Public Health England

Tuberculosis in London:
Annual review (2012 data)

Data from 1999 to 2012

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Executive summary

In 2012, 3426 tuberculosis (TB) cases were reported among London residents, a rate of 41 per 100,000 population. After two decades of increase, TB rates in London have stabilised: but remain considerably higher compared to other parts of the UK, accounting for 39% of notified cases across the UK, almost 3500 patients per year.

The highest numbers and rates were among residents of Newham and Brent, but within a number of local authorities small pockets of very high incidence can be found. Young adults were most affected, notably males aged 20-29 years old. There was, however, an increase in the number of children aged under five: almost all of whom were UK born. BCG coverage was 73% of all cases, and 91% of children under five.

The majority of cases continue to occur among those born outside the UK, although the rate in the London UK born population remains twice that of those living across the whole of the UK. India, Pakistan and Somalia were the most common countries of birth of non-UK born patients: TB rates were highest and continuing to increase among the Indian population. While the rate among black Africans continues to decline in London, they still accounted for 21% of patients notified in 2012. With just 14% of all TB cases in 2012 having entered the UK within the previous two years, many have been resident here for long periods of time prior to their TB diagnosis.

As in recent years, less than half of all cases reported in 2012 were of pulmonary disease. A sputum smear result was known for only 76%: almost half of these were sputum smear positive, 16% of all cases. A quarter of patients had extra-thoracic lymph node TB.

In 2012, 260 patients had one or more social risk factor, and multiple problems were common. Social risk factors were more common among the UK born, males, white and black Caribbean ethnic groups. A higher proportion of individuals with these risk factors had pulmonary TB, and 39% were sputum smear positive.

While information on onset of symptoms should be interpreted with caution, a high proportion (34% of all patients, and 28% of those with pulmonary TB) had been symptomatic for more than three months before diagnosis: older patients were more likely to experience delays.

Almost all patients were offered an HIV test, and uptake of testing was also extremely high. Rates of TB-HIV co-infection continue to decrease across England, Wales and Northern Ireland.

In 2012, 71% of pulmonary cases and 50% of those with extra-pulmonary TB were confirmed by culture. This varied across the city, with the highest proportion of culture confirmed pulmonary cases in south east London and the lowest in north central and south west London.

Resistance to one or more first line anti-TB drug reduced from 10% in 2011 to 8% in 2012, although the proportion with multi-drug resistant disease stayed constant at 1.8%. Isoniazid resistant TB was equally common among UK and non-UK born patients, but more often among those of black Caribbean ethnicity. Multi-drug resistant TB, however, was more common among the non-UK born. Drug resistance was more common among those with a social risk factor and also infectious forms of TB: one in ten patients with sputum smear positive pulmonary disease had drug resistant TB.

In 2012, 48% of patients with a strain type clustered with at least one other patient, and the proportion of cases of TB attributable to recent transmission was estimated to be 26%. This varied across London: in four local authorities more than a third of notified TB cases were part of a cluster. Most clusters were small (over half had just two patients), but 37 London clusters were identified between 2010 and 2012 that contained ten or more individuals. During 2012, PHE London Health Protection Teams investigated 44 clusters, involving 422 cases. Clustering with other cases was more common among UK born, black African or black Caribbean individuals, those with pulmonary disease and with social risk factors. Among the non-UK born, those born in Somalia were more likely to be clustered, and those born in India or Bangladesh were less often part of a cluster.

Of the TB cases notified in 2011, 87% (excluding those with rifampicin resistance) completed treatment within 12 months. The most common reason for not completing was being lost to follow-up – almost half of whom were known to have left the UK – with a further 4% still on treatment. While the proportion dying was small (3%), TB caused or contributed to almost half of these deaths. The lowest levels of treatment completion were among older patients, males, those with social risk factors, the non-UK born Chinese, black Caribbean and white ethnic groups, and the UK born white patients.

Of the 34 cases of rifampicin resistant disease notified in 2010, at 24 months: 24 had completed treatment, four were still on treatment, four were lost to follow up (all of whom left the UK) and two had their treatment stopped (because of non-adherence).

Despite rates stabilising in recent years, TB remains a serious public health problem in London. This report updates the latest epidemiology of TB in London, describing the areas and populations at increased risk. For example, while a small proportion of all patients, the impact of those with social risk factors is likely to be disproportionate as

they were more likely to have infectious and drug resistant forms of disease, be part of clusters, and not complete treatment.

We recommend the following to PHE and NHS colleagues to improve and support the basic elements of TB control, which are prompt identification of active cases of disease, supporting patients to successfully complete treatment, and preventing new cases of disease occurring:

- highly targeted case finding and prevention activities among high risk groups;
- implementation of recent NICE guidance for tackling TB in hard to reach groups and screening for latent infection;
- the use of RCN guidance on case management and cohort review;
- increasing culture confirmation rates;
- and continued and expanded use of cohort review:

As in previous years, wider recommendations for TB control should reflect back on the recommendations in the comprehensive PHAST review in 2010, which have since been incorporated into the London TB Model of Care. These included central leadership and management for TB in London, standardisation of clinical policies and practices, revision of, and standardised monitoring of, key objectives, along with suggestions for accessibility and responsiveness of services, and lead providers, and should remain at the forefront of the new moves to create a London TB Control Board.

More detailed information is available in the appendices. This includes information on TB residents (Appendix B), all patients notified by London clinics (Appendix C), and detailed profiles of each local authority (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 cases

Objectives

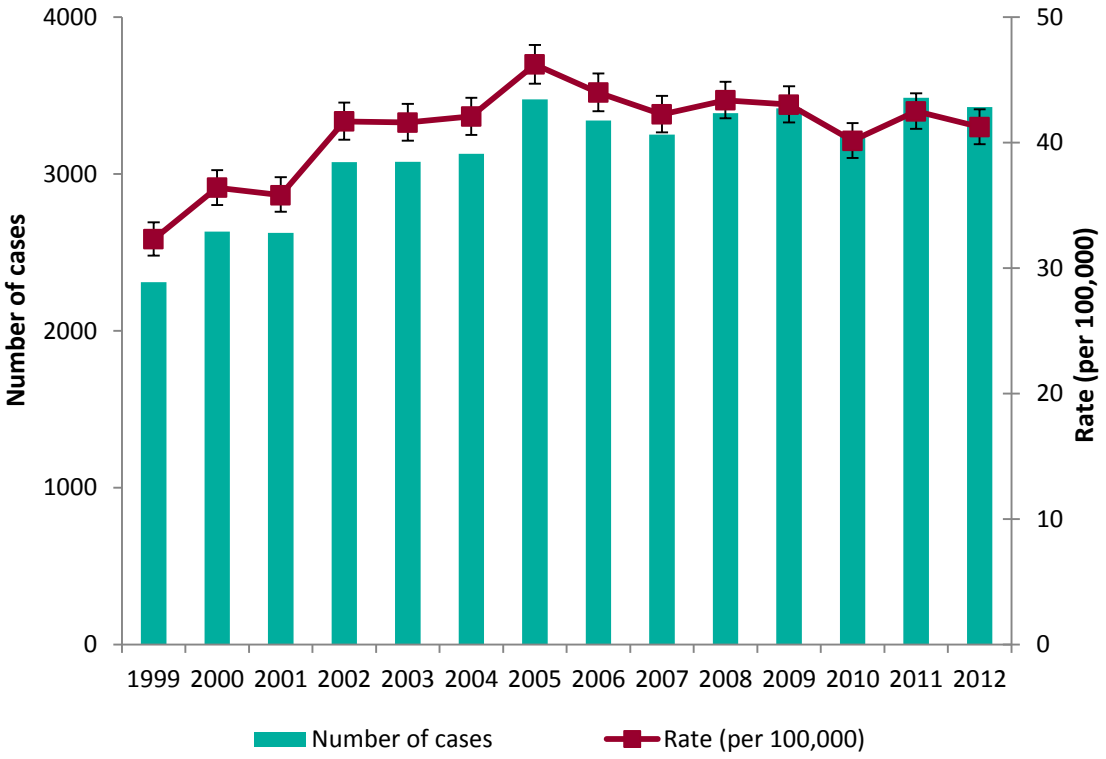
This report describes the recent epidemiology of tuberculosis in London. We aim to update public health, clinical and allied colleagues of the latest trends, identify areas where there is a high burden of disease, at risk population groups, and opportunities for interventions and prevention of future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

Tuberculosis epidemiology

Overall numbers, rates and geographical distribution

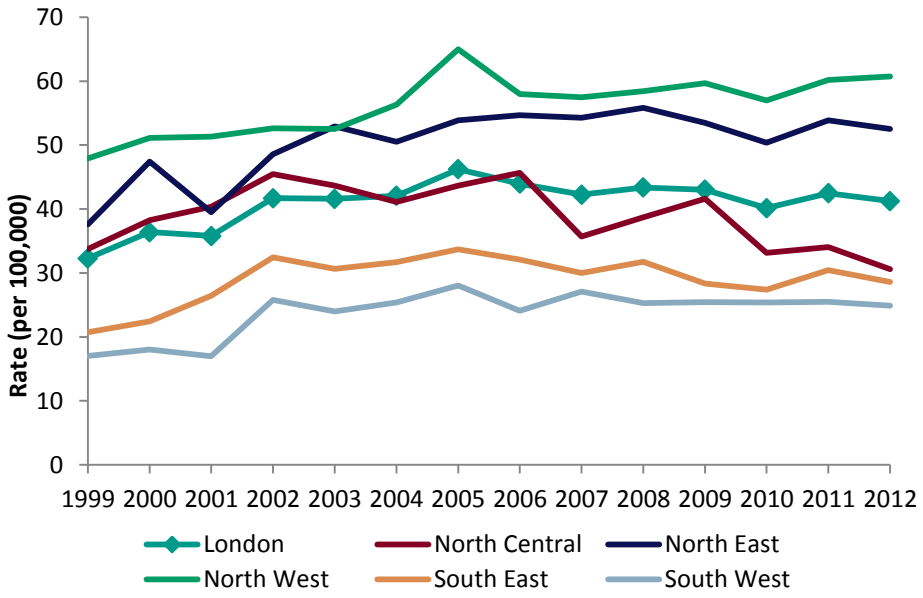
In 2012, 3426 tuberculosis (TB) cases were reported among London residents, a rate of 41 per 100,000 population. As in previous years, London accounted for 39% of the 8751 TB cases reported in the UK in 2012, and had the highest rate of disease[1]. After increasing up to 2005, the number and rate of TB has remained fairly stable in recent years (Figure 1).

Figure 1: Tuberculosis case reports and rates, London, 1999 – 2012



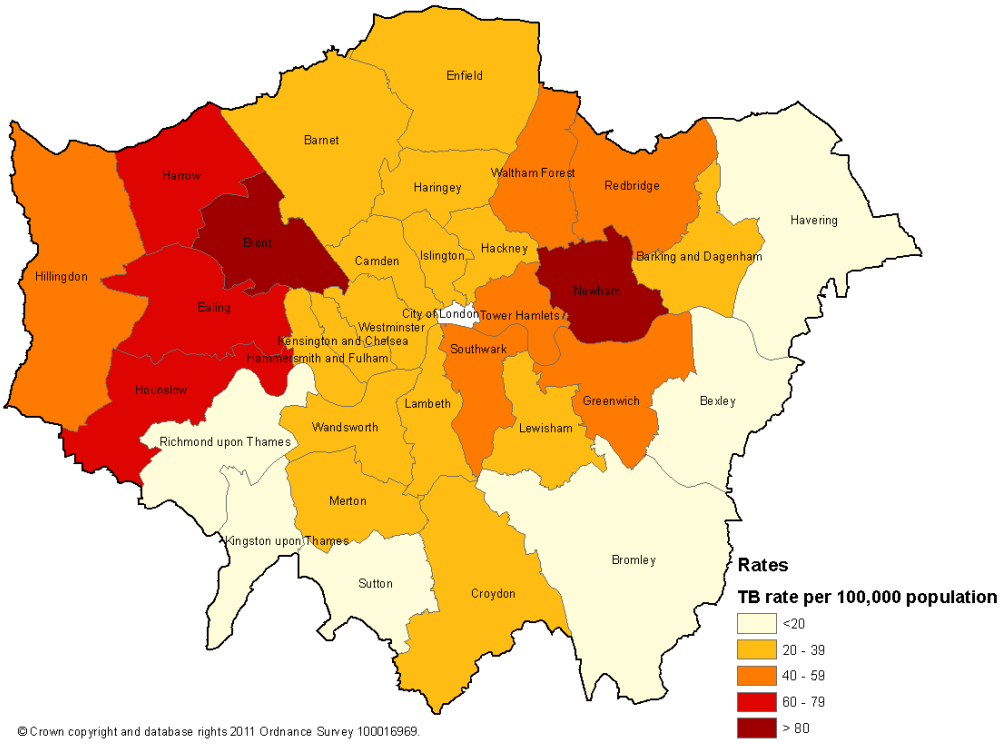
The highest rates and numbers continue to be in north west London: most other sectors remained stable, or decreased slightly in 2012 compared to 2011 (Figure 2).

