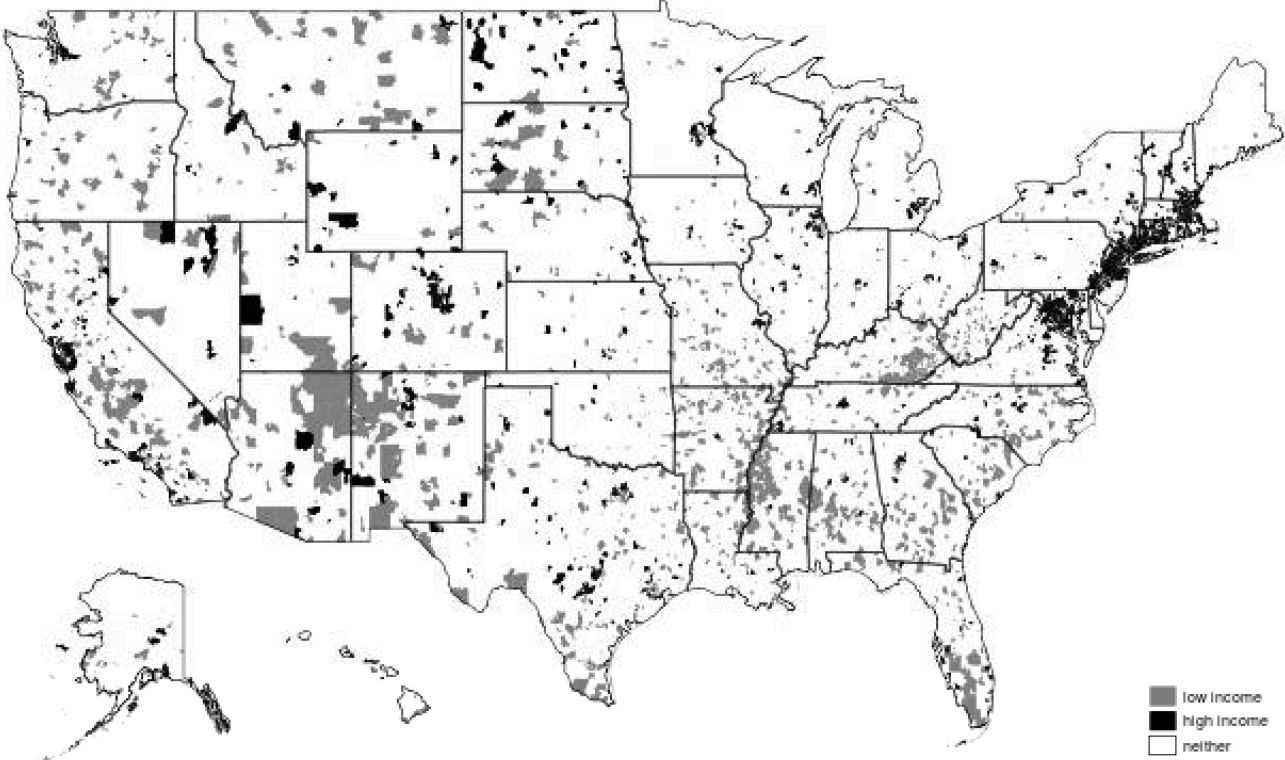


## **eAppendix**

### **Urban/Suburban/Rural Zip Code Classification**

Building on methods from a previous study and corresponding to geographical distinctions made in the reporting of the Behavioral Risk Factor Surveillance Survey,<sup>1</sup> we classified ZCTAs as urban, suburban, or rural. Using the 2010 Census metro and micro delineation file, we identified the principal city in each core based statistical area (CBSA), then employed a crosswalk to flag as urban the ZCTAs located in each principal city. Using the Census urban area relationship file, we flagged as rural all ZCTAs determined to be not in urban areas. All ZCTAs not flagged as urban or rural were classified as suburban; we reclassified 41 urban ZCTAs with fewer than 20 residents per square mile as suburban ZCTAs.<sup>2</sup>

**eAppendix Figure.** Distribution of low- and high-income ZCTAs across the U.S.



**eAppendix Table 1.** Number of ZCTAs and population by income and urban/suburban/rural classification.

	Low-income			High-income		
	Urban	Suburban	Rural	Urban	Suburban	Rural
Number of ZCTAs	881 (27.3%)	521 (16.1%)	1,830 (56.6%)	866 (26.8%)	1,682 (52.0%)	684 (21.2%)
Population	21,097,640 (76.4%)	4,719,594 (17.1%)	1,804,321 (6.5%)	20,423,396 (43.9%)	25,490,284 (54.8%)	617,331 (1.3%)

