

Supplementary Material

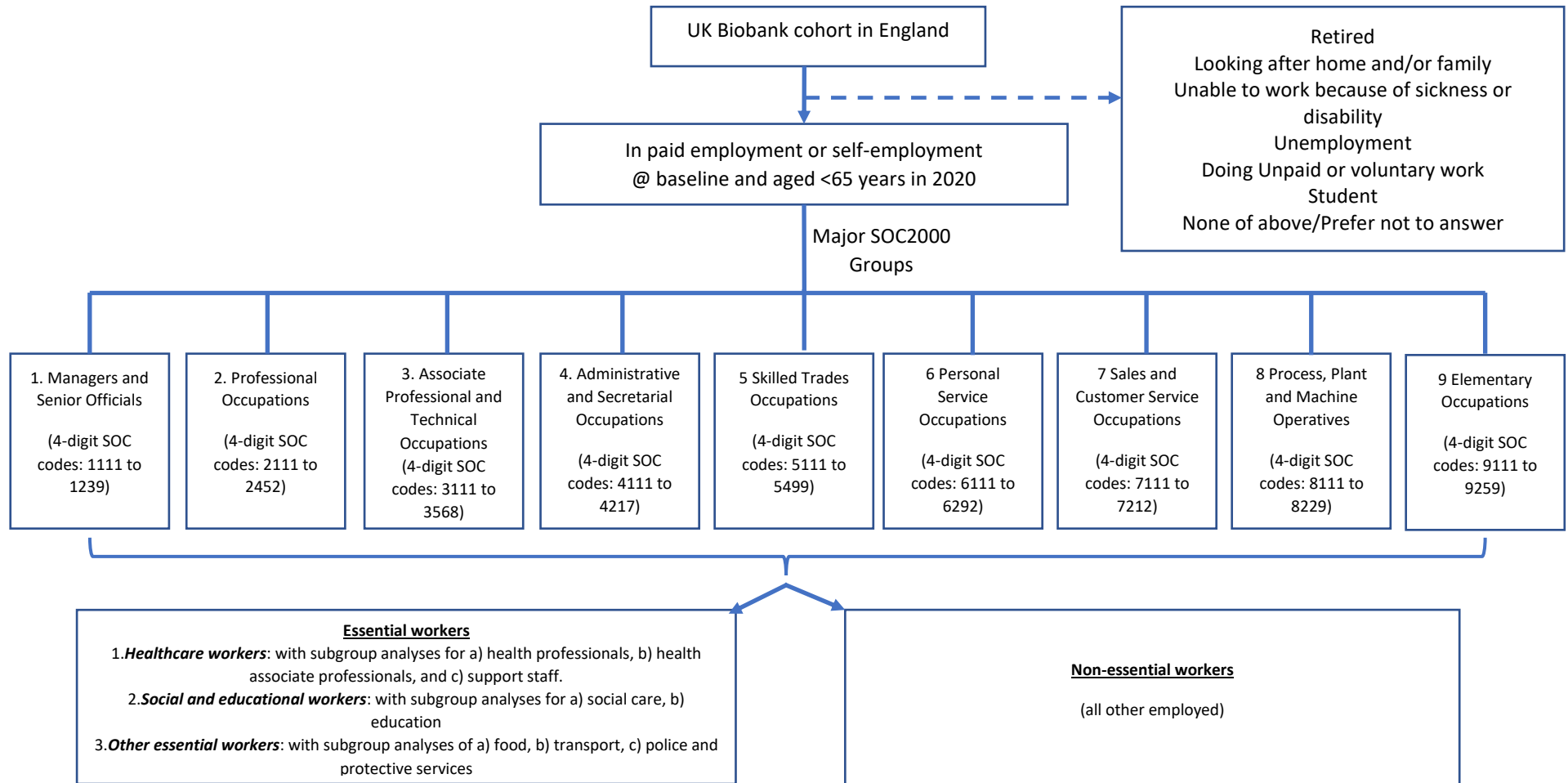
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Figure S1: Occupational groupings by (a) SOC2000 codes and (b) essential worker groups



Essential workers

1. **Healthcare workers:** with subgroups for a) health professionals, b) health associate professionals, and c) support staff.
 2. **Social and educational workers:** with subgroups for a) social care, b) education
 3. **Other essential workers:** with subgroups for a) food, b) transport workers, c) police and protective services

Healthcare workers

a) Health professionals

2211 Medical practitioners
 2212 Psychologists
 2213 Pharmacists/pharmacologists

b) Health associate professionals

321 Health Associate Professionals
 3211 Nurses
 3212 Midwives
 3213 Paramedics
 3214 Medical radiographers
 3215 Chiropodists
 3216 Dispensing opticians
 3217 Pharmaceutical dispensers
 3218 Medical and dental technicians
 1181 Hospital and health service managers
 1182 Pharmacy managers
 1183 Healthcare practice managers
 322 Therapists
 3221 Physiotherapists
 3222 Occupational therapists
 3223 Speech and language therapists
 3229 Therapists n.e.c.

c) support staff

4211 Medical secretaries
 6111 Nursing auxiliaries and assistants
 6112 Ambulance staff (excluding paramedics)
 9221 Hospital porters

Social and educational workers

a) Social care

1184 Social services managers
 1185 Residential and day care managers
 2442 Social workers
 2444 Clergy
 323 Social Welfare Associate Professionals
 3231 Youth and community workers
 3232 Housing and welfare officers
 6114 Houseparents and residential wardens
 6115 Care assistants and home carers
 6232 Caretakers
 6291 Undertakers and mortuary assistants
 9229 Elementary personal services occupations n.e.c.

a) Education

231 Teaching Professionals
 2314 Secondary education teaching professionals
 2315 Primary and nursery education teaching professionals
 2316 Special needs education teaching professionals
 6121 Nursery nurses
 6124 Educational assistants

Other essential workers

a) Food

1234 Shopkeepers and wholesale/retail dealers
 543 Food Preparation Trades
 5431 Butchers, meat cutters
 5432 Bakers, flour confectioners
 5433 Fishmongers, poultry dressers
 7111 Sales and retail assistants
 7112 Retail cashiers and check-out operators
 925 Elementary Sales Occupations
 9251 Shelf fillers
 9259 Elementary sales occupations n.e.c.
 116 Managers In Distribution, Storage And Retailing
 1162 Storage and warehouse managers
 1163 Retail and wholesale managers
 8111 Food, drink and tobacco process operatives
 1211 Farm managers
 1219 Managers in animal husbandry, forestry and fishing n.e.c.
 5111 Farmers
 5112 Horticultural trades
 5119 Agricultural and fishing trades n.e.c.
 9111 Farm workers
 9119 Fishing and agriculture related occupations n.e.c.

b) Transport workers

1161 Transport and distribution managers
 3514 Train drivers
 6215 Rail travel assistants
 8211 Heavy goods vehicle drivers
 8212 Van drivers
 8213 Bus and coach drivers
 8214 Taxi, cab drivers and chauffeurs
 8216 Rail transport operatives
 9211 Postal workers, mail sorters,

c) Police & Protective Services (including sanitary workers)

1172 Police officers (inspectors and above)
 1173 Senior officers in fire, ambulance, prison and related services
 1174 Security managers
 331 Protective Service Occupations
 3311 NCOs and other ranks
 3312 Police officers (sergeant and below)
 3313 Fire service officers (leading fire officer and below)
 3314 Prison service officers (below principal officer)
 3319 Protective service associate professionals n.e.c.
 2443 Probation officers
 9231 Window cleaners
 9232 Road sweepers
 9233 Cleaners, domestics
 9235 Refuse and salvage occupations
 9239 Elementary cleaning occupations n.e.c.

Table S1: Occupation agreement between baseline and follow-up (first imaging visit only) by broad essential worker groups

	Follow-up				
Baseline	Non-essential workers	Healthcare workers	Social and education workers	Other essential workers	Total
Non-essential workers (N)	7,913	160	235	258	8,566
(%)	92.38	1.87	2.74	3.01	100
Healthcare workers (N)	136	1,295	42	11	1,484
(%)	9.16	87.26	2.83	0.74	100
Social and education workers (N)	225	55	1,120	23	1,423
(%)	15.81	3.87	78.71	1.62	100
Other essential workers (N)	229	15	29	546	819
(%)	27.96	1.83	3.54	66.67	100
Total (N)	8,503	1,525	1,426	838	12,292
(%)	69.18	12.41	11.6	6.82	100

Table S2: Occupation agreement between baseline and follow-up (first imaging visit only) by narrow essential worker groups

