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Tuberculosis in London: Annual review (2013 data)

Data from 1999 to 2013

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Contents

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Executive summary

In 2013, 2,985 new tuberculosis (TB) cases were reported among London residents, a rate of 36 per 100,000 population. After a relatively stable period over the past ten years, this was a decrease of more than 10% compared to 2012. Rates remain high, however, compared to the rest of the UK and comparable western European cities.

As in recent years, the highest numbers and rates of TB were reported among residents of Newham and Brent local authorities, although these areas saw a decline in case numbers compared to 2012.

A large decrease in the rate of TB among those aged 20 to 29 was observed, although rates remained highest in this age group.

While 83% of individuals with TB in 2013 were born outside the UK, TB rates decreased in the non-UK born London population. This was mostly due to a reduction by half in the numbers of individuals with TB who had entered the country in the previous two years, down to the lowest number since enhanced surveillance began in 1999. The drop was mostly among those of Indian ethnicity, and particularly those aged 20 to 29 years old.

This was also reflected in the trends of TB numbers and rates by ethnic populations in London. Although Indian remains the most common ethnic group, numbers and rates in this group fell in 2013 after increasing continuously since 2001. Numbers and rates also continued to fall in the black African population. The Pakistani, Bangladeshi, black Caribbean, Chinese and white ethnic groups in London have seen little change in TB numbers and rates over this period. As in previous years, the most common country of birth of non-UK born TB patients was India followed by Pakistan, Somalia, Bangladesh, Nigeria and Nepal.

Since 1999, the number of cases occurring in UK born patients has remained fairly stable at around 500 per year, with rates around 7 per 100,000.

Almost one in ten patients were known to have one or more social risk factor (homelessness, imprisonment, drug or alcohol misuse), and a third of these had multiple risk factors. These were more common among patients of white or black Caribbean ethnicity and among those born in the UK. Patients from Eastern Europe had a particularly high prevalence with almost half reporting at least one social risk factor, although these only accounted for 4% of all patients with risk factors.

Less than half of reported cases had pulmonary disease, and just under half of these were sputum smear positive. As in recent years, a very small proportion of patients had a previous history of TB.

Almost all patients were offered an HIV test, and uptake of testing was extremely high across London.

Just 59% of all cases of TB were confirmed by culture, increasing to 73% among those with pulmonary disease. Isoniazid and multi-drug resistance increased slightly in 2013. White patients had the highest levels of drug resistance, particularly those born outside the UK where 24% were resistant to at least one first line drug. Drug resistance was also associated with having a social risk factor: 28% of all multi-drug resistant TB cases in 2013 reported at least one risk factor. More than nine out of ten resistant cases occurred in individuals who did not have a history of TB.

Since 2010, 85% of culture confirmed cases have been strain typed with at least 23 loci completed. In London, there were 3,194 clustered cases, a clustering proportion of 48% of those strain typed between 2010 and 2013. These cases made up 767 clusters. A quarter of the clustered cases in London were residents of Newham, Brent and Ealing, in tandem with high rates of TB observed in these local authorities.

The majority of clusters consisted of between two and four individuals. Children only comprised 3% of all clustered cases; however, among children with a strain type, 64% were clustered. The majority of clustered cases were of black African and Indian ethnicity, but the highest proportion of cases clustered were among black Caribbean individuals with nearly three quarters (73%) of cases in clusters. The Euro American lineage strain continues to be the most common strain among clustered cases; however individuals infected with the Beijing lineage strain were more often in clusters. Among TB patients with social risk factors, individuals that misuse drugs had the highest proportion of cases clustered. The annual number of new cases in the long-standing isoniazid mono-resistant outbreak has decreased to its lowest since 2008.

According to the revised outcome categories, within the rifampicin sensitive cohort 86% of patients in 2012 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 (6%), followed by loss to follow up (4%) and death (3%).

Among those with CNS, spinal, miliary or cryptic disseminated disease, the proportion completing was considerably lower: just under half completed treatment within 12 months, with 37% still on treatment at 12 months. A higher proportion was also lost to follow up (7%, mostly moving abroad), and death (5%).

Just over half of patients with rifampicin resistant disease had completed treatment at 24 months, with many still on treatment or lost to follow up.

The decrease in TB numbers and rates in 2013 is encouraging, but remains high compared to the rest of the UK and Western Europe. The absence of a decline in other groups, particularly the UK born, suggests that further work is needed to address the burden of TB in risk groups in London.

Key recommendations derived from the data presented in this report for NHS and PHE staff include: to continue excellent case management, including universal HIV testing, adhering to the national Royal College of Nursing guidance on TB case management as best practice; ensure TB is tackled among hard-to-reach groups with complex social needs through commissioning and supporting highly-targeted case finding and prevention activities that focus on high-risk groups; continue to tackle TB among other high-risk groups, including implementation of NICE recommendations around screening for latent TB; continue and expand cohort review as the tool to improve local TB control, including monitoring of outcomes for patients on longer treatment plans.

More detailed information is available in the appendices. This includes information by area of residence of TB patients (Appendix B), all patients notified by London clinics (Appendix C), and detailed profiles of local authorities with a high TB burden (Appendix D).

Background

Tuberculosis continues to be a serious public health problem in London.

Surveillance provides relevant information on the tuberculosis 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 London TB Register (LTBR) or national Enhanced Tuberculosis 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 recent epidemiology of tuberculosis in London residents, including characteristics and distribution of tuberculosis cases in London, trends in anti-tuberculosis drug resistance, clustering of tuberculosis cases, and also the treatment outcome of patients.

Objectives

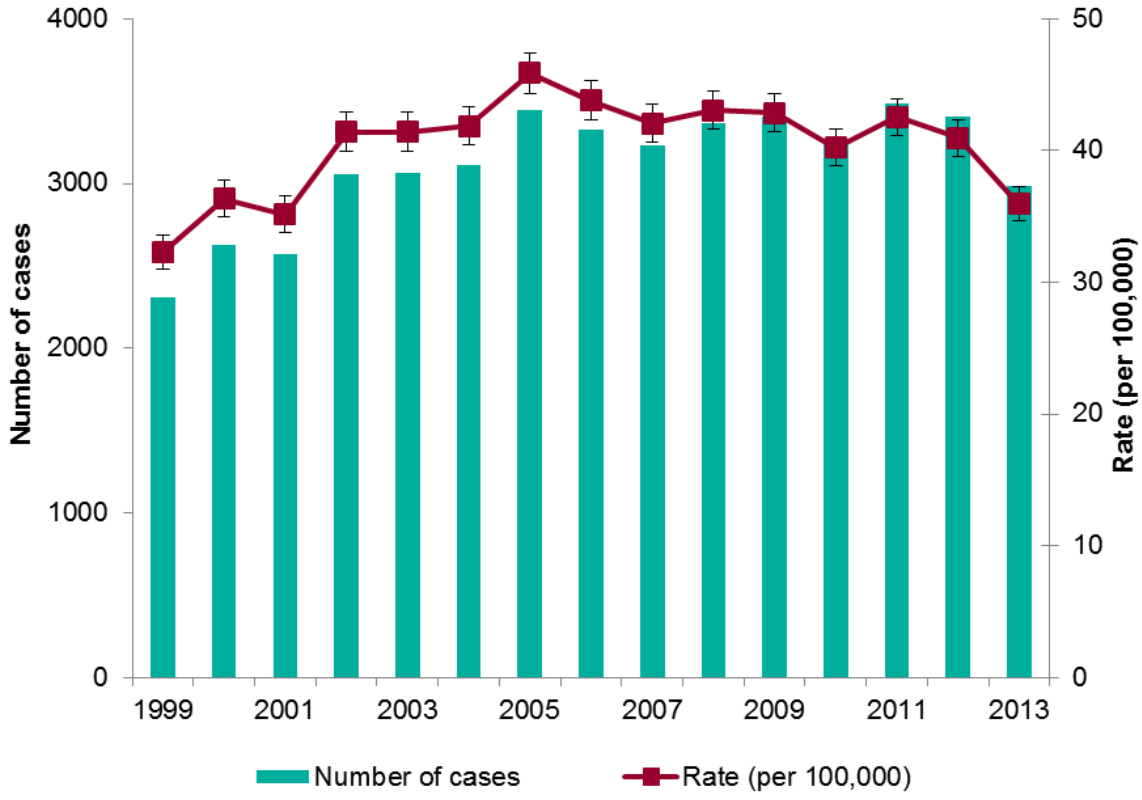
This report describes the recent epidemiology of tuberculosis in London. We aim to update public health, clinical and allied colleagues, including clinical commissioning groups and NHS England (London) of the latest trends, identify areas where there is a high burden of disease, at-risk population groups, and opportunities for interventions and prevention of future cases.

Tuberculosis epidemiology

Overall numbers, rates and geographical distribution

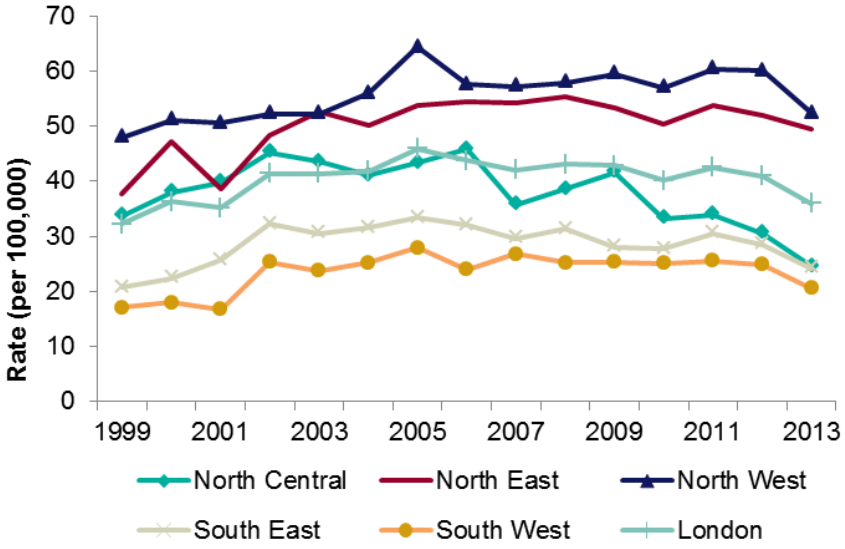
In 2013, 2,985 tuberculosis (TB) cases were reported among London residents, a rate of 36 per 100,000 population. After a relatively stable period over the past ten years, this was a decrease of more than 10% compared to 2012, and the lowest rate since 2001 (Figure 1). As in previous years, however, London accounted for 38% of the 7,892 TB cases reported in the UK in 2013, and had the highest rate of disease.[1]

Figure 1: TB case reports and rates, London, 1999 – 2013



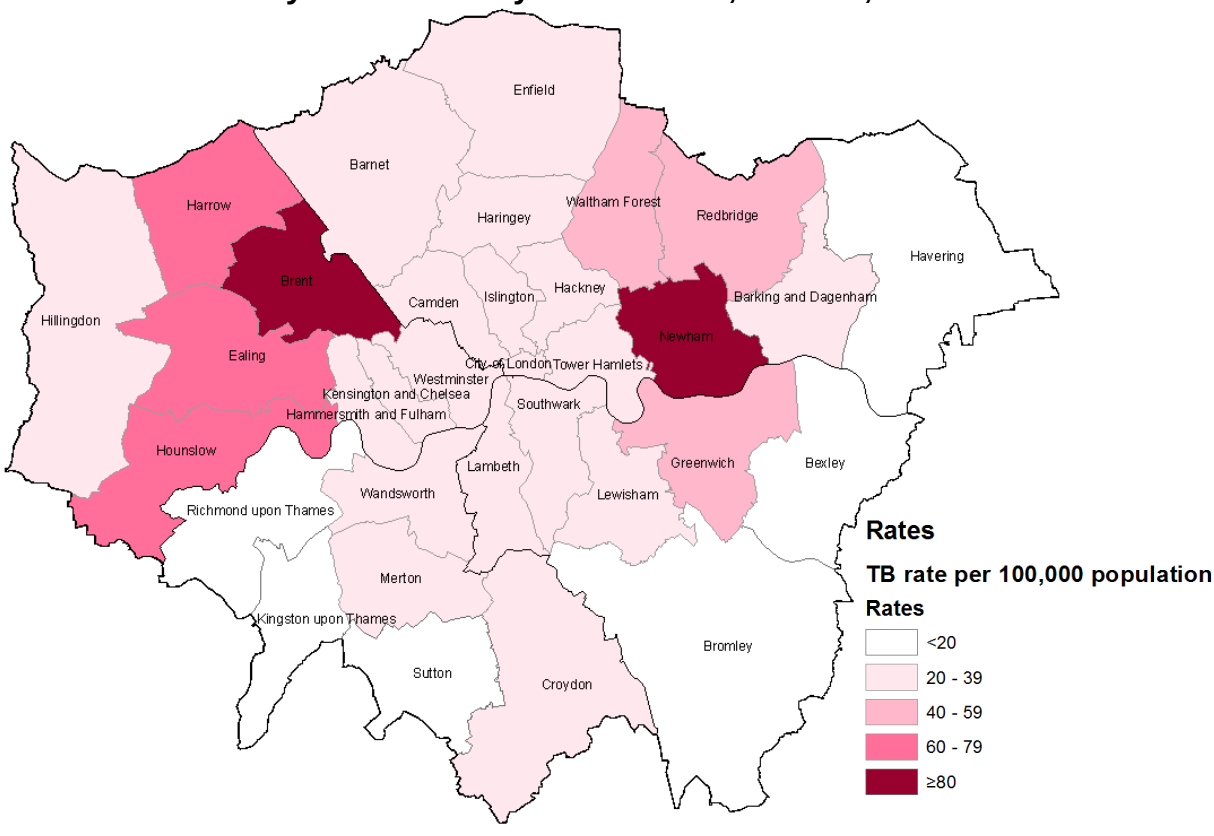
The highest rates and numbers continue to be in north west London, although decreases were seen in this area and across London other than in the north east, where there was little change compared to 2012 (Figure 2).

