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Contaminated Childhood: Inequities, Disparities & Lead Exposure- Breaking the Link

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OUR MISSION:

To promote, protect, and improve the health and safety of all Hoosiers.

OUR VISION:

Every Hoosier reaches optimal health regardless of where they live, learn, work, or play.

Objectives

At the conclusion of this session, participants will…

1. Be able to list the most common sources of lead exposure of children in Indiana
2. Be able to list the populations at higher risk of exposure to lead.
3. Be able to identify examples of types of disparities faced by children with elevated blood lead levels

We will cover:

- Introduction to lead and unhealthy homes: Why do we care?
- Lead toxicity and primary and secondary sources of lead
- Impacts of lead on children
- Lead's disproportionate impacts
- Environmental justice
- Remediation examples and inequities
- Nutrition
- Impact on education

Why Do We Care about Unhealthy Homes?

- Statistically, the home is the most dangerous place for U.S. families
- A Healthy Home supports the physical mental and emotional health and safety of its residents/children
- Children spend close to 70% of their time in their home
- Annual costs of environmentally caused childhood diseases in US is over $54.9 billion!
  - Lead poisoning
  - Neuro-behavioral disorders (ADHD)
  - Cancer
  - Asthma - Accounts for 3% of the country's total healthcare costs,
    - Associated with >10 million missed school days annually

Why Do We Care?

Low-income and/or ethnic minority communities –

- Already burdened with greater rates of disease, limited access to health care, & other health disparities
- Are also the populations living with the worst built environment conditions
- Negative aspects of built environments interact with & magnify health disparities, compounding distressing conditions

Lead Toxicity

- Lead toxicity remains the **#1 environmental threat** to America's children.
- CDC projects **about half a million children 1 to 5 years of age in U.S. have an elevated blood lead level** (above the threshold level at which CDC recommends public health actions be taken).
- There is NO SAFE Level of lead in the body!
- For most children, exposure occurs in the home.

Lead Toxicity in Indiana Children

Lead In Indiana:

In **2019** Indiana Department of Health reported:

- 77,807 children under age 7 were tested
- 607 (0.78%) considered elevated

2021:

88 of 92 counties have children with elevated blood lead levels

95.6% of counties

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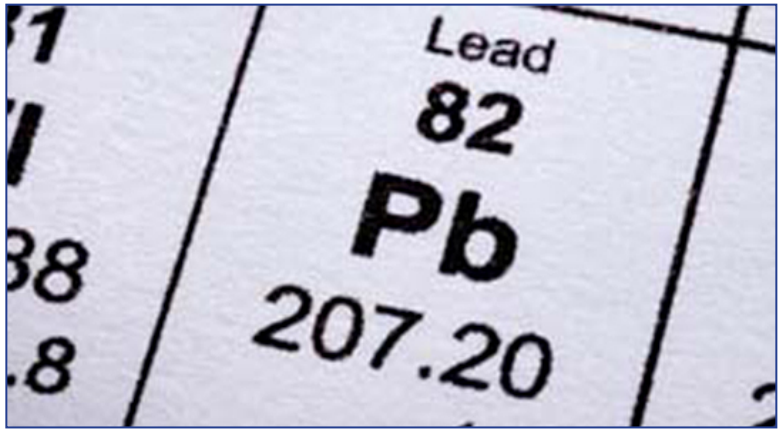
What Is Lead?

Naturally occurring element (heavy metal) found in soil, rocks, and water

TOXIC to humans and animals

Used throughout human history as an additive for a wide variety of products:

- Paint
- Gasoline
- Food products (e.g., candy, wine)
- Plastic/Vinyl (e.g., mini blinds, Christmas lights)



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How Are People Exposed to Lead?

