WEB MATERIAL

"Long-Term $PM_{2.5}$ Exposure and Respiratory, Cancer, and Cardiovascular Mortality in Older US Adults" by Pun et al.

Contents

WEB APPENDIX
Detailed Methodology

Details on the $PM_{2.5}$ data manipulation and imputation

We obtained daily $PM_{2.5}$ concentration data from EPA's Air Quality System (AQS) from 2000 through 2008. Of the 988 AQS included monitors that had daily measurements for at least four calendar years, with each year having ≥9 months with ≥4 daily measurements, we adopted the imputation method used in Greven et al.(29), that accounts for seasonality in $PM_{2.5}$ levels and unevenly spaced measurements, to calculate the 12-month/60-month moving average of $PM_{2.5}$ for each month and location over the study period. Specifically, we filled small $PM_{2.5}$ data gaps by smoothing the time series at each location, using a linear regression with the daily pollutant values as the response, and thin plate regression splines of time with four degrees of freedom per year as the predictor. For gaps longer than 90 days, we smoothed the $PM_{2.5}$ time series before and after each gap separately. We considered the 12-month moving averages to be valid if there were ≥350 (out of 365) non-missing predicted daily values available for computation. For 60-month moving average, we considered valid measure if there were ≥350 (out of 365) non-missing predicted daily values available for 5 consecutive years.

Centering method

Since monthly $PM_{2.5}$ concentrations are generally higher at some monitors as compared to other monitors, we applied a centering method to remove monitor-specific influence on the monthly $PM_{2.5}$ concentrations. As our primary exposure measure, we used centered $PM_{2.5}$ exposures, which is the $PM_{2.5}$ concentration at site *C* corresponding to month *t* (PM_t^C), centered by the average concentration at site *C* over the entire study period, $\overline{PM_C}$. This measure accounts for the fact that monthly $PM_{2.5}$ concentrations are generally higher at some sites as compared to other sites.

$$Centered\ PM_{2.5} = PM_t^C - \overline{PM_C} \qquad [1]$$

Detailed regression analysis

$$logE(Y_{at}^c) = \log(N_{at}^c) + \log\big(h^c(a)\big) + \beta PM_t^c \qquad [2]$$

where Y_{at}^c is the number of deaths at age-month *a* in month *t* for monitor *c*, N_{at}^c is the number of Medicare enrollees of age *a* with a zip code of residence matched to location *c* at the beginning of the month *t*, and β is the increase in the log-hazard of dying in a given month for a 1-μg/m^3 increase in average $PM_{2.5}$ concentration during the previous year.

Decomposition of $PM_{2.5}$ exposure measure into "temporal" and "spatiotemporal" components

We applied the method developed by Greven et al. (29) to decompose the $PM_{2.5}$ exposure into their "global" and "local" components, where:

- "*Temporal*": represents the national temporal trends in monthly concentrations ($\overline{PM_t}$) centered by the overall concentrations for all monitors and across the study period ($\overline{PM}$):

  $$Temporal\ PM_t = \overline{PM_t} - \overline{PM} \qquad [3]$$

  Given that this measure describes national temporal trend, the "global" measure directly reflects long-term time trends in exposure.

- *"Spatiotemporal"*: is equivalent to centered PM ($PM_t^C - \overline{PM_c}$) minus its global component ($\overline{PM_t} - \overline{PM}$):

