eTable 1. Spearman correlation coefficients between pollutant source concentrations and tracers (averaged across 10 ensemble runs)

eTable 2. Rate Ratios and 95% confidence intervals for the association of source-specific PM2.5 and total PM2.5 concentrations (per 1 µg/m3) and emergency department visits for respiratory and cardiovascular disease outcomes in Atlanta, GA (August 1, 1998 – December 23, 2010) as graphically shown in Figure 2

eTable 3. Rate Ratios and 95% confidence intervals for the association of lag 0-7 source-specific PM2.5 and total PM2.5 concentrations (per 1 µg/m3) and emergency department visits for respiratory outcomes in Atlanta, GA (August 1, 1998 – December 23, 2010)

eTable 4. Ratios of the imputation-corrected SE (that accounts for between imputation uncertainty) to the average SE from the ensemble runs from single-source models for all outcomes

eTable 1. Spearman correlation coefficients between pollutant source concentrations and tracers (averaged across 10 ensemble runs)

|  |  |  |
| --- | --- | --- |
| Source | Tracer | Spearman Correlation |
| Biomass burning | Potassium | 0.6 |
| Primary coal combustion | Selenium | 0.4 |
| Dust/resuspended soil | Aluminum  Silicon | 0.8  1.0 |
|  | Copper | 0.3 |
| Diesel-fueled vehicles | Elemental carbon | 0.7 |
| Gasoline-fueled vehicles | Zinc  Copper | 0.8  0.3 |
| Secondary organic carbon | Organic carbon | 0.6 |

eTable 2. Rate Ratios and 95% confidence intervals for the association of source-specific PM2.5 and total PM2.5 concentrations (per 1 µg/m3) and emergency department visits for respiratory and cardiovascular disease outcomes in Atlanta, GA (August 1, 1998 – December 23, 2010) as graphically shown in Figure 2

