



UK Health
Security
Agency

Tuberculosis in the West Midlands

Annual review (2020 data)

Data from 2000 to 2020

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Executive summary

National and regional

In 2020, there were 548 tuberculosis (TB) case reports to the Public Health England (PHE) Enhanced Tuberculosis Surveillance system (ETS)¹ for individuals resident in the West Midlands. The West Midlands has higher rates of TB than England as a whole. In 2020, the 548 cases equated to a rate of 9.2 cases per 100,000 population (95% confidence interval [CI] 8.4-10.0), compared to 7.3 per 100,000 (95% CI 7.1-7.5) in England overall (1). In the West Midlands, both the number of cases and rate of TB decreased in 2020 compared to 2019 – it is thought this decline is likely to be due to the COVID-19 pandemic affecting health seeking behaviour.

In England the rate of TB also decreased from 8.4 cases per 100,000 in 2019 to 7.3 cases per 100,000 in 2020, which continues the general downwards trend in national TB rates observed since 2011.

Local

Case numbers decreased in 8 out of 14 local authorities, with the largest reduction in numbers observed in Birmingham (189 cases versus 212 in 2019), Coventry (60 cases versus 80 in 2019) and Staffordshire (29 cases versus 41 in 2019). The highest rates of TB in the West Midlands were seen in Sandwell (20.1 per 100,000), Wolverhampton (18.9 per 100,000), Birmingham (16.6 per 100,000) and Coventry (15.8 per 100,000). A large increase in cases was observed between 2019 and 2020 in Warwickshire (+77%, 39 cases versus 22 in 2019) and Walsall (+36%, 38 cases versus 28 in 2019). Although at the level of the local authority some natural fluctuation of numbers is expected, these data highlight the importance of having sufficiently resilient, resourced services in place to deal with higher than expected numbers of cases.

Age and sex

The highest age and sex specific rates of TB in the West Midlands were recorded among men aged 30 to 39 years (19.0 per 100,000) and women aged 30 to 39 years (14.8 per 100,000). Since 2019, TB rates have declined in all age groups apart from the 45 to 64 age group which saw a small 3.8% increase from 10.1 (per 100,000) in 2019 to 10.5 (per 100,000) in 2020. However, TB rates in all age groups are significantly lower than their peaks between 2011 to 2012.

¹ At time of writing UKHSA National TB Surveillance system (NTBS).

Ethnic groups and origin

Individuals with a country of birth outside of the UK accounted for 69% of people with TB in the West Midlands in 2020 (365 out of 526) and experienced a rate of TB 13 times higher than the rate among UK-born individuals. This largely reflects the higher incidence of TB in the cases' respective countries of birth. The rate of TB in the West Midlands among UK-born individuals decreased between 2019 to 2020 (-20.1%, 3.2 versus 4.0 per 100,000 in 2019). A smaller decrease in rate was observed in non-UK-born individuals (-4.7%, 42.8 versus 44.9 per 100,000 in 2019).

India continues to be the most common country of birth outside of the UK for people with TB (32%, of non-UK cases, 117 out of 282), followed by Pakistan (18% of non-UK cases, 67 out of 282), Romania, Eritrea and Nigeria (all <10% of non-UK cases). The proportions of patients among these 5 most common countries of birth for TB patients born outside the UK retain very similar values to 2019, with a slightly larger fluctuational increase in patients from India and Nigeria.

Collectively, patients with a south-Asian ethnicity made up almost half (48%) of cases, of which most were of Indian (32%) or Pakistani ethnicity (18%). People of White ethnicity made up 23% of cases, of whom the large majority (71%) were UK-born. People of Black ethnicity made up 20% of cases, of whom just over three-quarters (76%) were of Black-African ethnicity. Similar to previous years, 43% (143 out of 335) of TB cases among people born outside the UK occurred in those that entered the UK 11 or more years prior to their TB diagnosis.

Occupation

In 2020 40% of people with TB aged 18 to 65 years were not in employment or education (171 out of 432). 8% of people with TB were in the education sector as either staff or students (36 out of 432), and 9% were health care workers, health care laboratory staff or prison staff (37 out of 432).

Clinical characteristics

In 2020, less than half of cases were pulmonary (49%) which is lower than in previous years. Amongst pulmonary cases the rate of sputum smear positivity in the West Midlands (63%) was higher than the rate of positivity in England (46%). Furthermore, 75% of pulmonary TB cases were confirmed by culture (202 out of 270), which is below the national target of 80% (2). 12% were inpatients at the time of diagnosis (61 out of 499), and 8% had previously been diagnosed with TB (39 out of 510).

Treatment outcomes

Similar to 2019, among people with pulmonary TB in 2020, 36% (88 out of 243) started TB treatment within 2 months of symptom onset, and 35% (86 out of 243) started treatment more than 4 months after symptom onset (which is consistent with a prolonged period of infectiousness). Extra-pulmonary cases of TB took on average 42 days longer to be diagnosed than pulmonary cases.

Treatment was completed within 12 months by 86% (449 out of 524) of people with rifampicin sensitive TB diagnosed in 2019 whose expected treatment duration was less than 12 months,² which is similar to treatment completion rates seen in recent years in the West Midlands. Of the 75 patients that did not complete treatment, 23 died (31%). Of those who died, TB was recorded to have contributed to or have caused death in 11 cases (48%).

Drug resistance

TB antibiotic sensitivity was known for 56% of cases in 2020 (309 out of 548), of which 12% were resistant to at least one first line drug (39 out of 309). The proportion of cases with resistance to at least one first line drug peaked at 12% in 2018 and has remained stable since. A total of 5% of the 2020 cases (16 out of 309) were resistant to isoniazid but not rifampicin (INH-R), and 3% (9 out of 309) had multi-drug resistant or rifampicin-resistant TB (MDR out of RR-TB). There were no cases of extensively drug-resistant TB (XDR-TB).³

Under-served populations

People with one or more recorded social risk factors for TB, including drug and alcohol misuse, homelessness and prison, accounted for 11%, (51 out of 507) of cases which is the lowest since 2016 (11%, 51 out of 507). This is also slightly below the national proportion of 13% (1). Between 2009 and 2020, individuals with risk factors were more likely to be male, UK-born, white, have pulmonary TB, be sputum smear positive and have a previous diagnosis of TB. Between 2009 and 2019 treatment was completed by 82% (580 out of 707) of patients with social risk factors at their last recorded outcome, compared to 91% (5,195 out of 5,734) of patients with no risk factors. In 2020, 43% (235 out of 548) of people with TB were resident in the most deprived areas of the West Midlands,⁴ compared to 6% in the least deprived areas, in line with previous years.

² Excludes cases with rifampicin resistance, and central nervous system, spinal, miliary or cryptic disseminated disease.

³ First line drugs: isoniazid, rifampicin, pyrazinamide and ethambutol. MDR-TB: cases initially resistant to at least isoniazid and rifampicin. XDR-TB: cases initially MDR and resistant to at least 1 injectable agent (amikacin, capreomycin or kanamycin) and at least 1 fluoroquinolone (moxifloxacin, ofloxacin or ciprofloxacin).

⁴ Most deprived quintile of lower super output areas based on Index of Multiple Deprivation (IMD 2019) rank.

HIV co-infection

HIV tests were not offered to 3% of eligible people with TB in 2020 (13 out of 452).⁵ Overall, in the West Midlands, 97% of all those offered an HIV test were tested. In 9 out of 14 upper tier local authority areas, 100% of cases offered HIV testing received the test.

Conclusion

In conclusion, although the overall number of TB notifications has declined in the West Midlands, if we are to achieve the World Health Organisation's (WHO) 'End TB Strategy' target of a 90% reduction in new notifications by 2035, TB needs to remain a health priority. Due to the much higher rates of TB abroad than the UK, rates of TB in the West Midlands are influenced by migration from countries with high rates of TB. Importantly, this report demonstrates how the burden of TB falls on more socio-economically challenged groups, and the high number of individuals with TB and social risk factors represents a significant challenge in the West Midlands in ensuring that this health inequality is addressed.

An increasing proportion of people with TB should have access to high-quality diagnostics, including culture confirmation and WGS technology, and continued effort and investment is needed to early diagnose TB and deliver effective packages of TB care in those with social risk factors to maximise treatment completion and minimise transmission. Contact tracing is another key element in the action plan (2) for reaching the '2035 End TB Strategy' target, and for COVID-19 recovery.

Recommendations

This report provides a detailed overview of the epidemiology of TB in the West Midlands. The observed reduction in TB incidence for 2020 should be treated with caution due to the potential impacts of the coronavirus (COVID-19) pandemic. However, the data continue to clearly highlight the disproportionate impact of TB in underserved populations in the West Midlands, including individuals from areas of higher deprivation, those born outside the UK and patients with social risk factors. Continuing efforts to address these health inequalities remains a key priority for TB control.

The main recommendations based on the data presented in this report include:

- continuing to strengthen partnership working across the health and social care systems to identify local populations at risk and ensure accessible and effective service provision
- increasing treatment completion rates in individuals with social risk factors

⁵ Excludes TB cases diagnosed post-mortem and patients whose HIV status was already known.

- reducing delays in treatment start time from onset of symptoms
- increasing the rate of culture confirmation for pulmonary TB cases to meet (or exceed) the national target
- improving data quality and completeness of key fields in NTBS

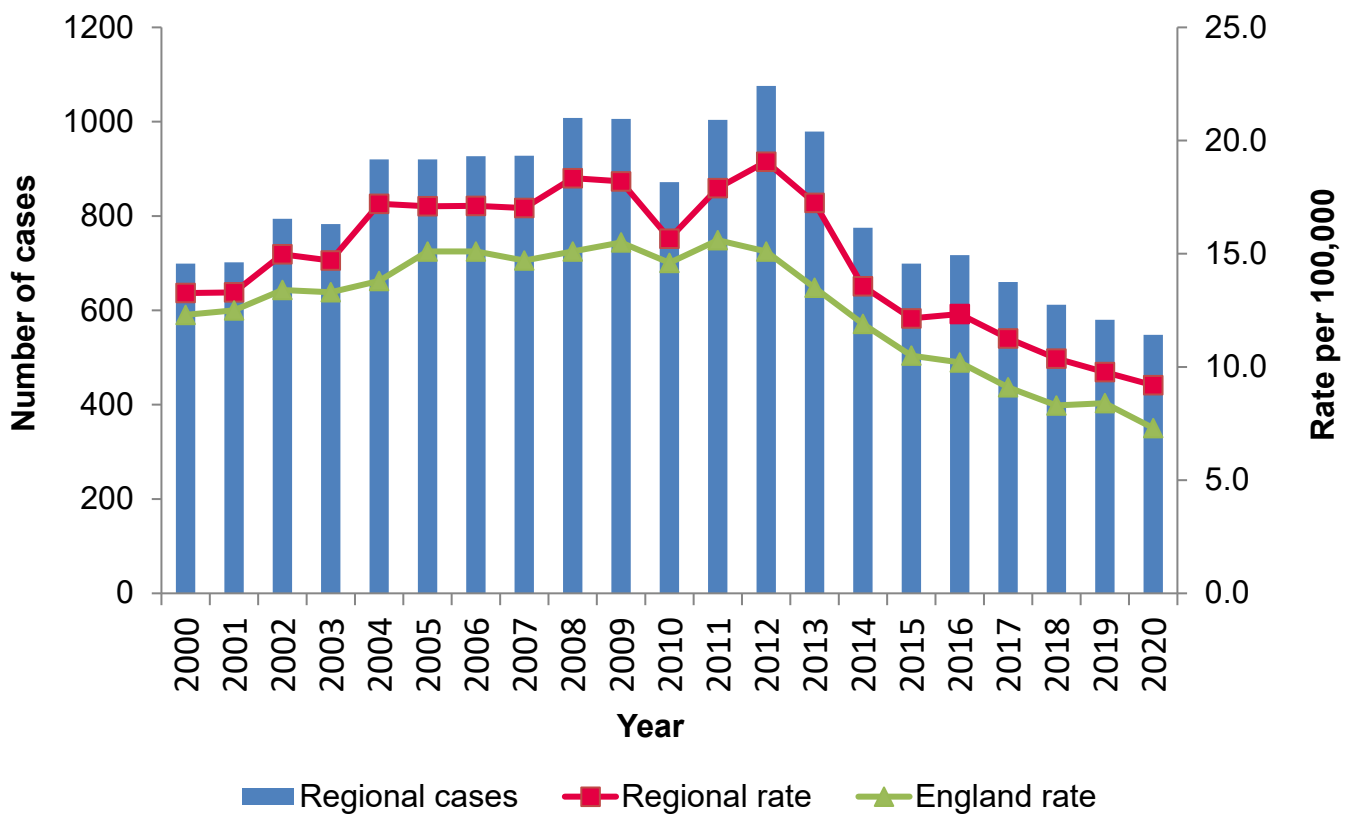
In addition, organisations and services should ensure they are aware of the actions assigned to them in the [National Tuberculosis Action Plan for 2021 to 2026](#).

1. TB notifications and incidence

Overall numbers, rates and geographical distribution

In 2020, 548 cases of tuberculosis (TB) were reported among residents in the West Midlands, a crude rate of 9.2 cases per 100,000 population (95% confidence interval [CI] 8.4-10.0), (Figure 1). The rate of TB in the West Midlands remains significantly higher than the overall rate for England of 7.3 per 100,000 (95% CI 7.1-7.5) (1). Case numbers have been gradually declining in the West Midlands since their peak in 2012, with there being a statistically significant lower rate in 2020 than 3 years ago in 2017 (11.3 per 100,000, 95% CI 10.4-12.2).

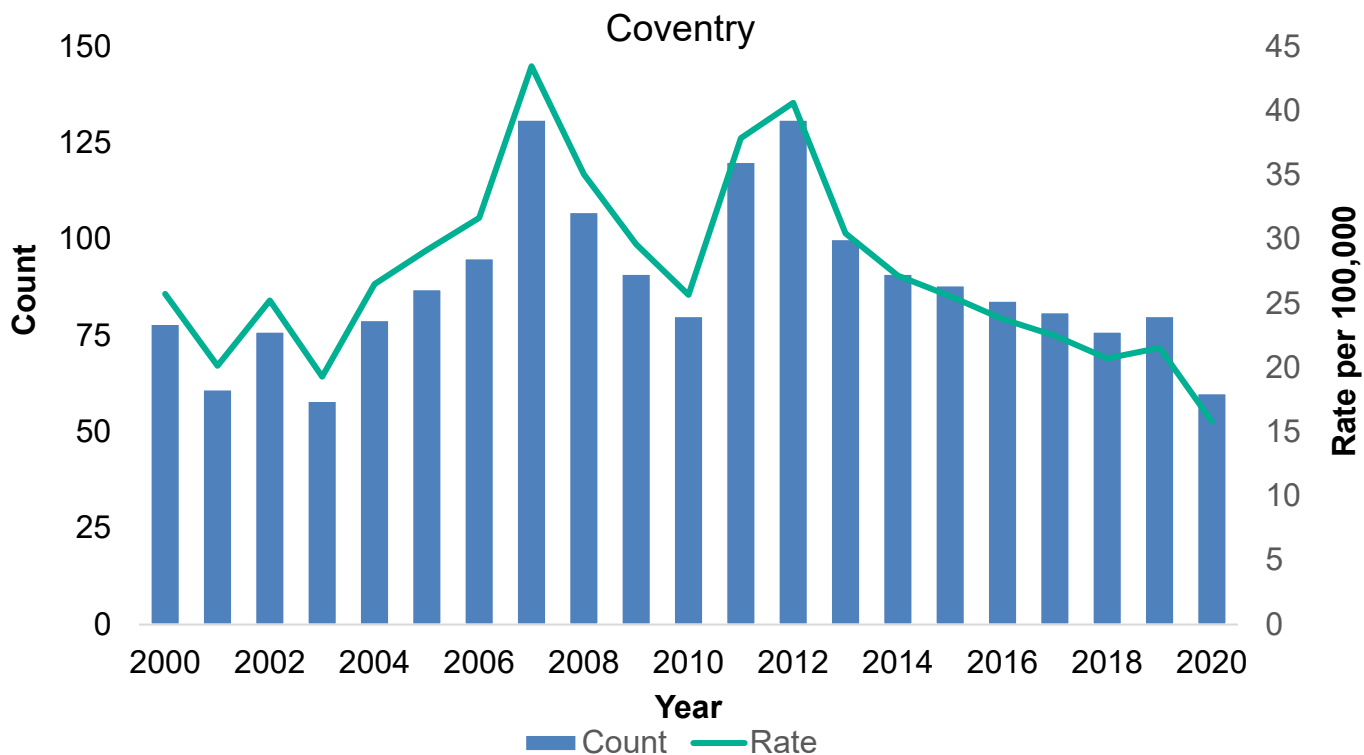
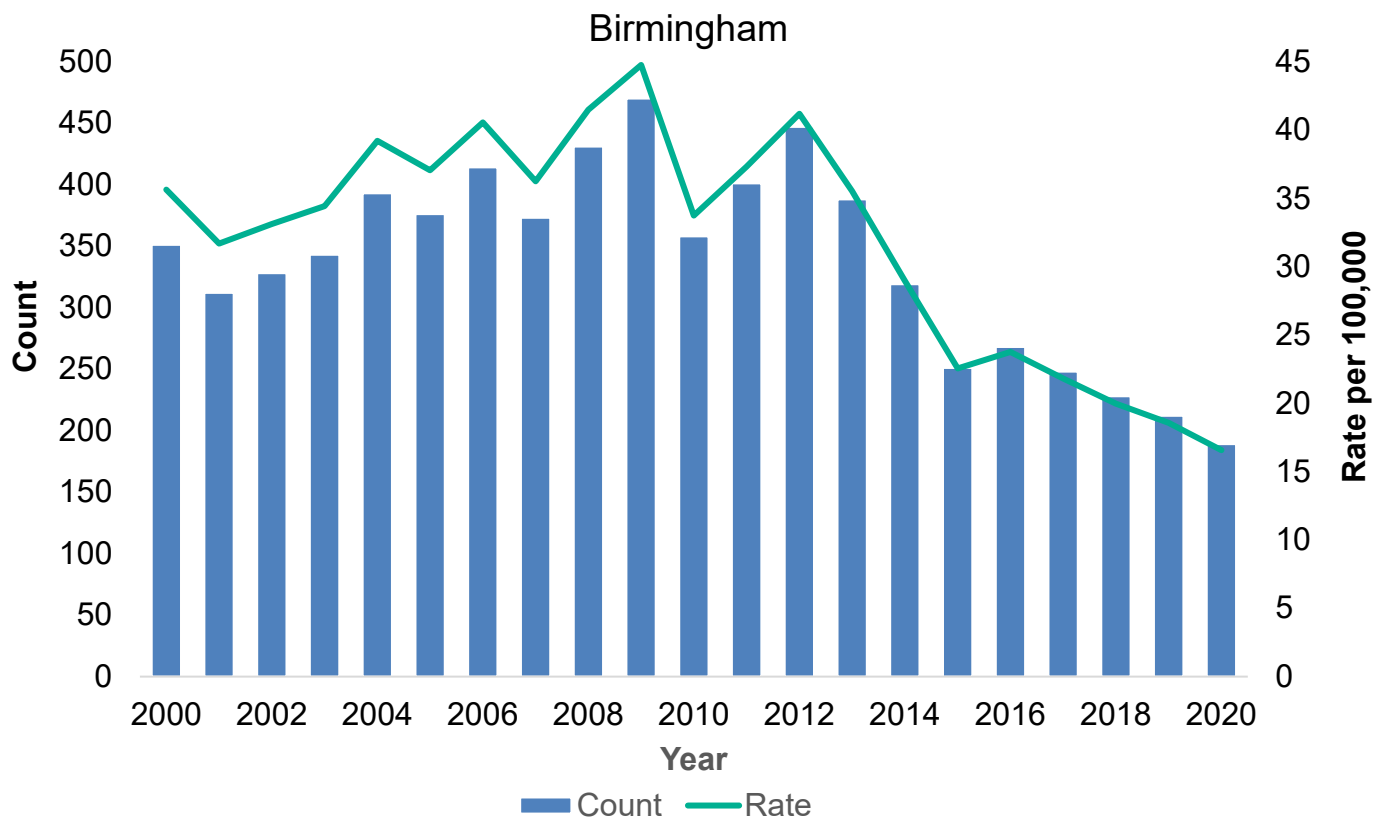
Figure 1. TB case reports and rates, West Midlands, 2000 to 2020

