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Tuberculosis in South East Centre: Annual review (2014 data)

Data from 2000 to 2014

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Executive summary

In 2014, 670 cases of tuberculosis (TB) were notified among South East of England residents, a rate of 7.8 per 100,000 population. This was a small (2.6%) decrease from the rate reported in 2013, and a 15% decrease from 2012. South East cases comprised 10% of the 6,520 TB cases in England and rates were lower than the average for England.[1]

As in previous years, a higher rate and number of cases were reported among residents of Thames Valley, particularly in Slough (59 cases, 41 per 100,000) and Reading (64 cases, 40 per 100,000). Rates decreased in Slough compared to 2013, but those in most other areas remained stable, with an increase seen in some (although numbers remained small across the South East). TB notification rates were highest among adults 30-39 years of age, irrespective of gender.

Although 75% of cases were among individuals born abroad, this was the third consecutive year that incidence decreased in this group, and was attributable to reductions in the number of cases among recent entrants to the UK. Conversely, the TB notification rate in the UK born population remained stable. For both those born abroad and in the UK, TB rates in the South East were lower than those in England overall.[1] The most commonly reported ethnicities among TB cases were Indian (27%) or white (24%), and least common were Chinese (2%) or Bangladeshi (3%). As in previous years, three quarters of the UK born patient population were white and 10% were of Pakistani ethnicity. India, Pakistan and Nepal were the most frequent countries of birth.

Just over half of all TB patients had pulmonary disease and 55% of these were sputum smear positive. As in previous years, only a very small proportion (5%) of patients had a previous history of TB.

Only 64% of cases were culture confirmed, although this was higher among those with pulmonary disease (81%).

In 2014, 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 one per 100,000. Between 2010 and 2014, 32% of strain typed South East TB cases were identified as being clustered with one or more other resident(s) in the South East (using 24 loci Mycobacterial Interspersed Repetitive Unit-Variable Number Tandem Repeats): 633 cases in 201 clusters. The majority of strain typed clusters were small, with 59% comprising two cases.

Among those with pulmonary TB, the median time between symptom onset and treatment start was 88.5 days. The proportion of pulmonary TB cases starting treatment within two months of symptom onset was 31%, increasing to 64% within four months. This was longer than that observed in England overall. Delays of more than four months were more common among males, older patients and those of white ethnicity. According to the revised outcome categories,[2] in 2013, 86% of rifampicin sensitive patients without CNS, spinal, miliary or cryptic disseminated disease completed treatment within 12 months, similar to recent years. The most common reason for not completing treatment was being still on treatment (5%). Completion was lower among older people and individuals with social risk factors. Among those with CNS, spinal, miliary or cryptic disseminated disease, just over half had completed treatment at 12 months (54%).

Overall, 5% of rifampicin sensitive South East cases diagnosed in 2013 died within 12 months of diagnosis. Death was more common in patients with CNS, spinal, miliary or cryptic disseminated TB. The median age of those who died was 76 years. A further 3% were lost to follow-up; this more common among those born abroad and with at least one social risk factor.

The proportion of cases with drug resistance in 2014 (7%) was in keeping with that in recent years. Patients of Pakistani ethnicity had the highest levels of resistance (11%, 6/54). The majority of resistant cases occurred in individuals with no previous history of TB.

In 2014, three new cases were multi-drug resistant (MDR), all of whom were born abroad. Only five of the nine patients with rifampicin resistant disease notified in 2012 had completed treatment at 24 months. Three remained on treatment and one had stopped treatment.

The proportion of all cases known to have at least one social risk factor (homelessness, drug use, imprisonment or alcohol misuse) was 7.5%, over a third of whom reported multiple factors. Social risk factors were nearly four times more common among those born in the UK than those born abroad and twelve times more common among males than females. While the proportion of patients with social risk factors was fairly small, they were more often infectious and also more often hospitalised during treatment. HIV testing coverage was very high, both with respect to the offering (95%) and uptake (98%) of tests. Over a quarter of all TB cases had been hospital inpatients at some point throughout treatment, increasing to 44% among those with one or more social risk factor. In 2014, 64% of those with at least one social risk factor were on directly observed therapy (DOT).

The decrease in TB numbers and rates in the South East since 2012 is encouraging, although little change was seen from 2013-2014. The decrease was largely attributable

to a reduction in cases among new migrants. Changes in migration patterns, pre-entrant screening for active TB and falling rates in some high-burden countries are likely to have contributed to this. The concordant increase in the number of cases among settled migrants indicates that reactivation of latent TB infection constitutes a notable proportion of the overall TB disease burden. Systematic latent TB infection (LTBI) screening and treatment, as articulated in the Collaborative Tuberculosis Strategy,[3] should reduce future TB cases among existing migrants. The roll out of this programme will be monitored by PHE at national level and future reports from the national centre will include coverage of the target population.

Greater efforts are warranted to ensure drug sensitivity profiles are available for all pulmonary cases. This would also provide a more complete and comprehensive picture of drug resistance in the South East, which is imperative when evaluating the Collaborative TB Strategy's sixth evidence-based area for action (Reduce drug-resistant TB).[3]

Cohort reviews should be used to validate and investigate the apparently long delays from symptom onset to treatment start. Similarly, deaths among TB patients should be audited and subjected to local review, to better understand the reason for deaths, thus ensuring that opportunities for their prevention are not missed.

Introduction

Tuberculosis (TB) remains a serious public health problem in the UK.

Surveillance provides relevant information on the TB cases to local teams, to help plan and evaluate their services. This report is based on surveillance data on patients from TB clinics collected via the national Enhanced TB Surveillance (ETS) system and microbiological information, including drug resistance and strain type, provided by the National Mycobacterium Reference Laboratory (NMRL).

This annual report provides an update on the epidemiology of TB in South East of England residents, including characteristics and distribution of TB cases, trends in anti-TB drug resistance, clustering of TB cases, and also the treatment outcome of patients.

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)

Data for indicators which are presented at upper tier local authority can be found at http://fingertips.phe.org.uk/profile/tb-monitoring.

Objectives

This report describes the recent epidemiology of TB in the South East of England. We aim to update the South TB control board, as well as public health, clinical and allied colleagues, including clinical commissioning groups, NHS England and local authorities. We aim to inform about strategy indicators – complementing the information available on fingertips (see above) – summarise the latest trends, identify areas where there is a high burden of disease and describe at-risk population groups as well as opportunities for interventions and prevention of future cases.

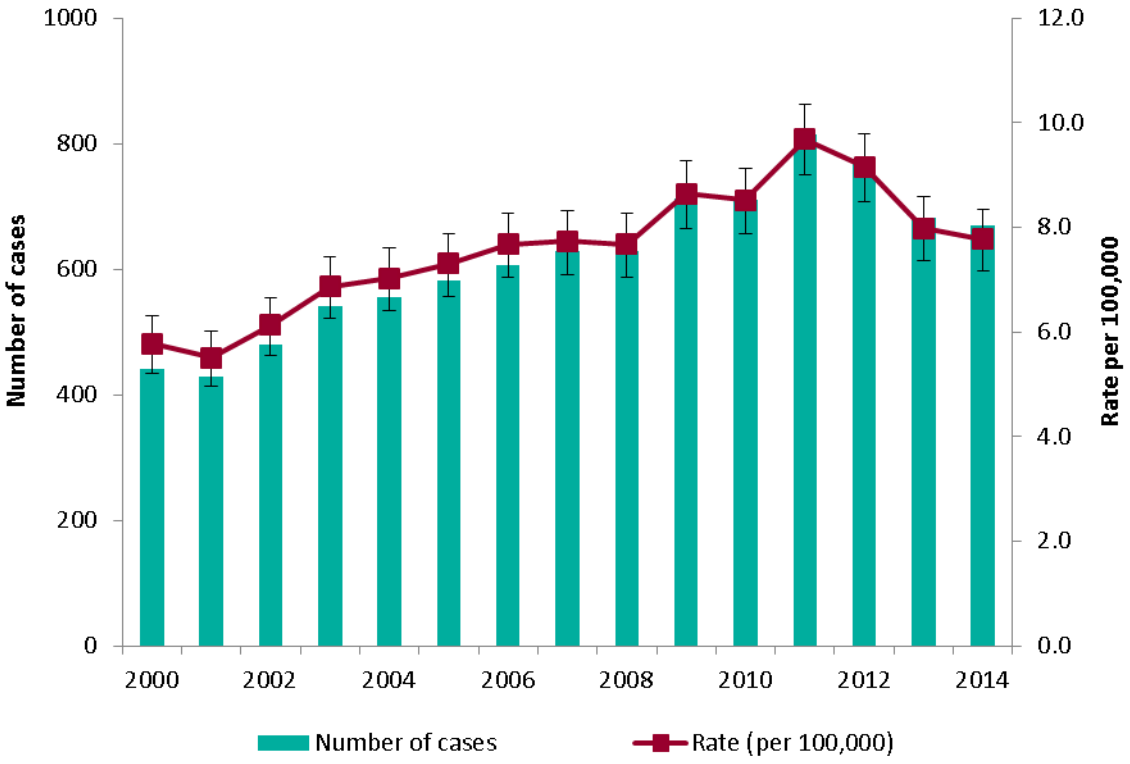
Tuberculosis epidemiology

Overall numbers, rates and geographical distribution

In 2014, 670 cases of tuberculosis (TB) were notified among South East of England residents, a rate of 7.8 per 100,000 population. Consistent with national trends in TB incidence,[1] this was a small (2.6%) decrease from the rate reported in 2013 and a 15.1% decrease from 2012. Following a continued increase from 2001 to 2011, this was the third consecutive year of a decrease in the South East TB notification rate and was a return to the rate observed in 2008 (Figure 1).

