

# LEAD POISONING IN LANCASTER COUNTY

Jeffrey R. Martin, M.D. FAAFP

Director Lancaster Lead Coalition

Emily Eddowes, Project Manager,  
Partnership for Public Health

- ▶ Understand the negative affects of lead poisoning
- ▶ Present the current situation in Lancaster County
- ▶ Ongoing advocacy and solutions to problem

## OBJECTIVES

# WHAT IS LEAD?

- 6500 BC. - Lead discovered in Turkey, first mine.
- 500 BC-300 AD.- Roman lead smelting produces dangerous emissions.
- 100 BC. - Greek physicians give clinical description of lead poisoning.

**"Lead makes the mind give way."**

***Dioscorides - 2nd BC***

"If we were to judge of the interest excited by any medical subject by the number of writings to which it has given birth, we could not but regard the poisoning by lead as the most important to be known of all those that have been treated of, up to the present time."

*Orfila, 1817*

“Lead Poisoning remains the most common and societal devastating environmental disease of young children.”

**PUBLIC HEALTH SERVICE - L. SULLIVAN, 1991**



# WHAT IS LEAD?

- ▶ Soft blue-gray metal
- ▶ Found in the natural environment
- ▶ Was added to paint and gasoline in past (up to 1978)
- ▶ Still used in consumer products
- ▶ Mexican candy, foot powder, jewelry, stained-glass, pottery etc.



*the natural ore galena*

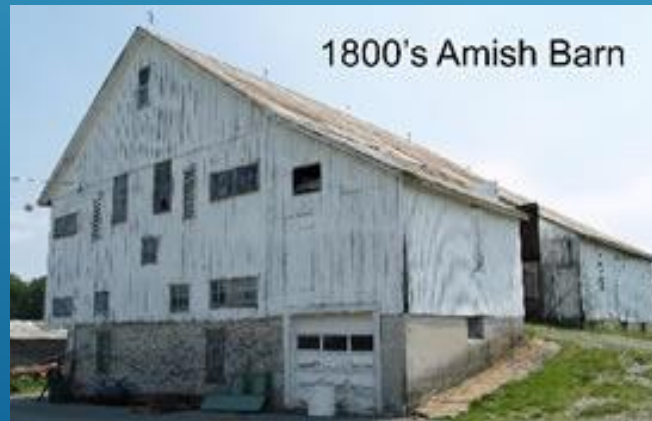
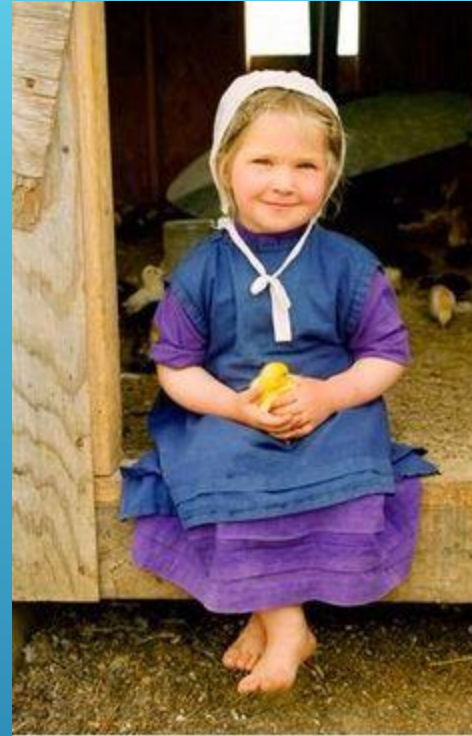


# HOW ARE PEOPLE EXPOSED TO LEAD?

- ▶ Dust, paint, and/or soil
- ▶ Contaminated food, water, or alcohol
- ▶ Some imported home remedies and cosmetics
- ▶ Endogenous exposure problem with increased bone turnover







AMISH "BOBBIES"



Nebraska or “old school”  
Amish in Belleville, PA

### Pennsylvania





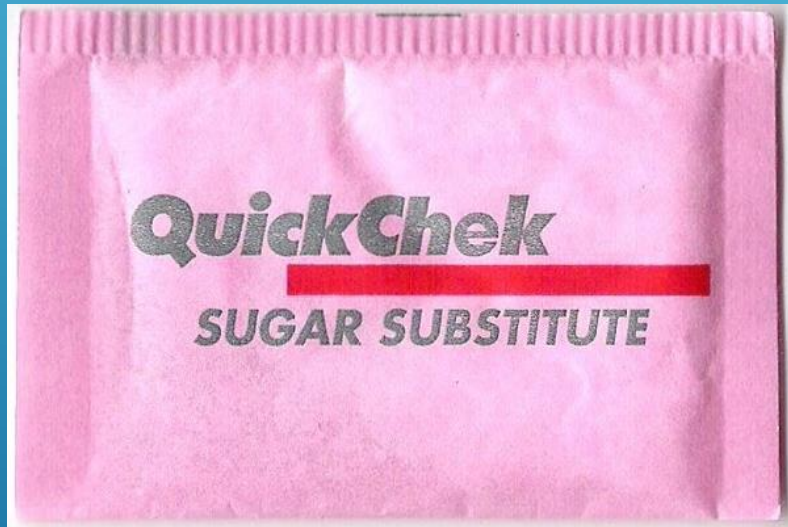
# ORAL ACTIVITY IS RISK FOR LEAD EXPOSURE



*Source; Lynn Ringenberg, MD and PSR Florida*

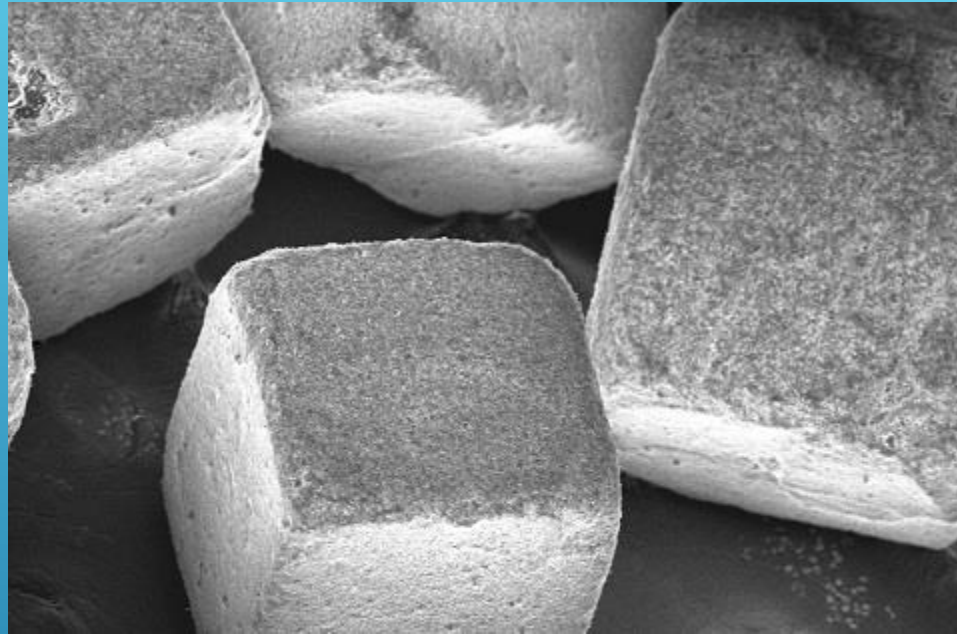


# HOW MUCH IS TOO MUCH?



- One packet of sugar substitute is 1gram.
- Current level of concern is 5mcg/dl.
- A microgram is one millionth of a gram.
- A deciliter is one tenth of a liter
- The average adult has 4-5 liters of blood. The average child 1-2 liters.
- So 50 millionth of a gram is enough to raise a child's blood lead level to 5mcg/dl.
- **There are 20,000 “doses” of potential lead poisoning in one packet of sugar substitute.**

