UK Health Security Agency

Tuberculosis in the North 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 at August 2021.

Foreword

Tuberculosis (TB) is perhaps one of the most misunderstood infectious threats to public health with many people thinking that it is a disease of the Victorian period with no relevance to today. However, this is not the case: it continues to be an important and significant threat to the health of our population, as well as a disease which carries a high morbidity burden for individuals.

TB is often characterised as a disease associated with migration to the UK. However, almost a third of North East TB cases reported in 2020 were in people born in the UK. Given that more than a quarter of cases in the North East (27%) were symptomatic for more than 4 months before diagnosis, we need to continue to make sure that front line clinicians consider a diagnosis of TB among UK-born patients with compatible symptoms.

TB is a disease of deprivation. The incidence among the most deprived quintile of North East residents (4.9 per 100,000) is almost 5 times that among the least deprived quintile (1.1 per 100,000). It is also a disease which cannot be properly tackled in isolation: almost a fifth of people diagnosed with TB in 2020 had a significant co-morbidity.

It is useful to consider this surveillance report in conjunction with the national Tuberculosis Action Plan for 2021 to 2026, jointly published by the UK Health Security Agency (UKHSA) and NHS England earlier this year, and – of particular relevance to the North East – the resource for low incidence areas published by Public Health England (PHE).

The number of TB cases in the North East each year remains small, but there is still much work to be done to ensure that our region is not left behind as the incidence declines nationally. The upcoming changes to public health and NHS organisations, including the establishment of UKHSA presents an opportunity for a joined-up, multimorbidity approach to detecting and treating TB. However, the disestablishment of clinical commissioning groups could see the task of retaining a North East focus on TB, especially when the number of cases is so small, needing greater focus.

As such our focus will remain on ensuring that the North East remains in the spotlight and the excellent multi-agency work undertaken over previous years is consolidated and invigorated by the changes and opportunities that lie ahead. We will continue to work collectively across the region to best serve our patients and our wider population

Simon Howard, Consultant in Health Protection UKHSA North East

Introduction

UK Health Security Agency North East region covers the upper tier local authority (UTLA) areas of County Durham, Gateshead, Hartlepool, Middlesbrough, Newcastle upon Tyne, North Tyneside, Nortumberland, Redcar and Cleveland, South Tyneside, Stockton-on-Tees and Sunderland. The North East is a low incidence area for TB when compared with the rest of the UK. However, in 2020, the incidence of TB in the Darlington, Middlesbrough and Newcastle upon Tyne was higher than the national rate (7.3 per 100,000 population).

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 system is real-time; once information is entered onto the website it is accessible at a clinical, regional and national level. See Appendix B 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.

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 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.

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 North East
- 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

Summary

In 2020, 84 people were notified with TB in the North East, an increase of 7% on the previous year. The North East has significantly lower notification rates of TB than England overall: 3.1 per 100,000 compared to 7.3 per 100,000 population (1). In all but 3 local authorities (Darlington, Middlesbrough and Newcastle upon Tyne), TB rates were below the national average.

The number of people with TB who were born outside the UK decreased; however, there was a increase in the number of people with TB born in the UK. TB rates in the UK born population remains very low at 1.7 per 100,000 while the rate in the people with TB born outside the UK was 29.3 per 100,000. Most of the UK-born people with TB were of white ethnicity.

In the highest incidence area of Middlesbrough, more than 60% of people with TB were born outside the UK. India, Romania and Pakistan were the most common countries of birth among those born outside the UK. The most common ethnicity of people with TB born abroad was black African, Indian and white.

Almost 75% of people notified with TB in 2020 had pulmonary disease. Pulmonary TB was more common among people born in the UK (88% vs 55% in those born abroad). In 2020, 80% of all cases were confirmed by culture, 90% among those with pulmonary TB, compared to 75% among those with pulmonary TB in England.

Information on the main co-morbidities (diabetes, hepatitis B, hepatitis C, chronic renal disease, chronic liver disease and immunosuppression) has been collected as part of enhanced TB surveillance since 2016. Almost 10% of people notified with TB in 2020 had a key co-morbidity. The most common being diabetes.

Over a quarter of people with pulmonary TB continue to experience a delay of more than 4 months between symptom onset and the start of treatment. The delays were highest in males, those born in the UK and of a white ethnic group.

There was an increase in the proportion of people notified with drug sensitive TB (with an expected treatment duration of less than 12 months) who completed treatment by 12 months from 72% in 2018 to 81% in 2019, compared to 82% among those with drug sensitive TB (with an expected treatment duration of less than 12 months) in England. The proportion in the entire non-MDR/RR who died at the last recorded outcome was 5.1%, lower than than in 2019 (8.3%).

In 2020, of those notified where risk factor information was available, 18% of people with TB (aged 15 years or over) had at least one social risk factor, such as drug and alcohol misuse, homelessness or a history of imprisonment. This is in comparison to 13% with at least one social risk factor in England. This was the similar to previous years, but was the highest

proportion in the North East since 2010 when data collection on risk factors began (previous highest 17% in 2018).

Information on HIV testing was available for 93% of people reported with TB (excluding cases that were diagnosed post-mortem), of those 91% (excluding cases diagnosed post-mortem and those where status was already known) were offered testing.

Resistance to one or more first line drugs remained similar to the previous year among people with culture confirmed TB in the North East in 2020.

Recommendations

Recommendations for local NHS and UKHSA staff include ensuring that:

- accurate and complete information is provided on the UKHSA enhanced TB surveillance system in a timely manner
- best practice case management is followed for all patients, including universal HIV testing and obtaining sputum smear results

The collective efforts of healthcare and public health organisations across the North East should continue to prioritise development of strategies to improve outcomes for under-served populations.

All named organisations should have due regard for the actions assigned to them in the National Tuberculosis Action Plan for 2021 to 2026.

1. TB notifications and incidence

Overall numbers, rates and geographical distribution

In 2020, 84 people were notified with TB among North East residents, a rate of 3.1 per 100,000 population (Figure 1). This was an increase of 34% in the number and rate compared to 2019 (n=78, rate: 2.9 per 100,0000). The rate of TB in the North East remained well below the England average of 7.3 per 100,000 population.

Within the North East, the highest rates of TB were seen in Middlesbrough (9.9 per 100,000 population) Newcastle upon Tyne (7.8 per 100,000 population) and Darlington (7.4 per 100,000 population), and the lowest in Northumberland, North Tyneside and County Durham (see Figures 2 and 3).