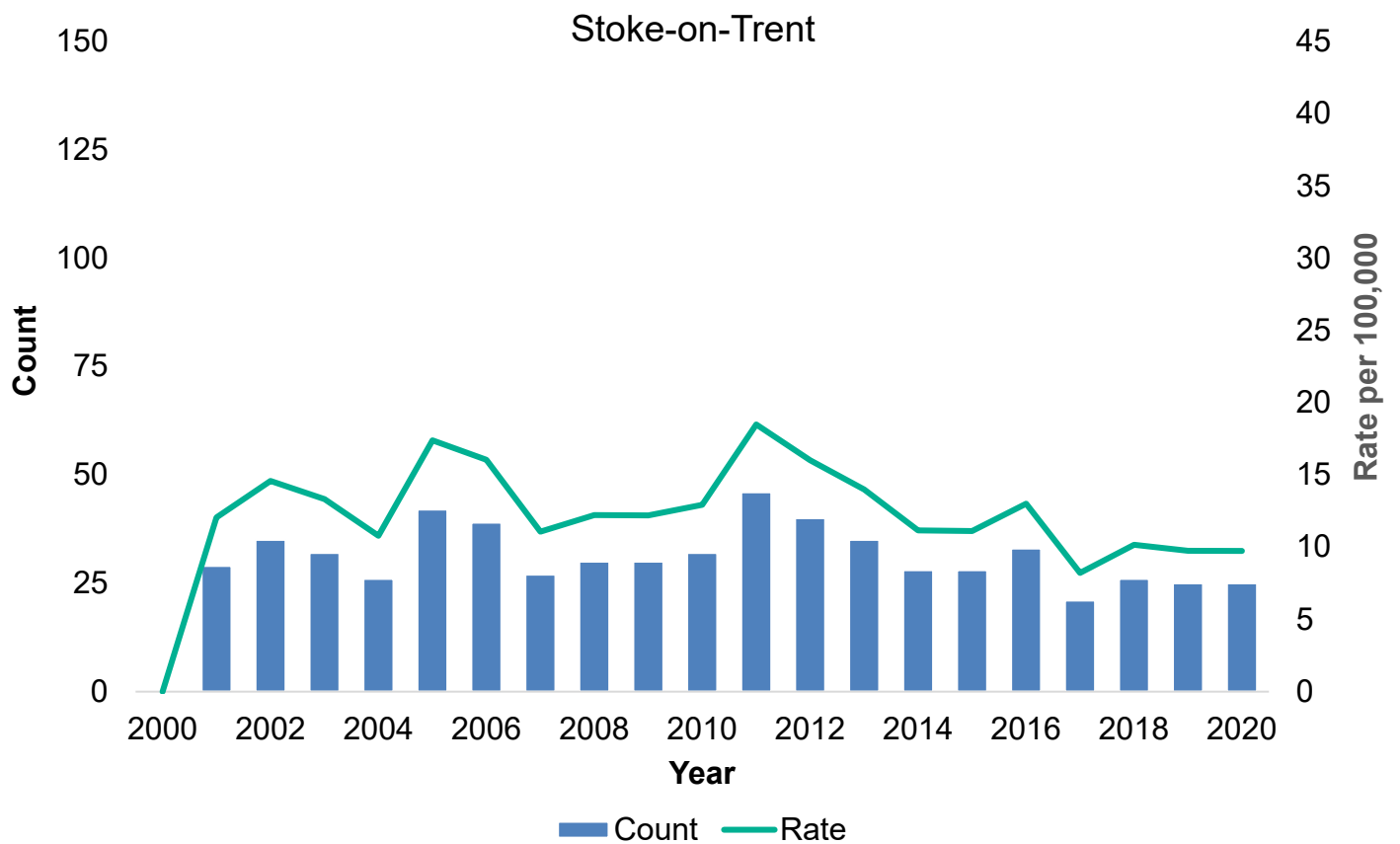
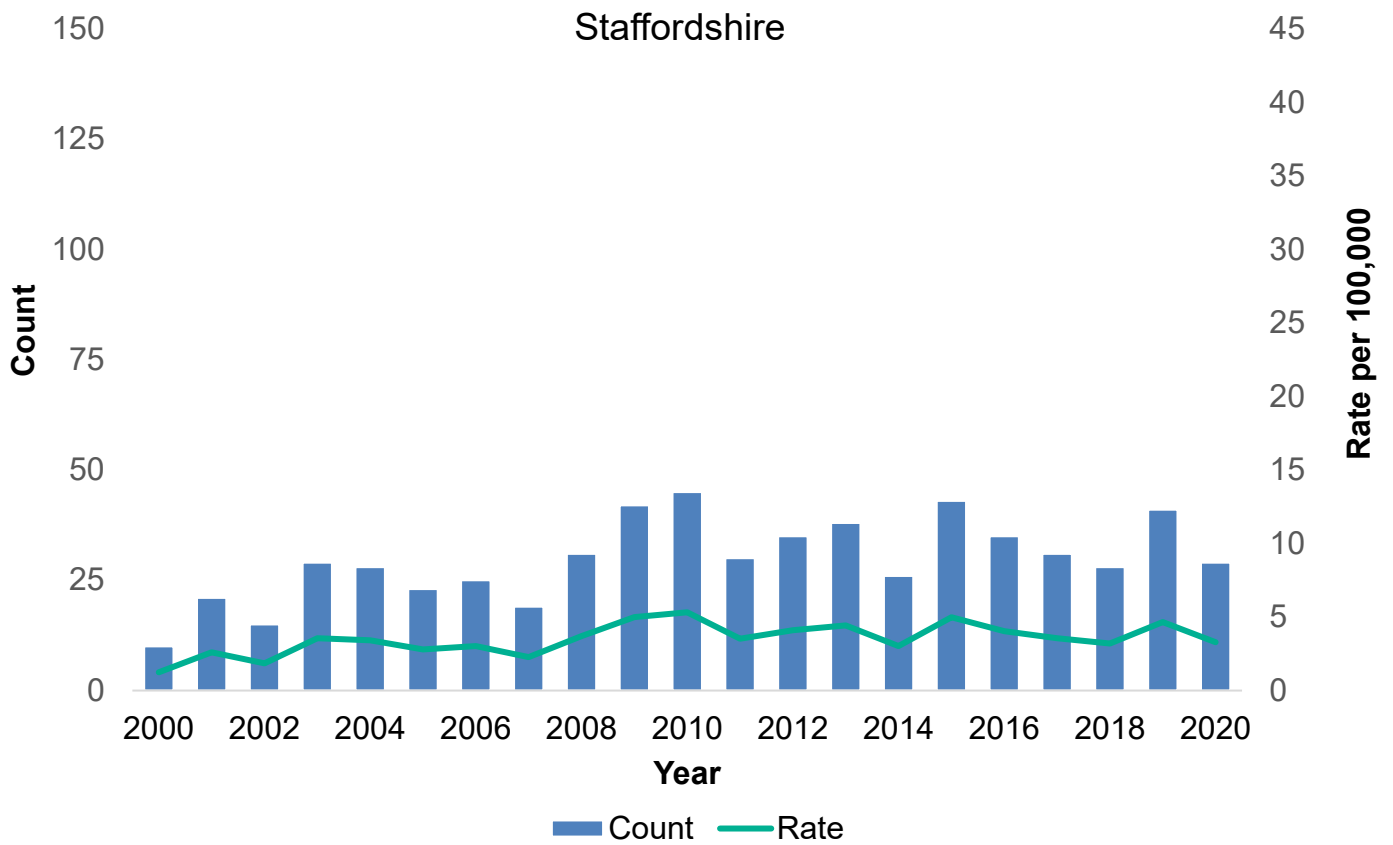


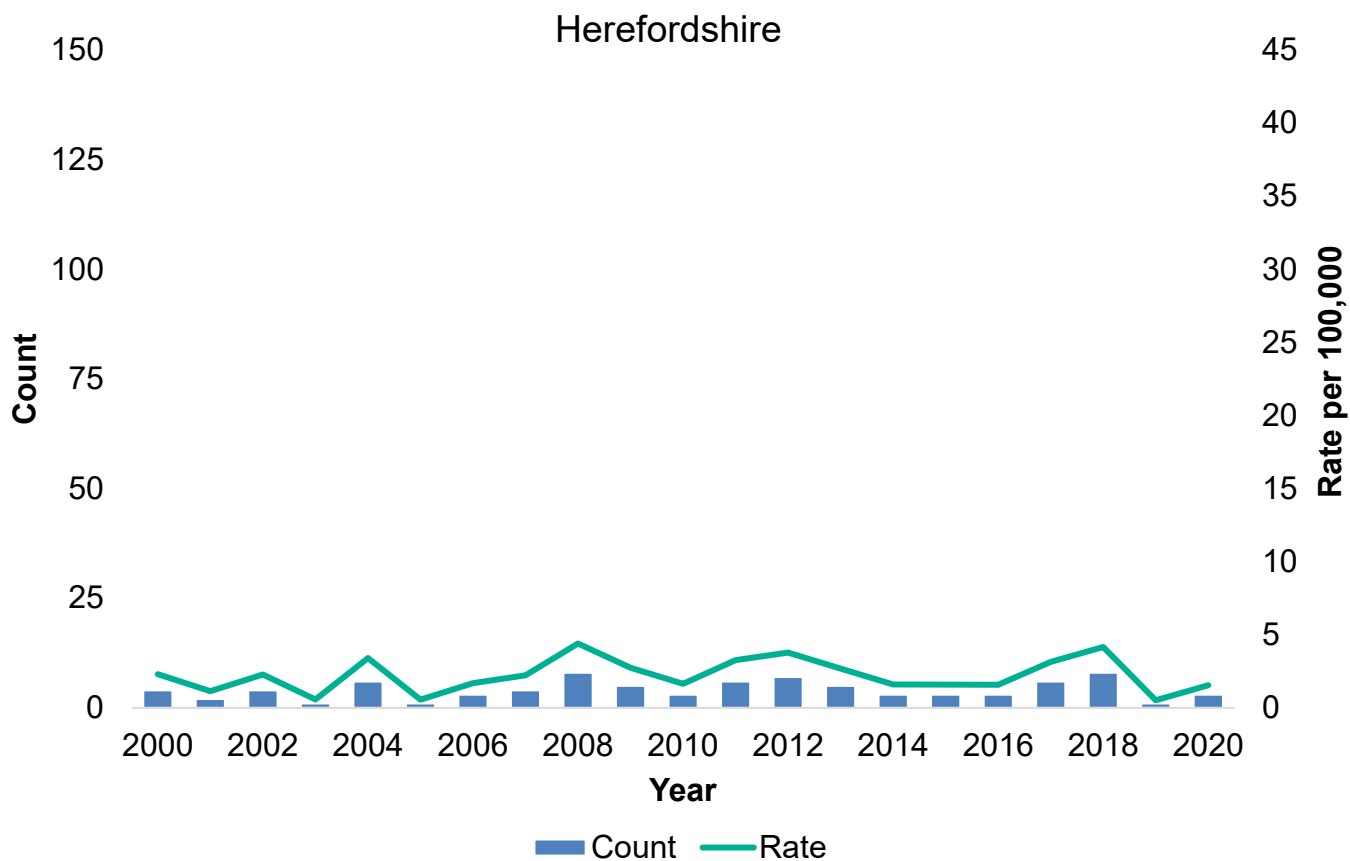
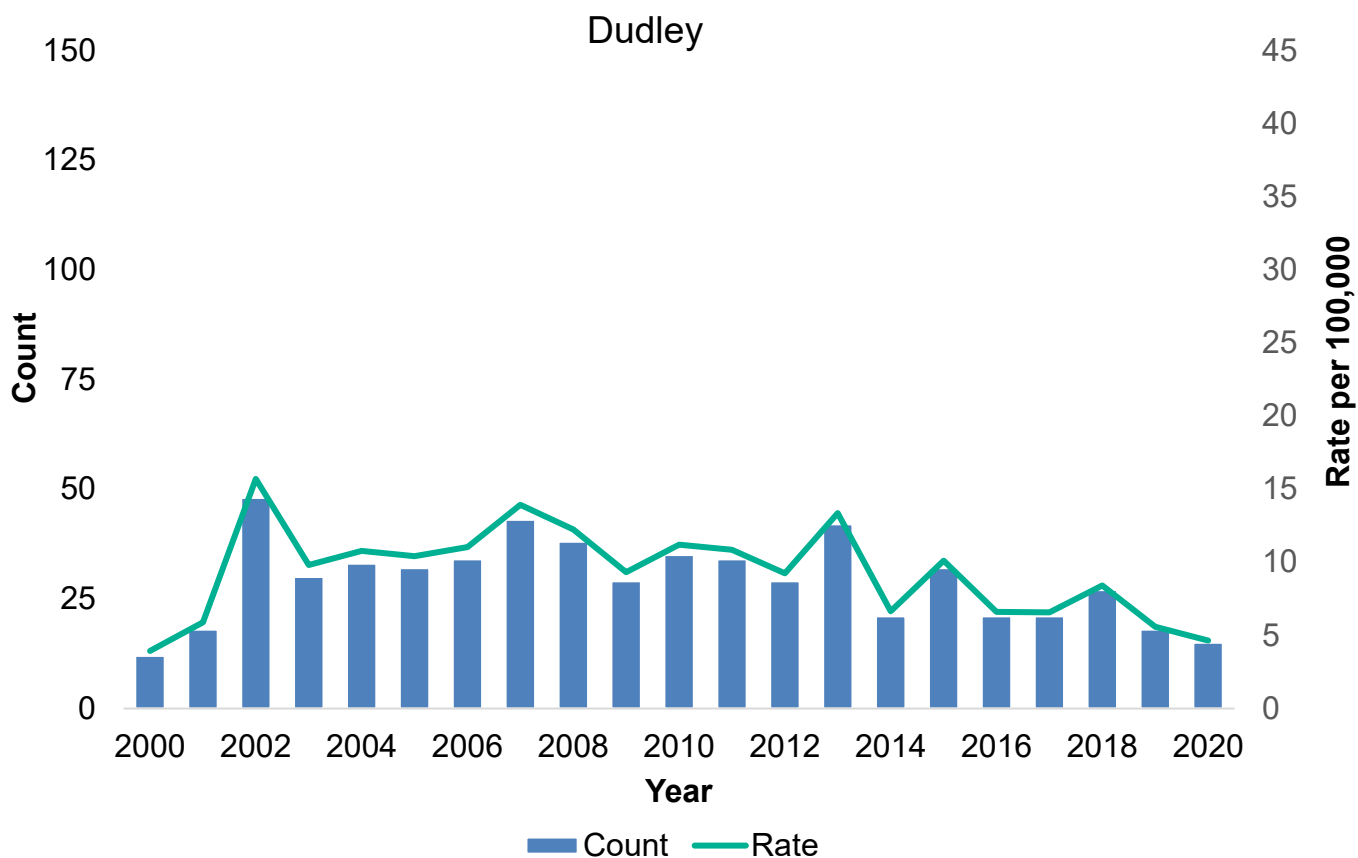
TB case rates for upper tier local authorities (UTLAs) are presented in Figure 2. Case numbers decreased in 8 out of 14 local authorities, with the largest percentage reductions in numbers observed in Coventry (-25%, 60 cases versus 80 in 2019) and Staffordshire (-29%, 29 cases versus 41 in 2019).⁶ A relatively large increase in case numbers were however observed between 2019 and 2020 in Warwickshire (+77%, 39 cases versus 22 in 2019) and Walsall (+36%, 38 cases versus 28 in 2019).