Inhalation and Ingestion

- Paint **chips/flakes**
- Paint degrades to **fine dust** due to friction when opening and closing painted windows and doors
  - Virtually invisible and easily dispersed into the air
- Contaminated **food, water, soil**
- Some imported **home remedies and cosmetics**
- **Toys, jewelry, hobby objects** (like stained glass, ink, paint)

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Source: U.S. Environmental Protection Agency, 2011
ATSDR, Medical Grand Rounds CS109909-3

Sources of Lead

Paint

- **Old** (before 1978), chipping, peeling
- **Interior** – especially windows, doors, stairs, banisters
- **Exterior** – chipping paint falling into soil

Soil

- From leaded **exterior paint**; **exhaust** from leaded gasoline, **lead pipes**, or **driplines** around home

Dust

- From **friction of lead paint**, often found near windows and doors; **home renovations**

Secondary Sources

- **Inexpensive, imported items**
  - -Ceramic/lead crystal
  - -Children's toys, jewelry
- **Reclaimed barn wood, decorating items**
- **Imported spices**
- **Folk remedies** (East Indian, Indian, Middle Eastern, Hispanic)
- **Imported make-up**

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Lead Paint

For many decades, lead was added to paint:

- Leaded paint was used on both the **interiors and exteriors** of homes
- Once the paint begins to deteriorate, it becomes a lead HAZARD
- Lead was **banned from house paint** in **1978** by the U.S. Consumer Product Safety Commission
- Homes built before 1978 may contain leaded paint

Percentage of Pre-1980 Housing

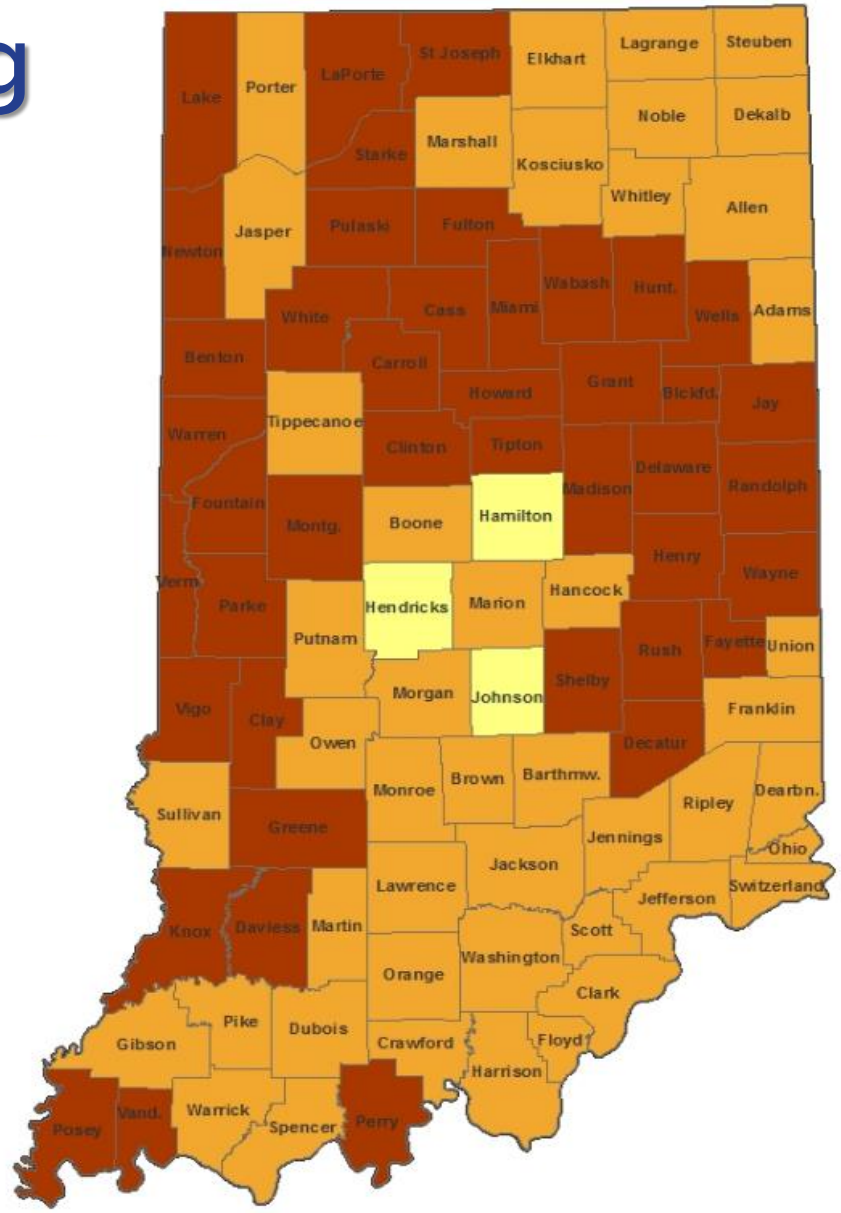
2015 Statistics

Less than 45%

45% to < 60%

65% and higher

Is there a risk for children with elevated blood lead levels in your community?