	Follow-up									
Baseline	Non-essential workers	Healthcare professionals	Medical support staff	Health associate professionals	Social care workers	Education workers	Food workers	Transport workers	Police and protective service workers	Total
Non-essential workers (N)	7,913	17	38	105	122	113	126	70	62	8,566
(%)	92.38	0.2	0.44	1.23	1.42	1.32	1.47	0.82	0.72	100
Healthcare professionals (N)	23	282	0	9	3	0	2	0	0	319
(%)	7.21	88.4	0	2.82	0.94	0	0.63	0	0	100
Medical support staff (N)	21	1	65	11	3	1	2	1	0	105
(%)	20	0.95	61.9	10.48	2.86	0.95	1.9	0.95	0	100
Health associate professionals (N)	92	25	18	884	25	10	5	0	1	1,060
(%)	8.68	2.36	1.7	83.4	2.36	0.94	0.47	0	0.09	100
Social care workers (N)	125	1	13	23	249	14	2	4	4	435
(%)	28.74	0.23	2.99	5.29	57.24	3.22	0.46	0.92	0.92	100
Education workers (N)	100	2	0	16	18	839	6	2	5	988
(%)	10.12	0.2	0	1.62	1.82	84.92	0.61	0.2	0.51	100
Food workers (N)	124	0	1	5	9	2	167	5	0	313
(%)	39.62	0	0.32	1.6	2.88	0.64	53.35	1.6	0	100
Transport workers (N)	43	0	3	1	2	1	4	145	2	201
(%)	21.39	0	1.49	0.5	1	0.5	1.99	72.14	1	100
Police and protective service workers (N)	62	0	2	3	13	2	7	4	212	305
(%)	20.33	0	0.66	0.98	4.26	0.66	2.3	1.31	69.51	100
Total (N)	8,503	328	140	1,057	444	982	321	231	286	12,292
(%)	69.18	2.67	1	8.6	3.61	7.99	3	1.88	2.33	100

Table S3: Occupation agreement between baseline and follow-up (first imaging visit only) by SOC major occupational groups

	Follow-up									
Baseline	Managers and Senior Officials	Professional Occupations	Associate Professional and Technical Occupations	Administrative and Secretarial Occupations	Skilled Trades Occupations	Personal Service Occupations	Sales and Customer Service Occupations	Process, Plant and Machine Operatives	Elementary Occupations	Total
Managers and Senior Officials (N)	1,515	276	310	204	71	46	35	33	45	2,535
(%)	59.76	10.89	12.23	8.05	2.8	1.81	1.38	1.3	1.78	100
Professional Occupations (N)	248	2,626	239	175	52	40	15	39	17	3,451
(%)	7.19	76.09	6.93	5.07	1.51	1.16	0.43	1.13	0.49	100
Associate Professional and Technical Occupations (N)	253	229	1,766	194	44	75	37	27	28	2,653
(%)	9.54	8.63	66.57	7.31	1.66	2.83	1.39	1.02	1.06	100
Administrative and Secretarial Occupations (N)	148	91	175	1,077	16	32	51	17	36	1,643
(%)	9.01	5.54	10.65	65.55	0.97	1.95	3.1	1.03	2.19	100
Skilled Trades Occupations (N)	41	58	42	4	381	9	7	30	30	602
(%)	6.81	9.63	6.98	0.66	63.29	1.5	1.16	4.98	4.98	100
Personal Service Occupations (N)	26	63	52	29	2	377	11	8	17	585
(%)	4.44	10.77	8.89	4.96	0.34	64.44	1.88	1.37	2.91	100
Sales and Customer Service Occupations (N)	27	9	23	35	5	16	115	3	18	251
(%)	10.76	3.59	9.16	13.94	1.99	6.37	45.82	1.2	7.17	100
Process, Plant and Machine Operatives (N)	15	23	15	12	23	4	6	189	23	310

(%)	4.84	7.42	4.84	3.87	7.42	1.29	1.94	60.97	7.42	100
Elementary Occupations (N)	17	4	18	15	25	16	11	20	136	262
(%)	6.49	1.53	6.87	5.73	9.54	6.11	4.2	7.63	51.91	100
Total (N)	2,290	3,379	2,640	1,745	619	615	288	366	350	12,292
(%)	18.63	27.49	21.48	14.2	5.04	5	2.34	2.98	2.85	100

Table S4: Cohort characteristics by broad essential worker groups

	Occupation (broad groups of essential workers)									
	Non-essential workers	Non-essential workers	Healthcare workers	Healthcare workers	Social and education workers	Social and education workers	Other essential workers	Other essential workers	Total	Total
	N	%	N	%	N	%	N	%	N	%
Age group (current)										
Under 55	18,510	73.1	2,049	8.1	2,454	9.7	2,302	9.1	25,315	100
55-59	31,806	71.1	4,016	9.0	4,728	10.6	4,184	9.4	44,734	100
60+	34,632	69.2	4,683	9.4	6,294	12.6	4,417	8.8	50,026	100
Sex										
Female	41,199	63.3	8,908	13.7	10,736	16.5	4,220	6.5	65,063	100
Male	43,749	79.5	1,840	3.3	2,740	5.0	6,683	12.1	55,012	100
UK Biobank assessment centre										
Manchester	2,578	70.8	369	10.1	398	10.9	296	8.1	3,641	100
Oxford	2,572	74.2	326	9.4	336	9.7	234	6.7	3,468	100
Stoke	3,363	69.1	383	7.9	563	11.6	561	11.5	4,870	100
Reading	6,238	77.4	580	7.2	714	8.9	529	6.6	8,061	100
Bury	4,506	68.6	588	9.0	794	12.1	676	10.3	6,564	100
Newcastle	6,470	67.7	971	10.2	1,178	12.3	942	9.9	9,561	100
Leeds	8,534	69.8	1,065	8.7	1,490	12.2	1,141	9.3	12,230	100
Bristol	9,495	71.9	1,248	9.5	1,376	10.4	1,080	8.2	13,199	100

Barts	3,107	78.6	296	7.5	313	7.9	239	6.0	3,955	100
Nottingham	5,978	69.9	790	9.2	950	11.1	836	9.8	8,554	100
Sheffield	5,615	67.3	874	10.5	1,056	12.6	804	9.6	8,349	100
Liverpool	5,713	68.1	769	9.2	1,041	12.4	872	10.4	8,395	100
Middlesborough	3,672	65.0	582	10.3	715	12.7	682	12.1	5,651	100
Hounslow	6,244	76.5	559	6.9	718	8.8	636	7.8	8,157	100
Croydon	5,695	72.2	686	8.7	834	10.6	668	8.5	7,883	100
Birmingham	5,168	68.6	662	8.8	1,000	13.3	707	9.4	7,537	100
Ethnicity										
White British	73,019	71.2	8,922	8.7	11,373	11.1	9,171	8.9	102,485	100
White Irish	2,235	69.7	389	12.1	366	11.4	215	6.7	3,205	100
White Other	3,740	75.2	420	8.4	463	9.3	351	7.1	4,974	100
Mixed	840	69.0	97	8.0	165	13.5	116	9.5	1,218	100
South Asian	2,047	66.6	289	9.4	274	8.9	465	15.1	3,075	100
Black	1,863	57.0	409	12.5	610	18.7	386	11.8	3,268	100
Other	1,204	65.1	222	12.0	225	12.2	199	10.8	1,850	100
Country of birth										
UK & Ireland	76,916	71.1	9,484	8.8	12,117	11.2	9,642	8.9	108,159	100
Elsewhere	8,032	67.4	1,264	10.6	1,359	11.4	1,261	10.6	11,916	100
Education level										
College or University degree	33,507	69.5	5,546	11.5	7,545	15.7	1,591	3.3	48,189	100

A levels/AS levels or equivalent	12,534	75.4	1,462	8.8	1,341	8.1	1,292	7.8	16,629	100
O levels/GCSEs/CSEs or equivalent	29,083	73.2	2,113	5.3	2,976	7.5	5,558	14.0	39,730	100
Other	6,437	63.4	1,538	15.1	1,385	13.6	797	7.8	10,157	100
None of the above	3,387	63.1	89	1.7	229	4.3	1,665	31.0	5,370	100
Deprivation quartile										
Quartile 1 (most advantaged)	20,677	72.6	2,719	9.5	3,059	10.7	2,033	7.1	28,488	100
Quartile 2	20,523	71.7	2,671	9.3	3,087	10.8	2,345	8.2	28,626	100
Quartile 3	22,404	70.4	2,827	8.9	3,658	11.5	2,913	9.2	31,802	100
Quartile 4 (least advantaged)	21,344	68.5	2,531	8.1	3,672	11.8	3,612	11.6	31,159	100
Shiftwork										
No	78,949	73.7	8,253	7.7	11,971	11.2	7,899	7.4	107,072	100
Yes	5,999	46.1	2,495	19.2	1,505	11.6	3,004	23.1	13,003	100
Manual occupation										
Non-manual	74,849	72.2	9,097	8.8	12,211	11.8	7,477	7.2	103,634	100
Manual	10,099	61.4	1,651	10.0	1,265	7.7	3,426	20.8	16,441	100
Job tenure										
<=10	49,625	70.0	6,212	8.8	8,853	12.5	6,206	8.8	70,896	100
11-20	19,420	70.5	2,631	9.5	3,055	11.1	2,446	8.9	27,552	100
>20	15,903	73.5	1,905	8.8	1,568	7.3	2,251	10.4	21,627	100

