

Effect on ethnicity on outcome after Covid-19 (report to SAGE and NERVTAG)

[OFFICIAL-SENSITIVE PROTECT]

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Number of patients by ethnicity

All results in this report exclude patients admitted in most recent 2 weeks.

Ethnic groups collected are East Asian, South Asian, West Asian, Black, White, Arab, Latin American, and Aboriginal/First Nations. For the purposes of this analysis, these are collapsed to Asian, Black, White, and Other, based on frequency.

		All patients
Ethnicity	Asian	542 (5.6)
	Black	417 (4.3)
	White	8063 (82.9)
	Other	700 (7.2)

Variation in age, sex, and comorbidities by ethnic group

Non-white ethnic groups are younger and more likely to have diabetes. Non-white ethnic groups were less likely to have other comorbidities such as cardiorespiratory disease and chronic neurological disease/dementia.

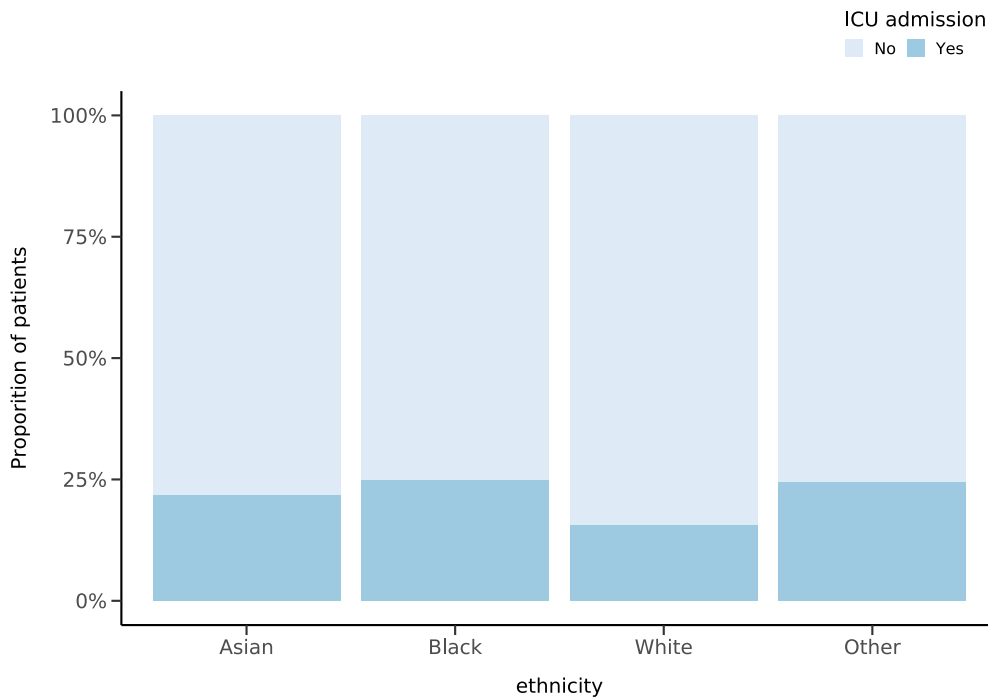
label	levels	Asian	Black	White	Other	p
Age on admission (years)	<50	148 (29.2)	109 (28.2)	884 (11.5)	197 (30.5)	<0.001
	50-69	211 (41.6)	158 (40.9)	2179 (28.3)	236 (36.5)	
	70-79	80 (15.8)	48 (12.4)	1940 (25.2)	113 (17.5)	
	80+	68 (13.4)	71 (18.4)	2694 (35.0)	100 (15.5)	
Sex at Birth	Male	328 (60.5)	227 (54.8)	4846 (60.3)	414 (59.6)	0.175
	Female	214 (39.5)	187 (45.2)	3195 (39.7)	281 (40.4)	
Obesity	No	418 (91.7)	317 (88.3)	6084 (90.0)	543 (91.3)	0.314
	Yes	38 (8.3)	42 (11.7)	677 (10.0)	52 (8.7)	
Diabetes	No	306 (61.8)	234 (60.2)	5594 (75.3)	437 (67.5)	<0.001
	Yes	189 (38.2)	155 (39.8)	1837 (24.7)	210 (32.5)	
Chronic cardiac disease	No	379 (76.9)	320 (84.0)	5052 (67.9)	519 (81.3)	<0.001
	Yes	114 (23.1)	61 (16.0)	2383 (32.1)	119 (18.7)	
Chronic pulmonary disease	No	441 (91.1)	350 (92.6)	5951 (80.4)	586 (92.0)	<0.001
	Yes	43 (8.9)	28 (7.4)	1452 (19.6)	51 (8.0)	
Asthma	No	422 (86.3)	334 (87.9)	6245 (84.8)	542 (84.3)	0.312
	Yes	67 (13.7)	46 (12.1)	1117 (15.2)	101 (15.7)	
Chronic kidney disease	No	427 (87.1)	319 (83.7)	6201 (84.2)	568 (89.7)	0.001
	Yes	63 (12.9)	62 (16.3)	1161 (15.8)	65 (10.3)	

