State of Illinois
Illinois Department of Public Health

Illinois Lead Program 2018 Annual Surveillance Report

December 2019

IDPH
Illinois Department of Public Health

IDPH
ILLINOIS DEPARTMENT OF PUBLIC HEALTH

December 2019

Dear Colleagues,

The Illinois Department of Public Health (IDPH) is pleased to present the 2018 annual Surveillance Report on the state's childhood lead-poisoning prevention activities. The goals of the Illinois Lead Program are:

- Primary prevention
- Early detection through blood lead testing and surveillance
- Monitoring of children exposed to lead sources and linkage to services

There is no safe level of lead in the body. Childhood lead poisoning is known to contribute to learning disabilities, to developmental delays, to behavioral problems, and other negative health effects.

Gov. JB Pritzker signed Public Act 100-0723 on February 8, 2019, which requires public health intervention at a blood lead level of 5 µg/dL or greater. Case management and environmental investigation services are required to be provided to each child with lead levels ≥5 µg/dL with committed efforts to prevent or to eliminate further exposure.

The burden of Illinois childhood lead poisoning remains one of the highest in the nation. Illinois law requires reporting of all blood lead tests to IDPH. Of the 237,000 children tested in 2018, more than 12,000 had blood lead levels at the Illinois public health intervention level.

Following growing public awareness of water as a source of lead exposure, Illinois law required schools and licensed day care facilities built prior to January 1, 2000 to test their facility's drinking water and submit results to IDPH by December 31, 2018.

This report is intended to serve as a standard public reference for legislators; decision-makers; community-based organizations; city, state, and federal agencies; as well as health professionals, researchers, and all who seek information on Illinois lead poisoning prevention.

The Illinois Lead Program looks forward to a continued collaboration with local health departments and other federal, state, and local partners.

Very truly yours,

Ngozi Ezike, M.D.
Director

Prepared by

Frida D. Fokum, M.S., Ph.D.
Quality Assurance Manager

Tina Estrop, M.A.
Illinois Lead Program Data System Administrator

Kert McAfee
Illinois Lead Program Manager

Ken Mccann, M.A., LEHP
Chief, Division of Environmental Health

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Corresponding Author: Frida Fokum (Frida.Fokum@illinois.gov)

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To report the results of all blood lead tests or for more information about the elimination of childhood lead poisoning, contact the Illinois Lead Program at 866-909-3572 or 217-782-3517 or visit dph.illinoislead.gov
The hearing impaired may dial 800-547-0466

Scope of the Illinois Lead Program Surveillance

- ✓ *Estimate the extent of elevated blood-lead levels among Illinois children*
- ✓ *Monitor and promote the follow-up of children with elevated blood-lead levels*
- ✓ *Identify potential sources of lead exposure*
- ✓ *Help allocate resources for lead poisoning prevention activities*
- ✓ *Provide information for education and policy*

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Acronyms and Symbols used in this Annual Report

ABLR	Adult Blood Lead Registry
ACOG	The American College of Obstetricians and Gynecology
BLL	Blood Lead Level
CDC	U.S. Centers for Disease Control and Prevention
CLIA	Clinical Laboratory Improvement Amendments
CLRQ	Childhood Lead Risk Questionnaire
CPSC	Consumer Product Safety Commission
FDA	U.S. Food and Drug Administration
IDPH	Illinois Department of Public Health
DHS	Illinois Department of Human Services
EBLL	Elevated Blood Lead Level
HFS	Illinois Department of Healthcare and Family Services
HHLPSS	Healthy Homes and Lead Poisoning Surveillance System
HUD	U.S. Department of Housing and Urban Development
IEPA	Illinois Environmental Protection Agency
IHDA	Illinois Housing and Development Authority
IVRS	Illinois Vital Records System
IQ	Intelligence Quotient
LSL	Lead Service Line
MCLG	Maximum Containment Level Goal
OSHA	Occupational Safety and Health Administration
Ppb	Parts per billion
Program	Illinois Lead Program
U.S. EPA	U.S. Environmental Protection Agency
µg/dL	Micrograms per deciliter
WIC	Special Supplemental Nutrition Program for Women, Infants, and Children
≥	Greater than or equal to

Definitions

Act: Illinois Lead Poisoning Prevention Act

Capillary blood draw: Blood samples collected by finger-stick method.

Case management: Any activity that involves coordinating, providing, and overseeing the services required to reduce blood lead levels.

Child: A person under the age of 16. In this report emphasis is placed on children 6 years of age or younger at the time of testing except as otherwise stated.

Code: Illinois Lead Poisoning Prevention Code

Community water system: A public water system that serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents for at least 60 days a year.

Confirmed blood lead level: A blood lead level resulting from a single venous blood test. Elevated capillary blood test results shall be confirmed by a venous test.

Delegate agency: Unit of local government or health department approved by IDPH to carry out provisions of the Act and Code.

Elevated blood lead: Blood lead level ≥5 µg/dL

Evaluation: Administration of Childhood Lead Risk Questionnaire (CLRQ) to parent by a health care provider.

Housing unit: A house, apartment, mobile home, group of rooms, or single room occupied or intended for occupancy (U.S. Census Bureau).

Lead service line: A service line constructed of lead or containing lead.

Non-community water system: A public water system that is not a community water system, that has at least 15 service connections used by non-residents, or regularly serves 25 or more non-resident individuals daily for at least 60 days a year and includes vending machines.

Non-transient non-community water system: A non-community water system that regularly serves the same 25 or more persons at least six months a year.

Percentage of children tested: The number of children tested for blood lead divided by the population of children multiplied by 100 (U.S. Census Bureau).

Service line: Piping from the source of a private water supply on the premises or from the main in the street, alley, or at the curb to,within and about any building or buildings where a person or persons live, work, or assemble. It does not mean water distribution piping in the building or facility (225 ILCS 320/2).

Test: The quantifiable result of a blood lead drawn on a child.

Executive Summary

This is the Illinois Lead Program's 25th annual surveillance report of childhood lead poisoning prevention activities within the state. This report, which covers Program happernings from January through December 2018, is intended to serve as a standard reference for legislators; community-based organizations; city, state, and federal agencies; as well as health care professionals and researchers who seek information on lead poisoning prevention in Illinois.

The Illinois Lead Poisoning Prevention Act [410 ILCS 45], authorizes IDPH's Office of Health Protection, Division of Environmental Health, Lead Program, to promulgate, to administer, and to enforce the Illinois Lead Poisoning Prevention Code (77 IL. Admin Code 845). In 2018, IDPH had grant agreements with 92 delegate agencies to provide case management care for lead-poisoned children in 94 of 102 counties. Additionally, 28 of the delegate agencies also had grant agreements to provide environmental investigation services. In the eight counties with no delegate agency agreements, IDPH provided these services.

Challenge: There is no safe level of lead in the body. Lead poisoning is one of the most prevalent and preventable environmental health hazards. Lead exposure can affect the brain and nervous system. Childhood lead exposure is known to contribute to learning disabilities, developmental delays, and behavioral problems as well as a number of other negative health effects.

Lead burden: The burden of childhood lead poisoning in Illinois remains one of the highest in the nation. In 2018 there were 12,000 Illinois children tested who had elevated blood lead levels (EBLL) ≥5 µg/dL and 4,500 were confirmed by a venous test. Approximately 4,600 children had EBLLs ≥10 µg/dL and 1,100 were confirmed.

Children at highest risk for lead exposure: Those with persistent hand-to-mouth behaviors, access to lead-containing products, and those residing in or frequenting poorly maintained pre-1978 housing. Fifty-nine percent of pre-1978 housing units have lead-based paint and 69% of those have significant lead-based paint hazards.

Mission: The mission of the Program is to eliminate the incidence of childhood and prenatal lead exposure.

Vision: The vision of the Program is to provide a lead-safe environment for all children and pregnant women.

Goals:

- Prevent childhood and prenatal lead exposure through community and health care provider education, and public awareness campaigns
- Identify children and pregnant women exposed to lead, provide prompt interventions to reduce EBLLs, and improve health and developmental outcomes

Funding: The program is currently supported by the Lead Poisoning Screening, Prevention, and Abatement Fund; Illinois State General Revenue Funds; U.S. Centers for Disease Control and Prevention (CDC); and the U.S. Environmental Protection Agency (U.S. EPA).

Key Facts. Illinois 2018 Childhood Blood Lead Surveillance: According to the CDC Wonder national data system, there were an estimated 1.1 million children 6 years of age and younger in Illinois.

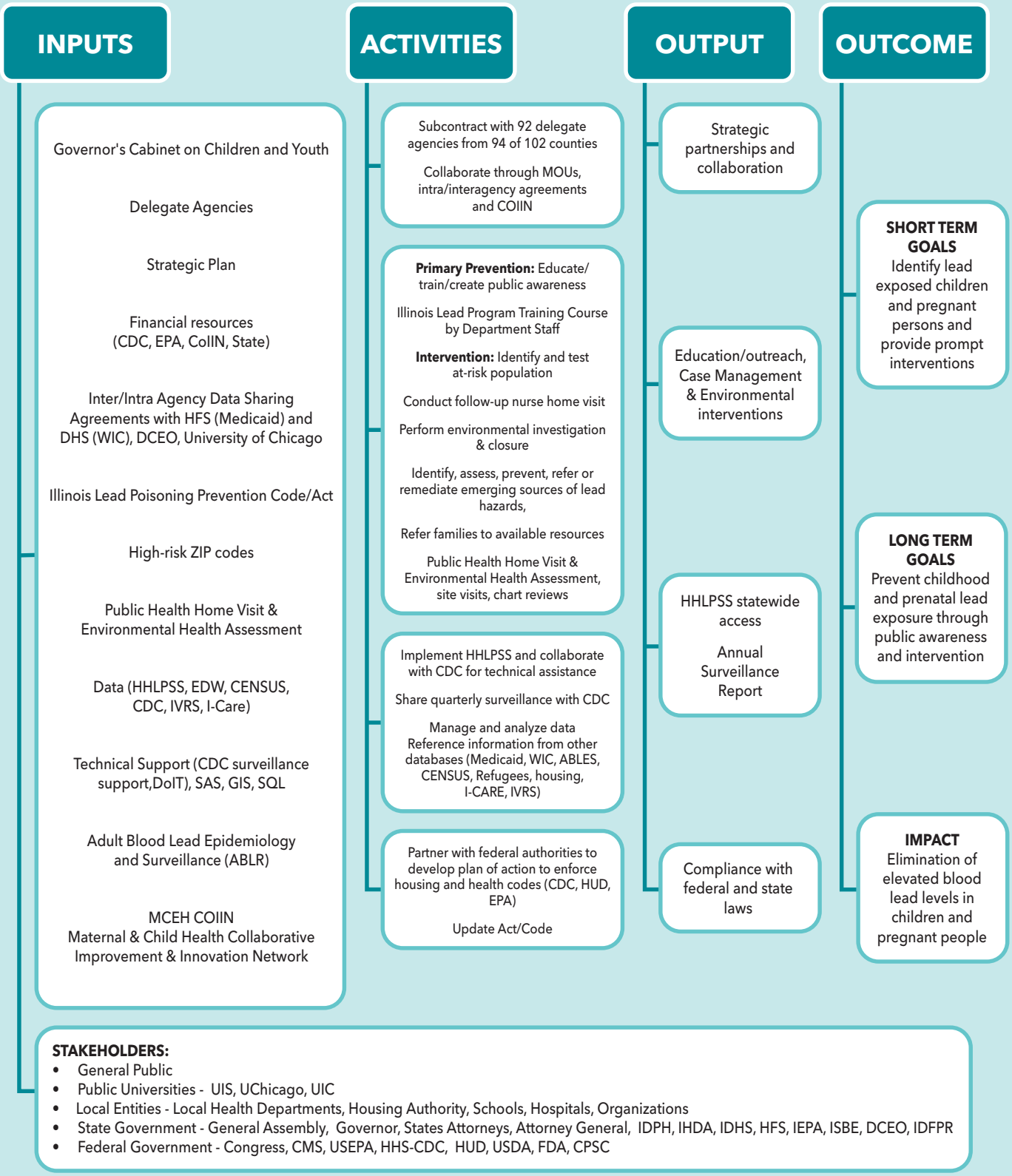
- About 237,000 children 6 years of age and younger were tested. Of children tested, 56% had at least one venous blood lead test.
- Approximately 51% of Illinois children have received a blood lead test at least once in their lifetime.
- Children tested with a confirmed EBLL ≥10 µg/dL totaled 1,120 (approximately 1 in 200).
- BLLs in children averaged 2.0 µg/dL (geometric mean of 1.9 µg/dL).
- Of the 12,000 (approximately 1 in 20) children tested in 2018 with BLLs at the federal reference value ≥5 µg/dL for public health intervention:
  - ➢ 44% had a confirmatory venous test and 56% were capillary tests
  - ➢ 61% were 2 years of age or younger
  - ➢ 55% benefited from programs administered by Medicaid
  - ➢ 36% Black or African American, 31% White, and 33% other
- Approximately 65% of the 5.3 million Illinois housing units were built prior to the lead-paint ban of 1978.

The five goals set for the federal lead strategy are:

1. Reduce sources of lead in children's environments
2. Improve identification and monitoring of lead exposure to children
3. Improve the health of children identified as lead-exposed
4. Communicate effectively and consistently with stakeholders about childhood lead exposure
5. Plan cross-federal research to advance our scientific understanding of the effects, evaluation and control of lead hazards in children's environments.

https://archive.epa.gov/epa/newsreleases/epa-administrator-scott-pruitt-hosts-nations-leaders-discuss-efforts-reduce-childhood.html

Figure 1: Illinos Lead Program Activities and Outcomes

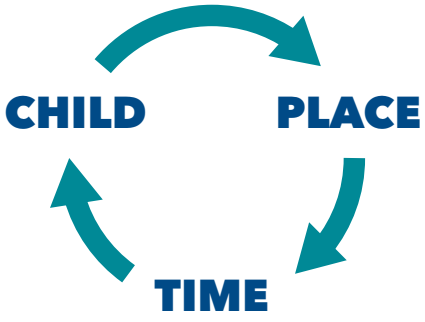


Lead Poisoning

Childhood lead poisoning in Illinois remains one of the highest in the nation

There is no safe level of lead in the body

Lead poisoning can affect a child's ability to think, learn or behave



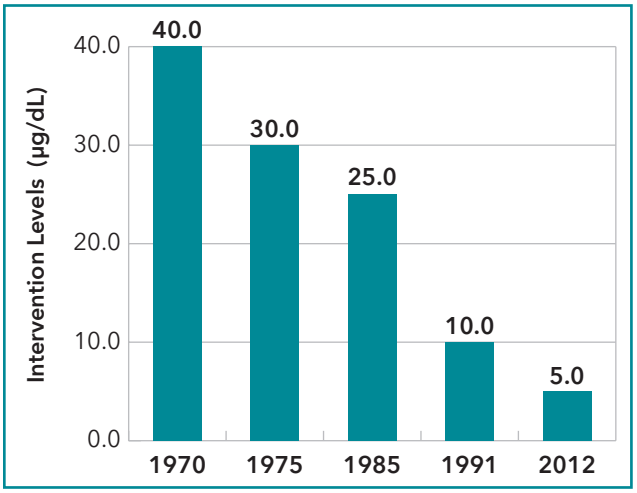
The only way to know if a child is lead poisoned is to get tested

In Illinois, it is estimated that approximately 60,109 children are likely to have elevated blood lead levels (EBLL) above the CDC's reference value…

https://www.law.columbia.edu/sites/default/files/microsites/clinics/health-advocacy/illinois_cba.pdf

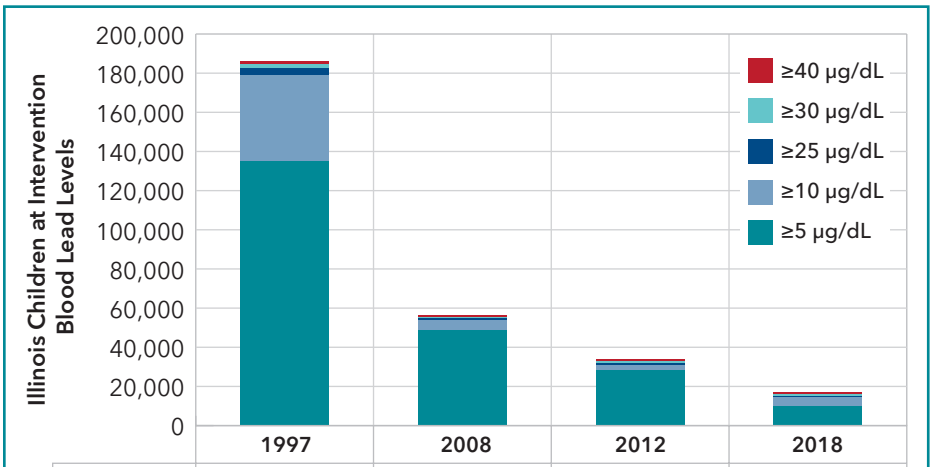
Changes in Blood Lead Levels for Public Health Intervention

Figure 2: CDC Recommended Intervention Levels through the Years



Reference level as established by the CDC is the recommended blood lead level that triggers public health intervention. Figure 2 shows how the intervention level has evolved through the years.

