

Supplemental Tables S1–S3

Melhim, S. (2026). From air quality to public safety: Rethinking crime dynamics and social costs of pollution in the United States. *Journal of Environmental Health*, 89(3), 18–25.
<https://doi.org/10.70387/001c.171786>

Corresponding Author: Sadiq Melhim, MA; Department of Economics, University of Waterloo, Waterloo, Canada; and International Economics Department, School of Foreign Service, Georgetown University, Doha, Qatar.

Email: sadiqmelhim@gmail.com, smelhim@uwaterloo.ca, sm3837@georgetown.edu

Note. The author submitted these supplemental tables as additional resources for readers. The *Journal of Environmental Health* did not copy edit or format the text.

Supplemental Tables

Table S1

Raw Data of PM_{2.5} Annual Concentrations and Poverty, Unemployment, and Crime Rates

State	Year	PM _{2.5} (µg/m ³)	Poverty Rate (%)	Unemployment Rate (%)	Crime Rate
CA	2000	21.40	12.70	4.90	622.00
CA	2001	21.00	12.60	5.50	615.00
CA	2002	23.10	13.10	6.70	615.00
CA	2003	17.50	13.10	6.90	580.00
CA	2004	18.10	13.20	6.20	552.00
CA	2005	18.90	13.20	5.40	526.00
CA	2006	19.00	12.20	4.90	531.00
CA	2007	21.90	12.70	5.30	523.00
CA	2008	22.70	14.60	7.30	508.00
CA	2009	20.70	15.30	11.50	473.00
CA	2010	15.90	16.30	12.30	439.00
CA	2011	15.30	16.90	11.70	411.00
CA	2012	13.90	15.90	10.40	424.00
CA	2013	21.40	15.10	9.00	403.00
CA	2014	20.10	15.80	4.60	396.00
CA	2015	17.10	13.90	6.20	428.00
CA	2016	15.30	13.90	5.50	445.00
CA	2017	17.10	12.10	4.80	451.00
CA	2018	18.50	11.10	4.30	459.00
CA	2019	12.40	10.10	4.10	435.00
CA	2020	20.00	11.10	10.10	500.00
CA	2021	18.30	11.90	7.30	499.00
CA	2022	16.00	11.20	4.30	504.00
OR	2000	11.30	10.90	5.20	350.73
OR	2001	11.60	11.80	6.40	306.61
OR	2002	11.90	10.90	7.50	292.53
OR	2003	10.60	12.50	8.00	294.75
OR	2004	10.30	11.80	7.40	298.61
OR	2005	11.00	12.00	6.20	287.01
OR	2006	9.70	11.80	5.40	280.29
OR	2007	8.90	12.80	5.20	287.58
OR	2008	9.60	10.60	6.30	257.17
OR	2009	9.80	13.40	10.60	254.70
OR	2010	7.30	14.30	10.60	290.00
OR	2011	8.40	14.40	9.50	288.00
OR	2012	7.00	13.50	8.70	250.00
OR	2013	8.80	14.00	7.80	290.00
OR	2014	8.60	14.40	6.70	283.00
OR	2015	8.10	11.90	5.50	301.00
OR	2016	6.00	11.80	4.80	312.00

