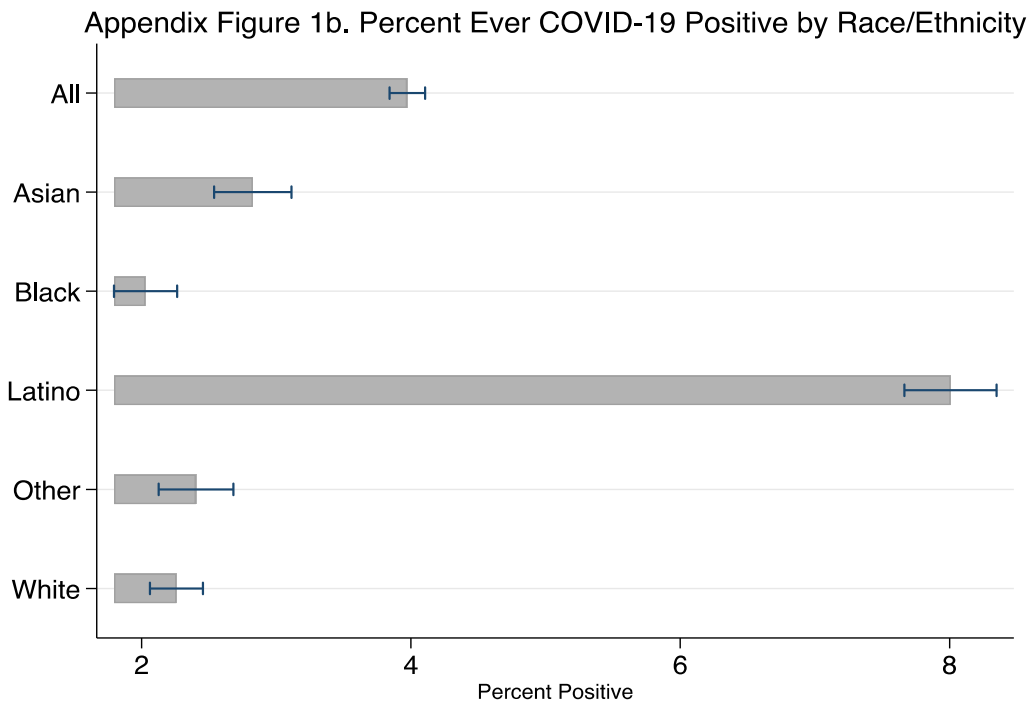
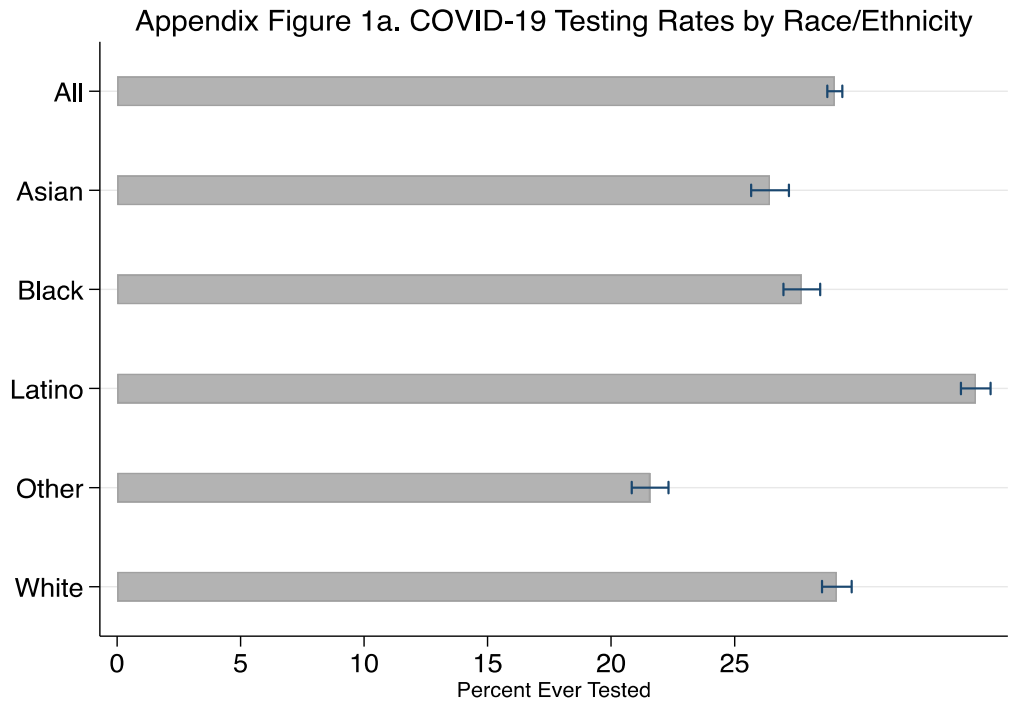
