

Supplemental Materials

Figure S1: Flowchart demonstrating total number of observations available, excluded to due to missing values or hospitals having less than 10 patients, and final number of observations included in analysis

Table S1. Components of the Social Vulnerability Index

Table S2. Diagnosis Characteristics, Admission Features, and Laboratory Values for Patients Hospitalized with COVID-19 by County-Level Social Vulnerability Index Quartiles

Table S3. In-Hospital Mortality and Major Adverse Cardiovascular Events (MACE) of Patients Hospitalized with COVID-19 by County-Level Social Vulnerability Index Quartiles

Table S4. Odds Ratios of Clinical Outcomes by Per-Decile Increase in Subcomponents of Social Vulnerability Index Among Patients Hospitalized for COVID-19

Table S5. Association between County-Level Social Vulnerability and Clinical Outcomes by Time Period (January 14 to June 30, 2020 vs. July 1 to November 30, 2020)

Table S6. In-Hospital Treatment Patterns and Death Among COVID-19 Patients with Acute Coronary Syndromes by County-Level Social Vulnerability Quartiles

Figure S1: Flowchart demonstrating total number of observations available, excluded to due to missing values or hospitals having less than 10 patients, and final number of observations included in analysis

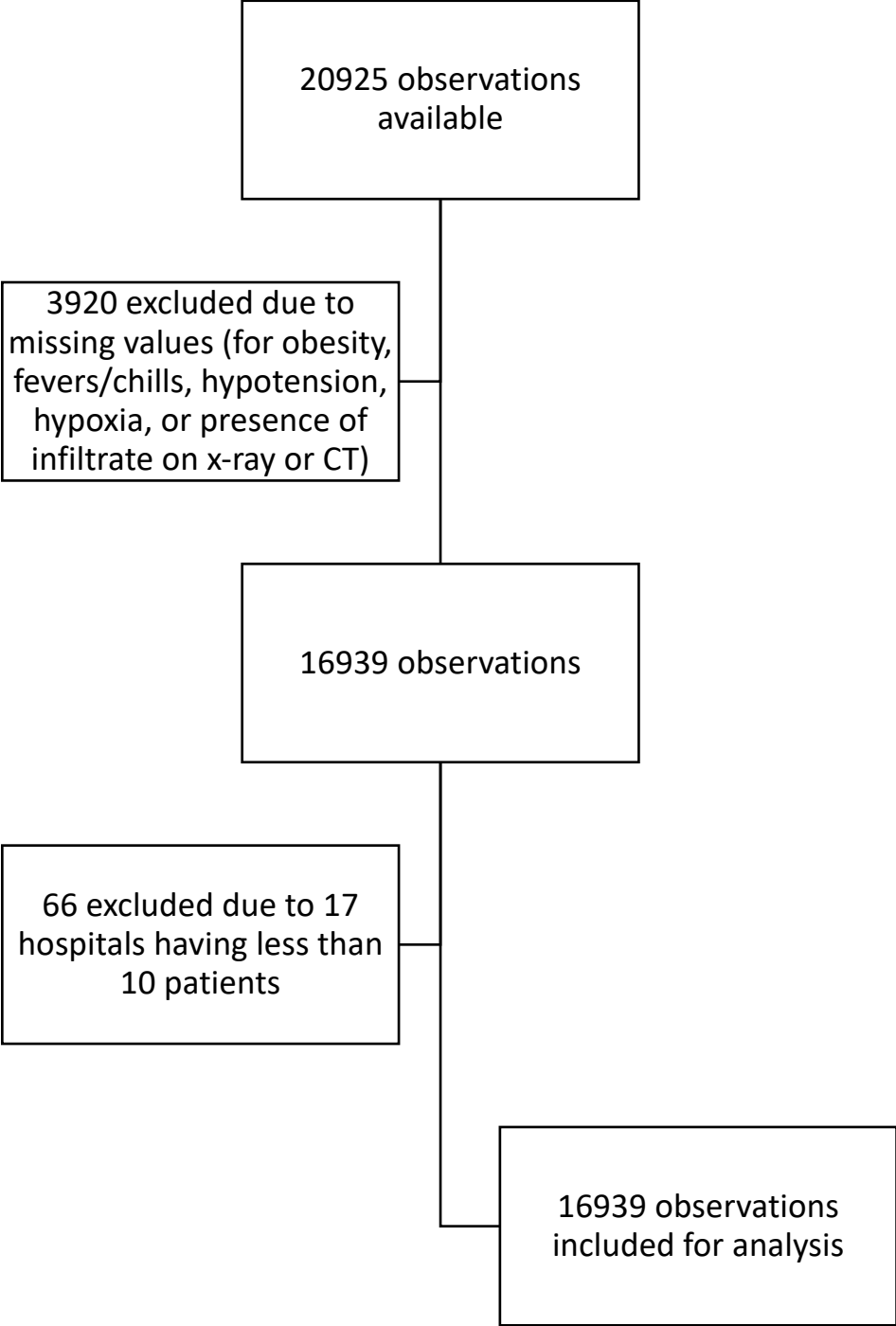


Table S1. Components of the Social Vulnerability Index

Socioeconomic Status	Below Poverty Unemployed Income No High School Diploma
Household composition and Disability	Age 65 years or older Age 17 years or younger Older than Age 5 years with a Disability
Minority Status and Language	Minority Speak English “Less than Well”
Housing Type and Transportation	Multi-Unit Structures Mobile Homes Crowding No Vehicle Group Quarters

Table S2. Diagnosis Characteristics, Admission Features, and Laboratory Values for Patients Hospitalized with COVID-19 by County-Level Social Vulnerability Index Quartiles

Characteristic	Quartile 1 (Least Vulnerable)	Quartile 2	Quartile 3	Quartile 4 (Most Vulnerable)	Overall	p-value
	N=3168	N=3451	N=5251	N=5065	N=16935	
Diagnosis and Hospital Presentation						
Days from symptoms onset to hospital arrival	7.0±6.8 (2691)	7.2±6.8 (2838)	6.8±6.7 (4466)	6.1±6.2 (4358)	6.7±6.6 (14353)	<.001
