UK Health Security Agency

Tuberculosis in London

Annual review (2020 data)

Data from 2000 to 2020

Contents

Executive summary

While London remains the area of highest TB incidence in England, accounting for 35% of all people with TB in 2020 and over double the national rate, case numbers continue to decline. In 2020 1,464 people notified with TB, a rate of 16.3 per 100,000 of the population. This was a drop of more than half from the peak in 2005 (45.9 per 100,000).

The London boroughs of Newham, Harrow, Hounslow and Brent were the only areas with a rate above 30 per 100,000, and most boroughs saw decreases in TB rates. However, a notable increase in TB rate occurred in Harrow in 2020.

Rates decreased among those born abroad, to their lowest levels since 2001. The majority (79%) of people with TB in London were born outside the UK, most of whom had been in the UK a long time prior to TB notification with a median time since entry of 10 years. The most common countries of birth were India, Pakistan, Somalia and Bangladesh, with median time from entry to notification between 8 and 16 years. The fifth most common country of birth was Romania: people from here with TB had been in the UK a median of 4 years prior to notification.

Just over half of all people with TB had pulmonary disease, with extra-thoracic lymph node the next most common site. In 2020, 63% of people with TB had their TB culture confirmed, 80% among those with pulmonary TB. Of those with pulmonary disease, 76% had a known sputum smear result, of whom 53% were sputum smear positive.

TB rates among UK-born children have declined over the last decade, evidence of declining transmission. Between 2018 and 2020, 20% of people with culture confirmed TB were in a TB cluster and less than 5 SNPs from another person in England. Over this time, 271 TB clusters were reviewed by HPTs and local services to identify links and opportunities to interrupt transmission. While most clusters do not grow further, a small number continue to exhibit sustained growth and require continued efforts by local teams.

Almost 1 in 4 people had a key co-morbidity (diabetes, hepatitis B, hepatitis C, chronic renal disease, chronic liver disease or immunosuppression), most commonly diabetes, which 13% of people with TB had in 2020. These were more common among older people, with half of those aged 65 or older having at least one comorbidity. Almost all people with TB in London were tested for HIV.

People with pulmonary TB in London had shorter periods from becoming unwell to starting treatment than on average for England (66 days compared to 79).

Of those people with TB notified in 2019 that would be expected to receive 6 months standard treatment, (excluding those with rifampicin resistance, CNS, spinal, miliary or cryptic disseminated disease) 85% had completed treatment at 12 months. People who were older (65 years of more), had at least one social risk factor, or had one of the key comorbidities were less

likely to complete treatment. Of those without rifampicin resistance, CNS, spinal, miliary or cryptic disseminated disease, 4% died before completing treatment, with TB causing or contributing to almost half of these deaths. Only 76% of those with CNS, spinal, miliary or cryptic disseminated TB had completed treatment by the last recorded outcome. Of this group, 9% died before completing treatment and TB was reported to have caused or contributed to under a third of these deaths.

The proportion of people with TB resistant to one or more first line drug decreased to 10%, mostly due to a decrease in isoniazid mono-resistance. The proportion with multi-drug resistant disease rose very slightly to 1.5%.

The proportion of adults with TB that had a social risk factor, defined as homelessness, prison history, or drug or alcohol misuse, remained similar to the previous 3 years at 13% in 2020. Experience of one or more social risk factor was more common among men and people born in the UK. People with TB with a social risk factor were more likely to be infectious.

In conclusion, it is encouraging that TB rates in London continue to decline and are now at to their lowest level since 2001. However, this decline should be viewed with caution in light of the significant impact of the coronavirus (COVID-19) pandemic. In addition, 1 in 3 people with TB in London have either a social risk factor or key co-morbidity. This medical and social complexity provides significant challenges to TB control and the achievement of TB elimination in England by 2035.

Recommendations

Further reductions in TB in London will require:

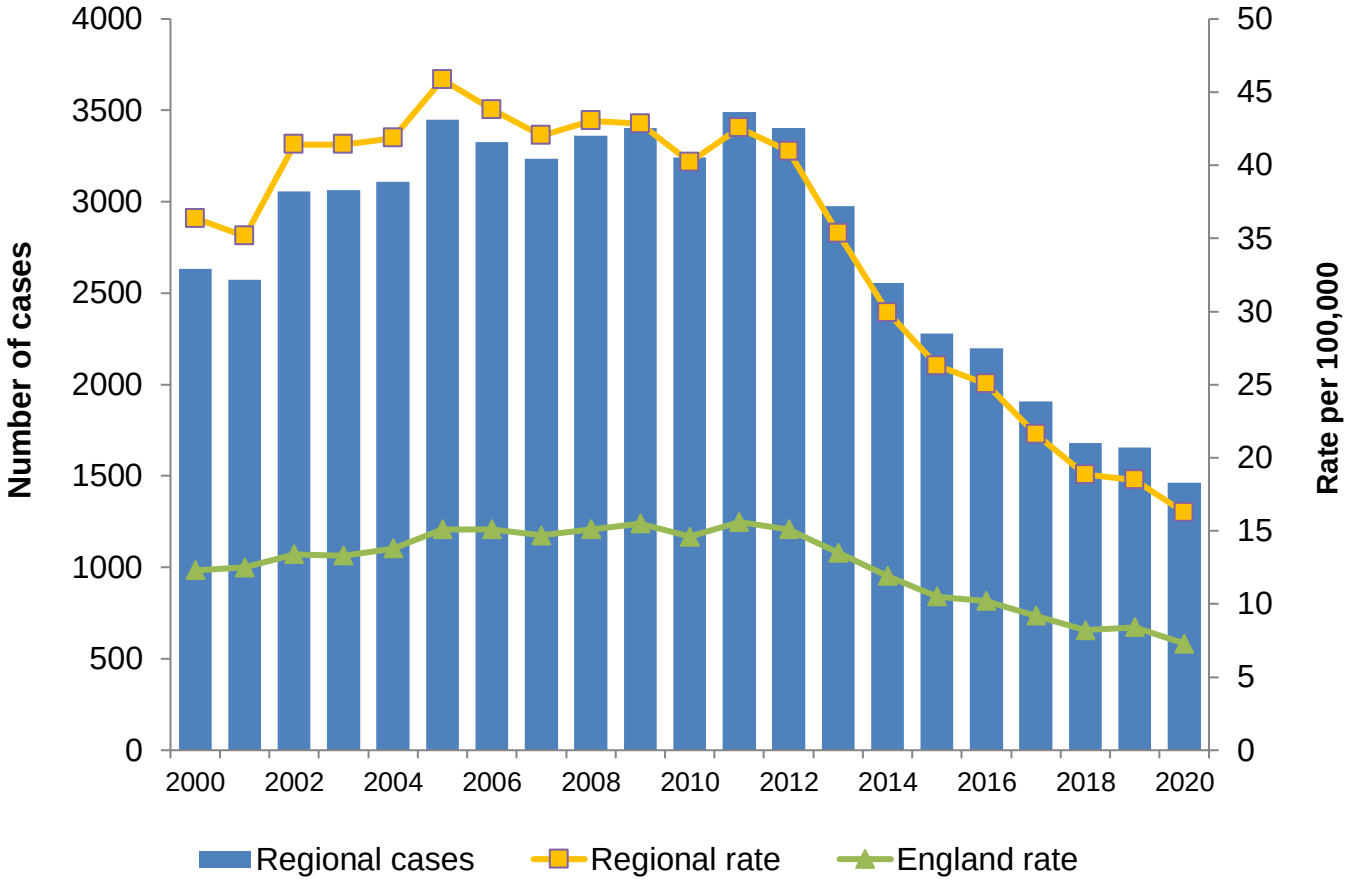
- work to ensure that delays to diagnosis are monitored to ensure timely access to treatment services
- efforts to improve treatment completion rates in groups with complex medical and social circumstances, such as those in older age groups, those with risk factors and those with drug-resistant TB
- continuation of robust contact tracing by TB teams to identify those who need treatment for TB or LTBI
- Health Protection Teams to work closely with TB services on wider TB incidents, and the utilisation of WGS cluster analysis efficiently to interrupt transmission where possible

1.TB notifications and incidence

Overall numbers, rates and geographical distribution

In 2020, there were 1,464 cases of tuberculosis (TB) notified in London residents, a rate of 16.3 per 100,000 of the population (Figure 1). This was the lowest rate of TB in London since 2000 , and represents a 12% decline in rate from 2019, and a 65% decrease from 2005, when rates peaked. This was a greater decline than seen nationally, where a decrease of 52% was seen in the number of people with TB in England from 2011 to 2020 (15.1 per 100,000 in 2005 vs. 7.3 per 100,000 in 2020).

Figure 1. TB case reports and rates, London, 2000 to 2020



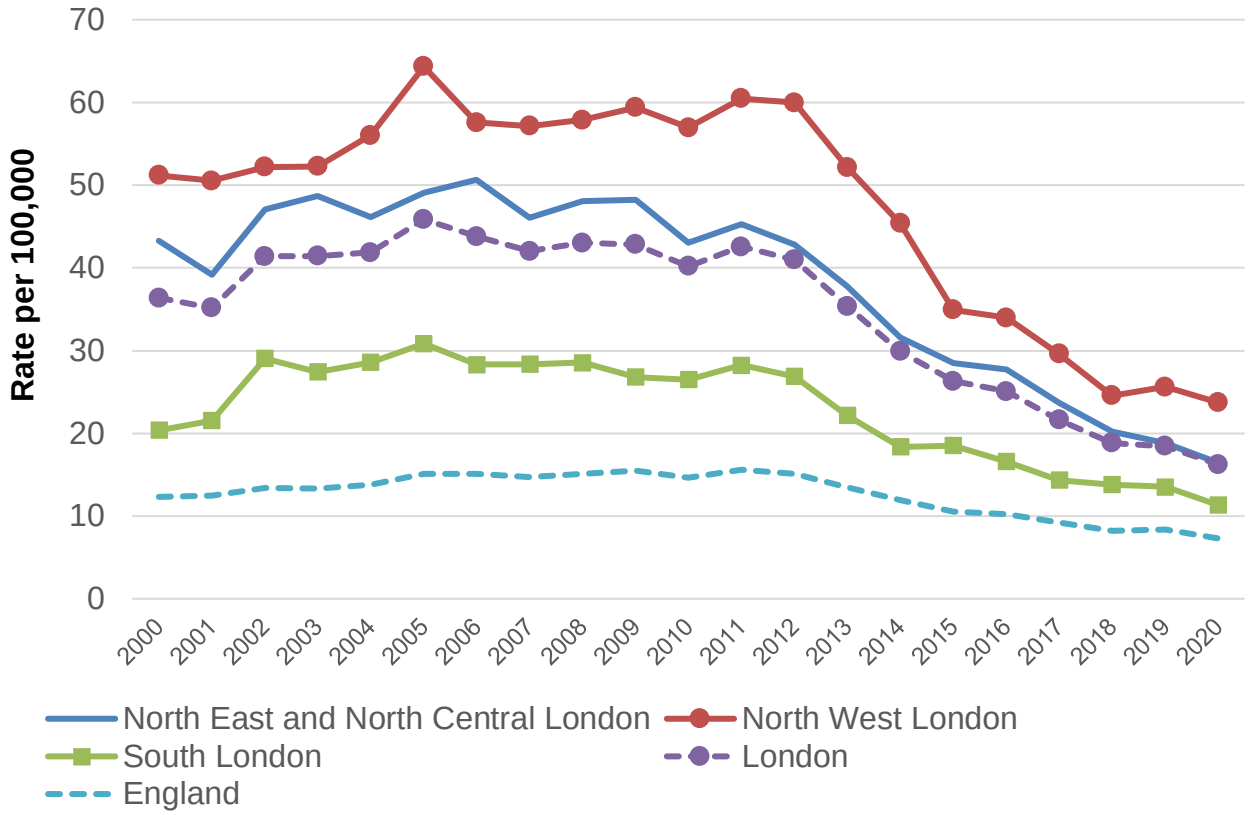
Despite this, the rate of TB in London in 2020 remains over twice as high as the rate for England (7.3 per 100,000) and continues to account for the highest proportion of cases in England (35% of the 4,125 cases in 2020).[1]

The highest TB rate was among residents of the North West London Health Protection Team area (23.7 per 100,000 of the population), despite a 7.4% reduction since 2019. All areas saw a

[1] Tuberculosis in England: 2021 (presenting data to end of 2020, UK Health Security Agency, prepared by: Tuberculosis Unit, National Infection Service.

