



Inequalities in SARS-CoV-2 case rates by ethnicity, religion, measures of socioeconomic position, English proficiency, and self-reported disability: cohort study of 39 million people in England during the alpha and delta waves

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ABSTRACT

OBJECTIVE To examine sociodemographic inequalities in people with SARS-CoV-2 during the second (alpha) and third (delta) waves of the covid-19 pandemic.

DESIGN Retrospective, population based cohort study.

SETTING Resident population of England.

PARTICIPANTS 39 006 194 people aged 10 years and older who were enumerated in the 2011 census, registered with the NHS, and alive on 1 September 2020.

MAIN OUTCOME MEASURES Age standardised SARS-CoV-2 case rates (ie, the number of people who received a positive test result per 100 000 person weeks at risk) during the second wave (1 September 2020 to 22 May 2021) or third wave (23 May to 10 December 2021) of the pandemic. Age standardised rates were calculated by sociodemographic characteristics and adjusted rate ratios were estimated using generalised linear

regression models with a Poisson distribution (models were adjusted for covariates including sex, age, geographical variables, and sociodemographic characteristics).

RESULTS During the study period, 5 767 584 people (14.8% of the study population) tested positive for SARS-CoV-2. In the second wave, the fully adjusted relative risks of having a positive test were highest for the Bangladeshi and Pakistani ethnic groups compared with the white British group, with rate ratios of 1.75 (95% confidence interval 1.73 to 1.77) and 1.69 (1.68 to 1.70), respectively. Muslim and Sikh religious groups had fully adjusted rate ratios of 1.51 (1.50 to 1.51) and 1.64 (1.63 to 1.66), respectively, compared with the Christian group. Greater area deprivation, disadvantaged socioeconomic position, living in a care home, and low English language proficiency were also associated with higher relative risk of having a positive test. However, the inequalities among groups varied over time. Being Christian, white British, without a disability, and from a more advantaged socioeconomic position were associated with increased relative risk of testing positive during the third wave.

CONCLUSION Research is urgently needed to understand the large sociodemographic inequalities in SARS-CoV-2 case rates in order to inform policy interventions in future waves or pandemics.

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ People with pre-existing health conditions or disability, ethnic minority groups, elderly people, some religious groups, people with low socioeconomic status, and those living in deprived areas have been disproportionately affected by the covid-19 pandemic in terms of risk of infection and adverse outcomes

WHAT THIS STUDY ADDS

- ⇒ Linked data on 39 million people in England were used to calculate the relative risk of testing positive for covid-19 in the community during the second and third waves of the pandemic
- ⇒ During the second wave, the relative risk was highest among the Bangladeshi and Pakistani ethnic groups, the Muslim and Sikh religious groups, and people from deprived areas and of low socioeconomic status; during the third wave, being Christian, white British, without a disability, and from a more advantaged socioeconomic position were associated with increased risk of receiving a positive test
- ⇒ Adjusting for geographical factors, sociodemographic characteristics, and prepandemic health status explained some, but not all, of the excess risk

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE, OR POLICY

- ⇒ Data from national, large scale testing programmes should be linked to other population level data to inform further research into the impact of covid-19 on sociodemographic groups
- ⇒ These data should lead to early policy interventions targeting these groups to minimise the effect of inequalities

Introduction

As of 18 February 2022, more than 418 million people globally have had SARS-CoV-2 infection, with more than 160 000 deaths in the UK.^{1 2} While the covid-19 pandemic has affected all areas of the UK, some groups have been disproportionately affected. Rates of covid-19 related hospital admissions and deaths have been higher among elderly people, those with pre-existing health conditions or disability,³⁻⁵ ethnic minority groups,⁶⁻⁸ some religious groups,⁹ people with low socioeconomic status,¹⁰ and those living in care homes,¹¹ large households,¹² and deprived areas.¹³⁻¹⁵

Less is known about sociodemographic inequalities in infection rates. Research using data from the Coronavirus Infection Survey, a large household survey representative of the UK community

population, has shown that several factors were associated with SARS-CoV-2 positivity during the second wave and the early part of the third wave in the UK.^{16–18} Other studies have also highlighted non-white ethnicity, male sex, and living in an urban or more deprived area as risk factors for testing positive.^{6,19,20} However, large scale studies using national population level data sources that adjust for key confounding variables to understand the drivers of increased infection rates are limited,²¹ particularly for the third wave. Because sociodemographic inequalities in severe covid-19 outcomes appear to be largely driven by differences in infection rates, there is a clear evidence gap with which to inform national policies to reduce infection risk.

In this study, we used a large, population level dataset, comprising 2011 census data linked to administrative data sources to examine differences in SARS-CoV-2 case rates in England according to sociodemographic characteristics and disability status. We examined NHS Test and Trace data for the second and third waves of the SARS-CoV-2 pandemic, which correspond to the dominance of the alpha and delta variants, respectively. Vaccinations were also widely available during these periods of the pandemic.

Methods

Study data

We linked national SARS-CoV-2 positive test results obtained through pillar 1 (swab testing in UK Health Security Agency laboratories and NHS hospitals for those with a clinical need, and health and care workers) and pillar 2 (swab testing for the wider population, as set out in government guidance) to

the Office for National Statistics (ONS) Public Health Data Asset (PHDA) using NHS number.

The ONS PHDA is a linked data resource combining the 2011 census, death registrations, General Practice Extraction Service Data for Pandemic Planning and Research (GDPPR)²² and Hospital Episode Statistics.²³ To obtain NHS numbers, we linked the 2011 census to the 2011–13 NHS patient registers using deterministic and probabilistic matching, with an overall linkage rate of 94.6%. The NHS numbers in national testing data were incomplete, with missing values for 21% of records. To retrieve additional NHS numbers, we linked the testing data to the NHS Personal Demographics Service using deterministic matching, achieving a linkage rate of 91.4%.

The study population consisted of all people aged ≥ 10 years living in England who were enumerated in the 2011 census, registered with a general practitioner (GP) surgery in November 2019, and alive on 1 September 2020 (figure 1). The cohort comprised 39 006 194 participants, 78.4% of the mid-year 2020 population estimate of people aged ≥ 10 years in England.

We used national testing data up to 10 December 2021. Out of all test results, 83.0% were linked to the ONS PHDA. We could not calculate case rates and rate ratios for the first wave because mass testing was not available.

Characteristics and covariates

All individual level sociodemographic characteristics (sex, age, ethnic group, religious affiliation, disability status, educational attainment, National Statistics Socio-economic Classification (NS-SEC) of

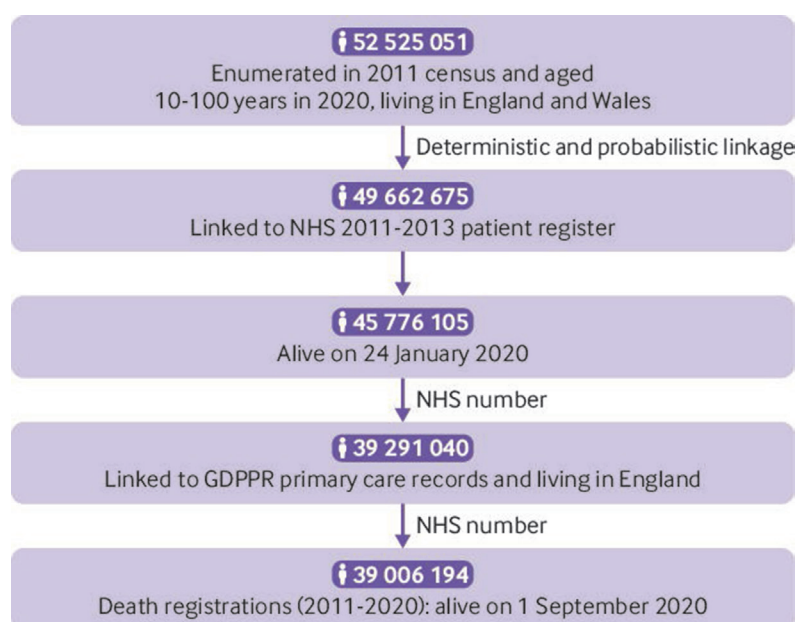


Figure 1 | Flow diagram of how the study population was derived by combining and selecting people from different data resources. The 2011 census is linked to the patient register using deterministic and probabilistic methods with a 94.6% linkage success rate.^{42,43} GDPPR=General Practice Extraction Service Data for Pandemic Planning and Research

the household reference person, English language proficiency, country of birth) were obtained from the 2011 census. Place of residence variables (region within England and rural-urban classification²⁴) and area based deprivation²⁵) were derived based on postcodes held in GP records. Care home residence was retrieved from the 2019 NHS patient register. Pre-existing health conditions were derived from GDPPR data as in the QCOVID risk prediction model.³ We included the number of pre-existing conditions and a separate adjustment for learning disability because it could directly affect exposure to SARS-CoV-2.²⁶ The number of pre-existing health conditions was included as a proxy for contact with the healthcare system, which might affect the risk of SARS-CoV-2 infection or lead to shielding. Contact with the healthcare system would also make the person more likely to be tested for SARS-CoV-2. We also adjusted for body mass index as a categorical variable with a category for missing values.

Missing data for 2011 census data were imputed using nearest neighbour donor imputation, the standard method used by the ONS to impute missing values.²⁷ Because we do not have any information on which records were imputed, we could not perform multiple imputation. Therefore, the confidence intervals might not fully represent the level of uncertainty. However, the item non-response was less than 4% for all variables used in our analysis.²⁸ Therefore, we would only expect this to have a minimal effect on the confidence intervals. Table S1 in supplemental file 1 lists all variables included in the analyses.

Outcome

The outcome was receiving a positive test result (polymerase chain reaction (PCR) or lateral flow device, including positive lateral flow device tests that were not confirmed by PCR) for SARS-CoV-2. We excluded any positive tests that occurred within 120 days of an initial positive test from the same person because these might have been part of the same infection episode.²⁹ We classified tests from 1 September 2020 up to and including 22 May 2021 as having occurred in the second wave of the covid-19 pandemic, with tests from 23 May 2021 to 10 December 2021 classified as being in the third wave.¹⁷

Statistical analyses

We estimated age standardised SARS-CoV-2 case rates as the number of people who received a positive test result per 100 000 person weeks at risk, stratified by sociodemographic characteristics, and standardised to the 2013 European Standard Population³⁰ using the approach described in the Association of Public Health Observatories' third technical briefing.³¹ Rates were calculated separately for the second and third waves of the pandemic.

To explore differences in case rates by sociodemographic characteristics, for each factor, we compared rate ratios for testing positive for SARS-CoV-2 estimated from generalised linear regression models using a Poisson distribution, adjusted in a stepwise manner for three different sets of covariates: sex and age (model 1); sex, age, and geographical variables (region and rural-urban classification; model 2); and sex, age, geographical variables, sociodemographic characteristics (ethnicity, indices of deprivation as fifths, educational attainment, household tenure, and care home residence status), self-reported disability status, body mass index, and the number of pre-existing health conditions (model 3). Note that some of the variables in the covariate sets are considered as covariates and factor variables at different stages. Throughout the study, age is modelled using restricted natural cubic splines with 10 year age bands. The baseline rate ratios for each factor are therefore obtained under model 1, with the fully adjusted rate ratios given by model 3. This stepwise approach enables us to examine how much of the excess risk in certain groups can be accounted for by confounding factors. To account for the fact that some people died during the study period, the natural logarithm of time at risk (in days) was included in the model as an offset term.

Because of the considerable overlap between ethnicity and religion, when considering religion as our main factor of interest, we excluded ethnicity from the third covariate set. To examine the relation between ethnicity and religion in our data and their impact on rate ratios, we ran additional models using an interaction term between ethnicity and religion, adding back ethnicity to the third covariate set alongside religion as our factor. Similarly, in a separate model we investigated the interaction between ethnicity and English language proficiency (self-defined from the 2011 census), which could act as a proxy for a range of factors from cultural upbringing to the length of time a person had been in England before the 2011 census. These models are included in the online supplemental file 1.

We explored how differences in the risk of testing positive for SARS-CoV-2 changed over the course of the pandemic by fitting separate models for the second and third waves. We also fitted separate models for those aged <65 years and ≥65 years.

All analyses were conducted using R version 3.5.1 (in Cloudera Data Science Workbench) using Spark base engine 8,³² and the packages sparklyr³³ and dplyr.³⁴

Patient and public involvement

We did not directly involve patients and the public in the design and conception of the study because of the pace at which this study was conducted to inform the UK government's response to the covid-19 pandemic. The use of deidentified data

precludes direct dissemination to participants. For the purpose of open access, the authors have applied a Creative Commons Attribution (CC BY) licence to any author accepted manuscript version arising. Results will also be disseminated by all coauthors through their home institutions.

Results

Of the 39 006 194 people in our study population, 52.1% were female, the mean age was 47.6 (standard deviation 21.1) years, 81.7% identified as white British, 4.8% as white other, 2.7% as Indian, 59.5% as Christian, 25.5% as having no religious affiliation, and 5.0% as Muslim (table 1 and table S2 in online supplemental file 1). Between 1 September 2020 and 10 December 2021, 5 767 584 people (14.8% of the study population) living in England aged ≥ 10 years had tested positive for SARS-CoV-2; of these, 46 484 (0.8%; 0.1% of the total study population) had an infection episode in the second and third waves of the pandemic.

During the second wave, the largest differences in rates of testing positive for SARS-CoV-2 were observed for ethnicity; age standardised rates were highest in the Bangladeshi and Pakistani ethnic groups at 382.4 (95% confidence interval 377.9 to 386.9) and 373.8 (371.2 to 376.4) per 100 000 person weeks, respectively, and in the Chinese ethnic group at 90.8 (88.5 to 93.0) per 100 000 person weeks. During the third wave, however, the white British ethnic group had the highest rate at 359.7 (359.2 to 360.1) per 100 000 person weeks (table 2 and table S3 in online supplemental file 1).

There were also notable inequalities in case rates by religious affiliation. During the second wave of the pandemic, rates per 100 000 person weeks were highest for people who identified as Muslim (334.9, 333.3 to 336.5) or Sikh (321.6, 318.3 to 325.0). Rates were lowest for people in the other religion group (142.9, 139.4 to 146.3) and the Buddhist group (143.3, 139.9 to 146.7). During the third wave, those who identified as Christian had the highest rates at 353.8 (353.3 to 354.3) per 100 000 person weeks, whereas the lowest rates were found in the Buddhist and Muslim groups at 221.4 (216.3 to 226.4) and 226.7 (225.4 to 228.1) per 100 000 person weeks, respectively.

In the second wave, the Bangladeshi ethnic group had the highest rate ratio of testing positive for SARS-CoV-2 relative to the white British ethnic group (table 3, with a full list of model results in table S4 in online supplemental file 1); adjusting for age and sex only, the rate ratio was 2.03 (95% CI 2.01 to 2.05), whereas the model 3 rate ratio was 1.75 (1.73 to 1.77). Geography, sociodemographic factors, and prepandemic health status accounted for 27.2% of the increased relative risk of testing positive for SARS-CoV-2 among the Bangladeshi ethnic group during the second wave of the pandemic. During the third wave, however,

Table 1 | Characteristics of the study population reported across the full study period

Variable	No (%)
Sex	
Male	18 697 485 (47.9)
Female	20 308 709 (52.1)
Age group (years)	
10-19	4 717 448 (12.1)
20-29	5 096 953 (13.1)
30-39	5 218 309 (13.4)
40-49	5 587 972 (14.3)
50-59	6 428 201 (16.5)
60-69	5 206 788 (13.4)
70-79	4 239 611 (10.9)
80-89	2 062 293 (5.3)
≥ 90	448 619 (1.2)
Disability status	
Not limited	33 694 478 (86.4)
Daily activities limited a little	3 211 382 (8.2)
Daily activities limited a lot	2 100 334 (5.4)
Ethnic group	
Bangladeshi	326 883 (0.8)
Black African	644 633 (1.7)
Black Caribbean	410 320 (1.1)
Chinese	203 648 (0.5)
Indian	1 055 511 (2.7)
Mixed	778 396 (2.0)
Other	993 009 (2.6)
Pakistani	854 879 (2.2)
White British	31 857 196 (81.7)
White other*	1 881 719 (4.8)
English indices of deprivation group (fifths)	
1 (most deprived)	7 335 236 (18.8)
2	7 620 096 (19.5)
3	7 902 220 (20.3)
4	8 040 520 (20.6)
5 (least deprived)	8 108 122 (20.8)
Religious affiliation	
Buddhist	155 191 (0.4)
Christian	23 191 008 (59.5)
Hindu	597 404 (1.5)
Jewish	178 494 (0.5)
Muslim	1 934 281 (5.0)
Sikh	324 447 (0.8)
No religion	9 955 732 (25.5)
Other religion	168 850 (0.4)
Not stated	2 500 787 (6.4)

*The white other group is composed of those who selected Irish, Gypsy or Irish Traveller, or other white in the 2011 census.

the relative risk of testing positive for SARS-CoV-2 was lower for all ethnic minority groups compared with the white British group, including the white other group.

In the second wave, for religious affiliation, the highest rate ratio of testing positive for SARS-CoV-2 (compared with the Christian group) was observed for people identifying as Sikh; when

Table 2 | Age standardised SARS-CoV-2 case rates (per 100 000 person weeks) by sociodemographic characteristics and wave of the pandemic

Characteristic	Wave two (1 September 2020 to 22 May 2021)		Wave three (23 May to 10 December 2021)	
	No of cases	Rate (95% CI)	No of cases	Rate (95% CI)
Sex				
Female	1 357 898	189.1 (188.8 to 189.4)	1 796 143	347.8 (347.3 to 348.3)
Male	1 090 708	162.7 (162.4 to 163.0)	1 569 319	316.3 (315.8 to 316.8)
Disability status				
No disability—not limited	2 147 056	174.0 (173.8 to 174.2)	3 134 229	337.6 (337.3 to 338.0)
With disability—limited a little	173 719	162.9 (161.9 to 163.9)	146 457	272.0 (270.1 to 273.9)
With disability—limited a lot	127 831	159.9 (158.7 to 161.1)	84 776	212.6 (210.6 to 214.6)
Ethnic group				
Bangladeshi	43 449	382.4 (377.9 to 386.9)	23 756	229.9 (226.3 to 233.5)
Black African	47 855	200.2 (198.0 to 202.4)	41 958	198.4 (196.2 to 200.5)
Black Caribbean	27 748	184.6 (182.3 to 186.8)	28 941	266.4 (263.2 to 269.5)
Chinese	6811	90.8 (88.5 to 93.0)	9031	162.5 (159.0 to 165.9)
Indian	102 001	267.3 (265.6 to 269.0)	80 550	265.9 (264.0 to 267.8)
Mixed	55 724	183.5 (181.5 to 185.5)	88 670	303.5 (301.0 to 305.9)
Other	87 798	238.0 (236.3 to 239.7)	68 648	225.5 (223.7 to 227.3)
Pakistani	110 638	373.8 (371.2 to 376.4)	62 132	233.1 (231.0 to 235.2)
White British	1 851 398	165.3 (165.0 to 165.5)	2 824 792	359.7 (359.2 to 360.1)
White other	115 184	166.7 (165.7 to 167.8)	136 984	260.3 (258.8 to 261.8)
Education level				
No qualification	356 433	150.4 (149.8 to 151.0)	258 959	175.6 (174.8 to 176.4)
Apprenticeship	58 991	138.0 (136.7 to 139.3)	64 967	224.2 (222.1 to 226.2)
Level 1	300 887	144.3 (143.7 to 144.9)	335 274	211.2 (210.5 to 211.9)
Level 2	347 997	142.4 (141.9 to 142.9)	410 814	219.1 (218.4 to 219.8)
Level 3	270 548	137.7 (137.2 to 138.3)	343 028	223.3 (222.5 to 224.1)
Level 4	456 144	119.3 (118.6 to 119.9)	656 680	212.4 (211.4 to 213.5)
Other	108 109	156.4 (155.4 to 157.5)	83 920	165.7 (164.3 to 167.1)
English indices of deprivation group (fifths)				
1 (most deprived)	581 068	218.7 (218.1 to 219.2)	644 804	311.8 (311.0 to 312.6)
2	527 010	191.2 (190.7 to 191.7)	649 484	317.3 (316.6 to 318.1)
3	472 664	168.5 (168.0 to 169.0)	666 824	331.5 (330.7 to 332.3)
4	450 659	160.3 (159.8 to 160.8)	690 861	347.5 (346.7 to 348.3)
5 (least deprived)	417 205	148.0 (147.6 to 148.5)	713 489	358.1 (357.3 to 359.0)
Religious affiliation				
Buddhist	8043	143.3 (139.9 to 146.7)	8860	221.4 (216.3 to 226.4)
Christian	1 406 889	177.3 (177.0 to 177.6)	1 920 206	353.8 (353.3 to 354.3)
Hindu	49 248	227.3 (225.2 to 229.4)	45 158	265.2 (262.7 to 267.7)
Jewish	11 730	189.8 (186.3 to 193.3)	13 298	293.1 (288.0 to 298.1)
Muslim	228 476	334.9 (333.3 to 336.5)	139 064	226.7 (225.4 to 228.1)
Sikh	37 471	321.6 (318.3 to 325.0)	26 322	286.0 (282.5 to 289.5)
No religion	564 183	147.2 (146.8 to 147.6)	1 000 330	336.2 (335.6 to 336.9)
Other religion	8284	142.9 (139.4 to 146.3)	10 725	267.6 (261.6 to 273.7)
Not stated	134 282	151.9 (151.1 to 152.7)	201 499	304.9 (303.5 to 306.2)

adjusting for age and sex, the rate ratio was 1.76 (95% confidence interval 1.75 to 1.78), reducing to 1.64 (1.63 to 1.66) in model 3. This suggests that geography, sociodemographic factors (not including ethnicity) and prepandemic health status only explained 15.8% of the increased excess risk of testing positive for SARS-CoV-2 among people identifying as Sikh during the second wave of the pandemic. During the third wave, the relative risk of testing positive for SARS-CoV-2 was highest among those identifying as

Christian; the lowest rate ratio was observed in the Muslim population at 0.67 (0.67 to 0.67), while the highest was for the no religion group at 0.97 (0.97 to 0.97).

