UK Health Security Agency

Tuberculosis in the East of England

2021 report (presenting data to end of 2020)

Data from 2000 to 2020

Contents

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

Acknowledgements

We are grateful to all those who contribute information on people with tuberculosis in the East of England, including nurses, physicians, microbiologists, scientists, outreach and social care and administrative staff. We also acknowledge colleagues at the UK Health Security Agency (UKHSA) National Mycobacterium Reference Service for information on culture confirmation and drug susceptibility testing. Further thanks are due to the UKHSA National Tubuerculosis (TB) Unit for providing the cleaned matched data set, the East of England Centre Health Protection Team and the Field Service East of England team for their work supporting Enhanced Tuberculosis Surveillance.

Authors

This report was prepared by Nneoma Okeke, Amy Trindall and Lucy Reeve (Field Service East of England, Health Protection Operations, UKHSA) with input from Richard Puleston (Field Service East of England) and Ravikumar Balakrishnan (Health Protection Team East of England, Health Protection Operations, UKHSA).

Suggested citation

UK Health Security Agency. (October 2022) Tuberculosis in East of England: 2021 Report (presenting data to end of 2020), 2022. UK Health Security Agency: (East of England).

Lay summary

The coronavirus (COVID-19) pandemic has affected healthcare systems and health care reporting worldwide, with tuberculosis (TB) being no exception. TB is an infectious disease of public health concern, with 5.8 million newly diagnosed cases reported globally in 2020. This is a significant decline from 2019 when 7.1 million cases were reported, and a substantial difference from the predicted 10 million cases. This drop is likely to be an artefact of reduced diagnosis and reporting during the pandemic. The COVID-19 pandemic has significantly slowed the progress made in tacking TB, with reduced TB diagnoses and treatments being executed, there has been an increase in TB deaths, bringing rates back up to those seen in 2017 (1).

The UK Health Security Agency (UKHSA), working with NHS England (NHSE), has launched a 5-year action plan to reduce TB cases in England (2). The TB action plan for England, 2021 to 2026 aim to improve prevention, detection and control of TB, enabling the UK to meet its commitment to the World Health Organization (WHO) End TB Strategy and eliminate TB in England by 2035. Earlier detection and treatment of TB increases the likelihood of recovery and reduces the chances of onward spread of disease.

This report looks at TB in the East of England and enables everyone involved (from GPs to local government) to use the latest data to design public health strategies and clinical care to control TB and achieve elimination by 2035.

TB case reports peaked at 560 in the East of England in 2011. Since then, the number of people diagnosed with TB has fallen by 34% to 371 people in 2020. In general, the East of England has lower rates of TB than England overall (5.7 cases per 100,000 population compared to 7.3 per 100,000).

The recent declines are not experienced by all groups of people, and there are still significant inequalities to be addressed. The largest reductions occurred among people born outside the UK, with steady rate reductions seen since 2016; however, an increasing proportion of TB cases are among people from Pakistan.

In 2020, over 4 months elapsed between the onset of symptoms and treatment for both pulmonary and extra-pulmonary TB in over 40% of cases. This is an increase in delay for pulmonary TB from 2019 where 36.3% of cases experienced a delay of over 4 months – another likely effect of the COVID-19 pandemic.

More than 10% of people with TB in 2020 reported having social risk factors such as drug and alcohol misuse, homelessness, or a history of imprisonment. These individuals are twice as likely to die following their TB diagnosis, and therefore need additional social support to help them successfully complete their antibiotic treatment in a stable environment.

For the first time since 2016 the proportion of patients that completed treatment within 12 months dropped below 80%, with 77.1% of patients diagnosed in 2019 completing treatment in 2020, which is likely due to the influence of COVID-19 pandemic (3). Encouragingly, antibiotic-resistant TB is still relatively rare.

Whilst positive steps have been made towards the elimination of TB in the East of England the COVID-19 pandemic has affected many areas of healthcare, and the progress towards TB elimination has unfortunately also been adversely affected. The UKHSA TB action plan for 2021 to 2026 has taken recovering from COVID-19 into consideration by outlining steps stakeholders need to take to ensure we get back on track to meet elimination targets. Although achieving elimination is a very challenging target, everyone should continue to work together in integrated and co-ordinated ways to achieve TB control through effective clinical care, surveillance, and public health action.

Executive summary

In 2020, there were 371 TB case reports to the UK Health Security Agency (UKHSA) Enhanced Tuberculosis Surveillance system (ETS) for individuals resident in the East of England. The East of England has lower rates of TB than England as a whole. In 2020, the 371 cases equated to a rate of 5.7 cases per 100,000 population (95% confidence interval (CI) 5.1-6.3), compared to 7.3 per 100,000 (95% CI 7.1–7.5) in England overall (4).

In the East of England, both the number of cases and rate of TB decreased in 2020 compared to 2019 (6.4 per 100,000, 95% CI 5.8–7.0). Case numbers increased marginally in 2 out of 12 local authorities, but encouraging reductions were observed in Bedford (7 cases versus 16 in 2019), Hertfordshire (67 cases versus 78 in 2019), Peterborough (29 cases versus 39 in 2019), and Thurrock (7 cases versus 18 in 2019). While the reduction in incidence is in line with similar reductions over the years, it is still unclear how great a role the COVID-19 pandemic played in influencing these figures.

As in previous years, Luton continued to experience the highest rate of TB in the East of England (26.7 per 100,000), an increase from 2019 (21.1 per 100,000). Luton, Southend-on-Sea, and Suffolk all recorded an increasing trend in rate between 2019 and 2020.

The highest age and sex specific rates of TB in the East of England were recorded among men aged 30 to 39 years (15.3 per 100,000) and women 40 to 49 years (8.7 per 100,000), with 15 paediatric cases reported. TB rates declined in every age group except among people aged 0 to 14 years whose rate increased.

Country of birth data was available for 98.4% of cases in the East of England in 2020 (365 out of 371). A country of birth outside of the UK was recorded for 70.4% of people with TB in 2020 (257 out of 365). This largely reflects the high incidence of TB in the communities from which migrants have originated. The rate of TB among people born outside the UK (32.1 per 100,000)

was 16 times higher than the rate among UK born individuals (2.0 per 100,000). The decline in rate for the East of England is largely caused by changes in TB among people born outside the UK.

Compared with England overall, people with TB are more frequently born in India, Pakistan, Romania, Somalia, and Eritrea (4). There was a decrease in TB cases from all persons born outside the UK, with the biggest decrease seen in those from Poland where cases fell by 36%, possibly due to restrictions on travel and immigration.

Among those with ethnicity recorded, the most common ethnic group with TB in the East of England is white (41.6%, 151 out of 363), equating to a rate of 2.7 cases per 100,000, slightly lower than the rate recorded for white individuals in 2019 (3.2 per 100,000). As in previous years, most TB cases among people born outside the UK occurred among settled migrants who entered the UK 11 or more years prior to their TB diagnosis.

In 2020, approximately one-quarter of people with TB in the East of England aged between 18 and 65 years were not in employment or education (24.5%, 72 out of 294). Where occupation was recorded, 12.9% of people with TB were healthcare workers (38 out of 294), 1.4% worked in social service or prison services (4 out of 294), and 7.1% were in the education sector as either students or staff (21 out of 294).

As in previous years, over half (60.9%, 226 out of 371) of people had pulmonary TB. Of those with hospital inpatient status recorded, nearly one-quarter were inpatients at the time of diagnosis (23.5%, 81 out of 345). Inpatient cases were more likely to have previously been diagnosed with TB (8.6%, 7 out of 81) compared with the East of England average (6.7%, 23 out of 345). Furthermore, 65.9% of pulmonary TB cases were confirmed by culture (149 out of 226), which is still not at the national target of 80%.

Among people with pulmonary TB in 2020 with a recorded onset and treatment date, 31.2% started TB treatment within 2 months of symptom onset (59 out of 189), a slight decrease from 2019 where 35.2% of patients were treated within 2 months. Additionally, 41.8% of people with pulmonary TB diagnosed in 2020 started treatment more than 4 months after symptom onset, consistent with a prolonged period of infectiousness. Of note is the significantly increased median time from symptom onset to diagnosis for pulmonary cases, increasing by over 3 weeks (24 days) since 2019 (101 days in 2020 versus 77 days in 2019) which is likely due to the influence of the COVID-19 pandemic on the healthcare system. This change means similar median durations to diagnosis were seen for both pulmonary and extra-pulmonary cases (103 days) in 2020

Treatment was completed within 12 months for 77.1% (280 out of 363) of people with rifampicin sensitive TB reported in 2019 whose expected treatment duration was less than 12 months. The most common outcome category for people who did not complete treatment within 12 months was continuation of treatment (7.2%, 26 out of 363). Sixteen people reported in 2019 with

rifampicin sensitive TB died within 12 months of their diagnosis, 50% (8 out of 16) of whom had TB cause or contribute to their death.

TB antibiotic sensitivity was known for 56.6% of cases in 2020 (210 out of 371), of which 4.7% were resistant to at least 1 first line drug (10 out of 210), and 1.4% had multidrug-resistant or rifampicin-resistant TB (MDR/RR-TB, 3 out of 210). One of these cases had extensively drug-resistant TB (XDR-TB).[1]

People reporting one or more social risk factors for TB, including drug and alcohol misuse, homelessness and prison was similar in 2020 (12.6%, 37 out of 293) to 2019 (12.9%, 45 out of 350). In previous years, the East of England has had one of the highest proportions of people with risk factors, but this now falls slightly below average for England overall (12.7%) (4). This may reflect a real change in the characteristics of people with TB, but also depends on their willingness to disclose such information to TB services.

When looking at the demographics of those with social risk factor (SRF) associated TB in the East of England between 2010 and 2020, 86.5% of those with gender data available were male (430 out of 497), 45.8% of those with country of birth data available were UK born (217 out of 474), 57.9% of those with ethnicity data available were white (288 out of 481). The majority of those with site of disease data available had pulmonary disease (82.1%, 408 out of 496), reiterating that pulmonary disease transmission is probably higher among those with social risk factors than those without. When comparing TB cases with a recorded sputum smear result, those with SRFs had positive smears 65.5% of the time (187 out of 285) compared to 47.7% in those with no SRF between 2010 and 2020. Considering those with data on previous TB diagnosis between 2010 and 2020, those with SRF were twice as likely to have had TB previously compared to those with no SRFs (12.2%, 53 out of 433 versus 5.9%, 242 out of 4,095). Lastly, when looking at treatment outcomes in those with data recorded between 2010 and 2020, those with SRFs completed treatment 77.1% of the time compared to 89.7% completion in those with no SRFs.

In 2020 almost half (41%, 152 out of 371) of people with TB were resident in the most deprived areas of the East of England,[2] and a substantial proportion of patients living in these areas (16.3%, 20 out of 152) also had at least one social risk factor. As in previous years, TB case rate has maintained a linear association with deprivation.

HIV tests were not offered to 5.1% of people with TB in 2020 that were eligible to be tested (17 out of 335[3]). Having offered a test to the other 95.0% of individuals, follow-up to complete the test varied substantially by upper tier local authority. Except for Bedford and Suffolk local

[1] 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 one injectable agent (amikacin, capreomycin or kanamycin) and at least one fluoroquinolone (moxifloxacin, ofloxacin or ciprofloxacin).
[2] Most deprived quintile of lower super output areas based on Index of Multiple Deprivation (IMD 2015) rank.
[3] Excludes TB cases diagnosed post-mortem and patients whose HIV status was already known.

authorities, local authorities in the East of England offered and performed HIV tests in 90% of cases.

In conclusion, the epidemiology of TB in the East of England is changing. Although the overall number of TB notifications has declined in the East of England, the influence the COVID-19 pandemic has had on reporting and diagnoses must be considered. Ongoing attention should be paid to people with social risk factors who represent a core population of socially disadvantaged individuals who require continued effort and investment to provide effective packages of TB care. All stakeholders including commissioners and partners of TB services should work together on innovative local approaches to reduce the average time from symptom onset to treatment start for people with pulmonary TB to reduce their infectious period.

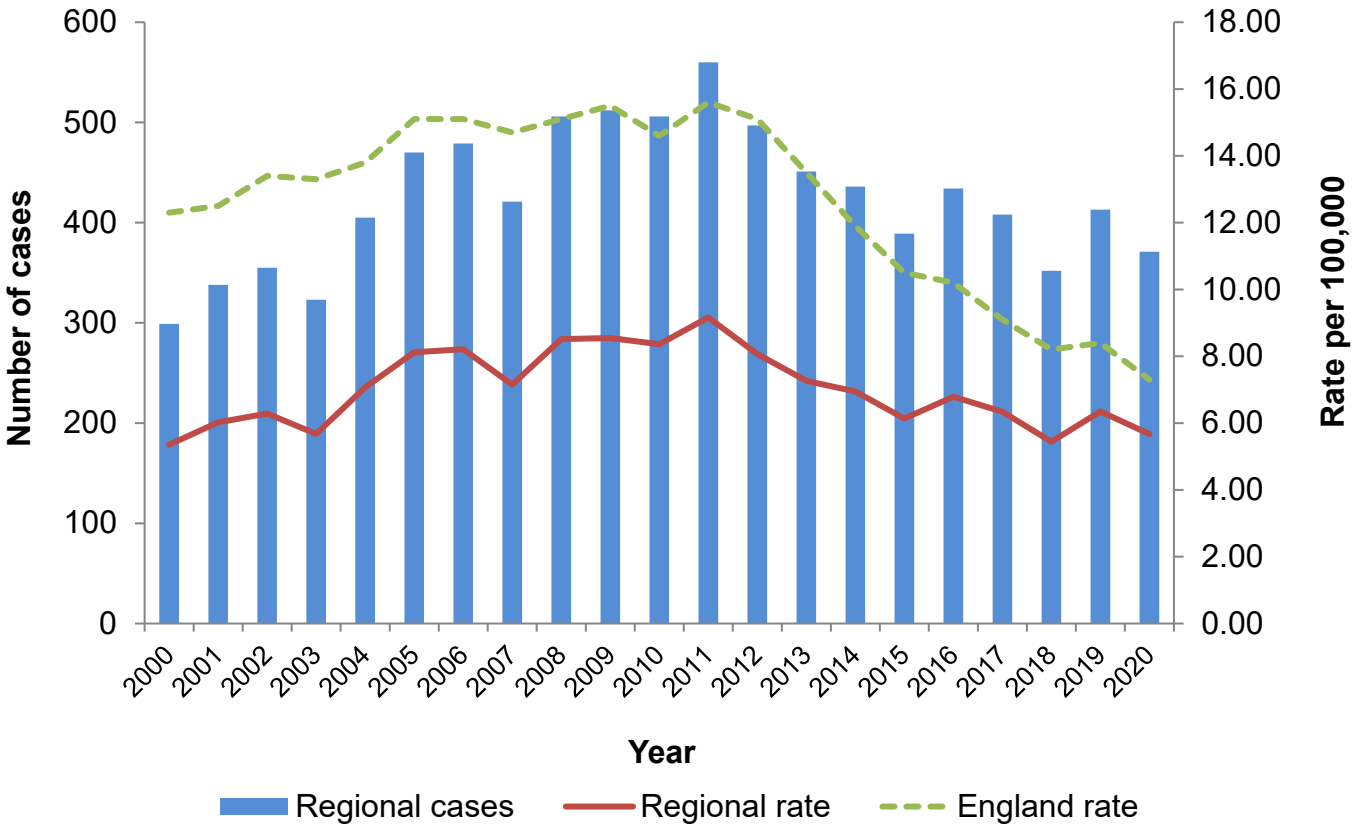
Additionally, providers should ensure thorough contact tracing is undertaken to interrupt transmission, and clusters of genetically related cases of TB should be investigated. HIV tests should be offered to all people diagnosed with TB, in line with national guidance, and everyone should have access to high-quality diagnostic which should improve the rate of culture confirmation to reach the national target of 80%. The Cohort Review process should continue to provide local oversight of all of these aspects of TB control and should escalate any issues to the regional TB Control Board. Finally, the collaborative UKHSA and NHSE&I TB Action Plan, 2021 to 2026, should be reviewed to identify and act upon any additional priority areas.

1. TB notifications and incidence

Overall numbers, rates, and geographical distribution

In 2020, 371 cases of TB were notified in the East of England, with a crude rate of 5.7 per 100,000 population (95% confidence interval (CI) 5.1–6.3) as shown in Figure 1.1. This was a decrease of 10.2% in the number of cases, and a 10.6% decrease in the rate compared to 2019 (n=413, rate: 6.4 per 100,000, 95% CI 5.8–7.0). The rate of TB in the East of England remains significantly lower than the overall rate for England (7.3 per 100,000) (4). Case rates have been gradually declining in the East of England since their peak in 2011 (9.2 per 100,000), with a particularly low rate of notifications in 2018 (5.4 per 100,000).

Figure 1.1. TB case reports and rates, East of England, 2000 to 2020



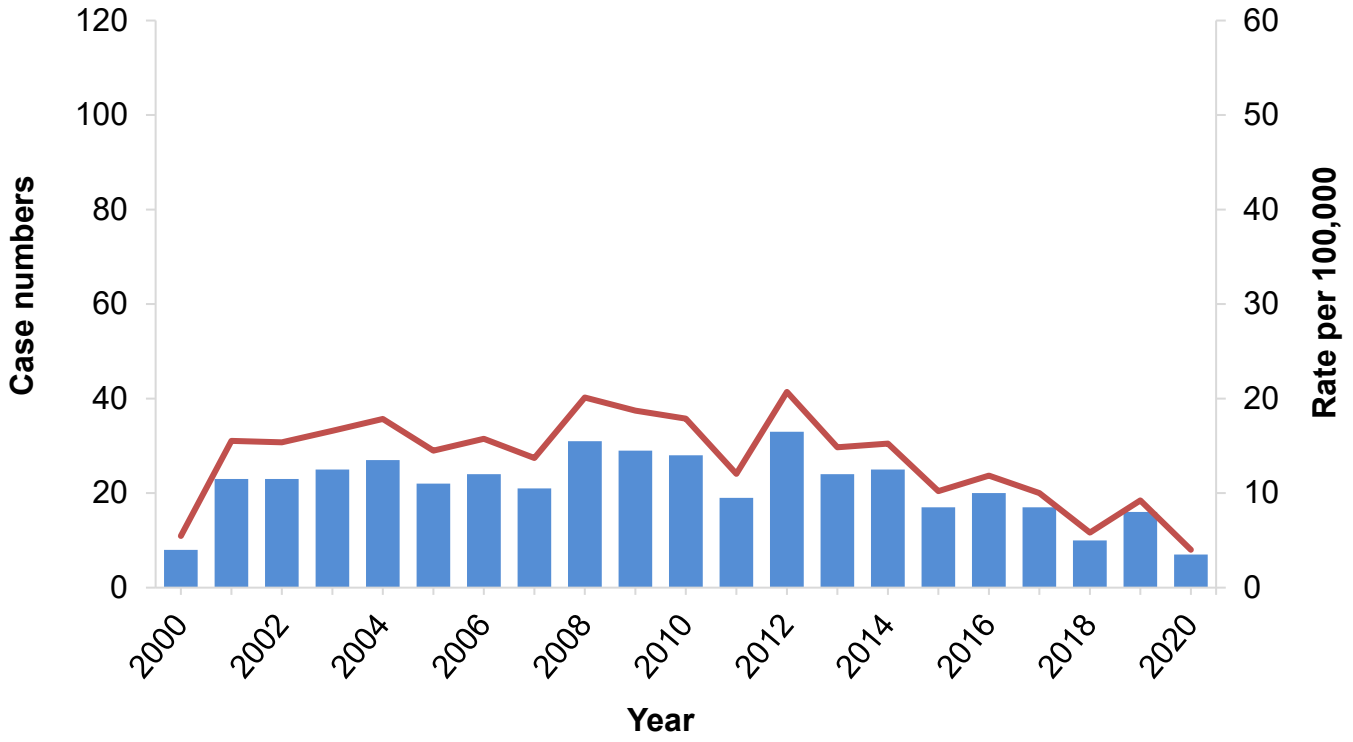
The rates of TB dropped in most upper tier local authorities (UTLAs) compared to 2019, with the only increases being seen in Luton, Southend-on-Sea and Suffolk which increased by 26.4%, 0.2% and 23.8% respectively – although the latter 2 are influenced by changes in a small number of cases. In general, rates are stable below 20 cases per 100,000 for most UTLAs except for Luton (26.7 per 100,000, an increase from 21.1 per 100,000 in 2019). TB cases rates for upper tier local authorities are presented in Figure 1.2. The case rates for 2020 are also presented as a map in Figure 1.3.

