Using Technology in the Fight to End Childhood Lead Poisoning in St. Louis City
A Cooperative Project Funded Through the Centers for Disease Control and Prevention
Environmental Tracking Grant

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Collaborative Partners

Tulane Center for Applied Environmental Public Health
Missouri Department of Natural Resources
Missouri Department of Economic Development
City of St. Louis
Overview of Activities to End Childhood Lead Poisoning in St. Louis

- Relative Pocket of Need (RPoN)
- Demolition Study
- Historic Smelter Project
Relative Pockets Of Need
Relative Pockets of Need

In order to move beyond simple ranking procedures and develop more interpretable need models Missouri’s DHSS through the Environmental Tracking Team began work on a Relative Pocket of Need Formula and Methodology in the Summer of 2003.
Relative Pocket of Need?

– Relative
  • Information from multiple sources that exists on the same scale for comparability

– Pocket of Need
  • Region as defined by its requirement for assistance or outside resources

Relative Pocket of Need

Region whose requirements for assistance or outside resources are based on information that exists on a uniform scale allowing for enhanced interpretation and analysis
Relative Pocket of Need

• Relative Pocket of Need (RPoN) Methodology
  – Ranks (Orders) Areas in Relationship to One Another Based on Related Types of Need
    • Types of Need Identified for Lead
      – Social
        » Median Household Income
        » Median Housing Value
      – Rental
        » Number of Rentals
        » Median Cost of Rentals
      – Lead
        » Number of Houses Older than 1950
Relative Pocket of Need (for Pb)

Relative Pocket of Need (Lead) Main Equation

\[
\text{RPoN}_{\text{Pb}} = \frac{P}{\text{Area}} \cdot (F_1 - F_2)
\]

Relative Pocket of Need (Lead) Main Factor Equation

\[
F_n = \left( \left( \frac{M_S}{\sum M} \right) \cdot V_S \right) + \left( \left( \frac{M_R}{\sum M} \right) \cdot V_R \right) + \left( \left( \frac{M_{\text{Pb}}}{\sum M} \right) \cdot V_{\text{Pb}} \right)
\]

Relative Pocket of Need Sub-Factor Equation (\(F_1\) Main Factor)

\[
V_f = \left( \left( \frac{m_1}{\sum m} \right) \cdot e^{\left( \frac{x_{v_1} - \bar{x}_{v_1}}{SD_{v_1}} \right)} \right) + \ldots \left( \left( \frac{m_n}{\sum m} \right) \cdot e^{\left( \frac{x_{v_n} - \bar{x}_{v_n}}{SD_{v_n}} \right)} \right)
\]

Relative Pocket of Need Sub-Factor Equation (\(F_2\) Main Factor)

\[
V_f = \left( \left( \frac{m_1}{\sum m} \right) \cdot e^{-\left( \frac{x_{v_1} - \bar{x}_{v_1}}{SD_{v_1}} \right)} \right) + \ldots \left( \left( \frac{m_n}{\sum m} \right) \cdot e^{-\left( \frac{x_{v_n} - \bar{x}_{v_n}}{SD_{v_n}} \right)} \right)
\]
Missouri RPoN

- All Sub-Factors Equal Weighted
- Social, Rental, and Lead Sub-Factors
- Weighted by Population
- Controlled for Area
City of St. Louis RPoN

State-Wide Comparison

RPoN Values
- LOW
- MEDIUM
- HIGH
City of St. Louis RPoN

City-Wide Comparison

RPoN Values

- LOW
- MEDIUM
- HIGH
Demolition Study
How the Study Developed

The St. Louis City Demolition Study grew out of a concern by City detox crews that children near demolition sites were showing higher than normal rates of elevated blood lead levels.
Specific Aims of the Study

• Determine the number and geographic location of demolition activities in the City from Jan. 1, 2000 – Dec. 31, 2002

• To identify children screened for blood lead in the City during the same time period

• To determine if elevated lead levels cluster around demolition sites in the City

• To determine if there is a relationship between children’s blood lead levels and the distance from their residence to a demo site

• To determine if demolition and containment procedures in the City are effective to protect children from demo-related exposure
Distribution Pattern of All Elevated Children in St. Louis in 2002

Children < 72 Months of Age with Blood Lead Levels 10 (µg/dl) or Greater 2002
Density of Children < 72 months of Age with Blood Lead Levels 10 (µg/dl) or Greater - 2002
3D Representation of All Elevated Children by Block Groups in St. Louis in 2002

Children < 72 Months of Age with Blood Lead Levels 10 (µg/dl) or Greater
By Block Group
2002

Count

- 0
- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 25
Blood Lead Cases 10 (µg/dl) or Greater Controlled by Population < 72 Months of Age 2002
<table>
<thead>
<tr>
<th>TOTAL CASES PER 100 TESTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
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<tr>
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</tr>
<tr>
<td>10.01 - 20.00</td>
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<tr>
<td>20.01 - 30.00</td>
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<tr>
<td>30.01 - 40.00</td>
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<tr>
<td>40.01 - 50.00</td>
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</tr>
</tbody>
</table>
ST. LOUIS CITY BLOOD LEAD SCREENINGS BY BLOCK GROUP: 2002

Spatial Density of EBLs Controlled by the Total Number Tested.

- LOW
- MEDIUM
- HIGH
Evaluation of RPoN Effectiveness
2002 Demolitions in St. Louis City
Demolition Density
2002
SPATIAL ANALYSIS
2002 – Comparing Demolition Areas to Greatest Density of EBL

Greatest Density of Demolitions Compared to Greatest Density Of Children < 72 Months of Age with Blood Lead Levels 10 (µg/dl) or Greater - 2002

Areas with greatest density association
Historic Smelter Project
IDENTIFIED HISTORIC SMELTER LOCATIONS IN ST. LOUIS CITY
Elevated Blood Lead Levels in 2002 And Historic Smelter Locations In St. Louis City

Spatial Density of Children <72 Months of Age with Blood Lead Levels 10 (µg/dl) or Greater
Shanfeld Brothers Metal Company
Where do we go from here?

- Continue to build additional partnerships
- Incorporation of historic land use data
- Incorporation of meteorological data
- Dispersion Modeling
- Real-time air monitoring at a demo project
The End

For further information on anything seen in this presentation please contact:

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