Figure 2: Tuberculosis case rates by London Health Protection Team, 1999 – 2012



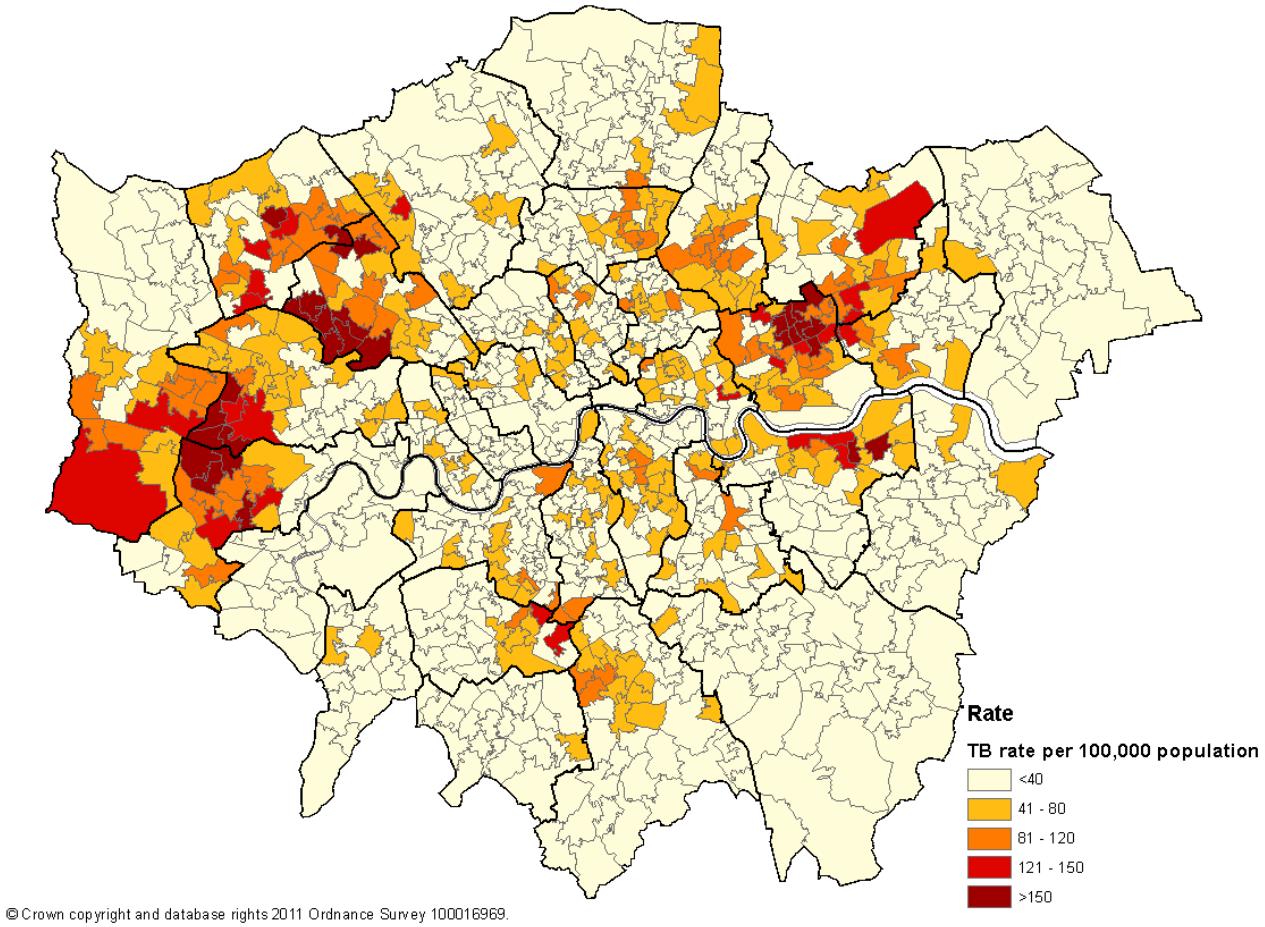
As in previous years, the highest numbers and rates were reported among residents of Newham (366 cases, 117 per 100,000) and Brent (313, 100 per 100,000) local authorities, followed by Ealing (253 cases, 75 per 100,000) (Figure 3).

Figure 3: TB rate by local authority of residence, London 2012



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

Figure 4: TB rates by MSOA of residence, London 2012



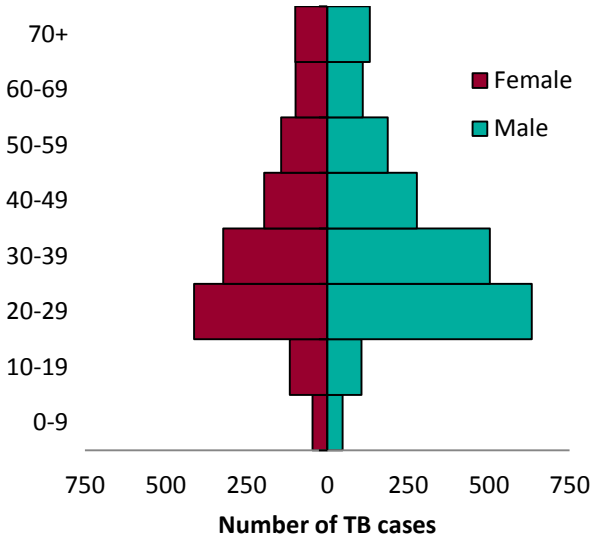
Demographic characteristics

Age and sex

In 2012, 58% of TB patients were male – the proportion of males was higher across all ages, but particularly noticeable among those aged 20-39 years (Figure 5).

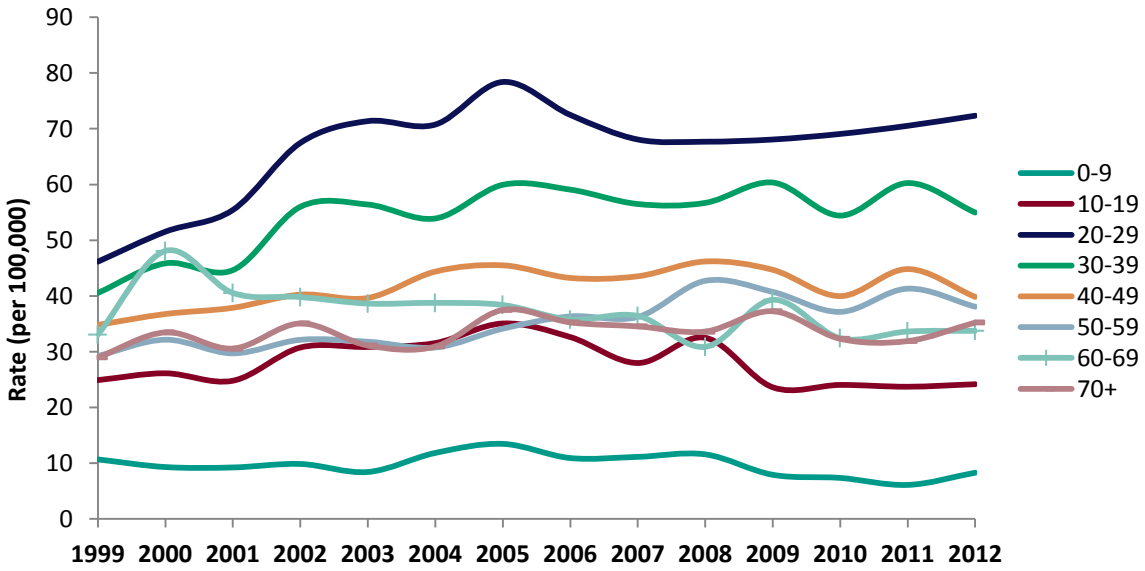
The highest rate of TB continues to be among those aged 20-29, and particularly among males (89 per 100,000 population) (Figure 6).

Figure 5: Age and sex of tuberculosis patients, London, 2012



In 2012, 177 children aged less than 16 years old were reported, similar to previous years (a rate of 10/100,000). There was, however, an increase in the number of children aged under five: 60 children were diagnosed with TB, (compared to approximately 40 reported during recent years), a rate of 10 per 100,000 population. Almost all were UK born (95%, 56/59 where known); 37% (22) were black African, 20% (12) Indian and 12% (7) white. The highest rates in children were among the black African population: 45 per 100,000 and 36 per 100,000 among those aged under 16 and 5 years old, respectively. Next highest rates were among those of Indian ethnicity, of 22 and 44 per 100,000 among under 16 and 5 year olds, respectively.

Figure 6: Tuberculosis case rates by age group, London, 1999 - 2012



Place of birth and time since entry

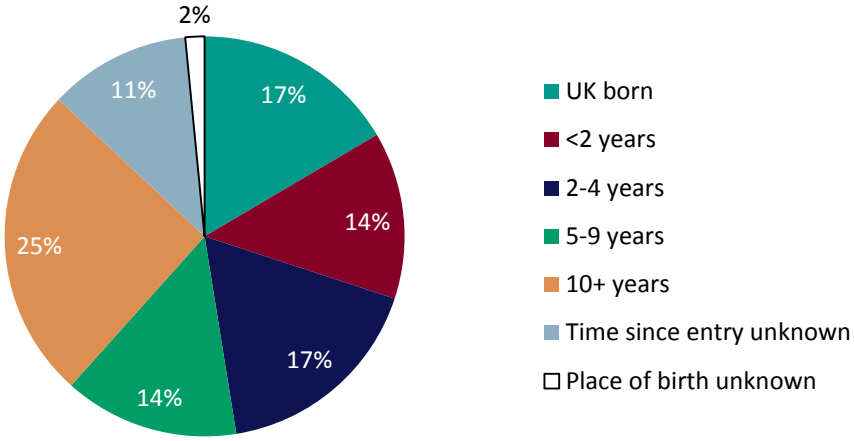
In 2012, 83% of TB patients were born outside of the UK, and rates in the non-UK born remain around ten times greater than among those born in the UK born. Among the UK born population, however, 566 cases did occur, a rate of 11 per 100,000: this was a slight increase compared to 2011 (505 cases, 10 per 100,000), and twice the rate of the UK born across the rest of the country (4 per 100,000)[1].

Figure 7: Tuberculosis case numbers and rates by place of birth, London, 2004 - 2012

As in previous years, the most common country of birth of non-UK born cases was India (911, 33%). This was followed by Pakistan (302, 11%), Somalia (250, 9%), Bangladesh (175, 6%), Nigeria (104, 4%) and Nepal (103, 4%). In London, the most common country of birth of those not born in the UK is currently India, followed by Poland, Pakistan, Ireland, Germany and Bangladesh.

Although the majority of TB patients in London were born abroad, only 14% were recent entrants to the UK (i.e. entered within the previous two years, Figure 8). Among the non-UK born, 36% (869/2414) had been in the UK for ten or more years prior to diagnosis.

Figure 8: Tuberculosis case numbers by place of birth and time since entry, London, 2012



Ethnicity

Information on ethnicity was known for 3396 patients in 2012. The most common ethnic group was Indian, accounting for a third of all cases (1103, Figure 9). This was followed by 21% black African (709 cases), with 10% white (343) and 10% Pakistani (347).