**eAppendix Table 2.** Physician density by urban/suburban/rural classification and income.

	Urban		Suburban		Rural	
	Low-income	High-income	Low-income	High-income	Low-income	High-income
Number of ZCTAs	881	864	517	1,677	1,782	669
Median PCP density	2.1	2.3	1.2	1.8	1.2	1.4
Mean PCP density	2.5	2.9	6.3	2.0	3.1	5.2
Median specialist density	3.8	5.0	1.5	3.7	1.0	1.5
Mean specialist density	1.2	2.4	5.1	1.4	1.2	1.8

*Notes:* Medians and means are both winsorized. Means are weighted by ZCTA population.

**eAppendix Table 3.** Physician density by urban/suburban/rural classification and relative income.

	Urban		Suburban		Rural	
	Relative Low-income	Relative High-income	Relative Low-income	Relative High-income	Relative Low-income	Relative High-income
Number of ZCTAs	902	959	526	1,261	1,723	946
Median PCP density	12.8	13.2	8.2	10.4	7.8	8.2
Mean PCP density	15.3	15.4	8.9	12.2	9.3	10.2
Median specialist density	19.8	21.1	8.9	15.1	5.2	7.4
Mean specialist density	28.0	28.6	11.4	20.0	7.5	12.0

*Notes:* Medians and means are both winsorized. Means are weighted by population.

**eAppendix Table 4.** Relationship between percent low-income and physician supply (density per 10,000 population) with hospital flag.

Coefficients	Primary Care Density				Specialist Density			
<b>% Low-Income (urban)</b>	-0.006	-0.004	0.002	0.004	-0.007	-0.008	0.008	0.010
	(0.004)	(0.003)	(0.004)	(0.004)	(0.008)	(0.007)	(0.009)	(0.008)
<b>Suburban X % Low-Income</b>	-0.021***	-0.009*	-0.024***	-0.014**	-0.066***	-0.034***	-0.068***	-0.042***
	(0.004)	(0.004)	(0.005)	(0.004)	(0.009)	(0.008)	(0.010)	(0.009)
<b>Rural X % Low-Income</b>	-0.007	0.006	-0.008	-0.002	-0.020*	0.003	-0.023**	-0.013
	(0.004)	(0.004)	(0.004)	(0.004)	(0.008)	(0.008)	(0.009)	(0.008)
<b>Urban (reference)</b>	1.965***	1.212***	2.086***	1.412***	2.716***	2.716***	2.742***	1.623***
	(0.145)	(0.184)	(0.159)	(0.192)	(0.297)	(0.297)	(0.328)	(0.411)
<b>Suburban</b>	0.200	-0.327*	0.232	-0.277	1.162***	-0.275	0.855*	-0.431
	(0.154)	(0.145)	(0.173)	(0.163)	(0.340)	(0.324)	(0.365)	(0.336)
<b>Rural</b>	-0.199	-0.910***	-0.392*	-0.784***	-1.254***	-2.248***	-1.664***	-2.072***
	(0.174)	(0.156)	(0.163)	(0.149)	(0.325)	(0.298)	(0.343)	(0.313)
<b>Hospital in PCSA</b>	0.769***	0.931***	0.556***	0.638***	2.280***	2.777***	2.065***	2.399***
	(0.068)	(0.070)	(0.083)	(0.073)	(0.117)	(0.133)	(0.109)	(0.115)

<b>State Fixed Effects included</b>	No	Yes	No	Yes	No	Yes	No	Yes
<b>Weighted by ZCTA population</b>	Yes	Yes	No	No	Yes	Yes	No	No
<b>Sample N</b>	31,851	31,851	31,851	31,851	31,851	31,851	31,851	31,851
<b>R-squared</b>	0.027	0.082	0.010	0.033	0.071	0.130	0.065	0.095
<b>F</b>	52.65	11.53	42.32	10.08	108.1	18.62	149.3	22.92
<b>Association between ZCTA percent low-income and physician supply</b>								
<b>Urban</b>	-0.006	-0.004	0.002	0.004	-0.007	-0.008	0.008	0.010
<b>Suburban</b>	-0.026***	-0.013***	-0.022***	-0.010***	-0.073***	-0.042***	-0.060***	-0.032***
<b>Rural</b>	-0.012***	0.002	-0.006***	0.002	-0.027***	-0.005	-0.015***	-0.003

*Notes:* Low-income is defined as below 200% FPL. Urban is the reference group for all regressions. In models with state fixed effects, urban ZCTAs in California is the reference group. Standard errors in parentheses (clustered by PCSA).