South East cases comprised 10% of the 6,520 TB cases in England and the South East was the PHE Centre with the fourth lowest notification rate, below the England average of 12 per 100,000.[1]

Figure 1: TB case notifications and rates, South East, 2000-2014 (TB Monitoring Indicator 1)



As in previous years, a higher rate and number of cases were reported among residents of Thames Valley compared to residents of other health protection team areas (Figure 2).

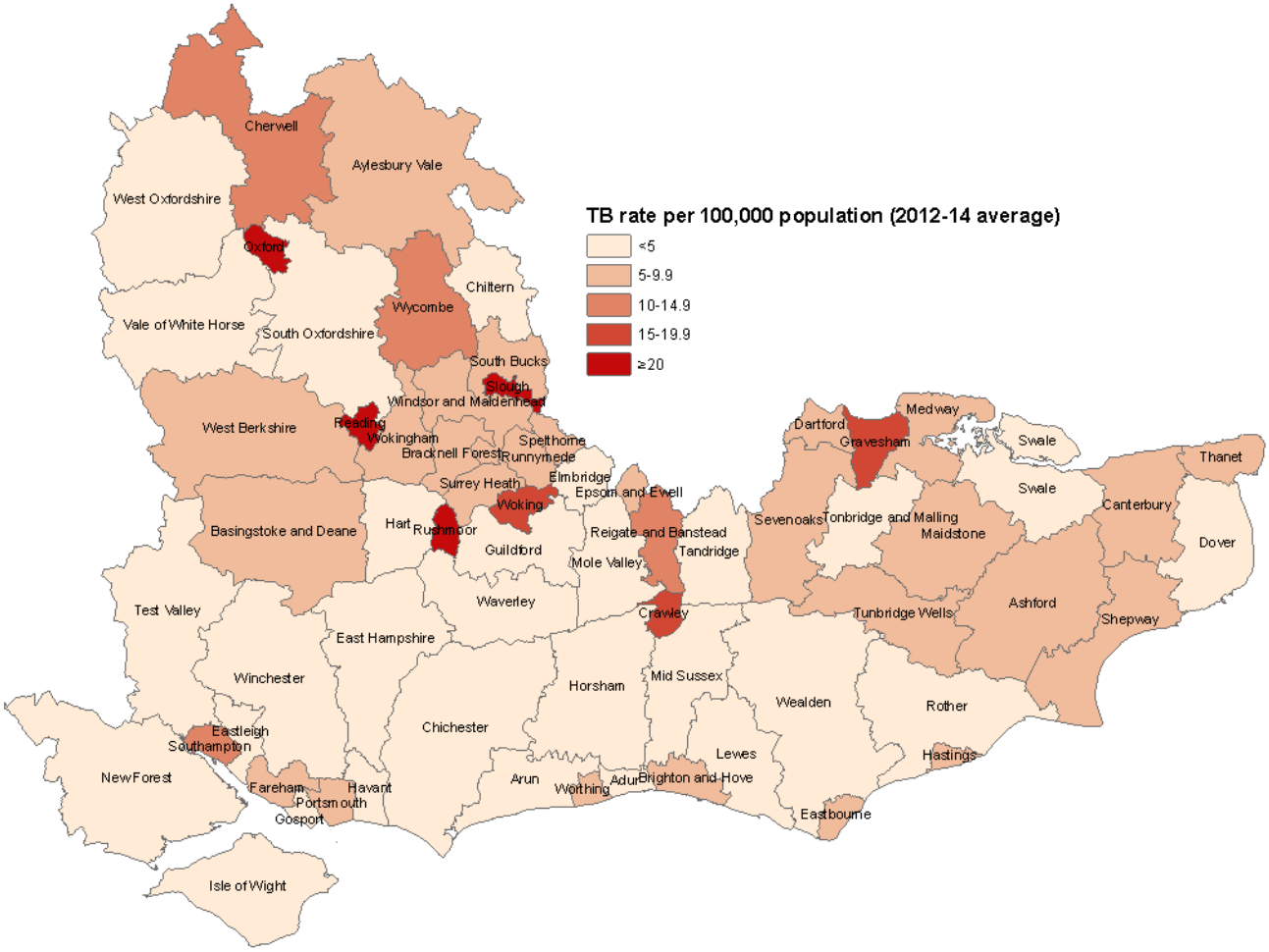
Residents of Hampshire and Isle of Wight (HIOW) experienced the lowest rate of TB. Relative to 2013, TB notification rates only decreased slightly in HIOW, remaining stable in Kent and Thames Valley and increasing slightly in Surrey and Sussex.

Figure 2: TB notification rates, by health protection team area of residence, South East, 2000-2014

In 2014, the highest TB notification rates were observed in Slough (59 cases, 41 per 100,000) and Reading (64 cases, 40 per 100,000), followed by Windsor and Maidenhead (21 cases, 14 per 100,000), Wokingham (19 cases, 12 per 100,000), and Bracknell Forest (14 cases, 12 per 100,000). All of these were upper tier local authorities within the Thames Valley area (See Appendix B). Relative to 2013, rates decreased by 25% in Slough and very slightly (by 4%) in Reading. Conversely, rates in Wokingham, Windsor and Maidenhead, and Bracknell Forest increased, although numbers in these areas remain small.

Residents of Slough (51 per 100,000) and Reading (36 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 Rushmoor in Hampshire (24 per 100,000), Oxford in Thames Valley (23 per 100,000) and Gravesham in Kent (20 per 100,000).

Figure 3: Three-year average TB notification rate by lower tier local authority of residence, South East, 2012-2014



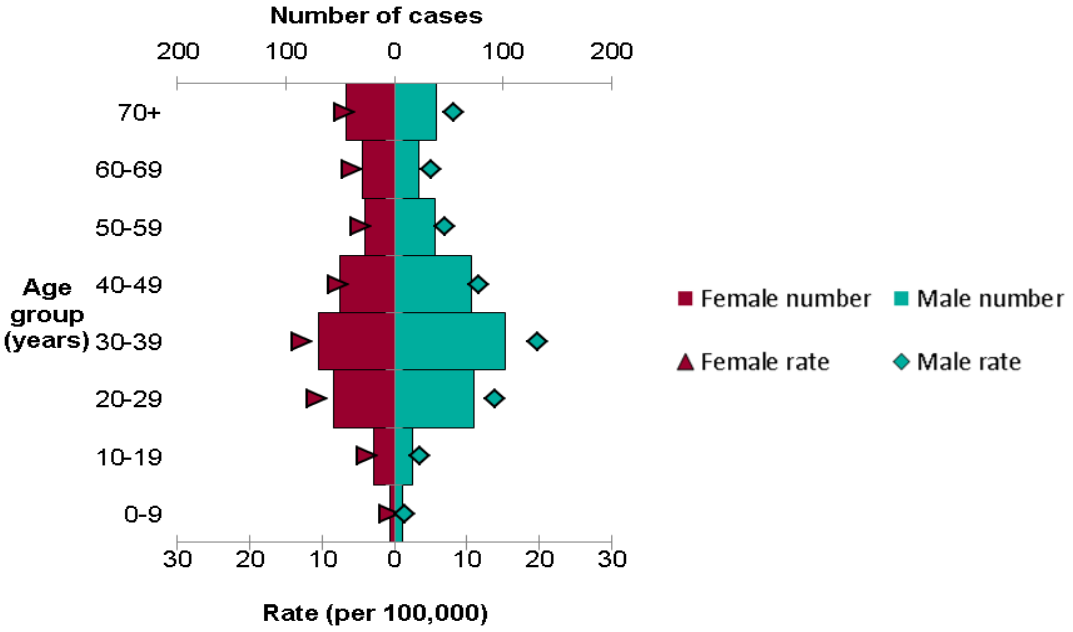
Demographic characteristics

Age and sex

In 2014, 55% (370) of TB cases were male. Rates were slightly higher among males than females (9 per 100,000 vs 7 per 100,000), as seen in previous years.

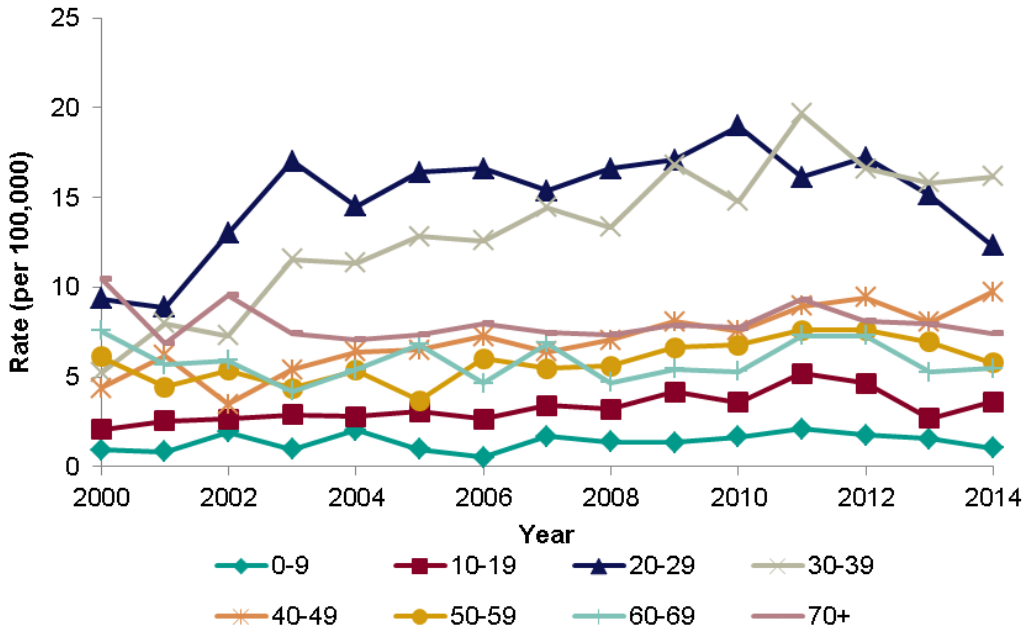
TB notification rates were highest among adults 30-39 years of age, irrespective of gender (Figure 4). Rates in this age group have increased since 2000, remaining stable over the last few years (2012 to 2014, Figure 5).

