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## **Supplemental Material**

### **Ambient Coarse Particulate Matter and the Right Ventricle:**

#### **The Multi-Ethnic Study of Atherosclerosis**

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#### **Table of Contents**

**Figure S1.** Study Population

**Table S1.** Comparison of Full Cohort with Included and Excluded samples

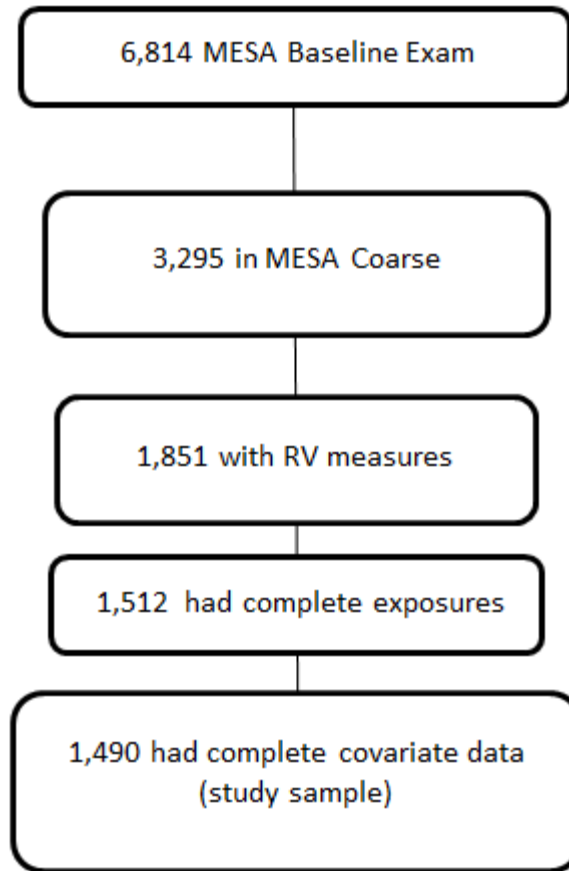
**Table S2.** Pearson Correlation Coefficients between different pollutants: overall and within study site

**Figure S2.** Associations Between Air Pollutant Concentrations and Right Ventricular End-Diastolic Mass in Single and Multi-Pollutant Models (g per IQR of Pollutant, 95% CI)

**Figure S3.** Sensitivity of Results to Adjustment for Various Covariates Including Potential Intermediates

**Figure S4.** Effect Modification of Associations Between  $PM_{10-2.5}$  Concentrations and Right Ventricular End-Diastolic Volume and Ejection Fraction, After Control for  $PM_{2.5}$  and  $NO_2$  (g per IQR of Pollutant, 95% CI)

**Figure S1. Study Population**



**Table S1. Comparison of Full Cohort with Included and Excluded samples**

	<b>Full</b>	<b>Included</b>	<b>Excluded</b>
N	3295	1490	1805
Age (years)	61.8±10.2	61.1±10.0	62.3±10.3
Female	1726 (52%)	795 (53%)	931 (52%)
Race/Ethnicity			
White	1731 (53%)	828 (56%)	903 (50%)
Chinese	304 (9%)	158 (11%)	146 (8%)
Black	801 (24%)	293 (20%)	508 (28%)
Hispanic	459 (14%)	211 (14%)	248 (14%)
Education			
<High School	922 (28%)	400 (27%)	522 (29%)
High School/Some College	992 (30%)	440 (30%)	552 (31%)
≥College	1377 (42%)	650 (44%)	727 (40%)
Smoking Status			
Never	1543 (47%)	744 (50%)	799 (44%)
Former	1302 (40%)	556 (37%)	746 (41%)
Current	446 (14%)	190 (13%)	256 (14%)
≥ 10 years in neighborhood	2115 (64%)	1033 (69%)	1082 (60%)
<b>Health</b>			
BMI (kg/m <sup>2</sup> )	28.3±5.4	27.7±5.0	28.8±5.6
Cholesterol (mg/dl)	194.3±35.4	195.3±36.0	193.5±34.9
Hypertension	1407 (43%)	584 (39%)	823 (46%)
Diabetic	347 (11%)	143 (10%)	204 (11%)
<b>Pollutants, mean (SD)</b>			
PM <sub>10-2.5</sub> (µg/m <sup>3</sup> )	5.0±1.7	4.9±1.6	5.1±1.7
Copper (ng/m <sup>3</sup> )	4.6±2.7	4.4±2.5	4.8±2.8
Zinc (ng/m <sup>3</sup> )	10.0±10.7	9.0±9.6	11.0±11.6
Silicon (µg/m <sup>3</sup> )	0.4±0.1	0.4±0.1	0.4±0.1
Phosphorous (ng/m <sup>3</sup> )	16.2±3.7	15.9±3.6	16.5±3.8
Endotoxin (EU/m <sup>3</sup> )	0.1±0.1	0.1±0.1	0.1±0.1
PM <sub>2.5</sub> (µg/m <sup>3</sup> )	14.7±2.2	14.6±2.1	14.8±2.2
NO <sub>2</sub> (ppb)	15.0±5.4	14.7±5.1	15.2±5.6