Working hours										
<40	41,380	66.8	7,374	11.9	8,486	13.7	4,706	7.6	61,946	100
40-45	29,380	76.8	2,330	6.1	3,174	8.3	3,395	8.9	38,279	100
>45	14,188	71.5	1,044	5.3	1,816	9.1	2,802	14.1	19,850	100
Number of chronic conditions										
0	44,022	71.9	5,356	8.7	6,417	10.5	5,449	8.9	61,244	100
1	27,162	70.5	3,443	8.9	4,425	11.5	3,496	9.1	38,526	100
2	9,820	68.3	1,349	9.4	1,816	12.6	1,389	9.7	14,374	100
3	2,916	67.5	427	9.9	573	13.3	403	9.3	4,319	100
4+	1,028	63.8	173	10.7	245	15.2	166	10.3	1,612	100
Long-standing illness, disability or infirmity										
No	67,132	71.1	8,484	9.0	10,427	11.0	8,367	8.9	94,410	100
Yes	17,816	69.4	2,264	8.8	3,049	11.9	2,536	9.9	25,665	100
BMI Category										
Underweight (<18.5)	411	67.0	63	10.3	92	15.0	47	7.7	613	100
Normal weight (18.5-24.9)	31,078	69.8	4,845	10.9	5,536	12.4	3,037	6.8	44,496	100
Overweight (25.0-29.9)	35,289	72.4	3,841	7.9	4,862	10.0	4,761	9.8	48,753	100
Obese (>=30.0)	18,170	69.3	1,999	7.6	2,986	11.4	3,058	11.7	26,213	100
Smoking status										
Never	52,308	70.3	7,154	9.6	8,688	11.7	6,236	8.4	74,386	100

Previous	22,660	71.5	2,733	8.6	3,395	10.7	2,896	9.1	31,684	100
Current	9,980	71.3	861	6.1	1,393	9.9	1,771	12.6	14,005	100
Alcohol consumption										
Daily or almost daily	15,272	76.1	1,473	7.3	1,765	8.8	1,570	7.8	20,080	100
Three or four times a week	22,155	74.0	2,747	9.2	2,976	9.9	2,064	6.9	29,942	100
Once or twice a week	25,038	71.0	3,033	8.6	3,866	11.0	3,336	9.5	35,273	100
One to three times a month	10,686	67.7	1,522	9.6	1,969	12.5	1,602	10.2	15,779	100
Special occasions only	7,558	63.1	1,214	10.1	1,819	15.2	1,394	11.6	11,985	100
Never (former drinker)	1,902	63.8	283	9.5	423	14.2	371	12.5	2,979	100
Never	2,337	57.9	476	11.8	658	16.3	566	14.0	4,037	100
Total	84,948	70.7	10,748	9.0	13,476	11.2	10,903	9.1	120,075	100

Table S5: Descriptive statistics for severe COVID-19 by broad race/occupation groups

	Severe COVID-19				Total	Total
	No		Yes			
	N	%	N	%	N	%
White (non-essential worker)	78,902	99.9	92	0.1	78,994	100
Non-white (non-essential worker)	5,934	99.7	20	0.3	5,954	100
White (essential worker)	31,541	99.6	129	0.4	31,670	100
Non-white (essential worker)	3,427	99.1	30	0.9	3,457	100
Total	119,804	99.8	271	0.2	120,075	100

Table S6: Risk of severe COVID-19 according to broad essential worker groups

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Severe COVID-19	RR	RR	RR	RR	RR	RR
	[95% CI]	[95% CI]	[95% CI]	[95% CI]	[95% CI]	[95% CI]
Occupation: Non-essential workers	1.00	1.00	1.00	1.00	1.00	1.00
	-	-	-	-	-	-
Healthcare workers	7.43***	8.45***	7.57***	8.44***	8.53***	7.69***
	[5.52,10.00]	[6.22,11.47]	[5.50,10.41]	[6.21,11.46]	[6.29,11.58]	[5.58,10.60]
Social and education workers	1.84**	2.00**	1.90**	1.99**	1.97**	1.88**
	[1.21,2.82]	[1.30,3.08]	[1.22,2.94]	[1.29,3.06]	[1.28,3.03]	[1.21,2.91]
Other essential workers	1.60*	1.30	1.17	1.30	1.27	1.15
	[1.05,2.45]	[0.85,1.98]	[0.76,1.80]	[0.85,1.98]	[0.83,1.94]	[0.75,1.77]
Age group (current): Under 55	1.00	1.00	1.00	1.00	1.00	1.00
	-	-	-	-	-	-
55-59	1.06	1.05	1.08	1.05	1.05	1.08
	[0.79,1.43]	[0.78,1.42]	[0.80,1.46]	[0.77,1.41]	[0.78,1.42]	[0.80,1.45]
60+	0.64**	0.63**	0.67*	0.62**	0.62**	0.65*
	[0.46,0.89]	[0.45,0.88]	[0.48,0.94]	[0.45,0.87]	[0.45,0.86]	[0.47,0.91]
Sex: Female	1.00	1.00	1.00	1.00	1.00	1.00
	-	-	-	-	-	-
Male	1.38*	1.41*	1.35*	1.41*	1.36*	1.31
	[1.05,1.80]	[1.08,1.84]	[1.01,1.79]	[1.08,1.85]	[1.04,1.79]	[0.98,1.75]
Assessment centre: Manchester	0.73	0.74	0.75	0.74	0.75	0.77
	[0.39,1.37]	[0.39,1.40]	[0.40,1.41]	[0.39,1.40]	[0.39,1.42]	[0.40,1.46]
Oxford	0.70	0.78	0.78	0.78	0.81	0.81
	[0.35,1.40]	[0.39,1.56]	[0.39,1.55]	[0.39,1.57]	[0.40,1.62]	[0.41,1.63]
Stoke	0.63	0.66	0.65	0.67	0.66	0.65
	[0.33,1.20]	[0.35,1.25]	[0.35,1.23]	[0.35,1.26]	[0.35,1.24]	[0.35,1.23]
Reading	0.41**	0.50*	0.50*	0.51*	0.51*	0.51*
	[0.22,0.77]	[0.27,0.95]	[0.27,0.95]	[0.27,0.96]	[0.27,0.96]	[0.27,0.97]
Bury	0.49*	0.50*	0.50*	0.51*	0.50*	0.51*
	[0.27,0.90]	[0.27,0.92]	[0.27,0.92]	[0.28,0.93]	[0.27,0.92]	[0.27,0.93]
Newcastle	1.00	1.00	1.00	1.00	1.00	1.00
	-	-	-	-	-	-
Leeds	0.38***	0.41***	0.41**	0.41**	0.41***	0.41**

	[0.22,0.65]	[0.24,0.69]	[0.24,0.70]	[0.24,0.70]	[0.24,0.69]	[0.24,0.70]
Bristol	0.24*** [0.13,0.45]	0.27*** [0.14,0.50]	0.27*** [0.14,0.50]	0.27*** [0.14,0.50]	0.27*** [0.14,0.51]	0.27*** [0.14,0.51]
Barts	0.20** [0.07,0.55]	0.18** [0.06,0.50]	0.19** [0.07,0.53]	0.18** [0.06,0.51]	0.19** [0.07,0.53]	0.19** [0.07,0.55]
Nottingham	0.30*** [0.15,0.58]	0.32*** [0.17,0.63]	0.33*** [0.17,0.63]	0.32*** [0.17,0.63]	0.33** [0.17,0.64]	0.33** [0.17,0.64]
Sheffield	0.80 [0.50,1.28]	0.83 [0.52,1.32]	0.84 [0.53,1.34]	0.83 [0.52,1.32]	0.83 [0.52,1.33]	0.85 [0.53,1.36]
Liverpool	0.86 [0.54,1.37]	0.87 [0.55,1.38]	0.88 [0.55,1.40]	0.87 [0.55,1.39]	0.85 [0.53,1.36]	0.87 [0.55,1.39]
Middlesborough	0.45* [0.23,0.87]	0.47* [0.24,0.92]	0.48* [0.25,0.93]	0.47* [0.24,0.92]	0.46* [0.24,0.90]	0.47* [0.24,0.92]
Hounslow	0.37** [0.21,0.68]	0.37** [0.20,0.67]	0.37** [0.20,0.69]	0.37** [0.20,0.68]	0.37** [0.20,0.69]	0.39** [0.21,0.71]
Croydon	0.36*** [0.20,0.64]	0.36*** [0.20,0.64]	0.37*** [0.21,0.67]	0.36*** [0.20,0.65]	0.36*** [0.20,0.64]	0.37** [0.21,0.67]
Birmingham	0.40** [0.22,0.72]	0.39** [0.21,0.70]	0.40** [0.22,0.73]	0.39** [0.21,0.70]	0.38** [0.21,0.69]	0.40** [0.22,0.72]
Ethnicity: White British	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
White Irish	1.54 [0.82,2.89]	1.58 [0.84,2.96]	1.59 [0.85,2.97]	1.58 [0.84,2.95]	1.58 [0.84,2.98]	1.59 [0.85,2.98]
White Other	1.19 [0.60,2.35]	1.25 [0.63,2.49]	1.27 [0.64,2.52]	1.25 [0.63,2.48]	1.23 [0.62,2.44]	1.24 [0.62,2.46]
Mixed	1.44 [0.46,4.49]	1.37 [0.44,4.29]	1.36 [0.43,4.25]	1.38 [0.44,4.30]	1.33 [0.43,4.12]	1.32 [0.42,4.11]
South Asian	3.94*** [2.24,6.93]	3.78*** [2.14,6.70]	3.80*** [2.14,6.76]	3.77*** [2.12,6.71]	3.94*** [2.24,6.94]	4.00*** [2.26,7.07]
Black	3.57*** [2.14,5.96]	3.01*** [1.80,5.04]	2.93*** [1.74,4.92]	3.00*** [1.79,5.01]	2.78*** [1.65,4.68]	2.73*** [1.61,4.62]
Other	1.49 [0.60,3.66]	1.38 [0.56,3.45]	1.32 [0.53,3.28]	1.39 [0.56,3.45]	1.42 [0.57,3.49]	1.36 [0.55,3.36]
Country of birth: UK & Ireland	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
Elsewhere	0.90	0.91	0.85	0.92	0.91	0.87