OR	2017	11.10	11.50	4.10	302.00
OR	2018	8.30	9.70	4.00	302.00
OR	2019	8.20	8.10	3.70	300.00
OR	2020	14.50	9.40	7.60	291.00
OR	2021	7.70	9.20	5.20	292.00
OR	2022	15.70	9.90	4.00	342.00
OK	2000	10.30	14.90	3.00	490.86
OK	2001	10.70	15.10	3.60	487.93
OK	2002	10.40	14.10	4.60	482.11
OK	2003	10.10	12.80	5.40	473.91
OK	2004	9.50	10.80	4.70	466.46
OK	2005	10.60	15.60	4.30	468.16
OK	2006	8.80	15.20	3.90	497.27
OK	2007	11.10	13.40	4.00	491.63
OK	2008	10.50	13.60	3.60	497.59
OK	2009	9.30	12.90	6.50	480.58
OK	2010	9.00	16.30	6.50	469.39
OK	2011	9.90	13.90	5.60	469.74
OK	2012	9.60	18.00	5.10	474.40
OK	2013	9.30	21.20	5.10	433.79
OK	2014	8.90	17.30	4.30	413.75
OK	2015	8.10	14.20	4.30	428.57
OK	2016	7.70	14.60	4.60	455.34
OK	2017	7.40	12.80	4.00	457.43
OK	2018	8.40	13.40	3.30	466.13
OK	2019	7.80	10.80	3.10	459.00
OK	2020	8.00	15.50	6.30	482.00
OK	2021	8.70	15.10	4.00	473.00
OK	2022	8.50	16.90	3.00	420.00
GA	2000	16.00	12.10	3.50	551.03
GA	2001	13.80	12.90	4.00	542.39
GA	2002	13.40	11.20	5.00	544.82
GA	2003	13.50	12.50	4.80	520.95
GA	2004	14.30	13.00	4.80	504.78
GA	2005	14.80	14.40	5.30	504.10
GA	2006	14.70	12.60	4.70	507.59
GA	2007	13.70	13.60	4.60	480.35
GA	2008	12.70	15.50	6.40	469.06
GA	2009	10.90	18.40	9.90	446.47
GA	2010	11.30	18.80	10.40	431.10
GA	2011	11.00	16.40	10.00	403.60
GA	2012	9.60	18.10	9.00	402.91
GA	2013	9.10	18.50	8.10	392.23
GA	2014	9.60	16.80	7.10	372.18
GA	2015	8.40	18.10	6.10	402.41
GA	2016	9.40	15.40	5.40	398.54
GA	2017	8.60	13.10	4.80	397.00
GA	2018	8.20	14.80	4.00	402.06

GA	2019	8.60	12.10	3.60	326.60
GA	2020	8.10	13.30	6.50	400.10
GA	2021	9.50	14.00	3.90	426.46
GA	2022	8.00	11.70	3.20	427.80
IL	2000	15.40	10.70	4.50	566.90
IL	2001	15.90	10.10	5.40	558.50
IL	2002	15.00	12.80	6.50	553.40
IL	2003	14.50	12.60	6.70	545.10
IL	2004	13.70	12.30	6.20	522.60
IL	2005	16.00	11.50	6.70	506.90
IL	2006	13.10	10.60	4.60	506.50
IL	2007	14.70	10.00	5.10	504.20
IL	2008	12.20	14.30	6.50	497.40
IL	2009	11.90	13.20	10.00	480.80
IL	2010	13.20	14.10	10.40	434.90
IL	2011	11.50	14.20	9.80	426.00
IL	2012	11.30	15.20	9.00	413.40
IL	2013	10.60	13.60	9.10	403.10
IL	2014	11.60	13.70	7.20	372.60
IL	2015	9.90	10.90	6.00	403.20
IL	2016	8.40	12.10	5.90	436.20
IL	2017	8.10	11.50	5.00	436.30
IL	2018	8.80	10.30	4.40	404.10
IL	2019	8.20	9.30	4.00	406.00
IL	2020	7.90	8.00	9.30	406.10
IL	2021	9.00	10.70	6.10	404.30
IL	2022	8.10	9.50	4.60	404.70
TX	2000	13.10	15.50	4.40	528.50
TX	2001	13.00	14.90	5.00	526.40
TX	2002	12.50	15.60	6.40	510.20
TX	2003	13.80	17.00	6.80	503.90
TX	2004	13.10	16.50	6.00	491.00
TX	2005	14.20	16.20	5.50	497.00
TX	2006	13.00	16.40	5.00	511.50
TX	2007	13.20	16.50	4.40	510.90
TX	2008	12.20	15.90	4.90	507.30
TX	2009	11.70	17.30	7.60	490.00
TX	2010	11.70	18.40	8.30	447.30
TX	2011	11.90	17.40	8.00	433.30
TX	2012	11.20	17.00	6.70	412.90
TX	2013	10.50	16.90	6.30	410.30
TX	2014	11.00	16.40	5.20	403.30
TX	2015	11.00	14.30	4.50	412.20
TX	2016	9.60	13.80	4.60	435.30
TX	2017	9.40	13.20	4.40	439.00
TX	2018	9.80	13.70	3.90	418.90
TX	2019	9.70	11.10	3.50	418.40
TX	2020	10.10	14.00	7.70	419.20