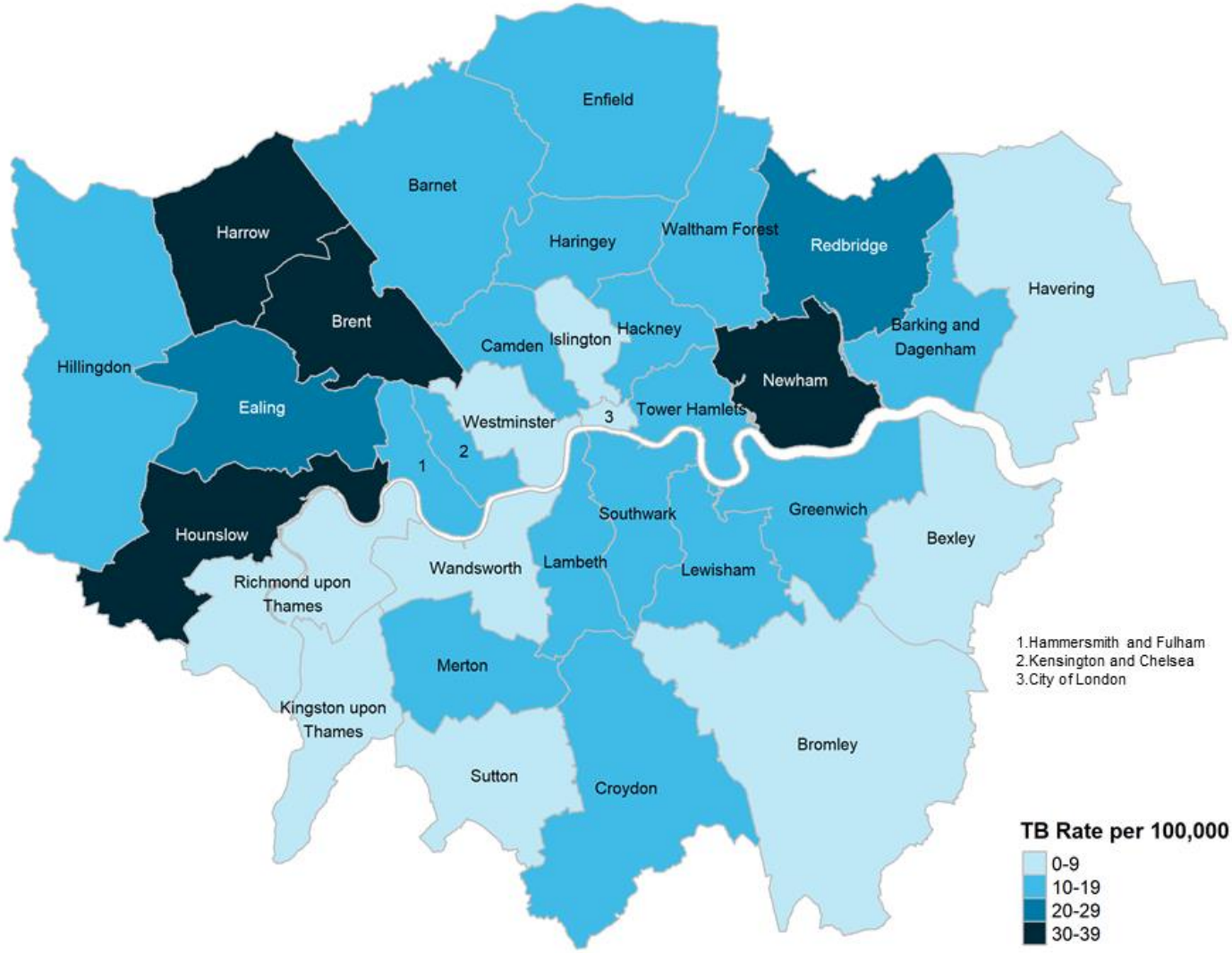
decrease in rates since 2019, with the largest decrease in the South London HPT (by 16.3% from 13.5 per 100,000 in 2019 to 11.3 per 100,000 in 2020) (Figure 2).

Figure 2. TB case rates, by Health Protection Team of residence, London, 2000 to 2020



The London Borough of Newham remained the borough with the highest rate of TB (39.4 per 100,000, 140 cases), followed by Harrow (36.9 per 100,000, 93 cases), Hounslow (35.3 per 100,000, 96 cases) and Brent (30.8 per 100,000, 101 cases (Figure 3 and Appendix C2). These were the only boroughs with rates over 30 per 100,000. Rates in Newham and Brent fell compared to 2019. However, the rate in Harrow increased by 45% (64 cases, 25.5 per 100,000 in 2019 versus 93 cases, 36.9 per 100,000 in 2020), despite the significant decreases seen in previous years (75.9 per 100,000 in 2013 to 24.4 per 100,000 in 2018). This was the largest increase in TB rates in any London borough. Notable increases in TB rates were also observed in Kensington and Chelsea (19%, 9.6 per 100,000, 15 cases, in 2019 to 11.5 per 100,000, 18 cases, in 2020) and Waltham Forest (44 cases, 18%, 15.9 per 100,000 in 2019 to 52 cases, 18.8 per 100,000 in 2020).

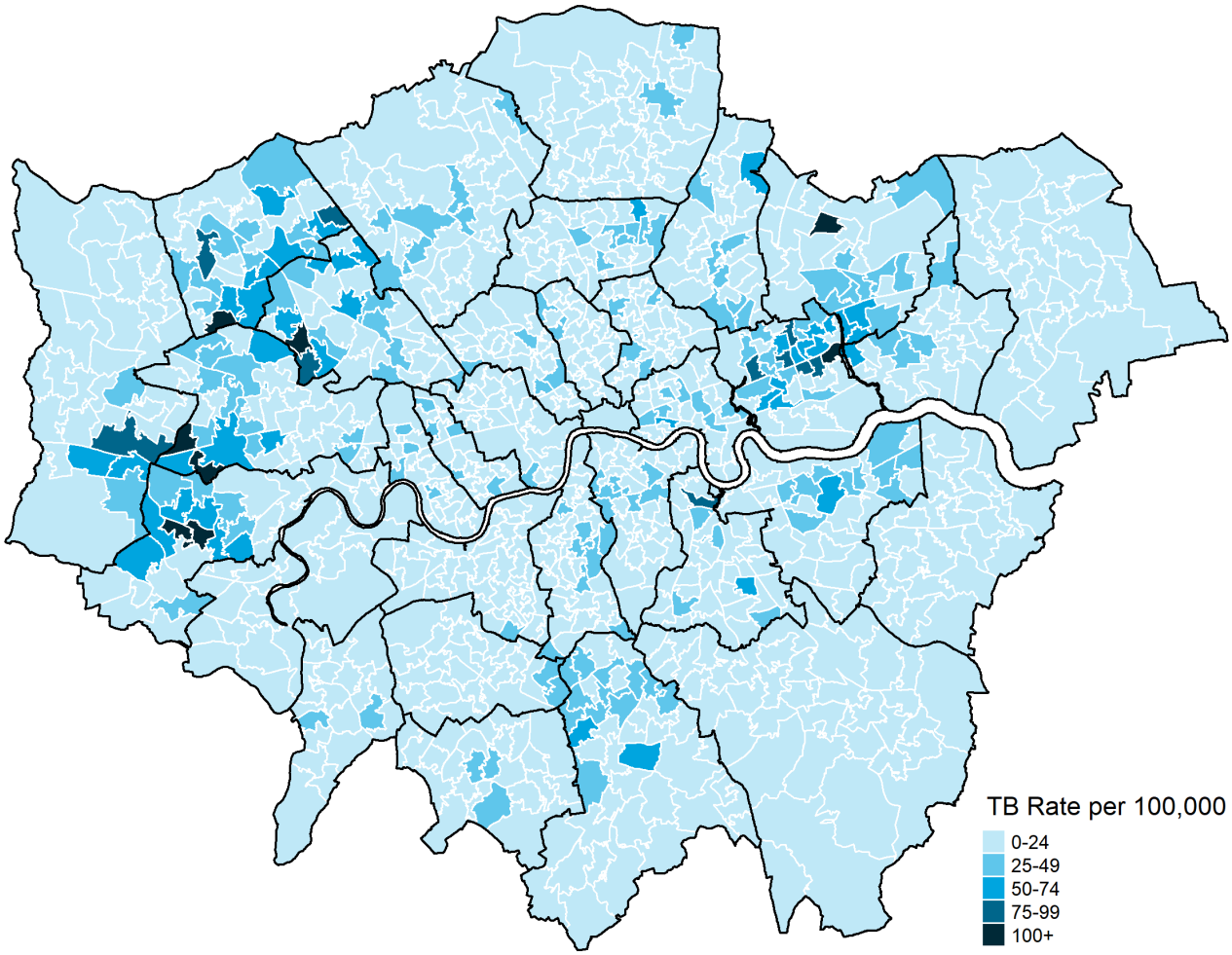
Figure 3. TB case rate by upper tier local authority of residence, London, 2020



The majority of boroughs saw declines in rates from 2019, with the largest declines observed in Richmond upon Thames (64%, 7.1 per 100,000 in 2019 vs. 2.5 per 100,000 in 2020), Wandsworth (47%, 13.6 per 100,000, 45 cases, in 2019 vs 7.3 per 100,000, 24 cases in 2020), and Sutton (40%, 14.5 per 100,000, 30 cases, in 2019 vs. 8.7 per 100,000, 18 cases in 2020), all in the South London HPT. However, changes in rates in these lower-incidence boroughs should be treated with caution due to small numbers (Appendix C1).

At a higher geographical resolution, more variation was seen in the incidence of TB in London, such that high overall rates in boroughs could be attributed to a relatively small number of very high incidence middle super output areas (Figure 4). As in previous years, this was particularly the case for Brent, Ealing, Redbridge, Newham, Hillingdon and Hounslow.

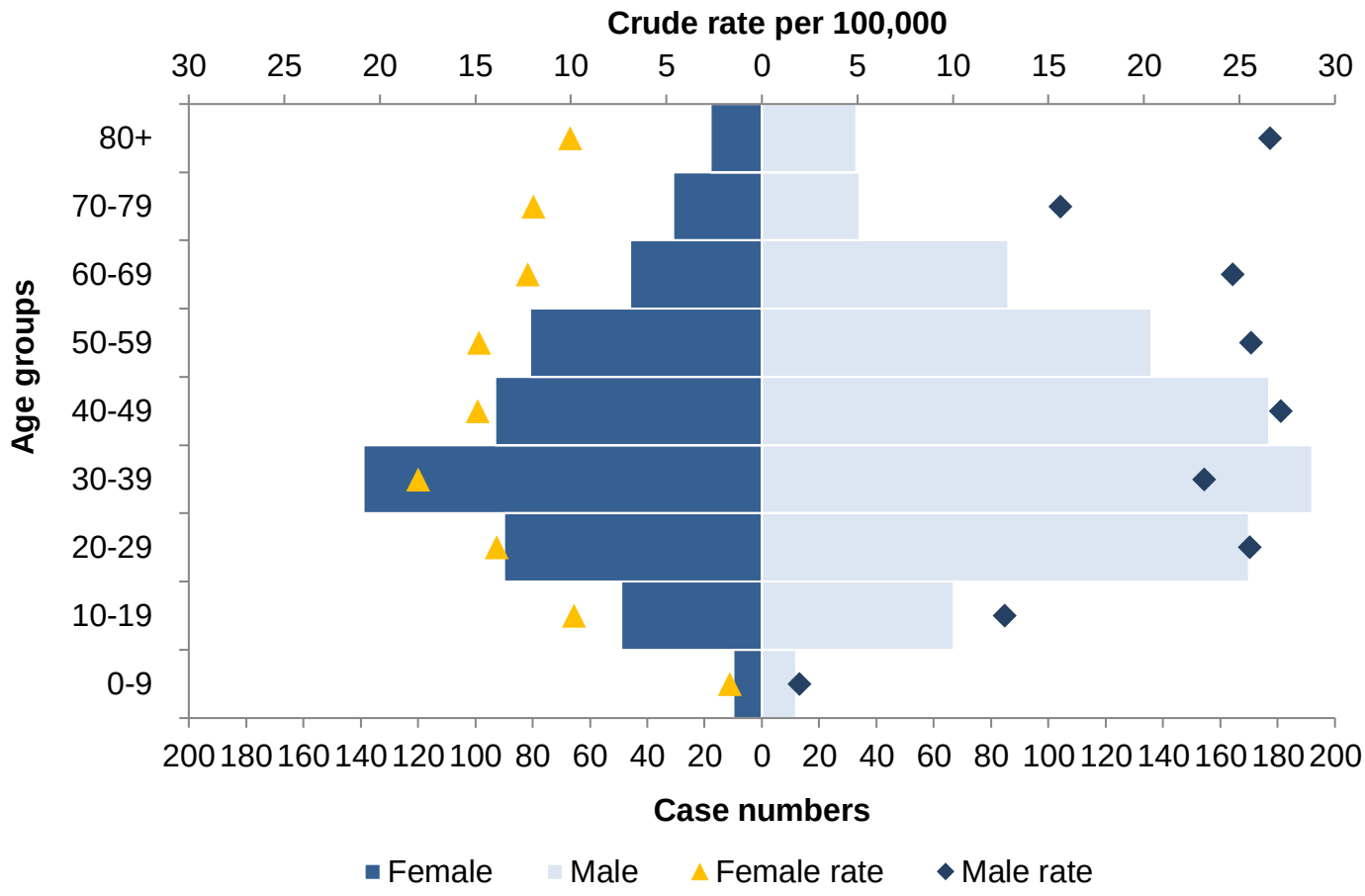
Figure 4. TB case rate by Middle Super Output Area of residence, London, 2020



Demographic characteristics

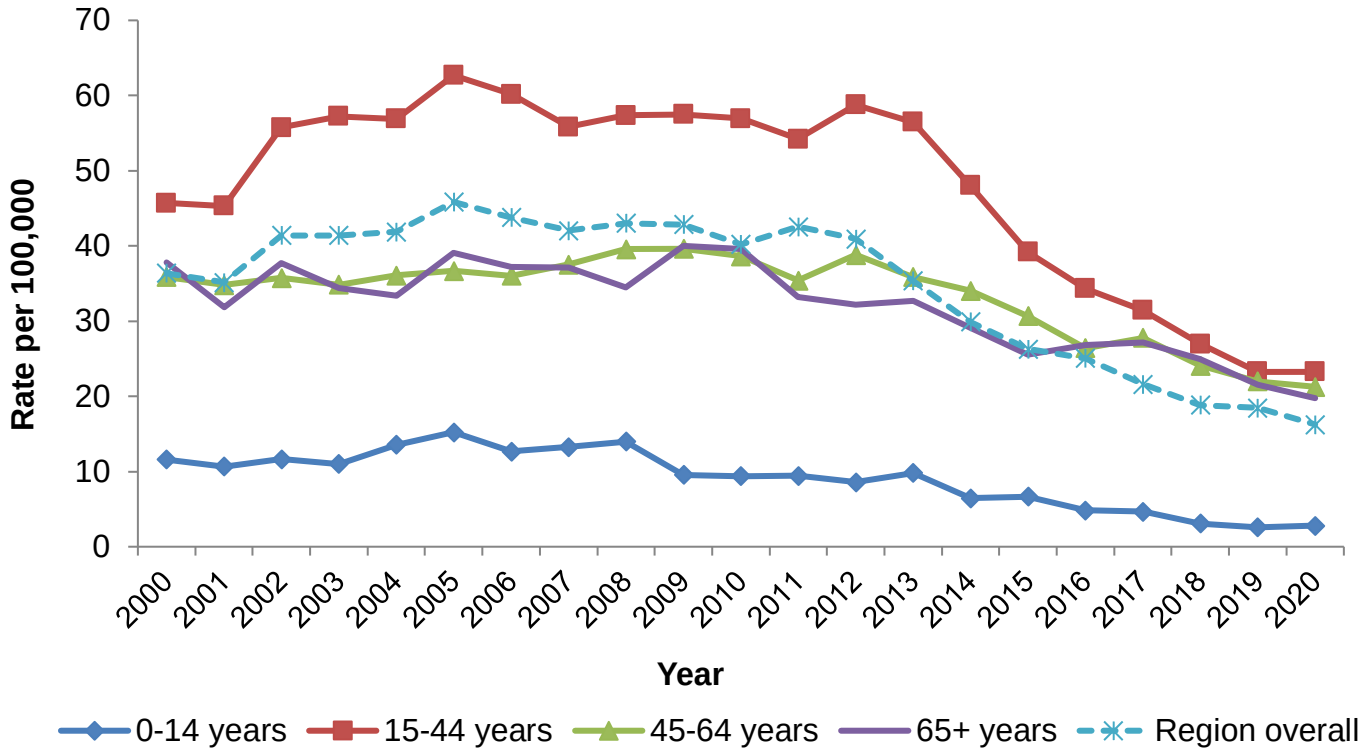
Age and sex

Figure 5. TB case reports and rate by age and sex, London, 2020



In 2020, 62% (907) of people with TB in London were male, and the rate was higher among males (20 per 100,000) than for females (12 per 100,000). Rates were highest for males aged between 40 and 49 (27 per 100,000) and for females 30 to 39 years old (18 per 100,000). Among men, rates in all age groups were above 20 per 100,000 over the age of 19, other than in the 70 to 79 age group (15.6 per 100,000). This was a shift from previous years, when rates in those aged 70 to 79 years old were similar to other adults. In women, rates in all groups other than those in the 30 to 39 age group were under 15 per 100,000 and had declined since previous years.