Figure 3: Illinois Children Tested at Different Intervention Levels Through the Years: 1997-2018



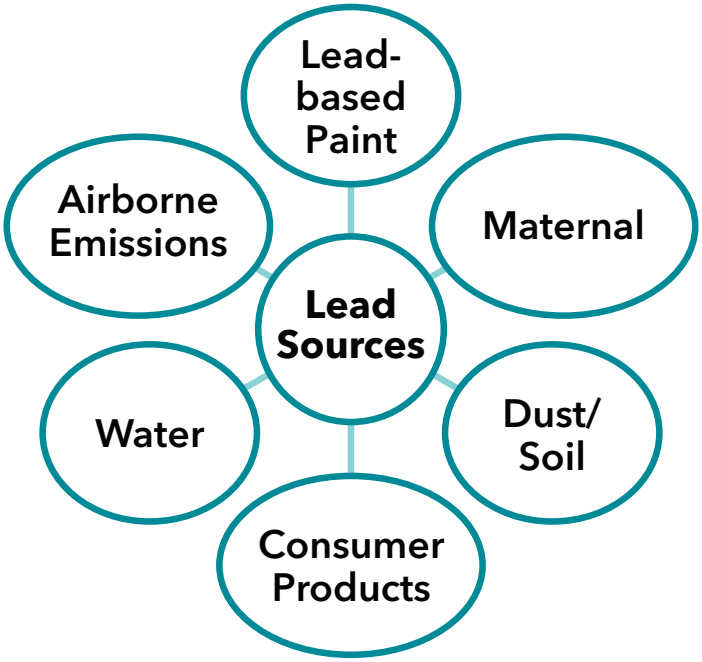
	1997	2008	2012	2018
≥40 µg/dL	654	152	85	62
≥30 µg/dL	1,985	376	201	148
≥25 µg/dL	3,820	619	334	236
≥10 µg/dL	43,683	5,126	3,035	4,586
≥5 µg/dL	135,197	49,571	29,160	10,318

The number of Illinois children with BLLs at intervention levels has decreased with time. In 2018, 62 children had lead levels ≥40 µg\dL compared to 654 children in 1997 (Figure 3).

Regulations that mandated removal of lead from food canning, gasoline, new residential paint, plumbing, and other sources significantly contributed to the decrease in childhood lead poisoning.

Sources of Lead Exposure

Figure 4: Sources of Lead Exposure

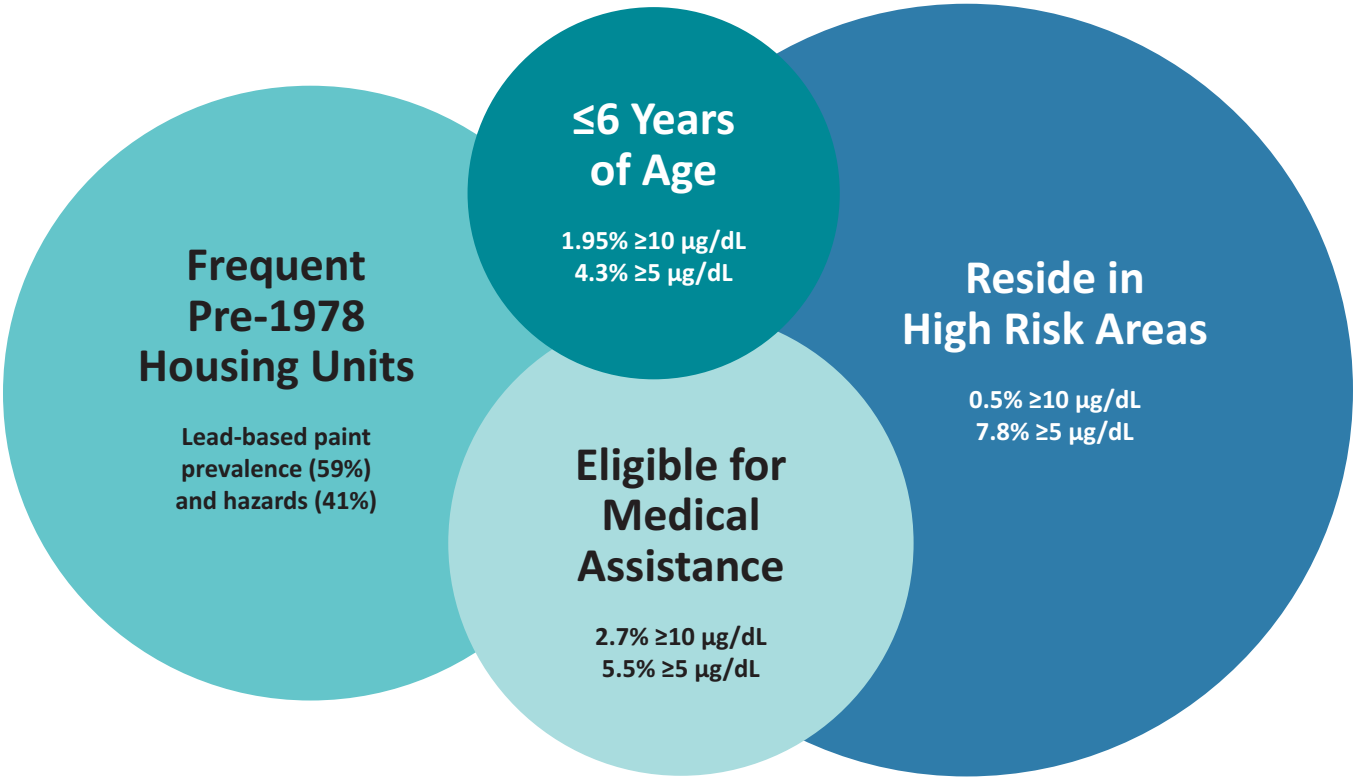


For more information about sources of lead exposure, refer to the following websites

dph.illinois.gov/illinoislead
https://www.atsdr.cdc.gov/csem/csem.html
http://www.epa.gov/lead/pubs/leadpdfe.pdf
https://www.cdc.gov/nceh/lead/tips/sources.htm

Children at Highest Risk for Lead Exposure

Figure 5: Children at Highest Risk for Lead Exposure



Illinois 2017 Kids Count Profile – The Annie E. Casey Foundation
http://www.aecf.org/m/databook/2017KC_profiles_IL.pdf

Illinois 2017 Healthy Housing Fact Sheet
https://nchh.org/resource-library/Healthy-Housing-Fact-Sheet_IL.pdf

Each dollar invested in lead hazard control yields returns between $17-$221, through reduced crime, increased taxable income, lower healthcare costs and other social and economic benefits. (Source: Childhood lead poisoning: conservative estimates of the social and economic benefits of lead hazard control E Gould - Environmental Health Perspectives, 2009 – www.ncbi.nlm.nih.gov)

Lead in Water

By

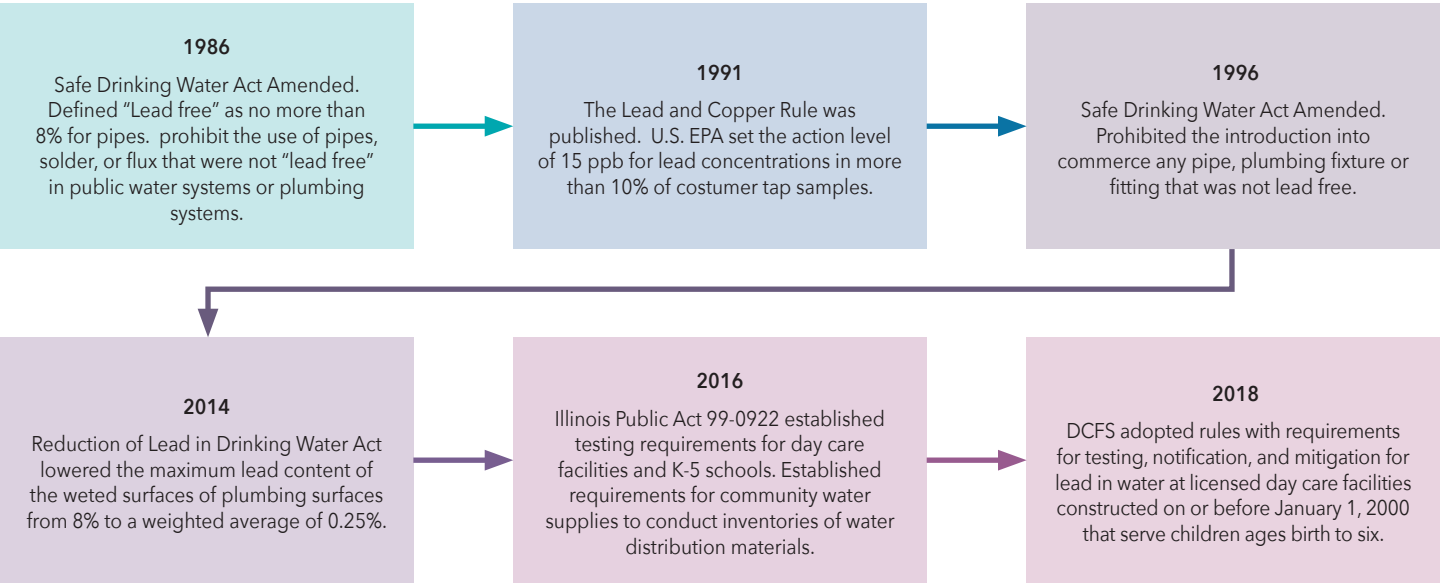
Brian Cox, PE; Darrah Dunlap, MPH; and Jennifer Krick
Plumbing and Water Quality Program - Illinois Department of Public Health

Sources of lead in drinking water

Drinking water is one possible source of lead exposure. While a majority of lead exposures in Illinois come from lead-based paint, U.S. EPA estimates that drinking water can make up 20% or more of a person's total exposure to lead. Infants who consume mostly mixed formula can receive 40 to 60% of their exposure from drinking water. Lead can enter drinking water through plumbing fixtures, solder, and pipes, including:

- Corroded lead service lines
- Brass faucets or fixtures
- Galvanized pipe
- Fixtures or piping with lead solder

Buildings or homes constructed before 1987 are more likely to have lead pipes, fixtures, and solder. In 1986, U.S. EPA amended the Safe Drinking Water Act to prohibit the use of lead pipes, solder, and flux in public water systems and plumbing.



Public Act 99-0922

In 2016, Public Act 99-0922 was passed to address public health concerns associated with lead in drinking water. It amended the Illinois Plumbing License Law, Child Care Act of 1969, and the Environmental Protection Act to initiate a multi-faceted approach to reduce lead in water exposures, especially for young children.

- *Illinois Plumbing License Law (225 ILCS 320/35.5)*
  - In accordance with Public Act 99-0922, Illinois school buildings constructed prior to January 1, 2000 occupied by more than 10 children or students, pre-kindergarten through fifth grade were required to test sources of potable water and submit results of lead in water testing to IDPH by December 31, 2018. As of December 31, 2018, IDPH had received sampling results from 2,366 schools with 2,014 of those determined to have results in compliance with the requirements of Section 35.5 of the Plumbing License Law. A total of 1,796 of the 2,014 schools (89.2%) submitting complete results, detected lead in water from at least one of the sources of potable water sampled.
  - If any sample collected exceeded 5 parts per billion (ppb), schools were required to promptly issue individual notifications to parents or to legal guardians, including information on the sampling location and links to the the U.S. EPA's website on lead in drinking water.
- *Child Care Act of 1969 (225 ILCS 10/5.9)*
  - Public Act 99-0922 amended the Child Care Act of 1969 by requiring testing for lead in water at Illinois Department of Children and Family Services (DCFS)- licensed day cares constructed on or before January 1, 2000 serving children under the age of 6. DCFS passed emergency rulemaking May 9, 2018, which was replaced by a corresponding companion rule effective January 1, 2019, that addressed lead in water at DCFS- licensed day care centers, day care homes, and group day care homes constructed on or before January 1, 2000 that serve children under the age of 6. They included testing and notification requirements, as well as mitigation requirements for fixtures with lead in water results at or above 2.01 ppb. In addition, day care providers must also provide a certificate of completion of lead safety training consisting of instruction in the following topics on mitigation plans for test results of 2.01 ppb or above and the health impacts of lead exposures.
- *Environmental Protection Act (415 ILCS 5/17.11)*
  - In accordance with Public Act 99-0922, Illinois community water systems are required to develop a water distribution system material inventory to be submitted to the Illinois Environmental Protection Agency (IEPA) on an annual basis commencing on April 15, 2018 and continuing on each April 15th thereafter until the inventory is completed. Inventories are required to identify the number of known lead service lines within or connected to the distribution system, including privately owned lead service lines.
  - The following provides a preliminary report, as of November 2018, of what is known about service lines containing lead in Illinois:
    - 1,660 of 1,749 community water supplies have reported inventory information to IEPA.
    - Of the 3,736,666 total service lines reported, 414,895 (11%) were constructed of or contain lead and 318,653 were reported as copper service lines potentially with lead solder.
    - Of the reported inventories, 1,504,784 (40%) service lines were identified as unknown.
  - The new Section additionally requires community water systems to provide individual, written notice to potentially affected residences of construction or repair work on a water main or lead service lines at least 14 days prior to beginning work to repair or to replace lead service lines. Notifications shall at a minimum include the following:

- A warning that the work may result in sediment, possibly containing lead, in the residence's water supply;
- information concerning best practices for preventing the consumption of any lead in drinking water (e.g., flushing pipes and removing aerators); and
- information regarding the dangers of lead for young children.

Lead and Copper Rule (LCR)

Community and non-transient community water supplies are required to monitor concentrations of lead and copper in drinking water at customer taps to comply with the LCR. The U.S. EPA has established an action level of 15 ppb for lead in water. If lead concentrations exceed 15 ppb in more than 10% of customer taps sampled, the water system must take actions to optimize corrosion control.

- In 2018, 193 of 1,757 community water supplies in Illinois were sampled for lead and cooper. Five of these systems were over the 15 ppb lead action level. The water systems were required to make timely notification to all water consumers of the exceedance.
- At the end of 2018, 14 non-transient non-community water systems were over the lead action level. IDPH will continue to engage with these water systems to meet the lead action level and conduct follow-up activities under the LCR.

The 15 ppb action level for a public water system is not a health-based standard. The U.S. EPA action level for lead is utilized as an indicator of the efficacy of the water system's treatment process to minimize the corrosive properties of water provided to consumers. However, an exceedance also triggers requirements for the water system to inform the public about steps they should take to protect their health. U.S. EPA has established a maximum contaminant level goal (MCLG) of zero for lead in drinking water.

Controlling or eliminating lead exposures

Removing any identified sources of lead and following best practices to reduce lead in water is the best strategy to reduce exposure to lead in drinking water.

Best practices to reduce lead in drinking water

- Use only cold water for drinking, cooking, and making baby formula. Boiling water does not remove lead from water.
- Remove or regularly clean faucet aerators. The small screen can trap sediments containing lead.
- Before drinking or cooking, flush cold water through the fixture. The amount of time to run the water will depend on whether your home has a lead service line or not and the length of the lead service line. Residents should contact their water utility for recommendations about flushing times in their community.

Temporary strategies

- Use filters certified for lead removal (NSF/ANSI Standards 42 and 53). After installation, filters should be used, maintained, and replaced in accordance with the manufacturer's specification. The U.S. EPA's consumer tool may be used help to identify appropriate filters.

- Use an alternative source of water for drinking, cooking, and preparing baby formula. If alternative sources of water are used (i.e., bottled water), they should be certified by an independent testing organization for cooking and drinking.

Long-term strategies

- Have drinking water tested. Testing is the only way to confirm if lead is present in drinking water.
- Identify any possible sources of lead. Contact the water utility or a licensed plumber to determine if the pipe that connects a home to the water main (called a service line) is made from lead.
- Remove plumbing materials known or suspected to contain lead. Removing identified or suspected sources of lead is the best strategy to reduce lead concentrations in drinking water. Plumbing fixtures, piping, fittings, and service lines containing lead may be replaced with other "lead free" materials approved under the Illinois Plumbing Code (77 Ill. Adm. Code 890).
- Prioritize replacement of fixtures by frequency of use for cooking, drinking, and making baby formula.
- After removing plumbing fixtures known to contain lead, including service lines, use a filter certified to remove lead to reduce exposures. Construction may cause more lead to be released from the service line or plumbing materials.

