_.pdf

5. PHE NIS CIDSC, personal communication, January 2016.

6. Public Health England. UK pre-entry tuberculosis screening report 2015. London: PHE; 2016 September: www.gov.uk/government/uploads/system/uploads/attachment_data/file/555150/UK_pre-entry_tuberculosis_screening_2015_GTW230916.pdf

7. World Health Organization. Global tuberculosis report 2016. WHO: 2016: apps.who.int/iris/bitstream/10665/250441/1/9789241565394-eng.pdf?ua=1

8. Public Health England. Latent TB testing and treatment for migrants: a practical guide for commissioners and practitioners. London: PHE; 2015 June: www.gov.uk/government/uploads/system/uploads/attachment_data/file/442192/030615_LTBI_testing_and_treatment_for_migrants_1.pdf

9. Royal College of Nursing. Tuberculosis case management and cohort review: guidance for health professionals. London: RCN: www2.rcn.org.uk/__data/assets/pdf_file/0010/439129/004204.pdf

Appendix A: Description of data sources and definitions

Data sources
Data on TB cases in South East England comes from the national Enhanced TB surveillance (ETS) system. Data collected includes notification details, and demographic, clinical and microbiological information, including drug resistance and strain type, provided by the reference laboratories (most notably the National Mycobacterium Reference Laboratory in London).

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

Treatment outcome
Information on outcomes was reported for all cases notified in the previous year, excluding those with known rifampicin resistant disease: outcomes for these cases were reported at 24 months. Definitions for outcome are based on World Health Organization (WHO) and European definitions, but adapted to the UK context. In this report, all data was obtained from the ETS matched dataset provided in August 2015.

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

Confidence intervals
A 95% confidence interval for incidence was obtained using the relevant procedure in Stata, assuming a Poisson distribution.

Population denominator
Tuberculosis rates by geographical area (centre, local authority, MSOA and LSOA), age, sex and place of birth were calculated using ONS mid-year population estimates for the most recently available year.

Cluster definitions
Strain typing was performed at the TB reference laboratories using 24 MIRU-VNTR profiling. Analysis was undertaken on strain type clusters defined as two or more people with TB caused by indistinguishable strains, with at least 23 complete VNTR loci. Analysis of clustering in the South East was carried out on cases that clustered in the South East and notified between 2010 and 2015.

Appendix B: TB among South East residents

Table Bi: TB cases numbers by local authority of residence, South East, 2000 to 2015

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Hampshire	34	30	41	42	51	38	47	54	37	66	67	79	67	53	44	58
Isle of Wight	<5	7	<5	<5	<5	<5	<5	7	<5	<5	<5	6	7	<5	<5	<5
Portsmouth	24	12	15	16	23	20	23	23	23	30	24	16	23	19	10	18
Southampton	18	15	27	36	33	30	33	24	24	36	27	51	41	39	29	24
HIOW	**76**	**64**	**86**	**95**	**108**	**91**	**103**	**108**	**85**	**135**	**121**	**152**	**138**	**112**	**86**	**101**
Kent	47	37	66	67	61	65	86	86	129	111	104	112	114	107	101	91
Medway	13	21	13	20	9	14	16	18	22	20	20	28	20	16	16	14
Kent & Medway	**60**	**58**	**79**	**87**	**70**	**79**	**102**	**104**	**151**	**131**	**124**	**140**	**134**	**123**	**117**	**105**
Brighton and Hove	17	24	6	<5	14	15	15	30	28	35	22	23	31	15	22	25
East Sussex	13	28	25	13	20	15	16	12	17	27	24	25	34	20	25	23
Surrey	42	31	28	60	61	64	79	57	72	89	86	100	98	57	77	69
West Sussex	37	34	39	44	52	38	63	58	38	49	51	77	46	63	41	40
Surrey & Sussex	**109**	**117**	**98**	**120**	**147**	**132**	**173**	**157**	**155**	**200**	**183**	**225**	**209**	**155**	**165**	**157**
Bracknell Forest	8	<5	<5	6	<5	10	<5	6	7	9	12	10	10	6	14	7
Buckinghamshire	42	38	51	47	32	40	41	37	34	30	48	52	54	45	39	45
Oxfordshire	36	33	26	43	64	61	52	76	53	56	60	71	70	64	74	51
Reading	29	30	41	39	33	59	44	55	60	57	59	52	43	66	64	37
Slough	56	64	68	73	71	75	62	54	59	61	72	85	84	78	58	71
West Berkshire	6	5	8	<5	9	11	<5	10	5	11	7	6	9	11	7	6
Windsor and Maidenhead	11	12	11	15	7	17	8	9	11	13	9	10	12	9	21	7
Wokingham	9	5	9	13	11	9	15	12	9	10	16	10	14	12	19	18
Thames Valley	**197**	**191**	**218**	**240**	**231**	**282**	**229**	**259**	**238**	**247**	**283**	**296**	**296**	**291**	**296**	**242**
South East	**442**	**430**	**481**	**542**	**556**	**584**	**607**	**628**	**629**	**713**	**711**	**813**	**777**	**681**	**664**	**605**

Table Bii: TB rate* per 100,000 by local authority of residence, South East, 2000 to 2015