Figure 1. Number of TB notifications and rates, North East, 2000 to 2020

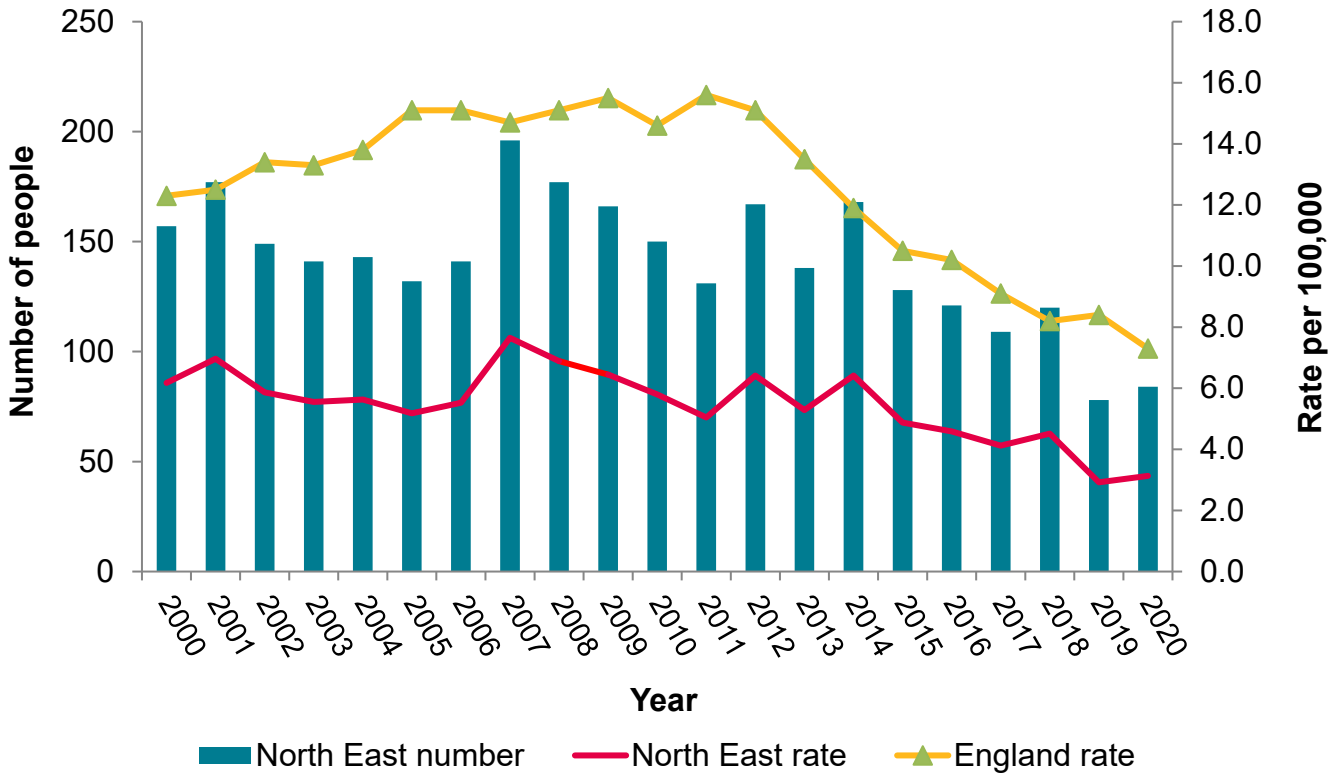
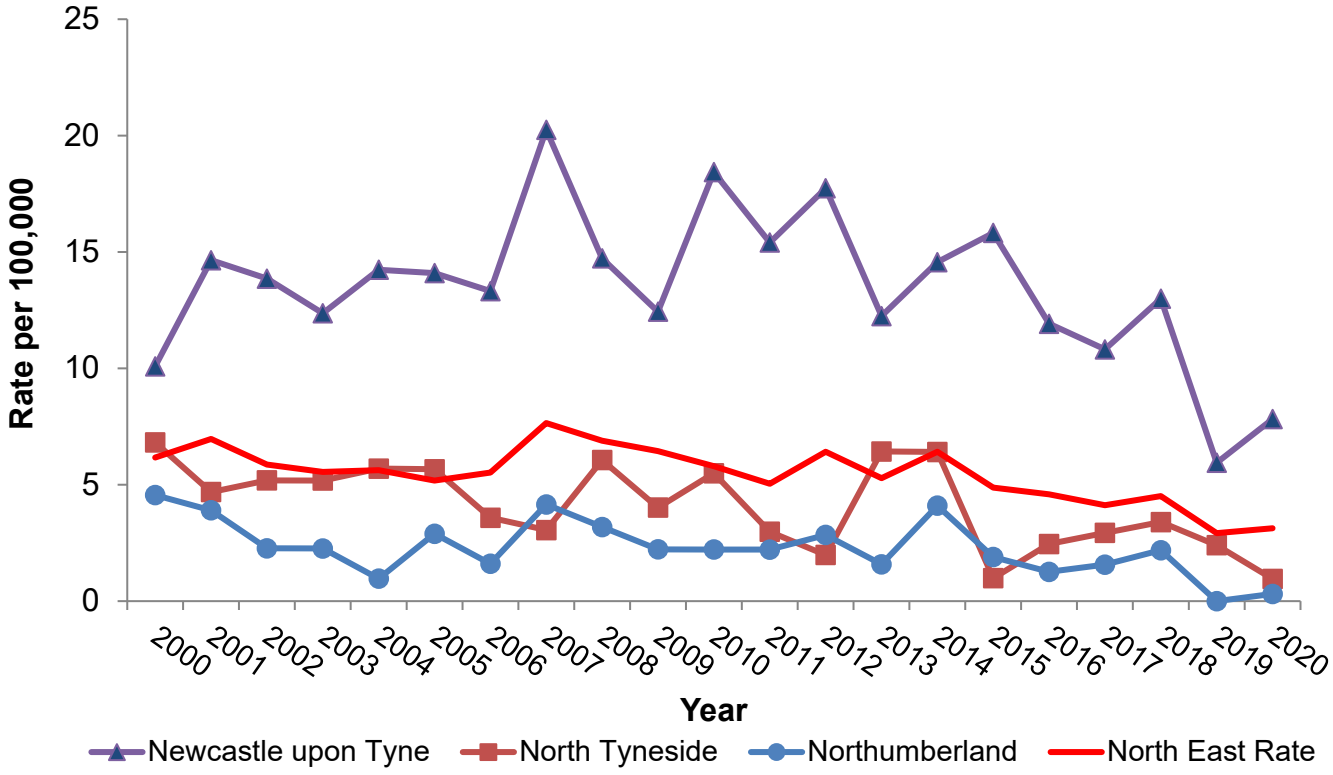
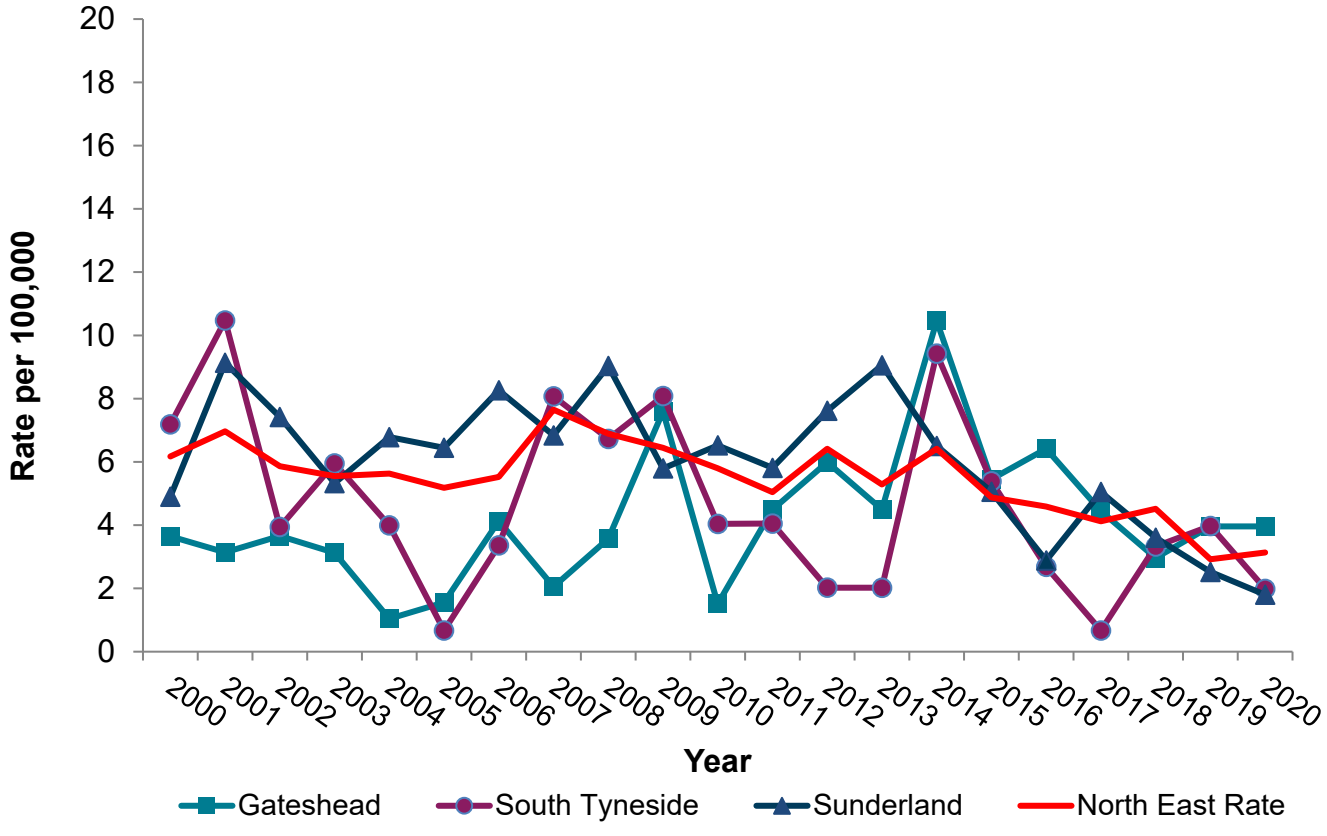


Figure 2. TB notification rates, by North East local authority of residence, North East, 2000 to 2020

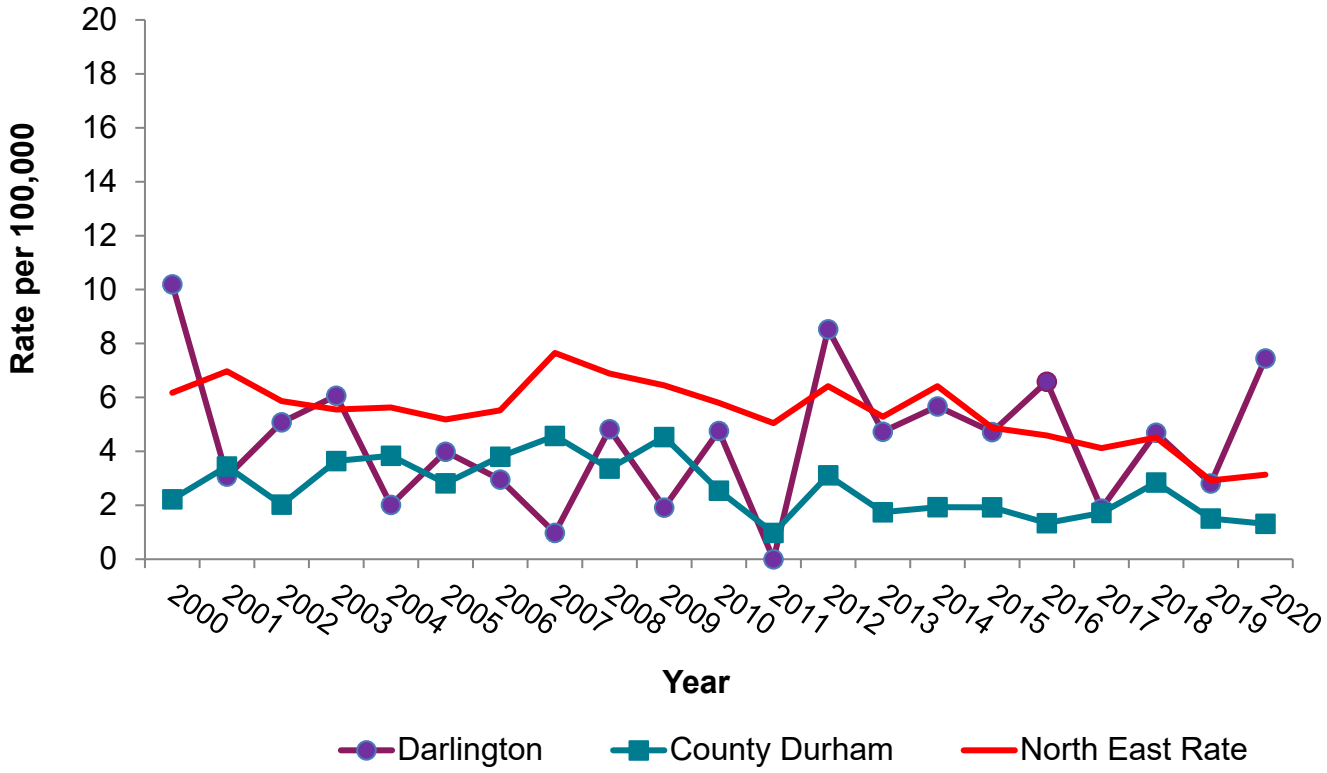
2a. Newcastle upon Tyne, North Tyneside, Northumberland



