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Supplemental Material

Geographic Variation in the Association between Ambient Fine Particulate Matter (PM_{2.5}) and Term Low Birth Weight in the United States

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Table S1. Adjusted odds ratio of term LBW associated with PM_{2.5} exposure during pregnancy by county poverty level^a.

County Poverty Level	N	Entire Pregnancy (AOR, 95% CI)	First Trimester (AOR, 95% CI)	Second Trimester (AOR, 95% CI)	Third Trimester (AOR, 95% CI)
20% or higher	239,503	1.11 (1.00, 1.22)	1.00 (0.95, 1.05)	1.01 (0.96, 1.06)	1.04 (0.99, 1.09)
15% – 19.9%	609,592	1.04 (0.98, 1.09)	1.02 (0.99, 1.05)	1.02 (0.99, 1.05)	1.00 (0.97, 1.04)
10% – 14.9%	1,304,935	1.00 (0.96, 1.04)	1.01 (0.99, 1.04)	1.01 (0.99, 1.03)	0.98 (0.96, 1.00)
Less than 10%	1,117,173	1.01 (0.96, 1.06)	1.01 (0.98, 1.04)	1.01 (0.98, 1.03)	1.00 (0.97, 1.02)

N, sample size; CI, confidence intervals; LBW, low birth weight; AOR, adjusted odds ratios.

^aEffect estimates (95% CI) are reported as per 5 µg/m³ increase in PM_{2.5}; all models include county-level random effects, PM_{2.5} exposure during either entire pregnancy or a specific trimester, and other individual-level covariates: infant’s gender and parity, gestational age, mother’s age, race/ethnicity, marital status, education, prenatal care, birth season, and census division. * Indicates statistical significance at p < 0.05.

Table S2. Odds ratio of term LBW associated with PM_{2.5} exposure during pregnancy in the contiguous US, using model-based PM_{2.5} estimates^a.

Trimester	Model 3^b (AOR, 95% CI)
N	3,271,203
Entire Pregnancy	1.01 (0.99, 1.04)
First Trimester	1.01 (0.99, 1.03)
Second Trimester	1.01 (1.00, 1.03)
Third Trimester	0.99 (0.98, 1.01)

N, sample size; CI, confidence intervals; LBW, low birth weight; OR, odds ratios; AOR, adjusted odds ratios.

^aEffect estimates (95% CI) are reported as per 5 µg/m³ increase in PM_{2.5}. ^bModel 3 = PM_{2.5} + county-level random effects + county-level poverty + individual-level covariates, including infant’s gender and parity, gestational age, mother’s age, race/ethnicity, marital status, education, prenatal care, smoking, birth season, and census division; term births from California were assigned an unknown category for smoking status.* Indicates statistical significance at p < 0.05.

Table S3. Adjusted odds ratio of term LBW associated with PM_{2.5} exposure during pregnancy by census division, using model-based PM_{2.5} estimates^a.

Census Division	N	Entire Pregnancy (AOR, 95% CI)	First Trimester (AOR, 95% CI)	Second Trimester (AOR, 95% CI)	Third Trimester (AOR, 95% CI)
New England	142,575	1.09 (0.93, 1.28)	1.02 (0.91, 1.15)	1.08 (0.98, 1.20)	1.00 (0.92, 1.09)
Middle Atlantic	413,520	1.16 (1.06, 1.26)*	1.09 (1.03, 1.15)*	1.02 (0.98, 1.07)	1.04 (1.00, 1.08)
East North Central	507,796	1.13 (1.06, 1.20)*	1.08 (1.03, 1.13)*	1.06 (1.02, 1.11)*	1.03 (0.98, 1.07)
West North Central	218,318	1.08 (0.96, 1.21)	1.07 (0.97, 1.19)	1.11 (1.02, 1.20)*	0.97 (0.90, 1.05)
South Atlantic	599,403	0.96 (0.92, 1.01)	0.97 (0.93, 1.00)	0.99 (0.95, 1.02)	0.98 (0.95, 1.01)
East South Central	188,987	0.97 (0.87, 1.07)	0.98 (0.91, 1.05)	1.02 (0.95, 1.09)	0.96 (0.90, 1.02)
West South Central	431,798	0.96 (0.88, 1.04)	0.96 (0.90, 1.02)	1.00 (0.94, 1.06)	0.96 (0.90, 1.02)
Mountain	250,368	0.81 (0.70, 0.93)*	0.95 (0.90, 1.01)	0.97 (0.91, 1.03)	0.98 (0.92, 1.03)
Pacific ^b	518,438	1.02 (0.98, 1.05)	1.01 (0.98, 1.04)	1.01 (0.98, 1.04)	1.01 (0.98, 1.04)
Non-CA ^c	97,266	1.09 (0.83, 1.43)	1.08 (0.89, 1.32)	0.99 (0.84, 1.17)	1.02 (0.90, 1.16)
California ^d	421,172	1.02 (0.99, 1.06)	1.01 (0.99, 1.04)	1.02 (0.99, 1.05)	1.02 (0.99, 1.06)

N, sample size; CI, confidence intervals; LBW, low birth weight; AOR, adjusted odds ratios.