Why Are We Worried About Lead Toxicity?

Those **age 6 and under** are particularly vulnerable to lead toxicity:

Developing brains	Hand-to-mouth activity
Proximity to the ground	Rapid respiratory rates
Gastrointestinal absorption of lead is greater	

- Usually occurs over a period of months or years with multiple exposures, builds slowly
- After entering body, 73% of remaining lead is stored in bones & teeth of children
- Lead stored in bones for decades, ongoing source of toxin long after exposure has ended

Why Are We Worried About Lead Toxicity?

Neurological Impacts on Infants and Young Children

- Interrupts brain cell connections during key time of development
- Damages nerves in the brain
- Developmental delays, IQ loss, Behavioral problems, Learning difficulties, Academic challenges later

Why Are We Worried About Lead Toxicity?

Physical Impacts of lead toxicity are a health risk for people of all ages.

Children	Adults

• Neurological (brain) damage:
  • Reduced IQ/learning disabilities
  • Developmental delays
  • Hyperactivity/ADD
  • Disruptive/violent behavior
  • Visual-spatial skills/fine motor skills
  • Processing/acquisition delays
	• Reproductive difficulties
	• Miscarriage/premature birth

• Anemia	• High blood pressure
• Hearing loss	• Hearing loss
• Impaired growth	• Anemia
• Kidney damage	• Kidney damage
• Insomnia	• Memory loss
• Stomach pain/vomiting/muscle weakness	• Irritability/Disruptive behavior

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Why Ae We Worried About Lead Toxicity?

Lifetime impacts of lead toxicity for all.

- Children with elevated lead levels are:
  - **7** times more likely to drop out of school
  - **6** times more likely to become involved with the juvenile justice system
  - Lose **2** IQ points for each 10 µg/dL increase in blood lead level
  - Average loss of lifetime earnings estimated **$900,000**

Can be treated, but damage is PERMANENT

At-risk Populations

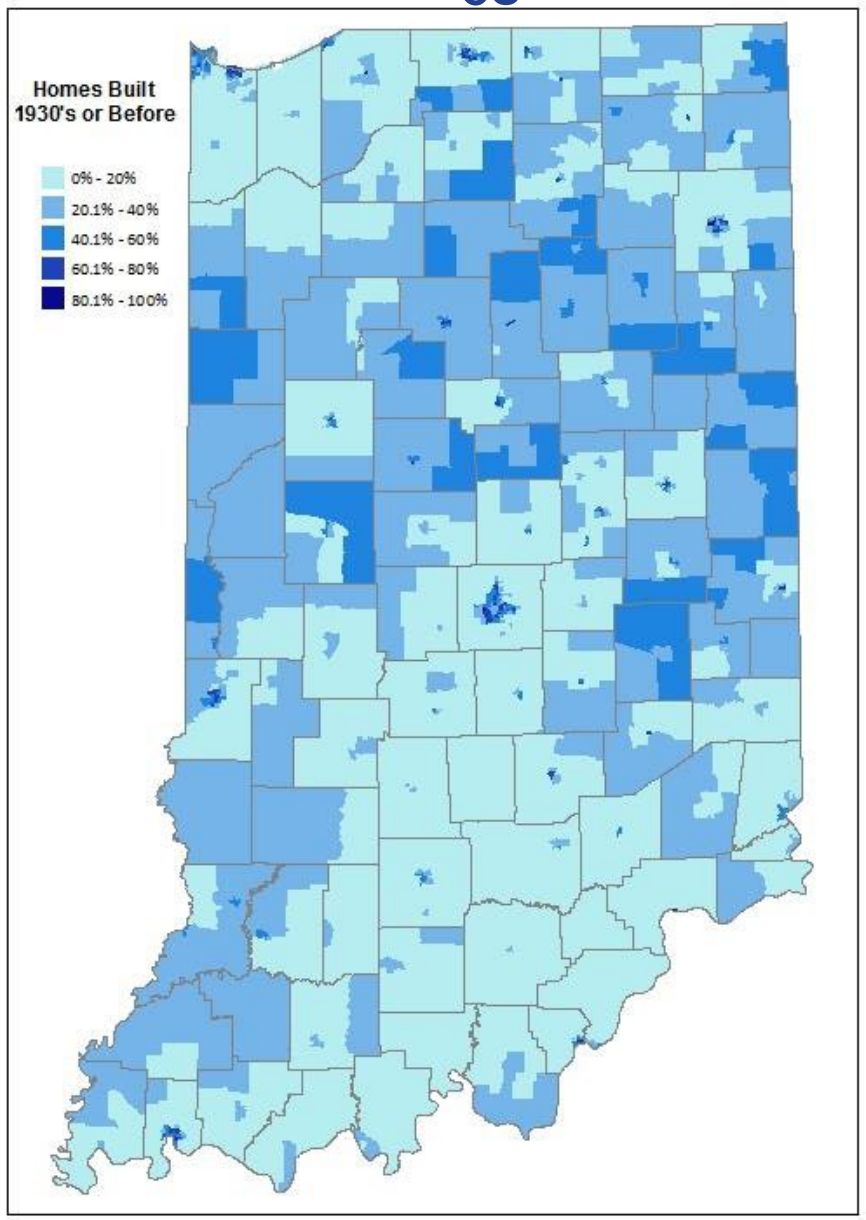
Children are at higher risk for lead exposure if they:

