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Supplemental Material

Associations between Source-Specific Fine Particulate Matter and Emergency Department Visits for Respiratory Disease in Four U.S. Cities

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Figure S3 Estimated relative risks of pneumonia ED visits for interquartile range increases (IQR) in PM_{2.5} mass and source-specific PM_{2.5} using single day exposure lags 0 to 3 for Atlanta, GA; Birmingham, AL; St. Louis, MO; and Dallas, TX.

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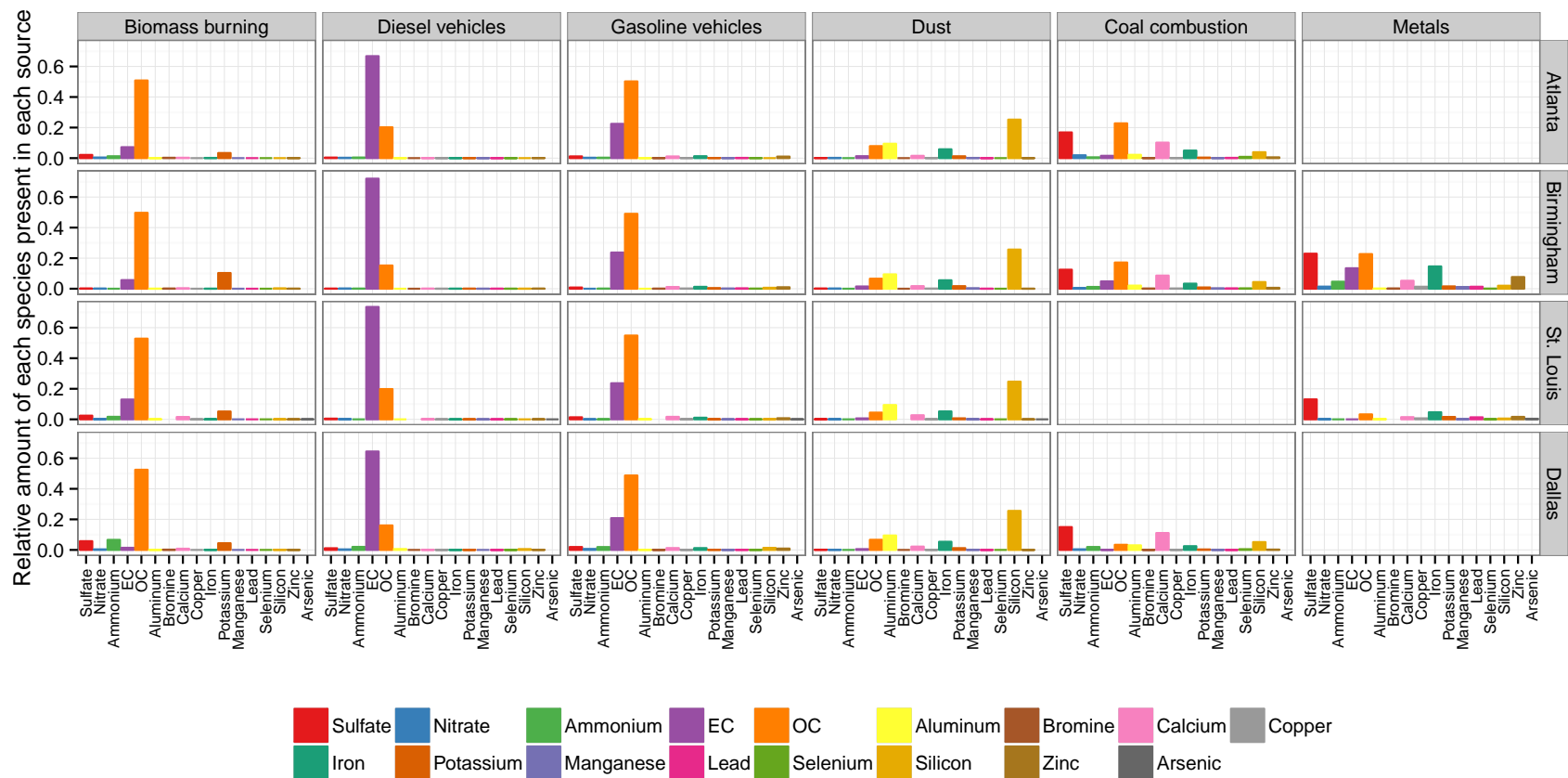