Figure 2: TB case rates by health protection team, London, 1999 – 2013



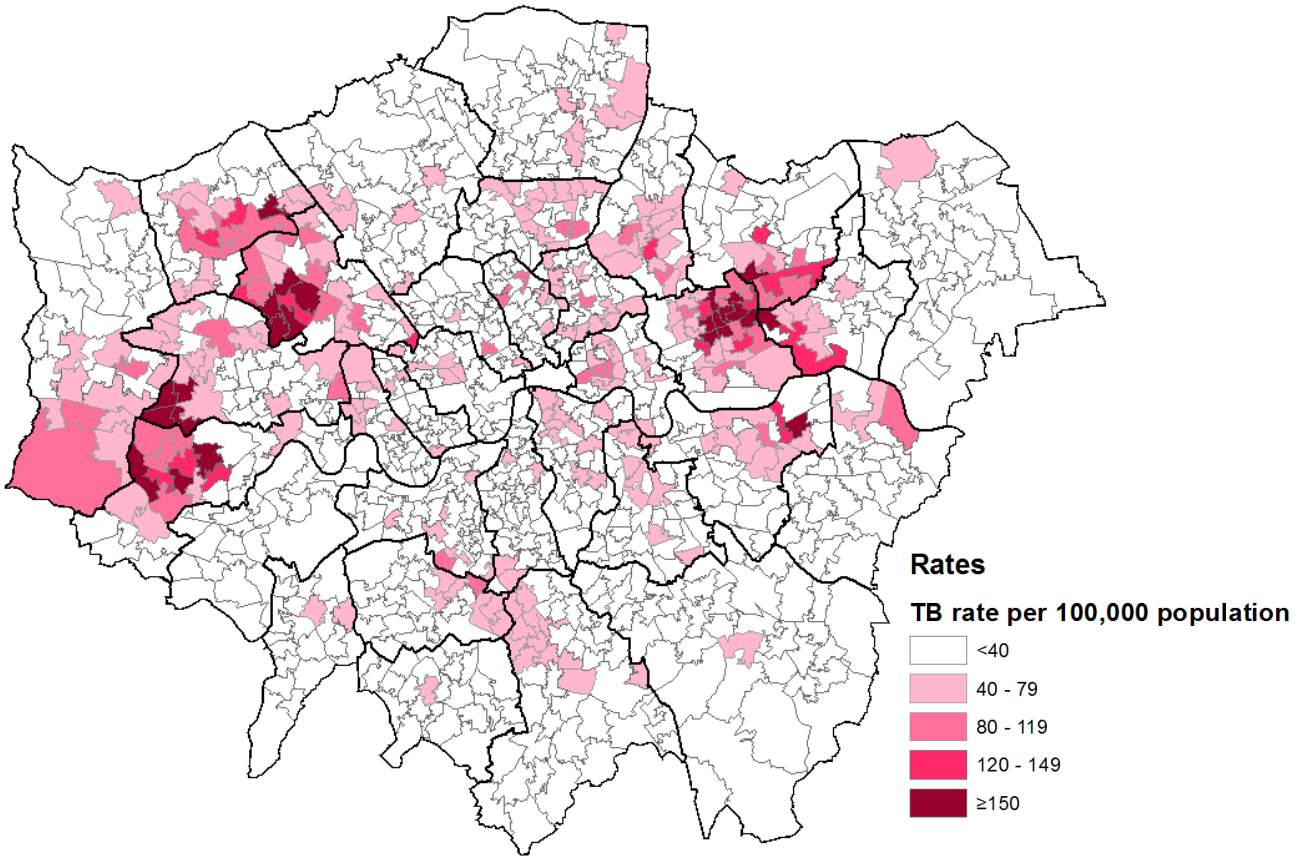
As in previous years, the highest numbers and rates were reported among residents of Newham (335 cases, 107 per 100,000) and Brent (279, 89 per 100,000) local authorities, followed by Ealing (213 cases, 63 per 100,000), Hounslow (163, 63 per 100,000) and Harrow (147 cases, 61 per 100,000), although all these areas saw a decline in case numbers of approximately 10% or more (Figure 3).

Figure 3: TB case rate by local authority of residence, London, 2013



Even within local authorities, however, overall rates can mask smaller areas of very high incidence as seen in Figure 4. More information on TB within each local authority can be found in the appendices, including maps by Lower Super Output Area (LSOA).

Figure 4: TB case rate by Middle Super Output Area of residence, London, 2013



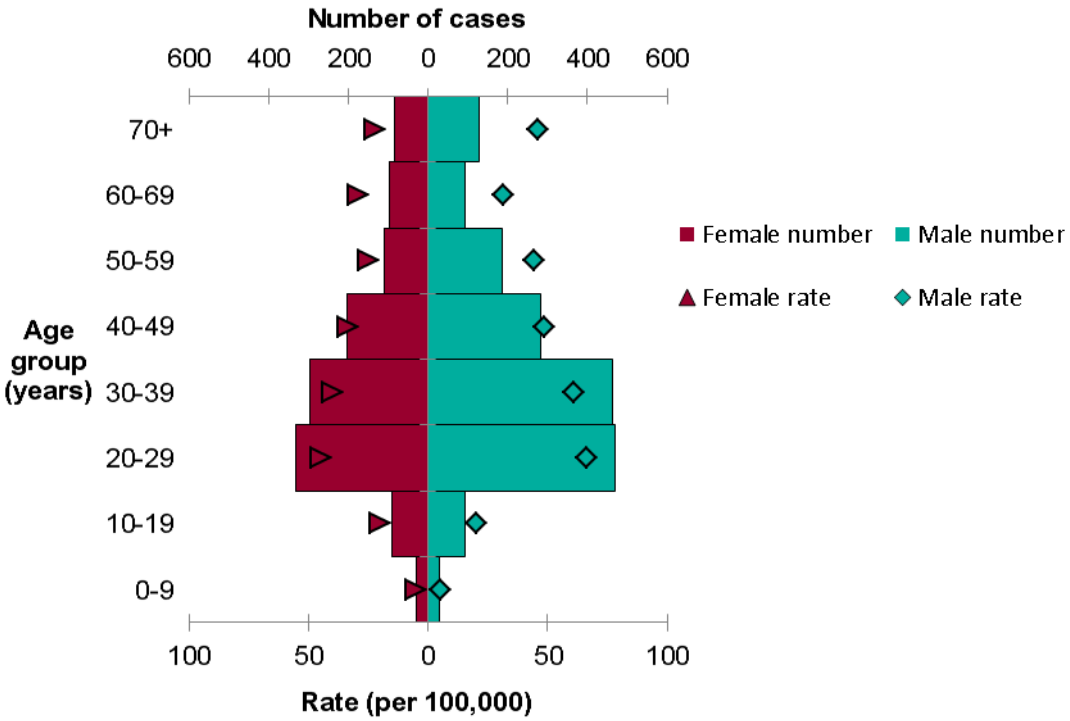
Demographic characteristics

Age and sex

In 2013, 58% of TB patients were male, and rates among males were higher than females as in recent years (42 per 100,000 vs. 29 per 100,000 in females). TB rates were highest among adults aged 20 to 39 years old (Figure 5).

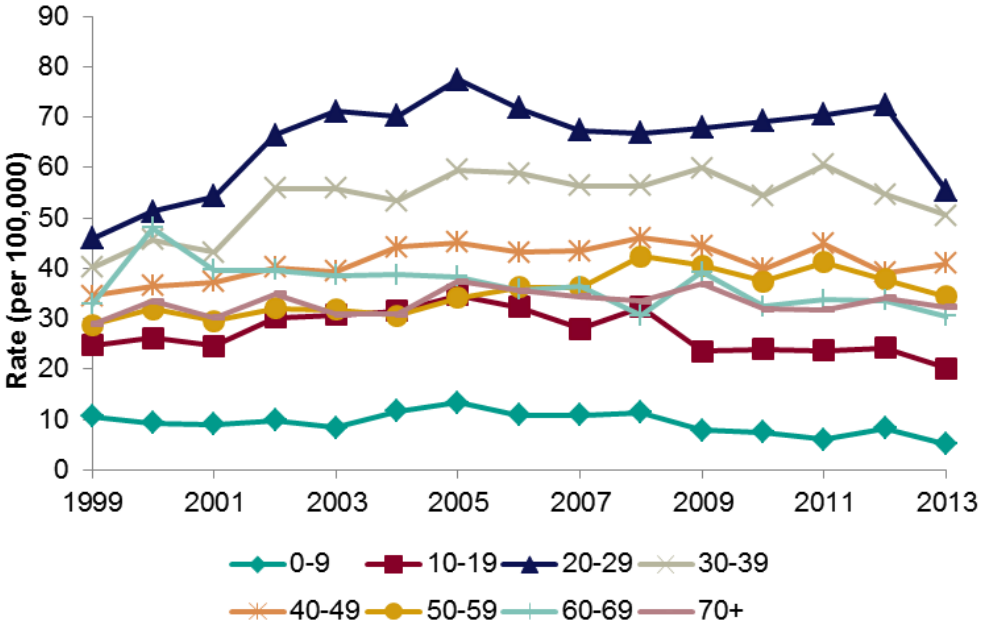
Numbers and rates were higher among males for those aged 20 or older, but similar for males and females in those under 20 years old (Figure 5).

Figure 5: TB case reports and rate by age and sex, London, 2013



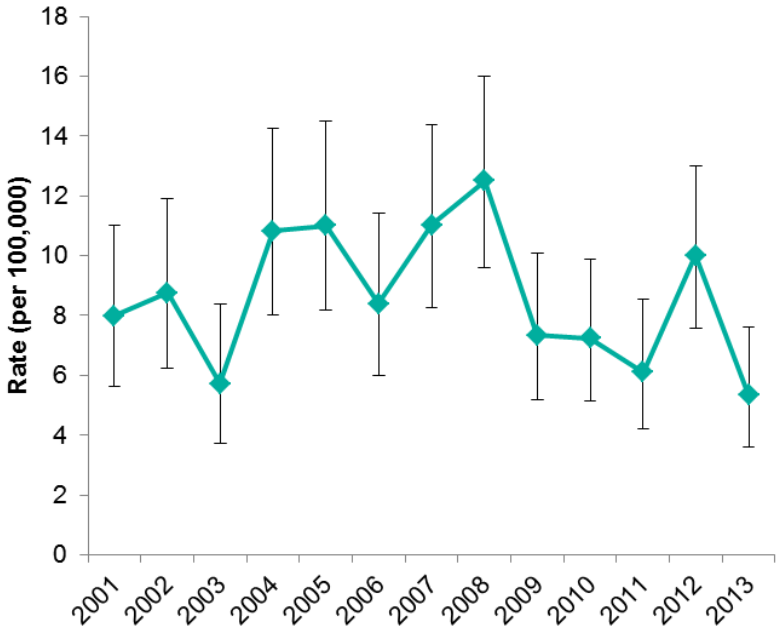
The rate of TB among those aged 20 to 29 decreased by 24% from 72 per 100,000 in 2012 to 55 per 100,000 in 2013 (Figure 6). Rates among other age groups were similar or slightly less than the previous year.

Figure 6: TB case rates by age group, London, 1999 – 2013



In 2013, 127 children aged less than 16 years old were reported, similar to previous years (a rate of 8 per 100,000) and 31 children aged less than five years old were diagnosed with TB (5 per 100,000 population). Among those under five, almost all were UK born (97%, 30); 32% (10) were black African, 32% (10) were mixed/other ethnicity and 16% (5) Indian. Only two (6%) were white. Rates in UK born children under five have remained fairly constant between 2001 and 2013 (Figure 7).

Figure 7: TB case rates in UK born children under five years old, London, 2001 – 2013

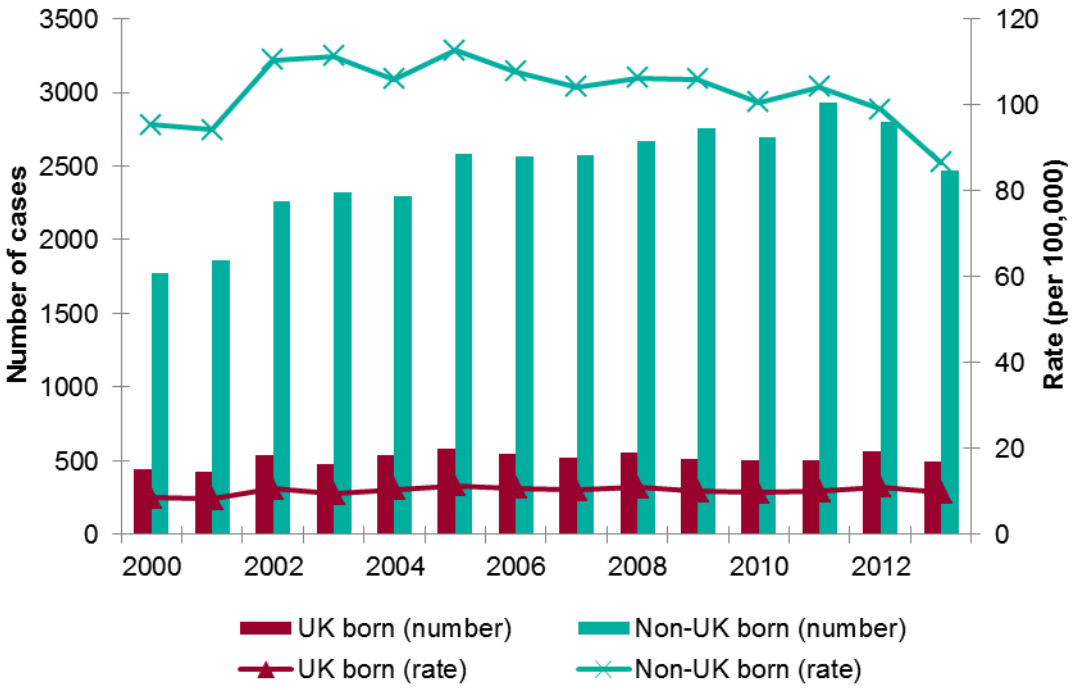


Place of birth and time since entry

In 2013, 83% of TB patients were born outside of the UK, and rates in the non-UK born remain nearly ten times greater than among those born in the UK (Figure 8). The number and rate of TB cases among the non-UK born has started to decrease, down to 2,468 and 87 per 100,000 population in 2013. This represents a 16% fall since 2011, and 12% in the last year (2012 to 2013).