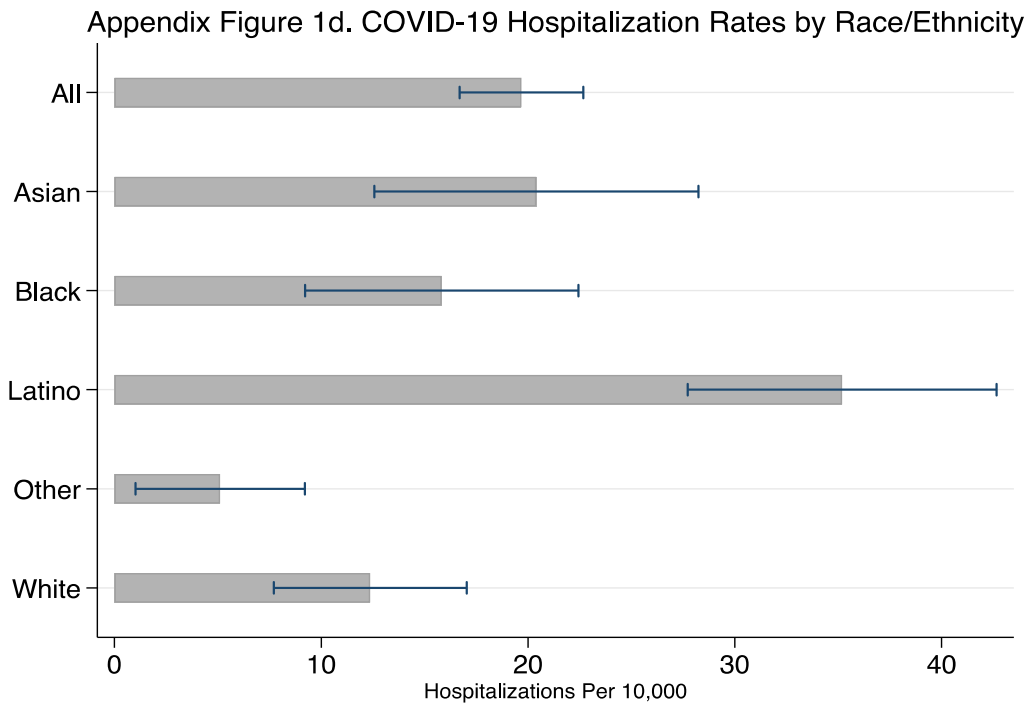
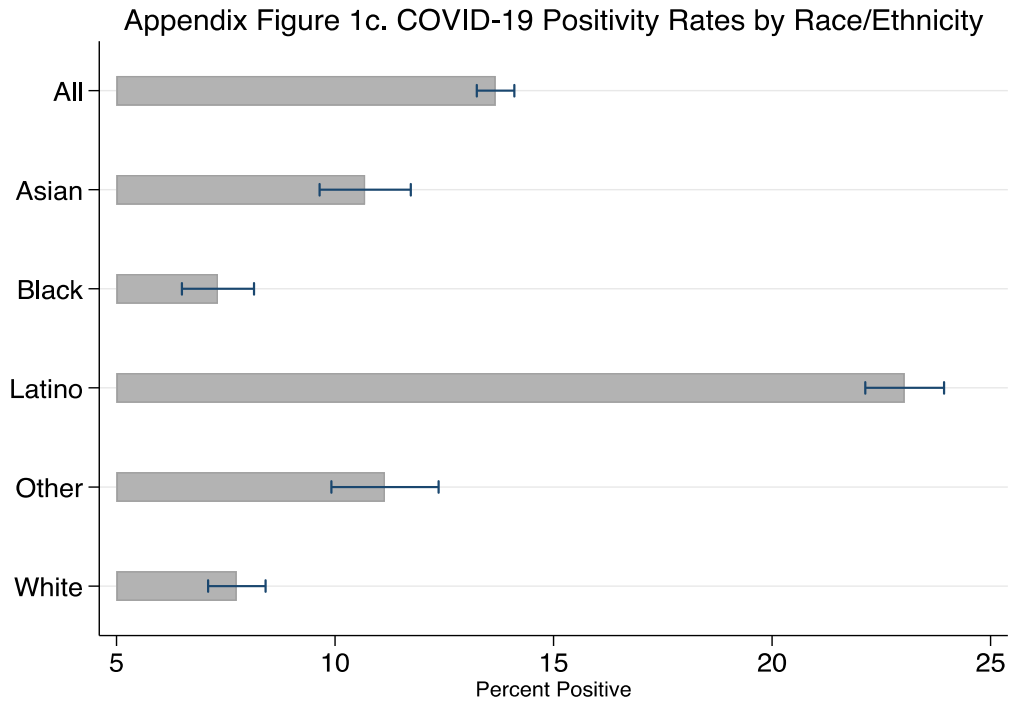