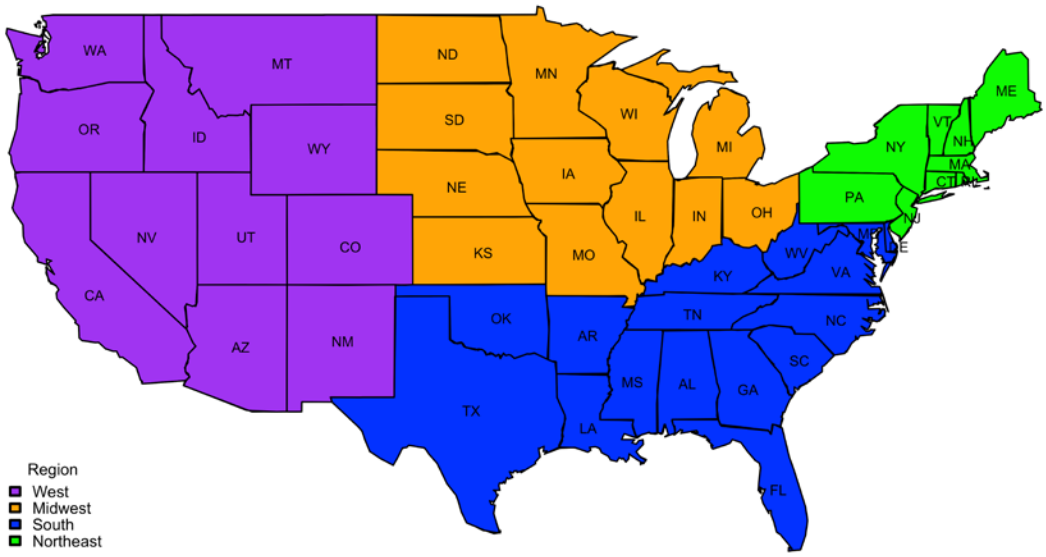
  $$Spatiotemporal\ PM_t^C = (PM_t^C - \overline{PM_c}) - (\overline{PM_t} - \overline{PM}) \qquad [4]$$

  where $\overline{PM_t}$ represents the concentration mean for month *t* across all locations, $\overline{PM_C}$ is the mean concentration for monitor *C*, and $\overline{PM}$ the mean concentration across all monitors and years. In

essence, this measure captures the monthly $PM_{2.5}$ concentration at monitor *C* that is not explained by year or monitor.

In the BRFSS-adjusted models, we parsed the BRFSS covariates into their "temporal" and "spatiotemporal" components, so that the risk ratios associated with "temporal" and "spatiotemporal" $PM_{2.5}$ were estimated simultaneously adjusting for "temporal" and "spatiotemporal" BRFSS measures.

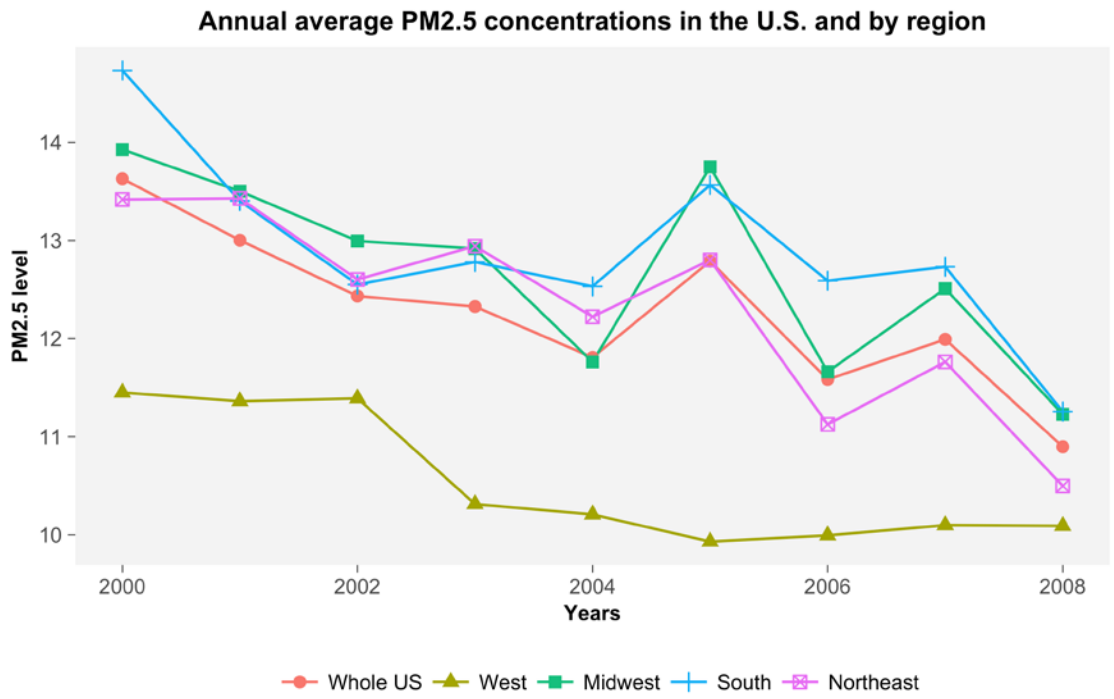
Web Figure 1. Boundaries of the 4 geographical regions used for the analysis, 2000–2008, United States



