Air Pollution Cost Analysis: Predicting Social Health Expenditures (APOCALYPSE)

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Abstract

This paper evaluates the costs of air pollution exposure for the health system in France.
We thus offer the first nationwide, individual-level evaluation of the causal impact of air pollution on health expenditures in France across a wide range of medical conditions. We combine daily predicted concentrations of four major pollutants—PM2.5, PM10, NO2, and O3—with anonymised reimbursement records from the ESND (Echantillon du Syst`eme National des Données de Santé), a representative 2% sample of the French health insurance database, spanning the period 2014–2021. This rich administrative dataset enables monthly tracking of health care expenditures—including outpatient care, pharmaceuticals, and sick leave—at the individual level. Leveraging exogenous meteorological variation, we apply a two-stage instrumental variable strategy to identify pollutant-specific effects on health care costs, allowing us to examine both short- and long-term exposures, dynamic lag structures, and non-linear threshold effects linked to WHO guideline exceedances of air quality.