Whilst rates consider the size of the population from which cases arise, the actual number of cases also need to be considered. Hertfordshire notified the largest number of cases in 2020 (67), while Central Bedfordshire reported the fewest (4, Appendix C). Case numbers increased in just 2 of 12 local authorities, with the largest change seen in Luton (57 cases versus 45 in 2019). Reductions in case numbers were seen in 8 out of 12 local authorities, with notable reductions observed in 4 local authorities: Bedford (7 cases versus 16 in 2019), Hertfordshire (67 cases versus 78 in 2019), Peterborough (29 cases versus 39 in 2019), and Thurrock (7 cases versus 18 in 2019).

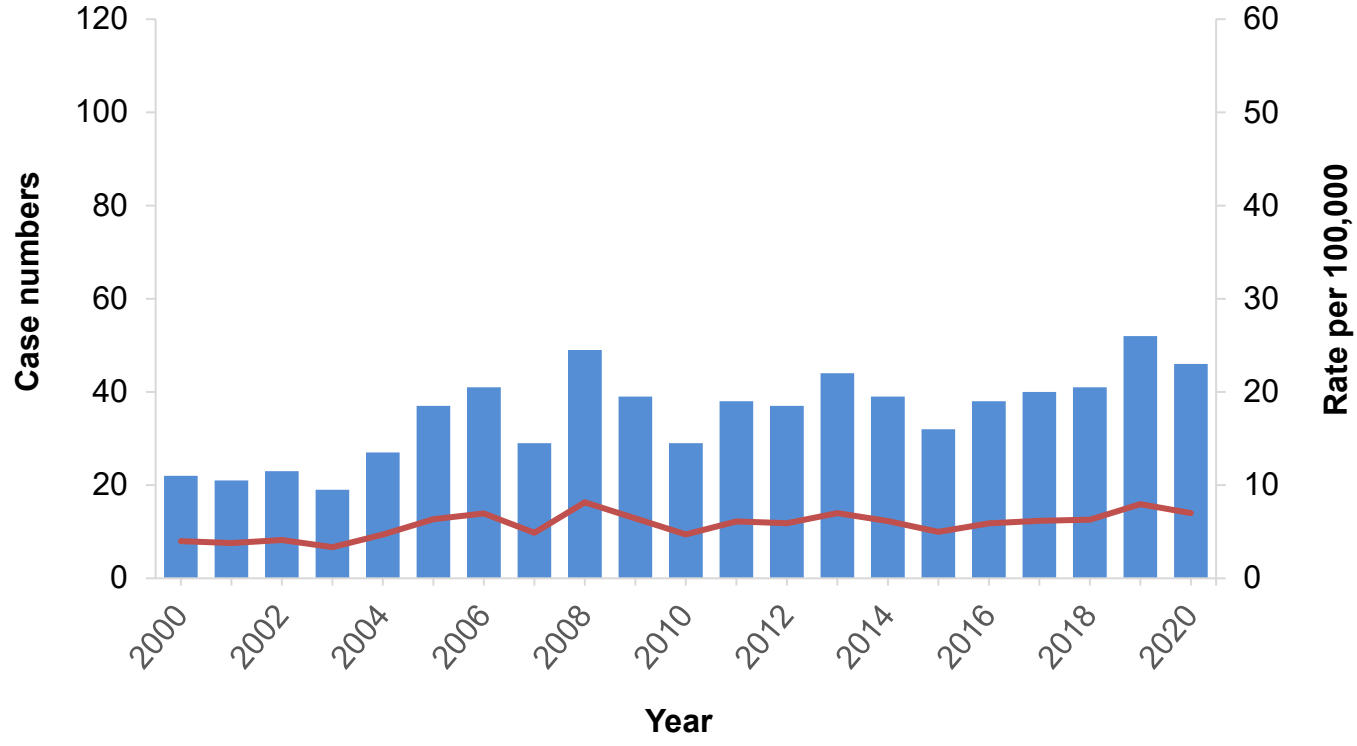
Figure 1.2. TB case rates, by upper tier local authority of residence, East of England, 2000 to 2020

In the following 12 graphs the bars indicate case numbers and the red line indicates TB case rates.