**Appendix**  
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**Appendix Figure 1.** Testing rates, percent positive, and hospitalizations and deaths per 10,000 by race/ethnicity.

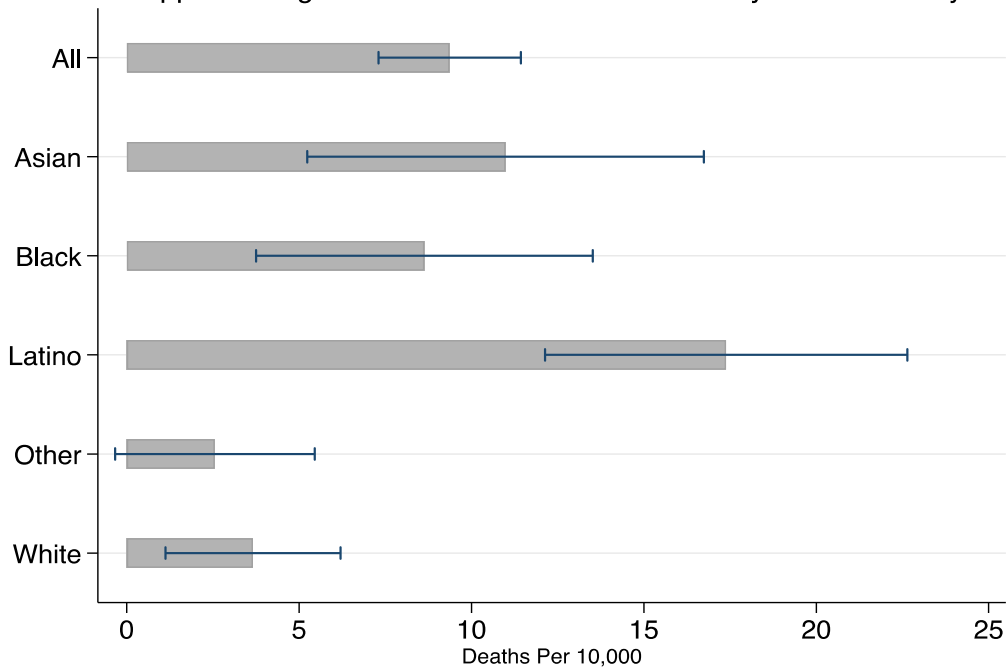


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Appendix Figure 1e. COVID-19 Death Rates by Race/Ethnicity



