

Toxic air emissions and proximity to low-income areas, Scarborough, Toronto

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Abstract

This paper explores socioeconomic status as a determinant of health by investigating facilities releasing multiple toxic emissions to the air by their mass and proximity to areas of low income in Scarborough. Analysis considers facilities that manufacture, process or otherwise use three priority substances.

Background and Relevance

This paper incrementally advances the study of environmental justice by examining the spatial distribution of socio-economic factors in relation to point source air pollution emissions. Statistically analyzing the spatial distribution of pollutants and demographics in Scarborough, Toronto advances our understanding of how context and method interact to produce observed patterns of environmental inequality.

Methods and Data

First, the 2011 ChemTRAC dataset lists businesses located in Scarborough that manufacture, process or otherwise use priority substances (e.g., NO_x, PM 2.5 and VOCs), and exceed government established reporting thresholds (Toronto Public Health, Healthy Public Policy, 2011). This paper normalizes emission data using Toxic Equivalency Potential (TEP) scores, to facilitate direct comparison of alternative substances (Toronto Public Health, 2013). Second, the 2005 total after-tax income for the over 15 population sourced from Statistics Canada is used to identify low-income areas (Statistics Canada, 2006). This paper defines low income by the federal poverty line established by the Canadian government.

The Gi* statistic identifies high and low income clusters by the weighted summation of income values around a specified location of interest. Alternative facility emission masses are then weighted by the TEP value to generate facility TEP scores. TEP scores are then weighted by inverse Euclidean distance from identified income coldspots. Correlation analyses of facility and chemical type examine the strength of the relationship between neighborhood income and the toxicity of airborne facility releases.

Results

The preliminary results of aggregated emissions indicate a positive relationship among low-income and high emissions. However, aggregate results likely mask chemical and facility specific patterns. Analysis of different chemicals and facility types are not expected to reveal the same relationship.

Conclusions

The findings improve the public's awareness of local sources of air pollution and assist in identifying patterns of disproportionate exposure to air pollution emission for practitioners, public health and environmental inequality researchers.

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