Figure 4: TB case reports and rate by age and sex, South East, 2014



TB rates in those aged 20-29 have decreased since 2013, while those in 10-19 and 40-49 year olds have increased. Rates in most other age groups have remained relatively stable in recent years.

Figure 5: TB notification rates by age group, South East, 2000-2014



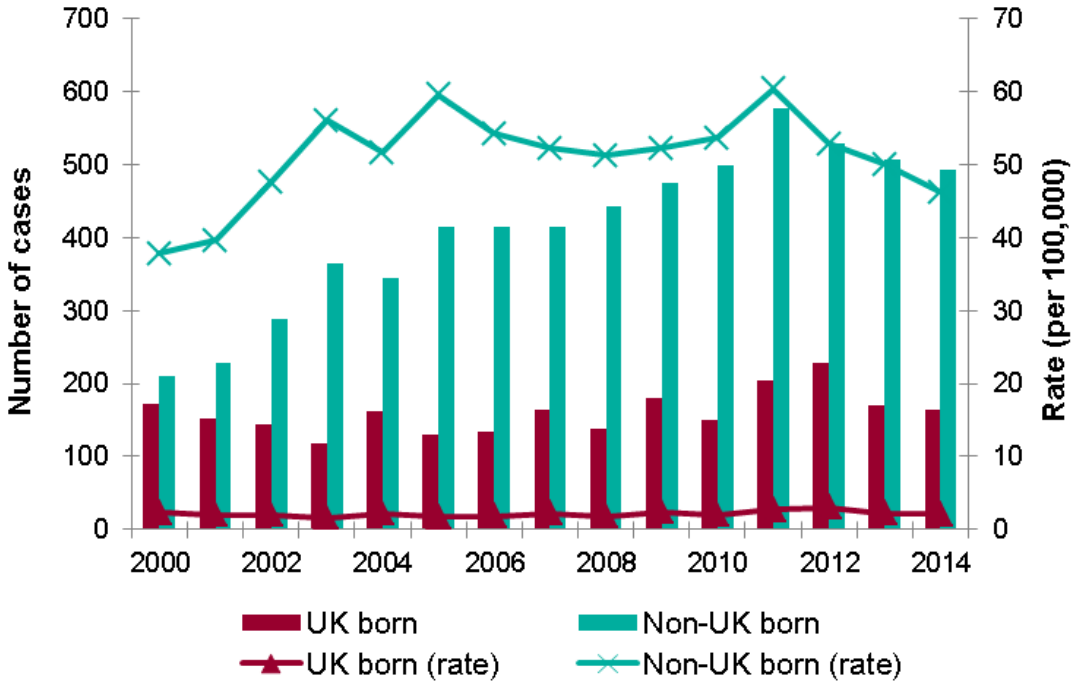
In 2014, 27 children under the age of 16 were notified, two thirds of whom (67%, 18) were born in the UK. Similar to recent years, nine children less than five years of age were diagnosed with TB, three of whom had not received BCG vaccination. Among those under five, all but one were UK born, of whom half (4) were mixed/other ethnicity (two were not vaccinated, one of whom had miliary TB), two were black African, one was Indian and one was white (also not vaccinated).

Place of birth and time since entry

In 2014, 75% (492/657) of cases were among individuals born outside of the UK, similar to previous years. Although the TB notification rate for those born abroad was 21 times higher than for those born in the UK (46.2 per 100,000 vs 2.2 per 100,000), this was the third consecutive year when TB incidence decreased in this group (Figure 6).

The TB notification rate in the UK born population has remained relatively stable since 2000. For both those born abroad and in the UK, TB rates in the South East were lower than those in England overall.[1]

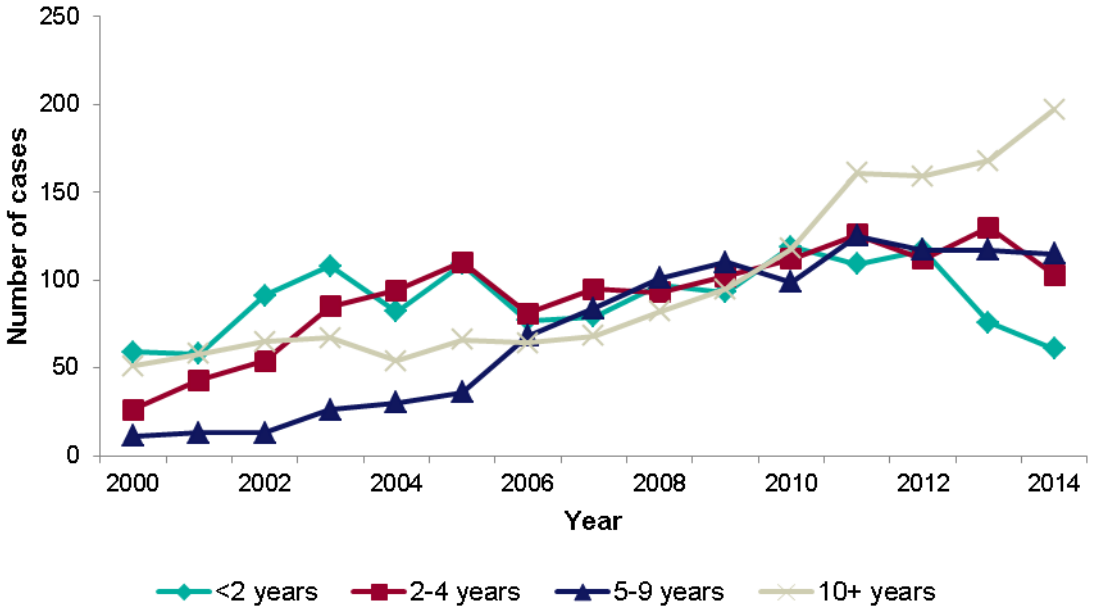
Figure 6: TB case notifications and rates by place of birth, South East, 2000-2014 (TB monitoring indicator 2)



In 2014, information on the time between entry to the UK and TB notification was available for 97% (476/492) of those born abroad. The number of cases among recent entrants to the UK (diagnosed less than two years after entry) has declined since 2012 (from 117 in 2012 to 61 in 2014). This was due to a reduction in recent entrants from Nepal (25 in 2012 to 3 in 2014), Pakistan (16 to 3) and India (35 to 25), particularly among those aged 20-29 years.

Numbers have remained relatively stable among those diagnosed 2-4 and 5-9 years since entry (Figure 7). Since 2004, the number of cases diagnosed in individuals ten or more years after arrival in the UK has steadily increased (from 54 to 197 in 2014).

Figure 7: Time between entry to the UK and TB notification for non-UK born cases by year, South East, 2000-2014



In 2014, country of birth was known for all but two of those born abroad. As in previous years, India, Pakistan and Nepal were the most frequent countries of birth (Table 1). Together these countries represented 57% (280/492) of non-UK born patients and 42% of all TB patients in the South East.

Relative to 2013, there was little change in the number of cases among those born in India and Nepal (158 and 46 respectively), but a slight decrease in those from Pakistan (down from 96 in 2013). The median time since entry to diagnosis for those born in these countries was between 6 and 8 years, a slight increase from the median time in 2013 (5.5 years for India, four years for Nepal and seven years for Pakistan).

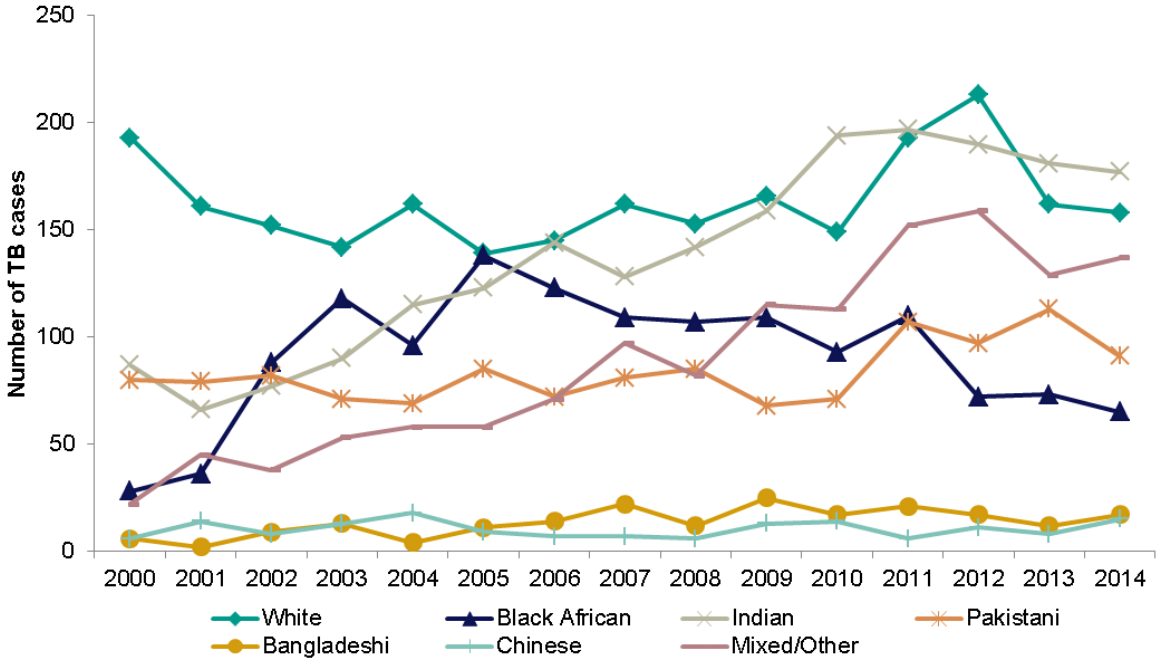
Table 1: Ten most common countries of birth of non-UK born TB cases, South East, 2014

Country of birth	n	% of non-UK born patients	median years since entry
India	155	31.6	7.0
Pakistan	72	14.7	8.0
Nepal	53	10.8	6.0
Philippines	22	4.5	5.5
Bangladesh	17	3.5	8.0
Zimbabwe	15	3.1	12.0
Hong Kong	14	2.9	10.5
Poland	11	2.2	5.0
Afghanistan	10	2.0	7.0
Nigeria	10	2.0	12.5

Ethnicity

Ethnicity was known for all but ten cases notified in 2014. The most commonly reported ethnicity among TB cases was Indian (27%, 177/660) or white (24%, 158), and least common were Chinese (2%, 15) or Bangladeshi (3%, 17) ethnicity.