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**Appendix Table 1.** ZIP Code Characteristics of Patient Population Overall and by Race/Ethnicity<sup>a</sup>

<b>Variable</b>	<b>Total</b>	<b>Asian</b>	<b>Black/African American</b>	<b>Latino</b>	<b>Other/Unknown<sup>b</sup></b>	<b>White/Caucasian</b>
Impaneled patients	83,310	12,686	13,641	24,014	11,577	21,392
Percent of total		15%	16%	29%	14%	26%
<b>ZIP code characteristics</b>						
Median income, \$	85,455	90,097	77,234	77,433	90,593	94,169
SD	(27,669)	(28,914)	(21,726)	(20,577)	(32,510)	(30,318)
Average HH size	3.03	3.02	3.13	3.12	3.00	2.90
SD	0.34	0.33	0.30	0.30	0.35	0.37
Share employed	0.61	0.62	0.61	0.61	0.61	0.62
Share uninsured	0.07	0.07	0.08	0.08	0.07	0.06
Share cash assistance	0.03	0.03	0.04	0.04	0.03	0.03
Share Social Security	0.28	0.28	0.27	0.27	0.28	0.29
Share receiving SNAP	0.10	0.09	0.11	0.11	0.09	0.08
Share detached single family home	0.65	0.66	0.65	0.64	0.66	0.66
<b>Number of ZIP codes</b>						
Overall	467	162	181	197	206	311
With ≥50 patients	45	45	45	45	45	45
Impaneled patients in ZIP codes with ≥50 patients	81,482	12,455	13,227	23,765	11,295	20,740
Percent of all patients	98%	98%	97%	99%	98%	97%

<sup>a</sup>Data are from the 2018 American Community Survey (ACS).

<sup>b</sup>Due to small numbers (N=280) American Indian/Native Alaskan is included with Other/Unknown.

HH, household; SNAP, Supplemental Nutrition Assistance Program.

