2016 Childhood Lead Surveillance Report

Environmental Public Health
Lead & Healthy Homes Program

Indiana State
Department of Health

Table of Contents

Executive Summary

The Indiana State Department of Health is working to increase blood lead screenings in Indiana in order to identify children with elevated blood lead levels. In 2016, 56,438 children were tested in Indiana, a 36.7% increase from the 41,267 children tested in 2015.

Lead testing was one of the first biomonitoring programs instituted by the government. A lead test can determine how much lead content is circulating in the body. According to Indiana Administrative Code, a child becomes a confirmed case when he or she receives either a single venous blood test or (two) capillary blood tests with a blood lead result ≥10µg/dl. However, in 2015 and 2016, in order to simulate the Centers for Disease Control and Prevention's (CDC) new reference level, the Indiana State Department of Health's (ISDH) Lead and Healthy Homes Program (LHHP) began conducting surveillance and recommending that case management be provided at levels of ≥5µg/dL.

Among the 56,438 children tested in 2016, a total of 2,024 Indiana children had either an initial screening level or a confirmed blood lead level (BLL) of 5 µg/dL or higher. Of the children tested, 359 had at least one test with a BLL of 10 µg/dL and above; 177 of those children became confirmed cases and were referred to case management. While ISDH recommends that case management be initiated at levels of ≥5 µg/dL, some counties continue to use the Indiana Administrative Code's reference level of ≥10µg/dL as their threshold for case management.

INTRODUCTION

Elevated blood lead levels can negatively impact cognitive function and cause behavioral disorders and slowed physical development in young children. Lead exposure also can have a financial impact, including increased medical and education costs and costs associated with teen pregnancy, low-birth-weight infants, child abuse, crime, welfare utilization and adult health issues (Peter Muenning, 2009). Additional costs incurred include expenses associated with state and local county government case management, Medicaid, and increased use of juvenile and adult correctional programs (Needlemen, 1990).

Since 2013, some states, including Michigan and Minnesota, have issued reports that estimate the potential loss in lifetime earnings that could occur because of elevated blood lead levels in childhood. Minnesota's report estimates children born in 2004 who were tested for lead could see a $1.9 billion loss in lifetime earnings because of their lead exposure (Tracking, 2014).

Based on similar methods and resources, Indiana children who had a confirmed elevated blood lead level (EBLL) of ≥10µg/dL from 2010 to 2014 (n=1,022) had a potential lifetime cost of $121.7 million. This includes healthcare costs associated with an elevated blood lead level. This estimate is likely an underrepresentation because of low lead testing rates.

Indiana law does not require universal testing of all children under age 7; only children covered by Medicaid are required by federal law to be tested for lead. Identifying children with elevated blood lead levels early and providing education and other resources can help decrease the long-term effects of lead. The Indiana State Department of Health's Lead and Healthy Homes Program remains committed to identifying children with elevated blood lead levels and monitoring the treatment of those who have confirmed elevated levels.

The program strives to help local health departments:

- Identify susceptible populations in Indiana at risk for elevated blood lead levels, identify the sources of lead exposure, and provide outreach and education to those communities to prevent future incidence;
- Screen areas in counties that are more at risk for lead exposures due to older housing;
- Provide case coordination and case management to children identified with an elevated blood lead level and remove identified associated hazards ; and
- Increase screening for all children under the age of 7 through education and outreach.

HIGHLIGHTS FROM 2016

In 2016, 56,438 unique children were screened in Indiana. This represents about 10 percent of the children under age 7 in the state, based on the U.S. Census population estimate for 2015 (based on 2010 Census), which is the most current year available for ages 0-6.

A total of 2,024 of the children tested had at least one blood lead level at or above the Centers for Disease Control and Prevention (CDC) reference level of 5µg/dL. This includes both initial screening tests, which are often less accurate due to a number of variables, and confirmatory tests. According to Indiana statute, a child becomes a confirmed case when he or she receives at least (one) venous blood test or (two) capillary blood tests within a three-month period with a blood lead result at 10µg/dL or above.