We found large differences and variations in risk over time according to care home residency status. In the second wave, the model 3 rate ratio of testing positive for people living in a care home was 4.30 (4.25 to 4.35) compared with those not in a care home, whereas in the third wave the model 3 rate ratio was 1.32 (1.28 to 1.36).

Table 3 | Adjusted rate ratios (95% confidence intervals) of receiving a positive test for SARS-CoV-2 by sociodemographic characteristics and wave of the pandemic

Characteristic	Wave two (1 September 2020 to 22 May 2021)			Wave three (23 May to 10 December 2021)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Disability status						
Not limited	1 (reference)	1 (reference)	1 (reference)	1 (reference)	1 (reference)	1 (reference)
Limited a little	1.03 (1.02 to 1.03)	1.01 (1.00 to 1.01)	0.92 (0.92 to 0.93)	0.85 (0.85 to 0.86)	0.85 (0.84 to 0.85)	0.87 (0.86 to 0.87)
Limited a lot	1.15 (1.15 to 1.16)	1.10 (1.10 to 1.11)	0.94 (0.93 to 0.94)	0.74 (0.73 to 0.74)	0.73 (0.72 to 0.73)	0.77 (0.77 to 0.78)
Ethnic group						
White British	1 (reference)	1 (reference)	1 (reference)	1 (reference)	1 (reference)	1 (reference)
Bangladeshi	2.03 (2.01 to 2.05)	1.83 (1.81 to 1.84)	1.75 (1.73 to 1.77)	0.59 (0.58 to 0.60)	0.65 (0.64 to 0.66)	0.68 (0.67 to 0.68)
Black African	1.15 (1.14 to 1.16)	1.05 (1.04 to 1.06)	1.05 (1.04 to 1.06)	0.55 (0.54 to 0.55)	0.61 (0.61 to 0.62)	0.64 (0.64 to 0.65)
Black Caribbean	1.11 (1.10 to 1.12)	1.01 (1.00 to 1.02)	0.97 (0.96 to 0.98)	0.78 (0.77 to 0.79)	0.88 (0.87 to 0.89)	0.91 (0.89 to 0.92)
Chinese	0.54 (0.53 to 0.56)	0.51 (0.50 to 0.52)	0.55 (0.54 to 0.57)	0.45 (0.44 to 0.46)	0.47 (0.46 to 0.48)	0.49 (0.48 to 0.50)
Indian	1.59 (1.58 to 1.60)	1.46 (1.45 to 1.47)	1.50 (1.49 to 1.51)	0.75 (0.74 to 0.75)	0.80 (0.79 to 0.80)	0.79 (0.78 to 0.80)
Mixed	1.10 (1.09 to 1.11)	1.04 (1.03 to 1.05)	1.04 (1.04 to 1.05)	0.85 (0.85 to 0.86)	0.90 (0.90 to 0.91)	0.92 (0.92 to 0.93)
Other	1.41 (1.40 to 1.42)	1.30 (1.29 to 1.31)	1.31 (1.30 to 1.32)	0.63 (0.62 to 0.63)	0.69 (0.68 to 0.69)	0.72 (0.71 to 0.72)
Pakistani	2.01 (2.00 to 2.02)	1.76 (1.75 to 1.77)	1.69 (1.68 to 1.70)	0.60 (0.60 to 0.61)	0.61 (0.60 to 0.61)	0.62 (0.61 to 0.62)
White other	1.00 (1.00 to 1.01)	0.97 (0.96 to 0.98)	1.00 (1.00 to 1.01)	0.73 (0.73 to 0.74)	0.79 (0.79 to 0.80)	0.83 (0.82 to 0.83)
Education level						
No qualification	1 (reference)	1 (reference)	1 (reference)	1 (reference)	1 (reference)	1 (reference)
Apprenticeship	0.93 (0.92 to 0.94)	0.98 (0.97 to 0.99)	1.05 (1.04 to 1.06)	1.29 (1.28 to 1.30)	1.26 (1.25 to 1.27)	1.17 (1.16 to 1.18)
Level 1	0.91 (0.91 to 0.92)	0.95 (0.94 to 0.95)	0.99 (0.99 to 1.00)	1.15 (1.15 to 1.16)	1.15 (1.15 to 1.16)	1.10 (1.09 to 1.10)
Level 2	0.90 (0.90 to 0.90)	0.94 (0.94 to 0.95)	1.00 (1.00 to 1.01)	1.19 (1.18 to 1.20)	1.19 (1.18 to 1.19)	1.11 (1.11 to 1.12)
Level 3	0.88 (0.87 to 0.88)	0.92 (0.92 to 0.92)	0.99 (0.98 to 0.99)	1.22 (1.21 to 1.22)	1.22 (1.21 to 1.22)	1.14 (1.13 to 1.14)
Level 4	0.72 (0.72 to 0.73)	0.76 (0.75 to 0.76)	0.82 (0.82 to 0.82)	1.17 (1.17 to 1.18)	1.21 (1.20 to 1.21)	1.14 (1.14 to 1.15)
Other	1.02 (1.01 to 1.03)	1.02 (1.01 to 1.02)	1.02 (1.01 to 1.02)	0.93 (0.92 to 0.93)	0.98 (0.97 to 0.99)	1.06 (1.05 to 1.06)
English indices of deprivation group (fifths)						
1 (most deprived)	1.45 (1.45 to 1.46)	1.27 (1.27 to 1.28)	1.17 (1.16 to 1.17)	0.88 (0.88 to 0.88)	0.84 (0.83 to 0.84)	0.93 (0.93 to 0.93)
2	1.29 (1.28 to 1.29)	1.21 (1.20 to 1.21)	1.14 (1.13 to 1.14)	0.90 (0.89 to 0.90)	0.91 (0.91 to 0.91)	0.96 (0.96 to 0.97)
3	1.14 (1.13 to 1.14)	1.13 (1.13 to 1.14)	1.10 (1.09 to 1.10)	0.93 (0.93 to 0.93)	0.95 (0.94 to 0.95)	0.98 (0.97 to 0.98)
4	1.08 (1.08 to 1.09)	1.09 (1.08 to 1.09)	1.07 (1.06 to 1.07)	0.97 (0.97 to 0.98)	0.97 (0.97 to 0.98)	0.99 (0.98 to 0.99)
5 (least deprived)	1 (reference)	1 (reference)	1 (reference)	1 (reference)	1 (reference)	1 (reference)
Religious affiliation						
Christian	1 (reference)	1 (reference)	1 (reference)	1 (reference)	1 (reference)	1 (reference)
Buddhist	0.81 (0.79 to 0.82)	0.80 (0.78 to 0.82)	0.84 (0.82 to 0.86)	0.63 (0.62 to 0.65)	0.68 (0.66 to 0.69)	0.71 (0.69 to 0.72)
Hindu	1.27 (1.26 to 1.29)	1.20 (1.19 to 1.21)	1.24 (1.23 to 1.26)	0.76 (0.75 to 0.77)	0.85 (0.84 to 0.86)	0.85 (0.84 to 0.86)
Jewish	1.07 (1.05 to 1.09)	0.99 (0.98 to 1.01)	1.04 (1.02 to 1.06)	0.84 (0.83 to 0.86)	0.97 (0.95 to 0.98)	0.95 (0.93 to 0.96)
Muslim	1.71 (1.71 to 1.72)	1.55 (1.55 to 1.56)	1.51 (1.50 to 1.51)	0.60 (0.60 to 0.61)	0.64 (0.64 to 0.65)	0.67 (0.67 to 0.67)
Sikh	1.76 (1.75 to 1.78)	1.65 (1.63 to 1.66)	1.64 (1.63 to 1.66)	0.81 (0.80 to 0.82)	0.86 (0.85 to 0.87)	0.85 (0.84 to 0.86)

Continued

Table 3 Continued

Characteristic	Wave two (1 September 2020 to 22 May 2021)			Wave three (23 May to 10 December 2021)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
No religion	0.85 (0.85 to 0.85)	0.87 (0.87 to 0.87)	0.88 (0.87 to 0.88)	0.96 (0.95 to 0.96)	0.96 (0.95 to 0.96)	0.97 (0.97 to 0.97)
Other religion	0.79 (0.77 to 0.80)	0.80 (0.79 to 0.82)	0.81 (0.79 to 0.83)	0.77 (0.76 to 0.79)	0.80 (0.78 to 0.81)	0.81 (0.79 to 0.82)
Not stated	0.87 (0.87 to 0.88)	0.88 (0.88 to 0.89)	0.89 (0.88 to 0.89)	0.87 (0.87 to 0.88)	0.88 (0.88 to 0.89)	0.89 (0.89 to 0.90)

Model 1, adjusted for age and sex only; model 2, adjusted for age, sex, and geographical variables (region and rural-urban classification); model 3, adjusted for age, sex, geographical variables, sociodemographic characteristics (ethnicity, indices of deprivation as fifths, educational attainment, household tenure, and care home residence status), self-reported disability status, body mass index, and the number of pre-existing health conditions. Note that for religion the fully adjusted model (model 3) does not adjust for ethnicity.

Several other factors were independently associated with SARS-CoV-2 infection. For example, people living in urban areas had higher relative risk of testing positive for SARS-CoV-2 than those living in rural areas during the second and third waves. Living in a more deprived area was also associated with higher relative risk of testing positive during the second wave (rate ratio for most deprived group 1.45, 95% confidence interval 1.45 to 1.46 compared with the least deprived group) but not in the third wave (least deprived group 0.88, 0.88 to 0.88). During the second wave, people who reported that English was not their main language had higher relative risk of testing positive for SARS-CoV-2 than those who reported speaking English as their main language after adjusting for other factors (rate ratio for those who do not speak English well or at all 1.48, 95% confidence interval 1.47 to 1.49 when adjusting for age and sex; 1.10, 1.09 to 1.11 in model 3). Conversely, during the third wave, the relative risk of testing positive among people who did not speak English as their main language was lower than those whose main language was English (rate ratio for those who do not speak English well or at all 0.83, 0.82 to 0.84 in model 3).

People with a disability who were limited a lot in their daily activities had increased relative risk of testing positive during the second wave after adjusting for age and sex only (rate ratio for those limited a lot 1.15, 95% confidence interval 1.15 to 1.16), but had lower relative risk than people without a disability in model 3 (rate ratio for those limited a lot 0.94, 0.93 to 0.94). In the third wave, people with a disability had lower relative risk of testing positive than those without a disability across all models. Odds ratios are shown as plots S1-S3 in the online supplemental file 1.

As an exploratory analysis, we stratified the data by broad age group (<65 years *v* ≥65 years). Among people aged <65 years (table S5 in online supplemental file 1), all ethnic minority groups had lower relative risk of testing positive than the white British group during the third wave, as was observed in the main models. Conversely, during the third wave among people aged ≥65 years (table S6 in online supplemental file 1), the relative risk

of testing positive from model 3 was highest for the Bangladeshi ethnic group (rate ratio 1.61, 95% confidence interval 1.50 to 1.72).

We also performed a sensitivity analysis for missing body mass index data by running a model after filtering out all those with missing data (classified as unknown; see table S1 in online supplemental file 1). The results after this filtering give similar model coefficients, which are provided in online supplemental file 2 and online supplemental file 3. Results of the models with interactions are included in online supplemental file 4 and online supplemental file 5).

Discussion

Main findings

Our analysis using population level linked data in England shows that there were major inequalities in covid-19 case rates in people aged ≥10 years during the second and third waves for several sociodemographic characteristics, most notably by ethnic group, religious affiliation, and rural-urban classification. During the second wave, case rates were highest among Bangladeshi and Pakistani ethnic groups, with adjustments for geographical variables, socioeconomic factors, and pre-existing health conditions accounting for 27.2% and 31.7% of the excess risk, respectively. For religious affiliation, those who identified as Muslim or Sikh had the highest rates, with adjustments only accounting for 27.2% and 15.8% of the excess risk, respectively. While some differences were found by deprivation and other sociodemographic factors, these were less pronounced than for ethnicity or religious affiliation. However, there is considerable overlap between ethnicity and religion; 93.4% of people from the Pakistani and Bangladeshi ethnic groups within the study self-identified as Muslim. The highest rates were seen among people from the most deprived areas, even in model 3. Those who do not speak English well or at all were at greater risk of having a positive test than those with English as their main language, with adjustments for geographical variables, socioeconomic factors, and pre-existing health conditions accounting for 79.2% of the excess risk.

For the third wave, corresponding to the emergence of the delta variant, we observed a different pattern for several factors. The white British ethnic group had the highest case rates and rate ratios, while those who self-identified as Christian had the highest rates among religious affiliations. Case rates also became highest among people born in the UK and whose main language was English. A potential reason is that levels of population immunity were higher for the groups that had the highest case rates in the first and second waves, even considering the potential for reinfection.³⁵

Changes in the rate ratios observed in wave three compared with wave two could also be due to changes in testing behaviours in response to rollout of vaccination, changes in the perceived risk of infection or reinfection, and policy changes related to isolation periods and compensation after testing positive for SARS-CoV-2. Rates of access to sick pay in England and Wales were lower among South Asian workers than white British workers³⁶ and it was more difficult for ethnic minority groups to access Test and Trace services,³⁷ which probably had an impact on case rates among these groups. Interestingly, when stratifying these models by broad age groups (<65 years *v* ≥65 years) as an exploratory analysis, we found that the rate ratios for all ethnic minority groups were higher in the model restricted to people aged ≥65 years compared with the unrestricted model and the model restricted to those aged <65 years. These results could indicate the presence of further factors affecting the underlying risk of infection and the likelihood of being tested, such as living in multigenerational and overcrowded households. This finding is consistent with the continued increased risk of mortality during the third wave for ethnic minority groups compared with the white British population.^{7 38}

Comparison with other studies

Our findings are consistent with results from the Coronavirus Infection Survey, which found that between September 2020 and May 2021, people living in urban areas and deprived areas, and of a younger age were most likely to test positive in the UK.¹⁶ Studies using UK covid-19 surveillance data have also suggested that black and South Asian ethnic groups were more likely to test positive than white British people in England.^{6 39} In addition, our results support previous analyses using UK administrative data that have shown higher age standardised case rates among ethnic minority groups until June 2021, when rates increased among the white population.³⁸ Similar patterns of increased infection in the most deprived areas and among minority ethnic groups have been observed worldwide.^{10 40}

Studies have shown that covid-19 vaccinations significantly reduced the risk of SARS-CoV-2 infection.¹⁸ From December 2020 onwards, unadjusted

vaccination uptake rates were lower among adults from ethnic minority groups, people living in the most deprived areas, those self-reporting as having a disability, people younger in age, those who did not speak English as their first language, and people who belonged to a lower socioeconomic group.^{38 41} These data are consistent with our findings when adjusting for age and sex only during the second wave, suggesting that lower vaccine uptake rates for certain groups and younger people might contribute to case rate inequalities. Although vaccination rates were lower for the Bangladeshi and Pakistani groups than the white British population, the lowest rates were found in black African and black Caribbean groups.

Strengths and limitations

The primary strength of the study is using nationwide linked population level data that combine a diverse set of demographic and socioeconomic factors from the 2011 census with timely data on national SARS-CoV-2 testing. Unlike studies based solely on electronic health records, our study is based on self-identified ethnicity, limiting the potential for factor misclassification bias. We also have information on a wide range of sociodemographic factors not typically available in electronic health records, such as religion, main language, and educational attainment. Another strength is the size of the dataset, comprising 78.4% of people aged ≥10 years living in England in 2020. Therefore, this study is sufficiently powered to detect small differences in the relative risk of testing positive for SARS-CoV-2 by detailed characteristics after adjusting for confounding factors and interactions with age.

An important limitation is that the PHDA only contains information on people who were enumerated in the 2011 census. Therefore, it excludes people living in England in 2011 who did not participate in the 2011 census (estimated to be approximately 5% of the population at the time); respondents who could not be linked to the 2011-13 NHS patient registers (5.4% of census respondents); people who have immigrated since 2011; children <10 years old in 2021; and people not registered with a GP surgery or who had opted out of GPPR. Additionally, the NHS patient register is known to have coverage issues,⁴² with undercoverage of specific groups such as migrants and recent returnees to the UK, armed forces and dependants, prisoners, and people registered only with private practices. Therefore, because our study population is based on the PHDA, specific groups might not be adequately covered,⁴³ which could result in biased estimates of relative risks for some groups. However, the coverage is high and the biases are probably small.

A further limitation is that many of the sociodemographic variables were derived from the 2011 census. Some of these characteristics (for example, disability status, English language proficiency, and NS-SEC) might have changed since the 2011 census and might

not accurately reflect peoples' circumstances during the pandemic. Some unaccounted factors might also exist that could contribute to the inequalities in case rates observed across ethnicities, such as current occupation or household size, with Pakistani and Bangladeshi groups being most likely to work in occupations which carry greater risk of infection³⁷ and live in overcrowded households with poor ventilation.^{44 45} Because our occupation data are from the 2011 census, we have used the NS-SEC of the household reference person to give wider coverage of age groups. Using this as a proxy for occupation means people could have changed NS-SEC categories since the 2011 census, particularly those who are not the household reference person and have moved out.

National SARS-CoV-2 testing data do not provide a representative measure of infections because people are more likely to get a test for covid-19 if they have symptoms, as they are advised to do, and because there might also be other biases in the choice to get a test. About 40% of people who tested positive in the Coronavirus Infection Survey did not develop symptoms within 35 days of testing positive.²⁹ Therefore, these figures are likely to under-represent the number of people without symptoms and so might not be generalisable to all infections in the population. Additionally, people in certain occupations and school children are required to undergo regular testing, and so might be more likely to test positive for covid-19 as a result of higher testing rates. Adherence to testing has been shown to be lower among men and boys, those of younger age, and people of lower socioeconomic status,⁴⁶ meaning inequalities in case rates are likely to be underestimated.

We were not able to account for the impact of lockdown measures on relative risks because these varied over time throughout the waves and differed by geographical areas. These policies were also not consistent across occupations and so varying rates of sociodemographic characteristics across regions and occupations could lead to differential risks which are not accounted for in this study.

Different diagnostic tests have been used for identifying SARS-CoV-2 infection, with the gold standard being reverse transcription PCR testing, a technique based on amplifying genetic material present in a sample to confirm the presence of the virus. All test types have been found to have high specificity, meaning that false positives are rare, while the test sensitivities have been found to differ across type of tests.⁴⁷ With the accuracy of tests being affected by the timing and the conditions of the test, and in people with symptoms the ability and willingness to identify their symptoms and seek a test,^{48 49} the case rates reported in this study are probably underestimates. A large scale population study would be valuable to understand the differences in test seeking behaviours and estimate the probability of being tested for SARS-CoV-2 according to sociodemographics.

Conclusion

SARS-CoV-2 case rates were found to vary considerably across different sociodemographic groups, particularly ethnicity and religion, in the second and third waves of the covid-19 pandemic. Further research is needed to understand why these inequalities exist and how they can best be addressed through policy interventions. Continued surveillance is essential to ensure that changes in the patterns of infection are identified early to inform public health interventions.

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► Additional supplemental material is published online only. To view, please visit the journal online (<http://dx.doi.org/10.1136/bmjmed-2022-000187>).

Supplementary material

Table S1: Sources of variables used in the analyses

Variable	Coding	Source
Positive test for SARS-CoV-2	Tested positive for SARS-CoV-2 between 1 September 2020 and 10 December 2021 and result recorded in national testing data	NPEX/SGSS
Age	Restricted natural cubic spline (using 10-year age bands)	2011 Census
Sex	Female, male	2011 Census
Ethnicity	White British, Bangladeshi, Black African, Black Caribbean, Chinese, Indian, Mixed, Other, Pakistani, White Other	2011 Census
Religious affiliation	Christian, Buddhist, Hindu, Jewish, Muslim, Sikh, no religion, other religion, religion not stated	2011 Census
Region	North East, North West, Yorkshire and The Humber, East Midlands, West Midlands, East of England, London, South East, South West	GDPPR
Rural-Urban Classification	Major or minor conurbation; city and town; town and Fringe; villages, hamlets and isolated dwellings	GDPPR
English Indices of Deprivation	Dummy variables representing quintile groups of deprivation, with 1 as the most deprived and 5 as the least deprived groups.	GDPPR
National Statistics Socio-economic classification (NS-SEC)	Higher managerial, administrative and professional occupations; Lower managerial, administrative and professional occupations; Intermediate occupations; Small employers and own account workers;	2011 Census

	Lower supervisory and technical occupations; Semi-routine occupations; Routine occupations; Never worked and long-term unemployed; Not in a household; Not classified	
Residence type	Dummy variables representing private household or other communal establishment, or care home residency	GDPPR/2011 Census
Household tenure	Own, social rented, private rented, other	2011 Census
Country of birth	UK, non-UK	2011 Census
English language proficiency	Main language, other	2011 Census
Level of highest qualification	Degree, A-level or equivalent, GCSE or equivalent, no qualification, other	2011 Census
Disability	Non-disabled, disabled (daily activities limited a little), disabled (daily activities limited a lot)	2011 Census
Body Mass Index (kg/m²)	< 18.5, 18.5 to <25, 25 to <30, >= 30, unknown	GDPPR
Learning disability	No learning disability, Down's syndrome, other learning disability	GDPPR
Pre-existing conditions	Number of pre-existing conditions	GDPPR/HES

NPEx, National Pathology Exchange; SGSS, Second Generation Surveillance System; GCSE, General Certificate of Secondary Education; GDPPR, General Practice Extraction Service Data for Pandemic Planning and Research; HES, Hospital Episode Statistics

Table S2: Characteristics of the study population reported across the full study period (variables not in the main text tables).