- Are poor
- Are members of racial-ethnic minority groups
- Are recent immigrants
- Live in older, poorly maintained rental properties
- Have parents who are exposed to lead at work

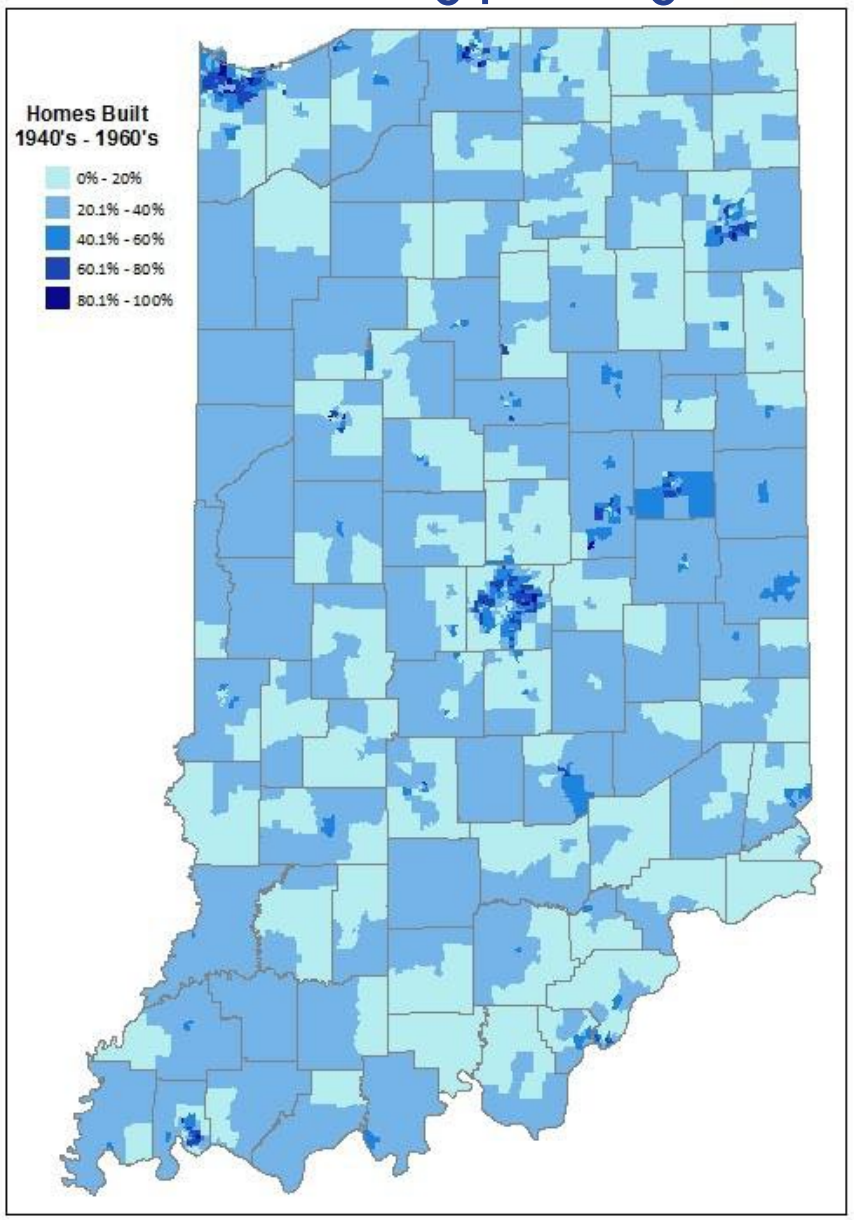
Indiana Lead Risks Housing Map, 2010 Census Estimates