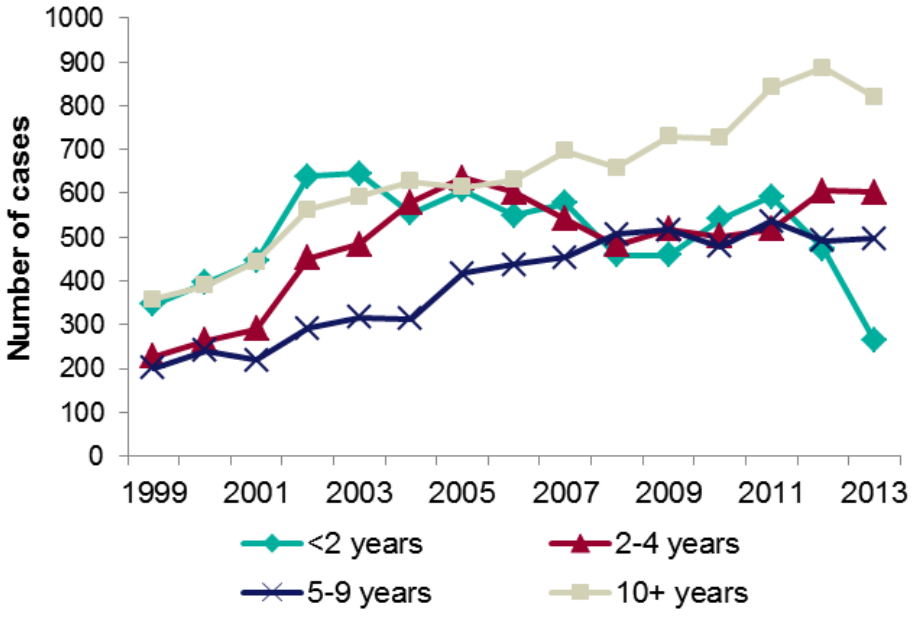
Among the UK born population 492 cases of TB occurred in 2013, a rate of 10 per 100,000: this was a small decrease compared to 2012 (560 cases), but still more than twice the rate of the UK born across the rest of the country (4 per 100,000).[1] Since 1999, the number of cases occurring in UK born patients has remained fairly stable at around 500 per year.

Figure 8: TB case numbers and rate by place of birth, London, 2000 – 2013



The biggest decrease was among individuals who had recently entered the country. In 2013, only 266 and 9% of all TB patients were recent entrants to the UK (entered within the previous two years): this was half the number reported in 2012, and the lowest number since enhanced surveillance began in 1999 (Figure 9). Little or no change was seen in other non-UK born groups compared to 2012.

Figure 9: TB case numbers by time since entry, London, 1999 – 2013



The decrease was mostly in those of Indian ethnicity. Although 32% of recent migrants with TB in 2013 were Indian, the numbers more than halved compared to 2012 (84 vs. 192). Small decreases were seen across all age groups of recent migrants, but the biggest change was among those aged 20 to 29 years old (264 in 2012 to 123 in 2013). In particular, the number of Indian recent migrants aged 20 to 29 fell from 114 in 2012 to just 38 in 2013.

As in previous years, the most common country of birth of non-UK born TB patients was India (Table 1), although the actual number of cases reduced by 17% compared to 2012 (from 906 to 756 in 2013). This was again followed by Pakistan, Somalia (although again a reduction from 250 in 2012), Bangladesh, Nigeria and Nepal. This compares with the most common countries of birth of the non-UK born general population of London, which in 2013 was India, followed by Poland, Pakistan, Bangladesh and Ireland.

Table 1: Ten most common countries of birth of non-UK born TB patients, London, 2013

Country of birth	n	% of non-UK born patients
India	756	32
Pakistan	309	13
Somalia	193	8
Bangladesh	141	6
Nigeria	101	4
Nepal	87	4
Sri Lanka	63	3
Philippines	52	2
Kenya	39	2
Romania	37	2

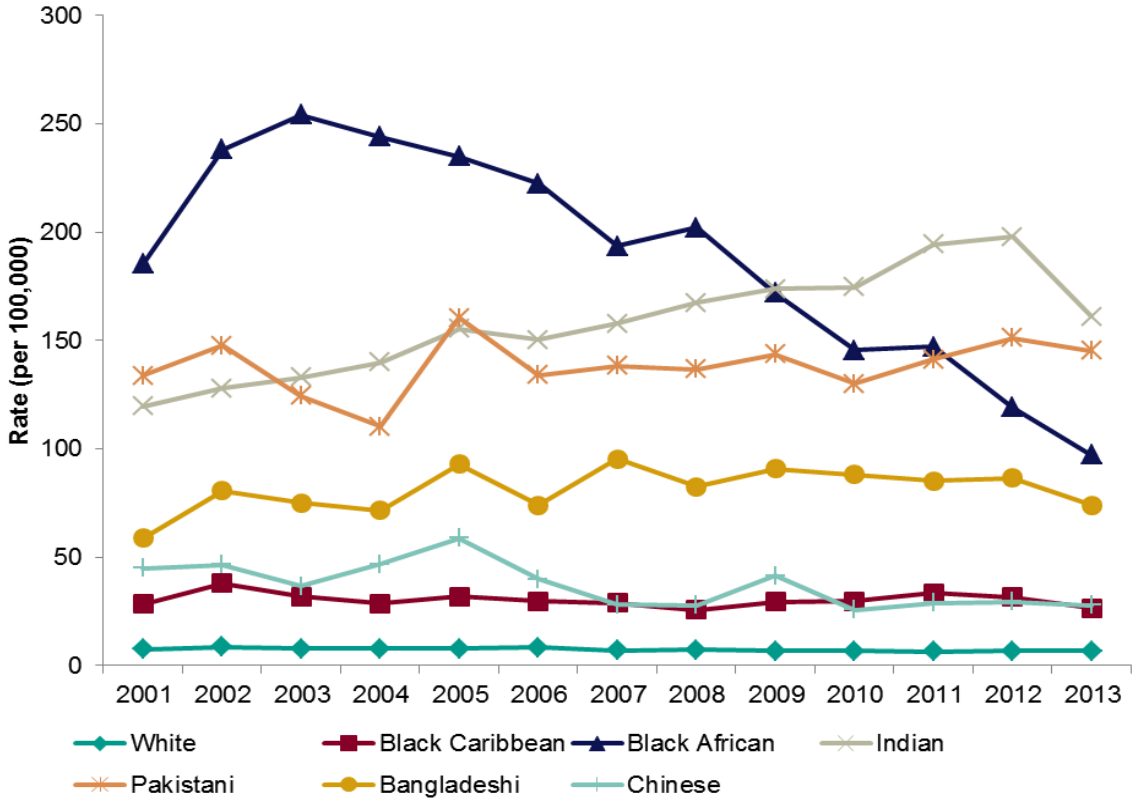
Ethnicity

The most common ethnic group of TB patients in London was Indian, accounting for almost a third of all cases in 2013 and the highest rate of TB (907, 31%, 161 per 100,000 Figure 10). After year-on-year increases since 2001, TB numbers and rates among the Indian population of London fell in 2013.

The next highest rates were among the Pakistani population at 145 per 100,000, who comprised just 12% (346) of patients in 2013. Numbers and rates were stable in this population compared to recent years. The next highest rates were among the black African population (97 per 100,000). These account for the next most common ethnic group, one in five patients (594 cases), but numbers and rates continue to fall in this group.

Rates were lowest in the white population (7 per 100,000, 334 cases), but have remained stable with no decline in recent years. Numbers of cases in the black Caribbean population were small (92), but rates were nearly four times greater than that of the white population (27 per 100,000), and have also remained stable since 2001. Sixteen per cent of patients in 2013 were of mixed or other ethnicity, with just 1% Chinese.

Figure 10: TB case rate by ethnic group, London, 2001 – 2013

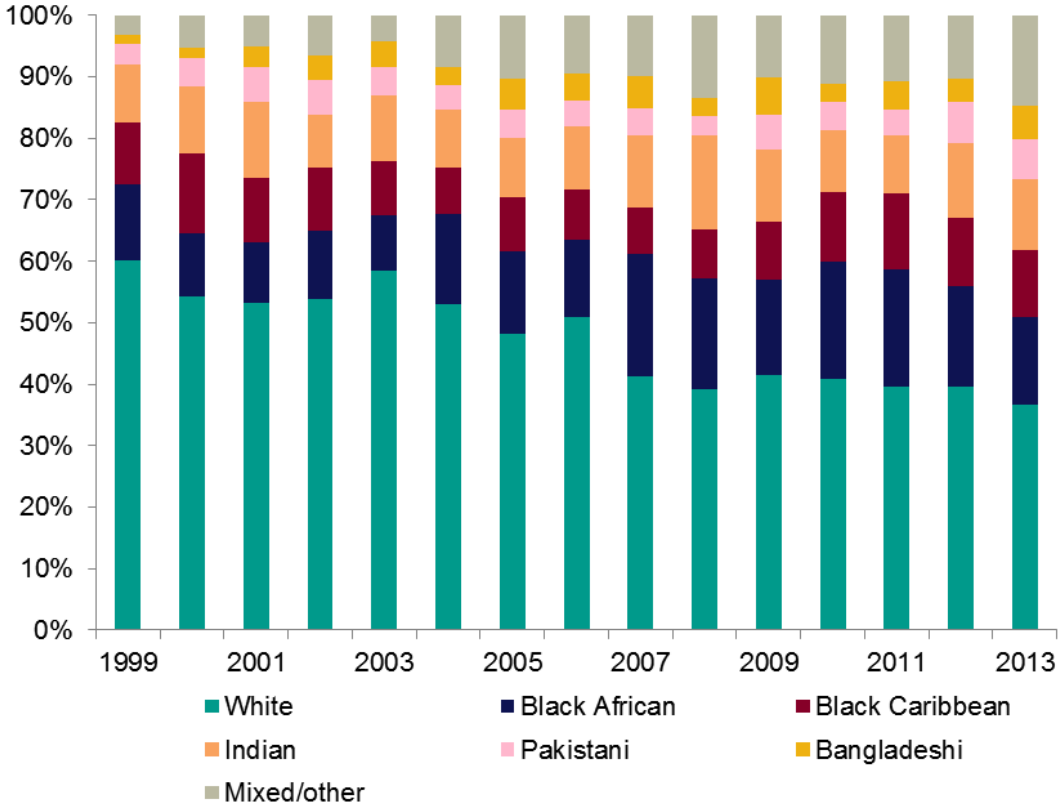


Ethnicity among UK born TB patients

Among UK born TB patients, the proportion from different ethnic groups has stayed fairly constant from 1999 to 2013. Over this time, the most common ethnic group among UK born TB patients was white (Figure 11). Between 1999 and 2006, this accounted for 50-60% of all UK born patients, and since 2007 has remained stable at around 40%.

The proportion of UK born TB patients that were of black African ethnicity was around 10 to 15% between 1999 and 2006, around 20% between 2007 to 2011, and then decreased again to around 15% in 2012/2013. The proportion of mixed or other ethnicity has increased, from just 3% in 1999 to 15% in 2013. Since 1999, around 10% of UK born TB patients were black Caribbean, and 10% Indian. Around seven per cent were Pakistani in 2012 and 2013, a slight increase from around 5% in previous years, and since 2005 around 5% were Bangladeshi.

Figure 11: Proportion of UK born TB patients by ethnic group, London, 1999 – 2013



Social risk factors

In 2013, 262 patients were reported as having one or more social risk factor (9%, Table 2). For each risk factor, 4.1% reported alcohol misuse (114/2796), 3.6% drug use (104/2895), 3.5% reported homelessness (103/2913) and 2.4% imprisonment (70/2898). Multiple issues were common, with a third reporting more than one factor (34%, 89/262).

Table 2: Social risk factors among TB patients, London, 2009 – 2013

	Any risk factor		Total
	n	%	
2009	328	13.0	2,527
2010	315	11.3	2,790
2011	266	8.6	3,086
2012	262	8.5	3,093
2013	262	9.4	2,785

Among patients of white or black Caribbean ethnicity, one in four had at least one social risk factor. The proportion with a risk factor was similar among UK born and non-UK born white patients, but much higher among UK born black Caribbean patients (30%) than non-UK born (11%). Overall, social risk factors were more than twice as common among UK born patients than those born abroad (82, 17% vs. 179, 7%).

Among those born abroad, social risk factors were particularly prevalent in those from Eastern Europe, with almost a half of TB patients from there in 2013 reporting at least one (43%, 9/21) – but these only accounted for 4% (9) of all those with risk factors, while 32% (83) were born in the UK. Social risk factors were more common among male patients than female (211, 13% vs. 51, 4%).