Variable	Level	Count (%)
Education level	No qualification	6,039,757 (15.5)
	Apprenticeship	1,131,625 (2.9)
	Level 1	4,557,085 (11.7)
	Level 2	5,174,885 (13.3)
	Level 3	4,065,049 (10.4)
	Level 4	8,927,314 (22.9)
	Not classified	7,482,144 (19.2)
	Other	1,628,335 (4.2)
Household tenure	Private rented	5,732,235 (14.7)
	Social rented	5,953,221 (15.3)
	Owned	26,395,380 (67.7)
	Other (e.g., live rent free)	619,926 (1.6)
Care home status	No	38,823,660 (99.5)
	Yes	182,534 (0.5)
National Statistics Socio-Economic Classification of the household reference person	1 Higher managerial, administrative and professional occupations	5,541,223 (14.2)
	2 Lower managerial, administrative and professional occupations	9,072,504 (23.3)
	3 Intermediate occupations	4,024,100 (10.3)
	4 Small employers and own account workers	5,145,160 (13.2)
	5 Lower supervisory and technical occupations	3,407,288 (8.7)
	6 Semi-routine occupations	4,925,771 (12.6)
	7 Routine occupations	4,571,754 (11.7)
	8 Never worked and long-term unemployed	1,437,647 (3.7)
	Not in a household	305,432 (0.8)
	Not classified	575,315 (1.5)
Country of birth	UK	34,244,696 (87.8)

English language proficiency	Non-UK	4,761,498 (12.2)
	Main language	36,311,243 (93.1)
Rural Urban Classification	Well or very well	2,114,632 (5.4)
	Not well or not at all	580,319 (1.5)
	Major or minor conurbation	14,546,114 (37.3)
	City and town	17,317,517 (44.4)
BMI category	Town and fringe	3,561,427 (9.1)
	Villages, hamlets and isolated dwellings	3,581,136 (9.2)
	Underweight	366,743 (0.9)
	Ideal	6,300,076 (16.2)
	Overweight	6,386,147 (16.4)
	Obese	5,512,880 (14.1)
Learning condition	Missing	20,440,348 (52.4)
	Does not have a learning condition	38,574,896 (98.9)
	Has a learning condition	431,298 (1.1)

Table S3: Age-standardised SARS-CoV-2 case rates (per 100,000 person-weeks) by socio-demographic characteristics and wave of the pandemic (variables not in the main text tables).

Exposure		Wave two (1 September 2020 to 22 May 2021)				Wave three (23 May 2021 onwards)			
		Number of cases	Rate	Lower CI	Upper CI	Number of cases	Rate	Lower CI	Upper CI
Household tenure	Private rented	367,298	168.4	167.8	169.1	548,583	299.4	298.5	300.3
	Social rented	419,093	193.1	192.5	193.7	508,011	296.3	295.5	297.1
	Owned	1,601,009	177.8	177.5	178.1	2,237,339	355.1	354.6	355.6
	Other	38,571	169.3	167.6	171.0	50,985	300.6	298.0	303.3
National Statistics Socio-Economic Classification of the household reference person	Higher managerial, administrative and professional occupations	139,872	102.0	100.7	103.3	229,509	211.3	208.8	213.7
	Lower managerial, administrative and professional occupations	369,283	128.3	127.7	128.9	498,925	228.8	227.7	229.9
	Intermediate occupations	250,852	141.0	140.3	141.6	299,393	228.8	227.8	229.8
	Small employers and own account workers	153,985	127.6	126.7	128.6	163,628	189.7	188.1	191.3
	Lower supervisory and technical occupations	134,166	142.5	141.7	143.3	144,680	213.1	211.8	214.3
	Semi-routine occupations	299,012	158.0	157.4	158.6	293,050	211.9	211.1	212.7
	Routine occupations	208,805	145.7	145.1	146.4	203,723	202.9	202.0	203.9
	Never worked and long-term unemployed	110,573	153.8	152.9	154.8	92,397	158.8	157.8	159.8
Country of birth	UK	2,089,141	171.7	171.5	171.9	3,081,174	345.0	344.6	345.4
	Non-UK	359,465	203.1	202.4	203.9	284,288	238.2	237.1	239.4
English language proficiency	Main language	2,211,286	171.6	171.4	171.8	3,191,368	342.2	341.9	342.6
	Speak English very well or well	187,607	239.4	238.2	240.6	140,685	228.2	226.8	229.5

Exposure		Wave two (1 September 2020 to 22 May 2021)				Wave three (23 May 2021 onwards)			
		Number of cases	Rate	Lower CI	Upper CI	Number of cases	Rate	Lower CI	Upper CI
	Do not speak English well or at all	49,713	238.8	236.2	241.5	33,409	194.4	191.6	197.2
Rural-Urban Classification	Cities and towns	1,005,795	162.3	162.0	162.6	1,565,237	350.0	349.4	350.5
	Major or minor conurbations	1,129,050	215.0	214.6	215.3	1,223,891	308.7	308.1	309.2
	Towns and fringes	171,629	139.9	139.2	140.5	307,205	360.1	358.8	361.4
	Villages, hamlets and isolated dwellings	142,132	118.8	118.1	119.4	269,129	332.3	331.0	333.7
Region	North East	132,204	194.7	193.6	195.7	204,171	420.4	418.6	422.2
	North West	400,613	218.2	217.5	218.8	487,936	363.6	362.5	364.6
	Yorkshire and the Humber	270,098	192.0	191.3	192.7	384,690	375.8	374.6	377.0
	East Midlands	218,633	177.9	177.1	178.6	320,396	363.1	361.8	364.4
	West Midlands	282,221	193.6	192.9	194.3	354,840	332.9	331.8	334.0
	East of England	250,486	158.4	157.8	159.1	352,650	308.6	307.6	309.7
	London	406,794	205.4	204.7	206.0	371,473	241.6	240.8	242.4
	South East	343,314	150.6	150.1	151.1	525,119	319.4	318.6	320.3
	South West	144,243	101.3	100.8	101.9	364,187	370.2	368.9	371.4

CI, confidence interval (95%).

Table S4: Adjusted rate ratios of receiving a positive test for SARS-CoV-2 by sociodemographic characteristics and wave of the pandemic

		Wave two (1 September 2020 to 22 May 2021)			Wave three (23 May 2021 onwards)		
Exposure	Group	RR (Model 1)	RR (Model 2)	RR (Model 3)	RR (Model 1)	RR (Model 2)	RR (Model 3)
Household tenure	Owned	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Other	0.96 [0.95 - 0.97]	0.97 [0.96 - 0.98]	0.93 [0.92 - 0.94]	0.86 [0.85 - 0.86]	0.89 [0.88 - 0.89]	0.92 [0.91 - 0.93]
	Private rented	0.93 [0.93 - 0.93]	0.92 [0.92 - 0.92]	0.89 [0.89 - 0.90]	0.84 [0.84 - 0.84]	0.86 [0.86 - 0.86]	0.89 [0.89 - 0.90]
	Social rented	1.07 [1.07 - 1.07]	1.02 [1.02 - 1.02]	0.93 [0.93 - 0.93]	0.84 [0.84 - 0.84]	0.86 [0.86 - 0.86]	0.90 [0.90 - 0.90]
Care home status	No	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Yes	4.15 [4.11 - 4.20]	4.17 [4.13 - 4.22]	4.3 [4.25 - 4.35]	1.07 [1.04 - 1.10]	1.06 [1.03 - 1.09]	1.32 [1.28 - 1.36]
National Statistics Socio-Economic Classification of the household reference person *	1 Higher managerial, administrative and professional occupations	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	2 Lower managerial, administrative and professional occupations	1.17 [1.16 - 1.18]	1.16 [1.15 - 1.16]	1.13 [1.12 - 1.13]	1.02 [1.02 - 1.02]	1.01 [1.01 - 1.01]	1.01 [1.01 - 1.01]
	3 Intermediate occupations	1.25 [1.24 - 1.26]	1.20 [1.20 - 1.21]	1.12 [1.11 - 1.13]	0.97 [0.97 - 0.98]	0.96 [0.95 - 0.96]	0.96 [0.96 - 0.97]
	4 Small employers and own account workers	1.29 [1.28 - 1.29]	1.29 [1.28 - 1.29]	1.15 [1.15 - 1.16]	0.92 [0.91 - 0.92]	0.91 [0.91 - 0.91]	0.95 [0.94 - 0.95]
	5 Lower supervisory and technical occupations	1.34 [1.33 - 1.35]	1.31 [1.30 - 1.32]	1.19 [1.18 - 1.19]	0.98 [0.98 - 0.98]	0.95 [0.94 - 0.95]	0.97 [0.97 - 0.97]
	6 Semi-routine occupations	1.39 [1.38 - 1.40]	1.33 [1.33 - 1.34]	1.18 [1.18 - 1.19]	0.92 [0.91 - 0.92]	0.89 [0.89 - 0.89]	0.93 [0.93 - 0.93]
	7 Routine occupations	1.38 [1.37 - 1.38]	1.32 [1.31 - 1.32]	1.16 [1.15 - 1.17]	0.92 [0.91 - 0.92]	0.88 [0.88 - 0.88]	0.93 [0.92 - 0.93]
	8 Never worked and long-term unemployed	1.27 [1.27 - 1.28]	1.15 [1.15 - 1.16]	0.97 [0.96 - 0.98]	0.74 [0.74 - 0.74]	0.74 [0.73 - 0.74]	0.81 [0.81 - 0.82]
Country of birth	UK	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Non-UK	1.21 [1.21 - 1.22]	1.14 [1.14 - 1.15]	1.05 [1.04 - 1.05]	0.70 [0.70 - 0.71]	0.77 [0.76 - 0.77]	0.96 [0.96 - 0.97]

		Wave two (1 September 2020 to 22 May 2021)			Wave three (23 May 2021 onwards)		
English language proficiency	Main language	1 (ref)	1 (ref)	1 (ref)			
	Well or very well	1.34 [1.34 - 1.35]	1.26 [1.25 - 1.26]	1.12 [1.11 - 1.12]	0.68 [0.67 - 0.68]	0.74 [0.73 - 0.74]	0.94 [0.93 - 0.94]
	Not well or not at all	1.48 [1.47 - 1.49]	1.35 [1.33 - 1.36]	1.10 [1.09 - 1.11]	0.58 [0.58 - 0.59]	0.62 [0.61 - 0.63]	0.83 [0.82 - 0.84]
Rural-Urban Classification	Villages, hamlets and isolated dwellings	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	City and town	1.38 [1.37 - 1.38]	1.36 [1.35 - 1.37]	1.29 [1.28 - 1.29]	1.07 [1.06 - 1.07]	1.07 [1.07 - 1.07]	1.12 [1.11 - 1.12]
	Major or minor conurbation	1.80 [1.79 - 1.81]	1.60 [1.59 - 1.61]	1.46 [1.45 - 1.46]	0.95 [0.95 - 0.95]	1.02 [1.01 - 1.02]	1.11 [1.10 - 1.11]
	Town and fringe	1.18 [1.17 - 1.19]	1.15 [1.15 - 1.16]	1.15 [1.14 - 1.16]	1.09 [1.08 - 1.09]	1.08 [1.07 - 1.08]	1.08 [1.07 - 1.08]

RR, rate ratio; CI, confidence interval (95%).

Model 1, adjusted for age and sex only; Model 2, plus geography (region and Rural-Urban Classification); Model 3, fully-adjusted model. Note that for Religion the fully adjusted model (model 3) does not adjust for ethnicity.

* For the National Statistics Socio-Economic classification of the household reference person, model 3 does not adjust for household tenure, due to strong collinearity affecting convergence of the models.

Table S5: Adjusted rate ratios of receiving a positive test for SARS-CoV-2 by sociodemographic characteristics and broad age group during the second wave (1 September 2020 to 22 May 2021)

		Under 65			65+		
Exposure	Group	RR (Model 1)	RR (Model 2)	RR (Model 3)	RR (Model 1)	RR (Model 2)	RR (Model 3)
Disability status	Not Limited	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Limited a little	0.91 [0.9 - 0.91]	0.89 [0.89 - 0.9]	0.85 [0.85 - 0.86]	1.39 [1.38 - 1.4]	1.36 [1.34 - 1.37]	1.14 [1.13 - 1.15]
	Limited a lot	0.84 [0.83 - 0.84]	0.81 [0.8 - 0.82]	0.75 [0.74 - 0.76]	1.94 [1.93 - 1.96]	1.82 [1.81 - 1.84]	1.28 [1.27 - 1.3]
Ethnicity	White British	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Bangladeshi	1.97 [1.95 - 1.99]	1.79 [1.77 - 1.81]	1.73 [1.71 - 1.75]	3.45 [3.31 - 3.59]	2.89 [2.78 - 3.02]	2.51 [2.41 - 2.62]
	Black African	1.13 [1.12 - 1.14]	1.04 [1.03 - 1.05]	1.04 [1.03 - 1.05]	1.67 [1.6 - 1.75]	1.42 [1.36 - 1.48]	1.36 [1.3 - 1.42]
	Black Caribbean	1.07 [1.06 - 1.09]	0.98 [0.97 - 1]	0.96 [0.94 - 0.97]	1.38 [1.34 - 1.43]	1.18 [1.14 - 1.21]	1.09 [1.05 - 1.13]
	Chinese	0.53 [0.51 - 0.54]	0.5 [0.48 - 0.51]	0.54 [0.52 - 0.55]	0.7 [0.65 - 0.76]	0.62 [0.58 - 0.67]	0.69 [0.64 - 0.74]
	Indian	1.55 [1.54 - 1.56]	1.44 [1.43 - 1.45]	1.46 [1.45 - 1.47]	1.93 [1.89 - 1.97]	1.66 [1.63 - 1.7]	1.73 [1.69 - 1.76]
	Mixed	1.09 [1.08 - 1.1]	1.04 [1.03 - 1.05]	1.04 [1.04 - 1.05]	1.33 [1.27 - 1.39]	1.22 [1.16 - 1.28]	1.16 [1.1 - 1.21]
	Other	1.38 [1.37 - 1.39]	1.29 [1.28 - 1.3]	1.3 [1.29 - 1.31]	1.76 [1.71 - 1.8]	1.53 [1.49 - 1.57]	1.55 [1.51 - 1.59]
	Pakistani	1.94 [1.93 - 1.95]	1.71 [1.7 - 1.72]	1.65 [1.64 - 1.66]	3.4 [3.32 - 3.48]	2.84 [2.77 - 2.9]	2.6 [2.54 - 2.66]
	White Other	0.99 [0.98 - 0.99]	0.96 [0.95 - 0.97]	0.99 [0.99 - 1]	1.14 [1.12 - 1.16]	1.06 [1.04 - 1.08]	1.04 [1.02 - 1.06]
Education level	No qualification	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Apprenticeship	1 [0.99 - 1.01]	1.06 [1.05 - 1.07]	1.1 [1.08 - 1.11]	0.77 [0.76 - 0.78]	0.8 [0.79 - 0.81]	0.93 [0.91 - 0.94]
	Level 1	0.98 [0.98 - 0.99]	1.02 [1.02 - 1.03]	1.04 [1.04 - 1.05]	0.75 [0.74 - 0.76]	0.77 [0.76 - 0.79]	0.88 [0.87 - 0.89]
	Level 2	0.97 [0.97 - 0.98]	1.02 [1.01 - 1.03]	1.05 [1.04 - 1.06]	0.72 [0.71 - 0.73]	0.76 [0.75 - 0.77]	0.87 [0.86 - 0.89]
	Level 3	0.94 [0.94 - 0.95]	0.99 [0.98 - 0.99]	1.03 [1.02 - 1.03]	0.7 [0.69 - 0.71]	0.73 [0.72 - 0.75]	0.86 [0.85 - 0.87]
	Level 4	0.78 [0.78 - 0.79]	0.82 [0.81 - 0.82]	0.85 [0.84 - 0.85]	0.6 [0.59 - 0.6]	0.63 [0.63 - 0.64]	0.75 [0.74 - 0.76]
	Other	1.08 [1.08 - 1.09]	1.08 [1.07 - 1.09]	1.06 [1.05 - 1.06]	0.93 [0.92 - 0.94]	0.93 [0.92 - 0.94]	0.95 [0.93 - 0.96]

English Indices of Deprivation quintile group	1 (most deprived)	1.39 [1.38 - 1.39]	1.21 [1.21 - 1.22]	1.14 [1.14 - 1.15]	1.95 [1.93 - 1.97]	1.72 [1.71 - 1.74]	1.34 [1.32 - 1.35]
	2	1.25 [1.25 - 1.26]	1.17 [1.16 - 1.17]	1.12 [1.12 - 1.13]	1.5 [1.49 - 1.52]	1.44 [1.42 - 1.45]	1.22 [1.2 - 1.23]
	3	1.12 [1.12 - 1.13]	1.11 [1.11 - 1.12]	1.09 [1.08 - 1.09]	1.23 [1.21 - 1.24]	1.26 [1.25 - 1.28]	1.14 [1.13 - 1.15]
	4	1.08 [1.07 - 1.08]	1.08 [1.07 - 1.08]	1.06 [1.06 - 1.07]	1.11 [1.1 - 1.12]	1.13 [1.12 - 1.15]	1.08 [1.06 - 1.09]
	5 (least deprived)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Religion	Christian	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Buddhist	0.8 [0.78 - 0.82]	0.8 [0.78 - 0.82]	0.84 [0.82 - 0.86]	0.81 [0.76 - 0.87]	0.77 [0.72 - 0.83]	0.83 [0.77 - 0.89]
	Hindu	1.24 [1.23 - 1.25]	1.18 [1.17 - 1.2]	1.21 [1.2 - 1.23]	1.59 [1.55 - 1.63]	1.36 [1.33 - 1.4]	1.45 [1.41 - 1.49]
	Jewish	1.07 [1.04 - 1.09]	1 [0.98 - 1.02]	1.03 [1.01 - 1.06]	1.1 [1.06 - 1.15]	0.95 [0.91 - 0.99]	1.06 [1.02 - 1.11]
	Muslim	1.66 [1.65 - 1.67]	1.52 [1.51 - 1.53]	1.48 [1.47 - 1.49]	2.82 [2.78 - 2.87]	2.38 [2.34 - 2.42]	2.19 [2.15 - 2.23]
	Sikh	1.71 [1.69 - 1.73]	1.61 [1.59 - 1.63]	1.59 [1.58 - 1.61]	2.3 [2.23 - 2.37]	1.99 [1.93 - 2.06]	2.04 [1.98 - 2.1]
	No religion	0.85 [0.85 - 0.85]	0.87 [0.87 - 0.87]	0.88 [0.88 - 0.88]	0.79 [0.78 - 0.8]	0.81 [0.8 - 0.82]	0.85 [0.84 - 0.86]
	Other religion	0.77 [0.75 - 0.78]	0.78 [0.77 - 0.8]	0.8 [0.78 - 0.82]	0.92 [0.87 - 0.98]	0.92 [0.87 - 0.98]	0.95 [0.9 - 1.01]
	Not stated	0.86 [0.86 - 0.87]	0.87 [0.87 - 0.88]	0.88 [0.87 - 0.88]	0.94 [0.93 - 0.95]	0.95 [0.94 - 0.96]	0.94 [0.93 - 0.96]
Household tenure	Owned	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Other	0.91 [0.9 - 0.92]	0.93 [0.92 - 0.94]	0.9 [0.89 - 0.91]	1.28 [1.25 - 1.32]	1.28 [1.25 - 1.31]	1.09 [1.07 - 1.12]
	Private rented	0.9 [0.9 - 0.91]	0.9 [0.89 - 0.9]	0.88 [0.88 - 0.89]	1.25 [1.23 - 1.27]	1.26 [1.24 - 1.28]	1.09 [1.07 - 1.1]
	Social rented	1.01 [1.01 - 1.02]	0.97 [0.96 - 0.97]	0.91 [0.91 - 0.91]	1.53 [1.52 - 1.54]	1.41 [1.4 - 1.43]	1.11 [1.1 - 1.12]
Care home status	No	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Yes	2.43 [2.36 - 2.49]	2.51 [2.44 - 2.57]	3 [2.92 - 3.08]	5.12 [5.05 - 5.18]	5.09 [5.02 - 5.15]	4.42 [4.36 - 4.48]
National Statistics Socio-Economic Classification of the household	1 Higher managerial, administrative and professional occupations	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	2 Lower managerial, administrative and professional occupations	1.17 [1.17 - 1.18]	1.16 [1.15 - 1.17]	1.13 [1.13 - 1.14]	1.19 [1.17 - 1.2]	1.17 [1.15 - 1.18]	1.1 [1.09 - 1.12]

reference person*	3 Intermediate occupations	1.25 [1.24 - 1.26]	1.21 [1.2 - 1.21]	1.14 [1.13 - 1.14]	1.32 [1.3 - 1.34]	1.26 [1.24 - 1.28]	1.1 [1.08 - 1.12]
	4 Small employers and own account workers	1.28 [1.27 - 1.29]	1.28 [1.27 - 1.28]	1.16 [1.15 - 1.16]	1.36 [1.34 - 1.38]	1.38 [1.36 - 1.4]	1.16 [1.15 - 1.18]
	5 Lower supervisory and technical occupations	1.32 [1.31 - 1.33]	1.3 [1.29 - 1.3]	1.19 [1.18 - 1.2]	1.49 [1.47 - 1.52]	1.42 [1.4 - 1.44]	1.17 [1.15 - 1.19]
	6 Semi-routine occupations	1.37 [1.36 - 1.37]	1.31 [1.31 - 1.32]	1.19 [1.18 - 1.2]	1.6 [1.57 - 1.62]	1.51 [1.49 - 1.53]	1.19 [1.17 - 1.2]
	7 Routine occupations	1.33 [1.32 - 1.33]	1.27 [1.27 - 1.28]	1.15 [1.15 - 1.16]	1.71 [1.69 - 1.73]	1.59 [1.57 - 1.62]	1.2 [1.19 - 1.22]
	8 Never worked and long-term unemployed	1.21 [1.2 - 1.22]	1.1 [1.09 - 1.11]	0.97 [0.96 - 0.97]	2 [1.96 - 2.04]	1.8 [1.76 - 1.84]	1.17 [1.14 - 1.19]
Country of birth	UK	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Non-UK	1.17 [1.17 - 1.18]	1.11 [1.11 - 1.12]	1.02 [1.01 - 1.02]	1.51 [1.49 - 1.52]	1.36 [1.35 - 1.37]	1 [0.98 - 1.02]
English language proficiency	Main language	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Well or very well	1.31 [1.3 - 1.31]	1.23 [1.22 - 1.24]	1.11 [1.1 - 1.11]	1.86 [1.83 - 1.89]	1.63 [1.6 - 1.65]	1.16 [1.13 - 1.18]
	Not well or not at all	1.35 [1.34 - 1.37]	1.24 [1.23 - 1.26]	1.05 [1.04 - 1.06]	2.29 [2.25 - 2.34]	1.94 [1.9 - 1.98]	1.12 [1.09 - 1.15]
Rural-Urban Classification	Villages, hamlets and isolated dwellings	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	City and town	1.35 [1.34 - 1.36]	1.33 [1.33 - 1.34]	1.28 [1.27 - 1.28]	1.5 [1.48 - 1.52]	1.47 [1.45 - 1.49]	1.32 [1.3 - 1.34]
	Major or minor conurbation	1.75 [1.74 - 1.76]	1.57 [1.56 - 1.58]	1.44 [1.43 - 1.45]	2.06 [2.03 - 2.09]	1.77 [1.74 - 1.79]	1.49 [1.47 - 1.51]
	Town and fringe	1.18 [1.17 - 1.19]	1.15 [1.14 - 1.16]	1.15 [1.14 - 1.16]	1.19 [1.17 - 1.21]	1.16 [1.14 - 1.18]	1.14 [1.12 - 1.16]

RR, rate ratio; CI, confidence interval (95%).