Excluded refers to those who were in the MESA Coarse study but were missing exposure, outcome and/or covariates used in the main model

**Table S2. Pearson Correlation Coefficients between different pollutants: overall and within study site**

(p values are printed below Pearson Correlation Coefficients)

**Overall**

	PM <sub>10-2.5</sub>	Cu	Zn	Ph	Si	Endo	PM <sub>2.5</sub>	NO <sub>2</sub>
PM <sub>10-2.5</sub>	1							
Cu	0.53 <.0001	1						
Zn	0.45 <.0001	0.79 <.0001	1					
Ph	-0.09 0.0003	0.04 0.09	0.10 <.0001	1				
Si	0.53 <.0001	0.16 <.0001	0.08 0.00	-0.13 <.0001	1			
Endo	0.16 <.0001	-0.30 <.0001	-0.27 <.0001	-0.46 <.0001	0.27 <.0001	1		
PM <sub>2.5</sub>	0.02 0.38	0.46 <.0001	0.42 <.0001	0.57 <.0001	-0.28 <.0001	-0.61 <.0001	1	
NO <sub>2</sub>	0.52 <.0001	0.89 <.0001	0.76 <.0001	-0.07 0.01	0.19 <.0001	-0.24 <.0001	0.46 <.0001	1

**Chicago**

	PM <sub>10-2.5</sub>	Cu	Zn	Ph	Si	Endo	PM <sub>2.5</sub>	NO <sub>2</sub>
PM <sub>10-2.5</sub>	1							
Cu	0.80 <.0001	1						
Zn	0.74 <.0001	0.56 <.0001	1					
Ph	0.78 <.0001	0.73 <.0001	0.65 <.0001	1				
Si	0.84 <.0001	0.77 <.0001	0.57 <.0001	0.79 <.0001	1			
Endo	-0.14 0.00	-0.21 <.0001	-0.08 0.07	-0.30 <.0001	-0.31 <.0001	1		
PM <sub>2.5</sub>	0.58 <.0001	0.51 <.0001	0.38 <.0001	0.60 <.0001	0.59 <.0001	-0.26 <.0001	1	
NO <sub>2</sub>	0.79 <.0001	0.75 <.0001	0.57 <.0001	0.65 <.0001	0.75 <.0001	-0.16 0.00	0.62 <.0001	1

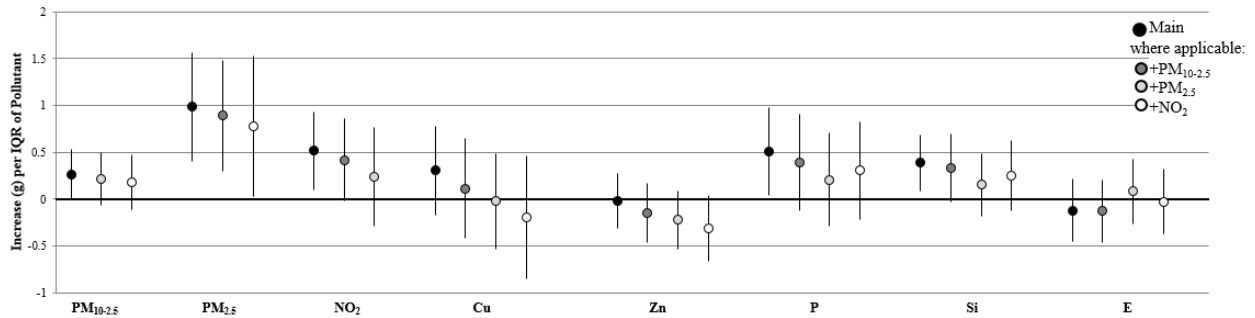
**Winston-Salem**

	PM <sub>10-2.5</sub>	Cu	Zn	Ph	Si	Endo	PM <sub>2.5</sub>	NO <sub>2</sub>
PM <sub>10-2.5</sub>	1							
Cu	0.05 0.31	1						
Zn	-0.29 <.0001	0.25 <.0001	1					
Ph	0.32 <.0001	0.24 <.0001	0.08 0.10	1				
Si	0.51 <.0001	0.57 <.0001	0.13 0.01	0.31 <.0001	1			
Endo	0.36 <.0001	-0.37 <.0001	-0.53 <.0001	-0.17 0.00	-0.12 0.01	1		
PM <sub>2.5</sub>	-0.36 <.0001	0.41 <.0001	0.30 <.0001	-0.03 0.51	0.05 0.30	-0.36 <.0001	1	
NO <sub>2</sub>	-0.15 0.00	0.64 <.0001	0.52 <.0001	0.04 0.40	0.35 <.0001	-0.33 <.0001	0.60 <.0001	1