Occupation

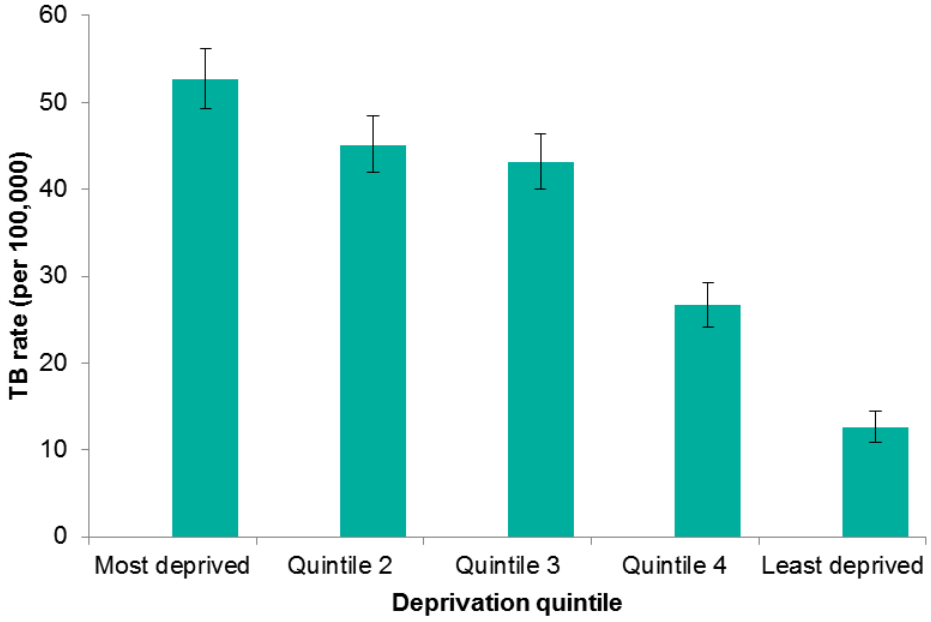
Table 3: Occupational category of TB patients aged 18 or older, London, 2013

	n	%
Education	301	12
(Full time student	*283*	*94)*
Health care worker	111	4
Other	1075	43
None	1013	41
Total	2500	

Of the 2,814 adult patients aged 18 or older in 2013, occupation was reported for 89% (2,500): 41% of these were not employed (Table 3). Where reported, the most common occupation category was education: nearly all of these were full-time students.

Deprivation

Figure 12: TB case rate by deprivation, London, 2013



Based on the Index of Multiple Deprivation (IMD 2010), TB rates were highest in the most deprived areas of London in 2013 (Figure 12). Almost one in three TB patients were resident in the most deprived quintile (895, 30%) compared to 6% in the least deprived.

Clinical characteristics

Site of disease

As in recent years, less than half (47%) of all TB cases reported in 2013 had pulmonary disease. The next most common site of disease remains extra-thoracic lymph node TB, which accounts for a quarter of all cases (Table 4).

Table 4: Site of disease of TB patients, London, 2013

Site of disease*	2013	
	n	%
Pulmonary	1417	47
Lymph Node (extra thoracic)	772	26
IT Lymph Nodes	386	13
Other	341	11
Pleural	270	9
Gastrointestinal/Peritoneal	180	6
Bone/Joint (spine)	161	5
Bone/Joint (other - not spine)	105	4
Miliary	77	3
CNS (meningitis)	64	2
Genitourinary	52	2
CNS (Other - not meningitis)	46	2
Cryptic Disseminated	13	0
Laryngeal	3	0

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

Pulmonary disease was more common among the UK born: 62% (305/492) vs. 45% (1,103/2,468) among the non-UK born in 2013. It was also more common among white (72%, 242/334) and Chinese patients (70%, 26/37) and less common among Bangladeshi (34%, 56/174), Indian (37%, 337/907) and Pakistani (40%, 139/346) patients. The majority of patients with social risk factors had pulmonary disease (70%, 184), over half of whom had smear positive disease (54%, 83/155) compared to 46% (1,149/2,523) of those without social risk factors, 43% (373) of whom were smear positive).

Previous diagnosis of tuberculosis

In 2013, 7% (207/2,904) of cases occurred in individuals with a previous history of TB, a similar proportion since 1999.

BCG vaccination

Information on BCG vaccination was available on 79% of cases in 2013 (2,352), and 75% of these reported being vaccinated (Table 5). A higher proportion of children had been vaccinated: 86% of those under five (among those where this was reported: information was missing for two patients under five years old).

Table 5: Number and proportion of TB patients with BCG vaccination, London, 2013

	<5 years old BCG vaccination			<16 years old BCG vaccination			All ages BCG vaccination		
	n	%	N	n	%	N	n	%	N
UK born	25	89	28	65	81	80	309	74	416
Non-UK born	0	0	1	23	72	32	1449	75	1924
All cases	25	86	29	88	79	112	1768	75	2352

Time symptomatic

The time between onset of symptoms and starting treatment was available for 66% of London patients in 2013 (Table 6): the remaining patients were either asymptomatic at diagnosis, or did not have a date of symptom onset recorded. The median number of days was 70 with an interquartile range (IQR) of 35-135 days. This was lower among those with pulmonary disease, at 65 days (IQR 32-120).

Children had the shortest time to starting treatment (median time 47 days, IQR 22-98 for those with pulmonary disease aged under 16). The median time for those with pulmonary disease aged 65 and over was 74 days (IQR 36-182), and 84 days (IQR 31-183) among those aged 75 or older with pulmonary disease.

Table 6: Time between symptom onset and diagnosis, London, 2013

	Median days (IQR)	0-2 months		2-4 months		>4 months		Total patients*
		n	%	n	%	n	%	
Extra-pulmonary	**78 (40-159)**	373	37	294	29	335	33	1002
Pulmonary	**65 (32-120)**	432	44	297	31	243	25	972
Pulmonary smear positive	**62 (32-107)**	168	46	121	33	75	21	364
All cases	**70 (35-135)**	805	41	591	30	578	29	1974

*excluding asymptomatic cases, and those with missing onset dates

There was little difference between those born in the UK or abroad (median time to start treatment for those with pulmonary disease was 68, IQR 31-122 vs. 64, IQR 32-118 days). Those of black Caribbean ethnicity and with pulmonary disease had the longest median delay to starting treatment (76 days, IQR 28-146), and those of black African the shortest (57 days, IQR 29-109).

HIV testing

Information on HIV testing was available for 99% of patients (2,969 /2,985), and 98% were offered an HIV test, or their HIV status was already known (2,913 patients). Uptake of testing was extremely high, and 95% of patients actually had an HIV test, or their status was already known (2,811).

Hospital inpatient and directly observed therapy

Almost one in three TB patients notified during 2013 was a hospital inpatient at some point during their treatment (922, 31%). This was more common among elderly patients (41% of those aged 65 or older, 119/288), those with drug resistant disease (41%, 63/154) and those with social risk factors (45%, 118/261).

Twelve per cent of patients were reported to have received directly observed therapy (DOT) at some point during treatment (352). Half of the patients with one or more social risk factor were given DOT (50%, 131/262).

Microbiological information

Sputum smear and culture confirmation

Of the 1,417 pulmonary cases in 2013, only 76% (1084) had a sputum smear result. Of these, 45% (491) were sputum smear positive.

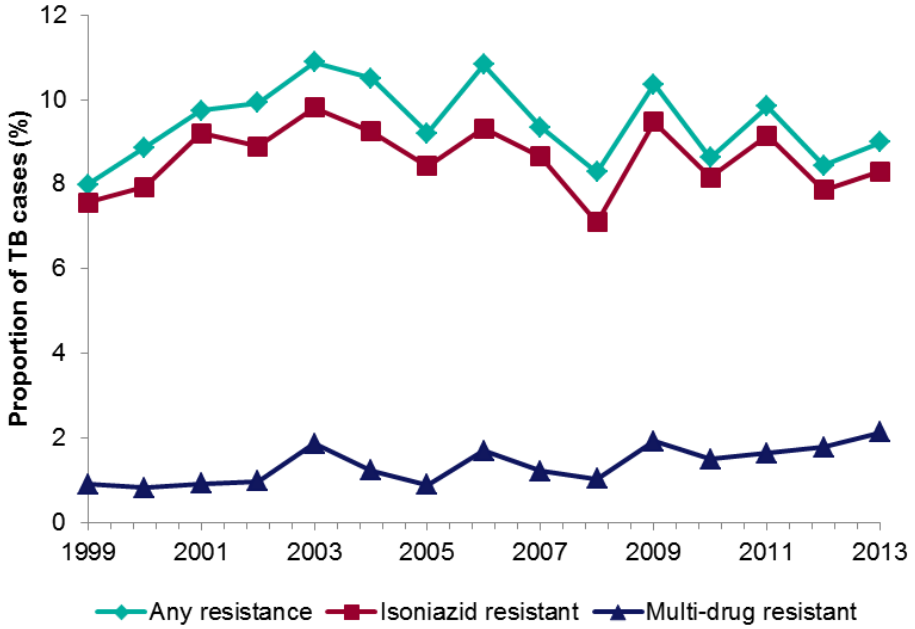
In 2013, 59% of all cases were confirmed by culture (1,752). Seventy three per cent (1,039) of pulmonary cases were culture confirmed of whom 54% were smear positive. Among those with extra-pulmonary disease, 45% were culture confirmed (713/1,568). This varied across London, with the highest proportion of culture confirmed pulmonary cases in south east London (79%, 209/266), and just 66% confirmed among pulmonary cases in north central and south west London (141/214 and 122/185, respectively).

Drug resistance

Overall drug resistance and geographical distribution

The proportion of TB cases resistant to one or more first line drug increased slightly to 9% (156/1,729) compared to 2012 (8%, 175/2,062), although has remained between 8 and 11% since 1999 (Figure 13). This reflected an increase in both isoniazid resistant (to 8%, 144) and multi-drug resistant disease (2.1%, 37).

Figure 13: Proportion of TB cases with first line drug resistance, London, 1999 – 2013



Characteristics of patients with drug resistant TB

Resistance was similar among males (9%, 98/1,052) and females (8%, 58/683). Younger (aged less than 20 years, 1%, 1/112) and elderly patients (aged over 70 years, 2%, 2/131) had lower levels of drug resistance than other age groups.

Overall, drug resistance was slightly higher among non-UK born cases (9% 127/1,457 vs. 7%, 18/265). White patients had the highest levels of drug resistance – particularly those born outside the UK, where 24% (24/100) were resistant to at least one first line drug, 22% (22) resistant to isoniazid and 5% (5) multi-drug resistant (from Lithuania, Romania and the Ukraine). Non-UK born patients with drug resistant TB were most often Indian or black African, however. UK born patients with drug resistant TB were most often white (39%, 7/18, of those with isoniazid resistant TB, and 67%, 2, of those with multi-drug resistant disease).

Drug resistance was slightly more common among those with pulmonary forms of disease: 10% (99/1026) vs. 8% (57/709). One in ten sputum smear positive patients had drug resistant TB (11%, 51/454). Patients with a previous history of TB were more likely to have drug resistance (13%, 12/90) than those without (9%, 138/1595). More than nine out of ten resistant cases, however, occurred in individuals who did not have a history of TB (92%, 138/150).

Patients with a social risk factor were much more likely to have drug resistance (17%, 31/181) than those without (8%, 113/1423). More than one in five of all isoniazid resistant TB cases in London in 2013 occurred in individuals with social risk factors (28/133), as did 28% of all multi-drug resistant TB cases (10/36).

TB clusters identified through molecular strain typing

The PHE National Strain Typing Service was established in January 2010. All TB isolates were typed using 24 loci mycobacterial interspersed repetitive unit-variable number tandem repeats (MIRU-VNTR) at the National Mycobacterium Reference Laboratory (NMRL). Cases with an indistinguishable strain pattern are considered clustered.[2] All data shown are for patients reported between 2010 and 2013.

Proportion of cases clustered and geographical distribution

Among 7,881 culture confirmed cases, 6,704 (85%) cases had a TB isolate strain typed with at least 23 loci completed (Table 7). Of these, 3,510 (52%) had a unique strain type within London. The remaining 3,194 clustered with at least one other case in London since 2010, a cluster rate of 48%. In total, 767 different molecular clusters were reported during 2010 to 2013.

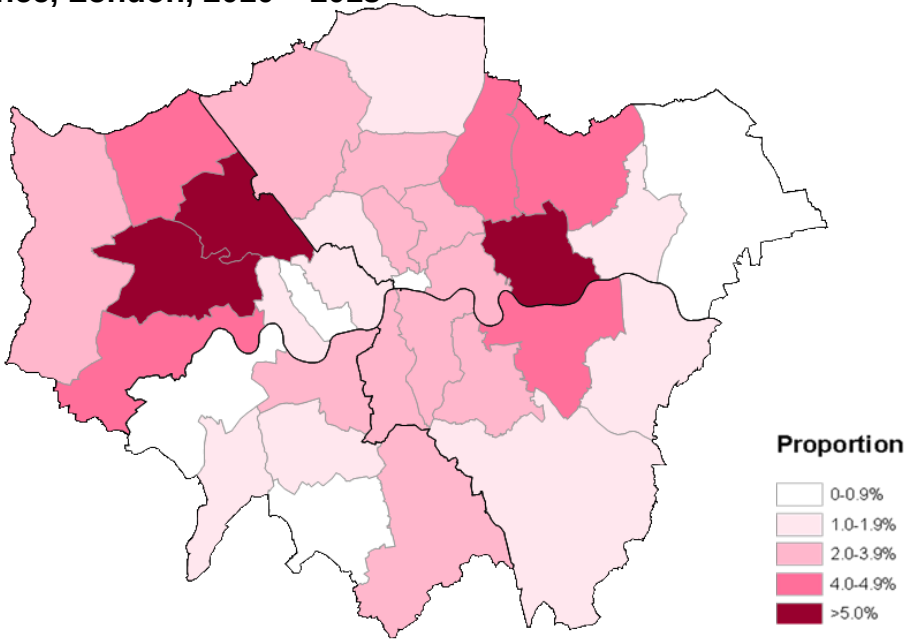
Table 7: Clustering of TB cases in London, 2010 – 2013

Year	Culture confirmed cases	Strain typed cases*		Cases clustered in London		Number of clusters
		n	% of culture confirmed	n	% of strain typed	
2010-2013	7,881	6,704	85	3,194	48	767

* Culture confirmed cases with a MIRU-VNTR profile with at least 23 complete loci

A quarter (26%) of clustered cases in London were residents of Newham, Brent and Ealing (Figure 14). Richmond, Sutton, Havering, Kensington, Chelsea and the City of London contributed the lowest proportion of clustered cases. This was largely a reflection of TB rates in each local authority.