Figure S1: Ensemble-based source profiles (EBSPs) for summer source-specific $PM_{2.5}$ corresponding to sources of primary $PM_{2.5}$ for Atlanta, GA; Birmingham, AL; St. Louis, MO; and Dallas, TX. The EBSPs are unitless but can be roughly interpreted as the amount (in $\mu\text{g}/\text{m}^3$) of each chemical species per $\mu\text{g}/\text{m}^3$ of source-specific $PM_{2.5}$.

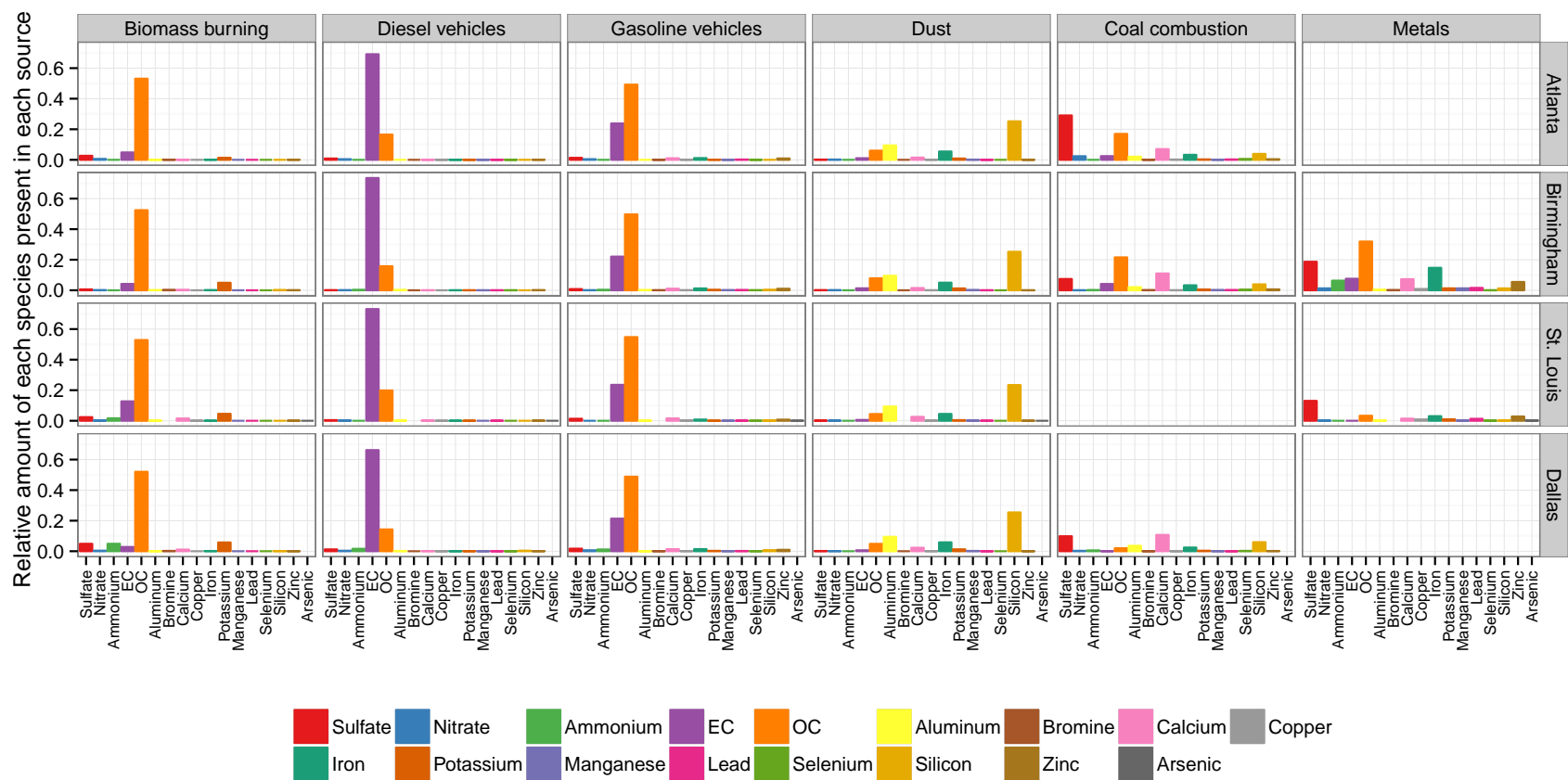


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Table S1: Mean (minimum, maximum) correlation between daily concentrations of PM_{2.5} mass and source-specific PM_{2.5} across Atlanta, GA; Birmingham, AL; St. Louis, MO; and Dallas, TX.

	Biomass burning	Diesel vehicles	Gasoline vehicles	Dust	Coal combustion ^a	Metals ^b
PM _{2.5} mass	0.38 (0.24, 0.55)	0.30 (0.18, 0.43)	0.26 (0.12, 0.37)	0.24 (0.12, 0.34)	0.29 (0.06, 0.55)	0.28 (0.11, 0.44)
Biomass burning		0.17 (0.08, 0.36)	0.23 (0.00, 0.57)	0.09 (0.02, 0.20)	0.09 (-0.01, 0.19)	0.23 (0.05, 0.41)
Diesel vehicles			0.36 (0.26, 0.53)	0.04 (0.01, 0.09)	0.18 (0.09, 0.25)	0.26 (0.21, 0.30)
Gasoline vehicles				0.01 (-0.13, 0.19)	0.28 (0.24, 0.35)	0.26 (0.05, 0.47)
Dust					0.10 (-0.03, 0.28)	0.10 (0.02, 0.18)
Coal combustion						0.23 ^c (-, -)

^aCorrelations for three cities: Atlanta, Birmingham, and Dallas

^bCorrelations for two cities: Birmingham and St. Louis

^cOnly Birmingham identified both PM_{2.5} from coal combustion and metals

