

## **Probabilistic Approach to the Spatial Identification of the Environmental Sources behind Mortality Rates in Europe**

**Authors :** Alina Svechkina, Boris A. Portnov

**Abstract :** In line with a rapid increase in pollution sources and enforcement of stricter air pollution regulation, which lowers pollution levels, it becomes more difficult to identify actual risk sources behind the observed morbidity patterns, and new approaches are required to identify potential risks and take preventive actions. In the present study, we discuss a probabilistic approach to the spatial identification of a priori unidentified environmental health hazards. The underlying assumption behind the tested approach is that the observed adverse health patterns (morbidity, mortality) can become a source of information on the geographic location of environmental risk factors that stand behind them. Using this approach, we analyzed sources of environmental exposure using data on mortality rates available for the year 2015 for NUTS 3 (Nomenclature of Territorial Units for Statistics) subdivisions of the European Union. We identified several areas in the southwestern part of Europe as primary risk sources for the observed mortality patterns. Multivariate regressions, controlled by geographical location, climate conditions, GDP (gross domestic product) per capita, dependency ratios, population density, and the level of road freight revealed that mortality rates decline as a function of distance from the identified hazard location. We recommend the proposed approach an exploratory analysis tool for initial investigation of regional patterns of population morbidity patterns and factors behind it.

**Keywords :** mortality, environmental hazards, air pollution, distance decay gradient, multi regression analysis, Europe, NUTS3

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