label	levels	Asian	Black	White	Other	p
Moderate/severe liver disease	No	478 (98.2)	368 (97.1)	7186 (98.4)	619 (98.1)	0.284
	Yes	9 (1.8)	11 (2.9)	118 (1.6)	12 (1.9)	
Mild Liver disease	No	480 (98.6)	370 (98.4)	7183 (98.5)	617 (97.9)	0.734
	Yes	7 (1.4)	6 (1.6)	109 (1.5)	13 (2.1)	
Chronic neurological disorder	No	450 (92.0)	348 (92.3)	6523 (89.3)	584 (92.4)	0.007
	Yes	39 (8.0)	29 (7.7)	783 (10.7)	48 (7.6)	
Malignancy	No	465 (95.3)	345 (91.3)	6538 (89.8)	585 (92.4)	<0.001
	Yes	23 (4.7)	33 (8.7)	740 (10.2)	48 (7.6)	
Chronic hematologic disease	No	467 (95.7)	351 (92.1)	6993 (96.1)	613 (97.1)	0.001
	Yes	21 (4.3)	30 (7.9)	282 (3.9)	18 (2.9)	
AIDS/HIV	No	477 (99.2)	364 (97.3)	7221 (99.6)	621 (99.4)	<0.001
	Yes	4 (0.8)	10 (2.7)	31 (0.4)	4 (0.6)	
Rheumatologic disorder	No	456 (95.0)	356 (93.7)	6497 (89.6)	591 (93.5)	<0.001
	Yes	24 (5.0)	24 (6.3)	756 (10.4)	41 (6.5)	
Dementia	No	461 (95.8)	360 (94.2)	6346 (86.6)	593 (94.1)	<0.001
	Yes	20 (4.2)	22 (5.8)	979 (13.4)	37 (5.9)	
Malnutrition	No	463 (98.7)	361 (98.6)	6807 (97.7)	595 (98.2)	0.301
	Yes	6 (1.3)	5 (1.4)	159 (2.3)	11 (1.8)	
Smoking	Yes	11 (2.6)	9 (2.8)	354 (5.9)	26 (4.8)	<0.001
	Never Smoked	361 (84.3)	268 (84.0)	3519 (58.8)	425 (78.1)	
	Former Smoker	56 (13.1)	42 (13.2)	2110 (35.3)	93 (17.1)	
Immunosuppression medication prior to Covid-19	No	439 (90.7)	329 (87.7)	6301 (89.2)	574 (90.7)	0.351
	Yes	45 (9.3)	46 (12.3)	762 (10.8)	59 (9.3)	
Treatment for infection prior to Covid-19	No	394 (81.7)	305 (81.8)	5724 (81.0)	514 (81.5)	0.943
	Yes	88 (18.3)	68 (18.2)	1347 (19.0)	117 (18.5)	
Deprivation (IMD)	Mean (SD)	68.8 (60.5)	78.8 (54.0)	83.0 (58.4)	87.2 (59.2)	<0.001

Ethnicity and HDU/ITU admission

On raw numbers, the white ethnic group are less likely to be admitted to ICU, compared to others. This does not account for other differences between groups, such as age and comorbidities.