2b. Gateshead, South Tyneside, Sunderland



2c. Darlington, County Durham



2d. Hartlepool, Redcar and Cleveland, Stockton-on-Tees, Middlesbrough

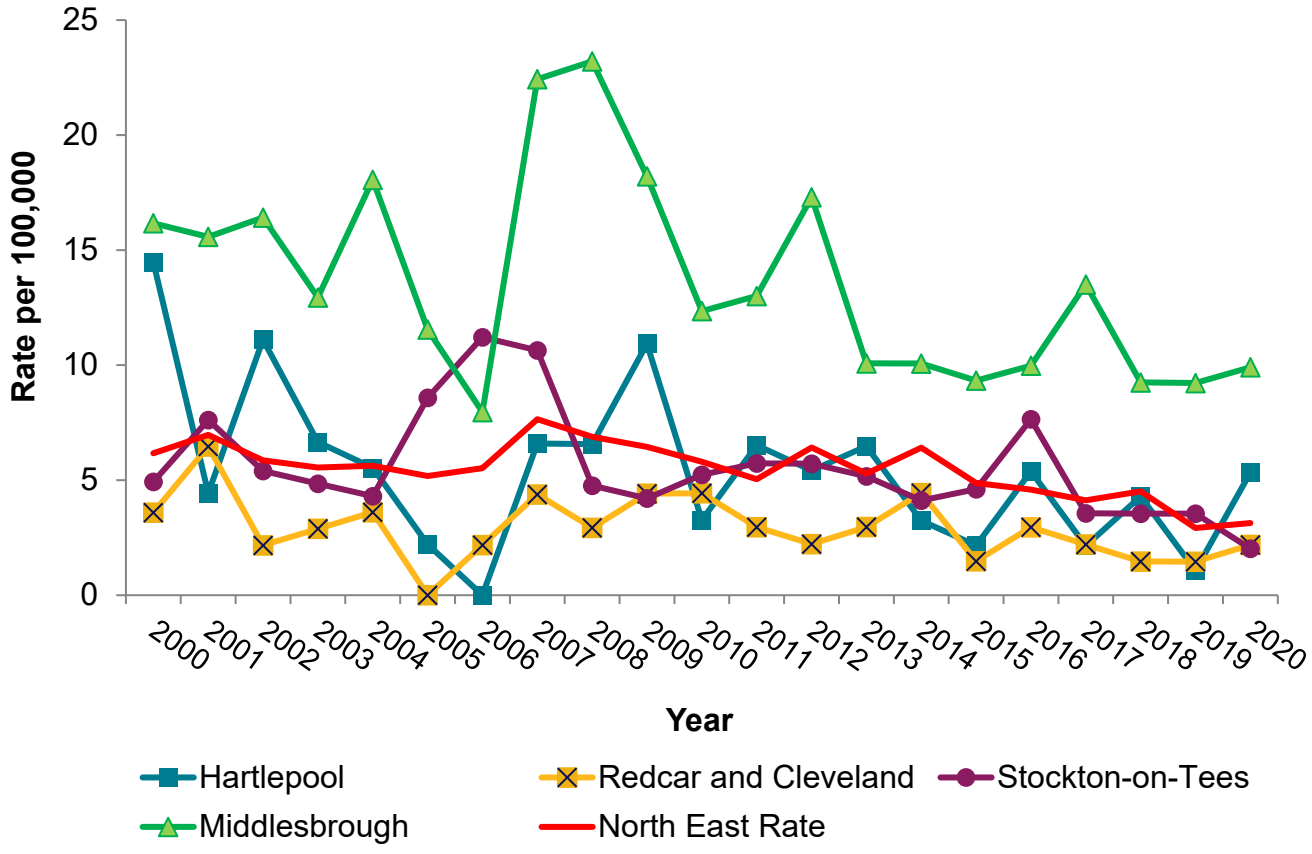
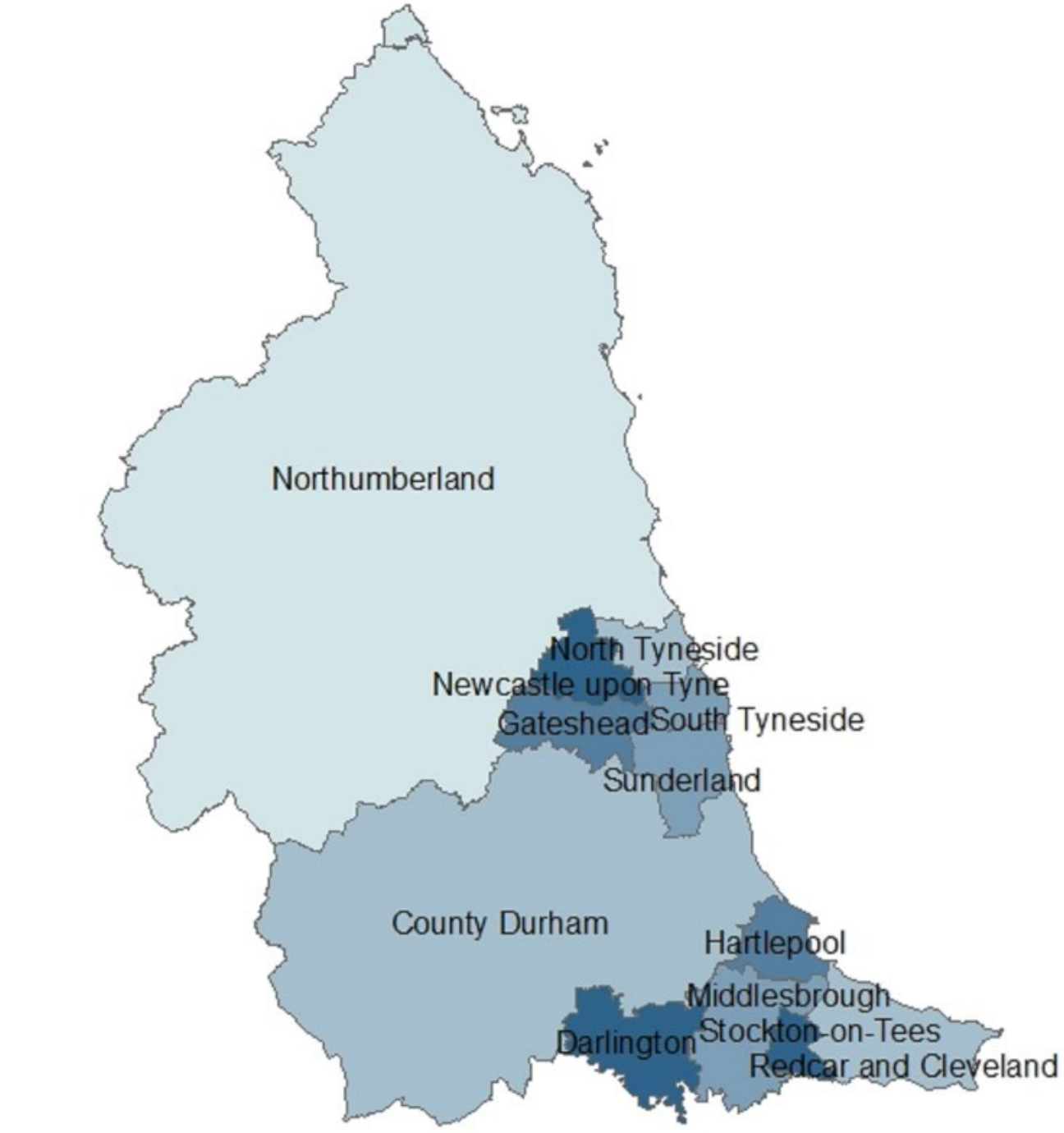


Figure 3. TB notification rate per 100, 000 population by upper tier local authority of residence, North East, 2020

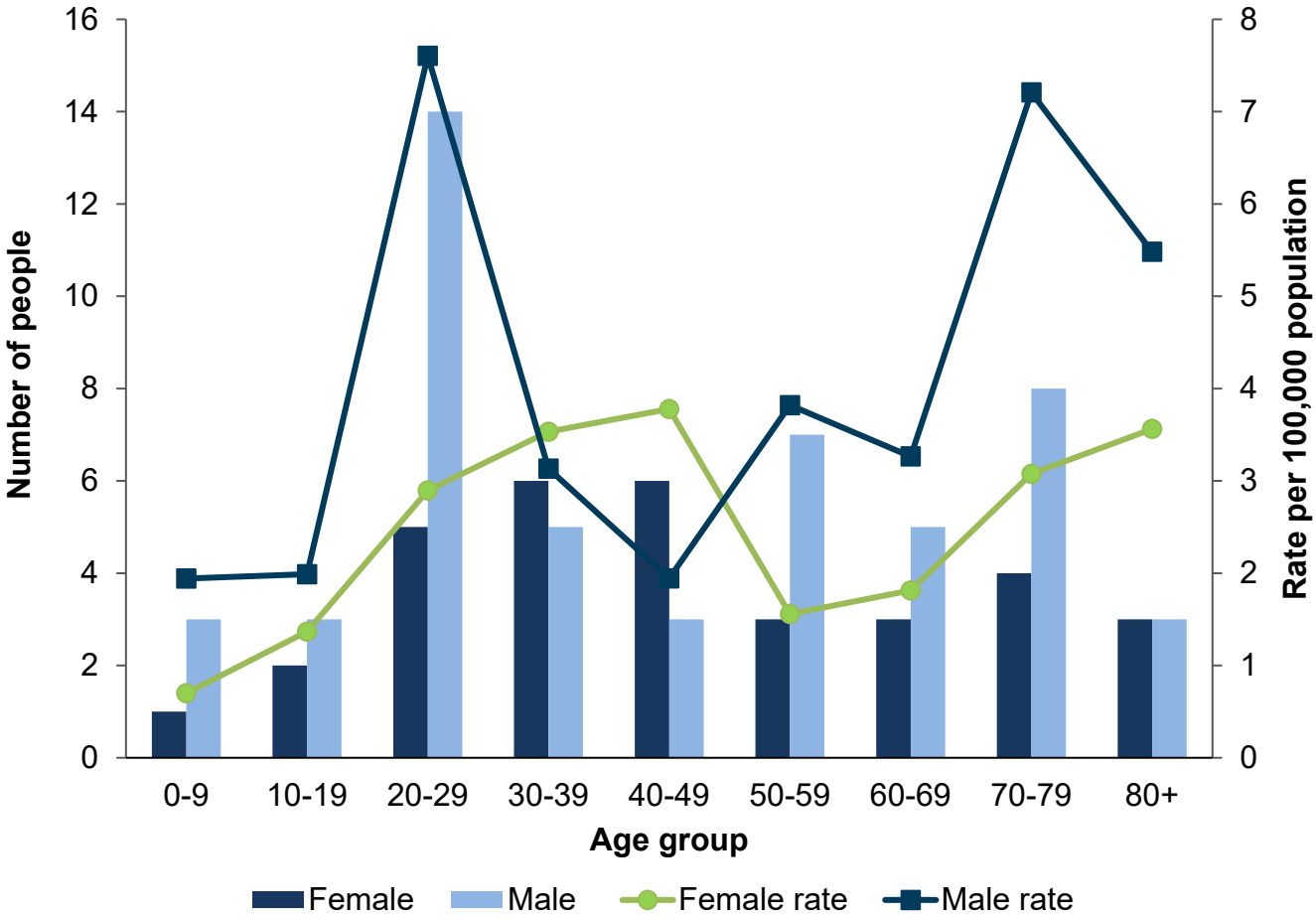


Demographic characteristics

Data on age and sex was available on all notifications of TB reported in the North East in 2020. In 2020, 61% (51 out of 84) of people notified with TB were male (notification rate of 3.9 per 100,000 population). The notification rate for females was 2.4 per 100,000 population.