	[0.59,1.37]	[0.59,1.40]	[0.55,1.33]	[0.60,1.41]	[0.59,1.41]	[0.56,1.36]
Socioeconomic deprivation: Quartile 1 (most advantaged)		1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
Quartile 2		1.35 [0.89,2.03]	1.33 [0.88,2.02]	1.34 [0.89,2.03]	1.33 [0.88,2.01]	1.32 [0.87,2.00]
Quartile 3		1.64* [1.11,2.44]	1.60* [1.08,2.38]	1.63* [1.10,2.42]	1.58* [1.07,2.34]	1.54* [1.04,2.29]
Quartile 4 (least advantaged)		2.01*** [1.36,2.96]	1.87** [1.26,2.77]	1.98*** [1.34,2.92]	1.89** [1.29,2.79]	1.77** [1.20,2.63]
Education level: College or University degree		1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
A levels/AS levels or equivalent		1.10 [0.72,1.69]	1.05 [0.68,1.60]	1.09 [0.71,1.68]	1.05 [0.69,1.61]	1.00 [0.66,1.54]
O levels/GCSEs/CSEs or equivalent		1.67*** [1.24,2.25]	1.51** [1.12,2.04]	1.67*** [1.24,2.24]	1.56** [1.16,2.10]	1.42* [1.05,1.93]
Other		1.29 [0.85,1.94]	1.13 [0.74,1.72]	1.28 [0.85,1.92]	1.20 [0.80,1.81]	1.07 [0.70,1.62]
None of the above		2.22** [1.31,3.74]	1.88* [1.10,3.23]	2.19** [1.30,3.70]	2.03** [1.20,3.46]	1.74* [1.01,3.01]
Shiftwork: No			1.00 -			1.00 -
Yes			1.43* [1.06,1.92]			1.38* [1.02,1.86]
Occupation: Non-manual			1.00 -			1.00 -
Manual			1.39* [1.02,1.89]			1.41* [1.04,1.91]
Job tenure (years): <=10			1.00 -			1.00 -
11-20			1.21 [0.91,1.59]			1.22 [0.93,1.61]
>20			0.71 [0.48,1.05]			0.72 [0.49,1.06]
Working hours/week: <40			1.00 -			1.00 -
40-45			0.98			0.97

			[0.73,1.32]			[0.72,1.30]
>45			1.10 [0.77,1.56]			1.08 [0.76,1.54]
Number of chronic conditions: 0				1.00		1.00
				-		-
1				1.27 [0.97,1.66]		1.23 [0.93,1.61]
2				0.98 [0.64,1.50]		0.92 [0.60,1.41]
3				1.03 [0.52,2.04]		0.93 [0.46,1.86]
4+				1.48 [0.64,3.43]		1.31 [0.56,3.05]
Long-standing illness/disability: No				1.00		1.00
				-		-
Yes				1.08 [0.79,1.47]		1.06 [0.77,1.45]
Body Mass Index category: Underweight (<18.5)					1.15 [0.17,8.00]	1.15 [0.17,7.87]
Normal weight (18.5-24.9)					1.00	1.00
					-	-
Overweight (25.0-29.9)					1.46* [1.08,1.95]	1.44* [1.07,1.94]
Obese (>=30.0)					1.75*** [1.28,2.41]	1.72** [1.24,2.38]
Smoking status: Never					1.00	1.00
					-	-
Previous					1.32* [1.00,1.74]	1.31 [0.99,1.73]
Current					1.00 [0.66,1.51]	0.96 [0.64,1.45]
Alcohol consumption: Daily or almost daily					1.00	1.00
					-	-
Three or four times a week					0.88 [0.57,1.35]	0.88 [0.57,1.35]
Once or twice a week					0.97	0.96

					[0.65,1.46]	[0.64,1.44]
One to three times a month					1.40 [0.91,2.17]	1.38 [0.89,2.14]
Special occasions only					1.07 [0.65,1.77]	1.03 [0.62,1.71]
Never (former drinker)					0.48 [0.17,1.38]	0.46 [0.16,1.32]
Never					1.07 [0.58,1.99]	1.02 [0.55,1.88]
Observations	120075	120075	120075	120075	120075	120075

CI=confidence interval; RR=risk ratio; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Model 1: Adjusted for age group, sex, ethnicity, country of birth; Model 2: Model 1 + socioeconomic deprivation quartile, education level; Model 3: Model 2 + shift work, manual work, job tenure, working hours; Model 4: Model 2 + number of chronic conditions, long-standing illness/disability; Model 5: Model 2 + BMI category, smoking status, alcohol consumption; Model 6: All covariates

Table S7: Risk of severe COVID-19 according to narrow essential worker groups

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Severe COVID-19	RR	RR	RR	RR	RR	RR
	[95% CI]	[95% CI]	[95% CI]	[95% CI]	[95% CI]	[95% CI]
Occupation: Non-essential workers	1.00	1.00	1.00	1.00	1.00	1.00
	-	-	-	-	-	-
Healthcare professionals	6.19*** [3.68,10.43]	8.62*** [4.98,14.94]	8.26*** [4.77,14.28]	8.70*** [5.02,15.06]	9.33*** [5.40,16.14]	8.99*** [5.20,15.54]
Medical support staff	8.70*** [4.87,15.55]	7.43*** [4.17,13.25]	6.48*** [3.62,11.58]	7.39*** [4.13,13.19]	7.33*** [4.13,13.02]	6.42*** [3.60,11.45]
Health associate professionals	7.53*** [5.44,10.43]	8.54*** [6.13,11.90]	7.61*** [5.33,10.87]	8.52*** [6.11,11.88]	8.54*** [6.12,11.92]	7.65*** [5.34,10.95]
Social care workers	2.46*** [1.47,4.14]	2.38** [1.42,4.00]	2.19** [1.29,3.72]	2.36** [1.40,3.97]	2.31** [1.37,3.88]	2.13** [1.25,3.63]
Education workers	1.36 [0.75,2.48]	1.61 [0.88,2.96]	1.59 [0.86,2.92]	1.61 [0.88,2.95]	1.62 [0.88,2.96]	1.59 [0.87,2.91]
Food workers	1.12 [0.52,2.42]	0.93 [0.43,1.98]	0.85 [0.40,1.83]	0.93 [0.43,1.98]	0.92 [0.43,1.96]	0.84 [0.39,1.80]
Transport workers	2.20** [1.21,4.00]	1.66 [0.91,3.01]	1.48 [0.81,2.70]	1.66 [0.91,3.01]	1.58 [0.87,2.90]	1.43 [0.78,2.63]
Police and protective service workers	1.55 [0.72,3.32]	1.36 [0.63,2.93]	1.21 [0.56,2.64]	1.35 [0.62,2.92]	1.32 [0.61,2.86]	1.19 [0.55,2.58]
Age group (current): Under 55	1.00	1.00	1.00	1.00	1.00	1.00
	-	-	-	-	-	-
55-59	1.06 [0.78,1.43]	1.05 [0.78,1.42]	1.08 [0.80,1.46]	1.05 [0.77,1.41]	1.05 [0.78,1.42]	1.08 [0.80,1.45]
60+	0.64** [0.46,0.89]	0.63** [0.46,0.88]	0.67* [0.48,0.94]	0.62** [0.45,0.87]	0.62** [0.45,0.86]	0.65* [0.47,0.91]
Sex: Female	1.00	1.00	1.00	1.00	1.00	1.00
	-	-	-	-	-	-
Male	1.35* [1.03,1.78]	1.37* [1.04,1.80]	1.31 [0.99,1.75]	1.37* [1.04,1.80]	1.32* [1.00,1.74]	1.28 [0.95,1.71]
Assessment centre: Manchester	0.73 [0.39,1.37]	0.74 [0.39,1.40]	0.75 [0.40,1.41]	0.74 [0.39,1.40]	0.75 [0.39,1.42]	0.77 [0.40,1.46]
Oxford	0.71	0.78	0.78	0.79	0.81	0.82

