

## Supplemental Content

This supplement has been provided by the authors to give readers additional information about their work.

Supplement to: Christina S Boncyk, Sonali Shirali, Nicholas Flores-Connor, Gen Li, Jacob Clifton, Pamela Butler, Karen Y McCarthy, Robert E Freundlich. Examining the Association of Social Determinants of Health on Critically Ill COVID-19 Patient Outcomes: A Retrospective Observational Study

**Table S5. The Effect of Air Quality on the Number of Ventilator-Free Days over First 28 Days Following ICU Admission**

Variables	Adjusted Parameter Estimate (95% CI)	P-Value
Average AQI in the Year Prior to COVID-19 Diagnosis (per 10-unit increase)	0.83 (0.17, 1.50)	0.014
Age (per 10-year increase)	-1.27 (-1.51, -1.03)	<.001
Body Mass Index	-0.08 (-0.13, -0.03)	<.001
Congestive Heart Failure	0.64 (-0.51, 1.78)	0.277
Hypertension, Uncomplicated	0.66 (-0.26, 1.58)	0.160
Hypertension, Complicated	1.49 (-0.25, 3.23)	0.094
Chronic Pulmonary Disease	-0.15 (-1.23, 0.94)	0.791
Diabetes, Uncomplicated	0.53 (-0.74, 1.79)	0.412
Diabetes, Complicated	0.07 (-1.15, 1.30)	0.908
Renal Failure	-1.79 (-3.22, -0.36)	0.014
Liver Disease	-2.04 (-3.27, -0.80)	0.001
Metastatic Cancer	1.69 (-0.50, 3.89)	0.130

**Table S6. The Effect of Air Quality on the Number of ICU-Free Days over First 28 Days Following ICU Admission**

Variables	Adjusted Parameter Estimate (95% CI)	P-Value
Average AQI in the Year Prior to COVID-19 Diagnosis (per 10-unit increase)	0.88 (0.12, 1.63)	0.024
Age (per 10-year increase)	-1.44 (-1.71, -1.17)	<.001
Body Mass Index	-0.19 (-0.24, -0.13)	<.001
Congestive Heart Failure	1.90 (0.58, 3.20)	0.005
Hypertension, Uncomplicated	0.81 (-0.24, 1.85)	0.132
Hypertension, Complicated	3.08 (1.09, 5.07)	0.002
Chronic Pulmonary Disease	-1.83 (-3.07, -0.60)	0.004
Diabetes, Uncomplicated	0.50 (-0.94, 1.95)	0.495
Diabetes, Complicated	0.21 (-1.18, 1.61)	0.764
Renal Failure	-3.07 (-4.70, -1.43)	<.001
Liver Disease	-2.14 (-3.55, -0.72)	0.003
Metastatic Cancer	2.82 (0.32, 5.33)	0.027

**Table S7. The Effect of Air Quality on the Number of Hospital-Free Days over First 28 Days Following ICU Admission**

<b>Variables</b>	<b>Adjusted Parameter Estimate (95% CI)</b>	<b>P-Value</b>
Average AQI in the Year Prior to COVID-19 Diagnosis (per 10-unit increase)	0.89 (0.17, 1.61)	0.016
Age (per 10-year increase)	-1.20 (-1.46, -0.94)	<.001
Body Mass Index	-0.13 (-0.18, -0.08)	<.001
Congestive Heart Failure	-0.18 (-1.43, 1.07)	0.781
Hypertension, Uncomplicated	-0.36 (-1.36, 0.65)	0.486
Hypertension, Complicated	2.75 (0.85, 4.64)	0.005
Chronic Pulmonary Disease	-2.19 (-3.37, -1.01)	<.001
Diabetes, Uncomplicated	0.66 (-0.72, 2.04)	0.349
Diabetes, Complicated	-0.55 (-1.88, 0.78)	0.420
Renal Failure	-3.54 (-5.10, -1.98)	<.001
Liver Disease	-3.21 (-4.56, -1.86)	<.001
Metastatic Cancer	1.65 (-0.75, 4.04)	0.178