Web Table 1. Total numbers of zip codes, Medicare enrollees, and deaths among persons aged ≥65 years during 2000–2008, United States

Sample	No. (%) of Zip Codes	No. (%) of Enrollees	No. (%) of Deaths
Conterminous US, ages 65−120	46,130 (100)	52,925,449 (100)	15,849,593 (100)
Primary analysis: zip codes with nearest monitor within a 6-mile (9.6-km) buffer zone and that had sufficient $PM_{2.5}$ data	7,788 (17)	18,937,461 (36)	4,235,282 (27)
Sensitivity analysis: zip codes with SMART BRFSS data available	5,169 (11)	12,188,746 (23)	2,097,508 (13)

Web Figure 2. Annual average $PM_{2.5}$ levels over 2000–2008, United States



Web Table 2. Risk ratios (95% CI) for cause-specific mortality associated with increases in 12- to 60-month moving average $PM_{2.5}$ exposure, by region, based on 988 monitors, 2000–2008, United States

Cause of Death by Region	Moving Average for $PM_{2.5}$				
	12-Month	24-Month	36-Month	48-Month	60-Month
All causes					
United States	1.227 (1.222-1.232)	1.311 (1.304-1.318)	1.374 (1.365-1.384)	1.426 (1.412-1.439)	1.459 (1.439-1.48)
West	1.168 (1.161-1.174)	1.22 (1.212-1.228)	1.249 (1.239-1.26)	1.274 (1.26-1.289)	1.305 (1.283-1.328)
Midwest	1.239 (1.228-1.249)	1.435 (1.415-1.455)	1.561 (1.531-1.59)	1.729 (1.682-1.777)	1.55 (1.496-1.605)
South	1.256 (1.244-1.268)	1.35 (1.329-1.371)	1.5 (1.464-1.536)	1.75 (1.69-1.813)	1.729 (1.65-1.812)
Northeast	1.434 (1.418-1.45)	1.674 (1.647-1.701)	1.973 (1.93-2.017)	2.191 (2.124-2.26)	2.313 (2.215-2.415)
Nonaccidental					
United States	1.232 (1.227-1.237)	1.318 (1.31-1.325)	1.382 (1.372-1.392)	1.434 (1.42-1.448)	1.469 (1.448-1.489)
West	1.171 (1.165-1.178)	1.223 (1.214-1.231)	1.252 (1.241-1.263)	1.277 (1.262-1.292)	1.31 (1.287-1.333)
Midwest	1.243 (1.233-1.254)	1.448 (1.427-1.468)	1.584 (1.554-1.614)	1.759 (1.711-1.809)	1.567 (1.513-1.624)
South	1.263 (1.251-1.276)	1.362 (1.341-1.384)	1.513 (1.477-1.55)	1.777 (1.714-1.841)	1.748 (1.667-1.833)
Northeast	1.444 (1.428-1.46)	1.694 (1.666-1.722)	2.001 (1.957-2.046)	2.218 (2.15-2.289)	2.353 (2.252-2.458)
Accidental					
United States	1.008 (0.98-1.036)	1.014 (0.975-1.055)	1.022 (0.97-1.076)	1.055 (0.984-1.132)	1.046 (0.946-1.158)
West	0.999 (0.959-1.041)	1.079 (1.024-1.137)	1.097 (1.027-1.172)	1.115 (1.022-1.216)	1.081 (0.948-1.232)
Midwest	1.047 (0.988-1.109)	0.966 (0.879-1.062)	0.809 (0.713-0.919)	0.815 (0.679-0.979)	0.936 (0.74-1.185)
South	0.988 (0.928-1.051)	0.927 (0.838-1.026)	1.037 (0.89-1.209)	0.968 (0.772-1.213)	1.124 (0.832-1.519)
Northeast	1.002 (0.925-1.086)	0.906 (0.806-1.019)	0.962 (0.821-1.127)	1.171 (0.937-1.463)	0.978 (0.718-1.333)
CVD					
United States	1.559 (1.549-1.568)	1.788 (1.774-1.803)	1.888 (1.867-1.909)	1.99 (1.96-2.019)	2.106 (2.061-2.153)
West	1.408 (1.397-1.42)	1.517 (1.501-1.533)	1.555 (1.534-1.576)	1.591 (1.563-1.619)	1.651 (1.607-1.696)
Midwest	1.57 (1.549-1.591)	2.226 (2.177-2.276)	2.477 (2.403-2.552)	3.079 (2.947-3.217)	2.667 (2.52-2.823)
South	1.754 (1.727-1.782)	2.18 (2.126-2.236)	2.757 (2.652-2.865)	3.961 (3.741-4.195)	4.506 (4.171-4.867)
Northeast	2.055 (2.02-2.091)	2.876 (2.805-2.95)	3.591 (3.47-3.717)	4.007 (3.815-4.207)	4.04 (3.771-4.328)
IHD					
United States	1.753 (1.739-1.767)	2.036 (2.014-2.059)	2.123 (2.092-2.154)	2.204 (2.161-2.249)	2.407 (2.337-2.479)
West	1.544 (1.528-1.561)	1.655 (1.632-1.678)	1.669 (1.64-1.699)	1.705 (1.666-1.744)	1.822 (1.758-1.888)
Midwest	1.768 (1.735-1.801)	2.659 (2.579-2.743)	2.962 (2.841-3.089)	3.62 (3.405-3.849)	3.09 (2.855-3.343)