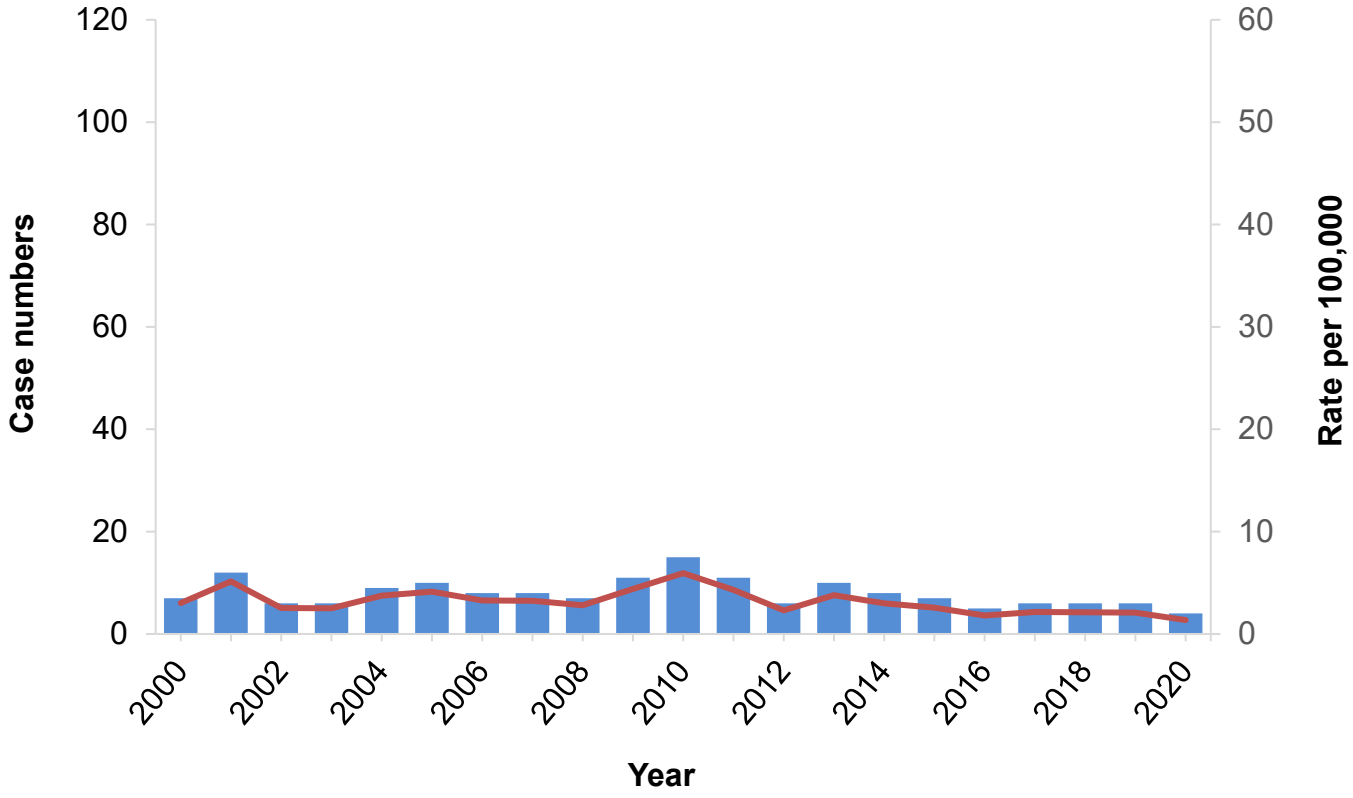
a) Bedford



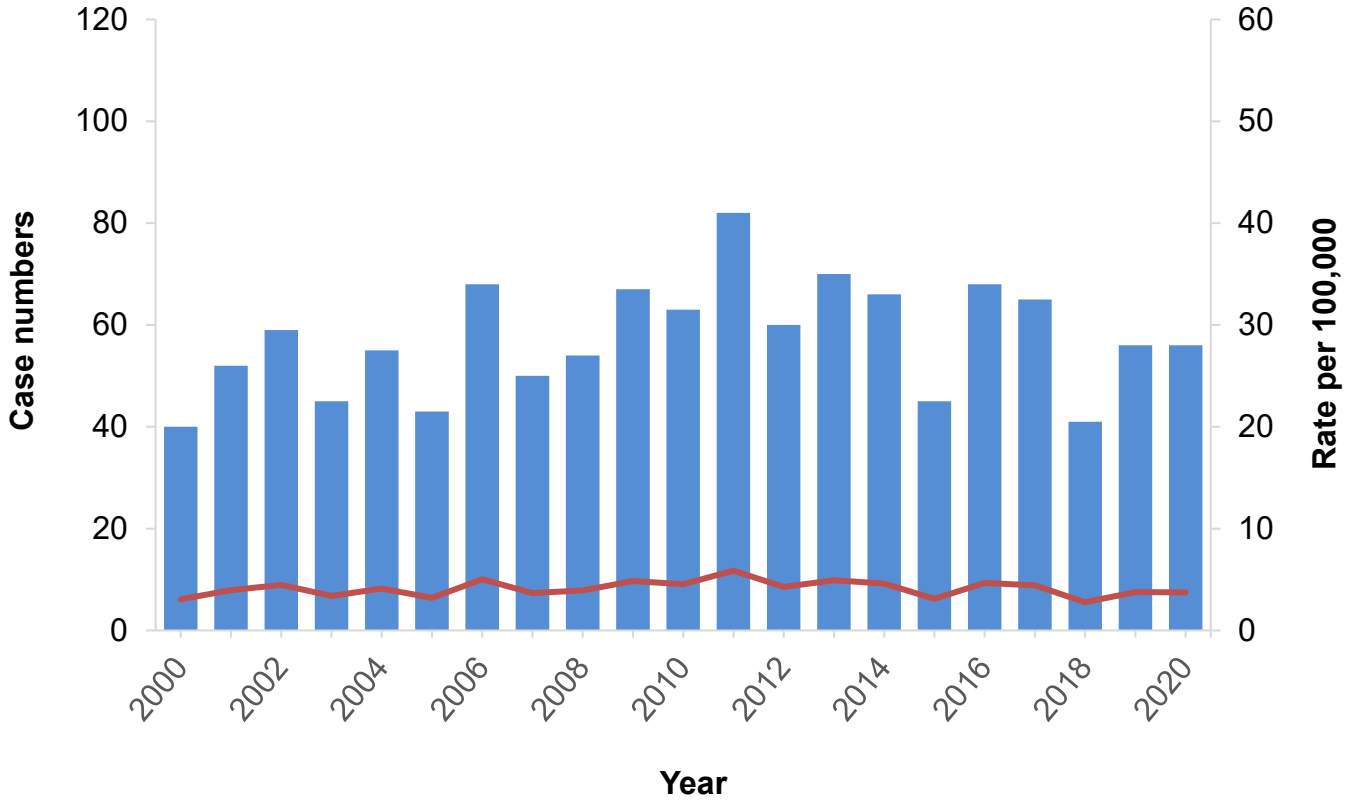
b) Cambridgeshire



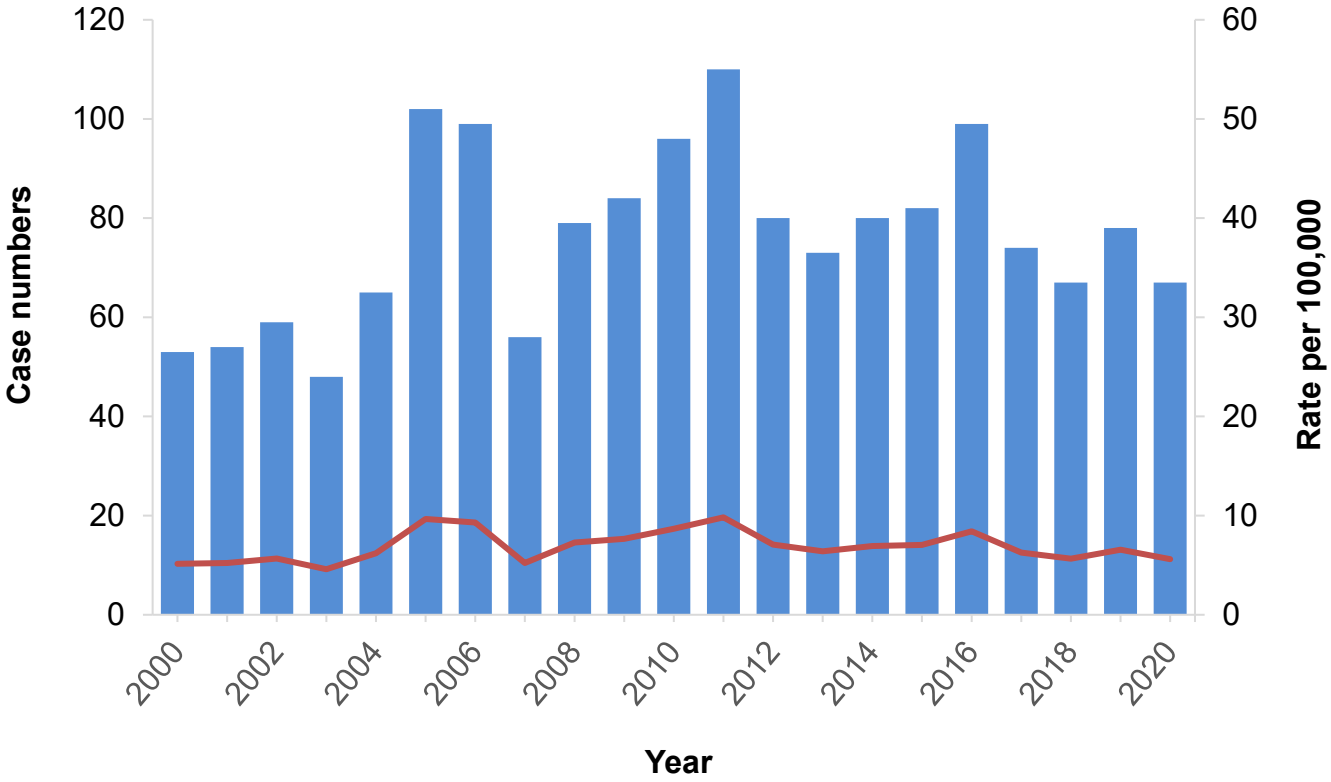
c) Central Bedfordshire



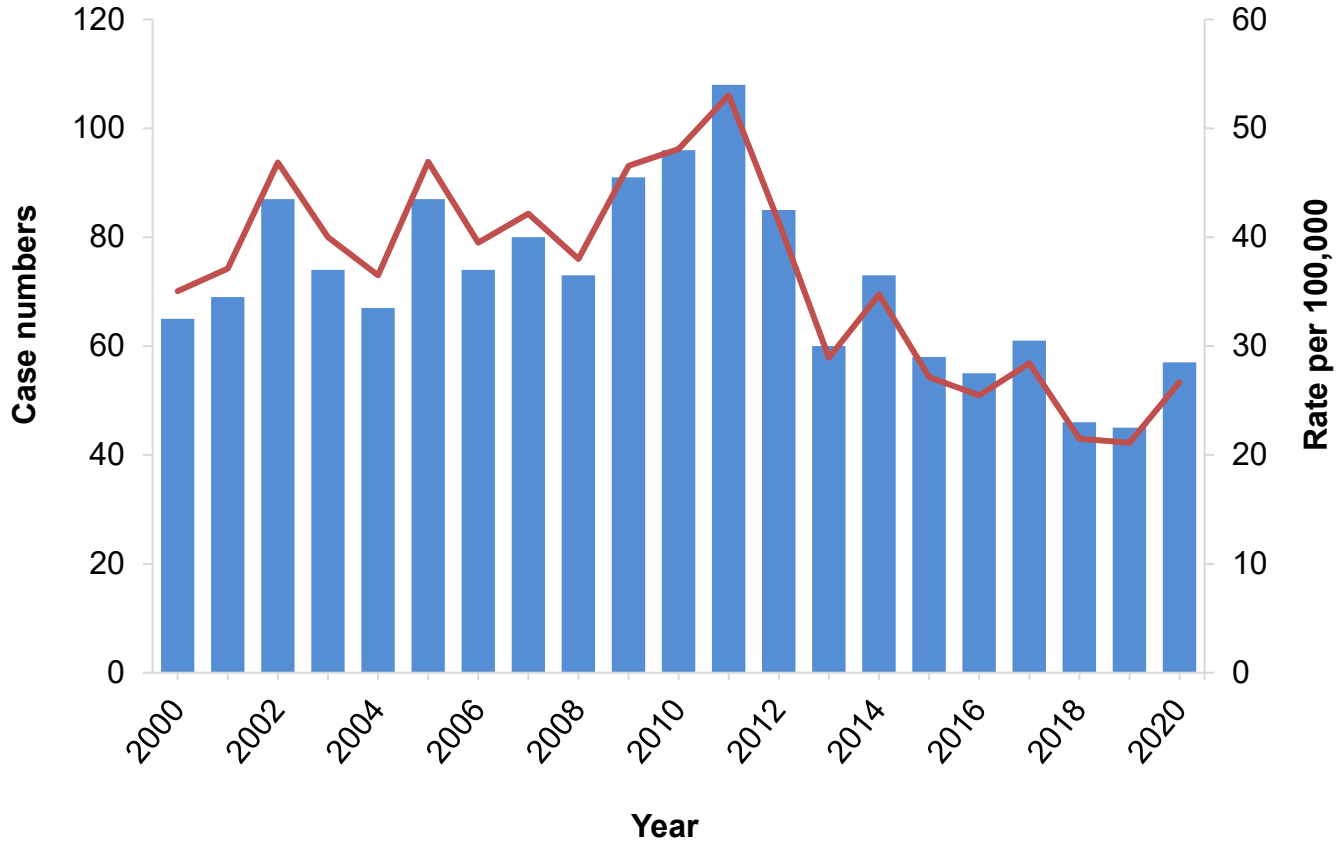
d) Essex



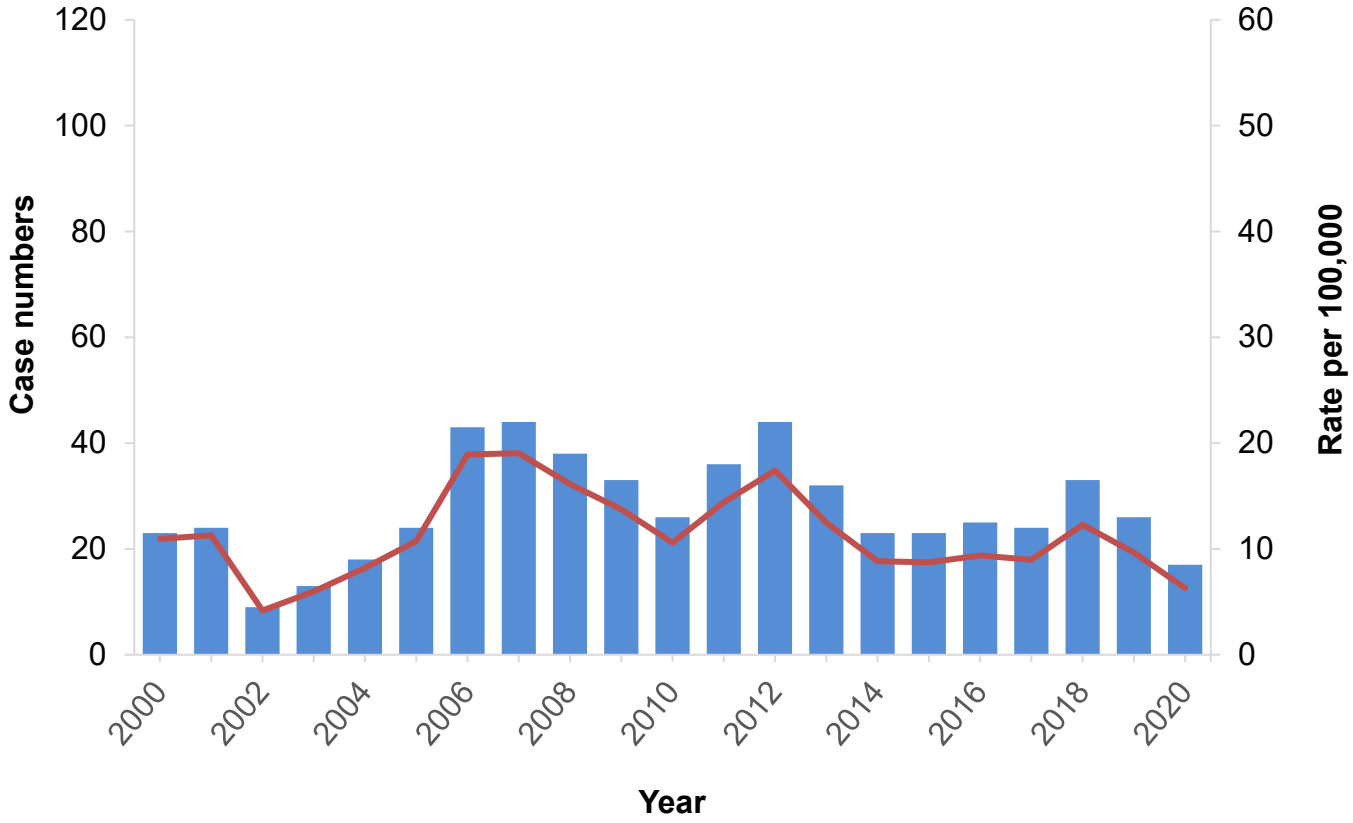
e) Hertfordshire



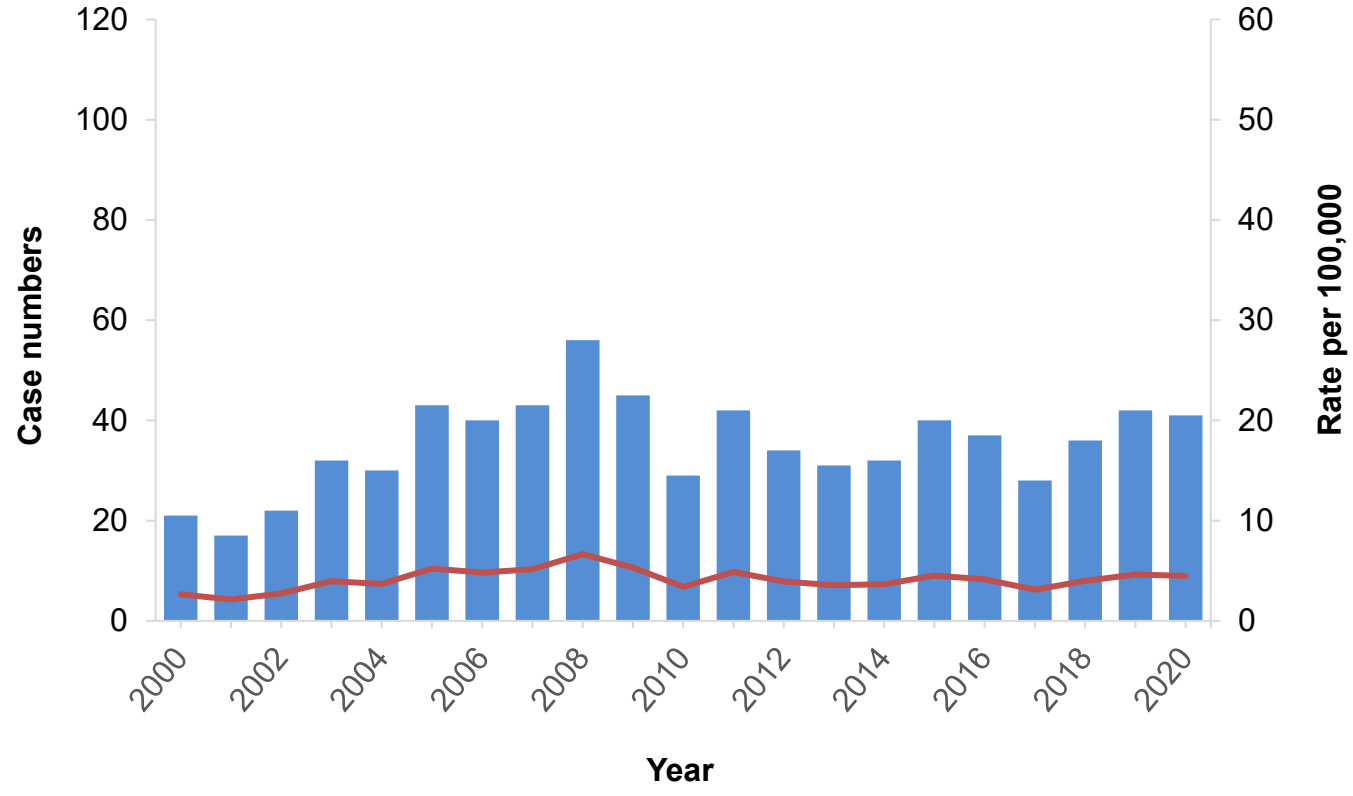
f) Luton



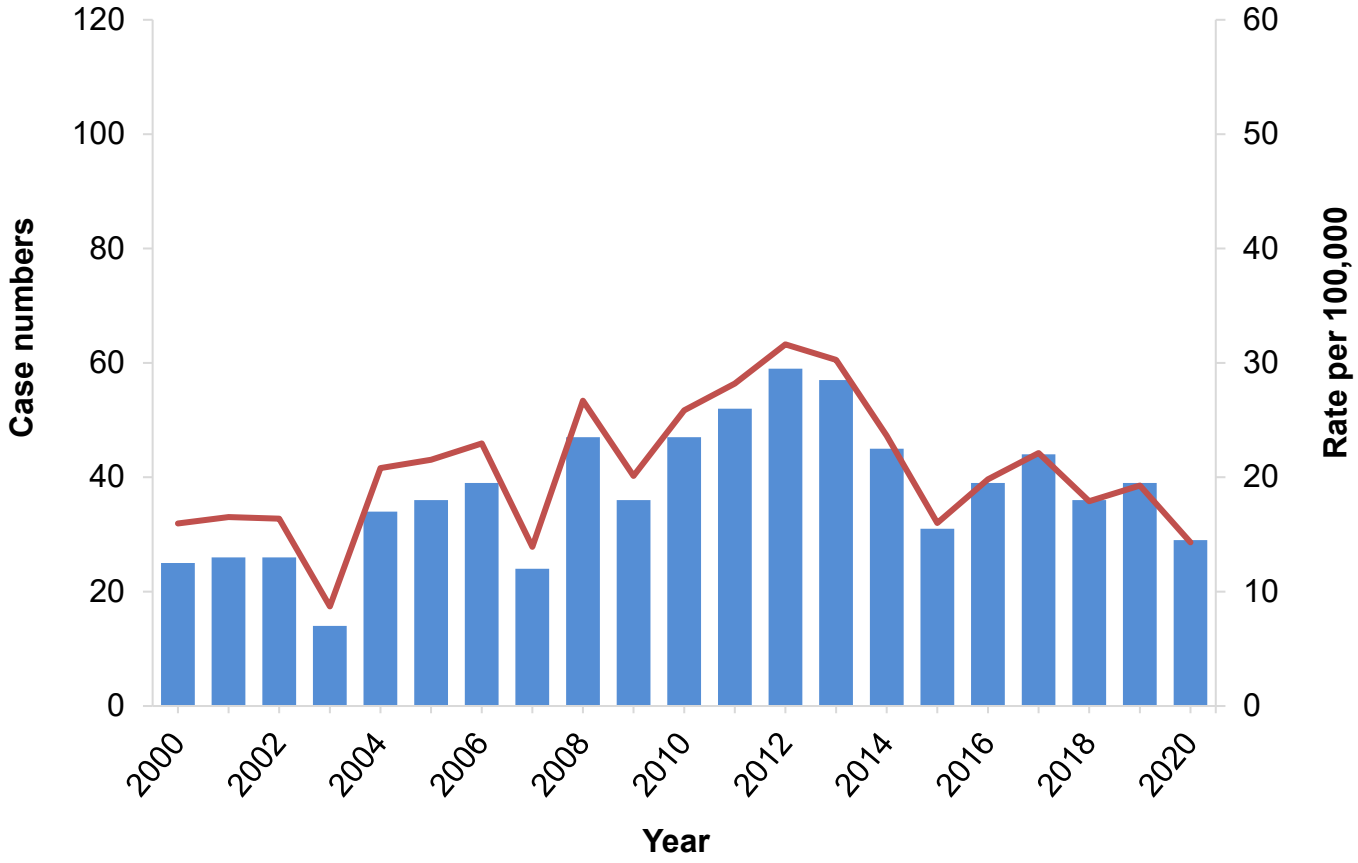
g) Milton Keynes



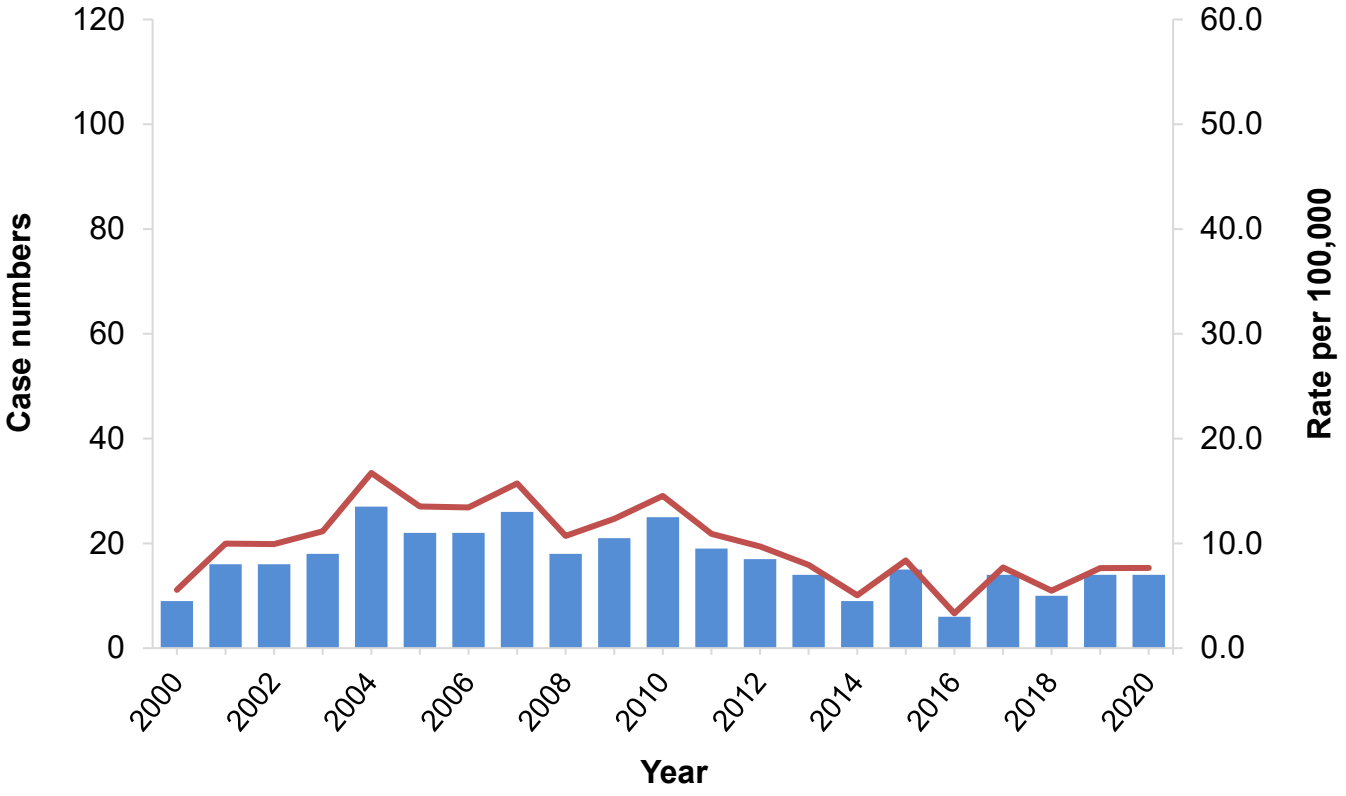
h) Norfolk



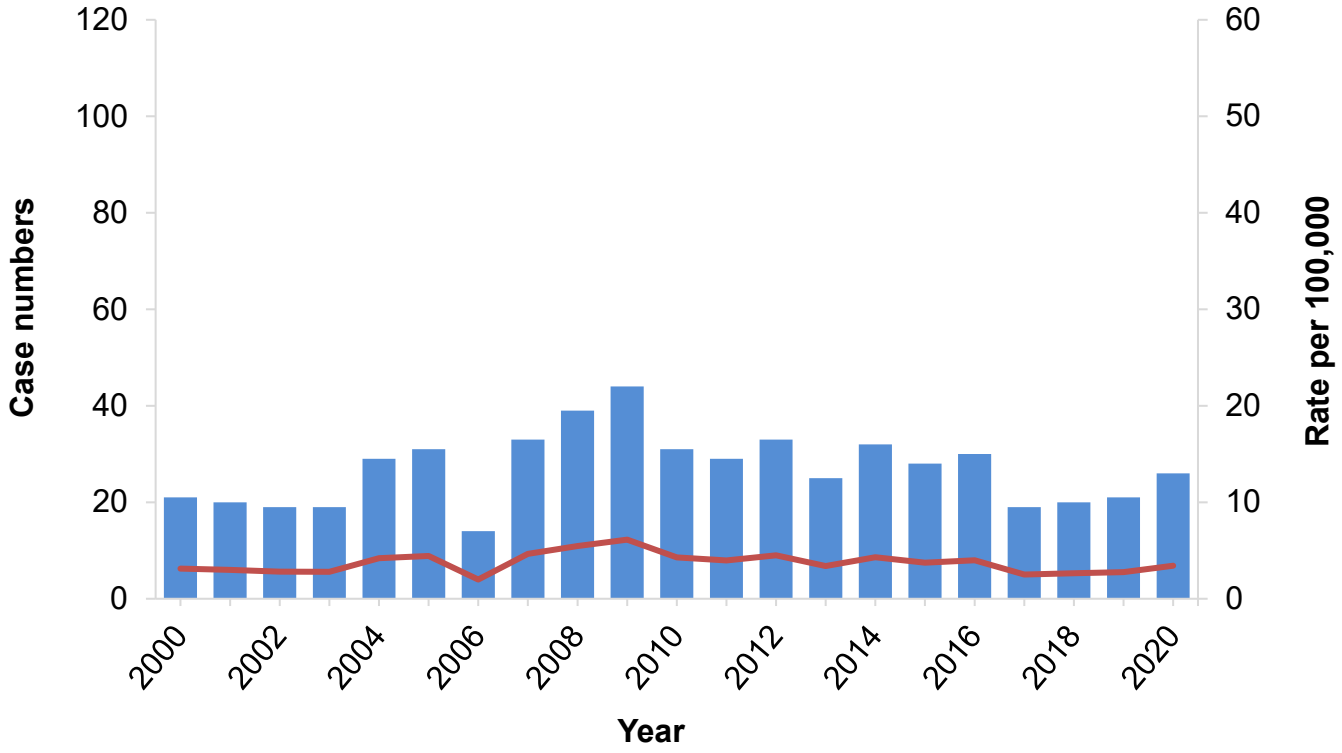
i) Peterborough



j) Southend-on-Sea



k) Suffolk



l) Thurrock

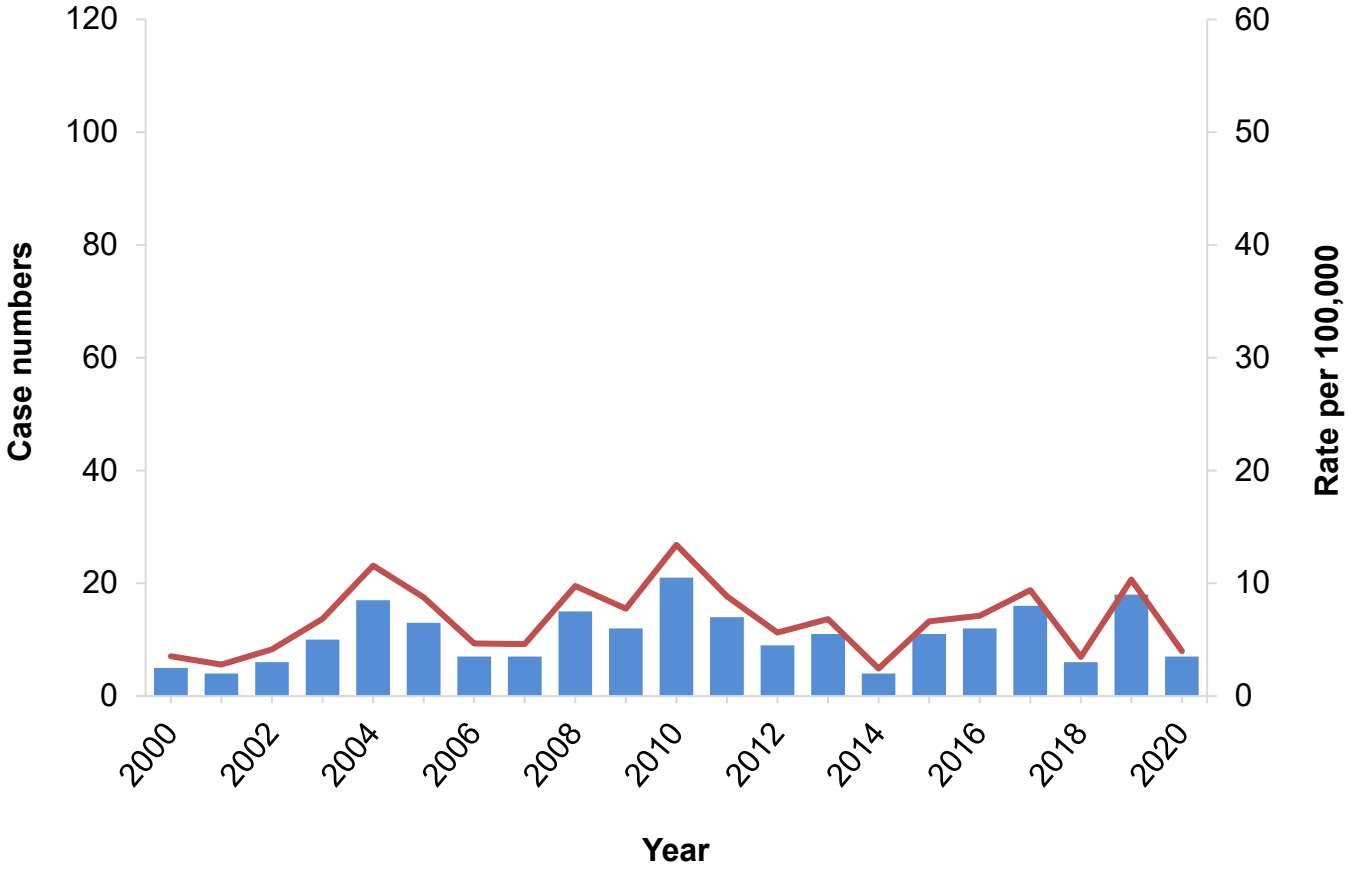
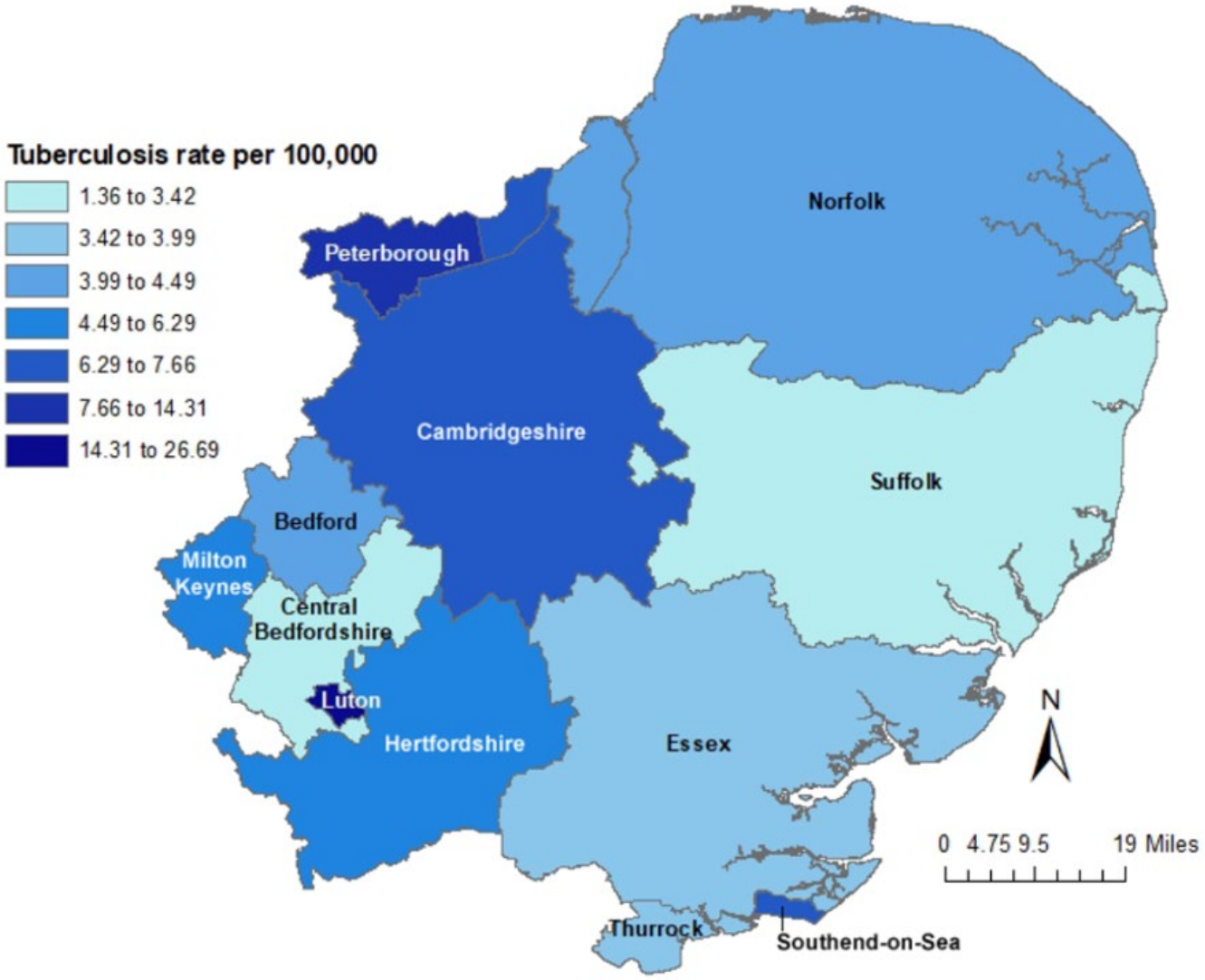