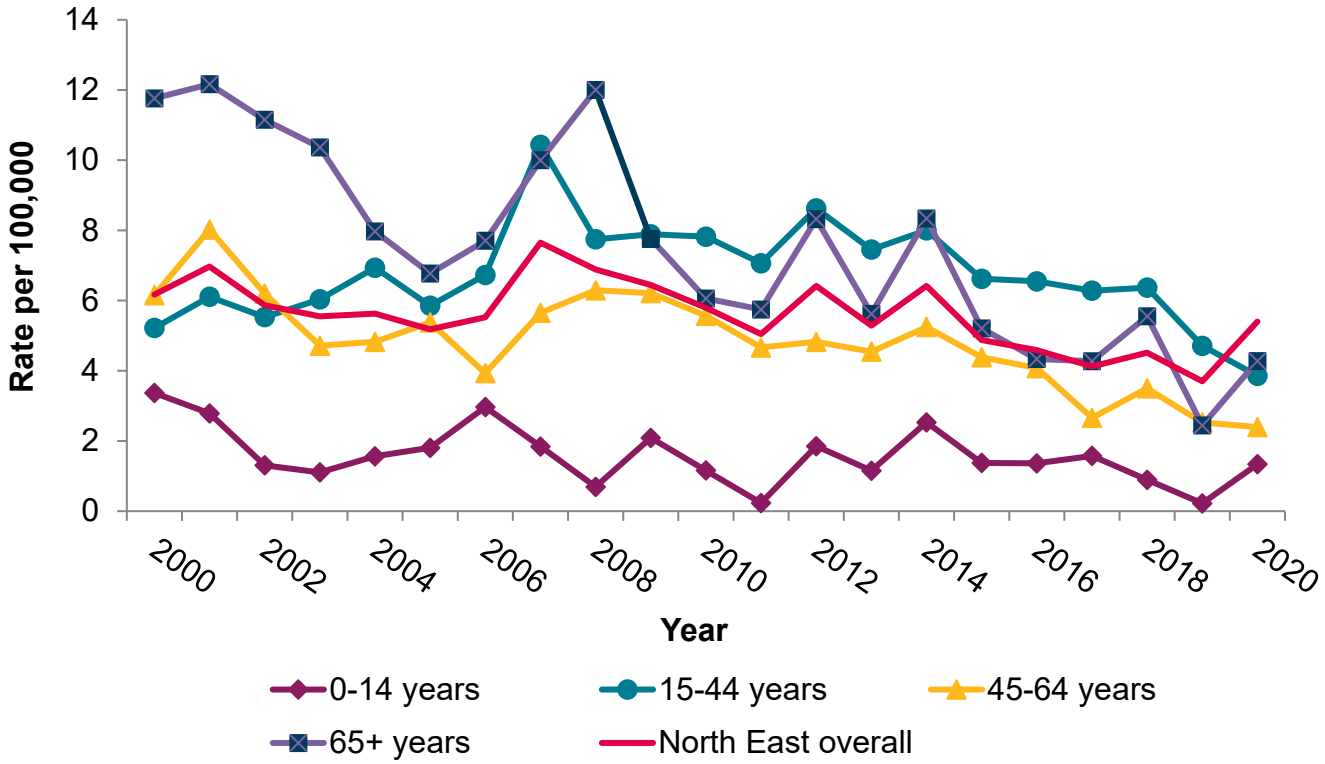
Among both sexes, the highest notification rate of TB were observed in those aged 80 to 84 years (8.1 per 100,000 population) and was lowest in those aged 50 to 54 (0.5 per 100,000 population). When cases were stratified by age and sex, the highest notification rate was seen in males aged 20 to 29 (7.6 per 100,000 population) and the highest rate for females was seen in those aged 40 to 49 (3.8 per 100,000 population; Figure 4).

Figure 4. Number of TB notifications and rate by age and sex, North East, 2020



Looking at the age distribution of notifications using 4 broader age categories (under 15s, 15 to 44, 45 to 64 and over 65), the rate in TB was highest among people aged 65 and over in 2020 (see Figure 5). Compared to 2019, there was an 18% decrease in the rate among people aged 15 to 44 years, a 5% decrease in the rate among people aged 45 to 64. The rates in people less than 15 years of age increased from 0.2 in 2019 to 1.3 in 2020 and from 2.4 to 4.3 in 65 and over age categories (see Figure 5).

Figure 5. TB notification rates by age group, North East, 2000 to 2020



Place of birth and time since entry

The notification rates of TB in the non-UK born population 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 from 15 high TB incidence countries. In 2012, this pre-entry screening was extended to all countries with a high incidence of TB (that is, more than 40 cases per 100,000 population) (2).

In 2020, place of birth was known for 98% (82 out of 84) of people with TB in the North East. Between 2019 and 2020, a decrease of 24.5% in the number of TB notified in people born outside the UK was observed. Of these cases, 40 (49%) were born outside of the UK, with a non-UK born TB notification rate of 29.3 per 100,000 population. Whilst the TB notification rate in UK born population remains very low at 1.7 per 100,000 population. However, the number of UK born TB cases increased from 24 in 2019 to 42 in 2020 (see Figure 6).

In 2020, information on time since entry to the UK and TB notification was available for all of those born abroad; the largest proportion of people being notified was in those between 2 to 5 years since entry to the UK (40%, 16 out of 40). An increase was observed in those between 2 to 5 years since entry and those notified less than 1 year since arriving in the UK. A decrease was observed in those that entered between 6 and 10 years ago and also was observed in 11 years and over (see Figure 7).

Figure 6. Number of TB notifications and rate by place of birth, North East, 2001 to 2020

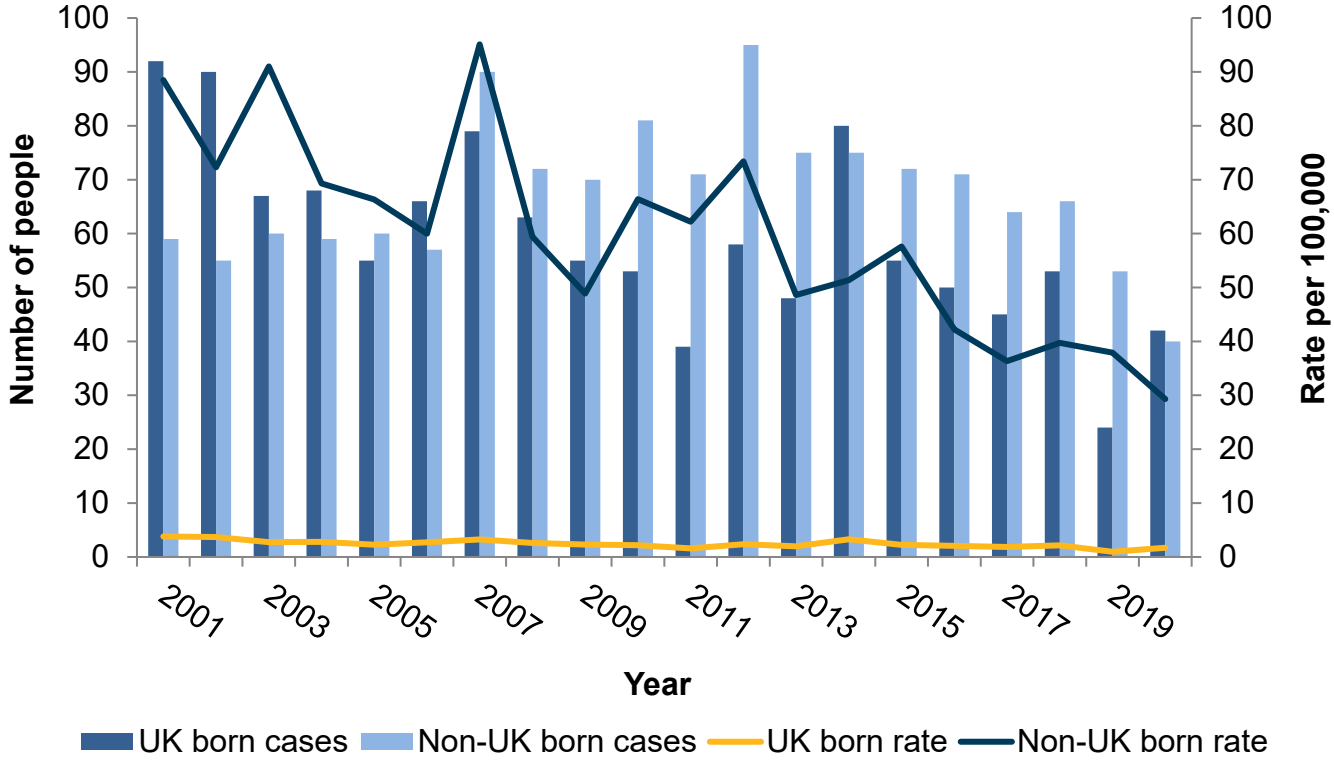
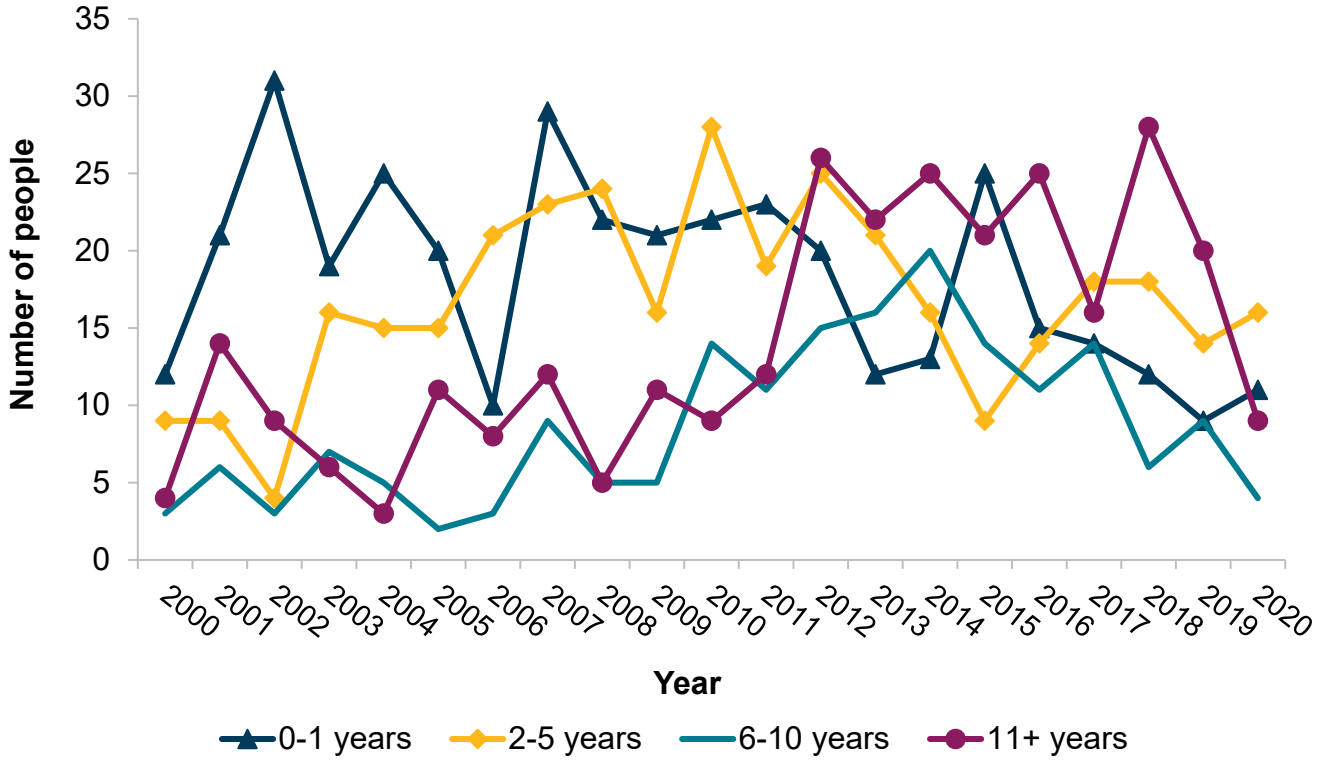