Among the children tested:

- A total of 177 had a confirmed blood level of 10µg/dL or higher.
- An estimated 773 confirmed ≥5µg/dL. Estimates are determined using new surveillance methodology that was unavailable prior to 2016.
- Of the 2,024 children who had at least one test result of 5µg/dL or above:
    - 56% were males
    - Almost half were white. However, a higher percentage of those tested who are Asian or Pacific Islander had elevated levels (5.6%) compared with white children tested (3.7%).
    - Among those reporting ethnicity, Hispanic children accounted for 20% of the elevated results.
    - Medicaid status was reported for 6% of children tested. Of that subset, 85% of those with elevated blood lead levels reported Medicaid coverage.

Case Management – Training and Outreach

The Lead and Healthy Homes Program (LHHP) has had a dynamic year working in collaboration with the ISDH Laboratories to offer training for local health departments and providers throughout the state. The outreach effort included training in proper blood lead specimen collection, appropriate packaging and laboratory submission of specimens, and case management of children with elevated blood lead results. The primary program outreach goal was to increase the number of children screened for the presence of lead in the blood.

As a result of the 2015-2016 joint outreach effort, all 10 of Indiana's Preparedness Districts were offered training, with 213 participants statewide. The Kirkpatrick Model of Evaluation indicates an average 39.7% increase in learning among these participants. At year's end, 71% of local health departments had participated in the program update. This joint training has been added to the department's annual training schedule, twice a year, to satisfy requirements of Indiana's Case Management Rule 410 IAC 29 for new hires. Targeted case management updates for the remaining local health departments is an LHHP outreach goal for 2017.

Lead screening rates vary among health departments due to staffing levels and other considerations. The LHHP remains committed to helping local health departments and providers start or update lead screening and case management programs for at-risk children in all 93 Indiana local health departments.

"At risk" is defined as a child who:

- lives in or regularly visits a house or other structure built before 1978;
- has a sibling or playmate who has been lead poisoned;
- has frequent contact with an adult who works in an industry or has a hobby that uses lead;
- is an immigrant or refugee or has recently lived abroad;
- is a member of a minority group;
- is a Medicaid recipient;
- uses medicines or cosmetics containing lead; or
- lives in a geographic area that increases the child's probability of exposure to lead

As part of its outreach efforts, the LHHP has updated its literature and website to assist local health departments and providers with consumer education and identification of environmental hazards that may contribute to elevated blood lead levels in Indiana children. Outreach materials are available at http://www.in.gov/isdh/26550.htm.

In addition, as more providers begin to use point-of-care diagnostic tools for in-office blood lead analysis, the LHHP will make educating providers in the appropriate use and reporting protocols

required under 410 IAC 29-3-1, the statute governing the reporting of all blood lead test results, a priority for 2017.

By counseling providers on the proper use of these devices and encouraging them to report ***all*** childhood blood lead results, ISDH hopes to increase data submissions so it can provide a more comprehensive analysis of community and statewide lead data.

The LHHP has been actively testing a web-based data collection system from the Centers for Disease Control and Prevention (CDC). The new web-based system, HHLPSS (Healthy Housing Lead Poisoning Surveillance System), will replace the current system known as STELLAR. The new data collection system is expected to be implemented in 2017. Implementation will include training and outreach to local health departments regarding data collection and case management of a child with an elevated blood lead level.

East Chicago Superfund Site

In 2016, concerns about lead exposure escalated in Indiana due to the revelation that high levels of lead had been found in soil at a public housing complex in East Chicago that had been built on a federal Superfund site.

The Indiana State Department of Health's Public Health Preparedness & Emergency Response division, in conjunction with the East Chicago Health Department (ECHD), conducted more than 30 blood lead testing clinics for residents of the Superfund area. Samples were sent to the ISDH Laboratories for analysis. As of December 29, 2016, 1,671 individuals had been tested for lead, including 336 children under age 7. Among those 336 children, a total of 17 had confirmed blood lead levels ≥5 µg/dl.

The LHHP, working with federal partners, performed 28 lead risk assessments in the West Calumet Housing Complex. Lead program staff also provided case management and blood lead screening training to ECHD staff, as well as weekly analysis of East Chicago blood lead screening data.

In addition, ISDH provided $100,000 in funding to help ECHD hire a public health nurse and health educator and provided education and outreach at numerous multi-agency neighborhood meetings.

ISDH will continue to provide support and other needed assistance to the ECHD in 2017.

