Blood Lead in Young Children: Cumulative Impacts

Results of Analysis Conducted by the California Department of Public Health

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DTSC Independent Review Panel Meeting

May 12, 2016
Cumulative Impacts:
Many Sources of Lead Add Up
Blood Lead Level (BLL) Analysis

Background:

• CA law: All children in public programs must be tested at ages 1 & 2
• All data electronically reported to CDPH
• ~700,000 BLL reports statewide annually
• 2012 - most recent year with quality-checked data
• BLL reported as micrograms of lead per deciliter of blood (µg/dL)
• Reporting threshold varies by lab (3-5 µg/dL or below)
• Data are medical-confidential
Elevated BLLs in Exide Area

LA County does an investigation when a child has:
  One BLL $\geq 20 \, \mu g/dL$
  Two BLLs $\geq 15 \, \mu g/dL$

Number of children in the 8 zip code area around Exide with BLLs that triggered a health investigation by LA County between January 1, 2012 – October 1, 2015:

9 children
- 6 had pica
- 6 had deteriorated lead paint
- 2 had soil $>400$ ppm (both with lead paint)
- 3 more had soil $>80$ ppm (2 with lead paint)
- 3 had other sources (clay pots, Mexican candies, take home exposures)
Historical Blood Lead Trends

Blood lead levels are much lower today than they were decades ago...

- ...but we now know more about low dose levels of lead:
  - Historically known to be toxic at high blood levels over 40 µg/dL (anemia, abdominal cramps, seizures, encephalopathy, kidney damage)
  - Now recognized as a subtle neurodevelopmental toxicant at levels below 10 µg/dL
CDPH Analysis of Children’s BLLs  
April 8, 2016

Methods

- 2012 data
- Children < age 6
- 11,702 children in the 8 zip codes (~100 census tracts) around Exide
- Percent of children with BLL ≥ 4.5 vs. < 4.5 µg/dL

- Evaluated:
  - Distance
  - Direction
  - Child’s age
  - Child’s sex
  - Age of housing
Percentage of Children under age 6 with Blood Lead Levels (BLLs) ≥ 4.5 μg/dL in 2012

Data Supplied by the Childhood Lead Poisoning Prevention Branch California Department of Public Health

Distance Effect (Univariate)

Percent of Children with BLL ≥4.5

- LA Background
- 1~4 miles
- <1 mile

Percentage with BLLs ≥ 4.5 µg/dL
Age of Housing (Univariate)

Percent of Children with BLL ≥ 4.5

<20% Pre-1940

>40% Pre-1940

Percentage with BLLs ≥ 4.5 µg/dL
Distance and Age of Housing (Multivariate)

Two approaches:

1) Census tract median age of housing (11,705 children)
   - 13% increase in probability of a child having a BLL ≥ 4.5 µg/dL with each mile closer to Exide.
   - Distance not statistically significant (p=0.10)
   - Median age of housing highly significant (p<0.01)

2) Sub-study with actual age of housing (560 children):
   - 10% increase in probability of a child having a BLL ≥ 4.5 µg/dL with each mile closer to Exide.
   - Distance not statistically significant (p=0.36)
   - Actual year of construction highly significant (p<0.01)
Distance, Housing, Direction, Age, Sex (Multivariate)

Census tract median age of housing (11,425 children):

- 9% increase in probability of a child having a BLL $\geq 4.5$ µg/dL with each mile closer to Exide.
- Distance not statistically significant ($p=.29$)
- Median year built borderline significant ($p=0.06$)
- Northern area statistically significant ($p=0.04$)
- Younger age highly significant ($p=0.01$)

Conclusion: Lead exposure comes from many sources, and housing is very important.
Potential Actions for DTSC

• When families self-identify with higher BLLs, prioritize those homes for testing and clean-up (if soil lead is elevated).
• Coordinate work to increase resources available for lead-based paint hazard controls.
• Work with university to convene group to identify better ways to report, track, and reduce BLLs in LA:
  – Government (local and state)
  – Community and NGOs
  – Clinicians and scientific experts