Figure 7. Time between entry to the UK and TB notification for people with TB born outside the UK, North East, 2000 to 2020



For those born outside the UK, country of birth data was available for all the non-UK born notifications. In 2020, the most frequent countries of birth for people born outside the UK were

India (8, 20%) followed by Romania (6, 15%) and Pakistan (5, 13%). The average time between entry to the UK and TB diagnosis varied by country of birth.

Over the past few years, people born in India, Pakistan and Eritrea have made up the highest proportion of non-UK born population. Between 2019 and 2020, the number of notifications declined among people born in those countries. In the same time period, the number of people born in Romania increased.

Table 1. Most common countries of birth for people with TB born outside of UK, North East, 2020

Country of origin	Number of TB notifications	Proportion of non-UK born (%)
India	8	20
Romania	6	15
Pakistan	5	13
Others under 5	21	53
Total non-UK born	40	100

Ethnicity

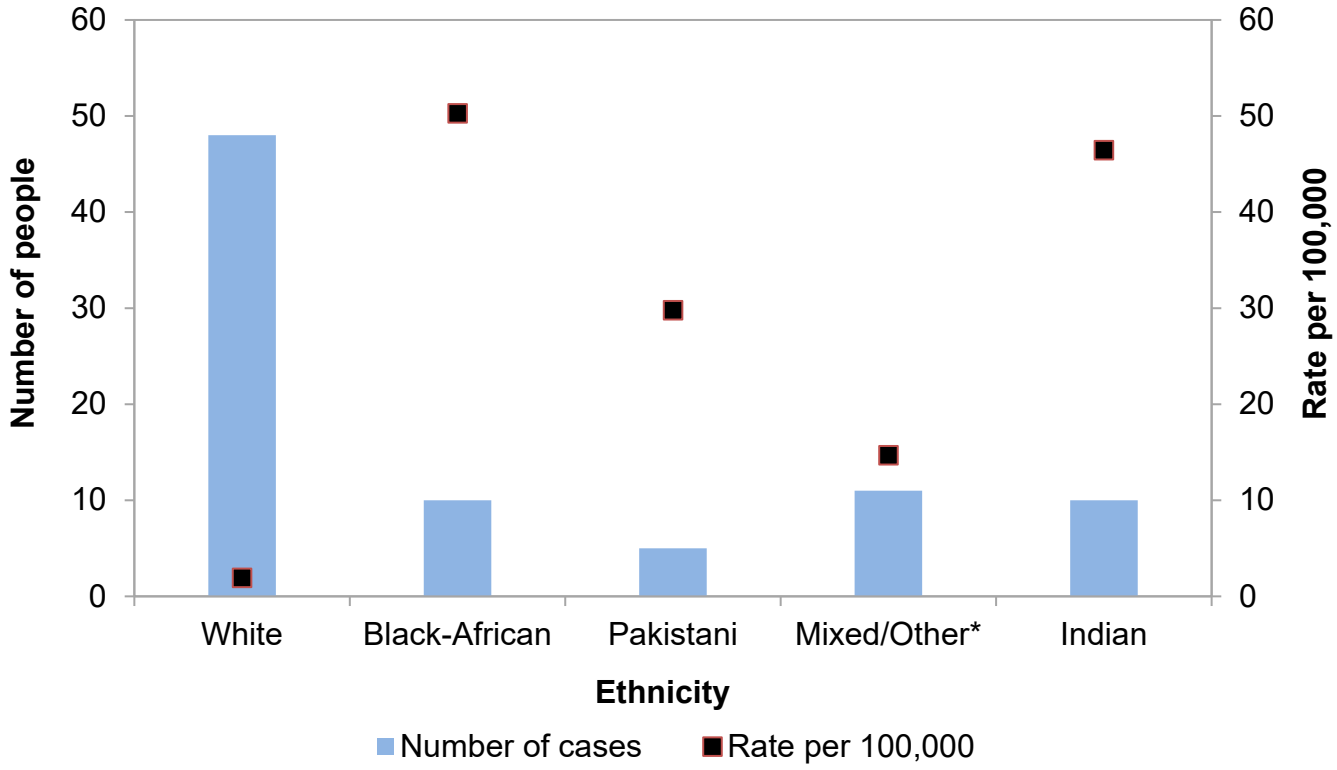
The rates in this section should be interpreted with caution, as population estimates, used as the denominators for the different ethnic groups were calculated using the Labour Force Survey, which is liable to sampling error for small population groups.[1]

As in previous years, among TB notifications in 2020 the most common ethnic group was white, accounting for 57% (48 out of 84) of TB cases, followed by Mixed/Other. Due to the predominantly white population of the North East, this equates to a rate of 1.9 per 100,000 of the white population. The rates in the other ethnic groups were significantly higher.

Of the UK born TB notifications reported in 2018 to 2020[2], the majority (84%, 100 out of 119) were in the white ethnic group. Among the non-UK born TB notifications reported in 2018 to 2020, the majority (21%, 53 out of 257) were in the black African group.

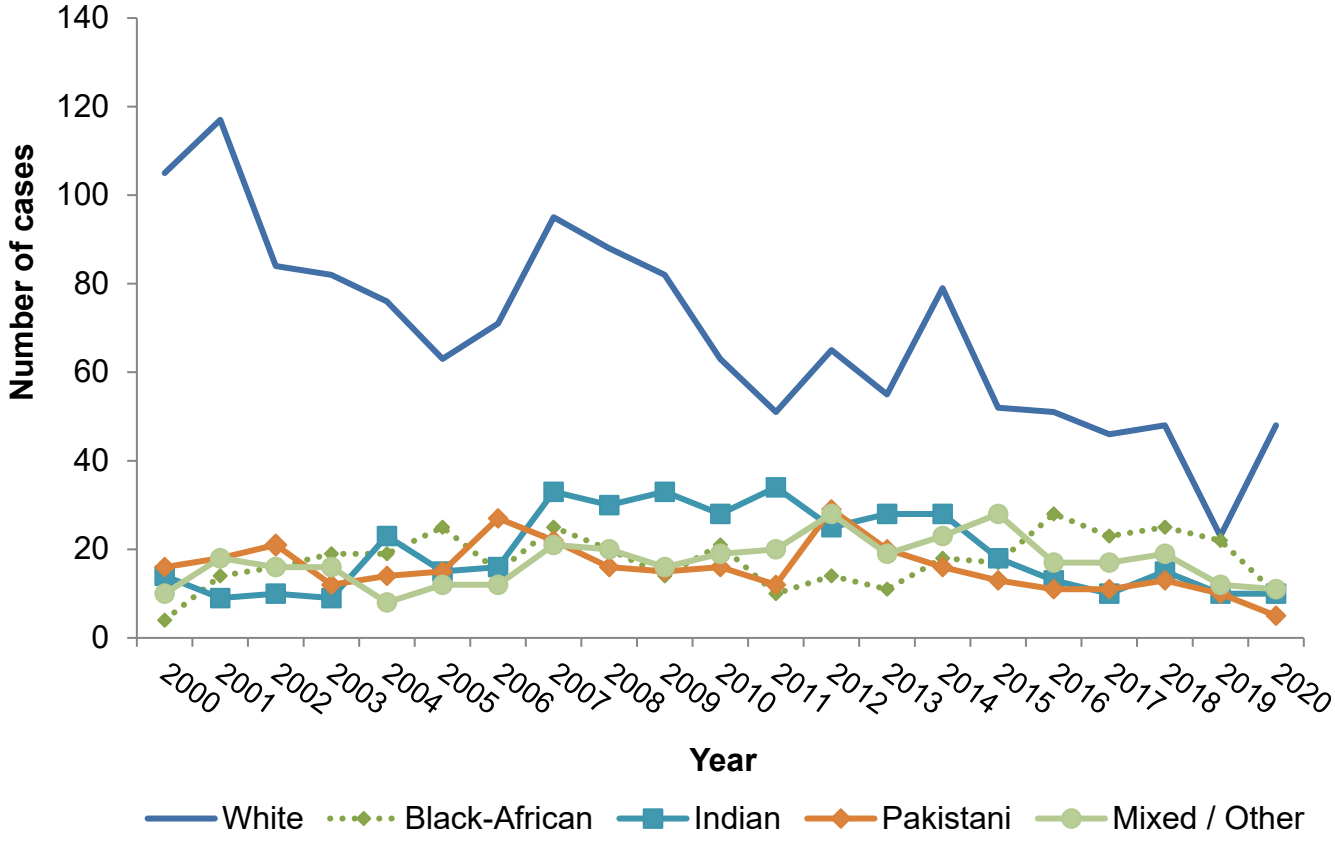
[1] The Labour Force Survey (LFS) was used to calculate population estimates based on a random sample of surveyed individuals, weighted to represent others in the region. Small populations are often underrepresented in the LFS sample, which may inflate TB rates for some ethnic groups.
[2] Three-year data due to small numbers.

