

Key points about lead exposure in children

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City of Cincinnati Housing & Growth Committee

February 3, 2026

Lead

- Malleable, corrosion-resistant metal
- Used by humans since 6500 BCE (Turkey)
- Toxicity described by Greek Physician Nicander in 2nd Century BCE
- Paint known to be poisonous to children by 1904



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Common Sources of Lead



Lead-based
paint dust/
chips



Occupational
take-home
lead



Water



Food/herbs



Soil



Toys



Cosmetics
and
ceremonial
powders*

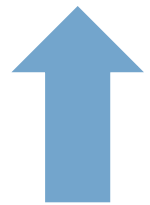


Spices*



Traditional
medicine*

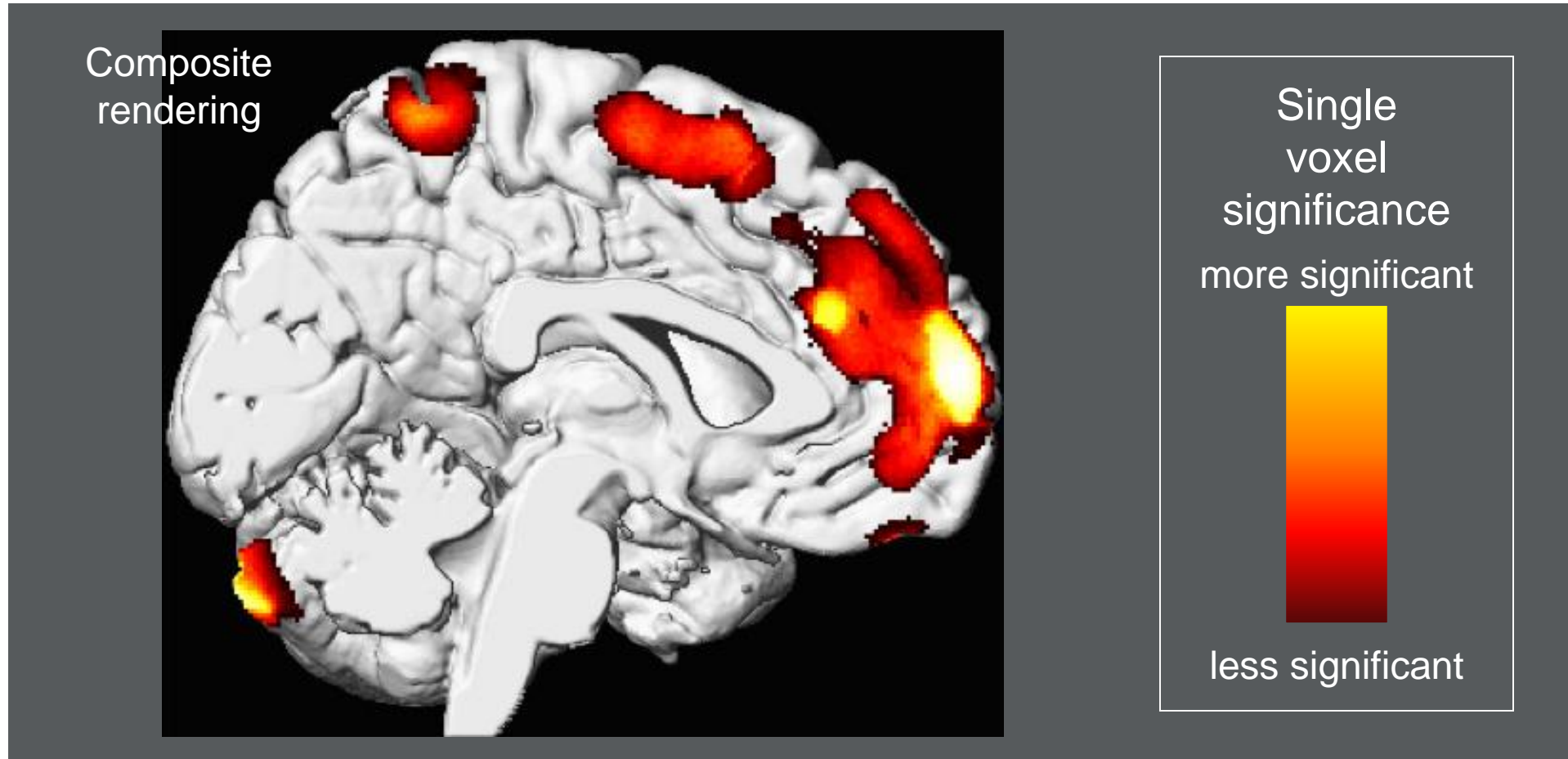
Courtesy, Ohio AAP Lead Free Ohio Program