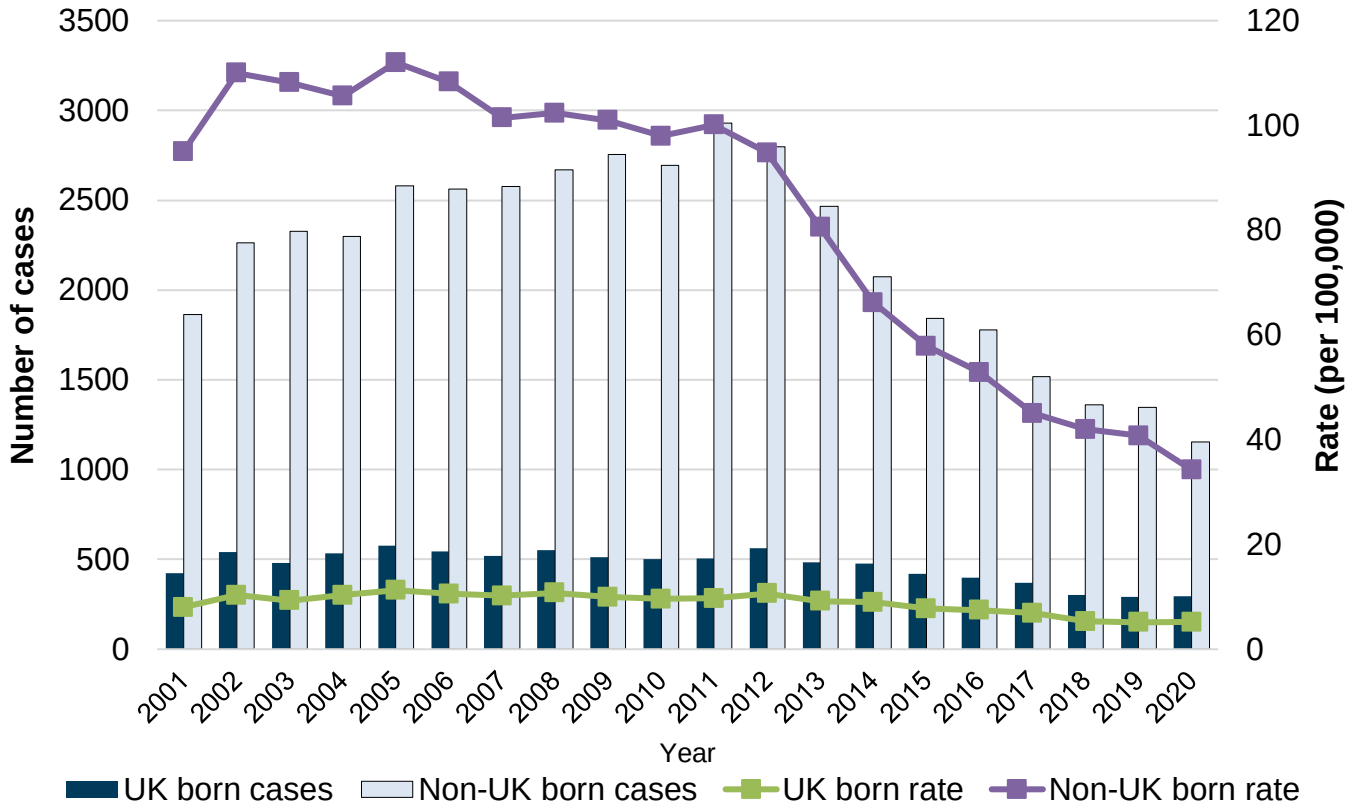
Figure 6. **TB case rates by age group, London, 2000** to **2020**



Rates in adults with TB did not appreciably differ across the age strata in 2020, and rates in all age groups were similar to the previous year other than in the over 65 age group in which TB rates decreased slightly. This led to an overall decrease across all age groups. The convergence of TB rates in adult age groups seen over recent years was largely driven by the decline in the rate of TB in people aged 15 to 44 since 2012 (Figure 6).

Place of birth and time since entry

Figure 7. TB case reports and rate by place of birth, London, 2001 to 2020

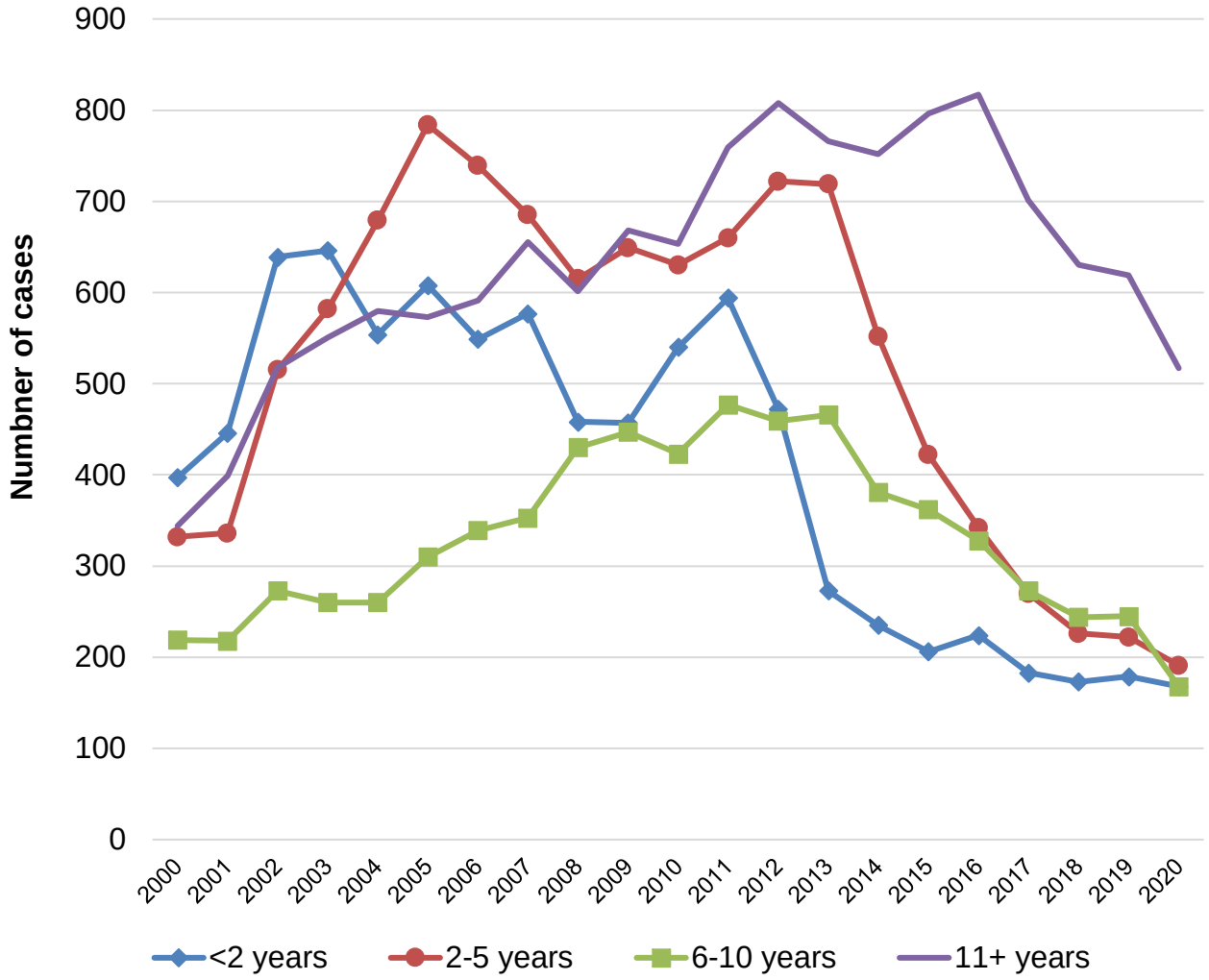


In 2020, country of birth was known for 99% of people with TB in London (1,449 out of 1,464). Overall, 79% of all people with TB in London were born abroad, higher than the proportion of cases born abroad nationally (73%). This borough with the lowest proportion of people born abroad was Islington, with 57% (13 out of 23) of those with TB born outside the UK.

The rate of TB in people born outside of the UK fell by 16% from 2019 (40.7 per 100,000 vs 34.2 per 100,000 in 2020), reaching the lowest it has been since 2001 (figure 7). Despite this decline, the rate of TB in people born abroad was over 6 times greater than the rate of TB in people born in the UK (5.2 per 100,000). The number and rate of people with TB who were born in the UK (294, 5.2 per 100,000) was similar to that in 2019 (290, 5.1 per 100,000), with little change over the past 3 years after a gradual decline in rates between 2012 and 2018. However, the London TB rate in people born in the UK was still higher than the England rate (3 per 100,000).

In 2020, information on the time since entry to the UK and notification date of TB was available for 90% of people born outside the UK (1,044 out of 1,155). Similar to recent years, the median time since entry was 10 years (interquartile range, IQR, 3 to 19.5 years). Half of people born outside the UK had entered the UK over 10 years ago (50%, 517 out of 1,044), although the number of people decreased in all time of entry groups. Less change was seen in the number of migrants who had entered the UK in the previous 5 years (Figure 8).

Figure 8. Time between entry to the UK and TB notification for non-UK-born people by year, London, 2000 to 2020



In 2020, the country of birth was known for 99% (1,146 out of 1,155) of people not born in the UK. As in previous years, the most common country of birth for people with TB who were not born in the UK was India (29%, 336 out of 1,146), and the median time since entry was 8 years (IQR 2 to 15 years). For those born in Pakistan, the second most common country of birth, there was an increase in median time since entry to 16 years from 13 years in 2019.

Of those who were born in the 10 most common countries of birth for people with TB born outside the UK, those born in Sri Lanka had the longest median time since entry in 2020 (22 years), followed by those from Pakistan, Somalia and the Philippines (all 16 years). People with TB from Romania and Eritrea were more likely to be recent entrants, with a median time from entry to diagnosis of 4 years for both countries.

Table 1. Ten most common countries of birth of non-UK-born people with TB and time between entry to the UK and TB notification, London, 2020

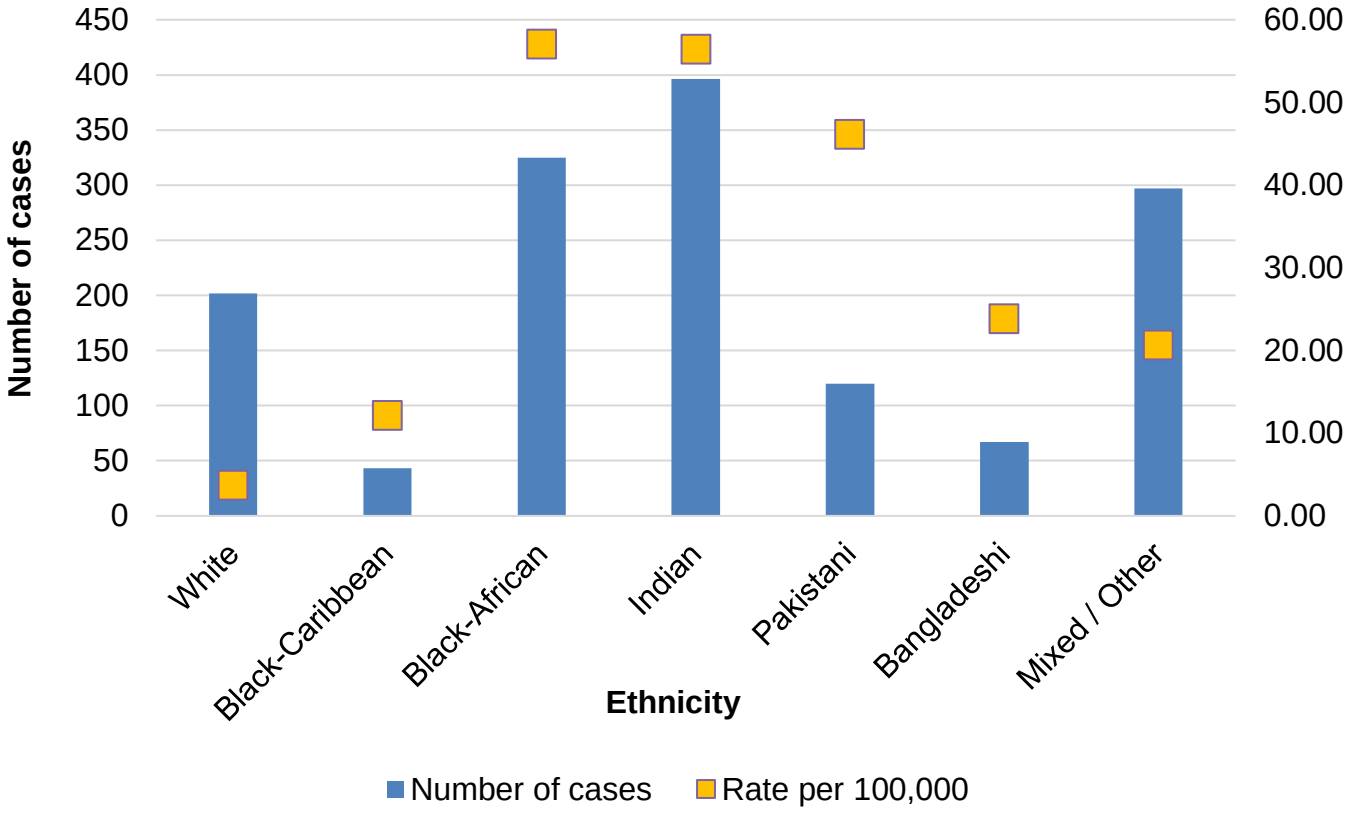
Country of origin	Number of cases	Proportion of non-UK-born (%)	Median time since entry	Time since entry (IQR)	
India	336	29	8	2	15
Pakistan	95	8	16	6	27
Somalia	75	6	16	9	24
Bangladesh	54	5	10	3	18
Romania	54	5	4	2	7
Philippines	35	3	16	10	30
Nigeria	33	3	12	6	20
Eritrea	31	3	4	1	9
Nepal	28	2	8	2	12
Sri Lanka	27	2	22	10	29