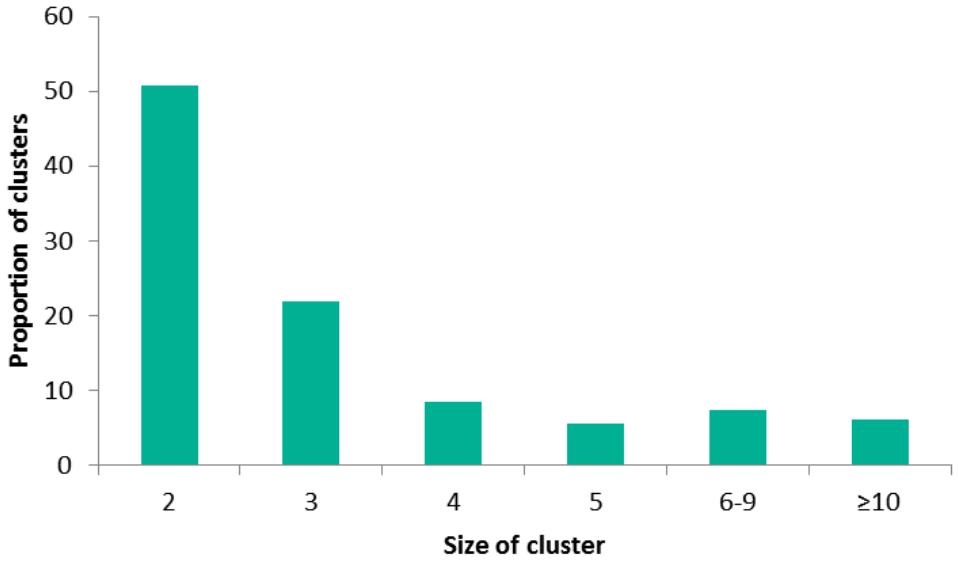
Figure 14: Proportion of strain typed TB cases that are clustered according to local authority of residence, London, 2010 – 2013



Size of clusters

Of the 767 clusters identified comprising at least two cases in London since January 2010, 51% contained just two individuals, and 19% were clusters containing more than five individuals (Figure 15).

Figure 15: Size of clusters in London, 2010 – 2013



Cluster Lineage

Since the start of the service in 2010 where lineage was known, four in ten clustered cases had strains of Euro American lineage, 32% Central Asian, 11% East African Indian lineage and 9% Beijing (Table 8). Although the majority were infected with the Euro American lineage, only 55% of those were in clusters. Among cases infected with the Beijing strain, 71% were found to be in clusters.

Table 8: Lineage of reported TB clusters, London, 2010 – 2013

Lineage	Clustered cases		Number of cases
	n	%	n
Euro American	1,254	55	2,303
Central Asian	1,018	59	1,736
East African Indian	356	34	1,064
Beijing	273	71	385
Other*	293	39	753

***Including *M.bovis* cases, *M.africanum* cases, cases with multiple lineages and cases with no lineage known

Characteristics of cases in clusters (Table 9)

Of the 3,194 individuals reported in clusters from 2010 to 2013, 61% were male and the majority aged 15 to 44 years (72%). The proportion clustered was similar among male and female patients. Although less than 3% of those in clusters were children aged under 15 years, 64% of 141 children were in clusters.

Table 9: Characteristics of clustered cases, London, 2010 – 2013

Characteristic		Number of clustered cases*		Total
		n	%	n
Sex	Male	1,953	48	4,070
	Female	1,241	47	2,633
Age	0-14 years	90	64	141
	15-44 years	2,309	48	4,787
	45–64 years	577	48	1,203
	>=65 years	218	38	573
Country of birth	UK born	662	66	1,005
	Non-UK born	2,490	44	5,612
Non-UK born years since entry into the UK	<2 years	466	44	1,050
	2-10 years	1,045	44	2,403
	>10 years	642	46	1,392
Ethnic group	White	395	54	730
	Black African	883	57	1,549
	Black Caribbean	163	73	224
	Indian	807	41	1,992
	Pakistani	294	47	630
	Bangladeshi	91	28	324
	Mixed/Other	537	45	1,183
Social risk factor	One or more social risk factors	394	59	667
	Alcohol misuse	171	59	289
	Drug misuse	175	68	259
	Homelessness	146	58	251
	Imprisonment	136	66	207
Clinical characteristics	Pulmonary disease	2,068	52	3,964
	Sputum smear positive**	1,016	56	1,819
	Previous TB diagnosis	173	56	307
	Isoniazid resistant	280	50	557
	Multi-drug resistant	60	50	120

*denominator varies slightly depending on variable completeness
** of pulmonary cases

Though only comprising 21% of all clustered cases, 66% of UK born cases were in clusters. Among the four-fifths of cases not born in the UK, 18% were recent entrants (entered within previous two years). The most common ethnic group of those in clusters was black African (28%) and Indian (26%). Black Caribbean TB patients had the highest proportion of cases in clusters (73%), while the Bangladeshi ethnic group had the lowest proportion (28%).

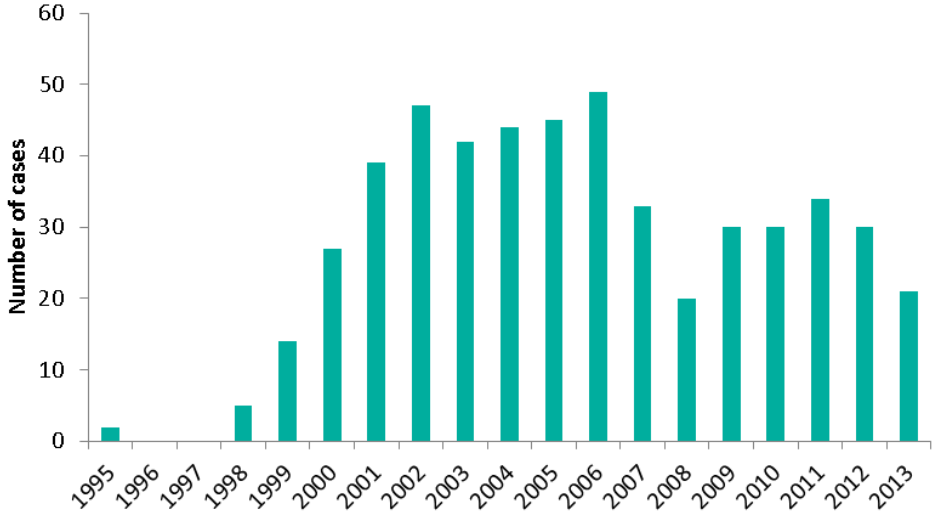
Among individuals in TB clusters, 14% had one or more social risk factors: 59% of those with one or more social risk factors were in clusters. More specifically, of those with a history of drug misuse 68% were clustered; 66% of individuals with a history of imprisonment; and 58% of individuals with a history of homelessness were in clusters.

Half (52%) of TB patients with pulmonary disease clustered, and half of these were sputum smear positive. Resistance to isoniazid was reported in 9% of clustered cases and 60 (2%) had multi-drug resistant TB. Among individuals with isoniazid and multi-drug resistant TB, 50% were clustered.

Isoniazid mono-resistant outbreak

Over the past two decades, a TB outbreak with mono-resistance to isoniazid has been ongoing, focussed around north London. The earliest identified case was in 1995. There was a peak in numbers between 2002 and 2006 (Figure 16), with a small second peak in late 2009 that coincided with the start of universal typing in 2010. By the end of 2013, this cluster comprised 501 individuals nationally, with 21 new cases reported in 2013. Of all cases in the cluster, 82% occurred in London residents. Figures since 2010 may not be directly comparable to those previously as since that date all TB isolates in London are being strain typed compared to only those with isoniazid mono resistance (or multi-drug resistant TB) prior to this time.

Figure 16: Year of notification of cases in the isoniazid resistant cluster, London, 1995 – 2013



TB outcome

TB patient outcomes are reported in accordance with the revised 2013 World Health Organization (WHO) definitions.[3] Under these, outcome at 12 months is reported for the cohort of patients diagnosed in 2012 with drug (rifampicin) sensitive TB (excluding patients with initial or acquired rifampicin or multi-drug resistance) with expected course of treatment of less than 12 months (cohort 1A below), and separately for those with CNS, spinal, miliary or cryptic disseminated disease (cohort 1B below).

Outcome at 24 months is reported for the cohort (2) of patients diagnosed in 2011 with initial or acquired rifampicin or multi-drug resistance.

The national surveillance team also further revised the outcome data provided by clinics: where the time between treatment start and end dates was greater than 365 days, any coded as completed within 12 months were reassigned to 'still on treatment at one year' (similarly for 24 and 36 month outcomes). PHE will be working with clinic staff to improve and validate any amendments to outcome data.

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

In 2012, 3,403 TB cases were notified, 3,359 (99%) of whom were not resistant to rifampicin and so were included in cohort A with outcome reported at 12 months.

1A: Outcomes for patients with rifampicin sensitive TB: non CNS, spinal, miliary or cryptic disseminated disease

According to the revised outcome categories, 86% of patients with rifampicin sensitive, non-CNS, spinal, miliary or cryptic disseminated disease completed treatment within 12 months, a similar proportion to previous years (Table 10).

The most common reason for not completing treatment, according to the revised outcome categories for patients notified in 2012, was being still on treatment (6%, Table 11). Information on the reason was not available for half (88) of these (recoded to still on treatment by the national surveillance team). Where known, half of those still on treatment were on a planned treatment regimen that exceeded 12 months (30% of these due to initial isoniazid resistance), 29% had treatment interrupted (no reason given) and 20% had their treatment changed due to poor clinical response, intolerance, initial or development of new drug resistance.

Table 10: Number and proportion completing treatment at 12 months, London, 2002 – 2012*

	TB patients		
	n	%	Total
2002	2024	74	2730
2003	2076	76	2716
2004	2182	78	2786
2005	2441	79	3098
2006	2429	82	2968
2007	2338	83	2824
2008	2539	85	2976
2009	2581	86	2989
2010	2436	86	2832
2011	2617	86	3059
2012	2572	86	2993

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

The next most common reason was loss to follow-up (4%): where known, half had left the UK (reason was not available for the 19 patients recoded by the national surveillance team).

Of the 81 deaths, TB caused or contributed to 29, was incidental to 34, and the relationship was unknown for the remaining 18. The median age of patients who died was 73, but TB caused or contributed to death in two individuals aged 20 to 39 years old. Three cases were diagnosed in patients only at post-mortem.

Table 11: TB outcome at 12 months, London, cases diagnosed in 2012*

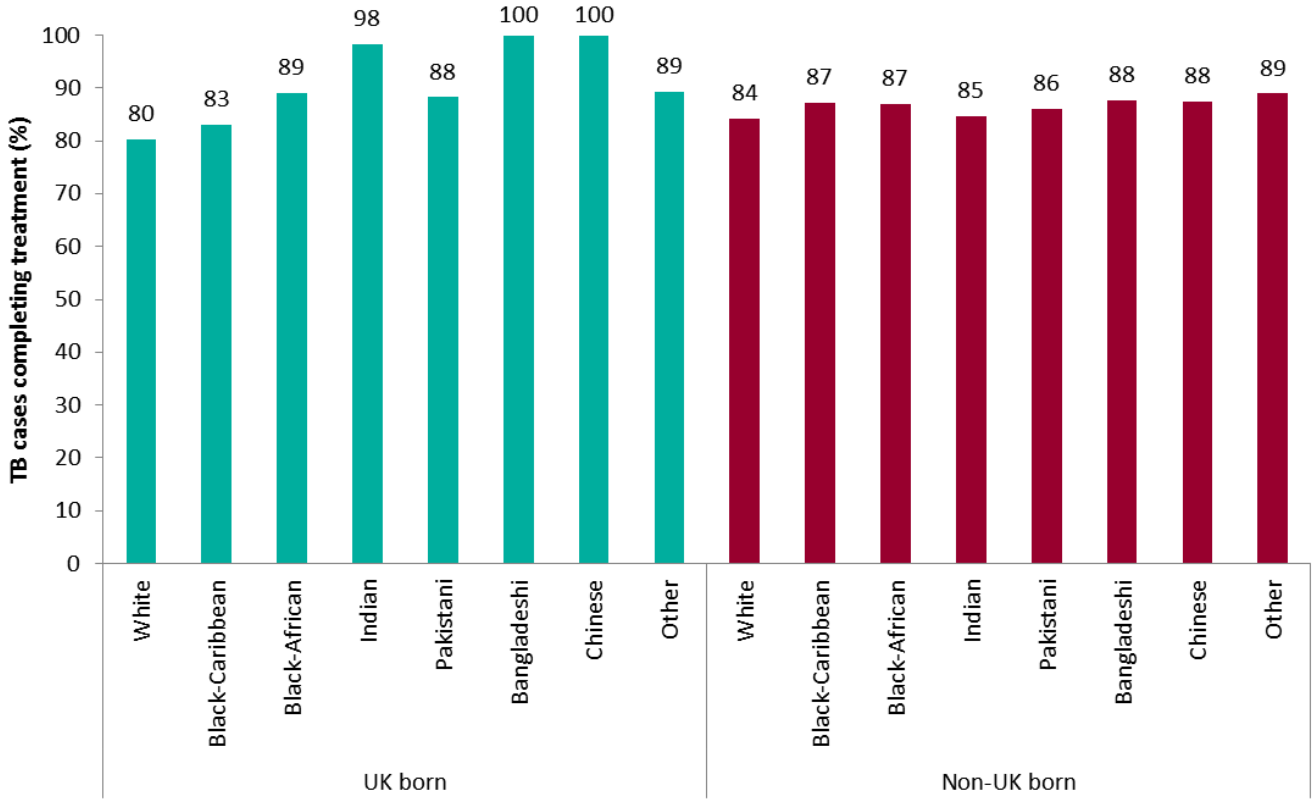
Outcome at 12 months	n	%
Completed	2,572	86
Died	81	3
Lost to follow up	122	4
Still on treatment	168	6
Treatment stopped	30	1
Not evaluated	20	1
Total	2,993	

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

Older patients were less likely to complete: just 74% of those aged 65 or older completed (206/278), with higher rates of death (18%, 50). Treatment completion was slightly lower among males (84%, 1,447/1,722 vs. 89%, 1,125/1,271): they were more likely to die (3.5%, 61 vs. 1.6%, 20) or be lost to follow up (5.1% 87 vs. 2.8%, 35).