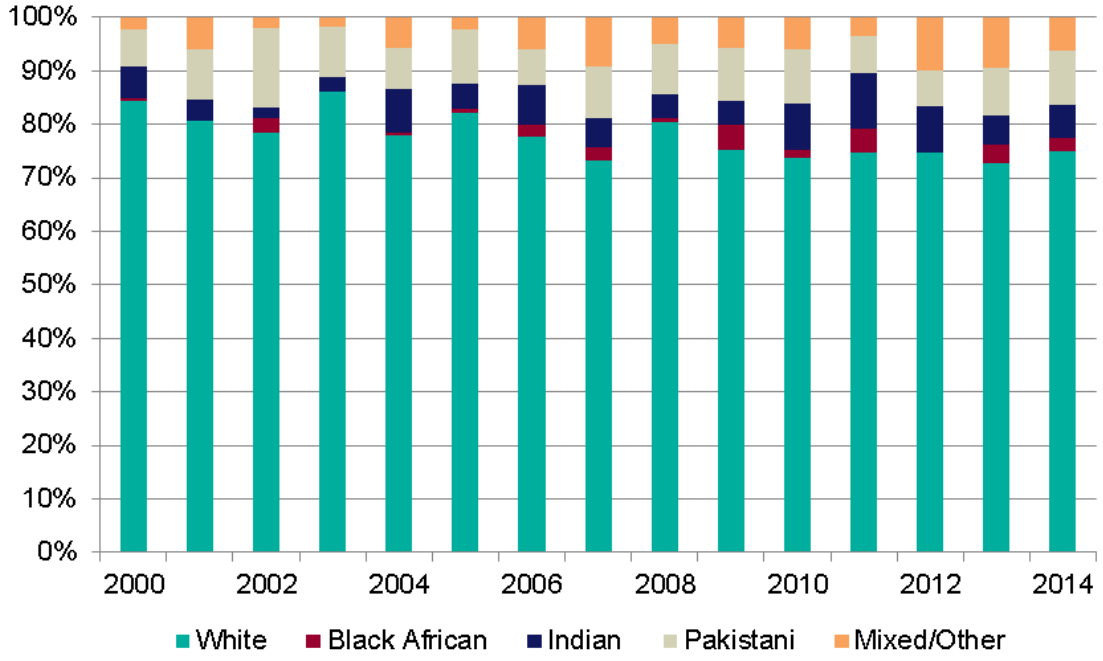
Figure: TB case number by ethnic group, South East, 2000-2014



Ethnicity among UK born TB cases

As in previous years, three quarters of the UK born patient population was white (75%, 123/164) and 10% (17) was of Pakistani ethnicity (Figure 9).

Figure 9: Proportion of UK born TB cases by ethnic group, South East, 2000-2014



Occupation

In 2014, occupation was known for 97% (614) of the 636 cases aged 18 years or older (Table 2). Of these, 228 (37%) occurred in those not currently working, almost all of whom were retired, unemployed or a housewife/husband.

The majority of the 55 (9%) cases working or engaged in education were non-UK born (81%, 43/53). Similarly, of the 56 (9%) healthcare workers diagnosed with TB, 89% (49/55) were born abroad.

Table 2: Occupational category of persons with TB aged 18 years and older, South East, 2014

Occupation	n	%
Agriculture/Animal care	1	0.2
Education	55	9.0
Health care worker	56	9.1
Laboratory/Pathology	1	0.2
Other	273	44.5
None	228	37.1
Total	**614**	100.0

Clinical characteristics

Site of disease

In 2014, just over half (52%) of all TB patients had pulmonary disease (Table 3), similar to the proportion in recent years. The second most common site was extra-thoracic lymph node TB, accounting for over a quarter of cases (29%, 191).

Table 3: Site of disease of TB patients, South East, 2014

Site of disease	2014	
	n	%
Pulmonary	350	52.2
Lymph Node (extra thoracic)	191	28.5
IT Lymph Nodes	86	12.8
Pleural	56	8.4
Gastrointestinal/Peritoneal	38	5.7
Other	31	4.6
Bone/Joint (spine)	22	3.3
CNS (meningitis)	19	2.8
Miliary	15	2.2
Bone/Joint (other - not spine)	12	1.8
Genitourinary	10	1.5
CNS (Other - not meningitis)	7	1.0
Laryngeal	2	0.3
Cryptic Disseminated	1	0.1

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

Pulmonary TB was more common among UK born patients (71%, 116/163) than those born abroad (46%, 227/489). It was also more common among those of white (79%, 124/156) or Chinese ethnicity (67%, 67/130). It was less common among those of Pakistani (38%, 34/90) and Indian (38%, 68/177) ethnicity.

Previous diagnosis of tuberculosis

In 2014, data on previous diagnosis was available for 643 (96%) cases. As in previous years, only a small number (5%, 35) were previously diagnosed with TB.

BCG vaccination

Information on BCG vaccination was available for 505 cases in 2014 (75%), 76% (382) of whom were vaccinated (Table 4). A higher proportion of non-UK born cases had

been vaccinated (80%, 315/393) than UK born cases (59%, 66/111). Three UK born children less than five years of age had not been vaccinated: two were of mixed/other ethnicity, and one was white.

Table 4: Number and proportion of TB patients with BCG vaccination, South East, 2014

	<5 years old		<16 years old		All ages	
	n(N)	%	n(N)	%	n(N)	%
UK born	5(8)	62.5	10(17)	58.8	66(111)	59.5
Non-UK born	1(1)	100.0	8(8)	100.0	315(393)	80.2
All cases	6(9)	66.7	18(72)	72.0	381(504)	75.6

Microbiological information

Culture confirmation and speciation

As in previous years, 64% (431) of cases were culture confirmed. This was higher among those with pulmonary TB than those with extra-pulmonary TB (81%, 283/350 vs 47%, 148/315.

Of those cases that were culture confirmed, almost all were *Mycobacterium tuberculosis* (96%, 414). Nine cases were *M. africanum*, and five cases could not be categorised beyond belonging to the *M. tuberculosis* complex. Of the three *M. bovis* cases, all were in individuals born outside of the UK.

Sputum smear

In 2014, sputum smear results were available for only 55% (191/350) of pulmonary TB patients. Of these, 55% (105) were sputum smear-positive, similar to previous years.

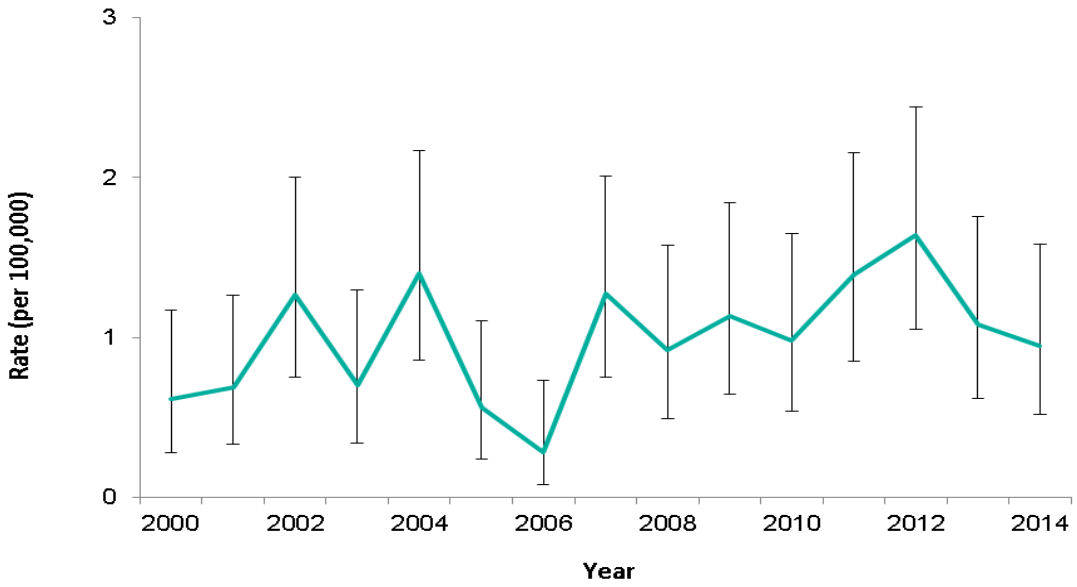
TB transmission

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. 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.[4] It is hoped that a 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 in the South East, an indirect indicator of recent transmission, was estimated at 1 per 100,000. Cases of TB in children under 15 are very low in the South East, so year on year changes should be interpreted with caution (Figure 10).

Figure 10: Rate of TB in UK born children aged under 15 years, South East, 2000-2014 (TB monitoring indicator 5)



Strain typing and clustering

The national TB strain typing service in England was established in 2010 and since that time all TB isolates have been typed using MIRU-VNTR 24 loci genotyping. Clusters of TB cases with indistinguishable MIRU-VNTR strain types (clustered cases) may reflect cases that are part of the same chain of recent transmission, but 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.

