UK Health Security Agency

Tuberculosis in the South West: 2021

2021 report (presenting data to end of 2020)

Contents

The data presented in this report is correct as of October 2021.

Executive summary

In 2020, there were 167 cases of tuberculosis (TB) notified among residents of the South West, with a rate of 3.0 (95% confidence interval (CI): 2.5 to 3.4) per 100,000 population. The rate of TB in the South West decreased in 2020, after having increased in 2019 for the first time since 2013. The national rate in England was 7.3 (95% CI: 7.1 to 7.5) per 100,000 population.

The following upper tier local authorities had the highest notification rates: City of Bristol (9.2 per 100,000 population), Swindon (7.6 per 100,000 population) and Bournemouth, Christchurch and Poole (3.8 per 100,000 population).

The rate of notifications for males and females was 3.6 per 100,000 population and 2.4 per 100,000 population, respectively.

The highest rates were observed in the following: those aged 30 to 39 (6.9 per 100,000 population), 40 to 49 (3.6 per 100,000 population) and 50 to 59 (3.5 per 100,000 population).

In 2020, there were 6 notifications of TB in children aged 0 to 14. The proportion of cases observed in children aged 0 to 14 years in 2020 (3.6%) is lower than the proportion recorded in 2019 (4.2%). 3 of these cases were residents in North Somerset. 5 of the cases were UK born, which equates to a rate of TB in UK born children of 0.6 per 100,000 population. This rate has decreased since 2019. This rate is often used as an indicator for ongoing local transmission.

The rate among all non-UK born persons of all ages was 20.3 per 100,000 population (97 cases) which is substantially higher than the rate of TB among UK born persons of all ages which was 1.3 per 100,000 population (68 cases). The largest proportion of non-UK born persons were born in India (25.3%), Romania and Somalia (both 8.4%) and Pakistan (5.3%).

The highest proportion of cases was among white (49.7%) followed by Indian (16.4%) and black African (15.2%) ethnic groups.

The site of disease was known for all cases. The largest proportion of cases was diagnosed with pulmonary TB only (72, 43.1%).

In total, 110 (65.9%) cases were culture confirmed. Of the 59 pulmonary cases with sputum smear information, 44 (76.4%) pulmonary cases were sputum smear positive.

The median delay between symptom onset and diagnosis for cases, once applying a 2 year cap was 86.5 days (inter-quartile range (IQR): 43.5 to 155.0).

The median delay between symptom onset and treatment start date for cases once applying a 2-year cap was 84.0 days (IQR: 47.0 to 157.0).

At least one social risk factor (alcohol abuse, drug use, homeless or imprisonment) was reported for 30 (22.4%) cases.

The postcodes of cases were linked to an Index of Multiple Deprivation (IMD) score as an indicator of socioeconomic status. In 2020, the largest proportion of cases lived in the areas from the most deprived decile (53, 31.7%).

HIV status was already known for 8 (5.2%) cases. For those cases where HIV status was not known, HIV tests were offered and completed for 131 (85.6%) cases.

Resistance to at least one first-line drug was present in 7 (6.6%) cases. There were no multi-drug resistant (MDR) or extensively drug-resistant (XDR) cases.

Following a 12-month follow-up period, 153 (73.6%) drug-sensitive cases notified in 2019 successfully completed treatment, 10 (4.8%) died, 10 (4.8%) were lost to follow-up, 8 (3.8%) were still on treatment, 5 (2.4%) had their treatment stopped and 22 (10.6%) cases were not evaluated.

Introduction

UK Health Security Agency South West region covers the upper tier local authority (UTLA) areas of Bath and North East Somerset, Bournemouth, Christchurch and Poole, the City of Bristol, Cornwall and the Isles of Scilly, Devon, Dorset, Gloucestershire, North Somerset, Plymouth, Somerset, South Gloucestershire, Swindon, Torbay, and Wiltshire. The South West is traditionally a low incidence area for TB when compared with the rest of the UK. This reflects the socio-demographic characteristics of the population (low level of non-UK born migrants and a rural environment). There is only one local authority, the City of Bristol, with an annual incidence of TB routinely greater than the national rate. In 2020, the incidence of TB in the City of Bristol and Swindon was higher than the national rate (7.3 per 100,000 population).

Enhanced TB surveillance in England and Wales was launched in January 1999. It has the aim of providing detailed, comparable information on the epidemiology of TB following the worldwide resurgence of the disease, which prompted the World Health Organization (WHO) to declare a ‘global emergency’ in 1993. The minimum data set in the surveillance system includes notification, demographic, clinical and microbiological information on all cases of TB reported by clinicians at the local level.

In 2008, the Enhanced Tuberculosis Surveillance (ETS) system was rolled out across the UK. The ETS system is a secure website, enabling users to notify and de-notify cases, add treatment outcome monitoring information, generate reports and export case or laboratory information. The ETS system was implemented in the South West in November 2008. The system is real-time; once information is entered onto the website it is accessible at a clinical, regional and national level. See Appendix A for a description of data sources and definitions.

During 2021, the National TB Surveillance System (NTBS) was launched across UKHSA regions, replacing and combining both ETS and the London TB Register (LTBR), in a single surveillance system with improved functionality, user interface, built-in data quality checks and an automated alerts function, such as how users can now easily query the database for TB cases. Variables across both ETS and NTBS remain principally similar, except for some variables that have been harmonised to align with LTBR variables. NTBS has imported all cases from 1 January 2018 and any linked cases from earlier years. NTBS was implemented in the South West in December 2021.

Whilst for this surveillance report data was extracted from ETS, future annual TB related surveillance publications will use data extracted from NTBS.

The TB Action Plan for England 2021 to 2026 (1) was published in July 2021. The TB Action Plan aims to improve the prevention, detection and control of TB in England. The Action Plan will focus on the needs of those affected by TB and TB services whilst recognising the impact and learning of the coronavirus (COVID-19) pandemic response. The TB Action Plan includes actions linked to the outcomes of the Collaborative TB Strategy for England 2015 to 2020

particularly the challenges and recommendations outlined in the TB Strategy End of Programme Report (2). Future surveillance reports will probably use priorities, actions and indicators linked to the TB Action Plan.

Data for this report comes principally from 3 different years, namely:

- case data is from TB notifications occurring in 2020
- outcome data for cases with drug-sensitive TB infections is from 2019 notifications
- outcome data for cases with drug-resistant TB infections is from 2018 notifications

Objectives

The objectives of this report are to:

- describe the overall epidemiology of TB in the South West
- highlight recent trends in TB epidemiology
- identify areas of high burden of disease
- identify at-risk population groups
- assist in the identification of opportunities to prevent further case

Tuberculosis epidemiology

Overall numbers, rates and geographical distribution

In 2020, there were 167 cases of TB notified among residents of UKHSA South West. This equates to a rate of 3.0 per 100,000 population (95% CI: 2.5 to 3.4). The rate in 2020 was a decrease compared to 2019 (4.2 per 100,000 population). There has been a year on year decrease in the rate since 2013, except for 2019 where the rate increased slightly, see Figure 1.

The South West rate was lower than the England rate of 7.3 per 100,000 population in 2020 (95% CI: 7.1 to 7.5).

Within the South West, the highest TB rates were observed in the following local authorities in order of decreasing incidence: City of Bristol (9.2 per 100,000 population), Swindon (7.6 per 100,000 population) and Bournemouth, Christchurch and Poole (3.8 per 100,000 population), see Figure 2.

The rate of TB in Bristol has largely decreased after peaking in 2013 to 2014. There was a small increase noted in 2019.

Figure 1. Number of TB cases, rate and 95% confidence intervals, South West and England, 2000 to 2020

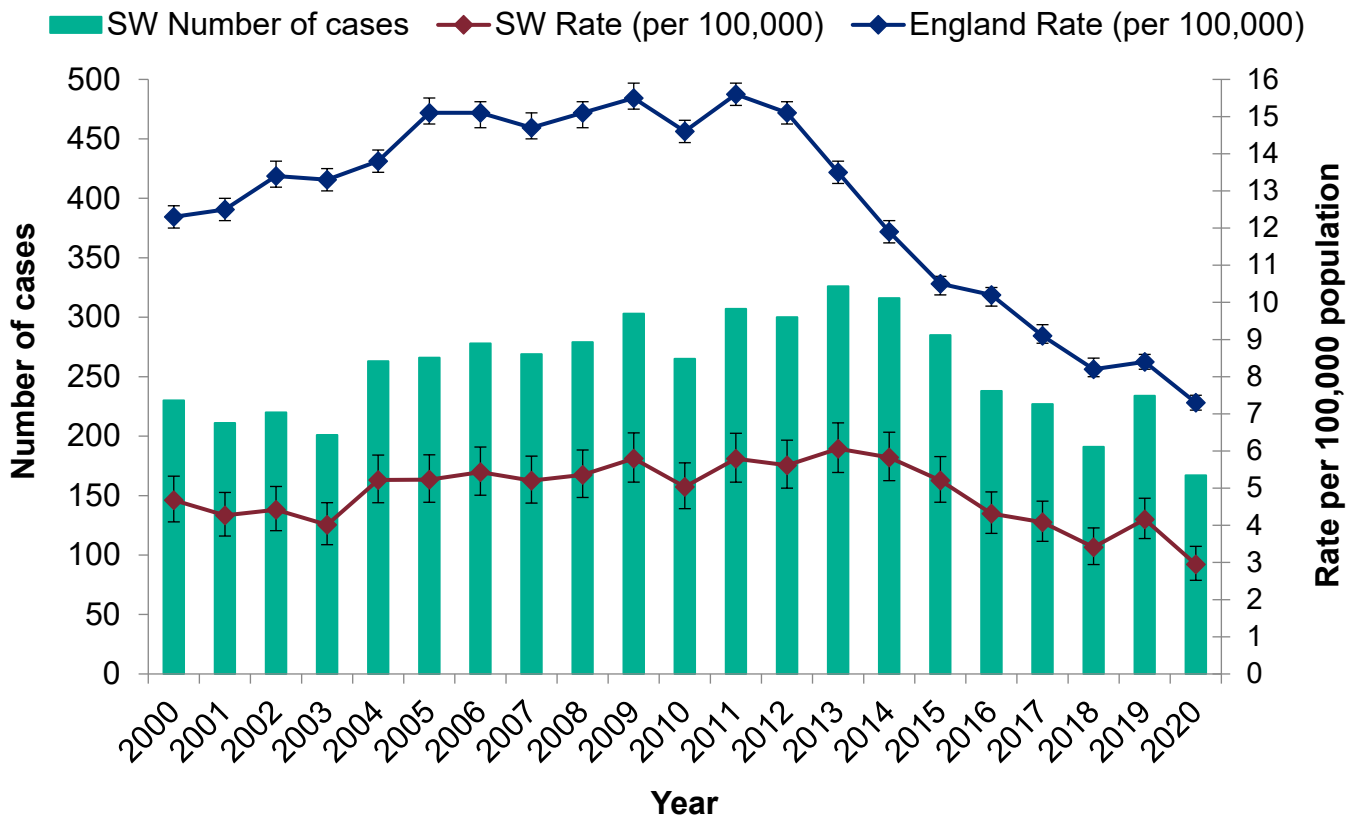
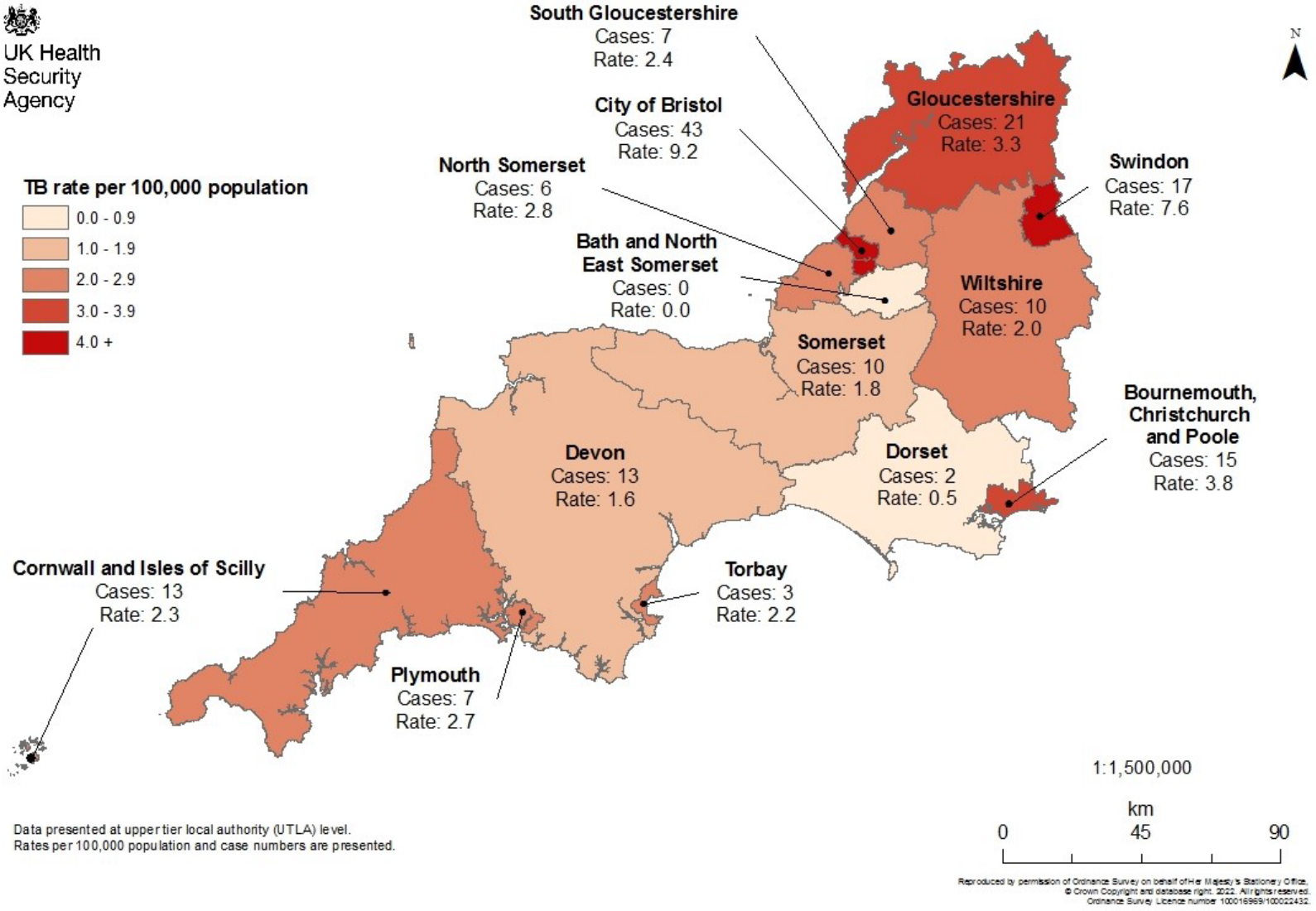


Figure 2. TB rate per 100,000 population by upper tier local authority of residence, South West 2020



Demographic characteristics

Age and sex

There were 99 male (59%) and 68 female (41%) cases. This equates to a rate of 3.6 per 100,000 population for males (95% CI: 2.9 to 4.3) and 2.4 per 100,000 population for females (95% CI: 1.8 to 3.0).

The age of cases ranged from 3 months to 87 years and the median age was 41 years (IQR: 32 to 57). Female cases had a median age of 41 years (IQR: 35 to 57) and for males, the median age was also 41 years (IQR: 31 to 57).

When examining age groups, the highest rates of TB were observed in those aged 30 to 39 (6.9 per 100,000 population) years. The age distribution was different for females and males, see Figure 3. Whilst the highest incidence rate for both males and females was in those aged 30 to 39, 8.47 and 5.37, respectively, higher rates were seen in males amongst older age groups (aged 50 to 80 and over) compared to females. Rates were low in those aged under 19 for both male and female cases.