**Table S8. The Effect of Air Quality on Duration of Hospitalization of COVID-Patient**

<b>Variables</b>	<b>Adjusted Parameter Estimate (95% CI)</b>	<b>P-Value</b>
Average AQI in the Year Prior to COVID-19 Diagnosis (per 10-unit increase)	0.01 (-1.25, 1.28)	0.982
Age (per 10-year increase)	-1.22 (-1.68, -0.76)	<.001
Body Mass Index	0.12 (0.03, 0.21)	0.012
Congestive Heart Failure	1.42 (-0.77, 3.60)	0.204
Hypertension, Uncomplicated	1.74 (-0.01, 3.49)	0.051
Hypertension, Complicated	-5.39 (-8.71, -2.07)	0.002
Chronic Pulmonary Disease	5.48 (3.42, 7.54)	<.001
Diabetes, Uncomplicated	-0.41 (-2.82, 1.99)	0.736
Diabetes, Complicated	0.60 (-1.73, 2.93)	0.615
Renal Failure	6.83 (4.10, 9.55)	<.001
Liver Disease	5.15 (2.79, 7.51)	<.001
Metastatic Cancer	1.15 (-3.03, 5.33)	0.588

**Table S9. The Effect of Air Quality on 28-Day Mortality Following ICU Admission**

<b>Variables</b>	<b>Adjusted Odds Ratio (95% CI)</b>	<b>P-Value</b>
Average AQI in the Year Prior to COVID-19 Diagnosis (per 10-unit increase)	0.81 (0.68, 0.96)	0.015
Age (per 10-year increase)	1.67 (1.55, 1.80)	<.001
Body Mass Index	1.03 (1.02, 1.05)	<.001
Congestive Heart Failure	0.75 (0.56, 0.99)	0.045
Hypertension, Uncomplicated	0.80 (0.63, 1.01)	0.058
Hypertension, Complicated	0.80 (0.53, 1.22)	0.301
Chronic Pulmonary Disease	1.18 (0.90, 1.53)	0.233
Diabetes, Uncomplicated	0.88 (0.64, 1.20)	0.415
Diabetes, Complicated	0.96 (0.71, 1.30)	0.777
Renal Failure	1.70 (1.20, 2.39)	0.003
Liver Disease	1.53 (1.13, 2.06)	0.006
Metastatic Cancer	1.01 (0.60, 1.71)	0.968