Lead in Indiana's Burmese Population

Indiana has significant Burmese populations in Marion and Allen counties. Concerns about lead levels among these residents arose in March 2014, when an investigation was conducted by the Fort Wayne-Allen County Department of Health on a Burmese child with an elevated blood lead level. As additional samples from similar investigations were received, the ISDH Food Protection program, which regulates cosmetics, worked with the ISDH Environmental Public Health and

Allen County lead programs to identify possible source(s). The ISDH Environmental Public Health program's environmental epidemiologist then identified and reported higher rates of elevated blood lead levels among the Burmese populations in both Allen and Marion counties.

The ISDH Food Protection and Environmental Public Health programs, along with the Allen County lead program, developed a sampling plan to collect traditional foods, cosmetics, and pharmaceutical products used by the Burmese population. The sampling found some level of lead in 65 percent of the products collected, leading to a product advisory for the most adulterated products.

In 2016, the Marion County Public Health Department developed a sampling plan to identify products that could contribute to childhood lead exposures in an Indianapolis Burmese community. Sampling was done in the spring and summer of 2016, and some products were found to contain arsenic and lead. Outreach and communication were established with store owners and the community to educate them on the products that were above 5 parts per million (ppm). Products found to be elevated (≥5 ppm) include a five-spice powder, tooth powder, an herbal remedy, and a wok pan. Two herbal remedies -- a chest congestion rub and a powder with multiple intended uses -- were found to have elevated levels of arsenic as well.

WOK PAN

DIGESTIVE AID

FISH POWDER

ISDH will continue to work with local partners to develop other actions regarding these items and potential future sampling.

2016 (Asian/Pacific Islander Demographic) Lead Data:

Geography	Children Tested	Children with BLL ≥5µg/dL	Percentage with BLL ≥5µg/dL (%)
Indiana	933	52	5.6
Marion County	319	20	6.3
Allen County	239	23	9.6

Housing: The Leading Factor in Elevated Blood Lead Levels in Indiana:

The greatest risk for lead exposure in Indiana is lead paint in housing built before 1978, when lead paint was banned. All but three Indiana counties – Hamilton, Johnson and Hendricks – have more than 45 percent of their housing built before 1980 (Figure 1).

In 2016, the ISDH environmental epidemiologist participated in an Environmental Public Health Tracking Network Fellowship under its mentor state, Maine. The full report for the project is available online here. The project plotted all Indiana lead data from 2005 to 2015 into a map. The data were then organized by census tract and compared with data for lead risk factors, such as older housing and income status. The intention of this map is to help local health departments visualize lead risk factors within their geographic areas so that they can apply resources to areas with the highest risk and better identify children exposed to lead.

Figure 2 shows that certain areas may be disproportionately impacted by lead exposures at the sub-county level and helps identify areas in which children are at a greater risk and should be tested. The lead risk map, which will allow a user to insert an address to assess risk, will be made available online in 2017.

