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Appendix: Search strategy

PubMed

("COVID-19"[Supplementary Concept] OR "severe acute respiratory syndrome coronavirus 2"[Supplementary Concept] OR (("Coronavirus"[MeSH Terms] OR "Coronavirus Infections"[Mesh:NoExp] OR pneumonia virus*[tiab] OR cov[tiab]) AND (outbreak[tiab] OR wuhan[tiab] OR novel[all] OR 19[tiab] OR 2019[tiab] OR epidem*[tiab] OR epidemy[all] OR epidemic*[all] OR pandem*[all] OR new[tiab])) OR coronavirus*[tiab] OR corona virus*[tiab] OR ncov[tiab] OR 2019ncov[tiab] OR covid19[tiab] OR "covid 19"[tiab] OR "sars cov 2"[tiab] OR sars2[tiab] OR "ncov 2019"[tiab] OR "sars coronavirus 2"[tiab] OR "sars corona virus 2"[tiab] OR "severe acute respiratory syndrome cov 2"[tiab] OR "severe acute respiratory syndrome cov2"[tiab] OR severe acute respiratory syndrome cov*[tiab] OR cov2[tiab]) AND ("2019/12"[Date - Entrez] : "3000"[Date - Entrez])

Embase Ovid

- 1 exp Coronavirus/
- 2 exp Coronavirus Infections/
- 3 (coronavirus* or corona virus* or OC43 or NL63 or 229E or HKU1 or HCoV* or ncov* or covid* or sars-cov* or sarscov* or Sars-coronavirus* or Severe Acute Respiratory Syndrome Coronavirus*).mp.
- 4 (or/1-3) and 20190101:20301231.(dc). [this set is the sensitive/broad part of the search]
- 5 4 not (SARS or SARS-CoV or MERS or MERS-CoV or Middle East respiratory syndrome or camel* or dromedar* or equine or coronary or coronal or covidence* or covidien or influenza virus or HIV or bovine or calves or TGEV or feline or porcine or BCoV or PED or PEDV or PDCoV or FIPV or FCoV or SADS-CoV or canine or CCov or zoonotic or avian influenza or H1N1 or H5N1 or H5N6 or IBV or murine corona*).mp. [line 5 removes noise in the search results]
- 6 ((pneumonia or covid* or coronavirus* or corona virus* or ncov* or 2019-ncov or sars*).mp. or exp pneumonia/) and Wuhan.mp.
- 7 (coronavirus disease 2019 or 2019-ncov or ncov19 or ncov-19 or 2019-novel CoV or severe acute respiratory syndrome coronavirus 2 or sars-cov2 or sars-cov-2 or sarscov2 or sarscov-2 or Sars-coronavirus2 or Sars-coronavirus-2 or SARS-like coronavirus* or coronavirus-19 or covid19 or covid-19 or covid 2019 or ((novel or new or nouveau) adj2 (CoV or nCoV or covid or coronavirus* or corona virus or Pandemi*2)) or ((covid or covid19 or covid-19) and pandemic*2) or (coronavirus* and pneumonia)).mp.
- 8 (coronavirus disease 2019 or severe acute respiratory syndrome coronavirus 2).sh,dj.
- 9 (630575119 OR 630830186 OR 630941329 OR 631043694 OR 631260659 OR 631272428 OR 631272880 OR 631286076 OR 631290163 OR 631308782 OR 631324397 OR 631352500 OR 631416440 OR 631431802 OR 631452886 OR 631456079 OR 631457551 OR 631462438 OR 631462876 OR 631465538 OR 631465685 OR 631469310 OR 2004499662 OR 2004505338 OR 2005280837 OR 2005387675 OR 2005408544 OR 2005484987 OR 2005549151).an. [Articles not captured by this search when created in April 2020, pending further indexing by NLM/Elsevier]
- 10 (or/6-9) and 20191201:20301231.(dc). [Lines 5 to 8 are specific to Covid-19]
- 11 5 or 10

Appendix Table 1: Study outcomes and definitions

Severity stage	Case	control	Population
1. Infection	Test positive	Test negative	General population
2. Hospitalization	Hospitalized	Not hospitalized	Confirmed COVID-19
			cases
3. Severe symptoms	Severe symptoms	Non-severe symptoms	Hospitalised COVID-19
			cases
4. ICU admission	Admitted to ICU	Not admitted to ICU	Hospitalised COVID-19
			cases
5. Death	Death	Alive	Hospitalised COVID-19
			cases

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Appendix Table 2: Overview of	f odds ratios adiu.	sted for multiple	factors per outcome