Even after employing temporary or long-term strategies, the "Best practices to reduce lead in water" identified above should always be followed.

Lead service line replacement

Research indicates that while various components of a plumbing system including piping, fixtures, and solder add to lead concentrations in water, lead service lines are the largest contributors to lead levels in water (Sandvig et. al 2008).

A study conducted in Washington D.C. found that children living in homes with lead in at least some part of their service lines were twice as likely as those living in homes without a lead service line to have blood lead levels of 5 to 9 µg/L, and three times as likely as those without a lead service line to have levels at or above 10 µg/L (Stokes et al., 2004). Additionally, the study did not find a statistically significant difference between blood lead levels of children from homes with partial versus full lead service lines, indicating that partial lead service line replacements are inadequate at removing the lead exposure.

Potential funding sources

As communities, schools, and day cares develop and implement programs intended to reduce exposure to lead in water, many have searched for potential funding sources. For the period between July 1, 2017 through June 30, 2018, IEPA granted one Illinois community, Galesburg, a $2 million loan to implement a lead service line replacement project. The funding for this loan was provided by the IEPA State Revolving Fund (SRF) and qualified for 100% principal forgiveness. Funding for community lead service line replacement projects continue to be a viable option for many communities seeking assistance.

Additional funding opportunities may be available through other federal programs, state programs, or other organizations. In October 2019, the U.S.EPA Office of Groundwater and Drinking Water published, *Potential Funding Sources for Reducing Lead in Drinking Water in Schools and Child Care Facilities* (EPA 816-B-19-005). This document is a helpful resource to identify other possible funding sources for projects associated with reducing exposures to lead in water.

Regulations to Reduce Lead in Drinking Water

Safe Drinking Water Act: https://www.epa.gov/sdwa

U.S. EPA Lead and Copper Rule: https://www.epa.gov/dwreginfo/lead-and-copper-rule

Additional Resources on Lead in Drinking Water

IDPH - Lead in Water: http://www.dph.illinois.gov/topics-services/environmental-health-protection/lead-in-water

U.S. EPA- Basic Information about Lead in Drinking Water: https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water#reducehome

CDC - Water: https://www.cdc.gov/nceh/lead/tips/water.htm

References

Sandvig, A., Kwan, P., Kirmeyer, G., Maynard, B., Mast, D., Trussell, R.R.,Prescott, A. (2008). Contribution of service line and plumbing fixtures to lead and copper rule compliance issues. Retrieved from https://archive.epa.gov/region03/dclead/web/pdf/91229.pdf.

Stokes L, Onwuche NC, Thomas P, et al., Blood Lead Levels in Residents of Homes with Elevated Lead in Tap Water – District of Columbia, 2004; MMWR Weekly, April 2, 2004, 53(12); 268-270.

According to a 2016 study conducted by the American Water Works Association, Illinois has more LSLs than any other state in the U.S.

Lead Prevalence and Pre-1978 Housing

Older homes with deteriorated lead paint continue to be the primary source of lead exposure in Illinois. Approximately 64% of Illinois housing units were built prior to the residential lead paint ban of 1978. Based on a national survey, 59% of pre-1978 Illinois housing units have lead-based paint, and 41% have significant lead-based paint hazards (Table 1).

Table 1: Estimates of Pre-1978 Housing Units with Lead Hazards in Illinois

		Prevalence of Lead-based Paint2		Significant Lead-based Paint Hazard1	
Year Structure Built	Illinois Estimate	% Prevalence	Illinois Units	% Hazard	Illinois Units with Lead Hazards
1960 to 1977	1,247,506	23.8	296,906	7.7	96,058
1940 to 1959	1,026,517	73.7	756,543	48.7	499,914
Pre-1940	1,164,941	82.6	962,241	68.5	797,985
Pre-1978	**3,438,964**	**58.6**	**2,015,691**	**40.5**	**1,393,956**

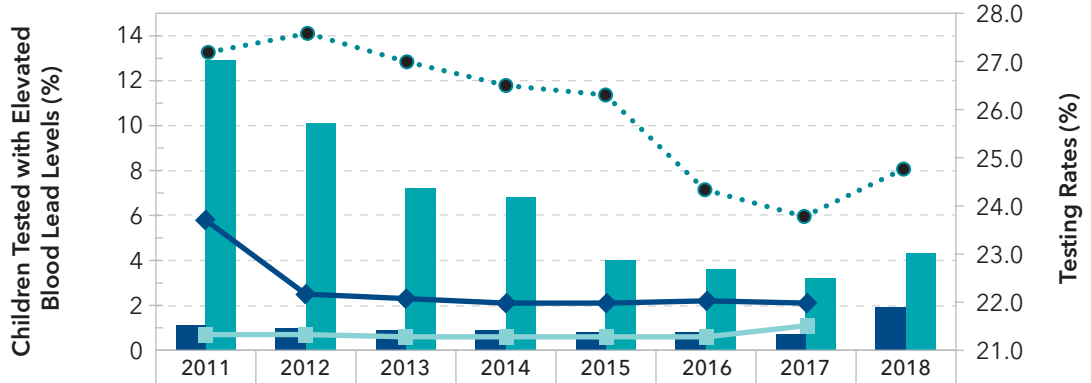
Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-year estimate Year Structure Built Table B25034, [1]Table 5-1 and [2]Table 4-1, American Healthy Homes Survey, 2011: http://portal.hud.gov/hudportal/documents/huddoc?id=AHHS_REPORT.pdf https://nchh.org/resource-library/Healthy-Housing-Fact-Sheet_IL.pdf

For Illinois counties estimates of pre-1978 housing units with lead hazards, click appendix 1 here.

Illinois and U.S. Childhood Blood Lead Prevalence: 2011-2018

Illinois continues to make progress in reducing childhood blood lead exposure. Figure 6 represents the percentage of children 5 years of age and younger at time of testing with BLL ≥10 µg/dL and ≥5 µg/dL, respectively. Illinois BLLs ≥5 µg/dL has significantly decreased from 12.9% in 2011 to 4.3% in 2018.

Figure 6: Illinois and U.S. Children with Elevated Blood Lead Levels 2011 – 2018



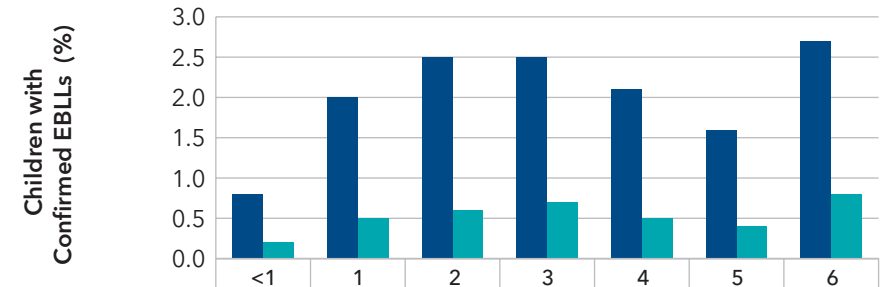
	2011	2012	2013	2014	2015	2016	2017	2018
IL Blood Lead Level ≥10 µg/dL (%)	1.1	1.0	0.9	0.8	0.8	0.7	0.7	1.9
IL Blood Lead Level ≥5 µg/dL (%)	12.9	10.1	7.2	6.8	4.0	3.6	3.2	4.3
US Blood Lead Level ≥10 µg/dL (%)	0.6	0.6	0.5	0.5	0.5	0.5	1.0	
US Blood Lead Level ≥5 µg/dL (%)	5.7	2.4	2.2	2.0	2.0	2.1	2.0	
IL Testing Rate (%)	27.2	27.6	27.0	26.5	26.3	24.3	23.8	24.8

Data Source: Illinois Lead Program Surveillance Data, 2012-2018; Illinois population of 5 years of age and younger from CDC WONDER; the United States average is based on data reported by the CDC at http://www.cdc.gov/nceh/lead/data/national.htm. Note: In order to compare with national data compiled by CDC this figure only includes children 5 years of age and younger.

Blood Lead Levels by Age

Illinois law requires physicians to perform a blood lead test on all children 6 years of age or younger who live in a high-risk area. Of the 4,508 children with confirmed EBLLs ≥10 µg/dL, more than 77% were between the ages of 1 and 3 (Figure 7). Approximately 40% of Illinois children reside in high risk ZIP codes accounting for almost half of children with EBLLs ≥10 µg/dL.

Figure 7: Children with Confirmed Elevated Blood Lead Levels by Age



	<1	1	2	3	4	5	6
≥5 µg/dL (%)	0.8	2.0	2.5	2.5	2.1	1.6	2.7
≥10 µg/dL (%)	0.2	0.5	0.6	0.7	0.5	0.4	0.8

Every child must be evaluated for lead risk. Illinois law also requires parents or legal guardians to provide a statement from a physician or health care provider that the child has been evaluated (and tested if necessary) for lead exposure before attending a licensed daycare, kindergarten, or school.

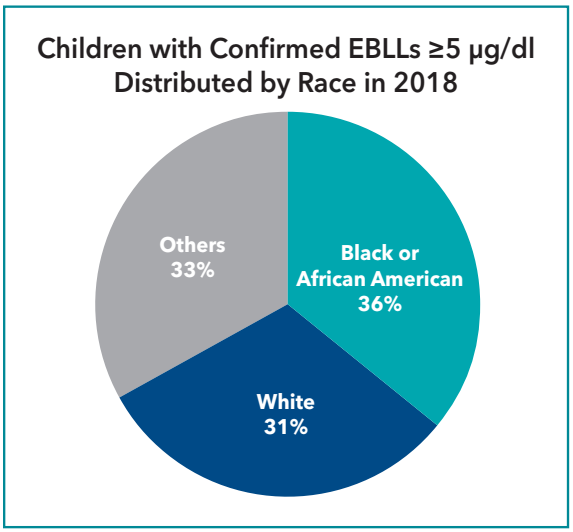
Source: Illinois Department of Public Health – Healthy Homes and Lead Poisoning Surveillance (HHLPSS) Database, 2018. Confirmed EBLLs only include venous blood lead test results.

For more details on blood lead levels by age Appendix 2 on page 42

Blood Lead Levels by Race

Black or African-American children are disproportionately effected by lead poisoning as compared to White chldren. Race status for all children tested identified 34% (79,562) as White, 20% (44,869) as Black or African American, and 46% as other races or unidentified.

Figure 8: Childhood Blood Lead Levels by Race



Of the 4,438 children tested in 2018 with confirmed EBLLs ≥5 µg/dL, 36% were Black or African American, and 31% were White (Figure 8).

Of the 44,869 Black or African American children tested, 3.6% were confirmed ≥5 µg/dL. Of the 79,562 White children tested, 1.7% were confirmed ≥5 µg/ dL.

Data source: Illinois Department of Public Health - Healthy Homes and Lead Poisoning Surveillance System.

For more details on blood lead levels by race/ethnicity, click appendix 3 here

Healthy Homes and Lead Poisoning Surveillance System

During December 2017, IDPH implemented the CDC-sponsored, Healthy Homes and Lead Poisoning Surveillance System (HHLPSS) to replace the previous antiquated blood lead tracking application. HHLPSS is a centralized web-based system that provides more immediate access to test results and collaboration between IDPH and its delegate agencies. HHLPSS provides tools for Program and delegate agencies to track and to manage:

- Blood lead surveillance;
- Environmental investigations, abatement, or mitigation; and
- Case management activities.

Estimated Population and Children Tested for Blood Lead by County and Delegate Agencies

In 2018, BLLs in children ranged from 1.0 µg/dL to 191 µg/dL with a mean/median of 2 µg/dL. The most frequent reading was 1.0 µg/dL. Table 2 reflects the number of children tested in 2018 as well as those retested for follow-up by county, lead level, and blood specimen collection type.

There were 4,597 children 6 years of age and younger identified with a BLL ≥10 µg/dL, and 1,120 (24%) of them were confirmed with a venous test. Of those confirmed, 722 were identified for the first time in 2018.

Approximately 51% of Illinois children have received at least one test in their lifetime (Children Ever Tested as of December 31, 2018 in below chart).

Table 2: Children Tested for Blood Lead by County and Delegate Agencies in 2018

Illinois/ County/ Delegate Agency	Estimated Population 6 Years of Age and Younger[a]	All Children Tested in 2017				All Children Tested in 2018				Children Ever Tested as of December 31, 2018 (%)
		Total Tested 2017	Capillary and Venous in µg/dL (%)[b]			Total Tested 2018	Capillary and Venous in µg/dL (%)[b]			
		N	<5	5-9	≥10	N	<5	5-9	≥10	
Illinois	**1,067,942**	**229,203**	**96.8**	**2.4**	**0.7**	**237,491**	**94.8**	**3.3**	**0.5**	**51**
Adams	5,710	1,306	90.4	7.9	1.8	1,236	92.2	5.2	2.6	74
Alexander	578	96	86.5	8.3	5.2	65	89.2	3.1	7.7	56
Bond	1,147	212	96.7	2.4	0.9	203	83.3	2.5	14.3	74
Boone	4,324	1,020	98	1.3	0.7	1,010	98.4	1.2	0.4	63
Brown	403	77	90.9	6.5	2.6	88	92	6.8	1.1	74
Bureau	2,478	510	93.7	4.3	2	416	94	4.3	1.7	62
Calhoun	338	32	100	0	0	27	100	0	0	30
Carroll	1,020	239	93.7	4.6	1.7	223	93.3	3.1	3.6	74
Cass	1,132	254	92.9	6.3	0.8	283	91.5	6.4	2.1	87
Champaign	15,943	1,687	99.2	0.5	0.3	1,778	98.9	0.8	0.3	44
Christian	2,352	593	97.8	1.7	0.5	502	97	2.4	0.6	75
Clark	1,315	274	97.8	2.2	0	251	96.8	3.2	0	77
Clay	1,135	292	91.4	7.5	1	287	95.1	4.5	0.3	84
Clinton	3,043	344	98	1.5	0.6	396	98.2	1.3	0.5	47
Coles	3,469	851	97.2	2.5	0.4	799	96.6	2.5	0.9	83
Cook w/o Chicago	198,613	41,159	98.2	1.3	0.4	41,099	97.7	1.9	0.4	48
Chicago	242711	84,209	97.3	2.1	0.6	88,748	95	4.4	0.6	43
Crawford	1,419	243	95.9	2.9	1.2	269	95.9	3.3	0.7	65
Cumberland	913	164	95.7	3	1.2	158	97.5	2.5	0	59
DeKalb	8,353	1,302	97.8	1.5	0.6	1,266	96.4	2.1	1.5	49
DeWitt	1,183	212	91	8.5	0.5	198	92.9	7.1	0	66
Douglas	1,758	255	96.9	2.4	0.8	271	96.3	3.3	0.4	56
DuPage	77,364	7,119	98.4	1.2	0.4	7,728	98.3	1.2	0.5	34
Edgar	1,262	304	93.8	4.6	1.6	347	93.9	4	2	83
Edwards	523	95	97.9	1.1	1.1	129	86	4.7	9.3	73
Effingham	3,158	508	97.2	2.2	0.6	490	98.4	1.2	0.4	47