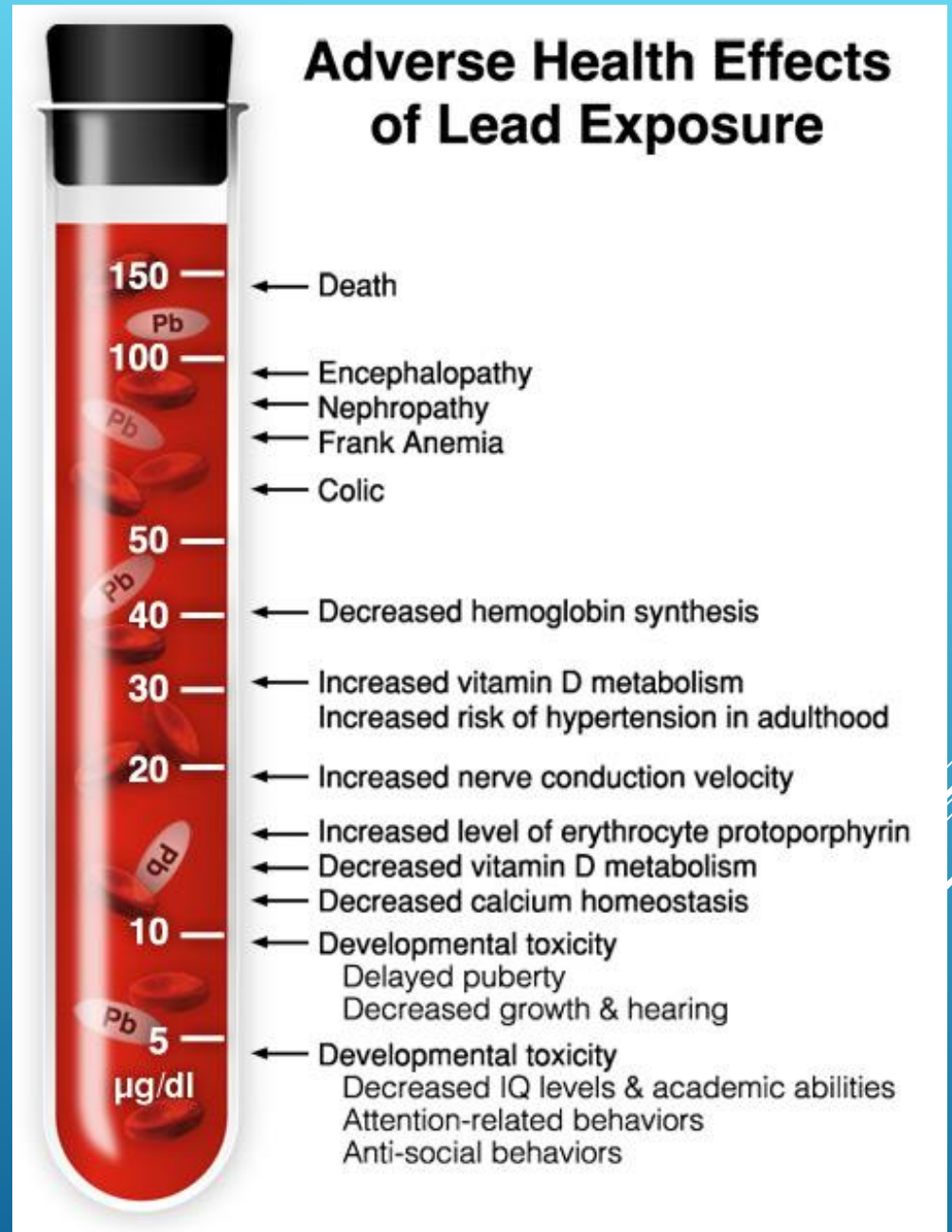




HOW MUCH IS 50  
MICROGRAMS?