**St.Paul**

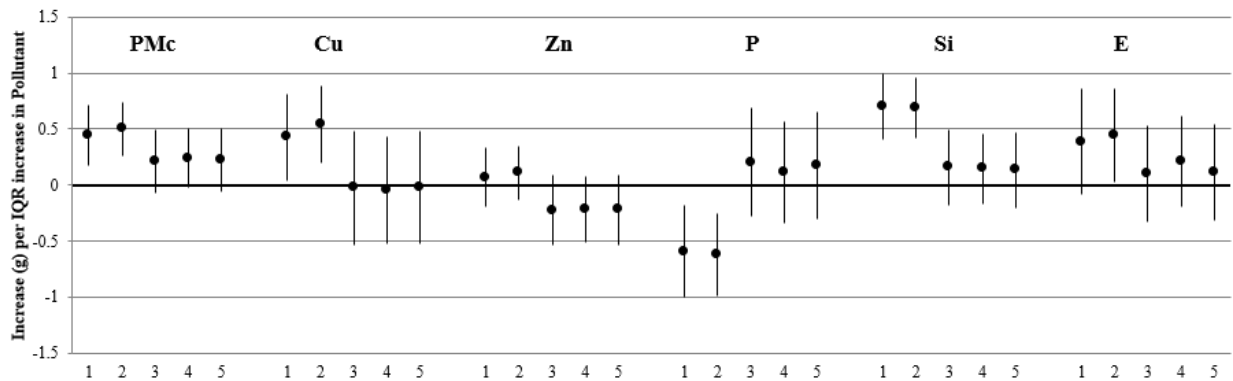
	PM <sub>10-2.5</sub>	Cu	Zn	Ph	Si	Endo	PM <sub>2.5</sub>	NO <sub>2</sub>
PM <sub>10-2.5</sub>	1							
Cu	0.56 <.0001	1						
Zn	0.28 <.0001	0.51 <.0001	1					
Ph	0.18 <.0001	0.36 <.0001	0.38 <.0001	1				
Si	0.45 <.0001	0.41 <.0001	0.36 <.0001	0.46 <.0001	1			
Endo	0.13 0.00	0.03 0.54	0.20 <.0001	0.11 0.01	-0.20 <.0001	1		
PM <sub>2.5</sub>	0.23 <.0001	0.40 <.0001	0.25 <.0001	0.28 <.0001	0.46 <.0001	-0.02 0.60	1	
NO <sub>2</sub>	0.41 <.0001	0.63 <.0001	0.46 <.0001	0.35 <.0001	0.49 <.0001	0.01 0.76	0.81 <.0001	1

**Figure S2. Associations Between Air Pollutant Concentrations and Right Ventricular End-Diastolic Mass in Single and Multi-Pollutant Models (g per IQR of Pollutant, 95% CI)**



All models adjusted for age, race, gender, height, weight, NSES, education, smoking status, pack-years, second-hand smoke exposure, hypertension, diabetes, total cholesterol, study site, and site by NSES interaction.  
 Associations scaled to IQR of pollutant: PM<sub>10-2.5</sub> (2.2 µg/m<sup>3</sup>), PM<sub>2.5</sub> (3.8 µg/m<sup>3</sup>), NO<sub>2</sub> (7.0 ppb), Cu (4 ng/m<sup>3</sup>), Zn (11 ng/m<sup>3</sup>), P (6 ng/m<sup>3</sup>), Si (0.13 µg/m<sup>3</sup>), Endotoxin (0.08 EU/m<sup>3</sup>).

