Supplemental Material

Particulate Air Pollution, Exceptional Aging, and Rates of Centenarians: A Nationwide Analysis of the United States, 1980–2010

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Table S1. Results of different regression models, including estimates (standard errors) of difference in probability of aging to 85-94 years (P^{EA}_{85-94}) associated with 10 µg/m^3 of PM$_{2.5}$, adjusted for smoking, migration, demographic, socioeconomic, and regional indicator variables. The results reported in the paper are from the 'primary model-censored' model (shaded in grey).

	No region adjustment	No region adjustment-censored†	Primary model	Primary model-censored†	Robust regression‡	Robust regression‡-censored†
PM$_{2.5}$ (x10 µg/m^3)	-171.7 (36.4)***	-149.6 (31.2)***	-267.3 (40.9)***	-225.2 (35.0)***	-175.1 (21.4)***	-174.8 (21.5)***
% Smoking	-46.8 (3.9)***	-49.6 (3.4)***	-37.4 (4.1)***	-39.4 (3.5)***	-39.0 (2.7)***	-38.9 (2.7)***
% Obesity	-8.1 (3.4)*	-5.7 (2.9)	-20.4 (3.8)***	-16.8 (3.2)***	-12.9 (2.3)***	-12.7 (2.3)***
Population density	4.2 (2.0)*	4.0 (1.7)*	6.4 (2.0)**	5.9 (1.7)**	6.2 (0.8)***	6.3 (0.8)***
% Urban	2.7 (0.4)***	2.3 (0.3)***	2.5 (0.4)***	2.1 (0.3)***	1.3 (0.3)***	1.3 (0.3)***
% Below poverty	-16.1 (3.9)***	-21.1 (3.4)***	-13.0 (4.0)**	-17.6 (3.4)***	-19.5 (2.9)***	-19.8 (2.9)***
Median income	5.9 (1.8)**	1.9 (1.6)	7.5 (1.8)***	3.5 (1.6)*	-2.8 (1.0)**	-2.8 (1.0)**
% High school graduate	0.8 (2.1)	1.0 (1.8)	3.5 (2.1)	3.5 (1.8)	4.0 (1.5)**	4.1 (1.5)**
% Unemployed	-0.5 (4.6)	0.9 (4.0)	4.8 (5.1)	3.6 (4.3)	-1.0 (4.0)	-1.2 (4.0)
% Black	-4.0 (0.8)***	-4.3 (0.7)***	-3.8 (0.9)***	-3.7 (0.7)***	-4.2 (0.6)***	-4.1 (0.6)***
% Hispanic	-4.5 (1.0)***	-3.4 (0.9)**	-3.9 (1.0)**	-2.8 (0.9)**	-2.5 (0.7)**	-2.4 (0.7)**
Median age	-47.0 (5.0)***	-38.1 (4.4)***	-50.8 (5.2)***	-41.7 (4.5)***	-32.1 (3.8)***	-32.2 (3.8)***
% Over 65 years old	56.7 (5.0)***	45.8 (4.4)***	58.1 (5.3)***	47.4 (4.6)***	28.2 (4.1)***	28.1 (4.1)***

Table S1. Continued from the previous page

	No region adjustment	No region adjustment-censored†	Primary model	Primary model-censored†	Robust regression‡	Robust regression‡-censored†
% Migration	34.1 (3.2)***	33.6 (2.8)***	30.7 (3.2)***	31.0 (2.8)***	29.6 (2.5)***	28.8 (2.5)***
Migration rate, 60–64-year-olds	-1.4 (1.2)	-3.5 (1.0)**	-1.2 (1.2)	-3.3 (1.0)**	-3.5 (1.1)**	-3.4 (1.1)**
Migration rate, 65–69-year-olds	8.6 (1.5)***	9.4 (1.3)***	8.1 (1.5)***	9.1 (1.3)***	6.4 (1.5)***	6.5 (1.5)***
Migration rate, 70–74-year-olds	18.9 (1.4)***	19.0 (1.3)***	18.6 (1.4)***	18.6 (1.2)***	17.2 (1.3)***	17.3 (1.3)***
Migration rate, 75–79-year-olds	19.6 (0.8)***	18.1 (0.7)***	20.2 (0.8)***	18.7 (0.7)***	18.3 (0.6)***	18.2 (0.6)***
Regional indicators	No	No	Yes	Yes	Yes	Yes
R^2	0.82	0.83	0.83	0.84	0.58‡	0.59‡
No. of counties	3034	2987	3034	2987	3034	2987

*$p<0.05$; **$p<0.01$; ***$p<0.001$

†Censored models excluded all outliers, defined as observations with residuals that were more than three standard deviations greater than or less than zero.