Table S2: Mean (standard deviation) number of daily emergency department visits for respiratory diseases and subcategories of respiratory disease for Atlanta, GA; Birmingham, AL; St. Louis, MO; and Dallas, TX.

	Atlanta	Birmingham	St. Louis	Dallas
Respiratory	361 (129)	59 (27)	281 (81)	455 (159)
Pneumonia	47 (20)	8 (4)	45 (16)	72 (27)
COPD	18 (7)	6 (3)	16 (5)	23 (7)
Upper Respiratory Infection	212 (78)	36 (18)	162 (52)	263 (100)
Asthma/Wheeze	72 (29)	9 (5)	51 (15)	77 (24)

Table S3: Number of days of available data for selected tracer PM_{2.5} chemical constituents for Atlanta, GA; Birmingham, AL; St. Louis, MO; and Dallas, TX. Tracers were selected as potassium (K) for biomass burning PM_{2.5}, EC for diesel PM_{2.5}, zinc (Zn) for gasoline PM_{2.5}, silicon (Si) for dust PM_{2.5}, as well as OC for both mobile and burning PM_{2.5}.

	Atlanta	Birmingham	St. Louis	Dallas
K	3206	733	722	330
OC	3618	808	728	332
EC	3621	808	728	332
Zn	3206	733	722	330
Si	3206	733	722	330

Table S4: Average (standard deviation) concentration and median of city-specific interquartile ranges (IQR) in $\mu\text{g}/\text{m}^3$ for selected tracer $\text{PM}_{2.5}$ chemical constituents in Atlanta, GA; Birmingham, AL; St. Louis, MO; and Dallas, TX. Tracers were selected as potassium (K) for biomass burning $\text{PM}_{2.5}$, EC for diesel $\text{PM}_{2.5}$, zinc (Zn) for gasoline $\text{PM}_{2.5}$, silicon (Si) for dust $\text{PM}_{2.5}$, as well as OC for both mobile and burning $\text{PM}_{2.5}$.