Ethnicity

In 2020, 99% of those with TB in London had their ethnicity recorded (1,450 out of 1,464). People of Black-African ethnicity had the highest rate of TB in London (57 per 100,000), followed by those of Indian ethnicity (56 per 100,000), and those of Pakistani ethnicity (46 per 100,000). Similarly to previous years, those of Indian ethnicity made up the highest proportion of cases in London overall (27%, 396 out of 1,450) (Figure 9).

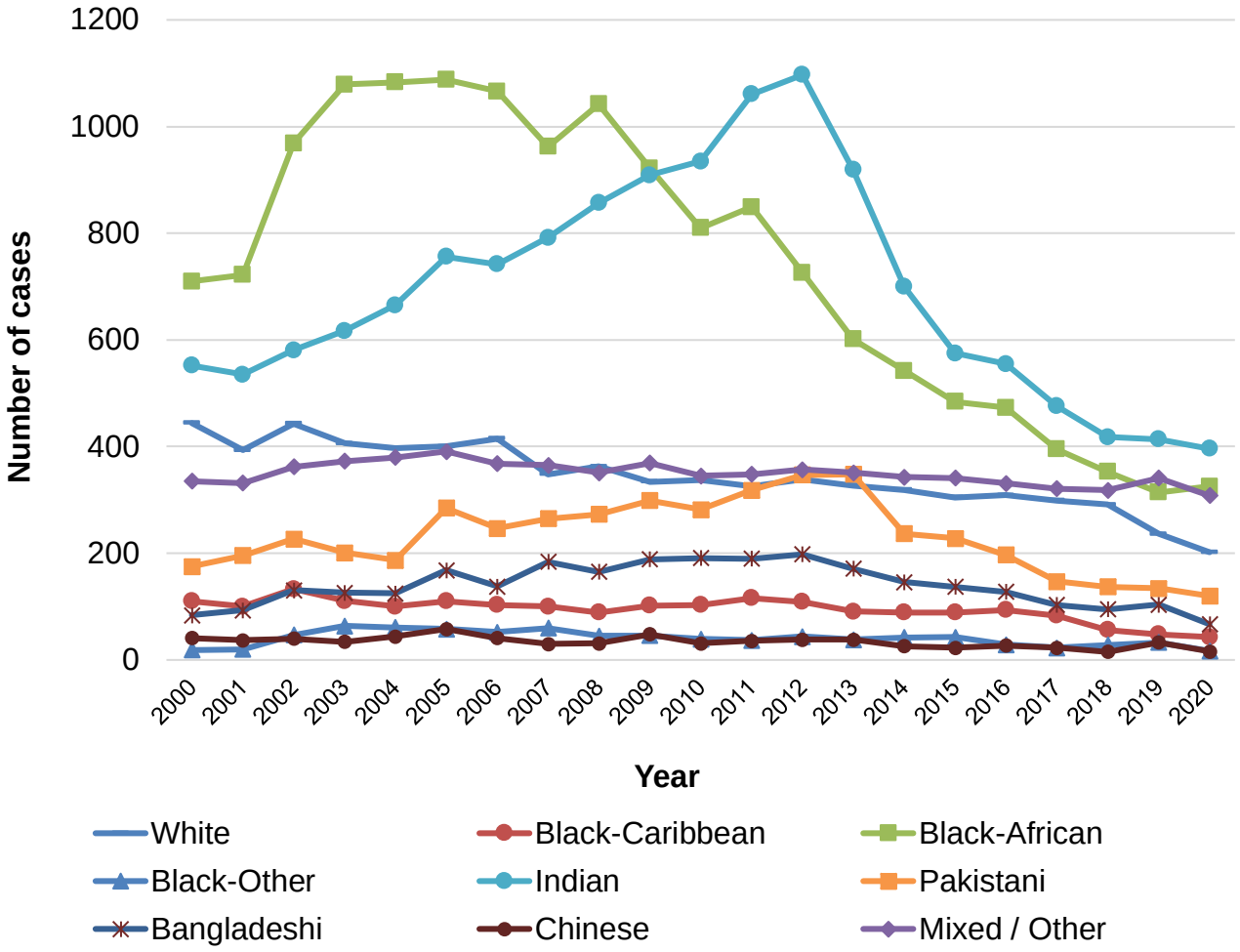
Most people of Indian ethnicity were born in India (84%, 334 out of 396). People of Black-African ethnicity made up the second highest proportion of cases (22%, 325 out of 1,450), among whom the most common countries of birth were Somalia (22%, 71 out of 325), UK (19%, 61 out of 325), and Nigeria (10%, 32 out of 325). The third most common ethnicity was those of other or mixed ethnic backgrounds (18%, 264 out of 1,450), of which the most common countries of birth were the Philippines (13%, 35 out of 264), Nepal (11%, 28 out of 264) and the UK (10%, 27 out of 264). The fourth most common ethnicity was white (14%, 202 out of 1,450), however this ethnicity also had a lower rate of TB (3.7 per 100,000) than any other ethnic group. Among those of white ethnicity, the most common country of birth was the UK (46%, 92 out of 202) followed by Romania (15%, 31 out of 202). Less than half of those of white ethnicity who had TB were born in the UK (46%, 92 out of 202).

Figure 9. TB case number and rate by ethnic group, London, 2020



In 2020, there was a small increase (4%) in the number of people of black African ethnicity with TB compared to 2019 (figure 10). Small decreases or little change were seen in the numbers of people of white, black Caribbean, Indian, or mixed or other ethnic groups, however larger declines were seen in the number of people with TB who were of Bangladeshi ethnicity (36%, 104 in 2019 to 67 in 2020).

Figure 10. TB case number by ethnic group, London, 2000 to 2020



Clinical characteristics

Site of disease

Table 2. Site of disease of people with TB, London, 2020

Site of disease	n	%*
Pulmonary	751	51.3
Lymph nodes (extra-thoracic)	373	25.5
Lymph nodes (intra-thoracic)	259	17.7
Gastrointestinal	92	6.3
Bone or joint (spine)	78	5.3
Miliary	42	2.9
Bone or joint (other – not spine)	36	2.5
Central nervous system (meningitis)	30	2.0
Central nervous system (other – not meningitis)	30	2.0

Site of disease	n	%*
Genitourinary	21	1.4
Cryptic	10	0.7
Laryngeal	2	0.1
Total patients*	1,464	

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

As in recent years, over half (51%, 751 out of 1,464) of those notified with TB in 2020 had pulmonary disease (Table 2). Pulmonary disease was more common among children under 15 years (66%, 25 out of 38 versus 50%, 726 out of 1,426 of those in older age groups), and in those born in the UK (64%, 187 out of 264 versus 49%, 560 out of 1,155 of those born abroad).

Pulmonary TB was also more common in those of white (75%, 150 out of 202) ethnicity than any other ethnic groups, particularly Indian (41%, 162 out of 396) and Bangladeshi (36%, 24 out of 67) ethnic groups . Those with at least one social risk factor were also more likely to have pulmonary TB (75%, 139 out of 185 versus 47%, 578 out of 1,217).

Previous history of tuberculosis

In 2020, data on previous diagnosis was available for 98% (1,437 out of 1,464). As in recent years, 6.1% (88 out of 1,437) of people with TB in 2020 had a previous TB diagnosis. The median time between diagnoses was 6 years (IQR 3 to 17). Of people who received Directly Observed Therapy (DOT), 12% (32 out of 260) had a previous TB diagnosis.

Hospital inpatient and directly observed therapy (DOT)

In 2020, information on hospital inpatient status was available for 99% (1,449 out of 1,464) of people with TB. As in previous years, a third (33%, 483 out of 1,449) were hospital inpatients at the point of their diagnosis. Being admitted to hospital was more common among people over the age of 65 (42%, 67 out of 160). A smaller proportion of those of Bangladeshi ethnicity (20%, 13 out of 64) were admitted to hospital compared to other ethnic groups. People with pulmonary TB (45%, 334 out of 742) were more likely to be admitted to hospital, and of people with pulmonary TB who were sputum smear positive, over half were admitted to hospital (59%, 179 out of 301). People with a social risk factor were also more likely to be admitted to hospital (54%, 99 out of 182).

In 2020, 18% (260 out of 1,464) of people with TB were reported to receive directly observed treatment (DOT): this includes people receiving video observed treatment (VOT). Of those with at least one social risk factor, 45% (84 out of 185) received DOT, slightly lower than previous years (49% in 2019). Of those with multi-drug resistant TB (MDR-TB), 50% (6 out of 12) received DOT. DOT was more common among those who were UK-born (21%, 63 out of 231 versus 17%, 194 out of 960 in those born abroad), men (21%, 191 out of 715 versus 12%, 69 out of 488 in women), those with pulmonary TB (25%, 184 out of 566 versus 11%, 76 out of 637

in those with extrapulmonary TB only), and among people with one of the key morbidities (46%, 84 out of 100 versus 14%, 165 out of 1,052).

Comorbidities

Data for several comorbidities (diabetes, hepatitis B and C, chronic liver disease, chronic renal disease, and immunosuppression) has been routinely collected as part of TB surveillance in London since 2016. People recorded as having any of these conditions are classified as having a comorbidity. If they are not listed as having any of these, they are classified as having no comorbidity, even if some of the data is missing.

Data was available for 99% (1,442 out of 1,464) of people notified with TB in 2020. Of those, 23% (336 out of 1,442) had at least one comorbidity. The most common comorbidity reported was diabetes, followed by immunosuppression (Table 3).

Table 3. **Co-morbidities among people with TB, London, 2020**

Comorbidity	n	%	Total
Diabetes	183	13	1,436
Immunosuppression	99	7	1,419
Chronic renal disease	62	4	1,426
Chronic liver disease	32	2	1,419
Hepatitis B	26	2	1,365
Hepatitis C	24	2	1,363

Males had a higher rate of comorbidities than females in 2020 (30%, 21 out of 683 of males versus 23%, 125 out of 548 of females). Comorbidities were also higher in those born abroad (25%, 287 out of 1,432) than those born in the UK (16%, 46 out of 287). The prevalence of comorbidities increased with age, from 5% (2 out of 38) in those aged under 15, to 50% (79 out of 157) in those aged over 65.

2. Laboratory confirmation of TB

Laboratory tests data collection

Laboratory data on culture confirmed TB isolates from the National Mycobacterium Reference Service were matched to TB case notifications and used to report culture confirmation. Results for microscopy, PCR and histology are also collected in LTBR.

Culture confirmation and speciation

In 2020 in London, 63% of people had their TB diagnosis confirmed by culture (925 out of 1,464). This was higher among those with pulmonary TB (80%, 599 out of 751 versus 46%, 326 out of 713 of people with exclusively extra-pulmonary TB).

Of those people with TB who had a positive culture diagnosis, the vast majority has *Mycobacterium tuberculosis* (98%, 908 out of 925), 15 had M. africanum, and 2 had *M. bovis*.

Of the 539 people who did not have their diagnosis confirmed by culture, 46 had a positive PCR result, and 63 had positive histology. In total, 28% (417 out of 1,464) of the people who had TB in 2020 had no recorded laboratory evidence of TB, similar to previous years. The proportion without a recorded laboratory result was highest among those under 15 years old (61%, 23 out of 38), those with extra-pulmonary TB (41%, 292 out of 713 versus 17%, 125 out of 751 with pulmonary disease), and those with no social risk factors (30%, 370 out of 1,217 versus 18%, 34 out of 185 with at least one social risk factor).

Sputum smear

In 2020, sputum-smear results were known for 76% (572 out of 751) of people with pulmonary TB, similar to recent years. Results were more likely to be known among people with a social risk factor (84%, 117 out of 139) than those without (74%, 426 out of 578).It was least likely to be known among children under 15 years.

Where known, 53% (303 out of 572) of people with pulmonary TB had sputum smear positive disease, similar to previous years.