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**Appendix Table 2. AORs**

Variable	Panel A: Ever tested for SARS-CoV-2	Panel B: Ever tested positive for SARS-CoV-2	Panel C: COVID-19 hospitalization	Panel D: COVID-19 death
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
White (ref)				
Asian	0.90 (0.86, 0.95)	1.28 (1.11, 1.47)	1.44 (0.83, 2.51)	2.01 (0.83, 4.91)
Black	0.91 (0.86, 0.95)	0.85 (0.73, 0.98)	1.41 (0.80, 2.48)	3.09 (1.26, 7.62)
Latino	1.35 (1.29, 1.40)	3.58 (3.23, 3.96)	3.42 (2.18, 5.35)	5.70 (2.63, 12.38)
Other <sup>a</sup>	0.81 (0.77, 0.86)	1.11 (0.95, 1.29)	0.57 (0.24, 1.40)	0.91 (0.24, 3.49)
Asthma	1.50 (1.43, 1.57)	1.14 (1.02, 1.27)	1.23 (0.78, 1.93)	0.75 (0.34, 1.67)
Cancer	1.39 (1.29, 1.50)	1.05 (0.86, 1.28)	1.53 (0.88, 2.64)	0.79 (0.34, 1.84)
Pain <sup>b</sup>	1.39 (1.33, 1.45)	1.18 (1.06, 1.31)	1.18 (0.80, 1.75)	1.40 (0.82, 2.39)
Diabetes	1.22 (1.16, 1.28)	1.23 (1.11, 1.37)	1.55 (1.07, 2.25)	1.60 (0.98, 2.62)
COPD	1.37 (1.25, 1.49)	0.83 (0.63, 1.09)	1.82 (1.00, 3.30)	2.29 (1.17, 4.46)
Hypertension	1.26 (1.21, 1.32)	1.20 (1.08, 1.32)	1.05 (0.71, 1.53)	0.60 (0.36, 1.00)
Age 18–29, years (ref)				
Age 30–39	1.08 (1.03, 1.13)	1.04 (0.94, 1.16)	1.18 (0.62, 2.24)	1.35 (0.08, 21.68)
Age 40–49	1.05 (1.00, 1.11)	0.99 (0.88, 1.11)	1.36 (0.71, 2.62)	8.65 (1.01, 74.30)
Age 50–64	0.94 (0.89, 0.98)	0.79 (0.71, 0.89)	2.17 (1.24, 3.80)	18.03 (2.36, 137.76)
Age 65–74	0.72 (0.68, 0.77)	0.58 (0.49, 0.67)	3.40 (1.84, 6.28)	54.40 (7.11, 416.36)
Age 75–84	0.51 (0.46, 0.56)	0.51 (0.40, 0.64)	3.38 (1.62, 7.05)	194.66 (25.54, 1483.75)
Age ≥85	0.36 (0.31, 0.43)	0.34 (0.22, 0.53)	3.20 (1.13, 9.04)	246.83 (30.51, 1997.18)
BMI >30 or not	0.68 (0.65, 0.70)	0.86 (0.79, 0.92)	0.78 (0.54, 1.13)	1.37 (0.82, 2.30)
Female vs male <sup>f</sup>	1.24 (1.20, 1.28)	1.30 (1.21, 1.40)	0.96 (0.70, 1.32)	0.60 (0.38, 0.93)
Observations	84,328	84,328	84,328	84,328
Mean rate	29.1 <sup>c</sup>	3.97 <sup>d</sup>	19.7 <sup>e</sup>	9.37 <sup>e</sup>
Fully adjusted model				
White (ref)				
Asian	0.86 (0.79, 0.94)	1.19 (1.01, 1.40)	1.35 (0.66, 2.74)	1.73 (0.60, 4.96)
Black	0.87 (0.81, 0.93)	0.76 (0.63, 0.91)	1.29 (0.80, 2.08)	2.29 (0.86, 6.09)
Latino	1.27 (1.18, 1.37)	3.15 (2.63, 3.77)	3.23 (2.06, 5.08)	4.11 (1.90, 8.86)
Other <sup>a</sup>	0.79 (0.72, 0.87)	1.06 (0.86, 1.31)	0.56 (0.24, 1.27)	0.83 (0.19, 3.61)