	[0.35,1.42]	[0.39,1.57]	[0.39,1.56]	[0.39,1.58]	[0.40,1.63]	[0.41,1.64]
Stoke	0.63 [0.33,1.19]	0.67 [0.35,1.26]	0.66 [0.35,1.24]	0.67 [0.35,1.26]	0.66 [0.35,1.25]	0.65 [0.35,1.24]
Reading	0.41** [0.22,0.77]	0.51* [0.27,0.96]	0.51* [0.27,0.96]	0.51* [0.27,0.97]	0.51* [0.27,0.97]	0.52* [0.27,0.98]
Bury	0.49* [0.26,0.89]	0.50* [0.27,0.93]	0.51* [0.28,0.93]	0.51* [0.28,0.93]	0.50* [0.27,0.93]	0.51* [0.28,0.94]
Newcastle	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
Leeds	0.38*** [0.22,0.65]	0.41*** [0.24,0.69]	0.41** [0.24,0.70]	0.41** [0.24,0.70]	0.41*** [0.24,0.69]	0.41** [0.24,0.70]
Bristol	0.24*** [0.13,0.45]	0.27*** [0.14,0.50]	0.27*** [0.14,0.50]	0.27*** [0.14,0.50]	0.27*** [0.14,0.51]	0.27*** [0.14,0.51]
Barts	0.20** [0.07,0.55]	0.18** [0.06,0.50]	0.19** [0.07,0.53]	0.18** [0.06,0.51]	0.19** [0.07,0.53]	0.19** [0.07,0.55]
Nottingham	0.30*** [0.15,0.58]	0.32*** [0.17,0.63]	0.33*** [0.17,0.63]	0.33*** [0.17,0.63]	0.33** [0.17,0.64]	0.33** [0.17,0.64]
Sheffield	0.80 [0.50,1.28]	0.83 [0.52,1.32]	0.84 [0.53,1.34]	0.83 [0.52,1.32]	0.84 [0.52,1.34]	0.85 [0.53,1.37]
Liverpool	0.86 [0.54,1.37]	0.87 [0.55,1.39]	0.88 [0.55,1.41]	0.87 [0.55,1.39]	0.86 [0.54,1.37]	0.88 [0.55,1.40]
Middlesborough	0.45* [0.23,0.87]	0.47* [0.24,0.92]	0.48* [0.25,0.93]	0.47* [0.24,0.92]	0.46* [0.24,0.90]	0.47* [0.24,0.93]
Hounslow	0.37** [0.20,0.67]	0.37** [0.20,0.67]	0.38** [0.21,0.69]	0.37** [0.20,0.68]	0.38** [0.20,0.69]	0.39** [0.21,0.71]
Croydon	0.36*** [0.20,0.64]	0.36*** [0.20,0.65]	0.37** [0.21,0.67]	0.36*** [0.20,0.66]	0.36*** [0.20,0.65]	0.38** [0.21,0.68]
Birmingham	0.40** [0.22,0.72]	0.39** [0.21,0.70]	0.41** [0.23,0.73]	0.39** [0.22,0.71]	0.38** [0.21,0.70]	0.40** [0.22,0.73]
Ethnicity: White British	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
White Irish	1.54 [0.82,2.90]	1.56 [0.83,2.94]	1.57 [0.84,2.95]	1.56 [0.83,2.93]	1.57 [0.84,2.96]	1.58 [0.84,2.96]
White Other	1.21 [0.61,2.40]	1.25 [0.63,2.48]	1.26 [0.63,2.50]	1.25 [0.63,2.47]	1.22 [0.62,2.42]	1.23 [0.62,2.43]
Mixed	1.42	1.37	1.35	1.37	1.32	1.31

	[0.45,4.46]	[0.44,4.27]	[0.43,4.23]	[0.44,4.28]	[0.42,4.11]	[0.42,4.09]
South Asian	4.02*** [2.26,7.15]	3.78*** [2.12,6.73]	3.77*** [2.11,6.74]	3.77*** [2.11,6.73]	3.91*** [2.20,6.92]	3.94*** [2.21,7.02]
Black	3.42*** [2.04,5.74]	2.95*** [1.76,4.95]	2.89*** [1.72,4.87]	2.94*** [1.76,4.93]	2.74*** [1.62,4.61]	2.70*** [1.59,4.57]
Other	1.47 [0.60,3.62]	1.38 [0.55,3.42]	1.31 [0.53,3.27]	1.38 [0.55,3.43]	1.40 [0.57,3.46]	1.36 [0.55,3.35]
Country of birth: UK & Ireland	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
Elsewhere	0.90 [0.59,1.37]	0.91 [0.59,1.39]	0.85 [0.55,1.32]	0.92 [0.60,1.41]	0.91 [0.59,1.40]	0.87 [0.56,1.36]
Socioeconomic deprivation: Quartile 1 (most advantaged)		1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
Quartile 2		1.35 [0.89,2.03]	1.34 [0.88,2.02]	1.34 [0.89,2.03]	1.33 [0.88,2.02]	1.32 [0.88,2.00]
Quartile 3		1.64* [1.11,2.43]	1.60* [1.08,2.38]	1.63* [1.10,2.41]	1.58* [1.07,2.34]	1.54* [1.04,2.29]
Quartile 4 (least advantaged)		1.99*** [1.35,2.93]	1.87** [1.26,2.76]	1.97*** [1.33,2.90]	1.89** [1.28,2.78]	1.78** [1.20,2.63]
Education level: College or University degree		1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
A levels/AS levels or equivalent		1.09 [0.71,1.68]	1.05 [0.69,1.62]	1.09 [0.71,1.68]	1.06 [0.69,1.63]	1.02 [0.67,1.57]
O levels/GCSEs/CSEs or equivalent		1.67*** [1.23,2.27]	1.53** [1.12,2.09]	1.67** [1.23,2.27]	1.58** [1.17,2.15]	1.45* [1.06,1.99]
Other		1.27 [0.83,1.93]	1.13 [0.74,1.74]	1.26 [0.83,1.92]	1.20 [0.79,1.83]	1.08 [0.70,1.65]
None of the above		2.20** [1.28,3.78]	1.89* [1.09,3.29]	2.18** [1.27,3.74]	2.05* [1.19,3.53]	1.76* [1.01,3.09]
Shiftwork: No			1.00 -			1.00 -
Yes			1.41* [1.04,1.91]			1.37* [1.01,1.86]
Occupation: Non-manual			1.00 -			1.00 -
Manual			1.41*			1.42*

			[1.03,1.91]			[1.05,1.93]
Job tenure (years): <=10			1.00			1.00
			-			-
11-20			1.21			1.22
			[0.91,1.59]			[0.93,1.61]
>20			0.71			0.72
			[0.48,1.05]			[0.49,1.06]
Working hours/week: <40			1.00			1.00
			-			-
40-45			0.98			0.96
			[0.73,1.31]			[0.72,1.29]
>45			1.08			1.05
			[0.75,1.54]			[0.74,1.51]
Number of chronic conditions: 0				1.00		1.00
				-		-
1				1.27		1.23
				[0.97,1.66]		[0.94,1.61]
2				0.98		0.92
				[0.64,1.49]		[0.60,1.41]
3				1.03		0.92
				[0.52,2.03]		[0.46,1.85]
4+				1.48		1.31
				[0.64,3.43]		[0.56,3.06]
Long-standing illness/disability: No				1.00		1.00
				-		-
Yes				1.08		1.06
				[0.78,1.47]		[0.77,1.45]
Body Mass Index category: Underweight (<18.5)					1.15	1.15
					[0.17,8.02]	[0.17,7.88]
Normal weight (18.5-24.9)					1.00	1.00
					-	-
Overweight (25.0-29.9)					1.46*	1.45*
					[1.09,1.96]	[1.07,1.95]
Obese (>=30.0)					1.75***	1.72**
					[1.27,2.40]	[1.24,2.39]
Smoking status: Never					1.00	1.00

					-	-
Previous					1.31 [1.00,1.74]	1.31 [0.99,1.73]
Current					1.00 [0.66,1.51]	0.96 [0.64,1.45]
Alcohol consumption: Daily or almost daily					1.00 -	1.00 -
Three or four times a week					0.88 [0.57,1.35]	0.88 [0.57,1.35]
Once or twice a week					0.97 [0.65,1.46]	0.96 [0.64,1.44]
One to three times a month					1.40 [0.90,2.17]	1.38 [0.89,2.14]
Special occasions only					1.08 [0.65,1.78]	1.04 [0.63,1.72]
Never (former drinker)					0.48 [0.17,1.38]	0.46 [0.16,1.32]
Never					1.08 [0.58,2.00]	1.03 [0.55,1.90]
Observations	120075	120075	120075	120075	120075	120075