3.TB transmission

Rate of TB in UK-born children

TB in UK-born children is used as a proxy indicator for recent TB transmission, since it is likely to be caused by recent exposure. In 2020, the rate of TB in UK-born children under 15 years of age in London was 1.7 per 100,000 population (95% CI 1.2 to 2.5, 27 cases) compared to 2.5 per 100,000 in the UK in 2019. Small numbers mean year on year changes should be interpreted with caution. However, these data indicate a decline in TB transmission in London over the last decade (Figure 11).

Figure 11. Rate of TB in UK-born children under 15 years of age, London, 2001 to 2020

Whole genome sequencing (WGS) of TB isolates

Routine whole genome sequencing (WGS) of TB isolates was introduced in London in January 2018 for speciation, to predict drug resistance and detect relatedness. Forest, a UKHSA prototype, assigns patients to a WGS cluster if their isolate is found to be within 12 single nucleotide polymorphisms (SNPs) of an isolate from another person in the database.

UKHSA London and the Field Service systematically collect and review TB relatedness information to better understand TB transmission in London and identify where public health action may be applied to interrupt this.

The interval from specimen date to WGS results displaying in Forest was 32 days (IQR 25 to 45) in London between 2018 and 2020. The time to culture the isolate, performed at the source laboratory accounted for most of this interval.

Following the monthly cluster review meeting London TB services are notified if their patients are identified as being less than 5 SNPs of another person and may be asked to complete a cluster questionnaire for their patient. The information collected is used to identify any links and opportunities for interventions where transmission may be ongoing, or other contacts may have been exposed.

Table 4. TB relatedness in London 2018 to 2020

Year	TB notifications	Culture confirmed	Clustered (<=12 SNPs)	Reviewed (<5 SNPs)	Clusters reviewed
2018	1,679	1,042	222	168	94
2019	1,655	1,000	284	224	131
2020	1,464	925	267	216	139
Total	4,798	2,967	773	608	271

Among the 2,967 people with culture confirmed TB in London between 2018 and 2020, 20% (608) were less than 5 SNPs from another person with TB in England, within a total of 271 clusters (Table 4).

Of the 271 clusters reviewed, 201 (74%) exhibited no further growth at less than 5 SNPs in London. Of the remaining 70 clusters, 18 exhibited sustained growth (the addition of 1 or more patients at less than 5 SNPs in London each year) over this period. These 18 clusters contributed 27% (162 out of 608) of cases clustered at less than 5 SNPs in London between 2018 and 2020.

4. Delay from onset of symptoms to start of treatment

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

Overall delay includes time from symptom onset to the people presenting to healthcare and from the initial presentation to diagnosis and start of TB treatment. Information on delay was available for 88% (664 out of 751) people with pulmonary TB in 2020. One person was diagnosed post-mortem. The median time from symptom onset to start of treatment was 69 days (IQR 34 to 133) (Table 5), shorter than the median delay in England (79 days).

Table 5. Time between symptom onset and treatment start in people with pulmonary TB, London, 2013 to 2020

Year	0 to 2 months		2 to 4 months		More than 4 months		Median days (IQR)		Total N
	n	%	n	%	n	%			
2013	506	46	328	30	271	25	65	(33-121)	1,105
2014	445	43	315	30	275	27	69	(35-129)	1,035
2015	464	46	309	31	234	23	67	(34-116)	1,007
2016	409	41	319	32	269	27	72	(37-130)	997
2017	359	41	297	34	226	26	73	(37-132)	882
2018	342	42	275	34	193	24	70	(35-120)	810
2019	320	43	227	31	196	26	69	(36-127)	743
2020	298	45	180	27	186	28	69	(34-133)	664

The median delay was longest in people resident in South London (76 days, IQR 39 to 146): this had increased by 6 days since 2019 (median 70, IQR 40 to 122). This was followed by those resident in North East and North Central London (70 days, IQR 34 to 135). Delays experienced by people resident here had decreased compared to 2019 by 2 days. The shortest delays were in people resident in North West London (64 days, IQR 32 to 120), which saw no change since 2019.

Characteristics of people with pulmonary TB with a delay from onset of symptoms to treatment of more than 4 months

Of the London residents with pulmonary TB, 28% had a delay of more than 4 months from their first symptoms before starting treatment. Adults aged 45 to 64 were more likely than other age groups to experience delays. A total of 31% of adults in this age group experienced a delay longer than 4 months. This is contrast to recent years, in which adults over 65 were more likely to experience delays. People with negative sputum smears were also more likely to experience delays (30%, (104 out of 343) versus 24% (69 out of 284) among people with positive results). Females were more likely that males to experience delays in treatment (32%, 65 out of 205 versus 26%, 121 out of 459), however delays were similar for those born abroad or in the UK, and those with and without a social risk factor.

Table 6. Proportion of people with pulmonary TB with a delay from onset of symptoms to treatment of more than 4 months, by PHE Health Protection Team area, age group, sex, place of birth, social risk factor, and comorbidity, London, 2020

		Number delayed	Percentage delayed	Total
HPT	North East North Central London	78	30%	264
	North West London	55	24%	230
	South London	53	31%	170
Age group	0 to 14	2	11%	19
	15 to 44	108	28%	392
	45 to 64	56	31%	179
	65 and over	20	27%	74
Sex	Female	65	32%	205
	Male	121	26%	459
Place of birth	Non-UK-born	138	28%	500
	UK-born	47	29%	162
Social risk factor	No	148	29%	519
	Yes	36	29%	126
Any comorbidity	Yes	184	28%	160
	No	146	30%	494

5.TB outcomes in drug-sensitive cohort

Drug-sensitive cohort

For the purposes of reporting outcomes for people with TB, the drug-sensitive cohort is defined as all people notified with TB excluding those in the drug-resistant cohort (see Chapter 6). Under this definition, people with TB resistant to isoniazid, ethambutol and/or pyrazinamide but without resistance to rifampicin are included in the drug-sensitive cohort. Outcomes are reported according to year of notification.

Treatment outcomes for the drug-sensitive cohort are reported separately for:

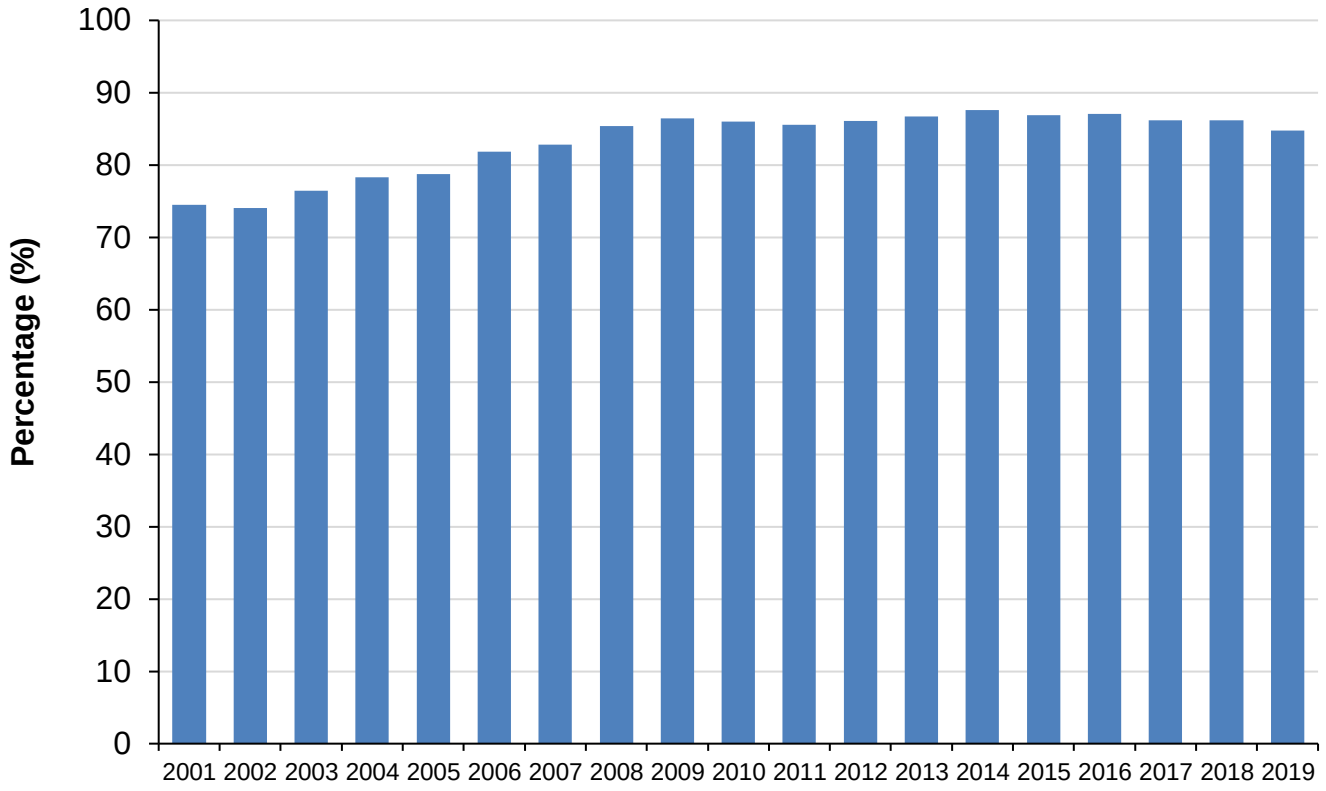
- people with TB with expected duration of treatment less than 12 months, for whom outcomes at 12 months are reported – this excluded individuals with central nervous system (CNS) disease, who would be treated for 12 months. In addition, those with spinal, cryptic disseminated or military disease are also excluded, as CNS involvement cannot be reliably ruled out for the purposes of reporting
- people with CNS, spinal, cryptic disseminated or military disease, for whom the last recorded treatment outcome is reported

Detailed data on deaths and people lost to follow-up at least recorded outcomes are presented for the entire drug-sensitive cohort.

Outcomes for people with TB with expected treatment duration of less than 12 months

In 2019, 85% (1,225 out of 1,445) of those with rifampicin-sensitive TB (and without CNS, spinal, military or cryptic disseminated disease) completed treatment at 12 months.

Figure 12. Proportion completing treatment at 12 months, London, 2000 to 2020



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

This was higher than that seen nationally (82%). Among the 1445 patients for whom duration of treatment was known, the median treatment time was 188 days (IQR 182 to 258). The proportion completing treatment has remained stable for more than a decade (Figure 12).

The most common reasons for not completing were loss to follow-up (5%, 68 out of 1,445) and still being on treatment (5%, 74 out of 1,445), followed by death (4%, 50 out of 1,445) (Table 7). More information on deaths and loss to follow-up is in section 3 of this chapter. Further information was available on 70 of the 74 people who were still on treatment at 12 months. Half (51%, 36 out of 70) were on a planned treatment regime that exceeded 12 months (8 due to initial drug resistance), 31% (22 out of 70) had their treatment changed, and 17% (12 out of 70) were still on treatment due to treatment interruptions.

Table 7. TB outcome at 12 months for people diagnosed in London in 2019*

Outcome	Number of patients	Percentage
Treatment completed	1,225	84.8
Died	50	3.5
Lost to follow-up	68	4.7
Still on treatment	74	5.1
Treatment stopped	15	1.0
Not evaluated	13	0.9

Outcome	Number of patients	Percentage
Total	1,445	

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

People aged 65 and older were less likely to complete treatment (71%, 137 out of 193): more than a third of those who did not complete treatment (39%, 32 out of 83) had died. Treatment completion was also lower among people with a social risk factor (76%, 135 out of 177 versus 88%, 1,068 out of 1,216), the primary reason being loss to follow-up (43%, 18 out of 42). People with one of the key comorbidities were also less likely to complete treatment (76%, 239 out of 314 versus 88%, 981 out of 1,111 in those with no key comorbidities).

3.5% (50 out of 1,445) of people with rifampicin-sensitive TB notified in 2019 died before completing treatment. TB caused or contributed to 46% (23 out of 50) of these deaths, 32% (16 out of 50) were not related to TB, and information on whether TB was part of the reason for death was not known for the remaining 11 individuals (22%). None were diagnosed with TB post-mortem. The median age at death was 72.5 (IQR 58.5 to 81).

4.7% (68 out fo 1,445) of people with rifampicin-sensitive TB notified in 2019 were lost to follow-up within 12 months. For 41% of those lost to follow-up, the reason was recorded as having left the UK (28 out of 68). The median age at loss to follow-up was 34 (IQR 23 to 53).

Outcomes for people with isoniazid-resistant TB

There were 89 people with isoniazid-resistant TB in the 2019 drug-sensitive cohort. This includes 10 with CNS, spinal, miliary or cryptic disseminated disease, and 79 without.

At 12 months, over half (57%, 51 out of 89) of people with isoniazid resistance had completed treatment. The most common reason for not having completed treatment with still being on treatment (22 out of 89), followed by loss to follow-up (7 out of 89) and having died (7 out of 89). By the last recorded outcome, completion had increased to 73% (65 out of 89) and 8% (7 out of 89) were still on treatment.

Outcomes for drug-sensitive cohort of people with CNS, spinal, military or cryptic TB

Of the 189 people with CNS, spinal, military, or cryptic disseminated TB notified in 2019, 55% (104 out of 189) had completed treatment at 12 months (Table 8). The most common reason for not completing was still being on treatment, although by the last recorded outcome 76% (144 out of 189) had completed, and only 8% of people (15 out of 189) were still on treatment. The next most common reason for not completing treatment was death (8.5%), and 3.7% were lost to follow-up. For those who completed treatment, the median treatment time was 364 days (IQR 272 to 369).

Table 8. **TB outcome at 12 months for people with rifampicin-sensitive, CNS, cryptic disseminated diagnosed in London in 2019**

Outcome at 12 months	n	%
Completed	104	55.0
Still on treatment	57	30.2
Died	16	8.5
Lost to follow-up	7	3.7
Treatment stopped	2	1.1
Not evaluated	3	1.6
Total	189	100

9% (17 out of 189) of people with CNS, spinal, military, or cryptic disseminated TB notified in 2019 died before completing treatment. TB caused or contributed to 29% (5 out of 17) of these deaths, 24% (4 out of 17) were not related to TB, and information on whether TB was part of the reason for death was not known for the remaining 8 individuals (47%). None were diagnosed with TB post-mortem. The median age at death was 56 (IQR 51 to 66).