|  | **RESPIRATORY OUTCOMES** | **Single-Source Model**  **Lag 0-2** | | | **All-Sources Model**  **Lag 0-2** | | | **CVD**  **OUTCOMES** | **Single-Source Model**  **Lag 0** | | | **All-Sources Model**  **Lag 0** | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SOURCE** | **RR** | **95% CI** | | **RR** | **95% CI** | | **RR** | **95% CI** | | **RR** | **95% CI** | |
| **Biomass burning** | All Respiratory | 1.004 | 1.000, | 1.007 | 1.008 | 1.004, | 1.011 | All CVD | 1.001 | 0.999, | 1.004 | 1.001 | 0.998, | 1.004 |
| Asthma/wheeze | 1.005 | 1.001, | 1.010 | 1.007 | 1.002, | 1.012 | Ischemic heart disease | 0.999 | 0.995, | 1.004 | 1.000 | 0.995, | 1.004 |
| COPD | 1.004 | 0.997, | 1.012 | 1.011 | 1.002, | 1.020 | Dysrhythmia | 1.001 | 0.997, | 1.005 | 1.001 | 0.996, | 1.006 |
| Pneumonia | 1.000 | 0.995, | 1.005 | 1.006 | 1.000, | 1.011 | Congestive heart failure | 1.001 | 0.996, | 1.006 | 1.000 | 0.995, | 1.006 |
| URI | 1.004 | 1.000, | 1.008 | 1.008 | 1.003, | 1.013 | Ischemic stroke | 1.004 | 0.999, | 1.009 | 1.004 | 0.998, | 1.009 |
| **Primary coal combustion** | All Respiratory | 0.958 | 0.904, | 1.016 | 0.934 | 0.873, | 0.999 | All CVD | 1.024 | 0.980, | 1.070 | 1.018 | 0.974, | 1.065 |
| Asthma/wheeze | 1.020 | 0.942, | 1.104 | 0.984 | 0.904, | 1.072 | Ischemic heart disease | 1.055 | 0.971, | 1.146 | 1.059 | 0.975, | 1.151 |
| COPD | 0.978 | 0.818, | 1.170 | 0.979 | 0.815, | 1.174 | Dysrhythmia | 1.003 | 0.931, | 1.080 | 0.996 | 0.922, | 1.076 |
| Pneumonia | 0.944 | 0.851, | 1.047 | 0.943 | 0.846, | 1.050 | Congestive heart failure | 1.040 | 0.960, | 1.126 | 1.037 | 0.954, | 1.127 |
| URI | 0.939 | 0.874, | 1.009 | 0.910 | 0.836, | 0.991 | Ischemic stroke | 0.992 | 0.908, | 1.083 | 0.971 | 0.887, | 1.064 |
| **Dust/re-suspended soil** | All Respiratory | 0.992 | 0.977, | 1.006 | 0.992 | 0.977, | 1.007 | All CVD | 1.005 | 0.994, | 1.015 | 1.004 | 0.993, | 1.014 |
| Asthma/wheeze | 0.988 | 0.967, | 1.009 | 0.982 | 0.961, | 1.004 | Ischemic heart disease | 0.987 | 0.967, | 1.007 | 0.987 | 0.967, | 1.007 |
| COPD | 0.957 | 0.921, | 0.996 | 0.960 | 0.922, | 0.999 | Dysrhythmia | 1.012 | 0.993, | 1.032 | 1.012 | 0.993, | 1.032 |
| Pneumonia | 0.988 | 0.962, | 1.015 | 0.994 | 0.966, | 1.022 | Congestive heart failure | 1.000 | 0.980, | 1.020 | 0.999 | 0.978, | 1.019 |
| URI | 1.000 | 0.983, | 1.018 | 1.001 | 0.982, | 1.019 | Ischemic stroke | 1.023 | 1.000, | 1.045 | 1.020 | 0.998, | 1.043 |