Model 1, adjusted for age and sex only; Model 2, plus geography (region and Rural-Urban Classification); Model 3, fully-adjusted model. Note that for Religion the fully adjusted model (model 3) does not adjust for ethnicity.

* For the National Statistics Socio-Economic classification of the household reference person, model 3 does not adjust for household tenure, due to strong collinearity affecting convergence of the models.

Table S6: Adjusted rate ratios of receiving a positive test for SARS-CoV-2 by sociodemographic characteristics and broad age group during the third wave (23 May 2021 to 10 December 2021)

		Under 65			65+		
Exposure	Group	RR (Model 1)	RR (Model 2)	RR (Model 3)	RR (Model 1)	RR (Model 2)	RR (Model 3)
Disability status	Not Limited	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Limited a little	0.81 [0.80 - 0.81]	0.80 [0.80 - 0.81]	0.83 [0.83 - 0.84]	1.06 [1.05 - 1.07]	1.03 [1.02 - 1.04]	0.97 [0.96 - 0.98]
	Limited a lot	0.62 [0.62 - 0.63]	0.62 [0.61 - 0.62]	0.68 [0.67 - 0.68]	1.18 [1.16 - 1.19]	1.11 [1.10 - 1.13]	1.00 [0.99 - 1.01]
Ethnicity	White British	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Bangladeshi	0.58 [0.57 - 0.58]	0.63 [0.63 - 0.64]	0.66 [0.66 - 0.67]	1.48 [1.39 - 1.59]	1.63 [1.52 - 1.74]	1.61 [1.50 - 1.72]
	Black African	0.54 [0.54 - 0.55]	0.61 [0.60 - 0.61]	0.64 [0.63 - 0.65]	0.69 [0.65 - 0.74]	0.81 [0.75 - 0.86]	0.81 [0.75 - 0.87]
	Black Caribbean	0.77 [0.76 - 0.77]	0.86 [0.85 - 0.87]	0.90 [0.88 - 0.91]	0.98 [0.94 - 1.02]	1.08 [1.04 - 1.13]	1.07 [1.02 - 1.12]
	Chinese	0.45 [0.44 - 0.46]	0.48 [0.47 - 0.49]	0.49 [0.48 - 0.50]	0.41 [0.37 - 0.46]	0.44 [0.40 - 0.49]	0.48 [0.43 - 0.53]
	Indian	0.72 [0.72 - 0.73]	0.77 [0.77 - 0.78]	0.76 [0.76 - 0.77]	1.20 [1.17 - 1.23]	1.29 [1.26 - 1.33]	1.30 [1.26 - 1.33]
	Mixed	0.85 [0.84 - 0.86]	0.90 [0.89 - 0.90]	0.92 [0.92 - 0.93]	0.92 [0.86 - 0.98]	0.98 [0.92 - 1.04]	0.98 [0.92 - 1.04]
	Other	0.61 [0.61 - 0.62]	0.68 [0.67 - 0.68]	0.71 [0.70 - 0.71]	0.95 [0.92 - 0.98]	1.07 [1.03 - 1.11]	1.09 [1.05 - 1.13]
	Pakistani	0.59 [0.58 - 0.59]	0.59 [0.59 - 0.60]	0.61 [0.60 - 0.61]	1.44 [1.38 - 1.49]	1.38 [1.33 - 1.43]	1.32 [1.27 - 1.37]
	White Other	0.72 [0.72 - 0.73]	0.78 [0.78 - 0.79]	0.82 [0.82 - 0.83]	0.89 [0.87 - 0.91]	0.97 [0.95 - 0.99]	0.97 [0.95 - 1.00]
Education level	No qualification	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Apprenticeship	1.37 [1.35 - 1.38]	1.34 [1.32 - 1.35]	1.21 [1.20 - 1.22]	1.02 [1 - 1.04]	1.02 [1.01 - 1.04]	1.05 [1.03 - 1.07]
	Level 1	1.23 [1.22 - 1.24]	1.22 [1.22 - 1.23]	1.15 [1.14 - 1.15]	0.96 [0.94 - 0.97]	0.99 [0.98 - 1.01]	1.02 [1.01 - 1.04]
	Level 2	1.27 [1.27 - 1.28]	1.27 [1.26 - 1.27]	1.16 [1.16 - 1.17]	0.94 [0.93 - 0.95]	0.97 [0.96 - 0.98]	1.01 [0.99 - 1.02]
	Level 3	1.30 [1.29 - 1.31]	1.29 [1.29 - 1.30]	1.19 [1.18 - 1.19]	0.95 [0.94 - 0.97]	0.99 [0.97 - 1.00]	1.02 [1.01 - 1.04]
	Level 4	1.26 [1.25 - 1.27]	1.30 [1.29 - 1.31]	1.20 [1.20 - 1.21]	0.88 [0.87 - 0.89]	0.93 [0.92 - 0.94]	0.98 [0.97 - 0.99]

	Other	0.94 [0.93 - 0.95]	1.00 [0.99 - 1.01]	1.08 [1.07 - 1.09]	0.99 [0.97 – 1.00]	1.02 [1 - 1.04]	1.03 [1.01 - 1.04]
English Indices of Deprivation quintile group	1 (most deprived)	0.85 [0.85 - 0.86]	0.82 [0.82 - 0.82]	0.92 [0.92 - 0.92]	1.29 [1.27 - 1.3]	1.12 [1.11 - 1.14]	1.09 [1.08 - 1.11]
	2	0.88 [0.88 - 0.88]	0.89 [0.89 - 0.90]	0.96 [0.95 - 0.96]	1.15 [1.14 - 1.17]	1.11 [1.09 - 1.12]	1.08 [1.07 - 1.10]
	3	0.92 [0.92 - 0.92]	0.94 [0.93 - 0.94]	0.97 [0.97 - 0.97]	1.05 [1.03 - 1.06]	1.05 [1.04 - 1.07]	1.04 [1.02 - 1.05]
	4	0.97 [0.96 - 0.97]	0.97 [0.96 - 0.97]	0.98 [0.98 - 0.99]	1.05 [1.03 - 1.06]	1.04 [1.03 - 1.06]	1.03 [1.02 - 1.05]
	5 (least deprived)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Religion	Christian	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Buddhist	0.64 [0.62 - 0.65]	0.68 [0.66 - 0.69]	0.71 [0.69 - 0.72]	0.59 [0.54 - 0.65]	0.65 [0.59 - 0.70]	0.68 [0.62 - 0.74]
	Hindu	0.74 [0.73 - 0.75]	0.83 [0.82 - 0.84]	0.82 [0.82 - 0.83]	1.13 [1.10 - 1.17]	1.27 [1.22 - 1.31]	1.28 [1.24 - 1.33]
	Jewish	0.82 [0.80 - 0.83]	0.94 [0.92 - 0.96]	0.92 [0.9 - 0.94]	1.06 [1.01 - 1.12]	1.19 [1.14 - 1.26]	1.22 [1.16 - 1.28]
	Muslim	0.59 [0.59 - 0.60]	0.63 [0.63 - 0.64]	0.66 [0.66 - 0.66]	1.24 [1.21 - 1.27]	1.28 [1.25 - 1.31]	1.25 [1.22 - 1.29]
	Sikh	0.79 [0.78 - 0.80]	0.83 [0.82 - 0.85]	0.82 [0.81 - 0.83]	1.32 [1.27 - 1.38]	1.39 [1.33 - 1.45]	1.38 [1.32 - 1.44]
	No religion	0.96 [0.96 - 0.96]	0.96 [0.96 - 0.96]	0.98 [0.97 - 0.98]	0.83 [0.82 - 0.84]	0.85 [0.84 - 0.86]	0.87 [0.86 - 0.88]
	Other religion	0.76 [0.75 - 0.78]	0.78 [0.77 - 0.80]	0.79 [0.78 - 0.81]	0.91 [0.86 - 0.97]	0.97 [0.91 - 1.03]	0.97 [0.92 - 1.03]
	Not stated	0.87 [0.87 - 0.88]	0.89 [0.88 - 0.89]	0.90 [0.89 - 0.90]	0.84 [0.82 - 0.85]	0.86 [0.84 - 0.87]	0.86 [0.85 - 0.88]
Household tenure	Owned	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Other	0.85 [0.84 - 0.85]	0.88 [0.87 - 0.89]	0.92 [0.91 - 0.92]	0.98 [0.94 - 1.01]	0.99 [0.96 - 1.02]	0.95 [0.92 - 0.99]
	Private rented	0.84 [0.84 - 0.84]	0.86 [0.86 - 0.86]	0.90 [0.89 - 0.90]	0.93 [0.91 - 0.95]	0.95 [0.93 - 0.96]	0.91 [0.89 - 0.92]
	Social rented	0.83 [0.83 - 0.83]	0.85 [0.85 - 0.86]	0.90 [0.90 - 0.91]	1.01 [1.00 - 1.02]	0.98 [0.97 - 0.99]	0.91 [0.90 - 0.92]
Care home status	No	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Yes	0.58 [0.55 - 0.61]	0.57 [0.54 - 0.60]	0.84 [0.80 - 0.88]	1.72 [1.67 - 1.78]	1.69 [1.64 - 1.75]	1.65 [1.59 - 1.70]
National Statistics Socio-Economic	1 Higher managerial, administrative and professional occupations	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)

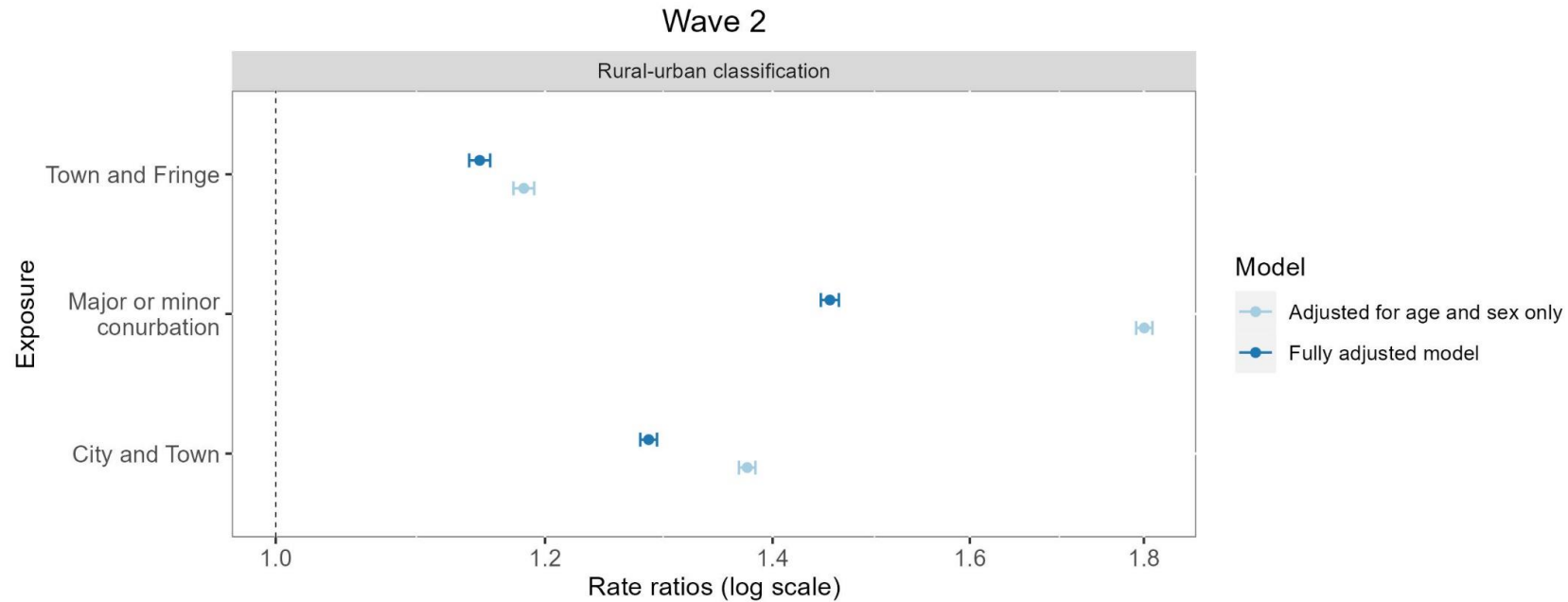
Classification of the household reference person*	2 Lower managerial, administrative and professional occupations	1.02 [1.01 - 1.02]	1.01 [1.00 - 1.01]	1.01 [1.01 - 1.02]	1.05 [1.04 - 1.07]	1.03 [1.02 - 1.05]	1.02 [1.00 - 1.03]
	3 Intermediate occupations	0.97 [0.97 - 0.98]	0.96 [0.95 - 0.96]	0.98 [0.98 - 0.99]	1.05 [1.03 - 1.06]	1.01 [0.99 - 1.03]	0.97 [0.96 - 0.99]
	4 Small employers and own account workers	0.91 [0.9 - 0.91]	0.9 [0.9 - 0.9]	0.95 [0.95 - 0.95]	1.06 [1.05 - 1.08]	1.06 [1.04 - 1.08]	1.01 [1 - 1.03]
	5 Lower supervisory and technical occupations	0.97 [0.97 - 0.97]	0.94 [0.93 - 0.94]	0.98 [0.97 - 0.98]	1.13 [1.11 - 1.15]	1.06 [1.04 - 1.08]	1 [0.98 - 1.02]
	6 Semi-routine occupations	0.91 [0.9 - 0.91]	0.88 [0.87 - 0.88]	0.95 [0.95 - 0.96]	1.11 [1.1 - 1.13]	1.05 [1.03 - 1.06]	0.98 [0.97 - 1]
	7 Routine occupations	0.9 [0.89 - 0.9]	0.87 [0.86 - 0.87]	0.94 [0.94 - 0.95]	1.15 [1.14 - 1.17]	1.06 [1.05 - 1.08]	0.99 [0.97 - 1]
	8 Never worked and long-term unemployed	0.73 [0.72 - 0.73]	0.73 [0.73 - 0.73]	0.86 [0.85 - 0.86]	1.01 [0.99 - 1.04]	0.96 [0.93 - 0.99]	0.86 [0.84 - 0.89]
Country of birth	UK	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Non-UK	0.68 [0.68 - 0.68]	0.74 [0.74 - 0.75]	0.94 [0.93 - 0.94]	0.97 [0.96 - 0.98]	1.06 [1.04 - 1.07]	0.95 [0.92 - 0.97]
English language proficiency	Main language	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	Well or very well	0.66 [0.66 - 0.67]	0.72 [0.72 - 0.73]	0.92 [0.92 - 0.93]	1.05 [1.02 - 1.07]	1.13 [1.11 - 1.16]	1.02 [0.99 - 1.06]
	Not well or not at all	0.54 [0.54 - 0.55]	0.58 [0.58 - 0.59]	0.79 [0.78 - 0.8]	1.17 [1.13 - 1.2]	1.2 [1.17 - 1.24]	1.05 [1.01 - 1.09]
Rural-Urban Classification	Villages, hamlets and isolated dwellings	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
	City and town	1.05 [1.04 - 1.05]	1.05 [1.05 - 1.05]	1.1 [1.1 - 1.11]	1.24 [1.22 - 1.26]	1.24 [1.23 - 1.26]	1.21 [1.2 - 1.23]
	Major or minor conurbation	0.92 [0.91 - 0.92]	0.99 [0.99 - 1]	1.09 [1.08 - 1.09]	1.35 [1.34 - 1.37]	1.34 [1.32 - 1.36]	1.29 [1.27 - 1.31]
	Town and fringe	1.08 [1.07 - 1.08]	1.07 [1.06 - 1.07]	1.07 [1.06 - 1.08]	1.16 [1.14 - 1.18]	1.14 [1.12 - 1.16]	1.13 [1.11 - 1.15]

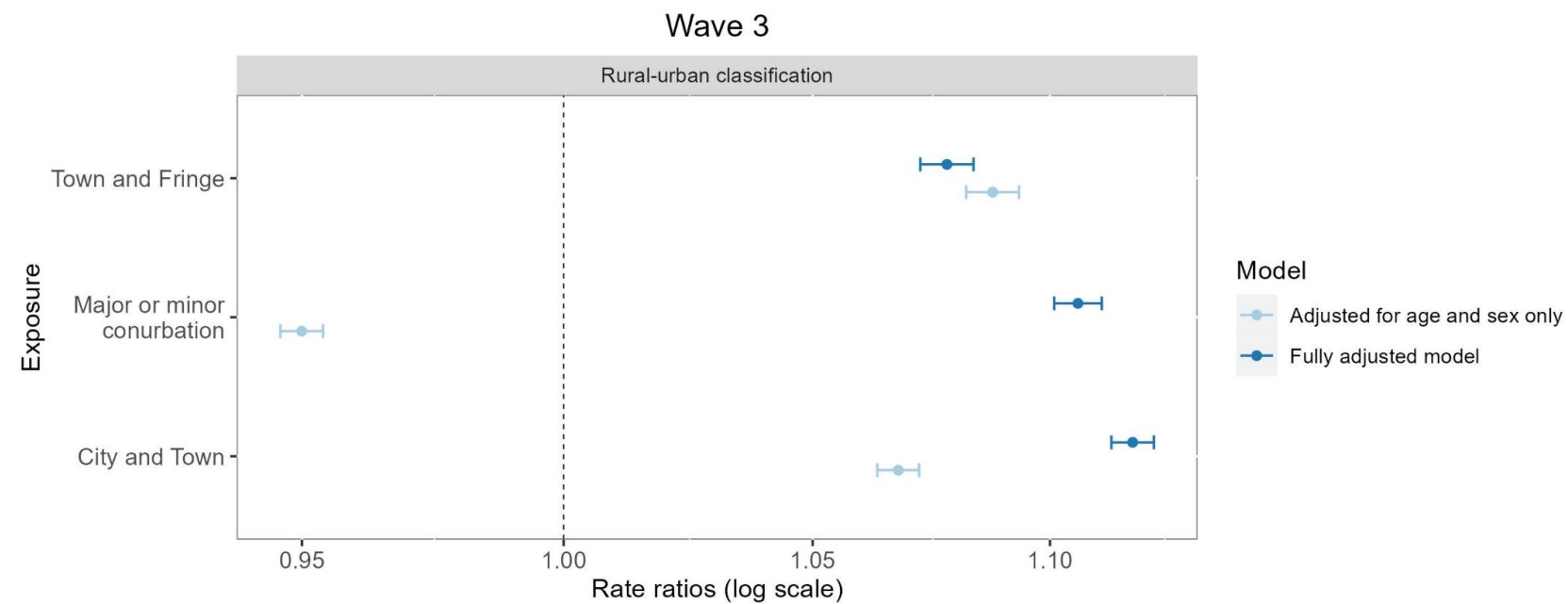
RR, rate ratio; CI, confidence interval (95%).

