



Geospatial Technologies for Children's Environmental Health Research

Policy makers, public health officials, child advocates, and others currently lack the appropriate framework and infrastructure to evaluate children's social and environmental exposure potential across a broad range of risks. Unable to identify where the highest risks occur and how various risks act in the aggregate, children's environmental health programs remain mitigative instead of preventive. Current programs and supporting databases are not designed to make the connections among contributing factors nor provide an integrated approach to children's environmental health. As a result, programs have proven costly and insufficient and have resulted in economic and racial disparities among populations. In addition, most resources for improving children's health are directed toward individual problems, missing opportunities for more cost-effective combined interventions.

The social and environmental factors that complicate children's risk can also help predict threats to children's health. By integrating multifactorial components into a comprehensive model, Geographic Information Systems (GIS) technology and spatial analysis offer innovative strategies for improving children's environmental health. The key to spatial analysis is that most data contain a geographic component that can be tied to a specific location, such as a state, county, zip code, Census block, or single address, as well as more ecologically oriented locations, such as watershed, airshed, floodplain, or riparian zone. Geographic analysis enables users to explore and overlay data by location, revealing hidden trends that are not readily apparent in traditional spreadsheet and statistical packages. Additionally, GIS contains advanced capabilities to generate clear and accessible maps and data reports that can serve as powerful tools for health management, community outreach, and policy design.

Our ongoing work on childhood lead exposure provides a good example of how GIS-based spatial analysis approaches can improve health outcomes for children. This work, which is funded by the U.S. Centers for Disease Control and Prevention (CDC), assesses whether the application of sophisticated information management systems and spatial analysis can improve the capture rate of children targeted for lead screening and facilitate preventive intervention before lead poisoning occurs. By combining GIS technology with advanced statistical analysis, we developed a predictive risk model that spatially locates important risk factors, weights them according to their statistically-determined importance, and creates modeled exposure zones, thus highlighting critical areas for targeted intervention.

In addition to our lead model, CEHI supports several other spatially-based projects on children's environmental health including research on asthma and allergens, pesticides, and toxic releases. These projects are funded by the Department of Housing and Urban Development, the Robert Wood Johnson Foundation, the National Institute of Environmental Health Sciences, the Wallace Genetic Foundation, and the Department of Energy. CEHI staff also work in collaboration with the State of North Carolina's Department of Health and Human Services on a project that seeks to introduce and incorporate GIS technology into local public health departments. Throughout its projects, CEHI is committed to issues of environmental justice and children's environmental health. All CEHI projects include Spanish/English bilingual community outreach and dissemination efforts.