CI=confidence interval; RR=risk ratio; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Model 1: Adjusted for age group, sex, ethnicity, country of birth; Model 2: Model 1 + socioeconomic deprivation quartile, education level; Model 3: Model 2 + shift work, manual work, job tenure, working hours; Model 4: Model 2 + number of chronic conditions, long-standing illness/disability; Model 5: Model 2 + BMI category, smoking status, alcohol consumption; Model 6: All covariates

Table S8: Risk of severe COVID-19 according to SOC2000 major occupational groups

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Severe COVID-19	RR	RR	RR	RR	RR	RR
	[95% CI]	[95% CI]	[95% CI]	[95% CI]	[95% CI]	[95% CI]
Occupation: Managers and Senior Officials	1.00	1.00	1.00	1.00	1.00	1.00
	-	-	-	-	-	-
Professional Occupations	1.36	1.47	1.49	1.47	1.51	1.53
	[0.85,2.18]	[0.91,2.36]	[0.92,2.41]	[0.91,2.36]	[0.94,2.43]	[0.95,2.48]
Associate Professional and Technical Occupations	3.19***	3.11***	2.73***	3.10***	3.15***	2.78***
	[2.10,4.85]	[2.05,4.72]	[1.77,4.23]	[2.04,4.71]	[2.08,4.79]	[1.79,4.29]
Administrative and Secretarial Occupations	1.24	1.14	1.22	1.14	1.17	1.24
	[0.73,2.12]	[0.67,1.95]	[0.71,2.11]	[0.67,1.94]	[0.68,2.00]	[0.72,2.15]
Skilled Trades Occupations	0.82	0.67	0.49	0.68	0.69	0.50
	[0.39,1.74]	[0.31,1.44]	[0.22,1.06]	[0.32,1.45]	[0.32,1.49]	[0.23,1.09]
Personal Service Occupations	2.73***	2.31**	1.75	2.29**	2.33**	1.77
	[1.56,4.76]	[1.32,4.03]	[0.99,3.10]	[1.32,4.00]	[1.34,4.06]	[1.00,3.13]
Sales and Customer Service Occupations	1.36	1.09	0.91	1.08	1.08	0.90
	[0.59,3.17]	[0.46,2.57]	[0.38,2.18]	[0.46,2.55]	[0.46,2.56]	[0.38,2.16]
Process, Plant and Machine Operatives	2.39**	1.82	1.25	1.81	1.81	1.26
	[1.31,4.36]	[0.99,3.34]	[0.66,2.36]	[0.99,3.33]	[0.99,3.34]	[0.67,2.37]
Elementary Occupations	1.76	1.29	0.87	1.28	1.31	0.89
	[0.92,3.34]	[0.65,2.53]	[0.43,1.75]	[0.65,2.52]	[0.67,2.59]	[0.44,1.79]
Age group (current): Under 55	1.00	1.00	1.00	1.00	1.00	1.00
	-	-	-	-	-	-
55-59	1.08	1.08	1.11	1.07	1.08	1.11
	[0.80,1.46]	[0.80,1.46]	[0.82,1.51]	[0.79,1.45]	[0.80,1.46]	[0.82,1.50]
60+	0.66*	0.66*	0.70*	0.65*	0.65*	0.68*
	[0.48,0.92]	[0.47,0.92]	[0.50,0.98]	[0.47,0.90]	[0.47,0.90]	[0.49,0.95]
Sex: Female	1.00	1.00	1.00	1.00	1.00	1.00
	-	-	-	-	-	-
Male	1.02	1.02	1.00	1.02	0.98	0.97
	[0.78,1.33]	[0.78,1.32]	[0.76,1.32]	[0.78,1.33]	[0.75,1.29]	[0.74,1.29]
Assessment centre: Manchester	0.69	0.68	0.70	0.68	0.69	0.72
	[0.36,1.30]	[0.36,1.29]	[0.37,1.34]	[0.36,1.30]	[0.36,1.32]	[0.38,1.37]
Oxford	0.66	0.71	0.73	0.71	0.74	0.76

	[0.33,1.32]	[0.36,1.43]	[0.37,1.46]	[0.36,1.43]	[0.37,1.48]	[0.38,1.53]
Stoke	0.59 [0.31,1.12]	0.63 [0.33,1.19]	0.63 [0.33,1.19]	0.63 [0.34,1.20]	0.63 [0.33,1.19]	0.63 [0.34,1.19]
Reading	0.37** [0.20,0.69]	0.43** [0.23,0.81]	0.44* [0.23,0.84]	0.43** [0.23,0.82]	0.44* [0.23,0.82]	0.45* [0.24,0.86]
Bury	0.46* [0.25,0.85]	0.48* [0.26,0.88]	0.49* [0.27,0.90]	0.48* [0.26,0.88]	0.48* [0.26,0.88]	0.49* [0.27,0.91]
Newcastle	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
Leeds	0.36*** [0.21,0.61]	0.37*** [0.22,0.63]	0.38*** [0.22,0.65]	0.37*** [0.22,0.64]	0.37*** [0.22,0.64]	0.39*** [0.23,0.66]
Bristol	0.23*** [0.12,0.42]	0.25*** [0.13,0.47]	0.26** [0.14,0.48]	0.25*** [0.13,0.47]	0.25*** [0.13,0.47]	0.26*** [0.14,0.49]
Barts	0.16*** [0.06,0.46]	0.14*** [0.05,0.40]	0.15*** [0.05,0.44]	0.14*** [0.05,0.41]	0.15*** [0.05,0.42]	0.16*** [0.06,0.46]
Nottingham	0.29*** [0.15,0.56]	0.30*** [0.16,0.59]	0.31*** [0.16,0.61]	0.30*** [0.16,0.59]	0.31*** [0.16,0.60]	0.32*** [0.16,0.61]
Sheffield	0.81 [0.50,1.29]	0.83 [0.52,1.33]	0.85 [0.53,1.37]	0.83 [0.52,1.33]	0.84 [0.52,1.34]	0.86 [0.54,1.38]
Liverpool	0.85 [0.53,1.36]	0.85 [0.53,1.36]	0.87 [0.55,1.39]	0.85 [0.53,1.36]	0.84 [0.52,1.34]	0.86 [0.54,1.37]
Middlesborough	0.45* [0.23,0.88]	0.47* [0.24,0.92]	0.48* [0.25,0.93]	0.47* [0.24,0.92]	0.46* [0.24,0.91]	0.47* [0.24,0.93]
Hounslow	0.30*** [0.16,0.55]	0.29*** [0.16,0.53]	0.30*** [0.17,0.56]	0.29*** [0.16,0.54]	0.30*** [0.16,0.55]	0.31*** [0.17,0.58]
Croydon	0.31*** [0.17,0.56]	0.30*** [0.17,0.54]	0.32*** [0.18,0.58]	0.30*** [0.17,0.55]	0.30*** [0.17,0.55]	0.33*** [0.18,0.59]
Birmingham	0.37** [0.20,0.67]	0.36*** [0.20,0.65]	0.38** [0.21,0.69]	0.36*** [0.20,0.65]	0.36*** [0.20,0.65]	0.38** [0.21,0.69]
Ethnicity: White British	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
White Irish	1.80 [0.96,3.39]	1.78 [0.95,3.35]	1.76 [0.94,3.30]	1.78 [0.95,3.34]	1.78 [0.95,3.36]	1.75 [0.93,3.29]
White Other	1.16 [0.58,2.31]	1.14 [0.57,2.29]	1.17 [0.58,2.35]	1.14 [0.57,2.28]	1.12 [0.56,2.25]	1.14 [0.57,2.29]
Mixed	1.36	1.28	1.26	1.28	1.24	1.23

	[0.43,4.25]	[0.41,4.00]	[0.40,3.94]	[0.41,4.00]	[0.40,3.88]	[0.39,3.86]
South Asian	4.41*** [2.47,7.89]	4.12*** [2.31,7.37]	4.10*** [2.29,7.35]	4.08*** [2.28,7.31]	4.14*** [2.32,7.37]	4.19*** [2.34,7.51]
Black	3.95*** [2.40,6.52]	3.39*** [2.05,5.59]	3.22*** [1.94,5.37]	3.37*** [2.04,5.55]	3.12*** [1.88,5.20]	3.01*** [1.80,5.05]
Other	1.57 [0.64,3.85]	1.48 [0.60,3.66]	1.38 [0.56,3.43]	1.47 [0.60,3.64]	1.50 [0.61,3.68]	1.42 [0.58,3.50]
Country of birth: UK & Ireland	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
Elsewhere	1.01 [0.66,1.53]	1.01 [0.66,1.55]	0.92 [0.59,1.43]	1.02 [0.67,1.56]	1.01 [0.66,1.55]	0.94 [0.60,1.46]
Socioeconomic deprivation: Quartile 1 (most advantaged)		1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
Quartile 2		1.34 [0.88,2.02]	1.32 [0.87,2.00]	1.33 [0.88,2.02]	1.32 [0.87,1.99]	1.31 [0.86,1.98]
Quartile 3		1.61* [1.09,2.39]	1.57* [1.06,2.34]	1.61* [1.08,2.38]	1.56* [1.06,2.31]	1.52* [1.03,2.25]
Quartile 4 (least advantaged)		1.92** [1.30,2.84]	1.81** [1.22,2.68]	1.90** [1.29,2.81]	1.83** [1.23,2.70]	1.72** [1.16,2.55]
Education level: College or University degree		1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
A levels/AS levels or equivalent		0.89 [0.58,1.36]	0.87 [0.56,1.33]	0.88 [0.57,1.36]	0.86 [0.56,1.32]	0.84 [0.55,1.29]
O levels/GCSEs/CSEs or equivalent		1.33 [0.97,1.82]	1.22 [0.89,1.67]	1.32 [0.96,1.82]	1.25 [0.91,1.71]	1.15 [0.84,1.58]
Other		1.32 [0.86,2.02]	1.15 [0.75,1.77]	1.31 [0.86,2.01]	1.25 [0.82,1.91]	1.09 [0.71,1.68]
None of the above		1.70 [0.97,2.98]	1.52 [0.87,2.67]	1.69 [0.96,2.96]	1.58 [0.90,2.79]	1.42 [0.81,2.50]
Shiftwork: No			1.00 -			1.00 -
Yes			1.78*** [1.31,2.42]			1.74*** [1.28,2.36]
Occupation: Non-manual			1.00 -			1.00 -
Manual			1.79***			1.82***