Proportion of cases clustered

In 2014, 99% (428/431) of culture confirmed cases in South East residents had an isolate that was strain typed and 92% (395/431) had at least 23 loci typed (Table 5).

Table 5: Number and proportion of culture confirmed cases typed, and with 23 or 24 loci typed, South East, 2010-2014

Year	Notified cases	Culture confirmed		Typed[a]		≥23 loci typed[b]		24 loci typed[c]	
	n	n	%	n	%	n	%	n	%
2010	710	435	61.3	375	86.2	291	66.9	189	43.4
2011	814	490	60.2	489	99.8	428	87.3	291	59.4
2012	776	487	62.8	485	99.6	445	91.4	315	64.7
2013	682	440	64.5	439	99.8	392	89.1	283	64.3
2014	670	431	64.3	428	99.3	395	91.6	299	69.4
Total	3,652	2,283	62.5	2,216	97.1	1,951	85.5	1,377	60.3

[a]culture confirmed cases which have at least one loci typed
[b]culture confirmed cases which have had at least 23 loci typed
[c]culture confirmed cases which have had at least 24 loci typed

Overall 86% (1,951/2,283) of isolates were typed with at least 23 loci; of these, 32% (633/1,951) were identified as belonging to 201 molecular clusters in South East, with the remaining 68% (1,318) having a unique strain (Table 6).

The proportion of South East residents that clustered with at least one other case within the South East from 2010-2014 was relatively stable by year (range 31% to 34%, Table 6). The number of new clusters identified each year[1] ranged from 17 in 2010, to 50 the following year. Forty three new South East clusters were identified in 2014.

Table 6: Number and proportion of unique cases, clustered cases and new clusters by year, South East, 2010-2014

Year	Notified cases	Culture confirmed		Strain typed cases (≥23 loci)		Unique cases		Clustered [a]		New clusters (per year)[b]
	n	n	%	n	%	n	%	n	%	n
2010	710	435	61.3	291	66.9	191	65.6	100	34.4	17
2011	814	490	60.2	428	87.3	284	66.4	144	33.6	50
2012	776	487	62.8	445	91.4	308	69.2	137	30.8	45
2013	682	440	64.5	392	89.1	264	67.3	128	32.7	46
2014	670	431	64.3	395	91.6	271	68.6	124	31.4	43
Total	3,652	2,283	62.5	1,951	85.5	1,318	67.6	633	32.4	201

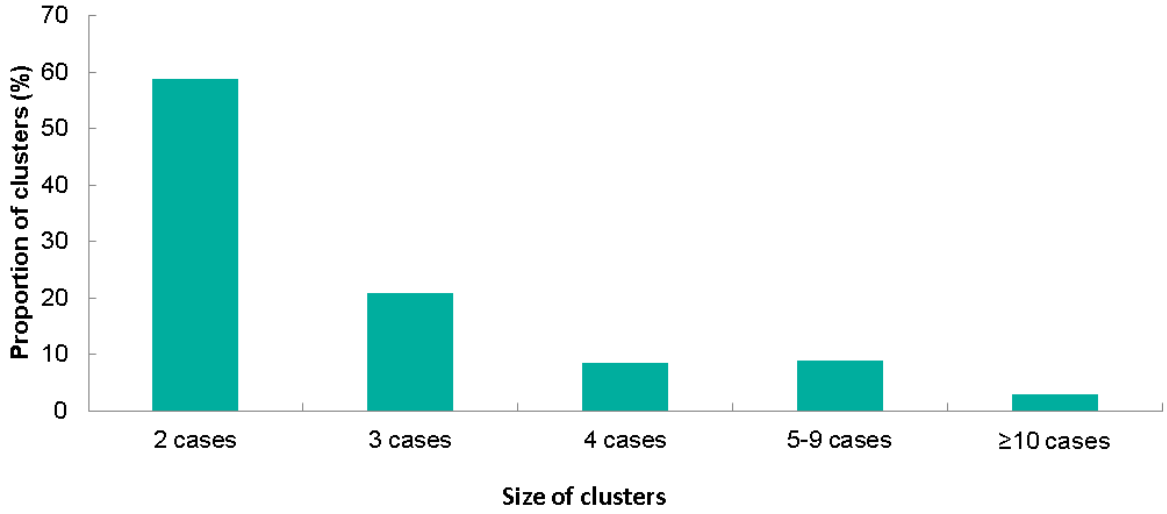
[a] South East TB cases clustered with at least one other case in a South East resident between 2010 and 2014
[b] New clusters identified that included at least one South East resident. A new cluster is identified at the point when a second case is notified with the same MIRU-VNTR strain type as an existing case within South East

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

Size of clusters

Over the five year period of 2010-2014, there were a total of 201 clusters that included 633 South East residents, with a median cluster size of two (range 2-25). The majority of clusters (59%) contained two cases, 11% contained five or more and 3% contained ten or more cases (Figure 11).

Figure 11: Proportion of clusters by size, South East, 2010-2014



Cluster lineage

The majority of South East clusters were of Euro American lineage, which accounted for 39% (78/201) of clusters observed between 2010 and 2014 (Table 7). Clusters of Central Asian lineage composed 29% (59/201), followed by East African Indian 12% (24) and Beijing 10% (21). The distribution of cluster size in the South East tended to be similar across lineage (median cluster size 2).

Table 7: Cluster lineage and size, South East 2010-2014

Cluster size	Number of clusters	Euro American		Central Asian		East African		Beijing		Other*	
		n	%	n	%	n	%	n	%	n	%
2	118	43	55.1	39	66.1	14	58.3	11	52.4	11	73.3
3	42	19	24.4	10	16.9	6	25.0	5	23.8	2	13.3
4	17	6	7.7	5	8.5	1	4.2	2	9.5	3	20.0
5-9	18	9	11.5	3	5.1	2	8.3	1	4.8	3	20.0
≥10	6	1	1.3	2	3.4	1	4.2	2	9.5	0	0.0
Total	201	78		59		24		21		15	

*includes 4 *M.africanum* clusters and 15 clusters where no lineage has been identified

Characteristics of cases in clusters

Of the 633 South East clustered TB cases notified between 2010 and 2014, 59% were male, 64% were aged 15-44 and 66% were born outside the UK (Table 8). For those born outside the UK, 18% had been in the country for less than two years and 32% for ten or more. The most common ethnicities for those in clusters were white (33%) and Indian (19%).

Fourteen percent of clustered cases had one or more social risk factor: 6% reported alcohol misuse, 5% drug use, 5% had a history of homelessness and 5% of imprisonment.

In terms of clinical characteristics, 73% of clustered cases had pulmonary disease of which 62% were sputum smear positive. Only 5% had a previous history of TB, 7% had isoniazid drug resistance and overall 0.5% had multi-drug resistance (MDR).

Between 2010 and 2014 the proportions of these characteristics remained broadly similar for clustered cases in the South East.

Table 8: Characteristics of clustered cases*, South East, 2010-2014

Characteristic	Category	Clustered cases*	
		n	%
Sex	Male	375	59.4
Age (years)	0-14	21	3.3
	15-44	407	64.3
	45-64	142	22.4
	65 and over	63	10.0
Country of birth	UK	207	33.8
	non UK	405	66.2
Years since UK entry (non UK born)	Less than 2	69	18.1
	2 to 9	190	49.9
	10 or more	122	32.0
Ethnicity	White	203	32.9
	Black African	70	11.4
	Indian	115	18.6
	Pakistani	67	10.9
	Mixed/other	162	26.3
Social risk factor	One or more	77	14.0
	Alcohol	33	5.6
	Drug	28	4.9
	Homelessness	31	5.3
	Prison	31	5.4
Clinical characteristics	Pulmonary disease	461	72.8
	Sputum smear positive[a]	193	65.2
	Previous TB diagnosis	31	5.1
	Isoniazid resistance	45	7.2
	Multi-drug resistant	3	0.5

* denominator may vary depending on completeness of variable
[a] of the 296 pulmonary cases for which sputum smear results were known

Delay from onset of symptoms to start of treatment

Time symptomatic

Information on delay from symptom onset to treatment start was available for 90% (316/350) of pulmonary TB cases in 2014. Only one patient was asymptomatic at diagnosis. In 2014, the median time between onset of symptoms to start of treatment was 88.5 days, with an interquartile range (IQR) of 52-159.5 days. This was two weeks longer than that observed in 2013 (74 days with IQR of 38-153). Similarly, it was two weeks longer than the median delay in England in 2014 (74 days, IQR 39-139).[1] Among smear positive pulmonary cases, however, the median delay was shorter, at 73 days (IQR 44-128).

In 2014, 31% (97/316) of South East residents with pulmonary TB started treatment within two months of symptom onset and 64% (201) within four months (Table 9). This was longer than that observed in England overall, where 40% of pulmonary cases started treatment within two months and 70% within four months of symptom onset.[1]

Table 9: Time between symptom onset and treatment start in pulmonary TB cases*, South East, 2014 (TB Monitoring Indicators 6 and 7)

	0-2 months		2-4 months		>4 months		Total
Year	n	%	n	%	n	%	n
2011	144	40.0	102	28.3	114	31.7	360
2012	145	39.6	113	30.9	108	29.5	366
2013	119	38.3	92	29.6	100	32.2	311
2014	97	30.7	104	32.9	115	36.4	316

*excluding those with missing onset and treatment start dates

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

A higher proportion of males had a greater than four month delay between symptom onset and treatment (40%, 74/184 vs 31%, 41/132 in females). None of the seven children less than 15 years of age waited in excess of four months, compared with nearly half of those 65 years or older (46%, 25/54). It was slightly more common for UK born cases to experience a delay of more than four months (38%, 40/104 vs 35%, 73/209 in non-UK born cases). The Chinese (44%, 4/9), white (44%, 48/109) and Pakistani (41%, 12/29) ethnic groups had the highest proportion of cases with a more than four month delay to treatment; however small numbers in some groups mean these results should be interpreted with caution.