Model 1, adjusted for age and sex only; Model 2, plus geography (region and Rural-Urban Classification); Model 3, fully-adjusted model. Note that for Religion the fully adjusted model (model 3) does not adjust for ethnicity.

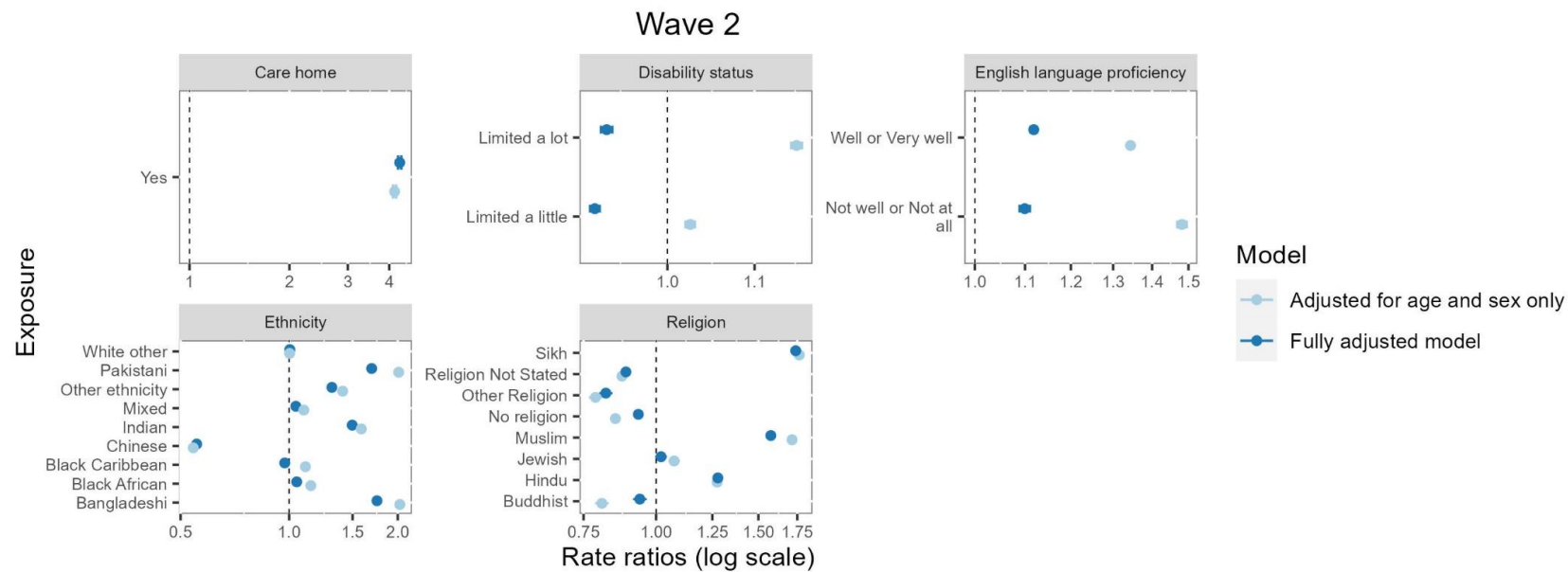
* For the National Statistics Socio-Economic classification of the household reference person, model 3 does not adjust for household tenure, due to strong collinearity affecting convergence of the models.

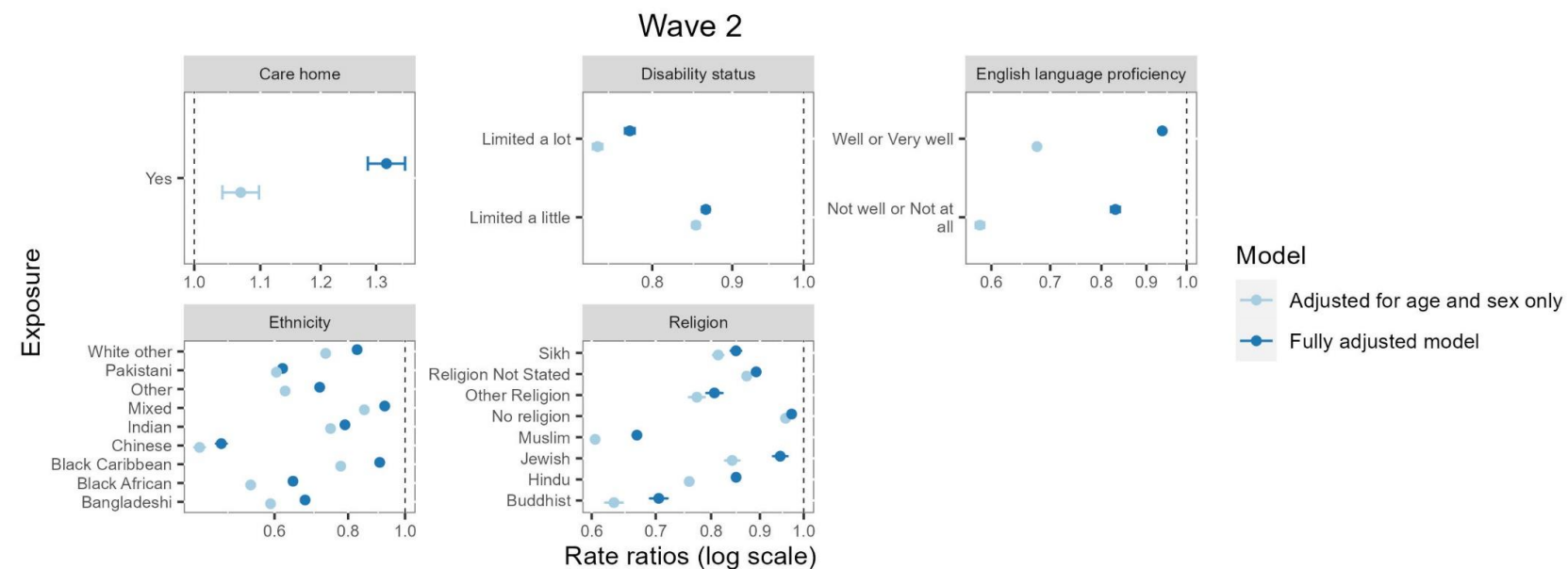
Plot S1: Rate ratios by wave of the pandemic – Geographical variables





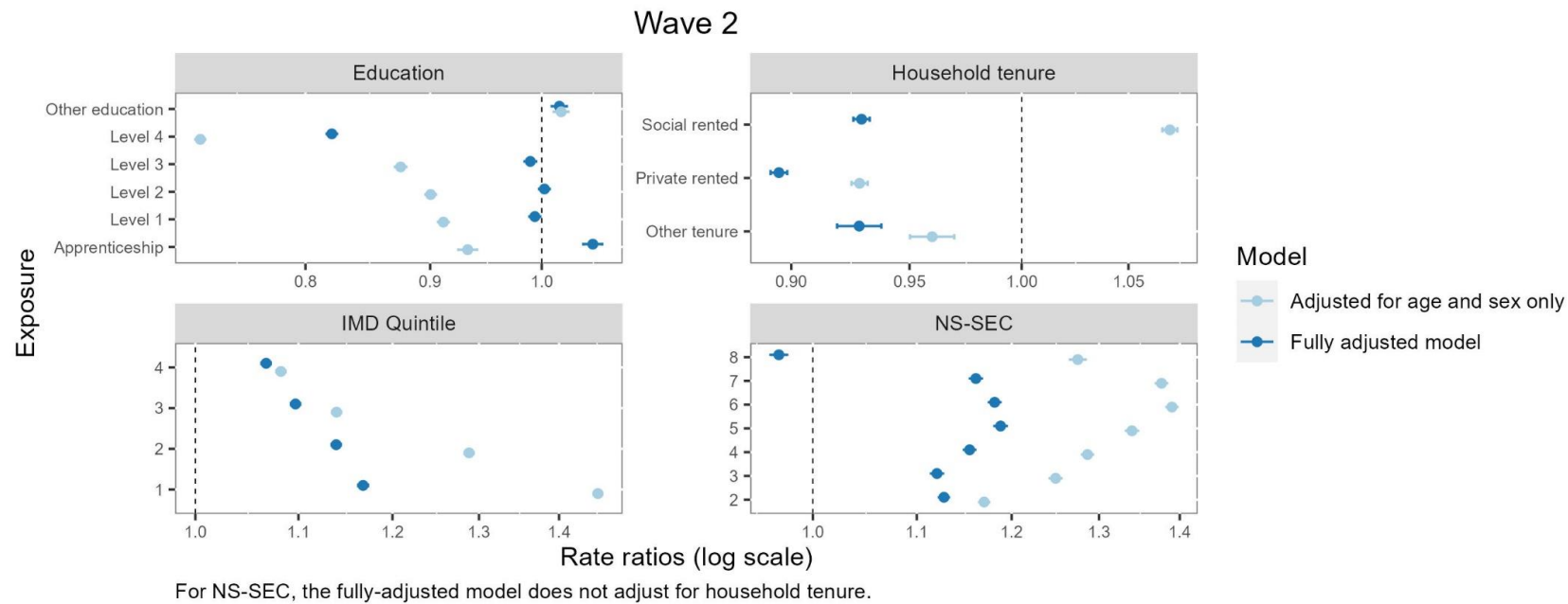
Plot S2: Rate ratios by wave of the pandemic – sociodemographic variables

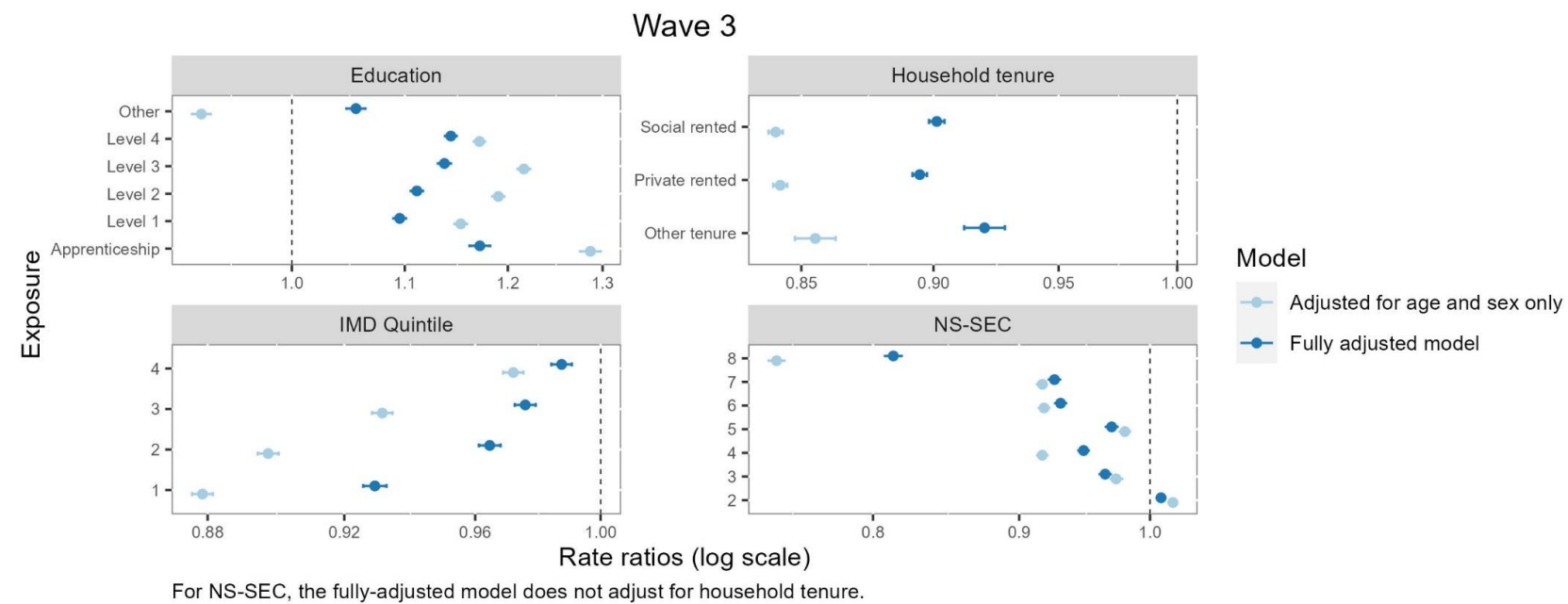




For Religion, the fully adjusted model does not adjust for ethnicity.

Plot S3: Rate ratios by wave of the pandemic – socioeconomic variables





* For the National Statistics Socio-Economic classification (NS-SEC) of the household reference person, the fully-adjusted model does not adjust for household tenure, due to strong collinearity affecting convergence of the models. Please see Table S2 for a look-up of the NS-SEC group which corresponds to the given number (omitted within the plot due to text length).

term	p.value	rr	lower_ci	upper_ci
(Intercept)	0.981382	0.953584	0.017607	51.6443
age_1_1	2.67E-07	0.135376	0.063203	0.289964
age_1_2	0.00029	0.406031	0.249381	0.661081
age_1_3	2.52E-05	0.476776	0.337794	0.672939
age_1_4	2.40E-05	0.56123	0.42927	0.733756
age_1_5	1.17E-06	0.578988	0.464471	0.721739
age_1_6	8.33E-05	0.68196	0.563573	0.825215
age_1_7	0.781074	1.025131	0.860517	1.221234
age_1_8	1.13E-08	0.611793	0.516839	0.724191
age_1_9	2.62E-14	0.468773	0.385733	0.569689
age_2_1	1.23E-08	1.149051	1.095407	1.205322
age_2_2	0.001656	1.03195	1.011926	1.052371
age_2_3	3.83E-05	1.021041	1.010971	1.031211
age_2_4	4.15E-05	1.012697	1.006605	1.018825
age_2_5	6.67E-08	1.011406	1.007251	1.015578
age_2_6	0.000147	1.006192	1.00299	1.009404
age_2_7	3.05E-05	0.993947	0.991115	0.996788
age_2_8	7.99E-07	1.006917	1.004164	1.009677
age_2_9	3.68E-13	1.012726	1.009278	1.016186
age_3_1	3.53E-09	0.997014	0.996025	0.998004
age_3_2	0.00499	0.999628	0.999368	0.999888
age_3_3	5.39E-05	0.999804	0.999709	0.999899
age_3_4	6.96E-05	0.999908	0.999862	0.999953
age_3_5	2.06E-09	0.999921	0.999895	0.999947
age_3_6	3.46E-05	0.999961	0.999943	0.99998
age_3_7	3.93E-11	1.000053	1.000037	1.000069
age_3_8	0.000108	0.999972	0.999957	0.999986
age_3_9	1.36E-11	0.999941	0.999923	0.999958
sex_1	0	0.911145	0.907709	0.914594
region_1	0	1.077653	1.067799	1.087598
region_2	0	1.057706	1.05053	1.064931
region_3	0	0.70705	0.700732	0.713425
region_4	0	1.19457	1.186926	1.202262
region_5	0	1.065165	1.054419	1.076019
region_6	0	1.065358	1.057336	1.07344
region_7	4.60E-13	1.033236	1.024127	1.042427
region_8	0	1.098494	1.087718	1.109377
ruralurban	0	1.168276	1.155794	1.180893
ruralurban	0	1.501075	1.487736	1.514534
ruralurban	0	1.308319	1.297323	1.319407
bmi_categ	0	1.29785	1.280619	1.315314
bmi_categ	0	1.129059	1.11414	1.144177
bmi_categ	0	1.453731	1.434403	1.473319
health_cor	0	1.065634	1.063442	1.067832
learning_c	0	1.121053	1.102461	1.139959
ethnicity_1	1.83E-05	0.971029	0.958058	0.984175
ethnicity_2	0	1.71739	1.566244	1.883121
ethnicity_3	0	1.154881	1.131914	1.178314
ethnicity_4	0.618673	1.004883	0.985793	1.024342

ethnicity_5	0	1.438907	1.395687	1.483465
ethnicity_6	0	0.656147	0.610354	0.705377
ethnicity_7	0.010294	0.977574	0.960781	0.994659
ethnicity_8	2.69E-06	1.040162	1.023196	1.057409
ethnicity_9	0.004334	1.450309	1.123386	1.872372
imd_quint	0	1.084393	1.077715	1.091112
imd_quint	0	1.128085	1.121138	1.135074
imd_quint	0	1.172709	1.165489	1.179974
imd_quint	0	1.211917	1.204048	1.219838
religion_1	0.047245	1.20049	1.002222	1.437982
religion_2	0	0.869482	0.861473	0.877565
religion_3	0	0.697809	0.671885	0.724733
religion_4	0	0.883163	0.878747	0.887601
religion_5	0	1.331518	1.275015	1.390526
religion_6	0.516366	1.009294	0.981484	1.037893
religion_7	0.397491	0.91806	0.753116	1.119128
religion_8	0	0.700791	0.659415	0.744762
education_1	0.691375	0.998137	0.988992	1.007368
education_2	0.947247	0.999233	0.976786	1.022197
education_3	0	0.847267	0.841813	0.852755
education_4	0.102068	1.00611	0.99879	1.013484
education_5	0.000725	1.011677	1.004889	1.018511
education_6	0.473848	0.997503	0.990702	1.004351
education_7	1.96E-11	1.042184	1.02968	1.05484
tenure_1	0	0.951765	0.946634	0.956924
tenure_2	0	0.914052	0.908953	0.919179
tenure_3	4.44E-16	0.94188	0.92845	0.955505
tenure_4	0	0.850101	0.834558	0.865934
care_home	0	4.19185	4.128999	4.255658
english_lar	0.001063	1.079401	1.031131	1.129931
english_lar	0.046677	0.919262	0.846089	0.998764
ethnicity_r	0.281484	1.196459	0.863243	1.6583
ethnicity_r	0.001413	0.942622	0.909034	0.977452
ethnicity_r	0.428755	1.056739	0.921728	1.211527
ethnicity_r	0	0.838152	0.817661	0.859156
ethnicity_r	0.329129	0.974582	0.925465	1.026305
ethnicity_r	0.190682	0.952216	0.884881	1.024675
ethnicity_r	0.105065	1.25788	0.953117	1.660092
ethnicity_r	0.265937	0.905671	0.760606	1.078405
ethnicity_r	0.261085	0.846756	0.633529	1.131749
ethnicity_r	0.677406	1.022098	0.92208	1.132966
ethnicity_r	0.783366	0.927939	0.544463	1.581505
ethnicity_r	1.54E-07	0.646624	0.549458	0.760973
ethnicity_r	2.24E-08	0.747779	0.675353	0.827972
ethnicity_r	0.142317	0.650774	0.366605	1.155212
ethnicity_r	0.77963	1.046768	0.759972	1.441795
ethnicity_r	0.403382	0.764617	0.407425	1.434964
ethnicity_r	0.019821	1.244522	1.035325	1.495989
ethnicity_r	0.226437	0.970834	0.92537	1.018533
ethnicity_r	0.171008	1.107181	0.956995	1.280937

ethnicity_r	0	0.770431	0.735633	0.806875
ethnicity_r	0	0.78236	0.744367	0.822292
ethnicity_r	0.501413	1.040295	0.927122	1.167283
ethnicity_r	0.224894	1.132258	0.926452	1.383782
ethnicity_r	1.60E-09	1.261413	1.169763	1.360242
ethnicity_r	0.113274	1.240158	0.950135	1.618709
ethnicity_r	0.476641	1.019656	0.966436	1.075807
ethnicity_r	0.720893	1.035225	0.856156	1.251747
ethnicity_r	0.501336	0.989249	0.958566	1.020914
ethnicity_r	0.000359	0.888709	0.832944	0.948207
ethnicity_r	0.198316	1.143931	0.932003	1.404049
ethnicity_r	0.371218	1.125781	0.868303	1.459608
ethnicity_r	0.045373	1.202922	1.003809	1.441531
ethnicity_r	0.315173	0.910134	0.757366	1.093718
ethnicity_r	0.009828	0.925812	0.87319	0.981606
ethnicity_r	6.78E-05	1.158598	1.07765	1.245626
ethnicity_r	0	0.676144	0.628393	0.727524
ethnicity_r	0.007212	0.925625	0.874884	0.979309
ethnicity_r	0.010528	0.490929	0.284622	0.846775
ethnicity_r	0.264593	0.892038	0.729813	1.090323
ethnicity_r	0.037992	1.23316	1.011677	1.503131
ethnicity_r	1.34E-07	3.453598	2.178712	5.474493
ethnicity_r	0.165776	1.100902	0.960961	1.261223
ethnicity_r	0.049116	1.600783	1.001816	2.557862
ethnicity_r	0.305516	0.957633	0.88153	1.040307
ethnicity_r	5.26E-05	1.540606	1.249445	1.899616
ethnicity_r	0.028718	2.451814	1.097695	5.476378
ethnicity_r	0.003637	2.088452	1.271348	3.430715
ethnicity_r	1.01E-07	1.401745	1.237879	1.587303
ethnicity_r	0.02473	2.176363	1.103957	4.290525
ethnicity_r	0.039819	0.940875	0.88776	0.997169
ethnicity_r	0.847506	1.021857	0.81975	1.273794
ethnicity_r	0.001235	0.922123	0.877863	0.968615
ethnicity_r	0.000139	0.708914	0.593925	0.846166
ethnicity_r	0.175979	0.575269	0.25827	1.28135
ethnicity_r	0.037706	1.493904	1.023061	2.181443
ethnicity_r	0.721264	0.922559	0.592489	1.436507
ethnicity_r	0.628229	0.753426	0.239516	2.369997
ethnicity_r	0.522118	1.021975	0.956166	1.092313
ethnicity_r	0.358667	1.180509	0.828286	1.682511
ethnicity_r	0.27035	0.949397	0.865658	1.041236
ethnicity_r	0	0.738415	0.699545	0.779445
ethnicity_r	0.798011	0.922163	0.495776	1.715262
ethnicity_r	0.111968	1.420262	0.921454	2.18909
ethnicity_r	0.674841	1.124253	0.650464	1.943145
ethnicity_r	0.484596	1.204538	0.714787	2.029855
ethnicity_r	0.06926	1.276781	0.980914	1.661887
ethnicity_r	0.566673	0.662256	0.161727	2.711867
ethnicity_r	0.106534	0.766786	0.555422	1.058584
ethnicity_r	0.472691	0.909392	0.701724	1.178517