In 2012, TB rates were highest (199 per 100,000 population) and continued to increase among the Indian population of London (Figure 10). These were followed by the Pakistani population at 149 per 100,000, which has also seen a slight increase since 2010. The rate among black Africans continued to decline in London, to 119 per 100,000 population in 2012.

Figure 9: Ethnic group of tuberculosis cases, London 2012

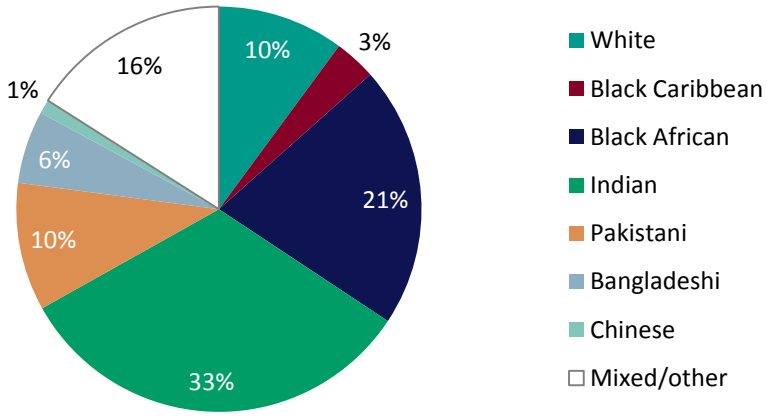
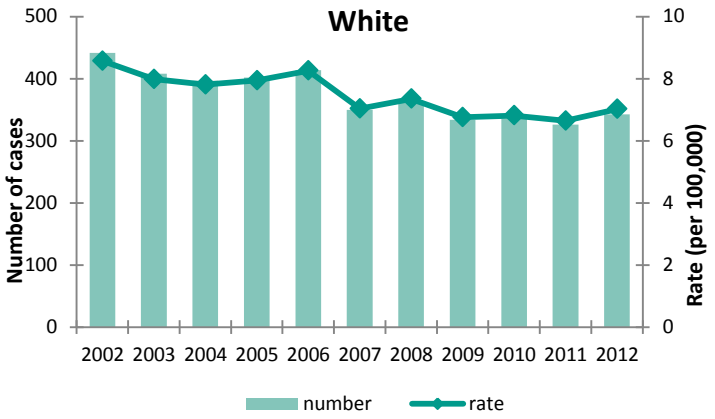
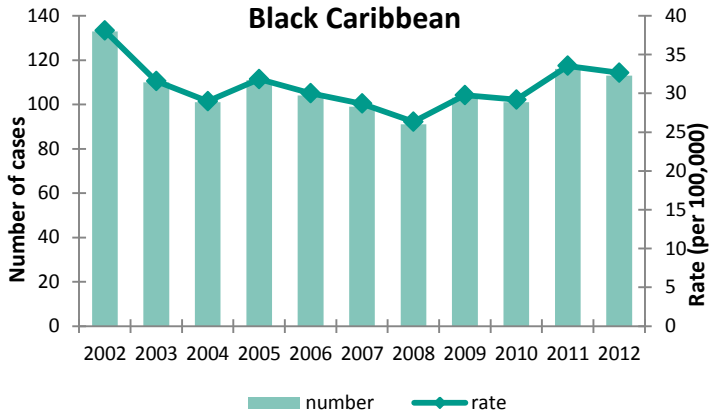
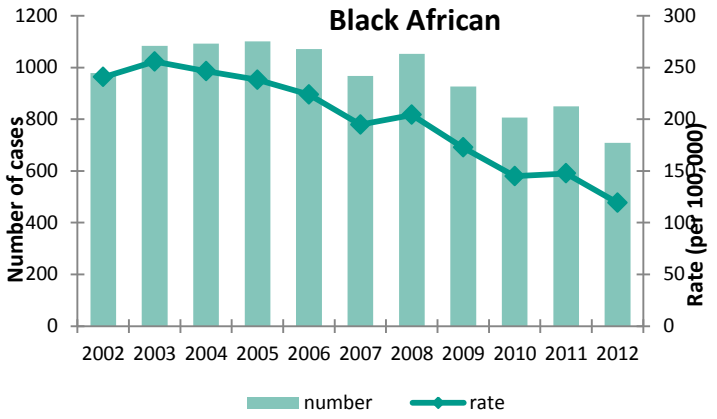
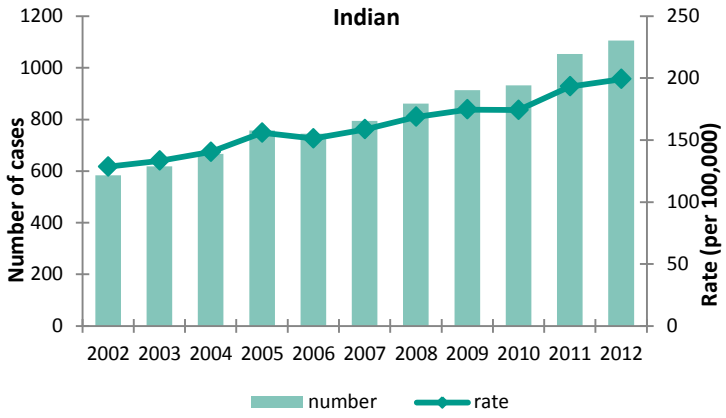


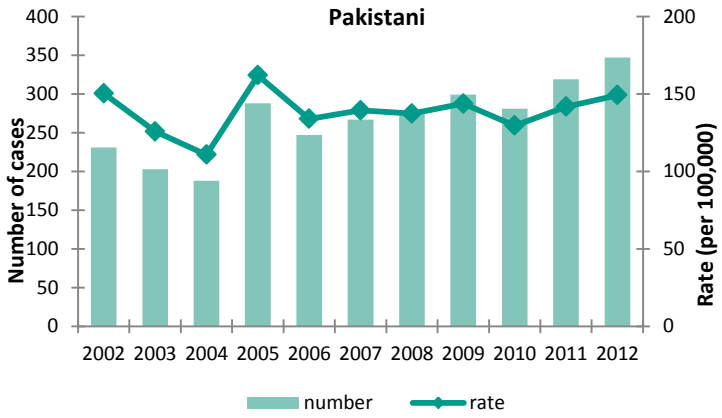
Figure 10: TB rate by ethnic group, London, 2002 - 2012

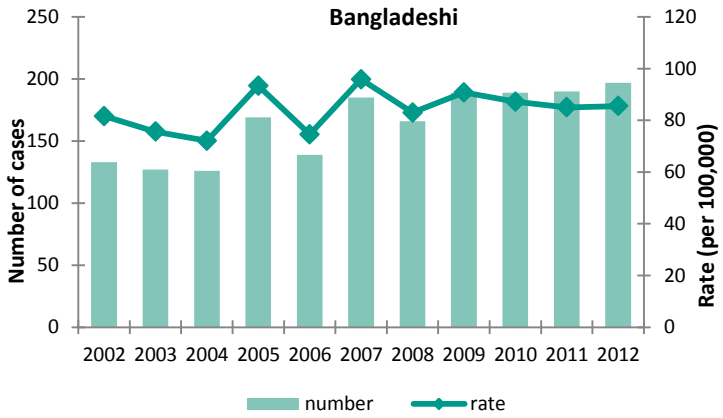












Social risk factors

In 2012, 260 patients were reported as having one or more social risk factor (8%). These were more common amongst patients in north east and north central London (10%, 90 and 43 respectively). For each risk factor, 3.3% reported alcohol misuse (103/3120), 3.1% drug use (103/3250), 3.0% reported homelessness (100/3293) and 2.6% imprisonment (84/3258). Multiple issues were common, with more than a third of these reporting more than one factor (35%, 91/260), accounting for 2.7% of all TB patients.

More than one in five of white and black Caribbean TB patients had at least one social risk factor. Those born in the UK were more likely to have these risk factors (15%, 80/551 vs. 6%, 176/2744), as were male patients (12%, 228/1929 vs. 2%, 32/1397). Among those born abroad, social risk factors were particularly prevalent in those from Eastern Europe, with over a quarter reporting at least one (26%, 5/19) – but these only accounted for 2% of all those with risk factors, while 31% were born in the UK.

The majority of patients with social risk factors had pulmonary disease (72%, 188), and 39% (101) had sputum smear positive TB.

Clinical characteristics

Site of disease

Table 2: Site of disease of TB cases, London 2012

Site of disease	2012	
	n	%
Pulmonary	1647	48
Lymph Node (extra thoracic)	826	24
IT Lymph Nodes	350	10
Pleural	293	9
Other	270	8
Bone/Joint (spine)	192	6
Genitourinary	43	1
Miliary	67	2
Bone/Joint (other - not spine)	99	3
CNS (meningitis)	78	2
Gastrointestinal/Peritoneal	180	5
CNS (Other - not meningitis)	35	1
Cryptic Disseminated	15	0
Laryngeal	2	0

As in recent years, less than half (48%) of all TB cases reported in 2012 had pulmonary disease. The next most common site of disease remains extra-thoracic lymph node TB, which accounts for almost a quarter of all cases (Table 2).

Pulmonary disease was more common among the UK born: 67% (379/566) vs. 44% (1241/2804) among the non-UK born in 2012. It therefore also varied across London, with the highest proportion of pulmonary cases in Lambeth (60%, 59/98), and the lowest in Westminster and Enfield (35% in each, 28/79 and 18/51, respectively).

Previous diagnosis of tuberculosis

Between 1999 and 2011, 6-10% of cases reported a previous history of TB. In 2012, this had reduced slightly to 5% (173/3307).

BCG vaccination

Information on BCG vaccination was available on 78% of cases in 2012 (2674), and 73% of these reported being vaccinated (Table 3). A higher proportion of children had been vaccinated: 91% of those under five (among those where this was reported: information was missing for six patients under five years old).

Table 3: Number and proportion of TB cases with BCG vaccination, London 2012

	All ages		<16 years old		<5 years old	
	n /N	%	n /N	%	n /N	%
UK born	310 /446	70	79 /96	82	47 /51	92
Non-UK born	1640 /2207	74	36 /52	69	1 /2	50
All cases	1963 /2674	73	118 /151	78	49 /54	91

Time symptomatic

The time between onset of symptoms and starting treatment was available for just over half of all patients in 2012 (55%, 1872). About a third had been symptomatic for more than three months (34%, 642) although this was lower among pulmonary cases (28%, 270/950). Older patients were more likely to have more than three months delay to diagnosis (40% (40/101) among those aged 65 and over, 33% (57/171) among those aged 45 to 64, 27% (165/620) among those 15 to 44 and 14% (8/58) among those aged under 15 years old).

There was little difference between those born in the UK or abroad (36%, 111/309 vs. 34%, 526/1542), but those of white ethnicity were most likely to have more than three month delay (42%, 81/191).

HIV testing and HIV / TB co-infection

Information on HIV testing was available for almost all patients (3408 /3426), and 97% were offered an HIV test, or their HIV status was already known (3290 patients). Uptake of testing was extremely high, and 92% of patients actually had an HIV test, or their status was already known (3128).

The most recent year for which TB-HIV co-infection estimates are available is 2011: 3.8% (127/3372) of London TB cases aged 15 and over were co-infected with HIV, similar to the average for England, Wales and Northern Ireland (3.6%, 296/8120). This is a continuation of the downward trend observed since the proportion peaked at 9% in 2003. London accounts for almost half of all co-infected patients in England, Wales and Northern Ireland, 45% (127/296).

Figure 11: Proportion of tuberculosis cases estimated to be co-infected with HIV, London vs. England, Wales and Northern Ireland, 2001 – 2011

Microbiological information

Sputum smear and culture confirmation

Of the 1647 pulmonary cases in 2012, only 76% (1251) had a sputum smear result. Of these, 45% (564) were sputum smear positive, 16% of all cases.