A total of 8 (4%) people with CNS, spinal, military, or cryptic disseminated TB notified in 2019 were lost to follow-up. For half (4 out of 8) of those lost to follow-up, the reason was recorded as having left the UK. The median age at loss to follow-up was 32 (IQR 29.75 to 51.5).

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

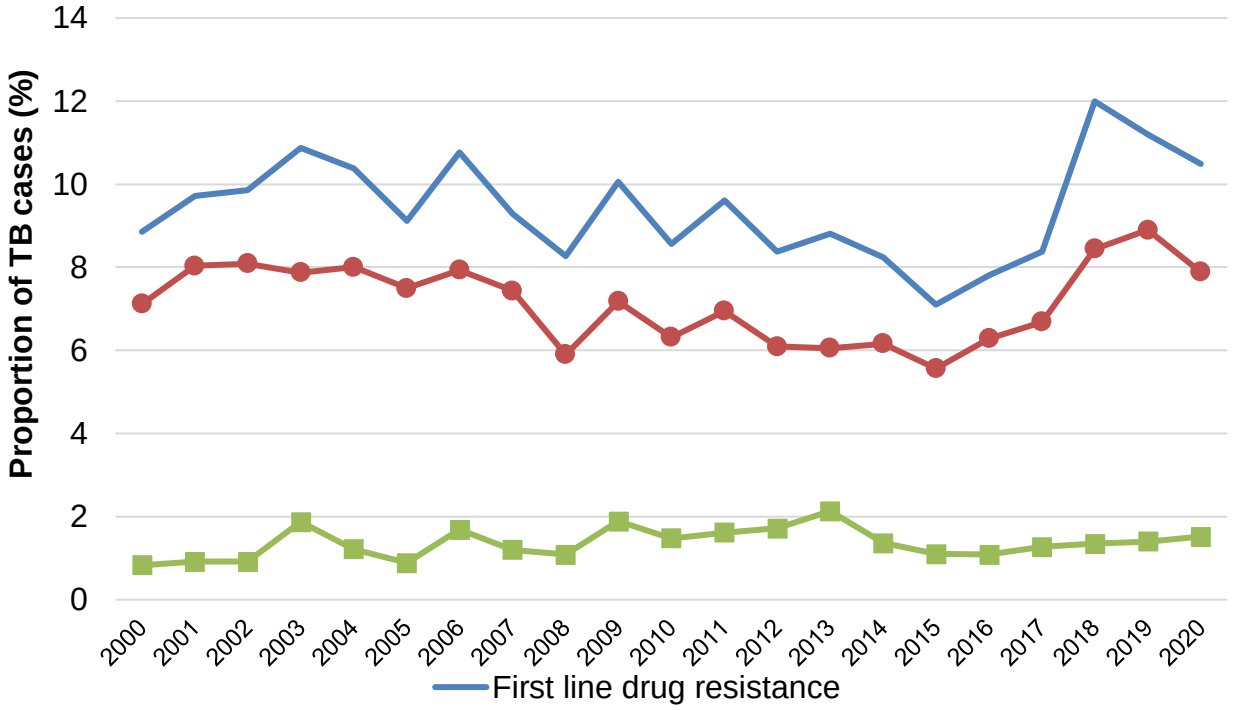
Drug resistance

Anti-TB antibiotic drugs are a large family and resistance may occur to one or more of these antibiotics and may be complex combinations. A distinction is made between first, second and third-line TB antibiotic drugs depending upon their clinical effectiveness. First-line drugs include isoniazid, rifampicin, pyrazinamide and ethambutol. Second-line drugs are injectable agents (for example amikacin, capreomycin, kanamycin), fluoroquinolones (such as moxifloxacin, ofloxacin, ciprofloxacin) and other oral bacteriostatic agents. MDR-TB cases are initially resistant to at least isoniazid and rifampicin. Extensively drug-resistant TB cases (XDR-TB) are initially MDR and resistant to at least 1 injectable and at least 1 fluoroquinolone.

Overall initial drug resistance and geographical distribution

In 2020, resistance profiles were available for 99% (919 out of 925) of culture-confirmed TB cases. The proportion of cases resistant to at least one first-line drug among people with culture-confirmed TB was 10% (97 out of 919), a slight decrease on the previous year (11%, 112 out of 998 in 2019) (Figure 13).

Figure 13. Proportion of TB cases with initial first-line drug resistance, London, 2000 to 2020



Most people with resistance to a first-line drug had resistance to isoniazid (90%, 87 out of 97). Of the 10 people who did not have resistance to isoniazid, 5 had resistance to pyrazinamide, 4 had resistance to rifampicin, and one had resistance to ethambutol.

Characteristics of people with drug-resistant TB

Any first-line drug resistance

Drug resistance was more prevalent among those without a previous diagnosis of TB (12%, 89 out of 762 versus 7%, 3 out of 43 in those with a previous diagnosis). Among common ethnicities, there was the least resistance among people of back-Caribbean, black-other and Chinese ethnicities, all of which had no cases of first-line drug resistance. The most resistance was observed in those of black-African (14%, 26 out of 181) ethnicity. Drug resistance was slightly higher in those without social risk factors (12%, 78 out of 647 versus 9%, 13 out of 138 in those with social risk factors), but did not differ based on sex or site of disease.

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

Small numbers mean the following information should be interpreted with caution. In 2020, there were 14 people with MRD-TB (resistance to isoniazid and rifampicin), 1.5% of the 925 culture-confirmed cases of TB among London residents. 10 were also resistant to ethambutol, 10 to pyrazinamide, 11 to streptomycin, and 1 each to moxifloxacin, prothionamide, P-aminosalicyclic acid (PAS) and linezolid. One person had XDR-TB, with resistance to isoniazid, ethambutol, pyrazinamide, streptomycin, moxifloxacin, PAS, levofloxacin, and kanamycin.

TB outcome at 24 months for patients with rifampicin-resistant disease

Of the 18 people in the rifampicin-resistant TB cohort notified in 2018, 67% (12 out of 18) had completed treatment after 24 months, 2 had died, one was still on treatment, one was lost to follow-up, one had treatment stopped, and one was not evaluated. At last known outcome, 12 people had completed treatment and 2 were still on treatment.

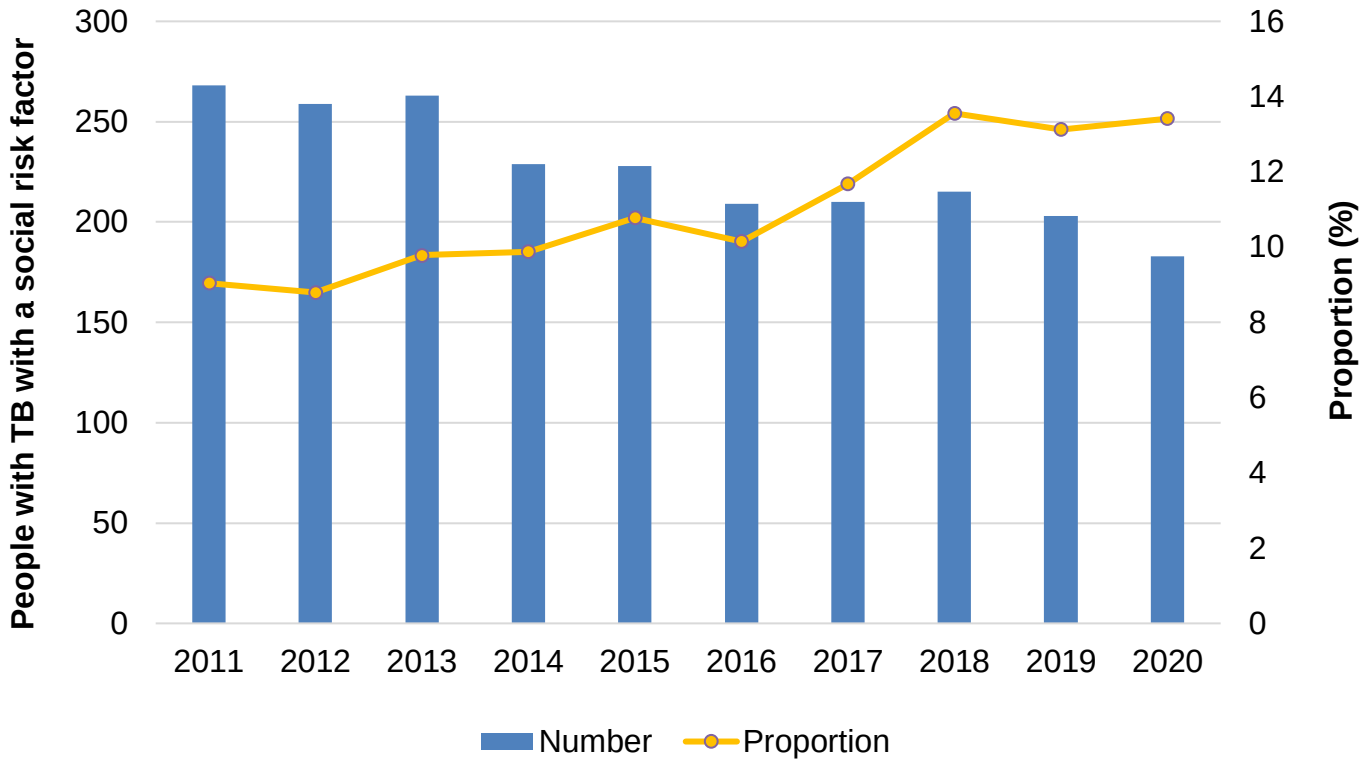
7. TB in under-served populations

Social risk factors

In this chapter, social risk factors (defined as current or previous history of homelessness, drug use of imprisonment, or current alcohol misuse) are described for people with TB aged 15 years or over.

In 2020, information on social risk factors was recorded for 96% (1,364 out of 1,426) of those aged 15 years or older. Of these, 13% (183 out of 1,364) had at least one social risk factor. The prevalence of risk factors has increased since 2011, however has levelled off in the past 3 years.

Figure 14. Social risk factors among people with TB, London, 2011 to 2020



Consistent with recent years, people with TB born in the UK were more likely to have experienced a social risk factor (25%, 63 out of 255) than those born abroad (11%, 119 out of 1,102). Among common countries of birth outside the UK, risk factors were most prevalent among people born in Eritrea (43%, 13 out of 30), Poland (41%, 7 out of 17), Lithuania (28%, 5 out of 18), and Romania (19%. 10 out of 52).

Risk factors were more common among men (19%, 161 out of 845) than women (4%, 22 out of 519). Almost all of the increase since 2011 has been among men, while prevalence among women has remained stable. Risk factors were also more prevalent among people with

pulmonary TB (20%, 137 out of 692) than those with exclusively extra-pulmonary disease (7%, 46 out of 672).

People with TB who experienced social risk factors were more likely to have infectious disease (defined as having sputum-smear positive pulmonary TB) (38% (71 out of 185) versus 18% (219 out of 1,217) in those with no social risk factors).

The most common risk factor recorded in 2020 was alcohol misuse (5.3%, 73 out of 1,375) (Table 9) followed by homelessness (4.8%, 67 out of 1,387).

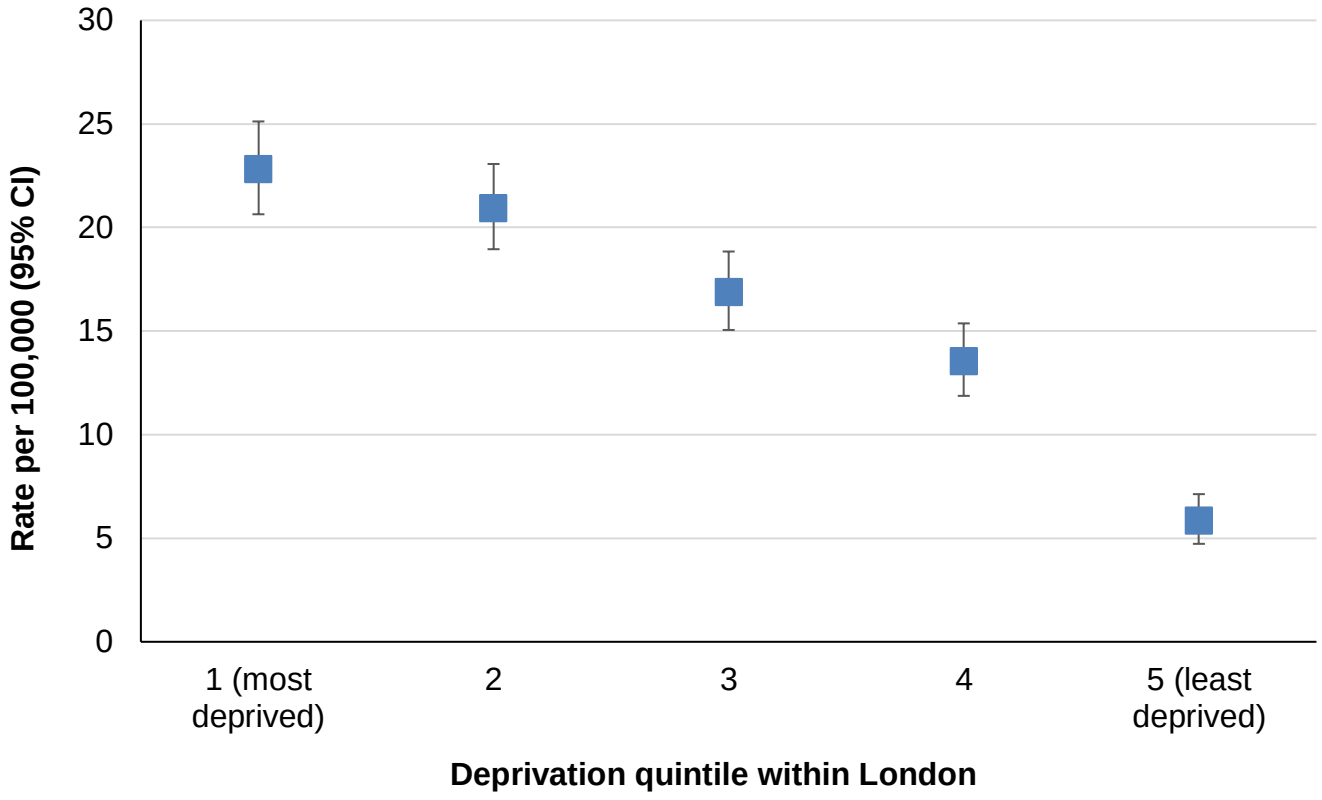
Table 9. **Social risk factors among TB patients, London, 2020**

Risk factor	Total with status recorded	Number of patients	Proportion (%)
Alcohol misuse	1,375	73	5.3
Homelessness	1,387	67	4.8
Drug misuse	1,383	63	4.6
Prison	1,366	48	3.5

Deprivation

Deprivation was assessed using the 2019 Index of Multiple Deprivation. In 2020, more than half of all people with TB were resident in the resident in the 2 most deprived quintiles of London (56%, 816 out of 1,464) (Figure 15). Rates were also highest in these 2 quintiles (23 and 21 per 100,000 respectively). The rate progressively decreased along with decreasing deprivation, reaching 5.8 per 100,000 in the least deprived quintile.