Figure 1.3. TB case rate by upper tier local authority of residence, East of England, 2020

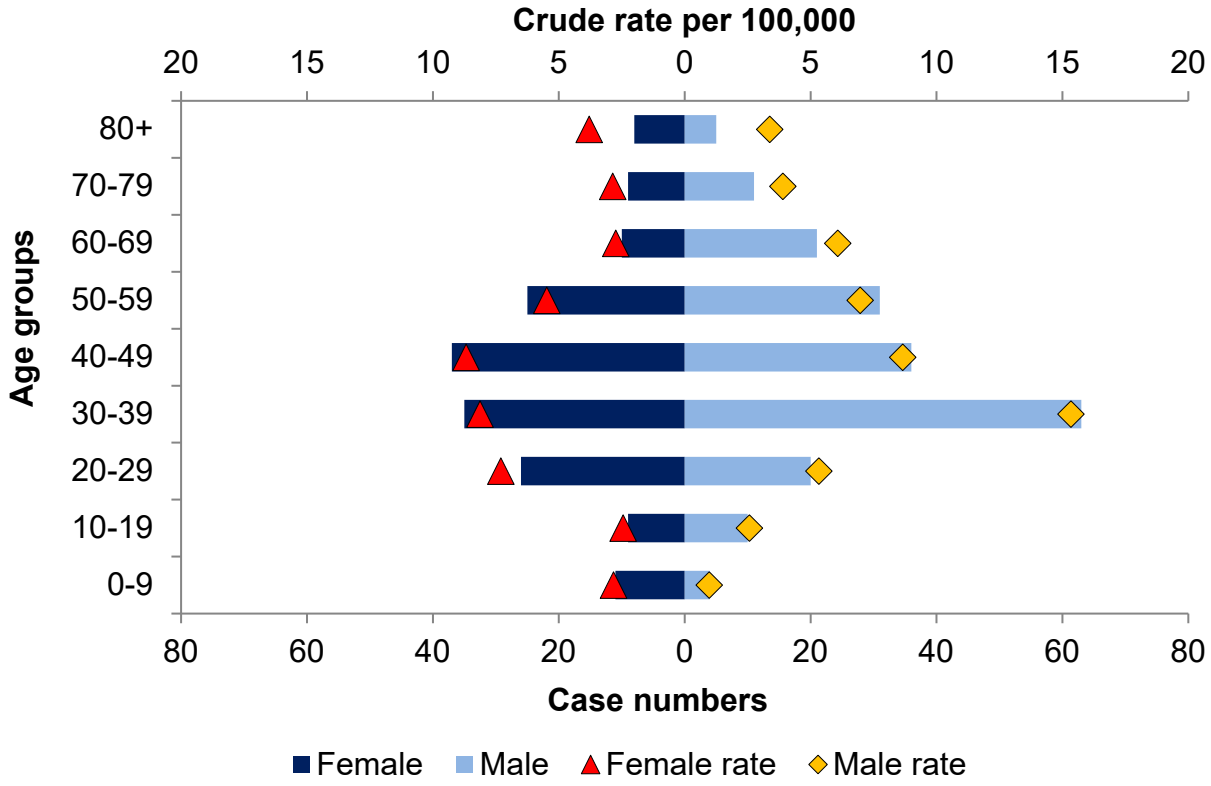


Demographic characteristics

Age and sex

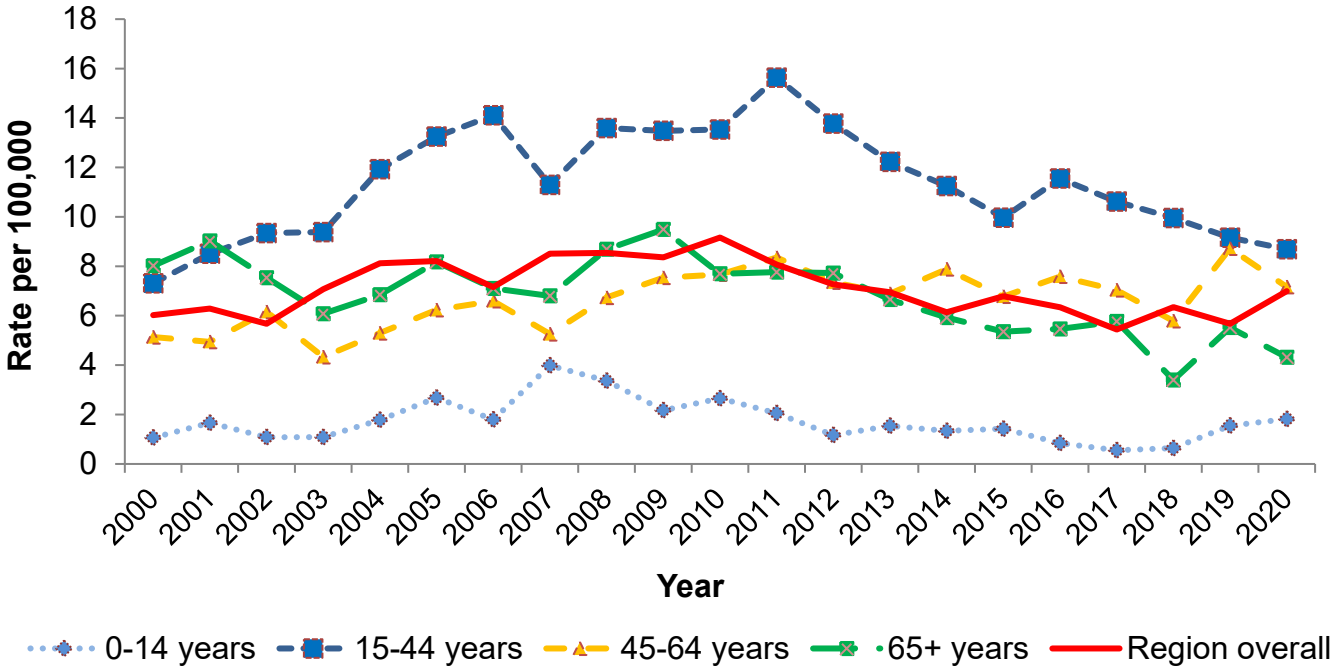
The age sex pyramid for people with TB in 2020 was similar to previous years, with more male (54.2%) than female cases. Crude rates of TB among males were highest for those aged 30 to 39 years (15.3 per 100,000), which is the same as the rate in 2019 (15.3 per 100,000). And for females, the highest rate was among those aged 40 to 49 years (8.7 per 100,000). This is a change compared to 2019, in which the highest rates of TB were among females aged 20 to 29 years (10.2 per 100,000). In 2020 there were 15 cases in children aged less than 9 years, compared to 5 in 2019 (Figure 1.4).

Figure 1.4. TB case reports and rate by age and sex, East of England, 2020



The overall rate of TB in the East of England is primarily caused by the rate of TB among people aged between 15 and 44 years. The rate of TB declined for most age groups compared to 2019, except among people aged 0 to 14 years whose rate increased (1.8 per 100,000 compared to 1.6 per 100,000 in 2019) as shown in Figure 1.5.

Figure 1.5. TB case rates by age group, East of England, 2000 to 2020

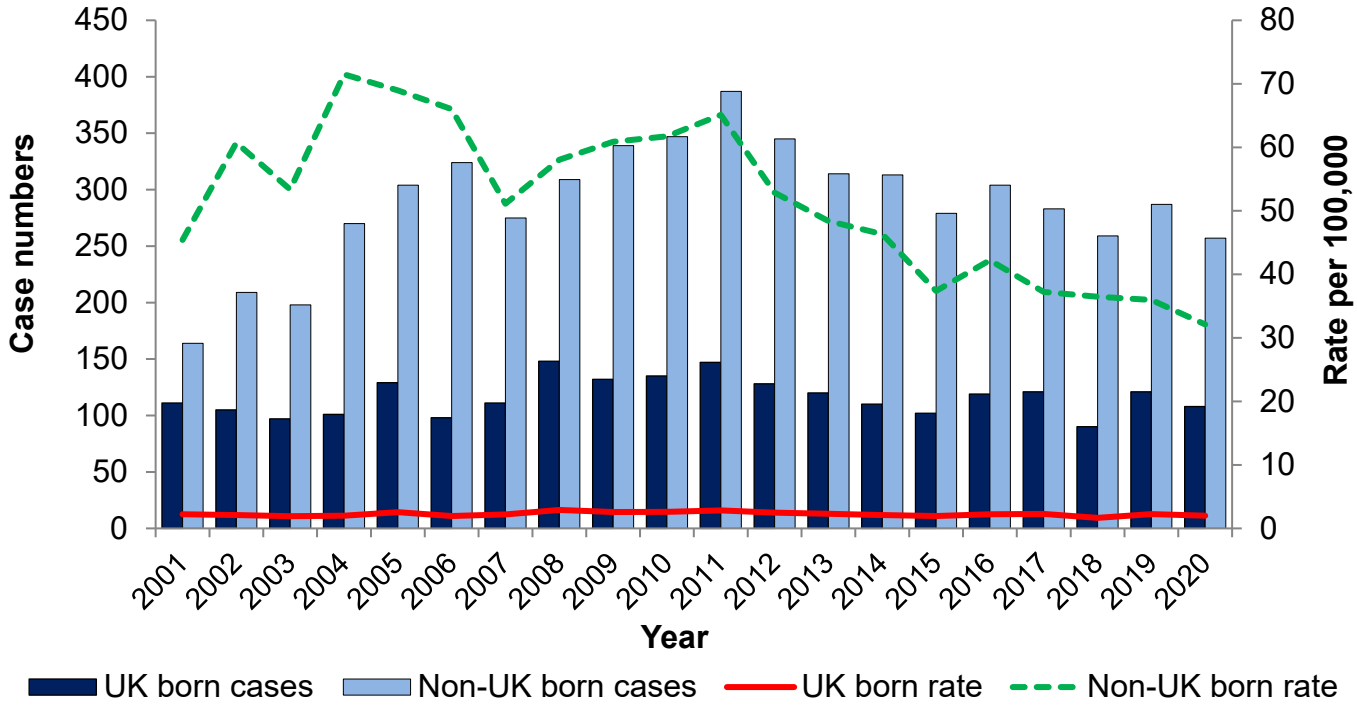


Place of birth and time since entry

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) (5).

In 2020 98.4% of people with TB had recorded a country of birth (365 out of 371), and of these, 70.4% (257 out of 365) were born outside the UK. The rate of TB was 16 times higher among these people (32.1 per 100,000) compared to UK born people with TB (2.0 per 100,000). These rates should be interpreted with caution, as population estimates, used as the denominators for UK born and non-UK born groups were calculated using the Labour Force Survey, which is liable to sampling error for small population groups.[4] 2020 saw a decrease in the number of UK born cases (108 versus 121), and a notable decrease in the number of non-UK born cases (257 versus 287) compared to 2019 as seen in Figure 1.6.

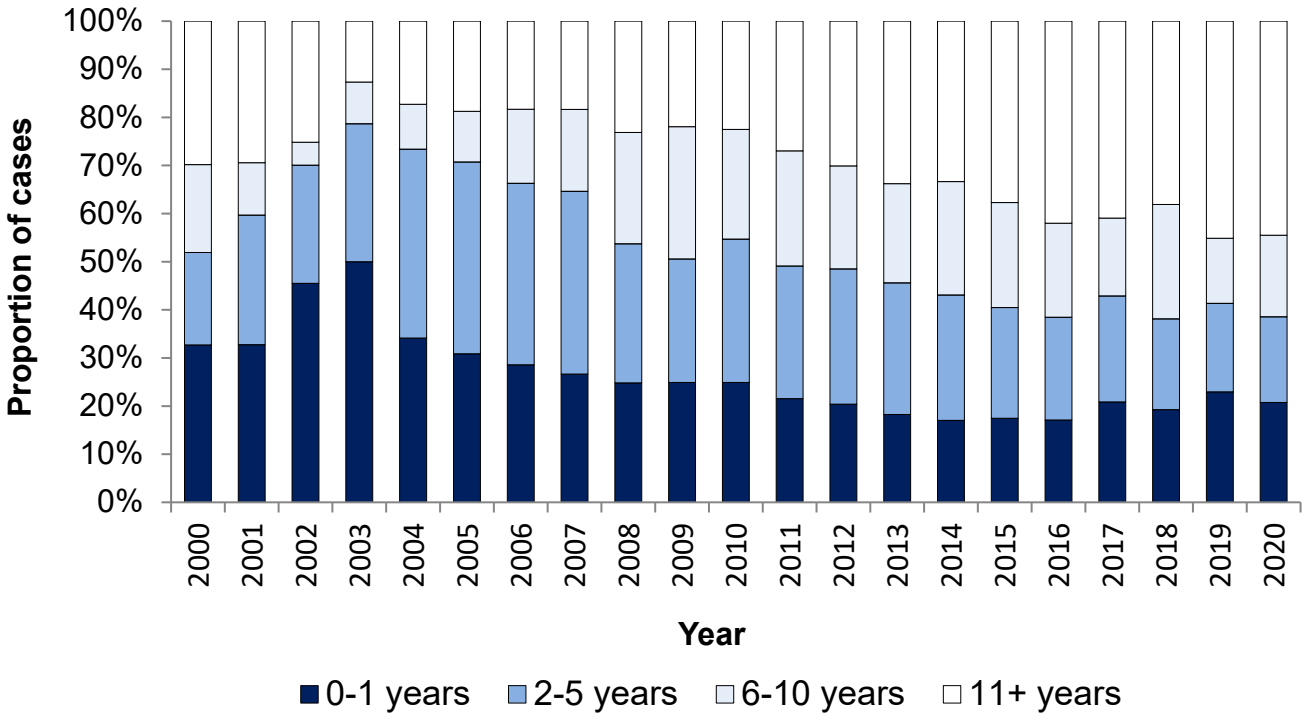
Figure 1.6. TB case reports and rate by place of birth, East of England, 2001 to 2020



In 2020 the year of entry to the UK was reported for 91.8% (236 out of 257) of TB patients born outside the UK. Among those with a reported date of entry, 44.5% (105 out of 236) had arrived in the UK 11 or more years prior to their TB diagnosis – a similar proportion compared to 2019 (45.1%, 120 out of 266, Figure 1.7). This suggests late onset re-emergence from latent disease in these individuals.

[4] The Labour Force Survey (LFS) was used to calculate population estimates based on a random sample of surveyed individuals, weighted to represent others in the region. The LFS data is based on the East of England Government Office Region, which excludes the Milton Keynes area. However, Milton Keynes cases have not been excluded from the numerator due to the large population over which the rate by place of birth has been calculated.

Figure 1.7. Time between entry to the UK and TB notification for non-UK born patients by year, East of England, 2000 to 2020



The 10 most common countries of birth for TB patients born outside the UK and notified in 2020 were India (accounting for 15.4% of non-UK born TB patients), Romania (8.7%), and Pakistan (8.1%) followed by Lithuania, Philippines, Zimbabwe, Nigeria, Bangladesh, Latvia and Congo (each less than 4.0%, Table 1.1).

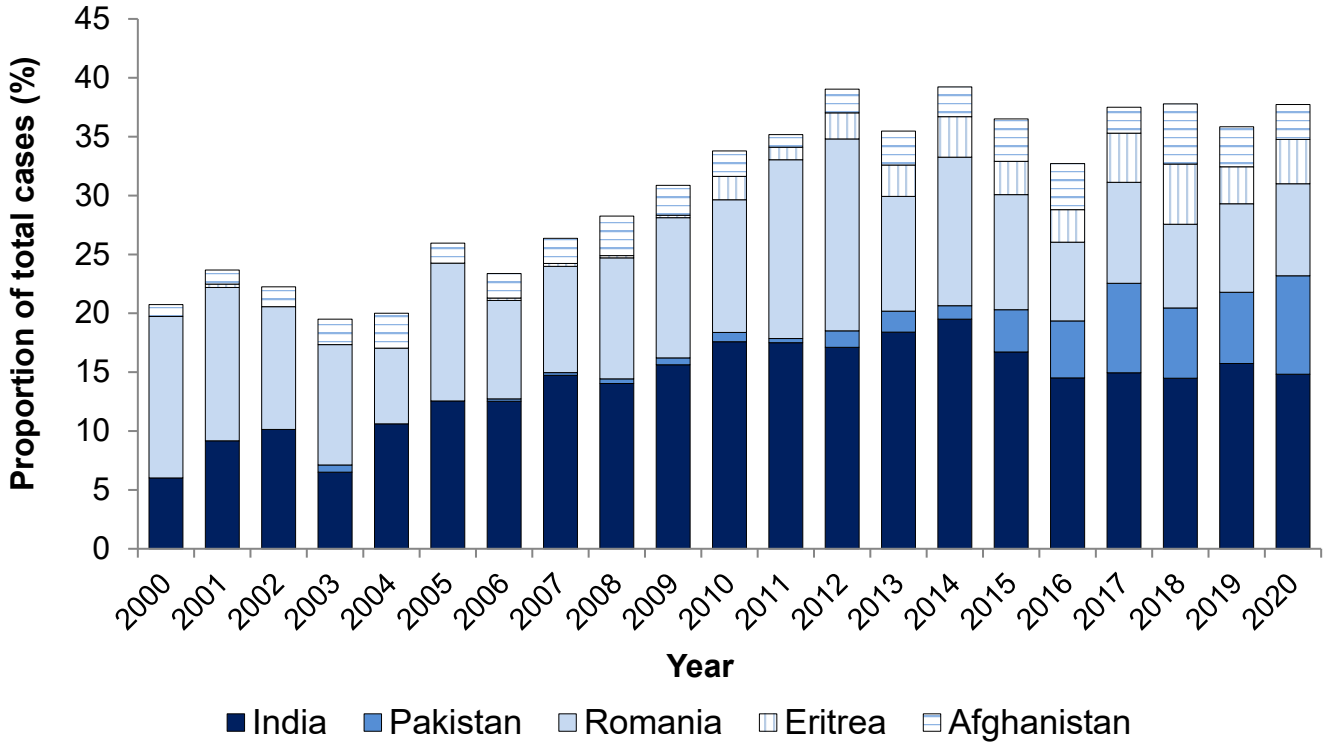
Table 1.1. Ten most common countries of birth of non-UK born TB patients, East of England, 2020

Country of origin	Number of cases	Proportion of non-UK born (%)	Median years since entry	Years since entry (IQR)	
India	55	15.4	9	1	15
Romania	31	8.7	5	3	6
Pakistan	29	8.1	18	9	40
Lithuania	14	3.9	9	1	13
Philippines	11	3.1	17	1	22
Zimbabwe	10	2.8	19	17	20
Nigeria	8	2.2	4	1	13
Bangladesh	6	1.7	6	3	23
Latvia	≤5	≤1.4	12	9	13
Congo	≤5	≤1.4	18	2	30
Total	173				

* IQR: Interquartile range.

Among the 5 most common countries of birth for TB patients born outside the UK, there has been an ongoing rise in the proportion of cases from Pakistan, increasing from 6.1% (25 out of 413) in 2019 to 8.4% (31 out of 371) in 2020 as presented in Figure 1.8. The proportion of cases born in Romania is gradually decreasing from its peak of 16.3% in 2012 (81 out of 497) and has maintained a proportion of under 10% of TB cases since 2015. There has also been a decline in the proportion of patients originating from India.