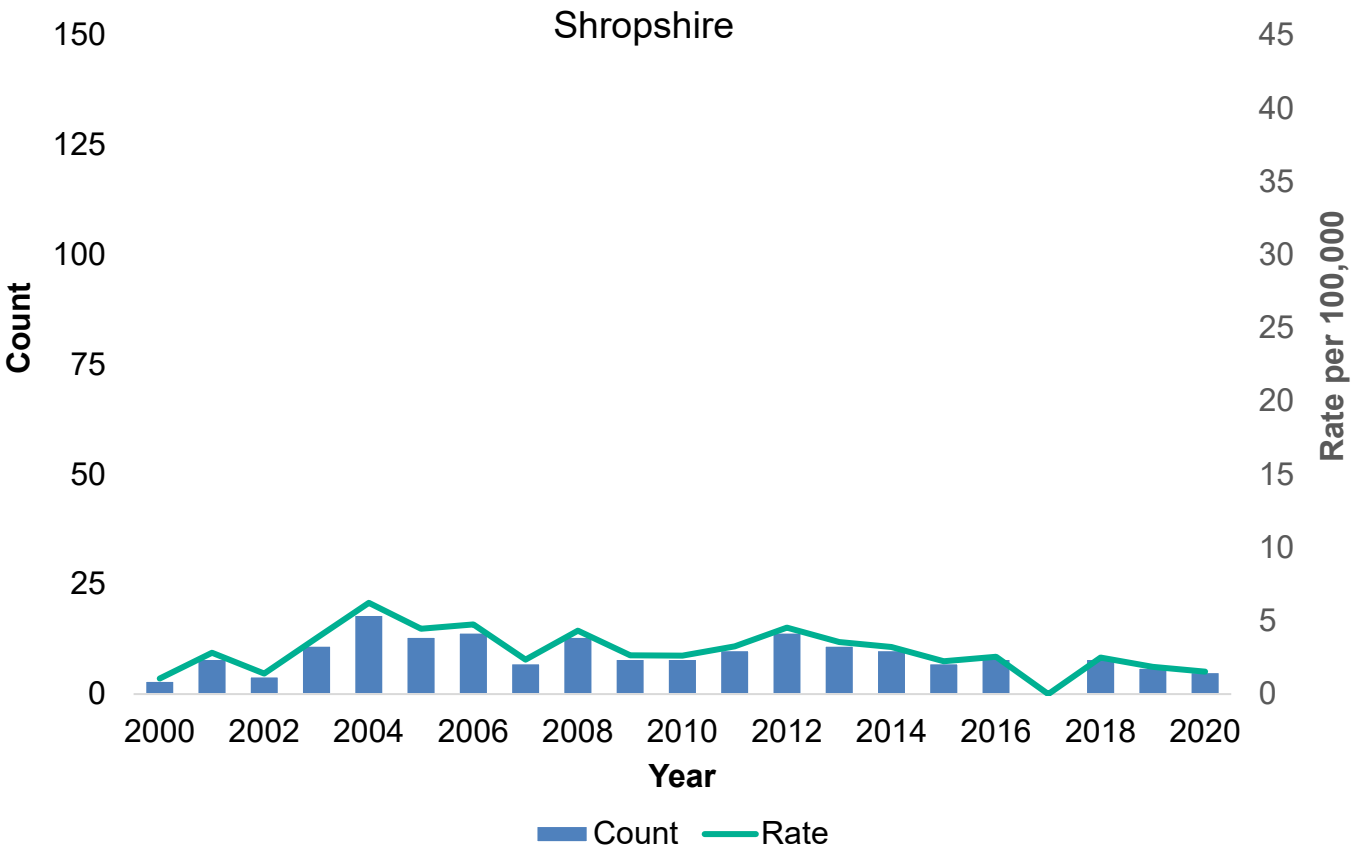
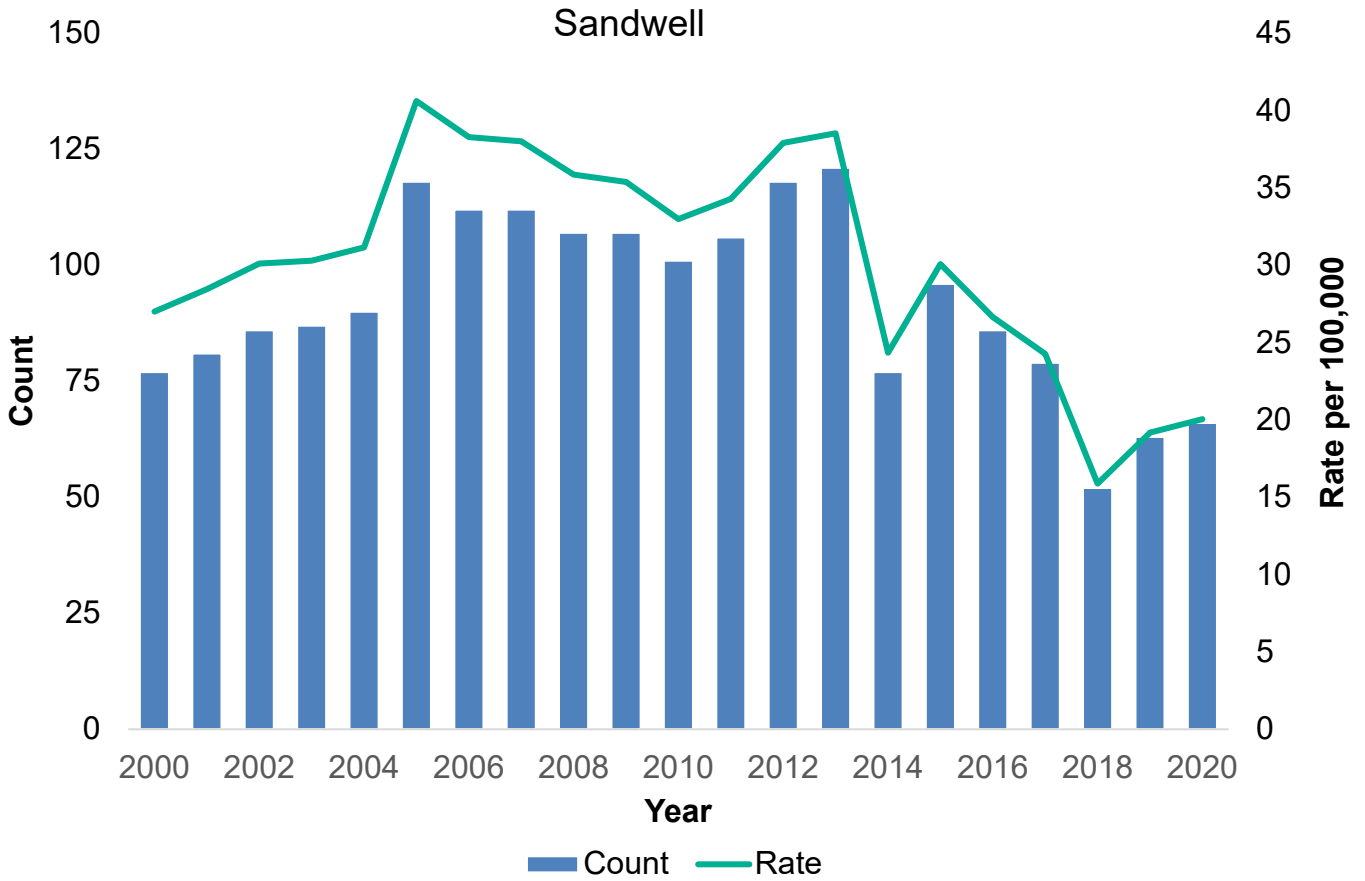
⁶ In UTLAs with 15 or more cases in 2019 only

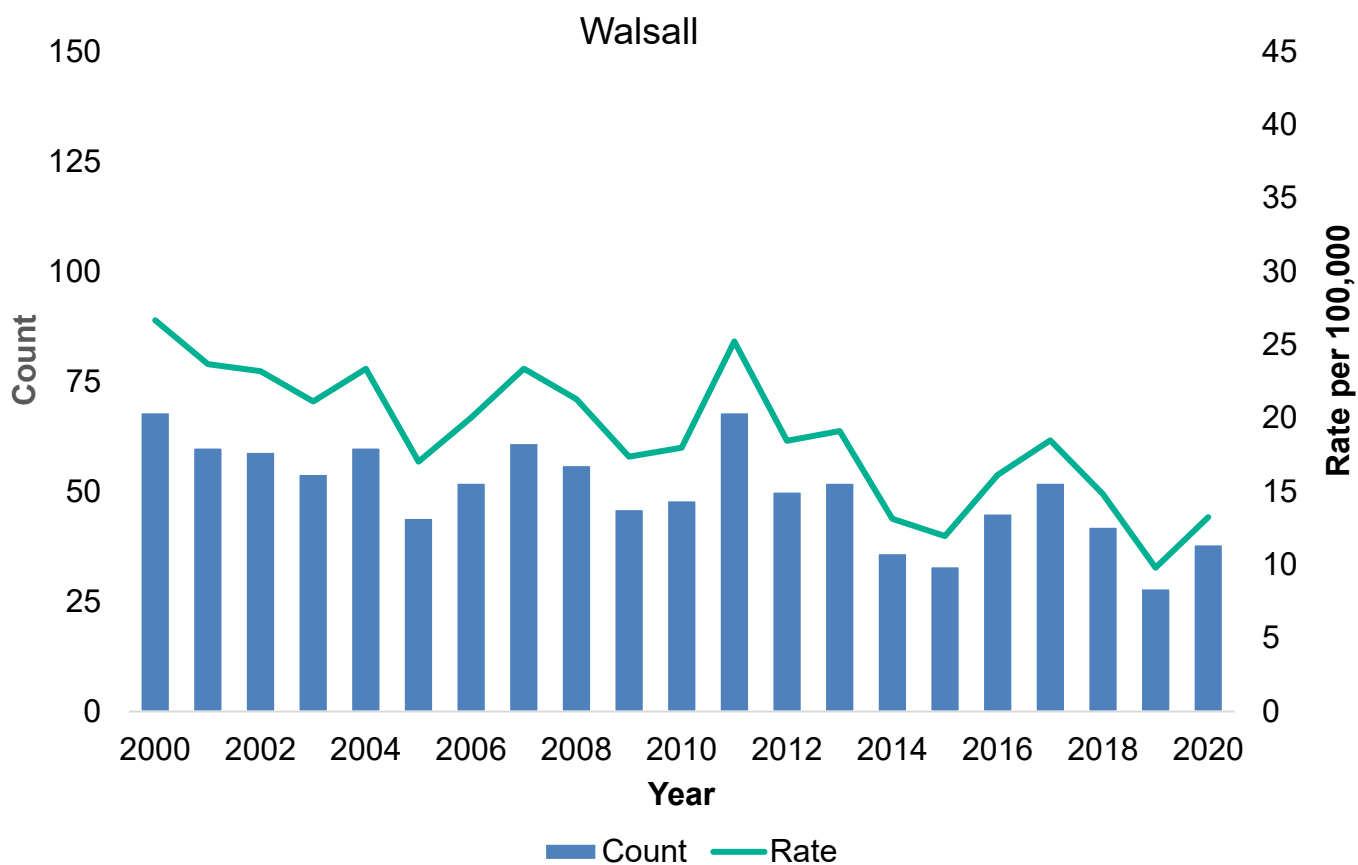
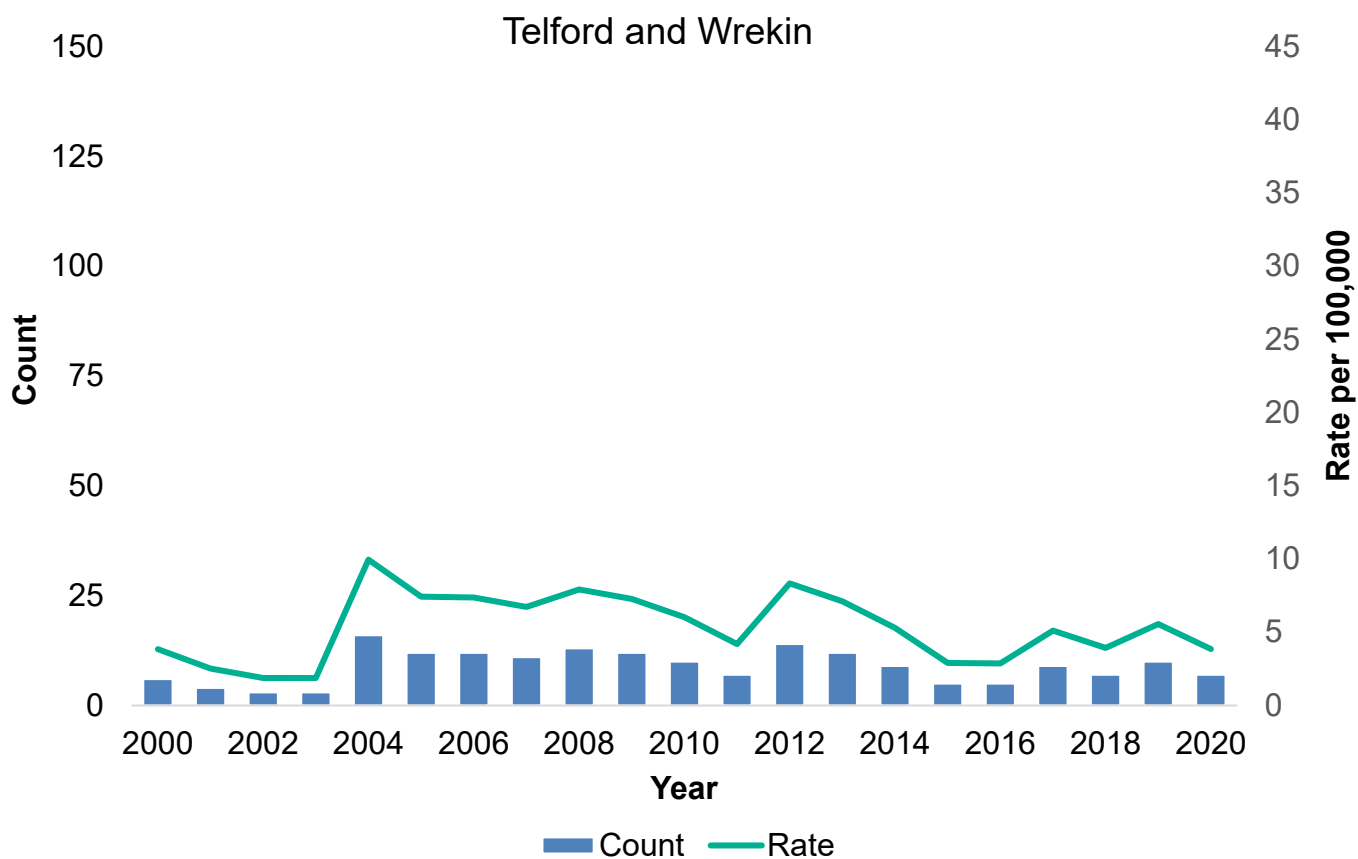
Figure 2. TB case rates, by upper tier local authority of residence, West Midlands, 2000 to 2020

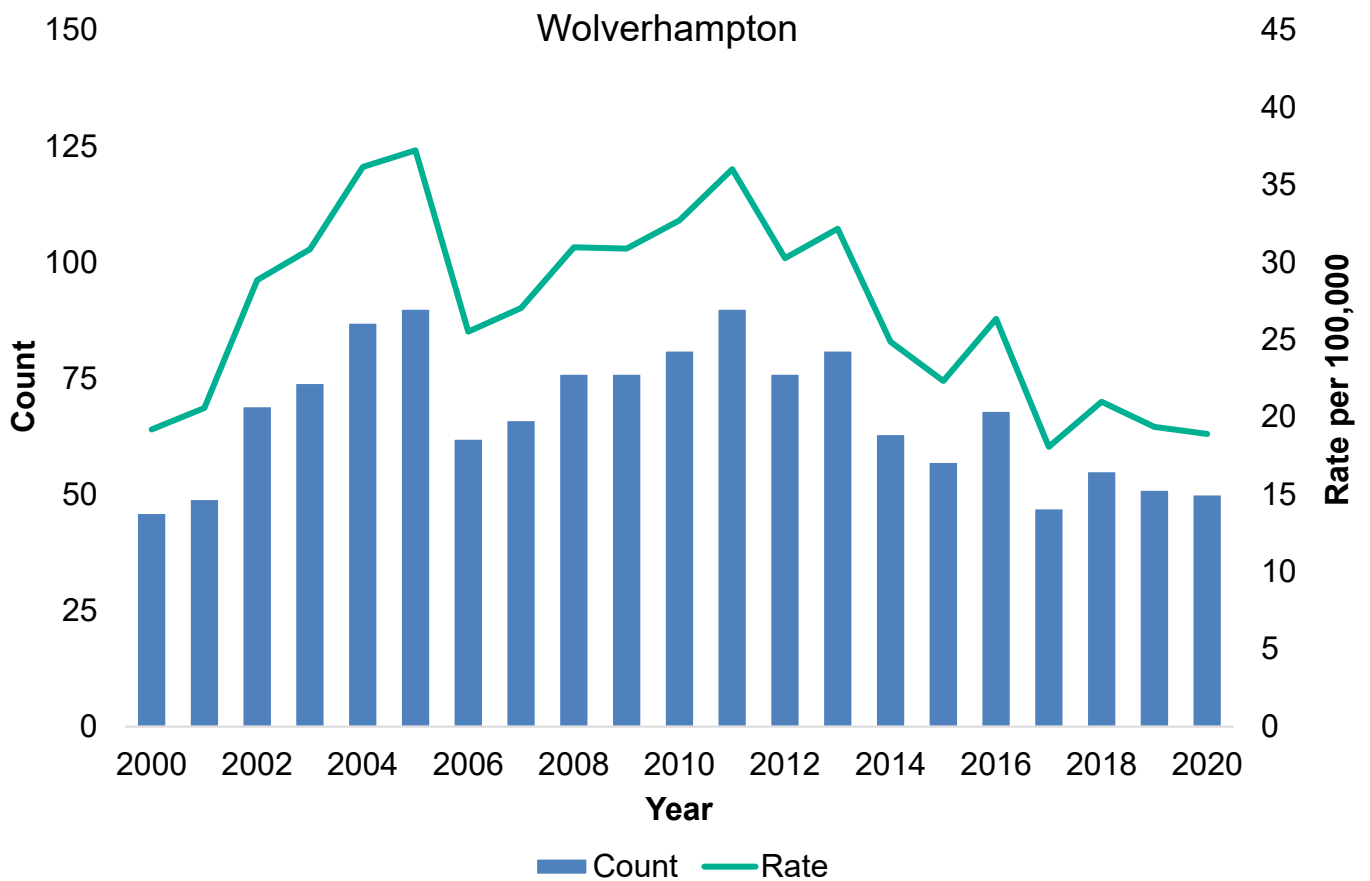
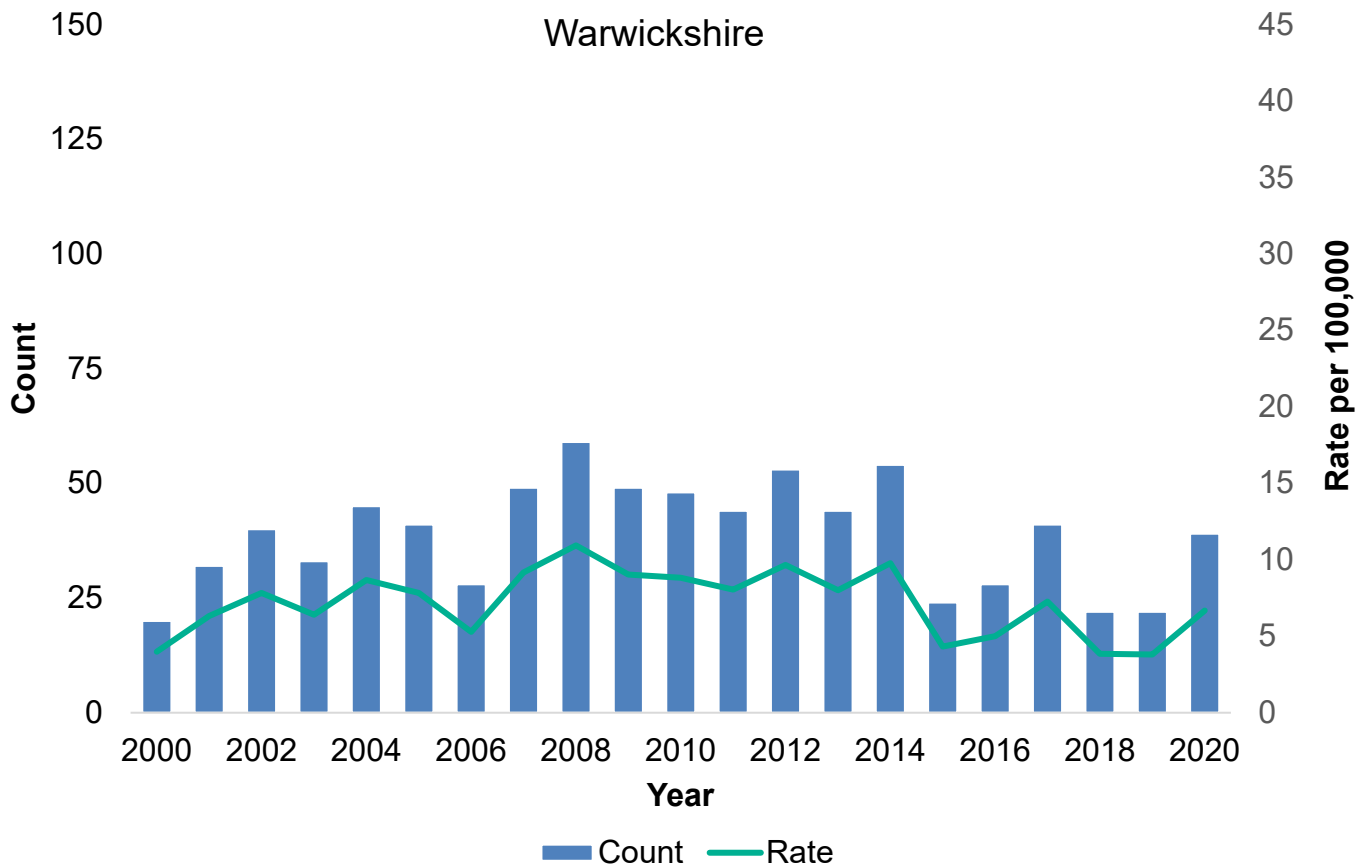