The rate in children under 5 years was 1.8 cases per 100,000 population (95% CI: 0.6 to 4.1), compared with 1.0 case per 100,000 population (95% CI: 0.2 to 3.0) in 2019. The rate in children aged 5 to 9 years was 0.3 cases per 100,000 population (95% CI: 0.0 to 1.7), lower than the rate seen in 2019, 1.2 per 100,000 (95% CI: 0.3 to 3.1). There were no TB cases in children aged 10 to 14, which is lower than the rate in 2019 of 1.0 per 100,000 population (95% CI: 0.2 to 2.8). The rate in those aged 15 to 19 was 1.7 cases per 100,000 population (95% CI: 0.5 to 3.9), compared with 4.0 cases per 100,000 (95% CI: 2.1 to 7.0) in 2019.

There were 6 notifications of TB in children aged 0 to 14 years giving a rate of 0.6 per 100,000 population (95% CI: 0.2 to 1.4). This is lower than the number of cases and rate per 100,000 in this age group reported in the 3 years previous. However, the percentage of TB cases occurring in this age group decreased slightly in 2020 (3.6%) compared to 2019 (4.2%) and 2018 (5.2). Of these 6 paediatric TB cases in 2020, 5 were UK born (83.3%), and all had pulmonary TB (6, 100%). The most common ethnic group among paediatric cases was white (5, 83.3%), whilst the other recorded case was of Indian ethnicity. 3 cases were resident in North Somerset (3, 50.0%) followed by one case in the upper tier local authorities of Cornwall, Gloucestershire and Swindon (16.7% each).

In 2020, the rates across all age groups decreased in comparison to 2019. Further trends in TB rate by age group are displayed in Figure 4.

Figure 3. Number of TB cases and rate by age and sex, South West 2020

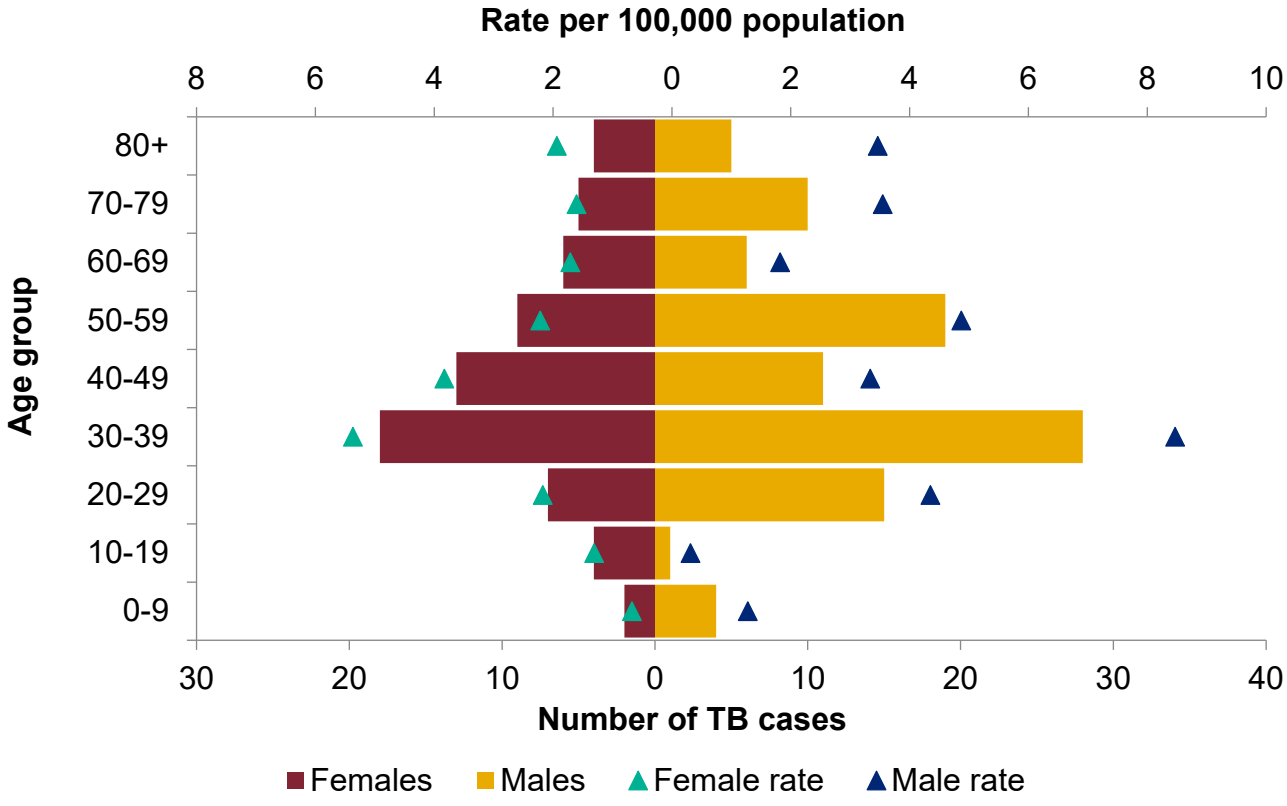
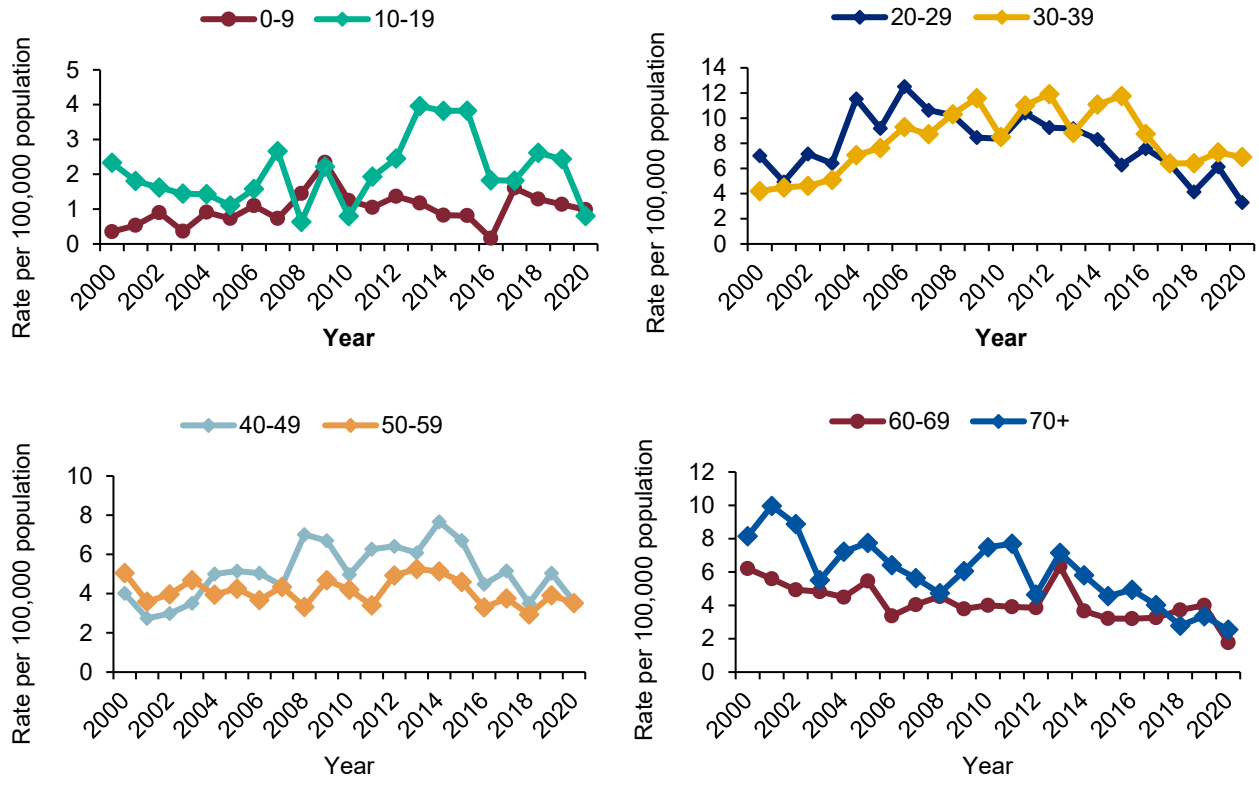


Figure 4. TB rate by age group, South West 2000 to 2020



Place of birth and time since entry to the UK

In 2020, data on whether a case was born in the UK was available for 165 (98.8%) of cases. Of these cases, 97 (58.8%) were born outside the UK, resulting in a non-UK born rate of 20.3 per 100,000 population. This represents a decrease in comparison to 2019, where the non-UK born rate was 25.9 per 100,000 population. However, as in previous years, this rate is substantially higher than the rate of 1.3 per 100,000 population observed in the UK born population in 2020, see Figure 5. There have been fluctuating numbers of cases in the UK born population and the rate has continued to decrease since a peak in 2013, see Figure 6.

Figure 5. TB cases and rate by place of birth, South West 2000 to 2020

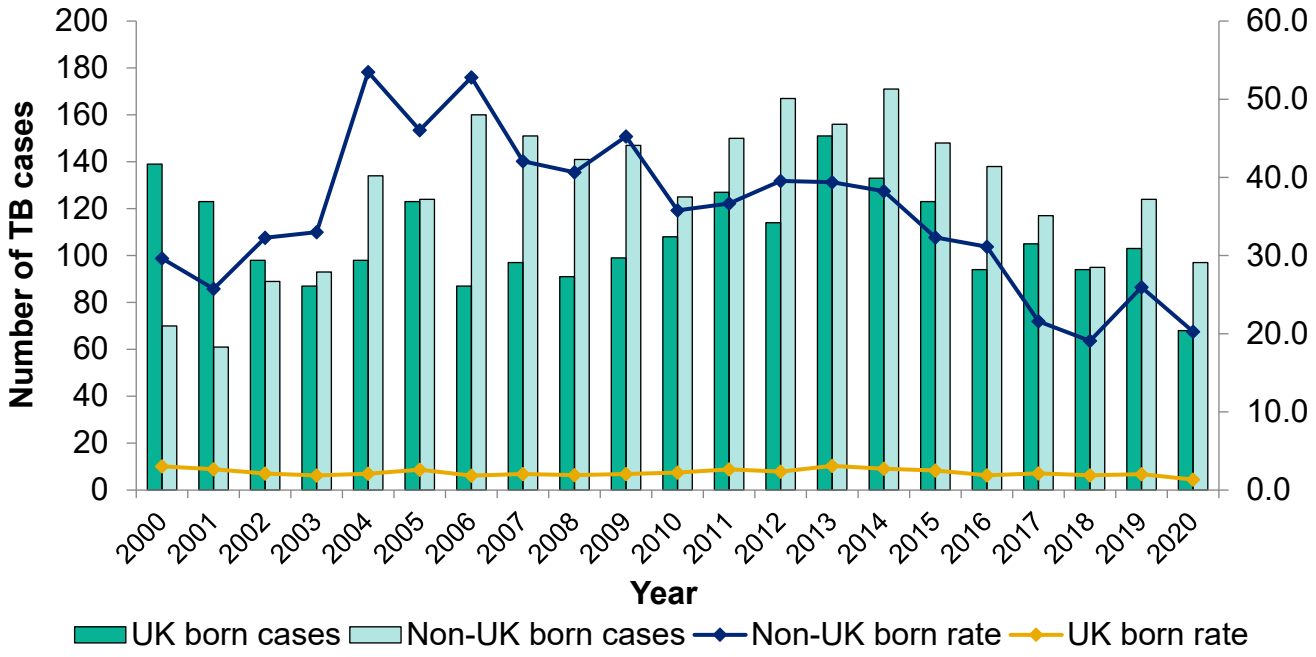
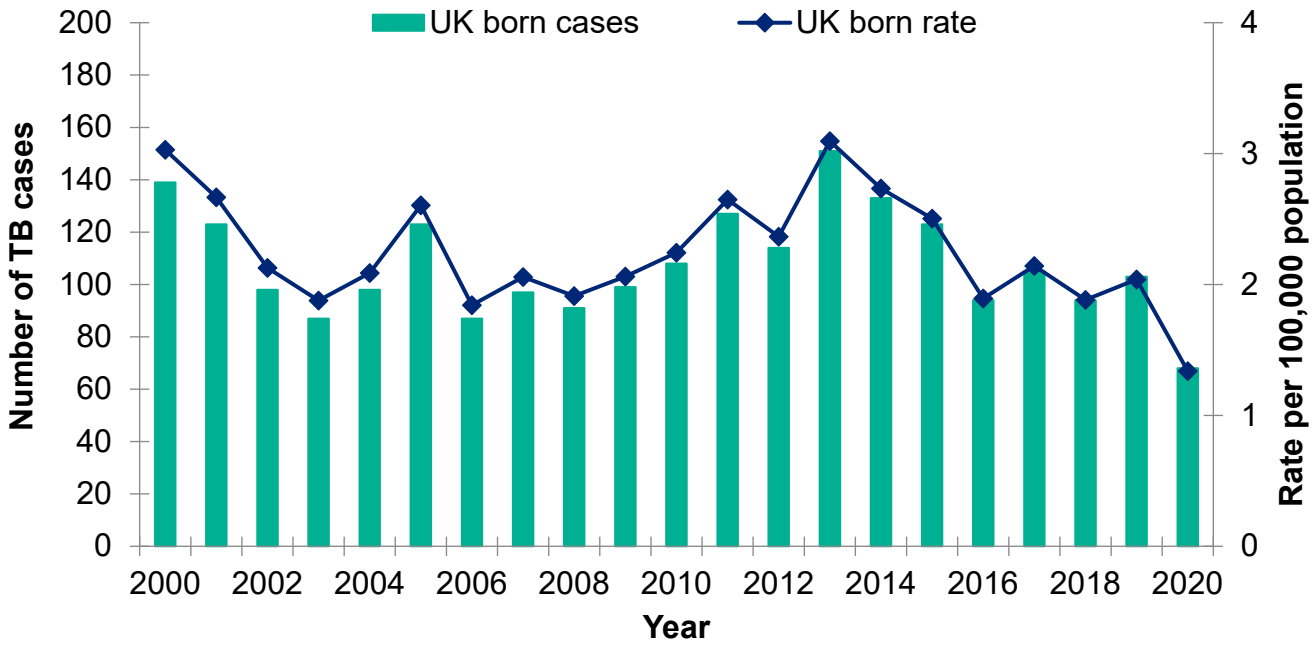
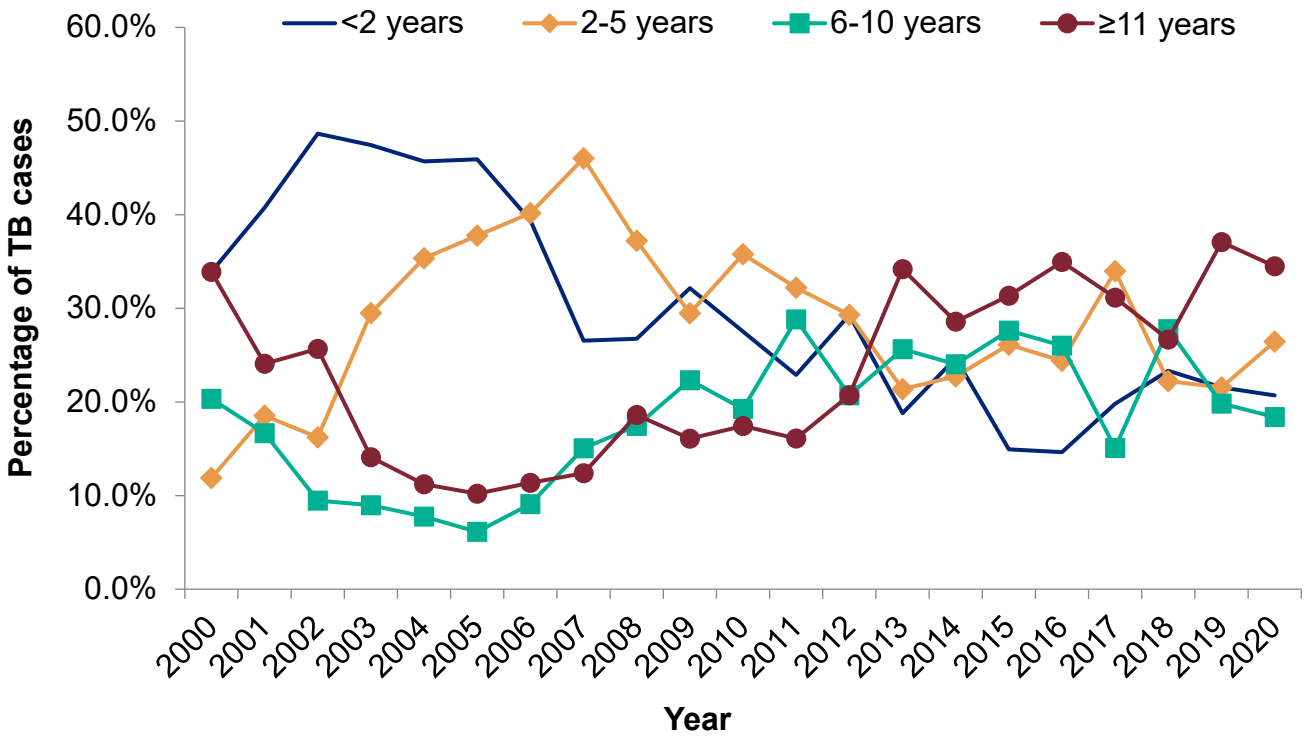


Figure 6. TB cases and rate for the UK born population, South West 2000 to 2020



In 2020, data was available on time since entry to the UK to diagnosis for 87 (89.7%) of non-UK born cases. Of these, a total of 30 (34.5%) cases had a time between entry to the UK and TB diagnosis of 11 or more years, 16 (18.4%) cases entered the UK between 6 and 10 years, 23 (26.4%) cases entered between 2 and 5 years and 18 (20.7%) cases had a time between entry and diagnosis of fewer than 2 years. The percentage of cases with a time between entry and diagnosis of fewer than 2 years decreased from 21.6% in 2019, the percentage of cases diagnosed between 2 and 5 years increased from 21.6% in 2019, the percentage of cases diagnosed 6 to 10 years after entry decreased from 19.8% in 2019, and the percentage of cases diagnosed 11 years or more after entry decreased from 37.1% in since the previous year, see Figure 7.

