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## New York City Focuses on Lead Poisoning Prevention With GIS

In New York City, maps are altering the political debate over the need to solve a long-standing, but preventable, environmental health problem: lead poisoning in children.

More than 40 years after the use of lead paint in homes was banned in New York City, data from the city's health department shows that thousands of children ages six months to six years are still identified each year with lead in their blood at levels above the federal safety threshold. According to the United States Environmental Protection Agency (EPA), lead is a highly toxic metal that affects children's health by undermining normal cognitive development, behavior, and growth. In New York City, lead poisoning primarily affects black, Hispanic, and Asian children. On the average, each year between 1995 and 2000, 94 percent of lead-poisoned children were nonwhite.

The city had passed a strict lead poisoning prevention law in 1981, but it was overhauled in 1999 after a bitter legislative fight. "It was a classic political battle, with a powerful special interest on one side and ordinary citizens on the other," says Andrew Goldberg, staff attorney for the New York Public Interest Research Group (NYPIRG), one of the main nongovernmental organizations fighting lead hazards.

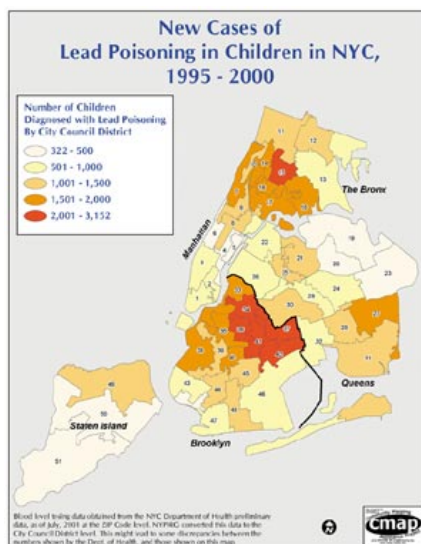
At the time, NYPIRG had hoped to use maps to help legislators understand the impact of the issue. But the only publicly available data on lead poisoning was aggregated by health districts. Goldberg notes, "The problem with health districts is that they don't correlate with any widely recognizable geographic unit such as legislative districts or postal zones."

NYPIRG earlier had sued the city to obtain computerized data of the geographic distribution of lead poisoning cases, but refusals by city officials prevented any meaningful maps from being used during the debate over the 1999 law.

### Fast Forward

Finally, in 2002, a judge ruled on NYPIRG's behalf, providing data that identified the number of new children poisoned annually from 1995 to 2000, aggregated by ZIP Code. Working with the Community Mapping Assistance Project (CMAP), the NYPIRG used this data to prepare a report calling on the City Council to renew its attention on lead poisoning.

Instead of analyzing the ZIP Code breakdowns, the NYPIRG used Esri's ArcGIS Desktop software to recalculate the statistics by City Council district. Although ZIP Code maps



would show finer-grained spatial patterns (there are more than 300 ZIP Codes citywide versus 51 City Council districts), the advocates hoped that City Council members would pay closer attention to maps comparing lead poisoning rates on a district basis.

In New York City, ZIP Codes are neither coterminous with City Council boundaries nor are they contained within City Council districts. Therefore, before any maps could be made, the group needed to allocate the number of children poisoned in each ZIP Code to the corresponding, overlapping City Council districts.

"GIS was essential for this project," emphasizes CMAP analyst Meg McCarron, "not only to make the maps but also to convert the data to the relevant geographic basis."

The CMAP team assumed that the distribution of childhood lead poisoning cases matched the general population under six years of age, in order to use a population-based method rather than simply comparing the geographic overlap between ZIP Codes and City Council districts. The team used the smallest type of polygon for which population data is assigned--blocks provided by the United States Census Bureau--to represent population patterns spatially within ZIP Codes.

The "spatial join" function in ArcGIS Desktop assigned blocks to ZIP Codes, and the software's field calculator determined the percentage of each ZIP Code's population under six years of age represented by each block within the ZIP Code (each block's numerator was 2000 Census data for children under six). A new field created in the block shapefile was populated by multiplying the ZIP Code lead poisoning data by each block percentage to "spread" this data across each ZIP Code. Separately, the spatial join function assigned City Council districts to census blocks. The lead poisoning data apportioned by block was then aggregated by City Council district.

CMAP prepared a series of maps using ArcGIS Desktop showing the district-level lead poisoning patterns. The maps were exported as images for reproduction in NYPIRG's report and posted on the group's Web site ([www.nonprofitmaps.org](http://www.nonprofitmaps.org)). CMAP used a Hewlett-Packard 2500 CP plotter to print poster maps for a news conference on the report. Hardware and software were provided by the Conservation Technology Support Program and Esri's Conservation Program.

## Maps Make All the Difference

The maps revealed an important, though not surprising, pattern. Districts with more children poisoned by lead tended to be represented by City Council members of color. In fact, two-thirds of children with a blood lead level above the threshold (10 ug/dL of blood) resided in just 23 of the 51 districts--21 of which are represented by members of the City Council's black, Hispanic, and Asian caucus. Activists always knew that lead poisoning predominantly affected children of color, but the last time the City Council voted on the issue, members of the minority caucus supported weak legislation favored by landlord interests.

This time, the reaction was very different. NYPIRG's report was released in June 2002, and its impact was powerful and immediate. The maps were reproduced in local and citywide newspapers including *The New York Times*. Within weeks of the report's release, the City Council's minority caucus held a special hearing on the issue. NYPIRG's maps were displayed prominently and referred to repeatedly during the hearing, helping provide the caucus members with a clear picture of the importance of the issue in their districts. At the hearing's end, the minority caucus adopted a resolution to make passage of strong legislation a top priority. The full City Council also scheduled hearings on the issue.

"Before the report was released, this was an uphill struggle," notes Manuel Castro, environmental justice coordinator for Make the Road by Walking, a community organization working with parents and kids affected by lead poisoning. "Now the maps have given us momentum to really push the issue forward."

## More to Do

The debate over solutions to New York City's lead poisoning crisis has been changed fundamentally by mapping the concentrated impact of lead poisoning in communities of color. Instead of an intangible policy discussion, carefully crafted maps have ensured that legislators cannot ignore that their constituents are being disproportionately impacted.

"Abstractions don't win legislative debates," Goldberg notes. "We needed to show the City Council that lead poisoning affected them directly, and the maps helped us achieve

that goal."

For more information, contact NYPIRG's Community Mapping Assistance Project, NYPIRG CMAP, 9 Murray Street, New York, New York 10007 (Web: [www.nonprofitmaps.org](http://www.nonprofitmaps.org), tel.: 212-349-6460, fax: 212-349-1366).