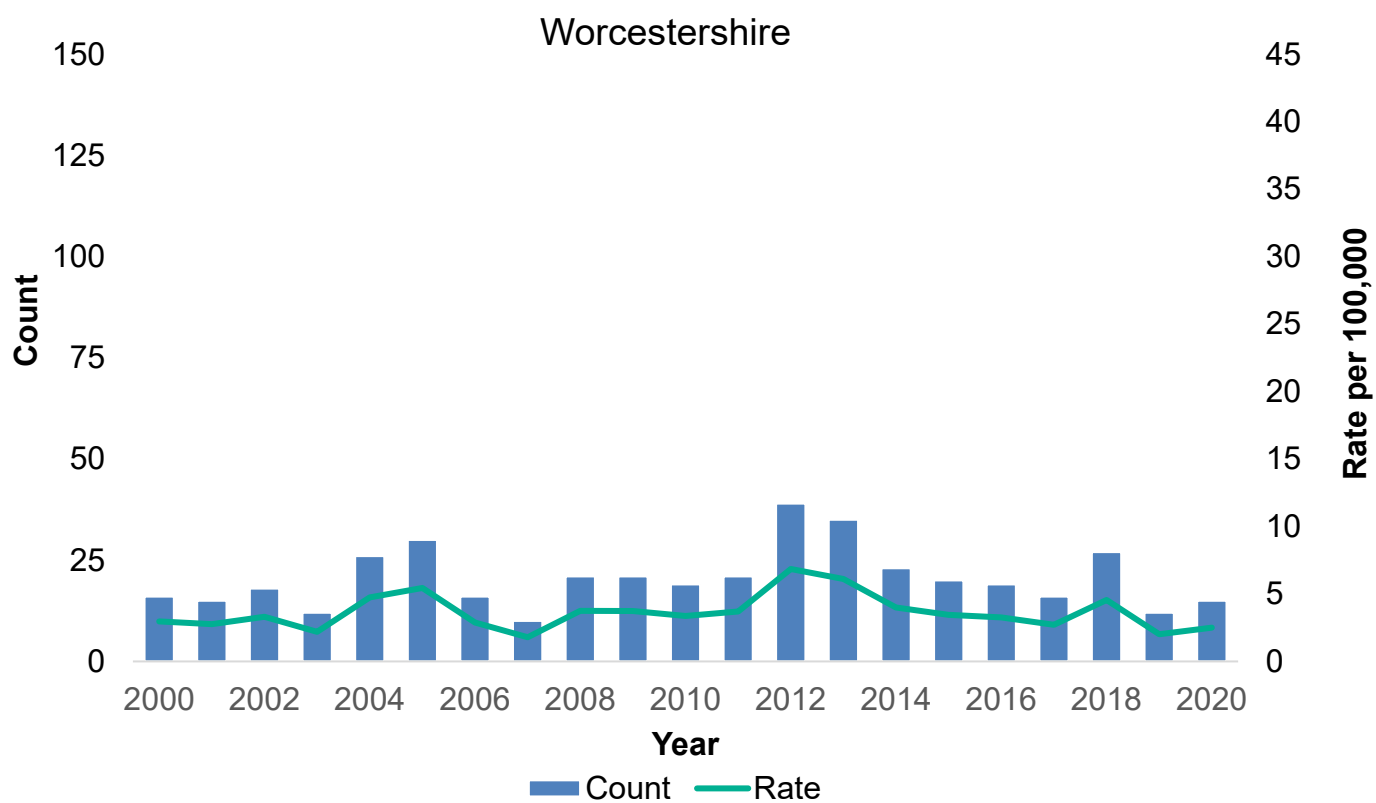
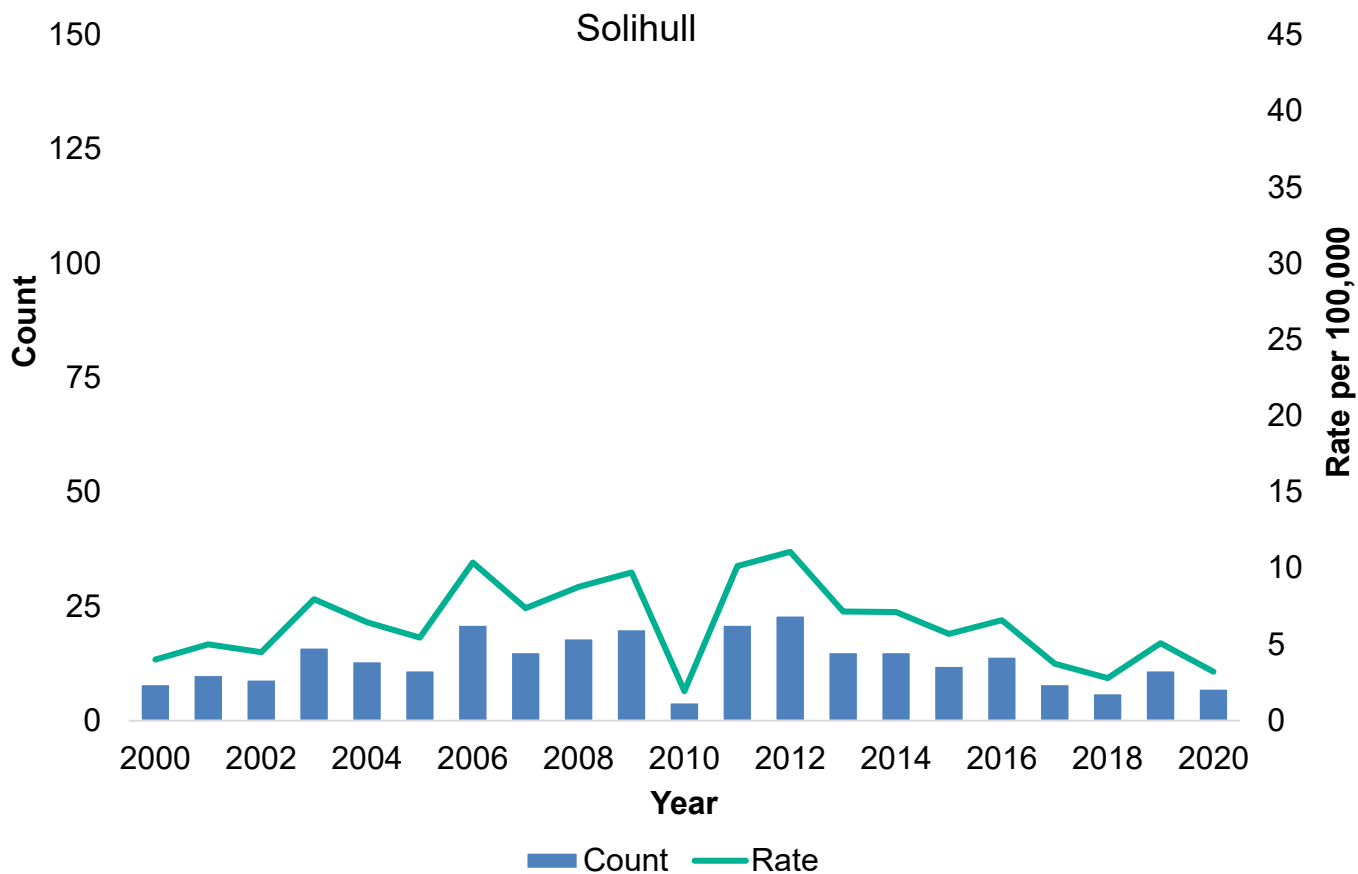






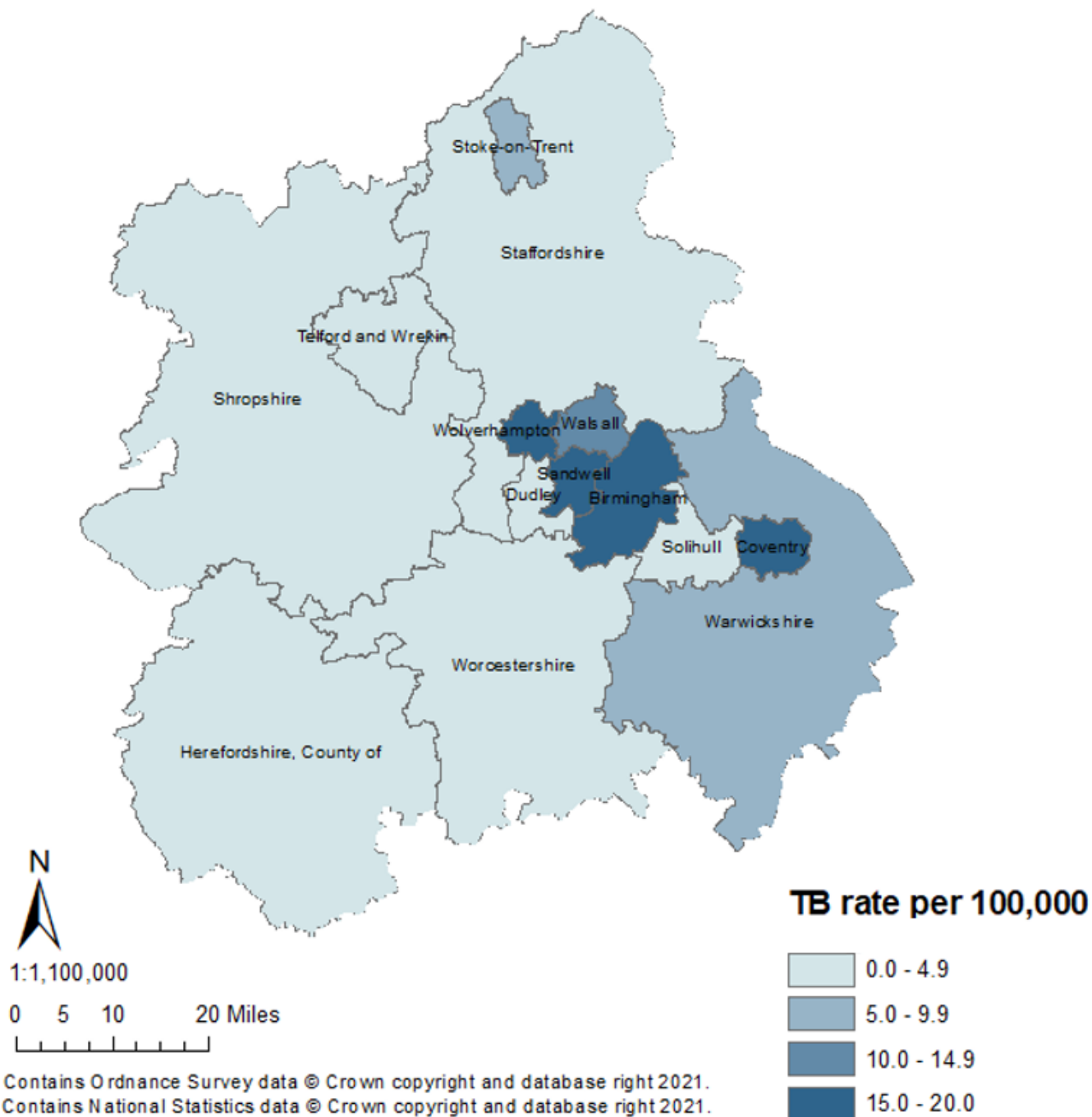






The highest rates of TB in the West Midlands were seen in Sandwell (20.1 per 100,000), followed by Wolverhampton (18.9 per 100,000), Birmingham (16.6 per 100,000) and Coventry (15.8 per 100,000) UTLAs (Figures 2 and 3).