**Figure S3. Sensitivity of Results to Adjustment for Various Covariates Including Potential Intermediates**

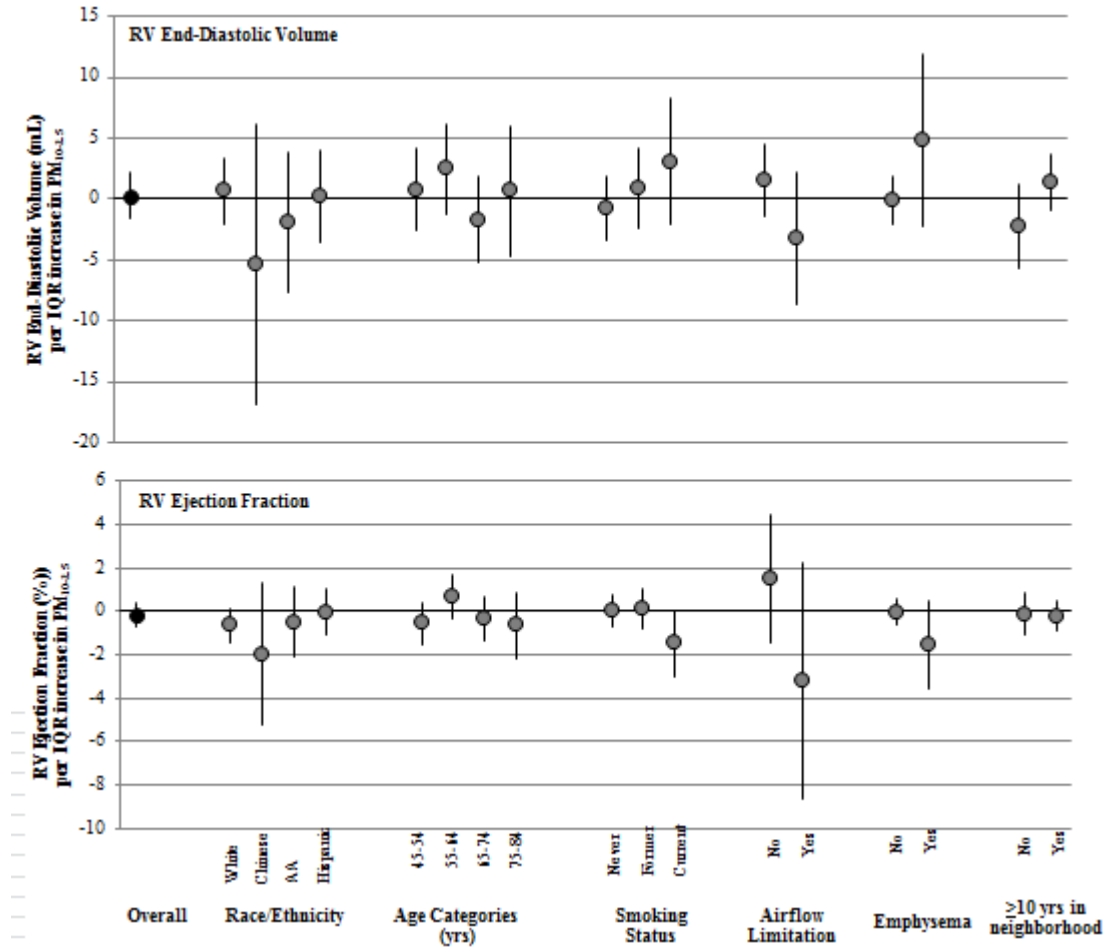


Above models are presented with increasing levels of adjustment in the following order:

- 1: Age, race, gender, NSES, education, PM<sub>2.5</sub>
- 2: Model 1 + height, weight, smoking status, pack-years, second-hand smoke exposure, hypertension, diabetes, total cholesterol
- 3: Model 2 + study site, and site by NSES interaction
- 4: Model 3 + left ventricular mass
- 5: Model 3 + %emphysema

Associations scaled to IQR of pollutant: PM<sub>10-2.5</sub> (2.2 µg/m<sup>3</sup>), Cu (4 ng/m<sup>3</sup>), Zn (11 ng/m<sup>3</sup>), P (6ng/m<sup>3</sup>), Si (0.13 µg/m<sup>3</sup>), Endotoxin (0.1 EU/m<sup>3</sup>).

**Figure S4. Effect Modification of Associations Between PM<sub>10-2.5</sub> Concentrations and Right Ventricular End-Diastolic Volume and Ejection Fraction, After Control for PM<sub>2.5</sub> and NO<sub>2</sub> (g per IQR of Pollutant, 95% CI)**



All models adjusted for age, race, gender, height, weight, NSES, education, smoking status, pack-years, second-hand smoke exposure, hypertension, diabetes, total cholesterol, study site, site by NSES interaction, PM<sub>2.5</sub> and NO<sub>2</sub> and their effect modifier interaction. Associations scaled to IQR of pollutant: PM<sub>10-2.5</sub> (2.2 µg/m<sup>3</sup>).