Figure 1.8. Trend in TB case numbers in the 5 most common countries of birth, East of England, 2000 to 2020



Although the majority of TB cases in the East of England occur among patients born outside the UK, some UTLAs record a large proportion of UK born cases. The UTLAs where 30% or more of all TB cases were among UK born patients include Essex (33.9%, 19 out of 56), Hertfordshire (30.3%, 20 out of 66), Norfolk (31.7%, 13 out of 41), Southend-on-Sea (50%, 7 out of 14) and Suffolk (50%, 13 out of 26). More than 30% of TB cases were among UK born patients in Bedford and Central Bedfordshire as well, however case numbers in these areas are particularly low.

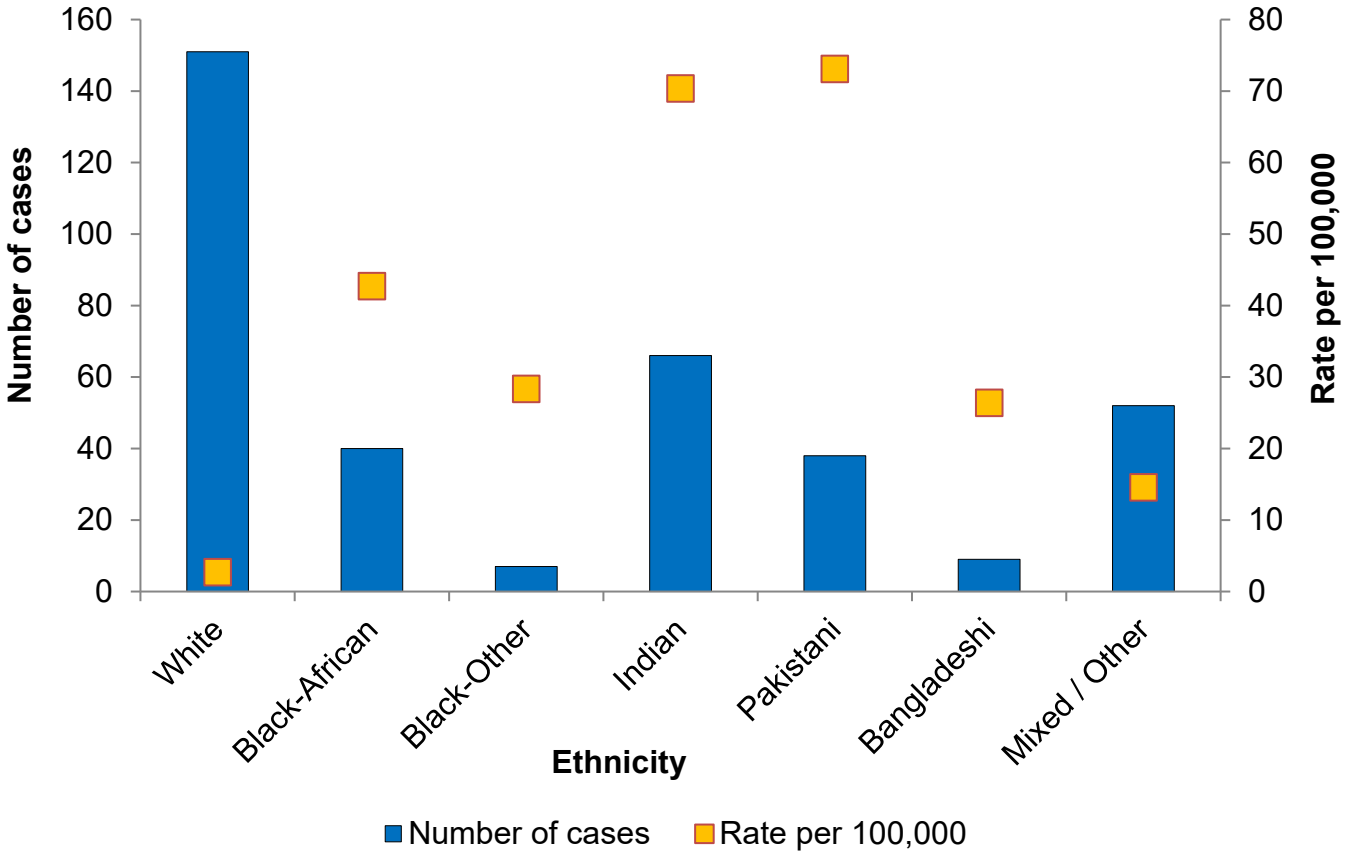
Ethnicity

In 2020 97.8% of patients with TB reported their ethnicity. Excluding cases resident in Milton Keynes[5], most cases were white (41.6%, 151 out of 363), equating to a rate of 2.7 cases per 100,000, slightly lower than the rate recorded for white individuals in 2019 (3.2 per 100,000).

[5] The Labour Force Survey (LFS) was used to calculate population estimates based on a random sample of surveyed individuals, weighted to represent others in the region. Cases resident in Milton Keynes are excluded from rate calculations (Figure 9) because the LFS data is based on the East of England Government Office Region, which excludes the Milton Keynes area.

The highest rates of TB were seen in Pakistani (73.1 per 100,000), Indian (70.4 per 100,000) and Black-African (42.7 per 100,000) ethnic groups (Figure 1.9). 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.[6] Ethnic groups with 5 or less cases were added to the mixed/other ethnic group.

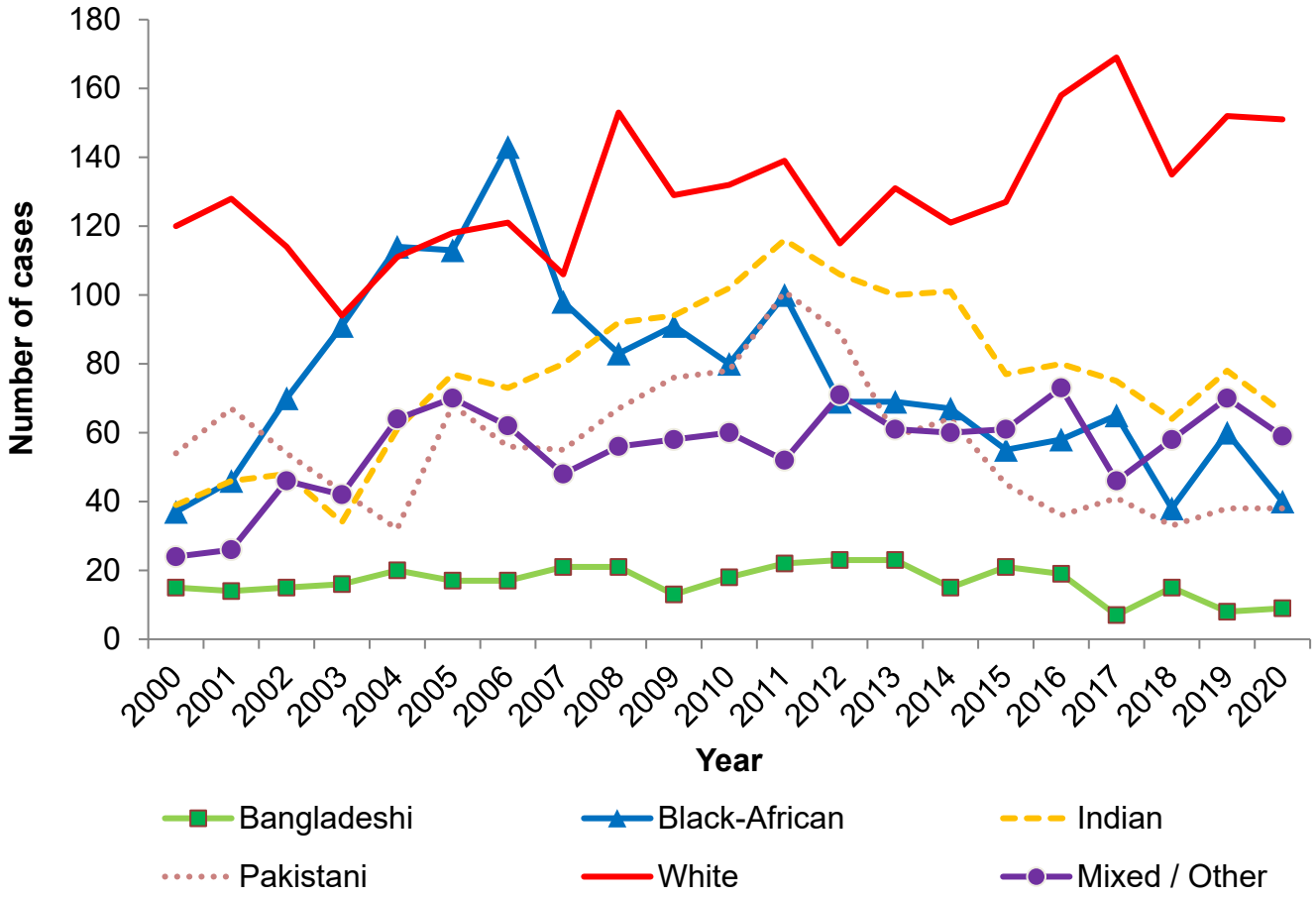
Figure 1.9. TB case number and rate by ethnic group, East of England, 2020



For most ethnic groups case numbers remained stable between 2019 and 2020. However, there was a decrease in Black-African and Indian cases, decreasing by 20 and 12 cases respectfully compared to 2019 as shown in Figure 1.10.

[6] Small populations are often underrepresented in the LFS sample, which may inflate TB rates for ethnic groups such as black individuals.

Figure 1.10. TB case number by ethnic group, East of England, 2000 to 2020

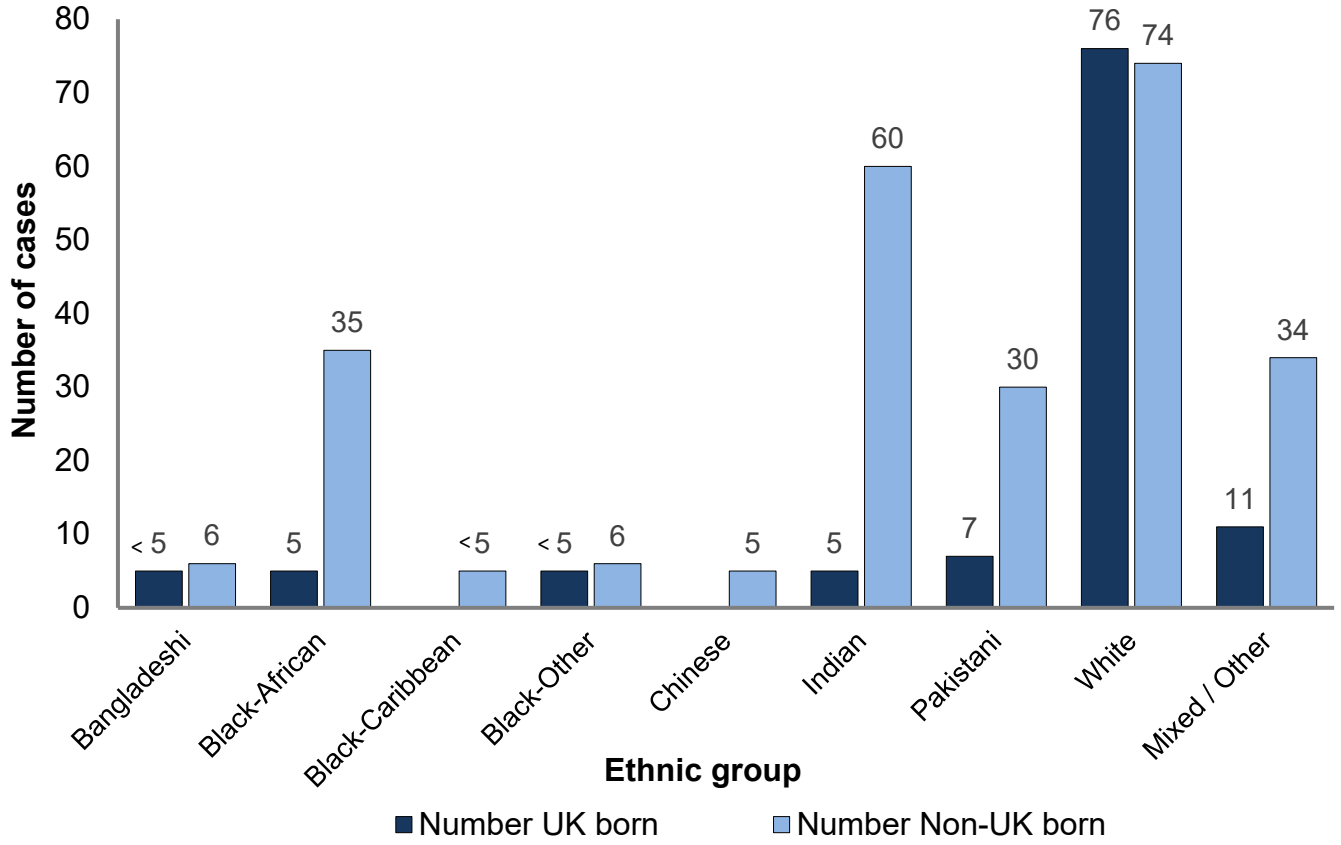


As in 2019 approximately half of white TB patients notified in 2020 were born in the UK (50.3%, 76 out of 151, Table 1.2).

Table 1.2. Proportion of UK born TB patients by ethnic group, East of England, 2020

Ethnic group	Number of cases	Number UK born	Proportion (%)
Bangladeshi	9	<5	<55.6
Black-African	40	5	12.5
Black-Caribbean	<5	<5	<100.0
Black-Other	7	<5	<71.4
Chinese	5	<5	<100.0
Indian	66	5	7.6
Pakistani	38	7	18.4
White	151	76	50.3
Mixed / Other	45	11	24.4

Figure 1.11. TB case number by ethnic group and place of birth, East of England, 2020



Occupation

As in previous years, in 2020 approximately one-quarter of TB patients aged between 18 and 65 years (24.5%, 72 out of 294) were not in employment or education. Overall, 12.9% of cases were among healthcare workers (38 out of 294), less than 1.7% worked in social service or prison services (<5 out of 294), and 7.1% were in the education sector as either students or staff (2 out of 294). The majority of cases reported working in another occupation (48.6%, 143 out of 294) and 5.4% did not report an occupation (Table 1.3).

Table 1.3. Occupational category of TB patients aged 18 to 65 years, East of England, 2020

Occupation	Number of cases	Proportion (%)
Agricultural or animal care worker	<5	<1.7
Education	21	7.1
Health care worker	38	12.9
Social service or prison worker	<5	<1.7
Other	142	48.3
None	72	24.5
Unknown	16	5.4
Total	294	

Clinical characteristics

Site of disease

In 2020, 60.9% of patients (226 out of 371) had pulmonary TB disease (with or without extra-pulmonary sites). The next most common site of disease, as in 2018 and 2019, was extra-thoracic lymph nodes, present in 20.2% of cases (75 out of 371, Table 1.4).

Table 1.4. Site of disease of TB patients, East of England, 2020

Site of disease	Number of cases	Proportion (%)
Pulmonary **only**	177	47.7
Pulmonary with or without extra-pulmonary sites	226	60.9
Pulmonary with extra-pulmonary sites	49	13.2
Bone or joint (spine)	7	1.9
Bone or joint (other)	<5	<1.3
Central nervous system (meningitis)	7	1.9
Central nervous system (other)	6	1.6
Cryptic	<5	<1.3
Gastrointestinal	19	5.1
Genitourinary	5	1.3
IT lymph nodes	30	8.1
Lymph nodes (extra-thoracic)	75	20.2
Laryngeal	0	0.0
Miliary	10	2.7
Pleural	28	7.5
Other (extra-pulmonary)	23	6.2
Extra pulmonary unknown	49	13.2
Unknown	<5	<1.3

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

In 2020, UK born patients were more likely to have pulmonary disease (77.8%, 84 out of 108) compared to non-UK born patients (54.1%, 139 out of 257). Furthermore, 75.7% of patients who reported at least one social risk factor[7] (28 out of 37) had pulmonary TB, compared to 61.2% of patients who reported no risk factors (169 out of 276).

Previous history of tuberculosis

In 2020 among patients who reported their clinical history, 6.9% of cases (24 out of 348) had a previous diagnosis of TB at least 12 months prior to their most recent notification, which is not

[7] Social risk factors for TB include prison, homelessness, alcohol, and substance misuse.

substantially different to the rate of previous diagnosis in previous years in the East of England. These patients had a median of 5 years since their previous diagnosis (IQR 2.5 to 14 years). This is similar to the proportion of cases reporting a previous diagnosis of TB in England overall (6.2%) (4).

Hospital inpatient and directly observed therapy

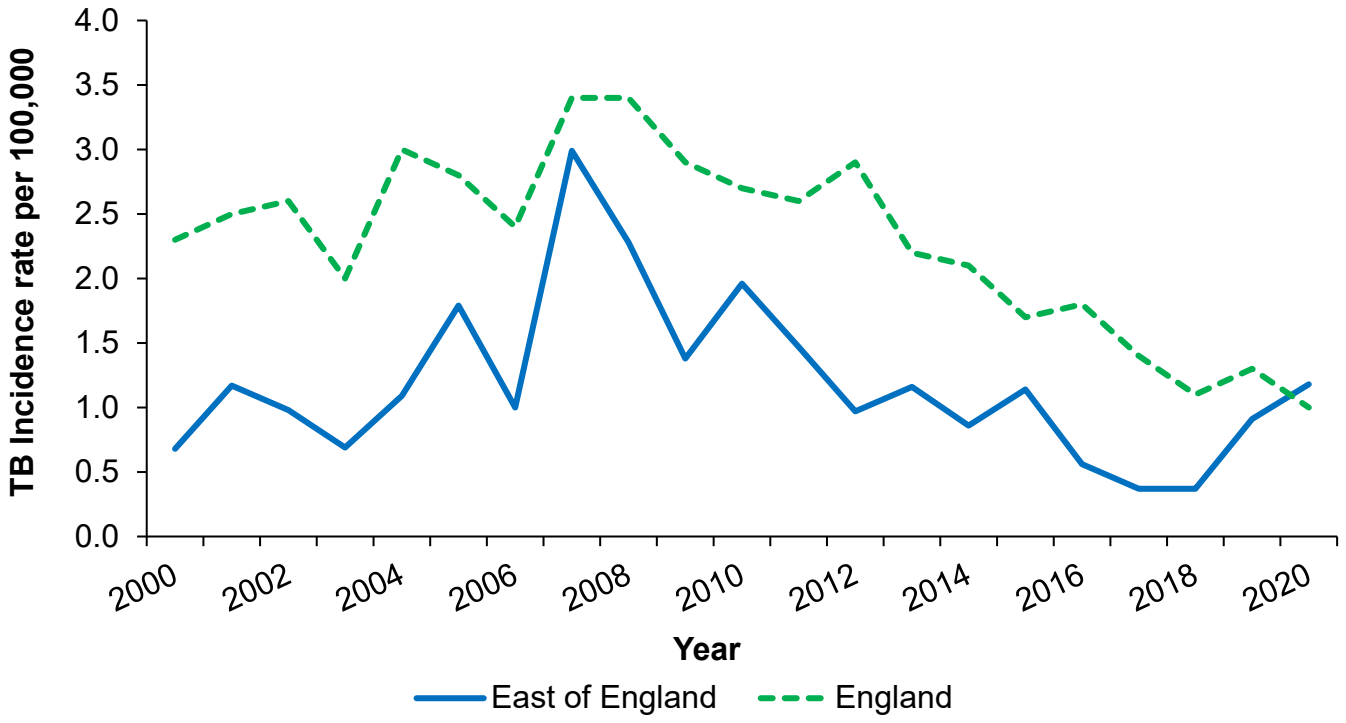
Nearly one-quarter of patients with hospital inpatient status recorded (23.5%, 81 out of 345) were inpatients at the time of diagnosis with TB. Among these inpatient cases, 8.6% (7 out of 81) had previously been diagnosed with TB, a higher proportion than all cases with hospital inpatient status (6.7%, 23 out of 345). Of those patients with inpatient status and SRF history recorded, over a third were inpatients in 2020 (36.4%, 12 out of 33), which is similar to proportions seen in 2019 (35%, 14 out of 40).

The proportion of patients who received directly observed therapy (DOT) in 2020 in the East of England is the highest recorded to date, with 11.1% (41 out 371) of all TB cases requiring DOT, a rise from 2019 (9.7%, 40 out of 413). A large proportion of children between aged 0 and 14 years received DOT (42.1%, 8 out of 19), as did patients with one or more social risk factors (56.7%, 17 out of 30) and all patients with MDR/RR-TB (100%, 3 out of 3).

The rate of TB in UK born children as a measure of transmission

TB in UK born children is used as an indirect indicator for recent TB transmission within the UK, since TB in children is likely to be caused by recent exposure (as opposed to reactivation of latent TB infection acquired some time previously). Figure 1.12 shows the trend of TB among children aged under 15 years in the East of England and England overall.