80% of children in Ohio
are exposed through old paint

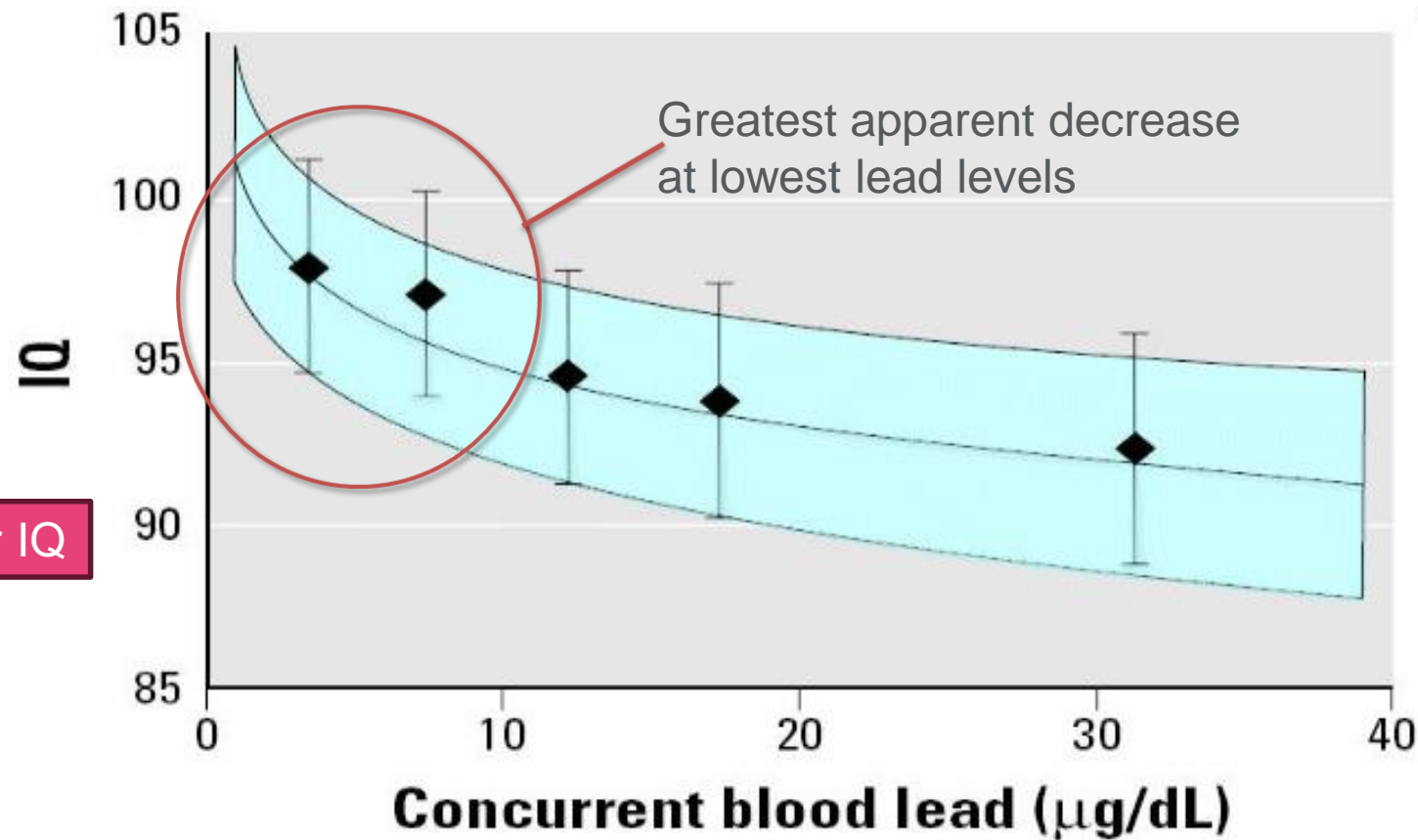
Lead was banned from household paint in 1978

Lead exposure in early childhood is related to brain volume loss in adults, Cincinnati Lead Study