Figure 8. TB case number and rate by ethnic group, North East, 2020



*Includes Mixed other, Bangladeshi, Black Caribbean, Black other and Chinese due to low numbers.

Figure 9. Number of TB notifications by ethnic group, North East, 2000 to 2020



Occupation

Table 2. Number of TB notifications by occupation for people aged 18 to 64 years, North East, 2020

Occupation	Number of cases	Per cent
Education	7	13.7
Health care worker	3	5.9
Other	23	45.1
No occupation	18	35.3
Total	**51**	

In 2020, occupation was known for 94% (51 out of 54) of people with TB aged between 18 and 65. The most common occupational category was ‘Other’ (23 out of 51, 45%) followed by ‘No occupation’ (18 out of 51, 35%) and ‘Education’ (7 out of 51, 14%; Table 2). In the ‘No occupation’ category, the most frequently reported status was ‘Unemployed’ (8 out of 18, 44%).

Clinical characteristics

Site of disease

Site of disease was known for all cases in 2020, 73%, (61/84) of people notified with TB had pulmonary disease with or without extra pulmonary (+/- EP) sites.
The largest proportion of cases was diagnosed with pulmonary disease only (40, 47.6%). Twenty one cases (27.3%) had both pulmonary and non-pulmonary disease equating to a total of 61 (72.6%) cases. There were 23 cases (27.4%) with non-pulmonary TB only(Table 3).

The most common extra pulmonary site was IT lymph nodes (9, 10.7%). Pulmonary TB was more common among those born in the UK than those born abroad (88%, 37 out of 42 versus 55%, 22 out of 42).

Table 3. Number of people by site of disease, North East, 2020**

Site of disease	Number of cases	Proportion (%)
Pulmonary*	61	72.6
Miliary	2	2.4
Laryngeal	0	0.0
Non-Pulmonary only	23	27.4
Bone or joint (spine)	5	6.0

Site of disease	Number of cases	Proportion (%)
Bone or joint (other)	2	2.4
CNS (meningitis)	1	1.2
CNS (other)	2	2.4
Cryptic	2	2.4
Gastrointestinal	4	4.8
Genitourinary	3	3.6
IT lymph nodes	9	10.7
Lymph nodes (extra-thoracic)	7	8.3
Pleural	2	2.4
Other (extra-pulmonary)	5	6.0
EP Unknown	16	19.0
Unknown	0	0.0

* with or without extra pulmonary sites.
**people may have disease at more than one site, so the total % will not equal 100%.

Previous history of tuberculosis

In 2020, data was available for 93% (78 out of 84) of notifications and of these 9% (7 out of 78) of people with TB had a previous diagnosis more than 12 months before their current notification. Of the people notified who were known to have previously been treated for TB, one received Direct Observed Therapy (DOT) during this episode. Time since previous diagnosis was known for 5 notifications, with a median time since diagnosis of 6 years (IQR 3 to 15).

Hospital inpatient and directly observed therapy

Data was available for 93% (78 out of 84) of notifications and of these 36% (28 out of 78) of people diagnosed with TB were recorded as being an inpatient at time of diagnosis, this was more common among those aged over 65 (48%, 10 out of 21).

2. Laboratory confirmation of TB

Laboratory tests data collection

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

Culture confirmation and speciation

In 2020, 80% (67 out of 84) of all TB cases reported in the North East were confirmed by culture, this is an increase from the previous year. The proportion of cases reported that were confirmed by culture also varied by region; in 2020 the highest rates of confirmation nationally were seen in the North East.

Culture confirmation was higher among people with pulmonary TB compared to those with extra-pulmonary TB (90%, 55 out of 61 versus 52%, 12 out of 23). Of those with culture confirmed TB in 2020, all were identified as *Mycobacterium tuberculosis* (*M. tuberculosis*) infection.

Sputum smear

In 2020, sputum smear results were available for 67% (41 out of 61) of people with pulmonary TB. Where known, 55% (37 out of 41) of people were sputum smear positive.

3. Delay from onset of symptoms to start of treatment

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

Overall delay includes time from symptom onset to the patient presenting to healthcare, and from the initial presentation to diagnosis and start of treatment. Information on delay was available for 95% (58 out of 61) of all people with pulmonary TB. The remaining people were either asymptomatic at diagnosis, did not have a date of onset recorded, did not have a start of treatment recorded or were diagnosed post-mortem.

In 2020, data was available for 93% (78 out of 84) notifications and of those 36% (21 out of 58) of people with pulmonary disease started treatment within 2 months, and 38% (22 out of 58) between 2 and 4 months from symptom onset (Table 5). The remaining 26% (15 out of 58) of pulmonary cases had a delay from symptom onset to treatment start of more than 4 months.

The median number of days between symptom onset and treatment start was 76 days.

Table 4. Time between symptom onset and treatment start*, North East, 2020

Time delay	Pulmonary		Extra-pulmonary only		Overall	
	n	%	n	%	n	%
Under 2 months	21	36	8	40	29	37
2 to 4 months	22	38	6	30	28	36
Over 4 months	15	26	6	30	21	27
Total	58	100	20	100	78	100

*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

Of the 15 out of 58 people with pulmonary TB with a delay from symptom onset to treatment start of more than 4 months. The highest proportion were male (8 out of 15), UK born (12 out of 15), aged 15 to 44 (6 out of 15) and mainly white ethnicity (12 out of 15).

4. TB outcomes in drug sensitive cohort

Drug sensitive cohort

For the purposes of TB outcome reporting, drug sensitive cases exclude all patients with rifampicin resistant TB (initial or amplified) including multidrug-resistant TB (MDR-TB, initial or amplified), and non-culture confirmed patients treated for MDR-TB (7).

Under this definition, cases with resistance to isoniazid, ethambutol and/or pyrazinamide but without resistance to rifampicin are included in the drug sensitive cohort. TB outcomes among patients with drug resistant disease are considered in the next chapter.

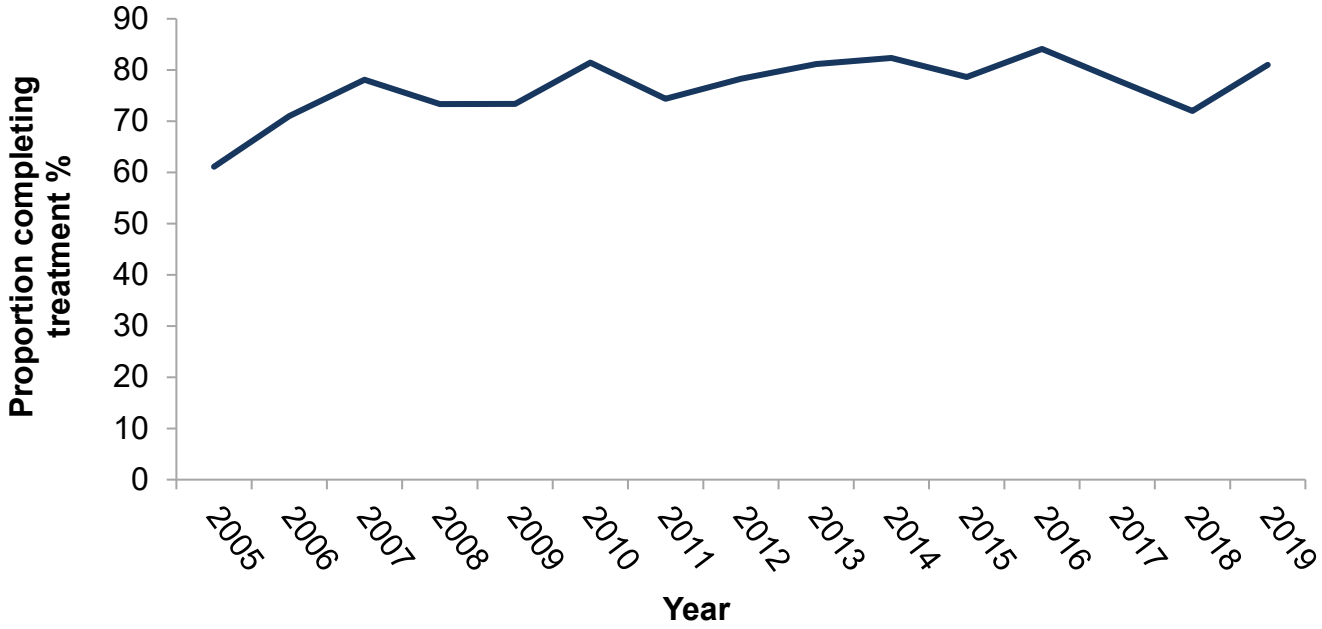
Treatment outcomes for the drug-sensitive cohort are reported separately for the following groups:

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

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

In the North East, 81% (57 out of 81) of people notified in 2019 (excluding CNS, spinal, military or cryptic disseminated TB) completed treatment within 12 months, this is an increase on previous year (see Figure 10).

Figure 10. Percentage of drug sensitive TB patients completing treatment at 12 months, North East, 2005 to 2019*



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

Table 5. Outcome of drug sensitive TB patients at 12 months, North East, people diagnosed in 2019*

Outcome	Number	%
Treatment completed	57	81.4
Died	4	5.7
Lost to follow up	2	2.9
Still on treatment	4	5.7
Treatment stopped	1	1.4
Not evaluated	2	2.9
Total	70	100

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

The most common reason for not completing treatment was due to death (6%) and still on treatment (6%; see Table 6). Of the people notified who were still on treatment, 3 were on a planned treatment regimen that exceeded 12 months.