Treatment completion was similar among the UK born and those born abroad overall (87%, 444/513 vs. 86%, 2,104/2,442). Those born abroad were more often lost to follow up (4.7%, 114 vs. 1.2%, 6), while the UK born were more likely to die (3.7%, 19 vs. 2.3%, 57). The lowest completion rates were among the UK born white and black Caribbean ethnic groups, followed by white patients born outside the UK (Figure 17).

Figure 17: Treatment completion within 12 months by place of birth and ethnic group, London, cases diagnosed in 2012



TB cases with social risk factors (homelessness, imprisonment, drug or alcohol misuse) had lower levels of treatment completion at 12 months (76%, 177/234). These were more often still on treatment (10%, 24), and lost to follow up (6%, 14).

1B: Outcomes for patients with rifampicin sensitive TB with CNS, spinal, miliary or cryptic disseminated disease

Just under half of the 366 patients with CNS, spinal, miliary or cryptic disease in 2012 completed treatment within 12 months (Table 12). Patients were commonly (37%) still on treatment. Where known, most were on planned treatment for more than 12 months (although half, 65, were recoded to still on treatment so additional information on reason was missing).

Table 12: TB outcome at 12 months for patients with rifampicin sensitive, CNS, spinal, miliary or cryptic disseminated disease, London, cases diagnosed in 2012*

Outcome at 12 months	n	%
Completed	179	49
Died	20	5
Lost to follow up	27	7
Still on treatment	134	37
Treatment stopped	3	1
Not evaluated	3	1
Total	366	

*excludes rifampicin resistant TB

The next most common reason was loss to follow-up (7%): where known, two-thirds left the UK. TB caused or contributed to nine of the 20 deaths, was incidental to three and relationship unknown for four patients. The median age at death was 63, but again TB caused or contributed to death in two individuals aged 20 to 29 years old, and none were diagnosed at post-mortem.

Older patients had worse outcomes (25% died before completing treatment, 9/36) but there was no difference in the proportion completing between males and females. UK born patients had worse outcomes (38% completed, 16/42 vs. 50%, 159/318), and were more likely to die (14%, 6 vs. 4%, 14).

2: TB outcome at 24 months for patients with rifampicin resistant disease

In 2011, 39 TB patients were initially rifampicin resistant at start of treatment, and one further case became rifampicin resistant. Eight had previously been treated for TB (21%). Almost all were born outside the UK (95%, 38): more than half in south Asia (13 in India). Thirty-five of these were multi-drug resistant, and two extensively-drug resistant (XDR), one born in China and one from the Ukraine.

Table 13: TB outcome at 24 months for patients with rifampicin resistant disease, London, cases diagnosed in 2011

Outcome at 24 months	n	%
Completed	21	53
Died	0	0
Lost to follow up	7	18
Still on treatment	10	25
Treatment stopped	2	5
Not evaluated	0	0
Total	40	

At 12 months, seven were lost to follow up (six having left the UK), one had their treatment stopped and 32 were still on treatment. Of those 32, at 24 months, 21 had completed treatment, ten were still on treatment and one had their treatment stopped.

Difference between original and revised 12 month outcomes:

Outcomes for patients reported between 2002 and 2012 were revised, and a number originally reported as completing within 12 months were reassigned to another category, particularly to still on treatment if treatment start and end dates suggested patients were treated for longer than 365 days (or 730 for 24 month outcomes). Further work is required to determine if this interpretation is correct, and PHE will be working with clinics to establish this.

Of the 2,993 patients with rifampicin sensitive TB with non CNS, spinal, miliary or cryptic disseminated disease, 89% were reported as completed treatment within 12 months by the clinics, but after revisions based on treatment dates this was reduced to 86%. Most of these outcomes were recoded to ‘still on treatment at 12 months’. There was also an increase in the number of patients coded as lost to follow up (122 from 103). Among patients with rifampicin resistant disease, four who were reported to have completed treatment within 24 months were recoded to ‘still on treatment’.

Discussion

After increasing since the late 1980s, followed by a period of stability, TB rates fell in London in 2013 – yet remain the highest in the UK, and higher than most comparable western European cities. This decrease was a reflection of a drop in TB among recent migrants, particularly those from India and aged 20 to 29 years old. A reduction was also observed in the number and proportion of non-UK born patients who had entered within the previous two years with pulmonary disease. This may be a result of the roll out of pre-entry screening for TB by chest x-ray in all high incidence countries including India from autumn 2012.[4] According to the recent report on pre-entry screening, the median age of applicants was 24 years old.[5] India is, however, still the most common country of birth of non-UK born patients, and the Indian population of London have the highest rates of TB of any ethnic group.

Numbers and rates among black Africans in London continue to decline, while they remain stable but high among the Pakistani and Bangladeshi ethnic groups. Rates were lowest among the white population, although this group still accounts for 11% of cases with no decline in incidence.

Since 1999, little change has been seen among the number of cases in UK born patients, with rates low but stable – and higher than elsewhere in the UK. This suggests greater risk of TB in London, which may be in part due to persistent risk experienced by second and third generation migrants, as evidenced by the lack of decline in UK born minority ethnic groups, but also the increased risk associated with social risk factors that are more common among the UK born.

Social risk factors were experienced by around one in ten patients, with a number having multiple factors. These were particularly prevalent among individuals from Eastern Europe – and those with drug resistance. More than one in four patients with multi-drug resistant TB had at least one social risk factor. These individuals were also more likely to be infectious, as more had pulmonary and sputum smear positive disease than other TB patients without social risk factors. The longer delay experienced by those of black Caribbean ethnicity with pulmonary disease may also be because one in four had at least one social risk factor, resulting in poorer recognition of symptoms and difficulties accessing healthcare.

HIV testing continues to have excellent coverage across London for both offering and uptake. Culture confirmation, however, remains quite low, while both isoniazid and multi-drug resistance increased. Particularly high levels of drug resistance were seen in some groups, including non-UK born white patients and those with social risk factors.

The combination of multi-drug resistant TB and complex social problems is of particular concern.

Almost half of strain typed individuals were found to be in clusters, the majority of which continue to be small. The geographic distribution of clustered cases closely resembles the TB rates in each local authority. Newham, Brent and Ealing have the highest rates of TB and also contribute the highest numbers of clustered cases in London.

Clustering was more common among children under 15 years old, the UK born and those of black Caribbean ethnicity, and those known to misuse drugs, suggesting these groups may be at increased risk of recent TB transmission within London. These observations need to be interpreted with caution and further investigation is necessary to understand why these groups are clustering more than others. Clustering was also more common among those with the Beijing lineage strain: we intend to explore the characteristics of the cases infected with the Beijing strain to determine if other factors may account for this.

Levels of treatment completion at 12 months among patients with rifampicin sensitive and non-CNS, spinal, miliary or cryptic disseminated disease were high and stable compared to recent years. The proportion completing within 12 months was considerably lower among those with CNS, spinal, miliary or cryptic disseminated disease, where the current recommendation is to treat for 12 months.[6]

Only patients with rifampicin resistant disease would be expected to be on planned treatment regimens for more than 12 months: outcomes at 24 months for those patients were not great, with just over half completing successfully, with many still on treatment or lost to follow up (although the majority of those lost were known to have returned to their country of origin outside the UK).

Conclusion and recommendations

The decrease in TB numbers and rates in 2013 is encouraging. Rates remain high, however, compared to the rest of the UK and western Europe. The absence of a decline in some groups, particularly the UK born, suggests that further work is needed to address the burden of TB in London. As overall numbers decline, TB also becomes more concentrated in risk groups. In London, these groups were also more often infectious and drug resistant. This supports the need for services to work collaboratively across the range of health and social care issues that affect these vulnerable populations, to both treat and prevent further cases.

This report updates the latest epidemiology of TB in London, describing those populations at increased risk of disease. This evidence can inform decision-makers and help services focus their efforts to implement the basic elements of TB control, namely prompt identification of active cases of disease, supporting patients to successfully complete treatment, and preventing new cases of disease occurring. The information will also be useful in targeting resources effectively.

Key recommendations for the NHS and PHE derived from the data presented in this report include:

1. Continue excellent case management, including universal HIV testing, adhering to the national Royal College of Nursing guidance on TB case management as best practice.[6]

2. Ensure TB is being tackled among hard-to-reach groups with complex social needs:

    a. Commission and support highly-targeted case finding and prevention activities which focus on high-risk groups

    b. Implement recommendations from NICE guidance in these groups.[7]

3. Continue to tackle TB among other high risk groups, including implementation of NICE recommendations around screening for latent TB.[8]

4. Continue and expand cohort review as the tool to improve local TB control, including monitoring of outcomes for patients on longer treatment plans.

PHE and NHS England will shortly publish the Collaborative TB Strategy for England 2015–2020, which sets out the improvements that need to be achieved across 10 key areas to bring about a sustained decline in TB in England.

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Appendix A: Description of data sources and definitions

Data sources
Data on TB cases in London comes from the PHE London TB Register (LTBR). The data contributes to 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 National Mycobacterium Reference Laboratory (NMRL).

Definitions
Social risk factors and directly observed therapy (DOT) have been defined in the RCN TB case management guidance.[6]

Treatment outcome
Information on outcomes were 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 2013.

The national surveillance team further revised outcome data provided by clinics, and where the time between treatment start and end dates was greater than 365 days, any coded as completed within 12 months were reassigned to ‘still on treatment at one year’, and similarly for 24 and 36 month outcomes.

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 (London, local authority, MSOA and LSOA), age, sex and place of birth were calculated using ONS mid-year population estimates. Tuberculosis rates by ethnicity were calculated using the population estimates provided by the Greater London Authority via the London Data Store.

http://data.london.gov.uk/datastore/applications/custom-age-range-creator-tool-gla-ethnic-group-population-projections-borough

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 London was carried out on cases that clustered in London and notified between 2010 and 2013.

Appendix B: TB among London residents

Table Bi: TB cases numbers by local authority of residence, London, 2002 – 2013

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Barking & Dagenham	35	42	43	60	49	62	69	72	69	61	66	74
Barnet	102	102	93	116	124	104	113	105	115	98	111	74
Bexley	22	25	30	22	19	26	21	17	20	35	25	33
Brent	212	216	229	283	240	274	306	297	296	309	308	279
Bromley	27	31	29	29	41	33	19	32	34	42	29	30
Camden	117	107	77	101	96	89	85	100	69	70	62	45
City Of London	1	2	2	2	2	1	1	4	2	1	1	2
Croydon	109	113	118	113	102	115	111	124	110	132	120	109
Ealing	201	186	254	237	233	236	198	220	207	242	246	213
Enfield	84	98	95	103	100	72	100	116	95	75	79	69
Greenwich	81	72	88	87	98	104	138	121	119	111	131	105
Hackney	146	155	155	129	133	141	123	114	92	90	88	86
Hammersmith & Fulham	73	66	70	89	80	67	67	73	53	68	46	48
Haringey	140	128	150	130	155	93	104	132	100	134	100	86
Harrow	118	115	99	132	123	122	125	135	138	153	183	147
Havering	20	13	12	30	23	16	20	30	13	18	27	29
Hillingdon	106	115	117	137	124	124	151	122	125	130	139	101
Hounslow	119	102	115	167	134	134	134	170	197	181	192	163
Islington	105	94	86	85	96	93	93	91	62	82	69	64
Kensington & Chelsea	34	52	48	47	53	32	52	50	36	47	33	35
Kingston upon Thames	20	20	22	28	25	29	29	31	37	30	28	25
Lambeth	158	156	126	144	134	104	126	117	114	97	98	78
Lewisham	96	80	77	98	84	100	82	73	73	106	84	70
Merton	55	41	62	61	66	57	63	61	55	64	73	59
Newham	218	245	241	256	261	277	283	309	301	370	367	335
Redbridge	92	111	109	120	144	135	162	147	137	161	154	151
Richmond upon Thames	16	11	12	19	20	14	13	20	16	16	13	12
Southwark	106	100	132	137	125	103	117	95	95	118	115	95
Sutton	32	31	24	25	28	32	18	30	33	32	29	25
Tower Hamlets	126	148	118	128	132	153	132	139	153	140	119	100
Waltham Forest	107	100	99	114	120	91	129	92	114	122	123	120
Wandsworth	100	96	94	125	80	115	110	84	99	87	92	63
Westminster	77	90	85	95	84	86	69	81	62	67	53	60
London	**3055**	**3063**	**3111**	**3449**	**3328**	**3234**	**3363**	**3404**	**3241**	**3489**	**3403**	**2985**

Table Bii: TB rate* per 100,000 by local authority of residence, London, 2002 – 2013