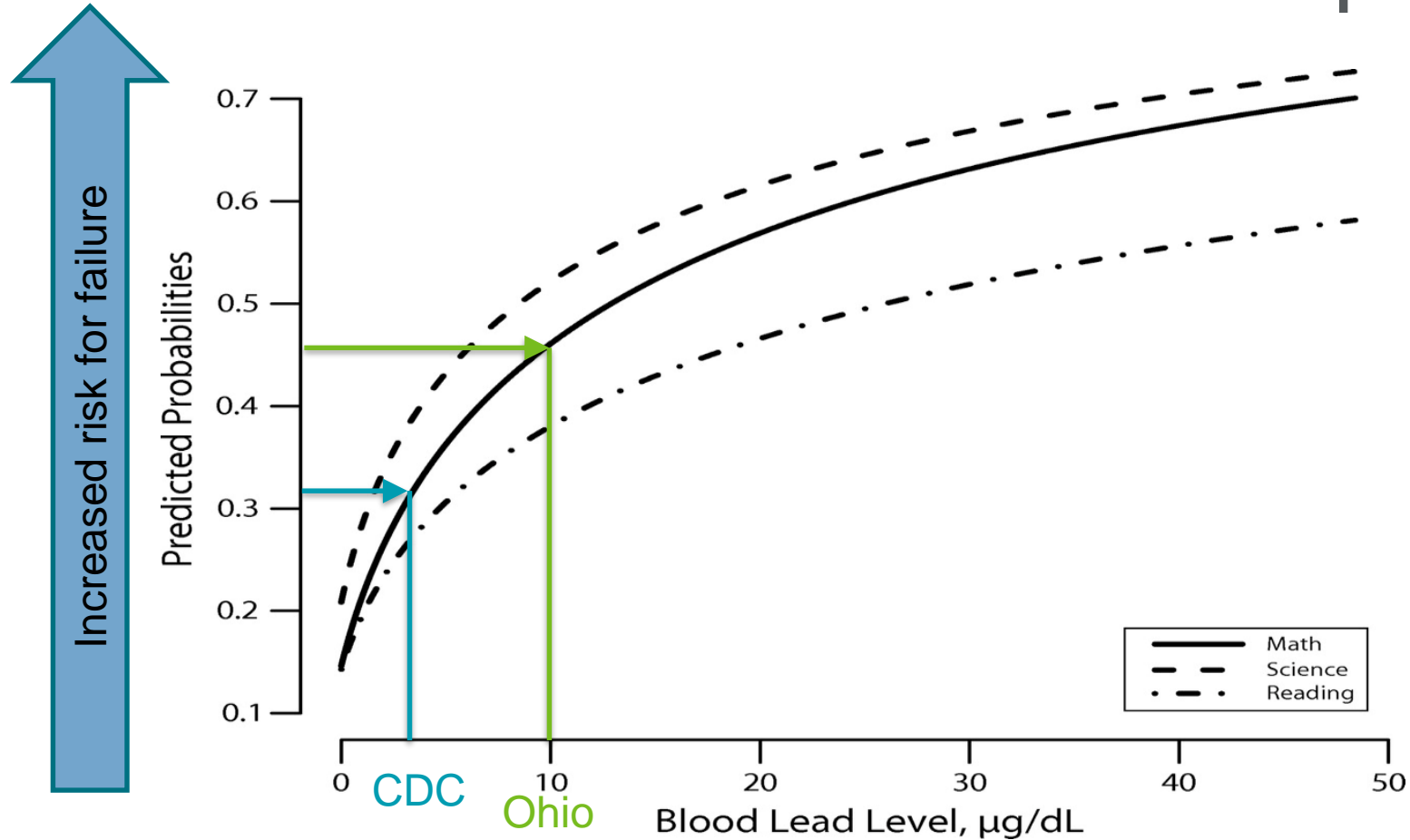
Map of strength of association between blood lead concentration and population-wide loss of gray matter volume. Single-voxel minimum significance threshold is $p < 0.001$ (uncorrected), found within a cluster of at least 700 voxels (Cecil, et al. 2008)

Blood lead concentration is negatively associated with IQ



Lanphear et al 2005. *Environmental Health Perspectives*.