Treatment completion was lower in males than females 80% (35 out of 44) versus 88% (22 out of 25). Treatment completion was also lower among the UK born than those born abroad (68% versus 73%). Those born abroad when compared to UK born were more often lost to follow up (4% versus 0%). The proportion of people who died whilst on or before treatment was greater in those UK born than those born abroad (14% versus 2%)[3].

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

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

In the North East, 75% (6 out of 8) of the people notified in 2019 with rifampicin sensitive, CNS, spinal, miliary or cryptic disseminated disease, completed treatment within 12 months; the remaining persons notified one completed treatment at the final recorded outcome and the other no outcome information was available.

Death and lost to follow up in the drug sensitive cohort

Of the 78 people notified in the entire drug-sensitive cohort, 4 cases (5%) had death as a reason for non-completion of treatment. Of these, the relationship between TB and death was unknown for 75% (3 out of 4) of cases. TB caused, contributed to or was incidental for one death.

The proportion of people with drug-sensitive TB in the North East that were lost to follow up at the last recorded outcome has ranged from 1% to 9% overall since 2004. Of people notified with TB in 2019, 3% (2 out of 78) were lost to follow up, all of those had left the UK and were all male.

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

Drug resistance

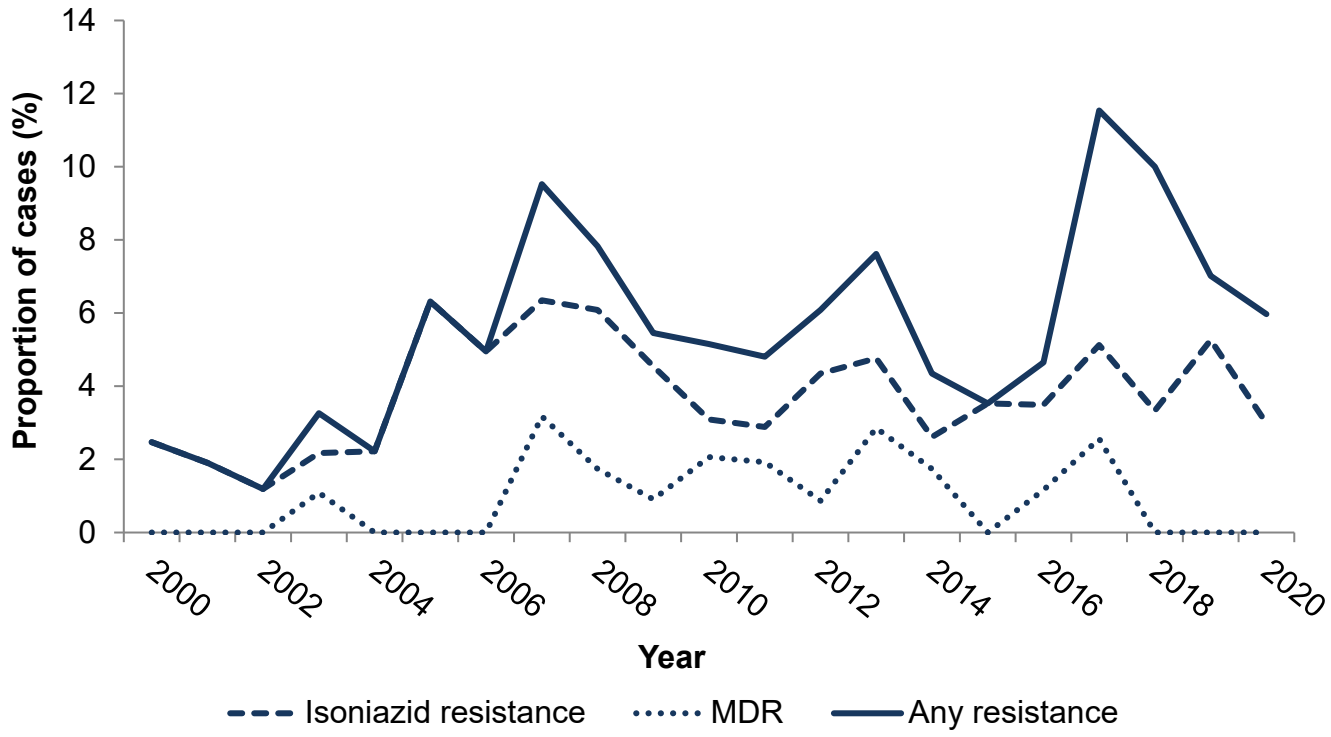
Anti-TB antibiotic drugs are a large family and resistance may occur to one or more of these antibiotics and may be in complex combinations. A distinction is made between first, second and third line TB antibiotic drugs depending upon their clinical effectiveness. First line drugs include isoniazid, rifampicin, pyrazinamide and ethambutol. Second line drugs are 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 (8).

Overall initial drug resistance and geographical distribution

The number of cases in the denominator for this section is comprised of cases who had drug sensitivity testing for at least isoniazid and rifampicin (including both phenotypic testing and WGS prediction). Note: TB monitoring indicator 18 (first line drug resistance) excludes *M. bovis* cases with resistance to pyrazinamide.

In 2020, all of the culture confirmed cases had information available on drug sensitivity testing and of those 6% (4 out of 67) of the culture-confirmed TB cases in the North East were resistant to one or more first line drugs. This percentage of resistant isolates decreased slightly when compared to previous years. In 2020, 2 (6%) isolates had isoniazid resistance without MDR, there were no cases found to be multi-drug resistant (MDR) (see Figure 11).

Figure 11. Proportion of TB notifications with initial first line drug resistance, North East, 2000 to 2020



A higher proportion of people born outside the UK had drug resistant disease, 10% (3 out of 30 born outside the UK, vs 3%, 1 out of 35 born in the UK). Resistant isolates were identified in people of Pakistani (2, 50%), mixed or other (1, 25%) and white (1, 25%) ethnicities.

Drug resistance occurred at a similar proportion in people with pulmonary TB (3 out of 55, 5.5%) than those with extra pulmonary TB (1 out of 17, 5.9%).

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

There were no notifications reported in 2018 with rifampicin-resistant disease.

6. TB in under-served populations

Social risk factors

Within the TB data collection system, data is collected on the presence or absence of 4 social risk factors (SRF) known to increase the risk of TB: current or history of homelessness, imprisonment, drug misuse and current alcohol misuse. Data in this chapter, apart from area level deprivation, is presented for TB cases aged 15 and older.

In 2020, data on social risk factors were available for 85% (66 out of 78) notifications aged 15 and over. During this year in the North East, 18% (12/66) of TB cases aged 15 years and older had at least one SRF (Table 7), this was a slight increase from the previous year. 3.5% of TB cases recorded 2 or more SRFs. In 2020 the most prevalent risk factor (where social risk factors known) was homelessness followed by alcohol misuse (Table 8).

Table 6. Number and proportion of people (aged 15 years or over) with a social risk factor, North East, 2009 to 2020

Year	Total number of cases greater than or equal to 15 years	Number with all fields completed	Number with any risk factor	%
2009	157	98	14	14
2010	145	126	12	10
2011	130	112	15	13
2012	159	136	15	11
2013	133	119	12	10
2014	157	138	13	9
2015	122	108	14	13
2016	115	105	17	16
2017	102	96	16	17
2018	116	104	18	17
2019	77	67	11	16
2020	78	66	12	18

Table 7. Number and proportion of people with TB (greater than or equal to 15 years) with social risk factor, North East, 2020

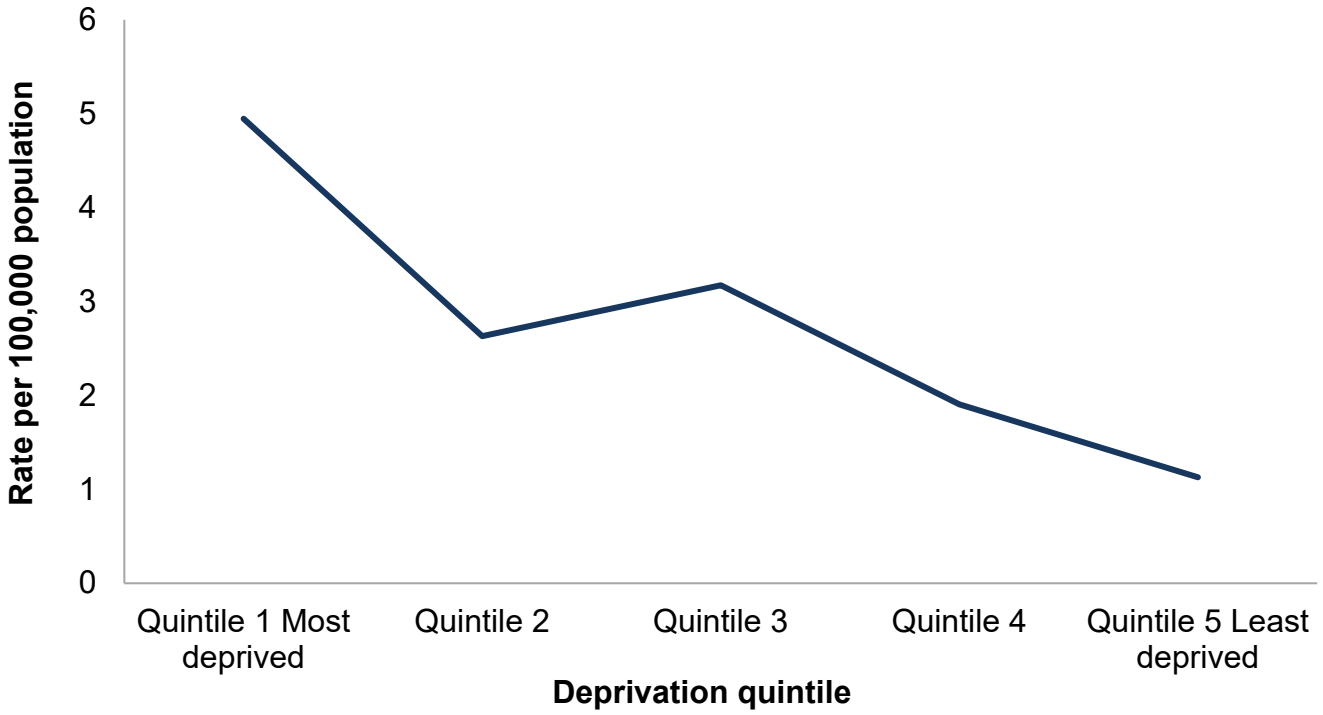
Risk factor	n	%	Total
Prison	1	1.5	66
Homelessness	7	9.9	71
Alcohol misuse	4	5.6	72
Drug use	3	4.3	69

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 socio-economic status.