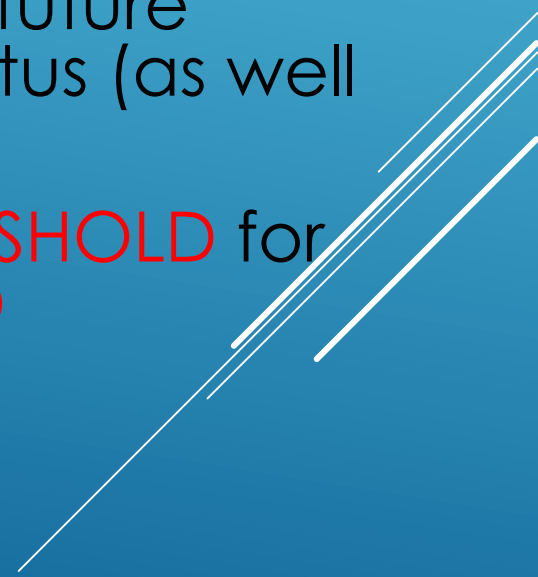


# EFFECTS OF LEAD

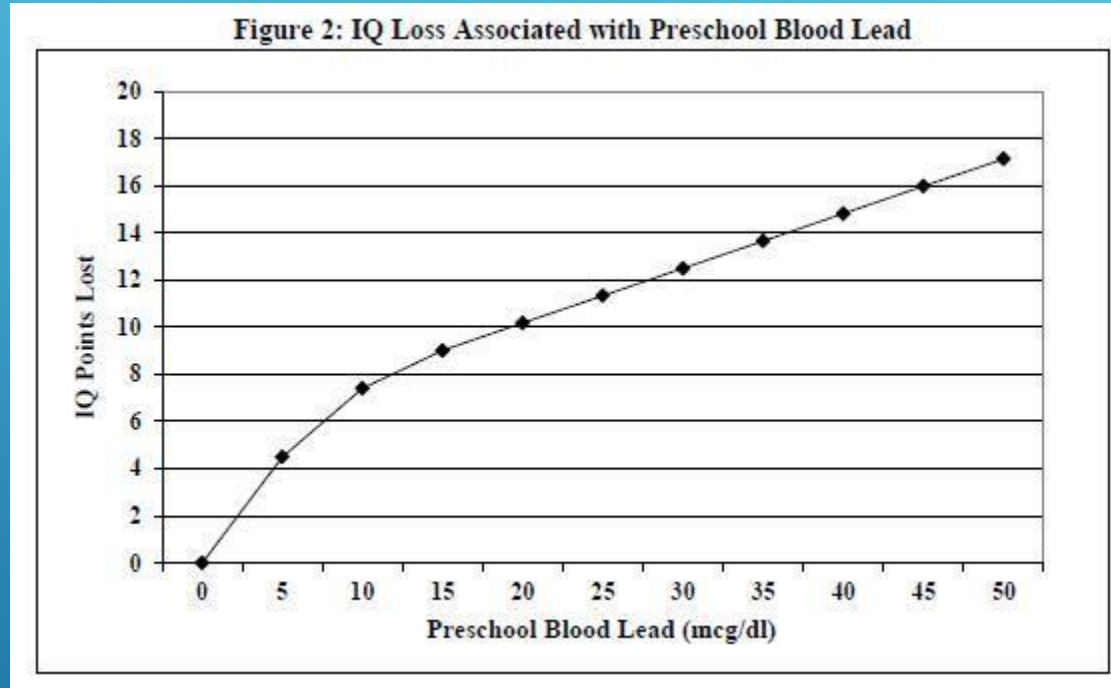




# CHILDREN AND LEAD EXPOSURE- OVERVIEW

- ▶ Chronic, low-level exposure can lead to subtle neurodevelopmental effects
  - ▶ Sometimes not recognized until older grades requiring higher-level cognitive functions
  - ▶ These can impact on children's future education and employment status (as well as lead to societal costs)
  - ▶ Newer studies indicate **NO THRESHOLD** for effects: **NO LEAD IS GOOD LEAD**
- 
- A decorative graphic consisting of several parallel white lines of varying lengths and orientations, located in the bottom right corner of the slide.

# LEAD AND IQ...NO LEVEL IS SAFE



Low-Level Environmental Lead Exposure and Children's Intellectual Function: An International Pooled Analysis.  
Bruce P. Lanphear; et al., Environ Health Perspect. 2005;113(7):894-899.

# STUDIES OF ADVERSE EFFECTS OF LEAD EXPOSURE

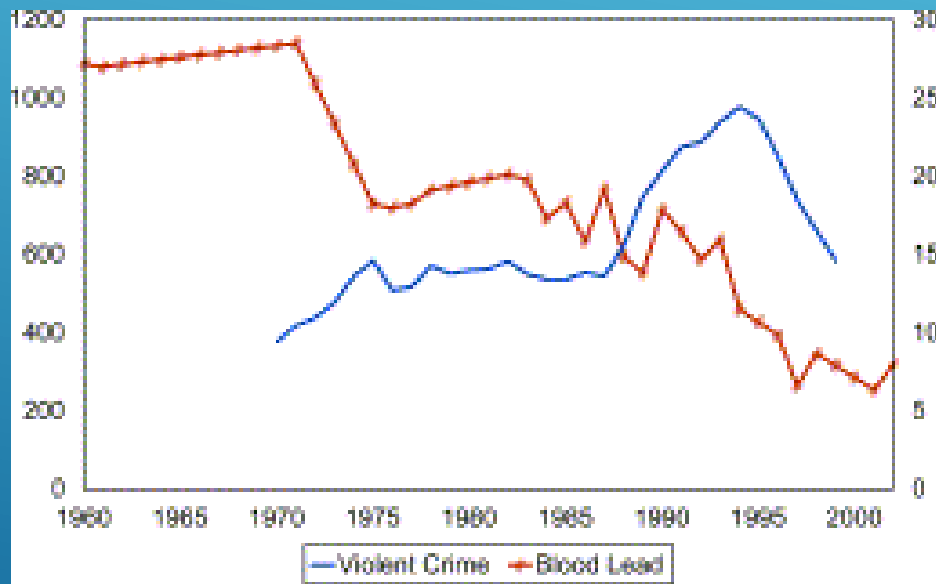
- ▶ **Inverse relationship** between indices of **lead exposure and IQ (cognition)**
- About 4-8 points as BLL increases to 10  $\mu\text{g}/\text{dL}$  and 1-5 points as BLL reaches 20  $\mu\text{g}/\text{dL}$
- ▶ Decrease in proficiency in **basic academic skills** (math, reading), **decreased school achievement** and **poor organizational skills**
- ▶ Association with **attention, learning, behavioral** (distractibility and hyperactivity) **problems**
- (REF: Lidsky and Schneider, 2006; Bellinger 2004; AAP 2005; Lanphear et al, 2005; Jusko et al, 2008; Canfield, 2003; CDC 2005; Binns , 2007)

# New Findings on Lead and Educational Attainment

Blood Lead Levels	Educational Impact	Size of Study	Location of Study
≤ 3 µg/dL	Decreased end of grade test scores	More than 57,000 children	North Carolina (Miranda et al. 2009) <sup>1</sup>
4 µg/dL at 3 years of age	Increased likelihood learning disabled classification in elementary school	More than 57,000 children	North Carolina (Miranda et al. 2009) <sup>1</sup>
	Poorer performance on tests	35,000 children	Connecticut (Miranda et al. 2011)
5 µg/dL	30% more likely to fail third grade reading and math tests	More than 48,000 children	Chicago (Evens et al. unpublished data)
	More likely to be non-proficient in math, science, and reading	21,000 children	Detroit (Zhang et al. 2013)
5-9 µg/dL	Scored 4.5 points lower on reading readiness tests	3,406 children	Rhode Island (McLaine et al. 2013)
≥10 µg/dL	Scored 10.1 points lower on reading readiness tests	3,406 children	Rhode Island (McLaine et al. 2013)
10 and 19 µg/dL	Significantly lower academic performance test scores in 4th grade	More than 3,000 children	Milwaukee (Amato et al. 2012)
≥ 25 µg/dL	\$0.5 million in excess annual special education and juvenile justice costs	279 children	Mahoning County, Ohio (Stefanak et al. 2005)

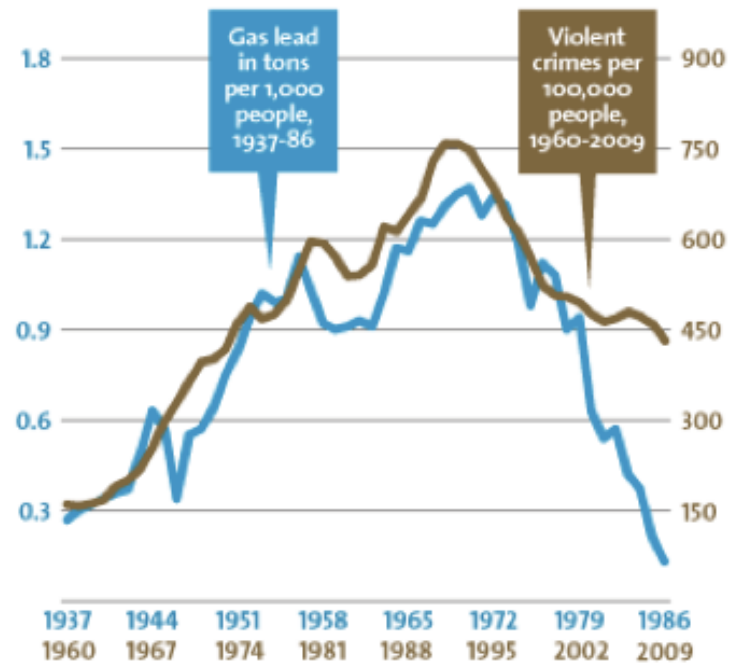
Source: Educational Services for Children Affected by Lead Expert Panel. Educational interventions for children affected by lead. Atlanta: U.S. Department of Health and Human Services; 2015.