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Asthma	1.51 (1.43, 1.59)	1.16 (1.03, 1.29)	1.29 (0.77, 2.17)	0.75 (0.33, 1.68)
Cancer	1.39 (1.27, 1.51)	1.03 (0.87, 1.22)	1.55 (0.94, 2.57)	0.82 (0.35, 1.90)
Pain <sup>b</sup>	1.40 (1.34, 1.46)	1.19 (1.10, 1.27)	1.17 (0.77, 1.80)	1.39 (0.89, 2.16)
Diabetes	1.21 (1.15, 1.28)	1.21 (1.09, 1.33)	1.58 (1.12, 2.22)	1.52 (1.09, 2.14)
COPD	1.34 (1.22, 1.47)	0.79 (0.59, 1.05)	1.69 (1.17, 2.44)	2.19 (1.13, 4.25)
Hypertension	1.26 (1.22, 1.30)	1.18 (1.07, 1.30)	1.04 (0.64, 1.70)	0.59 (0.28, 1.22)
Age 18–29, years (ref)				
Female vs male <sup>f</sup>	1.07 (1.01, 1.13)	1.05 (0.96, 1.16)	1.18 (0.68, 2.05)	1.37 (0.09, 22.21)
Age 40–49	1.05 (1.00, 1.10)	1.00 (0.91, 1.09)	1.35 (0.84, 2.18)	8.84 (1.03, 76.06)
Age 50–64	0.94 (0.89, 0.99)	0.81 (0.74, 0.89)	2.10 (1.36, 3.24)	18.54 (4.12, 83.37)
Age 65–74	0.72 (0.67, 0.78)	0.60 (0.47, 0.76)	3.33 (1.79, 6.21)	57.58 (6.17, 537.72)
Age 75–84	0.51 (0.46, 0.57)	0.53 (0.41, 0.69)	3.35 (1.50, 7.48)	205.29 (20.09, 2097.93)
Age ≥85	0.36 (0.30, 0.44)	0.34 (0.25, 0.45)	3.11 (1.27, 7.58)	270.92 (24.81, 2957.98)
BMI >30 or not	0.68 (0.65, 0.71)	0.86 (0.81, 0.91)	0.79 (0.61, 1.02)	1.41 (0.95, 2.09)
Female vs male	1.24 (1.20, 1.29)	1.30 (1.21, 1.40)	0.97 (0.81, 1.17)	0.60 (0.39, 0.90)
ZIP code characteristics				
Median income	1.00 (1.00, 1.00)	1.00 (1.00, 1.00)	1.00 (1.00, 1.00)	1.00 (1.00, 1.00)
Average HH size	0.81 (0.66, 0.99)	0.91 (0.70, 1.19)	0.91 (0.37, 2.19)	4.43 (2.42, 8.10)
Share employed	19.70 (3.52, 110.37)	300.38 (31.34, 2878.63)	6.35 (0.00, 9810.61)	303.21 (1.92, 47402.18)
Share uninsured	0.05 (0.01, 0.51)	0.24 (0.01, 4.96)	0.00 (0.00, 26.72)	0.02 (0.00, 204.07)
Share cash assistance	0.00 (0.00, 0.00)	0.00 (0.00, 0.01)	0.00 (0.00, 0.00)	8.18e+07 (2.78, 2.46e+15)
Share Social Security	1.17 (0.38, 3.60)	6.58 (1.28, 33.85)	0.55 (0.00, 295.45)	0.07 (0.00, 15.91)
Share receiving SNAP	617.20 (15.89, 24063)	5793.69 (59.10, 567194)	16161.15 (7.22, 3.62e+07)	0.00 (0.00, 0.00)
Share detached single family home	0.90 (0.56, 1.44)	1.09 (0.65, 1.85)	0.55 (0.07, 4.21)	1.21 (0.19, 7.76)
Observations	83,292	83,292	83,292	83,292
Mean outcome	29.1 <sup>c</sup>	3.97 <sup>d</sup>	19.7 <sup>e</sup>	9.37 <sup>e</sup>

<sup>a</sup>Due to small numbers (N=280), American Indian/Native Alaskan is included with Other/Unknown.

<sup>b</sup>Patients with a chronic pain diagnosis in the electronic health record.

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<sup>c</sup>Percent of all patients who had at least one test for SARS-CoV-2.

<sup>d</sup>Ever tested positive is denominated by all impaneled patients, irrespective of whether they were ever tested for SARS-CoV-2.

<sup>e</sup>Hospitalization and Death rate are per 10,000.

<sup>f</sup>The 18 patients who self-identified as non-binary or gender unknown were dropped in these models.

COPD, chronic obstructive pulmonary disease; HH, household; SNAP, Supplemental Nutrition Assistance Program.

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**Appendix Table 3.** Ever Had a RT-PCR Test for SARS-CoV-2

<b>Variable</b>	<b>Unadjusted OR (95% CI)</b>	<b>Demographic + health adjusted<sup>a</sup> OR (95% CI)</b>	<b>Demographic, health + ZIP code adjusted<sup>a</sup> OR (95% CI)</b>
White (ref)			
Asian	0.89 (0.85, 0.94)	0.93 (0.88, 0.98)	0.89 (0.81, 0.97)
Black	0.94 (0.90, 0.99)	0.92 (0.88, 0.97)	0.88 (0.83, 0.94)
Latino	1.33 (1.27, 1.38)	1.37 (1.32, 1.43)	1.30 (1.20, 1.41)
Other <sup>b</sup>	0.69 (0.65, 0.73)	0.83 (0.78, 0.87)	0.81 (0.74, 0.89)
Observations	84,346	84,328	83,292
Mean outcome	28.1%	28.1%	28.2%

<sup>a</sup>The 18 patients who self-identified as non-binary or gender unknown were dropped in these models.