Any admission to HDU/ICU during admission		No	Yes	p
Ethnicity	Asian	400 (78.3)	111 (21.7)	<0.001
	Black	298 (75.3)	98 (24.7)	
	White	6386 (84.5)	1172 (15.5)	
	Other	507 (75.7)	163 (24.3)	



Predictors of HDU/ICU admission

After adjusting for other patients factors associated with HDU/ICU admission, those in the black ethnic group were more likely to be admitted to HDU/ICU compared to those in the white group.

Any admission to HDU/ICU during admission		No	Yes	OR (univariable)	OR (multivariable)
Ethnicity	White	6386 (84.1)	1172 (75.9)	•	•
	Asian	400 (5.3)	111 (7.2)	1.51 (1.21-1.88, p<0.001)	1.08 (0.83-1.39, p=0.577)
	Black	298 (3.9)	98 (6.3)	1.79 (1.41-2.26, p<0.001)	1.39 (1.04-1.84, p=0.025)
	Other	507 (6.7)	163 (10.6)	1.75 (1.45-2.11, p<0.001)	1.13 (0.89-1.43, p=0.293)
Age on admission (years)	<50	1163 (14.2)	315 (18.8)	•	•
	50-69	2165 (26.5)	845 (50.5)	1.44 (1.24-1.67, p<0.001)	1.67 (1.39-2.00, p<0.001)
	70-79	1940 (23.7)	367 (21.9)	0.70 (0.59-0.83, p<0.001)	1.04 (0.84-1.29, p=0.711)
	80+	2915 (35.6)	145 (8.7)	0.18 (0.15-0.23, p<0.001)	0.35 (0.26-0.45, p<0.001)
Sex at Birth	Male	4954 (57.9)	1261 (70.8)	•	•
	Female	3595 (42.1)	521 (29.2)	0.57 (0.51-0.64, p<0.001)	0.56 (0.49-0.65, p<0.001)
Obesity	No	6674 (91.4)	1257 (82.8)	•	•
	Yes	625 (8.6)	262 (17.2)	2.23 (1.90-2.60, p<0.001)	1.74 (1.43-2.10, p<0.001)

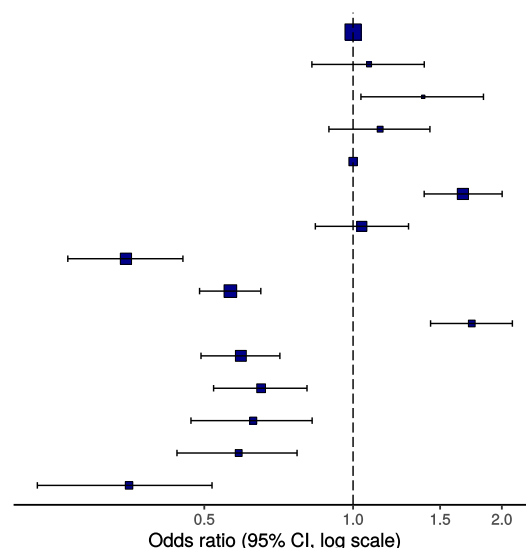
Any admission to HDU/ICU during admission		No	Yes	OR (univariable)	OR (multivariable)
Diabetes	No	5860 (73.4)	1244 (74.0)	•	•
	Yes	2128 (26.6)	436 (26.0)	0.97 (0.86-1.09, p=0.562)	•
Chronic cardiac disease	No	5439 (68.0)	1371 (82.2)	•	•
	Yes	2560 (32.0)	296 (17.8)	0.46 (0.40-0.52, p<0.001)	0.59 (0.49-0.71, p<0.001)
Chronic pulmonary disease	No	6476 (81.5)	1477 (89.0)	•	•
	Yes	1472 (18.5)	183 (11.0)	0.55 (0.46-0.64, p<0.001)	0.65 (0.52-0.81, p<0.001)
Asthma	No	6784 (85.7)	1378 (82.9)	•	•
	Yes	1128 (14.3)	285 (17.1)	1.24 (1.08-1.43, p=0.003)	•
Chronic kidney disease	No	6641 (84.0)	1506 (90.7)	•	•
	Yes	1261 (16.0)	154 (9.3)	0.54 (0.45-0.64, p<0.001)	•
Moderate/severe liver disease	No	7711 (98.4)	1622 (98.6)	•	•
	Yes	129 (1.6)	23 (1.4)	0.85 (0.53-1.30, p=0.468)	•
Mild Liver disease	No	7697 (98.4)	1624 (98.9)	•	•
	Yes	129 (1.6)	18 (1.1)	0.66 (0.39-1.06, p=0.102)	•
Chronic neurological disorder	No	6965 (88.7)	1552 (94.7)	•	•
	Yes	888 (11.3)	87 (5.3)	0.44 (0.35-0.55, p<0.001)	0.63 (0.47-0.83, p=0.001)
Malignancy	No	7006 (89.4)	1545 (94.4)	•	•
	Yes	829 (10.6)	92 (5.6)	0.50 (0.40-0.63, p<0.001)	0.59 (0.44-0.77, p<0.001)
Chronic hematologic disease	No	7488 (95.8)	1598 (97.5)	•	•
	Yes	332 (4.2)	41 (2.5)	0.58 (0.41-0.79, p=0.001)	•
AIDS/HIV	No	7766 (99.5)	1608 (98.9)	•	•
	Yes	36 (0.5)	18 (1.1)	2.41 (1.34-4.20, p=0.002)	•
Rheumatologic disorder	No	7030 (90.1)	1514 (92.5)	•	•