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

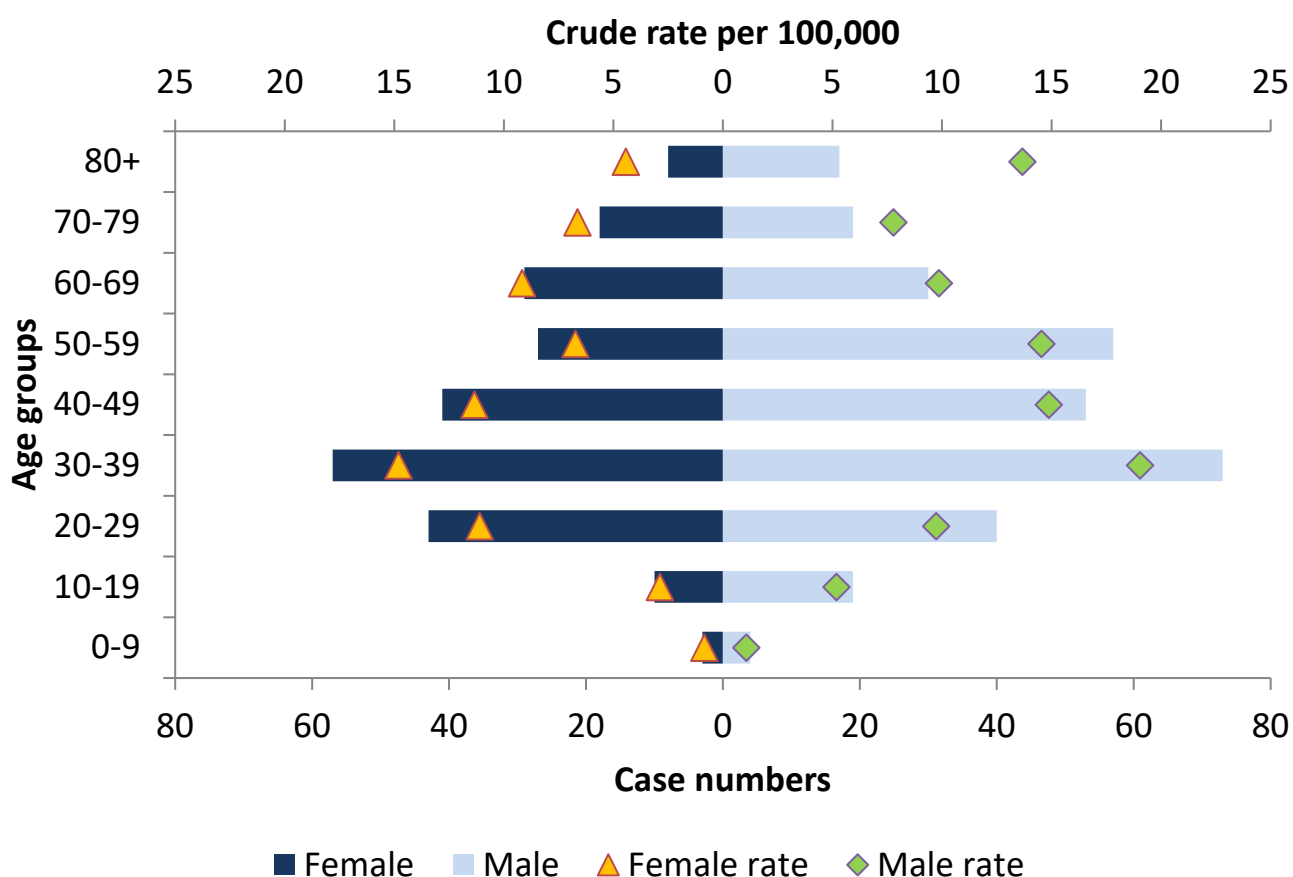


2. Demographic characteristics

Age and sex

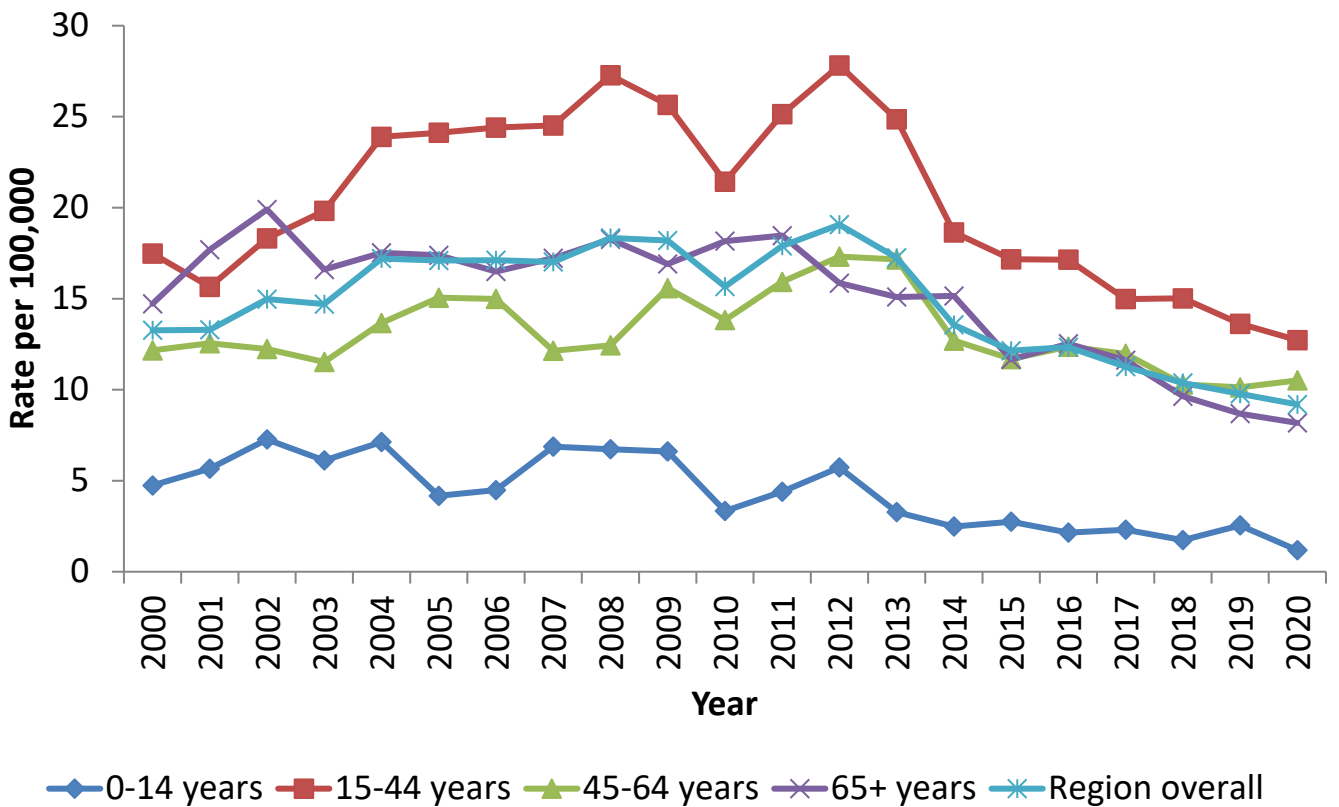
The age sex pyramid for people with TB in 2020 was similar to previous years, with more males (57%) than females (Figure 4). Using 10year age groups, crude rates of TB among were highest for those aged 30 to 39 years for both males (19.0 per 100,000) and females (14.8 per 100,000). This was also the age-group with the highest crude rate in males and females in 2019.

Figure 4. TB case reports and rate by age and sex, West Midlands, 2020



Using the life-stage age categories in Figure 5, the rate of TB declined for all age groups compared to 2019 apart from the 45 to 64 age group which saw a 3.8% increase from 10.1 (per 100,000) in 2019 to 10.5 (per 100,000) in 2020. With the highest case rates, the 15 to 44 age group is still thought to be the primary driver of TB in the West Midlands – though this is less so than 2012, where case rates in the 15 to 44 age group were over double those in 2020 (27.8 in 2012 compared to 12.7 per 100,000 in 2020) (Figure 5).

Figure 5. TB case rates by age group, West Midlands, 2000 to 2020



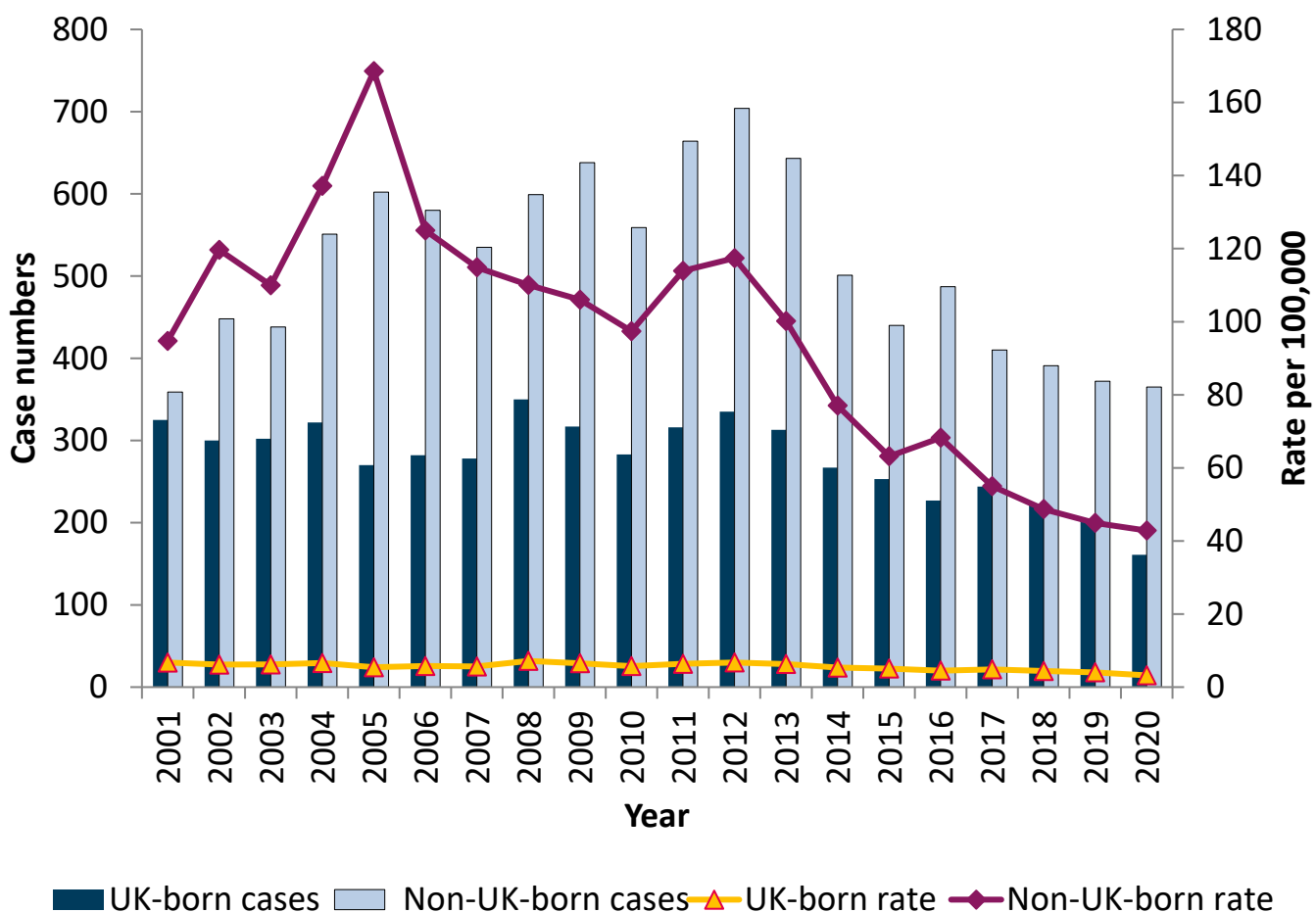
Place of birth and time since entry

The rates of TB among people born outside the UK should be interpreted in the context of changes to the pre-UK entry screening policies. In 2005 the UK piloted the pre-entry screening of long-term migrants to the UK for active pulmonary TB in 15 high TB incidence countries. In 2012 this pre-entry screening was extended to all countries with a high incidence of TB (>40 cases per 100,000 population) (3).

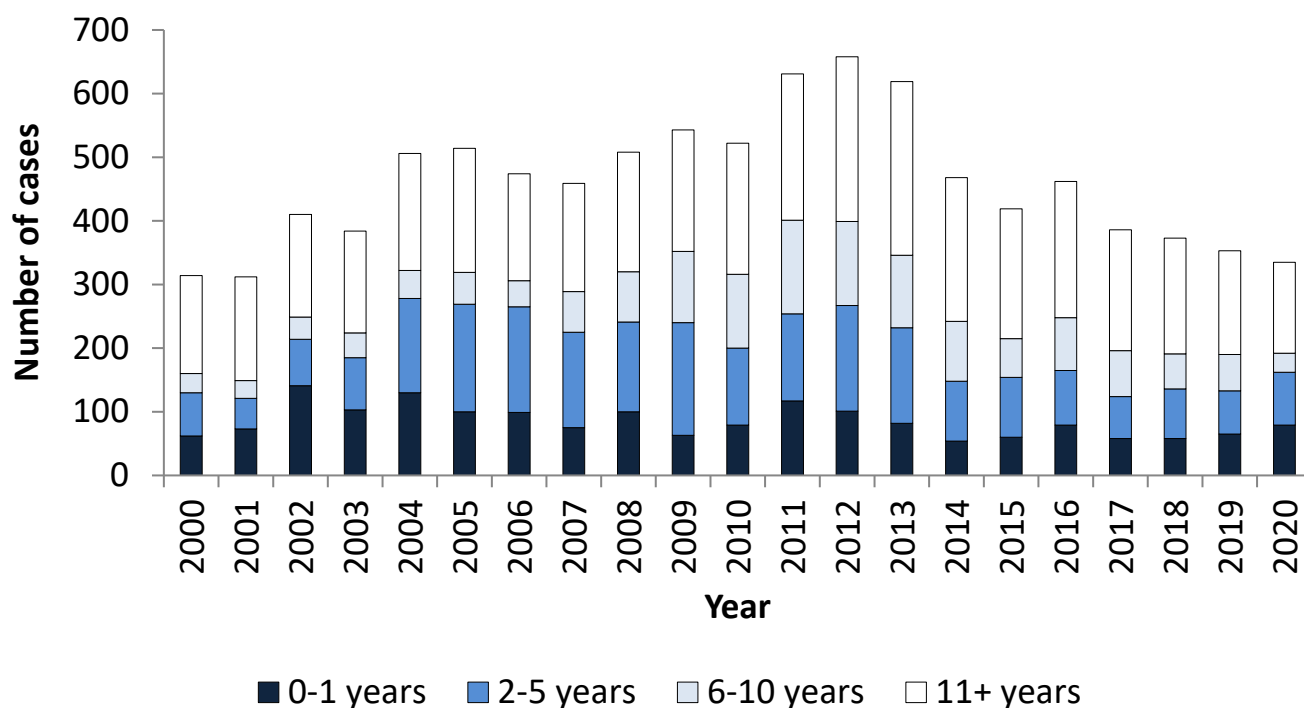
In 2020, 96% of TB cases had a recorded country of birth (526 out of 548), and of these, over two-thirds (69%, 365 out of 526) were born outside the UK, (Figure 6). The rate of TB was over 13 times higher among people born outside the UK (42.8 per 100,000) compared to those UK-born (3.2 per 100,000).⁷ Rates in 2020 decreased for both UK-born cases (-20%, 4.0 versus 3.2 per 100,000 in 2019), and non-UK-born cases (-5%, 42.8 versus 44.9 per 100,000 in 2019). This decrease in the UK-born rate is 4 times greater than the decrease in the non-UK-born rate. (Figure 6).

⁷ These rates should be interpreted with caution, as population estimates used as denominators for UK-born and non-UK born groups were calculated using The Labour Force Survey (LFS) populations estimates. These estimates are liable to sampling error for small population groups as they are based on a random sample of surveyed individuals weighted to represent others in the region.

Figure 6. TB case reports and rate by place of birth, West Midlands, 2001 to 2020



In cases notified in 2020, the year of entry to the UK was reported by 92% (335 out of 365) of TB patients born outside the UK. Of those, the largest proportion (43%, 143 out of 335) had arrived in the UK 11 or more years prior to their TB diagnosis, which is a similar pattern to previous years (Figure 7).

Figure 7. Time between entry to the UK and TB notification for non-UK-born patients by year, West Midlands, 2000 to 2020

The 10 most common countries of birth for TB patients born outside the UK and notified in 2020 were India (32%), and Pakistan (18%) followed by Romania, Eritrea, Nigeria, Afghanistan, Somalia, Zimbabwe, Ethiopia and the Philippines (each <10%, Table 1).

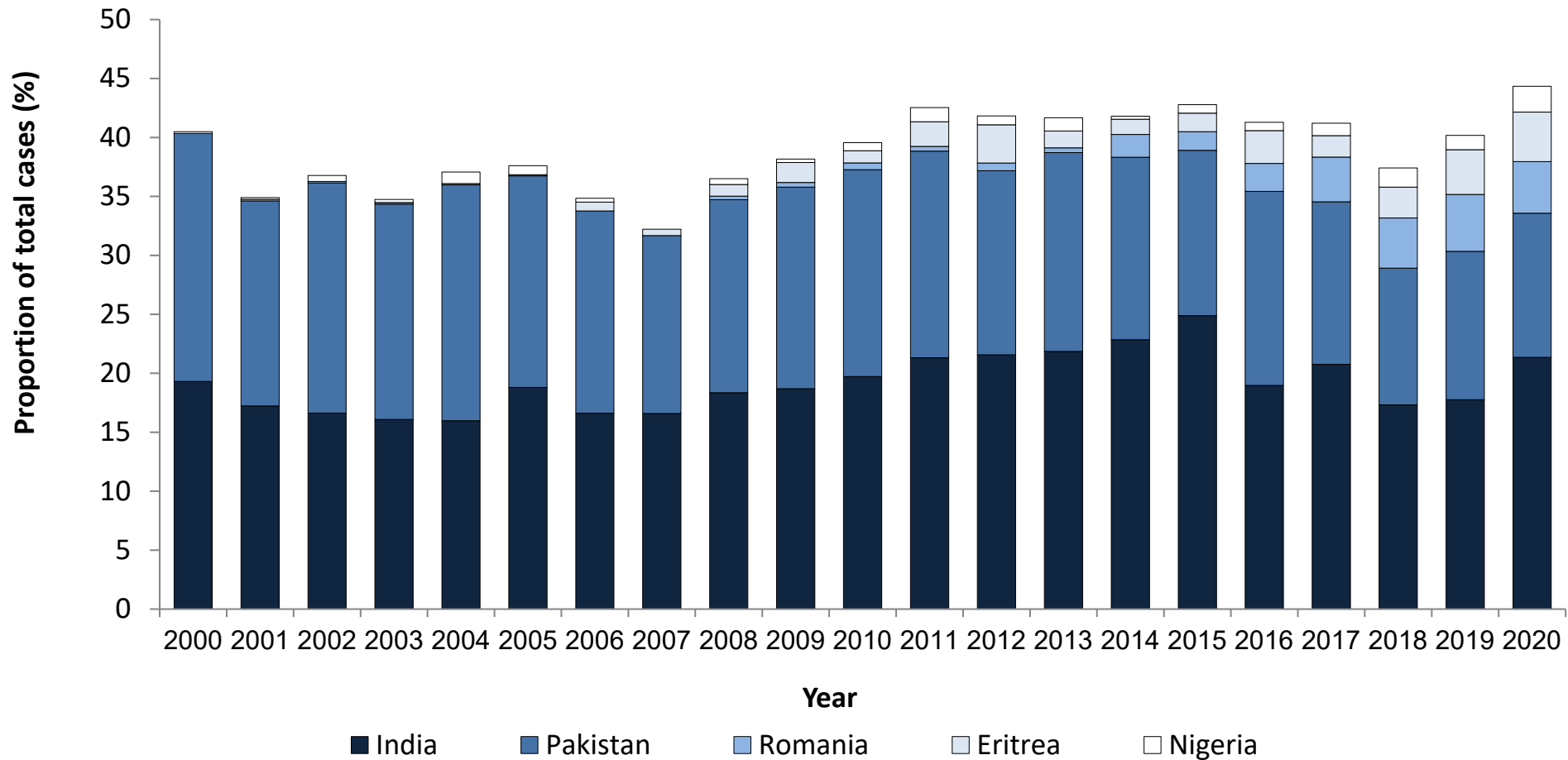
Table 1. 10 most common countries of birth of non-UK-born TB patients, West Midlands, 2020

Country of origin	Number of patients	Proportion of non-UK-born (%)	Time since entry (years)		
			Median	IQR*	
India	117	32	8	2	29
Pakistan	67	18	15	4	37
Romania	24	7	4	2	5
Eritrea	23	6	2	0	3
Nigeria	12	3	4	1	18
Afghanistan	10	3	1	0	18
Somalia	9	2	8	1	13
Zimbabwe	8	2	17	13	19
Ethiopia	6	2	3	2	16
Philippines	6	2	17	2	19
Total	282				

* IQR: Interquartile range.

India, Pakistan, Romania, Eritrea and Nigeria were the 5 most common countries of birth outside the UK for 2020, making up 42% (231 out of 548) of all cases. The proportions of patients retained very similar values to 2019, with a slightly larger increase in proportion of patients from India and Nigeria (Figure 8).