Author	Outcome	Country	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	OR group 1	OR group 2	OR group 3	OR group 4	OR group 5	OR group 6	OR group 7	OR group 8	Adjustment factors
Adegunsoye, A.	Infection	United States (NA)	Non-black	Black							Ref.	3.30 (2.75- 3.97)							Age, sex, zip code
Dublin, S.	Infection	United States (NA)	Non Hispanic White	Non Hispanic Black	Non Hispanic Asian	Non Hispanic Mixed/Other	Hispanic				Ref.	4.03 (3.19- 5.11)	2.23 (1.71- 2.90)	0.90 (0.58- 1.40)	2.67 (2.05- 3.47)				Age, sex, comorbidities, BMI, smoking status, medications
Gu, T.	Infection	United States (NA)	White	Black	Other	Unknown					Ref.	3.56 (2.90- 4.37)	1.57 (1.19- 2.06)	0.78 (0.51- 1.20)					Age, sex, comorbidities, neigborhood SES
Martin, C. A.	Infection	United Kingdom (EU)	White Caucasian	South Asian	Black						Ref.	2.44 (2.01- 2.97)	2.56 (1.71- 3.84)						Age, sex, EWS at presentation, decile of IMD, estimated household size and comorbidities
Niedzwiedz, C. L.	Infection	United Kingdom (EU)	White British	White Irish	White Other	Mixed	South Asian	Black	Chinese	Other	Ref.	1.132 (0.851- 1.507)	1.020 (0.718- 1.449)	0.896 (0.479- 1.675)	1.279 (0.908- 1.802)	(0.978-	2.373 (1.326- 4.246)	1.119 (0.735- 1.702)	Age, sex, assessment centre, country of birth, education level, household size, socioeconomic deprivation, housing tenure, urbanicity, employment status, manual occupation, healthcare worker, longstanding illness/disability, number of chronic conditions, self-rated health, body mass index, smoking status, alcohol consumption
De Lusignan, S.	Infection	United Kingdom (EU)	White	Asian	Black	Mixed, other					Ref.	1.46 (0.94- 2.29)	4.75 (2.65- 8.51)	1.71 (0.97- 3.01)					Age, sex, socioeconomic deprivation level, household size, rural/urban, smoking status, BMI, comorbidities
Rozenfeld, Y.	Infection	United States (NA)	White	American Indian/ Alaska Native	Asian	Black/African American	Native Hawaiian /Pacific Islander	Unknown			Ref.	0.63 (0.36- 1.12)	1.43 (1.18- 1.72)	1.51 (1.25- 1.83)	1.02 (0.66- 1.57)	1.34 (1.18- 1.52)			Age, sex, region, education, religion, marital status, language, BMI, comorbidities, primary care type, symptoms
Adegunsoye, A.	Hospita- lization	United States (NA)	Non-black	Black							Ref.	3.77 (2.38- 5.99)							Age, sex, zip code
Dublin, S.	Hospita- lization	United States (NA)	Non Hispanic White	Non Hispanic Black	Non Hispanic Asian	Non Hispanic Mixed/Other	Hispanic				Ref.	1.20 (0.68- 2.12)	0.94 (0.54- 1.63)	0.42 (0.11- 1.62)	1.07 (0.49- 2.36)				Age, sex, comorbidities, BMI, smoking status, medications
Gu, T.	Hospita- lization	United States (NA)	White	Black	Other	Unknown					Ref.	1.72 (1.15- 2.58)	1.42 (0.79- 2.54)	0.72 (0.28- 1.84)					Age, sex, comorbidities, neighborhood SES
Ingraham, N. E.	Hospita- lization	United States (NA)	White	Black	Asian	Hispanic	Declined	Other			Ref.	1.50 (1.15- 1.94)	2.39 (1.74- 3.29)	3.80 (2.72- 5.30)	1.82 (1.16- 2.87)	2.04 (1.04- 4.00)			Age, sex, comorbidities, area deprivation, rural/urban, marital status, English speaking
Killerby, M. E.	Hospita- lization	United States (NA)	White	Black	Other	Missing					Ref.	3.2 (1.8– 5.8)	Not reported	Not reported					Age, sex, obesity, smoking status, insurance status, comorbidities
McPadden, J.	Hospita- lization	United States (NA)	Unknown	Asian	Black	Hawaiian/ Pacific Islander	Hispanic	White	American Indian		Ref.	1.58 (1.02- 2.41)	1.43 (1.14- 1.78)	1.45 (0.53- 3.52)	1.81 (1.50- 2.18)	(0.70-	0.44 (0.02- 2.68)		Age, sex, comorbidities
Petrilli, C. M.	Hospita- lization	United States (NA)	Non- Hispanic white	Non-Hispanic African- American	Asian	Hispanic	Other/ multiracial	Unknown			Ref.	0.81 (0.65- 1.01)	1.29 (0.97- 1.72)	1.63 (1.35- 1.97)	1.6 (1.21- 2.11)	0.89 (0.65- 1.23)			Age, sex, smoking status, BMI, comorbidities, week of admission
Price- Haywood, E. G.	Hospita- lization	United States (NA)	White Non- Hispanic	Black Non- Hispanic							Ref.	1.96 (1.62- 2.37)							Fully adjusted models are adjusted for: age, sex, charlson comorb index, residence in low income area, obsesity (and insurance in case of the hospitalization model)
Van Gerwen, M.	Hospita- lization	United States (NA)	Non- Hispanic White	Non-Hispanic Black	Other	Unknown					Ref.	1.08 (0.86- 1.35)	1.51 (1.24- 1.85)	0.89 (0.61- 1.29)					Age, sex, BMI, smoking status, and comorbidities
Mendy, A.	Hospita- lization	United States (NA)	Non- Hispanic White	Non-Hispanic Black	Hispanics	Other					Ref.	2.23 (1.41- 3.53)	1.91 (1.11- 3.29)	0.59 (0.29- 1.18)					Age, sex, smoking status
McCarty, T. R.	Severe disease	United States (NA)	White	Black	Latinx						Ref.	0.89 (0.45- 1.79)	1.34 (0.79- 2.28)						Age, sex, obesity, comorbidities