South	2.138 (2.091-2.186)	2.894 (2.791-3.001)	3.929 (3.717-4.152)	5.797 (5.342-6.292)	6.474 (5.798-7.229)
Northeast	2.404 (2.35-2.458)	3.66 (3.541-3.783)	4.625 (4.422-4.838)	5.092 (4.775-5.43)	5.457 (4.981-5.979)
CBVD					
United States	1.778 (1.753-1.804)	2.175 (2.131-2.219)	2.35 (2.288-2.413)	2.515 (2.425-2.609)	2.353 (2.229-2.484)
West	1.698 (1.665-1.731)	1.906 (1.859-1.955)	2.034 (1.97-2.1)	2.138 (2.048-2.231)	1.993 (1.865-2.129)
Midwest	1.685 (1.631-1.741)	2.718 (2.576-2.868)	2.931 (2.725-3.153)	3.509 (3.152-3.907)	2.514 (2.186-2.892)
South	1.888 (1.822-1.956)	2.456 (2.316-2.604)	3.069 (2.804-3.36)	4.769 (4.168-5.456)	4.734 (3.944-5.682)
Northeast	2.287 (2.186-2.393)	3.311 (3.097-3.541)	4.075 (3.717-4.468)	3.809 (3.341-4.342)	3.693 (3.075-4.436)
CHF					
United States	1.073 (1.048-1.099)	1.098 (1.062-1.136)	1.246 (1.192-1.302)	1.425 (1.343-1.512)	1.794 (1.648-1.954)
West	0.773 (0.745-0.802)	0.788 (0.752-0.825)	0.903 (0.853-0.956)	0.976 (0.907-1.05)	1.143 (1.025-1.275)
Midwest	1.379 (1.314-1.446)	1.811 (1.676-1.958)	2.297 (2.07-2.548)	3.075 (2.645-3.574)	3.794 (3.119-4.616)
South	1.207 (1.141-1.276)	1.148 (1.047-1.26)	1.027 (0.89-1.184)	1.599 (1.296-1.972)	1.955 (1.471-2.599)
Northeast	1.646 (1.542-1.758)	2.085 (1.894-2.295)	3.08 (2.703-3.511)	4.628 (3.849-5.565)	5.411 (4.196-6.977)
All respiratory					
United States	1.238 (1.224-1.252)	1.327 (1.306-1.349)	1.463 (1.433-1.494)	1.584 (1.54-1.63)	1.624 (1.558-1.693)
West	1.21 (1.191-1.229)	1.302 (1.277-1.329)	1.369 (1.335-1.404)	1.428 (1.381-1.476)	1.437 (1.366-1.512)
Midwest	1.167 (1.137-1.198)	1.152 (1.103-1.202)	1.421 (1.341-1.505)	1.529 (1.406-1.663)	1.32 (1.185-1.47)
South	1.238 (1.202-1.275)	1.325 (1.263-1.389)	1.48 (1.377-1.592)	2 (1.797-2.227)	2.082 (1.804-2.403)
Northeast	1.519 (1.468-1.571)	1.811 (1.723-1.904)	2.44 (2.279-2.611)	3.264 (2.966-3.592)	4.231 (3.7-4.837)
COPD					
United States	1.098 (1.081-1.116)	1.112 (1.088-1.137)	1.191 (1.157-1.227)	1.163 (1.118-1.209)	1.067 (1.007-1.13)
West	1.12 (1.096-1.145)	1.178 (1.146-1.211)	1.225 (1.183-1.269)	1.228 (1.173-1.285)	1.177 (1.098-1.263)
Midwest	1.037 (1-1.075)	0.918 (0.866-0.974)	1.042 (0.962-1.128)	0.856 (0.762-0.961)	0.655 (0.565-0.758)
South	1.022 (0.982-1.065)	0.99 (0.927-1.058)	0.969 (0.877-1.071)	0.817 (0.704-0.947)	0.909 (0.746-1.106)
Northeast	1.238 (1.176-1.302)	1.157 (1.073-1.248)	1.452 (1.31-1.608)	1.523 (1.319-1.758)	1.386 (1.136-1.693)
Pneumonia					
United States	1.60 (1.567-1.633)	1.911 (1.858-1.965)	2.197 (2.119-2.278)	2.573 (2.45-2.702)	3.157 (2.934-3.397)
West	1.474 (1.435-1.513)	1.667 (1.612-1.723)	1.813 (1.738-1.891)	1.944 (1.839-2.055)	2.147 (1.97-2.339)
Midwest	1.629 (1.545-1.717)	2.055 (1.884-2.241)	2.878 (2.56-3.234)	4.334 (3.658-5.134)	4.639 (3.717-5.789)
South	1.879 (1.772-1.993)	2.868 (2.606-3.157)	3.82 (3.298-4.425)	10.17 (8.183-12.638)	13.275 (9.884-17.829)
Northeast	1.993 (1.878-2.115)	3.174 (2.912-3.459)	5.162 (4.591-5.805)	8.578 (7.256-10.14)	15.114 (11.922-19.16)