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Barnet	32	32	29	35	37	31	33	30	33	27	30	20
Camden	57	52	37	48	45	42	40	47	32	32	28	20
Enfield	30	35	34	36	35	25	34	38	31	24	25	22
Haringey	62	57	66	57	66	39	43	53	40	52	39	33
Islington	58	52	48	46	52	49	48	46	31	40	33	30
Barking & Dagenham	21	25	26	36	29	37	40	41	38	33	35	39
City Of London	14	28	28	28	28	13	13	54	27	13	13	26
Hackney	69	73	73	60	60	63	53	48	38	36	35	34
Havering	9	6	5	13	10	7	9	13	6	8	11	12
Newham	85	96	95	101	101	104	102	108	101	119	117	107
Redbridge	38	45	44	48	56	52	61	54	50	57	54	53
Tower Hamlets	61	71	56	60	60	68	57	58	62	55	45	38
Waltham Forest	48	45	44	50	52	39	53	37	45	47	47	46
Brent	79	80	85	104	87	97	105	100	97	99	98	89
Ealing	65	60	82	76	74	74	61	67	62	71	72	63
Hammersmith & Fulham	42	38	41	51	46	38	38	41	29	37	26	27
Harrow	56	54	46	60	55	54	54	58	58	64	76	61
Hillingdon	43	46	47	54	49	48	58	46	46	47	49	36
Hounslow	55	47	52	75	59	57	56	70	79	71	74	63
Kensington & Chelsea	21	31	29	28	32	20	32	31	22	30	21	22
Westminster	37	43	40	43	38	39	32	37	29	31	24	27
Bexley	10	11	14	10	9	12	9	7	9	15	11	14
Bromley	9	10	10	10	14	11	6	10	11	14	9	10
Greenwich	37	32	39	38	42	44	58	50	48	43	50	40
Lambeth	58	57	46	52	48	36	44	40	38	32	32	25
Lewisham	38	32	31	38	33	38	31	27	27	38	30	25
Southwark	41	39	51	52	47	38	42	34	33	41	39	32
Croydon	32	34	35	33	30	33	32	35	31	36	33	30
Kingston upon Thames	13	13	15	18	16	19	19	20	23	19	17	15
Merton	29	22	33	32	34	29	32	31	28	32	36	29
Richmond upon Thames	9	6	7	10	11	8	7	11	9	9	7	6
Sutton	18	17	13	14	15	17	10	16	17	17	15	13
Wandsworth	36	35	34	44	28	39	37	28	33	28	30	20
London	**41**	**41**	**42**	**46**	**44**	**42**	**43**	**43**	**40**	**43**	**41**	**36**

*rates calculated using ONS mid-year population estimates

Table Biii: TB case numbers and rate by age and sex, London, 2013

	Female		Male	
	n	rate	n	rate
0-9	31	5.7	27	4.7
10-19	91	20.3	94	20.0
20-29	331	45.2	468	65.7
30-39	297	40.2	462	60.7
40-49	202	33.9	284	48.2
50-59	111	25.2	187	43.9
60-69	96	29.8	92	31.2
70+	85	22.6	127	45.5

Table Biv: Drug resistance among TB patients with culture confirmed disease*, London, 1999 – 2013

Year	Any resistance		Isoniazid resistant		Multi-drug resistant		Total*
	n	%	n	%	n	%	
1999	97	8.0	92	7.6	11	0.9	1213
2000	107	8.9	96	7.9	10	0.8	1207
2001	127	9.7	117	9.2	12	0.9	1303
2002	173	9.9	159	8.9	17	1.0	1744
2003	192	10.9	172	9.8	33	1.9	1764
2004	188	10.5	167	9.3	22	1.2	1790
2005	186	9.2	171	8.4	18	0.9	2021
2006	216	10.8	193	9.3	34	1.7	1994
2007	169	9.4	158	8.7	22	1.2	1807
2008	159	8.3	134	7.1	20	1.0	1917
2009	194	10.4	175	9.5	36	1.9	1872
2010	167	8.6	152	8.2	29	1.5	1934
2011	203	9.8	181	9.2	34	1.6	2064
2012	175	8.4	163	7.9	37	1.8	2072
2013	156	9.0	144	8.3	37	2.1	1735

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

Appendix C: All TB patients notified by London clinics

Table Ci: Number of all TB cases and pulmonary cases notified by London clinics, 2010 – 2013

	2010		2011		2012		2013	
	Total	Pul	Total	Pul	Total	Pul	Total	Pul
Edgware TB Clinic	83	51	68	44	89	53	49	28
Great Ormond Street Hospital	10	3	7	2	5	4	4	2
North Middlesex Hospital	154	95	140	83	143	66	128	74
Royal Free	92	48	92	55	72	43	61	35
TB Service NCL - South Hub	59	41	83	51	64	41	59	43
UCLH TB Service	104	50	122	56	122	42	88	33
North Central	502	288	512	291	495	249	389	215
Havering TB Service	61	26	76	33	76	27	88	44
Homerton	96	46	94	51	88	47	89	47
King George Hospital	115	70	112	53	115	65	101	45
Mile End Hospital	230	86	239	80	216	83	214	77
Newham Chest Clinic	233	111	297	138	298	134	270	133
Whipps Cross University Hospital	125	65	131	62	139	69	129	58
North East	860	404	949	417	932	425	891	404
Central Middlesex Hospital	105	62	108	58	98	55	83	39
Charing Cross Hospital	46	16	66	26	73	25	47	21
Chelsea & Westminster	65	46	65	34	38	29	41	26
Ealing Hospital	170	82	202	87	213	99	166	72
Hammersmith Hospital (ICH NHS Trust)	63	29	54	28	50	14	48	23
Harefield Hospital	0	-	0	-	4	3	5	1
Hillingdon Hospital	93	49	115	67	111	68	73	39
Northwick Park Hospital	305	137	341	133	367	152	325	142
Royal Brompton	6	5	8	4	6	5	9	6
Royal Marsden Chelsea	1	1	0	-	0	-	1	0
St Mary's (ICH NHS Trust)	93	48	119	61	100	39	103	47
West Middlesex University Hospital	163	63	144	53	151	55	143	51
North West	1110	538	1222	551	1211	544	1044	467
Bromley TB Service	25	14	25	6	19	7	19	10
Kings College Hospital	105	48	115	53	118	59	100	55
Queen Elizabeth Hospital	108	57	105	56	125	70	99	58
Queen Mary's Hospital	6	3	1	1	0	-	0	-
St Thomas' Hospital	145	79	153	73	116	62	122	54
University Hospital Lewisham	81	41	99	49	74	42	67	35
South East	470	242	498	238	452	240	407	212
Croydon University Hospital	99	40	121	55	109	60	92	43
Epsom and St Helier NHS Trust	42	24	48	20	51	29	34	15
Kingston Hospital	55	35	31	17	35	24	36	16
St George's Hospital	164	78	158	68	180	88	137	59
South West	360	177	358	160	375	201	299	133
London	**3302**	**1649**	**3539**	**1657**	**3465**	**1659**	**3030**	**1431**

Table Cii: HIV testing (offered and uptake) among all TB notifications by London clinics, 2013

	2013 Total notifs	Offered And Done	Offered But Refused	Offered But Not Done	HIV Status Already Known	Not Offered	Null	Test offered (or status known)	Test done (or status known)
Edgware TB Clinic	49	45	1	1	0	1	1	96%	92%
Great Ormond Street Hospital	4	2	0	0	0	2	0	50%	50%
North Middlesex Hospital	128	116	3	1	4	3	1	97%	94%
Royal Free	61	59	0	0	2	0	0	100%	100%
TB Service NCL - South Hub	59	53	2	0	1	2	1	95%	92%
UCLH TB Service	88	74	1	5	6	2	0	98%	91%
North Central	389	349	7	7	13	10	3	97%	93%
Havering TB Service	88	58	0	21	7	2	0	98%	74%
Homerton	89	73	1	5	9	1	0	99%	92%
King George Hospital	101	98	0	2	0	1	0	99%	97%
Mile End Hospital	214	181	3	2	22	4	2	97%	95%
Newham Chest Clinic	270	239	4	14	6	5	2	97%	91%
Whipps Cross University Hospital	129	120	1	3	3	2	0	98%	95%
North East	891	769	9	47	47	15	4	98%	92%
Central Middlesex Hospital	83	82	0	1	0	0	0	100%	99%
Charing Cross Hospital	47	46	0	0	0	1	0	98%	98%
Chelsea & Westminster	41	32	0	0	8	1	0	98%	98%
Ealing Hospital	166	160	2	0	1	3	0	98%	97%
Hammersmith Hospital (ICH NHS Trust)	48	43	1	2	0	2	0	96%	90%
Harefield Hospital	5	3	0	1	0	1	0	80%	60%
Hillingdon Hospital	73	67	2	1	2	1	0	99%	95%
Northwick Park Hospital	325	318	0	0	5	2	0	99%	99%
Royal Brompton	9	4	1	0	0	4	0	56%	44%
Royal Marsden Chelsea	1	1	0	0	0	0	0	100%	100%
St Mary's (ICH NHS Trust)	103	89	2	0	12	0	0	100%	98%
West Middlesex University Hospital	143	130	2	0	11	0	0	100%	99%
North West	1044	975	10	5	39	15	0	99%	97%
Bromley TB Service	19	18	0	0	1	0	0	100%	100%
Kings College Hospital	100	95	0	0	0	1	4	95%	95%
Queen Elizabeth Hospital	99	94	0	0	5	0	0	100%	100%
St Thomas' Hospital	122	101	1	5	9	6	0	95%	90%
University Hospital Lewisham	67	56	1	4	3	3	0	96%	88%
South East	407	364	2	9	18	10	4	97%	94%
Croydon University Hospital	92	88	0	0	2	2	0	98%	98%
Epsom and St Helier NHS Trust	34	31	0	0	1	2	0	94%	94%
Kingston Hospital	36	30	2	1	3	0	0	100%	92%
St George's Hospital	137	122	1	4	7	3	0	98%	94%
South West	299	271	3	5	13	7	0	98%	95%
London	**3030**	**2728**	**31**	**73**	**130**	**57**	**11**	**98%**	**94%**

Table Ciii: Social risk factors* among all TB notifications by London clinics, 2010 – 2013

	2010		2011		2012		2013	
	n	%	n	%	n	%	n	%
Edgware TB Clinic	10	12%	4	6%	0	0%	0	0%
Great Ormond Street Hospital	0	0%	0	0%	0	0%	0	0%
North Middlesex Hospital	26	17%	19	14%	12	8%	17	13%
Royal Free	12	13%	6	7%	9	13%	1	2%
TB Service NCL - South Hub	13	22%	9	11%	10	16%	8	14%
UCLH TB Service	12	12%	22	18%	13	11%	9	10%
North Central	73	15%	60	12%	44	9%	35	9%
Havering TB Service	3	5%	3	4%	1	1%	10	11%
Homerton	16	17%	17	18%	18	20%	15	17%
King George Hospital	5	4%	7	6%	8	7%	9	9%
Mile End Hospital	21	9%	24	10%	15	7%	13	6%
Newham Chest Clinic	5	2%	9	3%	33	11%	25	9%
Whipps Cross University Hospital	9	7%	12	9%	17	12%	14	11%
North East	59	7%	72	8%	92	10%	86	10%
Central Middlesex Hospital	17	16%	10	9%	6	6%	8	10%
Charing Cross Hospital	3	7%	7	11%	10	14%	8	17%
Chelsea & Westminster	10	15%	5	8%	6	16%	3	7%
Ealing Hospital	8	5%	6	3%	10	5%	10	6%
Hammersmith Hospital (ICH NHS Trust)	4	6%	6	11%	3	6%	9	19%
Harefield Hospital	-	-	-	-	0	0%	0	0%
Hillingdon Hospital	1	1%	9	8%	12	11%	5	7%
Northwick Park Hospital	41	13%	6	2%	4	1%	11	3%
Royal Brompton	2	33%	0	0%	2	33%	0	0%
Royal Marsden Chelsea	0	0%	-	-	-	-	0	0%
St Mary's (ICH NHS Trust)	27	29%	17	14%	14	14%	26	25%
West Middlesex University Hospital	6	4%	5	3%	6	4%	5	3%
North West	119	11%	71	6%	73	6%	85	8%
Bromley TB Service	2	8%	1	4%	0	-	2	11%
Kings College Hospital	7	7%	17	15%	8	7%	6	6%
Queen Elizabeth Hospital	8	7%	7	7%	18	14%	5	5%
Queen Mary's Hospital	0	0%	0	0%	-	-	-	-
St Thomas' Hospital	14	10%	9	6%	10	9%	15	12%
University Hospital Lewisham	8	10%	8	8%	2	3%	10	15%
South East	39	8%	42	8%	38	8%	38	9%
Croydon University Hospital	7	7%	10	8%	6	6%	4	4%
Epsom and St Helier NHS Trust	5	12%	1	2%	6	12%	3	9%
Kingston Hospital	2	4%	2	6%	1	3%	1	3%
St George's Hospital	12	7%	7	4%	9	5%	13	9%
South West	26	7%	20	6%	22	6%	21	7%
London	**316**	**10%**	**265**	**7%**	**269**	**8%**	**265**	**9%**

* social risk factors include homelessness, imprisonment, alcohol and drug misuse.