Figure 15. TB case rate by deprivation, London, 2020



8. TB-HIV co-infection and HIV testing of people with TB

HIV testing

Of the 1,464 people notified with TB in 2020, HIV status was already known for 43. For TB diagnoses with a previously unknown status (1,417 out of 1,460), HIV testing information was recorded for 99% (1,407 out of 1,417) of cases. HIV tests were offered to 98% (1,384 out of 1,407) of patients with TB. Of these, 98% (1,358 out of 1,384) were offered and received a test, which is higher than the national figure of 91%. A further 1.4% (20 out fo 1,384) were offered but did not receive testing, and 6 people declined a test. The proportion not offered testing was 1.6% (23 out of 1,407). Of patients not offered a HIV test, 74% (17 out of 23) were male, 39% (9 out of 23) were over the age of 65, and 35% (8 out of 23) were of mixed or other ethnicity.

9. BCG

BCG vaccination status of people with TB

BCG immunisation is recommended for people at higher risk of exposure to TB, particularly to protect against serious forms of disease in infants.

Information on BCG vaccination was available for 79% (1,150 out of 1,464) of London residents notified in 2020, of whom 63% (721) were vaccinated (Table 10), the same as the previous year. Consistent with previous years, a higher proportion of non-UK-born cases had been vaccinated.

Table 10. BCG vaccination coverage among people with TB, London, 2020

	Under 5 years old			Under 15 years old			All ages		
	n	N	%	n	N	%	n	N	%
UK-born	9	12	75%	17	24	71%	127	220	58%
Non-UK-born	0	0	-	3	9	33%	590	925	64%
All cases*	9	12	75%	20	33	61%	721	1,150	63%

* Including missing place of birth.

Of the 12 children aged less than 5 years old with TB, all were born in the UK and 9 (75%) were vaccinated. Of the 3 not vaccinated, 2 were white and one belonged to the mixed or other ethnic group. One had extra-thoracic lymph node disease and 2 had intrathoracic lymph node disease.

In England, universal BCG vaccination for children up to 5 is offered in local authorities in which the 3-year average (2014 to 2016) TB rate >40 per 100,000. However, London BCG policy changed to a selective neonatal programme in September 2020 due to decreasing TB rates and in anticipation of the introduction of severe combined immunodeficiency (SCID) screening. Quarterly data of BCG vaccine coverage at 12 months in 2020 for those boroughs previously identified as higher incidence (Newham, Brent, Hounslow, Ealing and Redbridge) is available in the Cover of Vaccination Evaluated Rapidly (COVER) programme reports, and show that BCG vaccination was particularly low in Hounslow (<25% coverage throughout 2020), Brent (<35%) and Ealing (<50%).[2] However, these figures should be viewed with caution due to the impact of the COVID-19 pandemic.

[2] Cover of vaccination evaluated rapidly (COVER) programme 2020 to 2021: quarterly data

Discussion

TB rates in London continue to decline, having dropped by more than half the number notified since the peak in 2005. Although London remains the region with the highest TB rates in the UK, the rate of decline is higher than seen nationally. However, the period covered by this report was heavily affected by the COVID-19 pandemic, which has had complex impacts on healthcare access and delivery, migration and social behaviours, all of which may have influenced TB transmission, diagnoses and notifications. TB rates decreased among people born abroad but saw little change in those born in the UK. Most TB cases still occurred among people born in the Indian sub-continent.

Although the majority of TB cases had been in the UK for over 10 years before diagnosis, the number of people in this group is also decreasing, indicating that this pattern may be a result of successful TB detection and treatment in more recent entrants to the UK. People with TB from Romania and Eritrea were more likely to have recently arrived in the UK. It is not yet known how changing immigration patterns, for example due to Brexit and the COVID-19 pandemic, will impact on TB cases in the UK.

People with TB frequently have complex medical and social needs. Around a quarter of people with TB in London in 2020 had at least one comorbidity, and a third had at least one risk factor or comorbidity. Diabetes was particularly common, affecting 13% of all people with TB in London: of these, one in 10 people with diabetes also had at least one social risk factor. People with social risk factors or comorbidities continue to have worse outcomes, with both being less likely to complete treatment.

London maintained excellent levels of HIV testing among people with TB, and shorter delays from symptom onset to start of treatment than the national average.

Despite a fall in prevalence in recent years, high isoniazid resistance is still of concern due to the longer treatment regime and higher risk of developing multi-drug resistant disease. However, MDR disease remains at low levels. This highlights the importance of obtaining culture confirmation: rates were still low, only 63% of all people with TB (and 80% of those with pulmonary disease) had a culture result.

While rates decline, there remains evidence of transmission in London from WGS cluster data. While most identified clusters do not grow further, and require little or no management, a small number continue to exhibit sustained growth. These require continued efforts by local Health Protection, clinical, and allied service teams to identify and tackle the populations and places where risk of transmission remains.

A continued focus on early diagnosis and support through treatment, particularly for people with social risk factors and comorbidities, must remain a priority for successful TB control in London.

Conclusions and recommendations

Early diagnosis and treatment completion remain the cornerstone of TB control. The COVID-19 pandemic presented a huge challenge to the health service in 2020 and it is a credit to all working in TB services across London through this time that TB continued to be identified and treated without any significant drop off in access to services.

The reduction in TB rates seen in 2020, although welcome, may be partly a result of COVID-19 impacting some behaviours and transmission, and the emerging trends will need to be closely watched through 2021 and beyond to understand this impact as the UK returns to normal activity.

Recommendations

Further reductions in TB in London will require:

- work to ensure that delays to diagnosis are monitored to ensure timely access to treatment services
- efforts to improve treatment completion rates in groups with complex medical and social circumstances, such as those in older age groups, those with risk factors and those with drug-resistant TB
- continuation of robust contact tracing by TB teams to identify those who need treatment for TB or LTBI
- health protection teams to work closely with TB services on wider TB incidents, and the utilisation of WGS cluster analysis efficiently to interrupt transmission where possible

Programmes for LTBI testing and treatment of new migrants were mostly suspended in 2020 due to the pandemic but are being re-established.

Appendix A. Notes on the report

About the Field Service

The Field Service (FS) supports UKHSA Centres and partner organisations through the application of epidemiological methods to inform public health action. It does this firstly by providing a flexible expert resource available as and when needed to undertake epidemiological investigations for key health protection work and secondly through the expert analysis, interpretation and dissemination of surveillance information to UKHSA Centres, local health partners, service providers and commissioners of services. Within the FS network, excellence and innovation is encouraged, we foster academic collaborations and take active part and lead in research, development, and training.

Intended audience

This report is for use by healthcare professionals who diagnose and/or care for people with TB, commissioners involved in planning and financing TB services, public health professionals working to improve TB control and the health of at-risk populations, researchers with an interest in TB, and government and non-governmental organisations working in the field of TB. In particular this report is for the use of the South TB Control Board and local TB networks and health protection forums.

Aim of report

This report describes the recent epidemiology of TB ibn London. It includes local trends, areas and population groups with a high burden of disease, and detail on the care of people with TB.

Further TB information

- The national report of TB in England
- Official Statistics for TB
- TB Strategy Monitoring Indicators Collaborative TB Strategy for England 2015 to 2020: End of programme report
- TB indicators at upper tier local authority and clinical commissioning group level

Appendix B. Description of data sources and definitions

Data sources

This report is based on TB case notifications made to the PHE Enhances TB Surveillance system (ETS) and London TB Register in England to the end of 2020. This information is updated annually to take into account denotifications (if the patient was found not to have TB), late notifications and other updates. The data presented in this report supersedes data in previous reports.

Diagnostic laboratories serving acute hospitals are the first place in which TB infection-related samples are received and processed within the pathway of clinical diagnosis and management of suspected TB. Results for microbiology, polymerase chain reaction (PCR), histology and culture are collected in ETS. The National Mycobacterium Reference Service (NMRS) receives these diagnostic materials and undertake characterisation using culture and molecular diagnostic methods to define species of *Mycobacterium*, TB antibiotic (drug) susceptibility and organism relatedness.

Definitions

Term	Definition
BCG	Bacillus Calmette-Guérin vaccination
CI	Confidence interval
CCG	Clinical Commissioning Group
Cluster	Two or more people notified within the tie period of analysis caused by indistinguishable strains with at least 23 complete MIRU-VNTR loci
CNS	Central nervous system
Cohort review	The systematic review of all people with TB notified by a TB service in a 3 to 4 month period looking at standard outcomes in terms of care and contacts tracing
Cryptic disseminated TB	Systemic illness without localising features
DOT	Directly observed treatment
Drug	In the context of TB control a drug is an anti-TB antibiotic
Drug-resistant cohort	The drug-resistant cohort includes an people with rifampicin-resistant TB (initial or acquired) including MDR-TB (initial or acquired) as well as those without culture confirmation treated with an MDR-TB regimen

Term	Definition
Drug-sensitive cohort	and non-culture confirmed treated with an MDR-TB regimen.
DST	Drug sensitivity testing based on phenotypic analysis of cultured TB isolates
ETS	Enhanced TB surveillance system
First-line drug resistance	First-line anti-TB antibiotic drug resistance is defined as resistance to at least one of the first-line antibiotics (isoniazid rifampicin ethambutol pyraminamide)
HAART	Highly active antiretroviral therapy
IGRA	Interferon-gamma release assay – blood test for TB infection which does not differentiate between active disease and LTBI
IMD 2015	The Index of Multiple Deprivation 2010 rank for each LSOA based on deprivation score assigned relative to other LSOAs
IQR	Interquartile range
LSOA	Lower super output area (geographic definition)
LTBI	Latent TB infection
MDR	Multidrug-resistance: cases initially resistant to at least isoniazid and rifampicin
Miliary TB	TB infection spread via the bloodstream to all parts of the body
MIRU-VNTR	Mycobacterial Interspersed Repetitive Unit-Variable Number Tandem Repeats
PCR	Polymerase chain reaction
Post-mortem diagnosis	A post-mortem diagnosis is defined as where TB was not suspected before death but a TB diagnosis was made at post-mortem with pathological and/or microbiological findings consistent with active TB that would have warranted anti-TB treatment if discovered before death
Pulmonary TB	A pulmonary case is defined as involving the lungs and/or tracheobronchial tree with or without extra-pulmonary TB diagnosis. In this report in line with the WHO's recommendation and international reporting definitions miliary TB is classified as pulmonary TB due to the presence of lesions in the lungs
Second-line drugs	Second-line drugs include injectable agents (for example amikacin capreomycin kanamycin) fluoroquinolones (for example moxifloxacin) and other oral bacteriostatic agents.
SNP	Single nucleotide polymorphism – mutation of one base pair in the genome of an *M. tuberculosis complex* isolate
TB	Tuberculosis

Term	Definition
ULTA	Upper tier local authority (geographic definition)
VOT	Video observed therapy
WGS	Whole genome sequencing
XDR	Extensive drug resistance: cases initially MDR and resistant to at least one injectable agent (amikacin capreomycin or kanamycin) and at least one fluoroquinolone (moxifloxacin ofloxacin or ciprofloxacin)

Treatment outcome

Information on outcomes were reported for all people notified in the previous year, excluding those with known rifampicin-resistant disease: outcomes for these were reported at 24 months. Definitions for outcome are based on World Health Organisation (WHO) and European definitions but adapted to the UK context. In this report, all data was obtained from ETS matched data set provided in September 2021.

Proportions

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

Confidence interval

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

Population denominator

TB rates by geographical area, age, sex, and place of birth were calculated using ONS mid-year population estimates. TB rates by ethnic group were calculated using population estimates from the Labour Force Survey. This is based on a population sample, so estimates are liable to sampling errors, particularly for small population subgroups, and should be interpreted with caution.