All cancer					
United States	1.145 (1.136-1.155)	1.192 (1.178-1.206)	1.208 (1.189-1.226)	1.23 (1.205-1.256)	1.238 (1.201-1.276)
West	1.12 (1.107-1.134)	1.137 (1.12-1.154)	1.149 (1.127-1.171)	1.147 (1.119-1.176)	1.142 (1.1-1.186)
Midwest	1.113 (1.093-1.133)	1.238 (1.201-1.275)	1.289 (1.239-1.342)	1.383 (1.305-1.466)	1.339 (1.243-1.443)
South	1.169 (1.146-1.194)	1.222 (1.181-1.263)	1.224 (1.164-1.288)	1.41 (1.308-1.519)	1.398 (1.266-1.544)
Northeast	1.271 (1.242-1.301)	1.406 (1.358-1.455)	1.475 (1.408-1.546)	1.554 (1.456-1.659)	1.596 (1.457-1.748)
Lung cancer					
United States	1.132 (1.114-1.15)	1.217 (1.19-1.245)	1.253 (1.216-1.292)	1.268 (1.217-1.321)	1.33 (1.253-1.411)
West	1.185 (1.157-1.213)	1.219 (1.183-1.257)	1.246 (1.2-1.295)	1.204 (1.145-1.266)	1.255 (1.163-1.355)
Midwest	1.028 (0.993-1.063)	1.097 (1.037-1.16)	1.155 (1.072-1.244)	1.185 (1.062-1.321)	1.161 (1.01-1.334)
South	1.096 (1.056-1.139)	1.215 (1.143-1.292)	1.18 (1.076-1.295)	1.497 (1.306-1.716)	1.573 (1.311-1.886)
Northeast	1.191 (1.138-1.246)	1.404 (1.314-1.502)	1.551 (1.416-1.699)	1.692 (1.487-1.925)	1.949 (1.628-2.332)