Days from symptom onset to diagnosis	5.1±6.7 (2654)	4.7±6.3 (2800)	5.3±6.6 (4410)	5.0±6.4 (4302)	5.0±6.5 (14166)	0.009
Timing of COVID-19 diagnosis						
Prior to hospital arrival	35.2% (1115/3168)	48.9% (1689/3455)	33.5% (1756/5249)	29.7% (1503/5065)	35.8% (6063/16937)	<.001
During hospitalization	64.2% (2035/3168)	49.9% (1723/3455)	64.8% (3403/5249)	69.5% (3521/5065)	63.1% (10682/16937)	
After hospital discharge	0.5% (16/3168)	0.9% (30/3455)	1.3% (67/5249)	0.6% (28/5065)	0.8% (141/16937)	
Unknown	0.1% (2/3168)	0.4% (13/3455)	0.4% (23/5249)	0.3% (13/5065)	0.3% (51/16937)	
Admission Features						
Fever	57.7% (1828/3168)	56.0% (1935/3455)	63.5% (3336/5251)	59.1% (2994/5065)	59.6% (10093/16939)	0.002
Tachycardia	37.2% (1180/3168)	30.9% (1066/3455)	36.0% (1890/5251)	36.7% (1857/5065)	35.4% (5993/16939)	0.13
Hypotension	2.1% (67/3168)	2.1% (73/3455)	2.7% (141/5251)	2.5% (127/5065)	2.4% (408/16939)	0.12
Hypoxia	54.8% (1737/3168)	62.6% (2164/3455)	50.6% (2657/5251)	50.2% (2541/5065)	53.7% (9099/16939)	<.001
Infiltrate on initial chest XRay/Computed Tomography (CT)	69.7% (2207/3168)	73.9% (2554/3455)	74.8% (3928/5251)	74.0% (3747/5065)	73.4% (12436/16939)	<.001
Laboratory Values						
White blood cell count on admission						

N measured (%)	99.2% (3143/3168)	98.8% (3413/3455)	99.0% (5197/5251)	99.2% (5026/5065)	99.1% (16779/16939)	0.54
Measured value, K/uL	8.2±4.4 (3143)	8.1±4.3 (3413)	7.8±4.1 (5197)	7.9±4.2 (5026)	7.9±4.2 (16779)	<.001
C-reactive protein (CRP)						
N measured (%)	68.9% (2182/3168)	45.0% (1555/3455)	62.9% (3304/5251)	63.8% (3233/5065)	60.7% (10274/16939)	0.009
Measured value, mg/L	63.6±87.5 (2182)	91.1±110.4 (1555)	92.4±159.5 (3304)	80.6±97.9 (3233)	82.4±121.6 (10274)	<.001
D-dimer						
N measured (%)	34.2% (1084/3168)	37.4% (1293/3455)	42.5% (2234/5251)	42.5% (2153/5065)	39.9% (6764/16939)	<.001
Measured value, ng/mL	1566.9±2822.3 (1084)	2008.1±3430.5 (1293)	1859.3±3549.3 (2234)	1681.0±3463.0 (2153)	1784.1±3394.4 (6764)	0.004
Pro-calcitonin						
N measured (%)	62.6% (1983/3168)	48.1% (1663/3455)	62.2% (3267/5251)	52.8% (2676/5065)	56.6% (9589/16939)	<.001
Measured value, ng/mL	1.2±6.9 (1983)	1.3±7.3 (1663)	1.4±7.2 (3267)	1.7±8.4 (2676)	1.4±7.5 (9589)	0.15

