



Tuberculosis in prisons in England and Wales: Determining notification rates and risk factors

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INTRODUCTION

- TB is a notifiable airborne disease, Progression from infection to active disease is highly variable in duration and risk.
- People in prisons may have other social risk factors and health conditions, that make them more susceptible to TB infection, development of disease and have worse treatment outcomes (1).
- Better estimates of the contribution of exposure to imprisonment to TB notification rates will support targeted public health responses and planning of resources.

METHODS

- Prison history is recorded by TB case managers within The National TB Surveillance (NTBS) system as Yes or No and if current, occurred more or less than 5 years ago or unknown when it occurred.
- Prison population data for 2021 was obtained from UK government statistics. 95% confidence intervals were calculated using Poisson distribution. Risk ratios are model derived using the binomial distribution for proportions using data from 2019 to 2021..

RESULTS

- In 2021 161 people out of 4,515 (3.6%) of people notified with TB in England and Wales had prison history recorded of any or unknown period of occurrence
- Use of different population denominators coupled with different time periods with prison exposure as recorded in NTBS result in variable rates of TB in the prison population (**Table 1**).
- A conservative incidence of TB in persons with prison exposure lies within a range of a 24.0 to 28.1 per 100,000 persons, over 3 times higher than the TB rate in England and Wales for all people where the rate is 7.6 per 100,000 persons (95% CI 7.4 to 7.8).

Table 1: Estimates of rates by prison exposure and different denominator populations

Prison exposure criteria for TB notifications	Population at risk	Population at risk	TB notifications	Rate	95% CI	caveats	caveats
Current prison ONLY	2021 prison pop	78,324	22	28.1	17.6 to 42.5	probable underestimate	underestimates numerator - under reporting & if exposed to prison after notification
Current & last 5 yrs ¹	2022 prison pop	78,324	98	126.4	102.7 to 153.9	probable overestimate	underestimates denominator population
ALL	2023 prison pop	78,324	161	205.6	175.0 to 239.9	probable overestimate	underestimates denominator population; may overestimates numerator - prison abroad
Current & last 5 yrs ¹	sum 2017-2021	409,184	98	24.0	19.4 to 29.2	probable underestimate	overestimates denominator population; does not account for proportion in prison >1 yr
Current & last 5 yrs ¹	2021 prison & probation population	302,498	98	32.7	26.6 to 39.8	possible underestimate	may overestimate denominator population

1. Excludes those with prison history of unknown period

Estimates of incidence rates are complicated by movement of people through different stages of the justice system. People may be in long-stay or short stay institutions or moving between institutions and/or between probation or remand.

Figure 1: Risk Ratios for TB notified associated with any prison history vs no prison history, 2019- 2021 combined