Figure 1.12. The TB incidence rate in UK born children (under 15 years), East of England and England, 2000 to 2020



The incidence rate among children in the East of England has historically been below the England average, however after its lowest incidence rates in 2017 and 2018, the rates have continued to rise, and in 2020 have superseded the rates for England (1.2 per 100,000 in East of England compared to 1.0 per 100,000 in England). This may mean there is increased transmission of TB in the East of England, however the effect of COVID-19 on these rates is not yet known.

2. Laboratory confirmation of TB

Laboratory tests data collection

Laboratory data on culture confirmed TB isolates from the National Mycobacterium Reference Service were matched to TB case notifications, and the results were used to report culture confirmation. Results for microscopy, polymerase chain reaction (PCR) and histology are also collected in the UKHSA Enhanced Tuberculosis Surveillance system (ETS).

Culture confirmation and speciation

In 2020, 56.9% of all cases (211 out of 371) were confirmed by culture of a TB isolate. Among pulmonary cases, 65.9% of cases (149 out of 226) were culture confirmed. Of the 211 culture confirmed cases in 2020, 97.6% were *M. tuberculosis* (more than 206 out of 211) and less than 2.4% were *M. africanum* (less than 5 out of 211).

Sputum smear

As described in the last chapter, 60.9% of TB cases reported in 2020 were pulmonary. Among these individuals, 57.5% (130 out of 226) had a sputum smear test, of which 53.8% were smear positive (70 out of 130). These findings compare closely with previous years for the East of England. The rate of sputum smear testing for pulmonary cases was lower in the East of England compared to England overall (65.9%), although the smear positivity rate for those tested was higher than for England (46.3%) (4).

Other laboratory test results

Between 2018 and 2020 the 26.9% (123 out of 457) of cases that were not culture confirmed had an alternative positive laboratory result indicative of TB: either by microscopy, histology, or PCR (Table 2.1). The majority of these alternative confirmations were provided by histology (15.3%, 70 out of 457). A substantial proportion of cases not culture confirmed did not have any other positive test result reported (73.1%, 334 out of 457), and therefore we interpret that these cases were diagnosed based on imaging or clinical judgement. Overall, 29.4% of cases notified between 2018 and 2020 (334 out of 1,136) were not confirmed by any laboratory method (culture, microscopy, histology, or PCR).

Table 2.1. Number and proportion of non-culture confirmed TB cases by other laboratory diagnostic confirmation, East of England, 2018 to 2020

Laboratory test result*	Pulmonary		Extra-pulmonary		All cases	
	n	%	n	%	n	%
Sputum smear positive	26	11.8	0	0.0	26	5.7
Smear positive (not sputum)	9	4.1	3	1.3	13	2.8
Histology positive	24	10.9	46	19.7	70	15.3
PCR positive	13	5.9	9	3.8	22	4.8
No known positive lab result	155	70.5	177	75.6	334	73.1
Total	220		234		457	

* Patients may have more than one alternative test result, so the total proportion will not equal 100%. Total row displays number of non-culture confirmed TB cases.
† Includes cases with an unknown site of disease.

3. Delay from onset of symptoms to start of treatment

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

Overall, 364 patients started on TB treatment in 2020. Among patients with pulmonary TB who reported both date of symptom onset and date of treatment start, 31.2% (59 out of 189) started treatment within 2 months of symptom onset (Table 3.1), a slight decrease from 2019 where 35.2% of patients were treated within 2 months.

In 2020, more than one-third of patients with pulmonary TB started treatment more than 4 months (120 days) after symptom onset (41.8%, 79 out of 189), indicating a prolonged period of infectiousness.

A significant proportion of patients with extra-pulmonary TB started treatment more than 4 months after symptom onset (43.2%, 51 out of 118). These long treatment delays are often thought to relate to difficulties in diagnosing cases of extra-pulmonary disease, which is supported by the long median times from symptom onset to diagnosis (103 days), like previous years' median times. Of note is the significantly increased median time from symptom onset to diagnosis for pulmonary cases, increasing by over 3 weeks (24 days) since 2019 (101 days in 2020, 77 days in 2019).

Table 3.1. Time between symptom onset and treatment start*, East of England, 2020

Time delay	Pulmonary		Extra-pulmonary only		Overall	
	n	%	n	%	n	%
Under 2 months	59	31.2	26	22.0	86	27.9
2 to 4 months	51	27.0	41	34.7	92	29.9
4 months or over	79	41.8	51	43.2	130	42.2
Total	189		118		308	

* 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, 55.7% of pulmonary TB patients (44 out of 79) who experienced a treatment delay exceeding 4 months were male and 51.9% (41 out of 79) were between aged 15 and 44 years. Most of these patients were non-UK born (56.4%, 44 out of 79), among whom 20.5% (9 out of 44) entered the UK 2 to 5 years prior to their TB diagnosis, and 47.7% (21 out of 44) entered the UK 11 or more years previously. Only 35.4% of these pulmonary cases (28 out of 79) were sputum smear positive, and 6.3% (5 out of 79) had previously been diagnosed with TB. Overall, 20.3% (14 out of 79) of patients with a treatment delay exceeding 4 months had at least one social risk factor.

4. TB outcomes in drug sensitive cohort

Drug sensitive cohort

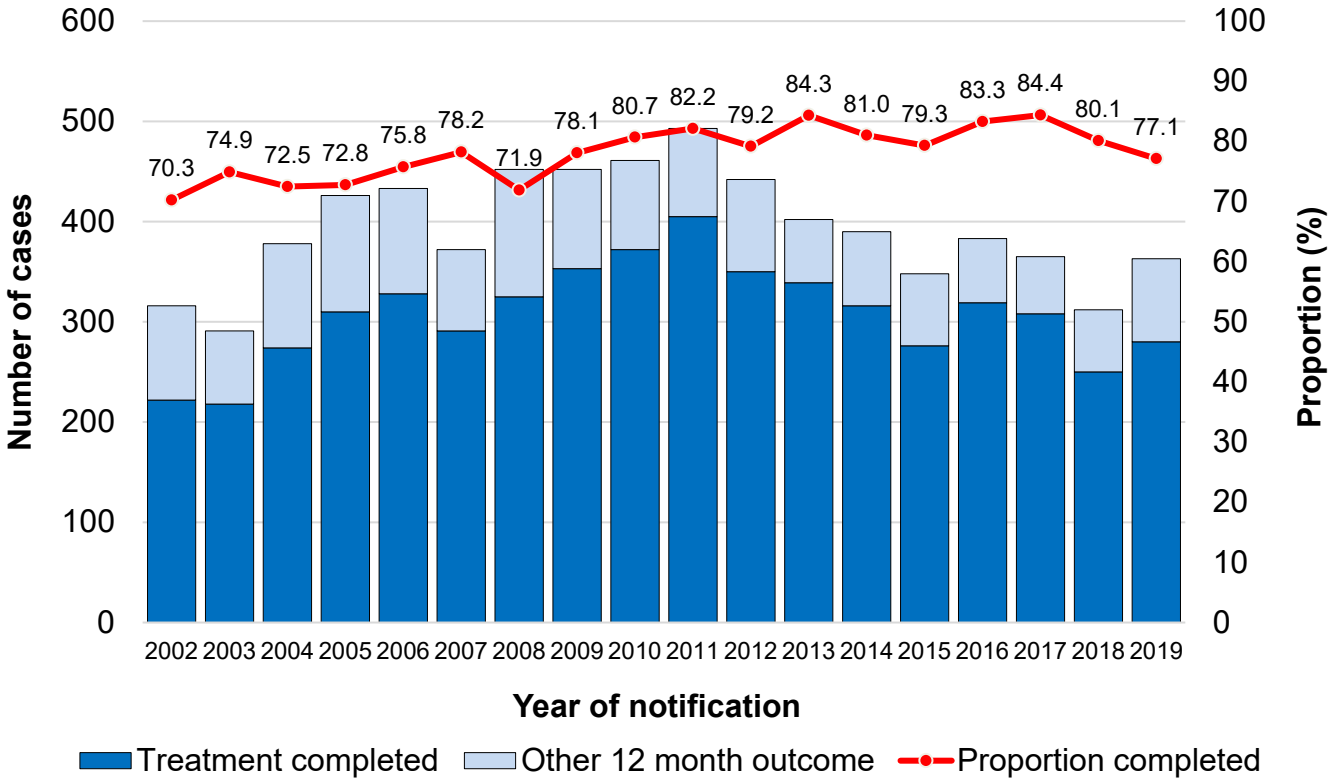
For the purposes of TB outcome reporting, drug sensitive cases are defined as sensitive to rifampicin. Under this definition, cases with resistance to isoniazid, ethambutol and/or pyrazinamide but sensitive to rifampicin are included in the drug sensitive cohort. Drug resistant strains are defined as those with resistance to rifampicin; and cases with suspected rifampicin resistance (initial or acquired) including non-culture confirmed patients treated for presumptive MDR-TB (7). TB outcomes among patients with drug resistant disease are considered in the next chapter (Chapter 5).

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

- 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
- 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
77.1% of patients (280 out of 363) 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 a slight decrease from previous years, with a proportion below 80% for the first time since 2016 as presented in Figure 4.1.

Figure 4.1. Number and proportion completing treatment at 12 months, East of England, 2002 to 2019*



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

The most common outcomes for patients who did not complete treatment at 12 months were continuation of treatment (7.2%, 26 out of 363), death (5.8%, 21 out of 363), and loss to follow-up (3.0%, 11 out of 363, Table 4.1). The proportion of patients notified in 2019 who died within 12 months of treatment start was higher than those notified in 2018 (4.1%). However, 2019 saw a reduction in the proportion of patients lost to follow-up (3.0%) compared to those diagnosed in 2018 (4.7%).

Table 4.1. TB outcome at 12 months, East of England, patients diagnosed in 2019 (excludes drug-resistant TB, and patients with CNS, spinal, miliary or cryptic disseminated disease)

Outcome at 12 months	Cases	Proportion (%)
Treatment completed	280	77.1
Died	21	5.8
Lost to follow-up	<15	<4.1
Still on treatment	26	7.2
Treatment stopped	<5	<1.4
Not evaluated	22	6.1
Total	363	

Patients aged 65 years or older had substantially worse treatment outcomes than average. In this age group, just 57.9% completed treatment within 12 months (33 out of 57), and 26.3% died within 12 months (15 out of 57), of which TB contributed to death in 46.7% (7 out of 15) cases, compared to 2.0% of patients aged under 65 years (6 out of 306). Deaths were also higher among UK born patients (10.2%, 11 out of 108) and patients with sputum smear positive TB (8.7%, 6 out of 69).

There was a substantial difference in loss to follow-up between UK born (<4.6%, less than 5 out of 108) and non-UK born patients (4.0%, 10 out of 250). Non-UK born patients who entered the UK in the year prior to their TB diagnosis were most likely to be lost to follow-up (11.3%, 6 out of 53), which is like proportions seen in 2019 (16.3%, 8 out of 49). For 36.4% of all patients lost to follow-up (4 out of 11), the reason recorded was because they had left the UK. The median age of patients lost to follow-up was 35 years.

In 2019 none of the deaths recorded among the 363 patients with rifampicin-sensitive TB without CNS involvement were diagnosed post-mortem. Causes of death reported by clinicians to ETS[8] indicated that TB caused the death of less than 31.3% of patients who died (less than 5 out of 16) and contributed to the death of 37.5% of patients who died (6 out of 16). TB was also incidental to the death of less than 31.3% of patients who died (less than 5 out of 16) and the relationship between TB and death was unknown for 43.8% of patients (7 out of 16). The median age of patients who died was 71.5 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), 69.2% (18 out of 26) had completed treatment (Table 4.2). The median treatment duration for these individuals was 271 days (IQR 256 to 439 days). This is a lower rate of treatment completion compared to similar patients diagnosed in 2018 (78.8%, 26 out of 33).

Table 4.2. TB outcome for patients with rifampicin sensitive, CNS, spinal, miliary or cryptic disseminated disease, East of England, patients diagnosed in 2019*

Outcome	Number of cases	Proportion (%)
Treatment completed	18	69.2
Died	0	0.0
Lost to follow-up	<5	<19.2
Still on treatment	<5	<19.2
Not evaluated	<5	<19.2

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

Outcome	Number of cases	Proportion (%)
Total	26	

* Excludes rifampicin-resistant TB.

No patients with rifampicin sensitive TB and possible CNS involvement died.

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

Drug resistance

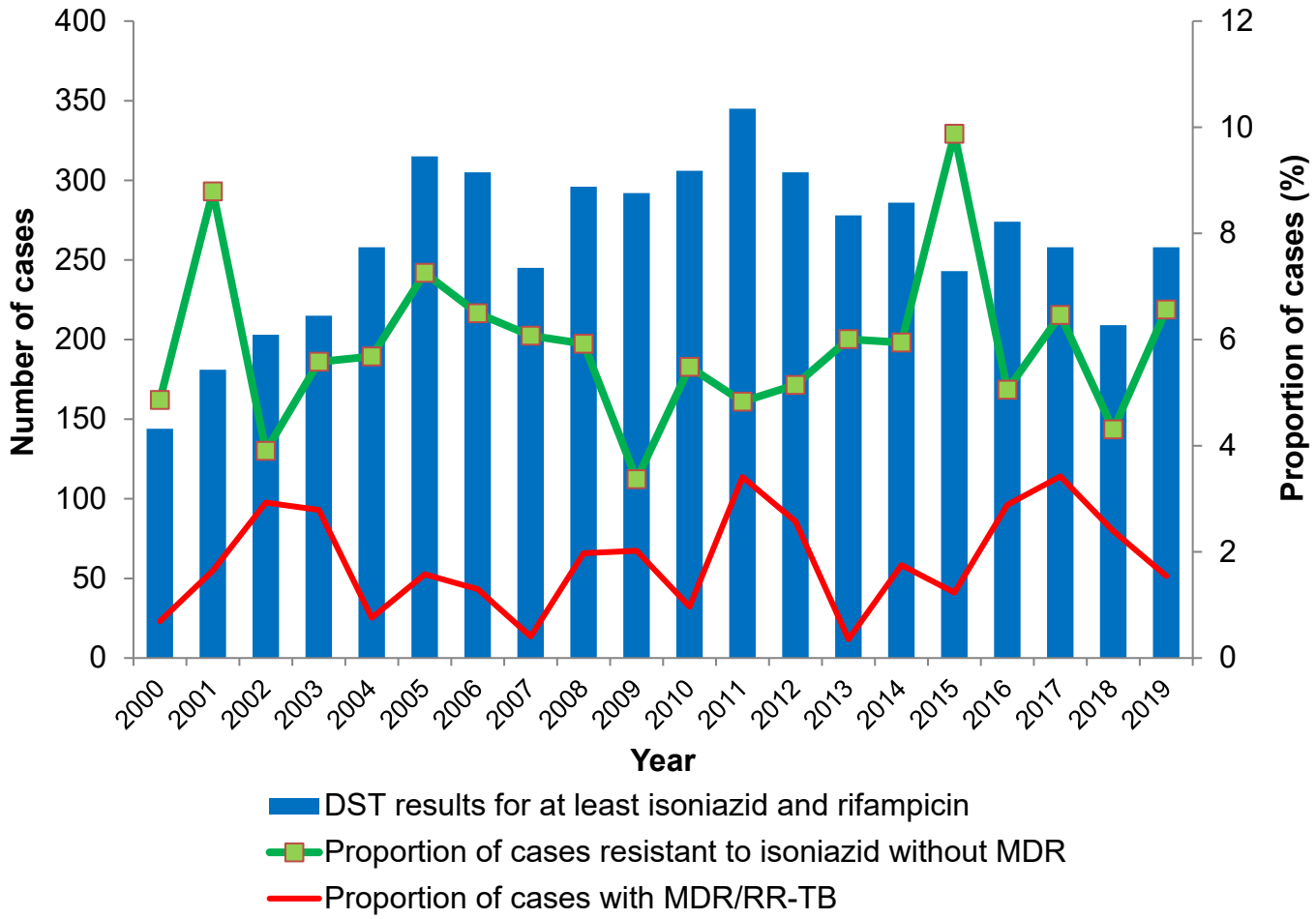
Anti-TB antibiotic drugs are a large family and resistance may occur to 1 or more of these antibiotics and may be in complex combinations. A distinction is made between first, second- and third-line TB antibiotic drugs depending upon their clinical effectiveness (8). First line drugs include rifampicin, 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. MDR-TB cases are initially resistant to at least isoniazid and rifampicin. Extensively drug-resistant TB cases (XDR-TB) are initially MDR and resistant to at least one injectable agent and at least one fluoroquinolone (7).

Overall initial drug resistance and geographical distribution

In 2020 among 210 culture confirmed cases of TB with phenotypic drug sensitivity testing (DST) for at least isoniazid and rifampicin, 4.7% (10 out of 210) had first line drug resistance. Many of these cases (2.8%, 6 out of 210) were resistant to isoniazid but not rifampicin (INH-R), however 1.4% (3 out of 210) had MDR/rifampicin-resistant TB (RR-TB) (Figure 5.1). No cases notified in 2020 were pre-XDR[9], however one MDR/RR-TB case was XDR-TB. No cases were treated with a second line regimen for MDR/RR-TB in the absence of resistant DST results.

[9] Pre-XDR-TB: cases initially MDR and resistant to either at least one injectable agent or at least one fluoroquinolone.

Figure 5.1. Proportion of TB cases with initial first line drug resistance, East of England, 2000 to 2020



* DST: drug sensitivity testing; MDR: multidrug-resistant TB; RR-TB: rifampicin-resistant TB (with or without resistance to other antibiotics).

Of the 10 cases with any first line drug resistance, a high proportion occurred among male patients (80%, 8 out of 10), patients aged between 15 and 44 years (60%, 6 out of 10), and white patients (70%, 7 out of 10). Most patients had pulmonary TB (90%, 9 out of 10). 2020 marks the lowest proportion of first line TB drug resistance recorded for the East of England, and the lowest number of resistant cases since 2000. This proportion is also significantly lower than that of England (11.6%).

Acquired drug resistance

Acquired drug resistance is defined as a newly emerged resistance to 1 or more anti-TB antibiotics identified on repeat culture 3 or more months after the first specimen date. In addition, cases with a change from sensitive to resistant result following commencement of anti-TB antibiotic treatment are reclassified as acquired resistance (even if this is within the 3-month period). It should be noted that patients who acquire resistance are recorded in the year they were notified, not the year that they acquired resistance, therefore the numbers for recent years may still increase for those still on treatment.

There have been 12 cases of acquired drug resistance in the East of England between 2008 and 2020 (0.3%, 12 out of 3,560), typically one case per year. The median time to development of first acquired drug resistance was 263 days after treatment start (IQR 218.5 to 398 days).

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

In 2018 6 cases of MDR/RR-TB were notified in the East of England; fewer than 5 patients had completed treatment within 24 months of starting their treatment.

6. TB in under-served populations

Social risk factors

Social risk factor history was recorded for 83.5% (293 out of 351) of patients with TB aged 14 years or older in 2020. Social risk factors of interest include homelessness, drug and alcohol misuse, and prison history.

Among these individuals, 12.6% (37 out of 293) had at least 1 risk factor, which is a similar proportion to what was seen in 2019 (12.9%, 45 out of 350).

The most common risk factor reported in 2020 was imprisonment (4.3%, 13 out of 303, Table 6.2) followed by alcohol misuse (4.1%, 13 out of 314), drug use[10] (3.8%, 12 out of 315) and homelessness (3.2%, 10 out of 308). Compared to the average proportion of social risk factors from 2010 to 2020 (Table 6.1), there was an increase in the proportion of alcohol misuse in 2020 (4.1%, Table 6.2).

Table 6.1. Social risk factors among TB patients, East of England, 2010 to 2020

Risk factor	Number of patients	Proportion (%)	Total recorded
Prison	170	4.1%	4,137
Homelessness	153	3.6%	4,254
Alcohol misuse	147	3.4%	4,290
Drug use	157	3.7%	4,237

Table 6.2. Social risk factors among TB patients, East of England, 2020

Risk factor	Number of patients	Proportion (%)	Total recorded
Prison	13	4.3%	303
Homelessness	10	3.2%	308
Alcohol misuse	13	4.1%	314
Drug use	12	3.8%	315

Among all cases notified between 2010 and 2020 with at least 1 risk factor, most patients were male (86.5%, 430 out of 497, Table 6.3).

Comparing those with SRF's to those with no SRF's, between 2010 and 2020, certain demographics are more likely to be seen in those with SRFs. A higher proportion of these patients were born in the UK (45.8% UK born with SRF versus 26.5% UK born with no SRFs) and were more likely to have pulmonary disease (82.1% pulmonary TB among those with SRFs

[10] Problem drug use is defined as illicit injecting drug use or long duration or regular use of illicit opiates, cocaine and/or amphetamines.

versus 55.3% pulmonary TB among those with no SRF's). Those with SRF's, notably incarceration, are more likely to spend extended periods of time with one another, increasing the likelihood of pulmonary TB transmission which could explain the significantly higher rates seen in this population (14). Those with SRF's are also more likely to have had a previous TB diagnosis compared to those with no SRF's (12.2% versus 5.9%) as well as higher rates of first line drug resistance (14.1% versus 8.2%). These findings could be because of higher rates of treatment noncompliance in those with SRF's causing reinfection over time and the potential for development of drug resistance.