**Table S10. The Effect of Air Quality on Discharge Destination of COVID-Patient**

<b>Discharge Destination (Home was Reference Category)</b>	<b>Adjusted Odds Ratio (95% CI)</b>	<b>P-Value</b>
<b>Skilled Nursing Facility</b>		
Average AQI in the Year Prior to COVID-19 Diagnosis (per 10-unit increase)	0.76 (0.58, 0.99)	0.044
Age (per 10-year increase)	1.97 (1.75, 2.22)	<.001
Body Mass Index	1.01 (0.99, 1.03)	0.469
Congestive Heart Failure	1.14 (0.74, 1.74)	0.557
Hypertension, Uncomplicated	0.95 (0.66, 1.36)	0.774
Hypertension, Complicated	0.72 (0.37, 1.39)	0.323
Chronic Pulmonary Disease	1.38 (0.90, 2.12)	0.138
Diabetes, Uncomplicated	0.99 (0.61, 1.60)	0.963
Diabetes, Complicated	1.16 (0.72, 1.87)	0.534
Renal Failure	1.99 (1.13, 3.52)	0.018
Liver Disease	1.35 (0.81, 2.24)	0.248
Metastatic Cancer	0.35 (0.13, 0.94)	0.036
<b>Rehabilitation Facility</b>		
Average AQI in the Year Prior to COVID-19 Diagnosis (per 10-unit increase)	0.76 (0.60, 0.96)	0.022
Age (per 10-year increase)	1.21 (1.11, 1.33)	<.001
Body Mass Index	1.01 (0.99, 1.02)	0.550
Congestive Heart Failure	1.38 (0.93, 2.05)	0.106
Hypertension, Uncomplicated	1.17 (0.85, 1.62)	0.338
Hypertension, Complicated	0.35 (0.19, 0.66)	0.001
Chronic Pulmonary Disease	1.43 (0.97, 2.11)	0.068
Diabetes, Uncomplicated	0.70 (0.45, 1.11)	0.127
Diabetes, Complicated	1.52 (0.99, 2.33)	0.053
Renal Failure	2.61 (1.60, 4.24)	<.001
Liver Disease	1.02 (0.64, 1.63)	0.919
Metastatic Cancer	0.65 (0.29, 1.46)	0.292
<b>Transferred to Another Hospital</b>		
Average AQI in the Year Prior to COVID-19 Diagnosis (per 10-unit increase)	0.85 (0.26, 2.75)	0.788
Age (per 10-year increase)	0.96 (0.62, 1.49)	0.864
Body Mass Index	0.98 (0.89, 1.08)	0.632
Congestive Heart Failure	1.67 (0.19, 15.18)	0.647
Hypertension, Uncomplicated	0.79 (0.14, 4.50)	0.791
Hypertension, Complicated	–	–
Chronic Pulmonary Disease	2.94 (0.54, 15.83)	0.211
Diabetes, Uncomplicated	1.10 (0.09, 13.84)	0.939
Diabetes, Complicated	1.07 (0.09, 13.15)	0.959
Renal Failure	–	–
Liver Disease	1.66 (0.19, 14.41)	0.646
Metastatic Cancer	–	–

**Table S10. The Effect of Air Quality on Discharge Destination of COVID-Patient (Continued)**

<b>Discharge Destination (Home was Reference Category)</b>	<b>Adjusted Odds Ratio (95% CI)</b>	<b>P-Value</b>
<b>Hospice</b>		
Average AQI in the Year Prior to COVID-19 Diagnosis (per 10-unit increase)	1.10 (0.68, 1.77)	0.696
Age (per 10-year increase)	2.51 (2.02, 3.13)	<.001
Body Mass Index	1.01 (0.97, 1.05)	0.680
Congestive Heart Failure	1.02 (0.50, 2.07)	0.965
Hypertension, Uncomplicated	0.70 (0.39, 1.26)	0.229
Hypertension, Complicated	2.05 (0.57, 7.39)	0.273
Chronic Pulmonary Disease	1.85 (0.97, 3.52)	0.060
Diabetes, Uncomplicated	1.15 (0.52, 2.56)	0.726
Diabetes, Complicated	0.79 (0.34, 1.85)	0.587
Renal Failure	0.45 (0.13, 1.60)	0.217
Liver Disease	3.22 (1.59, 6.53)	0.001
Metastatic Cancer	0.73 (0.24, 2.26)	0.588
<b>Expired</b>		
Average AQI in the Year Prior to COVID-19 Diagnosis (per 10-unit increase)	0.74 (0.60, 0.90)	0.002
Age (per 10-year increase)	1.86 (1.71, 2.02)	<.001
Body Mass Index	1.04 (1.03, 1.06)	<.001
Congestive Heart Failure	0.78 (0.56, 1.09)	0.146
Hypertension, Uncomplicated	0.82 (0.63, 1.07)	0.142
Hypertension, Complicated	0.62 (0.38, 1.03)	0.067
Chronic Pulmonary Disease	1.59 (1.17, 2.17)	0.003
Diabetes, Uncomplicated	0.76 (0.53, 1.08)	0.123
Diabetes, Complicated	1.18 (0.84, 1.67)	0.344
Renal Failure	2.64 (1.73, 4.02)	<.001
Liver Disease	1.87 (1.32, 2.65)	<.001
Metastatic Cancer	0.62 (0.34, 1.13)	0.117