		1		1		-	1 7	 _						
	Severe	United States	Non- Hispanic	Non-Hispanic Black	Other	Unknown		Ref.	1.31 (0.97-	1.52 (1.16-	1.53 (0.92-		Age, s	ex, BMI, smoking status, and comorbidities
wi. d	disease	(NA)	White	васк					1.77)	1.98)	2.55)			
Mendy, A.	Severe disease	United States	Non- Hispanic White	Non-Hispanic Black	Hispanics	Other		Ref.	3.15 (1.71- 5.79)	2.78 (1.29- 5.96)	Not estimated		Age, s	ex, smoking status
Costa		(NA) United	white					_	2.63	5.96)	5.19	2.98		
Costa Monteiro, A.	ICU	States	White	Latinx	Asian	Black	Other	Ref.	(0.63-	5.44 (0.62-	(0.81-	(0.46-	A.co. c	ex, smoking status, comorbidities
c a	admission	(NA)	white	Latinx	ASIdII	DIdCK	other	Rei.	11.03)	47.71)	33.44).	19.26)	Age, s	ex, smoking status, comorbiuries
		United							1.15	0.86	0.60	19.20)		
Gu, T.	ICU	States	White	Black	Other	Unknown		Ref.	(0.73-	(0.42-	(0.18-		Age 5	ex, comorbidities, neighborhood SES
а а	admission	(NA)	wince	Didek	ounci	Onknown		ner.	1.82)	1.78)	2.04)		л <u>ь</u> с, 3	ex, comorbiances, neighbornood 525
		United	Non						1.01	0.96	1.06	0.93		
	ICU	States	Hispanic	Non Hispanic	Hispanic	Non Hispanic	Unknown	Ref.	(0.89-	(0.76-	(0.83-	(0.74,-	Age, s	ex, smoking status, obesity, comorbidities
a	admission	(NA)	White	Black		Other			1.15)	1.21)	1.37)	1.15)		,.
		United							0.77	1.50				
	ICU	States	White	Black	Latinx			Ref.	(0.39-	(0.89-			Age, s	ex, obesity, comorbidities
ĸ. a	admission	(NA)							1.53)	2.52)				
		United		1					0.68					
Adegunsoye, D	Death	States	Non-Black	Black				Ref.	(0.14-				Age, s	ex, zip code
А.		(NA)							3.18)					
Golestaneh,		United	Non-	Non-Hispanic					1.2 (0.7-	1.0 (0.6-	1.3 (0.7-		A 70. 5	ex, comorbidities, smoking, obesity, SES, household size, % black
	Death	States	hispanic	Black	Hispanic	Other		Ref.	2.0)	1.0 (0.8-	2.2)			nts, >60% residents using public transportation regularly
-		(NA)	White	Didek					2.0)	1.7)	2.2)		reside	its, >00% residents using public transportation regularly
		United	Non-	Non Hispanic		Non Hispanic			1.07	1.17	1.26	1.30		
Kim, L. D	Death	States	Hispanic	Non-Hispanic Black	Hispanic	Other	Unknown	Ref.	(0.85-	(0.91-	(0.86-	(0.74-	Age, s	ex, smoking status, obesity, comorbidities
		(NA)	White	Didek		other			1.35)	1.51)	1.82)	2.31)		
McCarty, T.		United							0.39	0.55				
R. D	Death	States	White	Black	Latinx			Ref.	(0.13-	(0.23-			Age, s	ex, obesity, comorbidities
		(NA)						 	1.12)	1.29)				
		United		Black/African					1.22	1.34	1.18	1.76		
McPadden, J. D	Death	States	Unknown	-American	Hispanic	White	Asian	Ref.	(0.64-	(0.75-	(0.65-	(0.54-	Age, s	ex, comorbidities
		(NA)						 _	2.36)	2.37)	2.14)	5.18)		
		United		African					0.78	0.94	1.00		Age, s	ex, smoking status, comorbidities, clinical parameters (e.g. resp.
Mikami, T. D	Death	States	White	American	Asian	Others		Ref.	(0.65- 0.95)	(0.83- 1.08)	(0.83-			GFR, labs)
		(NA) United						 _	1.20	0.75	1.19)			
Musoke, N. D	Death	States	African	Caucasian	Hispanic	Other		Ref.	(0.38-	(0.22-	(0.52-		Aro. c	ex, BMI, comorbidities, therapeutic antigoagulation
viusoke, iv.	Death	(NA)	American	Caucasian	riispanic	other		Ner.	3.77)	2.52)	3.32)		Age, s	ex, bivil, comorbidities, therapeutic antigoagulation
		United							1.157	0.992	5.52)			
Peterson, E. D	Death	States	African	Caucasian	Others			Ref.	(0.385-	(0.492-			Age s	ex, BMI, comorbidities
Cicroon, E. D		(NA)	American	cuacusian	Guicij				3.482)	1.997)			Age, 3	
Price-		United	White						1.14					
Haywood, E. D	Death	States	Non-	Black Non-				Ref.	(0.88-				Age, s	ex, charlson comorb index, residence in low income area, obsesity
G.		(NA)	Hispanic	Hispanic					1.49)				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,
		United	Non-						0.96	0.98	1.00			
				Non-Hispanic						(0.76-				5540 IS 11 IS 11 IS 11
Van Gerwen, D	Death	States	hispanic	Black	Other	Unknown		Ref.	(0.72-	(0.76-	(0.56-		Age. s	ex, BMI, smoking status, and comorbidities

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Appendix Figure 1: Individual studies with unadjusted risk estimates for SARS-CoV-2 infection among the general population in the U.S. by ethnic minority group