ethnicity_r	0.472293	1.293589	0.641112	2.61011
ethnicity_r	0.391486	1.168495	0.818366	1.668423
ethnicity_r	0.869672	0.942766	0.46627	1.906207
ethnicity_ε	0.086495	1.043577	0.993902	1.095734
ethnicity_ε	5.07E-08	1.275475	1.168587	1.392139
ethnicity_ε	0.065917	0.954385	0.908056	1.003077
ethnicity_ε	0.056546	1.0885	0.997637	1.187638
ethnicity_ε	2.08E-06	1.128907	1.073762	1.186885
ethnicity_ε	2.33E-06	1.23952	1.133827	1.355065
ethnicity_ε	0.484375	1.024038	0.958079	1.094538
ethnicity_ε	0.002938	1.204079	1.065372	1.360844
ethnicity_ε	0.000474	1.09249	1.039615	1.148054
ethnicity_ε	4.00E-06	1.235599	1.129339	1.351858
ethnicity_ε	3.83E-05	0.832051	0.762322	0.90816
ethnicity_ε	0.566918	1.036579	0.916631	1.172223
ethnicity_ε	0.852067	1.01716	0.850599	1.216336
ethnicity_ε	0.217669	1.23648	0.882297	1.732843
ethnicity_ε	0.333584	0.973864	0.922962	1.027573
ethnicity_ε	0.178481	0.929831	0.836327	1.033789
ethnicity_ε	0.201797	0.965491	0.914807	1.018984
ethnicity_ε	0.00912	1.126927	1.030118	1.232834

term	p.value	rr	lower_ci	upper_ci
(Intercept)	0	2.90E-09	7.68E-11	1.09E-07
age_1_1	7.20E-12	11.90247	5.86177	24.16826
age_1_2	5.39E-11	4.347023	2.802245	6.743382
age_1_3	1.93E-10	2.766115	2.022258	3.783587
age_1_4	4.58E-07	1.873146	1.467695	2.390604
age_1_5	3.03E-13	2.112172	1.727659	2.582264
age_1_6	6.15E-12	1.843835	1.548747	2.195146
age_1_7	1.67E-12	1.807762	1.533718	2.130772
age_1_8	1.78E-11	1.93905	1.598629	2.351962
age_1_9	0.07641	1.312311	0.971561	1.772571
age_2_1	2.13E-12	0.846863	0.808491	0.887057
age_2_2	8.27E-12	0.940801	0.924479	0.957412
age_2_3	1.92E-11	0.969643	0.960953	0.978411
age_2_4	0.000185	0.989584	0.984167	0.995031
age_2_5	6.66E-16	0.984576	0.980869	0.988298
age_2_6	1.13E-12	0.989327	0.986407	0.992256
age_2_7	4.03E-12	0.990085	0.987301	0.992877
age_2_8	8.71E-10	0.98842	0.984747	0.992107
age_2_9	0.346866	0.997129	0.991172	1.003121
age_3_1	5.77E-12	1.003562	1.002547	1.004579
age_3_2	3.63E-12	1.000818	1.000587	1.001048
age_3_3	1.46E-12	1.000311	1.000225	1.000398
age_3_4	0.026168	1.000047	1.000006	1.000088
age_3_5	2.22E-16	1.0001	1.000076	1.000124
age_3_6	4.75E-11	1.000058	1.000041	1.000075
age_3_7	6.33E-10	1.000051	1.000035	1.000067
age_3_8	1.18E-08	1.000061	1.00004	1.000082
age_3_9	0.47003	1.000012	0.99998	1.000043
sex_1	0	0.938853	0.935454	0.942265
region_1	0	1.270785	1.260188	1.281471
region_2	0	1.105559	1.098522	1.112641
region_3	0	1.158034	1.150015	1.166109
region_4	0	1.1942	1.187008	1.201435
region_5	0	1.386726	1.374282	1.399283
region_6	0	0.902354	0.895533	0.909227
region_7	0.227176	1.005134	0.996815	1.013524
region_8	0	1.179561	1.168897	1.190322
ruralurban	0	1.088857	1.079073	1.09873
ruralurban	0	1.164008	1.155058	1.173028
ruralurban	0	1.162378	1.154192	1.170622
bmi_categ	0	1.257873	1.241258	1.274711
bmi_categ	0	1.17807	1.162629	1.193716
bmi_categ	0	1.273559	1.256673	1.290671
health_cor	0	1.014768	1.012414	1.017127
learning_c	0	1.589124	1.555621	1.623348
ethnicity_1	0	0.926676	0.914434	0.939082
ethnicity_2	0.003579	0.826893	0.727625	0.939705
ethnicity_3	0	0.784029	0.765289	0.803229
ethnicity_4	0.235217	0.988981	0.971051	1.007242

ethnicity_5	0	0.734739	0.706643	0.763951
ethnicity_6	0	0.586629	0.546854	0.629297
ethnicity_7	2.81E-07	0.952425	0.934871	0.970309
ethnicity_8	0	0.687685	0.674432	0.701198
ethnicity_9	0.616538	1.077627	0.804239	1.443949
imd_quint	0.319017	0.997217	0.991765	1.002699
imd_quint	6.96E-05	0.988708	0.983191	0.994256
imd_quint	7.33E-06	0.986998	0.981368	0.992661
imd_quint	0	0.968471	0.962502	0.974476
religion_1	0.441105	0.929164	0.770738	1.120154
religion_2	0	0.883352	0.875835	0.890934
religion_3	0	0.797662	0.772755	0.823373
religion_4	0	0.947075	0.942963	0.951206
religion_5	2.32E-07	0.870327	0.825702	0.917364
religion_6	0.211605	1.017841	0.989988	1.046478
religion_7	0.513422	0.941599	0.786116	1.127835
religion_8	1.71E-13	0.830404	0.79036	0.872476
education_1	0	1.063067	1.051603	1.074655
education_2	6.60E-10	1.067518	1.045609	1.089887
education_3	0	1.163839	1.155994	1.171737
education_4	0	1.156164	1.147524	1.16487
education_5	0	1.121812	1.113861	1.129819
education_6	0	1.098605	1.090629	1.10664
education_7	0	1.191724	1.17726	1.206365
tenure_1	0	0.92606	0.920919	0.931231
tenure_2	0	0.914186	0.909461	0.918936
tenure_3	0	0.9252	0.91215	0.938437
tenure_4	0	0.768347	0.753419	0.78357
care_home	0	1.32406	1.277118	1.372726
english_lar	2.98E-08	0.865362	0.822224	0.910763
english_lar	1.20E-07	0.749105	0.673121	0.833667
ethnicity_r	0.469634	0.856115	0.56189	1.304407
ethnicity_r	0.227611	0.978495	0.944541	1.013669
ethnicity_r	0.164071	1.088653	0.965893	1.227016
ethnicity_r	2.55E-08	0.939793	0.91948	0.960555
ethnicity_r	0.009405	0.91664	0.85836	0.978877
ethnicity_r	0.233392	0.956488	0.889	1.029099
ethnicity_r	0.38978	0.876105	0.648097	1.184329
ethnicity_r	0.862937	1.012931	0.875451	1.172
ethnicity_r	0.04706	1.41744	1.004535	2.000065
ethnicity_r	0.681939	0.970594	0.84148	1.119519
ethnicity_r	0.459414	0.752775	0.354742	1.597417
ethnicity_r	0.731275	0.96751	0.801289	1.168212
ethnicity_r	0.781903	0.98063	0.853811	1.126285
ethnicity_r	0.363158	1.309166	0.732537	2.339699
ethnicity_r	0.566633	1.118745	0.762161	1.64216
ethnicity_r	0.617943	1.185141	0.607963	2.310271
ethnicity_r	0.011782	1.281056	1.056471	1.553384
ethnicity_r	6.25E-05	1.11933	1.059226	1.182845
ethnicity_r	0.001984	1.279224	1.094376	1.495293

ethnicity_r	0.728091	0.991483	0.944805	1.040466
ethnicity_r	6.43E-06	1.151215	1.082903	1.223837
ethnicity_r	0.760327	0.977658	0.845545	1.130413
ethnicity_r	0.509761	1.064241	0.884389	1.280667
ethnicity_r	0.09635	1.064582	0.988877	1.146082
ethnicity_r	0.645881	0.930836	0.685645	1.26371
ethnicity_r	0.935265	1.002104	0.952545	1.054242
ethnicity_r	0.478775	0.93955	0.790644	1.1165
ethnicity_r	0.080833	1.025568	0.996908	1.055051
ethnicity_r	0.241824	0.955083	0.884339	1.031487
ethnicity_r	0.653239	1.048582	0.852552	1.289686
ethnicity_r	0.748137	0.959811	0.747217	1.232892
ethnicity_r	0.901381	1.010679	0.854374	1.195579
ethnicity_r	0.015987	1.266263	1.045001	1.534375
ethnicity_r	4.05E-07	1.195404	1.115651	1.280859
ethnicity_r	5.41E-07	1.239978	1.139924	1.348813
ethnicity_r	0.001855	1.122822	1.043828	1.207793
ethnicity_r	3.81E-05	1.163159	1.08244	1.249898
ethnicity_r	0.903399	1.034366	0.599375	1.785046
ethnicity_r	0.017994	1.250307	1.039057	1.504507
ethnicity_r	0.000575	1.469751	1.180442	1.829965
ethnicity_r	0.725087	1.175027	0.478235	2.88705
ethnicity_r	0.520784	1.045779	0.912227	1.198884
ethnicity_r	0.963166	1.013538	0.57277	1.793495
ethnicity_r	0.058026	0.924832	0.853043	1.002663
ethnicity_r	0.000104	1.662164	1.285924	2.148484
ethnicity_r	0.999714	3.34E-11	0	Inf
ethnicity_r	0.467309	1.259354	0.676236	2.345292
ethnicity_r	0.004081	1.19469	1.058107	1.348904
ethnicity_r	0.552021	1.353734	0.498946	3.672935
ethnicity_r	0.045029	1.061786	1.001328	1.125895
ethnicity_r	0.005725	1.314274	1.082674	1.595417
ethnicity_r	0.027233	0.946011	0.900537	0.993782
ethnicity_r	0.599848	0.948486	0.778427	1.155697
ethnicity_r	0.180732	0.549347	0.228506	1.32067
ethnicity_r	0.713929	1.084139	0.70388	1.669825
ethnicity_r	0.764755	0.937716	0.61538	1.428892
ethnicity_r	0.968012	1.029029	0.254112	4.167059
ethnicity_r	0.007862	1.112568	1.028406	1.203617
ethnicity_r	0.50785	1.15224	0.7575	1.752683
ethnicity_r	0.557652	1.031191	0.930569	1.142695
ethnicity_r	7.70E-08	1.199473	1.122488	1.281738
ethnicity_r	0.897136	0.948548	0.425854	2.112797
ethnicity_r	0.755846	1.095171	0.61746	1.942474
ethnicity_r	0.996203	0.99841	0.518391	1.922914
ethnicity_r	0.091018	0.443587	0.172811	1.138643
ethnicity_r	0.028888	0.708114	0.519569	0.965081
ethnicity_r	0.999758	1.76E-11	0	Inf
ethnicity_r	0.059937	0.708713	0.495088	1.014516
ethnicity_r	0.252955	0.840624	0.624213	1.132064

ethnicity_r	0.686112	0.80982	0.29113	2.252628
ethnicity_r	0.919643	1.020156	0.692294	1.503289
ethnicity_r	0.193435	0.541208	0.21454	1.365272
ethnicity_€	0.001349	1.091908	1.034752	1.152221
ethnicity_€	0.045385	1.121209	1.002351	1.254162
ethnicity_€	0.004123	1.090323	1.027769	1.156685
ethnicity_€	0.000122	1.255242	1.117827	1.409548
ethnicity_€	0.070516	1.054081	0.9956	1.115996
ethnicity_€	0.010359	1.165156	1.036645	1.309599
ethnicity_€	0.063351	0.931192	0.863688	1.003973
ethnicity_€	0.924274	1.007995	0.855355	1.187873
ethnicity_€	7.14E-07	1.154058	1.0905	1.221321
ethnicity_€	9.58E-07	1.350667	1.197647	1.523238
ethnicity_€	0.017043	0.897026	0.820413	0.980793
ethnicity_€	0.092257	0.875381	0.749731	1.02209
ethnicity_€	0.258067	0.886249	0.7189	1.092554
ethnicity_€	0.625226	0.875174	0.512555	1.494336
ethnicity_€	0.857761	1.005744	0.944683	1.070751
ethnicity_€	0.35788	1.067558	0.928681	1.227202
ethnicity_€	0.015508	1.085435	1.015713	1.159943
ethnicity_€	0.008229	1.177455	1.043094	1.329123

term	level	estimate	std.error	statistic
(Intercept)		-12.31616	0.399649	-30.81745
age_1_1		0.565978	0.080096	7.066219
age_1_2		0.516851	0.049188	10.50758
age_1_3		0.312907	0.035278	8.869803
age_1_4		0.244443	0.02834	8.625275
age_1_5		0.129831	0.02471	5.25422
age_1_6		0.188637	0.026301	7.172341
age_1_7		0.507724	0.033251	15.26935
age_1_8		-0.056029	0.039964	-1.402006
age_1_9		-0.338157	0.059095	-5.722279
age_2_1		-0.038775	0.005248	-7.388445
age_2_2		-0.022791	0.002012	-11.32605
age_2_3		-0.009121	0.001077	-8.466126
age_2_4		-0.005625	0.000727	-7.735279
age_2_5		-0.000974	0.000578	-1.685432
age_2_6		-0.002615	0.000644	-4.059738
age_2_7		-0.012384	0.000807	-15.34635
age_2_8		0.001765	0.000896	1.970882
age_2_9		0.007955	0.001227	6.483868
age_3_1		0.001021	0.000113	9.047022
age_3_2		0.000317	2.74E-05	11.58251
age_3_3		8.72E-05	1.12E-05	7.779684
age_3_4		4.24E-05	6.39E-06	6.639105
age_3_5		-4.89E-06	4.51E-06	-1.084977
age_3_6		6.15E-06	4.69E-06	1.311341
age_3_7		8.07E-05	5.28E-06	15.30282
age_3_8		-8.23E-06	5.22E-06	-1.578602
age_3_9		-4.22E-05	6.45E-06	-6.538634
sex_1	Male	-0.121921	0.001317	-92.58007
region_1	Yorkshire and The Humber	0.108939	0.002796	38.96568
region_2	West Midlands	0.069149	0.002683	25.77518
region_3	South West	-0.348635	0.003164	-110.1754
region_4	North West	0.186206	0.002526	73.72417
region_5	North East	0.13736	0.00337	40.76037
region_6	London	0.064694	0.002865	22.58089
region_7	East of England	0.069779	0.002678	26.05687
region_8	East Midlands	0.130761	0.002813	46.48772
ruralurban_detailed_1	Town and Fringe	0.140309	0.003613	38.83062
ruralurban_detailed_2	Major or minor conurbation	0.378994	0.0031	122.2543
ruralurban_detailed_3	City and Town	0.257137	0.002887	89.07959
bmi_category_Missing		0.15173	0.006664	22.76731
bmi_category_OVERWEIGHT		0.249216	0.006772	36.79966
bmi_category_IDEAL		0.11213	0.006764	16.57655
bmi_category_OBESE		0.357351	0.006776	52.74134
health_condition		0.073489	0.000845	86.99446
learning_condition_No		0.125686	0.006155	20.42178

ethnicity_1	White other	-0.04973	0.005069	-9.811092
ethnicity_2	Pakistani	0.473209	0.035432	13.35531
ethnicity_3	Other	0.120225	0.007267	16.54332
ethnicity_4	Mixed	0.017615	0.006284	2.803318
ethnicity_5	Indian	0.359178	0.010888	32.98968
ethnicity_6	Chinese	-0.49423	0.027306	-18.09964
ethnicity_7	Black Caribbean	-0.0338	0.006928	-4.878378
ethnicity_8	Black African	-0.002219	0.006115	-0.362949
ethnicity_9	Bangladeshi	0.328227	0.098136	3.344615
imd_quintile_1	4	0.06695	0.002168	30.87867
imd_quintile_2	3	0.094138	0.002169	43.40493
imd_quintile_3	2	0.129681	0.002178	59.54505
imd_quintile_4	1	0.154544	0.00229	67.48769
religion_1	Sikh	0.15521	0.06353	2.443118
religion_2	Religion Not Stated	-0.142564	0.003226	-44.18875
religion_3	Other Religion	-0.351516	0.014365	-24.47062
religion_4	No religion	-0.115506	0.00172	-67.13892
religion_5	Muslim	0.253054	0.014862	17.027
religion_6	Jewish	0.05058	0.010408	4.859861
religion_7	Hindu	-0.156713	0.071449	-2.193342
religion_8	Buddhist	-0.342736	0.022921	-14.95306
education_1	Other	0.002911	0.003642	0.799113
education_2	Not classified	-0.00704	0.006415	-1.097539
education_3	Level 4	-0.179316	0.002507	-71.52863
education_4	Level 3	0.000263	0.002804	0.093924
education_5	Level 2	0.010307	0.002584	3.989523
education_6	Level 1	-0.000706	0.002638	-0.267802
education_7	Apprenticeship	0.053508	0.004542	11.77943
tenure_1	Social rented	-0.061785	0.00192	-32.18265
tenure_2	Private rented	-0.101899	0.001963	-51.90289
tenure_3	Other tenure	-0.072641	0.005175	-14.03648
tenure_4	Not classified	-0.184517	0.006994	-26.38351
care_home_1	Yes	1.458451	0.005841	249.7124
english_language_1	Well or Very well	0.059444	0.016864	3.524979
english_language_2	Not well or Not at all	-0.074098	0.02926	-2.532413
ethnicity_religion_1	White other:Sikh	0.308509	0.110966	2.780223
ethnicity_religion_2	White other:Religion Not Stated	-0.057819	0.013289	-4.350893
ethnicity_religion_3	White other:Other Religion	-0.027189	0.054969	-0.494626
ethnicity_religion_4	White other:No religion	-0.178372	0.009219	-19.34843
ethnicity_religion_5	White other:Muslim	0.042463	0.018435	2.303371
ethnicity_religion_6	White other:Jewish	-0.076846	0.027982	-2.746298
ethnicity_religion_7	White other:Hindu	0.294935	0.104074	2.833891
ethnicity_religion_8	White other:Buddhist	-0.049531	0.066326	-0.74678
ethnicity_religion_9	Pakistani:Sikh	-0.037447	0.100002	-0.374461
ethnicity_religion_10	Pakistani:Religion Not Stated	0.062365	0.038433	1.622685
ethnicity_religion_11	Pakistani:Other Religion	-0.101502	0.207661	-0.488788
ethnicity_religion_12	Pakistani:No religion	-0.307642	0.059262	-5.191202
ethnicity_religion_13	Pakistani:Muslim	-0.25008	0.038454	-6.503302
ethnicity_religion_14	Pakistani:Jewish	-0.347948	0.195943	-1.775759