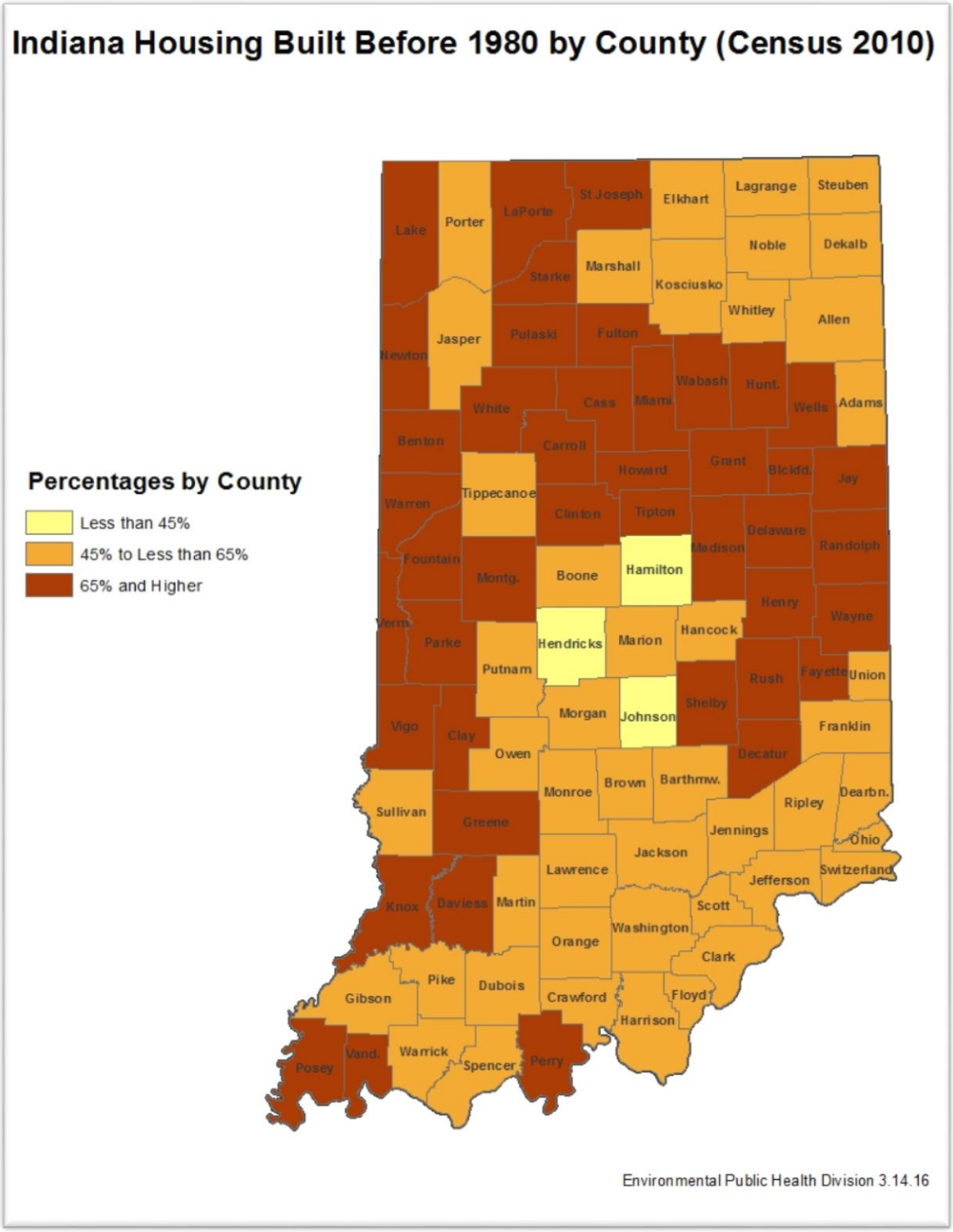
Indiana Housing Built Before 1980 by County (Census 2010)
Percentages by County
Less than 45%
45% to Less than 65%
65% and Higher
Lake
Porter
LaPorte
St Joseph
Elkhart
Lagrange
Steuben
Noble
Dekalb
Marshall
Starke
Kosciusko
Whitley
Allen
Jasper
Pulaski
Fulton
Newton
Wabash
Hunt.
Wells
Adams
White
Cass
Miami
Benton
Carroll
Howard
Grant
Blckfd.
Jay
Warren
Tippecanoe
Clinton
Tipton
Madison
Delaware
Randolph
Fountain
Montg.
Boone
Hamilton
Henry
Wayne
Verm.
Parke
Hendricks
Marion
Hancock
Putnam
Rush
Fayette
Union
Morgan
Johnson
Shelby
Vigo
Clay
Owen
Franklin
Decatur
Monroe
Brown
Barthmw.
Ripley
Dearbn.
Sullivan
Greene
Jennings
Ohio
Jackson
Lawrence
Switzerland
Jefferson
Knox
Daviess
Martin
Scott
Washington
Orange
Clark
Pike
Dubois
Crawford
Floyd
Gibson
Harrison
Vand.
Warrick
Spencer
Perry
Posey
Environmental Public Health Division 3.14.16