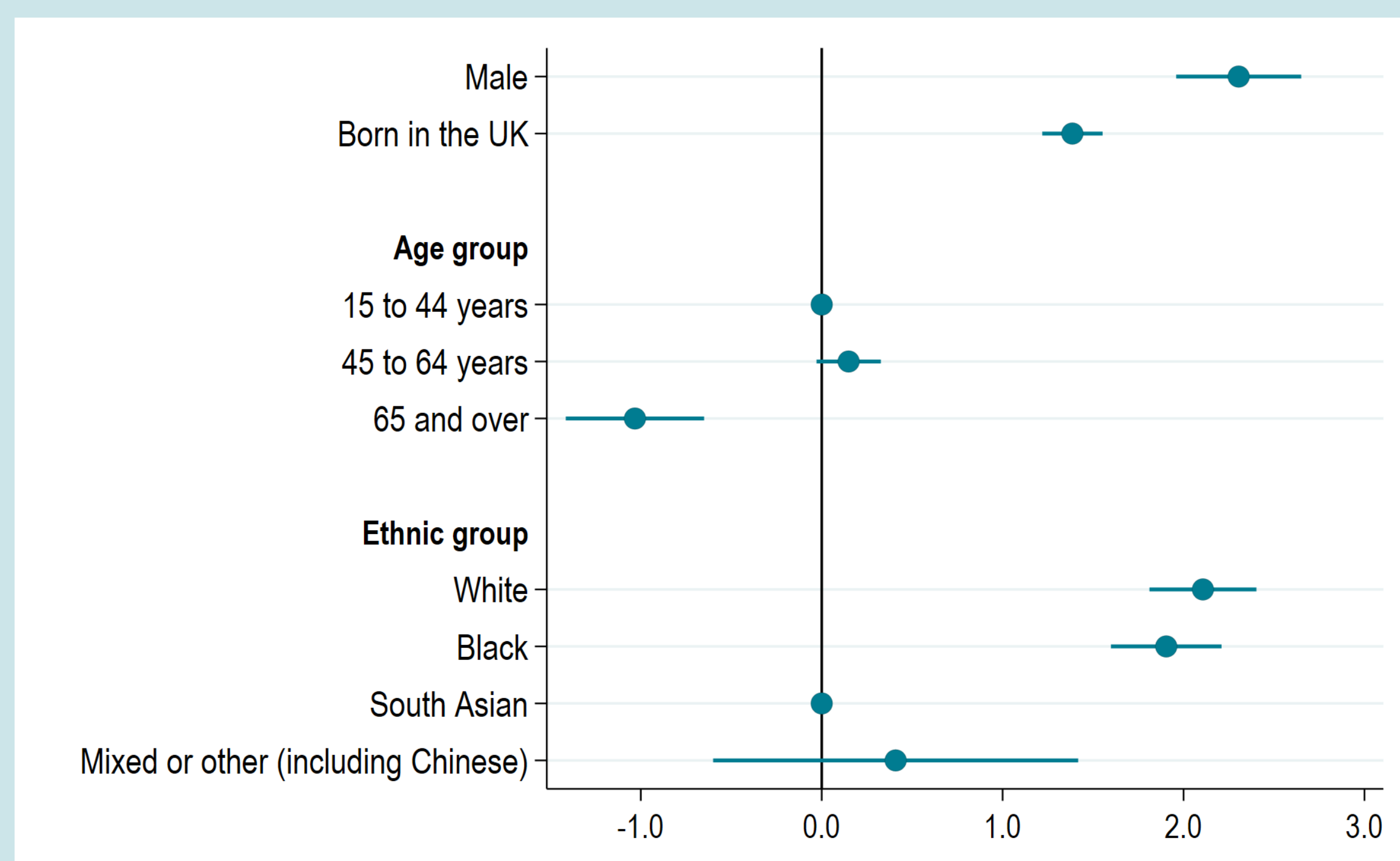
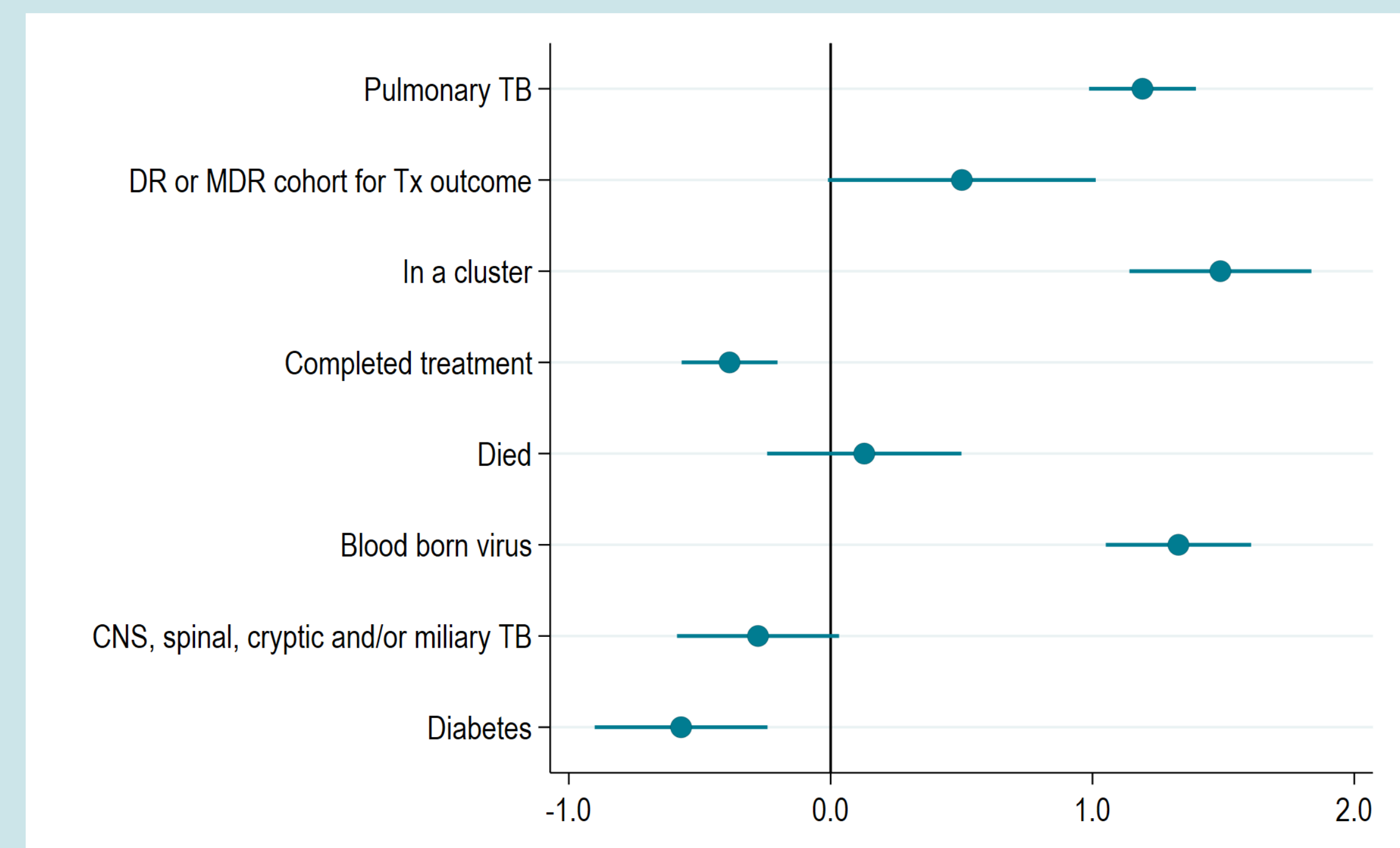