Authors	Country			OR (95% CI)	% Weight
African American					
Jehi, L.	United States		•	1.46 (1.26, 1.70)	8.38
McPadden, J.	United States		•	2.09 (1.96, 2.24)	8.69
Kalyanaraman, M. R.	United States		•	1.53 (1.39, 1.69)	8.60
Mehta, N.	United States		•	1.39 (1.28, 1.51)	8.65
Golestaneh, L.	United States		•	1.42 (1.21, 1.66)	8.34
Crouse, A.	United States			2.61 (2.19, 3.10)	8.25
Rozenfeld, Y.	United States			1.73 (1.46, 2.06)	8.27
Shah, S. J.	United States		•	0.62 (0.13, 3.02)	1.42
Singer, A. J.	United States		-	1.35 (1.01, 1.80)	7.48
Adegunsoye, A.	United States United States			4.27 (3.32, 5.49)	7.76 8.36
Gu, T. Haimovich, A. D.	United States			4.74 (4.06, 5.53)	8.36
Chang, T. S.	United States		1. T	2.08 (1.68, 2.59) 1.51 (1.18, 1.92)	7.99
Subtotal (I-squared = 96				1.94 (1.58, 2.38)	100.00
with estimated predictive				. (0.86, 4.38)	100.00
Hispanic					
Jehi, L.	United States		•	2.16 (1.80, 2.58)	11.70
McPadden, J.	United States		I ↓	2.54 (2.38, 2.72)	12.27
Kalyanaraman, M. R.	United States		•	2.74 (2.48, 3.03)	12.15
Golestaneh, L.	United States		▲ [∞]	0.91 (0.77, 1.07)	11.83
Rozenfeld, Y.	United States		•	3.54 (3.20, 3.92)	12.14
Shah, S. J.	United States			3.69 (1.10, 12.37)	3.55
Singer, A. J.	United States		+	3.31 (2.75, 4.00)	11.66
Adegunsoye, A.	United States		+	3.04 (2.38, 3.90)	11.19
Haimovich, A. D.	United States		•	1.42 (1.22, 1.65)	11.89
Chamie, G.	United States			84.45 (11.73, 607.83)	1.62
Subtotal (I-squared = 96 with estimated predictive				2.44 (1.87, 3.20) . (0.94, 6.37)	100.00
Asian	United Otatan			1 00 (0 00 1 00)	10.10
Jehi, L. McPadden, J.	United States United States			1.02 (0.62, 1.68) 1.17 (0.98, 1.39)	13.12 17.44
Rozenfeld, Y.	United States		T	2.26 (1.94, 2.64)	17.62
Shah, S. J.	United States			3.14 (1.26, 7.87)	7.87
Singer, A. J.	United States		·	0.90 (0.62, 1.30)	15.07
Adegunsoye, A.	United States		<u></u>	1.26 (0.72, 2.22)	12.18
Chang, T. S.	United States		÷.	1.07 (0.84, 1.37)	16.70
Subtotal (I-squared = 89		-		1.33 (0.95, 1.88)	100.00
with estimated predictive	interval		-	. (0.43, 4.16)	
Native Hawaiian					
McPadden, J.	United States		→	2.24 (1.42, 3.53)	45.19
Rozenfeld, Y.	United States		- +• -	1.23 (0.81, 1.85)	48.43
Adegunsoye, A.	United States		- F	1.02 (0.06, 18.19)	3.08
Chang, T. S.	United States			0.30 (0.02, 4.84)	3.30
Subtotal (I-squared = 42 with estimated predictive				1.53 (0.91, 2.57) . (0.26, 9.03)	100.00
American Indian					
McPadden, J.	United States			0.91 (0.48, 1.72)	35.34
Rozenfeld, Y.	United States			0.47 (0.27, 0.81)	35.34
Adegunsoye, A.	United States		•	1.20 (0.07, 21.91)	3.83
Chang, T. S.	United States		` _	1.56 (0.57, 4.27)	21.70
Subtotal (I-squared = 44				0.80 (0.44, 1.44)	100.00
with estimated predictive	interval			. (0.10, 6.55)	
NOTE: Weights are from	random effects analysis				
		 .01	1 7.51		
		cent.			

Authors	Country			OR (95% CI)	% Weight
Black/African	American (MF adj)				
Gu, T.	United States			3.56 (2.90, 4.37)	33.55
Dublin, S.	United States			- 3.87 (2.97, 5.05)	32.74
Rozenfeld, Y.	United States			1.51 (1.25, 1.83)	33.72
Subtotal (I-sq	uared = 95.9%, p = 0.000)			> 2.74 (1.47, 5.10)	100.00
Hispanic (MF	adj)				
Dublin, S.	United States		—	2.87 (2.13, 3.86)	100.00
Subtotal (I-sq	uared = .%, p = .)		\diamond	2.87 (2.13, 3.86)	100.00
Asian (MF adj					
Rozenfeld, Y.	United States			1.43 (1.18, 1.72)	52.21
Dublin, S.	United States		—	2.16 (1.68, 2.79)	47.79
Subtotal (I-sq	uared = 84.7%, p = 0.011)	\sim	>	1.74 (1.16, 2.61)	100.00
•					
Native Hawaii	an (MF adj)				
Rozenfeld, Y.	United States			1.02 (0.66, 1.57)	100.00
Subtotal (I-sq	uared = .%, p = .)	$\langle \rangle$		1.02 (0.66, 1.57)	100.00
•					
American India	an (MF adj)				
Rozenfeld, Y.	United States			0.63 (0.36, 1.12)	100.00
Subtotal (I-sq	uared = .%, p = .)	>		0.63 (0.36, 1.11)	100.00
NOTE: Weight	s are from random effects analysis				
	l .196	1		l 5.1	
	higher risk for majori		sk for minority	0.1	

Appendix Figure 2: Individual studies with adjusted risk estimates for SARS-CoV-2 infection among the general population in the U.S. by ethnic minority group

Note: studies are adjusted for multiple factors (MF adj)

Reference: White American

Appendix Figure 3: Individual studies with unadjusted risk estimates for SARS-CoV-2 infection among the general population in Europe by ethnic minority group

Authors	Country			OR (95% CI)	% Weight
African Caribbean/	Black Africans				
Niedzwiedz, C. L.	United Kingdom			2.22 (1.46, 3.35)	14.86
Lassale, C.	United Kingdom		_ →	2.83 (1.97, 4.07)	16.15
Hippisley-Cox, J.	United Kingdom		•	2.18 (2.06, 2.30)	22.20
Martin, C. A.	United Kingdom		→	2.26 (1.55, 3.31)	15.70
Corbett, R. W.	United Kingdom		—	1.05 (0.75, 1.49)	16.59
de Lusignan, S.	United Kingdom		—	3.99 (2.60, 6.14)	14.50
Subtotal (I-square	d = 81.4%, p = 0.000)		\diamond	2.22 (1.68, 2.92)	100.00
Asian					
Niedzwiedz, C. L.	United Kingdom	-	+	5.85 (0.61, 56.31)	9.64
Hippisley-Cox, J.	United Kingdom	+	~~~	0.49 (0.39, 0.60)	30.63
Corbett, R. W.	United Kingdom		↓ •	1.25 (0.92, 1.69)	30.03
de Lusignan, S.	United Kingdom		—	1.99 (1.41, 2.81)	29.69
Subtotal (I-square	d = 95.1%, p = 0.000)	<	\diamond	1.25 (0.53, 2.90)	100.00
South Asian					
Niedzwiedz, C. L.	United Kingdom		_ _	2.56 (1.60, 4.09)	20.07
Lassale, C.	United Kingdom		_ _	1.60 (1.04, 2.48)	21.03
Hippisley-Cox, J.	United Kingdom		•	1.44 (1.36, 1.52)	30.41
Martin, C. A.	United Kingdom		· •	2.40 (2.02, 2.87)	28.50
na grado gradu de la constal laste	d = 91.5%, p = 0.000)		\diamond	1.91 (1.34, 2.73)	100.00
Mixed					
Niedzwiedz, C. L.	United Kingdom			1.40 (0.81, 2.41)	1.47
Lassale, C.	United Kingdom		↓	1.45 (0.89, 2.34)	1.86
Hippisley-Cox, J.	United Kingdom		•	1.35 (1.26, 1.44)	94.58
Corbett, R. W.	United Kingdom		★	0.77 (0.26, 2.27)	0.37
de Lusignan, S.	United Kingdom		⊢ ⊷	1.59 (0.96, 2.62)	1.73
Subtotal (I-square	d = 0.0%, p = 0.818)		0	1.35 (1.27, 1.44)	100.00
Other Asian					
Hippisley-Cox, J.	United Kingdom		•	2.11 (1.95, 2.28)	100.00
Subtotal (I-square			Ŏ	2.11 (1.95, 2.28)	100.00
NOTE: Weights are	e from random effects ana	lysis			
		1			
		.15	1 3.25		