Any admission to HDU/ICU during admission		No	Yes	OR (univariable)	OR (multivariable)
	Yes	774 (9.9)	123 (7.5)	0.74 (0.60-0.90, p=0.003)	•
Dementia	No	6774 (86.1)	1605 (97.6)	•	•
	Yes	1094 (13.9)	39 (2.4)	0.15 (0.11-0.21, p<0.001)	0.35 (0.23-0.52, p<0.001)
Malnutrition	No	7328 (97.7)	1549 (98.9)	•	•
	Yes	176 (2.3)	18 (1.1)	0.48 (0.29-0.77, p=0.004)	•
Smoking	Yes	367 (5.7)	71 (5.0)	•	•
	Never Smoked	4071 (63.2)	928 (65.2)	1.18 (0.91-1.55, p=0.223)	•
	Former Smoker	2008 (31.2)	424 (29.8)	1.09 (0.83-1.45, p=0.533)	•
Immunosuppression medication prior to Covid-19	No	6867 (89.4)	1407 (89.8)	•	•
	Yes	813 (10.6)	160 (10.2)	0.96 (0.80-1.15, p=0.659)	•
Treatment for infection prior to Covid-19	No	6263 (81.6)	1257 (79.9)	•	•
	Yes	1409 (18.4)	316 (20.1)	1.12 (0.97-1.28, p=0.110)	•
Deprivation (IMD, centred/normalised)	Mean (SD)	-0.0 (1.0)	-0.1 (1.0)	0.96 (0.91-1.01, p=0.129)	0.96 (0.90-1.03, p=0.226)

Number in dataframe = 11181, Number in model = 7080, Missing = 4101, AIC = 5675, C-statistic = 0.734, H&L = Chi-sq(8) 19.07 (p=0.015)