# SOCIETY PAYS THE PRICE



## THE PB EFFECT

*What happens when you expose a generation of kids to high lead levels? Crime and teen pregnancy data two decades later tell a startling story.*



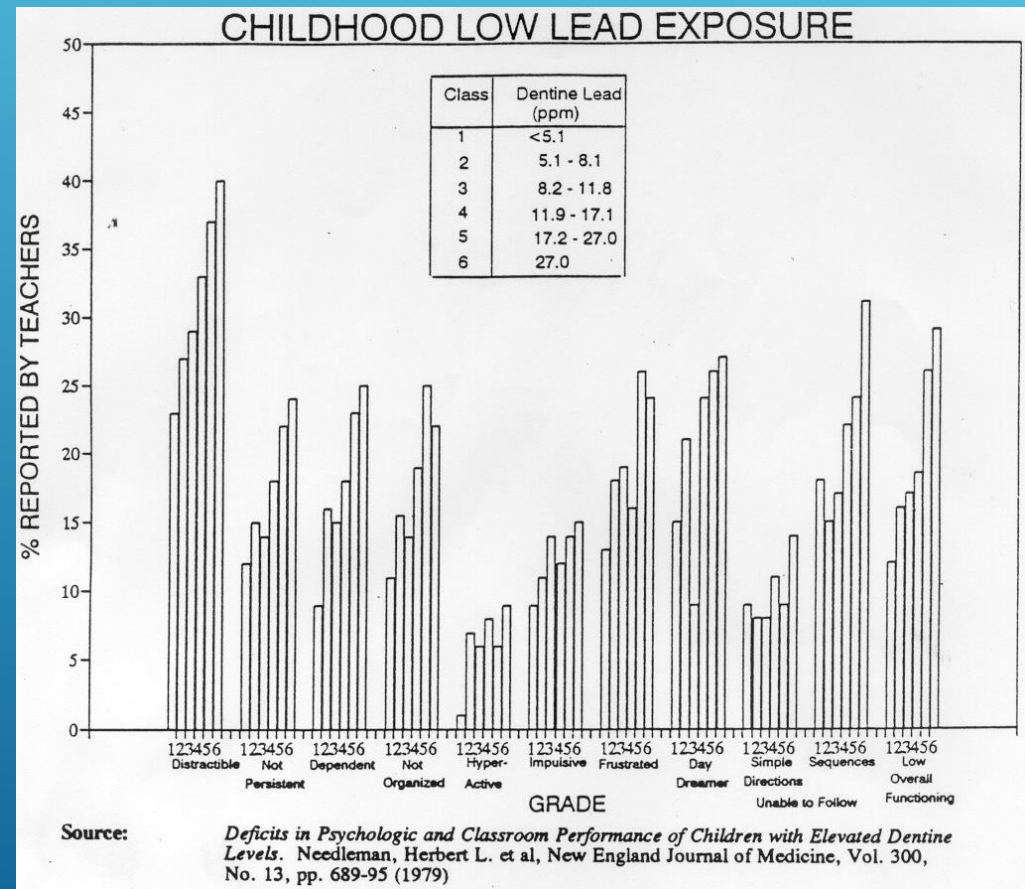
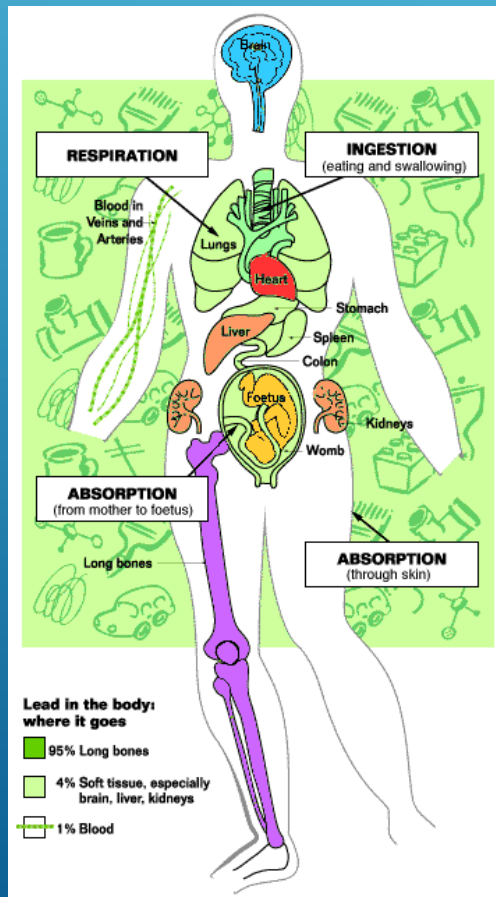
Sources: Rick Nevin,  
USGS, DOJ