<sup>b</sup> Due to small numbers American Indian/Native Alaskan is included with Other/Unknown.

RT-PCR, reverse transcriptase polymerase chain reaction.



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**Appendix Table 4.** Number of Tests for SARS-CoV-2<sup>a</sup>

Variable	Unadjusted	Demographic + health adjusted <sup>b</sup>	Demographic, health + ZIP code adjusted <sup>b</sup>
	Incident rate ratios (95% CI)	Incident rate ratios (95% CI)	Incident rate ratios (95% CI)
White (ref)			
Asian	0.86 (0.82, 0.90)	0.88 (0.84, 0.93)	0.88 (0.81, 0.95)
Black	0.87 (0.83, 0.91)	0.85 (0.81, 0.89)	0.86 (0.80, 0.93)
Latino	1.05 (1.01, 1.09)	1.07 (1.03, 1.11)	1.07 (1.01, 1.13)
Other <sup>c</sup>	0.72 (0.69, 0.76)	0.81 (0.77, 0.85)	0.82 (0.76, 0.89)
Observations	84,346	84,328	83,292
Mean outcome <sup>d</sup>	0.55	0.55	0.56

<sup>a</sup>Estimates are from negative binomial regression models.

<sup>b</sup>The 18 patients who self-identified as non-binary or gender unknown were dropped in these models.

<sup>c</sup>Due to small numbers American Indian/Native Alaskan is included with Other/Unknown.

<sup>d</sup>The mean number of tests is for all impaneled patients including those who were never tested.

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**Appendix Table 5.** Ever Had a Positive RT-PCR Test

Variable	Unadjusted OR (95% CI)	Demographic + health adjusted <sup>a</sup> OR (95% CI)	Demographic, health + ZIP code adjusted <sup>a</sup> OR (95% CI)
White (ref)			
Asian	1.27 (1.10, 1.45)	1.29 (1.12, 1.48)	1.20 (1.02, 1.41)
Black	0.89 (0.77, 1.03)	0.84 (0.72, 0.98)	0.75 (0.62, 0.91)
Latino	3.76 (3.40, 4.16)	3.56 (3.21, 3.95)	3.14 (2.61, 3.76)
Other <sup>b</sup>	1.07 (0.92, 1.24)	1.11 (0.95, 1.29)	1.06 (0.86, 1.31)
Observations	84,346	84,328	83,292
Mean outcome	3.94%	3.94%	3.99%

<sup>a</sup>The 18 patients who self-identified as non-binary or gender unknown were dropped in these models.

<sup>b</sup>Due to small numbers American Indian/Native Alaskan is included with Other/Unknown.

RT-PCR, reverse transcriptase polymerase chain reaction .

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**Appendix Table 6.** SARS-CoV-2 Test Positivity<sup>a</sup>

Variable	Unadjusted OR (95% CI)	Demographic + health adjusted <sup>b</sup> OR (95% CI)	Demographic, health + ZIP code adjusted <sup>b</sup> OR (95% CI)
White (ref)			
Asian	1.42 (1.23, 1.64)	1.40 (1.21, 1.62)	1.34 (1.13, 1.58)
Black	0.94 (0.81, 1.09)	0.91 (0.78, 1.06)	0.84 (0.70, 1.00)
Latino	3.56 (3.21, 3.96)	3.27 (2.94, 3.64)	2.98 (2.50, 3.54)
Other <sup>c</sup>	1.49 (1.28, 1.74)	1.37 (1.17, 1.60)	1.32 (1.07, 1.62)
Observations	24,508	24,506	24,333
Mean outcome	13.7	13.7	13.7

<sup>a</sup>Positivity is expressed as the number of patients who ever tested positive relative to the number ever tested for COVID-19.