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Hampshire	2.7	2.4	3.3	3.4	4.1	3.0	3.7	4.2	2.9	5.1	5.1	6.0	5.0	4.0	3.3	4.3
Isle of Wight	-	5.3	2.2	0.7	0.7	2.2	0.0	5.1	0.7	2.2	2.2	4.3	5.0	0.7	2.2	0.7
Portsmouth	12.8	6.4	8.0	8.4	11.9	10.2	11.7	11.8	11.7	15.1	11.8	7.8	11.1	9.2	4.8	8.5
Southampton	8.3	6.8	12.2	16.2	14.8	13.2	14.6	10.6	10.5	15.7	11.6	21.6	17.1	16.1	11.8	9.6
HIOW	4.3	3.6	4.8	5.3	6.0	5.0	5.6	5.9	4.6	7.2	6.4	8.0	7.2	5.8	4.4	5.2
Kent	3.5	2.8	4.9	5.0	4.5	4.7	6.2	6.1	9.1	7.7	7.2	7.6	7.7	7.2	6.7	6.0
Medway	5.2	8.4	5.2	8.0	3.6	5.6	6.3	7.0	8.5	7.7	7.6	10.6	7.5	5.9	5.8	5.1
Kent & Medway	3.8	3.7	5.0	5.4	4.3	4.9	6.2	6.3	9.0	7.7	7.2	8.1	7.7	7.0	6.6	5.8
Brighton and Hove	6.8	9.6	2.4	1.2	5.6	5.9	5.9	11.6	10.7	13.2	8.2	8.4	11.2	5.4	7.8	8.8
East Sussex	2.6	5.7	5.0	2.6	4.0	2.9	3.1	2.3	3.3	5.2	4.6	4.7	6.4	3.7	4.6	4.2
Surrey	4.0	2.9	2.6	5.6	5.7	6.0	7.3	5.2	6.5	8.0	7.6	8.8	8.6	4.9	6.6	5.9
West Sussex	4.9	4.5	5.2	5.8	6.8	4.9	8.1	7.4	4.8	6.2	6.3	9.5	5.6	7.7	4.9	4.8
Surrey & Sussex	4.3	4.6	3.8	4.7	5.7	5.1	6.6	5.9	5.8	7.4	6.7	8.2	7.6	5.6	5.9	5.5
Bracknell Forest	7.3	3.6	3.7	5.5	3.7	9.1	3.6	5.4	6.3	8.0	10.6	8.8	8.7	5.1	11.9	5.9
Buckinghamshire	8.8	7.9	10.7	9.8	6.6	8.2	8.4	7.5	6.8	6.0	9.5	10.3	10.6	8.7	7.5	8.5
Oxfordshire	5.9	5.4	4.3	7.0	10.3	9.7	8.2	12.0	8.3	8.7	9.2	10.8	10.6	9.6	11.0	7.5
Reading	20.2	20.7	28.5	27.1	22.8	40.2	29.7	36.7	39.6	37.4	38.2	33.5	27.4	41.4	39.8	22.9
Slough	46.8	53.1	56.2	60.4	58.8	61.0	49.5	42.2	44.9	45.3	52.2	60.4	59.2	54.5	40.1	48.7
West Berkshire	4.2	3.5	5.6	2.8	6.2	7.5	2.0	6.7	3.3	7.2	4.5	3.9	5.8	7.1	4.5	3.8
Windsor and Maidenhead	8.2	9.0	8.2	11.2	5.2	12.5	5.8	6.4	7.8	9.1	6.3	6.9	8.2	6.2	14.2	4.7
Wokingham	6.0	3.3	6.0	8.7	7.4	6.0	10.0	7.9	5.9	6.5	10.3	6.5	8.9	7.6	11.9	11.2
Thames Valley	10.5	10.1	11.5	12.6	12.1	14.6	11.8	13.2	12.0	12.4	14.1	14.6	14.5	14.1	14.2	11.5
South East	**5.7**	**5.5**	**6.1**	**6.9**	**7.0**	**7.3**	**7.5**	**7.7**	**7.7**	**8.6**	**8.5**	**9.7**	**9.2**	**8.0**	**7.7**	**7.0**

*Rates calculated using ONS mid-year population estimates.

Table Biii: TB case numbers and rate* by age and sex, South East, 2015

	Female		Male	
	n	rate	n	rate
0-9	4	0.8	4	0.7
10-19	15	3.1	16	3.1
20-29	47	9.1	68	12.7
30-39	52	9.5	86	16.4
40-49	45	7.2	56	9.3
50-59	30	5.1	43	7.5
60-69	29	5.8	28	5.9
70+	34	5.3	48	9.6

*Rates calculated using ONS mid-year population estimates.

Table Biv: Drug resistance among TB patients with culture confirmed disease*, South East, 2000 to 2015

Year	Any resistance		Isoniazid resistant		Multi-drug resistant		Total*
	n	%	n	%	n	%	
2000	15	7.4	14	6.9	3	1.5	203
2001	8	4.3	6	3.2	0	0.0	185
2002	22	7.5	20	6.8	7	2.4	292
2003	20	6.1	19	5.8	1	0.3	326
2004	21	6.4	19	5.8	2	0.6	330
2005	19	5.1	18	4.8	1	0.3	375
2006	25	6.1	21	5.1	4	1.0	411
2007	25	6.4	20	5.1	1	0.3	391
2008	28	7.5	22	5.9	5	1.3	375
2009	34	8.2	29	7.0	3	0.7	415
2010	27	6.3	25	5.8	6	1.4	431
2011	44	9.1	36	7.5	6	1.2	483
2012	39	8.1	36	7.4	7	1.4	484
2013	27	6.2	24	5.5	1	0.2	435
2014	31	7.3	30	7.1	3	0.7	425
2015	22	6.0	19	5.2	6	1.6	364

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

Appendix C: Local authority TB epidemiological summaries and hospital data

Local authority TB epidemiological summaries will provide further information about TB cases among residents of South East England upper tier local authorities with an average of at least 50 TB cases per year over the previous three years. These will be prepared and distributed to relevant stakeholders by FES SEaL.

In addition, case numbers and key outcomes by treating hospital will also be provided to local stakeholders. Contact the FES team or your local HPT for more information.