| **Diesel Vehicles** | All Respiratory | 1.001 | 0.993, | 1.009 | 1.001 | 0.989, | 1.012 | All CVD | 1.005 | 1.000, | 1.010 | 1.002 | 0.996, | 1.008 |
| Asthma/wheeze | 1.009 | 0.999, | 1.020 | 1.007 | 0.993, | 1.021 | Ischemic heart disease | 1.001 | 0.991, | 1.010 | 0.997 | 0.986, | 1.009 |
| COPD | 0.989 | 0.969, | 1.010 | 0.983 | 0.956, | 1.010 | Dysrhythmia | 1.004 | 0.993, | 1.015 | 1.001 | 0.988, | 1.014 |
| Pneumonia | 0.992 | 0.979, | 1.004 | 0.992 | 0.976, | 1.007 | Congestive heart failure | 1.003 | 0.993, | 1.013 | 1.002 | 0.990, | 1.014 |
| URI | 1.001 | 0.990, | 1.011 | 1.001 | 0.987, | 1.016 | Ischemic stroke | 1.013 | 1.001, | 1.025 | 1.009 | 0.995, | 1.023 |
| **Gasoline Vehicles** | All Respiratory | 0.992 | 0.982, | 1.003 | 0.979 | 0.966, | 0.991 | All CVD | 1.005 | 0.998, | 1.013 | 1.003 | 0.995, | 1.011 |
| Asthma/wheeze | 1.005 | 0.988, | 1.021 | 0.990 | 0.969, | 1.012 | Ischemic heart disease | 1.001 | 0.987, | 1.015 | 1.003 | 0.987, | 1.019 |
| COPD | 0.986 | 0.959, | 1.013 | 0.975 | 0.941, | 1.011 | Dysrhythmia | 1.004 | 0.990, | 1.018 | 1.001 | 0.985, | 1.017 |
| Pneumonia | 0.982 | 0.967, | 0.997 | 0.974 | 0.956, | 0.994 | Congestive heart failure | 1.002 | 0.989, | 1.015 | 1.001 | 0.985, | 1.017 |
| URI | 0.993 | 0.981, | 1.005 | 0.979 | 0.964, | 0.993 | Ischemic stroke | 1.017 | 1.000, | 1.033 | 1.008 | 0.989, | 1.027 |
| **Secondary Organic Carbon** | All Respiratory | 1.004 | 0.998, | 1.010 | 1.007 | 1.000, | 1.015 | All CVD | 1.003 | 1.000, | 1.006 | 1.002 | 0.999, | 1.006 |
| Asthma/wheeze | 1.005 | 0.997, | 1.013 | 1.005 | 0.996, | 1.013 | Ischemic heart disease | 1.003 | 0.997, | 1.009 | 1.003 | 0.996, | 1.009 |
| COPD | 1.008 | 0.994, | 1.021 | 1.016 | 1.000, | 1.033 | Dysrhythmia | 1.004 | 0.997, | 1.010 | 1.004 | 0.997, | 1.011 |
| Pneumonia | 1.005 | 0.996, | 1.014 | 1.010 | 1.001, | 1.020 | Congestive heart failure | 1.000 | 0.993, | 1.007 | 1.000 | 0.992, | 1.007 |
| URI | 1.003 | 0.996, | 1.010 | 1.006 | 0.998, | 1.015 | Ischemic stroke | 1.005 | 0.998, | 1.012 | 1.004 | 0.997, | 1.012 |
| **PM2.5** | All Respiratory | 1.001 | 1.000, | 1.002 |  |  |  | All CVD | 1.001 | 1.000, | 1.001 |  |  |  |
| Asthma/wheeze | 1.001 | 1.000, | 1.002 |  |  |  | Ischemic heart disease | 1.000 | 0.999, | 1.001 |  |  |  |
| COPD | 1.000 | 0.998, | 1.002 |  |  |  | Dysrhythmia | 1.001 | 0.999, | 1.002 |  |  |  |
| Pneumonia | 1.000 | 0.999, | 1.002 |  |  |  | Congestive heart failure | 1.000 | 0.999, | 1.001 |  |  |  |
| URI | 1.001 | 1.000, | 1.002 |  |  |  | Ischemic stroke | 1.002 | 1.000, | 1.003 |  |  |  |