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]

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

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

2. For cases with CNS, spinal, cryptic disseminated or miliary disease, the last recorded treatment outcome is reported. For cases reported in 2013, however, information on final outcome was collected in 2014 so may be only one year after start for many patients.

In 2013, 682 TB cases were notified, all but one of which were sensitive to rifampicin, and were therefore included in the drug sensitive cohort.

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

Of those with rifampicin-sensitive TB in 2013, 89% (607) had non-CNS, spinal, miliary or cryptic disseminated disease. Of these, 86% (523) had completed treatment at 12 months. This was consistent with an overall increasing trend in the proportion of patients completing treatment within 12 months (Table 10).

Table 10: Number and proportion completing treatment at 12 months, South East, 2002-2013*

	TB patients		
	n	%	Total
2002	155	35.6	436
2003	272	53.5	508
2004	337	65.4	515
2005	372	69.5	535
2006	382	70.0	546
2007	405	70.7	573
2008	414	74.6	555
2009	507	79.8	635
2010	509	79.8	638
2011	604	83.2	726
2012	583	83.2	701
2013	523	86.2	607

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

At 12 months, 5% (29) of patients were still on treatment, making this the most common reason for failure to complete treatment within 12 months (Table 11). Reasons for remaining on treatment were provided for only a third of patients (35%, 10). Of these, four had their treatment changed (three due to intolerance/side effects and one due to poor clinical response), four had their treatment interrupted (one due to intolerance/side effects, another due to poor compliance) and two were on a planned treatment regime that exceeded 12 months.

Table 11: TB outcome at 12 months, South East, cases diagnosed in 2013*

Outcome at 12 months	n	%
Completed	523	86.2
Died	26	4.3
Lost to follow up	17	2.8
Still on treatment	29	4.8
Treatment stopped	2	0.3
Not evaluated	10	1.7
Total	**607**	

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

Whereas, at 12 months, treatment completion was slightly lower among males (85%, 290/342) than females (88%, 233/265), similar proportions remained on treatment (4.5%, 12/265 for females vs 5.0%, 17/342 for males). Treatment completion was lowest among older people (70%, 73/105 for those aged 65 years or older). Overall, treatment completion was slightly higher among those born abroad than those born in the UK (87%, 386/442 vs 84%, 135/160). Treatment completion was worse among

those with at least one social risk factor (77%, 34/44) compared with those without any social risk factors (89%, 466/526).

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

Of the 74 cases of CNS, spinal, miliary or cryptic disseminated disease in 2013, only 54% (40) completed treatment within 12 months, with 19% (14) still being treated for TB. As illustrated in Table 12, by the time of the last recorded outcome, the proportion completing treatment had increased to 68% (50) and the proportion still on treatment had decreased to just 4% (3). Among the 47 cases for which the duration of treatment was known, the median treatment time was 364 days (IQR 250-365); approximately one year.

Table 12: Last recorded TB outcome for patients with rifampicin sensitive, CNS, spinal, miliary or cryptic disseminated disease, South East, cases diagnosed in 2013*

TB outcome	n	%
Completed	50	67.6
Died	10	13.5
Lost to follow up	4	5.4
Still on treatment	3	4.1
Treatment stopped	0	0.0
Not evaluated	7	9.5
Total	**74**	

*excludes rifampicin resistant TB

At 12 months, treatment completion was better among males (59%, 29/49) than females (44%, 11/25). Treatment completion was higher among those born abroad (57%, 36/63) compared to those born in the UK (40%, 4/10). Only three of the 68 cases for whom social risk factor information was known had at least one social risk factor. Of these, only one had completed treatment at 12 months.

Deaths and cases lost to follow up in the drug sensitive cohort

As seen in previous years, 5% (36/681) of rifampicin sensitive cases diagnosed in 2013 died before completing treatment. Death was more common in patients with CNS, spinal, miliary or cryptic disseminated disease. TB caused or contributed to half of these deaths (50%, 18), was incidental in one (3%), and had an unknown relationship to the remaining 17 (47%). Ten cases were diagnosed at post-mortem. The median age of those who died was 76 years (IQR 64-82), although TB was reported to have contributed to the deaths of two patients aged 52 and 63. Death was more common among the UK born (9%, 15/170 vs 4%, 19/505 in non-UK born). However, the UK born

patient population were an older age cohort (median age of 51 vs 36 in non-UK born). Death was also more than twice as common among those with at least one social risk factor (9%, 4/47 vs. 4%, 21/591 among those with no risk factors). TB contributed to the deaths of two of those with social risk factors and had an unknown relationship to the remaining two deaths in this group.

Overall, 3% (20/681) of rifampicin sensitive cases were lost to follow up within 12 months of diagnosis. This was similar to 2012 (4%, 27/767). The majority of those lost to follow up had left the UK (79%, 15/19). Among the 18 such cases for whom place of birth data was complete, all but one were born outside of the UK. Lost to follow up was markedly more common among those with at least one social risk factor (9%, 4/47) compared to those without any risk factors (2%, 13/591).

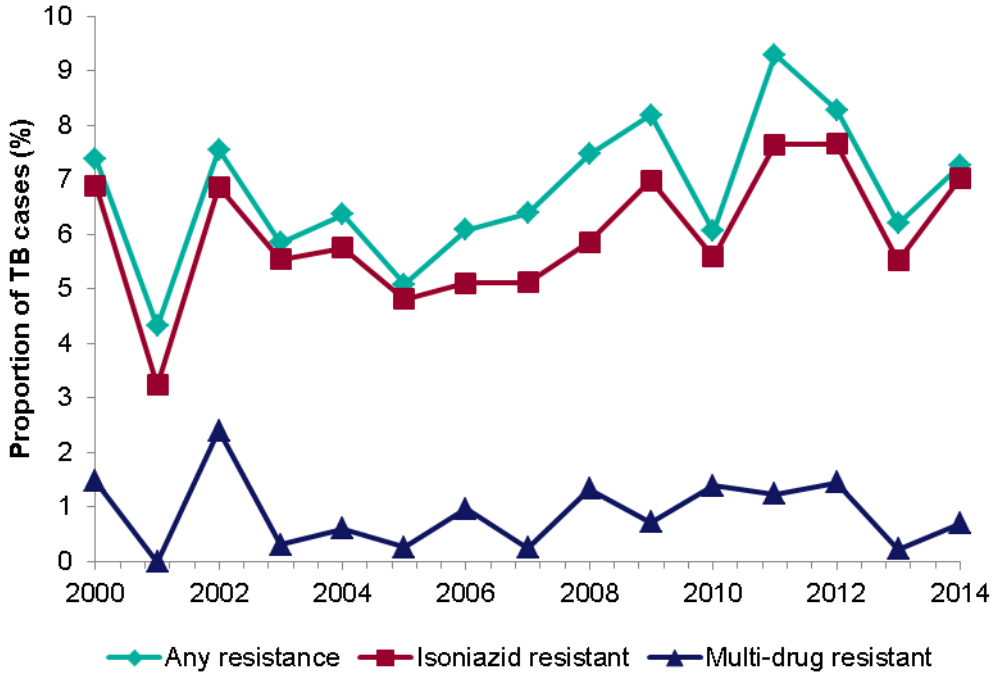
Drug resistant TB (including outcomes in the drug resistant cohort)

Drug resistance

Overall drug resistance and geographical distribution

The proportion of culture-confirmed TB cases resistant to at least one first-line drug increased slightly to 7% (31/427) relative to 6% (27/435) in 2013. This reflected an increase in both the proportion resistant to isoniazid (from 6% to 7%), as well as the proportion with MDR (from 0.2% to 0.7%). However, both the proportions isoniazid resistant and MDR remained below those observed in 2012. Since 2000, the proportion resistant to at least one first-line drug has remained between 4% and 9% (Figure 12). In 2014, all but one case with resistant disease had isoniazid resistance.

Figure 12: Proportion of TB cases with first line drug resistance, South East, 2000-2014



Characteristics of patients with drug resistant TB

Any first line drug resistance

In 2014, equivalent proportions of males (7%, 13/180) and females (7%, 18/247) with TB were resistant to at least one first line drug. The majority (77%, 24/31) of resistant cases occurred in individuals 15-44 years of age, although culture confirmation was also more common in this age group (67% vs 59% in older people and only 23% in children less than 15 years of age).

A slightly higher proportion of non-UK born cases had drug resistant disease (8%, 25/322 vs 6%, 6/97 of UK born cases). In recent years, there has been little difference between levels of resistance in those born in the UK vs abroad. Overall, in 2014, patients of Pakistani ethnicity had the highest levels of resistance (11%, 6/54), with no resistance observed in patients of Bangladeshi or Chinese ethnicity, although numbers in these groups were small. Among those born abroad, resistance was most common in those of Pakistani (11%, 5/44), white (10%, 3/29) or mixed/other (10%, 9/91) ethnicity. UK born cases with resistant disease were either of white (4), Pakistani (1) or mixed/other (1) ethnicity.

Drug resistance was more common among those with exclusively extra-pulmonary TB (10%, 15/147) than those with pulmonary disease (6%, 16/280). This was not consistent with previous years, where either relatively similar levels of resistance between the two groups was observed, or else higher levels in those with pulmonary TB. Similar to 2013,

resistance was more common among sputum-smear positive cases (9%, 9/102) than smear negative cases (6%, 5/80). Although drug resistance was more than twice as common among cases with a previous history of TB (18%, 3/17 vs 7%, 26/388 among those with no previous history), these accounted for only 10% (3/31) of resistant cases. No patients with at least one social risk factor had drug resistant TB.