Figure 1

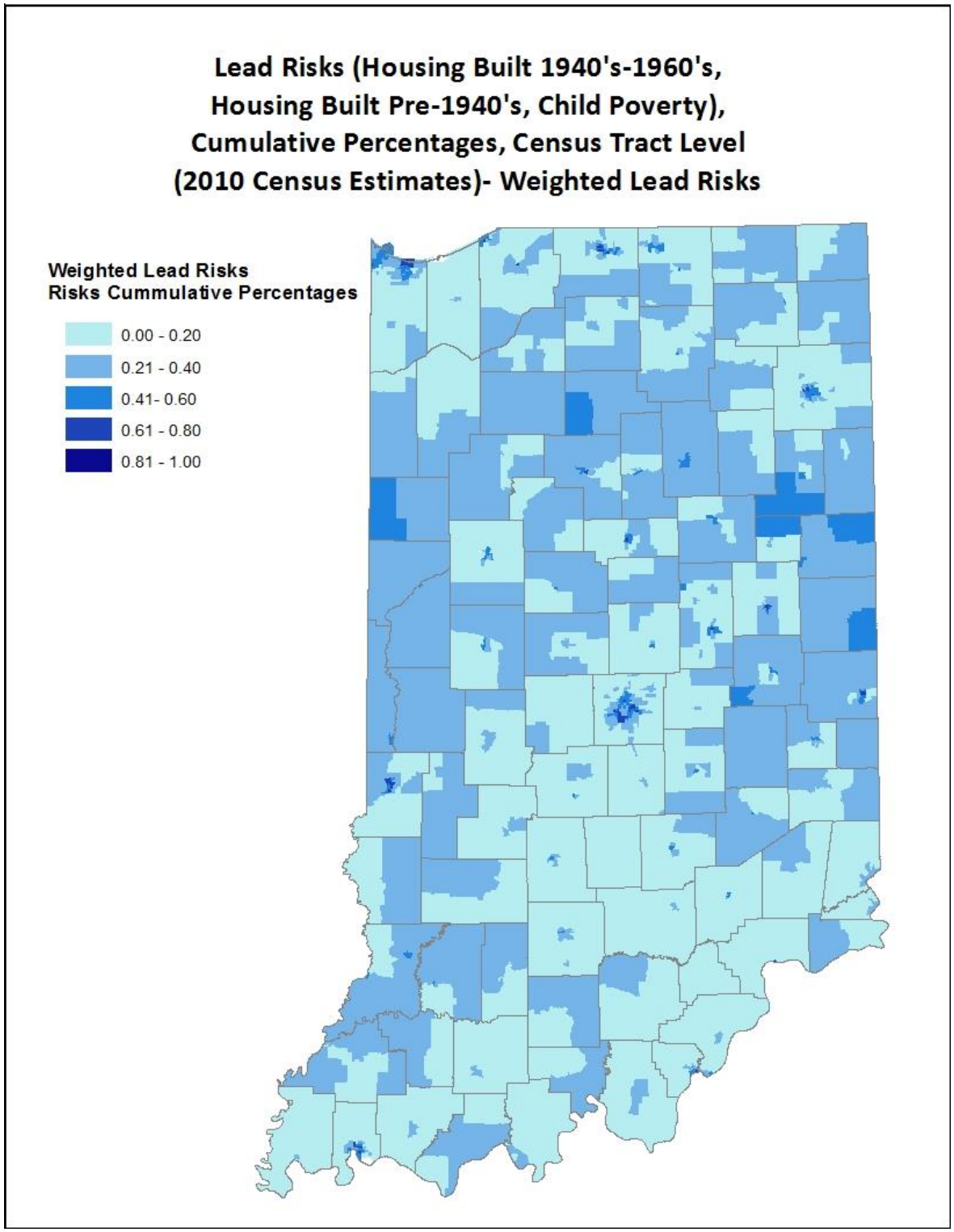
Lead Risks (Housing Built 1940's-1960's,
Housing Built Pre-1940's, Child Poverty),
Cumulative Percentages, Census Tract Level
(2010 Census Estimates)- Weighted Lead Risks
Weighted Lead Risks
Risks Cummulative Percentages
0.00 - 0.20
0.21 - 0.40
0.41- 0.60
0.61 - 0.80
0.81 - 1.00

FIGURE 2

We anticipate that with more targeting to these high-risk areas, more elevated lead levels will be identified at the city, county, and state levels, which would increase the overall percentage of children impacted by lead in Indiana.

Lead exposure remains an environmental threat to children, as well as pregnant women, because many sources of lead contamination still exist in Indiana. The Indiana General Assembly took steps to help eliminate the risk of lead contamination in 2003 through the enactment of 410 IAC 29 for the reporting, monitoring and prevention of elevated blood lead levels, and in 2010 with 410 IAC 32 to formalize and define the requirements of the lead-based paint program in federally funded housing. However, the age of Indiana's housing stock remains a significant risk factor for lead exposure.