With over 62% of Indiana's housing being built before 1980 (1978 lead-based paint ban) more than half of Indiana's homes could pose a lead risk

Homes Built 1930's or Before



Homes Built 1940's – 1960's



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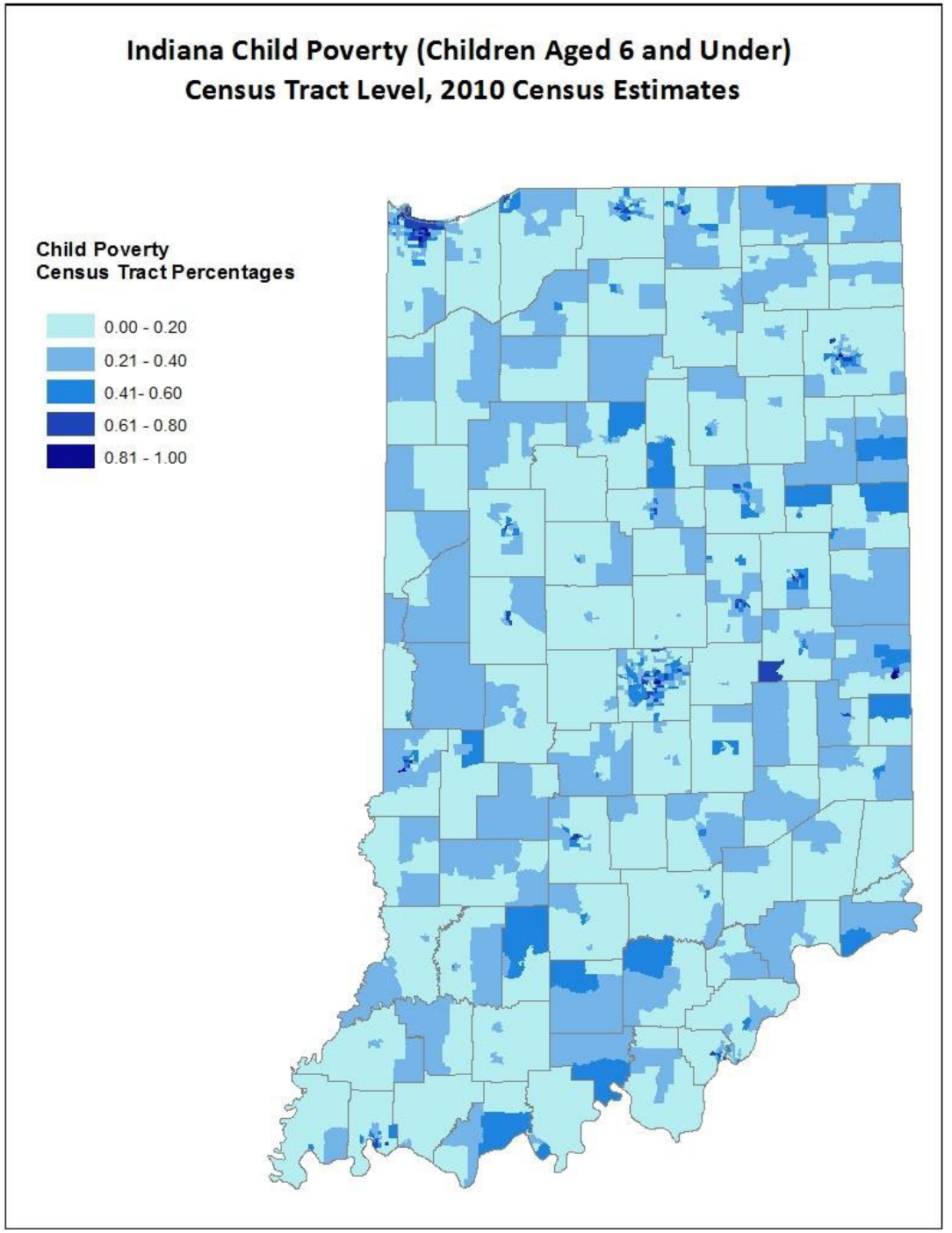
Poverty in Indiana

