Title:

Spatial analysis and mapping of the effect of the socioeconomic deprivation on the association between ambient air NO_2 and infant mortality in the Lille metropolitan area, France

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Abstract: (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)

Introduction: Mapping spatial distributions of disease occurrence can serve as a useful tool for identifying exposures of public health concern. Infant mortality is an important indicator of the health status of a population. A few studies have associated air pollution with increased mortality and suggested that airborne particles act as a rapid trigger of infant deaths. The recent literature suggests that neighborhood deprivation status can modify the effect of air pollution on preterm delivery, a known risk factor of infant mortality.

Methods: We investigated the effect of neighborhood social deprivation on the association between exposure to ambient air NO_2 and infant mortality in Lille Metropolitan Area, North of France between 2000 and 2009. We conducted an ecological study using the French census block as the geographical unit. Infant mortality data were collected from local councils and geocoded at the census block level using the address of residence. A neighborhood deprivation index was estimated from the 1999 census data. We generated maps using generalized additive models, smoothing on longitude and latitude while adjusting for covariates. We used permutation tests to examine the overall importance of location in the model and identify areas of increased and decreased risk.

Results: With 668 cases during the study period, the average death rate was 4.1 per 1000 live births. We found evidence of several clusters of elevated infant mortality. Exposure to NO_2 did not fully explain the spatial relationship. After adjustment for socioeconomic status, there were no longer any areas of statistically significant risk, suggesting that the socioeconomic status has an important impact on infant mortality.

Discussion: Our results provide evidence of spatial disparities of infant mortality in a large French metropolitan area and show how the geographic patterns change after accounting for ambient air NO_2 and the deprivation index. This analysis underscores the importance of the neighborhood socioeconomic status.