	Atlanta	Birmingham	St. Louis	Dallas	IQR
K	0.03 (0.02)	0.05 (0.04)	0.07 (0.05)	0.03 (0.02)	0.03
OC	3.93 (2.20)	5.93 (3.19)	4.46 (1.87)	2.82 (1.15)	2.34
EC	1.37 (0.96)	1.16 (0.83)	0.83 (0.45)	0.55 (0.31)	0.61
Zn	0.01 (0.01)	0.09 (0.14)	0.03 (0.03)	0.01 (0.00)	0.02
Si	0.09 (0.10)	0.21 (0.24)	0.11 (0.18)	0.16 (0.28)	0.08

Table S5: Mean (minimum, maximum) correlation between daily concentrations of selected tracer $\text{PM}_{2.5}$ chemical constituents across for Atlanta, GA; Birmingham, AL; St. Louis, MO; and Dallas, TX. Tracers were selected as potassium (K) for biomass burning $\text{PM}_{2.5}$, EC for diesel $\text{PM}_{2.5}$, zinc (Zn) for gasoline $\text{PM}_{2.5}$, silicon (Si) for dust $\text{PM}_{2.5}$, as well as OC for both mobile and burning $\text{PM}_{2.5}$.

	OC	EC	Zn	Si
K	0.50 (0.30, 0.58)	0.34 (0.08, 0.50)	0.19 (0.07, 0.30)	0.54 (0.38, 0.66)
OC		0.64 (0.44, 0.80)	0.30 (0.14, 0.40)	0.18 (0.06, 0.28)
EC			0.46 (0.20, 0.65)	0.12 (-0.05, 0.29)
Zn				0.09 (-0.11, 0.40)

Table S6: Mean (minimum, maximum) correlation between daily concentrations of PM_{2.5} mass, source-specific PM_{2.5}, and selected tracer PM_{2.5} chemical constituents across Atlanta, GA; Birmingham, AL; St. Louis, MO; and Dallas, TX. Tracers were selected as potassium (K) for biomass burning PM_{2.5}, EC for diesel PM_{2.5}, zinc (Zn) for gasoline PM_{2.5}, silicon (Si) for dust PM_{2.5}, as well as OC for both mobile and burning PM_{2.5}.

	K	OC	EC	Zn	Si
PM _{2.5} mass	0.50 (0.39, 0.63)	0.66 (0.51, 0.81)	0.47 (0.20, 0.64)	0.28 (0.25, 0.30)	0.27 (0.14, 0.37)
Biomass burning	0.74 (0.60, 0.84)	0.44 (0.32, 0.52)	0.32 (0.14, 0.47)	0.19 (0.10, 0.41)	0.16 (0.04, 0.36)
Diesel vehicles	0.20 (0.15, 0.26)	0.47 (0.35, 0.62)	0.71 (0.67, 0.81)	0.29 (0.10, 0.41)	0.06 (0.02, 0.12)
Gasoline vehicles	0.24 (0.03, 0.44)	0.42 (0.34, 0.55)	0.53 (0.45, 0.64)	0.48 (0.29, 0.64)	0.05 (-0.12, 0.29)
Dust	0.46 (0.38, 0.55)	0.16 (0.10, 0.23)	0.10 (-0.05, 0.23)	0.01 (-0.11, 0.16)	0.91 (0.74, 0.98)
Coal combustion ^a	0.18 (0.06, 0.37)	0.30 (0.21, 0.47)	0.30 (0.13, 0.49)	0.18 (0.15, 0.23)	0.16 (0.06, 0.34)
Metals ^b	0.29 (0.14, 0.43)	0.34 (0.25, 0.44)	0.30 (0.12, 0.47)	0.38 (0.08, 0.67)	0.20 (0.04, 0.37)