<sup>b</sup>The 18 patients who self-identified as non-binary or gender unknown were dropped in these models.

<sup>c</sup>Due to small numbers American Indian/Native Alaskan is included with Other/Unknown.

**Appendix**  
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**Appendix Table 7.** AORs With Alternate Codings for Other/Unknown Race<sup>a</sup>

Variable	Panel A: Ever tested for SARS-CoV-2	Panel B: Ever tested positive for SARS- CoV-2	Panel C: COVID- 19 hospitalization	Panel D: COVID- 19 death
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Panel A: Recode Unknown as Latino				
Asian	0.85 (0.77, 0.93)	1.15 (0.97, 1.36)	1.29 (0.63, 2.62)	1.66 (0.58, 4.78)
Black	0.85 (0.80, 0.91)	0.74 (0.61, 0.89)	1.25 (0.78, 2.01)	2.23 (0.84, 5.95)
Latino	1.11 (1.01, 1.21)	2.73 (2.23, 3.33)	2.82 (1.81, 4.38)	3.66 (1.68, 7.97)
Other	1.05 (0.96, 1.16)	1.32 (1.05, 1.64)	0.70 (0.27, 1.78)	0.92 (0.18, 4.70)
Panel B: Recode Unknown as Asian				
Asian	0.75 (0.69, 0.82)	1.05 (0.90, 1.23)	1.16 (0.57, 2.36)	1.56 (0.54, 4.47)
Black	0.87 (0.81, 0.93)	0.76 (0.63, 0.91)	1.29 (0.80, 2.08)	2.28 (0.86, 6.07)
Latino	1.27 (1.18, 1.37)	3.15 (2.63, 3.77)	3.22 (2.05, 5.06)	4.09 (1.90, 8.82)
Other	1.06 (0.97, 1.17)	1.34 (1.08, 1.66)	0.71 (0.28, 1.82)	0.93 (0.18, 4.75)
Panel C: Recode Unknown as Black				
Asian	0.86 (0.79, 0.95)	1.20 (1.02, 1.41)	1.34 (0.66, 2.72)	1.72 (0.60, 4.93)
Black	0.76 (0.70, 0.82)	0.74 (0.60, 0.92)	1.10 (0.66, 1.81)	1.94 (0.71, 5.31)
Latino	1.27 (1.17, 1.37)	3.15 (2.63, 3.77)	3.22 (2.05, 5.05)	4.10 (1.91, 8.83)
Other	1.06 (0.96, 1.17)	1.34 (1.08, 1.66)	0.71 (0.28, 1.82)	0.93 (0.18, 4.75)
Panel D: Recode Unknown as White				
Asian	0.96 (0.88, 1.06)	1.27 (1.07, 1.50)	1.48 (0.73, 3.01)	1.82 (0.69, 4.84)
Black	0.97 (0.91, 1.04)	0.81 (0.70, 0.94)	1.43 (0.90, 2.26)	2.41 (1.02, 5.71)
Latino	1.44 (1.32, 1.56)	3.36 (2.84, 3.99)	3.58 (2.21, 5.79)	4.33 (2.21, 8.48)
Other	1.19 (1.08, 1.32)	1.43 (1.15, 1.77)	0.78 (0.30, 2.01)	0.98 (0.21, 4.72)
Observations <sup>b</sup>	83,292	83,292	83,292	83,292
Mean outcome	29.2	4.02 <sup>c</sup>	19.8 <sup>d</sup>	9.48 <sup>d</sup>

<sup>a</sup>Estimates from fully adjusted models that code those of unknown race as Latino, Asian, Black or White in Panels A, B, C, and D respectively.

<sup>b</sup>The 18 patients who self-identified as non-binary or gender unknown were dropped in these models.

<sup>c</sup>Percent positive is for all impaneled patients irrespective of whether they were tested.

<sup>d</sup>Hospitalization and death rates are per 10,000.