Figure 7. Time between entry to the UK and TB diagnosis for non-UK born cases* by year, South West 2000 to 2020



* Excludes non-UK born cases with no information on time since entry.

Country of birth data was available for 95 (97.9%) non-UK born cases. The largest proportion of these cases was born in India (24, 25.3%) followed by Romania (8, 8.4%) and Somalia (8, 8.4%), and then Pakistan (5, 5.3%), see Table 1. Those born in India were most frequently diagnosed less than 2 years after entry (25.0%) or after 11 years (25.0%), with a median time since entry of 6 years (IQR: 1.0 to 11.0). Those born in Romania were most frequently diagnosed with TB between 2 and 5 years after entry (62.5%), with a median time since entry of 4 years (IQR: 2.0 to 5.0). 50.0% of those born in Somalia and 60.0% of those born in Pakistan were most frequently diagnosed 11 or more years after entry, with a median time since entry of 15.0 years (IQR: 6.0 to 18.0) and 13.0 years (IQR: 5.0 to 18.0), respectively. No cases born in Romania, Somalia or Pakistan were diagnosed in under 2 years since entry into the UK. Over the past 5 years, cases born in India have made up the

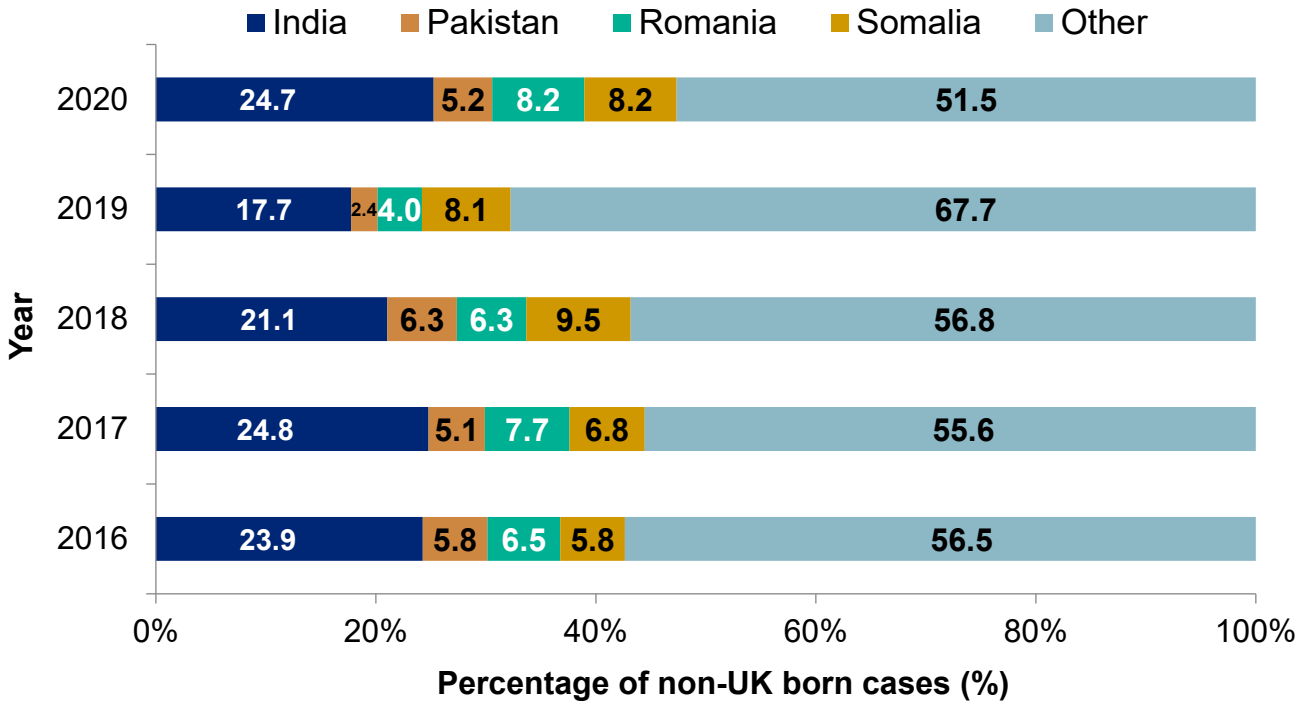
highest proportion of non-UK born cases and has increased since 2019. The proportion of cases born in Pakistan and Romania has also increased in 2020 in comparison to their respective proportions in 2019, whilst cases in Somalia remained relatively stable compared to the year before, see Figure 8.

Table 1. Most common countries of birth for non-UK born TB cases*, South West 2020

Country of birth	Number of cases	Percentage of non-UK born cases (%)
India	24	25.3%
Romania	8	8.4%
Somalia	8	8.4%
Pakistan	5	5.3%

* All countries with at least 5 notifications.

Figure 8. 5-year trend in the percentage of non-UK born TB cases in the 5 most common countries of birth, South West, 2016 to 2020



Ethnicity

Data on ethnicity was available for 165 (98.8%) cases in 2020. The most frequently reported ethnic groups in 2020 were white (82, 49.7%), Indian (27, 16.4%) and black African (25, 15.2%). The proportion of cases of Indian and black African ethnicity increased in 2020, against a previously continual decreasing trend since 2016, see Table 2.

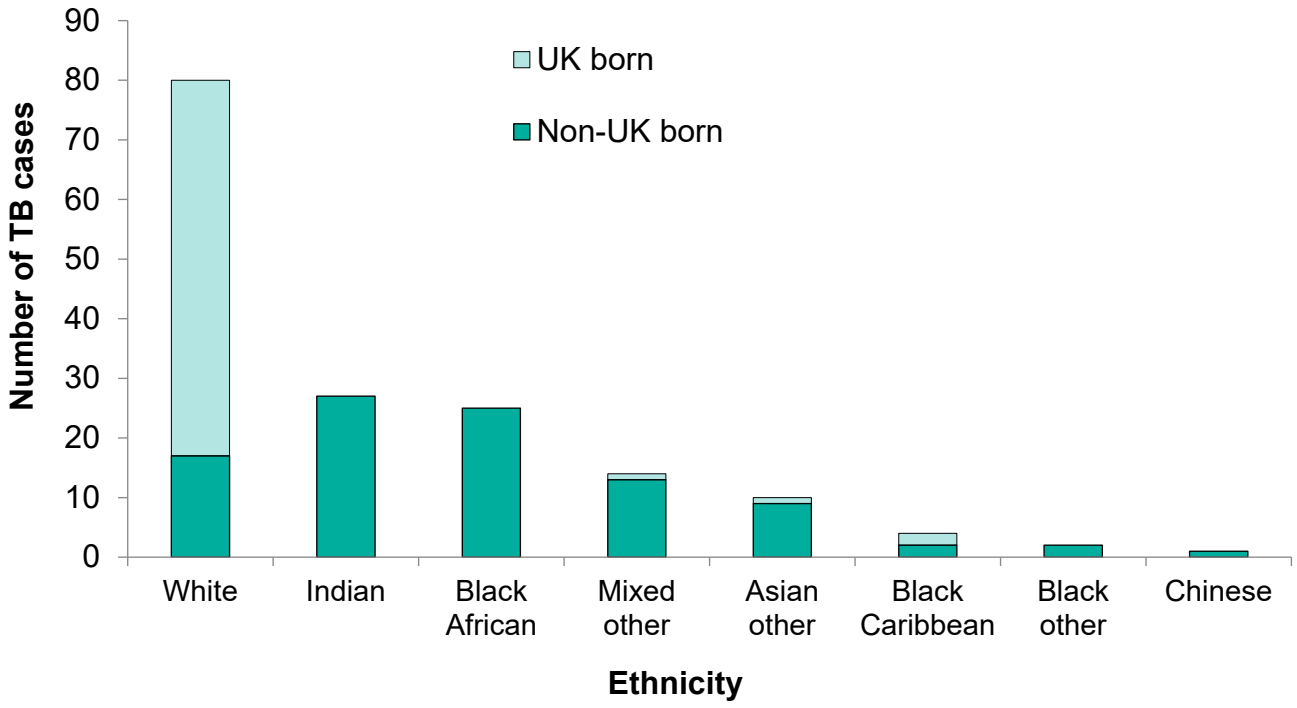
Table 2. Percentage of TB cases by ethnicity and year, South West, 2016 to 2020

Ethnicity	2016	2017	2018	2019	2020
Asian other (%)	6.8	4.5	6.9	6.0	6.1
Black African (%)	14.8	13.0	12.7	12.8	15.2
Black Caribbean (%)	1.7	0.9	3.2	1.3	2.4
Black other (%)	1.7	0.4	0.5	1.3	1.2
Chinese (%)	1.3	2.2	2.6	3.4	0.6
Indian (%)	15.3	14.8	13.8	11.9	16.4
Mixed other (%)	10.6	11.2	10.6	14.9	8.5
White (%)	47.9	52.9	49.7	48.5	49.7

Data on ethnic group for UK born cases was available for 67 (98.5%) cases. As in previous years, the majority of UK born cases in 2020 were of white ethnicity (63, 94.0%). The next most common ethnicity among UK born cases was those of black Caribbean ethnicity (2, 3.0%). Other cases were of mixed other (1, 1.5%) or Asian other (1, 1.5%) ethnicities.

Data on ethnic group for non-UK born cases was available for 96 (99.0%) cases. The majority of non-UK born cases were of Indian ethnicity (27, 28.1%), followed by black African ethnicity (25, 26.0%), white ethnicity (17, 17.7%) and mixed other ethnicity (13, 13.5%). The number of cases of black Caribbean ethnicity was similar for both UK and non-UK born cases, see Figure 9.

Figure 9. Frequency of ethnicity by place of birth for TB cases, South West, 2020*



* Excludes cases with a missing place of birth.

Occupation

In 2020, 132 (79.0%) cases were aged between 16 and 64 and therefore considered of working age (3). Information on occupation was available for 127 (96.2%) of these cases. Most reported an occupation in the Other category (67, 52.8%). The most common occupations within this category were taxi driver (5, 3.9%), factory worker (3, 2.4%), warehouse worker (2, 1.6%), construction worker (2, 1.6%), and cleaner (2, 1.6%). 31 cases (24.4%) reported no occupation, where cases most frequently reported being unemployed (15, 11.8%), or being a housewife/husband (10, 7.9%). A further 5 (3.9%) cases were retired and one (0.8%) case was incarcerated. The percentage of cases who reported being unemployed has decreased in comparison to the figure in 2019. Cases amongst healthcare workers (16, 12.6%) were most commonly reported among community care workers (7, 5.5%) and healthcare workers – other (4, 3.1%). The majority of cases in education (9, 7.1%) were students (8, 6.3%). 4 cases (3.1%) reporting working in agriculture or animal care, see Table 3.

Table 3. Occupational category of TB cases aged 16 to 64 years, South West, 2020

Occupational category	Number of TB cases	Percentage of cases (%)
Agricultural or animal care worker	4	3.1%
Education	9	7.1%
Healthcare worker	16	12.6%
Other	67	52.8%
N1	31	24.4%
Total	127	100%

Clinical characteristics

Site of disease

The site of disease was known for all cases in 2020. The largest proportion of cases was diagnosed with pulmonary disease only (72, 43.1%). Thirty-four cases (20.4%) had both pulmonary and non-pulmonary disease equating to a total of 106 (63.5%) cases. There were 61 cases (36.5%) with non-pulmonary TB only. The distribution in the site of disease has remained relatively stable over the last 10 years (the proportion of total pulmonary cases (with and without non-pulmonary)) has ranged from 61.7% to 70.9% whilst the proportion of non-pulmonary cases has remained between 29.0% and 38.0%). The most commonly recorded non-pulmonary sites of disease were extrathoracic lymph nodes (27, 16.2% of all cases) and unknown non-pulmonary sites (25, 15.0%), see Table 4.

Table 4. Site of disease for TB cases, South West, 2020*

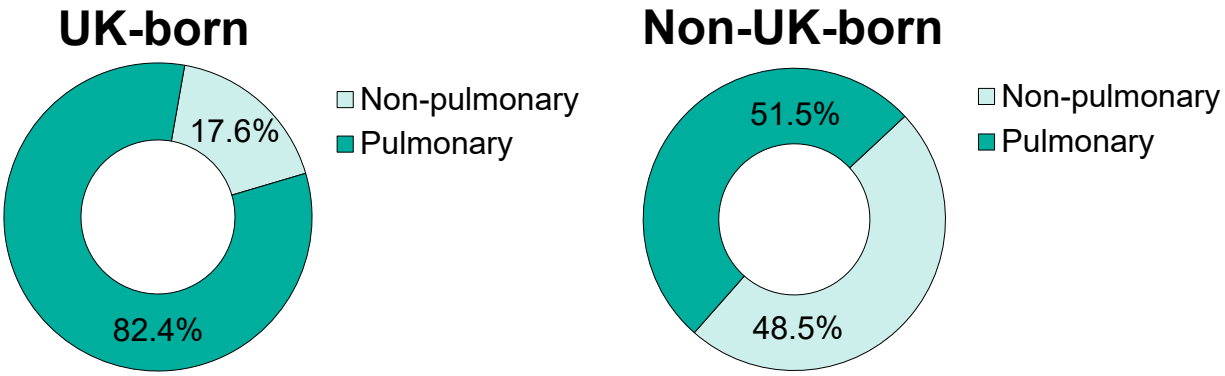
Site of disease	Number of cases	Percentage of cases (%)
Pulmonary	106	63.5%
Miliary	10	6.0%
Laryngeal	0	0.0%
Non-pulmonary	61	36.5%
Lymph nodes (extra-thoracic)	27	16.2%
Unknown non-pulmonary site	25	15.0%
Lymph nodes (intrathoracic)	14	8.4%
Pleural	13	7.8%
Gastrointestinal	12	7.2%
Genitourinary	12	7.2%
Other non-pulmonary site	11	6.6%
Bone or joint (spine)	7	4.2%
Bone or joint (other)	3	1.8%
Central nervous system (other)	6	3.6%
Central nervous system (meningitis)	5	3.0%
Cryptic	3	1.8%

*Cases may have disease at more than one site.