Table 6.3. Characteristics of patients aged 15 years or older in relation to social risk factors, East of England, patients diagnosed between 2010 and 2020

Characteristic		Cases with social risk factors		Cases with no social risk factors	
		n	%	n	%
Sex	Female	67	13.5	1,986	47.7
	Male	430	86.5	2,180	52.3
Age	15 to 44	2	0.4	169	4.0
	45 to 64	319	64.2	2,441	58.4
	Over 65	153	30.8	952	22.8
Country of birth	Non-UK born	257	54.2	3,020	73.5
	UK born	217	45.8	1,091	26.5
Ethnicity	White	288	57.9	1,176	28.1
	Black-Caribbean	21	4.2	24	0.6
	Black-African	80	16.1	620	14.8
	Black-Other	5	1.0	37	0.9
	Indian	19	3.8	916	21.9
	Pakistani	15	3.0	621	14.9
	Bangladeshi	7	1.4	165	3.9
	Chinese	4	0.8	63	1.5
	Mixed / Other	42	8.5	462	11.1
	Unknown	16	3.2	95	2.3
Clinical characteristics	Pulmonary	408	82.3	2,305	55.4
	Sputum smear positive	187	65.6	604	47.7
	Previous TB diagnosis	53	12.2	242	5.9
Time since entry	0 to 1	58	26.0	536	19.3
	2 to 5	59	26.5	667	24.0
	6 to 10	41	18.4	584	21.0
	Over 11	65	29.1	988	35.6

Characteristic	Cases with social risk factors		Cases with no social risk factors	
	n	%	n	%
First line drug resistance	52	14.1	200	8.2
HIV test offered	280	56.3	2,313	55.5

Overall, 33.1% (113 out of 341) of patients between 2010 and 2020 aged 15 years or older with at least one risk factor started treatment more than 4 months after symptom onset. This is similar to the proportion of all patients between 2009 and 2019 (33.3%, 99 out of 297) who started treatment more than 4 months after symptom onset. Delays of this length were more common among patients with risk factors and extra-pulmonary TB (41.2%, 21 out of 51) compared to pulmonary TB (31.7%, 92 out of 290). The median time from symptom onset to diagnosis was generally shorter for patients with risk factors (76 days, IQR 31 to 162 days) compared to patients with no risk factors (98 days, IQR 50 to 187 days).

Outcomes for patients aged 15 years or older with rifampicin sensitive TB with no CNS involvement with risk factors (notified between 2010 and 2020) were less favourable than patients with no risk factors (Table 6.4). Treatment was completed by 77.1% (252 out of 327) of patients with social risk factors at their last recorded outcome, compared to 89.7% (2,710 out of 3,022) of patients with no risk factors. Additionally, patients with risk factors were more likely to die (8.3%, 27 out of 327 versus 3.9%, 117 out of 3,022) or be lost to follow-up (9.8%, 32 out of 327 versus 3.5%, 107 out of 3,022).

Table 6.4. Last recorded TB outcome for patients aged 15 years or older, East of England, patients diagnosed 2010 to 2020

Last recorded outcome	Cases with social risk factors		Cases with no social risk factors	
	n	%	n	%
Treatment completed	252	77.1	2,710	89.7
Died	27	8.3	117	3.9
Lost to follow-up	32	9.8	107	3.5
Still on treatment	2	0.6	6	0.2
Treatment stopped	5	1.5	42	1.4
Not evaluated	9	2.8	40	1.3
Total	327		3,022	

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

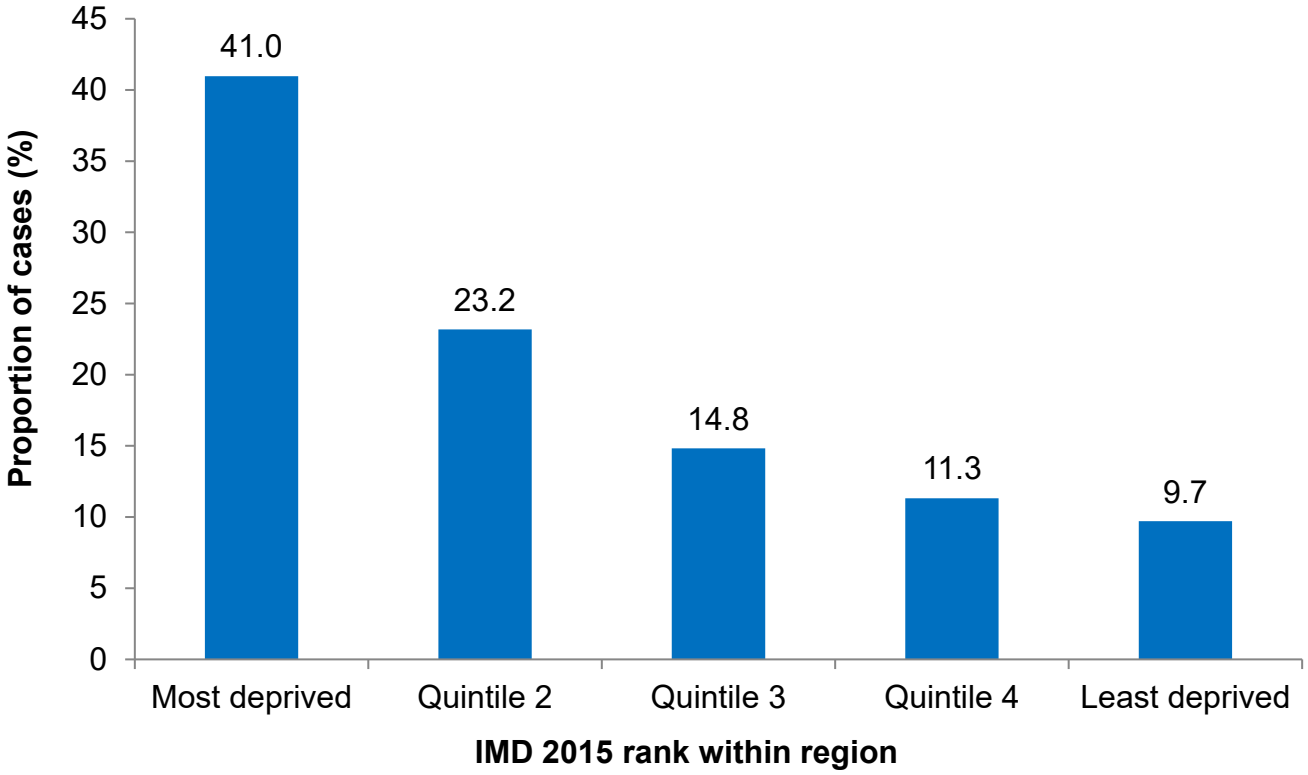
Among all individuals with social risk factors between 2010 and 2020, only 34.3% (112 out of 327) were known to have started on DOT, similar to the rates seen between 2009 and 2019 (33.7%, 94 out of 279). The proportion of rifampicin-sensitive patients on DOT who completed

treatment (78.6%, 88 out of 112) was marginally worse than patients who did not receive DOT (81.9%, 140 out of 171).

Deprivation

Based on the Index of Multiple Deprivation (IMD 2015) rank assigned to different geographical areas in the East of England in 2020, 41% (152 out of 371) of patients were resident in the most deprived quintile, compared to other areas in the East of England (Figure 6.1). A substantial proportion of patients living in these areas (16.3%, 20 out of 152) also had at least 1 social risk factor. As in previous years, TB case rate has maintained a linear association with deprivation.

Figure 6.1. TB case rate by deprivation, East of England, 2020



7. TB-HIV co-infection and HIV testing of TB patients

HIV testing

TB complicating HIV infection is a well-recognised and particularly lethal clinical state but is successfully treated with a combination of highly active antiretroviral therapy (HAART) and appropriate TB antibiotic treatment (7). For this reason, it is essential that all patients with TB should undergo HIV testing so that if they are diagnosed as having TB-HIV co-infection they have the opportunity to start curative TB treatment and HAART as soon as possible, and in so doing preserve their life expectancy and reduce the risk of TB and HIV transmission to others.

Of the 371 TB patients diagnosed in 2020, 366 patients were not diagnosed post-mortem. HIV status was already known for 4.1% of patients and 4.4% of patients' HIV test status was not recorded (Figure 7.1 and Table 7.1). HIV tests were offered to nearly all patients with TB who did not already know their status: 84.7% were offered and received a test, 1.1% were offered but declined a test, and 1.1% were offered but did not receive this testing. HIV tests were not offered to 4.6% of patients. Of those not offered a test, 70.6% were female (12 out of 17), 47.1% were 0 to 14 years (8 out of 17) and 68.8% were UK born (11 out of 17).

Apart from Bedford and Suffolk local authorities, local authorities in the East of England offered and performed HIV tests in 90% of cases (Table 7.2).

Table 7.1. HIV testing status, East of England, 2020

HIV testing status	Offered	
	n	%
Offered and done	310	84.7
Offered but not done	4	1.1
Offered but refused	4	1.1
Not offered	17	4.6
HIV status already known	15	4.1
Unknown	16	4.4
Total	366	

Figure 7.1. HIV testing status in the East of England, 2020

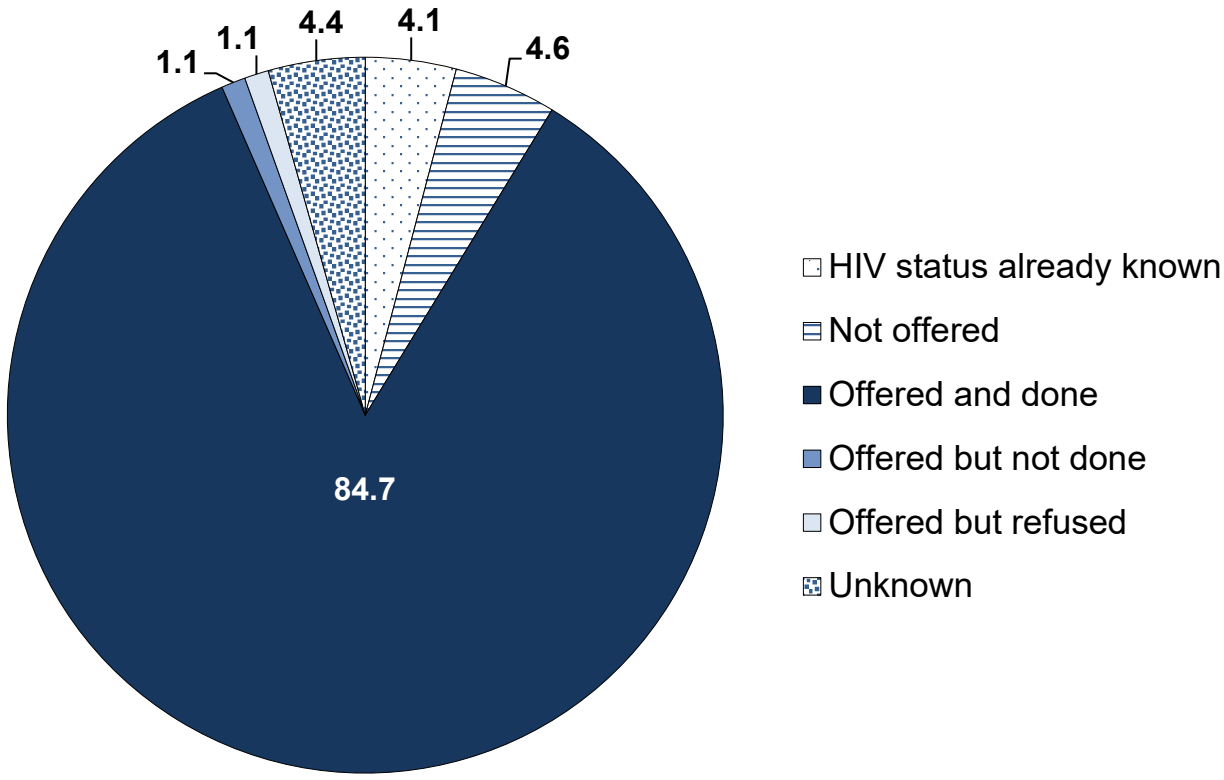


Table 7.2. HIV testing by upper tier local authority of residence, East of England, 2020

UTLA name	Offered		Offered and received		Total number of patients
	n	%	n	%	
Bedford	5	71.4	5	71.4	7
Cambridgeshire	41	95.3	40	93.0	43
Central Bedfordshire	4	100.0	4	100.0	4
Essex	45	91.8	44	89.8	49
Hertfordshire	60	100.0	57	95.0	60
Luton	52	96.3	49	90.7	54
Milton Keynes	14	93.3	14	93.3	15
Norfolk	37	97.4	37	97.4	38
Peterborough	26	100.0	26	100.0	26
Southend-on-Sea	10	100.0	10	100.0	10
Suffolk	17	77.3	17	77.3	22
Thurrock	7	100.0	7	100.0	7
East of England	318	94.9	310	92.5	335

8. BCG vaccination

BCG vaccine coverage

The BCG immunisation programme is a risk-based programme. The vaccine is recommended for individuals at higher risk of exposure to TB, particularly to protect against serious forms of disease in infants (9). All infants (under 12 months old) living in an area where TB incidence is ≥40 per 100,000 population should be offered the BCG vaccine. From April 2015, neonatal BCG has been included as part of the Cover of Vaccination Evaluated Rapidly (COVER) programme. This provides an opportunity for BCG vaccine coverage to be estimated to local authorities where a universal neonatal vaccination programme is in place (10).

BCG vaccination status of TB patients

In 2020, BCG information was recorded for 59.6% of cases (221 out of 371), an increase from 2019 (55.1% ,199 out of 361). There was a total of 17 cases aged between 0 and 14 years with BCG vaccination status recorded, of which 70.6% (12 out of 17) had been vaccinated. Among all cases, non-UK born vaccination rates were higher than UK born vaccination rates and is consistent with findings in previous years.

Table 8.1. Number and proportion of TB patients with BCG vaccination, East of England, 2020*

Country of birth	Unvaccinated	Vaccinated	Total	Proportion (%)
Non-UK born	37	118	155	76.1
UK born	24	42	66	63.6

* Excludes cases with no BCG information.

9. Latent TB infection testing and treatment

This report, derived from the ETS surveillance system, which is a national case register and management system for cases of active TB, does not deal with the issue of latent TB infection (LTBI). The establishment of a national programme for the screening and treatment of LTBI for new migrants was introduced by the Department of Health and UKHSA in April 2015. Information for this programme is currently collected separately to the ETS (11).

Individuals are eligible for the national LTBI testing programme if they are aged between 16 and 35 years and entered the UK from a high incidence country (≥150 cases per 100,000 or sub-Saharan Africa) within the last 5 years and had been living in that high incidence country for 6 months or longer. Eligible individuals are primarily identified prospectively by GP practices during the new patient registration process, however some clinical commissioning groups (CCGs) also searched retrospectively through GP clinical systems or use community or secondary care services for identification.

Laboratory testing providers were selected for high TB incidence and burden CCGs following a national NHS procurement process and establishing a laboratory provider framework (11). As per national programme clinical guidelines, individuals who receive a positive diagnostic result (interferon-gamma release assay, IGRA) are referred to secondary care to rule out active TB and begin LTBI treatment (11).

In the East of England, the LTBI screening programme was commenced in a limited number of GP practices in Cambridgeshire and Peterborough, Hertfordshire Valley, Milton Keynes, Luton, and Bedfordshire CCGs in May 2016. Since March 2020 the COVID-19 pandemic has posed many challenges to CCGs delivering their LTBI programmes. The LTBI programme was paused for 6 months in response to the pandemic. UKHSA and NHS England and NHS Improvement (NHSE/I) are working closely with newly established Integrated care Boards to re-establish local LTBI testing and treatment programmes and return to the momentum of 2019 (12). For more information, please refer to ‘Tuberculosis in England: 2020’ (4).

10. Discussion

The rate of TB in the East of England in 2020 was 5.7 cases per 100,000 population, representing a gradual decline which is statistically significantly lower than the rate of TB in 2012 (8.1 per 100,000). Rates of TB decreased in most East of England local authorities, most notably in Bedford, Peterborough, and Thurrock. Rates in Luton have risen since 2019 from 21.1 to 26.7 per 100,000 in 2020 and remains the UTLA with the highest rates in the East of England. The decrease in rates, while in line with a historical downward trend, may have been influenced by the COVID-19 pandemic and the effects of the pandemic on TB are yet to be fully appreciated. Non-UK born individuals still experience significantly higher rates of TB than those born in the UK. As seen at a national level, case numbers remain high among settled migrants who arrive in the UK more than 11 years prior to their TB notification.

Antibiotic drug resistance is a relatively small issue in the East of England, with 10 cases of first line resistance in 2020, a 67% decrease from 2019 (30 cases), which is also the lowest ever recorded number of drug-resistant cases since the year 2000. This is likely influenced by the COVID-19 pandemic, as the proportion of cases with drug sensitivity results in 2020 was 56.6%, a considerable drop from 2019 (62.5%) and much lower than the 2010 to 2020 average (61.6%). This could be a result of a combination of laboratory pressures, clinical staff shortages and redeployment, and reduced diagnoses. Rifampicin and multidrug-resistance remain rare, with 3 MDR/RR-TB cases notified in 2020, of which one had XDR-TB.

Active pulmonary TB is the infectious form of TB and delay in treatment means increased periods of potential transmission. Over one-third of patients with pulmonary TB, including 2 cases of MDR/RR-TB, experienced a delay of over 4 months between onset of symptoms and treatment start date. This delay remains unacceptably long and is an area to work on reducing potential transmission of TB.

Of note is the significantly increased median time from symptom onset to diagnosis for pulmonary cases, increasing by over 3 weeks (24 days) since 2019 (101 days in 2020, 77 days in 2019) which is likely due to the influence of the COVID-19 pandemic on the healthcare system. The burden of COVID-19 on laboratories may also be the cause of the reduced number of culture confirmed pulmonary TB cases in 2020 (65.9%), a decline from previous years and a set back from the 80% target.

In 2019 the number of patients notified that completed treatment within the expected duration of 12 months was 77.1%, a decrease from 83.8% in 2018. The proportion of patients who were lost to follow-up also reduced.

TB is still a substantial problem for under-served populations (those with a current or history of drug and alcohol misuse, homelessness, and prison). These individuals have a higher risk of developing TB (13), usually with pulmonary sites of disease, and have poorer outcomes (77.1% treatment completion compared to 89.7% among people without social risk factors). The

complex needs of these populations require additional time to address, and often the combined efforts of numerous stakeholders to get them the help required. It is likely that social risk factors are under-recorded, and continuing efforts should be made to find and treat TB among individuals with social risk factors.

The access to TB services and treatment has been negatively affected by the COVID-19 pandemic, with the WHO reporting a substantial fall in the global number of TB notifications of 18% between 2019 and 2020 (14). With the pressures on the NHS during the pandemic, many workforce changes had to be made, which included the diversion of TB staff in many services. Public perception of their health status would have likely influenced the reduced number of notifications. TB and COVID-19 symptoms have many similarities, the main being cough. It is a possibility that some patients with TB assumed their symptoms to be those of COVID-19, leading them to follow self-isolation procedures instead of seeking treatment. The fear surrounding attending healthcare settings and the possible infection with COVID-19 during the peak of the pandemic may also have played a role in the reduced health seeking behaviour noted(15). With all this taken into consideration, it is possible the rates noted in this report will see a considerable change in following years as everything begins to normalise again.

11. Conclusion and recommendations

The period covered by this report was heavily affected by the COVID-19 pandemic, which has had complex effects on healthcare access and delivery, migration, and social behaviours, all of which may have influenced TB transmission, diagnoses, and notifications. A decline in the reported number and rate of people notified with TB in 2020, after the rise in 2019, should be viewed with caution in the light of the significant effect of the COVID-19 pandemic.

TB is still a public health issue in the East of England and particularly among under-served populations (those with a current or past history of drug and alcohol misuse, homelessness, prison). These individuals have a higher risk of developing TB and have poorer outcomes. They have complex needs and frequently pose challenges in identifying and managing these cases. This complexity plays a significant threat to TB control and the achievement of TB elimination in England by 2035. Additionally, the majority of people with TB born outside the UK are diagnosed with TB 11 or more years after their entry to the UK.