Elevated Blood Lead Levels

According to the data from the U.S. Census, the Centers for Disease Control and Prevention (CDC) estimates that 4 million American households with children in them are being exposed to high levels of lead. This amounts to approximately half a million children between the ages of 1 and 5 with blood lead levels above the reference value of 5 μg/dL.

In 2012, the CDC set the blood level of concern and the level at which it recommends initiating public health action at 5 μg/dL. The CDC also has acknowledged that there is no safe level of lead exposure (Centers for Disease Control). While ISDH recommends that local health departments initiate case management at levels of 5 μg/dL, state law requires case management at levels of 10 μg/dL and above. It is important for children who have an initial screening test of 5 μg/dL or higher to receive confirmatory testing so that appropriate public health actions can be initiated.

The percentage of confirmed cases ≥10μg/dL in Figure 4 demonstrates the impact of eliminating lead-based paint and gasoline, as well as outreach and education initiatives at the local, state, and national levels.

Figure 4 illustrates the low occurrence of blood lead levels ≥10μg/dL in the last few years. As average blood lead levels continue to decrease, the reference levels to initiate case management and confirmatory testing should match those new levels.

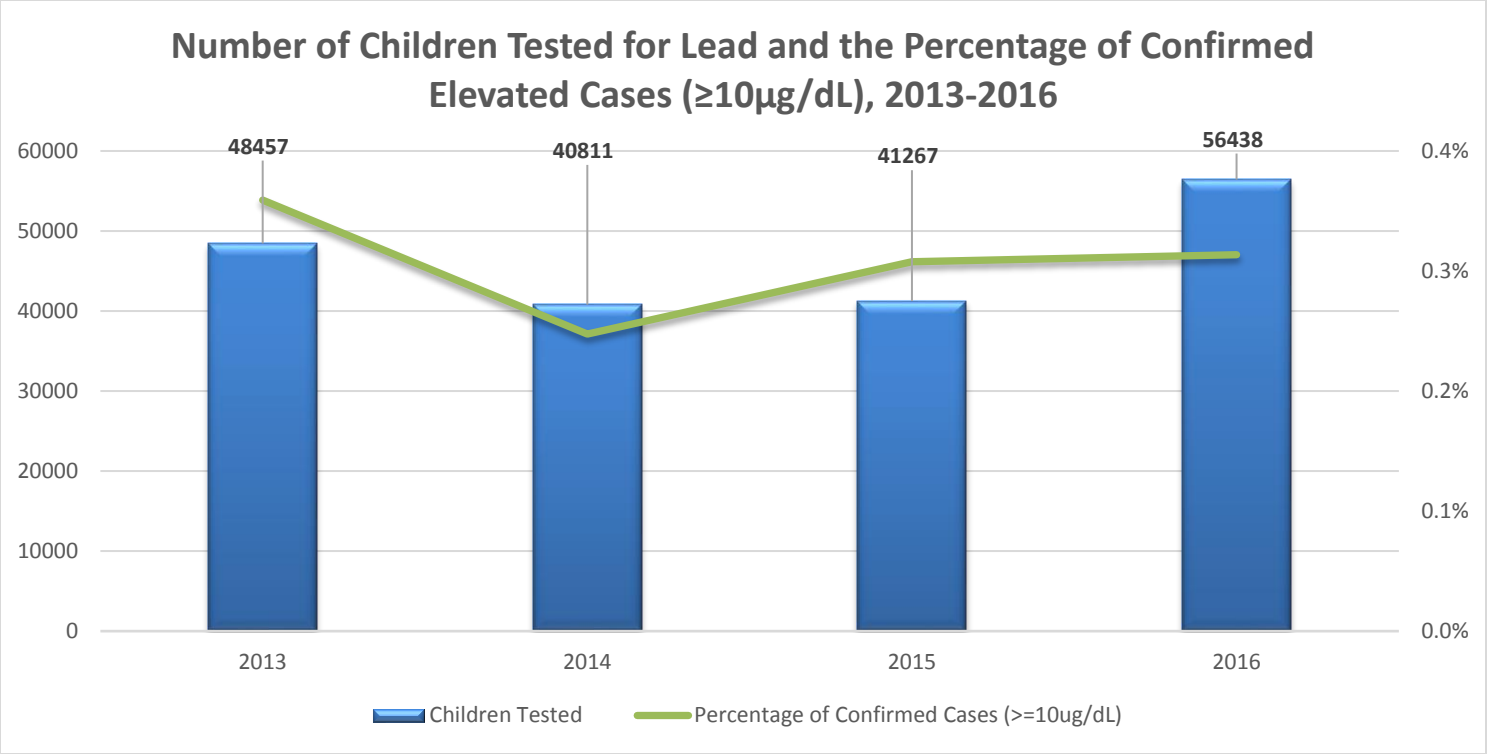

FIGURE 4

Indiana Blood Lead Surveillance

Lead is a reportable disease condition in the State of Indiana. All tests must be submitted to the Indiana State Department of Health. In order to understand the baselines in screening among communities, to identify potential lead hazards in communities, and to provide case coordination to Indiana children with elevated blood lead levels, ISDH must receive the information below per statute (410 IAC 29-3-1 Rule 3. Reporting) :

(1) With respect to the individual whose blood is examined:

A. Full name
B. Date of birth
C. Gender
D. Full address, including street address, city, and ZIP code
E. County of residence
F. Race and ethnicity
G. Parent or guardian's name and phone number, where applicable
H. Any other information that is required to be included to qualify to receive federal funding.

(2) With respect to the examination:

A. The date
B. The type of blood test performed
C. The person's normal limits for the test

D. The results of the test
E. The interpretation of the results of the test by the person who examined the specimen for the presence of lead