Table Civ: Sputum smear and culture confirmation of all TB notifications by London clinics, 2013

	Culture positive (all)		Total notifs	Culture positive (pulmonary)		Pulmonary with smear result		Total Pulmonary
	n	%	N	n	%	n	%	
Edgware TB Clinic	28	57%	49	15	54%	14	50%	28
Great Ormond Street Hospital	1	25%	4	1	50%	1	50%	2
North Middlesex Hospital	69	54%	128	53	72%	51	69%	74
Royal Free	43	70%	61	29	83%	31	89%	35
TB Service NCL - South Hub	29	49%	59	25	58%	31	72%	43
UCLH TB Service	42	48%	88	20	61%	24	73%	33
North Central	212	54%	389	143	67%	152	71%	215
Havering TB Service	57	65%	88	35	80%	36	82%	44
Homerton	60	67%	89	37	79%	47	100%	47
King George Hospital	63	62%	101	36	80%	25	56%	45
Mile End Hospital	119	56%	214	63	82%	61	79%	77
Newham Chest Clinic	150	56%	270	91	68%	72	54%	133
Whipps Cross University Hospital	81	63%	129	44	76%	47	81%	58
North East	530	59%	891	306	76%	288	71%	404
Central Middlesex Hospital	58	70%	83	33	85%	30	77%	39
Charing Cross Hospital	30	64%	47	15	71%	17	81%	21
Chelsea & Westminster	23	56%	41	19	73%	12	46%	26
Ealing Hospital	97	58%	166	54	75%	58	81%	72
Hammersmith Hospital (ICH NHS Trust)	24	50%	48	15	65%	20	87%	23
Harefield Hospital	3	60%	5	1	100%	1	100%	1
Hillingdon Hospital	35	48%	73	23	59%	28	72%	39
Northwick Park Hospital	186	57%	325	102	72%	132	93%	142
Royal Brompton	4	44%	9	4	67%	3	50%	6
Royal Marsden Chelsea	1	100%	1	-	-	-	-	0
St Mary's (ICH NHS Trust)	61	59%	103	36	77%	34	72%	47
West Middlesex University Hospital	76	53%	143	37	73%	41	80%	51
North West	598	57%	1044	339	73%	376	81%	467
Bromley TB Service	14	74%	19	8	80%	6	60%	10
Kings College Hospital	70	70%	100	40	73%	34	62%	55
Queen Elizabeth Hospital	70	71%	99	51	88%	51	88%	58
St Thomas' Hospital	76	62%	122	46	85%	47	87%	54
University Hospital Lewisham	40	60%	67	28	80%	30	86%	35
South East	270	66%	407	173	82%	168	79%	212
Croydon University Hospital	46	50%	92	30	70%	39	91%	43
Epsom and St Helier NHS Trust	17	50%	34	11	73%	10	67%	15
Kingston Hospital	22	61%	36	10	63%	8	50%	16
St George's Hospital	80	58%	137	37	63%	54	92%	59
South West	165	55%	299	88	66%	111	83%	133
London	**1775**	**59%**	**3030**	**1049**	**73%**	**1095**	**77%**	**1431**

Table Cv: Drug resistance among all TB notifications by London clinics, 2013

	Any drug resistance*		Isoniazid resistant		Multi-drug resistant		Total**
	n	%	n	%	n	%	
Edgware TB Clinic	0	-	0	-	0	-	26
Great Ormond Street Hospital	0	-	0	-	0	-	1
North Middlesex Hospital	8	12%	7	10%	1	1%	69
Royal Free	2	5%	1	2%	0	-	43
TB Service NCL - South Hub	5	19%	5	19%	2	7%	27
UCLH TB Service	6	14%	6	14%	2	5%	42
North Central	21	10%	19	9%	5	2%	208
Havering TB Service	4	7%	4	7%	1	2%	57
Homerton	9	15%	9	15%	0	-	59
King George Hospital	9	14%	9	14%	4	6%	63
Mile End Hospital	7	6%	7	6%	0	-	119
Newham Chest Clinic	14	9%	11	7%	2	1%	150
Whipps Cross University Hospital	6	8%	6	8%	2	3%	80
North East	49	9%	46	9%	9	2%	528
Central Middlesex Hospital	6	10%	6	10%	2	3%	58
Charing Cross Hospital	3	10%	3	10%	1	3%	30
Chelsea & Westminster	1	5%	0	0%	0	-	22
Ealing Hospital	6	6%	5	5%	2	2%	97
Hammersmith Hospital (ICH NHS Trust)	3	13%	3	13%	1	4%	24
Harefield Hospital	0	-	0	0%	0	-	3
Hillingdon Hospital	5	15%	4	12%	0	-	33
Northwick Park Hospital	18	10%	17	9%	3	2%	184
Royal Brompton	0	0%	0	0%	0	-	4
Royal Marsden Chelsea	0	0%	0	0%	0	-	1
St Mary's (ICH NHS Trust)	4	7%	4	7%	1	2%	60
West Middlesex University Hospital	9	12%	8	11%	4	5%	76
North West	55	9%	50	8%	14	2%	592
Bromley TB Service	1	7%	1	7%	0	-	14
Kings College Hospital	6	9%	5	7%	1	1%	70
Queen Elizabeth Hospital	3	4%	3	4%	1	1%	70
St Thomas' Hospital	6	8%	6	8%	3	4%	74
University Hospital Lewisham	8	21%	7	18%	1	3%	39
South East	24	9%	22	8%	6	2%	267
Croydon University Hospital	3	7%	3	7%	1	2%	44
Epsom and St Helier NHS Trust	2	12%	1	6%	0	-	17
Kingston Hospital	1	5%	1	5%	1	5%	22
St George's Hospital	2	3%	2	3%	1	1%	80
South West	8	5%	7	4%	3	2%	163
London	**157**	**9%**	**144**	**8%**	**37**	**2%**	**1758**

*First line drugs are isoniazid, rifampicin, ethambutol and pyrazinamide

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

Table Cvi: Treatment status at 12 months of all rifampicin sensitive, non-CNS, miliary, spinal or cryptic TB notifications by London clinics, 2012

	2012 Total Notifs	Treatment completed	Died	Lost to follow up	Still on treatment	Treatment stopped	Not Evaluated
Edgware TB Clinic	86	92%	1%	4%	4%	0%	0%
Great Ormond Street Hospital	4	75%	0%	0%	25%	0%	0%
North Middlesex Hospital	127	85%	3%	3%	4%	5%	0%
Royal Free	59	81%	5%	2%	5%	7%	0%
TB Service NCL - South Hub	58	88%	3%	2%	7%	0%	0%
UCLH TB Service	102	92%	4%	1%	0%	2%	1%
North Central	**436**	**88%**	**3%**	**2%**	**4%**	**3%**	**0%**
Havering TB Service	63	81%	5%	3%	6%	5%	0%
Homerton	82	85%	2%	0%	10%	2%	0%
King George Hospital	106	85%	7%	4%	2%	1%	2%
Mile End Hospital	183	84%	3%	3%	8%	2%	1%
Newham Chest Clinic	263	84%	2%	8%	6%	0%	0%
Whipps Cross University Hospital	129	89%	2%	4%	2%	2%	1%
North East	**826**	**85%**	**3%**	**5%**	**6%**	**1%**	**1%**
Central Middlesex Hospital	89	85%	1%	6%	8%	0%	0%
Charing Cross Hospital	53	83%	4%	6%	6%	0%	2%
Chelsea & Westminster	35	77%	11%	3%	6%	0%	3%
Ealing Hospital	192	85%	1%	5%	9%	0%	0%
Hammersmith Hospital (ICH NHS Trust)	46	80%	4%	11%	0%	0%	4%
Harefield Hospital	4	75%	0%	25%	0%	0%	0%
Hillingdon Hospital	104	90%	2%	2%	5%	0%	1%
Northwick Park Hospital	322	88%	2%	4%	6%	1%	1%
Royal Brompton	6	67%	0%	17%	17%	0%	0%
St Mary's (ICH NHS Trust)	89	92%	2%	1%	5%	0%	0%
West Middlesex University Hospital	127	78%	2%	5%	14%	1%	1%
North West	**1067**	**85%**	**2%**	**4%**	**7%**	**0%**	**1%**
Bromley TB Service	19	84%	11%	5%	0%	0%	0%
Kings College Hospital	99	87%	4%	7%	2%	0%	0%
Queen Elizabeth Hospital	101	84%	4%	3%	9%	0%	0%
St Thomas' Hospital	104	93%	1%	0%	3%	1%	2%
University Hospital Lewisham	64	84%	6%	5%	3%	2%	0%
South East	**387**	**87%**	**4%**	**4%**	**4%**	**1%**	**1%**
Croydon University Hospital	103	81%	6%	7%	5%	2%	0%
Epsom and St Helier NHS Trust	51	88%	6%	2%	4%	0%	0%
Kingston Hospital	33	88%	3%	0%	9%	0%	0%
St George's Hospital	147	86%	1%	5%	5%	1%	2%
South West	**334**	**85%**	**4%**	**5%**	**5%**	**1%**	**1%**
London	**3050**	**86%**	**3%**	**4%**	**6%**	**1%**	**1%**

Treatment status is collected one year after notification, shown are notifications for 2012 with outcomes collected one year later in 2013 on the LTBR

Table Cvii: Treatment status at 12 months of all rifampicin sensitive, CNS, miliary, spinal or cryptic TB notifications by London clinics, 2012

	2012 Total Notifs	Treatment completed	Died	Lost to follow up	Still on treatment	Treatment stopped	Not Evaluated
Edgware TB Clinic	1	100%	0%	0%	0%	0%	0%
Great Ormond Street Hospital	1	0%	0%	0%	100%	0%	0%
North Middlesex Hospital	15	33%	7%	0%	53%	7%	0%
Royal Free	12	58%	0%	0%	42%	0%	0%
TB Service NCL - South Hub	4	25%	0%	0%	75%	0%	0%
UCLH TB Service	18	67%	6%	11%	17%	0%	0%
North Central	**51**	**51%**	**4%**	**4%**	**39%**	**2%**	**0%**
Havering TB Service	13	31%	8%	0%	62%	0%	0%
Homerton	6	67%	17%	0%	17%	0%	0%
King George Hospital	8	63%	13%	0%	25%	0%	0%
Mile End Hospital	32	56%	3%	25%	16%	0%	0%
Newham Chest Clinic	29	38%	3%	7%	52%	0%	0%
Whipps Cross University Hospital	9	33%	11%	22%	22%	0%	11%
North East	**97**	**46%**	**6%**	**12%**	**34%**	**0%**	**1%**
Central Middlesex Hospital	5	20%	20%	0%	60%	0%	0%
Charing Cross Hospital	19	53%	11%	0%	37%	0%	0%
Chelsea & Westminster	3	33%	0%	0%	33%	0%	33%
Ealing Hospital	19	42%	5%	16%	37%	0%	0%
Hammersmith Hospital (ICH NHS Trust)	4	50%	0%	0%	50%	0%	0%
Harefield Hospital	50	44%	8%	6%	40%	0%	2%
Hillingdon Hospital	6	33%	0%	0%	67%	0%	0%
Northwick Park Hospital	40	63%	0%	10%	28%	0%	0%
Royal Brompton	0	-	-	-	-	-	-
St Mary's (ICH NHS Trust)	11	82%	0%	0%	18%	0%	0%
West Middlesex University Hospital	21	33%	14%	14%	38%	0%	0%
North West	**178**	**49%**	**6%**	**7%**	**37%**	**0%**	**1%**
Bromley TB Service	0	-	-	-	-	-	-
Kings College Hospital	17	77%	6%	0%	18%	0%	0%
Queen Elizabeth Hospital	22	36%	5%	0%	59%	0%	0%
St Thomas' Hospital	11	64%	0%	0%	27%	9%	0%
University Hospital Lewisham	7	71%	0%	0%	29%	0%	0%
South East	**57**	**58%**	**4%**	**0%**	**37%**	**2%**	**0%**
Croydon University Hospital	6	50%	0%	0%	50%	0%	0%
Epsom and St Helier NHS Trust	0	-	-	-	-	-	-
Kingston Hospital	2	50%	0%	0%	0%	50%	0%
St George's Hospital	29	31%	10%	10%	48%	0%	0%
South West	**37**	**35%**	**8%**	**8%**	**46%**	**3%**	**0%**
London	**420**	**49%**	**6%**	**7%**	**37%**	**1%**	**1%**

Treatment status is collected one year after notification, shown are notifications for 2012 with outcomes collected one year later in 2013 on the LTBR

Table Cviii: Treatment status at 24 months of all rifampicin resistant TB notifications by London clinics, 2011

	2011 Total Notifs	Treatment completed	Died	Lost to follow up	Still on treatment	Treatment stopped	Not Evaluated
Edgware TB Clinic	2	100%	0%	0%	0%	0%	0%
Great Ormond Street Hospital	0	-	-	-	-	-	-
North Middlesex Hospital	3	33%	0%	0%	33%	33%	0%
Royal Free	2	100%	0%	0%	0%	0%	0%
TB Service NCL - South Hub	0	-	-	-	-	-	-
UCLH TB Service	2	50%	0%	50%	0%	0%	0%
North Central	**9**	**67%**	**0%**	**11%**	**11%**	**11%**	**0%**
Havering TB Service	0	-	-	-	-	-	-
Homerton	0	-	-	-	-	-	-
King George Hospital	0	-	-	-	-	-	-
Mile End Hospital	0	-	-	-	-	-	-
Newham Chest Clinic	4	75%	0%	0%	25%	0%	0%
Whipps Cross University Hospital	0	-	-	-	-	-	-
North East	**4**	**75%**	**0%**	**0%**	**25%**	**0%**	**0%**
Central Middlesex Hospital	3	67%	0%	33%	0%	0%	0%
Charing Cross Hospital	1	100%	0%	0%	0%	0%	0%
Chelsea & Westminster	0	-	-	-	-	-	-
Ealing Hospital	1	0%	0%	0%	100%	0%	0%
Hammersmith Hospital (ICH NHS Trust)	1	0%	0%	100%	0%	0%	0%
Harefield Hospital	0	-	-	-	-	-	-
Hillingdon Hospital	2	50%	0%	0%	50%	0%	0%
Northwick Park Hospital	3	33%	0%	33%	33%	0%	0%
Royal Brompton	0	-	-	-	-	-	-
St Mary's (ICH NHS Trust)	4	50%	0%	25%	25%	0%	0%
West Middlesex University Hospital	1	0%	0%	0%	0%	100%	0%
North West	**16**	**44%**	**0%**	**25%**	**25%**	**6%**	**0%**
Bromley TB Service	0	-	-	-	-	-	-
Kings College Hospital	2	50%	0%	50%	0%	0%	0%
Queen Elizabeth Hospital	2	0%	0%	0%	100%	0%	0%
St Thomas' Hospital	4	100%	0%	0%	0%	0%	0%
University Hospital Lewisham	3	33%	0%	0%	67%	0%	0%
South East	**11**	**55%**	**0%**	**9%**	**36%**	**0%**	**0%**
Croydon University Hospital	0	-	-	-	-	-	-
Epsom and St Helier NHS Trust	0	-	-	-	-	-	-
Kingston Hospital	0	-	-	-	-	-	-
St George's Hospital	2	50%	0%	50%	0%	0%	0%
South West	**2**	**50%**	**0%**	**50%**	**0%**	**0%**	**0%**
London	**42**	**55%**	**0%**	**17%**	**24%**	**5%**	**0%**

Treatment status is collected two years after notification for rifampicin resistant TB notifications, shown are notifications for 2011 with outcomes collected two years later in 2013 on the LTBR

Appendix D: Local authority TB profiles

Please see the separate documents, Appendix D: Local authority TB profiles, for further information about TB cases among residents of London local authorities with a high TB burden (≥20 per 100,000 population and ≥30 cases).