All stakeholders including commissioners and partners of TB services should work together to ensure that efforts are targeted on these high-risk populations to address inequalities in health. They should work on innovative local approaches to reduce the average time from symptom onset to treatment start for people with pulmonary TB to reduce their infectiousness. People with TB should have access to high-quality diagnostics, and therefore the rate of culture confirmation should be improved to attain the national target of 80% with a positive culture. Providers should put additional effort on thorough contact tracing and further development of whole genome sequence cluster investigation to interrupt transmission. The providers should offer HIV testing for all those diagnosed with tuberculosis; and ensure that tests are done in line with national guidance. They should prioritise work to improve outcomes for underserved populations and people with drug-resistant TB.

The Cohort Review process should provide an essential forum for local oversight of these important aspects of TB control. All stakeholders should ensure Cohort Review continues to play a vital role in quality assurance of TB case and contact management with identification and escalation of issues to TB Control Board. The TB Control Board should work with partners to ensure appropriate service provision.

The collaborative UKHSA and NHSE&I TB Action Plan, 2021 to 2026, was published in July 2021 and contains actions and targets to achieve improvements in TB care, prevention, and control. The Action Plan has 5 main priorities; recovery from COVID-19, Prevent TB, Detect TB, Control TB disease and Workforce (2). It is recommended that these priorities are reviewed, and actions agreed up on by TB stakeholders in the East of England.

References

1. WHO. Global tuberculosis report 2021
2. UKHSA (2021). TB Action Plan for England, 2021 to 2026
3. British Thoracic Society. 'Tuberculosis services during the COVID-19 pandemic.' Available from the BTS Document Library
4. UKHSA (2021). Tuberculosis in England: 2020
5. UKHSA (2021). UK pre-entry tuberculosis screening report 2020
6. WHO. Definitions and reporting framework for tuberculosis – 2013 revision (updated December 2014 and January 2020)
7. WHO (2020). WHO consolidated guidelines on tuberculosis, module 4: treatment - drug-resistant tuberculosis treatment
8. NICE (2022). Tuberculosis | Treatment summary | BNF content published by NICE
9. Joint Committee on Vaccination and Immunisation (2011). Tuberculosis: the green book, chapter 32
10. PHE (2019). UK tuberculosis technical instructions (cited 17 January 2022)
11. PHE (2019). Latent TB infection (LTBI): testing and treatment. (cited 17 January 2022)
12. PHE (2021). Latent TB infection testing and treatment programme for migrants. (cited 6 April 2022)
13. Velen K, Charalambous S. Tuberculosis in prisons: an unintended sentence? The Lancet Public Health 2021: volume 6, issue 5, pages e263 to e264
14. WHO. COVID-19 and TB (cited 7 April 2022)
15. Ipsos MORI. Public perceptions of health and social care in light of COVID-19 (November 2020). The Health Foundation. 2022 (cited 7 April 2022)

Appendix A. Notes on the report

About the Field Service

The Field Service (FS) supports UK Health Security Agency (UKHSA) 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 UKHSA Centres, local health partners, service providers and commissioners of services. Within the FS network, excellence and innovation is encouraged, we foster academic collaborations and take active part and lead in research, development and training.

Intended audience

This report is for use by healthcare professionals who diagnose and/or care for people with tuberculosis (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 East of England TB Control Board and local health protection forums.

Aim of report

This report describes the recent epidemiology of TB in East of England. 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

The national report of TB in England.

Additional data on TB notifications in the UK to the end of 2020, 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 2020'.

As part of the Collaborative TB Strategy for England 2015 to 2020, 'TB Strategy Monitoring Indicators' are available online.

Where data for these indicators are presented in this report, the indicator name is shown.

In 2021, a new TB action plan for England, 2021 to 2026, was published, the aim being to improve the prevention, detection and control of TB in England, while considering the effect of the COVID-19 pandemic on those affected by TB and TB services (2).

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 on 1 March 2022.

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 2020. 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. ETS was replaced with the National TB Surveillance system (NTBS) in 2021. NTBS records all TB notifications in the UK and will be the data source used in future 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.

Definitions

Abbreviations and terms	Definition
BCG	Bacillus Calmette-Guérin vaccination
CI	Confidence interval
CCG	Clinical Commissioning Group
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
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

Abbreviations and terms	Definition
	(initial or acquired), and non-culture confirmed patients treated with an MDR-TB regimen
DST	Drug sensitivity testing, based on UKHSA no typic 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)
HAART	Highly active antiretroviral therapy
IGRA	Interferon-gamma release assay – blood test for TB infection which does not differentiate between active disease and LTBI
IMD 2015	The Index of Multiple Deprivation 2010 rank for each LSOA, based on deprivation score assigned, relative to other LSOAs in the UKHSA East of England area
IQR	Interquartile range
LSOA	Lower super output area (geographic definition)
LTBI	Latent TB infection
MDR	Multidrug resistance: cases initially resistant to at least isoniazid and rifampicin
Miliary TB	TB infection spread via the bloodstream to all parts of the body
NTBS	National Tuberculosis Surveillance System
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
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.

Abbreviations and terms	Definition
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 WHO and European definitions but adapted to the UK context. In this report, all data was obtained from the ETS matched data set provided in October 2020.

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.

Appendix C. TB among region residents

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

Upper tier local authority of residence	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bedford	8	23	23	25	27	22	24	21	31	29	28	19	33	24	25	17	20	17	10	16	7
Cambridgeshire	22	21	23	19	27	37	41	29	49	39	29	38	37	44	39	32	38	40	41	52	46
Central Bedfordshire	7	12	6	6	9	10	8	8	7	11	15	11	6	10	8	7	5	6	6	6	4
Essex	40	52	59	45	55	43	68	50	54	67	63	82	60	70	66	45	68	65	41	56	56
Hertfordshire	53	54	59	48	65	102	99	56	79	84	96	110	80	73	80	82	99	74	67	78	67
Luton	65	69	87	74	67	87	74	80	73	91	96	108	85	60	73	58	55	61	46	45	57
Milton Keynes	23	24	9	13	18	24	43	44	38	33	26	36	44	32	23	23	25	24	33	26	17
Norfolk	21	17	22	32	30	43	40	43	56	45	29	42	34	31	32	40	37	28	36	42	41
Peterborough	25	26	26	14	34	36	39	24	47	36	47	52	59	57	45	31	39	44	36	39	29
Southend-on-Sea	9	16	16	18	27	22	22	26	18	21	25	19	17	14	9	15	6	14	10	14	14
Suffolk	21	20	19	19	29	31	14	33	39	44	31	29	33	25	32	28	30	19	20	21	26
Thurrock	5	4	6	10	17	13	7	7	15	12	21	14	9	11	4	11	12	16	6	18	7
East of England	299	338	355	323	405	470	479	421	506	512	506	560	497	451	436	389	434	408	352	413	371

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

LTLA name	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
Bedford																			
Bedford	12.1	15.8	16.6	16.3	16	14.7	16.5	17.5	18.9	16.2	16.9	15.9	16.9	13.4	12.4	10.7	9.2	8.4	6.4
Cambridgeshire																			
Cambridge	7.6	7.3	6.9	8.4	13.5	14.3	15.8	11.2	12.5	10.5	12.0	12.5	11.4	10.2	10.4	11.7	13.6	17.6	19.2
East Cambridgeshire	2.3	1.3	2.6	2.6	3.5	2.5	3.3	2.9	2.8	3.2	2.8	2.7	3.1	2.7	3.0	2.3	3.4	3.4	3.0
Fenland	4.0	2.0	2.3	2.3	3.0	2.2	4.3	4.6	4.3	3.9	4.2	7.3	8.3	7.9	5.4	3.3	4.3	4.6	5.2
Huntingdonshire	2.3	3.8	3.7	5.2	4.1	4.1	3.4	5.6	5.6	5.9	4.1	4.5	4.4	5.0	4.6	4.5	4.0	4.1	4.3
South Cambridgeshire	3.8	3.3	4.0	4.1	5.3	6.0	6.3	7.0	6.0	4.3	4.4	4.9	5.1	4.6	4.7	5.6	5.3	4.7	4.2
Central Bedfordshire																			
Central Bedfordshire	3.6	3.4	2.9	3.5	3.7	3.5	3.1	3.5	4.4	4.9	4.2	3.5	3.0	3.1	2.5	2.2	2.0	2.1	1.9
Essex																			
Basildon	4.2	4.6	4.4	5.2	6.5	7.1	7.8	7.2	8.3	8.0	6.5	6.2	6.0	7.2	7.3	6.7	6.1	5.2	4.5
Braintree	1.8	1.3	1.5	1.9	2.9	2.1	1.7	0.9	1.8	2.7	3.8	3.4	3.4	2.0	2.0	1.5	1.3	1.5	2.4

LTLA name	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
Brentwood	7.3	5.8	3.8	3.3	4.3	4.2	6.5	7.4	7.4	5.5	3.6	4.5	6.2	7.9	7.4	5.2	3.9	3.0	4.3
Castle Point	4.2	3.5	4.6	3.4	3.1	3.0	3.0	3.4	1.9	2.6	2.3	3.4	3.0	3.7	2.6	2.2	2.2	3.3	5.5
Chelmsford	3.4	4.8	6.2	5.1	5.1	3.9	4.7	4.2	3.6	4.0	3.4	3.0	3.1	3.3	3.5	3.0	2.7	3.4	2.4
Colchester	4.5	3.8	3.6	3.3	3.5	4.7	4.0	4.4	4.5	7.0	6.5	5.5	3.4	3.3	3.6	4.1	3.5	3.1	2.7
Epping Forest	6.1	4.9	4.9	3.8	4.9	3.5	3.5	3.8	5.7	6.2	7.2	8.5	8.4	6.5	4.1	3.6	3.1	2.5	3.5
Harlow	5.9	8.5	9.0	6.4	7.7	7.6	10.1	8.8	8.7	10.6	16.6	19.3	16.8	9.1	9.0	12.4	15.1	12.0	6.5
Maldon	1.1	1.1	2.2	2.2	1.7	0.5	1.1	1.6	2.2	2.7	2.2	2.2	1.6	1.6	2.6	3.1	3.1	2.1	1.5
Rochford	3.4	3.4	3.4	2.5	3.7	4.1	4.1	4.4	3.6	3.2	1.6	1.6	1.2	0.8	1.9	1.9	2.3	1.2	1.1
Tendring	2.4	3.3	2.6	2.4	1.9	1.4	0.7	1.0	1.7	2.9	2.2	2.4	2.4	2.1	2.3	2.3	2.5	2.5	1.6
Uttlesford	1.9	1.9	1.0	1.4	2.8	4.1	3.6	4.0	3.9	3.9	1.7	1.2	1.2	3.2	3.5	3.9	4.2	5.6	7.0
Hertfordshire																			
Broxbourne	4.2	4.6	7.2	7.6	9.4	6.3	5.9	4.7	5.1	4.3	5.0	7.0	7.7	7.0	6.9	8.3	7.6	5.5	5.1
Dacorum	1.9	1.9	2.9	3.4	4.6	5.3	5.2	4	5.1	5.8	7.6	6.1	4.7	3.8	4.2	4.8	4.8	5.2	4.3
East Hertfordshire	1.8	1.8	2.0	2.3	3.6	2.8	2.3	1.5	1.7	2.7	2.9	2.6	2.4	3.3	4.4	4.3	3.9	2.5	2.0
Hertsmere	10.6	10.9	9.2	8.8	8.8	8.8	7.6	7.5	11.5	12.1	13	10.6	10.5	8.5	11	10.6	11.2	8.6	7.6
North Hertfordshire	6.0	4.0	3.6	4.7	7.2	7.4	7.1	8.3	8.0	7.7	5.2	6.0	5.2	6.1	5.3	6.3	4.8	4.7	3.0
St Albans	3.6	3.1	5.3	6.3	8.3	6.0	5.0	4.2	7.2	7.2	7.4	5.2	5.3	4.6	4.8	4.3	4.5	4.3	4.9
Stevenage	6.7	5.4	5.8	11.2	14.9	13.7	13.2	10.2	13.8	12.4	10.7	9.4	8.6	10.1	8.9	8.0	8.7	7.2	8.0
Three Rivers	6.4	5.6	5.2	5.9	6.3	8.3	6.3	5.4	4.2	6.5	7.6	7.9	8.5	6.3	6.9	5.4	7.2	7.5	6.1
Watford	16.6	19.5	16.1	20.1	22.0	24.3	18.1	14.6	14.6	19.5	18.5	16.0	12.4	15.7	17.7	16.2	12.4	15.5	17.6
Welwyn Hatfield	1.0	1.0	2.3	4.6	5.8	5.4	8.1	11.4	12.0	14.3	12.0	11.7	7.3	7.5	9.6	8.3	7.1	4.9	5.7
Luton																			
Luton	39.7	41.3	41.1	41.1	41.0	42.9	39.9	42.2	44.2	49.2	47.5	41.1	35.0	30.3	29.1	27.0	25.1	23.7	23.1
Milton Keynes																			
Milton Keynes	8.8	7.1	6.1	8.3	12.6	16.2	18.0	16.3	13.5	12.9	14.1	14.8	12.9	10.0	9.0	9.0	10.2	10.3	9.4
Norfolk																			
Breckland	1.1	1.9	2.7	4.0	4.3	3.7	3.6	3.6	3.9	3.1	2.5	3.0	2.3	2.0	1.7	1.9	2.9	2.9	3.8
Broadland	2.0	1.4	1.4	1.6	2.2	3.3	3.0	2.7	1.6	1.6	1.9	2.7	2.1	1.6	0.5	0.3	0.3	1.0	1.5
Great Yarmouth	2.2	4.0	5.4	5.4	4.6	6.0	10.5	13.5	12.8	11.0	9.2	8.5	8.9	8.8	11.8	11.4	12.4	12.1	12.8
King's Lynn and West Norfolk	2.9	3.6	3.4	3.3	3.3	3.3	4.4	4.3	4.6	3.2	2.7	2.5	3.3	3.8	4.6	4.2	4.4	5.1	4.0
North Norfolk	2.0	0.7	0.7	1.3	2.3	7.0	7.3	7.6	3.6	3.6	2.3	3.3	2.0	2.3	1.0	1.0	1.0	1.0	1.0
Norwich	4.6	6.0	8.4	10.7	11.2	9.2	8.9	7.8	8.8	8.7	9.3	8.7	7.2	7.8	8.0	7.9	5.9	5.7	7.3

LTLA name	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
South Norfolk	2.4	2.7	2.1	3.2	3.8	3.7	2.6	2.5	1.9	1.9	1.3	1.1	1.0	1.8	2.0	1.8	0.7	1.0	1.6
Peterborough																			
Peterborough	16.3	13.9	15.3	17.0	21.8	19.5	21.2	20.2	24.2	24.7	28.6	30.0	28.5	23.3	19.8	19.3	20.0	19.8	17.2
Southend-on-Sea																			
Southend-on-Sea	8.5	10.4	12.6	13.8	14.6	14.2	13.3	12.9	12.5	12.6	11.7	9.5	7.6	7.1	5.6	6.5	5.5	6.9	6.9
Suffolk																			
Babergh	1.6	1.2	1.6	1.9	1.6	0.4	1.1	1.9	3.1	2.7	2.3	1.5	1.5	1.9	2.6	2.6	1.8	1.1	1.4
East Suffolk	3.2	3.1	2.6	4.1	3.4	3.4	4.5	5.6	5.6	4.4	4.4	4.3	3.7	2.9	2.6	2.9	2.6	2.4	2.7
Ipswich	7.4	6.8	8.9	6.3	5.7	5.6	6.3	9.4	9.3	8.6	6.5	4.7	5.6	6.3	7.5	5.5	5.3	5.3	5.8
Mid Suffolk	1.1	1.5	1.5	1.9	1.5	2.2	1.4	1.8	1.0	1.7	2.1	2.1	2.0	2.3	3.0	2.0	1.3	0.3	0.3
West Suffolk	1.1	1.3	1.9	3.5	4.3	5.3	4.7	6.1	5.4	5.2	4.5	5.2	5.8	5.0	4.5	3.8	3.6	3.0	3.4
Thurrock																			
Thurrock	3.5	4.6	7.5	9.1	8.3	6.0	6.3	7.4	10.3	10.0	9.3	7.1	5.0	5.3	5.4	7.7	6.7	7.7	5.9
East of England	5.6	5.7	6.0	6.6	7.6	7.5	7.7	7.7	8.1	8.3	8.2	8.0	7.3	6.7	6.6	6.4	6.2	6.1	5.9

* Rates calculated using ONS mid-year population estimates.

Table C3. TB case numbers and rate by age and sex, East of England, 2020

Age group (years)	Female			Male			Overall		
	Number	Rate	95% CI	Number	Rate	95% CI	Number	Rate	95% CI
0 to 14	14	2.38	1.30 – 4.00	6	0.97	0.36 – 2.11	20	1.82	1.11 – 2.81
15 to 44	90	7.73	6.22 – 9.50	106	9.06	7.42 – 10.96	196	8.69	7.52 – 9.99
45 to 64	45	5.20	3.79 – 6.95	62	7.35	5.64 – 9.43	107	7.17	5.87 – 8.66
65+	21	3.00	1.86 – 4.59	27	4.57	3.01 – 6.65	48	4.31	3.18 – 5.72
All ages	170	5.13	4.38 – 5.96	201	6.24	5.4 – 7.16	371	5.67	5.11 – 6.28

* Rates calculated using ONS mid-year population estimates.

Table C4. Drug resistance among TB patients with culture confirmed disease*, East of England, 2000 to 2020

Year	DST results for at least isoniazid and rifampicin	First line drug resistance		Isoniazid resistance without rifampicin resistance		MDR/RR-TB		MDR		Pre-XDR		XDR		Amplified drug resistance	
	Number	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
2000	144	9	6.3	7	4.9	1	0.7	0	0.0	0	0.0	0	0.0	0	0.0
2001	181	19	10.4	16	8.8	3	1.6	2	1.1	0	0.0	0	0.0	0	0.0
2002	203	16	7.8	8	3.9	6	2.9	5	2.4	0	0.0	0	0.0	0	0.0

Year	DST results for at least isoniazid and rifampicin	First line drug resistance		Isoniazid resistance without rifampicin resistance		MDR/RR-TB		MDR		Pre-XDR		XDR		Amplified drug resistance	
	Number	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
2003	215	18	8.4	12	5.6	6	2.8	5	2.3	0	0.0	0	0.0	1	0.5
2004	258	17	6.4	15	5.7	2	0.8	2	0.8	0	0.0	0	0.0	2	0.8
2005	315	29	9.1	23	7.3	5	1.6	3	0.9	0	0.0	0	0.0	0	0.0
2006	305	24	7.8	20	6.5	4	1.3	3	1.0	0	0.0	0	0.0	0	0.0
2007	245	16	6.5	15	6.1	1	0.4	1	0.4	0	0.0	0	0.0	1	0.4
2008	296	25	8.2	18	5.9	6	2.0	6	2.0	1	0.3	1	0.3	0	0.0
2009	292	21	7.1	10	3.4	6	2.0	5	1.7	1	0.3	0	0.0	1	0.3
2010	306	22	7.1	17	5.5	3	1.0	3	1.0	1	0.3	0	0.0	1	0.3
2011	345	30	8.5	17	4.8	12	3.4	12	3.4	4	1.1	2	0.6	1	0.3
2012	305	28	9.0	16	5.1	8	2.6	8	2.6	1	0.3	2	0.6	1	0.3
2013	278	19	6.7	17	6.0	1	0.4	1	0.4	0	0.0	0	0.0	1	0.4
2014	286	24	8.4	17	5.9	5	1.7	5	1.7	1	0.3	0	0.0	2	0.7
2015	243	27	11.1	24	9.9	3	1.2	3	1.2	1	0.4	1	0.4	0	0.0
2016	274	23	8.3	14	5.1	8	2.9	7	2.5	4	1.4	0	0.0	1	0.4
2017	258	28	10.6	17	6.5	9	3.4	5	1.9	2	0.8	1	0.4	1	0.4
2018	209	17	8.1	9	4.3	5	2.4	5	2.4	0	0.0	1	0.5	0	0.0
2019	258	30	11.6	17	6.6	4	1.5	4	1.5	1	0.4	0	0.0	0	0.0
2020	210	10	4.7	6	2.8	3	1.4	2	0.9	0	0.0	1	0.5	1	0.5

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

Appendix D. All TB patients notified by region clinics

Tables of further information about TB cases treated by hospital clinics and TB services based on the East of England are available for public health and clinical stakeholders from your local FS team.

About the UK Health Security Agency

UKHSA is responsible for protecting every member of every community from the impact of infectious diseases, chemical, biological, radiological and nuclear incidents and other health threats. We provide intellectual, scientific and operational leadership at national and local level, as well as on the global stage, to make the nation health secure.

UKHSA is an executive agency, sponsored by the Department of Health and Social Care.

Version 1

Prepared by: Field Service (East of England)
For queries relating to this document, please contact: EFEU@UKHSA.gov.uk

Published: October 2022
Publishing reference: GOV-13325

UKHSA supports the
Sustainable Development Goals