In 2012, 60% of cases were confirmed by culture (2051). This increased to 71% (1165) among pulmonary cases vs. 50% among those with extra-pulmonary disease

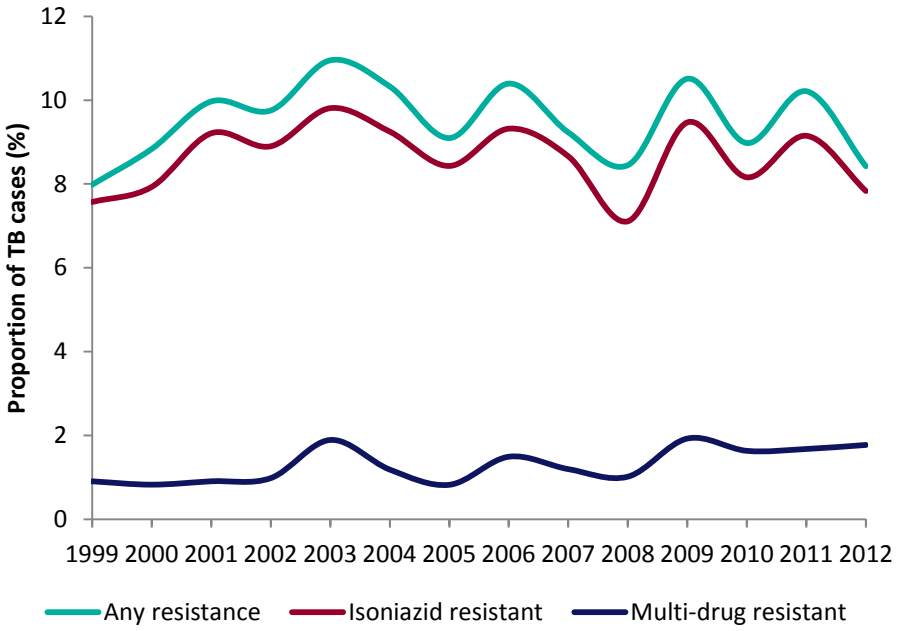
(886/1776). This varied across London, with the highest proportion of culture confirmed pulmonary cases in south east London (79%, 209/266), and just 66% confirmed among pulmonary cases in north central and south west London (141/214 and 122/185, respectively).

Drug resistance

Overall drug resistance and geographical distribution

The proportion of TB cases resistant to one or more first line drug reduced to 8% (171 /2030) in 2012 compared to 2011 (10.2%, 201 /1968), although has remained between 8 and 11% since 1999 (Figure 12). This was a reflection of a slight decrease in isoniazid resistant disease (to 8%, 159 in 2012), while the proportion with multi-drug resistant disease stayed constant at 1.8% (36).

Figure 12: Proportion of TB cases with first line drug resistance, London 1999 – 2012



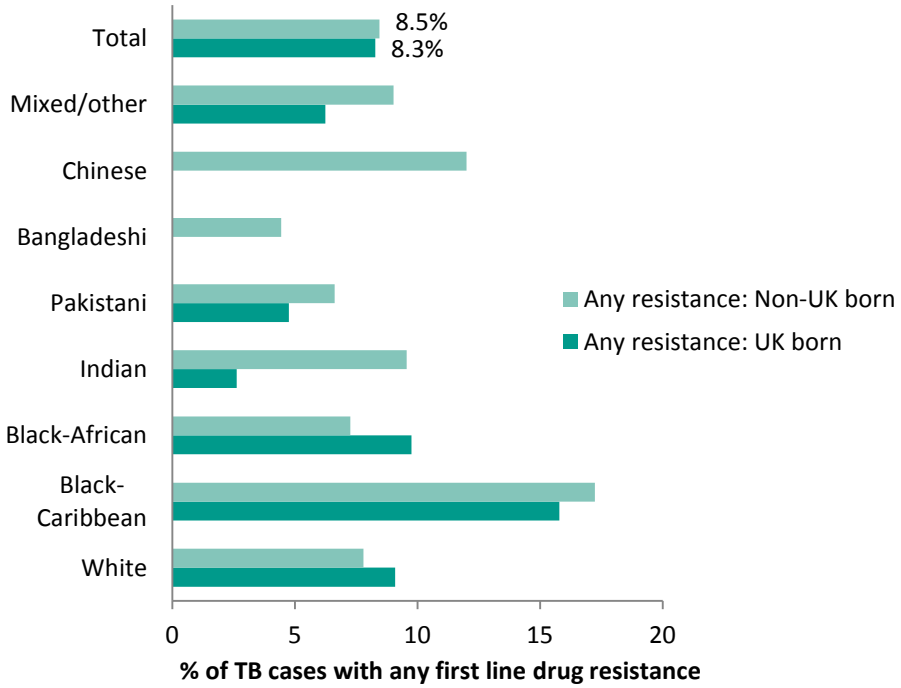
Demographic characteristics

Older patients (over 65 years) were slightly less likely to have drug resistant TB (6%, 11/173) compared to all other age groups (9%, 160/1857). Drug resistant disease was similar among males and females in 2012 (9%, 107/1236, vs. 8%, 64/794). Multi-drug resistant TB, however, was twice as frequent among males (2.3%, 28 vs.1.0%, 8).

There was no difference between the levels of drug resistance in UK born and non-UK born cases (Figure 13). This was a reflection of similar levels of isoniazid resistance (8%) in UK born and non-UK born London TB cases (24/302 and 131/1680). Any first

line drug resistance, and isoniazid resistant disease were more common among those of black Caribbean ethnicity; both UK and non-UK born. Multi-drug resistant TB was more common among non-UK born cases (1.9%, 3, vs. 1.0%, 32). Although the highest proportion of multi-drug resistance was among black Caribbean patients, nearly 40% of all multi-drug resistant TB cases were non-UK born Indian TB patients.

Figure 13: Drug resistance among tuberculosis cases by ethnic group and place of birth, London, 2012



Site of disease

Drug resistance was more common among those with pulmonary forms of disease: 9% (109/1155) vs. 7% (62/875). One in ten sputum smear positive patients had drug resistant TB (10%, 53/512).

Previous history

Patients with a previous history of TB were much more likely to have drug resistance (17%, 14/83) than those without a history of TB (8%, 151/1868). The majority of resistant cases, however, occurred in individuals who did not have a history of TB (92%, 151/165).

Social risk factors

Patients with a social risk factor were much more likely to have drug resistance (14%, 27/188) than those without (8%, 138/1778). Overall, 18% of all isoniazid resistant TB

cases in London occurred in individuals with social risk factors (27/153), as did 15% of all multi-drug resistant TB cases (5/34).

TB clusters identified through molecular strain typing

The PHE National Strain Typing Service was established in January 2010: all culture positive TB isolates are typed using 24 loci mycobacterial interspersed repetitive unit-variable number tandem repeats (MIRU-VNTR). Cases with an identical strain pattern are considered clustered.

Cluster rate

Since 2010, 4999 London residents have had a culture positive TB isolate strain typed (Table 4). There has been an increase each year in the proportion of strain typed TB cases as well as an increase in the number of clusters in London.

Table 4: Clustering of TB cases in London, 2010-2012

Year	Notified cases	Culture confirmed		Strain typed cases*		Clustered cases		No. clusters	Estimated % cases due to recent transmission***
		n	%	n	% of culture confirmed	n**	% of strain		
2010	3236	1888	58	1376	73	628	46	333	21
2011	3485	2058	59	1764	86	772	44	393	21
2012	3426	2051	60	1859	91	886	48	404	26
2010-2012	10147	5997	59	4999	83	2286	46	593^	34

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

** Cases that cluster with at least one other case notified in 2010, 2011 or 2012

*** (no. of isolates in clusters-no. of clusters)/total no isolates with a strain type

^ The total no. of clusters reported between 2010 and 2012 is less than the sum of clusters reported each year as clusters can span more than one year

In 2012, 1859 culture confirmed cases of TB in London residents had a strain type with a MIRU-VNTR profile with at least 23 complete loci (54% of all 3426 reported cases, and 91% of the 2051 culture confirmed cases). Of these 973 cases (52%) had a unique strain type in London. The remaining 886 clustered with at least one other case since 2010, a cluster rate of 48%. The proportion of cases of TB attributable to recent transmission in London in 2012 (using the n-1 method which discounts the first member of each cluster[2]) was estimated to be 26%. In total, 404 molecular clusters were reported in 2012, an increase on the numbers reported in 2010 and 2011.

North west London had the highest number of cases in clusters (300 cases) while the south east sector had the highest proportion of all cases with a valid strain type that were in clusters (59%), (Table 5). The estimated proportion of cases due to recent transmission ranged from 9% in south west London to 27% in south east London.

Table 5: Sector level clustering of TB cases in London, 2012

	Notified cases	Culture confirmed cases		Strain typed cases*		Clustered cases		No. clusters	Estimated % cases due to recent transmission***
		n	%	n	% of culture confirmed	n**	% of strain typed		
North Central London	421	228	54	209	92	94	45	74	10
North East London	953	562	59	511	91	236	46	157	15
North West London	1213	726	60	653	90	300	46	189	17
South East London	484	323	67	294	91	173	59	95	27
South West London	355	212	60	192	91	83	43	65	9
London	**3426**	**2051**	**60**	**1859**	**91**	**886**	**48**	**404^**	**26**

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

** 2012 cases that cluster with at least one other case notified in 2010, 2011, 2012

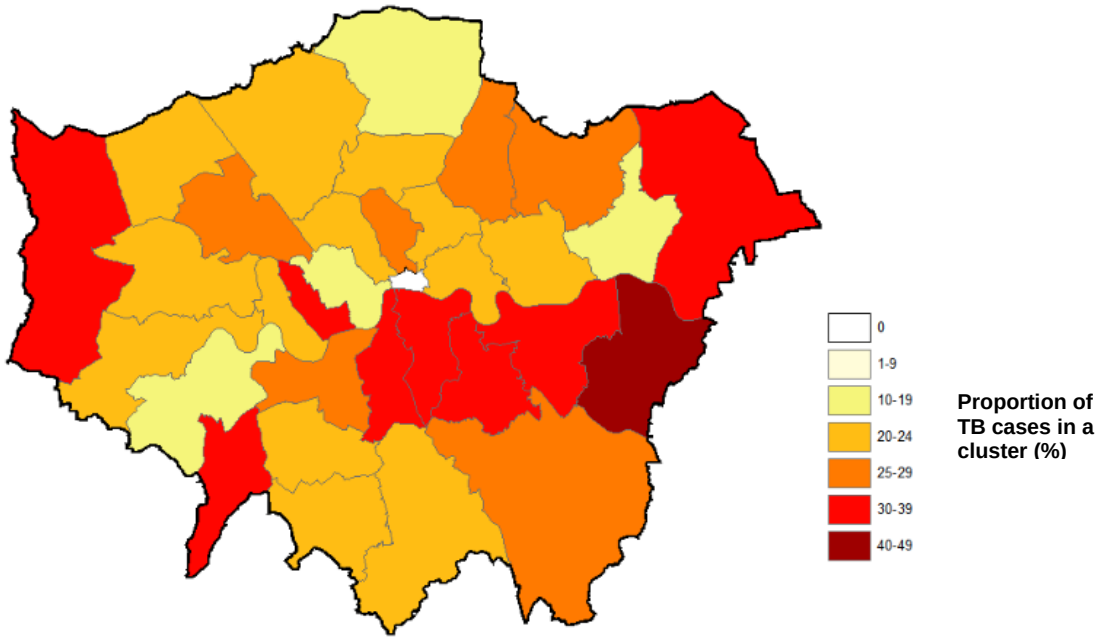
*** (no. of isolates in clusters-no. of clusters)/total no isolates with a strain type

includes cases that are part of clusters that cluster outside London

~ The total no. of clusters in London is lower than the sum of all the sector clusters as clusters can span more than one sector

In four local authorities more than a third of notified TB cases were part of a cluster (Figure 14). Bexley local authority had the highest proportion of TB cases in a cluster (46%) and Enfield the lowest (14%) (excluding City of London where the only case notified was not part of a cluster).