ethnicity_religion_15	Pakistani:Hindu	0.064457	0.120901	0.533142
ethnicity_religion_16	Pakistani:Buddhist	-0.351434	0.246167	-1.427623
ethnicity_religion_17	Other:Sikh	0.26012	0.064749	4.01737
ethnicity_religion_18	Other:Religion Not Stated	0.005647	0.016924	0.333697
ethnicity_religion_19	Other:Other Religion	0.10738	0.056641	1.895791
ethnicity_religion_20	Other:No religion	-0.246669	0.017235	-14.31208
ethnicity_religion_21	Other:Muslim	-0.211884	0.017263	-12.27413
ethnicity_religion_22	Other:Jewish	-0.048242	0.044926	-1.073816
ethnicity_religion_23	Other:Hindu	0.209993	0.072449	2.898476
ethnicity_religion_24	Other:Buddhist	0.177107	0.028397	6.236856
ethnicity_religion_25	Mixed:Sikh	0.215302	0.083599	2.57541
ethnicity_religion_26	Mixed:Religion Not Stated	0.020966	0.016626	1.261046
ethnicity_religion_27	Mixed:Other Religion	0.044908	0.067068	0.669587
ethnicity_religion_28	Mixed:No religion	0.006317	0.01	0.631706
ethnicity_religion_29	Mixed:Muslim	-0.087426	0.020985	-4.166027
ethnicity_religion_30	Mixed:Jewish	0.012592	0.076755	0.16406
ethnicity_religion_31	Mixed:Hindu	0.219704	0.086616	2.536513
ethnicity_religion_32	Mixed:Buddhist	0.147187	0.059434	2.476474
ethnicity_religion_33	Indian:Sikh	-0.073756	0.064688	-1.140194
ethnicity_religion_34	Indian:Religion Not Stated	-0.04508	0.020421	-2.207526
ethnicity_religion_35	Indian:Other Religion	0.213003	0.027582	7.722609
ethnicity_religion_36	Indian:No religion	-0.377478	0.027086	-13.93611
ethnicity_religion_37	Indian:Muslim	-0.072978	0.019554	-3.732099
ethnicity_religion_38	Indian:Jewish	-0.447381	0.189565	-2.360037
ethnicity_religion_39	Indian:Hindu	-0.043772	0.07241	-0.604506
ethnicity_religion_40	Indian:Buddhist	0.063467	0.08053	0.788115
ethnicity_religion_41	Chinese:Sikh	1.138807	0.187223	6.082633
ethnicity_religion_42	Chinese:Religion Not Stated	0.065515	0.051228	1.278885
ethnicity_religion_43	Chinese:Other Religion	0.338276	0.194763	1.736855
ethnicity_religion_44	Chinese:No religion	-0.022485	0.03122	-0.720189
ethnicity_religion_45	Chinese:Muslim	0.473587	0.081609	5.803131
ethnicity_religion_46	Chinese:Jewish	0.635673	0.379018	1.677155
ethnicity_religion_47	Chinese:Hindu	0.670459	0.210432	3.186114
ethnicity_religion_48	Chinese:Buddhist	0.349102	0.047454	7.356663
ethnicity_religion_49	Black Caribbean:Sikh	0.674126	0.285104	2.364494
ethnicity_religion_50	Black Caribbean:Religion Not Stated	-0.037867	0.022643	-1.672345
ethnicity_religion_51	Black Caribbean:Other Religion	-0.04897	0.092285	-0.530633
ethnicity_religion_52	Black Caribbean:No religion	-0.072305	0.019359	-3.735004
ethnicity_religion_53	Black Caribbean:Muslim	-0.25392	0.063494	-3.999107
ethnicity_religion_54	Black Caribbean:Jewish	-0.843187	0.378172	-2.229636
ethnicity_religion_55	Black Caribbean:Hindu	0.474025	0.150648	3.146573
ethnicity_religion_56	Black Caribbean:Buddhist	0.041951	0.170724	0.245722
ethnicity_religion_57	Black African:Sikh	0.081192	0.322603	0.251679
ethnicity_religion_58	Black African:Religion Not Stated	-0.001279	0.023737	-0.053875
ethnicity_religion_59	Black African:Other Religion	-0.015306	0.151535	-0.101004
ethnicity_religion_60	Black African:No religion	-0.054877	0.036228	-1.514775
ethnicity_religion_61	Black African:Muslim	-0.330072	0.018843	-17.5173
ethnicity_religion_62	Black African:Jewish	0.04197	0.223914	0.187439
ethnicity_religion_63	Black African:Hindu	0.349612	0.175432	1.992859

ethnicity_religion_64	Black African:Buddhist	0.183019	0.224843	0.813986
ethnicity_religion_65	Bangladeshi:Sikh	0.263222	0.179369	1.467487
ethnicity_religion_66	Bangladeshi:Religion Not St	0.20453	0.101051	2.024022
ethnicity_religion_67	Bangladeshi:Other Religion	-0.960636	0.714019	-1.345393
ethnicity_religion_68	Bangladeshi:No religion	-0.210599	0.123082	-1.711053
ethnicity_religion_69	Bangladeshi:Muslim	-0.087278	0.099316	-0.878785
ethnicity_religion_70	Bangladeshi:Jewish	0.205392	0.268747	0.764255
ethnicity_religion_71	Bangladeshi:Hindu	0.202493	0.135703	1.49218
ethnicity_religion_72	Bangladeshi:Buddhist	-0.348157	0.295076	-1.179887
ethnicity_english_1	White other:Well or Very we	0.018612	0.018001	1.033947
ethnicity_english_2	White other:Not well or Not	0.171795	0.030933	5.553804
ethnicity_english_3	Pakistani:Well or Very well	-0.012357	0.018248	-0.677164
ethnicity_english_4	Pakistani:Not well or Not at	0.107679	0.031009	3.472517
ethnicity_english_5	Other:Well or Very well	0.124462	0.018356	6.780535
ethnicity_english_6	Other:Not well or Not at all	0.192631	0.031767	6.063791
ethnicity_english_7	Mixed:Well or Very well	-0.00235	0.02424	-0.096929
ethnicity_english_8	Mixed:Not well or Not at all	0.137359	0.044878	3.060736
ethnicity_english_9	Indian:Well or Very well	0.080342	0.018263	4.399305
ethnicity_english_10	Indian:Not well or Not at all	0.190014	0.032044	5.929738
ethnicity_english_11	Chinese:Well or Very well	-0.281015	0.033017	-8.511317
ethnicity_english_12	Chinese:Not well or Not at a	-0.03968	0.046209	-0.858714
ethnicity_english_13	Black Caribbean:Well or Ve	-0.071763	0.074533	-0.962828
ethnicity_english_14	Black Caribbean:Not well or	0.145778	0.140596	1.036856
ethnicity_english_15	Black African:Well or Very w	0.058566	0.01997	2.932643
ethnicity_english_16	Black African:Not well or No	-0.026838	0.039514	-0.679192
ethnicity_english_17	Bangladeshi:Well or Very w	-0.005305	0.019892	-0.266674
ethnicity_english_18	Bangladeshi:Not well or Not	0.139027	0.032481	4.280264

					Rate ratio,	Rate ratio,
p.value	Lower CI	Upper CI	Rate ratio		lower CI	upper CI
	0	-13.09947	-11.53285	4.48E-06	2.05E-06	9.80E-06
1.59E-12	0.408989	0.722966	1.761169	1.505295	2.060536	
	0	0.420442	0.61326	1.676739	1.522634	1.846441
	0	0.243763	0.382051	1.367394	1.276041	1.465287
	0	0.188896	0.29999	1.27691	1.207915	1.349845
1.49E-07	0.0814	0.178263	1.138636	1.084805	1.195139	
7.37E-13	0.137088	0.240187	1.207603	1.146929	1.271487	
	0	0.442552	0.572896	1.661505	1.556674	1.773396
0.160914	-0.134358	0.0223	0.945511	0.874277	1.02255	
1.05E-08	-0.453983	-0.222331	0.713083	0.635094	0.80065	
1.49E-13	-0.049062	-0.028489	0.961967	0.952122	0.971913	
	0	-0.026735	-0.018847	0.977467	0.973619	0.98133
	0	-0.011232	-0.007009	0.990921	0.988831	0.993015
1.02E-14	-0.00705	-0.0042	0.994391	0.992974	0.995809	
0.091905	-0.002107	0.000159	0.999026	0.997895	1.000159	
4.91E-05	-0.003877	-0.001352	0.997388	0.99613	0.998648	
	0	-0.013966	-0.010802	0.987692	0.986131	0.989256
0.048737	9.75E-06	0.003521	1.001767	1.00001	1.003527	
8.94E-11	0.00555	0.01036	1.007987	1.005566	1.010414	
	0	0.0008	0.001242	1.001021	1.0008	1.001243
	0	0.000263	0.000371	1.000317	1.000263	1.000371
7.11E-15	6.52E-05	0.000109	1.000087	1.000065	1.000109	
3.16E-11	2.99E-05	5.49E-05	1.000042	1.00003	1.000055	
0.277932	-1.37E-05	3.94E-06	0.999995	0.999986	1.000004	
0.189743	-3.04E-06	1.53E-05	1.000006	0.999997	1.000015	
	0	7.04E-05	9.11E-05	1.000081	1.00007	1.000091
0.114427	-1.85E-05	1.99E-06	0.999992	0.999982	1.000002	
6.21E-11	-5.49E-05	-2.96E-05	0.999958	0.999945	0.99997	
	0	-0.124503	-0.11934	0.885218	0.882936	0.887506
	0	0.10346	0.114419	1.115095	1.109001	1.121222
	0	0.063891	0.074407	1.071596	1.065976	1.077245
	0	-0.354837	-0.342433	0.705651	0.701288	0.710041
	0	0.181256	0.191157	1.204671	1.198722	1.210649
	0	0.130755	0.143965	1.147241	1.139688	1.154844
	0	0.059079	0.070309	1.066833	1.060859	1.07284
	0	0.064531	0.075028	1.072272	1.066658	1.077915
	0	0.125248	0.136274	1.139696	1.13343	1.145996
	0	0.133227	0.147391	1.150629	1.142509	1.158807
	0	0.372918	0.38507	1.460814	1.451965	1.469717
	0	0.25148	0.262795	1.293223	1.285927	1.30056
	0	0.138668	0.164793	1.163846	1.148743	1.179149
	0	0.235943	0.26249	1.283019	1.266102	1.300163
	0	0.098872	0.125389	1.118659	1.103925	1.133589
	0	0.344071	0.370631	1.429537	1.410678	1.448648
	0	0.071834	0.075145	1.076257	1.074477	1.078041
	0	0.113623	0.137749	1.133926	1.12033	1.147687

	0	-0.059665	-0.039796	0.951486	0.94208	0.960986
	0	0.403762	0.542656	1.605137	1.497447	1.720571
	0	0.105981	0.134469	1.12775	1.111801	1.143929
0.005058	0.005299	0.029932	1.017771	1.005313	1.030384	
	0	0.337838	0.380518	1.432152	1.401914	1.463042
	0	-0.547749	-0.44071	0.610041	0.57825	0.643579
1.07E-06	-0.04738	-0.02022	0.966765	0.953725	0.979983	
0.716643	-0.014204	0.009766	0.997783	0.985896	1.009814	
0.000824	0.13588	0.520573	1.388504	1.145545	1.682992	
	0	0.0627	0.071199	1.069242	1.064708	1.073795
	0	0.089887	0.098389	1.098711	1.094051	1.103392
	0	0.125412	0.13395	1.138465	1.133616	1.143335
	0	0.150056	0.159032	1.167125	1.161899	1.172376
0.014561	0.030692	0.279728	1.167903	1.031168	1.32277	
	0	-0.148887	-0.136241	0.867132	0.861666	0.872633
	0	-0.379671	-0.323361	0.703621	0.684086	0.723713
	0	-0.118878	-0.112134	0.890915	0.887916	0.893925
	0	0.223925	0.282183	1.287953	1.250977	1.326022
1.17E-06	0.030181	0.070979	1.051881	1.030641	1.073559	
0.028283	-0.296753	-0.016672	0.85495	0.743227	0.983466	
	0	-0.38766	-0.297811	0.709826	0.678643	0.742442
0.424225	-0.004228	0.010049	1.002915	0.995781	1.0101	
0.272406	-0.019613	0.005532	0.992985	0.980578	1.005548	
	0	-0.184229	-0.174402	0.835842	0.831745	0.839959
0.925169	-0.005232	0.005759	1.000263	0.994781	1.005776	
6.62E-05	0.005243	0.015371	1.010361	1.005257	1.01549	
0.788852	-0.005876	0.004463	0.999294	0.994141	1.004473	
	0	0.044605	0.062411	1.054965	1.045614	1.0644
	0	-0.065548	-0.058023	0.940085	0.936554	0.943629
	0	-0.105747	-0.098051	0.903121	0.899652	0.906603
	0	-0.082784	-0.062498	0.929935	0.92055	0.939415
	0	-0.198225	-0.17081	0.831506	0.820185	0.842982
	0	1.447003	1.469898	4.299293	4.250358	4.348792
0.000424	0.026391	0.092496	1.061246	1.026742	1.096909	
0.011328	-0.131447	-0.016749	0.928581	0.876826	0.983391	
0.005432	0.091017	0.526002	1.361394	1.095287	1.692153	
1.36E-05	-0.083866	-0.031773	0.943821	0.919555	0.968727	
0.620864	-0.134929	0.08055	0.973177	0.873778	1.083883	
	0	-0.196441	-0.160303	0.836631	0.82165	0.851886
0.021258	0.00633	0.078595	1.043377	1.00635	1.081766	
0.006027	-0.131689	-0.022002	0.926033	0.876613	0.978238	
0.004598	0.090949	0.49892	1.343039	1.095214	1.646942	
0.455196	-0.179529	0.080467	0.951676	0.835664	1.083794	
0.708062	-0.233452	0.158558	0.963246	0.791796	1.171819	
0.104657	-0.012964	0.137694	1.064351	0.98712	1.147624	
0.624992	-0.508517	0.305513	0.903479	0.601387	1.357321	
2.09E-07	-0.423795	-0.191488	0.735179	0.654558	0.82573	
7.86E-11	-0.325451	-0.17471	0.778738	0.722202	0.839701	
0.075773	-0.731997	0.036101	0.706136	0.480948	1.03676	

0.593935	-0.172508	0.301423	1.06658	0.841551	1.351781
0.1534	-0.833922	0.131054	0.703678	0.434342	1.140029
5.89E-05	0.133212	0.387028	1.297086	1.142492	1.472597
0.738608	-0.027523	0.038818	1.005663	0.972852	1.039581
0.057988	-0.003637	0.218398	1.113358	0.99637	1.244082
0	-0.28045	-0.212888	0.781399	0.755444	0.808246
0	-0.245718	-0.178049	0.809059	0.782142	0.836901
0.282905	-0.136297	0.039813	0.952903	0.872583	1.040616
0.00375	0.067992	0.351994	1.233669	1.070357	1.4219
4.46E-10	0.121449	0.232765	1.193759	1.129132	1.262085
0.010012	0.051448	0.379155	1.240236	1.052794	1.46105
0.207292	-0.011621	0.053553	1.021187	0.988447	1.055012
0.503121	-0.086545	0.17636	1.045931	0.917094	1.192868
0.527579	-0.013283	0.025917	1.006337	0.986805	1.026255
3.10E-05	-0.128558	-0.046295	0.916287	0.879363	0.954761
0.869684	-0.137847	0.163032	1.012672	0.871232	1.177075
0.011196	0.049936	0.389472	1.245708	1.051203	1.476201
0.013269	0.030696	0.263678	1.158571	1.031172	1.30171
0.254205	-0.200544	0.053031	0.928898	0.818285	1.054463
0.027277	-0.085105	-0.005055	0.955921	0.918416	0.994958
1.15E-14	0.158943	0.267063	1.237388	1.172271	1.306123
0	-0.430568	-0.324389	0.685588	0.65014	0.722969
0.00019	-0.111304	-0.034652	0.929621	0.894667	0.965942
0.018273	-0.818929	-0.075833	0.6393	0.440904	0.926971
0.545507	-0.185695	0.098151	0.957172	0.830527	1.103129
0.43063	-0.094372	0.221306	1.065524	0.909944	1.247705
1.18E-09	0.77185	1.505763	3.123039	2.163766	4.507591
0.200938	-0.034892	0.165923	1.067709	0.965709	1.180482
0.082413	-0.043461	0.720012	1.402527	0.95747	2.054458
0.471409	-0.083677	0.038707	0.977766	0.919729	1.039466
6.51E-09	0.313633	0.63354	1.605743	1.368388	1.884269
0.093512	-0.107203	1.378549	1.888292	0.898343	3.969138
0.001442	0.258013	1.082905	1.955135	1.294356	2.953246
1.89E-13	0.256093	0.442112	1.417794	1.291872	1.555989
0.018055	0.115323	1.232929	1.962317	1.122235	3.431265
0.094456	-0.082246	0.006513	0.962841	0.921045	1.006535
0.595673	-0.229849	0.131909	0.95221	0.794654	1.141005
0.000188	-0.110248	-0.034362	0.930247	0.895612	0.966222
6.36E-05	-0.378368	-0.129471	0.775754	0.684978	0.87856
0.025772	-1.584405	-0.101969	0.430337	0.20507	0.903058
0.001652	0.178755	0.769296	1.606448	1.195728	2.158246
0.805897	-0.292669	0.37657	1.042843	0.746269	1.457278
0.801289	-0.551109	0.713494	1.08458	0.57631	2.04111
0.957035	-0.047803	0.045245	0.998722	0.953322	1.046284
0.919547	-0.312314	0.281703	0.984811	0.731752	1.325384
0.129829	-0.125883	0.016129	0.946602	0.881718	1.01626
0	-0.367003	-0.29314	0.718872	0.692808	0.745918
0.851317	-0.396901	0.480842	1.042863	0.6724	1.617435
0.046277	0.005765	0.69346	1.418517	1.005781	2.000625

0.415653	-0.257673	0.62371	1.200837	0.772848	1.865838
0.142244	-0.088342	0.614787	1.301116	0.915448	1.849262
0.042968	0.00647	0.402591	1.226948	1.00649	1.495695
0.178498	-2.360114	0.438841	0.382649	0.094409	1.550909
0.087071	-0.45184	0.030641	0.810099	0.636456	1.031115
0.379518	-0.281938	0.107382	0.916423	0.754321	1.11336
0.444715	-0.321353	0.732136	1.228006	0.725167	2.079519
0.135652	-0.063485	0.468472	1.224452	0.938489	1.597551
0.238045	-0.926506	0.230193	0.705988	0.395935	1.258843
0.301161	-0.01667	0.053894	1.018786	0.983468	1.055372
2.80E-08	0.111167	0.232423	1.187434	1.117581	1.261654
0.498302	-0.048124	0.02341	0.987719	0.953016	1.023686
0.000516	0.046902	0.168457	1.113691	1.048019	1.183477
1.20E-11	0.088485	0.160439	1.132539	1.092518	1.174027
1.33E-09	0.130367	0.254895	1.212435	1.139246	1.290326
0.922782	-0.04986	0.045161	0.997653	0.951362	1.046196
0.002208	0.049399	0.225319	1.14724	1.050639	1.252723
1.09E-05	0.044548	0.116137	1.083658	1.045555	1.12315
3.03E-09	0.127207	0.252821	1.209266	1.135652	1.287652
0	-0.345728	-0.216302	0.755017	0.707705	0.805492
0.390498	-0.13025	0.050889	0.961096	0.877876	1.052207
0.335634	-0.217848	0.074323	0.930752	0.804247	1.077154
0.299803	-0.12979	0.421346	1.156939	0.878279	1.524012
0.003361	0.019424	0.097708	1.060315	1.019614	1.10264
0.497016	-0.104286	0.05061	0.973519	0.900968	1.051913
0.78972	-0.044292	0.033683	0.994709	0.956674	1.034257
1.87E-05	0.075364	0.20269	1.149155	1.078277	1.224692

term	level	estimate	std.error	statistic	p.value	Lower CI
(Intercept)		-17.27719	0.317296	-54.45136		0 -17.89909
age_1_1		1.938695	0.06309	30.72914		0 1.815039
age_1_2		1.190198	0.038853	30.6331		0 1.114046
age_1_3		0.836834	0.028147	29.7308		0 0.781666
age_1_4		0.485842	0.022655	21.44508		0 0.441438
age_1_5		0.625906	0.020554	30.45235		0 0.585621
age_1_6		0.517778	0.023406	22.12139		0 0.471902
age_1_7		0.487616	0.033185	14.69399		0 0.422574
age_1_8		0.53903	0.059243	9.098621		0 0.422913
age_1_9		0.247599	0.107	2.314001	0.020668	0.037878
age_2_1		-0.120091	0.00412	-29.15101		0 -0.128166
age_2_2		-0.049387	0.00159	-31.05886		0 -0.052504
age_2_3		-0.025916	0.000871	-29.76313		0 -0.027623
age_2_4		-0.007418	0.000589	-12.59559		0 -0.008573
age_2_5		-0.013269	0.00051	-25.99347		0 -0.01427
age_2_6		-0.009379	0.000607	-15.46068		0 -0.010568
age_2_7		-0.008343	0.000838	-9.957565		0 -0.009985
age_2_8		-0.009678	0.00138	-7.0151	2.30E-12	-0.012382
age_2_9		-0.00311	0.002251	-1.381712	0.16706	-0.007521
age_3_1		0.002311	8.85E-05	26.10778		0 0.002138
age_3_2		0.000658	2.18E-05	30.19865		0 0.000615
age_3_3		0.000267	9.20E-06	29.03021		0 0.000249
age_3_4		2.50E-05	5.23E-06	4.782926	1.73E-06	1.48E-05
age_3_5		8.61E-05	4.12E-06	20.90914		0 7.80E-05
age_3_6		5.12E-05	4.49E-06	11.40813		0 4.24E-05
age_3_7		4.26E-05	5.54E-06	7.684878	1.53E-14	3.17E-05
age_3_8		5.12E-05	8.11E-06	6.304387	2.89E-10	3.53E-05
age_3_9		1.41E-05	1.19E-05	1.189298	0.234322	-9.14E-06
sex_1	Male	-0.079654	0.001114	-71.51281		0 -0.081837
region_1	Yorkshire and T	0.195598	0.002281	85.76864		0 0.191128
region_2	West Midlands	0.080169	0.002262	35.4476		0 0.075736
region_3	South West	0.140485	0.00218	64.42914		0 0.136211
region_4	North West	0.132454	0.002137	61.96738		0 0.128264
region_5	North East	0.270278	0.002716	99.51271		0 0.264955
region_6	London	-0.130113	0.002597	-50.09148		0 -0.135204
region_7	East of England	-0.008564	0.002212	-3.870894	0.000108	-0.012901
region_8	East Midlands	0.149781	0.002297	65.21755		0 0.14528
ruralurban_ Town and Fring		0.076103	0.002665	28.55432		0 0.070879
ruralurban_ Major or minor c		0.102496	0.002383	43.00473		0 0.097825
ruralurban_ City and Town		0.114246	0.002132	53.57909		0 0.110067
bmi_category_Missing		0.144449	0.006619	21.82315		0 0.131476
bmi_category_OVERWEIG		0.227598	0.00674	33.77054		0 0.214388
bmi_category_IDEAL		0.158105	0.006711	23.55949		0 0.144952
bmi_category_OBESE		0.240234	0.00676	35.53506		0 0.226984
health_condition		0.015614	0.000901	17.32053		0 0.013847
learning_condition_No		0.388887	0.005853	66.44492		0 0.377415