Mother Jones



# LEAD AND JUVENILE DELINQUENCY

**Analysis: Is Lead Exposure the Secret to the Rapid Rise and Fantastic Fall of the Juvenile Crime Rate?**



# POPULATION HEALTH EFFECTS

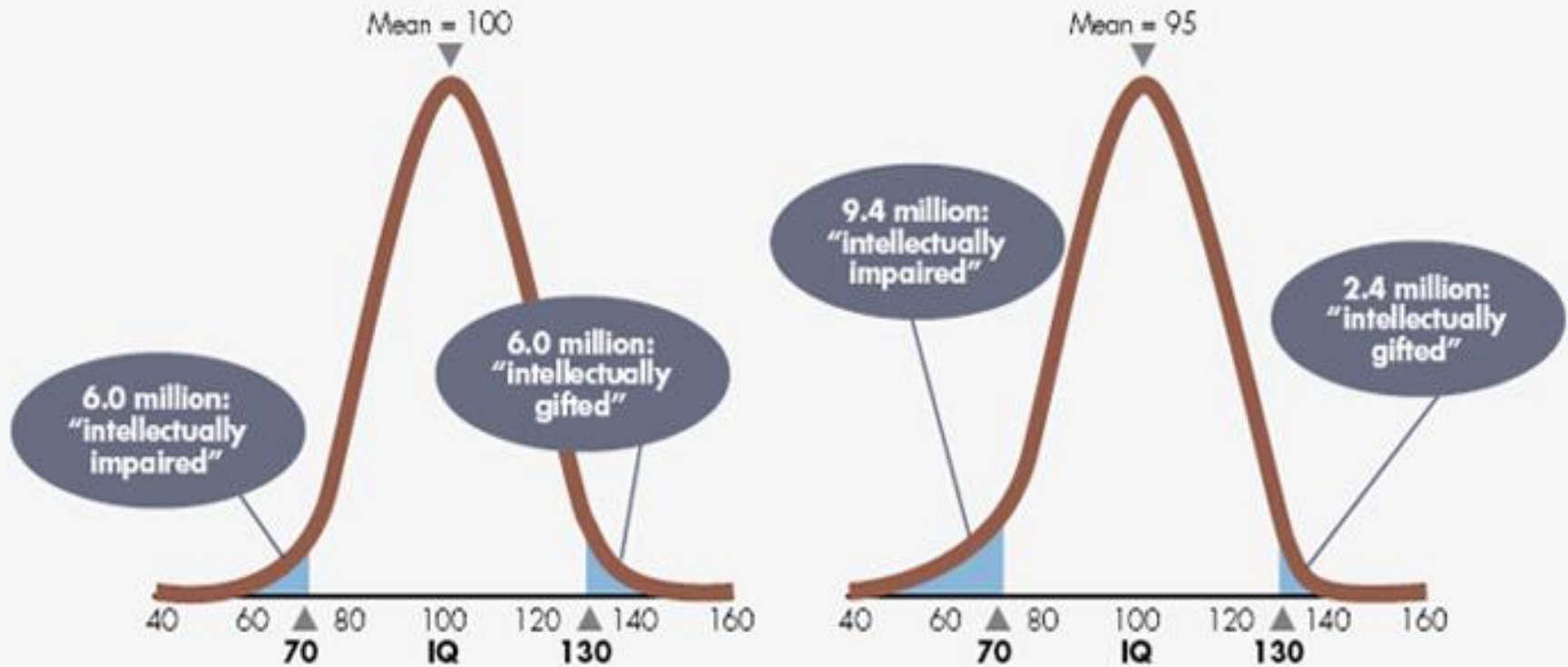
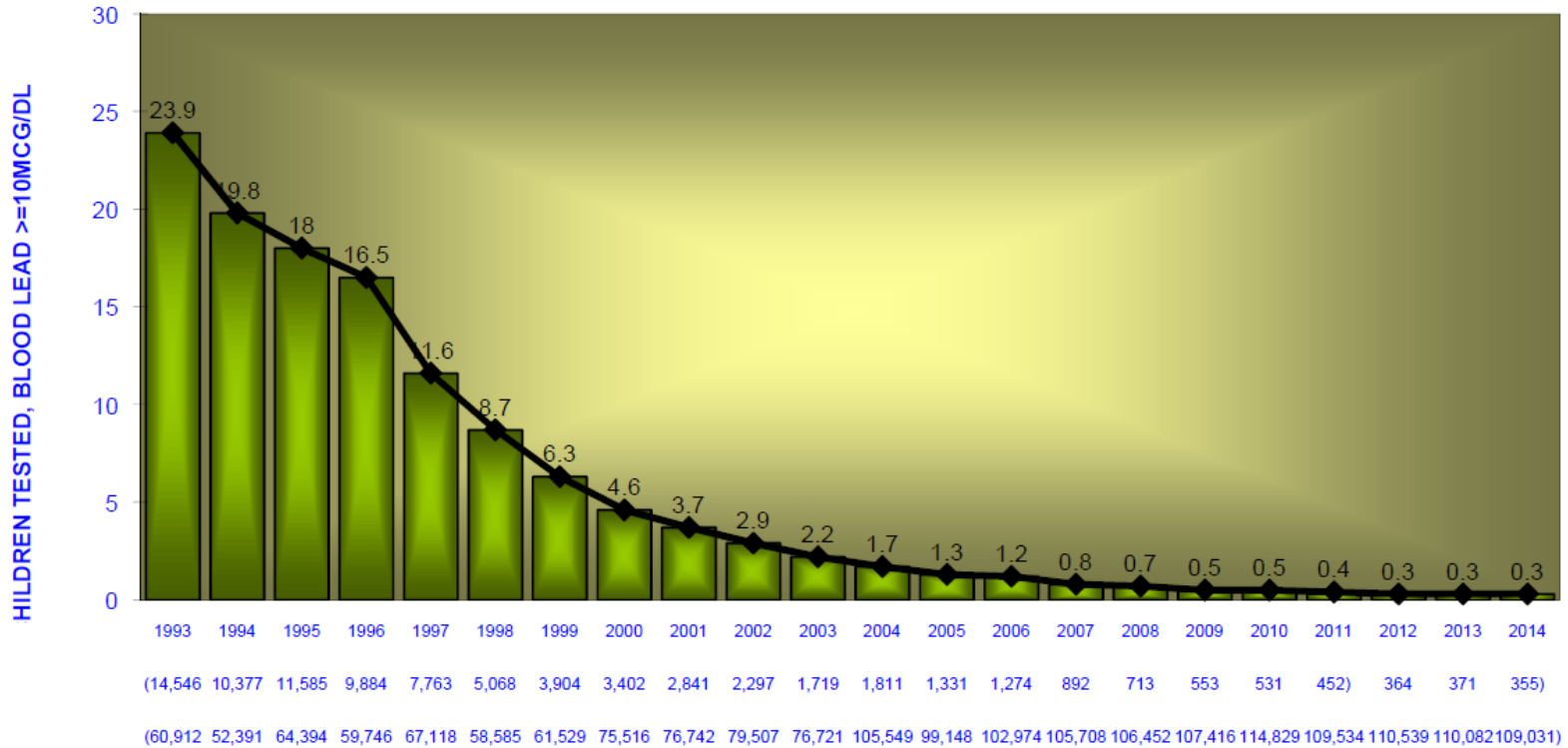


Figure 6: Small Individual Effects Can Have Significant Population Effects!

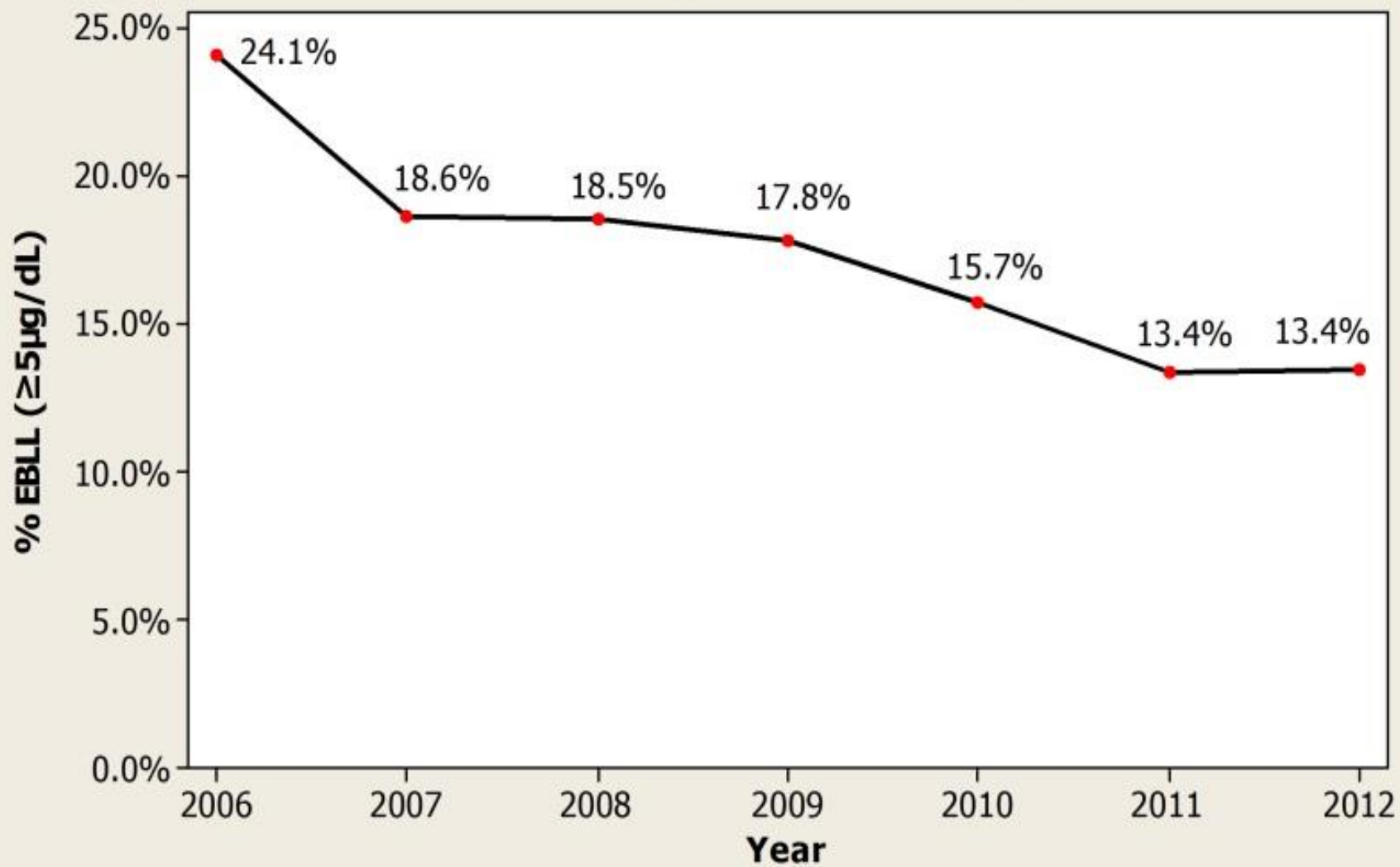
MARYLAND DEPARTMENT OF THE ENVIRONMENT  
CHILDHOOD BLOOD LEAD SURVEILLANCE  
STATEWIDE 1993-2014



