The dangers of air pollution. Evidence on emergency respiratory diseases in Italy.

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- Topic of the paper: Determinants of health /open sessions
- Presentation format: Oral

Over the last decades the debate around the relationship between environmental sustainability and healthier population (EEA, 2013; WHO, 2013), has gained increasing attention from both the scientific and policy community. Considering this setting, and in line with the long-term objectives of achieving air pollution levels that do not lead to unacceptable harm to human health and the environment (EU, 2002, 2013), the key aim of this paper is to provide a better understanding of the consequences of air pollution on health, seeking to identify the most vulnerable sub-groups in terms of age and socioeconomic status. In particular, air pollution increases the incidence of a wide range of diseases (e.g. respiratory diseases), with both long and short-term health effects (e.g. Janke, 2014, Lagravinese et al., 2014).

The aim of the empirical analysis is to disentangle the relationship between daily hospital emergency admissions for respiratory diseases and the concentration of several air pollutants. For this purpose we construct a large daily panel data set, combining on the one hand hospital discharges, and on the other, concentrations of 6 types of pollutants, namely PM10, PM2.5, carbon monoxide, sulphur dioxide, nitrous dioxide and ozone.
The resulting dataset covers 8090 Italian municipalities for each day in the period between 2013 and 2015. In particular, we use the Hospital Discharge Data (SDO) from the Italian Ministry of Health, representing the hospitalizations taking place in both Italian public and private hospitals. We aggregate the individual patient level data at the municipality and specific age-group level and use the official population data in order to construct a measure of daily hospitalizations per 100,000 residents in each age group and municipality. In terms of air pollutants, we employ data of the Department of Atmospheric Chemistry of the Max Planck Institute for Chemistry (Mar et al., 2016). The six pollutants' concentrations are expressed in mg of substance/cubic meter and are derived form an analysis at a finer geographical resolution (grid of about 17x17 km) guaranteeing a homogeneous measure of pollution over space and minimizing the measurement error. Again, we aggregate the data into daily and municipality level concentrations. Finally, in order to control for the socioeconomic characteristics, we complement our dataset with the information on gross income at municipality level to evaluate potential mitigation income effects (Forastiere et al., 2007).

The high frequency of the data and the large panel dimension allow us to control for year-week effects, which capture time trends, seasonal effects and recurrent episodes of specific epidemics. We also include information on weather conditions at the same time-space scale, in order to account for potential confounder factors that may affect health outcomes. Being able to account for this wide set of controls and fixed effects, enables us to capture the effect of deviations in pollutant concentrations on hospitalizations which can be claimed to be as good as causal.

Our preliminary findings suggest that higher concentrations of pollutants lead to more emergency hospital admissions, with this effect being heterogeneous across age groups and pollutant types.

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