Table S3. In-Hospital Mortality and Major Adverse Cardiovascular Events (MACE) of Patients Hospitalized with COVID-19 by County-Level Social Vulnerability Index Quartiles

Characteristic	Quartile 1	Quartile 2	Quartile 3	Quartile 4	Overall	p-value
	N=3168	N=3451	N=5251	N=5065	N=16935	
In-hospital Mortality	13.6% (430/3168)	12.5% (431/3455)	14.5% (762/5251)	16.9% (855/5065)	14.6% (2478/16939)	<.001
Age < 55 years	5.0% (54/1080)	4.7% (54/1154)	5.4% (96/1762)	6.8% (133/1945)	5.7% (337/5941)	0.013
Age 55 - 70 years	12.2% (120/984)	10.3% (119/1152)	12.8% (210/1645)	17.6% (282/1602)	13.6% (731/5383)	<.001
Age > 70 years	23.2% (256/1104)	22.5% (258/1149)	24.7% (456/1844)	29.0% (440/1518)	25.1% (1410/5615)	<.001
MACE	16.1% (510/3168)	16.4% (566/3455)	18.3% (959/5251)	20.2% (1024/5065)	18.1% (3059/16939)	<.001
Acute Coronary Syndrome (all)	2.4% (76/3168)	3.1% (106/3455)	3.4% (176/5251)	3.4% (173/5065)	3.1% (531/16939)	0.01
NSTEMI	0.3% (8/3168)	0.2% (8/3454)	0.4% (20/5250)	0.3% (15/5065)	0.3% (51/16937)	0.16
STEMI	2.1% (68/3168)	2.8% (98/3454)	3.0% (156/5250)	3.1% (158/5065)	2.8% (480/16937)	0.50
Stroke	1.3% (40/3168)	1.4% (50/3453)	1.4% (72/5250)	1.5% (75/5065)	1.4% (237/16936)	0.50
New-onset heart failure	1.0% (31/3168)	1.7% (58/3453)	1.6% (82/5250)	1.2% (62/5065)	1.4% (233/16936)	0.67
Myocarditis	0.3% (10/3168)	0.2% (6/3453)	0.4% (21/5250)	0.3% (17/5064)	0.3% (54/16935)	0.45
Sustained Ventricular Arrhythmia	1.3% (42/3168)	1.2% (42/3453)	1.0% (54/5248)	1.0% (52/5064)	1.1% (190/16933)	0.16
Cardiogenic Shock	0.8% (24/3168)	0.6% (22/3455)	0.7% (36/5251)	0.5% (25/5065)	0.6% (107/16939)	0.18
In-hospital cardiac arrest	3.2% (100/3168)	2.8% (98/3453)	4.4% (233/5246)	7.1% (359/5065)	4.7% (790/16932)	<.001

Table S4. Odds Ratios of Clinical Outcomes by Per-Decile Increase in Subcomponents of Social Vulnerability Index Among Patients Hospitalized for COVID-19

Outcome	Base Model (SVI)		Model 1 (Base + Age & Sex)		Model 2 (Model 1 + Race)		Model 3 (Model 2 + Insurance Status)		Model 4 (Model 3 + Past Medical History)		Model 5 (Model 4 + Clinical Features)	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
In-hospital mortality												
<i>Socioeconomic Status</i>	1.04 [0.99, 1.09]	0.11	1.06 [1.00, 1.11]	0.02	1.06 [1.01, 1.11]	0.02	1.06 [1.01, 1.05]	0.02	1.07 [1.01, 1.12]	0.01	1.07 [1.02, 1.12]	0.01
<i>Household Composition & Disability</i>	0.99 [0.95, 1.02]	0.63	1.00 [0.96, 1.04]	0.90	0.99 [0.96, 1.04]	0.88	1.00 [0.96, 1.04]	0.80	0.99 [0.95, 1.03]	0.63	0.99 [0.95, 1.03]	0.49
<i>Minority Status & Language</i>	0.97 [0.93, 1.00]	0.10	1.00 [0.97, 1.04]	0.90	1.00 [0.96, 1.04]	0.94	1.00 [0.97, 1.04]	0.83	1.01 [0.97, 1.05]	0.61	1.02 [0.98, 1.06]	0.35
<i>Housing Type & Transport</i>	0.99 [0.96, 1.03]	0.96	0.98 [0.95, 1.02]	0.28	1.00 [0.98, 1.03]	0.25	0.98 [0.94, 1.01]	0.20	0.97 [0.94, 1.01]	0.14	0.97 [0.94, 1.01]	0.24
Major Adverse Cardiovascular Events (MACE)												
Socioeconomic Status	1.02 [0.98, 1.06]	0.50	1.03 [0.99, 1.08]	0.17	1.03 [0.99, 1.08]	0.17	1.03 [0.99, 1.08]	0.16	1.03 [0.99, 1.08]	0.13	1.04 [0.99, 1.09]	0.12
Household Composition & Disability	1.01 [0.97, 1.05]	0.48	1.02 [0.99, 1.06]	0.26	1.02 [0.98, 1.06]	0.28	1.02 [0.98, 1.06]	0.33	1.02 [0.98, 1.06]	0.44	1.01 [0.97, 1.05]	0.62
Minority Status & Language	0.96 [0.93, 0.99]	0.01	0.99 [0.95, 1.02]	0.44	0.99 [0.95, 1.02]	0.39	0.99 [0.95, 1.02]	0.46	0.99 [0.96, 1.03]	0.60	1.00 [0.96, 1.03]	0.86