			[1.29,2.50]			[1.31,2.53]
Job tenure (years): <=10			1.00			1.00
			-			-
11-20			1.20			1.22
			[0.91,1.58]			[0.92,1.61]
>20			0.72			0.73
			[0.49,1.07]			[0.49,1.08]
Working hours/week: <40			1.00			1.00
			-			-
40-45			0.91			0.90
			[0.68,1.23]			[0.67,1.22]
>45			1.11			1.09
			[0.77,1.58]			[0.76,1.56]
Number of chronic conditions: 0				1.00		1.00
				-		-
1				1.26		1.22
				[0.96,1.65]		[0.93,1.60]
2				1.00		0.94
				[0.66,1.52]		[0.61,1.44]
3				1.04		0.95
				[0.53,2.07]		[0.47,1.91]
4+				1.51		1.34
				[0.65,3.50]		[0.57,3.14]
Long-standing illness/disability: No				1.00		1.00
				-		-
Yes				1.07		1.05
				[0.78,1.47]		[0.77,1.44]
Body Mass Index category: Underweight (<18.5)					1.06	1.08
					[0.15,7.45]	[0.15,7.55]
Normal weight (18.5-24.9)					1.00	1.00
					-	-
Overweight (25.0-29.9)					1.44*	1.42*
					[1.07,1.93]	[1.05,1.91]
Obese (>=30.0)					1.68**	1.65**
					[1.23,2.31]	[1.19,2.29]
Smoking status: Never					1.00	1.00

					-	-
Previous					1.29 [0.98,1.71]	1.29 [0.97,1.70]
Current					0.96 [0.64,1.45]	0.93 [0.62,1.40]
Alcohol consumption: Daily or almost daily					1.00 -	1.00 -
Three or four times a week					0.90 [0.58,1.38]	0.89 [0.58,1.36]
Once or twice a week					0.97 [0.65,1.46]	0.96 [0.64,1.45]
One to three times a month					1.44 [0.92,2.23]	1.39 [0.89,2.16]
Special occasions only					1.09 [0.66,1.80]	1.03 [0.62,1.70]
Never (former drinker)					0.51 [0.18,1.46]	0.49 [0.17,1.39]
Never					1.14 [0.61,2.11]	1.06 [0.57,1.96]
Observations	120075	120075	120075	120075	120075	120075

CI=confidence interval; RR=risk ratio; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Model 1: Adjusted for age group, sex, ethnicity, country of birth; Model 2: Model 1 + socioeconomic deprivation quartile, education level; Model 3: Model 2 + shift work, manual work, job tenure, working hours; Model 4: Model 2 + number of chronic conditions, long-standing illness/disability; Model 5: Model 2 + BMI category, smoking status, alcohol consumption; Model 6: All covariates

Table S9: Risk of severe COVID-19 according to broad race/occupation groups

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Severe COVID-19	RR	RR	RR	RR	RR	RR
	[95% CI]	[95% CI]	[95% CI]	[95% CI]	[95% CI]	[95% CI]
Race/occupation group:	1.00	1.00	1.00	1.00	1.00	1.00
White (non-essential worker)	-	-	-	-	-	-
Non-white (non-essential worker)	3.27*** [1.90,5.62]	3.04*** [1.77,5.20]	2.98*** [1.73,5.13]	3.03*** [1.77,5.18]	2.98*** [1.73,5.11]	2.95*** [1.71,5.09]
White (essential worker)	3.47*** [2.63,4.59]	3.40*** [2.58,4.48]	3.01*** [2.27,3.99]	3.39*** [2.58,4.46]	3.36*** [2.55,4.43]	2.99*** [2.25,3.96]
Non-white (essential worker)	8.34*** [5.17,13.47]	7.37*** [4.56,11.92]	6.36*** [3.89,10.40]	7.34*** [4.53,11.88]	7.08*** [4.40,11.41]	6.19*** [3.80,10.09]
Age group (current): Under 55	1.00	1.00	1.00	1.00	1.00	1.00
55-59	-	-	-	-	-	-
60+	1.06 [0.78,1.43]	1.06 [0.78,1.43]	1.08 [0.80,1.47]	1.05 [0.78,1.42]	1.06 [0.78,1.43]	1.08 [0.80,1.46]
Sex: Female	0.63** [0.45,0.87]	0.63** [0.45,0.88]	0.67* [0.48,0.93]	0.62** [0.45,0.87]	0.62** [0.45,0.87]	0.65* [0.46,0.90]
Male	1.00	1.00	1.00	1.00	1.00	1.00
Assessment centre: Manchester	-	-	-	-	-	-
Oxford	1.13 [0.88,1.44]	1.10 [0.86,1.41]	1.06 [0.81,1.39]	1.10 [0.86,1.42]	1.06 [0.82,1.36]	1.03 [0.78,1.36]
Stoke	0.75 [0.40,1.41]	0.74 [0.39,1.40]	0.75 [0.40,1.42]	0.74 [0.39,1.40]	0.75 [0.39,1.42]	0.77 [0.40,1.46]
Reading	0.72 [0.36,1.45]	0.78 [0.39,1.56]	0.79 [0.39,1.58]	0.78 [0.39,1.57]	0.81 [0.40,1.62]	0.82 [0.41,1.65]
Bury	0.60 [0.31,1.13]	0.63 [0.33,1.18]	0.62 [0.33,1.18]	0.63 [0.33,1.19]	0.62 [0.33,1.17]	0.62 [0.33,1.18]
Newcastle	0.41** [0.22,0.76]	0.48* [0.25,0.90]	0.48* [0.26,0.91]	0.48* [0.25,0.91]	0.48* [0.25,0.91]	0.49* [0.26,0.93]
Leeds	0.48* [0.26,0.89]	0.50* [0.27,0.91]	0.50* [0.27,0.92]	0.50* [0.27,0.91]	0.50* [0.27,0.92]	0.50* [0.27,0.93]
	1.00	1.00	1.00	1.00	1.00	1.00
	-	-	-	-	-	-
	0.38***	0.39***	0.40***	0.39***	0.39***	0.40***

	[0.22,0.64]	[0.23,0.67]	[0.23,0.68]	[0.23,0.67]	[0.23,0.67]	[0.23,0.68]
Bristol	0.24*** [0.13,0.45]	0.26*** [0.14,0.49]	0.26*** [0.14,0.50]	0.26*** [0.14,0.49]	0.26*** [0.14,0.49]	0.27*** [0.14,0.50]
Barts	0.19** [0.07,0.54]	0.17*** [0.06,0.48]	0.18** [0.06,0.51]	0.17*** [0.06,0.49]	0.18** [0.06,0.50]	0.19** [0.07,0.53]
Nottingham	0.30*** [0.15,0.58]	0.31*** [0.16,0.61]	0.32*** [0.16,0.62]	0.32*** [0.16,0.61]	0.32*** [0.16,0.61]	0.32*** [0.17,0.62]
Sheffield	0.81 [0.50,1.30]	0.83 [0.52,1.33]	0.85 [0.53,1.35]	0.83 [0.52,1.33]	0.84 [0.52,1.34]	0.85 [0.53,1.37]
Liverpool	0.86 [0.54,1.36]	0.85 [0.53,1.36]	0.87 [0.54,1.38]	0.85 [0.54,1.36]	0.84 [0.52,1.34]	0.86 [0.54,1.37]
Middlesborough	0.44* [0.22,0.86]	0.45* [0.23,0.88]	0.45* [0.23,0.88]	0.45* [0.23,0.88]	0.44* [0.23,0.87]	0.45* [0.23,0.88]
Hounslow	0.37** [0.20,0.68]	0.36** [0.19,0.66]	0.37** [0.20,0.68]	0.36** [0.19,0.67]	0.37** [0.20,0.68]	0.38** [0.20,0.70]
Croydon	0.36*** [0.20,0.65]	0.35*** [0.19,0.63]	0.36*** [0.20,0.66]	0.35*** [0.19,0.64]	0.34*** [0.19,0.63]	0.36*** [0.20,0.66]
Birmingham	0.41** [0.23,0.75]	0.40** [0.22,0.72]	0.42** [0.23,0.76]	0.40** [0.22,0.73]	0.40** [0.22,0.71]	0.41** [0.23,0.75]
Country of birth: UK & Ireland	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
Elsewhere	1.06 [0.71,1.58]	1.07 [0.71,1.60]	0.99 [0.65,1.51]	1.07 [0.72,1.61]	1.07 [0.71,1.62]	1.02 [0.67,1.55]
Socioeconomic deprivation: Quartile 1 (most advantaged)		1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
Quartile 2		1.34 [0.89,2.03]	1.32 [0.87,2.00]	1.34 [0.88,2.02]	1.32 [0.88,2.00]	1.31 [0.86,1.98]
Quartile 3		1.60* [1.08,2.37]	1.55* [1.04,2.29]	1.59* [1.07,2.35]	1.55* [1.05,2.29]	1.50* [1.01,2.22]
Quartile 4 (least advantaged)		1.86** [1.26,2.73]	1.72** [1.17,2.55]	1.84** [1.25,2.70]	1.77** [1.20,2.61]	1.65* [1.11,2.45]
Education level: College or University degree		1.00 -	1.00 -	1.00 -	1.00 -	1.00 -
A levels/AS levels or equivalent		0.99 [0.65,1.51]	0.92 [0.60,1.40]	0.98 [0.65,1.50]	0.95 [0.62,1.45]	0.89 [0.58,1.35]
O levels/GCSEs/CSEs or equivalent		1.29	1.12	1.29	1.21	1.06