Figure 8. TB case reports by country of birth from the 5 most common countries of birth outside the UK, West Midlands, 2000 to 2020



The age distribution of TB cases was broadly similar between patients born within and outside the UK. Both groups had the highest proportion of cases in the 15 to 44 age group, accounting for 44% of UK-born cases (71 out of 161) and 58% (210 out of 365) of non-UK-born cases. Proportions in other age groups were also comparable between the UK-born and non-UK-born cases (33% versus 26% for 45 to 64, 19% versus 15% in 65+ and 4% versus 2% for 0 to 14 respectively).

Ethnicity

In 2020, 98% (538 out of 548) of patients with TB had their ethnicity recorded, of which 8% were recorded as mixed out of other. Collectively, patients with a recorded South Asian ethnicity made up almost half (48%) of cases, of whom the majority were of Indian ethnicity (59%). One fifth (20%) of cases with South Asian ethnicity were UK-born. Patients of White ethnicity made up just under a quarter (23%) of cases, of whom the large majority (71%) were UK-born. Patients of Black ethnicities made up one fifth (20%) of cases, of whom 76% were Black African. 12% of cases of Black ethnicity were UK-born (Table 2).

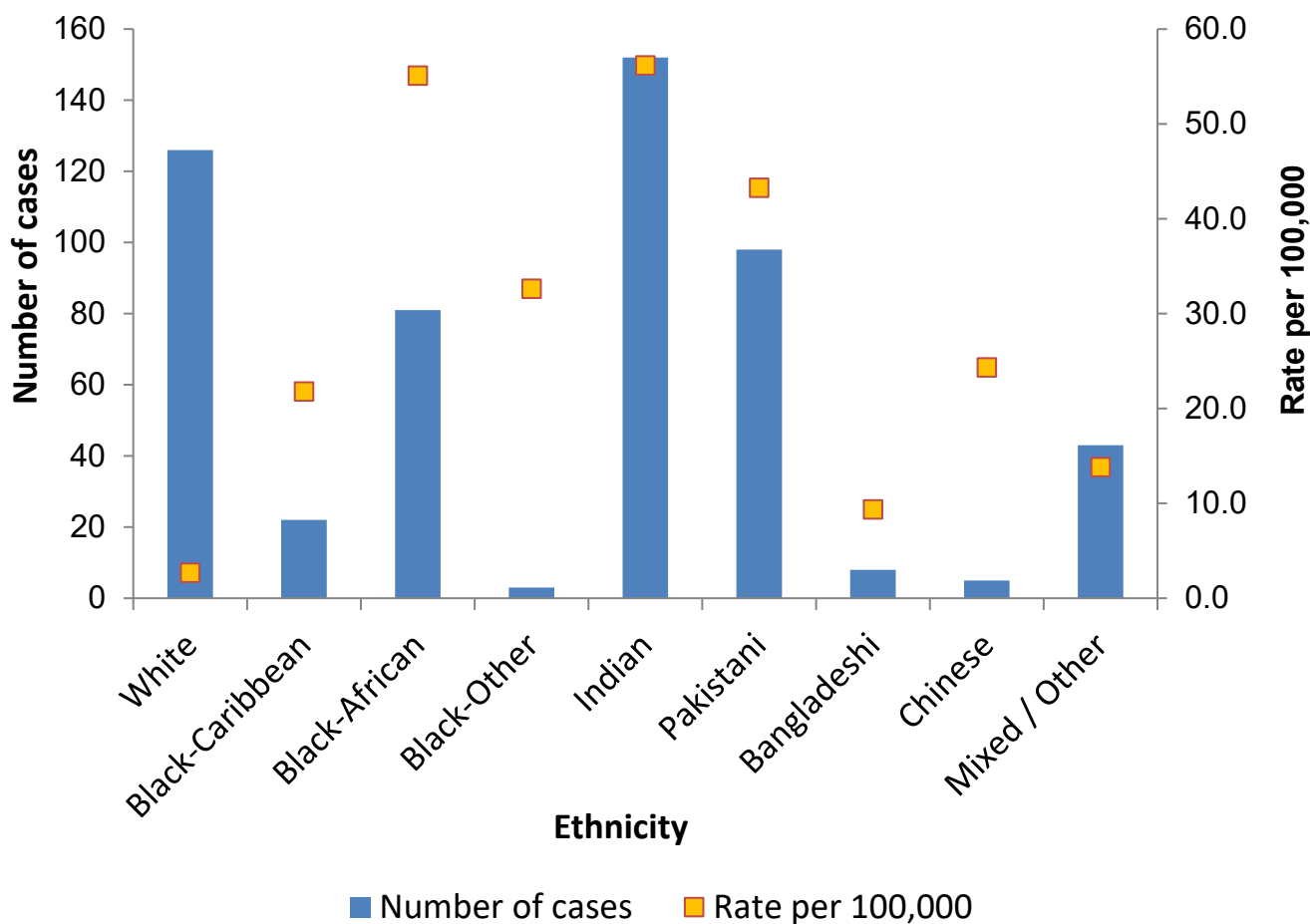
Table 2. Proportion of UK-born TB patients by ethnic group, West Midlands, 2020

Ethnic group	Number of cases	Number UK-born	Proportion UK-born (%)
White	126	90	71.4
Black Caribbean	22	10	45.5
Black African	81	<5	Suppressed
Black Other	<5	<5	Suppressed
Indian	152	24	15.8
Pakistani	98	26	26.5
Bangladeshi	8	<5	Suppressed
Chinese	5	0	0.0
Mixed / Other	43	5	11.6

Whilst patients of White ethnicity made up almost a quarter of cases, they were found to have the lowest TB rates compared to all other ethnicities (2.7 cases per 100,000), whilst patients of Indian and Black African ethnicities were found to have TB rates 21 times higher⁸ (Figure 9).

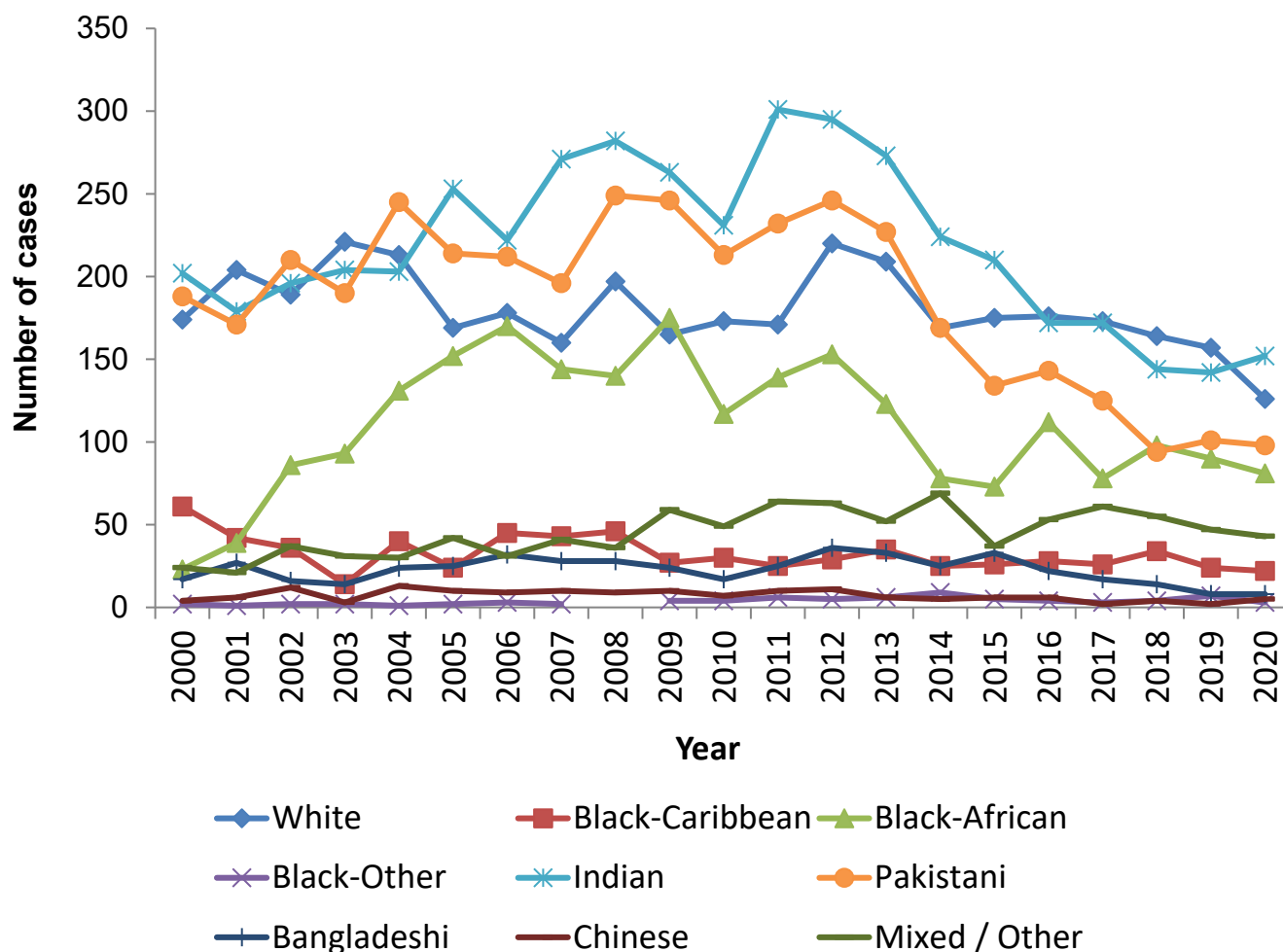
⁸ These rates should be interpreted with caution, as population estimates, used as the denominators for the different ethnic groups were calculated using the Labour Force Survey, which is liable to sampling error for small population groups. Small populations are often under-represented in the LFS sample, which may inflate TB rates for ethnic groups such as black individuals.

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



In 2020, the highest case numbers were in patients of Indian ethnicity following an increase of 10 cases from 2019 (152 in 2020 versus 142 in 2019). This was the first increase in case numbers in patients of Indian ethnicity since a peak in 2011, where case numbers were twice as high as 2020. There was a decrease in the number of cases with White ethnicity in 2020, though cases have been predominantly of White or Indian ethnicity since 2016 (Figure 10).

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



Occupation

In 2020 40% of people with TB aged 18-65 years were recorded as not in employment or education (this includes housewives out of husbands, retired, unemployed, asylum seekers and prisoners (171 out of 432)). A total of 8% (36 out of 432) of cases were in the education sector as either staff or students, and 9% were health care workers, health care laboratory staff or prison staff (37 out of 432) (Table 3).

Table 3. Occupational category of TB patients aged 18 to 64 years, West Midlands, 2020

Occupation	Number of patients	Proportion (%)
None*	171	39.6
Other	161	37.3
Education	36	8.3
Health care worker†	37	8.6
Agriculture or animal care worker	<5	Suppressed

Tuberculosis in the West Midlands (2020)

Occupation	Number of patients	Proportion (%)
Unknown occupation	25	5.8
Total	433	

* Includes housewives or husbands, retired, unemployed, asylum seekers and prisoners.

† Also includes laboratory/pathology workers and social service or prison staff.

3. Clinical characteristics

Site of disease

In 2020, site of disease was recorded for all but one case (547 out of 548). Almost half (49%, 270 out of 548) of patients had pulmonary TB disease (with or without extra-pulmonary sites). Lymph nodes were the next most common site of disease (35%, 194 out of 548), of which 66% (128 out of 194) were extra-thoracic and 34% (66 out of 194) were intra-thoracic. Other extra-pulmonary sites of unknown origin also make up a significant proportion of cases (16%) (Table 4).

Table 4. Site of disease of TB patients, West Midlands, 2020

Site of disease	Number of cases	Proportion %†
Pulmonary*	270	49.3
Miliary	17	3.1
Laryngeal	<5	Suppressed
Extra-pulmonary	364	66.4
Lymph nodes (extra-thoracic)	128	23.4
EP Unknown	87	15.9
Pulmonary +EP sites	86	15.7
IT lymph nodes	66	12.0
Other (extra-pulmonary)	70	12.8
Pleural	45	8.2
Gastrointestinal	31	5.7
Bone or joint (spine)	19	3.5
Bone or joint (other)	9	1.6
Central nervous system (meningitis)	18	3.3
Genitourinary	7	1.3
CNS (other)	6	1.1
Cryptic	<5	Suppressed
Unknown	<5	Suppressed

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

* With or without disease at another site.

In 2020, UK-born patients were more likely to have pulmonary disease (62%, 100 out of 161) compared to non-UK-born patients (44%, 160 out of 365). Patients reporting at least one social

risk factor⁹ were more often pulmonary cases (77%, 39 out of 51) compared to patients reporting no social risk factors (46%, 196 out of 429). People with pulmonary TB have the potential to be infectious to others.

Previous history of tuberculosis

In 2020, among the 93% of patients who reported their clinical history, 7.6% of cases (39 out of 510) had a previous diagnosis of TB at least 12 months prior to their most recent notification, which is very similar to the rate in previous years in the West Midlands. These patients had a median of 11 years since their previous diagnosis (IQR 4-21 years). This is slightly higher than the proportion of cases reporting a previous diagnosis of TB in England overall (6.2%) ([1](#)).

Hospital inpatients

Of the 91% of cases with hospital inpatient status recorded, 12% (61 out of 499) were inpatients at the time of diagnosis with TB. Cases diagnosed while hospital inpatients were 3-times more likely to have pulmonary disease (18%, 45 out of 246) compared to non-pulmonary, 6%, 16 out of 252), and over twice as likely to have at least one recorded social risk factor (22%, 11 out of 49 compared to 10%, 42 out of 410 with no social risk factors).

⁹ Social risk factors for TB indicates one or more of prison, homelessness, alcohol or substance misuse.

4. 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 the results were used to report culture confirmation. Results for microscopy, polymerase chain reaction (PCR) and histology are also collected in the PHE Enhanced Tuberculosis Surveillance system (ETS).¹⁰

Culture confirmation and speciation

In 2020, 58% of all cases (315 out of 548) were confirmed by culture of a TB isolate. Among pulmonary cases, 75% of cases (202 out of 270) were culture confirmed. These proportions are consistent with the previous year, where 58% (330 out of 574) of all cases, and 73% (239 out of 328) of pulmonary cases, were culture confirmed.

Of the 315 culture confirmed cases in 2020, almost all were *M. tuberculosis* (95.6%, 301 out of 315). The small number remaining were either *M. africanum* or *M. bovis*.

Sputum smear

As described in the last chapter, 49% (270 out of 548) of TB cases reported in 2020 were pulmonary. Among these individuals, 60% (163 out of 270) had a sputum smear test, of which 63% were smear positive (102 out of 163). The rate of sputum smear testing for pulmonary cases was slightly lower in the West Midlands compared to England overall (65.9%), and the smear positivity rate for those tested was higher compared to England overall (46.3%) ([1](#)).

¹⁰ ETS was replaced in September 2021 by the National Tuberculosis Surveillance System (NTBS).

5. Delay from onset of symptoms to start of treatment

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

Overall, 534 patients started on TB treatment in 2020. Among patients with pulmonary TB who reported both date of symptom onset and date of treatment start, 36% (88 out of 243) started treatment within 2 months of symptom onset (Table 6), which is similar to the previous year. In 2020, over one third of patients with pulmonary TB started treatment more than 4 months (120 days) after symptom onset (35%, 86 out of 243), indicating a prolonged period of infectiousness. This is the highest proportion in recent years.

52% of patients with extra-pulmonary TB started treatment more than 4 months after symptom onset (119 out of 231), which is higher than the previous year (47%, 102 out of 205). The longer treatment delays in extra-pulmonary cases are often thought to relate to delays in presenting to healthcare and in diagnosing extra-pulmonary disease, which is supported by the longer median time from symptom onset to diagnosis for extra-pulmonary cases (121 days) compared to pulmonary cases (79 days).

Table 6. Time between symptom onset and treatment start*, West Midlands, 2020

Time delay	Pulmonary		Extra-pulmonary only		Overall	
	n	%	n	%	n	%
Under 2 months	88	36.2	56	24.2	144	30.4
2 to 4 months	69	28.4	56	24.2	125	26.4
Over 4 months	86	35.4	119	51.5	205	43.2
Total	243		231		474	

* Excluding asymptomatic patients, and those with missing onset dates.

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

In 2020, of pulmonary TB patients who experienced a treatment delay exceeding 4 months, 54% (46 out of 86) were male and 50% (43 out of 86) were aged 15 to 44 years. The majority were non UK-born (56%, 47 out of 86), among whom just over half (55% 26 out of 47) had entered the UK over 11 years prior to their TB diagnosis. Over a third of these late diagnosed pulmonary cases were sputum smear positive (36% 31 out of 86). One fifth had at least one social risk factor (19% 15 out of 86) and 8% (7 out of 86) had previously been diagnosed with TB.

6. TB outcomes in drug sensitive cohort

For the purposes of TB outcome reporting, drug sensitive cases are defined as sensitive to rifampicin. Under this definition, cases with resistance to isoniazid, ethambutol and/or pyrazinamide but sensitive to rifampicin are included in the drug sensitive cohort. Drug-resistant strains are defined as those with resistance to rifampicin, and cases with suspected rifampicin resistance (initial or acquired) including non-culture confirmed patients treated for presumptive MDR-TB (4). TB outcomes among patients with drug-resistant disease are considered in the next chapter (Chapter 6).

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

1. For patients with an expected duration of treatment less than 12 months, outcomes at 12 months are reported. This group excludes individuals with central nervous system (CNS) disease, who would be treated for 12 months. In addition, those with spinal, cryptic disseminated or miliary disease are excluded from this group, as CNS involvement cannot be reliably ruled out for the purposes of reporting.
2. For patients with CNS, spinal, cryptic disseminated or miliary disease, the last recorded treatment outcome is reported.

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

86% of patients (449 out of 524) diagnosed in 2019 with rifampicin sensitive TB and an expected treatment duration of less than 12 months (excluding CNS, spinal, miliary or cryptic disseminated disease) completed treatment within 12 months. This is similar to the treatment completion rates seen in recent years in the West Midlands (Table 7).