Appendix Figure 4: Individual studies with adjusted risk estimates for SARS-CoV-2 infection among the general population in Europe by ethnic minority group

Authors	Country				OR (95% CI)	% Weight
Asian						
de Lusignan, S.	United Kingdom		++	_	1.46 (0.94, 2.29)	31.74
Corbett, R. W.	United Kingdom		_		1.14 (0.85, 1.56)	68.26
Subtotal (I-squared	d = 0.0%, p = 0.368)		\diamond		1.23 (0.96, 1.58)	100.00
·						
African Caribbean/E	Black Africans					
de Lusignan, S.	United Kingdom			+	4.75 (2.65, 8.51)	21.04
Corbett, R. W.	United Kingdom		•		1.05 (1.03, 1.06)	28.35
Martin, C. A.	United Kingdom		_	—	2.56 (1.71, 3.84)	24.29
Niedzwiedz, C. L.	United Kingdom				1.29 (0.98, 1.70)	26.32
Subtotal (I-squared	i = 93.5%, p = 0.000)		\langle	>	1.89 (1.12, 3.20)	100.00
South Asian						
Martin, C. A.	United Kingdom				2.44 (2.01, 2.97)	52.45
Niedzwiedz, C. L.	United Kingdom		++-		1.28 (0.91, 1.80)	47.55
Subtotal (I-squared	i = 90.3%, p = 0.001)		\langle	>	1.80 (0.95, 3.38)	100.00
NOTE: Weights are	from random effects an	alysis				
	ا 118.		1		l 8.51	

Appendix Figure 5: Individual studies with unadjusted risk estimates for hospitalization among infected individuals in the U.S. by ethnic minority group

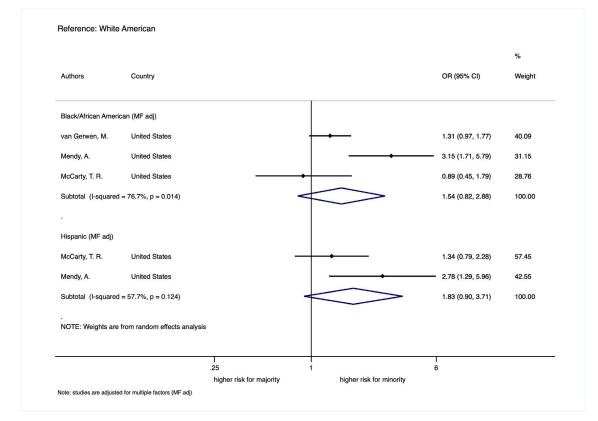
Authors	Country				RR (95% CI)	% Weight
African American						
Ingraham, N. E.	United States		-++	-	1.09 (0.90, 1.33)	8.64
McPadden, J.	United States		+		1.06 (0.94, 1.20)	9.27
Petrilli, C. M.	United States		—		0.74 (0.63, 0.86)	8.95
Kalyanaraman, M. R.	United States				1.47 (1.29, 1.68)	9.19
Killerby, M. E.	United States			+	3.88 (2.42, 6.24)	5.52
Mikami, T.	United States		-	←	1.24 (1.08, 1.42)	9.15
Mendy, A.	United States			—	2.05 (1.34, 3.11)	6.09
van Gerwen, M.	United States		-++	-	1.09 (0.91, 1.30)	8.82
Price-Haywood, E. G.	United States				1.71 (1.46, 1.99)	9.01
Tenforde, M. W.	United States				2.90 (1.39, 6.07)	3.41
Gottlieb, M.	United States		-	←	1.25 (1.07, 1.45)	9.05
Gu, T.	United States			—	1.77 (1.37, 2.30)	7.92
Chang, T. S.	United States			<u> </u>	1.20 (0.71, 2.05)	4.97
Subtotal (I-squared = 8	39.4%, p = 0.000)			\sim	1.38 (1.17, 1.64)	100.00
with estimated predictiv	ve interval			-	. (0.73, 2.62)	
Hispanic						
Ingraham, N. E.	United States				2.17 (1.70, 2.79)	17.69
McPadden, J.	United States				0.84 (0.75, 0.95)	20.01
Petrilli, C. M.	United States				1.01 (0.88, 1.17)	19.73
Kalyanaraman, M. R.	United States				1.00 (0.88, 1.13)	19.88
Mendy, A.	United States				0.71 (0.47, 1.09)	13.67
Tenforde, M. W.	United States				2.79 (1.42, 5.48)	9.01
Subtotal (I-squared = 9	91.2%, p = 0.000)			>	1.16 (0.89, 1.52)	100.00
with estimated predictiv	ve interval				. (0.47, 2.91)	
Asian						
Ingraham, N. E.	United States			—	2.09 (1.70, 2.57)	18.41
McPadden, J.	United States		-+		0.85 (0.60, 1.21)	16.75
Petrilli, C. M.	United States				0.79 (0.64, 0.99)	18.29
Mikami, T.	United States		-++	_	1.08 (0.84, 1.39)	17.94
Gottlieb, M.	United States			-	0.75 (0.45, 1.24)	14.57
Chang, T. S.	United States			<u> </u>	1.19 (0.70, 2.05)	14.05
Subtotal (I-squared = 8	39.8%, p = 0.000)		\neg	>	1.07 (0.73, 1.56)	100.00
with estimated predictiv	ve interval				. (0.28, 4.10)	
NOTE: Weights are from	m random effects anal	/sis				
					1	
		.2	1		9	