CBVD, cerebrovascular disease; CHF, congestive heart failure; CI, confidence interval; COPD, chronic obstructive pulmonary disease; CVD, cardiovascular disease; IHD, ischemic heart disease.

Web Table 3. Sensitivity analyses using 3-, 6-, and 12-mile (4.8-, 9.6-, and 19.2-km) buffer zones to assess $PM_{2.5}$ exposures, 2000–2008, United States

Region	Risk Ratio per 10-μg/m^3 Change in $PM_{2.5}$		
	3-Mile (4.8-km)	6-Mile (9.6-km)	12-Mile (19.2-km)
United States	1.218 (1.211-1.225)	1.232 (1.227-1.237)	1.251 (1.246-1.255)
West	1.142 (1.133-1.152)	1.167 (1.161-1.174)	1.18 (1.174-1.186)
Midwest	1.241 (1.226-1.256)	1.252 (1.241-1.263)	1.272 (1.262-1.281)
South	1.269 (1.251-1.287)	1.268 (1.256-1.281)	1.3 (1.289-1.311)
Northeast	1.388 (1.368-1.409)	1.44 (1.424-1.457)	1.429 (1.415-1.442)

Web Table 4. Temporal and spatiotemporal mortality risk ratios (95% CI) per 10-μg/m^3 increase in 12-month moving average $PM_{2.5}$ exposure: nationwide and by region, cause of death, nonadjusted versus BRFSS-adjusted models for a subset of monitors with BRFSS data[a], 2000–2008, United States