MDR

In 2014, three (0.7%) cases were MDR, all of whom were born abroad. These had arrived from Kazakhstan, Nepal and Pakistan and were all between 27 and 36 years of age. All three had exclusively extra-pulmonary disease and one was known to have a previous history of TB.

TB outcome at 24 months for patients with rifampicin resistant disease

In 2012, only nine TB cases were rifampicin resistant at start of treatment, seven of whom were MDR. Eight (89%) were in individuals born abroad, half of whom came from South Asia (two from India, one from Pakistan, and one from Sri Lanka). All but two were male and all were 27-43 years of age.

At 12 months, one patient had completed treatment (MDR), another had their treatment stopped (MDR) and the remaining seven were still on treatment. Of those that remained on treatment, four completed treatment within 24 months (two MDR and two rifampicin resistant). Three patients remained on treatment (Table 13), two of whom were on planned treatment regimens that exceeded 24 months and all of whom had MDR TB.

Table 13: TB outcome at 24 months for patients with rifampicin resistant disease, South East, cases diagnosed in 2012

Outcome at 24 months	n	%
Completed	5	55.6
Died	0	0.0
Lost to follow up	0	0.0
Still on treatment	3	33.3
Treatment stopped	1	11.1
Not evaluated	0	0.0
Total	**9**	

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

Social risk factors

Information on social risk factors was available for 611 (91%) cases notified in 2014. Of these, 7.5% (46) had at least one risk factor, as seen in previous years (Table 14). A social risk factor was defined as either current or a history of homelessness, drug use or imprisonment, as well as current alcohol misuse. Imprisonment was the most common risk factor (3.7%, 23/625), followed by alcohol misuse (3.3%, 21/635), homelessness (2.7%, 17/635) and drug use (1.7%%, 11/635). Among those with at least one risk factor, multiple were common, with over a third reporting more than one (37%, 17/46).

Table 14: Social risk factors among TB cases, South East, 2009-2014

	Any risk factor		Total
	n	%	
2009	42	8.7%	481
2010	37	7.0%	531
2011	63	8.9%	707
2012	59	8.3%	709
2013	47	7.4%	639
2014	46	7.5%	611

Presentation with at least one social risk factor was nearly four times more common among those born in the UK (17%, 26/153) than among those born abroad (4%, 20/456). All but three were male, such that the proportion of social risk factors among males was twelve times that among females (12.9%, 43/334 vs 1.1%, 3/277). Overall, social risk factors were most common in those of white ethnicity (17%, 24/141), particularly among those born in the UK (19%, 21/112 compared to abroad 10%, 3/29).

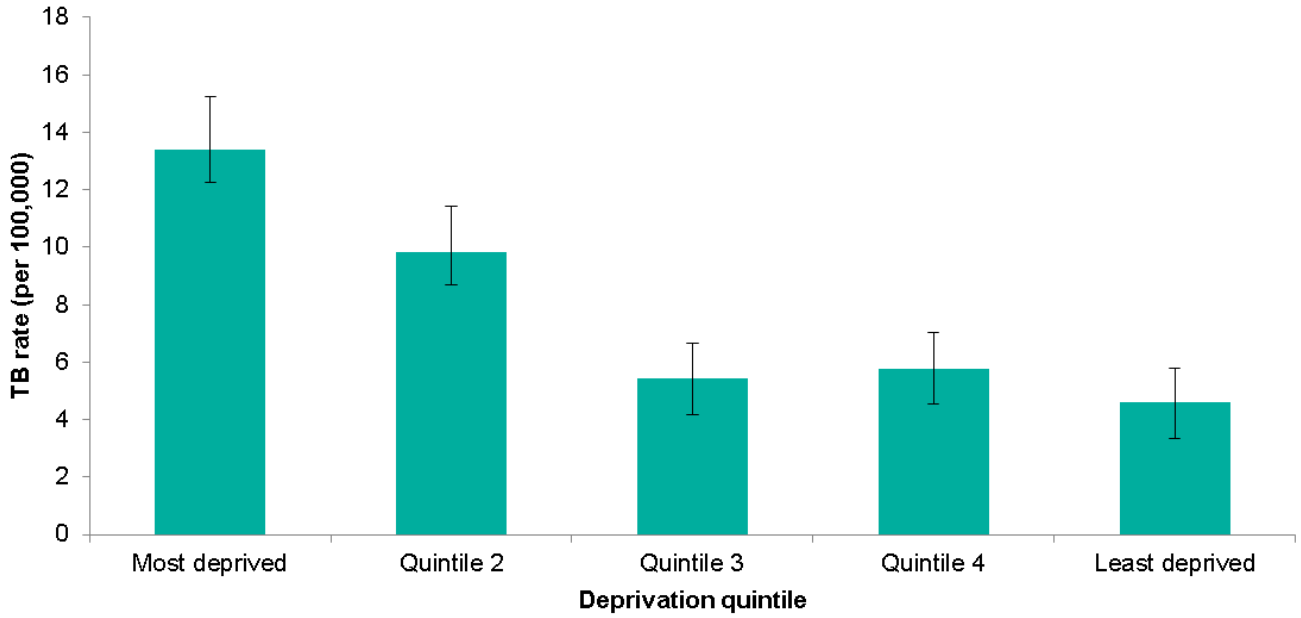
Individuals with social risk factors were twice more often infectious than those without them (59% had sputum smear positive pulmonary TB vs 27% among those without social risk factors).

Deprivation

Deprivation was assessed using the 2010 Index of Multiple Deprivation. In 2014, TB rates were highest in the most deprived areas of the South East (13 per 100,000 population). Rates in areas that comprised the three least deprived quintiles were relatively similar, at approximately five per 100,000 (Figure 13). Over a third of TB

patients were resident in the most deprived areas of the South East (35%, 232/670), compared to only 11% (77) in the least deprived.

Figure 13: TB case rate by deprivation, South East, 2014



Patient care: testing for HIV, hospitalisation and directly observed therapy

HIV testing

In 2014, information on HIV testing was available for 602 cases (90%). Of these, 95% (572) were either offered an HIV test or were already aware of their HIV status. Testing uptake was high: 97% (523/542) of those to whom a test was offered, were tested for HIV.

Hospital inpatient and directly observed therapy

In 2014, information on whether or not a case had been a hospital inpatient at some point throughout their treatment was available for 645 cases (96%), over a quarter of whom (26%, 169) had been hospitalised. A higher proportion of those 65 years or older (31%, 31/99) and of those with drug-resistant TB (35%, 8/23) had been inpatients. Among those with at least one social risk factor, the proportion whom had been hospitalised was nearly double that of those without any risk factors (44% vs 25%).

Overall, 13% (80/632) of cases notified in 2014 received directly observed therapy (DOT). However, this proportion was much higher among those with at least one risk factor (64%, 28/44), as well as those under the age of 15 (43%, 9/21).

Discussion

Public Health England (PHE) and NHS England have published a collaborative strategy for dealing with TB in England.[3] The aim of the strategy is to achieve year-on-year decreases in incidence, a reduction in health inequalities and ultimately eliminate TB as a public health problem in England (with a rate of less than one case per million population).

At eight per 100,000, TB rates in the South East remained below the national average in 2014 (12 cases per100,000 population).[1] In Thames Valley, however, rates were high relative to the rest of the South East, with residents of Slough and Reading reporting rates of 41 and 40 per 100,000 respectively.

Overall, in the South East, the rate of TB decreased in 2014, down 2.6% from 2013 and 15.1% since 2012. Although a more conservative decrease than that observed in other areas of England, this was appreciable given the South East's relatively low incidence. As seen across England, the decrease was among those born abroad; particularly recent entrants from Nepal, Pakistan and India. Changes in migration patterns, pre-entrant screening for active TB[5] and falling rates in some high-burden countries[6] are likely to have contributed to this. The small, concordant increase in the number of cases among settled migrants suggests reactivation of latent TB infections (LTBI) acquired prior to entry to the UK. Introduction of systematic LTBI screening and prophylaxis as part of the Collaborative Tuberculosis Strategy for England[3] will further reduce the future disease burden among this population.

As in previous years, TB patients were most often of Indian, white or mixed/other ethnicity. Although 90% of South East residents were white, only 2% were Indian and 2% of mixed/other ethnicity (in the 2011 census),[7] reflecting the much higher risk in these ethnic minority populations.

Less than two thirds of cases were culture confirmed, although this was higher among those with pulmonary TB. Sputum smear results were available for only 55% of pulmonary TB patients; a concern given that sputum smear status at diagnosis is an important measure of infectiousness.

Nearly a third of culture confirmed South East residents were molecularly clustered with one or more other case(s) in the South East; these were more often UK born and white. The implementation of whole genome sequencing in 2016 will permit greater discrimination between isolates. This will allow us to better identify where recent transmission is occurring, and target interventions appropriately.

The time between onset of symptoms and starting treatment was longer among South East residents with pulmonary TB than nationally.[1] In recent years, the proportion waiting in excess of four months has increased, and in 2014 this was most common among older people, nearly half of whom had a delay greater than four months. As longer delays increase the risk of transmission, we should determine whether these delays are attributable to late presentation at healthcare services, or delays within the health service itself. Symptom onset may be unreliable, however, in many patients, particularly older people who present with comorbidities.

After remaining stable for the previous two years, treatment completion at 12 months, among those with drug sensitive non-CNS, spinal, miliary or cryptic disseminated disease, increased slightly in 2014. Stronger co-ordination across TB clinical networks, and improved care pathways, as set out in the Collaborative TB Strategy,[3] is expected to further these improvements in outcome. Overall, 2.6% of rifampicin sensitive cases died with TB as a cause or contributing factor. Although death was more common among the UK born, it is likely that this was partially confounded by age, as the UK born patient population were an older age cohort. Local audit and review of deaths in TB cases should be undertaken so that instances where intervention may have contributed to death can be identified, addressed and avoided in future.