‡Robust regression. Note that for robust regression models, robust version[23] of R^2 is presented. R^2 values obtained from robust regression models are therefore not directly comparable to those from other models.

Table S2. Results of different regression models, including estimates (standard errors) of difference in probability of aging to <u>100-104 years</u> ($P_{100-104}^{EA}$) associated with 10 µg/m³ of PM$_{2.5}$, adjusted for smoking, migration, demographic, socioeconomic, and regional indicator variables. The results reported in the paper are from the 'primary model-censored' model. (shaded in grey).

	No region adjustment	No region adjustment-censored†	Primary model	Primary model-censored†	Robust regression‡	Robust regression‡-censored†
PM$_{2.5}$ (x10 µg/m³)	-9.9 (4.0)*	-8.3 (3.1)**	-11.9 (4.6)**	-10.4 (3.6)**	-11.7 (2.4)***	-11.7 (2.4)***
% Smoking	-2.0 (0.4)***	-1.8 (0.3)***	-1.7 (0.5)**	-1.4 (0.3)***	-1.1 (0.3)**	-1.1 (0.3)**
% Obesity	-0.6 (0.4)	-0.2 (0.3)	-1.2 (0.4)**	-0.8 (0.3)**	-1.0 (0.3)***	-1.0 (0.3)***
Population density	0.4 (0.2)	0.4 (0.2)*	0.4 (0.2)	0.4 (0.2)*	0.5 (0.1)***	0.5 (0.1)***
% Urban	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
% Below poverty	-0.3 (0.4)	-0.6 (0.3)	0.1 (0.4)	-0.3 (0.4)	-0.2 (0.3)	-0.2 (0.3)
Median income	0.5 (0.2)**	0.5 (0.2)**	0.7 (0.2)**	0.5 (0.2)**	0.5 (0.1)***	0.5 (0.1)***
% High school graduates	-0.1 (0.2)	0.0 (0.2)	-0.1 (0.2)	0.0 (0.2)	0.0 (0.2)	0.0 (0.2)
% Unemployed	0.5 (0.5)	0.5 (0.4)	1.0 (0.6)	0.8 (0.4)	0.3 (0.4)	0.3 (0.4)
% Black	0.4 (0.1)***	0.4 (0.1)***	0.3 (0.1)**	0.4 (0.1)***	0.4 (0.1)***	0.4 (0.06)***
% Hispanic	-0.1 (0.1)	0.1 (0.1)	-0.1 (0.1)	0.1 (0.1)	0.1 (0.1)	0.1 (0.1)
Median age	-0.6 (0.6)	-1.1 (0.4)*	-0.3 (0.6)	-0.9 (0.5)	-1.7 (0.4)***	-1.7 (0.4)***
% Over 65	1.0 (0.6)	1.7 (0.4)**	0.6 (0.6)	1.3 (0.5)**	2.0 (0.4)***	2.0 (0.4)***

Table S2. Continued from the previous page

	No region adjustment	No region adjustment-censored†	Primary model	Primary model-censored†	Robust regression‡	Robust regression‡-censored†
% Migration	0.2 (0.4)	0.4 (0.3)	0.1 (0.4)	0.3 (0.3)	0.6 (0.3)*	0.6 (0.3)*
Migration rate, 60–64-year-olds	0.2 (0.1)	0.2 (0.1)	0.2 (0.1)	0.2 (0.1)	0.2 (0.1)	0.2 (0.1)
Migration rate, 65–69-year-olds	-0.2 (0.2)	-0.2 (0.1)	-0.2 (0.2)	-0.1 (0.1)	-0.1 (0.2)	-0.1 (0.2)
Migration rate, 70–74-year-olds	0.1 (0.2)	0.0 (0.1)	0.2 (0.2)	0.0 (0.1)	-0.2 (0.1)	-0.2 (0.1)
Migration rate, 75–79-year-olds	1.3 (0.1)***	1.2 (0.1)***	1.3 (0.1)***	1.3 (0.1)***	1.4 (0.1)***	1.3 (0.1)***
Regional indicators	No	No	Yes	Yes	Yes	Yes
R^2	0.29	0.35	0.3	0.37	0.3‡	0.31‡
No. of counties	3032	2997	3032	2997	3032	2997

*$p<0.05$; **$p<0.01$; ***$p<0.001$

†Censored models excluded all outliers, defined as observations with residuals that were more than three standard deviations greater than or less than zero.

‡Robust regression. Note that for robust regression models, robust version[23] of R^2 is presented. R^2 values obtained from robust regression models are therefore not directly comparable to those from other models.