Cause of Death and Region	Nonadjusted Model		BRFSS-Adjusted Model	
	Temporal	Spatiotemporal	Temporal	Spatiotemporal
All causes				
United States	2.051 (1.996, 2.107)	1.03 (1.015, 1.046)	1.328 (1.27, 1.389)	1.003 (0.988, 1.019)
West	1.385 (1.315, 1.459)	1.127 (1.104, 1.15)	1.742 (1.607, 1.888)	1.046 (1.023, 1.071)
Midwest	1.356 (1.296, 1.418)	1.109 (1.066, 1.153)	1.178 (1.124, 1.236)	0.982 (0.942, 1.023)
South	1.611 (1.531, 1.694)	0.978 (0.935, 1.024)	1.314 (1.225, 1.408)	0.966 (0.922, 1.012)
Northeast	1.799 (1.732, 1.868)	0.989 (0.942, 1.038)	1.128 (1.06, 1.2)	1.037 (0.987, 1.09)
Accidental				
United States	0.911 (0.675, 1.23)	1.223 (1.098, 1.362)	0.871 (0.727, 1.044)	1.217 (1.093, 1.355)
West	1.233 (0.732, 2.076)	1.325 (1.126, 1.559)	0.773 (0.565, 1.058)	1.279 (1.101, 1.485)
Midwest	0.914 (0.667, 1.253)	1.2 (0.927, 1.554)	0.922 (0.685, 1.241)	1.121 (0.872, 1.441)
South	1.164 (0.742, 1.826)	1.067 (0.788, 1.444)	1.183 (0.852, 1.642)	1.102 (0.818, 1.484)
Northeast	0.839 (0.538, 1.309)	1.052 (0.737, 1.501)	1.06 (0.808, 1.389)	1.072 (0.757, 1.519)
All cardiovascular				
United States	4.38 (4.194, 4.574)	1.066 (1.041, 1.092)	1.584 (1.476, 1.701)	0.992 (0.968, 1.016)
West	2.675 (2.456, 2.914)	1.233 (1.195, 1.272)	2.968 (2.611, 3.374)	1.092 (1.055, 1.132)
Midwest	1.589 (1.478, 1.709)	1.346 (1.264, 1.433)	1.236 (1.144, 1.334)	0.998 (0.933, 1.067)
South	3.082 (2.837, 3.348)	0.984 (0.914, 1.06)	1.613 (1.441, 1.807)	0.961 (0.891, 1.036)
Northeast	2.988 (2.817, 3.171)	0.868 (0.803, 0.937)	1.379 (1.251, 1.52)	0.916 (0.847, 0.991)
Ischemic heart disease				
United States	6.096 (5.743, 6.47)	1.088 (1.054, 1.123)	1.876 (1.703, 2.067)	0.987 (0.955, 1.019)
West	2.922 (2.587, 3.301)	1.316 (1.263, 1.371)	3.326 (2.782, 3.977)	1.167 (1.113, 1.224)
Midwest	1.707 (1.54, 1.892)	1.47 (1.346, 1.606)	1.305 (1.17, 1.455)	1.018 (0.926, 1.119)
South	4.444 (3.949, 5.002)	0.944 (0.849, 1.049)	2.023 (1.724, 2.374)	0.897 (0.805, 0.999)
Northeast	3.813 (3.531, 4.118)	0.788 (0.711, 0.874)	1.597 (1.408, 1.812)	0.831 (0.748, 0.924)
Cerebrovascular disease				
United States	5.725 (5.147, 6.368)	1.196 (1.129, 1.266)	1.52 (1.276, 1.811)	1.093 (1.032, 1.158)
West	5.038 (4.138, 6.134)	1.335 (1.238, 1.438)	4.359 (3.242, 5.862)	1.113 (1.024, 1.209)
Midwest	1.713 (1.443, 2.034)	1.553 (1.335, 1.806)	1.27 (1.059, 1.524)	1.1 (0.938, 1.291)
South	3.375 (2.781, 4.097)	1.157 (0.973, 1.375)	1.425 (1.095, 1.854)	1.122 (0.941, 1.336)
Northeast	3.384 (2.881, 3.976)	1.044 (0.856, 1.273)	1.315 (1.009, 1.713)	1.109 (0.906, 1.359)
Congestive heart failure				
United States	2.64 (2.245, 3.104)	0.864 (0.785, 0.952)	1.441 (1.104, 1.881)	0.85 (0.771, 0.936)
West	1.41 (1.024, 1.943)	0.76 (0.661, 0.872)	1.691 (1.024, 2.793)	0.734 (0.631, 0.854)
Midwest	1.885 (1.465, 2.424)	1.076 (0.86, 1.347)	1.503 (1.151, 1.962)	0.859 (0.677, 1.091)
South	1.866 (1.368, 2.547)	1.165 (0.893, 1.521)	1.655 (1.08, 2.535)	1.148 (0.877, 1.503)
Northeast	2.361 (1.88, 2.966)	0.908 (0.686, 1.203)	1.21 (0.83, 1.763)	1.002 (0.752, 1.334)
All respiratory				
United States	2.462 (2.265, 2.676)	1.021 (0.975, 1.069)	1.474 (1.287, 1.688)	0.988 (0.944, 1.035)
West	1.379 (1.183, 1.607)	1.164 (1.096, 1.236)	2.388 (1.886, 3.023)	1.027 (0.96, 1.099)
Midwest	1.61 (1.402, 1.848)	1.018 (0.902, 1.149)	1.389 (1.2, 1.607)	0.867 (0.763, 0.985)
South	1.68 (1.435, 1.966)	0.926 (0.803, 1.068)	1.28 (1.031, 1.588)	0.911 (0.789, 1.052)
Northeast	2.212 (1.966, 2.489)	0.946 (0.815, 1.099)	1.34 (1.103, 1.628)	1.031 (0.885, 1.201)