Any admission to HDU/ICU during admission

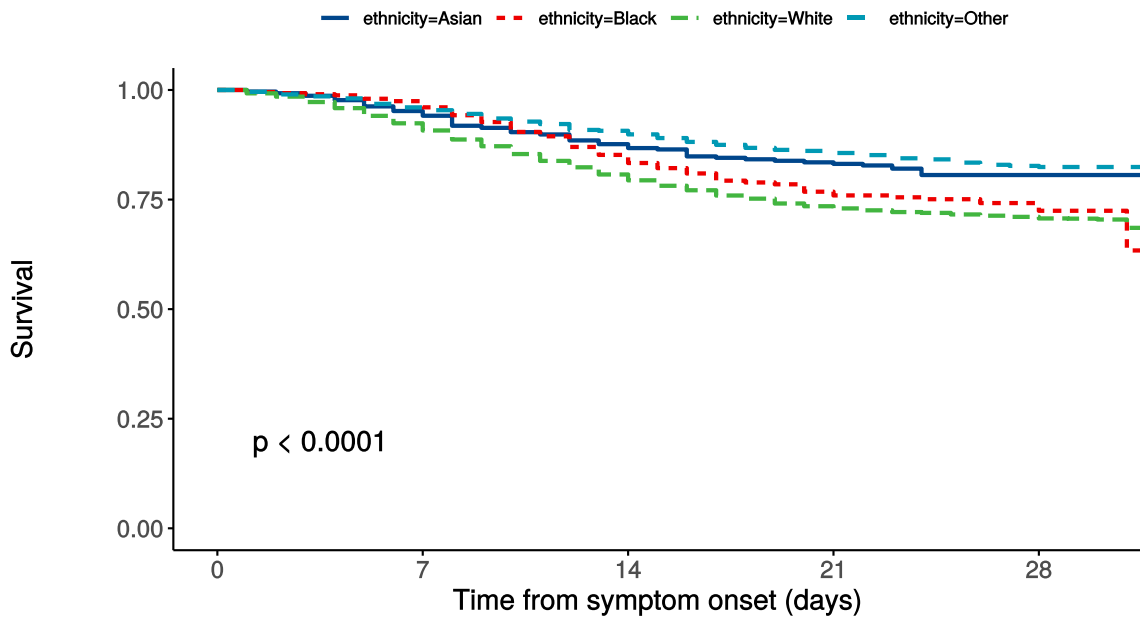
Ethnicity	White	-
	Asian	1.08 (0.83-1.39, p=0.577)
	Black	1.39 (1.04-1.84, p=0.025)
	Other	1.13 (0.89-1.43, p=0.293)
Age on admission (years)	<50	-
	50-69	1.67 (1.39-2.00, p<0.001)
	70-79	1.04 (0.84-1.29, p=0.711)
	80+	0.35 (0.26-0.45, p<0.001)
Sex at Birth	Female	0.56 (0.49-0.65, p<0.001)
Obesity	Yes	1.74 (1.43-2.10, p<0.001)
Chronic cardiac disease	Yes	0.59 (0.49-0.71, p<0.001)
Chronic pulmonary disease	Yes	0.65 (0.52-0.81, p<0.001)
Chronic neurological disorder	Yes	0.63 (0.47-0.83, p=0.001)
Malignancy	Yes	0.59 (0.44-0.77, p<0.001)
Dementia	Yes	0.35 (0.23-0.52, p<0.001)



Ethnicity and survival from Covid-19

Kaplan Meier analysis for death in those diagnosed with Covid-19 stratified by ethnicity

Looking at ethnicity in isolation, non-white ethnic groups have the same or better survival than the white ethnic group.



Number at risk

	0	7	14	21	28
ethnicity=Asian	542	441	294	236	215
ethnicity=Black	417	347	230	181	169
ethnicity=White	8063	6273	4113	3253	2951
ethnicity=Other	700	590	446	363	328

Ethnicity and other risk factors for death from Covid-19

There was an association between being in the black ethnic group and death from Covid-19, after adjustment for other factors. The evidence for this association was moderately strong. No association between white ethnicity and death was seen after adjustment. No association was seen in the Asian and Other group.

			HR (univariable)	HR (multivariable)
Ethnicity	White	8063 (82.9)	•	•
	Asian	542 (5.6)	0.64 (0.51-0.80, $p < 0.001$)	0.99 (0.74-1.32, $p = 0.948$)
	Black	417 (4.3)	0.85 (0.68-1.06, $p = 0.157$)	1.44 (1.10-1.87, $p = 0.007$)
	Other	700 (7.2)	0.55 (0.45-0.68, $p < 0.001$)	0.93 (0.73-1.18, $p = 0.533$)
Age on admission (years)	<50	1593 (15.0)	•	•
	50-69	3231 (30.5)	3.69 (2.79-4.87, $p < 0.001$)	4.05 (2.81-5.83, $p < 0.001$)
	70-79	2478 (23.4)	9.46 (7.22-12.40, $p < 0.001$)	9.49 (6.62-13.61, $p < 0.001$)
	80+	3287 (31.0)	13.37 (10.24-17.45, $p < 0.001$)	12.41 (8.66-17.77, $p < 0.001$)
Sex at Birth	Male	6674 (60.2)	•	•
	Female	4413 (39.8)	0.86 (0.79-0.94, $p = 0.001$)	0.82 (0.74-0.92, $p < 0.001$)
Obesity	No	8302 (90.1)	•	•
	Yes	915 (9.9)	1.01 (0.87-1.17, $p = 0.923$)	1.34 (1.12-1.61, $p = 0.001$)