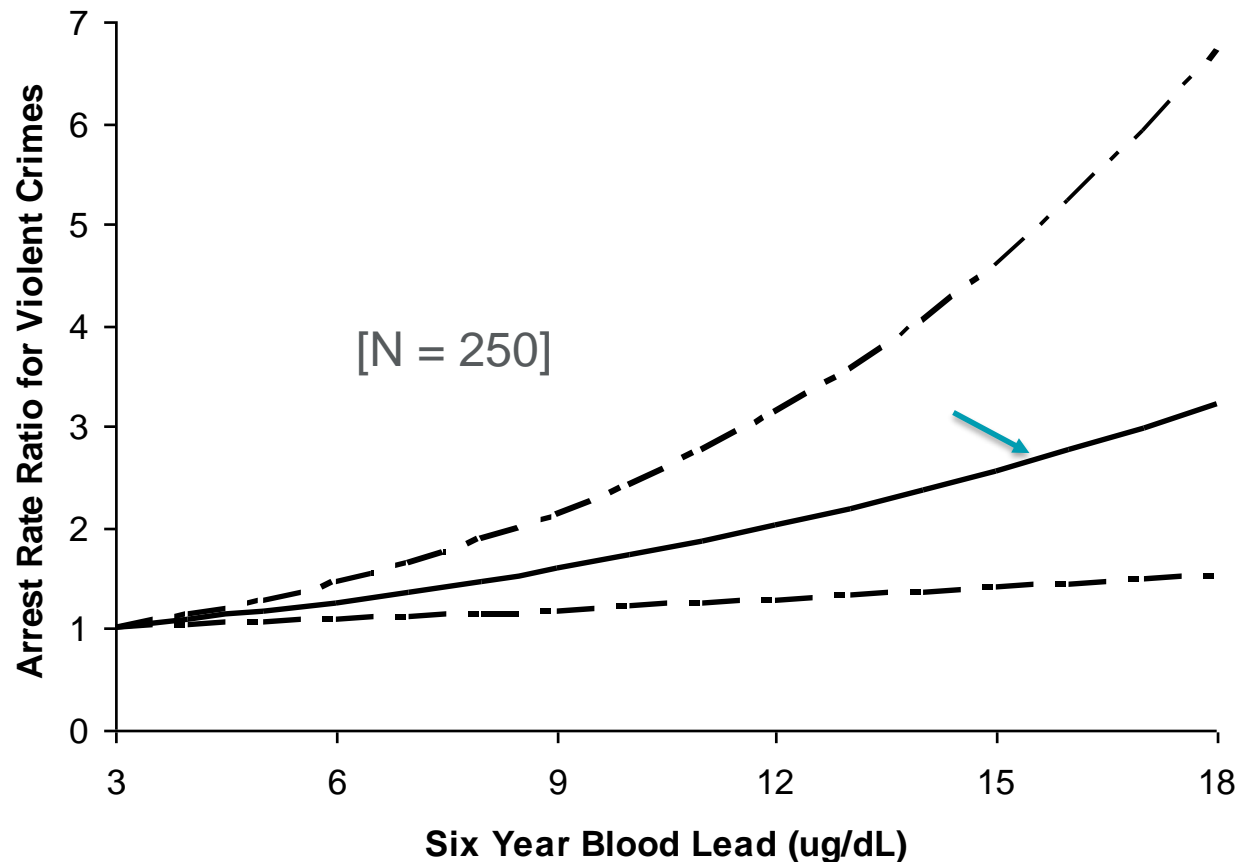
Increased lead level lowers school performance



Predicted probabilities of scoring “less than proficient” on 3 tests of the Michigan Educational Assessment Program as a function of blood lead level:
Detroit Public Schools, MI, 2008–2010

Zhang, AJPH, 2013

Age Six Blood Lead Concentrations and Arrest Rate Ratio for Violent Offenses in Adults, Cincinnati Lead Study



Adjusted for:

- Enriching home environment (HOME score)
- Birth Weight
- Gender
- Maternal Smoking During Pregnancy
- Maternal Drug/alcohol Use During Pregnancy
- Maternal Education
- Maternal IQ
- Maternal Criminal History
- Socioeconomic Status
- Household Size
- Public Assistance
- Age at time of study
- Positive drug screen

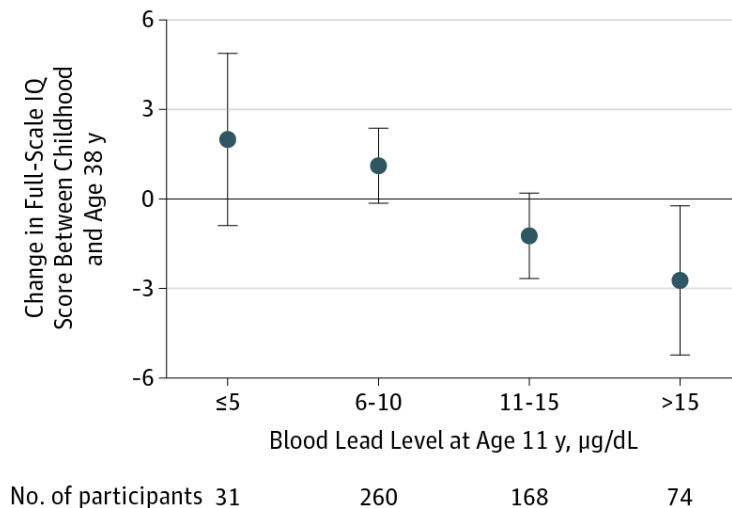
Any 5 ug/dL increase in blood lead increased the rate of arrests for violent offenses by 48 percent (RR = 1.48 95% CI 1.15-1.89).