^aCorrelations for three cities: Atlanta, Birmingham, and Dallas

^bCorrelations for two cities: Birmingham and St. Louis

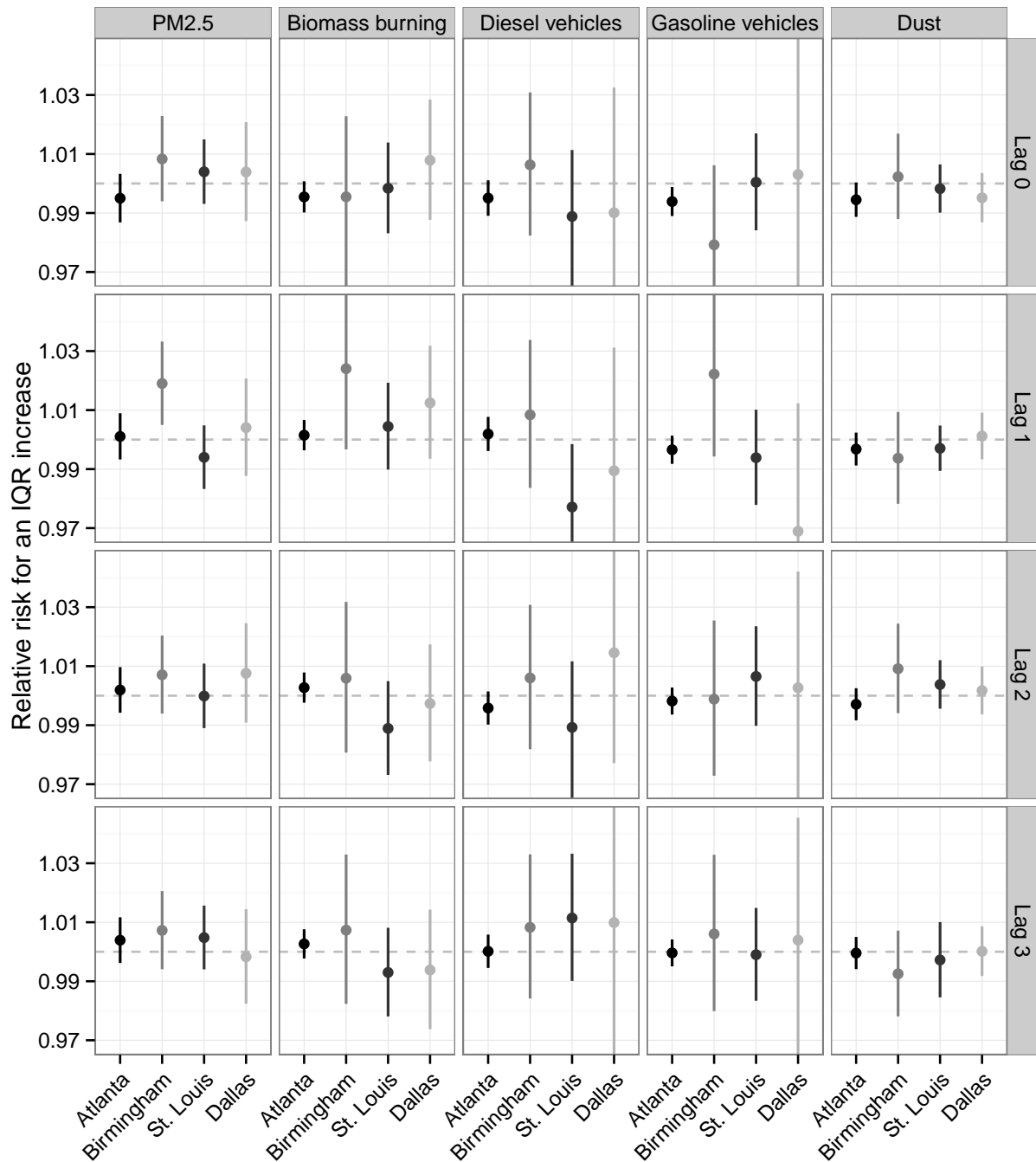


Figure S3: Estimated relative risks of pneumonia ED visits for interquartile range increases (IQR) in PM_{2.5} mass and source-specific PM_{2.5} using single day exposure lags 0 to 3 for Atlanta, GA; Birmingham, AL; St. Louis, MO; and Dallas, TX.