TX	2021	10.00	13.50	5.60	431.10
TX	2022	10.40	13.50	3.90	446.50
PA	2000	16.20	8.60	4.20	440.10
PA	2001	16.90	9.60	4.80	433.40
PA	2002	15.60	9.80	5.60	430.80
PA	2003	15.70	10.50	5.70	417.20
PA	2004	15.10	11.40	5.40	394.90
PA	2005	16.70	11.20	5.00	387.70
PA	2006	14.40	11.30	4.70	389.60
PA	2007	15.50	10.40	4.60	390.20
PA	2008	13.20	11.00	5.40	390.70
PA	2009	12.50	11.10	8.00	379.20
PA	2010	12.80	12.20	8.20	347.40
PA	2011	11.40	12.60	7.70	338.40
PA	2012	10.40	13.90	7.60	326.60
PA	2013	10.30	11.20	7.10	317.50
PA	2014	10.50	12.50	6.00	305.30
PA	2015	10.10	12.30	5.40	313.50
PA	2016	9.30	11.10	5.30	329.60
PA	2017	9.90	10.90	5.00	341.10
PA	2018	8.80	11.80	4.40	323.30
PA	2019	8.70	8.70	4.30	315.70
PA	2020	7.60	10.70	8.80	316.50
PA	2021	9.10	10.80	5.90	307.80
PA	2022	8.00	10.90	4.10	305.30
OH	2000	17.80	10.00	4.10	351.20
OH	2001	16.90	10.50	4.40	344.50
OH	2002	16.10	9.80	5.80	343.10
OH	2003	15.70	10.90	6.20	333.50
OH	2004	15.00	11.60	6.20	313.80
OH	2005	18.30	12.30	5.90	304.80
OH	2006	13.90	12.10	5.40	306.60
OH	2007	15.00	12.80	5.60	308.50
OH	2008	13.20	13.70	6.60	307.00
OH	2009	11.70	13.30	10.20	300.70
OH	2010	12.70	15.40	10.00	290.20
OH	2011	11.70	15.10	8.80	283.00
OH	2012	11.40	15.40	7.40	281.70
OH	2013	10.90	14.90	7.40	279.70
OH	2014	11.20	15.60	5.80	278.40
OH	2015	10.90	13.60	5.00	288.00
OH	2016	9.20	13.70	5.00	298.50
OH	2017	9.40	12.90	4.90	305.00
OH	2018	9.30	11.90	4.50	297.50
OH	2019	9.00	12.40	4.10	293.70
OH	2020	8.30	12.70	8.20	301.20
OH	2021	9.50	11.60	5.30	302.50
OH	2022	8.50	9.90	4.00	304.90

NV	2000	4.20	8.80	4.20	597.40
NV	2001	4.20	7.10	5.10	594.50
NV	2002	4.00	8.90	5.60	596.10
NV	2003	3.70	10.90	5.20	594.20
NV	2004	3.40	10.90	4.40	557.90
NV	2005	3.80	10.60	4.20	559.00
NV	2006	3.50	9.50	4.10	609.60
NV	2007	4.00	9.70	4.80	622.20
NV	2008	4.40	10.80	6.90	632.00
NV	2009	3.90	13.00	11.10	601.00
NV	2010	3.40	16.60	13.30	529.70
NV	2011	3.70	15.50	13.00	510.20
NV	2012	5.00	15.80	11.50	492.00
NV	2013	5.20	14.50	10.00	491.20
NV	2014	4.60	17.00	8.20	480.50
NV	2015	4.90	13.00	6.90	507.00
NV	2016	6.00	10.10	5.80	554.00
NV	2017	4.50	13.20	5.00	555.80
NV	2018	3.50	13.00	4.40	541.10
NV	2019	3.20	10.40	4.10	528.80
NV	2020	4.40	12.90	13.50	532.30
NV	2021	4.10	12.80	6.80	539.60
NV	2022	3.60	12.00	5.20	541.20
AZ	2000	9.50	11.70	4.00	523.70
AZ	2001	8.50	14.60	4.70	507.00
AZ	2002	9.80	13.50	6.20	483.00
AZ	2003	9.20	13.50	5.80	475.00
AZ	2004	8.40	14.40	5.00	464.40
AZ	2005	8.80	15.20	4.60	483.30
AZ	2006	9.10	14.40	4.30	507.00
AZ	2007	9.40	14.30	3.70	485.00
AZ	2008	9.40	18.00	5.80	474.00
AZ	2009	8.80	21.20	9.70	447.00
AZ	2010	7.30	18.80	10.40	410.30
AZ	2011	9.80	17.90	9.50	397.10
AZ	2012	9.10	19.00	8.40	382.00
AZ	2013	7.80	17.80	7.80	399.00
AZ	2014	7.90	21.20	6.80	413.00
AZ	2015	7.20	17.20	6.10	471.00
AZ	2016	7.60	16.10	5.50	474.00
AZ	2017	7.60	13.60	5.00	470.00
AZ	2018	8.10	12.80	4.80	470.30
AZ	2019	6.60	9.90	4.80	455.30
AZ	2020	8.30	10.90	7.80	484.80
AZ	2021	8.20	12.90	5.00	507.70
AZ	2022	7.60	12.70	3.80	485.40