Wright, Dietrich, RI's et al. PLoS Medicine, 2008

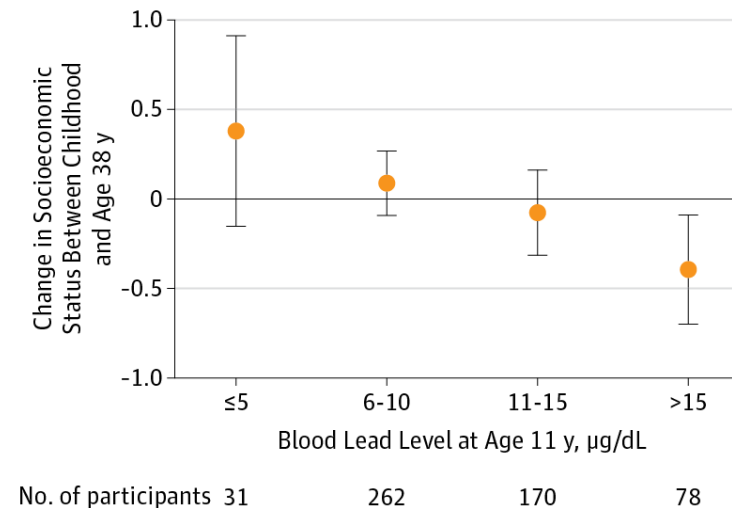
From: **Association of Childhood Blood Lead Levels With Cognitive Function and Socioeconomic Status at Age 38 Years and With IQ Change and Socioeconomic Mobility Between Childhood and Adulthood**

JAMA. 2017;317(12):1244-1251. doi:10.1001/jama.2017.1712

A Change in full-scale IQ by childhood blood lead levels



B Change in socioeconomic status by childhood blood lead levels



Higher blood lead levels in childhood associated with decline in IQ and socioeconomic status through their lifetime, up to age 38 years (Dunedin Longitudinal Study, New Zealand)