Illinois/ County/ Delegate Agency	Estimated Population 6 Years of Age and Younger[a]	All Children Tested in 2017				All Children Tested in 2018				Children Ever Tested as of December 31, 2018 (%)
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Fayette	1,717	344	96.8	3.2	0	308	96.8	2.6	0.6	67
Ford	1,121	169	92.9	5.3	1.8	187	95.7	3.7	0.5	56
Franklin	3,250	722	95.2	4	0.8	564	96.6	2.5	0.9	58
Fulton	2,437	382	94.5	4.2	1.3	340	91.8	5.3	2.9	56
Gallatin	367	74	97.3	2.7	0	106	97.2	1.9	0.9	83
Greene	1,000	219	96.3	2.7	0.9	258	93.4	4.3	2.3	80
Grundy	4,530	517	94.6	4.8	0.6	681	96.3	2.8	0.9	39
Hamilton	633	119	97.5	2.5	0	110	97.3	2.7	0	65
Hancock	1,364	241	92.1	7.9	0	235	91.9	6.4	1.7	71
Hardin	234	41	100	0	0	31	96.8	3.2	0	54
Henderson	461	78	96.2	3.8	0	65	100	0	0	55
Henry	3,957	800	91.3	7.3	1.5	754	91.6	6.9	1.5	71
Iroquois	2,136	338	94.7	3.6	1.8	317	95.3	2.5	2.2	62
Jackson	4,311	964	98	1.8	0.2	891	98.9	0.9	0.2	73
Jasper	795	103	97.1	2.9	0	89	96.6	3.4	0	44
Jefferson	3,341	589	95.8	4.1	0.2	451	95.8	3.1	1.1	61
Jersey	1,582	383	95.6	3.9	0.5	346	98.8	0.9	0.3	79
Jo Daviess	1,326	327	95.7	3.7	0.6	324	96	2.8	1.2	64
Johnson	828	131	95.4	0.8	3.8	105	96.2	2.9	1	55
Kane	47,944	11,918	97.2	2.2	0.6	10,792	97.2	2	0.7	60
Kankakee	9,097	2,181	96.1	3	0.9	2,366	95.6	3.4	1.1	69
Kendall	12,587	678	98.5	1.5	0	783	98.6	1.3	0.1	21
Knox	3,858	487	83.2	12.9	3.9	443	86	9.5	4.5	66
Lake	57,758	7,488	98.4	1.3	0.4	6,983	77.3	1.2	21.4	41
LaSalle	8,557	1,566	94	4.1	1.9	1,686	94.3	3.7	2	60
Lawrence	1,136	243	93.4	2.9	3.7	244	94.7	2.9	2.5	83
Lee	2,498	352	97.7	2	0.3	429	97	2.3	0.7	39
Livingston	2,770	557	96.8	2.9	0.4	565	94	4.8	1.2	68
Logan	2,083	325	95.1	4.3	0.6	352	96.3	3.1	0.6	64
McDonough	1,889	387	93.5	4.1	2.3	330	93.9	4.2	1.8	73
McHenry	24,297	1,986	98.4	1.3	0.3	2,620	98.6	1.1	0.3	29
McLean	14,236	2,915	95.6	3.4	1	2,839	96.2	2.9	0.9	65
Macon	8,925	2,655	90.3	7.7	2	2,585	90.4	7.6	2	60
Macoupin	3,381	586	93.9	4.1	2	661	91.7	5.7	2.6	67
Madison	21,552	3,799	97.2	2.1	0.7	3,601	97	2.3	0.7	57
Marion	3,403	874	95.4	4	0.6	669	96.1	3.1	0.7	76
Marshall	826	112	83	12.5	4.5	104	83.7	13.5	2.9	68
Mason	979	238	83.2	12.6	4.2	297	87.9	7.4	4.7	74
Massac	1,068	153	96.7	3.3	0	119	95.8	4.2	0	45
Menard	951	112	92	7.1	0.9	132	94.7	3	2.3	44
Mercer	1,127	265	94.7	2.6	2.6	240	92.9	6.3	0.8	72

Illinois/ County/ Delegate Agency	Estimated Population 6 Years of Age and Younger[a]	All Children Tested in 2017				All Children Tested in 2018				Children Ever Tested as of December 31, 2018 (%)
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		N	<5	5-9	≥10	N	<5	5-9	≥10	
Illinois	**1,067,942**	**229,203**	**96.8**	**2.4**	**0.7**	**237,491**	**94.8**	**3.3**	**0.5**	**51**
Monroe	2,732	253	97.6	2	0.4	318	97.8	1.6	0.6	48
Montgomery	2,075	426	96.9	2.6	0.5	416	97.4	1.7	1	73
Morgan	2,333	574	93.7	4.5	1.7	714	92.7	5.3	2	89
Moultrie	1,400	216	97.7	0.9	1.4	168	95.2	4.8	0	45
Ogle	3,983	533	97	2.4	0.6	416	95.9	2.9	1.2	15
Peoria	17,155	2,126	86.5	10.1	3.4	2,523	43.3	6	50.7	62
Perry	1,467	319	93.1	6	0.9	319	93.4	6.3	0.3	71
Piatt	1,371	142	97.2	2.1	0.7	133	94.7	4.5	0.8	44
Pike	1,304	298	94	4.4	1.7	290	95.5	4.1	0.3	81
Pope	158	25	100	0	0	35	97.1	0	2.9	68
Pulaski	455	62	96.8	3.2	0	58	94.8	3.4	1.7	47
Putnam	406	70	100	0	0	66	98.5	1.5	0	45
Randolph	2,351	388	98.2	1.8	0	468	97.6	1.9	0.4	65
Richland	1,477	225	92.9	5.8	1.3	250	95.2	4	0.8	50
Rock Island	12,437	2,674	93.6	4.6	1.8	2,778	93.2	5.2	1.6	76
St. Clair w/o ESHD	17,423	2,443	97.8	1.7	0.5	1,436	94.5	3.7	1.8	9
Saline	2,059	518	95.9	2.7	1.4	463	96.1	2.2	1.7	82
Sangamon	15,632	2,704	94.1	4.8	1.1	2,749	95.1	3.9	1	59
Schuyler	405	94	96.8	1.1	2.1	88	93.2	2.3	4.5	81
Scott	363	88	89.8	8	2.3	85	96.5	2.4	1.2	92
Shelby	1,734	291	97.3	2.4	0.3	281	96.8	2.5	0.7	59
Stark	423	79	84.8	11.4	3.8	86	86	7	7	87
Stephenson	3,431	1,132	88.6	8.1	3.3	1,074	89	7.3	3.7	92
Tazewell	10,881	443	90.1	6.8	3.2	579	91	5.2	3.8	46
Union	1,248	187	96.3	3.2	0.5	93	97.8	1.1	1.1	51
Vermilion	6,922	1,337	95.7	3.5	0.8	1,229	95.7	3.8	0.5	71
Wabash	1,030	183	94.5	3.8	1.6	234	72.2	2.6	25.2	73
Warren	1,474	275	88.7	7.6	3.6	282	88.7	7.4	3.9	74
Washington	1,114	136	98.5	1.5	0	210	94.8	2.9	2.4	50
Wayne	1,452	273	95.6	4	0.4	262	93.1	4.2	2.7	70
White	1,113	202	94.1	5	1	212	95.3	2.8	1.9	72
Whiteside	4,387	1,000	94.6	4.3	1.1	979	95.2	3.6	1.2	76
Will	58,188	9,370	97.8	1.8	0.4	8,638	97.7	1.9	0.4	44
Williamson	5,577	1,093	93.3	5.7	1	870	93.9	4.7	1.4	53
Winnebago	25,174	6,240	95.8	3	1.1	5,694	96.1	2.9	1	67
Woodford	3,206	214	94.9	4.7	0.5	226	95.1	3.5	1.3	49
Egyptian[1]	3,539	794	95.6	3.3	1.1	781	96	2.3	1.7	79
ESHD[2]	5,646	2,795	95.9	3.5	0.6	4,188	97.1	2.3	0.6	
Evanston	5,806	1,621	98.2	1.2	0.6	1,528	97.8	1.6	0.5	84

Illinois/ County/ Delegate Agency	Estimated Population 6 Years of Age and Younger[a]	All Children Tested in 2017				All Children Tested in 2018				Children Ever Tested as of December 31, 2018 (%)
		Total Tested 2017	Capillary and Venous in µg/dL (%)[b]			Total Tested 2018	Capillary and Venous in µg/dL (%)[b]			
		N	<5	5-9	≥10	N	<5	5-9	≥10	
Illinois	**1,067,942**	**229,203**	**96.8**	**2.4**	**0.7**	**237,491**	**94.8**	**3.3**	**0.5**	**51**
Oak Park	4,737	865	96.5	2.9	0.6	924	94.7	4.1	1.2	67
Skokie	5315	1,118	98.1	1.4	0.4	1,066	97.9	0.8	1.2	59
Southern Seven[3]	4,569	695	95.3	3.2	1.6	506	95.5	2.7	1.8	52
Stickney	716	114	99.1	0.9	0	593	98.7	1.2	0.2	

Data source: Illinois Department of Public Health – Healthy Housing and Lead Poisoning Surveillance System, HHLPSS 2018.

[a] Population data compiled from bridged-race Vintage 2018 (2010-2018) postcensal population estimates (released on 6/25/2019) available on CDC WONDER Online Database accessed at https://wonder.cdc.gov/bridged-race-v2018.html on Aug 13, 2019

[b] Capillary or venous blood draw. cConfirmed test in Illinois is a venous blood draw. Actual numbers are available at IDPH. Due to rounding, decimals may not add up perfectly.

[1] Egyptian Counties: Galatin, Saline, and White

[2] ESHD or East Side Health District includes the cities of Alorton, Brooklyn, Cahokia, Centreville, East St. Louis, Lovejoy, National Stock Yards, Sauget, Washington Park and Fairmont City. Source: U.S. Census Bureau, 2010 Census. Single Years of Age and Sex: Summary File 1, Table PCT12. QT-P2

[3] Southern Seven Counties: Alexander, Hardin, Johnson, Massac, Pope, Pulaski and Union

In 2018, most laboratories that analyzed blood lead were able to quantify and accurately report levels <5µg/dL compared to previous years. While the current acceptable error range is ±4µg/dL, most laboratories that do blood lead analyses perform at an error range within ±2µg/dL. The portable desktop blood-lead analyzers operate within ±3µg/dL error range. As required by the Act (410 ILCS 45/7), all health care providers are required by law to report all blood lead test results to IDPH, regardless of BLL. If a child has multiple tests, the highest venous result is selected. If there is no venous test on a child, the peak capillary blood lead result is selected.

In 2018, 58% of Illinois children tested were 2 years of age or younger and accounted for 63% of the children with BLLs ≥10 µg/dL. Based on the children 2 years of age or younger tested, 54% of Illinois counties and/or delegate agencies had blood lead prevalence above the state average, ranging from 0.9 to 6.0%. Positively, 24 counties/delegate agencies had no child younger than 3 years of age with BLLs ≥10 µg/dL.

For Illinois counties estimates of pre-1978 housing units with lead hazards, click appendix 1 here.

For details on blood lead testing activities in Illinois, Chicago, and the United States, click appendix 4 here

For new confirmed cases identified for the first time in 2018 click appendix 5 here

Societal Cost of Lead Poisoning in Illinois

--one cohort of children ages 1 to 2 years old who are estimated to have EBLLs above the CDC reference value, the costs could be as high as $699,115,749.73

- *$812,959.40 in costs associated with immediate medical intervention*
- *$2,408,258.43 in costs associated with treatment of lead-related ADHD*
- *$2,035,516.79 in parental work loss due to time taken off to care for child with an EBLL above 5 µg/dL*
- *$2,758,371.30 in costs associated with additional special education services for children with lead poisoning*
- *$691,100,643.81 in potential earnings over a lifetime.*

https://www.law.columbia.edu/sites/default/files/microsites/clinics/health-advocacy/illinois_cba.pdf

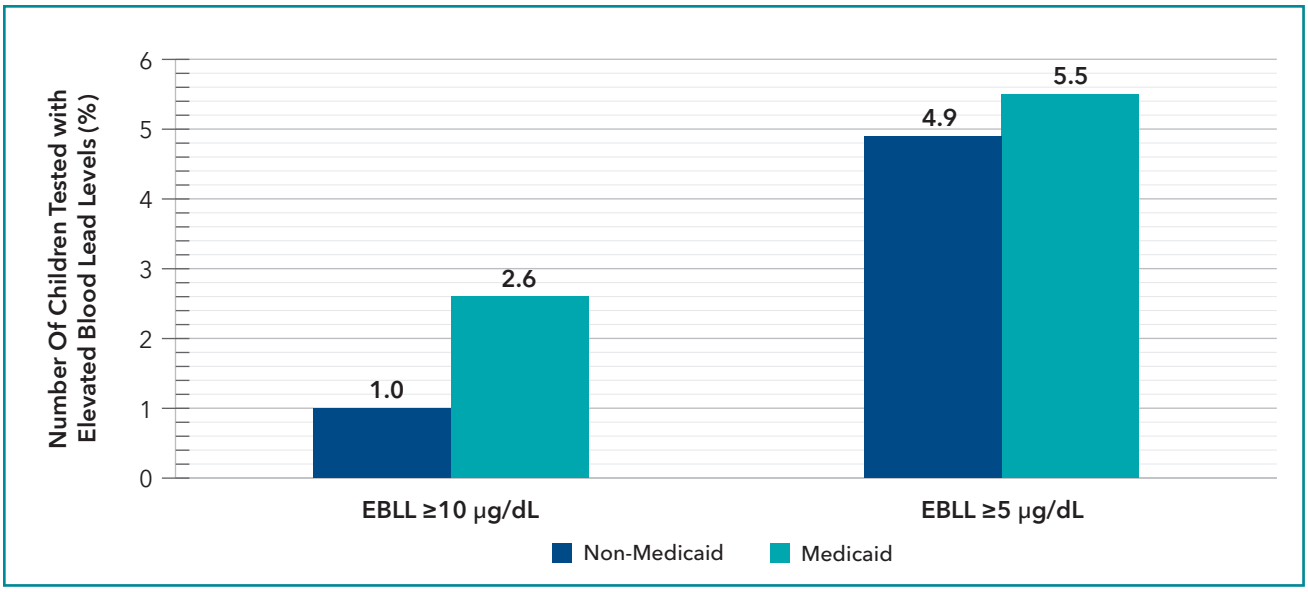
Lead Levels of Children by Medicaid Status

Medical assistance programs refer to the authorized Social Security Acts of Title XIX that include Medicaid, All Kids, and Moms & Babies, which are administered by HFS.
https://www.illinois.gov/hfs/MedicalPrograms/AllKids/Pages/default.aspx

State and federal mandates require all children enrolled in HFS' medical programs be considered at-risk for lead exposure and receive a blood lead test prior to 12 and 24 months of age. If a child is 3-6 years of age and has not been tested, a blood lead test is required. All children enrolled in HFS medical programs are expected to be tested regardless of where they live.

Of all children tested, 55% were Medical Assistance Program recipients in 2018. Of the Medicaid recipients tested, 5.5% had lead levels ≥5 µg/dL compared to 4.9% for non-recipients. Of all children tested in 2018 with BLLs ≥5 µg/dL, 58% were Medicaid-enrolled and 42% were non-Medicaid. Figure 9 highlights the difference between elevated blood lead levels based on Medicaid eligibility status.

Figure 9: Medicaid and Non-Medicaid Children Tested with Elevated Blood Lead Levels in 2018



Data source: Illinois Department of Public Health - HHLPSS and the Illinois Department of Healthcare and Family Services Enterprise Data Warehouse

For Medicaid and non-Medicaid enrolled children tested for blood lead by county click appendix 6 here

For more information on providers who test for blood lead go to:
https://www.illinois.gov/hfs/MedicalProviders/NonInstitutional/Pages/ProviderBloodLead.aspx

Blood Lead Levels in Refugee Children

IDPH Minority Health's Refugee Health Assessment Program monitors the testing of refugee children for blood lead exposure following CDC guidelines as part of the initial domestic refugee health assessment.

Table 3: BLLs in Refugee Children ≤6 Years of Age in 2018

Number of Refugee Children	N	%
Total number of refugee children who completed the initial health assessment	156	
Children who completed the initial health assessment including a blood lead test	141	90.38
BLL ≥5 µg/dL	31	21.98

Data source: Illinois Department of Public Health – Center for Minority Health, 2018

In 2018, there were 156 refugee children 6 years of age and younger at the time of testing who completed the initial health assessment in Illinois. Of those assessed, 141 children had blood lead results recorded in the IDPH Refugee Health Assessment Database and 31 of these children had an EBLL (Table 3). Case management services and environmental assessments were conducted by delegated agency staff for children with confirmed EBLLs ≥5 µg/dL. In collaboration with IDPH, these delegate agencies provided outreach and education to health care providers, families of lead-exposed children, and the general public.

Screening for Lead during the Domestic Medical Examination for Newly Arrived Refugees
https://www.cdc.gov/immigrantrefugeehealth/guidelines/lead-guidelines.html

Guidelines for the US domestic medical examination for newly arriving refugees
https://www.cdc.gov/immigrantrefugeehealth/guidelines/domestic/domestic-guidelines.html

Illinois RefugeeHealth Program
http://dph.illinois.gov/sites/default/files/publications/publicationscmh2015-refugee-program-ar.pdf

Beware of lead in some cultural products, i.e.: pay-loo-ah, daw tway gaw mo, greta, azarcon, litargirio, surma, tiro (tozali or kwalli), lozeena, tamarind, lead-glazed ceramics, make-up and beauty products.

Adult Blood Lead Registry

The Program and Adult Blood Lead Registry (ABLR) comprise the Illinois blood lead surveillance (Figure 10).

Figure 10: Illinois Blood Lead Surveillance Programs

The Adult Blood Lead Registry (ABLR), maintained by the IDPH Division of Epidemiologic Studies, collects blood lead data for adults 16 years of age and older and notifies federal enforcement agencies to trigger inspections and/or interventions. In calendar year 2018, ABLR made six referrals to the Occupational Safety and Health Administration (OSHA) for six companies with employees who had BLL ≥40 ug/dL.