COPD				
United States	1.535 (1.366, 1.726)	1.072 (1.005, 1.145)	1.346 (1.112, 1.629)	1.052 (0.985, 1.123)
West	1.084 (0.882, 1.331)	1.158 (1.064, 1.261)	1.76 (1.278, 2.424)	1.025 (0.933, 1.126)
Midwest	1.472 (1.217, 1.781)	1.098 (0.929, 1.297)	1.429 (1.168, 1.748)	1.031 (0.866, 1.228)
South	1.136 (0.915, 1.41)	0.853 (0.701, 1.038)	1.293 (0.96, 1.741)	0.85 (0.697, 1.036)
Northeast	1.574 (1.319, 1.879)	1.026 (0.821, 1.283)	1.177 (0.88, 1.574)	1.049 (0.835, 1.317)
Pneumonia				
United States	6.59 (5.622, 7.723)	0.976 (0.901, 1.056)	1.971 (1.526, 2.545)	0.886 (0.817, 0.961)
West	2.73 (2.004, 3.719)	1.181 (1.068, 1.305)	5.695 (3.654, 8.876)	0.97 (0.863, 1.09)
Midwest	2.499 (1.892, 3.301)	1.069 (0.836, 1.367)	1.797 (1.338, 2.414)	0.682 (0.525, 0.886)
South	4.049 (2.937, 5.582)	0.982 (0.735, 1.31)	1.485 (0.956, 2.307)	0.945 (0.705, 1.266)
Northeast	3.408 (2.776, 4.184)	0.729 (0.555, 0.956)	1.746 (1.243, 2.453)	0.85 (0.645, 1.12)
All cancer				
United States	1.492 (1.409, 1.58)	1.015 (0.982, 1.048)	1.167 (1.062, 1.282)	0.997 (0.965, 1.031)
West	1.307 (1.167, 1.463)	1.029 (0.985, 1.076)	1.29 (1.084, 1.535)	1.00 (0.952, 1.051)
Midwest	1.131 (1.029, 1.243)	1.055 (0.972, 1.145)	1.07 (0.968, 1.183)	1.014 (0.931, 1.105)
South	1.369 (1.23, 1.523)	0.961 (0.872, 1.059)	1.149 (0.992, 1.331)	0.952 (0.863, 1.05)
Northeast	1.41 (1.303, 1.526)	1.217 (1.099, 1.348)	1.119 (0.983, 1.274)	1.238 (1.115, 1.374)
Lung cancer				
United States	1.566 (1.403, 1.748)	1.024 (0.96, 1.093)	1.341 (1.118, 1.608)	1.007 (0.943, 1.075)
West	1.354 (1.083, 1.692)	1.096 (1.002, 1.199)	1.49 (1.054, 2.107)	1.118 (1.012, 1.235)
Midwest	1.123 (0.938, 1.345)	0.975 (0.833, 1.142)	1.109 (0.917, 1.342)	0.966 (0.818, 1.14)
South	1.788 (1.465, 2.182)	0.89 (0.744, 1.064)	1.45 (1.104, 1.903)	0.874 (0.729, 1.047)
Northeast	1.356 (1.161, 1.584)	1.228 (1.006, 1.498)	1.055 (0.817, 1.363)	1.249 (1.019, 1.53)

BRFSS, Behavioral Risk Factor Surveillance System; COPD, chronic obstructive pulmonary disease.

[a] BRFSS-adjusted model: adjusting for county-level race (being nonwhite), smoking, diabetes, body mass index, alcohol consumption (>2 drinks/day), asthma, and median income.