Lead Exposure

Decreased
IQ

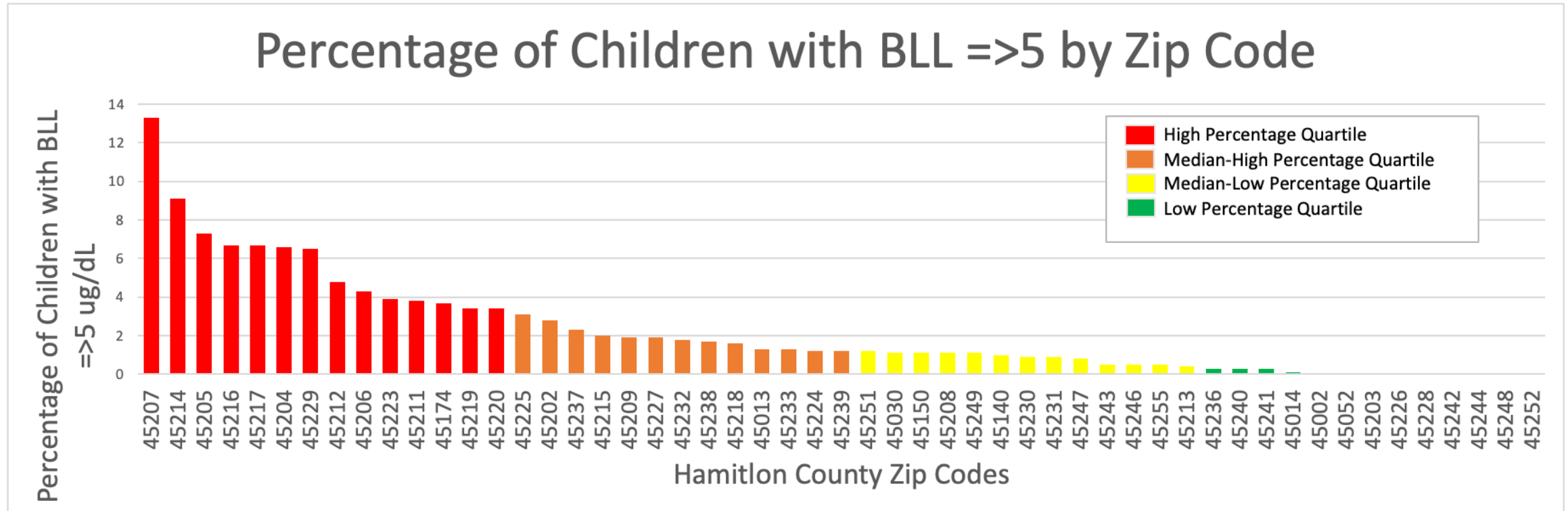
Delinquency/
Incarceration

Poor School
Performance

Behavioral
Problems

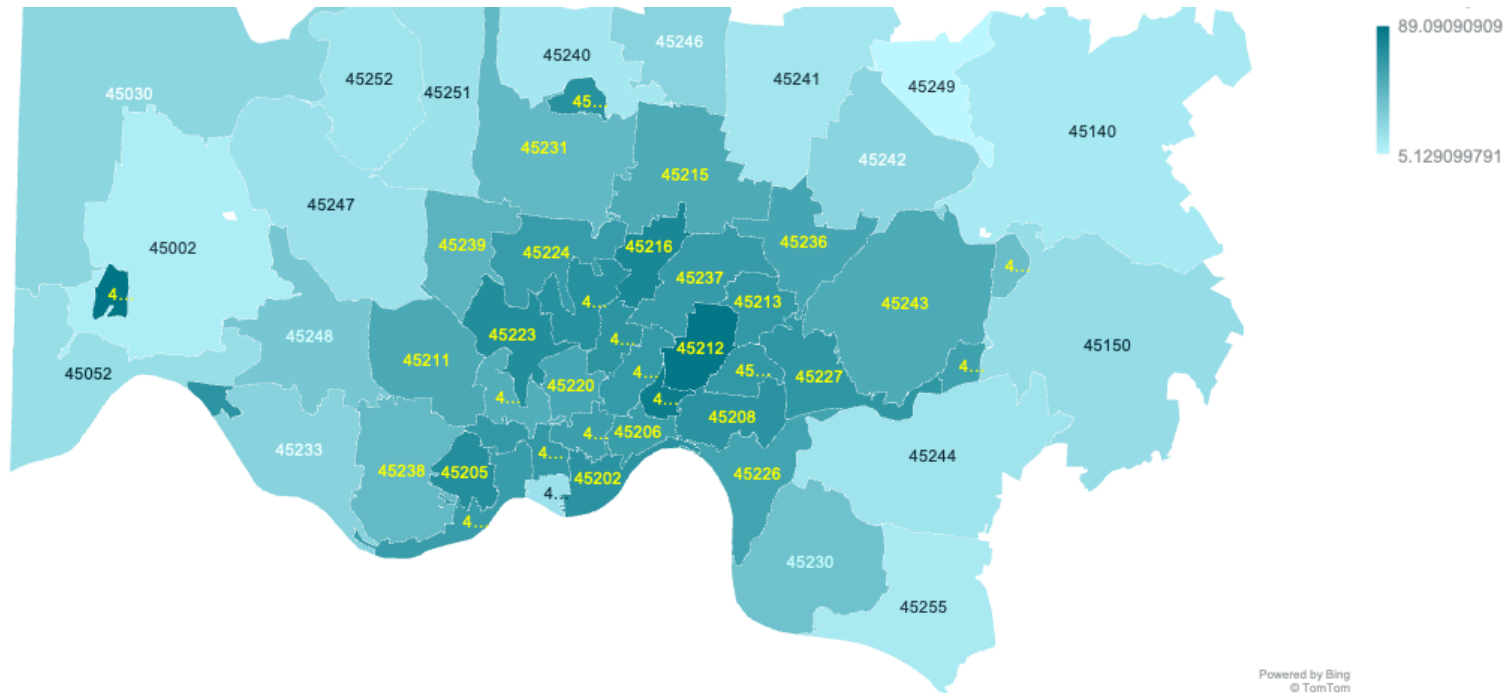
Premature
Birth

Zip code and lead level in Hamilton Co.



Unpublished Hamilton County Data, 2016

Hamilton County: Percentage of Housing Built Prior to 1960



Unpublished Hamilton County Data, 2016

Thank you