^aEffect estimates (95% CI) are reported as per 5 µg/m³ increase in PM_{2.5}; all models include county-level random effects, PM_{2.5} exposure during either entire pregnancy or a specific trimester, county-level poverty rate, and other individual-level covariates: infant's gender and parity, gestational age, mother's age, race/ethnicity, marital status, education, prenatal care, smoking, and birth season. ^bAn unknown category of smoking status was assigned for all California births in the models for the Pacific Division. ^cThe models for Non-CA Pacific division used only the births from Washington and Oregon states. ^dThe models for California did not include smoking status. * Indicates statistical significance at p < 0.05.

Table S4. Odds ratio of term LBW associated with PM_{2.5} exposure during pregnancy in the contiguous US, using monitor-based PM_{2.5} estimates^a.

Trimester	Model 1^b (OR, 95% CI)	Model 2^c (AOR, 95% CI)	Model 3^d (AOR, 95% CI)
N	2,435,805	2,435,805	2,435,805
Entire Pregnancy	1.04 (1.01, 1.07)*	1.02 (0.99, 1.04)	1.00 (0.98, 1.02)
First Trimester	1.01 (0.99, 1.02)	1.00 (0.99, 1.02)	1.01 (0.99, 1.02)
Second Trimester	1.02 (1.01, 1.03)*	1.02 (1.00, 1.03)*	1.00 (0.99, 1.02)
Third Trimester	1.00 (0.98, 1.01)	0.99 (0.98, 1.01)	0.99 (0.98, 1.00)

N, sample size; CI, confidence intervals; LBW, low birth weight; OR, odds ratios; AOR, adjusted odds ratios.

^aMonitor-based PM_{2.5} estimates were used to repeat the analyses in Models 1-3; effect estimates (95% CI) are reported as per 5 µg/m³ increase in PM_{2.5}. ^bModel 1 = PM_{2.5} + county-level random effects. ^cModel 2 = Model 1 + county-level poverty; ^dModel 3 = Model 2 + individual-level covariates, including infant's gender and parity, gestational age, mother's age, race/ethnicity, marital status, education, prenatal care, birth season, and census division. * Indicate statistical significance at p < 0.05.

Table S5. Adjusted odds ratio of term LBW associated with PM_{2.5} exposure during pregnancy by census division, using monitor-based PM_{2.5} estimates^a.

Census Division	N	Entire Pregnancy (AOR, 95% CI)	First Trimester (AOR, 95% CI)	Second Trimester (AOR, 95% CI)	Third Trimester (AOR, 95% CI)
New England	126,753	1.10 (0.99, 1.22)	1.08 (0.99, 1.18)	1.08 (1.00, 1.17)	1.00 (0.93, 1.08)
Middle Atlantic	337,026	1.07 (1.00, 1.15)	1.06 (1.00, 1.11)*	1.03 (0.98, 1.07)	1.03 (0.98, 1.07)
East North Central	360,069	1.05 (0.97, 1.14)	1.05 (1.00, 1.10)	1.03 (0.98, 1.08)	0.98 (0.94, 1.03)
West North Central	121,056	1.02 (0.88, 1.19)	1.00 (0.89, 1.14)	1.12 (1.01, 1.24)*	0.92 (0.83, 1.02)
South Atlantic	403,878	0.99 (0.93, 1.06)	0.98 (0.94, 1.02)	1.02 (0.98, 1.07)	0.98 (0.94, 1.02)
East South Central	103,795	1.04 (0.94, 1.14)	1.01 (0.94, 1.09)	1.04 (0.97, 1.11)	1.00 (0.94, 1.07)
West South Central	292,959	1.00 (0.90, 1.11)	0.98 (0.91, 1.04)	1.02 (0.95, 1.09)	1.01 (0.94, 1.08)
Mountain	199,558	0.90 (0.81, 1.00)*	0.97 (0.93, 1.01)	0.97 (0.92, 1.01)	1.01 (0.97, 1.06)
Pacific	490,711	1.01 (0.99, 1.04)	1.01 (0.99, 1.02)	1.01 (0.99, 1.03)	1.01 (0.99, 1.03)
California	411,402	1.01 (0.98, 1.04)	1.00 (0.98, 1.02)	1.01 (0.99, 1.03)	1.01 (0.98, 1.03)

N, sample size; CI, confidence intervals; LBW, low birth weight; AOR, adjusted odds ratios.

^aEffect estimates (95% CI) are reported as per 5 µg/m³ increase in PM_{2.5}; all models include county-level random effects, PM_{2.5} exposure during either entire pregnancy or a specific trimester, county-level poverty rate, and other individual-level covariates: infant’s gender and parity, gestational age, mother’s age, race/ethnicity, marital status, education, prenatal care, and birth season. * Indicates statistical significance at p < 0.05.