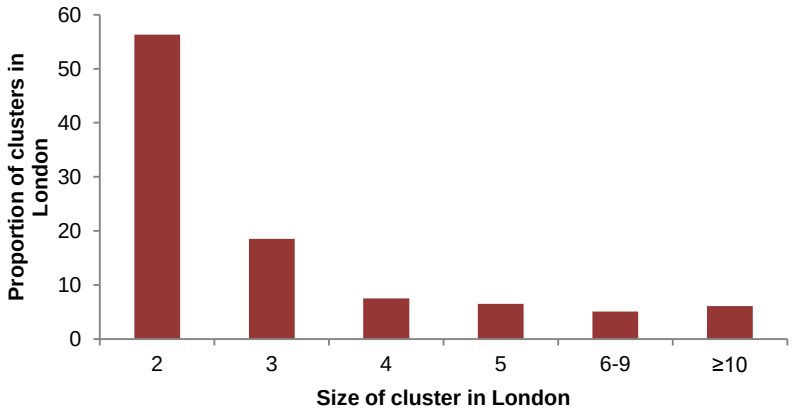
Figure 14: Proportion of TB cases in a strain typed cluster, London, 2012



Size and distribution of clusters

Since January 2010, 593 clusters were reported containing at least two London residents. Fifty-six per cent of clusters contained two individuals, and 11% were in clusters containing more than five individuals (Figure 15).

Figure 15: Size of reported clusters, London, 2010-2012



The majority of clusters reported from 2010 to 2012 were of between two and four cases (Table 6). South east London had the lowest proportion of small clusters, with 20% containing between five and nine cases. In north east London, while 90% of clusters were small, it also had the most large clusters (of 10 or more).

Table 6: Number and size of clusters by sector of patient residence, London, 2010-2012

	Cluster size		
	small	medium	large
	2-4	5-9	≥10 cases
North Central London	50 (86%)	7 (12%)	1 (2%)
North East London	119 (90%)	6 (5%)	7 (5%)
North West London	159 (85%)	20 (11%)	7 (4%)
South East London	63 (80%)	14 (17%)	2 (3%)
South West London	50 (96%)	2 (4%)	0 (0%)
London*	**487 (82%)**	**69 (12%)**	**37 (6%)**

*The total number of clusters in London is greater than the sum of all sectors as some clusters span more than one sector

The fastest growing cluster reported in 2012 was cluster C1006 which increased by 25 cases to a total of 59 London residents since 2010, with 113 cases identified nationally. First investigated in 2010; the strain is found mainly in those born in Somalia and East Africa who have been in the UK for several years.

Cluster lineage

Since the start of universal strain typing in 2010, 40% of clustered cases (where lineage was known) were of Euro-American lineage, 31% Central Asian strain, 11% East African Indian lineage and 8% Beijing strain (Table 7).

Table 7: Lineage of reported TB clusters, London 2010-12

Lineage	Clustered cases	Proportion %
East African Indian	325	11.3
Beijing	230	8.0
Central Asian	876	30.5
Euro American	1133	39.5
Other	305	10.6
London	**2869**	**100**

Characteristics of clustered cases

Demographics

Of the 886 individuals reported in clusters in 2012, 50% were males, and the most common age group was 25-29 years (18%), similar to that seen in previous years. There was no difference in sex between clustered and not clustered cases (Table 8). Clustered cases were more often children (under 16 years) compared to those not in a cluster: although this group accounted for less than 5% of clustered cases, this was a slight increase compared to 2011 (2%).

A fifth of those in clusters were UK born, comparable to previous years (18% in 2010; 24% in 2011). Those who clustered were more likely to be UK born than those who were not part of a cluster. Among those born abroad, the most common country of birth of clustered cases was India (28%) followed by Somalia (15%): this was comparable to previous years. Clustered cases were, however, more likely to be born in Somalia, while those born in India or in Bangladesh were less likely to be part of a cluster. Among those born abroad, clustering was not more frequent in recent entrants (entered less than two years previously) as had been seen in previous years. The most common ethnic group of those in clusters was Indian (27%) and black African (26%). Individuals that clustered were more often black African or black Caribbean, whilst those of Bangladeshi or Indian ethnicity were less often clustered.

Clinical characteristics

Pulmonary disease was more common among clustered cases (66% vs. 51%). No difference in drug resistance was seen between clustered and non-clustered cases.

Social risk factors

Clustered cases were more likely to have one or more social risk factor. In 2012, 12% of clustered cases had one or more social risk factor, lower than reported in the two previous years (16% in 2011; 14% in 2010). Cases in clusters more commonly had experience of drug misuse or imprisonment than those not part of a cluster.

Table 8: Characteristics of cases in clusters compared to cases not in clusters in 2012

		Clustered cases n*=886	Non clustered cases n*=973	p value**
Male		50%	50%	**0.006**
	<5 years	1%	0%	**0.002**
Age	<16 years	5%	2%	**0.001**
	25-29 years	18%	20%	0.535
UK born		22%	10%	**<0.001**
	India	28%	36%	**0.001**
Non UK born most common countries of birth:	Somalia	15%	6%	**<0.001**
	Pakistan	11%	10%	0.459
	Nepal	5%	3%	**<0.001**
	Bangladesh	4%	8%	**0.001**
Non UK born year entry to UK:	<2 years	20%	20%	0.885
	>10 years	35%	32%	0.216
Ethnic group	Indian	27%	37%	**<0.001**
	Pakistani	10%	10%	0.950
	Bangladeshi	4%	6%	**0.009**
	Black African	26%	16%	**<0.001**
	Black Caribbean	5%	1%	**<0.001**
	Mixed / Other	16%	20%	**0.021**
	White	11%	9%	0.086
One or more social risk factor		12%	8%	**0.008**
	alcohol misuse	5%	4%	0.144
	drug use	6%	3%	**0.001**
	homelessness	5%	3%	0.060
	imprisonment	4%	3%	**0.048**
Pulmonary disease		66%	51%	**<0.001**
Sputum smear positive		48%	46%	0.489
Previous TB diagnosis		5%	3%	**0.009**
Isoniazid resistant		9%	8%	0.331
Multi-drug resistant		2%	2%	0.809

* denominator varies slightly depending on variable completeness

** results where p<0.05 are highlighted

Cluster investigations

The threshold set for triggering an active cluster investigation was five (for local clusters) or ten (for regional and national clusters) cases occurring within a 24 month period with at least two cases in the last six months: if, however, a cluster included

cases vulnerable persons at greater risk of TB transmission (e.g. children, multi-drug resistant cases, those with HIV infection, nosocomial transmission, people living in congregate groups such as in prisons) two cases may trigger a cluster investigation[3].

During 2012 44 clusters were investigated by PHE London Health Protection Teams which fulfilled the above criteria. These investigations involved 422 notified cases since 2010. The majority of these were below the threshold but included factors of concern. Investigations led to public health control actions such as expanded contact tracing and raising awareness of TB signs and symptoms.

Treatment outcome at 12 months (excluding patients with rifampicin resistance)

Treatment outcomes in 2012 are reported in accordance with the revised 2013 World Health Organization (WHO) treatment outcome definitions[4]. Under these, treatment outcome is reported for the cohort of patients with drug sensitive TB (excluding patients with rifampicin or multi-drug resistance) at 12 months, and for the cohort of patients with rifampicin or multi-drug resistance at 24 months. Treatment outcomes reported using these new definitions are not directly comparable with previous reports.

Of the TB cases notified in 2011, 87% completed treatment within 12 months (Table 9). This was a slight increase compared to 85% in 2010, but similar to previous years (between 85% and 88% since 2001).

Table 9: Treatment outcome at 12 months for tuberculosis cases, London, 2011*

Treatment outcome	n	%
Completed	2990	87.0
Died	97	2.8
Lost to follow up	182	5.3
Still on treatment	122	3.5
Stopped	30	0.9
Not evaluated	17	0.5
Total	**3438**	**100**

*excludes rifampicin resistant TB. Not evaluated includes missing, unknown and transferred out.

The most common reason for not completing was loss to follow-up (5%, 182): of these, almost half were known to have left the UK (45%, 82). A further 3.5% were still on treatment, with more than half of these on a planned regimen that exceeded 12 months (53%, 65/122) – although only 9%, 6/65, were due to initial drug resistance. Other

reasons included a change in treatment (28%, 34) due to: intolerance (41%, 14); poor clinical response (26%, 9); initial drug resistance (24%, 8); or the development of new drug resistance (9%, 3). A further reason for being still on treatment was treatment interruptions (19%, 23 cases).

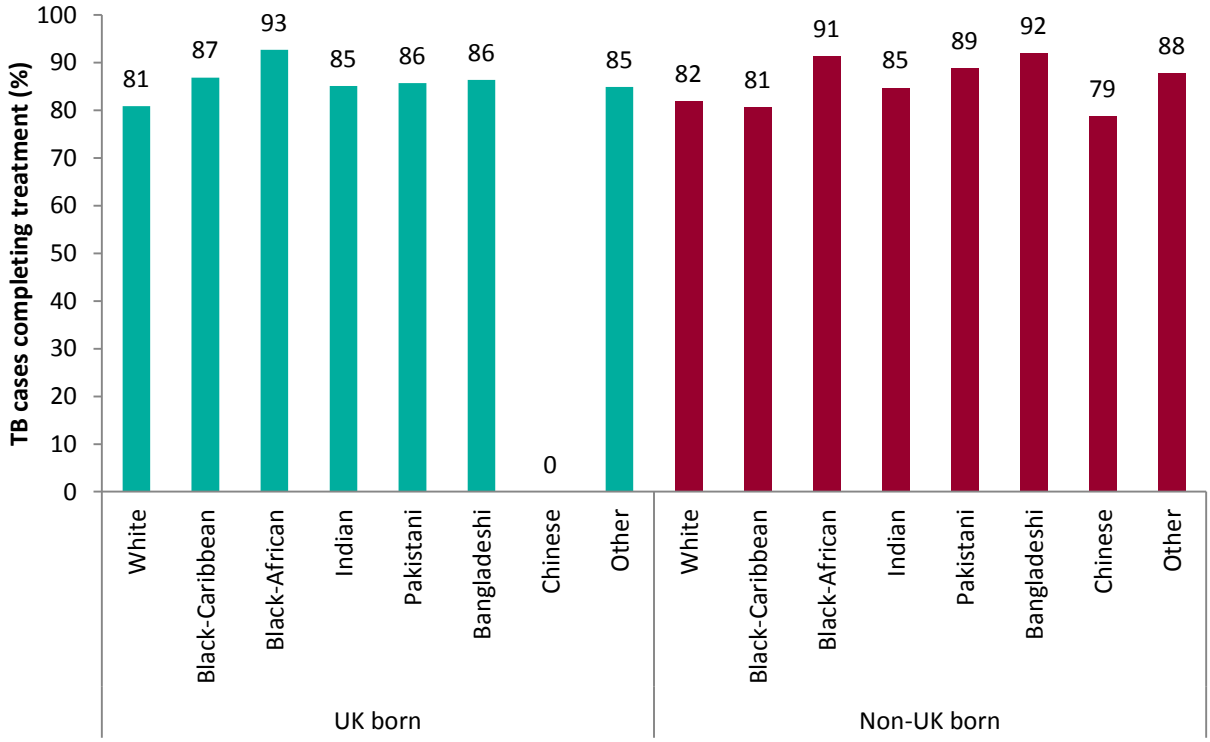
TB caused or contributed to 47% (46) of the 97 deaths, was incidental to 39% (29), and the relationship unknown for the remaining 23% (22). Of the deaths, 16% (14/87) were known to have a social risk factor, 21% (9/43) of those where TB was known to have caused or contributed to the death. Five cases were diagnosed at post-mortem.

Age and sex

Older patients were less likely to complete treatment: just 75% of those aged 65 or older completed within 12 months (225/303), with higher rates of death (20%, 60). Males were less likely to complete than females (85%, 1692/2002 vs. 90%, 1298/1436): they were more likely to die (3.5%, 69 vs. 2.0%, 28) or be lost to follow up (7.0% 140 vs. 2.9%, 42).