For cases where both site of disease and country of birth were known (165), pulmonary disease was most commonly reported in both UK born (56, 82.4%) and non-UK born (50, 51.5%) cases, however, there was a much higher proportion of UK born cases with a pulmonary site of disease compared to non-UK born, see Figure 10.

The highest proportion of cases with pulmonary disease was reported in white (68, 64.2%), black African (10, 9.4%) and Indian (10, 9.4%) ethnic groups. The highest proportion of cases with non-pulmonary disease was reported in Indian (17, 28.8%), black African (15, 25.4%) and white (14, 23.7%) ethnic groups.

Figure 10. Proportion of cases with pulmonary and non-pulmonary TB by place of birth, South West, 2020*



* For cases where place of birth is known.

Pulmonary cases include those with both pulmonary and non-pulmonary TB.

Previous diagnosis of tuberculosis

Data on whether a case had been previously diagnosed with TB was available for 160 (95.8%) notifications in 2020. A previous diagnosis of TB was recorded for 13 (8.1%) of these cases. The median time since previous diagnosis among those who had been previously diagnosed was 10.0 years (IQR: 4.0 to 21.0). The median age of those previously diagnosed was 54.0 years (IQR: 34.0 to 57.0). Among UK born cases, 8 (12.1%) had a previous TB diagnosis whereas among non-UK born cases 5 (5.4%) had a previous TB diagnosis. UK born cases with a previous TB diagnosis had a higher median age (57.0 years, IQR: 55.0 to 74.0) than non-UK born cases (34.0 years, IQR: 31.0 to 39.0). Among cases who were provided with directly observed therapy (DOT), 3 (21.4%) cases had a previous TB diagnosis.

BCG vaccination

BCG vaccination status was available for 94 (56.3%) cases in 2020, and of these, 48 (51.1%) had received a BCG vaccination. This was lower than the coverage seen in previous years which was 60.8% in 2019 and 61.8% in 2018. There were 5 cases of TB notified in 2020 among children aged under 5 years old, only one of whom was reported as having received a BCG vaccination.

Among all cases who had received a BCG vaccination, non-UK born cases were more likely to be vaccinated (35, 72.9%) than UK born cases (13, 27.1%), see Table 5. Among those cases where vaccination status was known, the highest proportion of cases who previously received a BCG vaccination was among those aged 50 to 59 (9, 75.0%), 40 to 49 (12, 70.6%), 20 to 29 (9, 60.0%), and 10 to 19 (1, 50%).

Table 5. Number and proportion of all TB cases with BCG vaccination by place of birth, South West, 2020

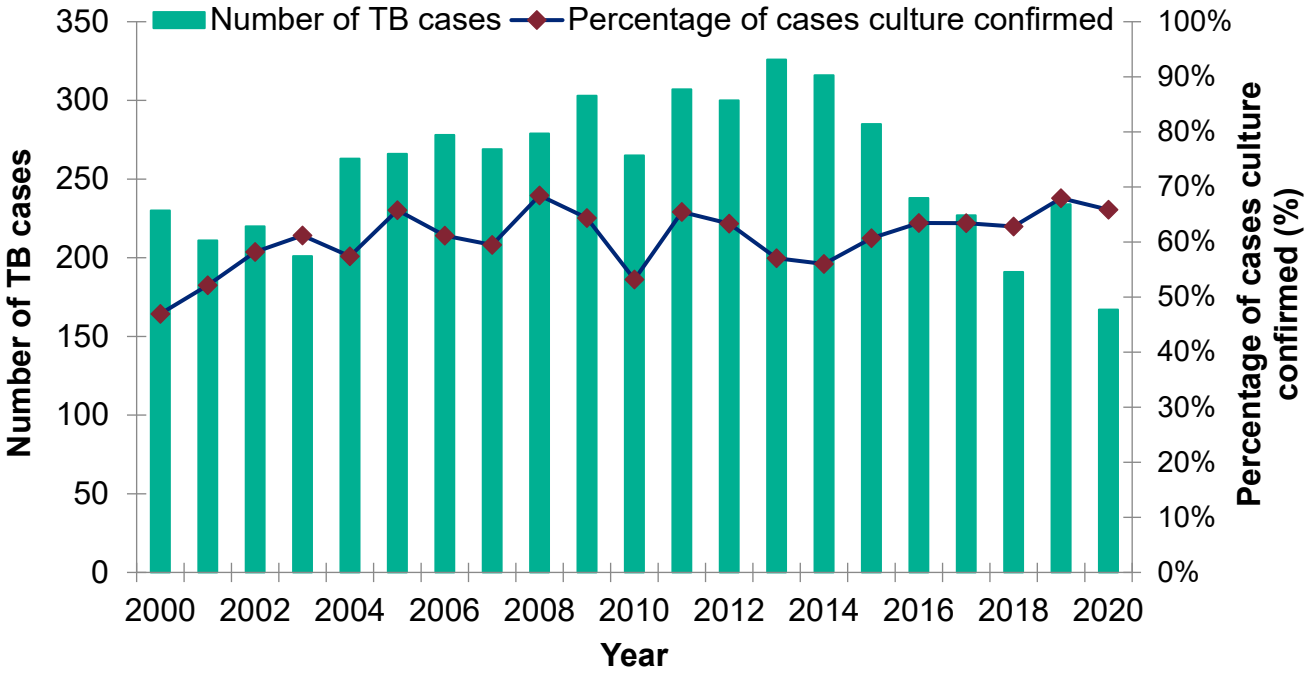
Place of birth	Cases with BCG vaccination	Percentage of cases (%)
UK born	13	19.1%
Non-UK born	35	36.1%
Total	48	55.2%

Microbiological information

Culture confirmation and speciation

In 2020, data on culture confirmation was available for all cases. During 2020 there were 110 (65.9%) culture confirmed cases of TB in the South West. This was slightly lower than seen in 2019 (159, 67.9%), see Figure 11. Of the 106 pulmonary cases, 83 (78.3%) were culture confirmed; of the 61 non-pulmonary cases, 27 (44.3%) were culture confirmed.

Figure 11. Number of TB cases and percentage of cases culture confirmed, 2000 to 2020



In 2020, 64 (66.0%) of all non-UK born cases and 45 (66.2%) of all UK born cases were culture confirmed. These proportions are not dissimilar to those reported in 2019 with 71.8% and 63.1% of non-UK and UK born cases being culture confirmed in 2019, respectively.

Information on mycobacterial speciation was available for all culture confirmed cases in 2020. There were 105 (95.5%) cases of *Mycobacterium tuberculosis (M. tuberculosis)* and 4 (3.6%) cases of *Mycobacterium bovis (M. bovis)*. The remaining case was reported as *Mycobacterium africanum* (0.9%).

Sputum smear status

Data on sputum smear status was available for 59 (55.7%) pulmonary cases in 2020. Of all pulmonary cases with available sputum smear information, 44 (74.6%) cases were sputum smear positive. This is higher than the percentage of all pulmonary cases which were sputum smear positive than seen in 2019 (59.0%) and 2018 (60.0%).

TB transmission

Rate of TB in UK born children

An indicator for ongoing local transmission is the rate of TB in UK born children under the age of 15. In 2020, the rate was 0.6 per 100,000 population (95% CI: 0.2 to 1.3), see Figure 12. This is a decrease compared to the rate reported in the past 3 years, see Table 6.

Figure 12. Rate of TB with 95% confidence intervals in UK born cases under 15-years old, South West, 2000 to 2020

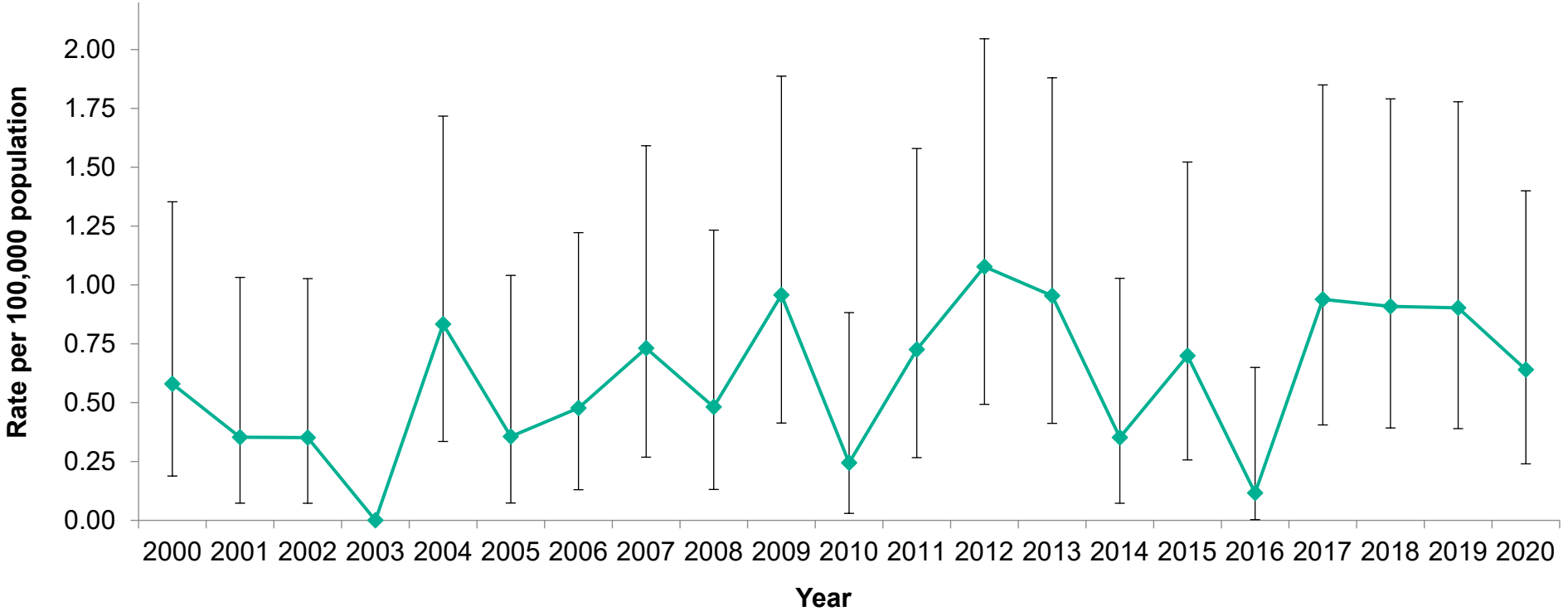


Table 6. Number and rate of UK born TB cases by age, South West, 2000 to 2020

Year	Age under 15 years		All ages	
	TB cases	Rate per 100,000 population	TB cases	Rate per 100,000 population
2000	5	0.6	139	3.0
2001	3	0.4	123	2.7
2002	3	0.4	98	2.1
2003	0	0.0	87	1.9
2004	7	0.8	98	2.1
2005	3	0.4	123	2.6
2006	4	0.5	87	1.8
2007	6	0.7	97	2.1
2008	4	0.5	91	1.9
2009	8	1.0	99	2.1
2010	2	0.2	108	2.2
2011	6	0.7	127	2.6
2012	9	1.1	114	2.4
2013	8	1.0	151	3.1
2014	3	0.4	133	2.7
2015	6	0.7	123	2.5
2016	1	0.1	94	1.9
2017	8	0.9	105	2.1
2018	8	0.9	94	1.9
2019	8	0.9	103	2.0
2020	5	0.6	68	1.3

Whole genome sequencing

Whole genome sequencing (WGS) of *M. tuberculosis* complex isolates was implemented in January 2018 in the South of England. It replaced MIRU-VNTR strain typing. MIRU-VNTR refers to repetitive sequences of DNA located at specific loci (a particular position, point, or place in the genome) possessed by the *M. tuberculosis* genome. These repeats vary in number between different loci and different strains. The MIRU-VNTR profile used in England compares the number of repeats present at 24 specific loci across the genome.

WGS provides data on single nucleotide polymorphism (SNP) differences between the genomes of TB isolates, indicating how much the genome of the organism has mutated over time. The DNA sequence of Mycobacterium tuberculosis is estimated to change at the rate of

approximately one SNP per genome every 2 years. Combined with clinical and epidemiological data, WGS offers a greater understanding than MIRU-VNTR as to whether isolates belong to the same transmission chain and may also help determine the timing and direction of transmission between cases (4, 5, 6). WGS can also enhance the diagnostic capability to identify *M. tuberculosis* complex and predict drug resistance using genotypic methods.

Although WGS was being performed routinely across England since January 2018, a number of TB services across the South West have agreed on arrangements to refer clinical isolates to the Cardiff TB Reference Laboratory, which launched a routine WGS service in January 2019.

Public health investigation and WGS

WGS can be used routinely to identify clusters in which cases are within 12 SNPs of each other. There is no current consensus as to what SNP cut off is best utilised for public health investigation, although 12 SNPs represents the maximum SNP difference between 2 isolates for which epidemiological links have previously been identified (7) and is considered a conservative measure (8). Cases and clusters are reviewed by the UKHSA South West Health Protection Team and Field Service South West to identify public health actions required to prevent ongoing transmission.

WGS has been used for public health management of clusters in the South West in 3 ways, which are:

- identification of new clusters
- identification of new cases within existing MIRU-VNTR clusters
- identification and confirmation of TB outbreaks

Time delays from onset of symptoms to diagnosis and treatment

Delay from onset of symptoms to diagnosis

Last year, a 2-year cap was introduced nationally for calculating the delay from onset of symptoms to diagnosis and treatment. Consequently, anyone whose delay exceeded 2 years (730 days) would be excluded from this part of the analysis. This approach will improve data quality and help to mitigate the risk of recall bias. Furthermore, a delay of greater than 2 years may not necessarily be the same TB episode. Therefore, the data presented here which describes the time from symptom onset to diagnosis is not directly comparable with reports published prior to 2019. It is also possible that the same cases might not have been excluded from both analyses, one for the time to diagnosis and one for the time to treatment start.

Data on the time between symptom onset and diagnosis was available for 151 (90.4%) for all cases. After introducing the limit of cases with a time delay of fewer than 730 days, data was available for 144 (86.2%) cases in 2020. This also excludes those diagnosed post-mortem and asymptomatic cases. During 2020, the median time between symptom onset and date of diagnosis for cases, once the 2-year cap was introduced, was 86.5 days (IQR: 43.5 to 155.0).

The minimum delay was 3.0 days and the maximum was 599.0 days. The median time between symptom onset and date of diagnosis has remained relatively stable in recent years, 82.0 and 80.0 days in 2019 and 2018, respectively.

In 2020, the median time between symptom onset and diagnosis for pulmonary cases was 82.0 days (IQR: 43.0 to 151.0). This median time has increased since 2019 (66.0, IQR: 37.0 to 163.0).

Pulmonary sputum smear positive cases had a longer median delay (73.0 days, IQR: 42.0 to 125.0) than pulmonary sputum smear negative cases (65.0 days, IQR: 29.0 to 163.0). Non-pulmonary cases had a median delay of 91.0 days (IQR: 45.0 to 166.0). This has decreased from the peak seen in 2019 of 125.0 days (IQR: 63.0 to 178.0).

The proportion of pulmonary cases being diagnosed more than 4 months after symptom onset (31 cases, 33.3%) was equal to the proportion diagnosed within zero to 2 and 2 to 4 months, 31 (33.3%) cases for both. In non-pulmonary cases, the proportion of cases diagnosed more than 4 months after symptom onset (18, 35.3%) was similar to the proportion diagnosed within zero to 2 and 2 to 4 months, 17 (33.3%) cases and 16 (31.4%) cases, respectively, see Table 7.

The proportion of pulmonary cases which have experienced a delay of more than 4 months between symptom onset and diagnosis has increased substantially from a minimum of 12 (14.5%) cases in 2007 to 31 (33.3%) in 2020. The highest proportion of pulmonary cases which have experienced a delay of more than 4 months between symptom onset and diagnosis, however, was recorded in 2017 (63, 46.0%). This value has remained relatively stable since 2018.