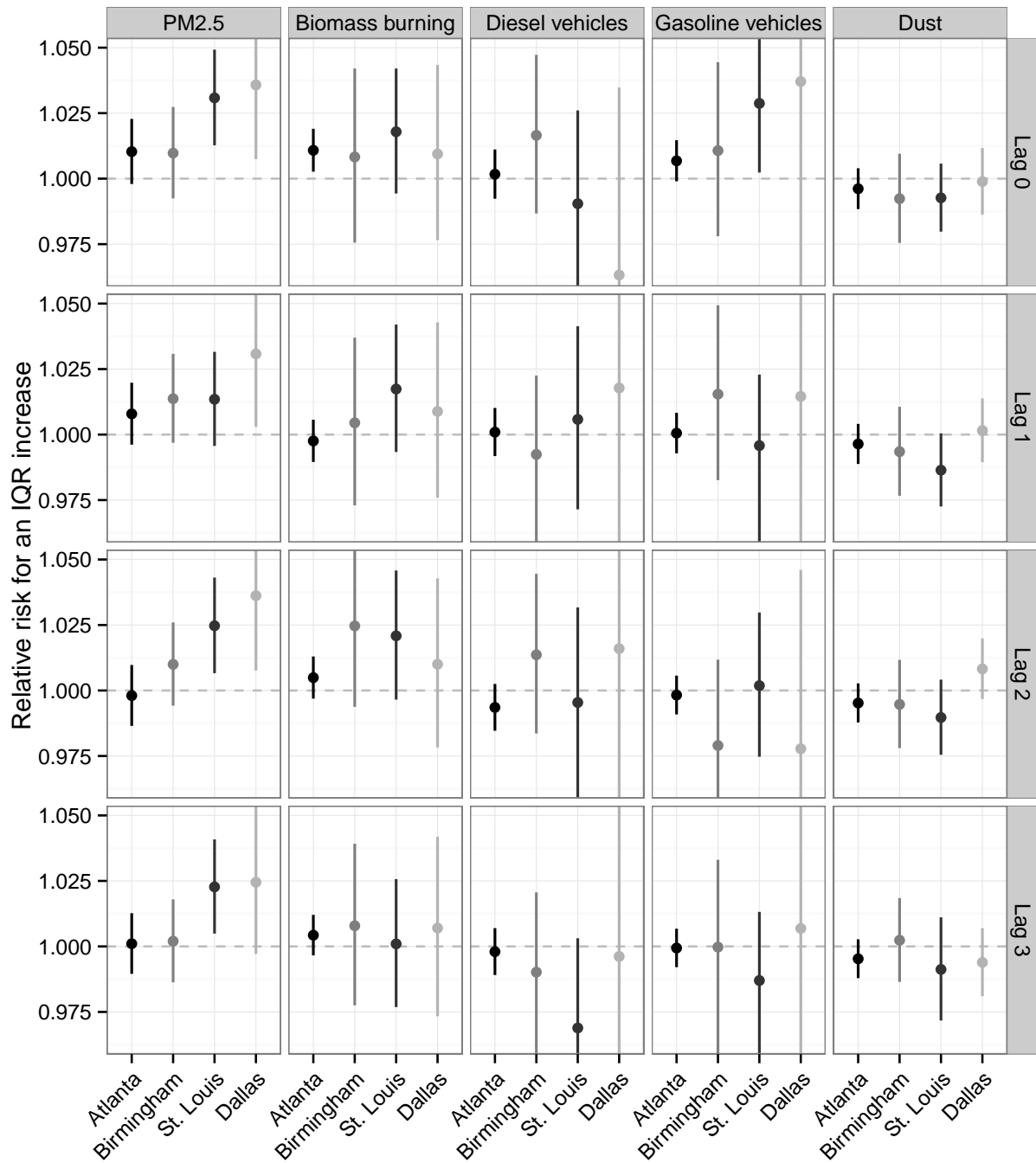


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