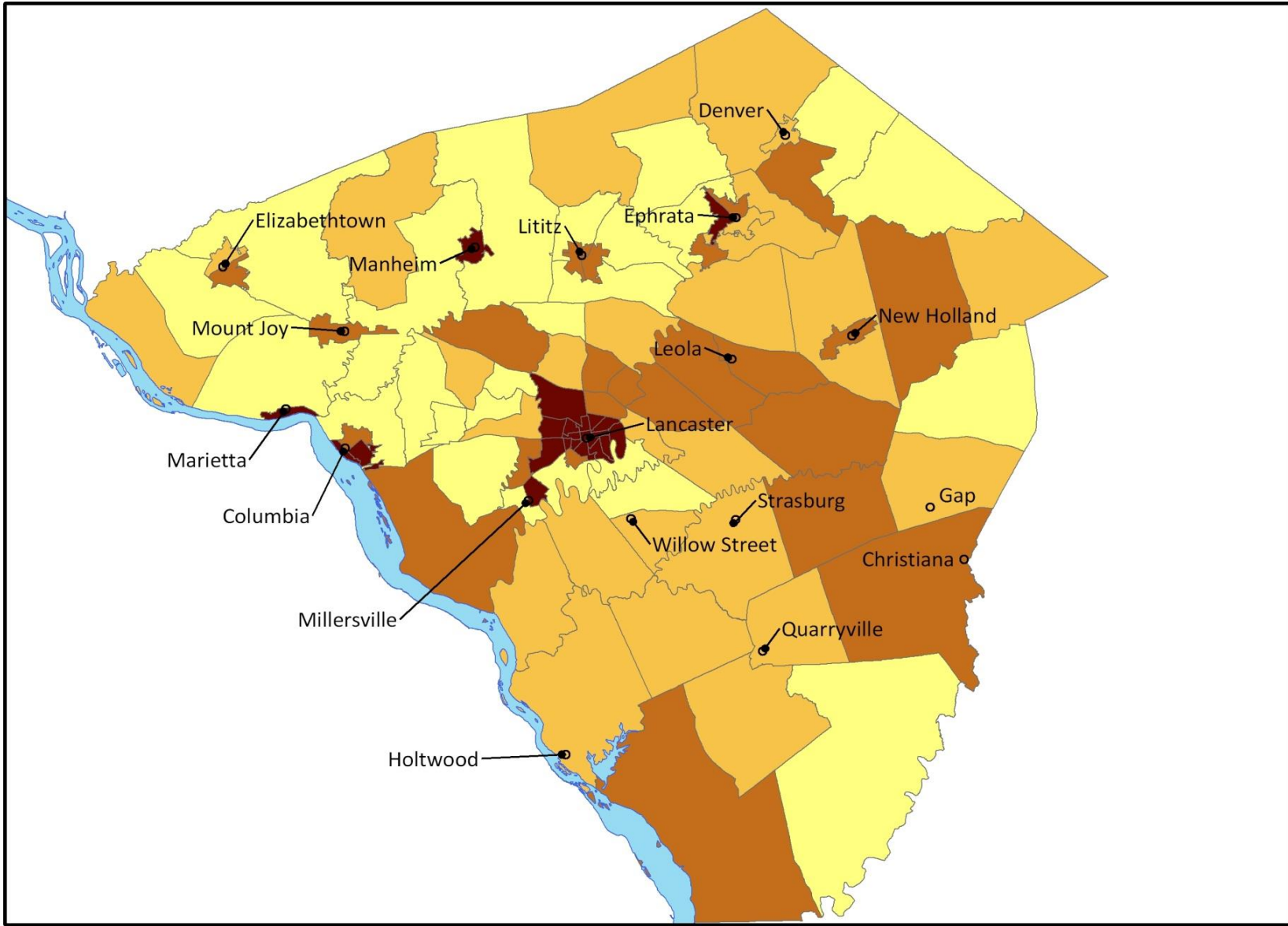
CALENDAR YEAR  
(Number of Children with BLL  $\geq$  10mcg/dl)  
(Number of Children Tested)



## Lancaster County EBLL Rate by Year



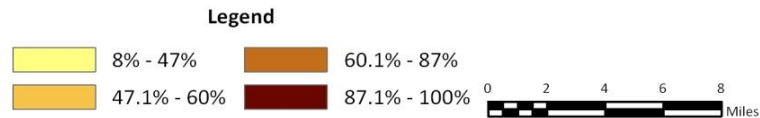
# Lancaster County Census Tracts Percentage of Residential Structures Constructed Prior to 1978