			HR (univariable)	HR (multivariable)
Diabetes	No	7450 (73.6)	•	•
	Yes	2676 (26.4)	1.34 (1.22-1.47, p<0.001)	1.02 (0.91-1.14, p=0.744)
Chronic cardiac disease	No	7138 (70.5)	•	•
	Yes	2983 (29.5)	2.04 (1.87-2.22, p<0.001)	1.25 (1.12-1.39, p<0.001)
Chronic pulmonary disease	No	8311 (82.5)	•	•
	Yes	1758 (17.5)	1.70 (1.54-1.88, p<0.001)	1.20 (1.06-1.35, p=0.004)
Asthma	No	8520 (85.0)	•	•
	Yes	1506 (15.0)	0.69 (0.60-0.79, p<0.001)	•
Chronic kidney disease	No	8543 (85.4)	•	•
	Yes	1466 (14.6)	1.91 (1.72-2.12, p<0.001)	1.23 (1.08-1.40, p=0.002)
Moderate/severe liver disease	No	9769 (98.3)	•	•
	Yes	164 (1.7)	1.30 (0.95-1.78, p=0.101)	1.66 (1.16-2.36, p=0.005)
Mild Liver disease	No	9759 (98.4)	•	•
	Yes	155 (1.6)	0.68 (0.44-1.04, p=0.077)	•
Chronic neurological disorder	No	8917 (89.8)	•	•
	Yes	1014 (10.2)	1.72 (1.52-1.95, p<0.001)	•
Malignancy	No	8964 (90.4)	•	•
	Yes	949 (9.6)	1.67 (1.47-1.89, p<0.001)	1.22 (1.05-1.42, p=0.009)
Chronic hematologic disease	No	9515 (96.1)	•	•
	Yes	384 (3.9)	1.69 (1.40-2.02, p<0.001)	•
AIDS/HIV	No	9814 (99.5)	•	•
	Yes	54 (0.5)	1.18 (0.69-1.99, p=0.547)	•
Rheumatologic disorder	No	8949 (90.6)	•	•
	Yes	925 (9.4)	1.41 (1.24-1.61, p<0.001)	•
Dementia	No	8769 (88.1)	•	•

			HR (univariable)	HR (multivariable)
	Yes	1182 (11.9)	2.40 (2.15-2.68, p<0.001)	1.48 (1.30-1.70, p<0.001)
Malnutrition	No	9289 (97.9)	•	•
	Yes	199 (2.1)	1.74 (1.35-2.24, p<0.001)	•
Smoking	Yes	458 (5.6)	•	•
	Never Smoked	5188 (63.5)	0.91 (0.73-1.14, p=0.417)	•
	Former Smoker	2525 (30.9)	1.32 (1.05-1.64, p=0.016)	•
Immunosuppression medication prior to Covid-19	No	8602 (89.5)	•	•
	Yes	1011 (10.5)	1.16 (1.02-1.33, p=0.028)	•
Treatment for infection prior to Covid-19	No	7815 (81.3)	•	•
	Yes	1801 (18.7)	1.15 (1.03-1.28, p=0.014)	•
Deprivation (IMD, centred/normalised)	Mean (SD)	-0.0 (1.0)	1.13 (1.08-1.18, p<0.001)	1.08 (1.03-1.14, p=0.003)

Number in dataframe = 11181, Number in model = 7363, Missing = 3818, Number of events = 1487, Concordance = 0.720 (SE = 0.006), R-squared = 0.115 (Max possible = 0.966), Likelihood ratio test = 898.292 (df = 16, p = 0.000)

Survival: Hazard ratio (95% confidence interval)

Ethnicity	Hazard Ratio	95% CI	p-value
Asian	0.99	(0.74-1.32)	p=0.948
Black	1.44	(1.10-1.87)	p=0.007
White	-	-	-
Other	0.93	(0.73-1.18)	p=0.533