Appendix C. TB among London residents

Table C1. Number of TB cases by local authority of residence, London, 2000 to 2020

LTLA name	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Barking and Dagenham	39	29	35	41	43	60	49	62	69	72	69	61	65	71	67	42	65	53	55	37	39
Barnet	87	77	102	102	93	116	124	104	113	105	115	98	111	73	73	74	74	61	59	48	50
Camden	65	86	118	108	77	101	96	90	85	100	69	70	62	45	43	37	50	44	25	47	31
Enfield	79	90	84	98	95	103	100	72	100	116	95	75	79	68	68	70	66	53	61	50	35
Hackney & City of London	132	126	147	157	157	130	135	142	124	118	94	91	89	88	74	61	70	63	55	41	35
Haringey	134	147	140	128	150	130	155	93	104	132	100	134	100	86	76	64	73	59	45	43	37
Havering	31	16	20	13	12	30	23	16	20	30	13	18	27	28	24	23	25	30	24	15	12
Islington	87	78	105	94	86	86	96	93	93	91	63	82	69	63	59	48	42	42	28	31	23
Newham	244	203	219	245	241	256	261	277	283	309	301	370	367	334	252	248	188	162	160	154	140
Redbridge	88	83	92	111	109	120	144	135	162	147	137	161	154	150	130	113	124	107	90	86	78
Tower Hamlets	88	64	126	148	118	128	132	153	132	139	153	140	120	100	93	82	90	67	59	70	54
Waltham Forest	90	66	106	100	99	114	120	91	129	92	114	122	123	119	86	99	85	80	47	44	52
North East and North Central London	**1,164**	**1,065**	**1,294**	**1,345**	**1,280**	**1,374**	**1,435**	**1,328**	**1,414**	**1,451**	**1,323**	**1,422**	**1,366**	**1,225**	**1,045**	**961**	**952**	**821**	**708**	**666**	**586**
Brent	221	225	214	216	229	284	240	274	305	297	295	311	308	281	204	166	190	150	110	111	101
Ealing	214	185	201	186	254	237	233	236	198	219	207	242	246	213	210	161	118	128	126	132	93
Hammersmith and Fulham	83	67	73	66	70	88	80	67	67	73	53	68	46	48	36	40	34	34	20	19	19
Harrow	93	95	118	115	99	132	123	122	125	135	138	153	184	151	111	83	92	82	61	64	93
Hillingdon	70	91	106	115	117	137	124	124	151	121	125	130	139	101	122	98	87	66	74	74	58
Hounslow	81	121	119	102	115	167	134	134	134	170	197	181	190	162	152	112	119	89	72	92	96
Kensington and Chelsea	46	40	32	51	48	47	53	32	52	50	36	47	33	35	36	21	22	28	22	15	18
Westminster	90	77	76	91	85	95	84	85	69	81	62	67	53	59	52	37	41	37	30	32	23
North West London	**898**	**901**	**939**	**942**	**1,017**	**1,187**	**1,071**	**1,074**	**1,101**	**1,146**	**1,113**	**1,199**	**1,199**	**1,050**	**923**	**718**	**703**	**614**	**515**	**539**	**501**
Bexley	14	17	22	25	30	22	19	26	21	17	20	35	25	33	17	19	30	33	24	21	21
Bromley	23	16	27	31	29	29	41	33	19	32	34	42	29	30	18	24	22	23	18	21	13
Croydon	96	96	109	113	118	113	102	115	111	124	110	132	120	109	79	90	84	70	69	69	71
Greenwich	49	68	81	72	88	87	98	104	138	121	119	111	131	105	97	91	62	68	69	63	48
Kingston upon Thames	11	14	20	20	22	28	25	29	29	31	37	30	28	25	26	21	11	5	18	14	15
Lambeth	107	125	158	156	126	144	134	104	126	117	114	97	99	76	77	62	57	48	52	46	49
Lewisham	60	68	96	80	77	98	84	100	82	73	73	106	85	70	69	63	63	48	53	47	42

LTLA name	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Merton	43	31	55	41	62	61	66	57	63	61	54	64	72	60	47	51	46	35	26	32	27
Richmond upon Thames	9	11	16	11	12	19	20	14	13	20	16	16	13	12	9	14	11	10	13	14	5
Southwark	84	96	106	100	132	136	125	103	117	95	95	118	115	92	76	80	79	70	44	48	44
Sutton	11	17	32	31	24	25	28	32	18	30	33	32	29	25	24	22	26	14	24	30	18
Wandsworth	63	49	100	96	94	125	80	115	110	84	100	87	92	63	48	63	51	48	46	45	24
South London	**570**	**608**	**822**	**776**	**814**	**887**	**822**	**832**	**847**	**805**	**805**	**870**	**838**	**700**	**587**	**600**	**542**	**472**	**456**	**450**	**377**
London	**2632**	**2574**	**3055**	**3063**	**3111**	**3448**	**3328**	**3234**	**3362**	**3402**	**3241**	**3491**	**3403**	**2975**	**2555**	**2279**	**2197**	**1907**	**1679**	**1655**	**1464**

Table C2. TB rate* per 100,000 by local authority of residence, London, 2000 to 2020

LTLA name	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Barking and Dagenham	23.8	17.5	21.0	24.7	26.0	36.1	29.3	36.7	40.0	40.5	37.7	32.6	34.1	36.5	33.7	20.7	31.2	25.2	25.9	17.4	18.2
Barnet	27.6	24.1	31.8	31.7	28.7	35.4	37.5	31.1	33.3	30.4	32.7	27.4	30.5	19.8	19.5	19.5	19.2	15.7	15.0	12.1	12.5
Camden	33.1	42.5	57.9	52.9	37.1	47.8	45.5	42.5	40.4	47.0	32.1	31.8	27.6	19.5	18.2	15.2	20.1	17.4	9.5	17.4	11.1
Enfield	28.7	32.5	29.9	34.8	33.7	36.2	34.8	24.7	33.6	38.4	30.9	23.9	24.9	21.2	21.0	21.3	19.9	15.9	18.3	15.0	10.5
Hackney & City of London	62.7	58.7	67.4	71.5	71.1	58.1	59.4	61.2	52.0	48.3	37.7	35.7	34.4	33.4	27.5	22.2	25.0	22.2	19.1	14.1	12.0
Haringey	61.0	66.4	62.4	56.9	66.2	56.7	66.5	39.3	42.5	52.8	39.6	52.4	38.8	32.9	28.7	23.9	26.8	21.8	16.6	16.0	13.9
Havering	13.8	7.1	8.9	5.8	5.3	13.2	10.1	7.0	8.6	12.8	5.5	7.6	11.3	11.6	9.8	9.2	9.9	11.7	9.3	5.8	4.6
Islington	48.9	43.5	58.3	52.0	47.6	46.9	51.8	49.3	48.4	46.3	31.5	39.8	32.7	29.2	26.6	21.1	18.1	17.9	11.7	12.8	9.3
Newham	99.4	81.4	85.8	95.6	94.7	100.9	101.2	104.0	102.4	107.9	100.6	119.2	116.0	103.9	76.8	73.8	54.6	46.6	45.5	43.6	39.4
Redbridge	36.7	34.3	37.7	44.9	43.8	47.7	56.3	51.9	61.0	54.4	49.8	57.2	54.1	51.9	44.2	37.9	41.2	35.5	29.6	28.2	25.5
Tower Hamlets	44.6	31.8	60.9	70.9	55.9	60.0	60.4	67.9	56.9	57.8	61.6	54.7	45.5	36.5	32.7	27.9	29.9	21.8	18.6	21.6	16.3
Waltham Forest	40.7	29.7	47.4	44.6	44.0	50.3	52.0	38.6	53.3	37.1	44.9	47.0	46.9	44.8	32.1	36.6	31.0	29.0	17.0	15.9	18.8
North East and North Central London	**43.3**	**39.2**	**47.1**	**48.7**	**46.2**	**49.1**	**50.6**	**46.1**	**48.1**	**48.2**	**43.1**	**45.3**	**42.8**	**37.7**	**31.6**	**28.5**	**27.7**	**23.7**	**20.2**	**18.8**	**16.4**
Brent	83.4	83.5	79.3	80.5	85.3	104.8	86.8	96.7	104.8	99.6	96.8	99.6	97.9	88.6	63.7	51.3	58.2	45.6	33.3	33.7	30.8
Ealing	70.3	60.2	65.0	60.4	81.9	75.8	73.9	74.1	61.1	66.4	62.0	71.3	72.3	62.3	61.2	46.8	34.2	37.3	36.8	38.6	27.3
Hammersmith and Fulham	50.5	39.6	42.4	38.5	40.7	50.8	45.8	38.0	37.8	40.5	29.3	37.3	25.3	26.5	19.8	22.0	18.7	18.6	10.8	10.3	10.4
Harrow	44.5	45.2	55.6	53.8	45.8	59.7	55.0	53.9	54.5	57.8	58.1	63.6	76.0	62.1	45.3	33.6	37.0	32.9	24.4	25.5	36.9
Hillingdon	28.5	37.0	42.9	46.4	47.0	54.5	48.7	48.3	57.8	45.5	46.4	47.2	49.4	35.3	41.9	33.1	29.0	21.8	24.3	24.1	18.8
Hounslow	37.7	56.0	54.9	47.1	52.4	74.6	58.7	57.4	56.3	69.9	79.0	71.0	73.5	62.0	57.6	42.0	44.4	33.1	26.6	33.9	35.3
Kensington and Chelsea	29.7	24.7	19.5	30.9	29.0	27.9	32.1	19.6	32.0	30.9	22.4	29.7	21.0	22.3	22.8	13.2	14.0	18.0	14.1	9.6	11.5
Westminster	45.8	37.9	36.5	43.1	39.6	42.6	37.7	38.5	31.6	37.3	28.5	30.5	23.7	26.2	22.6	15.5	16.9	15.1	11.7	12.2	8.5
North West London	**51.2**	**50.5**	**52.2**	**52.3**	**56.0**	**64.3**	**57.6**	**57.2**	**57.9**	**59.4**	**57.0**	**60.5**	**60.0**	**52.2**	**45.4**	**34.9**	**34.0**	**29.6**	**24.6**	**25.6**	**23.7**
Bexley	6.4	7.8	10.0	11.4	13.6	9.9	8.5	11.6	9.3	7.5	8.7	15.0	10.7	13.9	7.1	7.8	12.2	13.4	9.7	8.5	8.4
Bromley	7.8	5.4	9.1	10.4	9.8	9.7	13.6	10.9	6.2	10.4	11.0	13.5	9.2	9.4	5.6	7.4	6.7	7.0	5.4	6.3	3.9
Croydon	28.7	28.6	32.5	33.6	35.0	33.3	30.0	33.4	31.8	35.2	30.7	36.2	32.5	29.2	21.0	23.7	21.9	18.2	17.9	17.8	18.3
Greenwich	22.9	31.3	36.6	32.1	38.7	37.7	41.9	44.0	57.6	49.7	47.8	43.4	50.4	39.8	36.1	33.1	22.2	24.0	24.1	21.9	16.6
Kingston upon Thames	7.5	9.4	13.4	13.4	14.6	18.4	16.3	18.8	18.6	19.7	23.3	18.7	17.2	15.1	15.4	12.2	6.3	2.9	10.3	7.9	8.4
Lambeth	39.6	45.7	57.9	57.3	45.9	51.9	47.8	36.5	43.6	39.8	38.3	31.9	32.0	24.3	24.3	19.3	17.6	14.8	16.0	14.1	15.2
Lewisham	23.8	26.7	37.8	31.8	30.5	38.4	32.6	38.3	30.8	27.0	26.8	38.3	30.3	24.6	23.8	21.4	21.1	15.9	17.5	15.4	13.8
Merton	22.8	16.2	28.9	21.7	32.8	32.0	34.3	29.3	32.2	30.8	27.1	31.9	35.6	29.5	23.0	24.8	22.3	17.0	12.6	15.5	13.1
Richmond upon Thames	5.2	6.3	9.1	6.2	6.7	10.5	11.0	7.7	7.1	10.8	8.6	8.5	6.9	6.3	4.7	7.2	5.6	5.1	6.6	7.1	2.5
Southwark	33.2	37.4	41.4	39.2	51.3	51.9	46.7	37.8	42.2	33.8	33.5	40.9	39.2	30.8	25.1	25.9	25.3	22.3	13.9	15.1	13.7

LTLA name	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Sutton	6.1	9.4	17.7	17.1	13.3	13.7	15.3	17.4	9.7	15.9	17.4	16.7	15.0	12.8	12.1	11.0	12.9	6.9	11.7	14.5	8.7
Wandsworth	23.5	18.0	36.4	34.7	33.7	44.1	27.8	39.5	37.4	28.1	33.0	28.3	29.7	20.1	15.2	19.7	15.9	14.8	14.1	13.6	7.3
South London	**22.1**	**23.4**	**31.5**	**29.7**	**31.0**	**33.4**	**30.7**	**30.7**	**30.9**	**29.0**	**28.7**	**30.5**	**29.1**	**24.0**	**19.8**	**20.0**	**17.9**	**15.5**	**14.9**	**14.6**	**12.2**
London	**36.4**	**35.2**	**41.4**	**41.4**	**41.9**	**45.9**	**43.8**	**42.0**	**43.0**	**42.8**	**40.2**	**42.6**	**41.0**	**35.3**	**29.9**	**26.3**	**25.0**	**21.6**	**18.9**	**18.5**	**16.3**

* rates calculated using ONS mid-year population estimates

Table C3. TB case numbers and rate* by age and sex, London, 2020

Age group	Female		Male	
	n	rate	n	rate
0 to 9	10	1.71	12	1.95
10 to 19	49	9.85	67	12.70
20 to 29	90	13.88	170	25.52
30 to 39	139	18.01	192	23.13
40 to 49	93	14.90	177	27.16
50 to 59	81	14.81	136	25.58
60 to 69	46	12.28	86	24.64
70 to 79	31	11.97	34	15.60
80+	18	10.04	33	26.58

***rates calculated using ONS mid-year population estimates

Table C4. Drug resistance among people with culture confirmed TB*, London, 2000 to 2020

	Any first line drug resistance		Isoniazid resistance without rifampicin resistance		Multidrug resistance		Total*
	n	%	n	%	n	%	
2000	107	9	86	7	10	1	1,208
2001	127	10	105	8	12	1	1,303
2002	173	10	142	8	16	1	1,741
2003	192	11	139	8	33	2	1,763
2004	188	10	145	8	22	1	1,789
2005	186	9	153	7	18	1	2,021
2006	217	11	160	8	34	2	1,997
2007	170	9	136	7	22	1	1,806
2008	160	8	114	6	21	1	1,916
2009	192	10	137	7	36	2	1,871
2010	168	9	124	6	29	1	1,920
2011	202	10	146	7	34	2	2,062
2012	176	8	128	6	36	2	2,082
2013	157	9	108	6	38	2	1,768
2014	127	8	95	6	21	1	1,536
2015	97	7	76	6	15	1	1,357
2016	108	8	87	6	15	1	1,368
2017	99	8	79	7	15	1	1,171
2018	125	12	88	8	14	1	1,028
2019	112	11	89	9	14	1	998
2020	97	10	73	8	14	2	919

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

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