Due to the small numbers of cases, annual fluctuations in the proportion resistant to at least one first-line drug are expected and should not be over interpreted. Taking this into account, the proportion resistant in 2014 (7%) was in keeping with recent years. Only 10% of resistant cases had been previously diagnosed with TB, indicating that most drug resistance was primary acquisition, rather than a result of treatment failure.

While the proportion of patients with social risk factors was fairly small, they were more often infectious and thus every effort to identify these cases early should be made. Targeted active case finding should therefore be complemented by good contact tracing, as these individuals are more likely to have transmitted the infection. Those with at least one social risk factor were also more often hospitalised during treatment. Late presentation to healthcare services, or the presence of other comorbidities, could mean that these individuals were more unwell and thus required hospitalisation. Alternatively, hospitalisation may reflect 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.[8] Social risk factors were more common among males and among those born in the UK.

HIV testing coverage was high, in keeping with the Collaborative Tuberculosis Strategy for England.[3] However, despite recommendations that DOT be offered as part of standard care to all those with social risk factors,[9] only 64% of at-risk patients reportedly received DOT in 2014.

Conclusion and recommendations

The decrease in TB numbers and rates since 2012 is encouraging, although it was small between 2013 and 2014. However TB incidence was not uniform throughout the South East and was markedly higher in some areas of Thames Valley.

The decrease was largely attributable to a reduction in cases among new migrants. Changes in migration patterns, pre-entrant screening for active TB and falling rates in some high-burden countries[6] are likely to have contributed to this. The concordant increase in the number of cases among settled migrants indicates that reactivation of latent TB infection constitutes a notable proportion of the overall TB disease burden. Systematic LTBI screening and treatment, as articulated in the Collaborative Tuberculosis Strategy,[3] should reduce future TB cases among existing migrants. The roll out of this programme will be monitored by PHE at the national level and future reports from the national centre will include coverage of the target population.

Nearly 20% of pulmonary cases were not culture confirmed, and given the implications for treatment outcome, greater efforts are warranted to ensure drug sensitivity profiles are available for all pulmonary cases. This would also provide a more complete and comprehensive picture of drug resistance in the South East for evaluating the Collaborative TB Strategy's sixth evidence-based area for action (Reduce drug-resistant TB).[3]

Cohort reviews should be utilised to validate and investigate the apparently long delays from symptom onset to treatment start. Similarly, deaths among TB patients should be audited and subject to local review, thus ensuring that opportunities to prevent subsequent deaths are not missed. Key performance indicators at Trust level should be agreed and regularly reviewed.

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Appendix A: Description of data sources and definitions

Data sources
Data on TB cases in the South East 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 reported in the previous year, excluding those with known rifampicin resistant disease: outcomes for these cases were reported at 24 months. Definitions for outcome are based on World Health Organization (WHO) and European definitions, but adapted to the UK context. In this report, all data was obtained from the ETS matched dataset provided in August 2014.

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 (PHE 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 2014.

Appendix B: TB among South East England residents

Table Bi: TB cases numbers by local authority of residence, South East, 2003-2014

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Kent	66	61	65	86	86	129	111	104	112	114	107	103
Medway	20	9	14	16	18	22	20	20	28	20	16	16
Kent	**86**	**70**	**79**	**102**	**104**	**151**	**131**	**124**	**140**	**134**	**123**	**119**
Brighton and Hove	3	14	15	15	30	28	35	22	23	31	15	23
East Sussex	13	20	15	16	12	17	27	24	25	34	20	25
Surrey	60	61	64	79	57	72	89	85	101	98	57	78
West Sussex	44	52	38	63	58	38	49	51	77	46	63	42
Surrey & Sussex	**120**	**147**	**132**	**173**	**157**	**155**	**200**	**182**	**226**	**209**	**155**	**168**
Bracknell Forest	6	4	10	4	6	7	9	12	10	10	6	14
Buckinghamshire	47	32	40	41	37	34	30	48	52	54	45	37
Oxfordshire	43	64	61	52	76	53	56	60	71	70	64	74
Reading	39	33	59	44	55	60	57	59	52	43	66	64
Slough	73	71	74	62	54	59	61	72	85	84	78	59
West Berkshire	4	9	11	3	10	5	11	7	6	9	11	7
Windsor and Maidenhead	15	7	17	8	9	11	13	9	10	12	9	21
Wokingham	13	11	9	15	12	9	10	16	10	14	12	19
Thames Valley	**240**	**231**	**281**	**229**	**259**	**238**	**247**	**283**	**296**	**296**	**291**	**295**
Hampshire	42	51	38	47	54	37	66	67	79	67	54	46
Isle of Wight	1	1	3	0	7	1	3	3	6	7	1	3
Portsmouth	16	23	20	23	23	23	30	24	16	23	19	10
Southampton	36	33	30	33	24	24	36	27	51	40	39	29
HIOW	**95**	**108**	**91**	**103**	**108**	**85**	**135**	**121**	**152**	**137**	**113**	**88**
South East	**541**	**556**	**583**	**607**	**628**	**629**	**713**	**710**	**814**	**776**	**682**	**670**

Table Bii: TB rate* per 100,000 by local authority of residence, South East, 2003-2014

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Kent	4.9	4.5	4.7	6.2	6.1	9.1	7.7	7.2	7.6	7.7	7.2	6.8
Medway	8.0	3.6	5.6	6.3	7.0	8.5	7.7	7.6	10.6	7.5	5.9	5.8
Kent	**5.4**	**4.3**	**4.9**	**6.2**	**6.3**	**9.0**	**7.7**	**7.2**	**8.1**	**7.7**	**7.0**	**6.7**
Brighton and Hove	1.2	5.6	5.9	5.9	11.6	10.7	13.2	8.2	8.4	11.2	5.4	8.2
East Sussex	2.6	4.0	2.9	3.1	2.3	3.3	5.2	4.6	4.7	6.4	3.7	4.6
Surrey	5.6	5.7	6.0	7.3	5.2	6.5	8.0	7.6	8.9	8.6	4.9	6.7
West Sussex	5.8	6.8	4.9	8.1	7.4	4.8	6.2	6.3	9.5	5.6	7.7	5.1
Surrey & Sussex	**4.7**	**5.7**	**5.1**	**6.6**	**5.9**	**5.8**	**7.4**	**6.7**	**8.2**	**7.6**	**5.6**	**6.0**
Bracknell Forest	5.5	3.7	9.1	3.6	5.4	6.3	8.0	10.6	8.8	8.7	5.1	11.9
Buckinghamshire	9.8	6.6	8.2	8.4	7.5	6.8	6.0	9.5	10.3	10.6	8.7	7.1
Oxfordshire	7.0	10.3	9.7	8.2	12.0	8.3	8.7	9.2	10.8	10.6	9.6	11.0
Reading	27.1	22.8	40.2	29.7	36.7	39.6	37.4	38.2	33.5	27.4	41.4	39.8
Slough	60.4	58.8	60.2	49.5	42.2	44.9	45.3	52.2	60.4	59.2	54.5	40.8
West Berkshire	2.8	6.2	7.5	2.0	6.7	3.3	7.2	4.5	3.9	5.8	7.1	4.5
Windsor and Maidenhead	11.2	5.2	12.5	5.8	6.4	7.8	9.1	6.3	6.9	8.2	6.2	14.2
Wokingham	8.7	7.4	6.0	10.0	7.9	5.9	6.5	10.3	6.5	8.9	7.6	11.9
Thames Valley	**12.6**	**12.1**	**14.6**	**11.8**	**13.2**	**12.0**	**12.4**	**14.1**	**14.6**	**14.5**	**14.1**	**14.2**
Hampshire	3.4	4.1	3.0	3.7	4.2	2.9	5.1	5.1	6.0	5.0	4.0	3.4
Isle of Wight	0.7	0.7	2.2	0.0	5.1	0.7	2.2	2.2	4.3	5.0	0.7	2.2
Portsmouth	8.4	11.9	10.2	11.7	11.8	11.7	15.1	11.8	7.8	11.1	9.2	4.8
Southampton	16.2	14.8	13.2	14.6	10.6	10.5	15.7	11.6	21.6	16.7	16.1	11.8
HIOW	**5.3**	**6.0**	**5.0**	**5.6**	**5.9**	**4.6**	**7.2**	**6.4**	**8.0**	**7.2**	**5.9**	**4.5**
South East	**6.9**	**7.0**	**7.3**	**7.5**	**7.7**	**7.7**	**8.6**	**8.5**	**9.7**	**9.2**	**8.0**	**7.8**

*rates calculated using ONS mid-year population estimates

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

	Female		Male	
	n	rate	n	rate
0-9	4	0.8	7	1.3
10-19	19	3.9	17	3.3
20-29	56	10.9	73	13.7
30-39	70	12.9	102	19.6
40-49	50	7.9	71	11.6
50-59	27	4.8	38	6.8
60-69	30	6.0	23	4.9
70+	44	7.0	39	8.0

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

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	7.6	20	6.9	7	2.4	291
2003	19	5.8	18	5.5	1	0.3	325
2004	21	6.4	19	5.8	2	0.6	330
2005	19	5.1	18	4.8	1	0.3	374
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	26	6.1	24	5.6	6	1.4	429
2011	45	9.3	37	7.6	6	1.2	484
2012	40	8.3	37	7.7	7	1.4	483
2013	27	6.2	24	5.5	1	0.2	435
2014	31	7.3	30	7.0	3	0.7	427

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

Appendix C: Local authority TB epidemiological summaries

Local authority TB epidemiological summaries will provide further information about TB cases among residents of 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 published online shortly by your local FES team.