Figure 2: Risk Ratios for Clinical disease characteristics and TB treatment outcomes in people with and without any prison history



RESULTS

TB notifications associated with prison history compared with those without any prison history are:

- nearly 2 times more likely to be of White or Black ethnicity
- less likely to be elderly, more likely to be male and more likely to be born in the UK.
- more likely to have pulmonary disease compared to non-pulmonary disease and are less likely to complete treatment. Loss to follow up and outcome not evaluated are more common in those with prison history (data not shown).
- more likely to be in a cluster, i.e. genetically similar to another isolate from another person previously sequenced.
- more likely to have co-infections with blood-borne viruses (specifically Hepatitis B and Hepatitis C), likely due to shared social and behavioural risk factors for prison, TB and blood borne viruses.

Two thirds of people with TB and prison history have at least one other social risk factor of homelessness, drug or alcohol misuse, mental health needs or asylum seeker status.

The most common social risk factors in those with prison history were drug misuse and homelessness.

CONCLUSIONS

TB incidence in those in prisons is at least 3-4 times greater than in the general population.

The evidence of increased risk of being in a genomic cluster for those with a prison history provides strong evidence of increased risk of TB transmission occurring within this population.

Increased risk of infectious pulmonary TB and reduced probability of successful TB treatment completion within this population also indicate increased risk of TB transmission occurring within this population

The use of models that account for movement of people through the prison system are recommended to more accurately determine rate of TB in this complex population

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REFERENCES

1. Placeres et al, BMC Infect Dis 2023;23:20
2. <https://www.gov.uk/government/publications/tuberculosis-in-england-2022-report-data-up-to-end-of-2021/tb-incidence-and-epidemiology-in-england-2021>
3. The risk factor data will be published in the TB for Inclusion health groups toolkit in 2023.