## Census Tracts: Quartiles

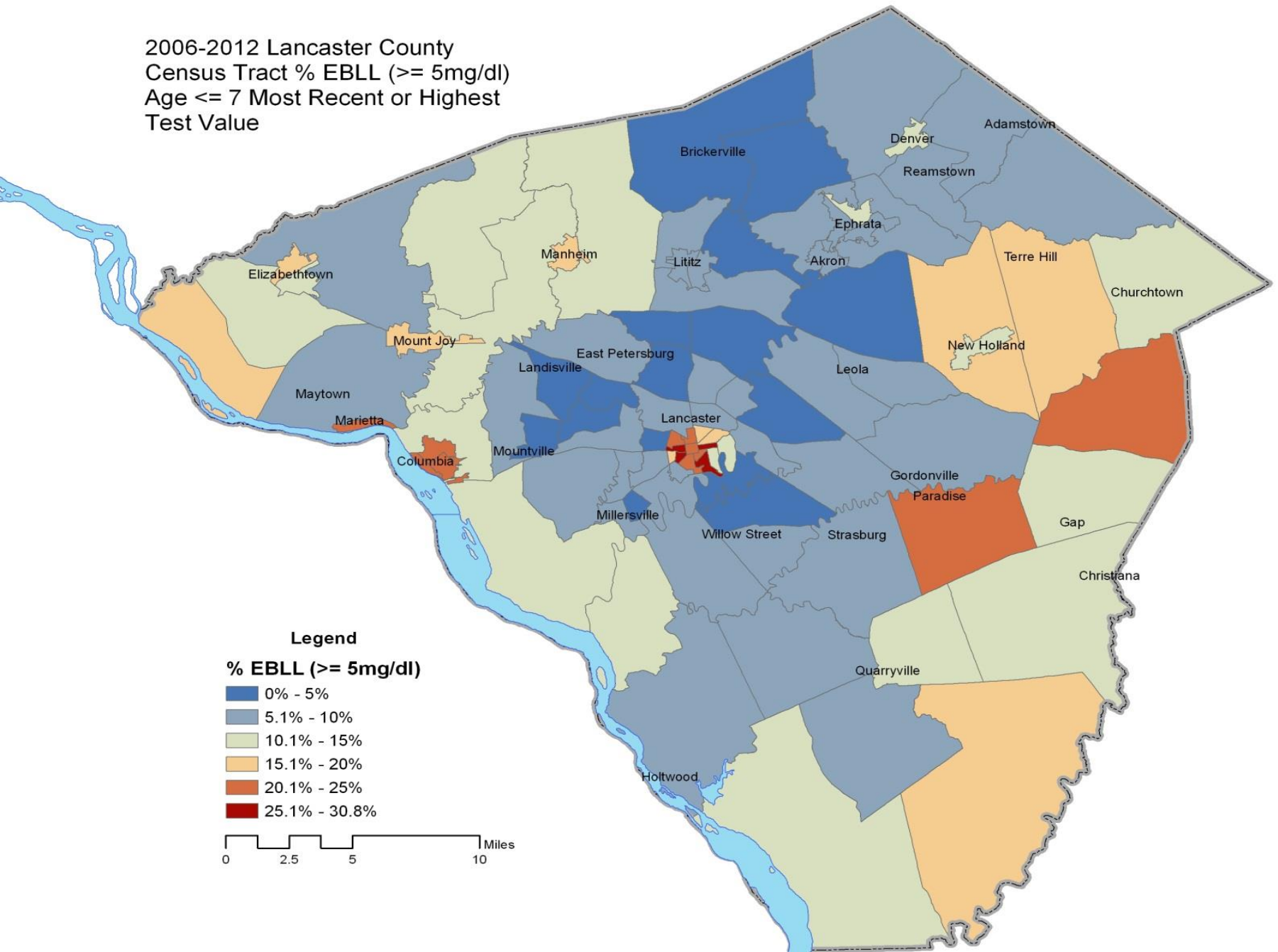
Parcel data from Lancaster County GIS and Assessment Office.

Map created by Lancaster General Research Institute: February 18, 2013.





2006-2012 Lancaster County  
 Census Tract % EBLL ( $\geq 5\text{mg/dl}$ )  
 Age  $\leq 7$  Most Recent or Highest  
 Test Value



**Legend**

**% EBLL ( $\geq 5\text{mg/dl}$ )**

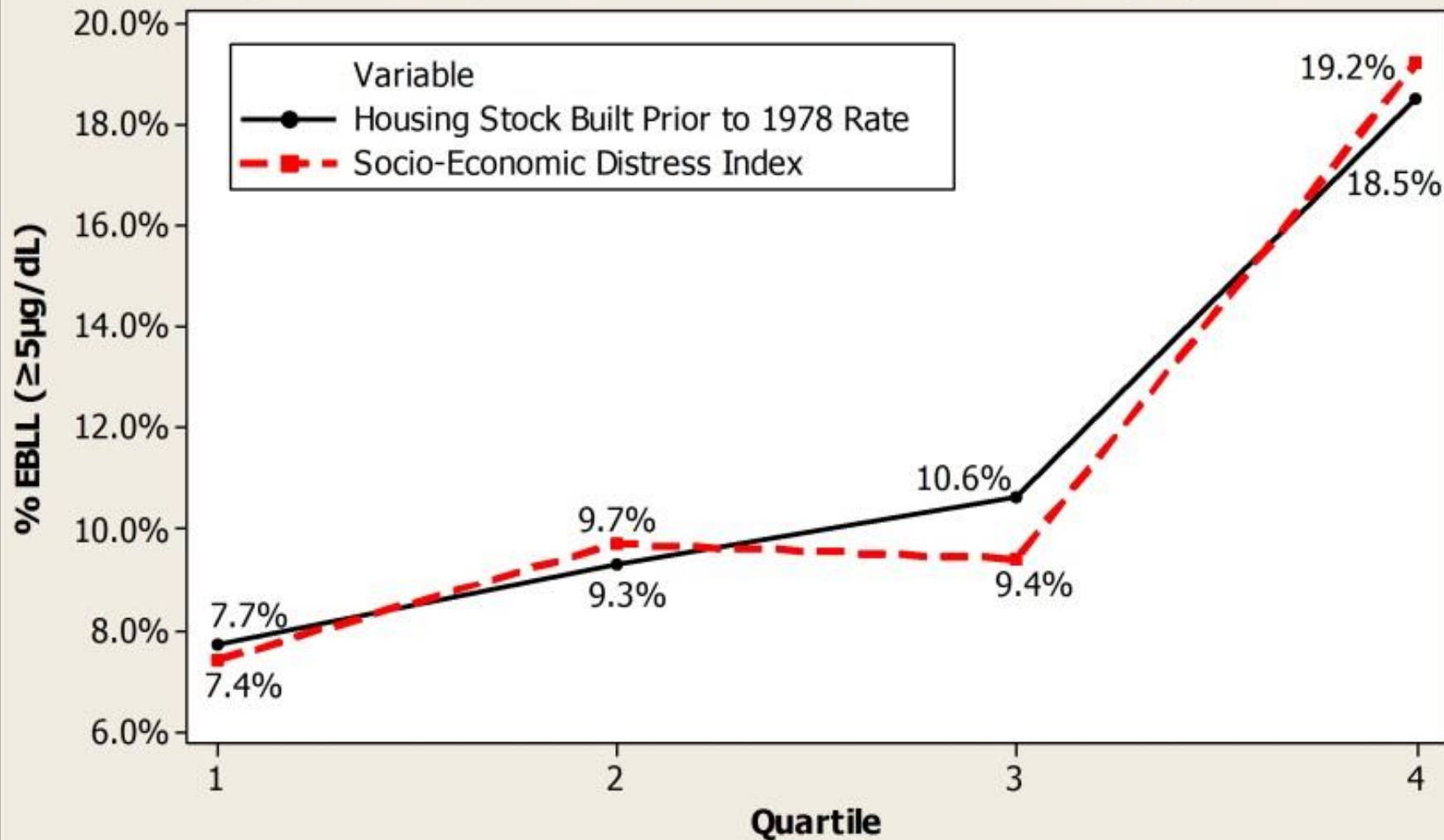
- 0% - 5%
- 5.1% - 10%
- 10.1% - 15%
- 15.1% - 20%
- 20.1% - 25%
- 25.1% - 30.8%

0 2.5 5 10 Miles

- ▶ Rate of children less than 7 years old with EBLs (elevated blood lead levels < 5) currently around 13%. The national average is.....5.4%
- ▶ According to 2010 census children under age of 7 represent 10% of the population, which is number 1 per capita in the state.
- ▶ The rate of testing for children 1 to 2 years of age was 7.64% which is half of most counties in PA and much lower than the national average of 16.2%.
- ▶ PA ranks 4<sup>th</sup> in nation with housing units built prior to 1978.