Housing Type and Transport	1.01 [0.98, 1.05]	0.43	1.00 [0.96, 1.03]	0.77	0.99 [0.96, 1.03]	0.69	0.99 [0.96, 1.02]	0.60	0.99 [0.96, 1.02]	0.49	0.99 [0.96, 1.03]	0.73
-------------------------------	-------------------------	------	-------------------------	------	-------------------------	------	-------------------------	------	-------------------------	------	-------------------------	------

Table S5. Association between County-Level Social Vulnerability and Clinical Outcomes by Time Period (January 14 to June 30, 2020 vs. July 1 to November 30, 2020)

	Demographics + insurance status	Demographics, Insurance + Comorbidities	Demographics, Insurance, Comorbidities + Clinical Features	P value for interaction term
In-hospital Mortality				
Q2 vs. Q1 before July 1	1.222 [0.952, 1.568]	1.176 [0.915, 1.512]	1.067 [0.825, 1.379]	0.039
Q3 vs. Q1 before July 1	1.210 [0.974, 1.503]	1.174 [0.944, 1.461]	1.165 [0.932, 1.456]	
Q4 vs. Q1 before July 1	1.284 [1.024, 1.609]	1.248 [0.994, 1.566]	1.232 [0.976, 1.556]	
Q2 vs. Q1 since July 1	0.767 [0.551, 1.069]	0.764 [0.548, 1.067]	0.808 [0.574, 1.138]	
Q3 vs. Q1 since July 1	0.757 [0.526, 1.089]	0.759 [0.526, 1.094]	0.755 [0.519, 1.099]	
Q4 vs. Q1 since July 1	1.220 [0.873, 1.704]	1.236 [0.883, 1.731]	1.277 [0.903, 1.806]	
Major Adverse Cardiovascular Events (MACE)				
Q2 vs. Q1 before July 1	1.267 [0.893, 1.798]	1.257 [0.886, 1.784]	1.203 [0.846, 1.709]	0.705
Q3 vs. Q1 before July 1	1.102 [0.806, 1.508]	1.085 [0.793, 1.485]	1.082 [0.790, 1.481]	
Q4 vs. Q1 before July 1	1.167 [0.842, 1.617]	1.159 [0.836, 1.606]	1.136 [0.819, 1.576]	
Q2 vs. Q1 since July 1	0.912 [0.605, 1.377]	0.933 [0.618, 1.410]	0.948 [0.626, 1.436]	
Q3 vs. Q1 since July 1	0.869 [0.572, 1.319]	0.887 [0.584, 1.349]	0.882 [0.579, 1.343]	
Q4 vs. Q1 since July 1	1.073 [0.716, 1.609]	1.094 [0.729, 1.641]	1.088 [0.724, 1.635]	

Demographic variables included in the model: age, sex, and race/ethnicity

Table S6. In-Hospital Treatment Patterns and Death Among COVID-19 Patients with Acute Coronary Syndromes by County-Level Social Vulnerability Index Quartiles

	Quartile 1 (Least Vulnerable)	Quartile 2	Quartile 3	Quartile 4 (Most Vulnerable)	Overall	p- value
	N=76	N=106	N=176	N=173	N=531	
Treatment						
Invasive Coronary Angiogram	11.8% (9/76)	4.7% (5/106)	8.0% (14/176)	8.7% (15/173)	8.1% (43/531)	0.86
Revascularization (percutaneous coronary intervention/PCI)	9.2% (7/76)	3.8% (4/106)	6.3% (11/176)	7.5% (13/173)	6.6% (35/531)	0.92
In-hospital mortality	40.8% (31/76)	23.6% (25/106)	33.5% (59/176)	39.3% (68/173)	34.5% (183/531)	0.36