Rate ratios are per 1 µg/m3

eTable 3. Rate Ratios and 95% confidence intervals for the association of lag 0-7 source-specific PM2.5 and total PM2.5 concentrations (per 1 µg/m3) and emergency department visits for respiratory outcomes in Atlanta, GA (August 1, 1998 – December 23, 2010)

|  | **RESPIRATORY OUTCOMES** | **Single-Source Model**  **Lag 0-7** | | | **All-Sources Model**  **Lag 0-7** | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SOURCE** | **RR** | **95% CI** | | **RR** | **95% CI** | |
| **Biomass burning** | All Respiratory | 1.005 | 0.997, | 1.014 | 1.012 | 1.002, | 1.023 |
| Asthma/wheeze | 1.011 | 1.001, | 1.020 | 1.015 | 1.004, | 1.027 |
| COPD | 1.000 | 0.985, | 1.015 | 1.014 | 0.996, | 1.034 |
| Pneumonia | 0.999 | 0.989, | 1.009 | 1.009 | 0.995, | 1.023 |
| URI | 1.006 | 0.996, | 1.015 | 1.011 | 0.999, | 1.023 |
| **Primary coal combustion** | All Respiratory | 0.956 | 0.839, | 1.088 | 0.908 | 0.768, | 1.074 |
| Asthma/wheeze | 1.042 | 0.873, | 1.242 | 0.965 | 0.783, | 1.190 |
| COPD | 0.858 | 0.596, | 1.234 | 0.960 | 0.643, | 1.434 |
| Pneumonia | 0.933 | 0.742, | 1.174 | 0.904 | 0.700, | 1.167 |
| URI | 0.940 | 0.806, | 1.096 | 0.888 | 0.730, | 1.081 |
| **Dust/re-suspended soil** | All Respiratory | 0.982 | 0.954, | 1.011 | 0.974 | 0.941, | 1.007 |
| Asthma/wheeze | 0.976 | 0.936, | 1.018 | 0.954 | 0.910, | 0.999 |
| COPD | 0.936 | 0.868, | 1.008 | 0.951 | 0.878, | 1.031 |
| Pneumonia | 0.977 | 0.928, | 1.027 | 0.985 | 0.929, | 1.044 |
| URI | 0.991 | 0.957, | 1.027 | 0.982 | 0.944, | 1.022 |
| **Diesel Vehicles** | All Respiratory | 1.009 | 0.991, | 1.028 | 1.023 | 0.991, | 1.057 |
| Asthma/wheeze | 1.023 | 0.995, | 1.052 | 1.038 | 0.995, | 1.082 |
| COPD | 0.948 | 0.905, | 0.993 | 0.949 | 0.888, | 1.013 |
| Pneumonia | 1.002 | 0.976, | 1.029 | 1.004 | 0.967, | 1.043 |
| URI | 1.011 | 0.990, | 1.032 | 1.026 | 0.992, | 1.062 |
| **Gasoline Vehicles** | All Respiratory | 0.989 | 0.965, | 1.013 | 0.956 | 0.920, | 0.992 |
| Asthma/wheeze | 1.001 | 0.969, | 1.034 | 0.954 | 0.912, | 0.998 |
| COPD | 0.954 | 0.895, | 1.016 | 0.957 | 0.879, | 1.042 |
| Pneumonia | 0.974 | 0.937, | 1.013 | 0.954 | 0.900, | 1.012 |
| URI | 0.996 | 0.970, | 1.023 | 0.964 | 0.926, | 1.005 |
| **Secondary Organic Carbon** | All Respiratory | 1.001 | 0.985, | 1.017 | 1.000 | 0.981, | 1.020 |
| Asthma/wheeze | 0.998 | 0.980, | 1.017 | 0.993 | 0.973, | 1.014 |
| COPD | 1.000 | 0.970, | 1.030 | 1.020 | 0.984, | 1.056 |
| Pneumonia | 1.017 | 0.995, | 1.039 | 1.021 | 0.994, | 1.049 |
| URI | 0.998 | 0.979, | 1.017 | 0.996 | 0.974, | 1.018 |
| **PM2.5** | All Respiratory | 1.000 | 0.999, | 1.002 |  |  |  |
| Asthma/wheeze | 1.000 | 0.998, | 1.003 |  |  |  |
| COPD | 0.996 | 0.991, | 1.001 |  |  |  |
| Pneumonia | 1.000 | 0.997, | 1.003 |  |  |  |
| URI | 1.001 | 0.999, | 1.003 |  |  |  |

Rate ratios are per 1 µg/m3 and were calculated used 2,655 days of data.

eTable 4. Ratios of the imputation-corrected SE (that accounts for between imputation uncertainty) to the average SE from the ensemble runs from single-source models for all outcomes

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Inflation of SE | | | | | | | | | |
|  | Respiratory | | | | | Cardiovascular | | | | |
| Source | All respiratory | Asthma/  wheeze | COPD | Pneumonia | URI | All CVD | Ischemic  heart  disease | Dysrhythmia | Congestive heart failure | Ischemic stroke |
| BURN | 1.341 | 1.121 | 1.076 | 1.122 | 1.393 | 1.164 | 1.167 | 1.144 | 1.273 | 1.139 |
| COAL | 1.206 | 1.050 | 1.239 | 1.184 | 1.221 | 1.260 | 1.304 | 1.140 | 1.200 | 1.149 |
| DUST | 1.028 | 1.031 | 1.025 | 1.015 | 1.019 | 1.020 | 1.030 | 1.013 | 1.013 | 1.018 |
| DV | 1.333 | 1.120 | 1.145 | 1.148 | 1.364 | 1.112 | 1.142 | 1.269 | 1.124 | 1.170 |
| GV | 1.248 | 1.225 | 1.093 | 1.040 | 1.203 | 1.068 | 1.136 | 1.088 | 1.025 | 1.105 |
| SOC | 1.387 | 1.168 | 1.095 | 1.143 | 1.370 | 1.044 | 1.075 | 1.116 | 1.187 | 1.052 |

Abbreviations: SE, standard error; CVD, cardiovascular disease; BURN, biomass burning; COAL, primary coal combustion; DUST, dust/resuspended soil; DV, diesel-fueled vehicles; GV, gasoline-fueled vehicles; SOC, secondary organic carbon; PM2.5, fine particulate matter.

Inflation of SE calculated as the SE accounting for both between and within model uncertainty divided by the average of the SEs from the 10 models for each source-outcome combination (SE accounting for only within model uncertainty)