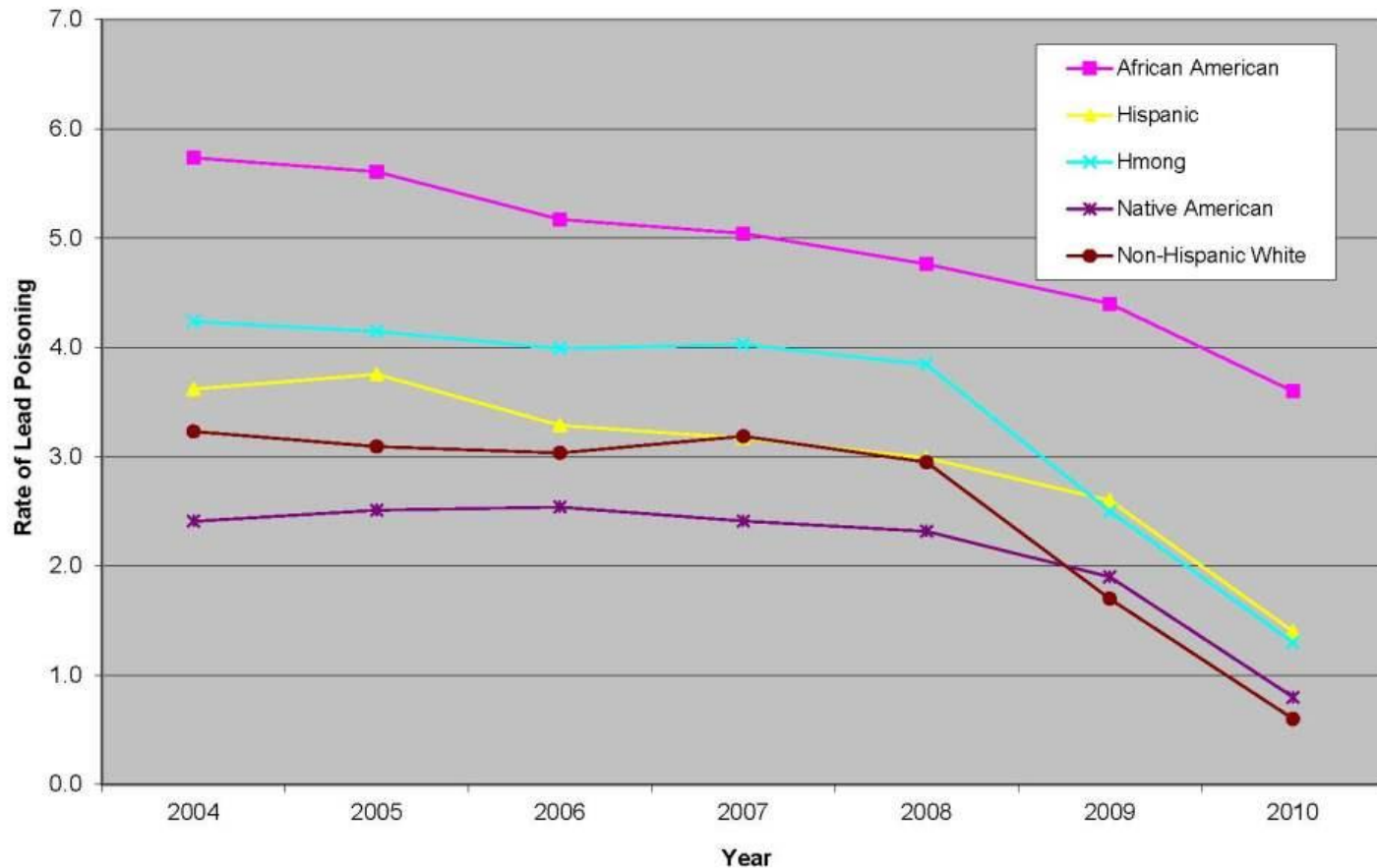
## LANCASTER AND LEAD.... A CONFLUENCE OF FACTORS

## Average EBLL by Distress Index and Housing Quartiles



# RACIAL DISPARITIES

Prevalence of Lead Poisoning in Children Under Age 6 by Race or Ethnicity in Wisconsin, 2004- 2010



- ▶ Several “at-risk” groups including Latino population and Amish population.
- ▶ No serious lead ordinances in county’s 63 separate municipalities, except Lancaster City.
- ▶ There are playgrounds in Lancaster City which test very high for lead in soil.
- ▶ Many community gardens may have high lead soil levels.

## LANCASTER AND LEAD... A CONFLUENCE OF FACTORS



- ▶ Partnership for Public Health and Lancaster Lead Coalition
- ▶ New Funding from HUD
- ▶ Other grant funding
- ▶ Community Partnerships/  
Legislative solutions

WORKING TOWARD SOLUTIONS

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# PARTNERSHIP FOR PUBLIC HEALTH

- “Working collaboratively with local stakeholders to protect health, prevent disease and promote the health and well-being of all people in Lancaster County.”
- Lead Coalition is a committee of the Partnership
- Goal of Lead Coalition is to increase awareness, increase screenings rates, and decrease incidence of cases
- [www.partnershipforpublichealth.org](http://www.partnershipforpublichealth.org)

WORKING TOWARD SOLUTIONS



## New Funding from HUD

- ▶ Lead Based Paint Hazard Control Grant
- ▶ \$1.33 million to abate lead hazards in city and county
- ▶ A total of 92 homes will be remediated
  - ▶ 70 in the City limits
  - ▶ 22 outside the City
- ▶ The majority of units will be for homeowners with some rental units beings served.

WORKING TOWARD SOLUTIONS

## Other grant funding

- ▶ CHI/ St. Joseph Children's Health
- ▶ Lowe's Community Partners Grant



WORKING TOWARD SOLUTIONS

# Community Partnerships/ Legislative solutions



- ▶ Advocating to legislators
- ▶ Developing better Lead ordinances
- ▶ Child-care ordinance in Lancaster City
- ▶ 211, single point of intake for children with EBLL
- ▶ Enhancing provider testing rates at LGH/ Penn Medicine
- ▶ Local solutions for local issues



WORKING TOWARD SOLUTIONS