Table S2

Regression Results on the Impact of PM_{2.5} Levels, Poverty Rates, and Unemployment Rates on the Crime Rate in the 10 Most Polluted States in the United States

```
. reg crime_rate pm25 poverty unemploy, vce(cluster state_id)
```

Linear regression

Number of obs = 230

F(3, 9) = 1.11

Prob > F = 0.3950

R-squared = 0.0212

Root MSE = 91.559

(Std. err. adjusted for 10 clusters in state_id)

crime_rate	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
pm25	.224329	7.303938	0.03	0.976	-16.29833	16.74698
poverty	3.544611	7.32299	0.48	0.640	-13.02114	20.11036
unemploy	-6.330969	6.251927	-1.01	0.338	-20.47381	7.811871
_cons	419.5057	144.4662	2.90	0.017	92.7004	746.3109

Table S3

Regression Results on the Impact of PM_{2.5} Levels, Poverty Rates, and Unemployment Rates on the Crime Rate in the 10 Most Polluted States in the United States With State- and Time-Fixed Effects

```

. eststo fe_state_year: xtreg crime_rate pm25 poverty unemploy i.year, fe vce(c)

```

Fixed-effects (within) regression
Group variable: state_id

Number of obs = 230
Number of groups = 10

R-squared:
Within = 0.7109
Between = 0.0564
Overall = 0.0827

Obs per group:
min = 23
avg = 23.0
max = 23

corr(u_i, Xb) = -0.1857

F(9, 9) = .
Prob > F = .

(Std. err. adjusted for 10 clusters in state_id)

crime_rate	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
pm25	5.054027	2.109394	2.40	0.040	.2822458	9.825809
poverty	.2505316	2.341925	0.11	0.917	-5.047271	5.548334
unemploy	-8.459945	3.425681	-2.47	0.036	-16.20937	-7.105164
year						
2001	-3.49986	2.983082	-1.17	0.271	-10.24806	3.248341
2002	-.3701712	6.644064	-0.06	0.957	-15.40009	14.65975
2003	-6.645757	6.556862	-1.01	0.337	-21.47841	8.186895
2004	-26.52339	8.056072	-3.29	0.009	-44.7475	-8.299292
2005	-39.80164	8.123879	-4.90	0.001	-58.17914	-21.42415
2006	-25.4861	12.20968	-2.09	0.066	-53.10632	2.134112
2007	-33.71832	12.52735	-2.69	0.025	-62.05716	-5.37949
2008	-26.16809	15.31053	-1.71	0.122	-60.80293	8.466744
2009	-10.67703	20.5287	-0.52	0.616	-57.11618	35.76212
2010	-29.57688	26.385	-1.12	0.291	-89.26389	30.11014
2011	-48.05177	26.01427	-1.85	0.098	-106.9001	10.7966
2012	-63.49046	23.97483	-2.65	0.027	-117.7253	-9.255635
2013	-75.28648	26.18182	-2.88	0.018	-134.5139	-16.05909
2014	-98.9579	26.60637	-3.72	0.005	-159.1457	-38.77011
2015	-75.53579	21.61997	-3.49	0.007	-124.4436	-26.62802
2016	-56.41211	20.11937	-2.80	0.021	-101.9253	-10.89894
2017	-61.49492	17.78468	-3.46	0.007	-101.7267	-21.26317
2018	-71.9837	18.27354	-3.94	0.003	-113.3213	-30.64609
2019	-83.6656	18.51871	-4.52	0.001	-125.5578	-41.77337
2020	-32.72765	20.40471	-1.60	0.143	-78.8863	13.43101
2021	-52.20714	15.77448	-3.31	0.009	-87.89149	-16.5228
2022	-65.10695	10.91576	-5.96	0.000	-89.80013	-40.41378
_cons	466.54	26.87649	17.36	0.000	405.7412	527.3389
sigma_u	90.556185					
sigma_e	26.471343					
rho	.92127628	(fraction of variance due to u_i)				