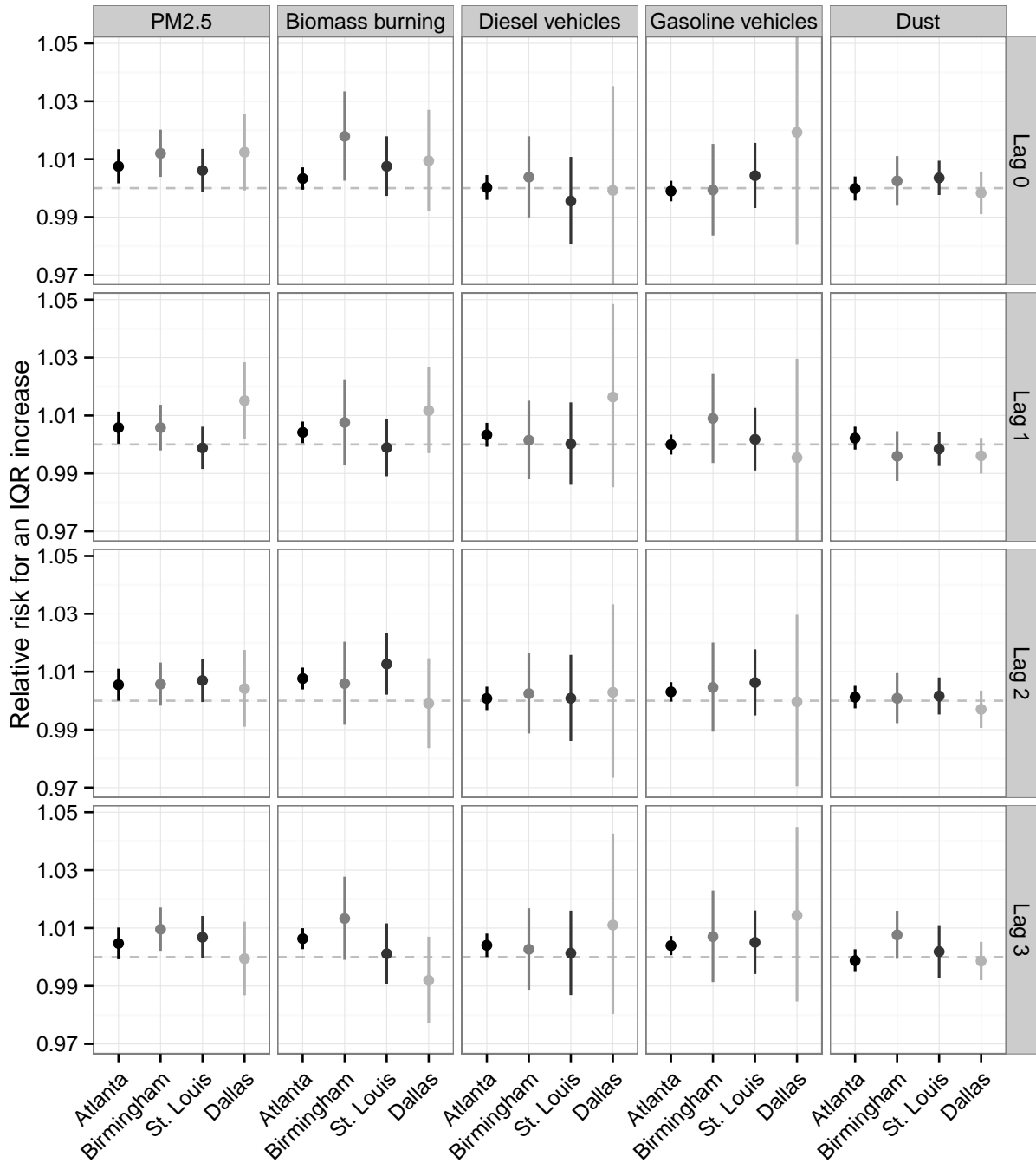


