PM2.5 CHEMICAL CONSTITUENTS AND MORTALITY IN 49 U.S. COMMUNITIES FROM 2001 TO 2005

Lucas Neas, *U.S. Environmental Protection Agency, NHEERL, USA*
Howard Chang, *Department of Statistics, North Carolina State University, USA*
Montserrat Fuentes, *Department of Statistics, North Carolina State University, USA*
Lisa Baxter, *U.S. Environmental Protection Agency, NERL, USA*
Lyle Burgoon, *U.S. Environmental Protection Agency, NCEA, USA*

Background and Aims: Short-term exposure to ambient particulate matter less than 2.5 µm in aerodynamic diameter (PM2.5) is consistently associated with adverse health outcomes in population studies. The PM2.5 mass represents a chemically diverse mixture of pollutants and there is limited evidence on the health effects of PM2.5 constituents.
Methods: We conducted a national multi-site time series analysis to examine the association between daily non-accidental mortality (≥ 65 years of age) and ambient levels of seven major PM2.5 chemical constituents: sulfate, elemental carbon (EC), nitrate, organic carbon (OC), silicon, sodium ion, and ammonium ion. Average lag-specific relative rates of death associated with each constituent were estimated using a two-stage Bayesian hierarchical model to combine evidence across 49 U.S. communities from 2001-2005.
Results: In a single pollutant model controlling for weather and seasonality, an interquartile range (IQR) increase in 2-day lagged EC levels (0.46 µg/m3) was associated with a 0.41% [95% posterior interval (PI), 0.06–0.76%] increase in the relative rate of death. An IQR increase in 1-day lagged OC levels (2.47 µg/m3) was associated with a 0.64% (95% PI, 0.14–1.15%) increase in the relative rate of death.
Conclusions: These findings suggest that ambient levels of EC and OC were positively associated with all-cause mortality for the elderly population. However, further investigations are needed to elucidate the joint effects of the PM2.5 constituents and their sources.

This is abstract does not necessarily reflect the policies of the U.S. Environmental Protection Agency.