Table 7. Time between symptom onset and date of TB diagnosis*, South West, 2020

	Median days (IQR)	0 to 2 months		2 to 4 months		Over 4 months		All
		n	%	n	%	n	%	n
Pulmonary	82.0 (43.0-151.0)	31	33.3%	31	33.3%	31	33.3%	93
Non-pulmonary	91.0 (45.0-166.0)	17	33.3%	16	31.4%	18	35.3%	51
Pulmonary smear positive	73.0 (42.0-125.0)	15	36.6%	15	36.6%	11	26.8%	41
Pulmonary smear negative	65.0 (29.0-163.0)	6	46.2%	2	15.4%	5	38.5%	13
Total**	87.0 (43.0-157.0)	48	33.3%	47	32.6%	49	34.0%	144

* Excluding asymptomatic cases, those with missing onset dates and those diagnosed post-mortem.
**Including cases with missing sputum smear status information.

Delay from onset of symptoms to treatment

In 2020, data on the time between symptom onset and treatment start date for 146 (87.4%) of cases overall, and for 140 (83.8%) cases treated in less than 730 days, excluding those diagnosed post-mortem and asymptomatic cases. The median delay for cases, once the 2 year cap was introduced, in 2020, was 84.0 days (IQR: 47.0 to 157.0). This has declined since the median delay in 2016 of 94.0 days. The median time between symptom onset and treatment for pulmonary cases was 80.0 days (IQR: 43.0 to 157.0), and 91.0 days (IQR: 50.0 to 171.0) for non-pulmonary cases. The proportion of pulmonary cases in 2020 with a delay of more than 4 months between symptom onset and treatment start date has remained broadly similar in 2020 (34.4%) compared to 2019 (34.2%).

In 2020, the median delay for males remained similar (72.0 days, IQR: 43.0 to 134.0) to what was seen the previous year (70.0 days, IQR: 41.0 to 160.0). The median delay from symptom onset to treatment was higher in females in 2020 (99.0 days, IQR: 61.0 to 187.0). This value however has decreased from 2019 (114.0 days, IQR: 59.0 to 189.0). The proportion of female cases with a delay from symptom onset to treatment of over 4 months was 44.3% (27 cases) compared to 29.1% (23 cases) in males.

The median delay for UK born cases was 82.0 days (IQR: 48.0 to 163.0) compared to 85.5 days (IQR: 46.0 to 151.0) in non-UK born cases.

The median delay for cases reporting at least one social risk factor was 59.0 days (IQR: 27.0 to 117.0) compared to a median delay of 91.0 days (IQR: 52.0 to 154.0) in those with no social risk factors. Among those who reported at least one social risk factor, 24.0% (6) of cases experienced a delay of greater than 4 months compared to 36.2% (34) of cases who reported having no social risk factors, see Table 8.

Table 8. Social risk factors and time between symptom onset and TB treatment, South West, 2020

	0 to 2 months		2 to 4 months		Over 4 months		Total
	n	%	n	%	n	%	N
No social risk factors	26	27.7%	34	36.2%	34	36.2%	94
At least one social risk factor	13	52.0%	6	24.0%	6	24.0%	25

TB outcomes in drug sensitive cohort

For the purposes of TB outcome reporting, the drug sensitive cohort excludes all TB cases with rifampicin-resistant TB including MDR-TB, and non-culture confirmed cases treated as MDR-TB (8). Treatment outcomes for the drug sensitive cohort are reported separately for the following groups:

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

Outcomes: cases with expected duration of treatment less than 12 months

Outcomes in this section and the following section use a different data set than the rest of the report. Cases in the data set presented are based on the region where the last case manager was assigned to the case on ETS, that is, in the treatment region. Therefore, the hospital variable may not correspond to the last case manager because of data validation rules on ETS. This data is therefore not comparable to the national annual report.

There were 230 drug sensitive cases notified in 2019 out of a total of 234 cases. Treatment completion data was available for all drug sensitive cases. During this year, there were 22 (9.6%) drug sensitive cases that reported CNS TB and these were excluded from the following analysis.

In the cohort without CNS disseminated disease and with TB infection sensitive to treatment using rifampicin, 153 (73.6%) cases completed treatment after a 12-month follow-up period. This is lower than the proportion of drug-sensitive notifications in 2018 that completed treatment within 12 months (76.2%). A lower proportion of cases notified in 2019 died or were still on treatment compared to in 2018, see Table 10.

Table 9. TB outcome at 12 months, South West, cases diagnosed in 2019*

Outcome at 12 months	Number of cases	Percentage of cases (%)
Completed	153	73.6
Died	10	4.8
Lost to follow up	10	4.8
Still on treatment	8	3.8
Treatment stopped	5	2.4
Not evaluated	22	10.6
Total	208	100.0

* Excludes rifampicin resistant TB, and cases with CNS, spinal, miliary and cryptic disseminated disease.

Table 10. TB treatment outcomes at 12 months, 2001 to 2019*

Year	Completed (%)	Died (%)	Lost to follow up (%)	Still on treatment (%)	Treatment stopped (%)	Not evaluated (%)
2001	67.2	10.9	4.7	5.7	3.1	8.3
2002	61.3	11.8	6.4	7.4	2.9	10.3
2003	64.0	7.5	6.5	2.2	3.8	16.1
2004	59.6	8.3	7.1	5.4	1.3	18.3
2005	57.7	11.8	7.3	8.9	4.5	9.8
2006	49.6	8.1	7.8	7.4	3.1	24.0
2007	68.3	6.5	4.1	10.2	0.4	10.6
2008	62.3	9.3	6.6	14.8	1.2	5.8
2009	63.4	7.7	8.4	11.4	0.4	8.8
2010	74.0	7.0	3.3	7.4	0.8	7.4
2011	68.8	4.3	7.1	11.7	0.4	7.8
2012	70.4	7.7	5.1	8.4	0.4	8.0
2013	73.9	5.9	5.3	7.3	0.7	6.9
2014	75.9	7.6	6.5	7.6	1.0	1.4
2015	79.8	4.5	4.9	6.1	3.6	1.2
2016	82.8	3.8	5.3	3.3	1.9	2.9
2017	81.1	8.3	3.9	3.9	1.5	1.5
2018	76.2	9.5	4.8	6.0	1.2	2.4
2019	73.6	4.8	4.8	3.8	2.4	10.6

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

Of the 10 notifications that were lost to follow-up, one (10.0%) left the UK whilst undergoing treatment, another 5 (50.0%) cases were recorded as having other reasons for disengagement from TB services, whilst a further 4 cases had no recorded reason for being lost to follow-up. Of the 10 cases that died before treatment completion, 2 cases (20.0%) were recorded as ‘TB contributed to death’ whilst a further 5 cases were reported as ‘TB incidental to death’ (50.0%). 3 cases (30.0%) had an unknown relationship between TB and death. 2 cases were diagnosed post-mortem. The median age of cases that died during their TB treatment was 76.0 years (IQR: 61.0 to 81.0). For the 8 cases still on treatment, a reason was provided for 3 cases: 2 cases had their treatment interrupted whilst one case had treatment last greater than 12 months. Treatment was stopped for 5 cases (2.4%) and outcomes were not evaluated for 22 cases (10.6%).

A higher proportion of females (66, 75.0%) completed treatment compared to males (87, 72.5%). Of those female cases who did not complete treatment, 3 cases died (which equates to 3.4% of total female drug sensitive cases), 2 were lost to follow-up (2.3%), one case was still on treatment (1.1%), treatment was stopped for 3 cases (3.4%) and outcomes were not evaluated for 13 cases (14.8%). Of the male cases who did not complete treatment, 7 cases died (5.8%), 8 cases were lost to follow-up (6.7%), 7 cases were still on treatment (5.8%), treatment was stopped for 2 cases (1.7%) and outcomes were not evaluated for 9 cases (7.5%).

Of the 10 youngest cases (0 to 14 years), 9 cases (90.0%) completed treatment whilst the treatment outcomes were not evaluated for one case (10.0%). This age group had the highest proportion of cases who completed treatment. This decreased with age. Treatment was completed by 76.4% of those aged 15 to 44, 72.0% of those aged 45 to 64 and 64.3% of those aged 65+. A higher proportion of those in the oldest age group (65 and over) died prior to treatment completion (7, 16.7%), compared to any of the age groups. Within that same age group, 3 cases (7,1%) were still on treatment, treatment was stopped for one case (2.4%) and 4 cases were not evaluated (9.5%). Of those aged 45 to 64, 3 cases died (6.0%), 2 cases were lost to follow-up (4.0%), 3 cases were still on treatment (6.0%), treatment was stopped for one case (2.0%) and for 5 cases (10.0%) treatment outcomes were not evaluated. For those aged 15 to 44, 8 cases (7.5%) were lost to follow-up, 2 (1.9%) were still on treatment, 3 cases (2.8%) had their treatment stopped and the treatment outcomes for 12 cases (11.3%) were not evaluated.

There was a higher proportion of TB cases who completed treatment among non-UK born cases (85, 77.3%) compared to UK born cases (65, 70.7%). There was also a higher proportion of non-UK born individuals who were lost to follow-up (8, 7.3%) compared to UK born cases (2, 2.2%). Higher proportions of UK born cases died (8, 8.7%) compared to 0.9% (1) of non-UK born cases. Similarly, higher proportions of UK born cases were still on treatment, 4.3% (4) compared to 3.6% (4) of non-UK born cases, 3.3% (3) of UK born cases had their treatment stopped compared to 1.8% (2) of non-UK born cases, whilst 10.9% (10) of UK born cases did not have their treatment outcome evaluated compared to 9.1% (10) of non-UK born cases.

Those of the black other ethnicity were the only ethnic group to all complete treatment. The ethnic group with the next highest proportion of cases completing treatment was Asian other (12, 92.3%), followed by mixed other (25, 80.6%). The lowest proportion of cases completing treatment was observed in Chinese (5, 62.5%), white (66, 66.7%) and black Caribbean ethnic groups (2, 66.7%). Cases among black Caribbean (1, 33.3%), Chinese (1, 12.5%) and white (8, 8.1%) ethnic groups died during treatment.

Treatment completion was reported for 119 cases (80.4%) with no social risk factors compared to 19 cases (63.3%) with at least one social risk factor. There was a higher proportion of cases with at least one social risk factor (2, 6.7%) who died during treatment compared to 5 cases (3.4%) of those with no social risk factors.

Upper tier local authorities with 5 or more cases where at least 70% cases completed treatment were Bath and North East Somerset (6, 75.0%), Bournemouth, Christchurch and Poole (16, 94.1%), City of Bristol (38, 84.4%), Cornwall (8, 80.0%), Devon (14, 70.0%), Dorset (5, 100.0%), Plymouth (9, 81.8%) and South Gloucestershire (12, 75.0%). Swindon had the lowest treatment completion out of all upper tier local authorities with 5 or more cases (10, 47.6%) followed by Wiltshire (7, 58.3%). North Somerset had the lowest proportion of cases achieving treatment completion overall (1, 25.0%). Swindon and Wiltshire also had the highest proportion of cases with treatment outcomes not evaluated, 8 (38.1%) and 4 (33.3%), respectively.

Outcomes: cases with CNS, spinal, miliary or cryptic disseminated disease

This section explores the outcomes of cases with CNS, spinal, miliary or cryptic disseminated TB that are sensitive to treatment with rifampicin.

There were 22 (10.6%) TB cases sensitive to rifampicin treatment with CNS, spinal, miliary or cryptic dissemination notified in 2019. Of these cases, 9 (40.9%) completed treatment, 5 cases died (22.7%), one case was lost to follow-up (4.5%), 4 cases (18.2%) were still on treatment and 3 cases were not evaluated (13.6%), see Table 11. This is a slight decrease in the proportion of cases completing treatment compared to 2018 when 59.1% (13) cases completed treatment. The proportion of cases with treatment outcomes not evaluated has however decreased once again, after an increase seen in 2018 (5, 22.7%).

Table 11. Outcome at 12 months for TB cases with rifampicin sensitive, CNS, spinal, miliary or cryptic disseminated diseases, South West, cases diagnosed in 2019*

Outcome at 12 months	Number of cases	Percentage of cases (%)
Completed	9	40.9
Died	5	22.7
Lost to follow up	1	4.5
Still on treatment	4	18.2
Treatment stopped	0	0.0
Not evaluated	3	13.6
Total	22	100.0

* Excludes rifampicin-resistant TB.

Of the 5 people who died notified in 2019, 2 cases (40.0%) were recorded as 'TB caused death', one case (20.0%) was recorded as 'TB contributed to death' and 2 cases (40.0%) died from causes unrelated to TB. The median age of those who died was 55.0 years (IQR: 53.0 to 71.0). No cases were diagnosed post-mortem. Of the 4 cases still on treatment, 3 cases (75.0%) had their treatment changed.

Of the 22 cases with rifampicin sensitive CNS, spinal, miliary or cryptic disseminated disease, 17 cases (77.3%) were male. Similar proportions of female (2, 40.0%) and male (7, 41.2%) cases completed treatment. One female case (20.0%) and 4 male cases (23.5%) died during treatment. Only one female case (20.0%) was lost to follow-up. One female case (20.0%) and 3 male cases (17.6%) were still on treatment, whilst a further 3 male cases (17.6%) were not evaluated.

There were no cases with drug sensitive CNS, spinal, miliary or cryptic TB aged 0 to 14. 10 cases were aged 15 to 44, of which 5 cases (50%) completed treatment, one case (10.0%) died, 2 cases (20.0%) were still on treatment and treatment outcomes were not evaluated for 2 cases (20.0%). Of the 7 cases aged 45 to 64, only 3 cases (42.9%) completed treatment, 2 cases (28.6%) died and 2 cases (28.6%) were still on treatment. Of the 5 cases aged 65 and over, only one case (20.0%) completed treatment, 2 cases (40.0%) died, one case (20.0%) was lost to follow-up and one case (20.0%) was not evaluated.

UK born cases with rifampicin sensitive CNS, spinal, miliary or cryptic disseminated disease had a slightly higher treatment completion rate (5, 45.5%) compared to non-UK born cases (4, 40.0%). One (10.0%) non-UK born case died compared to 3 (27.3%) UK-born cases.

Only one (10.0%) non-UK born case out of the whole cohort was lost to follow-up. Two of both UK born (18.2%) and non-UK born (20.0%) cases were still on treatment. 2 (20.0%) non-UK

born cases did not have treatment outcomes evaluated compared to one (9.1%) UK born case.

Three drug sensitive CNS, spinal, miliary or cryptic TB cases notified in 2019 reported at least one social risk factor. Of those cases with at least one social risk factor, 2 cases (66.7%) had completed treatment whilst the other case (33.3%) died. Of those reporting no social risk factors, the majority (6, 42.9%) completed treatment, 3 cases (21.4%) died and a further 3 (21.4%) were still on treatment. 2 (14.3%) cases' treatment outcomes were not evaluated.

The City of Bristol had the largest number of cases (4) in this group of any South West upper tier local authority. In Bristol, 3 cases (75.0%) completed treatment whilst one (25.0%) was still on treatment. All cases in Bournemouth, Christchurch and Poole completed treatment, compared to only one case (33.3%) in Gloucestershire and no cases in Swindon. Of the other 2 cases in Gloucestershire, one (33.3%) was still on treatment whilst the other (33.3%) was not evaluated. In Swindon, one (33.3%) case died, another (33.3%) was still on treatment whilst the final case (33.3%) was not evaluated.

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

The number and distribution of drug resistant cases notified in 2020 have been analysed. Outcomes related to drug resistant TB are presented for cases notified in 2018 due to the 24-month follow-up period. Unless otherwise stated, proportions in this section refer to the proportion of all culture confirmed cases excluding *M. bovis* cases as *M. bovis* is resistant to pyrazinamide.

