

Abstract

Spatial modeling of lead water contamination risk in local communities of pittsburgh, PA

Raanan Gurewitsch, BPhil¹, **Meghana Aruru, Ph.D., MBA, B.Pharm**², Pierre Goovaerts, Ph.D.³ and Saumyadipta Pyne, Ph.D.¹

(1)University of Pittsburgh, Pittsburgh, PA, (2)Washington DC, DC, (3)Biomedware Inc., Ann Arbor, MI

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Background: In American cities with aging water infrastructure, the sources of lead water contamination and associated risk factors can vary by household, thus complicating interventions and remediation efforts. Using local spatial modeling of cities with long history of industrialization such as Pittsburgh, PA, we could obtain unique insights into infrastructural complexity that underlie the challenge of accurate determination of lead water contamination.

Methods: In this study, we performed an exploratory data analysis of lead water contamination in Pittsburgh, PA, focusing on two primary data sources. We used geographically weighted regression framework to estimate both the prevalence of lead water service lines and the level of lead contamination at the census block group level, and mapped the local contributions from each risk factor for visual comparison.

Results: Risk measures in terms of prevalence of lead water service lines and lead contamination of water were found to be greater than 50% in over 92% of the census block-groups, affecting areas across the socioeconomic spectrum. In fact, our spatial models found the average housing age and vacancy rate of an area to have, in general, greater impact on its lead water contamination risk than general local deprivation measures.

Conclusion: This analysis provides insight into the variable spatial relationships that often exist between lead water contamination and its risk factors in the presence of infrastructural complexity, which could further our understanding of local health policy as well as nuances of water quality optimization, monitoring and risk communication in many parts of the United States.

Environmental health sciences Public health or related public policy Public health or related research