Appendix Figure 6: Individual studies with adjusted risk estimates for hospitalization among infected individuals in the U.S. by ethnic minority group

Authors	Country		OR (95% CI)	% Weight
Black/African American	(Age adj)			
Petrilli, C. M.	United States	- -	0.74 (0.63, 0.86)	51.80
Golestaneh, L.	United States	•	1.70 (1.20, 2.40)	48.20
Subtotal (I-squared = 9	94.6%, p = 0.000)		1.10 (0.49, 2.50)	100.00
Black/African American	(MF adj)			
Dublin, S.	United States		1.20 (0.68, 2.12)	7.35
Price-Haywood, E. G.	United States		1.96 (1.62, 2.37)	13.47
McPadden, J.	United States	•	1.68 (1.63, 1.73)	15.00
Gu, T.	United States		1.72 (1.15, 2.58)	9.85
van Gerwen, M.	United States	_ +	1.08 (0.86, 1.35)	12.92
Ingraham, N. E.	United States	→ _	1.50 (1.15, 1.94)	12.32
Petrilli, C. M.	United States		0.81 (0.65, 1.01)	13.00
Killerby, M. E.	United States		3.20 (1.80, 5.80)	7.14
Mendy, A.	United States		2.23 (1.41, 3.53)	8.95
Subtotal (I-squared = 8	38.0%, p = 0.000)	\diamond	> 1.53 (1.23, 1.89)	100.00
Hispanic (Age adj)				
Petrilli, C. M.	United States	_ _	1.01 (0.88, 1.17)	58.31
Golestaneh, L.	United States	→	1.50 (1.10, 2.20)	41.69
Subtotal (I-squared = 7	76.6%, p = 0.039)	\sim	1.19 (0.81, 1.75)	100.00
Hispanic (MF adj)				
Ingraham, N. E.	United States		3.80 (2.72, 5.30)	20.65
McPadden, J.	United States		♦ 2.13 (2.12, 2.14)	31.15
Dublin, S.	United States		1.07 (0.49, 2.36)	8.15
Mendy, A.	United States		• 1.91 (1.11, 3.29)	13.26
Petrilli, C. M.	United States		1.63 (1.35, 1.97)	26.78
Subtotal (I-squared = 8	32.1%, p = 0.000)		2.08 (1.60, 2.70)	100.00
Asian (Age adj)				
Petrilli, C. M.	United States		0.79 (0.64, 0.99)	100.00
Subtotal (I-squared = .		\diamond	0.79 (0.64, 0.98)	100.00
Asian (MF adj)				
Dublin, S.	United States	_	0.94 (0.54, 1.63)	17.69
Petrilli, C. M.	United States	·	1.29 (0.97, 1.72)	27.23
Ingraham, N. E.	United States	· · ·	2.39 (1.74, 3.29)	26.01
McPadden, J.	United States	I _	★ 1.86 (1.46, 2.34)	29.08
Subtotal (I-squared = 7		\sim	> 1.59 (1.14, 2.23)	100.00
NOTE: Weights are from	m random effects and	lysis		
		1	1	
		.25 1	6	
		higher risk for majority high	er risk for minority	

Appendix Figure 7: Individual studies with unadjusted risk estimates for severe disease among hospitalized COVID-19 patients in the U.S. by ethnic minority group

			%
Authors	Country	OR (95% CI)	Weight
African American			
Mendy, A.	United States -	2.53 (1.46, 4.4	1) 13.86
van Gerwen, M.	United States	- 1.29 (0.97, 1.7	1) 17.85
Singer, A. J.	United States	1.25 (0.65, 2.3	39) 12.37
Price, C. C.	United States	0.92 (0.51, 1.6	65) 13.36
Bhargava, A.	United States	0.69 (0.33, 1.4	6) 11.03
McCarty, T. R.	United States	- 0.91 (0.47, 1.7	7) 12.25
Chang, T. S.	United States -	3.36 (1.32, 8.5	51) 8.93
Gavin, W.	United States	0.43 (0.19, 0.9	6) 10.34
Subtotal (I-square	ed = 67.8%, p = 0.003)	• 1.17 (0.81, 1.7	70) 100.00
Hispanic			
Mendy, A.	United States	- 0.98 (0.53, 1.8	
Singer, A. J.	United States	→ 2.09 (1.45, 3.0	
Price, C. C.	United States	0.70 (0.34, 1.4	
McCarty, T. R.	United States	— 1.46 (0.90, 2.3	
Zachariah, P.	United States	0.84 (0.20, 3.5	2
Gavin, W.	United States	- 0.36 (0.06, 2.0	
Subtotal (I-square	ed = 59.2%, p = 0.031)	> 1.17 (0.75, 1.8	31) 100.00
Asian			
Singer, A. J.	United States	4.07 (2.17, 7.6	-
Chang, T. S.	United States	2.13 (0.82, 5.5	
Gavin, W.	United States	1.33 (0.20, 9.0	
Subtotal (I-square	ed = 4.1%, p = 0.353)	3.10 (1.83, 5.2	26) 100.00
NOTE: Weights a	re from random effects analysis		
	.01 1	6	



Appendix Figure 8: Individual studies with adjusted risk estimates for severe disease among hospitalized COVID-19 patients in the U.S. by ethnic minority group

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Appendix Figure 9: Individual studies with unadjusted risk estimates for ICU admission among hospitalized COVID-19 patients in the U.S. by ethnic minority group