23.3% of Children Under 6 in Indiana live below the poverty level

(Welfare Info, 2019)



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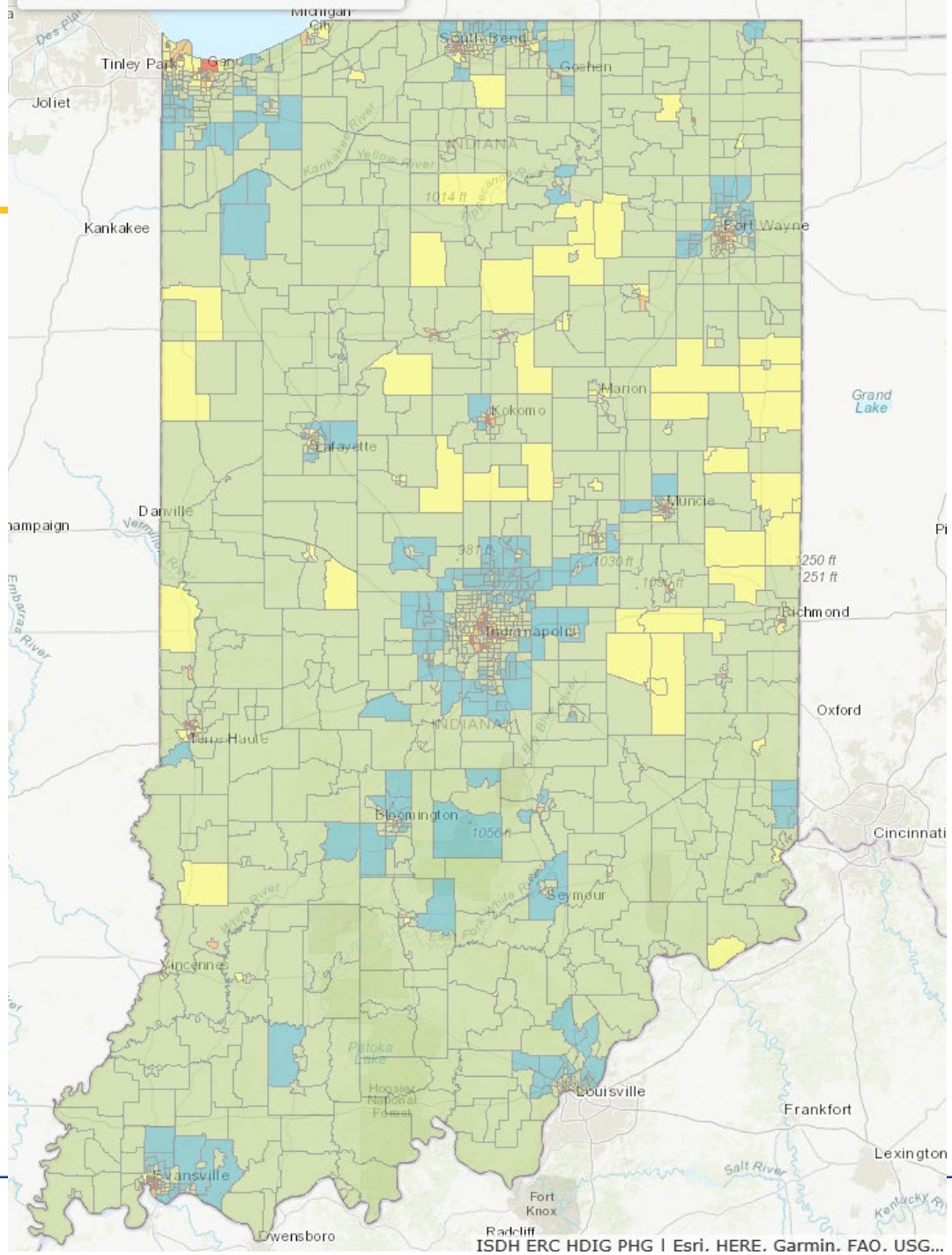
Lead's Disproportionate Impacts