Illinois Health and Hazardous Substances Registry Annual Reports:
http://dph.illinois.gov/sites/default/files/publications/publicationsoppsfy17-ihhsr-annual-report.pdf

Illinois Health and Hazardous Substances Registry Annual Reports,Section 5.1:
http://dph.illinois.gov/sites/default/files/publications/publicationsoppsfy16-ihhsr-annual-report.pdf

Distributions and Trends in Elevated Blood Lead Levels in Adults – Illinois, 2005-2017
http://dph.illinois.gov/sites/default/files/publications/publicationsoppsimmb-vol-4-issue-1.pdf

Data on 14,000 adults showed that an increase of 1 to 6.7 micrograms of lead per deciliter of blood (5 µg/dL) was significantly associated with an increase in mortality of 37% for all-causes, 70% for cardiovascular, and 108% for ischemic heart disease. Lanphear et al., 2018

For information on the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), read WIC Participation and Blood Lead Levels among Children 1–5 Years: 2007–2014 https://ehp.niehs.nih.gov/EHP2384/

Blood Lead Testing During Pregnancy

Exposure to lead is a serious health concern, especially for an unborn baby. Lead is stored in bone and previous lead exposure in the mother can remain in the body and be passed to the baby during pregnancy resulting in:

- Baby to be born too early or too small
- Miscarriage
- Damage to baby's developing brain, kidneys, and nervous system
- Learning and behavior problems for child after birth
  http://dph.illinois.gov/sites/default/files/publications/leadpregnancy.pdf

Each 1 µg/dL increase in umbilical cord blood lead has been found to be associated with a reduction of 0.6 points in the mental development index scores of the Bayley Scales of Infant Development at age 3 months, with similar results at age 6 months (Dietrich et. al. 1987).

In October 2015, the Program started collecting blood lead data for pregnant women in accordance with Section 6.2 of the Act. http://www.ilga.gov/legislation/ilcs/ilcs3.asp?ActID=1523&ChapterID=35

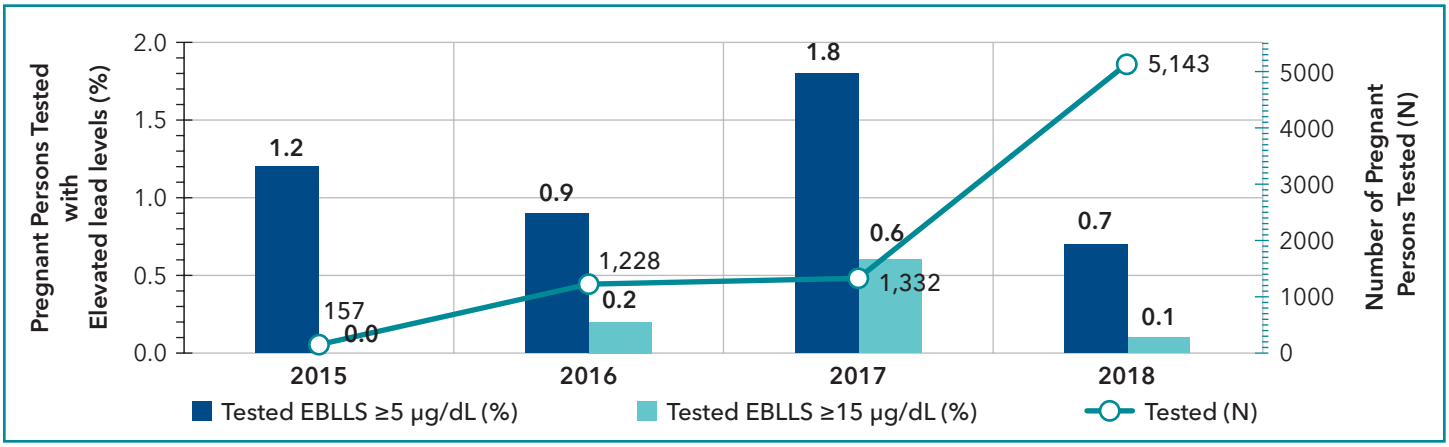
Prenatal blood lead data collected from October 2015 to December 2018 is displayed on Table 4 and figure 11.

Table 4: Prenatal Blood Lead Levels: 2015-2018

Prenatal Women Tested	Mean Age (Years)	Age Range (Years)	Prenatal BLLs <5 µg/dL (N)	Prenatal BLLs ≥5 µg/dL (N)	Prenatal BLLs ≥5 µg/dL(%)
7,860	27	14 - 52	7,791	69	0.9

Data source: Illinois Department of Public Health - HHLPSS. This is an ongoing study.

Figure 11: Prenatals Tested and Reported to IDPH with Elevated Lead Levels: 2015-2018



Data source: Illinois Department of Public Health - HHLPSS. This is an ongoing study.

More information

Stotland NE, Sutton P, Trowbridge J, Atchley DS, Conry J, et al. (2014) Counseling Patients on Preventing Prenatal Environmental Exposures - A Mixed-Methods Study of Obstetricians. https://www.researchgate.net/publication/263394111_Counseling_Patients_on_Preventing_Prenatal_Environmental_Exposures_-_A_Mixed-_Methods_Study_of_Obstetricians

CDC. Guidelines for the identification and management of lead exposure in pregnant and lactating women. Atlanta (GA): CDC; 2010. Available at: http://www.cdc.gov/nceh/lead/publications/leadandpregnancy2010.pdf

Lead Poisoning Prevention Activities

A. Educational Activities

The Program's regional nurses and the education coordinator conducted six lead poisoning prevention training sessions throughout the state. Topics covered in the training included:

Health effects and treatment of lead exposure	Identification of lead sources and exposure prevention	HHLPSS	Case management and follow-up
Medical management for EBLLs	Specimen collection, submission, and analysis at IDPH's Division of Laboratories	HHLPSS	Case management and follow-up

In early 2018, program staff began training for the implementation of the web-based HHLPSS data collection system, provided by CDC, which replaced the STELLAR program. Web-based training modules were developed for delegates also.

Childhood lead exposure can be minimized or prevented through increased public awareness and by:

1. Applying lead-safe work practices when disturbing lead-bearing surfaces
2. Keeping children's play, study, and living areas clean
3. Assuring that children consume a healthy diet that includes Vitamin D, calcium, and iron
4. Applying prevention strategies integrating health education and affordable housing, developed by the National Center for Healthy Housing in the blueprint for lead poisoning
5. Utilizing early educational interventions for children affected by lead such as the one developed by the National Center for Environmental Health by an expert panel of CDC and non-CDC authors www.cdc.gov/nceh/lead/publications/Educational_Interventions_Children_Affected_by_Lead.pdf
6. Ensuring all children ages six and under receive an evaluation for lead exposure and tested if necessary

For more lead poisoning prevention tips, visit CDC at http://www.cdc.gov/nceh/lead/tips.htm.

B. Lead Licensees

IDPH is the agency in Illinois responsible for administration and enforcement of the Act. IDPH requires any person who conducts lead services in a regulated facility to be appropriately licensed. The Program reviews and issues lead licenses for lead abatement workers, lead abatement supervisors, lead inspectors, lead risk assessors, lead abatement contractors, and lead training course providers. Licenses expire annually and must be renewed (Table 5).

For a list of licensed lead abatement contractors visit:
https://data.illinois.gov/dataset/566lead_contractor_registration

For a list of licensed risk assessors and inspectors visit:
https://data.illinois.gov/dataset/567lead_risk_assessor_and_inspector_licensees

Table 5: Lead Licenses Issued 2015-2018

	2015	2016	2017	2018
Worker	950	753	805	850
Supervisor	506	413	412	600
Inspector	64	45	73	75
Risk Assessor	349	265	430	350
Contractor	168	160	154	155

Data source: Illinois Department of Public Health – Licensing Database

Lead training course providers are required to submit notification of all lead courses to IDPH no later than seven calendar days prior to the start of all IDPH-approved courses (Table 6).

Table 6: Total Number of Notifications and Lead Courses Held 2015-2018

Class notifications and courses held	2015	2016	2017	2018
Notifications of upcoming lead courses received by IDPH	390	382	639	453
Number of lead courses held	262	220	524	227

Data source: Illinois Department of Public Health - Licensing Database

For approved training providers, go to:https://data.illinois.gov/Public-Health/Lead-Training-Course-Provider-List/wwdj-394b

Home inspections by regional office or delegate agency staff were all triggered by an elevated blood lead level of ≥10 µg/dL. Lead inspection/risk assessment can also be triggered when a HUD inspector conducts a general inspection of the home and finds chipping, cracking, or peeling paint. The homeowner is required to seek out a licensed professional to conduct the risk assessment.

C. Intervention - Case Management of Children with Elevated Blood Lead Levels

In 2018, IDPH had grant agreements with 92 delegate agencies to provide case management care for lead-exposed children with confirmed EBLLs ≥10 µg/dL in 94 of 102 counties (Figure 12). In collaboration with IDPH, these delegate agencies provided outreach and education to health care providers, families of lead-exposed children, and the general public. Case management activities include a home visit by a public health nurse who provides:

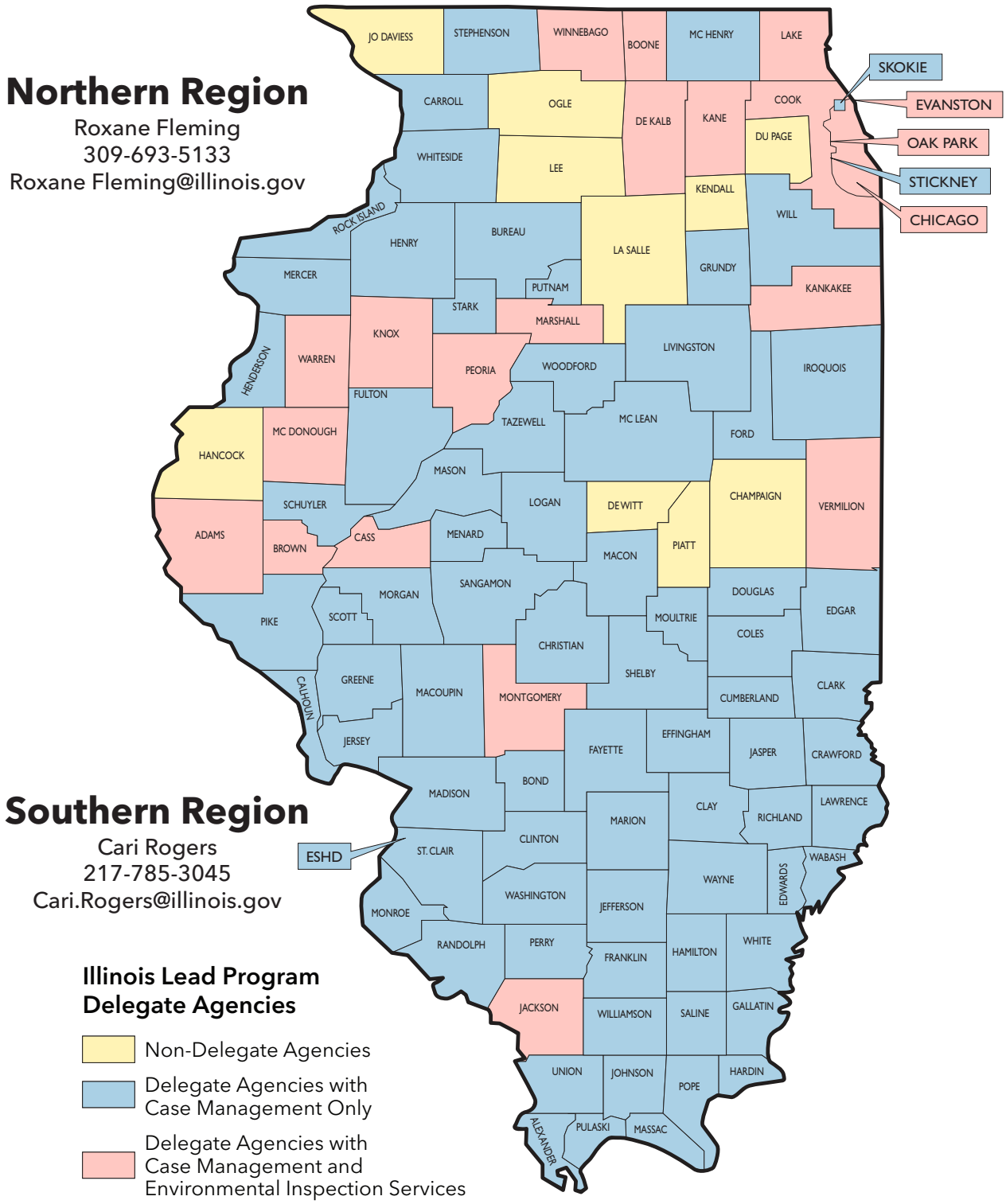
- Information regarding lead exposure and prevention
- Nutritional counseling
- Information on follow-up blood testing
- Instruction on proper housekeeping
- Referrals to appropriate services linked to medical and developmental testing

For questions frequently asked during a case management home visit, click here.

Local health departments that do not partner with the Program are considered non-delegate agencies. There were eight non-delegate agencies where case management services were provided by the Program's Regional Nurse Consultants (Figure 12).

IDPH had grant agreements with 28 delegate agencies to provide environmental inspection services in addition to case management services (Figure 12).

Figure 12: Illinois Lead Program Delegate and Non-delegate Agencies in 2018



*Brown is covered by Adams County Health Department
ESHD: East Side Health District

D. Intervention - Children Identified with Elevated Blood Lead Levels by Region

Investigations by regional offices and delegate agencies are triggered by elevated blood lead levels. There are six environmental regional offices at IDPH and 92 delegate agencies. In 2018, a total of 3,085 children were identified for the first time with confirmed venous BLLs ≥5 µg/dL and 722 of those children had BLLs ≥10 µg/dL (Table 7 and Figure 13).

Table 7: Children Tested for Blood Lead by Regions in 2018

Children Tested for Blood Lead		Champaign	Edwardsville	Marion	Peoria	Rockford	West Chicago	**TOTAL** (N)3
Children Tested for the **first time**		2,619	3,068	1,373	3,653	4,790	81,927	164,726
New confirmed cases (venous) identified for the **first time** in 2018 **(Incidence)**	≥10 µg/dL	42	44	23	104	74	492	722
	≥5 µg/dL	145	157	59	344	186	2,259	3,085
All confirmed cases in 2018 **(Prevalence)**	≥10 µg/dL	59	63	35	171	115	696	1,118
	≥5 µg/dL	236	255	90	564	323	3,036	4,464

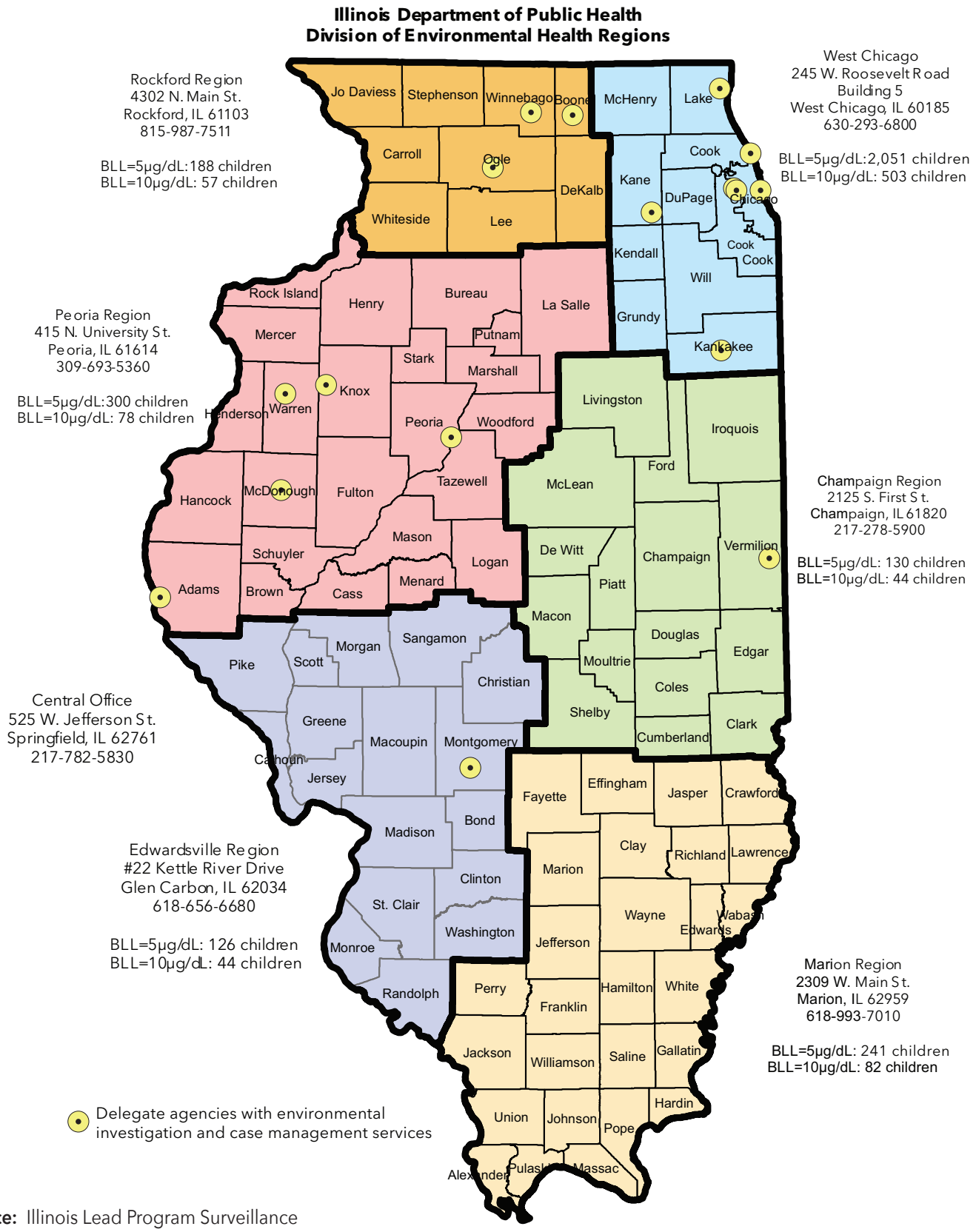
Data source: Illinois Department of Public Health –HHLPSS.