During 2020, the largest proportion of TB cases lived in areas from the most deprived quintile (27, 32%). The highest TB rates were also observed in the most deprived quintile, a rate of 4.9 per 100,000 population in the most deprived quintile compared to a rate of 1.1 per 100,000 in the 20% of the population living in the least deprived areas.

Figure 12. TB case rate by deprivation quintile, North East, 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 (9).

For this reason, it is essential that all patients with TB undergo HIV testing so that if they are diagnosed as having TB-HIV co-infection they can have the opportunity to start curative TB treatment and HAART as soon as possible, and in doing so preserve their life expectancy and reduce the risk of TB and HIV transmission to others.

In 2020, data on HIV testing was available for 93% of people notified with TB (77 out of 83)[4]. Of those, 91% (67 out of 74) were offered[5] an HIV test and 9% were not offered an HIV test. Among those offered testing, all undertook testing. Of the people notified who were not offered an HIV test, 43% (3 out of 7) were in the 45 to 64 age category and 86% (6 out of 7) were of white ethnicity an UK-born.

[4] Excludes cases identified at post-mortem.
[5] Excludes cases identified at post-mortem and those where HIV status is already known.

8. BCG vaccination

BCG vaccine coverage

BCG immunisation is recommended for people at higher risk exposure to TB, particularly to protect against serious forms of disease in infants. Information on neonatal BCG vaccine coverage at 12 months in English local authorities with TB incidence greater than equal to 40 per 100,000 and offering a universal programme is included as part of the Cover of Vaccination Evaluated Rapidly (COVER) programme.

BCG vaccination status of TB patients

BCG vaccination status was available for 77% (65 out of 84) of people notified in 2020. Where data was available, 55% (36 out of 65) of cases had received the BCG vaccination.

The proportion receiving BCG vaccination was greater in non-UK born than those born in the UK (19 out of 32, 60% versus 17 out of 33, 63%).

Table 8. Number and proportion of TB patients with BCG vaccination, North East, 2020

	0 to 14 years		All ages	
	Number vaccinated	Proportion %	Number vaccinated	Proportion %
Non-UK born	2	100	19	60
UK born	2	50	17	52
All cases	4	67	36	55

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). A new development has been the establishment of a national programme for the screening and treatment of LTBI for new migrants introduced by the Department of Health and Social Care (DHSC) and PHE which began in April 2015. Information for this programme is currently collected separately to the ETS (10).

Individuals are eligible for the national LTBI testing programme if they are aged 16 to 35 years and entered the UK from a high incidence country (greater than or equal to 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 search 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[6] 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 (IGRA) are referred to secondary care to rule out active TB and initiate LTBI treatment (12).

Currently there are no CCGs in the North East that meet the threshold for screening.

Discussion

In January 2015, PHE and NHS England published the ‘Collaborative TB Strategy for England 2015 to 2020’, which sets out the actions required to achieve a year on year reduction in TB incidence and a reduction in the health inequalities associated with the disease.

In July 2021 UKHSA published the ‘TB Action Plan 2021 to 2026’, with the aim 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. The TB Action Plan aims to support a year-on-year reduction in TB incidence and in-UK TB transmission and enable the UK to meet its commitment to the World Health Organization (WHO) elimination targets by 2035.

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

[6] High incidence is here defined as more than 20.0 cases per 100,000. High burden is defined as equal to or greater than 0.5% of the TB case burden in England.

‘TB Strategy End of Programme’ report. This report of TB surveillance data for North East England up until the end of 2020 provides an overview of the epidemiology of TB in the North East England following the implementation of the strategy.

Numbers and rates of TB in the North East remain low and below the national average. However, the rates and TB burden are higher in some areas and subgroups such as urban and deprived populations. In 2020, an increase was seen in the number of people notified with TB and born in the UK. Whilst the number of notifications of those born outside the UK decreased, the number and rate of TB notifications of those born outside the UK remains high compared to the UK born population. The most common ethnic group of people with TB remains White, followed by Black African.

The percentage of people notified with TB that had at least one social risk factor, such as drug and alcohol misuse, homelessness or a history of imprisonment has increased. The proportion is higher than any other region (1) and was the highest proportion in the North East since 2010 when data collection on risk factors began.

HIV testing was not offered, or not recorded as offered, to 9.5% of people with TB in 2020, the number offered an HIV test in 2020 has decreased slightly from 2019. UK guidelines recommend all TB patients should be offered a test, regardless of age or ethnicity or where they are resident (7). Information on symptom onset was well completed and identified longer delays in extra pulmonary cases. Culture confirmation was higher among people with pulmonary TB, of those nearly 70% of people notified with pulmonary TB had a sputum smear result. This is an important indication of infectiousness and should be done on all patients where possible.

Treatment completion at 12 months among patients with rifampicin sensitive and non- CNS, spinal or miliary or cryptic disseminated disease in the North East in 2019 was comparable to the national figure. The most commonly reported reason for not completing treatment was due to death or still being on treatment. First line drug resistance among people with TB in the North East decreased slightly from the previous year.

Conclusion and recommendations

This report updates the latest epidemiology of TB in the North East, describing those populations at increased risk of disease. This evidence can help services implement the basic elements of TB control, namely prompt identification of active cases of disease, supporting patients to successfully complete treatment, and preventing new cases of disease occurring, through effective case management and robust contact tracing. The information will also be useful to target resources effectively.

The main recommendations for the NHS and UKSHA derived from the data presented in this report include:

- ensuring that accurate and complete information is provided on the UKHSA National Tuberculosis Surveillance System (NTBS) in a timely manner
- offering and encouraging HIV testing for all those diagnosed with TB and ensuring, where possible, that tests are done, in line with national guidance (7)
- increasing the proportion of pulmonary TB cases with a sputum smear result to better inform local infection control and prevention activity
- reporting treatment outcome for all patients, and reviewing reasons why completion is low in some areas

In addition, all named organisations should have due regard for the actions assigned to them in the National Tuberculosis Action Plan for 2021 to 2026, which include strengthening early detection of TB in higher risk groups, those with social risk factors and other componenents that contribute to delays in people diagnosed with TB.

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12. Tuberculosis (TB): action plan for England

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 important health protection work and secondly through the expert analysis, interpretation and dissemination of surveillance information to UKHSA Centres, local health partners, service providers and commissioners of services. Within the FS network, excellence and innovation is encouraged, we foster academic collaborations and take active part and lead in research, development and training.

Intended audience

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

Aim of report

This report describes the recent epidemiology of TB in the North 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 following resources are available online:

- the national report of TB in England
- additional data on TB notifications in the UK to the end of 2020 and breakdowns by country in 'Reports of cases of tuberculosis to enhanced tuberculosis surveillance systems: United Kingdom, 2000 to 2019'
- TB Strategy Monitoring Indicators (part of the Collaborative TB Strategy for England 2015 to 2020)
- the Tuberculosis action plan for England 2021 to 2026
- TB indicators at upper tier local authority and clinical commissioning group level

Appendix B. Description of data sources and definitions

Data sources

This report is based on TB case notifications made to the UKHSA Enhanced Tuberculosis Surveillance system (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.

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, polymerase chain reaction (PCR), histology and culture are collected in ETS. Appropriate referral of clinical specimens to the Mycobacterium Reference Laboratories is an important part of the routine work of the diagnostic laboratories in the investigation and management of TB cases.

The National Mycobacterium Reference Service (NMRS) receives these diagnostic materials and undertake characterisation using culture and molecular diagnostic methods to define species of *Mycobacterium*, TB antibiotic (drug) susceptibility and organism relatedness. Historically, organism relatedness has been determined by Mycobacterial Interspersed Repetitive Unit-Variable Number Tandem Repeats (MIRU-VNTR) typing, however this has been superseded in recent years by Whole Genome Sequencing (WGS).

Definitions

Term	Definition
BCG	Bacillus Calmette-Guérin vaccination
CI	Confidence interval
CCG	Clinical Commissioning Group
Cluster	Two or more patients notified within the time period of analysis with TB cause by strains with ≤12 SNP differences
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

Term	Definition
Drug	In the context of TB control, a drug is an anti-TB antibiotic
Drug resistant cohort	The drug resistant cohort includes any patients with rifampicin resistant TB (initial or acquired), including MDR-TB (initial or acquired), as well as those without culture confirmation treated with an MDR-TB regimen
Drug sensitive cohort	The drug sensitive cohort excludes all TB patients with rifampicin resistant TB (initial or acquired) including MDR-TB (initial or acquired), and non-culture confirmed patients treated with an MDR-TB regimen
DST	Drug sensitivity testing, based on UKHSAnotypic 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
MIRU-VNTR	Mycobacterial Interspersed Repetitive Unit-Variable Number Tandem Repeats
PCR	Polymerase chain reaction
Post-mortem diagnosis	A patient diagnosed at post-mortem is defined as where TB was not suspected before death, but a TB diagnosis was made at post-mortem, with pathological and/or microbiological findings consistent with active TB that would have warranted anti-TB treatment if discovered before death
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

Term	Definition
	recommendation and international reporting definitions, miliary TB is classified as pulmonary TB due to the presence of lesions in the lungs
Second-line drugs	Second-line drugs include injectable agents (for example, amikacin, capreomycin, kanamycin), fluoroquinolones (for example, moxifloxacin, ofloxacin, ciprofloxacin) and other oral bacteriostatic agents.
SNP	Single nucleotide polymorphism – mutation of one base pair in the genome of an *M. tuberculosis complex* isolate
TB	Tuberculosis
UTLA	Upper tier local authority (geographic definition)
VOT	Video observed therapy
WGS	Whole genome sequencing
XDR	Extensive drug resistance: cases initially MDR and resistant to at least one injectable agent (amikacin, capreomycin or kanamycin) and at least one fluoroquinolone (moxifloxacin, ofloxacin or ciprofloxacin)

Treatment outcome

Information on outcomes were reported for all 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 August 2021.

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, 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.

Acknowledgements

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

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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 heath secure.

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