Place of birth and ethnicity

Figure 16: Proportion of TB cases completing treatment within 12 months by place of birth and ethnic group, London, 2011



Overall, treatment completion was similar among those born in the UK and those born abroad (85%, 427/502 vs. 87%, 2519/2881). Those born abroad were more likely to be lost to follow up (5.8%, 166 vs. 2.4%, 12), while those born in the UK were more likely to die (4.4%, 22 vs. 2.4%, 69) or have their treatment stopped (6.2%, 31 vs. 3.1%, 90).

The lowest levels of treatment completion were among the non-UK born Chinese, black Caribbean and white ethnic groups, and the UK born white patients (Figure 16).

Site of disease

While the proportion completing was similar among those with pulmonary (85%, 1368/1608) and extra-pulmonary disease (89%, 1622/1830), more deaths occurred among those with pulmonary disease (4.1%, 66 vs. 1.7%, 31), and more were lost to follow up (6.0%, 97 vs. 4.6%, 85).

Social risk factors

TB cases with social risk factors (homelessness, imprisonment, drug or alcohol misuse) were more likely to have poor treatment outcomes at 12 months, with higher rates of death, loss to follow up and remaining on treatment (Table 10).

Table 10: Treatment outcome for patients with social risk factors, London, 2011*

Treatment outcome	n	%
Completed	203	78
Died	14	5
Lost to follow up	15	6
Still on treatment	19	7
Stopped	6	2
Not evaluated	4	2
Total	**261**	**100**

* at 12months after starting. Excludes rifampicin resistant TB. Not evaluated includes missing, unknown and transferred out.

Treatment outcome at 24 months for patients with rifampicin resistant disease

In 2010, there were 34 cases of rifampicin resistant disease notified, 29 of which were multi-drug resistant. Six were UK born, with no previous history of TB treatment. Ten (29%) were known to have at least one social risk factor, most commonly homelessness (seven), and more than one in five had multiple social risk factors (21%, seven).

At 12 months, three had already been reported as completing treatment, and no further information was reported at 24 months.

At 24 months, a further 21 were reported as completing treatment (eight of whom had social risk factors) and four were still on treatment. Of the four still on treatment, three with multi-drug resistant TB have since completed (after 30-36 months), and one extensively drug resistant (XDR) patient remains on treatment planned until 2015.

Four patients were lost to follow up, all of whom were reported to have left the UK. Two had their treatment stopped, both because of non-adherence to treatment (one was known to be a homeless drug user).

Table 11: Treatment outcome at 24 months for TB cases with rifampicin resistant disease, London, 2010

Treatment outcome	n	%
Completed	21	62
Completed at 12 months	3	9
Died	0	0
Lost to follow up	4	12
Still on treatment	4	12
Stopped	2	6
Total	**34**	**100**

Discussion

After two decades of increase, TB rates in London have stabilised in recent years. London still, however, has a considerably higher rate of TB compared to other parts of the UK, and accounts for 39% of notified cases, almost 3500 patients per year.

Some parts (such as Newham and Brent) and populations (such as those of Indian ethnicity) of London have extremely high rates, some of which continue to increase. Young adults are most affected, notably males aged 20-29 years old, but an increase in TB in children under five years old is particularly concerning, and an indication of potentially avoidable recent transmission in the UK. The majority had, however, received a BCG (which is recommended for all neonates born in boroughs with incidence of more than 40/100,000, or with a parent or grandparent from a country with a high TB burden[6]).

Those born outside of the UK continue to account for the majority of TB cases, with India, Pakistan and Somalia the most common countries of origin. With just 14% having entered the UK within two years previously, many have been resident here for long periods of time prior to their TB diagnosis. TB rates in London's Indian population continue to increase, along with an increase in the Pakistani population, while the rate among black Africans has declined.

The rate in the UK born, however, is twice that seen for the whole of the UK, suggesting these groups are still at increased risk in London. This indicates the risk to second and third generation migrants may still persist in established communities. Those born in the UK were also more likely to have social risk factors known to increase the risk of infection and disease, and in particular infectious and drug resistant forms of disease, and lead to poor treatment outcomes with higher rates of death and loss to follow up.

As in recent years, less than half of all TB cases reported in 2012 had pulmonary disease, with the site in almost a quarter of cases being extra-thoracic lymph node TB.

While information on onset of symptoms should be interpreted with caution, indications that older patients may be more likely to have delays to diagnosis should be investigated further.

HIV testing continues to have excellent coverage across London for both offering and uptake.

Some improvements may be possible in increasing the proportion of pulmonary cases with a sputum smear result, and with a culture, particularly in light of the variations across London.

It is encouraging that a slight decrease was seen in the proportion with resistance to one or more first line drug, although the proportion with multi-drug resistant TB stayed constant. Among population groups where drug resistance is more common, such as those of black Caribbean ethnicity, maximum efforts should be made to obtain culture confirmation and drug susceptibilities.

More than half of all individuals with a strain type clustered with at least one other case, although the majority of clusters were small with 56% containing just two individuals. The proportion of TB attributable to recent transmission in 2012 was estimated to be 26%. Further work, however, is needed to determine the extent of local transmission within London, and which areas and populations are most affected: taking into account differences in the culture confirmation rates.

Clustering with other cases was more common among UK born, black African or black Caribbean individuals, those with pulmonary disease and with social risk factors. Among the non-UK born, those born in Somalia were more likely to be clustered. Information on clustering should continue to be used to inform and ensure the completeness of contact tracing, to ensure the loop is closed around identifying those exposed and also potential sources of each patient's TB.

An external independent evaluation was undertaken of the PHE TB strain typing service between 2010 and 2012. The findings of this will be published in the scientific literature. The service will be changing as a result of these recommendations, which included the investigation of clusters in response to local need rather than prospectively, and undertaking a detailed epidemiological analysis of data from 2010 to 2012 to determine factors associated with TB transmission.

Treatment completion for London TB patients notified in 2011 continues to be above the CMO target of 85%. Loss to follow up, however, was the most common reason for not completing – and although a large proportion are likely to have left the country, not knowing what happened to these patients is concerning.

Although sensitive to rifampicin, a further 122 patients were still on treatment at 12 months, more than half on initially planned regimens. Reasons for this are unknown, but may be due to the extent of disease in these patients, or suspected drug resistance in cases without drug susceptibility testing results.

Older patients were less likely to complete treatment, possibly due to the increased risk of co-morbidities, as these were more likely to die. Males were also less likely to complete: they were more likely to die or be lost to follow up. The non-UK born Chinese, black Caribbean and white ethnic groups, and UK born white patients had the lowest levels of treatment completion compared to other ethnic groups.

Conclusion / recommendations

Despite rates stabilising in recent years, TB remains a serious public health problem in London. This report updates the latest epidemiology of TB in London, describing the areas and populations at increased risk. To be of benefit, this information should be used to inform the basic elements of TB control, namely prompt identification of active cases of disease, supporting patients to successfully complete, and preventing new cases of disease occurring.

Delays in diagnosis, high rates of clustering, and cases in young children can indicate problems around prompt identification of patients as they suggest potentially infectious individuals in the community. Monitoring treatment outcome can identify patient groups who are at risk of default, and require enhanced care. Preventing new cases is achieved partly through removing infectious cases from the community, but also identifying those with latent infection through contact screening, and there is also a role for BCG in protecting children against the most serious forms of disease. TB is also linked closely to other determinates of poor health, such as poverty and overcrowding, and with the changes in commissioning arrangements, services should use the opportunity to better integrate to improve the health of vulnerable populations as a whole.

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

Identification & prevention

- Commission and support highly targeted case finding and prevention activities, which focus on high risk groups
- Encourage the use of NICE guidance to tackle TB among hard-to-reach groups[6]
- Implementation of the NICE recommendations around screening for latent TB[7]

Successful treatment

- Support continued use of RCN guidance on case management and cohort review to ensure high standards of case and contact management[8]

- Increase the number of cases with culture confirmation

- Continued and expand cohort review as the tool to monitor and improve patient outcomes

The national TB surveillance system should also continue to be developed to better meet the changing needs of its users, so London can move to the same national system as the rest of the country.

In the 2012 report, we noted wider recommendations for TB control should reflect back on the recommendations in the comprehensive PHAST review in 2010[9], which have since been incorporated into the London TB Model of Care (by London Health Programmes, 2011). These included central leadership and management for TB in London, standardisation of clinical policies and practices, revision of, and standardised monitoring of, key objectives, along with suggestions for accessibility and responsiveness of services, and lead providers, and should remain at the forefront of the new moves to create a London TB Control Board.

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Appendix A: Description of data sources and definitions

Data sources
Data on tuberculosis cases in London comes from the PHE London TB Register (LTBR). These data contribute to the national Enhanced TB surveillance (ETS) system. Data collected include notification details, and demographic, clinical and microbiological information.

Information on treatment outcomes are reported for all cases reported in the previous year, excluding those with known rifampicin resistant disease: treatment outcomes for these cases are reported at 24 months. Definitions for treatment outcome are based on World Health Organization (WHO) and European definitions, but adapted to the UK context. In this report, all data were obtained from the ETS matched dataset provided in August 2013.

Estimates on HIV co-infection rates were provided by the TB Section, PHE Centre for Infectious Disease Surveillance and Control. TB case reports in ETS aged 15 years and older were matched to HIV case reports (SOPHID and new diagnoses).

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. For prevalence data (proportions) a binomial distribution was assumed.

Rates
Tuberculosis rates by London, individual local authority, MSOA and LSOA were calculated using ONS mid-year population estimates.

All other tuberculosis rates (such as by age, sex and ethnicity) are 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 24 loci strains, with at least one case which has a complete 24 VNTR, additional cases of the cluster may each have one missing locus. Analysis of clustering in London was carried out on cases that clustered in London and notified in 2010, 2011 or 2012. Recent transmission was defined using the calculation (no. of isolates in clusters-no. of clusters) / total no isolates with a strain type.

Appendix B: TB among London residents

Table Bi: Number and rate of TB by local authority of residence, London 2012

	Number	Rate
Barnet	110	30.2
Camden	62	27.6
Enfield	79	24.9
Haringey	101	39.0
Islington	69	32.7
North Central	**421**	**30.6**
Barking & Dagenham	67	35.2
City Of London	1	13.2
Hackney	87	34.5
Havering	27	11.3
Newham	366	116.5
Redbridge	157	55.2
Tower Hamlets	119	45.2
Waltham Forest	129	49.1
North East	**953**	**52.5**
Brent	313	99.5
Ealing	253	74.3
Hammersmith & Fulham	46	25.6
Harrow	185	76.3
Hillingdon	139	49.3
Hounslow	193	74.5
Kensington & Chelsea	33	21.2
Westminster	51	22.8
North West	**1213**	**60.7**
Bexley	26	11.1
Bromley	29	9.2
Greenwich	131	50.4
Lambeth	98	31.6
Lewisham	84	29.8
Southwark	116	39.5
South East	**484**	**28.6**
Croydon	119	32.3
Kingston upon Thames	28	17.1
Merton	74	36.6
Richmond upon Thames	13	6.9
Sutton	29	15.0
Wandsworth	92	29.8
South West	**355**	**24.9**
London	**3426**	**41.2**

*rates calculated using ONS mid-year population estimates

Appendix C: all TB patients notified by London clinics

Table Ci: Number of all TB cases and pulmonary cases notified by London clinics, 2009-2012