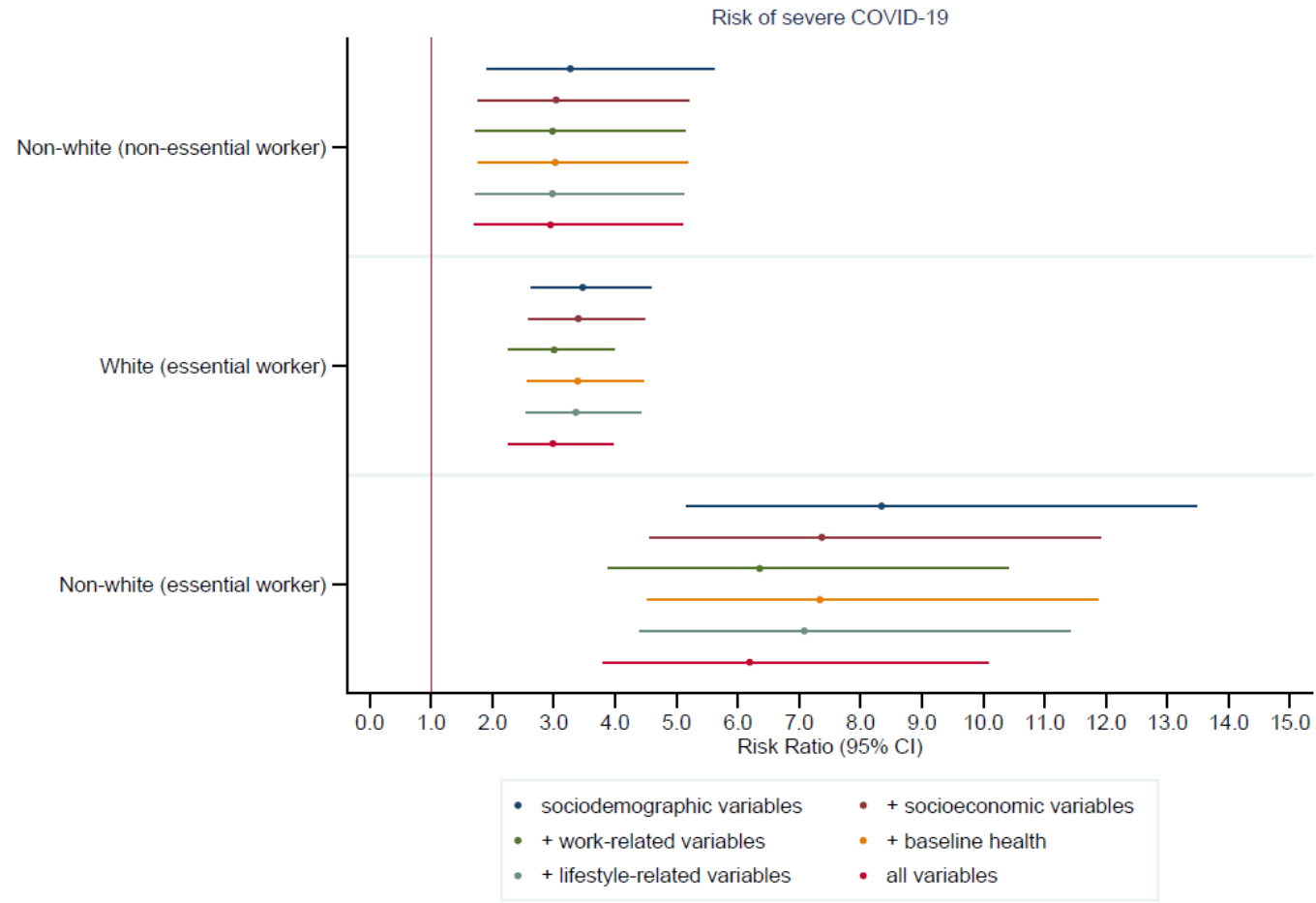
		[0.97,1.71]	[0.83,1.51]	[0.97,1.71]	[0.91,1.61]	[0.79,1.43]
Other		1.33 [0.89,2.00]	1.12 [0.74,1.71]	1.33 [0.88,2.00]	1.25 [0.83,1.89]	1.06 [0.70,1.62]
None of the above		1.32 [0.79,2.21]	1.11 [0.65,1.89]	1.31 [0.79,2.20]	1.24 [0.73,2.09]	1.04 [0.60,1.79]
Shiftwork: No			1.00 -			1.00 -
Yes			1.68*** [1.25,2.24]			1.63** [1.22,2.19]
Occupation: Non-manual			1.00 -			1.00 -
Manual			1.38* [1.02,1.87]			1.40* [1.03,1.89]
Job tenure (years): <=10			1.00 -			1.00 -
11-20			1.25 [0.94,1.65]			1.26 [0.96,1.67]
>20			0.78 [0.53,1.15]			0.78 [0.53,1.16]
Working hours/week: <40			1.00 -			1.00 -
40-45			0.91 [0.68,1.22]			0.90 [0.67,1.21]
>45			0.98 [0.69,1.39]			0.96 [0.67,1.36]
Number of chronic conditions: 0				1.00 -		1.00 -
1				1.26 [0.96,1.65]		1.22 [0.93,1.60]
2				0.99 [0.65,1.50]		0.93 [0.61,1.43]
3				1.05 [0.53,2.07]		0.95 [0.48,1.91]
4+				1.49 [0.64,3.48]		1.34 [0.57,3.13]
Long-standing illness/disability: No				1.00		1.00

				-		-
Yes				1.07 [0.78,1.47]		1.05 [0.77,1.44]
Body Mass Index category: Underweight (<18.5)					1.05 [0.15,7.50]	1.03 [0.15,7.30]
Normal weight (18.5-24.9)					1.00 -	1.00 -
Overweight (25.0-29.9)					1.44* [1.07,1.93]	1.43* [1.06,1.92]
Obese (>=30.0)					1.66** [1.21,2.28]	1.62** [1.17,2.25]
Smoking status: Never					1.00 -	1.00 -
Previous					1.28 [0.97,1.69]	1.27 [0.96,1.68]
Current					0.93 [0.62,1.40]	0.89 [0.60,1.34]
Alcohol consumption: Daily or almost daily					1.00 -	1.00 -
Three or four times a week					0.91 [0.60,1.40]	0.90 [0.59,1.39]
Once or twice a week					0.96 [0.64,1.44]	0.94 [0.63,1.41]
One to three times a month					1.38 [0.89,2.13]	1.33 [0.86,2.06]
Special occasions only					1.03 [0.62,1.69]	0.97 [0.59,1.60]
Never (former drinker)					0.48 [0.17,1.36]	0.45 [0.16,1.29]
Never					1.15 [0.62,2.12]	1.08 [0.59,2.00]
Observations	120075	120075	120075	120075	120075	120075

CI=confidence interval; RR=risk ratio; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Model 1: Adjusted for age group, sex, country of birth; Model 2: Model 1 + socioeconomic deprivation quartile, education level; Model 3: Model 2 + shift work, manual work, job tenure, working hours; Model 4: Model 2 + number of chronic conditions, long-standing illness/disability; Model 5: Model 2 + BMI category, smoking status, alcohol consumption; Model 6: All covariates

Figure S2: Risk of severe COVID-19 by broad race/occupation groups



Reference: White (non-essential worker)