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

**eAppendix Table 5.** Relationship between percent low-income and physician supply (density per 10,000 population) without hospital flag.

Coefficients	Primary Care Density				Specialist Density			
<b>% Low-Income (urban)</b>	-0.005	-0.003	0.002	0.005	-0.005	-0.004	0.010	0.013
	(0.004)	(0.003)	(0.004)	(0.004)	(0.008)	(0.007)	(0.009)	(0.008)
<b>Suburban X % Low-Income</b>	-0.018***	-0.008*	-0.022***	-0.014**	-0.059***	-0.031***	-0.063***	-0.041***
	(0.004)	(0.004)	(0.005)	(0.004)	(0.009)	(0.008)	(0.010)	(0.009)
<b>Rural X % Low-Income</b>	-0.008	0.004	-0.009*	-0.003	-0.023**	-0.002	-0.026**	-0.016
	(0.004)	(0.004)	(0.004)	(0.004)	(0.008)	(0.008)	(0.009)	(0.009)
<b>Urban (reference)</b>	2.601***	2.025***	2.552***	1.972***	4.604***	3.727***	4.475***	3.727***
	(0.136)	(0.175)	(0.146)	(0.181)	(0.310)	(0.396)	(0.329)	(0.404)
<b>Suburban</b>	0.029	-0.453**	0.091	-0.369*	0.654	-0.650	0.334	-0.776*
	(0.154)	(0.148)	(0.176)	(0.165)	(0.347)	(0.341)	(0.371)	(0.346)
<b>Rural</b>	-0.297	-0.997***	-0.435**	-0.836***	-1.547***	-2.506***	-1.824***	-2.269***
	(0.175)	(0.158)	(0.162)	(0.149)	(0.337)	(0.317)	(0.347)	(0.322)
<b>State Fixed Effects included</b>	No	Yes	No	Yes	No	Yes	No	Yes
<b>Weighted by ZCTA population</b>	Yes	Yes	No	No	Yes	Yes	No	No

<b>Sample N</b>	31,851	31,851	31,851	31,851	31,851	31,851	31,851	31,851
<b>F-Statistic</b>	0.015	0.066	0.007	0.029	0.037	0.083	0.042	0.066
<b>R-squared</b>	41.46	8.982	37.17	8.839	88.52	13.46	82.19	16.00
<b>Association between ZCTA percent low-income and physician supply</b>								
<b>Urban</b>	-0.005	-0.003	0.002	0.005	-0.005	-0.004	0.010	0.013
<b>Suburban</b>	-0.023***	-0.010***	-0.020***	-0.009**	-0.063***	-0.035***	-0.053***	-0.028***
<b>Rural</b>	-0.012***	0.002	-0.007***	0.001	-0.027***	-0.006	-0.016***	-0.004

*Notes:* Low-income is defined as below 200% FPL. Urban is the reference group for all regressions. In models with state fixed effects, urban ZCTAs in California is the reference group. Standard errors in parentheses (clustered by PCSA).

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05





<b>Sample N</b>	32,322	32,322	32,322	32,322	32,322	32,322	32,322	32,322
<b>R-squared</b>	0.113	0.238	0.113	0.296	0.032	0.770	0.139	0.259
<b>F</b>	809.2	123.4	1011	238.4	343.2	480.6	1105	218.0

*Notes:* Low-income is defined as below 200% FPL. Urban is the reference group for all regressions. In models with state fixed effects, urban ZCTAs in California is the reference group. Standard errors in parentheses (clustered by PCSA).

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05



<b>Sample N</b>	32,322	32,322	32,322	32,322	32,322	32,322	32,322	32,322
<b>R-squared</b>	0.059	0.537	0.126	0.589	0.049	0.870	0.119	0.512
<b>F</b>	404.8	680.5	931.8	841.6	334.4	3929	873.8	614.8

*Notes:* Low-income is defined as below 200% FPL. Urban is the reference group for all regressions. In models with state fixed effects, urban ZCTAs in California is the reference group. Standard errors in parentheses (clustered by PCSA).

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

**eAppendix Table 8.** Association between percent low-income and distance to closest hospital without state fixed effects and weighted by ZCTA population.

<b>Coefficients</b>	<b>General Acute Care Hospital</b>	<b>Teaching Hospital</b>	<b>Children's Hospital</b>	<b>Psychiatric Hospital</b>
<b>Urban</b>	-0.016***	0.026	-0.050	0.013
<b>Suburban</b>	0.029***	0.310***	0.717***	0.239***
<b>Rural</b>	0.141***	0.404***	0.608***	0.310***

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

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