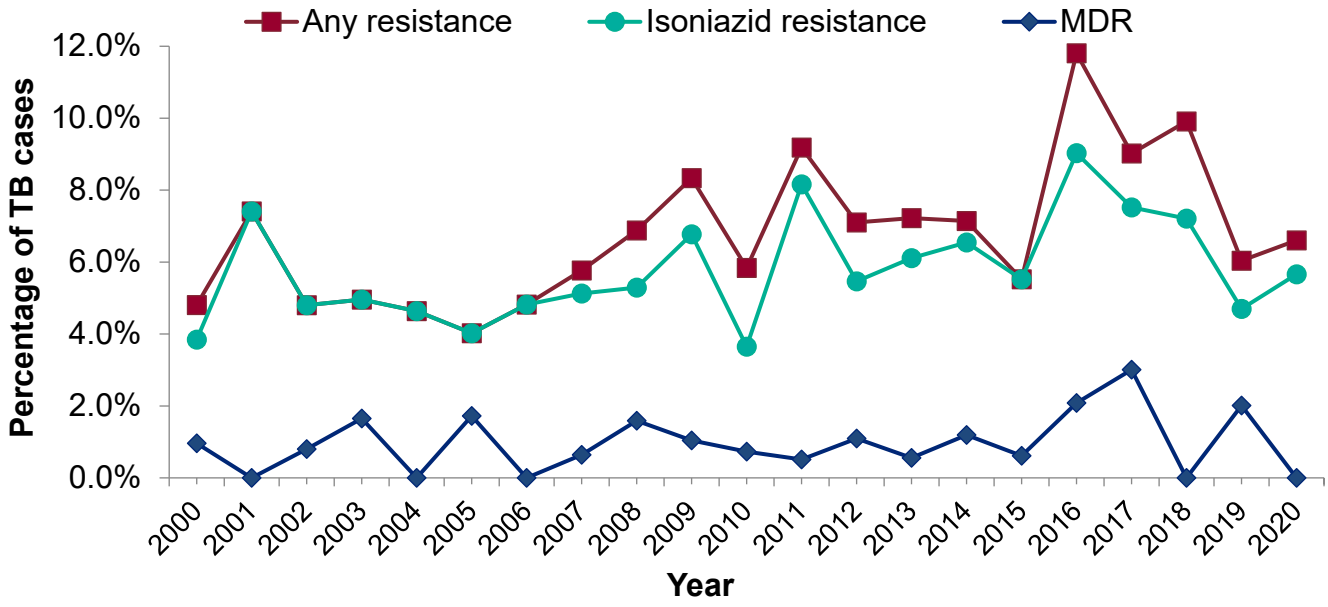
Overall drug resistance and geographical distribution

Seven (6.6%) culture confirmed cases excluding *M. bovis* exhibited resistance to at least one first-line drug, see Figure 13. In 2020, 6 (5.7%) culture confirmed isolates had isoniazid resistance, one (0.9%) had ethambutol resistance, one (0.9%) had rifampicin resistance, and no isolates had pyrazinamide resistance. There were no *M. bovis* cases with drug resistance reported in 2020 (discounting pyrazinamide).

In 2020, no culture confirmed TB cases were found to be multi-drug resistant (MDR), compared to in 2019, where 3 (2.0%) culture confirmed TB cases were found to be MDR.

In 2020, the local authorities with culture confirmed cases showing resistance to at least one first-line drug were Swindon (3, 42.9%), Bristol (2, 28.6%), North Somerset and Bournemouth, Christchurch and Poole (both one, 14.3%). Ten local authorities in the South West had no cases in 2020 with resistance to a first-line drug.

Figure 13. Percentage of culture confirmed TB cases with first-line drug resistance, South West, 2000 to 2020



Characteristics of cases with drug resistant TB

The proportion of resistant isolates among culture confirmed female cases was 4.9% (2) compared to 7.7% (5) in males.

The highest proportion of resistant isolates was identified in those aged 45 to 64 (3, 11.5%) followed by those aged 15 to 44 (3, 5.2%) and then those aged 65+ (1, 5.0%). No resistant isolates were found in the youngest age group, 0 to 14 years.

Of culture confirmed non-UK born cases, 4 (6.3%) cases were resistant to a first-line drug, compared with 3 (7.1%) UK born culture confirmed cases.

Resistant isolates were identified in cases with Indian (2, 15.4%), white (4, 7.8%) and black African (one, 6.7%) ethnicities.

Five (6.3%) pulmonary cases exhibited first line drug resistance compared to 2 (7.7%) non-pulmonary cases.

Resistant isolates were reported in one (11.1%) culture confirmed case with a previous diagnosis.

Five (13.6%) drug-resistant notifications reported at least one social risk factor, compared to 4 (5.9%) cases reporting no social risk factors.

Second-line drug resistance and extensively drug resistant (XDR) TB

There were no culture confirmed notifications in 2020 with an infection resistant to second-line drugs. 3 (2.0%) culture confirmed cases were reported in 2019 which were resistant to at least one second-line drug.

In 2020, there were also no cases found to be extensively drug resistance (XDR). Only 2 cases in the South West have ever been reported as XDR, which occurred in 2014 and 2017.

Outcomes: cases with rifampicin-resistant TB at 24 months

Outcomes in this section of the report use a different data set than the rest of the report. Cases in this data set are based on the region where the last case manager assigned to the case on ETS operates, that is, the treatment region. Therefore, the hospital variable may not correspond to the last case manager because of data validation rules on ETS. This data is therefore not comparable to the national annual report.

Of culture confirmed cases notified in 2018, no cases were rifampicin-resistant.

TB in those with social risk factors and health inequalities

Social risk factors

In 2020, data on social risk factors was available for 134 notifications (83.2%) aged 15 and over. During this year, 30 cases (22.4%) reported at least one social risk factor (alcohol abuse, drug use, homelessness, or imprisonment). This proportion has increased from 2019 when 17.6% of cases reported at least one social risk factor, see Table 12. The majority reported one social risk factor only (20, 14.9%), 6 cases (4.5%) reported 2 risk factors, 3 cases (2.2%) reported 3 risk factors whilst one case (0.7%) reported 4 risk factors.

A higher proportion of male cases (26, 27.4%) reported at least one social risk factor, compared to 6.1% (4) of female cases.

A higher proportion of people with pulmonary disease (27, 27.0%) reported at least one social risk factor, compared to 3 (4.9%) non-pulmonary cases.

At least one social risk factor was reported by 17 (27.0%) UK born cases, whilst only 12 (12.5%) of non-UK born cases reported at least one social risk factor.

The highest proportion of cases reporting at least one social risk factor were those of black Caribbean (3, 75.0%) and white (22, 28.6%) ethnicities. Cases reporting at least one social risk factor were also of Asian other (one, 10.0%), black African (2, 8.0%), mixed other (one, 7.1%) and Indian (one, 3.8%) ethnicities.

Among those reporting at least one social risk factor, the most prevalent risk factor was homelessness (13, 43.3%), see Table 13. The other risk factors were reported at similar rates, drug use was reported by 12 cases (40.0%), alcohol was reported by 11 cases (36.7%), followed by 9 cases (30.0%) reporting imprisonment.

Table 12. TB cases aged 15 and over reporting at least one social risk factor, South West, 2011 to 2020

Year	Any risk factor		Total
	Number of cases	Percentage of cases (%)	
2011	23	11.3%	204
2012	32	14.1%	227
2013	36	13.8%	260
2014	23	9.0%	255
2015	31	13.4%	232

Year	Any risk factor		Total
	Number of cases	Percentage of cases (%)	
2016	28	14.7%	191
2017	24	13.9%	173
2018	17	10.8%	158
2019	33	17.6%	187
2020	30	22.4%	134

Table 13. Individual social risk factors among TB cases, South West, 2020

Social risk factor	Number of cases	Percentage of cases (%)
Homelessness	13	43.3
Drug use	12	40.0
Alcohol	11	36.7
Imprisonment	9	30.0

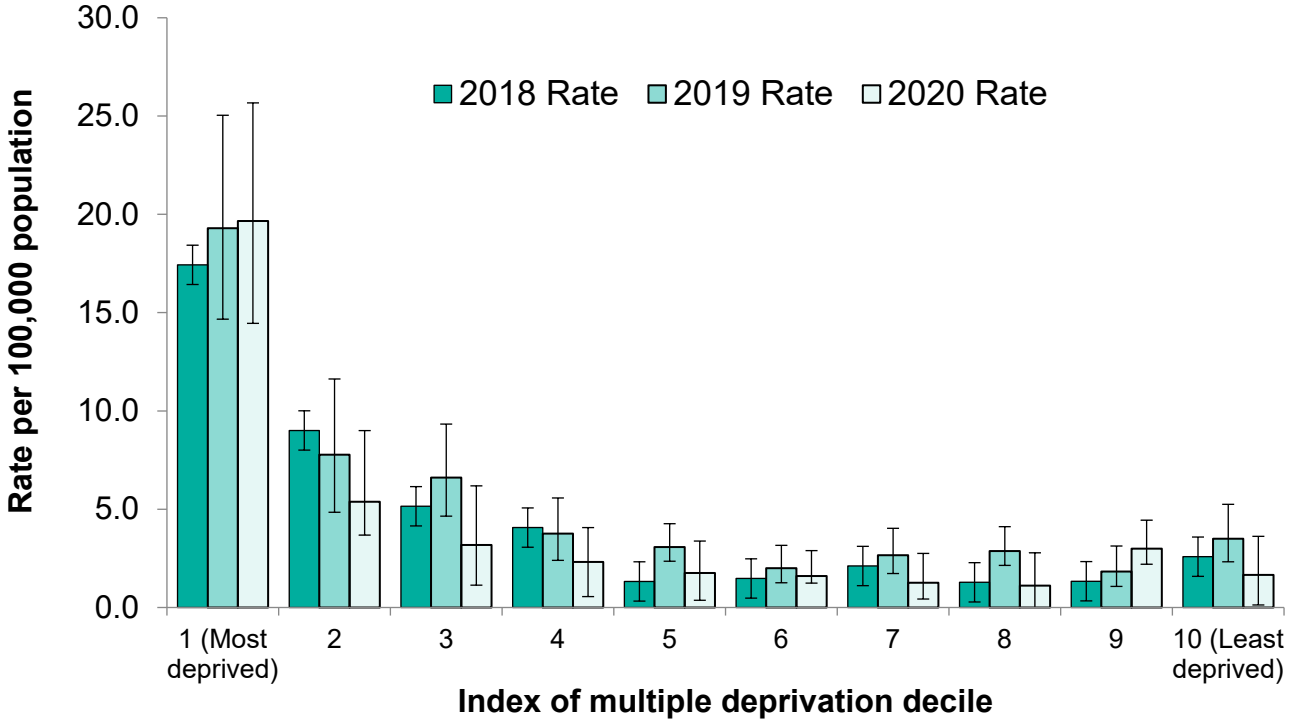
Deprivation

The Index of Multiple Deprivation (IMD), part of the English Indices of Deprivation, is an overall measure of deprivation experienced by people living in an area. It is measured at the level of lower super output areas and was last updated in 2019. The postcodes of cases were linked to an IMD score as an indicator of socioeconomic status.

In 2020, data on IMD was available for all notifications. During this year, the largest proportion of cases lived in areas from the most deprived South West IMD decile (53, 31.7%). This proportion is higher than in the previous year (52, 22.2%). The highest rate of TB was also observed in this decile (19.7 per 100,000 population), see Figure 14, where rates are calculated based on IMD rankings within the South West. In 2020, the rate in the most deprived decile had also increased compared to the 2019 rate (19.3 per 100,000 population).

There appears to be a trend towards higher rates of TB with increasing socio-economic deprivation. In 2020, the highest rates were in deciles one to 3. The rate then remains relatively low and constant through deciles 4 to 9. The rate then increased again in decile 9, before decreasing in decile 10. The lowest rate (1.1 per 100,000 population) was seen in decile 8.

Figure 14. TB rate and 95% confidence intervals by Index of Multiple Deprivation decile, South West, 2018 to 2020



HIV testing, directly observed therapy (DOT) and hospital admissions

HIV testing

In 2020, data on HIV testing was available for 153 (91.6%) cases. For some cases, HIV status was already known (8, 5.2%). Most cases (131, 85.6%) were offered an HIV test and had this d1, see Table 14. 6 cases (3.9%) were not offered an HIV test; this is lower than the figure seen in 2019 (15, 7.0%).

Table 14. HIV testing for TB cases, South West, 2020*

HIV testing status	Number of cases	Percentage of cases (%)
HIV test offered and d1	131	85.6%
HIV test offered but not d1	8	5.2%
HIV status already known	8	5.2%
HIV test not offered	6	3.9%
Total	153	100.0%

* Excludes cases diagnosed post-mortem.

Hospital inpatient and directly observed therapy (DOT)

In 2020, data on inpatient treatment for TB was available for 151 (90.4%) cases. A total of 38 cases (25.2%) were treated as an inpatient at some point during their care, see Table 15.

Data on directly observed therapy (DOT) was available for 147 cases (88.0%). 14 cases (9.5%) received DOT as part of their care in 2020. This was similar to the proportion of cases who received DOT (19, 9.2%) in 2019.

Table 15. Hospital inpatient and DOT use* for TB cases, South West, 2020

	Number of cases	Percentage of cases (%)	All cases
Hospital inpatient	38	25.2%	151
DOT given	14	9.5%	147

* At any time during treatment.

Comparison between South West and England

In 2020, the rate of TB in the South West, 3.0 (95% CI: 2.5 to 3.4) per 100,000 population, was less than half of that observed nationally, 7.3 (95% CI: 7.1 to 7.5) per 100,000 population. The South West had the lowest regional rate, followed by the North East, 3.1 (95% CI: 2.5 to 3.9) per 100,000 population. The highest regional rate was in London, 16.3 (95% CI: 15.4 to 17.1) per 100,000 population, reflecting how the main burden of this disease remains in concentrated urban areas. Both the case numbers and the national rate decreased in 2020 compared to 2019, similar to the trend seen in the South West.

In 2020, the rate of TB among UK born children (under 15 years old) in the South West, 0.6 (95% CI: 0.2 to 1.3) per 100,000 population was lower than in England, 1.0 (95% CI: 0.8 to 1.3) per 100,000 population. Both the national rate and the South West rate had decreased since 2019, 0.9 (95% CI: 0.4 to 1.8) and 1.3 (95% CI: 1.1 to 1.5) per 100,00 population, respectively.

The South West had the second lowest regional rate of disease in the non-UK born population, 20.3 per 100,000 population. This had decreased since 2019, from 25.9 per 100,000 population. Nationally, the rate of TB incidence in non-UK born individuals was higher, 36.3 (95% CI: 35.0 to 37.6) per 100,000. This rate, however, has also seen a decrease since 2019, 39.7 (95% CI: 38.4 to 41.0) per 100,000 population. Until 2016, there was a year on year increase in the proportion of non-UK born cases diagnosed at 11 or more years after entry to the UK seen in the South West, mirrored by what was reported at the national level. Since 2016, this proportion has remained relatively stable at the national level, 45.4% in 2017, 45.3% in 2018, 44.7% in 2019 and then 45.1% in 2020. In contrast, the South West has displayed more inconsistent trends, 31.1% in 2017, 26.7% in 2018, 37.1% in 2019 and 34.5% in 2020.

In the South West, the percentage of pulmonary cases (63.5%) was higher than recorded nationally (53.5%). In England, 60.7% of all TB cases and 75.3% of pulmonary cases were culture confirmed in 2020, compared to 65.9% and 78.3%, respectively, in the South West. The proportion of pulmonary notifications with a delay greater than 4 months between symptom onset and treatment start date in the South West was 34.4%. This was compared to 32.4% in England.

The South West had the highest proportion of cases reporting at least one social risk factor of all regions (22.4%), which has increased from 17.6% in 2019. Nationally, this figure was 12.7%, which had decreased from 13.9% in 2019. The South West was one of 4 regions to observe an increase in the proportion of cases reporting at least one social risk factor between 2019 and 2020.

Excluding cases where HIV status was already known and where no HIV status was available, 90.3% of cases in the South West had an HIV test offered and completed. This is similar to the proportion for England, 91.4%. Regionally, DOT was received in 9.5% of cases, compared to 13.0% of cases nationally.