Indiana Lead Census Tracts Risk Map

Childhood Poverty (Given Weight) + Older Housing 1940s-1960s (Given Weight) + Older Housing Pre-1940s (Given Weight) = Weighted Combined Percentage for Lead Risks



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Lead's Disproportionate Impacts on Vulnerable Populations

Older housing stock tends to be less expensive and located in urban areas.

Lower income families and families of color tend to occupy these homes

Older, less expensive housing stock is more likely to be in poor condition

Substandard and deteriorating housing contributes to a variety of health ailments

These health ailments disproportionately affect children of color and children from low-income families

Defining Environmental Justice

Environmental Justice is fair treatment and meaningful involvement of all people with respect to development, implementation, and enforcement of environmental laws, regulations, and policies.

Fair treatment means that no population bears a disproportionate share of negative environmental consequences

The most vulnerable communities in our country must endure the worst environmental pollution and its health effects (Benfer, 2017)

Environmental Justice

Low-income communities of color are far more likely to be housed next to sources of pollution, such as power plants, highways, landfills, and other industry, than their white counterparts.

Reasons are a matter of debate:

- Discriminatory siting

vs

- Post-siting demographic changes in response to lower property values and greater employment opportunities

Photo Citation: https://www.shorpy.com/node/3314

Environmental Justice Issue Examples

Photo Citation: https://www.commondreams.org/news/2016/01/13/epas-hush-hush-response-flint-water-crisis

- Flint, Michigan Water Crisis
- USS Lead Superfund Site in East Chicago, IN
- Pittsburgh air pollution

Dilapidated Housing

- “Invest & Neglect” -Foreclosure sales permit investors to purchase large volumes of low-cost residential properties.
- The odds of having an EBLL child (≥5 µg/dL) are higher for families living in investor-owned homes purchased through tax foreclosure sale – (Eisenburg, 2020)
- Dilapidated homes have issues that worsen the deterioration of lead paint.
- Low-income families are less likely to get lead testing done during the inspection process

Poor Housekeeping

Simply having lead paint in a home isn't enough to cause a child's blood lead level to be elevated. – Lead paint is only a hazard when it's deteriorating

- We often see paint chips laying around inside and outside of houses - Ingestion is the primary route of lead exposure in children
- We often see lead dust in high concentrations due to general lack of cleaning
- We often see "slum-lords" not keeping up with basic maintenance and building cleanliness

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Lead Remediations

Inexpensive plastic being used to block access to lead paint on window components vs the more expensive alternative of replacing the window components

- Low-income families may be unable to afford to fully remediate lead hazards identified in their homes.
- Risk assessors provide different remediation options depending on:
  - the amount of the family's renovation budget
  - how likely landlords are to keep up with the project.
- Low budget = short term solutions

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Inequalities in Different Hazard Control Options

Cheap or Free = Rearranging use of house space & yard play area space for children to avoid lead contaminated areas vs. actually remediating the hazards

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Inequalities in Different Hazard Control Options

Expensive Lead Abatement Projects that will remediate lead hazards long term

Lead Abatement Grant Help

- Professional Lead Abatement is expensive
- Grant help is available to EBLL families but not everyone qualifies
- The grants require
  - the family to be up-to-date on property taxes
  - cooperation from the owner if the family is not the deeded owner (messy situations for Rent-to-Own/Land Contract properties)
  - income restrictions

Occupational Exposures - Brought Home

- Some occupations at risk:
  - contractors who work on old houses
  - workers in scrap yards
  - some factory/manufacturing/industry workers

- Men working in white-collar jobs have a mean blood lead level that is statistically significantly lower than blue-collar workers. (Nuwayhid, 2001)
- There is still an independent contribution of education level to cumulative lead exposure, separate than just occupation (Schwartz, 2014)