ethnicity_1	White other	-0.122717	0.004561	-26.90724	0	-0.131656
ethnicity_2	Pakistani	-0.341839	0.045398	-7.52981	5.08E-14	-0.430819
ethnicity_3	Other	-0.304787	0.007665	-39.7634	0	-0.31981
ethnicity_4	Mixed	-0.063547	0.005076	-12.51937	0	-0.073496
ethnicity_5	Indian	-0.34792	0.012199	-28.52043	0	-0.37183
ethnicity_6	Chinese	-0.570873	0.023609	-24.18037	0	-0.617146
ethnicity_7	Black Caribbean	-0.099737	0.006828	-14.60719	0	-0.113119
ethnicity_8	Black African	-0.437605	0.00627	-69.79885	0	-0.449894
ethnicity_9	Bangladeshi	-0.104	0.106101	-0.980199	0.326988	-0.311958
imd Quintile	4	-0.011613	0.001705	-6.810477	9.73E-12	-0.014955
imd Quintile	3	-0.022381	0.00174	-12.8639	0	-0.025792
imd Quintile	2	-0.031468	0.001793	-17.54762	0	-0.034983
imd Quintile	1	-0.066194	0.001931	-34.27328	0	-0.06998
religion_1	Sikh	-0.13295	0.059674	-2.227923	0.025886	-0.249912
religion_2	Religion Not Stated	-0.103074	0.00256	-40.26917	0	-0.108091
religion_3	Other Religion	-0.237833	0.011588	-20.52374	0	-0.260545
religion_4	No religion	-0.045231	0.001331	-33.97574	0	-0.047841
religion_5	Muslim	-0.251791	0.015463	-16.28383	0	-0.282097
religion_6	Jewish	-0.066793	0.009642	-6.927182	4.29E-12	-0.085692
religion_7	Hindu	-0.100204	0.055919	-1.791944	0.073142	-0.209806
religion_8	Buddhist	-0.203831	0.018085	-11.27093	0	-0.239277
education_	Other	0.063637	0.004121	15.44286	0	0.055561
education_	Not classified	0.061561	0.006043	10.18759	0	0.049717
education_	Level 4	0.129846	0.002514	51.65439	0	0.124919
education_	Level 3	0.123322	0.002781	44.34313	0	0.117871
education_	Level 2	0.099729	0.002634	37.86059	0	0.094566
education_	Level 1	0.085399	0.00271	31.51755	0	0.080089
education_	Apprenticeship	0.152258	0.004455	34.17774	0	0.143526
tenure_1	Social rented	-0.096497	0.001708	-56.48038	0	-0.099845
tenure_2	Private rented	-0.100696	0.001603	-62.82646	0	-0.103837
tenure_3	Other tenure	-0.076889	0.004495	-17.10369	0	-0.0857
tenure_4	Not classified	-0.284669	0.007196	-39.5592	0	-0.298774
care_home	Yes	0.27754	0.013721	20.22801	0	0.250648
english_lan	Well or Very well	-0.169181	0.016632	-10.17191	0	-0.20178
english_lan	Not well or Not at all	-0.391645	0.028273	-13.85214	0	-0.447061
ethnicity_re	White other:Sikh	-0.250638	0.143255	-1.749598	0.080188	-0.531417
ethnicity_re	White other:Religious	-0.039496	0.011487	-3.438338	0.000585	-0.06201
ethnicity_re	White other:Other	0.039176	0.045656	0.858065	0.390856	-0.05031
ethnicity_re	White other:No religion	-0.079403	0.007588	-10.46395	0	-0.094276
ethnicity_re	White other:Muslim	0.036605	0.020613	1.775811	0.075764	-0.003797
ethnicity_re	White other:Jewish	-0.035925	0.026481	-1.356649	0.174893	-0.087827
ethnicity_re	White other:Hindu	-0.155274	0.102956	-1.508161	0.131513	-0.357068
ethnicity_re	White other:Buddhist	0.041184	0.054558	0.754868	0.450328	-0.06575
ethnicity_re	Pakistani:Sikh	0.399728	0.111005	3.600991	0.000317	0.182158
ethnicity_re	Pakistani:Religious	-0.098911	0.048984	-2.019255	0.043461	-0.19492
ethnicity_re	Pakistani:Other	-0.150103	0.262402	-0.572033	0.5673	-0.664411
ethnicity_re	Pakistani:No religion	0.029036	0.066335	0.437709	0.661597	-0.100982
ethnicity_re	Pakistani:Muslim	0.086795	0.048032	1.807002	0.070762	-0.007349
ethnicity_re	Pakistani:Jewish	-0.106893	0.228351	-0.468111	0.639705	-0.554461

ethnicity_re Pakistani:Hindu	-0.104523	0.141007	-0.741261	0.458535	-0.380897
ethnicity_re Pakistani:Buddh	0.450729	0.209874	2.14762	0.031744	0.039377
ethnicity_re Other:Sikh	0.279661	0.061537	4.544601	5.50E-06	0.159048
ethnicity_re Other:Religion I	0.036557	0.017455	2.094325	0.036231	0.002345
ethnicity_re Other:Other Rel	0.378322	0.053473	7.075021	1.49E-12	0.273515
ethnicity_re Other:No religio	0.006743	0.016382	0.411647	0.680598	-0.025365
ethnicity_re Other:Muslim	0.18432	0.018353	10.04289	0	0.148347
ethnicity_re Other:Jewish	-0.017052	0.050952	-0.334665	0.737878	-0.116918
ethnicity_re Other:Hindu	0.098648	0.057584	1.713133	0.086688	-0.014216
ethnicity_re Other:Buddhist	0.086501	0.025996	3.32751	0.000876	0.035549
ethnicity_re Mixed:Sikh	0.015176	0.078503	0.193311	0.846715	-0.13869
ethnicity_re Mixed:Religion I	0.003173	0.012578	0.252258	0.800841	-0.021481
ethnicity_re Mixed:Other Re	0.005701	0.053626	0.106305	0.91534	-0.099406
ethnicity_re Mixed:No religic	0.034964	0.007641	4.575887	4.74E-06	0.019988
ethnicity_re Mixed:Muslim	0.059664	0.020644	2.890096	0.003851	0.019201
ethnicity_re Mixed:Jewish	0.03619	0.068738	0.526488	0.598549	-0.098536
ethnicity_re Mixed:Hindu	-0.021497	0.068878	-0.3121	0.754965	-0.156497
ethnicity_re Mixed:Buddhist	0.017037	0.045832	0.371717	0.710103	-0.072795
ethnicity_re Indian:Sikh	0.271964	0.061271	4.438678	9.05E-06	0.151872
ethnicity_re Indian:Religion	0.13379	0.021554	6.207101	5.40E-10	0.091543
ethnicity_re Indian:Other Re	0.317661	0.029331	10.83012	0	0.260172
ethnicity_re Indian:No religic	0.10124	0.025463	3.975943	7.01E-05	0.051332
ethnicity_re Indian:Muslim	0.153486	0.021818	7.034781	2.00E-12	0.110722
ethnicity_re Indian:Jewish	-0.148304	0.229928	-0.645002	0.518926	-0.598962
ethnicity_re Indian:Hindu	0.26343	0.057408	4.588704	4.46E-06	0.15091
ethnicity_re Indian:Buddhist	0.346425	0.07991	4.335189	1.46E-05	0.189802
ethnicity_re Chinese:Sikh	0.225255	0.308234	0.730793	0.464906	-0.378884
ethnicity_re Chinese:Religio	0.026058	0.044057	0.591465	0.554209	-0.060293
ethnicity_re Chinese:Other I	0.507236	0.158268	3.204924	0.001351	0.197031
ethnicity_re Chinese:No reli	-0.049386	0.026955	-1.83216	0.066928	-0.102217
ethnicity_re Chinese:Muslim	0.561463	0.089333	6.285021	3.28E-10	0.386369
ethnicity_re Chinese:Jewish	-24.0688	51867.12	-0.000464	0.99963	-101683.6
ethnicity_re Chinese:Hindu	0.328581	0.212938	1.543078	0.122812	-0.088779
ethnicity_re Chinese:Buddhi	0.200278	0.0417	4.802859	1.56E-06	0.118547
ethnicity_re Black Caribbea	0.162612	0.412845	0.393881	0.693669	-0.646565
ethnicity_re Black Caribbea	-0.019245	0.021382	-0.90007	0.368083	-0.061154
ethnicity_re Black Caribbea	0.187777	0.078304	2.398066	0.016482	0.034302
ethnicity_re Black Caribbea	-0.062543	0.01812	-3.45163	0.000557	-0.098057
ethnicity_re Black Caribbea	0.074215	0.063955	1.16042	0.245878	-0.051137
ethnicity_re Black Caribbea	-0.260117	0.316447	-0.821991	0.411082	-0.880352
ethnicity_re Black Caribbea	0.057597	0.167845	0.343157	0.731481	-0.271379
ethnicity_re Black Caribbea	0.035987	0.16338	0.220263	0.825667	-0.284239
ethnicity_re Black African:Si	0.205516	0.382701	0.537015	0.591257	-0.544578
ethnicity_re Black African:R	-0.013309	0.023588	-0.564243	0.572589	-0.059542
ethnicity_re Black African:O	-0.065355	0.167169	-0.390948	0.695835	-0.393007
ethnicity_re Black African:N	-0.021895	0.037655	-0.58147	0.560924	-0.0957
ethnicity_re Black African:M	0.181888	0.019848	9.164131	0	0.142986
ethnicity_re Black African:Je	-0.491482	0.353732	-1.38942	0.164705	-1.184795
ethnicity_re Black African:Hi	0.214691	0.200497	1.070793	0.284262	-0.178283

ethnicity_re Black African:Bl	0.254012	0.236465	1.074208	0.282729	-0.209458
ethnicity_re Bangladeshi:Sil	-0.375304	0.259677	-1.44527	0.148382	-0.884272
ethnicity_re Bangladeshi:Re	-0.238775	0.11029	-2.164972	0.03039	-0.454944
ethnicity_re Bangladeshi:Otl	-24.66163	57876.63	-0.000426	0.99966	-113462.9
ethnicity_re Bangladeshi:No	-0.110557	0.127466	-0.867339	0.385756	-0.360391
ethnicity_re Bangladeshi:Mu	-0.051668	0.107346	-0.481321	0.630288	-0.262067
ethnicity_re Bangladeshi:Jer	-0.521619	0.421899	-1.236361	0.216324	-1.348541
ethnicity_re Bangladeshi:Hir	-0.062006	0.140014	-0.442856	0.65787	-0.336433
ethnicity_re Bangladeshi:Bu	-0.434715	0.308069	-1.411095	0.158217	-1.038531
ethnicity_er White other:We	0.101328	0.017597	5.758244	8.50E-09	0.066838
ethnicity_er White other:Not	0.162234	0.029814	5.441595	5.28E-08	0.103799
ethnicity_er Pakistani:Well c	0.181734	0.019293	9.419728	0	0.14392
ethnicity_er Pakistani:Not w	0.336333	0.032327	10.40397	0	0.272971
ethnicity_er Other:Well or V	0.103133	0.018611	5.541411	3.00E-08	0.066655
ethnicity_er Other:Not well c	0.23011	0.032139	7.159948	8.07E-13	0.167119
ethnicity_er Mixed:Well or V	-0.065418	0.024676	-2.651042	0.008024	-0.113784
ethnicity_er Mixed:Not well c	0.025135	0.046598	0.539396	0.589613	-0.066197
ethnicity_er Indian:Well or V	0.144229	0.018646	7.735008	1.02E-14	0.107682
ethnicity_er Indian:Not well c	0.324111	0.033334	9.72303	0	0.258776
ethnicity_er Chinese:Well or	-0.153156	0.030279	-5.058153	4.23E-07	-0.212502
ethnicity_er Chinese:Not we	0.081837	0.045057	1.816292	0.069326	-0.006475
ethnicity_er Black Caribbean	-0.050796	0.077917	-0.65192	0.514453	-0.203514
ethnicity_er Black Caribbean	-0.077033	0.194629	-0.395792	0.692259	-0.458506
ethnicity_er Black African:W	0.14546	0.02079	6.996577	2.62E-12	0.104711
ethnicity_er Black African:N	0.147166	0.041989	3.504879	0.000457	0.064868
ethnicity_er Bangladeshi:W	0.153423	0.021963	6.985653	2.84E-12	0.110376
ethnicity_er Bangladeshi:No	0.299731	0.035391	8.469181	0	0.230365

Upper CI	Rate ratio	Rate ratio, lower CI	Rate ratio, upper CI
-16.65529	3.14E-08	1.68E-08	5.84E-08
2.062351	6.949674	6.141314	7.864435
1.266351	3.287733	3.04666	3.547882
0.892002	2.309045	2.185109	2.44001
0.530246	1.625544	1.554942	1.699351
0.666191	1.869939	1.796105	1.946807
0.563654	1.678295	1.60304	1.757082
0.552659	1.62843	1.525885	1.737867
0.655146	1.714343	1.526402	1.925424
0.457319	1.280946	1.038605	1.579833
-0.112017	0.88684	0.879708	0.894029
-0.04627	0.951813	0.948851	0.954784
-0.02421	0.974417	0.972755	0.976081
-0.006264	0.992609	0.991464	0.993756
-0.012269	0.986818	0.985832	0.987806
-0.00819	0.990665	0.989488	0.991844
-0.006701	0.991692	0.990064	0.993322
-0.006974	0.990368	0.987694	0.99305
0.001302	0.996895	0.992507	1.001302
0.002485	1.002314	1.00214	1.002488
0.000701	1.000658	1.000616	1.000701
0.000285	1.000267	1.000249	1.000285
3.53E-05	1.000025	1.000015	1.000035
9.42E-05	1.000086	1.000078	1.000094
6.00E-05	1.000051	1.000042	1.00006
5.34E-05	1.000043	1.000032	1.000053
6.71E-05	1.000051	1.000035	1.000067
3.73E-05	1.000014	0.999991	1.000037
-0.077471	0.923436	0.921422	0.925454
0.200068	1.216038	1.210615	1.221486
0.084602	1.08347	1.078678	1.088284
0.144759	1.150832	1.145924	1.15576
0.136643	1.141626	1.136853	1.146419
0.275602	1.310329	1.303372	1.317323
-0.125021	0.877997	0.873538	0.882478
-0.004228	0.991472	0.987182	0.995781
0.154283	1.16158	1.156363	1.166821
0.081327	1.079074	1.073451	1.084725
0.107168	1.107933	1.10277	1.113121
0.118426	1.121028	1.116353	1.125723
0.157422	1.155403	1.14051	1.17049
0.240807	1.25558	1.239104	1.272276
0.171259	1.17129	1.155984	1.186798
0.253485	1.271547	1.254809	1.288508
0.01738	1.015736	1.013943	1.017532
0.400358	1.475337	1.45851	1.492359

-0.113778	0.884514	0.876643	0.892456
-0.252859	0.710462	0.649976	0.776577
-0.289764	0.73728	0.726287	0.748441
-0.053598	0.93843	0.92914	0.947813
-0.32401	0.706155	0.689471	0.723243
-0.524599	0.565032	0.539482	0.591792
-0.086354	0.905076	0.893044	0.91727
-0.425317	0.645581	0.637696	0.653563
0.103958	0.901225	0.732013	1.109554
-0.008271	0.988454	0.985156	0.991763
-0.018971	0.977867	0.974538	0.981207
-0.027953	0.969022	0.965622	0.972434
-0.062409	0.935949	0.932413	0.939499
-0.015988	0.875509	0.778869	0.984139
-0.098057	0.902061	0.897546	0.906597
-0.21512	0.788335	0.770631	0.806445
-0.042622	0.955776	0.953286	0.958274
-0.221484	0.777407	0.7542	0.801329
-0.047895	0.935388	0.917877	0.953234
0.009398	0.904653	0.810741	1.009442
-0.168385	0.8156	0.787197	0.845028
0.071714	1.065706	1.057133	1.074348
0.073405	1.063495	1.050974	1.076166
0.134773	1.138653	1.133056	1.144276
0.128773	1.131248	1.125099	1.137431
0.104892	1.104872	1.099182	1.110591
0.09071	1.089152	1.083383	1.094952
0.16099	1.164461	1.154337	1.174673
-0.093148	0.908013	0.904977	0.911059
-0.097554	0.904208	0.901372	0.907053
-0.068078	0.925993	0.91787	0.934188
-0.270565	0.752263	0.741727	0.762948
0.304433	1.319879	1.284858	1.355856
-0.136582	0.844356	0.817275	0.872335
-0.336229	0.675944	0.639505	0.714459
0.030141	0.778304	0.587771	1.0306
-0.016982	0.961274	0.939873	0.983162
0.128662	1.039953	0.950935	1.137306
-0.06453	0.923668	0.910032	0.937508
0.077007	1.037283	0.99621	1.080049
0.015977	0.964713	0.91592	1.016105
0.04652	0.85618	0.699725	1.047619
0.148118	1.042044	0.936365	1.15965
0.617298	1.491419	1.199804	1.853912
-0.002903	0.905823	0.8229	0.997102
0.364206	0.860619	0.514576	1.43937
0.159053	1.029461	0.903949	1.1724
0.180938	1.090673	0.992678	1.198341
0.340674	0.898621	0.574382	1.405895

0.171851	0.900754	0.683248	1.187501
0.862081	1.569456	1.040162	2.368085
0.400273	1.322681	1.172395	1.492232
0.070769	1.037233	1.002347	1.073333
0.483128	1.459832	1.314577	1.621138
0.038852	1.006766	0.974954	1.039616
0.220292	1.2024	1.159916	1.24644
0.082815	0.983093	0.889658	1.08634
0.211512	1.103678	0.985885	1.235545
0.137452	1.090352	1.036189	1.147347
0.169041	1.015291	0.870498	1.184169
0.027827	1.003178	0.978749	1.028217
0.110807	1.005717	0.905375	1.11718
0.04994	1.035582	1.020189	1.051208
0.100126	1.06148	1.019387	1.105311
0.170915	1.036852	0.906163	1.18639
0.113504	0.978733	0.855134	1.120196
0.106868	1.017183	0.929791	1.112788
0.392056	1.31254	1.164011	1.48002
0.176036	1.143152	1.095864	1.192481
0.37515	1.37391	1.297153	1.45521
0.151147	1.106542	1.052672	1.163168
0.196249	1.165891	1.117084	1.21683
0.302354	0.862169	0.549382	1.35304
0.375951	1.301387	1.162892	1.456376
0.503049	1.414004	1.20901	1.653756
0.829394	1.252642	0.684625	2.29193
0.112409	1.0264	0.941489	1.11897
0.817441	1.660695	1.217782	2.264697
0.003446	0.951814	0.902834	1.003452
0.736556	1.753235	1.471628	2.08873
101635.5	3.52E-11	0	Inf
0.74594	1.388995	0.915048	2.108422
0.28201	1.221743	1.125859	1.325792
0.971789	1.17658	0.523842	2.642668
0.022663	0.980939	0.940679	1.022922
0.341252	1.206565	1.034897	1.406708
-0.027028	0.939373	0.906597	0.973334
0.199567	1.077038	0.950148	1.220874
0.360119	0.770962	0.414637	1.4335
0.386574	1.059288	0.762327	1.471929
0.356212	1.036642	0.752587	1.42791
0.95561	1.228159	0.580087	2.600256
0.032923	0.986779	0.942196	1.033471
0.262298	0.936735	0.675024	1.299913
0.051909	0.978343	0.908737	1.05328
0.220789	1.199479	1.153714	1.24706
0.201832	0.611719	0.305809	1.223643
0.607665	1.239479	0.836705	1.836139

0.717483	1.289187	0.811023	2.049268
0.133664	0.68708	0.413015	1.143008
-0.022606	0.787592	0.634483	0.977647
113413.5	1.95E-11	0	Inf
0.139278	0.895336	0.697404	1.149443
0.158731	0.949644	0.76946	1.172022
0.305302	0.593559	0.259619	1.357035
0.212421	0.939877	0.714314	1.236669
0.169101	0.647449	0.353974	1.18424
0.135818	1.10664	1.069122	1.145474
0.220668	1.176135	1.109377	1.24691
0.219548	1.199295	1.154792	1.245514
0.399694	1.399805	1.313862	1.491369
0.139611	1.108639	1.068927	1.149827
0.293102	1.258739	1.181895	1.34058
-0.017052	0.936676	0.892451	0.983092
0.116466	1.025453	0.935946	1.12352
0.180776	1.155149	1.113694	1.198147
0.389446	1.382801	1.295343	1.476163
-0.093809	0.857996	0.808558	0.910457
0.170149	1.085279	0.993546	1.185481
0.101922	0.950473	0.815859	1.107297
0.304441	0.92586	0.632228	1.355866
0.186209	1.156572	1.11039	1.204674
0.229464	1.158546	1.067018	1.257925
0.19647	1.165818	1.116698	1.217099
0.369097	1.349496	1.25906	1.446428