The six IDPH environmental regional offices each have lead risk assessors who conducted home inspections for children with a confirmed EBLL ≥10 µg/dL in areas not covered by a delegate agency agreement. The risk assessor performed a comprehensive risk assessment and developed appropriate reports. The reports were provided to the property owners who were then required to submit a mitigation plan to IDPH or the delegate agency for review and approval. Certificates of compliance were issued following the successful completion of mitigations and/or abatements and follow-up inspections. Other reasons for case closures included:

- No lead hazard identified
- Residence or occupant not located
- Regulated facility demolished
- Administrative determination made by delegate agencies with environmental services

Environmental remediation is required by law when a lead hazard has been identified in a home where a child with an EBLL lives or frequents. Remediation is necessary to prevent on-going exposure to lead hazards. Children who return to an environment where lead hazards still exist remain at risk for further exposure.

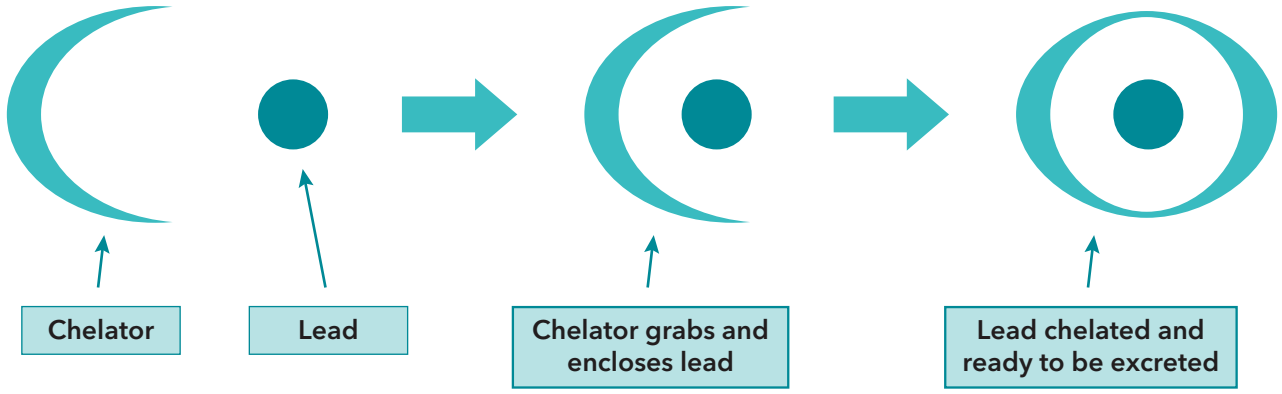
Figure 13: Children with Confirmed Elevated Blood Lead Identified for the First Time in 2018 by Regions



Source: Illinois Lead Program Surveillance
Recreated 09/28/2018

E. Intervention - Chelation of Children with Elevated Blood Lead Levels

Reducing a child's exposure to lead is the best way to treat children with elevated blood lead levels. Medical treatment by chelation involving use of chemical compounds that bind to lead to remove the toxic metal from the body may be used for extreme EBLLs. Medications used for chelation may include succimer, penicillamine, ethylenediamine tetraacetic acid (EDTA), or British anti-Lewisite (BAL). According to CDC, chelation therapy is recommended for EBLLs ≥45 µg/dL. Thirty-nine children had confirmed EBLLs ≥24 µg/dL and four children had confirmed EBLLs ≥70 µg/dL.



F. Compliance and Enforcement

The U.S. EPA authorizes the Illinois Department of Public Health to carry out the compliance and enforcement aspects within the Act and Code in lieu of federal requirements. For instance, all lead abatement or lead mitigation projects are required to be conducted by an Illinois-licensed lead abatement contractor who employs licensed lead abatement workers and lead abatement supervisors. IDPH is to receive notification from the contractor indicating the details of the project, which allows IDPH to conduct investigations to ensure compliance.

Following the Act and Code, IDPH:

- Conducted on-site investigations of lead mitigation/abatement projects statewide per notifications received by IDPH Central Office (Table 8):
  - Determined if individuals on-site were properly licensed
  - Ensured lead mitigation/abatement activities were conducted in compliance with the Act and Code
- Sought enforcement actions, fines, and penalties against persons found in violation of the Act and Code, including but not limited to persons performing lead services, such as lead inspection, risk assessment, mitigation, and abatement.
- Generated a summary compliance and enforcement action report for IDPH activities.

Table 8: Total Number of Abatement Projects

Compliance Type	2014	2015	2016	2017	2018
Abatement Projects	513	560	657	659	663

Source: Illinois Department of Public Health - Illinois Lead Program Database 2014-2018.

Smoking and Lead Exposure

Contributed by
Saloni Sahani, MPH Candidate
Graduate Public Service Intern (GPSI),
University of Illinois at Springfield

Childhood lead exposure is one of the most preventable environmental public health issues. There is no safe level of lead in the body; however, the CDC has recommended a standard of measurement where if a child's blood lead level is ≥5 µg/dL they are considered to have a high blood lead level.1 Long-term lead exposure can affect the health of anyone, especially children and unborn babies. Lead exposure may decrease bone and muscle growth, cause poor muscle coordination, damage the nervous system, affect speech or language, and may trigger seizures.2 Lead can enter the body through inhalation, swallowing, or by touching lead-containing products. There are many sources of lead exposure including air, water, or dust. This section highlights some studies that relate smoking to lead exposure.

Tobacco and tobacco smoke are comprised of thousands of chemicals and lead is one of them.[3] In a study conducted with several brands of cigarettes, the lead levels ranged from 0.60 to 1.16µg/g in dry tobacco.[4] One study showed that the amount of lead released increased with number of smoke puffs.[5] Children can be exposed to lead in tobacco through second-hand or third-hand smoke exposure. Involuntary or second-hand smoking is the exposure to exhaled smoke from a cigarette or other smoking devices (e-cigarette, vaping devices). It involves inhaling toxic components like lead that are present in tobacco smoke.[6] Third-hand smoke is the residue which remains on surfaces exposed to tobacco smoke. Both methods can expose children to unhealthy amounts of lead.

Several studies show a correlation between tobacco smoke and increased blood lead levels in adults and children. One study compared children's cotinine levels and blood lead levels. Mean blood lead levels were 38% higher in children with high cotinine levels when compared to children with lower cotinine levels. Mean blood levels were 1.5 µg/dL, 1.9 µg/dL, and 2.6 µg/dL for children with low, intermediate and high cotinine levels, respectively. Children with higher cotinine levels, which reflect exposure to tobacco smoke, were more likely to have lead in their blood than children with low cotinine levels.[7]

There is a positive association between blood lead levels and cotinine levels. Blood lead levels were 14% higher in children who lived with one smoker and 24% higher in children living with two or more smokers.[8] Unborn babies were also affected by smoking. Blood lead levels in umbilical cords of newborns were 7 to 49% higher in mothers who smoked during their pregnancy.[9]

Lead exposure can affect all age groups and smoking is one of the preventable sources. It can be eliminated by educating the public about the dangers of lead exposure and promoting smoke-free environment for children, in public places and in homes to reduce second-hand smoke exposure.

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2. KidsHealth. (2015). Lead poisoning. Retrieved from https://kidshealth.org/en/parents/lead-poisoning.html
3. Centers for Disease Control and Prevention. (2018). Lead. Retrieved from https://www.cdc.gov/niosh/topics/lead/health.html
4. Fresquez, M. R., Pappas, R. S., & Watson, C. H. (2013). Establishment of toxic metal reference range in tobacco from US cigarettes. *Journal of analytical toxicology*, 37(5), 298–304. doi:10.1093/jat/bkt021

5. Kalcher, K., Kern, W., & Pietsch, R. (1993). Cadmium and lead in the smoke of a filter cigarette. *Sci Total Environ*, 128(1), 21-35
6. World Health Organization. (ND). Second-hand tobacco smoke retrieved from http://www.who.int/tobacco/research/secondhand_smoke/en/
7. Mannino, D.M., Albalak, R., Grosse, S., & Repace, J. (2003). Second-hand smoke exposure and blood lead levels in U.S. children. *Epidemiology*, 14(6), 719-727.
8. Apostolou, A., Garcia-Esquinas, E., Fadrowski, F., McLain, P., Weaver, V., & Navas-Acien, A. (2012). Secondhand tobacco smoke: A source of lead exposure in US Children and adolescents. *American Journal of Public Health*, 102(4), 714-722.
9. Rhainds M, Levallois P, Dewailly E, Ayotte P. (1999). Lead, mercury, and organochlorine compound levels in cord blood in Québec, Canada. *Arch Environ Health*, 54(1), 40-47.

Looking Forward: Illinois Adopts CDC Reference Value ≥5 µg/dL of Lead in Blood

The Program has adopted the CDC reference value of ≥5 µg/dL for case management beginning February 2019. Surveillance data will be used to determine the number of lead-exposed children at this new level in each jurisdiction.

Case management services are provided to each child with lead levels ≥5 µg/dL with committed efforts to prevent or to eliminate further exposure.

Environmental investigations for each child with lead levels ≥5 µg/dL are being conducted to identify lead hazards that require mitigation.

If you have questions, contact the Illinois Lead Program at dph.lead@illinois.gov

Amendments to the Lead Poisoning Prevention Code were approved on January 15, 2019 and promulgated on February 8, 2019.

Following the amendment, Illinois has adopted the CDC reference value of 5 µg/dL as the level at which public health intervenes through case management and environmental investigations.

The following regulatory limits of lead were amended in 845.205:

- *Drinking water hazard standard: 5 µg/L.*
- *Dust hazard standard for*
  - *interior floors and stair treads: 10 µg/ft2*
  - *exterior porch floors: 40 µg/ft2*
  - *all other horizontal surfaces:100 µg/ft2*

http://www.ilga.gov/commission/jcar/admincode/077/07700845sections.html

Additional Resources

Illinois Lead Program
Illinois Department of Public Health
525 W. Jefferson St.
Springfield, IL 62761
Phone: 866-909-3572 or 217-782-3517
Hearing impaired may dial 800-547-0466
http://dph.illinois.gov/topics-services/environmental-health-protection/lead-poisoning-prevention

Illinois Public Health Association (IPHA)
http://www.ipha.com

American Public Health Association (APHA)
http://www.apha.org

National Center for Healthy Housing (NCHH)
http://www.nchh.org/

U.S. Centers for Disease Control and Prevention (CDC)
http://www.cdc.gov/nceh/lead/
https://www.cdc.gov/healthywater/drinking/

U.S. Consumer Product Safety Commission (CPSC)
http://www.cpsc.gov/

U.S. Department of Housing and Urban Development (HUD)
Office of Lead Hazard Control and Healthy Homes
http://www.hud.gov/healthyhomes, and
lead.regulations@HUD.gov

U.S. Environmental Protection Agency (U.S. EPA)
http://www.epa.gov/lead
800-424-LEAD / 800-424-5323

Safe Drinking Water Hotline
http://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water
800-426-4791
http://www.epa.gov/drink

Illinois Lead Program Team

525 W. Jefferson St., Springfield, IL 62761
Phone: 217-782-5830 Fax: 217-557-1188
dph.lead@illinois.gov

ASBESTOS AND LEAD SECTION CHIEF
Ken McCann, M.P.H., LEHP
Email: Ken.McCann@illinois.gov

ILLINOIS LEAD PROGRAM MANAGER
Kert McAfee, B.S.
Email: Kert.Mcafee@illinois.gov

DATA SYSTEM ADMINISTRATOR
Tina Estrop, M.A.
Email: Tina.Estrop@illinois.gov

CASE MANAGEMENT ADMINISTRATOR
Darla Hamende, B.S.
Email: Darla.Hamende@illinois.gov

REGIONAL NURSE CONSULTANT NORTHERN REGION,
Helen Wright, R.N., B.S.N.
Peoria Regional Office
5415 N. University St., Peoria, IL 61614
Phone: 309-693-5133 Fax: 309-693-5118
Email: Helen.Wright@illinois.gov

REGIONAL NURSE CONSULTANT SOUTHERN REGION
Cari Rogers, R.N., B.S.N.
Email: Cari.Rogers@illinois.gov

EDUCATION COORDINATOR
Aubrey Dove, B.S.
Email: Aubrey.Dove@illinois.gov

QUALITY ASSURANCE MANAGER
Frida Fokum, M.S., Ph.D.
Email: Frida.Fokum@illinois.gov

OFFICE COORDINATOR
Jennifer Kennett
Email: Jennifer.L.Kennett@illinois.gov

ADMINISTRATIVE ASSISTANT
Jennifer Holloway
Email: Jennifer.L.Holloway@illinois.gov

OFFICE ASSOCIATE
Shanyn Atterberry
Email: Shanya.Atterberry@illinois.gov

GRADUATE PUBLIC SERVICE INTERN (GPSI)
Saloni Sahani, B.D.S., M.P.H. Candidate
Email: Saloni.Sahani@illinois.gov

Rashmika Jalagam, B.S., M.S. Candidate
Email: Rashmika.Jalagam@illinois.gov

Sai Mani Teja Puppala, B.S., M.S. Candidate
Email: SaiManiTeja.Puppala@illinois.gov

REGIONAL ENVIRONMENTAL PROFESSIONALS

Rockford Region Phone: 815-987-7511
Vince Leonforte, Email: Vincent.Leonforte@illinois.gov
Kristy Morrison, Email: Kristy.L.Morrison@illinois.gov
4302 N. Main St., Rockford, IL 61103

Peoria Region Phone: 309-693-5360
Randy Johnson, Email: Randy.Johnson@illinois.gov
Morgan Jackson, Email: Morgan.Jackson@illinois.gov
5415 N. University St., Peoria, IL 61614

West Chicago Region Phone: 630-293-6800
Katherine Nelson, Email: Katherine.Nelson@illinois.gov
Dan Urban, Email: Daniel.Urban@illinois.gov
245 W. Roosevelt Road Building 5, West Chicago, IL 60185

Edwardsville Region Phone: 618-656-6680
Jessica Baylor, Email: Jessica.Baylor@illinois.gov
Ismay Daly, Email: Ismay.Daly@illinois.gov
22 Kettle River Drive, Glen Carbon, IL 62034

Champaign Region Phone: 217-278-5900
Barbara Owens, Email: Barbara.Owens@illinois.gov
Rajeshkumar Jani, Email: Rajeshkumar.Jani@illinois.gov
2125 S. First St., Champaign, IL 61801

Marion Region Phone: 618-993-7010
Shirley Ferguson, Email: Shirley.Ferguson@illinois.gov
2309 W. Main St., Marion, IL 62959

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Provide feedback by email to dph.lead@illinois.gov, call 217-782-3517, or FAX to 217-557-1188

Appendix 1:

Pre-1978 Housing Units and Children 2 Years of Age and Younger Tested with Elevated Blood Lead Levels by County or Delegate Agencies: 2018

