Proximity to Industrial Polluting Sources and Socioeconomic Status-An Environmental Equity Study on A Small-Area Scale.

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Background & Objective: Territorial disparities in exposure to environmental hazards according to socioeconomic status (SES) contradict the principle of environmental justice, which states that no population group should suffer a disproportionate burden of exposure. In this work, which is the first phase of an epidemiological study on environmental risk factors of perinatal mortality, we investigated the association between proximity to industrial pollution sources and SES at small-area level and assessed the impact of different proximity indicators on the measure of the association.

Methods: An ecological study was conducted in the Lille Metropolitan Area (LMA). We used a validated deprivation index, constructed from 1999 census data, to estimate SES at the French census block level (n = 453; 1,100,000 inhabitants). Information on industrial air emissions in 2006 was drawn from the French database of the European Pollutants Emission Register. Several industrial proximity indicators were estimated and sensitivity analysis was performed to investigate their influence on the association with SES while controlling for spatial autocorrelation in the data. We present here results using a Multi-Site Proximity Index (MSPI), a cumulative distance measure between census block centroids and each facility.

Results: Significant spatial autocorrelation was detected in SES and location of industries. Spatial distributions of industries show a clear pattern, with a higher number located in the most deprived areas, near the LMA center. The MSPI differ significantly between deprivation categories ($P < 0.001$), with the lowest MPSI in the most disadvantaged blocks (geometric mean: 499,286 km [95%CI = 482,959-516,166] in category 5) and the greatest in the wealthiest ones (559,083 km [95%CI = 533,197; 588,225] in category 1). Inclusion of emission levels in the MSPI sharpens the contrasts.

Conclusion: Deprived populations experience a greater exposure to industrial pollution. Substantial exposure misclassification may result from a poor choice of proximity metrics in environmental equity analyses and may lead to erroneous conclusions.