Table 7. Number and proportion completing treatment at 12 months, West Midlands, 2001 to 2020*

Year of diagnosis	Patients completing treatment at 12 months		
	Rifampicin sensitive cases	Number	Proportion (%)
2001	656	425	64.8
2002	752	526	69.9
2003	733	514	70.1
2004	864	631	73.0
2005	830	570	68.7
2006	835	566	67.8

Year of diagnosis	Patients completing treatment at 12 months		
	Rifampicin sensitive cases	Number	Proportion (%)
2007	871	673	77.3
2008	917	761	83.0
2009	908	743	81.8
2010	791	633	80.0
2011	891	724	81.3
2012	962	823	85.6
2013	857	736	85.9
2014	691	575	83.2
2015	621	516	83.1
2016	648	548	84.6
2017	590	505	85.6
2018	562	485	86.3
2019	524	449	85.7

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

Of the 75 patients who weren't recorded as completing treatment at 12 months, one third were still on treatment (33% 25 out of 75), and just under a third had died (which may or may not have been caused by TB) (31%, 23 out of 75). However, 21% (16 out of 75) of outcomes were unknown due to cases being lost to follow-up or not evaluated (Table 8).

Table 8. TB outcome at 12 months, West Midlands, patients diagnosed in 2019*

Outcome	Number of patients	Proportion (%)
Treatment completed	449	85.7
Died	23	4.4
Lost to follow up	10	1.9
Still on treatment	25	4.8
Treatment stopped	11	2.1
Not evaluated	6	1.1
Total	524	

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

Of the 10 patients lost to follow up, 8 were non-UK-born (80%), of whom 75% (6 out of 8) had entered the country 0 to 1 years ago. Half of those lost to follow up had left the UK (50%). The median age of patients lost to follow up was 33 years.

Patients aged 65 years or older had the highest death and treatment non-completion rates, with one quarter not completing treatment within 12 months (25% 21 out of 62), and 15% patient deaths within 12 months (12 out of 62) compared to 3% patient deaths aged under 65 years (11 out of 387).

Out of the 23 patient deaths, a higher proportion were UK-born (61%, 14 out of 23). A total of 18 of the 23 deaths were pulmonary (78%), which is higher than the proportion of cases with pulmonary TB (49%, 270 out of 548). Causes of death reported by clinicians to ETS¹¹ indicated that TB had contributed to or caused the death of 11 out of 23 TB patients (48%). TB was incidental to the death of 6 out of 23 patients (26%) and the relationship between TB and death was unknown for 6 out of 23 of patients (26%). The median age of patients who died was 70 years.

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

At the last recorded outcome for patients diagnosed in 2019 with rifampicin sensitive TB and possible CNS involvement (which is no more than 24 months after starting treatment), 81% (43 out of 53) had completed treatment (Table 9). These patients had a higher rate of treatment completion compared to similar patients diagnosed in 2018 76% (31 out of 41), and also higher than the national average of 75% for 2019 (1). The median treatment duration for these individuals was approximately one year (364 days, IQR 265-371 days). Of this cohort, fewer than 5 patients died (8%) with a median age at death of 61 years. TB contributed to the death in one case and was incidental to death in 3 cases (Table 9).

Table 9. TB outcome for patients with rifampicin sensitive, CNS, spinal, miliary or cryptic disseminated disease, West Midlands, patients diagnosed in 2018*

Outcome	Number of cases	Proportion (%)
Treatment completed	43	81.1
Died	4	7.5
Lost to follow up	<5	Suppressed
Still on treatment	<5	Suppressed
Treatment stopped	<5	Suppressed
Not evaluated	<5	Suppressed
Total	53	

* Excludes rifampicin-resistant TB.

¹¹ Causes of death reported to ETS were not necessarily based on review of death certificates completed in routine death registration.

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

Drug resistance

There are several groups of TB antibiotics, and resistance to TB antibiotic drugs may occur to one or more of these drugs and in different combinations. A distinction is made between first, second and third line TB antibiotic drugs depending upon their clinical effectiveness (5). First line drugs include rifampicin, isoniazid, pyrazinamide and ethambutol. Second line drugs include injectable agents (for example, amikacin, capreomycin, kanamycin), fluoroquinolones (for example, moxifloxacin, ofloxacin, ciprofloxacin) and other oral bacteriostatic agents. Multi-drug resistant cases (MDR-TB) are initially resistant to at least isoniazid and rifampicin. Extensively drug-resistant TB cases (XDR-TB) are both MDR and resistant to at least 1 injectable agent, one of which must be a fluoroquinolone (4).¹²

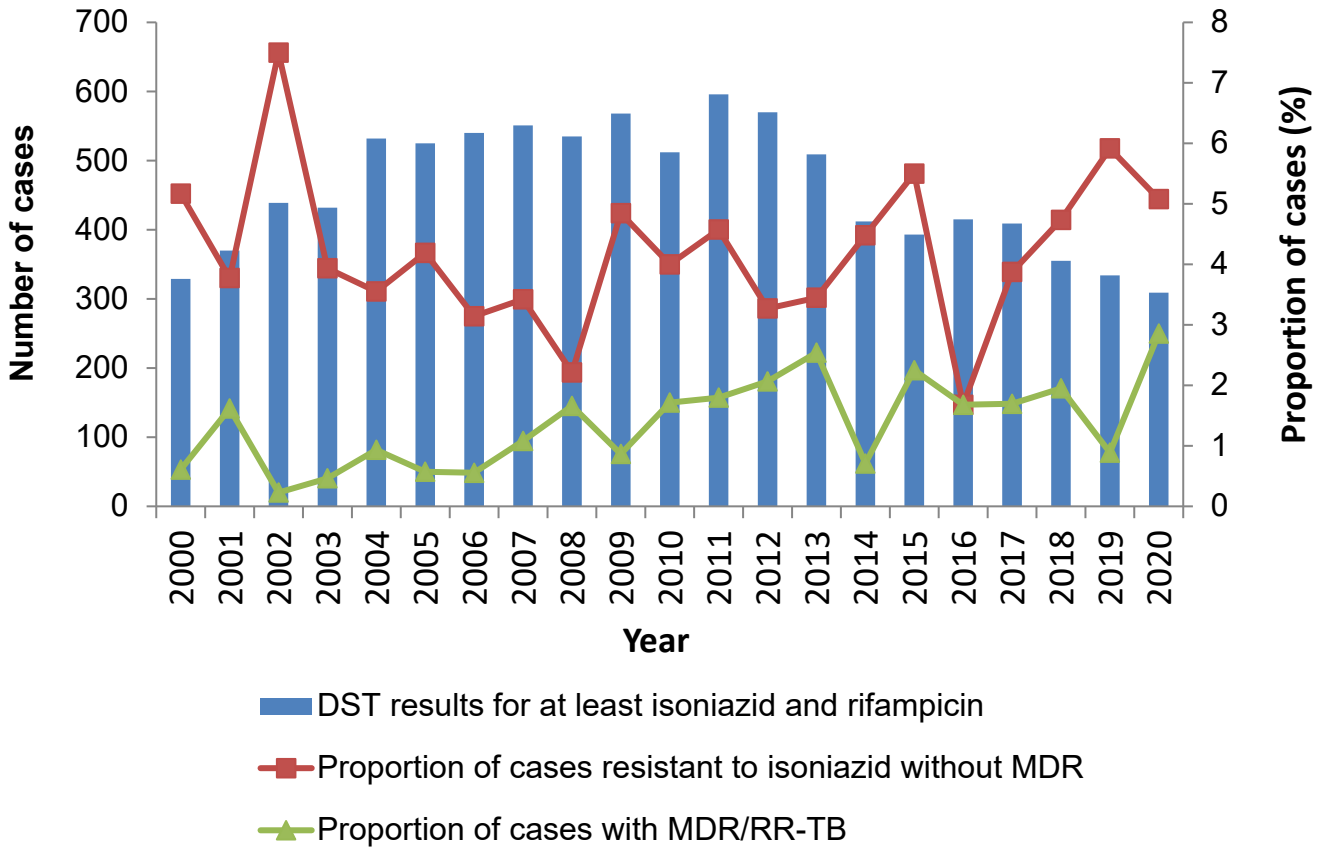
Overall initial drug resistance and geographical distribution

In 2020, first line drug resistance for TB in the West Midlands follows similar patterns to previous years. Phenotypic drug sensitivity testing (DST) was known for 56% of cases in 2020 (309 out of 548). Among these 309 culture confirmed cases of TB, 12% (39 out of 309) had first line drug resistance. The proportion of cases with resistance to at least one first line drug peaked at 12% in 2018, which was the highest since records began in 2000, and has remained stable since.

5% of culture-confirmed cases (16 out of 309) were resistant to isoniazid but not rifampicin (INH-R), and 3% (9 out of 039) had multi-drug resistant or rifampicin-resistant TB (MDR out of RR-TB). (Figure 13). There were no cases of extensively drug-resistant TB (XDR-TB).

¹² Injectable agents: amikacin, capreomycin or kanamycin. Fluoroquinolones: moxifloxacin, ofloxacin or ciprofloxacin.

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



Abbreviations

DST: drug sensitivity testing

MDR: multi-drug resistant TB

RR-TB: rifampicin-resistant TB (with or without resistance to other antibiotics)

The 39 cases with any first line drug resistance had similar patient characteristics to other West Midlands TB patients. The highest proportions occurred in patients aged 15 to 44 (62%, 24 out of 39), and the majority were in non-UK-born patients (92%, 34 out of 39), which is a larger proportion of non-UK-born than that seen in other West Midlands TB patients (69%, 365 out of 526).

Patients of Indian and Black African ethnicity made up over a quarter each of the first line resistance cases (both 26%, 10 out of 39), followed by Pakistani (21% 8 out of 39) and mixed out of other (15% 6 out of 39). 56% of patients with first line resistance had pulmonary TB (22 out of 39) and 31% were sputum smear positive (12 out of 39).

Among the 9 patients who had MDR out of RR-TB, 8 were non-UK-born (89%), and 7 were in the 15 to 44 age category (78%). In terms of patient clinical characteristics, 6 had pulmonary TB (67%) and 5 were sputum smear positive (56%). Fewer than 5 cases were previously diagnosed with TB.

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

Of the 7 West Midlands cases with MDR TB notified in 2018, 24 months less than 5 cases have completed treatment, whilst the remaining cases were either still on treatment, have died with TB contributing to death or were lost to follow-up.

8. TB in under-served populations

Social risk factors

Of the 535 patients with TB aged 15 years or older in 2020, 88% (469 out of 535) recorded risk factor status, including homelessness, imprisonment, drug or alcohol misuse. Among those individuals, 11% (51 out of 507) had at least one recorded risk factor, which is the lowest since 2016 (Table 10).

Table 10. Social risk factors among TB patients, West Midlands, 2009 to 2019

Year	Total with status recorded	Any social risk factor	
		Number of patients	Proportion (%)
2010	683	61	8.9
2011	819	61	7.4
2012	890	75	8.4
2013	831	87	10.5
2014	665	62	9.3
2015	619	78	12.6
2016	640	62	9.7
2017	586	79	13.5
2018	558	83	14.9
2019	519	92	17.7
2020	469	51	10.9

The most common risk factor reported in 2020 in the West Midlands was imprisonment (5.9%, 28 out of 475, Table 11) followed by drug use (4.5%, 22 out of 490), homelessness (3.7%, 18 out of 486) and alcohol misuse (3.3%, 16 out of 489).

Table 11. Social risk factors among TB patients, West Midlands, 2020

Risk factor	Total with status recorded	Number of patients	Proportion (%)
Drug use	490	22	4.5%
Prison	475	28	5.9%
Homelessness	486	18	3.7%
Alcohol misuse	489	16	3.3%

Compared to patients with no social risk factors (SRF) between 2009 and 2020, cases with at least one social risk factor were more likely to be male (85% versus 55% with no SRF), UK-born (63% versus 29% with no SRF), white (45% versus 20% with no SRF), sputum smear positive (71% versus 45% with no SRF), have pulmonary disease (81% versus 52% with no SRF) and have a previous diagnosis of TB (14% versus 7% with no SRF) (Table 12).

Table 12. Characteristics of patients aged 15 years or older in relation to social risk factors, West Midlands, patients diagnosed between 2009 and 2020

Characteristic		Patients with risk factors		Patients with no risk factors	
		Number of patients	Proportion (%)	Number of patients	Proportion (%)
Sex					
	Female	127	15.2	3,099	45.5
	Male	710	84.8	3,708	54.5
Age					
	15 to 44	527	63.0	3,843	56.5
	45 to 64	276	33.0	1,655	24.3
	65+	34	4.1	1,309	19.2
Country of birth					
	Non-UK-born	308	37.1	4,778	70.8
	UK-born	523	62.9	1,972	29.2
Ethnicity					
	White	379	45.3	1,367	20.1
	Black-Caribbean	86	10.3	188	2.8
	Black-African	101	12.1	891	13.1
	Black-Other	12	1.4	43	0.6
	Indian	122	14.6	2,026	29.8
	Pakistani	57	6.8	1,548	22.7
	Bangladeshi	≤5	Suppressed	197	2.9
	Chinese	≤5	Suppressed	55	0.8
	Mixed / Other	65	7.8	444	6.5
	Unknown ethnicity	8	1.0	48	0.7
Clinical characteristics					
	Pulmonary	680	81.3	3,535	52.1

Characteristic		Patients with risk factors		Patients with no risk factors	
		Number of patients	Proportion (%)	Number of patients	Proportion (%)
	Sputum smear positive	344	70.5	1,052	44.8
	Previous TB diagnosis	112	13.8	471	7.0
Drug sensitivity					
	First line drug resistance	43	7.3	269	8.0
HIV test					
	Offered	582	98.1	4,348	95.4

Between 2009 and 2019 in drug sensitive cases with no CNS involvement, patients with risk factors were slightly less likely to complete treatment (91% in patients with no risk factors, 82% in patients with risk factors); and were more likely to be lost to follow-up (2.7% in patients with no risk factors, 7.1% in patients with risk factors) (Table 13).

Table 13. Last recorded TB outcome for patients aged 15 years or older, West Midlands, patients diagnosed 2009 to 2019

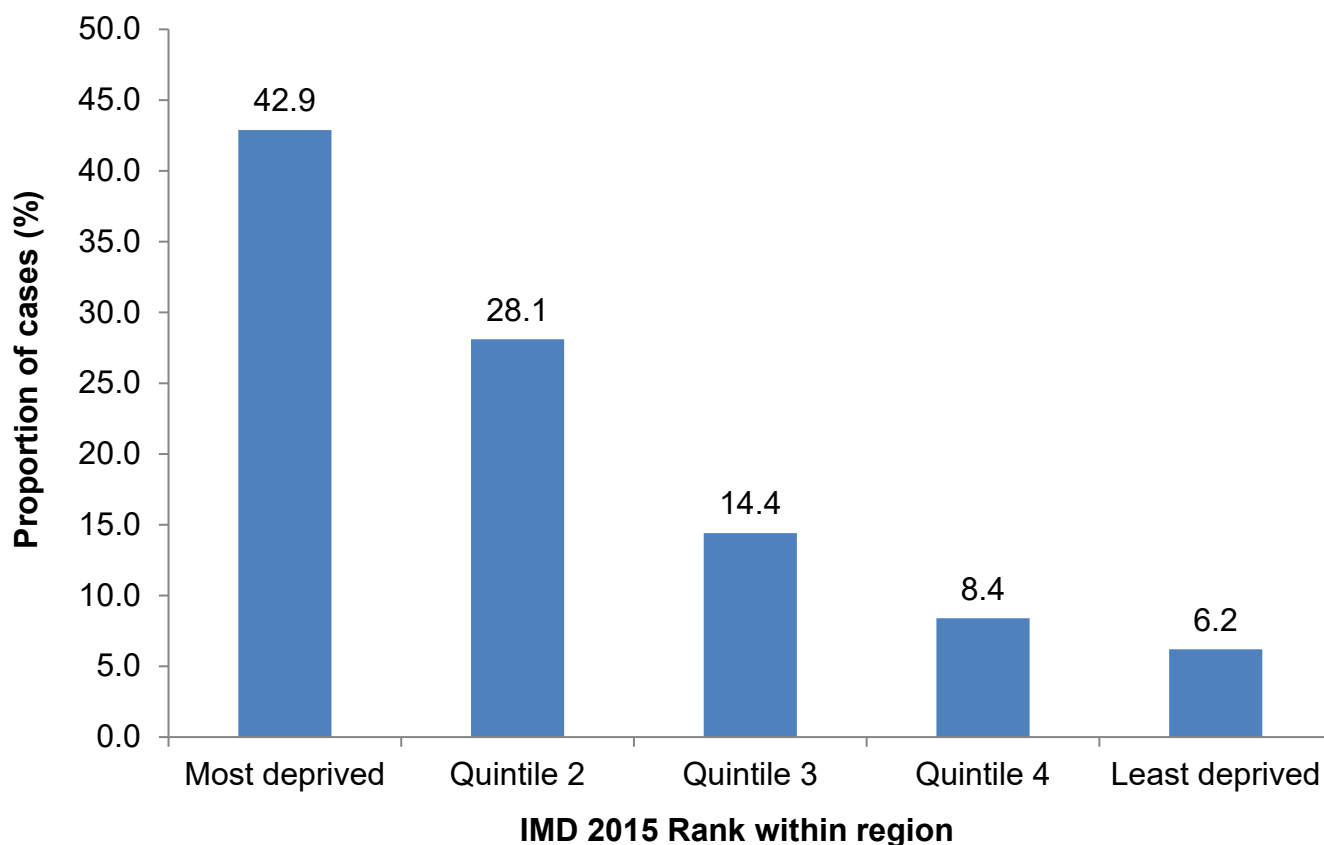
Last recorded outcome	Patients with risk factors		Patients with no risk factors	
	Number of patients	Proportion (%)	Number of patients	Proportion (%)
Treatment completed	580	82.0	5195	90.6
Died	51	7.2	282	4.9
Lost to follow up	50	7.1	154	2.7
Still on treatment	5	0.7	<5	Suppressed
Treatment stopped	13	1.8	76	1.3
Not evaluated	8	1.1	<25	Suppressed
Total	707		5734	

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

Deprivation

Based on the Index of Multiple Deprivation (IMD 2019) rank assigned to geographical areas in the West Midlands,¹³ 43% (235 out of 548) of patients were resident in the most deprived quintile (Figure 14). As in previous years, TB case rate has a linear association with deprivation, with lower proportions in the less deprived quintiles.

Figure 14. TB case rate by deprivation, West Midlands, 2020



¹³ The Index of Multiple Deprivation 2019 rank for each lower super output area (LSOA), based on deprivation score assigned, relative to other LSOAs in the PHE West Midlands area.

