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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 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 µg/m$^3$) of each chemical species per µg/m$^3$ of source-specific PM$_{2.5}$.

**Figure S2** Ensemble-based source profiles (EBSPs) for winter 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 µg/m$^3$) of each chemical species per µg/m$^3$ of source-specific PM$_{2.5}$.

**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.

**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.
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$_{2.5}$.

Table S4 Average (standard deviation) concentration and median of city-specific interquartile ranges (IQR) in µg/m$^3$ for selected tracer 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 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$_{2.5}$.

Table S5 Mean (minimum, maximum) correlation between daily concentrations of selected tracer 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 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$_{2.5}$.

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$_{2.5}$.

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.

Figure S4 Estimated relative risks of chronic obstructive pulmonary disease 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.

Figure S5 Estimated relative risks of upper respiratory infection 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.

Figure S6 Estimated relative risks of asthma/wheeze 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.