Illinois/County/ City/ Delegate Agencies[a]	Total Housing Units (N)[b]	Pre-1978 Housing Units Estimates (%)[c]	All BLLs of Children 2 Years of Age or Younger (< 36 Months of age) at Time of Testing		
			Tested (N)[d]	Tested ≥ 5µg/dL (%)[e]	Tested ≥ 10µg/dL (%)[f]
United States	**135,393,564**	**52**			
Illinois	**5,334,847**	**64**	**137,713**	**5.5**	**2.2**
Adams	30,167	70	848	7.1	2.4
Alexander	3,984	72	27	7.4	3.7
Bond	7,211	58	171	18.1	15.2
Boone	20,054	42	707	1.6	0.6
Brown	2,451	66	70	7.1	0.0
Bureau	15,696	76	240	8.3	2.1
Calhoun	2,870	63	14	0.0	0.0
Carroll	8,458	71	123	7.3	4.9
Cass	5,831	73	171	6.4	2.3
Champaign	90,783	52	1,315	1.1	0.2
Christian	15,593	72	324	3.4	0.6
Clark	7,787	63	195	4.1	0.0
Clay	6,413	62	223	4.9	0.4
Clinton	15,704	51	314	1.6	0.6
Coles	23,543	66	650	2.9	0.8
Cook w/o Chicago	983,682	70	23,245	2.4	0.4
Chicago	1,200,305	80	46,407	5.4	0.6
Crawford	8,693	70	198	4.5	1.0
Cumberland	4,881	59	127	2.4	0.0
DeKalb	41,143	52	663	4.4	1.7
DeWitt	7,565	72	140	7.9	0.0
Douglas	8,431	70	202	3.0	0.0
DuPage	358,421	52	4,699	1.6	0.5
Edgar	8,823	74	210	5.2	1.4
Edwards	3,183	68	67	16.4	13.4
Effingham	14,816	54	324	0.9	0.3
Fayette	9,297	66	252	3.2	0.8
Ford	6,336	79	126	4.8	0.8
Franklin	18,660	68	357	2.8	0.8
Fulton	16,296	77	179	8.9	2.8
Gallatin	2,748	66	73	4.1	1.4
Greene	6,404	76	171	7.6	3.5
Grundy	20,566	45	365	3.3	1.1
Hamilton	4,108	63	76	3.9	0.0
Hancock	9,254	73	172	8.7	1.7
Hardin	2,195	65	17	5.9	0.0

Illinois/County/ City/ Delegate Agencies[a]	Total Housing Units (N)[b]	Pre-1978 Housing Units Estimates (%)[c]	All BLLs of Children 2 Years of Age or Younger (< 36 Months of age) at Time of Testing		
			Tested (N)[d]	Tested ≥ 5µg/dL (%)[e]	Tested ≥ 10µg/dL (%)[f]
United States	**135,393,564**	**52**			
Illinois	**5,334,847**	**64**	**137,713**	**5.5**	**2.2**
Henderson	3,861	68	42	0.0	0.0
Henry	22,161	78	462	8.4	1.9
Iroquois	13,508	75	164	5.5	2.4
Jackson	28,921	57	588	0.9	0.2
Jasper	4,350	61	71	2.8	0.0
Jefferson	16,954	57	285	3.5	1.4
Jersey	10,100	54	260	1.2	0.4
Jo Daviess	13,686	58	205	3.4	0.5
Johnson	5,626	51	69	4.3	1.4
Kane	185,566	48	5,917	2.7	0.8
Kankakee	45,400	62	1,360	4.3	1.1
Kendall	41,463	25	498	1.2	0.0
Knox	23,958	80	269	14.5	5.6
Lake	262,553	46	4,135	21.9	20.6
LaSalle	50,087	69	1,065	5.0	1.8
Lawrence	7,047	76	173	4.6	1.7
Lee	15,098	74	243	2.5	0.8
Livingston	15,910	73	430	7.0	1.6
Logan	12,081	79	241	4.1	0.8
McDonough	14,443	69	268	4.5	1.5
McHenry	117,813	39	1,707	1.3	0.2
McLean	71,852	49	2,303	3.7	1.0
Macon	50,467	74	1,331	9.8	2.0
Macoupin	21,639	68	491	8.8	2.4
Madison	118,806	62	2,452	2.8	0.7
Marion	18,228	62	473	3.8	0.8
Marshall	5,907	72	78	16.7	2.6
Mason	7,058	79	175	11.4	4.6
Massac	7,135	59	49	8.2	0.0
Menard	5,709	60	92	7.6	3.3
Mercer	7,407	76	165	7.3	1.2
Monroe	13,931	38	249	2.0	0.4
Montgomery	13,107	69	310	2.9	1.3
Morgan	15,524	69	404	8.4	3.0
Moultrie	6,405	69	110	3.6	0.0
Ogle	22,636	63	250	4.8	1.2
Peoria	83,753	72	1,841	60.7	55.1
Perry	9,565	66	188	6.9	0.5
Piatt	7,389	64	76	5.3	0.0
Pike	7,973	75	224	3.6	0.4

Illinois/County/ City/ Delegate Agencies[a]	Total Housing Units (N)[b]	Pre-1978 Housing Units Estimates (%)[c]	All BLLs of Children 2 Years of Age or Younger (< 36 Months of age) at Time of Testing		
			Tested (N)[d]	Tested ≥ 5µg/dL (%)[e]	Tested ≥ 10µg/dL (%)[f]
United States	**135,393,564**	**52**			
Illinois	**5,334,847**	**64**	**137,713**	**5.5**	**2.2**
Pope	2,778	56	16	6.3	6.3
Pulaski	3,170	64	29	3.4	0.0
Putnam	3,125	61	41	0.0	0.0
Randolph	13,905	65	337	2.7	0.6
Richland	7,512	66	184	5.4	0.5
Rock island	66,063	78	1,730	6.4	1.3
St. Clair w/o ESHD	92,116	50	1,108	4.8	1.5
Saline	11,719	68	309	4.9	2.3
Sangamon	91,229	62	1,714	4.9	1.2
Schuyler	3,454	66	56	8.9	7.1
Scott	2,453	77	47	6.4	2.1
Shelby	10,564	68	213	3.8	0.9
Stark	2,662	82	42	19.0	7.1
Stephenson	22,004	73	676	9.2	2.7
Tazewell	58,584	71	406	8.9	3.7
Union	7,993	62	48	4.2	2.1
Vermilion	36,121	79	815	5.2	0.6
Wabash	5,564	72	171	33.9	30.4
Warren	7,694	83	204	11.8	3.9
Washington	6,635	64	112	4.5	3.6
Wayne	7,971	60	176	6.8	2.8
White	7,185	70	132	5.3	3.0
Whiteside	25,820	75	578	4.7	1.2
Will	241,498	37	4,646	2.2	0.4
Williamson	31,082	54	551	6.4	1.5
Winnebago	125,800	62	3,958	4.1	1.1
Woodford	15,478	58	173	5.8	1.7
Egyptian1	21,652	68	514	2.9	5.3
ESHD2	27,239	81	2,487	3.0	0.5
Evanston	31,970	82	1,058	2.2	0.5
Oak Park	23,139	89	659	4.9	1.2
Skokie	24,368	86	712	1.5	0.8
Southern Seven3	32,881	60	255	5.5	1.6
Stickney	2,393	94	306	1.0	0.0

Data source:[d,e,f] Illinois Department of Public Health – HHLPSS 2018. [a] Pre-1978 housing unit was estimated from U.S. Census Bureau, 2013-2017 5-Years American Community Survey, Table B25034-Year Structure Built

[1] Egyptian Counties: Galatin, Saline, and White

[2] ESHD or East Side Health District includes the cities of Alorton, Brooklyn, Cahokia, Centreville, East St. Louis, Fairmont City, Lovejoy, National Stock Yards, Sauget, and Washington Park

[3] Southern Seven Counties: Alexander, Hardin, Johnson, Massac, Pope, Pulaski and Union

[a] Data reported for U.S., Illinois, county, and delegate agencies

[b] Total Housing Units - U.S. Census Bureau, 2013-2017 5-Years American Community Survey, Table B25034-Year Structure Built

[c] Pre-1978 Housing Units Estimates: U.S. Census Bureau, 2013-2017 5-Years American Community Survey, Table B25034-Year Structure Built

[d] Total number of children 2 years of age or younger at the time of blood lead testing in calendar year 2018 (test date – birthdate ≤2 years old). Children are considered to be 2 years of age until their 3rd birthday.

[e] Percentage of children 2 years of age or younger tested with elevated blood lead levels ≥ 5µg/dL (numerator) based on all children 2 years of age or younger tested in 2018 (denominator).

[f] Percentage of children 2 years of age or younger tested with elevated blood lead levels ≥ 10µg/dL (numerator) based on all children 2 years of age or younger tested in 2018 (denominator).

While the current acceptable error range is ±4µg/dL, most laboratories that do blood lead analyses perform at an error range within ±2µg/dL. The portable desktop blood-lead analyzers operate within a ±3µg/dL error range.

Note: As required by the Act (410 ILCS 45/7), health care providers shall report all blood lead test results to IDPH. If a child has multiple tests, the highest venous result is selected for this report. If there is no venous test on a child, the peak capillary blood lead result is selected for the report. A child was counted only once for each year in which he or she was tested or had a follow-up test.

Appendix 2 :

Children Tested for Blood Lead by Age from January 1 to December 31, 2018

Age (Years)	Estimated Population[a]	Children Tested									Geomean Blood Lead Level, µg/dL
		Total Tested	<5 µg/dL		≥5 µg/dL			≥10 µg/dL			
		n	n	%	n		%	n		%	
					Venous	Capillary		Venous	Capillary		
<1	147,623	31,852	30,599	96.1	244	244	1.5	52	49	0.3	1.9
1	149,997	65,235	62,661	96.1	1,296	1,124	3.7	343	256	0.9	
2	154,179	48,342	46,032	95.2	1,182	818	4.1	298	205	1.0	
3	155,702	34,282	32,580	95.0	864	480	3.9	242	110	1.0	1.7
4	153,118	31,835	30,445	95.6	654	358	3.2	152	79	0.7	
5	152,837	28,569	27,484	96.2	457	250	2.5	109	54	0.6	
6	154,486	7,830	7,403	94.5	55	211	3.4	57	10	0.9	
Total	1,067,942	247,945	237,204	95.7	4,752	3,485	3.3	1,253	763	0.8	1.8

Data source: Illinois Department of Public Health –HHLPSS 2018. [a]Population data compiled from bridged-race Vintage 2018 (2010-2018) post-censal population estimates (released by NCHS on 6/25/2019). Available on CDC WONDER Online Database. Accessed at http://wonder.cdc.gov/bridged-race-v2018.html on Oct 21, 2019.

A total of 8,883 children 7 to 15 years of age were also tested for blood lead in 2018. Of the 370 children in this age group with BLLs ≥5µg/dL, 72% were confirmed by a venous test. Among the 88 children in this age group with EBLLs ≥10µg/dL, 83% were confirmed by a venous test.

Appendix 3:

Children Tested for Blood Lead by Race/Ethnicity - January 1 to December 31, 2018

Racial Classification	Estimated Population[a]	Children Tested by Race in 2018									Geomean Blood Lead Level, µg/dL
		Total Tested	<5 µg/dL		≥5 µg/dL			≥10 µg/dL			
		n	n	%	n		%	n		%	
					Venous	Capillary		Venous	Capillary		
Black or African American	190,322	48,650	44,894	92.3	1,792	865	5.5	466	206	1.4	1.83
White	806,140	87,355	83,557	95.7	1,910	1,793	4.2	724	431	1.3	1.9
Hispanic or Latino	259,424	48,677	46,848	96.2	1,008	439	3.0	439	107	1.1	
Asian or Pacific Islanders	65,172	6,815	6,356	93.3	209	109	4.7	71	35	1.6	
American Indian or Alaskan Native	6,308	408	386	94.6	15	5	4.9	5	1	1.5	
Total	1,067,942	247,945	237,204	95.7	4,752	3,485	3.3	1,253	763	0.8	1.8

Data Source: Illinois Department of Public Health –HHLPSS 2018. aPopulation data compiled from bridged-race Vintage 2018 (2010-2018) post-censal population estimates (released by NCHS on 6/25/2019). Available on CDC WONDER Online Database. Accessed at http://wonder.cdc.gov/bridged-race-v2018.html on Oct 21, 2019.

Appendix 4:

Blood Lead Burden of 5 Years Old and Younger in Illinois, Chicago, and the United States: 2015-2018

	2015		2016		2017		2018	
	N	%	N	%	N	%		
Illinois Children Tested	248,223	26.3	229,519	24.3	229,203		**229,887**	25.2
BLL≥10µg/dL	1,871	0.8	1,736	0.8	1,670	0.7	1,071	0.5
BLL≥5µg/dL	10,040	4	8,154	3.6	4,477	2.0	4,279	1.9
Illinois without Chicago	161,420		143,174		144,994			
BLL≥10µg/dL	1,211	0.8	1,152	0.8	1,142	0.8	650	
BLL≥5µg/dL	7,033	4.4	5,399	3.8	2,192	1.5	2,227	
Chicago	86,803		86,345		84,209			
BLL≥10µg/dL	660	0.8	584	0.7	528	0.6	421	
BLL ≥5µg/dL	3007	3.5	2,755	3.2	2,285	2.7	2,052	
United States[1]	2,415,604	10	2,517,134					
BLL ≥10µg/dL	11,054	0.5	12,135	0.5	11,097	1.0		
BLL ≥5µg/dL	43,270	2.0	46,196	2.1	40,122	3.0		

Source: Illinois Lead Program Surveillance Data, 2015-2018 and U.S. Centers for Disease Control and Prevention (CDC) Blood Lead Surveillance available at the time at: https://www.cdc.gov/nceh/lead/data/national.htm (downloaded October 21, 2019)

CDC only reported blood lead data for children 5 years of age and younger. In order to compare Illinois data to the national data published by CDC, Appendix 4 only included children 5 years of age and younger (<72 months) whose BLL results were reported to IDPH in 2015, 2016, 2017, and 2018. Due to strict data reporting requirements, Illinois data with missing core address fields are often under-reported nationally, which may contribute to a denominator differential of Illinois data as reported by CDC.

Appendix 5:

Children Tested and Newly Confirmed Cases in 2018

Illinois/ County/ Delegate Agency	Estimated Population 6 Years of Age and Younger[a]	All Children Tested in 2018[b] (N)	Children Ever Tested as of December 31, 2018 (%)	Children tested for the first time in 2018 based on all children tested[d]		New confirmed cases identified for the first time in 2018 based on all children tested[e]	
						EBL ≥5 µg/dL	EBL ≥10 µg/dL
				N	%	%	%
Illinois	**1,067,942**	**237,491**	**51**	**164,727**	**69**	**1.3**	**0.3**
Adams	5,710	1,236	74	843	68	5.6	2.0
Alexander	578	65	56	48	74	6.2	4.6
Bond	1,147	203	74	152	75	13.3	11.3
Boone	4,324	1,010	63	629	62	1.4	0.4
Brown	403	88	74	66	75	5.7	1.1
Bureau	2,478	416	62	283	68	4.1	1.4
Calhoun	338	27	30	22	81	0.0	0.0
Carroll	1,020	223	74	152	68	5.8	2.7
Cass	1,132	283	87	199	70	5.7	1.1
Champaign	15,943	1,778	44	1,501	84	1.1	0.3
Christian	2,352	502	75	342	68	2.2	0.6
Clark	1,315	251	77	190	76	3.2	0.0
Clay	1,135	287	84	197	69	3.5	0.0
Clinton	3,043	396	47	302	76	1.3	0.3
Coles	3,469	799	83	500	63	2.8	0.8
Cook w/o Chicago	198,613	41,099	48	27,430	67	1.7	0.3
Chicago	242711	88,748	43	73,999	83	3.3	0.4
Crawford	1,419	269	65	189	70	3.3	0.7
Cumberland	913	158	59	107	68	2.5	0.0
DeKalb	8,353	1,266	49	859	68	2.8	1.3
DeWitt	1,183	198	66	151	76	6.6	0.0
Douglas	1,758	271	56	195	72	2.6	0.0
DuPage	77,364	7,728	34	5,590	72	1.3	0.4
Edgar	1,262	347	83	243	70	4.6	1.4
Edwards	523	129	73	101	78	10.1	7.0
Effingham	3,158	490	47	337	69	1.0	0.4
Fayette	1,717	308	67	230	75	2.9	0.6
Ford	1,121	187	56	143	76	2.1	0.0
Franklin	3,250	564	58	413	73	3.0	0.5
Fulton	2,437	340	56	271	80	7.4	2.6
Gallatin	367	106	83	80	75	2.8	0.9
Greene	1,000	258	80	189	73	5.4	1.9
Grundy	4,530	681	39	464	68	3.1	0.9
Hamilton	633	110	65	87	79	2.7	0.0
Hancock	1,364	235	71	175	74	6.8	1.7