9. HIV testing of TB patients

HIV testing

For some patients who have TB, treatment can be more complicated because they also have HIV infection. However, both conditions can be successfully treated with a combination of antiretroviral therapy (ART) and appropriate TB antibiotic treatment (6). To optimise their outcome and reduce the risk of TB and HIV transmission to others, it is essential that all patients with TB undergo HIV testing to allow curative TB treatment and ART to be started as soon as possible.

HIV testing status was not recorded in 15% of cases (80 out of 545) and HIV status was already known in 2.4% of cases (13 out of 545). Of the remaining cases, 97% were offered an HIV test (439 out of 452), and of these an HIV test was received in 94% of cases (426 out of 452). 2.5% were offered but did not receive testing (11 out of 452), and 3% were not offered a test (13 out of 452). Of patients not offered an HIV test, 60% (6 out of 13) were non-UK-born, 62% (8 out of 13) were aged 65+, and 46% (6 out of 13) were white.

In 9 out of 14 upper tier local authority areas, 100% of cases offered HIV testing received the test (Table 14).

Table 14. HIV testing by upper tier local authority (UTLA) of residence, West Midlands, 2020

UTLA name	Total number of patients	Offered		Offered and received	
		Number of patients	Proportion (%)	Number of patients	Proportion (%)
Birmingham	143	140	97.9	136	97.1
Coventry	47	45	95.7	45	100.0
Dudley	11	11	100.0	11	100.0
Herefordshire, County of	<5	<5	Suppressed	<5	Suppressed
Sandwell	58	58	100.0	57	98.3
Shropshire	5	5	100.0	5	100.0
Solihull	6	6	100.0	6	100.0
Staffordshire	24	22	91.7	21	95.5
Stoke-on-Trent	23	23	100.0	23	100.0
Telford and Wrekin	7	7	100.0	7	100.0
Walsall	36	35	97.2	33	94.3
Warwickshire	31	29	93.5	29	100.0

Tuberculosis in the West Midlands (2020)

UTLA name	Total number of patients	Offered		Offered and received	
		Number of patients	Proportion (%)	Number of patients	Proportion (%)
Wolverhampton	47	45	95.7	40	88.9
Worcestershire	11	10	90.9	10	100.0
West Midlands	452	439	97.1	426	94.2

References

1. UKHSA (2021). 'Tuberculosis in England: 2021' (presenting data to end of 2020)
2. UKHSA (2021). ['TB Action Plan for England, 2021 to 2026'](#)
3. UKHSA (2021). 'UK pre-entry tuberculosis screening report 2020'
4. WHO (2013). ['Definitions and reporting framework for tuberculosis: 2013 revision'](#)
5. Joint Formulary Committee. [British National Formulary](#) 2018
6. WHO. 'Guidelines for treatment of tuberculosis 2010'

Appendix A. Notes on the report

About the Field Service

The Field Service (FS) supports PHE Centres and partner organisations through the application of epidemiological methods to inform public health action. It does this in 2 main ways, 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 PHE 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 West Midlands TB Control Board and local health protection forums.

Aim of report

This report describes the recent epidemiology of TB in the West Midlands. It includes local trends, which areas and population groups have a high burden of disease, and detail on the care of patients.

Further TB information

You can find more information about TB online:

- [the National Report of TB in England](#)
- additional data on TB notifications in the UK to the end of 2019, and breakdowns by country, can be found in the Official Statistic for TB, '[Reports of cases of tuberculosis to enhanced tuberculosis surveillance systems: United Kingdom, 2000 to 2019](#)'
- a number of [TB indicators at upper tier local authority and clinical commissioning group level](#) are available online and were updated with data for 2020 in February 2021

Appendix B. Description of data sources and definitions

Data sources

This report is based on TB case notifications made to ETS in England to the end of 2019. This information is updated annually to take into account denotifications (where 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 cases. Results for microscopy, PCR, histology and culture are collected in ETS. Appropriate referral of clinical specimens to the Mycobacterium Reference Laboratories is an important part of the routine work of the diagnostic laboratories in the investigation and management of TB cases.

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. Historically, organism relatedness has been determined by MIRU-VNTR typing, however this has been superseded in recent years by WGS.

Definitions

Term	Definition
BCG	Bacillus Calmette-Guérin vaccination
CI	Confidence interval
CCG	Clinical commissioning group
Cluster	2 or more patients notified within the time period of analysis with TB caused by indistinguishable strains, with at least 23 complete MIRU-VNTR loci
CNS	Central nervous system
Cohort review	The systematic review of all TB patients notified by a TB service in a 3 to 4 month period, looking at standard outcomes in terms of patient care and number of contacts screened
Cryptic disseminated TB	Systemic illness without localising features

Term	Definition
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 any patients 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
Drug sensitive cohort	The drug sensitive cohort excludes all TB patients with rifampicin-resistant TB (initial or acquired) including MDR-TB (initial or acquired), and non-culture confirmed patients 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, pyrazinamide)
ART	Antiretroviral therapy
IGRA	Interferon-gamma release assay – blood test for TB infection which does not differentiate between active disease and LTBI
IMD 2019	The Index of Multiple Deprivation rank for each LSOA, based on deprivation score assigned, relative to other LSOAs in the PHE West Midlands area
IQR	Interquartile range
LSOA	Lower super output area (geographic definition)
LTBI	Latent TB infection
MDR	Multi-drug 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 patient diagnosed at post-mortem 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

Term	Definition
Pulmonary tuberculosis	A pulmonary case is defined as a patient with TB 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, ofloxacin, ciprofloxacin) and other oral bacteriostatic agents.
SNP	Single nucleotide polymorphism – mutation of one base pair in the genome of an <i>M. tuberculosis complex</i> isolate
TB	Tuberculosis
UTLA	Upper tier local authority (geographic definition)
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 patients reported 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 Organization (WHO) and European definitions, but adapted to the UK context. In this report, all data was obtained from the NTBS 2020 database download.

Proportions

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

Confidence intervals

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

Population denominator

Tuberculosis rates by geographical area (Centre, upper and lower tier local authority), age, sex and place of birth were calculated using ONS mid-year population estimates. Tuberculosis rates by ethnic group were calculated using population estimates from the [Labour Force Survey](#) (LFS). The LFS is based on a population sample, so estimates are liable to sampling errors, particularly for small population subgroups, and should be interpreted with caution.

Cluster definitions

Strain typing was performed by the National Mycobacterial Reference Service using 24 MIRU-VNTR profiling. Analysis was undertaken on strain type clusters, as defined above.

Appendix C. TB among West Midlands residents

Table C1. TB case numbers by upper tier local authority of residence, West Midlands, 2000 to 2020

Upper tier local authority	Year																				
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Birmingham	351	312	328	343	393	376	414	373	431	470	358	401	447	388	319	251	268	248	228	212	189
Coventry	78	61	76	58	79	87	95	131	107	91	80	120	131	100	91	88	84	81	76	80	60
Dudley	12	18	48	30	33	32	34	43	38	29	35	34	29	42	21	32	21	21	27	18	15
Herefordshire	<5	<5	<5	<5	6	<5	<5	<5	8	5	<5	6	7	5	<5	<5	<5	6	8	<5	<5
Sandwell	77	81	86	87	90	118	112	112	107	107	101	106	118	121	77	96	86	79	52	63	66
Shropshire	<5	8	<5	11	18	13	14	7	13	8	8	10	14	11	10	7	8	0	8	6	5
Solihull	8	10	9	16	13	11	21	15	18	20	<5	21	23	15	15	12	14	8	6	11	7
Staffordshire	10	21	15	29	28	23	25	19	31	42	45	30	35	38	26	43	35	31	28	41	29
Stoke-on-Trent	0	29	35	32	26	42	39	27	30	30	32	46	40	35	28	28	33	21	26	25	25
Telford and Wrekin	6	<5	<5	<5	16	12	12	11	13	12	10	7	14	12	9	5	5	9	7	10	7
Walsall	68	60	59	54	60	44	52	61	56	46	48	68	50	52	36	33	45	52	42	28	38
Warwickshire	20	32	40	33	45	41	28	49	59	49	48	44	53	44	54	24	28	41	22	22	39
Wolverhampton	46	49	69	74	87	90	62	66	76	76	81	90	76	81	63	57	68	47	55	51	50
Worcestershire	16	15	18	12	26	30	16	10	21	21	19	21	39	35	23	20	19	16	27	12	15
West Midlands	699	702	794	783	920	920	927	928	1008	1006	872	1004	1076	979	775	699	717	660	612	574	548

Table C2. 3 year average TB rate* per 100,000 by lower tier local authority of residence, West Midlands, 2000 to 2020

LTLA name	Year																			
	2000-2002	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007	2006-2008	2007-2009	2008-2010	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020	
Birmingham, Solihull and the Black Country																				
Birmingham	33.5	33.1	35.6	37.0	38.9	38.0	39.5	40.9	40.0	38.6	37.4	38.0	35.2	29.0	25.1	22.7	21.8	20.1	18.4	
Dudley	8.5	10.5	12.1	10.3	10.7	11.8	12.4	11.8	10.9	10.5	10.4	11.2	9.8	10.0	7.8	7.8	7.2	6.9	6.2	
Sandwell	28.6	29.6	30.5	34.0	36.7	39.0	37.5	36.4	34.7	34.2	35.1	36.9	33.5	31.0	27.1	27.0	22.2	19.8	18.4	
Wolverhampton	23.0	26.8	32.0	34.8	33.0	29.9	27.9	29.6	31.6	33.2	33.0	32.8	29.1	26.5	24.6	22.2	21.8	19.5	19.7	
Walsall	24.6	22.7	22.6	20.5	20.1	20.2	21.6	20.7	18.9	20.2	20.5	20.9	16.9	14.7	13.8	15.5	16.5	14.4	12.6	
Solihull	4.5	5.8	6.3	6.6	7.4	7.7	8.9	8.6	6.8	7.3	7.7	9.5	8.4	6.7	6.5	5.3	4.4	3.9	3.7	
Coventry and Warwickshire																				
Coventry	23.7	21.6	23.6	25.0	29.2	34.8	36.8	35.9	30.1	31.1	34.8	36.3	32.7	27.8	25.5	23.9	22.3	21.5	19.4	
North Warwickshire	3.8	3.2	2.2	4.3	4.3	5.4	4.9	5.4	5.9	7.0	7.5	5.4	4.3	2.7	2.7	2.1	2.6	2.1	1.0	

LTLA name	Year																		
	2000-2002	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007	2006-2008	2007-2009	2008-2010	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020
Nuneaton and Bedworth	9.2	8.9	8.6	9.4	9.6	8.8	8.7	10.0	10.7	9.9	10.9	13.0	15.1	12.4	9.2	6.5	7.8	8.3	9.2
Rugby	12.2	12.0	12.4	8.5	8.4	10.0	16.5	19.4	17.7	11.8	10.6	10.6	11.5	9.4	7.3	7.0	5.6	5.9	5.8
Stratford-on-Avon	1.2	3.3	5.0	5.0	3.8	2.9	2.8	3.3	3.1	4.2	4.4	4.4	3.3	2.2	1.9	3.0	2.9	2.9	1.3
Warwick	4.2	6.2	8.4	9.3	8.7	9.3	9.3	10.2	10.1	9.9	10.2	8.2	9.4	7.9	8.6	7.4	6.4	4.4	4.9
Herefordshire																			
Herefordshire, County of	1.9	1.3	2.1	1.5	1.9	1.5	2.8	3.1	2.9	2.6	2.9	3.2	2.7	2.0	1.6	2.1	3.0	2.6	2.1
Staffordshire and Stoke-on-Trent																			
Cannock Chase	0.7	0.7	1.1	1.4	1.1	0.7	0.3	0.3	0.7	0.7	1.7	1.4	1.7	0.3	1.4	2.4	3.7	3.3	2.6
East Staffordshire	2.6	3.2	6.0	7.8	8.1	5.5	6.7	10.2	16.1	14.5	14.1	11.1	10.4	8.4	6.9	6.6	5.4	4.5	5.8
Lichfield	2.5	1.8	1.8	3.1	3.5	3.8	3.0	3.0	3.3	2.3	2.3	1.3	2.0	3.9	4.5	3.9	1.0	0.3	1.0
Newcastle-under-Lyme	3.0	4.4	4.3	3.5	3.5	3.0	4.3	3.8	3.8	4.1	4.0	4.3	3.7	4.2	5.3	4.7	6.2	5.1	4.9
South Staffordshire	1.9	3.8	4.4	4.1	3.4	2.2	1.9	1.9	2.5	2.8	2.2	1.2	1.2	2.7	3.0	4.8	3.0	3.6	2.7
Stafford	0.0	1.1	1.4	2.2	1.3	1.9	2.6	4.2	4.4	5.4	4.1	6.6	5.6	7.1	5.0	5.0	4.0	5.4	4.6
Staffordshire Moorlands	2.8	3.9	2.5	2.1	2.4	2.8	2.4	2.1	1.4	1.4	1.4	2.7	3.8	3.4	2.7	2.0	1.4	2.7	3.0
Tamworth	1.8	2.2	1.3	0.9	0.4	1.3	1.8	2.6	3.9	4.4	3.5	1.3	0.4	0.9	1.7	3.0	3.0	4.8	4.3
Stoke-on-Trent	8.9	13.3	12.9	13.8	14.8	14.8	13.1	11.8	12.5	14.6	15.8	16.1	13.7	12.1	11.8	10.8	10.4	9.4	9.9
Telford and Shropshire																			
Telford and Wrekin	2.7	2.1	4.6	6.4	8.3	7.2	7.3	7.3	7.1	5.8	6.2	6.6	6.9	5.1	3.7	3.6	4.0	4.9	4.4
Shropshire	1.8	2.7	3.8	4.8	5.1	3.8	3.8	3.1	3.2	2.8	3.5	3.8	3.8	3.0	2.7	1.6	1.7	1.5	2.0
Worcestershire																			
Bromsgrove	1.9	1.5	1.9	2.9	3.7	2.5	1.8	0.7	1.1	0.4	1.1	0.7	1.8	2.1	3.1	2.8	5.1	4.7	4.7
Malvern Hills	0.0	0.5	1.4	2.7	3.6	3.2	1.8	2.7	3.6	4.5	2.7	2.7	2.2	2.2	2.2	2.2	2.2	1.3	1.7
Redditch	4.2	3.8	5.9	8.8	9.6	6.6	4.5	4.0	4.4	5.2	14.6	18.6	18.9	9.1	6.7	4.7	5.1	3.1	3.1
Worcester	5.7	6.1	6.4	8.2	7.4	6.3	4.5	6.2	6.5	6.5	5.7	6.7	7.0	7.3	5.6	4.3	3.9	3.6	4.9
Wychavon	2.4	1.8	1.5	0.9	0.9	1.2	1.1	1.4	2.6	3.7	3.7	4.5	3.4	4.2	2.2	3.5	3.7	3.9	2.8
Wyre Forest	3.4	2.8	3.8	2.4	2.4	1.4	3.4	3.7	3.7	1.7	1.0	1.4	2.0	2.4	2.0	1.3	1.0	1.3	0.7
West Midlands	13.8	14.3	15.6	16.3	17.1	17.1	17.5	17.9	17.4	17.3	17.5	18.1	16.6	14.3	12.7	11.9	11.3	10.4	

* Rates calculated using ONS mid-year population estimates.

Table C3. TB case numbers and rate by age and sex, West Midlands, 2020

Age group (years)	Female				Male				Overall			
	Number	Rate	95% CI		Number	Rate	95% CI		Number	Rate	95% CI	
0 to 14	5	0.93	0.30	- 2.18	8	1.42	0.61	- 2.79	13	1.18	0.63	- 2.02
15 to 44	134	12.04	10.09	- 14.26	153	13.39	11.35	- 15.69	287	12.72	11.29	- 14.28
45 to 64	56	7.42	5.61	- 9.64	101	13.67	11.14	- 16.61	157	10.51	8.93	- 12.29
65+	41	6.82	4.89	- 9.25	50	9.77	7.25	- 12.88	91	8.18	6.58	- 10.04
All ages	236	7.85	6.88	- 8.92	312	10.55	9.41	- 11.79	548	9.19	8.44	- 9.99

* Rates calculated using ONS mid-year population estimates.

Table C4. Drug resistance among TB patients with culture confirmed disease*, West Midlands, 2000 to 2020

Year	DST results	First line drug resistance		INH-R without MDR-TB		MDR/RR-TB		Pre-XDR		XDR	
	Number	Number	%	Number	%	Number	%	Number	%	Number	%
2000	329	19	6	17	5	<5	Suppressed	0	0	0	0
2001	370	23	6	14	4	6	2	0	0	0	0
2002	439	35	8	33	8	<5	Suppressed	0	0	0	0
2003	432	20	5	17	4	<5	Suppressed	0	0	0	0
2004	532	26	5	19	4	5	1	0	0	0	0
2005	525	27	5	22	4	<5	Suppressed	0	0	0	0
2006	540	21	4	17	3	<5	Suppressed	0	0	0	0
2007	551	27	5	19	3	6	1	0	0	0	0
2008	535	22	4	12	2	9	2	<5	Suppressed	0	0
2009	568	34	6	28	5	5	1	0	0	0	0
2010	512	31	6	21	4	9	2	<5	Suppressed	0	0
2011	596	42	7	28	5	11	2	<5	Suppressed	0	0
2012	570	32	6	19	3	12	2	<5	Suppressed	0	0
2013	509	36	7	19	3	14	3	<5	Suppressed	<5	Suppressed
2014	412	23	5	19	4	<5	Suppressed	<5	Suppressed	0	0
2015	393	33	8	22	6	9	2	<5	Suppressed	<5	Suppressed
2016	415	15	4	7	2	7	2	<5	Suppressed	0	0
2017	409	37	9	16	4	7	2	<5	Suppressed	0	0
2018	355	42	12	17	5	7	2	<5	Suppressed	0	0
2019	334	37	11	20	6	<5	Suppressed	<5	Suppressed	0	0
2020	309	39	12	16	5	9	3	0	0	0	0

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

Appendix D. All TB patients notified by West Midlands clinics

Tables of further information about TB cases treated by hospital clinics and TB services based in the West Midlands can be requested by public health and clinical stakeholders from your local FS team.

Appendix E. Local authority TB epidemiological summaries

Local authority TB epidemiological summaries can provide further information about TB cases among residents of West Midlands upper tier local authorities with high rates of TB cases per year over the previous 3 years. These can be requested from your local FS team.

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