Photo Citation: https://media.gettyimages.com/photos/hispanic-construction-worker-greeting-son-picture-id84231233?s=2048x2048

SAMPLE MATERIAL	SAMPLE DESCRIPTION AREA OR LOCATION	AREA SAMPLED (INCHES) e.g., 12 x 12	LEAD MICROGRAM PER SQ. FT.	SAMPLE RPT LIMIT	Lab Sub Number
11 Wipe	work jacket	12X12	1100.	3.0	N

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Immigrant Families

- Some illegal immigrant families resist the lead testing for fear we are trying to get them deported.
- Immigrant families are disproportionately affected by lead in food products, spices and home remedies
  - Lead is sometimes added to consumer products in other countries because it adds weight - many items are sold by the weight.
  - Its difficult for risk assessors to identify brands, lot numbers etc. to do proper FDA reports to warn other consumers

Nutrition

- EBLL children need focus on excellent nutrition, specifically calcium and iron to help block lead absorption
- Low-income families
  - may have a difficult time providing healthy diets for their children
  - some can't afford fresh foods and vitamins
  - Are more likely to choose food that is filling over what is high in nutrients.
- Corner markets make inexpensive junk food and are available close to home and often open at all hours.

Photo Citation: https://joeylowensteinfoundation.org/how-dietary-changes-can-help-people-with-autism-and-aspergers-syndrome/

Summary

- Lead disproportionately impacts low-income families and minority populations
  - These families tend to occupy less expensive urban homes, which were often built pre-1978.
  - Less expensive housing tends to be in worse condition
  - Low-income families may be unable to afford to fully remediate lead hazards identified in their homes.
  - Low-income families are less likely to get lead testing done as part of the inspection process when buying a home.
  - Low-income families may be unable to afford fresh foods & vitamins which are important for blocking lead absorption.
  - These families are more likely to work in industries involving lead.

Effects of Lead on Education

- Not well known within education field about effects of lead on children's academic & behavioral outcomes
- Similar to children with TBI, silent problems that may not be easily identified
- Effects on children are individualized
- Children with BLLs at or above 5 µg/dL are at greater risk for
  - Developmental delay
  - Behavioral issues
  - Academic failure & diminished life success

Impacted Functions

Attention:

- Relationship between EBLL and deficits in sustained attention,

Executive Functions:

- Strategic planning, control of impulses

Visual-Spatial Skills:

- Organization & reasoning w/ visually presented nonverbal problems

Behavioral Challenges:

- Impulsivity, aggression, short attention, restless

Speech & Language:

- Language processing deficits, reading, speech comprehension, expressive speech, writing

Fine & Gross Motor Skills:

- Unsteadiness, clumsiness, fine-motor dysfunctions

What Can Schools Do?

1. Be aware of the risk and possibility during evaluation and assessment
2. Identify children with EBLL when possible
3. Educate/Screen parents about hazards of EBLL if/when assessing/ruling out possibilities and solutions
4. Use Whole School, Community, Child (WSCC) model and bring all school partners to the table

What Can Schools Do

5. Educate staff about adverse effects of EBLL on academic performance and behavior, impacts any child, **interventions to improve child outcomes should be multifaceted**
6. Develop school/corp. policies & processes for identifying students, interventions and services (i.e., 504, IEP, etc.), parent and community collaboration strategies
7. Work with Local Health Department to address other needs in the community

Important Take-Aways for Educational Community

- Impact on child is individualized
- Screening at risk children is vital, including those disproportionately impacted by poor housing, poverty
- Connecting at-risk children to early intervention services is likely key to reducing long term effects.
- Affected children may exhibit little to no developmental difficulties early in life but begin to exhibit learning delays at critical transition points in educational expectations (1st, 4th, and 6th grades), and as child ages

For More Information

Visit:

- EPA Lead Program website: www.epa.gov/lead
- U.S. CDC website: www.cdc.gov/nceh/lead
- U.S. Department of Housing and Urban Development website: www.hud.gov/offices/lead
- ISDH Lead and Healthy Homes: https://www.in.gov/isdh/26550.htm

Questions?

Thank You

Thank you for all that you do to promote health, safety, and education in your community!

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