Blood lead data is reported to the department electronically via manual entry into the Lead Data Flow database system, through HL7 messages reported electronically to the state, or through fax (if submitting less than 50 results in one calendar year). Indiana will begin collecting surveillance and case management data through the new CDC HLPPS database system in 2017.

The full lead result reporting code can be found here. Please consult the following link for more information about reporting blood lead results: https://secure.in.gov/isdh/files/FINAL(2.0)CD_Reportable_Diseases_List-1-7-2016.pdf.

2016 County Data

Data listed in the table below include the number of children with a screening result of ≥5µg/dL and come from multiple data sources and include some limitations:

- The number of children tested by county includes children with a county listed as part of the address reported with their lead test result and geocoded as that location. While the Indiana State Department of Health strives to include all test results in data reports, children whose test results did not include the required county listing are not included in these numbers.
- The percentage of housing built before 1980 comes from 2000 U.S. Census data. Lead-based paint was banned in 1978, and ISDH therefore uses 1980 as the cutoff based on the census data available.
- The number of risk assessments and hazards identified from a risk assessment is included by county. However, risk assessments can be conducted for children who do not have an elevated blood lead level, and the number of hazards identified may be larger than the number of risk assessments done. Also, according to current Indiana law, risk assessments are not required for children with a BLL of 5-9µg/dL.

2016 County Data

County Name	Children Tested (2016)	% Pre-1980 Housing	# Elevated Tests (≥5µg/dL)	Confirmed Elevated Tests (≥5µg/dL)	Hazards Identified	Risk Assessments
Adams	133	65%	5	*	8	13
Allen	2,873	62%	221	140	106	115
Bartholomew	618	63%	14	8	7	10
Benton	59	80%	5	*	*	*
Blackford	107	72%	14	6	*	*
Boone	383	51%	*	*	*	*
Brown	88	55%	*	*	*	*
Carroll	224	66%	6	*	*	*
Cass	603	79%	35	14	4	7
Clark	1,012	56%	17	11	9	14
Clay	235	69%	6	*	*	*
Clinton	369	76%	13	5	4	5
Crawford	93	59%	*	*	*	*
Daviess	99	67%	*	*	5	11
De Kalb	286	63%	8	*	5	5

Dearborn	235	52%	*	*	2	7
Decatur	195	66%	*	*	8	12
Delaware	744	74%	50	15	3	10
Dubois	46	54%	*	*	*	*
Elkhart	4,474	57%	177	37	14	19
Fayette	183	78%	13	5	0	1
Floyd	403	61%	10	*	6	7
Fountain	108	69%	9	*	1	1
Franklin	198	54%	5	*	*	*
Fulton	81	66%	*	*	*	*
Gibson	250	64%	9	*	*	*
Grant	991	77%	35	17	3	4
Greene	415	65%	*	*	*	*
Hamilton	1,651	24%	13	*	*	*
Hancock	223	48%	*	*	3	6
Harrison	370	50%	*	*	*	*
Hendricks	505	35%	7	*	5	6
Henry	287	78%	22	5	6	8
Howard	577	72%	11	*	6	9
Huntington	184	71%	29	25	5	5