The South West recorded 6.6% of culture confirmed cases exhibiting resistance to at least one first-line drug. Nationally, 11.6% of cases displayed the same resistance in 2020, compared to 10.8% in 2019. In the South West, between 2016 and 2020, 1.6% of cases were MDR compared with 1.4% nationally. There were no XDR cases in the South West in 2020 compared to 4 cases across England.

In relation to the outcome at 12 months for drug sensitive 2019 notifications, the South West had a treatment completion rate of 73.6%, which is the lowest rate of all regions. Nationally, the completion rate was 84.5% over the same time period. This discrepancy between the England and South West completion rates was due to a comparatively high proportion of cases who died or were not evaluated at 12 months in the South West.

Latent TB infection testing and treatment

The national latent TB infection (LTBI) testing and treatment programme (the LTBI programme) has been in place since 2015 as a key action of the previous collaborative strategy (2) (since replaced by the TB Action Plan for England 2021 to 2026 (1). The LTBI programme was established in areas with high TB incidence (more than 20.0 cases per 100,000 population) and the only clinical commissioning group to meet this threshold in the South West was Bristol.

The LTBI programme offers tests to new entrants to the UK based on eligibility criteria set out in the previous collaborative strategy. These are:

- born or spent more than 6 months in a high TB incidence country (≥equal to or greater than 150 per 100,000 population or Sub Saharan Africa)
- entered the UK within the last 5 years (including entry via other countries)
- aged between 16 to 35 years.
- no previous history of TB or LTBI
- not previously screened for LTBI in the UK

Sirona care and health are commissioned to provide a range of services; this includes a TB nurse service and a migrant health service.

The TB nurse service is commissioned to deliver the LTBI new entrant screening programme. The service receives data every 6 months with a list of eligible registrants at Bristol GP practices. Eligible individuals are invited by the service to be screened using simple English and the TB alert video that explains the screening process.

In the year 2020 to 2021 the TB nurse service suspended screening clinics from March 2020 until the end of October 2020 due to COVID-19 restrictions. The service was resumed from November 2020 onwards.

In addition, the Haven Asylum and Refugee health service carries out a comprehensive health assessment which includes testing for LTBI. The Haven continued to do their health assessments throughout 2020. The Haven submits data for those that meet the eligibility criteria for the programme though the screening is done on a wider group of people as per the asylum health service protocols.

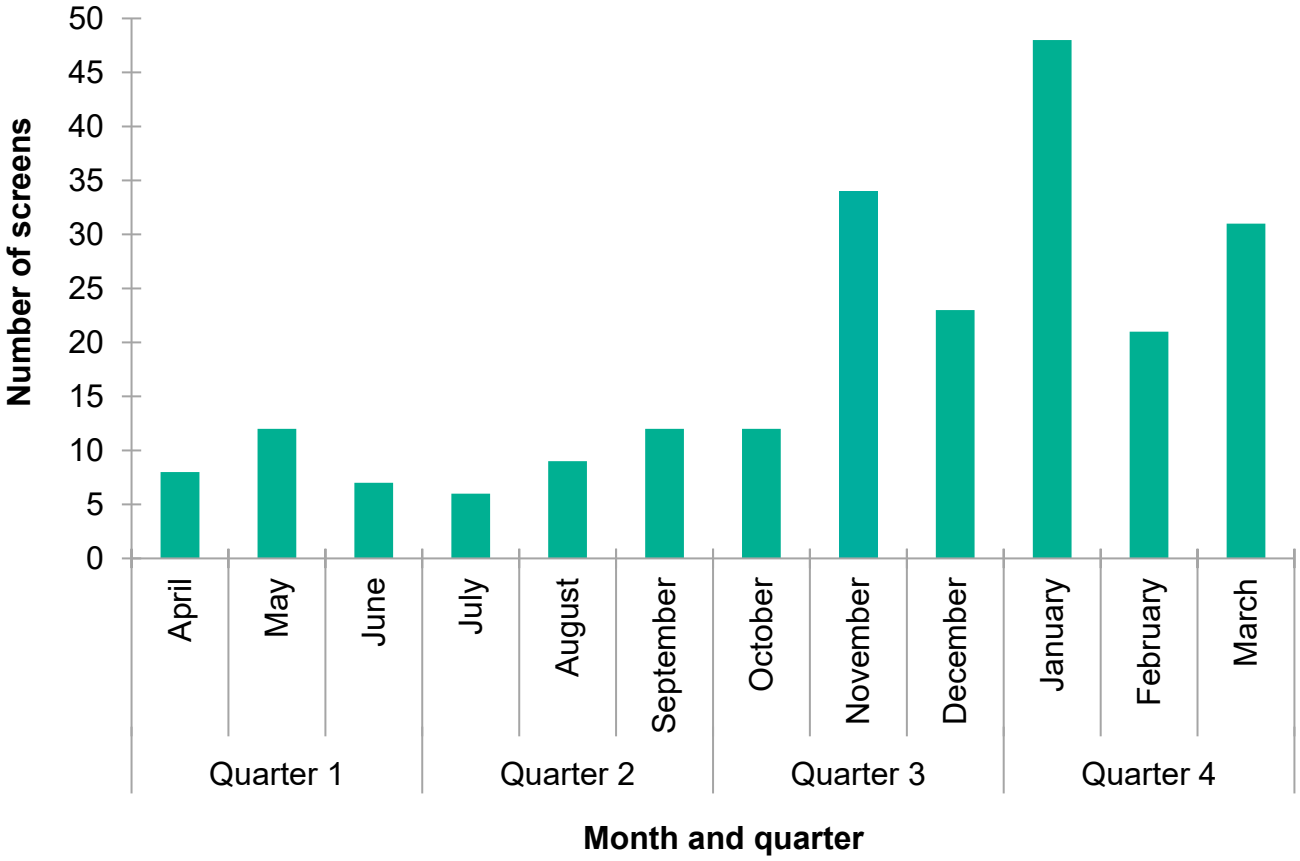
It is important to note that there have been a higher number of asylum seekers in Bristol and that trend has grown again in 2021 to 2022 with the arrival of Afghan refugees and more asylum seekers.

Main messages

In 2020 to 2021, a total of 223 LTBI screening tests were undertaken between one April 2020 to 31 March 2021, which is a slight decrease compared to 2019 to 2020 data (a total of 257 tests). The positivity rate is very high at 73% (163 positive tests) (Figure 15).

Figure 15 also shows that the lowest number of screening tests by month were undertaken in July 2020, which increased to a peak of 48 screen tests in January 2021.

Figure 15. Monthly number of LTBI screens undertaken by Sirona care and health in the financial year 2020 to 2021



Discussion

This report provides an epidemiological overview of TB in the South West. It uses notification data from 2020 and outcome data for cases notified in 2019 and 2018.

Previously, there had been a consistent decline reported in the case notification rate of TB in both the South West and nationally until 2019 when rates increased. Data for cases notified in 2020 shows the rate of TB in the South West and nationally has decreased below those reported for 2019. Rates have decreased from 4.2 to 3.0 per 100,000 population in the South West and 8.4 to 7.3 per 100,000 population in England. The TB rate for 2020 in the South West was the lowest in the country.

The age distribution of TB cases has remained largely similar throughout recent years, with variation generally reflecting changes in population-wide age distribution. The largest decreases in rates of TB between 2019 and 2020 were reported in those cases aged 10 to 19. The highest rate across both years, and historically, have occurred in those aged 30 to 39.

The overall rate of paediatric cases (aged 0 to 14) decreased between 2019 and 2020, although the rate of TB increased in those aged under 5. The rate of TB in UK born children under the age of 15 also decreased between 2019 and 2020, the rate for 2020 was the lowest in 3 years. This rate was also lower than the rate seen nationally. Although improvements have been reported, prevention of paediatric TB cases should remain a focus for South West TB ne2rks.

The rate of TB in both the UK born and non-UK born populations decreased compared to 2019. However, the rate in the non-UK born population was still much higher than the UK-born rate.

The proportion of non-UK born cases diagnosed across all time periods since entering the country has remained primarily similar to proportions seen in 2019. The only substantial increase between 2019 and 2020 was noted in those diagnosed 2 to 5 years after entry. The highest proportion of diagnoses in non-UK born individuals is still 11 or more years after entry. What may be causing this delay between the time of entry and diagnosis is unclear.

The transmission of respiratory infections is facilitated by prolonged close contact and case numbers and rates can become elevated in densely populated areas. The geographical distribution of TB in the South West and nationally typically reflects a higher concentration of cases and rates in urban upper tier local authorities (9). The highest TB rates in the South West were observed in the City of Bristol, Swindon and Bournemouth, Christchurch and Poole. These local authorities contain some large urban areas in the South West.

The rate in the City of Bristol has largely decreased since its peak in 2013, other than a small increase reported in 2019. The rate in Swindon has also decreased since its peak in 2013, but

this trend has demonstrated more variable changes between years although 2020 reported the lowest TB rate in Swindon since 2018. Rates in Bournemouth, Christchurch and Poole have remained relatively steady over previous years, however, 2020 reported the lowest rate since 2014. The City of Bristol contributed more than double the number of TB cases to the South West out of any other upper tier local authority.

These cities similarly contain some of the most diverse communities and deprived areas in the South West, according to IMD rankings (10). As has been shown throughout the years, TB rates are consistently higher in the most deprived areas. This may explain some of the geographic inequality in TB rates. The rate of TB in the most deprived decile in the South West was higher in 2020 compared to 2018 and 2019.

The proportion of cases that were resistant to at least one first-line drug increased slightly between 2019 and 2020. There were no MDR or XDR TB cases reported in 2020. There was a decrease in the proportion of cases with Rifampicin, Ethambutol and Pyrazinamide resistance and an increase in cases with Isoniazid resistance from 2019 to 2020. TB samples from male cases were marginally more likely to be resistant to first-line drugs than those from female cases.

In 2019, the South West had among the highest culture confirmation rate for all cases out of any region in England. However, this has decreased marginally in 2020. Whilst this rate has generally been improving over the years, it is paramount that TB services across the South West target improvement in culture confirmation rates. Culture confirmation supports the confirmation of clinical and radiological TB diagnosis, selection of appropriate treatment regimens, and microbiological whole genome sequencing for public health investigations including the identification of clusters.

The proportion of pulmonary cases in 2020 with a delay of more than 4 months between symptom onset and treatment start date has remained broadly similar to 2019. Nationally, the South West had the 4th lowest proportion of pulmonary cases with a delay of more than 4 months between symptom onset and treatment start date when compared to other regions. Whilst the overall median delay between symptom onset and treatment start decreased for all cases and non-pulmonary cases from 2019 to 2020, this increased for pulmonary cases.

Similar to data from 2019, cases reporting at least one social risk factor had a shorter median time delay and a lower percentage of cases with a time delay greater than 4 months than those reporting no social risk factors. This may indicate successful efforts by these cases to access TB services. Continuing to shorten treatment delays should be a priority for South West TB ne2rks as this is likely to reduce transmission and ensure better treatment outcomes.

In 2020, the proportion of cases reporting at least one social risk factor increased compared to 2019. Cases reporting at least one social risk factor were more likely to be male, UK born and of white ethnicity. Homelessness was the most frequently reported social risk factor. Drug use,

alcohol and imprisonment continue to be frequently reported among South West TB cases with social risk factors.

The treatment completion rate at 12 months for the drug-sensitive cohort in the South West was 73.6%. This has decreased since 2018 and was also the lowest of all regions in England. The South West has regularly missed the recommended target of 85% for these cases (1). It should however be noted that the South West also had the highest proportion of all regions in England where treatment outcome was not evaluated among this group of cases (10.6%).

During 2020, there were major impacts on healthcare, migration, and social interactions due to the ongoing COVID-19 pandemic which may have affected TB notifications in complex ways. It is important to note that the data and findings from 2020 are unlikely to represent the true burden of disease. As such their use in monitoring progress against both elimination goals and planning service provision will require careful consideration and further analysis of both 2020 and 2021 data (7).

Conclusion and recommendations

In line with the national trend, TB incidence decreased in the South West in 2020 compared to 2019. This may reflect the rate of TB stabilising after increasing in 2019. Whilst some longer term trends suggest that TB control in the South West continues to improve, some indicators highlight areas requiring further work across health systems and with local areas.

Due to the complex direct and indirect effects of the COVID-19 pandemic and response, notification data from 2020 may under-represent the true disease burden.

Main recommendations from the data presented in this report include:

- continuing to increase the rate of culture confirmation in all cases
- ensuring services are accessible and deliver high quality outcomes for underserved and non-UK born populations, those living in deprived communities and cases with social risk factors or drug-resistant TB
- reducing delays between symptom onset to treatment start for cases
- improving the treatment completion rate in the drug-sensitive cohort
- improving data quality and completeness of key fields in NTBS

It is expected that as cohort review continues to evolve it will facilitate services to improve TB detection, reduce healthcare associated delays and improve treatment outcomes. WGS is imperative to improve TB management and prevention. TB continues to present challenges for treatment completion which need to be considered when providing services.

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Appendix A. Methods, description of data sources and definitions

Methods

For a full description of the methods used to collect, manage, and clean the data see the national TB annual report.

Data sources

Data on TB cases in the South West comes from the national Enhanced TB Surveillance (ETS) system. Data collected includes notification, demographic, clinical and microbiological information, including drug resistance, and strain type.

Population denominators come from the Office for National Statistics (ONS) mid-year population estimates and the Quarterly Labour Force Survey, April to June 2020.

Definitions

Term	Definition
Amplified resistance	Amplified resistance is classed as resistance identified on repeat culture after 3 months of the first specimen date. Cases with a change from a sensitive to resistant result following treatment start are reclassified as amplified resistance, even if this is within the 3 month period.
BCG	Bacillus Calmette-Guérin vaccination.
Cluster	Clusters in this document refer to molecular clusters only. These are defined as a group of 2 or more cases that are infected with a strain of Mycobacterium tuberculosis complex with indistinguishable MIRU-VNTR profiles. Each cluster must have at least one notification with a full 24 MIRU-VNTR profile, and other members of the cluster may have a maximum of one missing loci.
Confidence intervals	A 95% confidence interval for incidence was obtained using the relevant procedure in Stata, assuming a Poisson distribution.
Drug resistant cohort	The drug resistant cohort includes any cases with rifampicin-resistant TB (initial or amplified), including MDR-TB (initial or amplified), as well as those without culture confirmation treated for MDR-TB.

Term	Definition
Drug sensitive cohort	The drug sensitive cohort excludes all TB cases with rifampicin-resistant TB (initial or amplified) including MDR-TB (initial or amplified), and non-culture confirmed cases treated as MDR-TB.
Extensively drug resistant TB (XDR-TB)	XDR-TB is defined as resistance to isoniazid and rifampicin (MDR-TB), at least one injectable agent (capreomycin, kanamycin or amikacin) and at least one fluoroquinol1.
First-line drug resistance	First-line drug resistance is defined as resistance to at least one of the first-line drugs (isoniazid, rifampicin, ethambutol, pyrazinamide).
Initial resistance	Initial resistance is classed as resistance identified within 3 months of the first specimen date.
Interquartile range	A measure of statistical dispersion, being equal to the difference between the upper and lower quartiles (IQR = $Q_3 - Q_1$).
Latent TB infection (LTBI)	LTBI is defined as a state of persistent immune response to stimulation by *Mycobacterium tuberculosis* antigens without evidence of active TB disease.
Last recorded outcome	Last known outcome, irrespective of when it occurred.
Median	Denoting or relating to a value or quantity lying at the midpoint of a frequency distribution of observed values or quantities, such that there is an equal probability of falling above or below it.
Multi-drug resistant TB (MDR-TB)	MDR-TB is defined as resistance to at least isoniazid and rifampicin, with or without resistance to other drugs.
Multi-drug resistant and rifampicin resistant TB (MDR/RR-TB)	MDR/RR-TB is defined as resistance to rifampicin including MDR-TB cases.
Population denominator	Tuberculosis rates by geographical area, age, sex and place of birth were calculated using ONS mid-year population estimates. Rates by place of birth and by ethnic group were calculated using population estimates from the Labour Force Survey. The Labour Force Survey is based on a population sample, so estimates are liable to sampling errors, particularly for small population subgroups, and should be interpreted with caution.
Post-mortem diagnosis	A post-mortem diagnosis is an unexpected diagnosis of TB made after death, usually during an autopsy examination.