					%
Authors	Country			OR (95% CI)	Weight
African American					
Kim, L.	United States			1.06 (0.87, 1.28)	39.24
Price-Haywood, E. G.	United States			1.33 (1.02, 1.75)	24.17
Golestaneh, L.	United States			1.96 (1.09, 3.51)	6.20
Costa Monteiro, A. C.	United States		•	2.62 (0.56, 12.31)	0.94
Maeda, T.	United States		•	1.09 (0.46, 2.56)	2.98
McCarty, T. R.	United States	+	+	0.77 (0.40, 1.49)	4.96
Gu, T.	United States	-		1.15 (0.78, 1.69)	13.42
Argenziano, M. G.	United States		+	1.00 (0.60, 1.67)	8.10
Subtotal (I-squared = 10	.2%, p = 0.351)		\diamond	1.16 (1.00, 1.35)	100.00
			-		
Hispanic					
Kim, L.	United States		+	0.84 (0.64, 1.11)	30.36
Golestaneh, L.	United States			1.65 (0.91, 3.00)	17.77
Costa Monteiro, A. C.	United States		↓	1.67 (0.58, 4.77)	8.36
McCarty, T. R.	United States		• • • • • • • • • • • • • • • • • • •	1.59 (0.99, 2.55)	22.03
Argenziano, M. G.	United States	+		0.83 (0.51, 1.36)	21.47
Subtotal (I-squared = 57	.0%, p = 0.054)		\diamond	1.15 (0.82, 1.63)	100.00
Asian					
Costa Monteiro, A. C.	United States		+ +	2.04 (0.45, 9.20)	17.76
Maeda, T.	United States		.	1.33 (0.50, 3.52)	42.43
Argenziano, M. G.	United States		—	2.76 (1.01, 7.55)	39.81
Subtotal (I-squared = 0.0	0%, p = 0.590)		\bigcirc	1.92 (1.02, 3.62)	100.00
NOTE: Weights are from	random effects analysis				
			1 2.75		
			2.75		

Appendix Figure 10: Individual studies with adjusted risk estimates for ICU admission among hospitalized COVID-19 patients in the U.S. by ethnic minority group

Authors	Country				OR (95% CI)	% Weight
			1		(
Black/African Ame	erican (Age adj)					
Kim, L.	United States		t		1.03 (0.93, 1.13)	100.00
Subtotal (I-square	ed = .%, p = .)		Ŷ		1.03 (0.93, 1.14)	100.00
Black/African Ame	erican (MF adi)					
McCarty, T. R.	United States	+	<u> </u>		0.77 (0.39, 1.53)	10.45
Gu, T.	United States	_	 •		1.15 (0.73, 1.82)	20.29
Kim, L.	United States		+		1.01 (0.89, 1.15)	67.68
Costa Monteiro, A	. C. United States	-	+		5.19 (0.81, 33.44)	1.58
Subtotal (I-square	ed = 22.6%, p = 0.275)		\diamond		1.03 (0.82, 1.31)	
			T			
Hispanic (Age adj)					
Kim, L.	United States	-	H		0.86 (0.69, 1.09)	100.00
Subtotal (I-square	ed = .%, p = .)	<	>		0.86 (0.68, 1.08)	100.00
Hispanic (MF adj)						
Kim, L.	United States	-	↓		0.96 (0.76, 1.21)	57.14
McCarty, T. R.	United States		↓ →		1.50 (0.89, 2.52)	34.66
Costa Monteiro, A	. C. United States	_	+ +		2.63 (0.63, 11.03)	8.20
Subtotal (I-square	ed = 49.4%, p = 0.138)	<	\diamond		1.22 (0.79, 1.88)	100.00
			-			
Asian (MF adj)						
Costa Monteiro, A	. C. United States	_		•	- 5.44 (0.62, 47.71)	100.00
Subtotal (I-square	ed = .%, p = .)	-			5.44 (0.62, 47.72)	100.00
NOTE: Weights a	re from random effects analysis	3				
		I .25	1	1 10		
	history	isk for majority	-	k for minority		

Appendix Figure 11: Individual studies with unadjusted risk estimates for death among hospitalized COVID-19 patients in the U.S. by ethnic minority group

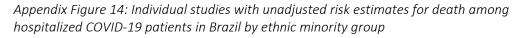
					%
Authors	Country			OR (95% CI)	Weight
African American					
Kalyanaraman, M. R.	United States	+		0.55 (0.45, 0.67)	17.13
Mikami, T.	United States	-+-		0.79 (0.63, 0.99)	15.41
McCullough, S. A.	United States	+		0.33 (0.14, 0.80)	1.94
van Gerwen, M.	United States	-+	-	0.85 (0.66, 1.11)	13.40
Kim, L.	United States			0.74 (0.58, 0.94)	14.26
Price-Haywood, E. G.	United States	-		0.64 (0.48, 0.85)	12.19
Golestaneh, L.	United States	-+	-	0.84 (0.54, 1.31)	6.51
McCarty, T. R.	United States	+		0.40 (0.15, 1.06)	1.57
Gu, T.	United States		_	0.81 (0.49, 1.35)	5.12
Gavin, W.	United States		<u> </u>	1.04 (0.34, 3.22)	1.21
McPadden, J.	United States	-		0.66 (0.49, 0.88)	11.28
Subtotal (I-squared = 3	3.8%, p = 0.128)	0		0.70 (0.61, 0.79)	100.00
Hispanic					
Kalyanaraman, M. R.	United States	-		0.53 (0.43, 0.64)	42.18
Kim, L.	United States	—		0.36 (0.23, 0.55)	23.55
Golestaneh, L.	United States		-	0.73 (0.47, 1.14)	22.65
McCarty, T. R.	United States			0.32 (0.15, 0.69)	10.76
Gavin, W.	United States	+		0.36 (0.02, 7.21)	0.86
Subtotal (I-squared = 4	0.8%, p = 0.149)	\diamond		0.49 (0.37, 0.65)	100.00
Asian					
Mikami, T.	United States		_	0.91 (0.60, 1.38)	75.25
McCullough, S. A.	United States			0.88 (0.41, 1.90)	22.40
Gavin, W.	United States		•	1.45 (0.13, 15.79)	2.34
Subtotal (I-squared = 0	.0%, p = 0.926)	<	>	0.91 (0.63, 1.31)	100.00
NOTE: Weights are fron	n random effects analys	sis			
	l .01		3		
	.01		5		

Appendix Figure 12: Individual studies with adjusted risk estimates for death among hospitalized COVID-19 patients in the U.S. by ethnic minority group