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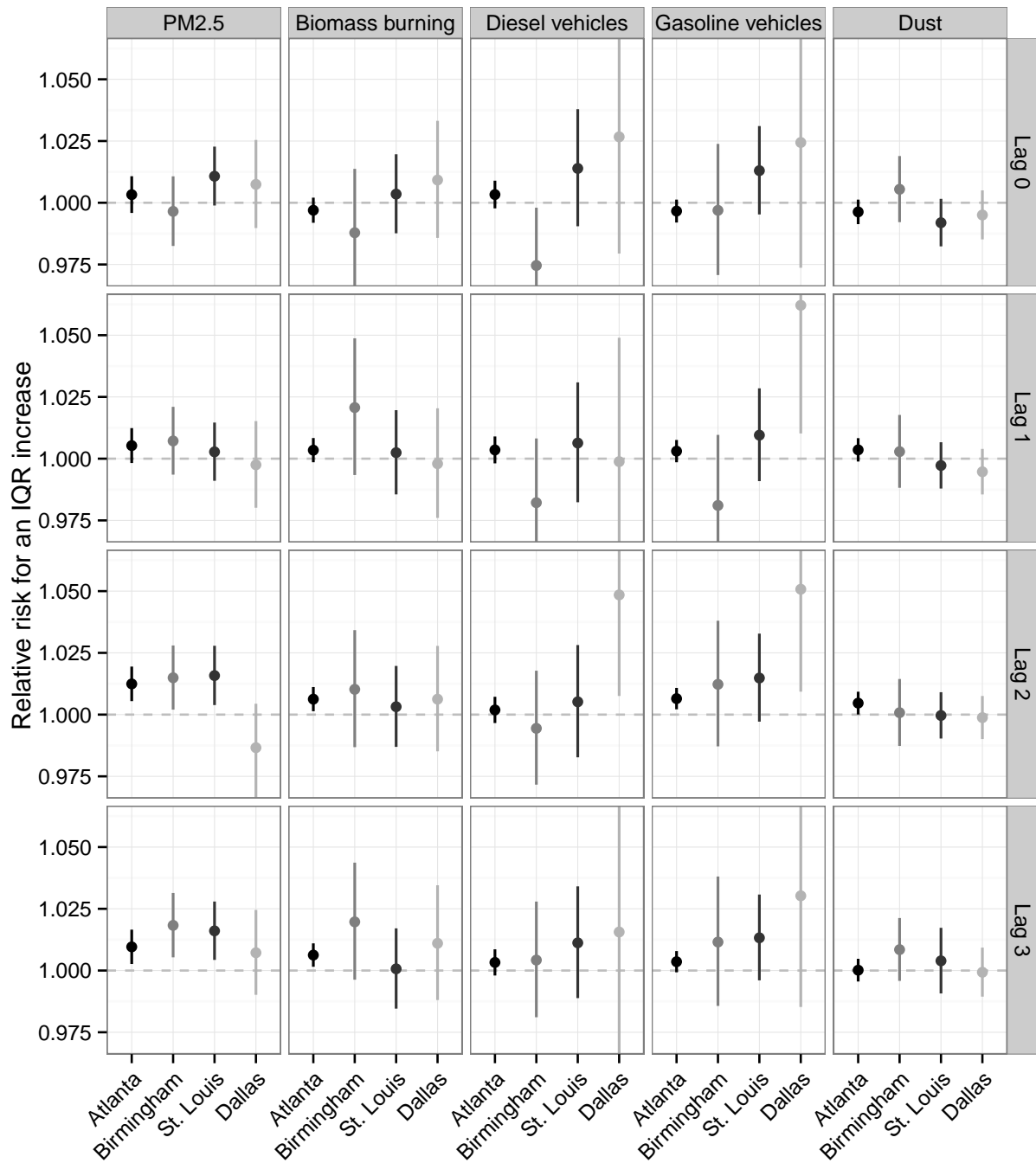


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