Term	Definition
Proportions	All proportions in this report are calculated among cases with known information or a known result, except where otherwise stated.
Pulmonary tuberculosis	A pulmonary case is defined as a case with TB involving the lungs or tracheo-bronchial tree, with or without non-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.
Social risk factor	Social risk factors for TB include current alcohol misuse, current or history of homelessness, current or history of imprisonment and current or history of drug misuse.
Treatment outcome	Information on outcomes were reported for all cases reported in the previous year, excluding those with known rifampicin-resistant disease: outcomes for these cases were reported at 24 months. Definitions for outcomes are based on WHO and European Centre for Disease Prevention and Control definitions but adapted to the UK context. In this report, all data was obtained from the ETS matched data set provided in October 2020.

Appendix B. TB among South West residents

Table B1. TB cases by local authority of residence (district level), South West, 2000 to 2020

Local authority	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bath and North East Somerset	6	11	11	12	9	18	4	5	8	12	12	4	11	9	20	12	5	3	5	8	0
Bournemouth, Christchurch, and Poole	33	24	28	20	25	38	32	25	29	22	23	28	19	16	14	23	17	18	17	20	15
Bristol, City of	48	40	63	51	75	66	81	81	71	84	81	82	88	97	98	79	66	61	48	49	43
Cheltenham	8	7	10	6	8	6	14	8	13	8	5	7	5	13	7	5	2	4	4	4	4
Cornwall and Isles of Scilly	13	10	13	12	20	13	10	21	11	13	7	23	18	14	17	9	12	14	13	11	13
Cotswold	2	3	0	0	1	1	2	1	2	2	1	3	5	3	1	1	1	1	2	2	2
Dorset	11	13	7	11	12	14	15	12	8	20	9	8	10	11	13	5	7	10	6	6	2
East Devon	8	2	5	1	6	5	1	3	2	5	4	3	1	0	1	4	2	1	4	6	3
Exeter	3	6	2	1	7	7	6	8	7	9	1	8	14	7	5	5	6	7	5	6	5
Forest of Dean	3	3	2	2	1	2	3	3	1	1	0	1	1	0	1	2	1	1	3	0	1
Gloucester	7	1	7	7	8	6	12	13	11	8	7	13	11	21	8	12	8	6	3	9	8
Mendip	2	2	5	2	10	9	3	3	4	1	4	2	2	6	5	3	2	3	1	1	2
Mid Devon	2	0	0	1	0	2	1	0	4	0	2	2	3	1	3	2	1	5	2	3	1
North Devon	3	0	0	0	1	0	0	1	0	1	0	0	1	3	3	4	2	1	1	2	0
North Somerset	3	7	4	3	5	10	6	5	10	13	10	6	9	7	8	10	6	6	7	5	6
Plymouth	11	15	12	9	12	5	16	12	13	13	11	16	20	12	11	18	17	20	11	12	7
Sedgemoor	1	0	5	0	2	0	0	3	2	1	2	7	3	2	4	2	0	3	0	6	3
Somerset West and Taunton	4	2	5	2	3	3	0	2	5	2	3	6	6	3	2	0	4	2	1	9	4
South Gloucestershire	8	11	5	12	12	10	9	8	16	25	13	18	13	17	21	16	18	9	11	18	7
South Hams	2	6	0	0	1	1	2	2	2	1	6	3	1	2	4	3	1	2	1	0	2
South Somerset	2	2	4	2	2	9	5	5	2	3	5	2	5	5	8	0	1	2	2	3	1
Stroud	6	3	0	6	3	4	4	3	7	4	2	2	5	7	5	5	1	3	3	6	3
Swindon	11	9	8	12	11	10	21	24	13	18	21	23	18	30	18	22	30	25	17	24	17
Teignbridge	11	12	5	8	2	2	5	4	8	8	5	9	4	9	7	13	7	3	6	3	0
Tewkesbury	5	1	1	2	3	4	2	2	1	1	2	4	2	4	4	4	3	5	4	5	3
Torbay	9	8	6	3	8	12	10	4	11	14	12	11	5	10	6	8	6	3	5	2	3
Torridge	1	1	0	0	1	0	0	1	0	0	0	1	1	0	2	1	1	0	1	1	1
West Devon	1	1	1	2	3	0	2	1	2	1	2	0	5	5	4	1	0	0	2	0	1
Wiltshire	6	11	11	14	12	9	12	9	16	13	15	15	14	12	16	16	11	9	6	13	10

Table B2. TB rate per 100,000 population by lower tier local authority of residence, South West, 2000 to 2020

Local authority	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bath and North East Somerset	3.6	6.5	6.5	7.0	5.3	10.5	2.3	2.9	4.6	6.9	6.9	2.3	6.2	5.0	10.5	6.5	2.7	1.6	2.6	4.1	0.0
Bournemouth, Christchurch and Poole	9.5	6.9	8.0	5.7	7.2	10.8	9.0	7.0	8.0	6.0	6.2	7.4	5.0	4.2	3.6	5.9	4.3	4.5	4.3	5.3	3.8
Bristol, City of	12.3	10.3	16.2	13.0	19.0	16.3	19.8	19.7	17.1	20.0	19.1	19.2	20.3	22.1	22.1	17.5	14.5	13.3	10.6	10.8	9.2
Cheltenham	7.3	6.4	9.1	5.5	7.3	5.4	12.5	7.1	11.5	7.0	4.4	6.1	4.3	11.2	6.0	4.3	1.7	3.4	3.4	4.3	3.4
Cornwall and Isles of Scilly	2.6	2.0	2.6	2.3	3.9	2.5	1.9	4.0	2.1	2.5	1.3	4.3	3.3	2.6	3.1	1.6	2.2	2.5	2.5	1.9	2.3
Cotswold	2.5	3.7	0.0	0.0	1.2	1.2	2.4	1.2	2.4	2.4	1.2	3.6	6.0	3.6	1.2	1.2	1.2	1.1	2.2	2.2	2.2
Dorset	3.2	3.8	2.0	3.1	3.4	3.9	4.2	3.3	2.2	5.5	2.5	2.2	2.7	3.0	3.5	1.3	1.9	2.7	1.9	1.8	0.5
East Devon	6.4	1.6	4.0	0.8	4.7	3.9	0.8	2.3	1.5	3.8	3.0	2.3	0.7	0.0	0.7	2.9	1.4	0.7	2.8	4.1	2.0
Exeter	2.7	5.4	1.8	0.9	6.3	6.2	5.3	7.0	6.1	7.9	0.9	6.8	11.8	5.8	4.1	4.0	4.7	5.4	4.6	4.6	3.8
Forest of Dean	3.8	3.7	2.5	2.5	1.2	2.5	3.7	3.7	1.2	1.2	0.0	1.2	1.2	0.0	1.2	2.4	1.2	1.2	3.5	0.0	1.1
Gloucester	6.3	0.9	6.3	6.3	7.1	5.3	10.4	11.1	9.3	6.7	5.8	10.7	8.9	16.9	6.4	9.4	6.2	4.6	2.3	7.0	6.2
Mendip	1.9	1.9	4.8	1.9	9.5	8.5	2.8	2.8	3.7	0.9	3.7	1.8	1.8	5.4	4.5	2.7	1.8	2.6	0.9	0.9	1.7
Mid Devon	2.9	0.0	0.0	1.4	0.0	2.7	1.3	0.0	5.2	0.0	2.6	2.6	3.8	1.3	3.8	2.5	1.3	6.2	2.4	3.6	1.2
North Devon	3.4	0.0	0.0	0.0	1.1	0.0	0.0	1.1	0.0	1.1	0.0	0.0	1.1	3.2	3.2	4.2	2.1	1.0	1.0	2.1	0.0
North Somerset	1.6	3.7	2.1	1.6	2.6	5.1	3.0	2.5	5.0	6.4	4.9	3.0	4.4	3.4	3.8	4.8	2.8	2.8	3.3	2.3	2.8
Plymouth	4.6	6.2	4.9	3.7	4.9	2.0	6.4	4.8	5.1	5.1	4.3	6.2	7.8	4.6	4.2	7.3	6.5	7.6	4.6	4.6	2.7
Sedgemoor	1.0	0.0	4.7	0.0	1.8	0.0	0.0	2.7	1.8	0.9	1.8	6.1	2.6	1.7	3.4	1.7	0.0	2.5	0.0	4.9	2.4
Somerset West and Taunton	3.0	1.5	3.6	1.4	2.1	2.1	0.0	1.4	3.5	1.4	2.1	4.1	4.1	2.0	1.4	0.0	2.7	1.3	0.6	5.2	2.6
South Gloucestershire	3.3	4.5	2.0	4.8	4.8	3.9	3.5	3.1	6.2	9.6	5.0	6.8	4.9	6.3	7.7	5.8	6.5	3.2	3.9	6.3	2.4
South Hams	2.4	7.3	0.0	0.0	1.2	1.2	2.4	2.4	2.4	1.2	7.2	3.6	1.2	2.4	4.7	3.5	1.2	2.3	1.2	0.0	2.3
South Somerset	1.3	1.3	2.6	1.3	1.3	5.8	3.2	3.1	1.2	1.9	3.1	1.2	3.1	3.0	4.9	0.0	0.6	1.2	1.2	2.4	0.6
Stroud	5.6	2.8	0.0	5.5	2.7	3.6	3.6	2.7	6.3	3.6	1.8	1.8	4.4	6.1	4.3	4.3	0.9	2.5	2.5	5.0	2.5
Swindon	6.1	5.0	4.4	6.5	5.9	5.3	10.9	12.2	6.5	8.8	10.1	11.0	8.5	14.0	8.3	10.1	13.7	11.3	6.3	10.4	7.6
Teignbridge	9.1	9.9	4.1	6.5	1.6	1.6	4.0	3.2	6.4	6.4	4.0	7.2	3.2	7.1	5.5	10.1	5.4	2.3	4.5	2.2	0.0
Tewkesbury	6.5	1.3	1.3	2.6	3.8	5.1	2.5	2.5	1.3	1.2	2.5	4.9	2.4	4.7	4.7	4.6	3.4	6.6	4.3	5.3	3.1
Torbay	7.0	6.2	4.6	2.3	6.1	9.1	7.6	3.0	8.3	10.6	9.1	8.4	3.8	7.6	4.5	6.0	4.5	2.2	3.7	1.5	2.2
Torridge	1.7	1.7	0.0	0.0	1.6	0.0	0.0	1.6	0.0	0.0	0.0	1.6	1.5	0.0	3.0	1.5	1.5	0.0	1.5	1.5	1.5
West Devon	2.1	2.0	2.0	4.0	6.0	0.0	3.9	1.9	3.8	1.9	3.8	0.0	9.3	9.3	7.4	1.8	0.0	0.0	7.2	0.0	1.8
Wiltshire	1.4	2.5	2.5	3.2	2.7	2.0	2.6	2.0	3.4	2.8	3.2	3.2	2.9	2.5	3.5	3.3	2.2	1.8	1.2	2.8	2.0

Table B3. TB rate per 100,000 population by clinical commissioning group (CCG), South West, 2000 to 2020

Local authority	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NHS Bath and North East Somerset, Swindon and Wiltshire CCG	2.9	3.9	3.8	4.7	4.0	4.4	4.4	4.6	4.4	5.1	5.6	4.9	4.9	5.8	6.1	5.6	5.1	4.1	3.0	4.9	2.9
NHS Bristol, North Somerset and South Gloucestershire CCG	7.2	7.0	8.7	7.9	11.0	10.1	11.2	10.8	10.9	13.7	11.7	11.8	12.2	13.2	13.8	11.2	9.5	8.0	6.9	7.5	5.8
NHS Devon CCG	4.8	4.7	2.9	2.3	3.7	3.1	3.8	3.2	4.2	4.6	3.8	4.7	4.7	4.3	4.0	5.1	3.7	3.5	3.2	2.9	1.9
NHS Dorset CCG	6.4	5.3	5.0	4.4	5.3	7.3	6.6	5.1	5.1	5.7	4.3	4.8	3.9	3.6	3.6	3.7	3.1	3.6	3.0	3.4	2.2
NHS Gloucestershire CCG	5.5	3.2	3.4	4.0	4.2	4.0	6.4	5.1	6.0	4.1	2.9	5.0	4.8	7.9	4.3	4.7	2.6	3.2	3.0	4.1	3.3
NHS Kernow CCG	2.6	2.0	2.6	2.3	3.9	2.5	1.9	4.0	2.1	2.5	1.3	4.3	3.3	2.6	3.1	1.6	2.2	2.5	2.3	1.9	2.3
NHS Somerset CCG	1.8	1.2	3.8	1.2	3.3	4.1	1.5	2.5	2.5	1.3	2.6	3.2	3.0	3.0	3.5	0.9	1.3	1.8	0.7	3.4	1.8

Table B4. TB cases and rate by age and sex, South West, 2020

Age group (years)	Male count	Male rate	Female count	Female rate
0 to 9	4	1.3	2	0.7
10 to 19	1	0.3	4	1.3
20 to 29	15	4.3	7	2.2
30 to 39	28	8.5	18	5.4
40 to 49	11	3.3	13	3.8
50 to 59	19	4.9	9	2.2
60 to 69	6	1.8	6	1.7
70 or over	15	3.5	9	4

Table B5. Drug resistance among TB cases with culture confirmed disease* South West, 2000 to 2020

Year	Any resistance		Isoniazid resistant		Multi-drug resistant		Ethambutol		Rifampicin		Total	Pyrazinamide		Total excluding *M. bovis*
	n	%	n	%	n	%	n	%	n	%	n	n	%	n
2000	5	4.8	4	3.8	1	1.0	0	0.0	2	1.9	108	0	0.0	104
2001	8	7.4	8	7.4	0	0.0	0	0.0	0	0.0	110	0	0.0	108
2002	6	4.8	6	4.8	1	0.8	0	0.0	1	0.8	128	0	0.0	125
2003	6	5.0	6	5.0	2	1.7	0	0.0	2	1.7	123	0	0.0	121
2004	7	4.6	7	4.6	0	0.0	0	0.0	0	0.0	151	0	0.0	151
2005	7	4.0	7	4.0	3	1.7	1	0.6	3	1.7	175	0	0.0	174
2006	8	4.8	8	4.8	0	0.0	0	0.0	0	0.0	170	0	0.0	166
2007	9	5.8	8	5.1	1	0.6	1	0.6	1	0.6	160	2	1.3	156
2008	13	6.9	10	5.3	3	1.6	2	1.1	4	2.1	191	3	1.6	189
2009	16	8.3	13	6.8	2	1.0	2	1.0	3	1.6	195	4	2.1	192
2010	8	5.8	5	3.6	1	0.7	1	0.7	2	1.5	141	2	1.5	137
2011	18	9.2	16	8.2	1	0.5	2	1.0	1	0.5	201	1	0.5	196
2012	13	7.1	10	5.5	2	1.1	1	0.5	3	1.6	190	3	1.6	183
2013	13	7.2	11	6.1	1	0.6	1	0.6	1	0.6	186	2	1.1	180
2014	12	7.1	11	6.5	2	1.2	2	1.2	2	1.2	177	0	0.0	168
2015	9	5.5	9	5.5	1	0.6	0	0.0	1	0.6	173	1	0.6	163
2016	17	11.8	13	9.0	3	2.1	3	2.1	5	3.5	151	1	0.7	144
2017	12	9.0	10	7.5	4	3.0	2	1.5	4	3.0	144	6	4.5	133
2018	11	9.9	8	7.2	0	0.0	1	0.9	0	0.0	120	2	1.8	111
2019	9	6.0	7	4.7	3	2.0	2	1.3	4	2.7	159	1	0.7	149
2020	7	6.6	6	5.7	0	0.0	1	0.9	1	0.9	110	0	0.0	106

* Culture confirmed cases, Pyrazinamide resistance excluding *M. bovis* case.

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