Authors	Country		OR (95% CI)	% Weight
Black/African American	(Age adj)			
McCullough, S. A.	United States		0.33 (0.14, 0.80)	21.63
Harrison, S. L.	United States		1.33 (1.18, 1.49)	40.58
Kim, L.	United States		0.75 (0.57, 0.99)	37.80
Subtotal (I-squared = 9	1.1%, p = 0.000)		0.79 (0.44, 1.43)	100.00
Black/African American	(MF adj)			
Mikami, T.	United States -	-	0.78 (0.65, 0.95)	18.61
Price-Haywood, E. G.	United States	+•	1.14 (0.88, 1.49)	12.46
McPadden, J.	United States	+	1.03 (0.98, 1.10)	36.03
Kim, L.	United States		1.07 (0.85, 1.35)	14.78
Golestaneh, L.	United States		1.20 (0.70, 2.00)	4.10
Musoke, N.	United States	•	0.83 (0.27, 2.63)	0.95
Peterson, E.	United States	↓	0.86 (0.29, 2.60)	1.02
van Gerwen, M.	United States		0.96 (0.72, 1.28)	11.00
McCarty, T. R.	United States	+	0.39 (0.13, 1.12)	1.06
Subtotal (I-squared = 3	5.2%, p = 0.136)	•	0.98 (0.88, 1.10)	100.00
Hispanic (Age adj)				
Kim, L.	United States		0.42 (0.32, 0.56)	100.00
Subtotal (I-squared = .	%, p = .)		0.42 (0.32, 0.56)	100.00
Hispanic (MF adj)				
McPadden, J.	United States	•	1.14 (1.11, 1.15)	24.94
Kim, L.	United States	+•	1.17 (0.91, 1.51)	22.47
McCarty, T. R.	United States		0.55 (0.23, 1.29)	10.95
Musoke, N.	United States		0.63 (0.58, 0.69)	24.63
Golestaneh, L.	United States		1.00 (0.60, 1.70)	17.01
Subtotal (I-squared = 9	7.7%, p = 0.000)	>	0.89 (0.61, 1.31)	100.00
Asian (Age adj)				
Harrison, S. L.	United States		0.45 (0.27, 0.74)	59.66
McCullough, S. A.	United States	◆	0.88 (0.41, 1.90)	40.34
Subtotal (I-squared = 5		>	0.59 (0.31, 1.12)	100.00
Asian (MF adj)				
McPadden, J.	United States	→	1.49 (0.83, 2.42)	33.50
Mikami, T.	United States	→	0.94 (0.83, 1.08)	66.50
Subtotal (I-squared = 6		\diamond	1.10 (0.72, 1.68)	100.00
NOTE: Weights are fro	n random effects analysis			
	.1	1 6		
	higher risk for majority	higher risk for minority		

Appendix Figure 13: Individual studies with unadjusted risk estimates for death among hospitalized COVID-19 patients in Europe by ethnic minority group

Authors	Country			OR (95% CI)	% Weight
African Caribbean/Bla	ock Africans				
Berenguer, J.	Spain	6	_	0.10 (0.01, 1.64)	2.66
Perez-Guzman, P. N.		· · ·	_	1.17 (0.73, 1.88)	34.37
Sapey, E.	United Kingdom			0.70 (0.48, 1.03)	
Brill, S. E.	United Kingdom			1.34 (0.65, 2.73)	
Subtotal (I-squared =		\diamond		0.92 (0.58, 1.48)	
Asian					
Ciceri, F.	Italy			1.18 (0.45, 3.08)	19.22
Berenguer, J.	Spain			0.30 (0.07, 1.32)	9.68
Perez-Guzman, P. N.	United Kingdom	-++	_	1.24 (0.73, 2.10)	
Brill, S. E.	United Kingdom	+	←	1.75 (0.92, 3.33)	
Subtotal (I-squared =	35.4%, p = 0.200)	<	>	1.19 (0.73, 1.95)	100.00
South Asian					
Sapey, E.	United Kingdom	+		0.68 (0.54, 0.86)	100.00
Subtotal (I-squared =	.%, p = .)	\diamond		0.68 (0.54, 0.86)	100.00
Mixed					
Berenguer, J.	Spain	_ _		0.43 (0.17, 1.12)	22.75
Perez-Guzman, P. N.	United Kingdom		-	0.48 (0.13, 1.71)	17.91
Sapey, E.	United Kingdom			0.35 (0.20, 0.62)	29.12
Brill, S. E.	United Kingdom			1.32 (0.80, 2.16)	30.22
Subtotal (I-squared =	77.4%, p = 0.004)	\diamond		0.58 (0.27, 1.27)	100.00
Hispanic					
Ciceri, F.	Italy			0.84 (0.09, 7.57)	4.34
Berenguer, J.	Spain	—		0.29 (0.18, 0.47)	95.66
Subtotal (I-squared =	0.0%, p = 0.360)	\diamond		0.31 (0.19, 0.48)	100.00
Arab					
Berenquer, J.	Spain	+		0.35 (0.10, 1.16)	100.00
Subtotal (I-squared =	25 A. (3)	\sim		0.35 (0.10, 1.16)	
NOTE: Weights are fro	om random effects anal	ysis			
		.15 1	I 10		
		higher risk for majority	higher risk for minority		



						%
Authors	Country				OR (95% CI)	Weight
Afro-Brazilian	S					
Soares, R. C.	M. Brazil	+	- -		1.27 (0.95, 1.69)	42.75
Baqui, P.	Brazil				1.82 (1.66, 2.01)	57.25
Subtotal (I-so	uared = 81.9%, p = 0.019)		\bigcirc		1.56 (1.10, 2.22)	100.00
Indigenous						
Baqui, P.	Brazil		•		1.78 (0.64, 4.91)	100.00
Subtotal (I-so	uared = .%, p = .)			>	1.78 (0.64, 4.91)	100.00
•						
East Asian						
Baqui, P.	Brazil	-			1.45 (1.04, 2.02)	100.00
Subtotal (I-so	uared = .%, p = .)	<	\bigcirc		1.45 (1.04, 2.02)	100.00
NOTE: Weigh	ts are from random effects anal	ysis				
	.25	1		4		
	higher risk for m	ajority	higher risk for min	ority		