Jackson	342	58%	23	6	3	7
Jasper	118	54%	*	*	*	*
Jay	169	80%	*	*	*	*
Jefferson	169	64%	8	5	7	12
Jennings	92	50%	5	*	*	*
Johnson	625	42%	13	*	*	*
Knox	198	79%	10	*	*	*
Kosciusko	425	60%	9	*	*	*
La Porte	930	70%	33	6	18	24
Lagrange	90	56%	5	*	*	*
Lake	3,897	73%	174	58	84	101
Lawrence	574	60%	5	*	*	*
Madison	1,019	75%	73	8	16	22
Marion	8,303	65%	307	123	107	192
Marshall	303	63%	6	*	*	*
Martin	100	57%	*	*	*	*
Miami	259	75%	12	9	*	*
Monroe	2,118	51%	6	*	2	6
Montgomery	381	71%	7	*	*	*
Morgan	574	54%	8	*	1	4

Newton	63	73%	*	*	*	*
Noble	220	63%	12	*	*	*
Ohio	21	57%	*	*	*	*
Orange	153	58%	*	*	*	6
Owen	317	50%	*	*	*	*
Parke	128	67%	5	*	*	*
Perry	124	70%	*	*	*	*
Pike	22	65%	*	*	*	*
Porter	758	54%	5	*	*	6
Posey	187	67%	6	*	*	*
Pulaski	80	67%	*	*	*	*
Putnam	192	56%	*	*	*	*
Randolph	96	80%	7	*	*	*
Ripley	280	59%	*	*	*	*
Rush	69	76%	5	*	*	*
Scott	200	52%	5	*	*	*
Shelby	90	70%	7	*	*	*
Spencer	146	57%	6	*	*	*
St Joseph	3,141	69%	151	44	46	53
Starke	107	67%	*	*	*	*

Steuben	213	54%	*	*	*	*
Sullivan	129	64%	*	*	*	*
Switzerland	50	51%	*	*	9	12
Tippecanoe	1264	52%	47	18	10	14
Tipton	64	79%	*	*	*	*
Union	74	62%	*	*	10	13
Vanderburgh	1,092	70%	58	32	10	16
Vermillion	181	72%	8	*	*	*
Vigo	1205	73%	50	24	3	4
Wabash	148	75%	8	*	*	*
Warren	36	66%	*	*	*	*
Warrick	265	51%	*	*	*	*
Washington	156	49%	*	*	2	10
Wayne	1,282	79%	86	21	19	25
Wells	195	69%	5	*	*	*
White	214	75%	6	*	*	*
Whitley	252	61%	6	*	*	*
Unknown	3236		38	10		

* means that data less than 5 have been suppressed to protect confidentiality. Risk assessments and hazards identified from I-Lead reporting.

ENDNOTES

The information contained in this report was compiled by the Lead and Healthy Homes Program in compliance with IC 16-41-39.4-5.

REFERENCES

Centers for Disease Control. (n.d.). Retrieved February 9, 2015, from www.cdc.gov: www.cdc.gov/nceh/lead/

Needlemen, S. e. (1990). *British Medical Journal.* Retrieved February 4, 2016, from National Library of Medicine, National Institute of Health: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1663823/

Peter Muenning, M. M. (2009, September 7). *JAMA Pediatrics.* Retrieved February 11, 2016, from JAMA: http://archpedi.jamanetwork.com

Environmental Public Health Tracking (2014, December). *Economic burden of the environment on the health of children in Minnesota.* Retrieved from Minnesota Department of Health: http://www.health.state.mn.us/divs/hpcd/tracking/projects/burden.html

U.S. Census Bureau, P. D. (2016, June). Annual estimates of the resident population by single year of age and sex for the United States, States, Puerto Rice Commonwealth: April 1, 2010 to July 1, 2015 2015 population estimates.

CONTACT INFORMATION:

Indiana State Department of Health

Lead & Healthy Homes Program

100 N. Senate Ave., N855

Indianapolis, IN 46204