	2009		2010		2011		2012	
	Total	***Pul***	**Total**	***Pul***	**Total**	***Pul***	**Total**	***Pul***
Edgware TB Clinic	69	*46*	84	*52*	72	*43*	89	*52*
Great Ormond Street Hospital	16	*9*	10	*3*	7	*2*	6	*5*
North Middlesex	190	*103*	155	*93*	141	*78*	145	*67*
Royal Free	113	*62*	98	*47*	94	*54*	76	*38*
UCLH TB Service	121	*61*	108	*52*	125	*56*	122	*39*
Whittington	94	*67*	60	*42*	83	*51*	64	*41*
North Central	**603**	***348***	**515**	***289***	**522**	***284***	**502**	***242***
Havering TB Service	81	*29*	61	*26*	76	*31*	76	*26*
Homerton	111	*58*	97	*44*	94	*49*	88	*45*
King George Hospital	153	*75*	116	*70*	112	*51*	116	*63*
London Chest Hospital	216	*92*	231	*86*	240	*79*	218	*78*
Newham Chest Clinic	245	*116*	237	*111*	301	*134*	300	*129*
Whipps Cross University Hospital	107	*52*	127	*63*	133	*62*	142	*68*
North East	**913**	***422***	**869**	***400***	**956**	***406***	**940**	***409***
Central Middlesex Hospital	158	*89*	105	*58*	110	*57*	98	*51*
Charing Cross Hospital	62	*26*	46	*15*	68	*24*	73	*24*
Chelsea & Westminster	61	*40*	68	*47*	66	*32*	38	*29*
Ealing Hospital	185	*91*	174	*84*	208	*90*	214	*99*
Hammersmith Hospital (ICH NHS Trust)	77	*38*	64	*28*	54	*28*	50	*14*
Harefield Hospital	-	-	-	-	-	-	6	*2*
Hillingdon Hospital	101	*56*	96	*46*	118	*66*	111	*68*
Northwick Park Hospital	256	*101*	306	*123*	341	*123*	369	*139*
Royal Brompton	2	*1*	6	*5*	10	*6*	5	*5*
St Mary's (ICH NHS Trust)	136	*62*	98	*51*	128	*66*	103	*41*
West Middlesex University Hospital	148	*60*	163	*55*	148	*52*	152	*50*
North West	**1186**	***564***	**1126**	***512***	**1251**	***544***	**1219**	***522***
Bromley TB Service	21	*7*	24	*13*	25	*6*	19	*7*
Kings College Hospital	110	*44*	107	*45*	119	*52*	119	*59*
Queen Elizabeth Hospital	106	*66*	110	*57*	106	*55*	125	*67*
Queen Mary's Hospital	8	*5*	7	*3*	1	*1*	-	-
St Thomas' Hospital	153	*75*	150	*73*	154	*71*	119	*58*
University Hospital Lewisham	69	*41*	83	*41*	101	*49*	75	*41*
South East	**467**	***238***	**481**	***232***	**506**	***234***	**457**	***232***
Croydon University Hospital	110	*54*	101	*41*	121	*55*	113	*62*
Epsom and St Helier NHS Trust	52	*41*	44	*24*	54	*21*	52	*30*
Kingston Hospital	59	*33*	55	*34*	32	*16*	35	*24*
St George's Hospital	137	*66*	170	*73*	163	*65*	186	*87*
South West	**358**	***194***	**370**	***172***	**370**	***157***	**386**	***203***
Non LTBR Clinics*	**11**	***4***	**13**	***3***	**37**	***16***	**27**	***7***
London	**3538**	***1770***	**3374**	***1608***	**3642**	***1641***	**3531**	***1615***

* Non LTBR Clinics includes data for London residents attending clinics where the London TB Register is not used (this includes private patients and patients attending clinics outside London)

Table Cii: Treatment status at 12 months of all TB notifications by London clinics, 2011

Treatment status is collected one year after notification, shown are notifications for 2011 with outcomes collected one year later in 2012 on the LTBR

	2011 Total Notifs	Completed	Still on treatment	Died	Lost to follow up	Treatment stopped	Transfers without further info	Outcome unknown /null
Edgware TB Clinic	72	88%	2.8%	0.0%	0.0%	1.4%	6.9%	1.4%
Great Ormond Street Hospital	7	71%	28.6%	0.0%	0.0%	0.0%	0.0%	0.0%
North Middlesex	141	82%	8.5%	2.1%	0.7%	3.5%	3.5%	0.0%
Royal Free	94	89%	5.3%	3.2%	1.1%	1.1%	0.0%	0.0%
UCLH TB Service	125	81%	7.2%	2.4%	3.2%	0.8%	5.6%	0.0%
Whittington	83	94%	4.8%	0.0%	1.2%	0.0%	0.0%	0.0%
North Central	**522**	**85%**	**6.5%**	**1.7%**	**1.3%**	**1.5%**	**3.3%**	**0.2%**
Havering TB Service	76	88%	3.9%	1.3%	2.6%	1.3%	2.6%	0.0%
Homerton	94	95%	1.1%	2.1%	0.0%	1.1%	1.1%	0.0%
King George Hospital	112	88%	0.9%	4.5%	3.6%	0.0%	2.7%	0.9%
London Chest Hospital	240	86%	2.9%	4.2%	2.5%	2.5%	1.3%	0.4%
Newham Chest Clinic	301	82%	5.0%	2.3%	8.0%	1.0%	1.3%	0.7%
Whipps Cross University Hospital	133	89%	4.5%	1.5%	2.3%	0.0%	2.3%	0.8%
North East	**956**	**86%**	**3.5%**	**2.8%**	**4.1%**	**1.2%**	**1.7%**	**0.5%**
Central Middlesex Hospital	110	83%	3.6%	2.7%	4.5%	1.8%	4.5%	0.0%
Charing Cross Hospital	68	78%	7.4%	4.4%	1.5%	1.5%	7.4%	0.0%
Chelsea & Westminster	66	91%	6.1%	1.5%	1.5%	0.0%	0.0%	0.0%
Ealing Hospital	208	86%	4.3%	1.4%	3.4%	1.0%	4.3%	0.0%
Hammersmith Hospital (ICH NHS Trust)	54	87%	1.9%	3.7%	3.7%	1.9%	1.9%	0.0%
Hillingdon Hospital	118	86%	6.8%	3.4%	0.8%	0.8%	1.7%	0.0%
Northwick Park Hospital	341	86%	3.5%	4.1%	3.2%	0.3%	3.2%	0.0%
Royal Brompton	10	70%	0.0%	10.0%	0.0%	0.0%	20.0%	0.0%
St Mary's (ICH NHS Trust)	128	87%	5.5%	2.3%	3.1%	0.8%	1.6%	0.0%
West Middlesex University Hospital	148	85%	9.5%	0.7%	0.7%	1.4%	2.7%	0.0%
North West	**1251**	**85%**	**5.1%**	**2.8%**	**2.6%**	**0.9%**	**3.3%**	**0.0%**
Bromley TB Service	25	92%	0.0%	4.0%	4.0%	0.0%	0.0%	0.0%
Kings College Hospital	119	76%	5.0%	5.9%	5.9%	2.5%	3.4%	0.8%
Queen Elizabeth Hospital	106	88%	6.6%	1.9%	1.9%	0.0%	1.9%	0.0%
Queen Mary's Hospital	1	100%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
St Thomas' Hospital	154	93%	5.2%	1.3%	0.6%	0.0%	0.0%	0.0%
University Hospital Lewisham	101	84%	4.0%	2.0%	1.0%	0.0%	8.9%	0.0%
South East	**506**	**86%**	**4.9%**	**2.8%**	**2.4%**	**0.6%**	**3.0%**	**0.2%**
Croydon University Hospital	121	88%	3.3%	3.3%	1.7%	0.8%	3.3%	0.0%
Epsom and St Helier NHS Trust	54	85%	1.9%	9.3%	0.0%	1.9%	1.9%	0.0%
Kingston Hospital	32	91%	9.4%	0.0%	0.0%	0.0%	0.0%	0.0%
St George's Hospital	163	77%	8.0%	3.7%	4.3%	0.6%	6.1%	0.0%
South West	**370**	**83%**	**5.7%**	**4.1%**	**2.4%**	**0.8%**	**4.1%**	**0.0%**
Non LTBR Clinics*	**37**	**73%**	**5.4%**	**8.1%**	**8.1%**	**0.0%**	**2.7%**	**2.7%**
London	**3642**	**85%**	**4.9%**	**2.8%**	**2.8%**	**1.0%**	**2.9%**	**0.2%**

* Non LTBR Clinics includes data for London residents attending clinics where the London TB Register is not used (this includes private patients and patients attending clinics outside London)

Table Ciii: HIV testing (offered and uptake) among all TB notifications by London clinics, 2012

	Total Notifs	Offered & done	HIV test Offered but refused	Offered but not done	HIV status already known	HIV test not offered	Null	Test offered (or status known)	Test done (or status known)
Edgware TB Clinic	89	83	3	1	0	2	0	98%	93%
Great Ormond Street Hospital	6	6	0	0	0	0	0	100%	100%
North Middlesex	145	121	4	6	9	5	0	97%	90%
Royal Free	76	69	0	0	7	0	0	100%	100%
UCLH TB Service	122	97	3	2	13	7	0	94%	90%
Whittington	64	59	5	0	0	0	0	100%	92%
North Central	**502**	**435**	**15**	**9**	**29**	**14**	**0**	**97%**	**92%**
Havering TB Service	76	64	1	5	4	2	0	97%	89%
Homerton	88	73	1	5	7	2	0	98%	91%
King George Hospital	116	109	0	0	4	3	0	97%	97%
London Chest Hospital	218	172	12	17	16	1	0	100%	86%
Newham Chest Clinic	300	243	5	29	8	15	0	95%	84%
Whipps Cross University Hospital	142	126	0	0	8	8	0	94%	94%
North East	**940**	**787**	**19**	**56**	**47**	**31**	**0**	**97%**	**89%**
Central Middlesex Hospital	98	97	0	1	0	0	0	100%	99%
Charing Cross Hospital	73	67	0	3	2	1	0	99%	95%
Chelsea & Westminster	38	25	1	0	8	4	0	89%	87%
Ealing Hospital	214	194	6	4	6	4	0	98%	93%
Hammersmith Hospital (ICH NHS Trust)	50	42	1	2	4	1	0	98%	92%
Harefield Hospital	6	5	0	0	0	1	0	83%	83%
Hillingdon Hospital	111	105	1	2	2	1	0	99%	96%
Northwick Park Hospital	369	359	0	0	3	7	0	98%	98%
Royal Brompton	5	4	0	0	0	1	0	80%	80%
St Mary's (ICH NHS Trust)	103	85	0	1	8	9	0	91%	90%
West Middlesex University Hospital	152	126	2	7	15	2	0	99%	93%
North West	**1219**	**1109**	**11**	**20**	**48**	**31**	**0**	**97%**	**95%**
Bromley TB Service	19	19	0	0	0	0	0	100%	100%
Kings College Hospital	119	119	0	0	0	0	0	100%	100%
Queen Elizabeth Hospital	125	119	0	1	5	0	0	100%	99%
St Thomas' Hospital	119	81	2	8	15	13	0	89%	81%
University Hospital Lewisham	75	62	1	1	6	3	2	93%	91%
South East	**457**	**400**	**3**	**10**	**26**	**16**	**2**	**96%**	**93%**
Croydon University Hospital	113	108	0	0	3	2	0	98%	98%
Epsom and St Helier NHS Trust	52	37	2	4	3	6	0	88%	77%
Kingston Hospital	35	31	2	0	1	1	0	97%	91%
St George's Hospital	186	150	4	8	3	21	0	89%	82%
South West	**386**	**326**	**8**	**12**	**10**	**30**	**0**	**92%**	**87%**
Non LTBR Clinics*	**27**	**13**	**0**	**0**	**1**	**4**	**9**	**52%**	**52%**
London	**3531**	**3070**	**56**	**107**	**161**	**126**	**11**	**96%**	**92%**

* Non LTBR Clinics includes data for London residents attending clinics where the London TB Register is not used (this includes private patients and patients attending clinics outside London)

Table Civ: Social risk factors* among all TB notifications by London clinics, 2009-2012