Illinois/ County/ Delegate Agency	Estimated Population 6 Years of Age and Younger[a]	All Children Tested in 2018[b] (N)	Children Ever Tested as of December 31, 2018 (%)	Children tested for the first time in 2018 based on all children tested[d]		New confirmed cases identified for the first time in 2018 based on all children tested[e]	
						EBL ≥5 µg/dL	EBL ≥10 µg/dL
				N	%	%	%
Illinois	**1,067,942**	**237,491**	**51**	**164,727**	**69**	**1.3**	**0.3**
Hardin	234	31	54	25	81	3.2	0.0
Henderson	461	65	55	49	75	0.0	0.0
Henry	3,957	754	71	553	73	7.3	1.1
Iroquois	2,136	317	62	230	73	3.5	1.6
Jackson	4,311	891	73	599	67	1.0	0.2
Jasper	795	89	44	66	74	3.4	0.0
Jefferson	3,341	451	61	356	79	3.8	1.1
Jersey	1,582	346	79	201	58	1.2	0.3
Jo Daviess	1,326	324	64	218	67	2.2	0.9
Johnson	828	105	55	75	71	2.9	1.0
Kane	47,944	10,792	60	5,577	52	2.0	0.6
Kankakee	9,097	2,366	69	1,253	53	3.8	1.0
Kendall	12,587	783	21	661	84	1.1	0.0
Knox	3,858	443	66	365	82	9.0	3.2
Lake	57,758	6,983	41	4,462	64	16.5	15.8
LaSalle	8,557	1,686	60	1,260	75	4.5	1.6
Lawrence	1,136	244	83	188	77	2.9	1.2
Lee	2,498	429	39	362	84	2.8	0.7
Livingston	2,770	565	68	406	72	5.5	1.1
Logan	2,083	352	64	251	71	3.1	0.6
McDonough	1,889	330	73	232	70	3.6	1.2
McHenry	24,297	2,620	29	1,979	76	1.1	0.2
McLean	14,236	2,839	65	2,001	70	3.2	0.8
Macon	8,925	2,585	60	1,255	49	6.8	1.5
Macoupin	3,381	661	67	481	73	7.1	2.0
Madison	21,552	3,601	57	2,332	65	2.5	0.6
Marion	3,403	669	76	460	69	3.3	0.6
Marshall	826	104	68	77	74	11.5	1.9
Mason	979	297	74	179	60	8.1	4.0
Massac	1,068	119	45	97	82	2.5	0.0
Menard	951	132	44	96	73	5.3	2.3
Mercer	1,127	240	72	182	76	4.6	0.4
Monroe	2,732	318	48	248	78	1.9	0.6
Montgomery	2,075	416	73	333	80	1.7	0.7
Morgan	2,333	714	89	463	65	5.6	1.5
Moultrie	1,400	168	45	109	65	4.2	0.0
Ogle	3,983	416	15	372	89	3.6	1.0
Peoria	17,155	2,523	62	1,729	69	37.9	35.6
Perry	1,467	319	71	225	71	6.0	0.3
Piatt	1,371	133	44	109	82	3.8	0.8

Illinois/ County/ Delegate Agency	Estimated Population 6 Years of Age and Younger[a]	All Children Tested in 2018[b] (N)	Children Ever Tested as of December 31, 2018 (%)	Children tested for the first time in 2018 based on all children tested[d]		New confirmed cases identified for the first time in 2018 based on all children tested[e]	
						EBL ≥5 µg/dL	EBL ≥10 µg/dL
				N	%	%	%
Illinois	**1,067,942**	**237,491**	**51**	**164,727**	**69**	**1.3**	**0.3**
Pike	1,304	290	81	223	77	3.1	0.3
Pope	158	35	68	31	89	2.9	2.9
Pulaski	455	58	47	40	69	5.2	1.7
Putnam	406	66	45	53	80	1.5	0.0
Randolph	2,351	468	65	326	70	1.9	0.4
Richland	1,477	250	50	183	73	3.6	0.4
Rock Island	12,437	2,778	76	1,890	68	5.2	1.2
St. Clair w/o ESHD	17,423	1,436	9	1,321	92	4.9	1.8
Saline	2,059	463	82	289	62	3.0	1.5
Sangamon	15,632	2,749	59	1,722	63	3.6	0.9
Schuyler	405	88	81	69	78	6.8	4.5
Scott	363	85	92	53	62	3.5	1.2
Shelby	1,734	281	59	190	68	2.8	0.7
Stark	423	86	87	72	84	12.8	5.8
Stephenson	3,431	1,074	92	621	58	5.9	1.9
Tazewell	10,881	579	46	457	79	7.6	3.5
Union	1,248	93	51	62	67	2.2	1.1
Vermilion	6,922	1,229	71	889	72	2.8	0.3
Wabash	1,030	234	73	171	73	18.4	17.1
Warren	1,474	282	74	227	80	7.8	2.5
Washington	1,114	210	50	162	77	4.3	2.4
Wayne	1,452	262	70	202	77	6.5	2.3
White	1,113	212	72	161	76	3.3	1.9
Whiteside	4,387	979	76	627	64	2.5	0.5
Will	58,188	8,638	44	5,108	59	1.9	0.3
Williamson	5,577	870	53	625	72	5.4	1.0
Winnebago	25,174	5,694	67	3,596	63	2.9	0.8
Woodford	3,206	226	49	176	78	3.5	0.9
Egyptian[1]	**3,539**	781	79	530	68	3.1	1.5
ESHD[2]	5,646	4,188		2,108	50	2.2	0.5
Evanston	5,806	1,528	84	982	64	1.6	0.5
Oak Park	4,737	924	67	632	68	3.8	1.1
Skokie	5315	1,066	59	721	68	1.8	1.0
Southern Seven[3]	4,569	506	52	378	75	3.4	1.4
Stickney	716	593		394	66	0.7	0.2

Data source: Illinois Department of Public Health –HHLPSS 2018. [a]Population data compiled from bridged-race Vintage 2018 (2010-2018) post-censal population estimates (released by NCHS on 6/25/2019). Available on CDC WONDER Online Database. Accessed at http://wonder.cdc.gov/bridged-race-v2018.html on Oct 21, 2019. [b]Only children ≤6 years of age; [c]Children tested at least once in their lifetime as of December 31, 2017 with denominator of Estimated Population 6 Years of Age and Younger[a]; [d] denominator of all children tested in 2018[b]

Appendix 6:

Proportion of Children Tested for Blood Lead in 2018 by County and Medicaid Status

Local Health Department	Total Number of Children Tested in 2018	Medicaid-Enrolled Children (%)			Non-Medicaid-Enrolled Children (%)		
		Children Tested Who Were Medicaid-Enrolled (%)	Percentage of Medicaid - Enrolled Children Tested At		Children Tested Who Were Non-Medicaid-Enrolled (%)	Percentage of Non-Medicaid - Enrolled Children Tested At	
			≥5 µg/dL	≥10 µg/dL		≥5 µg/dL	≥10 µg/dL
Illinois	**237,491**	**56**	**5.5**	**2.7**	**44**	**4.9**	**1.0**
Adams	1,236	66	10.0	3.5	34	3.6	1.0
Alexander	65	72	8.5	6.4	28	17.6	11.8
Bond	203	54	22.9	21.1	46	16.3	12.2
Boone	1,010	74	1.2	0.4	26	2.8	0.4
Brown	88	53	8.5	0.0	47	5.0	0.0
Bureau	416	56	7.7	2.1	44	3.9	1.1
Calhoun	27	44	0.0	0.0	56	0.0	0.0
Carroll	223	49	7.3	3.7	51	3.6	1.8
Cass	283	72	9.8	2.5	28	5.1	1.3
Champaign	1,778	55	1.3	0.4	45	0.8	0.1
Chicago	88,748	60	3.7	0.7	40	6.9	0.4
Christian	502	73	3.3	0.8	27	2.3	0.0
Clark	251	70	4.0	0.0	30	0.0	0.0
Clay	287	80	4.8	0.4	20	5.7	0.0
Clinton	396	60	1.7	0.4	40	1.9	0.6
Coles	799	70	3.7	0.4	30	2.2	2.2
Cook	41,099	41	1.5	0.3	59	2.8	0.4
Crawford	269	72	4.1	1.0	28	2.7	0.0
Cumberland	158	76	3.3	0.0	24	0.0	0.0
DeKalb	1,266	66	3.0	1.6	34	5.0	1.4
DeWitt	198	47	8.6	0.0	53	5.8	0.0
Douglas	271	72	4.1	0.5	28	2.7	0.0
Du Page	7,728	38	1.1	0.4	62	2.0	0.5
East Side Health District	4,188	85	3.0	0.6	15	3.2	1.0
Edgar	347	75	7.3	2.3	25	2.3	1.1
Edwards	129	46	20.3	15.3	54	7.4	4.4
Effingham	490	89	1.6	0.5	11	2.0	0.0
Evanston	1,528	35	2.2	0.6	65	2.0	0.5
Fayette	308	86	3.0	0.8	14	4.9	0.0
Ford	187	71	6.1	0.8	29	0.0	0.0
Franklin (Williamson)	564	70	2.3	0.5	30	5.4	1.2
Fulton	340	68	10.4	4.3	32	3.7	0.0
Gallatin	106	73	2.6	1.3	27	3.7	0.0
Greene	258	72	6.5	2.7	28	4.4	1.5
Grundy	681	15	3.0	0.0	85	3.8	1.0

Local Health Department	Total Number of Children Tested in 2018	Medicaid-Enrolled Children (%)			Non-Medicaid-Enrolled Children (%)		
		Children Tested Who Were Medicaid-Enrolled (%)	Percentage of Medicaid - Enrolled Children Tested At		Children Tested Who Were Non-Medicaid-Enrolled (%)	Percentage of Non-Medicaid - Enrolled Children Tested At	
			≥5 µg/dL	≥10 µg/dL		≥5 µg/dL	≥10 µg/dL
Illinois	**237,491**	**56**	**5.5**	**2.7**	**44**	**4.9**	**1.0**
Hamilton	110	80	2.3	0.0	20	4.8	0.0
Hancock	235	45	8.5	2.8	55	7.8	0.8
Hardin	31	84	3.8	0.0	16	0.0	0.0
Henderson	65	63	0.0	0.0	37	0.0	0.0
Henry (Stark)	754	58	11.1	2.1	42	4.8	0.6
Iroquois	317	68	6.5	3.2	32	1.0	0.0
Jackson	891	61	1.3	0.4	39	0.9	0.0
Jasper	89	87	3.9	0.0	13	0.0	0.0
Jefferson	451	70	4.4	1.3	30	3.8	0.8
Jersey	346	51	1.7	0.0	49	0.6	0.6
Jo Daviess	324	53	5.3	1.8	47	2.0	0.0
Johnson	105	53	1.8	1.8	47	6.4	0.0
Kane	10,792	61	2.8	0.8	39	2.7	0.6
Kankakee	2,366	66	5.0	1.4	34	3.4	0.4
Kendall	783	47	0.8	0.0	53	1.5	0.0
Knox	443	75	16.3	5.1	25	5.5	2.8
La Salle	1,686	56	7.2	3.0	44	3.5	0.4
Lake	6,983	46	37.3	36.5	54	10.1	8.5
Lawrence	244	74	6.7	2.8	26	1.6	1.6
Lee	429	60	4.3	0.8	40	1.2	0.6
Livingston	565	65	8.4	1.9	35	1.5	0.0
Logan	352	77	3.0	0.4	23	6.4	1.3
Macon	2,585	42	9.3	1.9	58	9.7	2.1
Macoupin	661	61	9.2	2.7	39	6.4	2.0
Madison	3,601	68	3.4	0.8	32	2.2	0.4
Marion	669	70	2.4	0.6	30	7.2	1.0
Marshall	104	66	17.4	2.9	34	14.3	2.9
Mason	297	66	14.3	6.1	34	8.3	2.1
Massac	119	84	3.0	0.0	16	11.8	0.0
McDonough	330	72	7.2	1.7	28	3.3	2.2
McHenry	2,620	43	1.8	0.4	57	1.1	0.2
McLean	2,839	57	4.2	0.9	43	3.3	0.9
Menard (Sangamon)	132	49	6.2	3.1	51	4.5	1.5
Mercer	240	66	10.1	1.9	34	2.5	0.0
Monroe	318	25	3.7	0.0	75	1.7	0.9
Montgomery	416	78	1.8	1.2	22	5.6	0.0
Morgan	714	70	8.0	2.2	30	5.6	1.4
Moultrie	168	74	6.4	0.0	26	0.0	0.0
Oak Park	924	17	5.6	2.5	83	5.1	0.9

Local Health Department	Total Number of Children Tested in 2018	Medicaid-Enrolled Children (%)			Non-Medicaid-Enrolled Children (%)		
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			≥5 µg/dL	≥10 µg/dL		≥5 µg/dL	≥10 µg/dL
Illinois	**237,491**	**56**	**5.5**	**2.7**	**44**	**4.9**	**1.0**
Ogle	416	66	3.7	0.7	34	4.6	2.3
Peoria	2,523	80	63.2	57.8	20	32.2	23.9
Perry	319	75	7.1	0.4	25	5.1	0.0
Piatt	133	44	6.9	1.7	56	2.7	0.0
Pike	290	75	5.5	0.5	25	1.4	0.0
Pope	35	71	4.0	4.0	29	0.0	0.0
Pulaski	58	71	7.3	2.4	29	0.0	0.0
Putnam	66	53	2.9	0.0	47	0.0	0.0
Randolph	468	60	1.8	0.4	40	3.2	0.5
Richland	250	77	5.7	1.0	23	1.7	0.0
Rock Island	2,778	38	5.6	0.8	62	7.6	2.1
Saline	463	64	3.0	1.3	36	5.0	1.9
Sangamon	2,749	57	5.3	1.1	43	4.5	0.9
Schuyler	88	77	7.4	4.4	23	5.3	5.3
Scott	85	67	7.0	1.8	33	0.0	0.0
Shelby	281	68	4.2	1.1	32	1.1	0.0
Skokie	1,066	26	3.9	2.9	74	1.3	0.6
St. Clair	1,436	55	5.3	1.6	45	5.5	1.8
Stark	86	74	17.2	9.4	26	4.5	0.0
Stephenson	1,074	61	10.1	2.9	39	12.6	5.1
Stickney	593	60	0.8	0.3	40	2.1	0.0
Tazewell	579	58	7.7	3.9	42	11.0	3.8
Union	93	58	1.9	1.9	42	2.7	0.0
Vermilion	1,229	77	4.8	0.6	23	2.6	0.0
Wabash	234	50	38.1	33.9	50	15.5	15.5
Warren	282	86	11.9	3.7	14	7.7	5.1
Washington	210	43	3.3	1.1	57	6.6	3.3
Wayne	262	78	7.4	2.9	22	5.2	1.7
White	212	60	5.5	1.6	40	3.6	2.4
Whiteside	979	67	5.0	1.2	33	4.1	1.3
Will	8,638	38	1.8	0.4	62	2.6	0.4
Williamson	870	65	4.2	1.1	35	9.6	2.0
Winnebago	5,694	76	4.0	0.9	24	3.7	1.4
Woodford	226	67	6.0	2.0	33	2.7	0.0
UNKNOWN	2,422	22	16.9	15.2	78	3.9	1.1

Data source: Illinois Department of Public Health –HHLPSS 2018 and Illinois Department of Healthcare and Family Services Enterprise Data Warehouse, 2018 through an interagency data agreement. The SAS (statistical analysis software) and SQL (Structured Query Language) codes were used to query databases. This data may not be complete at time of this analysis.

Appendix 7:

Questions Parents Frequently Ask During a Case Management Home Visit

1. **How long will it take for the BLL to decrease?**
   A. *It varies depending on the child's initial BLL, health status, medical treatment, and how quickly the source of the lead is eliminated from the child's environment.*
2. **What can I do to reduce my child's exposure to lead?**
   A. *Educate yourself on lead hazards, lead safe work, and housekeeping practices. Wash hands frequently.*
3. **What does lead actually do to the body?**
   A. *The effects of lead exposure are not reversible but can be remediated with proper intervention strategies. Lead can interfere with brain development, contribute to behavior problems and a lowered IQ, and may cause short- and long-term health problems.*
4. **What are the symptoms of lead poisoning?**
   A. *Lead poisoning has no obvious signs and most children do not report any abnormal symptoms. Children with high levels of lead in their bodies might report stomachaches or exhibit decreased appetite, hyperactivity, sleeping problems, or irritability. Because these symptoms appear to mimic other childhood problems, lead poisoning is sometimes mistaken for a cold or the flu.*
5. **Does a child have to eat paint chips to be exposed to lead?**
   A. *While paint chips, if eaten, are a source of lead exposure, the most common source is the ingestion of lead-contaminated dust through hand-to-mouth behaviors.*
6. **Is lead found in toys?**
   A. *Lead is rarely found in toys, but may be in some household items. Lead-based paint remains the most common source of childhood lead exposure.*

Illinois Department of Public Health
Illinois Lead Program
525 West Jefferson Street
Springfield, Illinois 62761
866-909-3572 or 217-782-3517
TTY 800-547-0466 (hearing impaired use only)

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