	2009		2010		2011		2012	
	n	%	n	%	n	%	n	%
Edgware TB Clinic	4	6%	12	14%	8	11%	4	4%
Great Ormond Street Hospital	0	0%	0	0%	0	0%	0	0%
North Middlesex	41	22%	34	22%	22	16%	26	18%
Royal Free	24	21%	13	13%	13	14%	14	18%
UCLH TB Service	25	21%	17	16%	24	19%	24	20%
Whittington	15	16%	19	32%	10	12%	12	19%
North Central	**109**	**18%**	**95**	**18%**	**77**	**15%**	**80**	**16%**
Havering TB Service	3	4%	3	5%	4	5%	5	7%
Homerton	27	24%	26	27%	25	27%	22	25%
King George Hospital	17	11%	8	7%	9	8%	8	7%
London Chest Hospital	28	13%	31	13%	32	13%	17	8%
Newham Chest Clinic	10	4%	10	4%	20	7%	47	16%
Whipps Cross University Hospital	4	4%	11	9%	18	14%	23	16%
North East	**89**	**10%**	**89**	**10%**	**108**	**11%**	**122**	**13%**
Central Middlesex Hospital	19	12%	19	18%	15	14%	8	8%
Charing Cross Hospital	11	18%	4	9%	7	10%	12	16%
Chelsea & Westminster	8	13%	11	16%	9	14%	7	18%
Ealing Hospital	8	4%	12	7%	10	5%	15	7%
Hammersmith Hospital (ICH NHS	6	8%	4	6%	8	15%	5	10%
Harefield Hospital	-	-	-	-	-	-	0	0%
Hillingdon Hospital	11	11%	5	5%	12	10%	18	16%
Northwick Park Hospital	45	18%	47	15%	16	5%	14	4%
Royal Brompton	0	0%	2	33%	0	0%	3	60%
St Mary's (ICH NHS Trust)	32	24%	36	37%	23	18%	16	16%
West Middlesex University Hospital	4	3%	7	4%	7	5%	11	7%
North West	**144**	**12%**	**147**	**13%**	**107**	**9%**	**109**	**9%**
Bromley TB Service	2	10%	2	8%	1	4%	0	0%
Kings College Hospital	13	12%	7	7%	18	15%	10	8%
Queen Elizabeth Hospital	17	16%	12	11%	7	7%	21	17%
Queen Mary's Hospital	0	0%	0	0%	0	0%	-	-
St Thomas' Hospital	15	10%	21	14%	10	6%	12	10%
University Hospital Lewisham	6	9%	12	14%	11	11%	3	4%
South East	**53**	**11%**	**54**	**11%**	**47**	**9%**	**46**	**10%**
Croydon University Hospital	14	13%	7	7%	11	9%	8	7%
Epsom and St Helier NHS Trust	7	13%	6	14%	1	2%	7	13%
Kingston Hospital	2	3%	3	5%	2	6%	1	3%
St George's Hospital	9	7%	17	10%	14	9%	18	10%
South West	**32**	**9%**	**33**	**9%**	**28**	**8%**	**34**	**9%**
Non LTBR Clinics**	**0**	**0%**	**2**	**15%**	**4**	**11%**	**1**	**4%**
London	**427**	**12%**	**420**	**12%**	**371**	**10%**	**392**	**11%**

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

** Non LTBR Clinics includes data for London residents attending clinics where the London TB Register is not used (this includes private patients and patients attending clinics outside London)

Table Cv: Drug resistance among all TB notifications by London clinics, 2010

	Resistant to any first line drug*		Isoniazid resistant		Multi-drug resistant		Total**
	n	%	n	%	n	%	
Edgware TB Clinic	2	4.9	2	4.9	1	2.4	41
Great Ormond Street Hospital	0	0.0	0	0.0	0	0.0	4
North Middlesex	15	16.9	15	16.9	2	2.2	89
Royal Free	1	1.6	1	1.6	0	0.0	61
UCLH TB Service	8	12.7	8	12.7	1	1.6	63
Whittington	5	19.2	5	19.2	1	3.8	26
North Central	**31**	10.9	**31**	10.9	**5**	1.8	**284**
Havering TB Service	1	3.8	1	3.8	1	3.8	26
Homerton	5	10.9	5	10.9	1	2.2	46
King George Hospital	6	9.1	6	9.1	2	3.0	66
London Chest Hospital	5	4.2	5	4.2	1	0.8	119
Newham Chest Clinic	11	8.3	10	7.5	2	1.5	133
Whipps Cross University Hospital	10	12.3	10	12.3	3	3.7	81
North East	**38**	8.1	**37**	7.9	**10**	2.1	**471**
Central Middlesex Hospital	1	1.3	1	1.3	0	0.0	76
Charing Cross Hospital	3	11.5	3	11.5	0	0.0	26
Chelsea & Westminster	1	3.1	1	3.1	1	3.1	32
Ealing Hospital	1	1.0	1	1.0	0	0.0	99
Hammersmith Hospital (ICH NHS Trust)	1	3.2	1	3.2	0	0.0	31
Harefield Hospital	-	-	-	-	-	-	0
Hillingdon Hospital	5	10.2	3	6.1	0	0.0	49
Northwick Park Hospital	26	14.0	22	11.8	3	1.6	186
Royal Brompton	0	0.0	0	0.0	0	0.0	1
St Mary's (ICH NHS Trust)	7	15.2	7	15.2	3	6.5	46
West Middlesex University Hospital	8	9.1	8	9.1	1	1.1	88
North West	**53**	8.4	**47**	7.4	**8**	1.3	**634**
Bromley TB Service	1	6.3	1	6.3	1	6.3	16
Kings College Hospital	7	11.3	6	9.7	2	3.2	62
Queen Elizabeth Hospital	5	7.8	5	7.8	0	0.0	64
St Thomas' Hospital	4	5.2	3	3.9	1	1.3	77
University Hospital Lewisham	4	8.7	4	8.7	0	0.0	46
South East	**21**	7.9	**19**	7.2	**4**	1.5	**265**
Croydon University Hospital	6	9.1	5	7.6	1	1.5	66
Epsom and St Helier NHS Trust	1	4.8	0	0.0	0	0.0	21
Kingston Hospital	3	7.7	3	7.7	0	0.0	39
St George's Hospital	10	9.9	8	7.9	1	1.0	101
South West	**20**	8.8	**16**	7.0	**2**	0.9	**227**
London	**163**	8.7	**150**	8.0	**29**	1.5	**1881**

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

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

Table Cvi: Drug resistance among all TB notifications by London clinics, 2011

	Resistant to any first line drug*		Isoniazid resistant		Multi-drug resistant		Total**
	n	%	n	%	n	%	
Edgware TB Clinic	7	14.0	6	12.0	2	4.0	50
Great Ormond Street Hospital	0	0.0	0	0.0	0	0.0	2
North Middlesex	17	22.1	16	20.8	3	3.9	77
Royal Free	5	8.3	5	8.3	2	3.3	60
UCLH TB Service	9	12.5	8	11.1	1	1.4	72
Whittington	5	10.9	5	10.9	0	0.0	46
North Central	**43**	14.0	**40**	13.0	**8**	2.6	**307**
Havering TB Service	2	4.8	2	4.8	0	0.0	42
Homerton	10	18.5	9	16.7	0	0.0	54
King George Hospital	7	10.4	5	7.5	0	0.0	67
London Chest Hospital	8	6.3	6	4.7	0	0.0	128
Newham Chest Clinic	14	9.0	14	9.0	4	2.6	155
Whipps Cross University Hospital	9	10.0	9	10.0	0	0.0	90
North East	**50**	9.3	**45**	8.4	**4**	0.7	**536**
Central Middlesex Hospital	6	8.1	6	8.1	3	4.1	74
Charing Cross Hospital	5	12.2	5	12.2	1	2.4	41
Chelsea & Westminster	3	10.3	3	10.3	0	0.0	29
Ealing Hospital	9	8.5	9	8.5	1	0.9	106
Hammersmith Hospital (ICH NHS Trust)	5	16.1	4	12.9	0	0.0	31
Harefield Hospital	-	-	-	-	-	-	0
Hillingdon Hospital	6	10.5	6	10.5	2	3.5	57
Northwick Park Hospital	19	9.3	17	8.3	3	1.5	204
Royal Brompton	0	0.0	0	0.0	0	0.0	5
St Mary's (ICH NHS Trust)	7	9.7	6	8.3	2	2.8	72
West Middlesex University Hospital	7	8.6	4	4.9	1	1.2	81
North West	**67**	9.6	**60**	8.6	**13**	1.9	**700**
Bromley TB Service	2	14.3	2	14.3	0	0.0	14
Kings College Hospital	11	14.3	10	13.0	2	2.6	77
Queen Elizabeth Hospital	3	5.2	3	5.2	2	3.4	58
St Thomas' Hospital	11	12.6	9	10.3	3	3.4	87
University Hospital Lewisham	8	14.3	7	12.5	2	3.6	56
South East	**35**	12.0	**31**	10.6	**9**	3.1	**292**
Croydon University Hospital	7	9.5	6	8.1	0	0.0	74
Epsom and St Helier NHS Trust	1	4.8	0	0.0	0	0.0	21
Kingston Hospital	0	0.0	0	0.0	0	0.0	22
St George's Hospital	4	4.0	3	3.0	1	1.0	99
South West	**12**	5.6	**9**	4.2	**1**	0.5	**216**
London	**207**	10.1	**185**	9.0	**35**	1.7	**2051**

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

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

Table Cvii: Drug resistance among all TB notifications by London clinics, 2012

	Resistant to any first line drug*		Isoniazid resistant		Multi-drug resistant		Total**
	n	%	n	%	n	%	
Edgware TB Clinic	6	12.5	6	12.5	2	4.2	48
Great Ormond Street Hospital	0	0.0	0	0.0	0	0.0	3
North Middlesex	10	13.9	8	11.1	1	1.4	72
Royal Free	4	8.9	4	8.9	1	2.2	45
UCLH TB Service	3	5.6	3	5.6	1	1.9	54
Whittington	5	13.9	5	13.9	2	5.6	36
North Central	**28**	10.9	**26**	10.1	**7**	2.7	**258**
Havering TB Service	2	4.0	0	0.0	0	0.0	50
Homerton	10	19.6	10	19.6	0	0.0	51
King George Hospital	4	5.5	4	5.5	1	1.4	73
London Chest Hospital	8	7.0	7	6.1	0	0.0	114
Newham Chest Clinic	19	11.7	18	11.0	5	3.1	163
Whipps Cross University Hospital	7	7.6	5	5.4	0	0.0	92
North East	**50**	9.2	**44**	8.1	**6**	1.1	**543**
Central Middlesex Hospital	11	16.7	10	15.2	4	6.1	66
Charing Cross Hospital	6	15.0	6	15.0	1	2.5	40
Chelsea & Westminster	0	0.0	0	0.0	0	0.0	17
Ealing Hospital	10	7.3	10	7.3	1	0.7	137
Hammersmith Hospital (ICH NHS Trust)	0	0.0	0	0.0	0	0.0	25
Harefield Hospital	0	0.0	0	0.0	0	0.0	1
Hillingdon Hospital	9	13.4	8	11.9	1	1.5	67
Northwick Park Hospital	19	8.4	19	8.4	5	2.2	225
Royal Brompton	0	0.0	0	0.0	0	0.0	4
St Mary's (ICH NHS Trust)	2	3.6	2	3.6	0	0.0	56
West Middlesex University Hospital	5	5.8	5	5.8	2	2.3	86
North West	**62**	8.6	**60**	8.3	**14**	1.9	**724**
Bromley TB Service	2	14.3	2	14.3	0	0.0	14
Kings College Hospital	5	5.3	4	4.2	1	1.1	95
Queen Elizabeth Hospital	8	9.6	7	8.4	1	1.2	83
St Thomas' Hospital	4	6.7	4	6.7	1	1.7	60
University Hospital Lewisham	6	12.0	6	12.0	3	6.0	50
South East	**25**	8.3	**23**	7.6	**6**	2.0	**302**
Croydon University Hospital	1	1.3	1	1.3	0	0.0	75
Epsom and St Helier NHS Trust	1	6.3	1	6.3	0	0.0	16
Kingston Hospital	1	4.0	1	4.0	0	0.0	25
St George's Hospital	7	7.5	7	7.5	4	4.3	93
South West	**10**	4.8	**10**	4.8	**4**	1.9	**209**
London	**175**	8.6	**163**	8.0	**37**	1.8	**2036**

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

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

Appendix D: Local authority TB profiles

Please see the separate document “Appendix D: Local authority TB profiles” for further information about TB cases among residents of each London local authority.