

Philadelphia Department of Public Health  
Environmental Health Services  
Lead and Healthy Homes Program

# CHILDHOOD LEAD POISONING

Surveillance Report

2018

October 2019



Department of  
**Public Health**

CITY OF PHILADELPHIA

## Contents

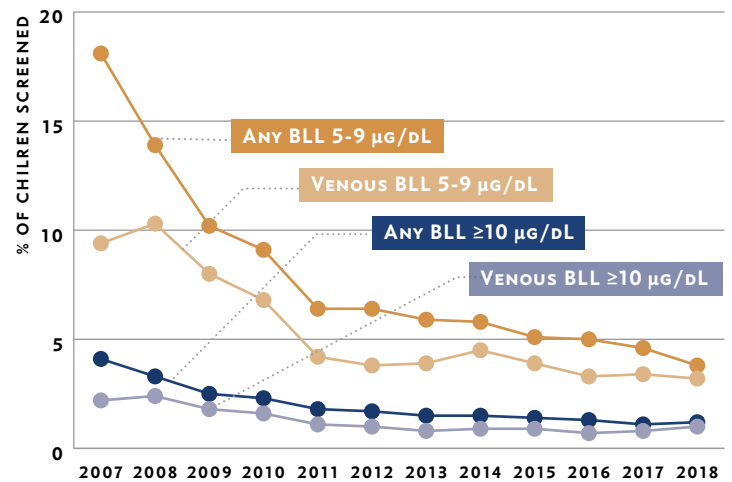
Introduction	1
Lead Poisoning	1
PDPH Lead and Healthy Home Program	1
Tracking Lead Exposure, Risk Factors, and Outcomes	2
Explanation of the Data	2
Screening Recommendations	4
Philadelphia Lead Paint Disclosure & Certification Law	4
Screening Rates for Lead Exposure Remain High	5
Lead Exposure is Occurring in Fewer Children Each Year, but Remains a Concern	7
Lead Exposure Identified through Venous Blood Samples	7
Lead Exposure Identified through All Types of Blood Specimens	9
Services Provided to Children with Elevated BLL	12
Poverty and Age of Housing are Associated with Elevated Blood Lead Levels in Children	13

## NUMBERS AT A GLANCE

**Among Philadelphia children under the age of 6 years old in 2018, there was a significant decrease in newly identified children with evidence of lead exposure from 2008 to 2011 and a slower, gradual decline from 2011 through 2018.**

**FIGURE 1.**

Trend of lead exposure by venous and any blood specimen type among children <6 years old living in Philadelphia, 2008-2018.\*



\*5-9 & ≥10 µg/dL categories are mutually exclusive

# INTRODUCTION

## LEAD POISONING

Even small amounts of lead can cause harm to the brain and other parts of the nervous system. Lead in a child's body can:

- Slow down growth and development
- Damage hearing and speech
- Cause behavior problems
- Make it hard to pay attention and learn

Due to their increased hand-to-mouth activity and developing neurological and digestive systems, children under the age of 72 months are at an increased risk of the effects of lead exposure. Some of the health problems caused by lead exposure may never go away. The best response to the problem is to prevent a child from becoming lead poisoned in the first place.

By far the major source of childhood lead exposure in Philadelphia is lead paint and the dust it produces. Many homes in Philadelphia built before 1978 have lead paint on the inside and outside of the building. When old paint cracks and peels, or when it is ground between surfaces such as around windows, it makes lead dust. Children can be exposed to lead from ingesting flakes of paint or paint dust that gets on their hands and toys. Some examples of other sources of lead exposure include contaminated water or soil, folk medicines, certain kinds of cosmetics and jewelry, and imported spices.

## PDPH LEAD AND HEALTHY HOMES PROGRAM

The Philadelphia Department of Public Health's (PDPH) Lead and Healthy Homes Program (LHHP), formerly known as Childhood Lead Poisoning Prevention Program, addresses conditions that cause childhood lead poisoning and educates social service and childcare providers, clinicians, families and children about the importance of preventing lead exposure and performing lead screening.

**For more information about LHHP and access to educational materials, please visit:**

These activities include:

- Providing education and outreach to families and healthcare providers.
- Offering private in-home services to eligible families, including home inspections and remediation to reduce lead hazards.
- Enforcing lead laws and regulations in collaboration with the Philadelphia Department of Licenses and Inspections and the Law Department.
- Conducting surveillance on childhood lead exposure to monitor trends and identify high-risk populations.

<https://www.phila.gov/programs/lead-and-healthy-homes-program>

## TRACKING LEAD EXPOSURE, RISK FACTORS, AND OUTCOMES

In situations where a child is already exposed to lead, LHHP works to prevent further exposure by educating families, inspecting homes, and providing remediation services when applicable.

LHHP staff members regularly monitor laboratory tests to identify children with high BLLs. When LHHP becomes aware of a child with a BLL  $\geq 10 \mu\text{g}/\text{dL}$  who has not already been identified, LHHP contacts the child's parents or guardian and initiates services. If a child has a BLL between 5-9  $\mu\text{g}/\text{dL}$ , LHHP offers education services to help educate the parent or guardian about how they can ensure the child is not further exposed to lead.

It is also important to determine how the trends of lead exposure are changing over time in Philadelphia as a whole, among certain demographic groups, or within specific geographical areas. Therefore, LHHP routinely analyzes data to monitor characteristics of children with higher BLLs and which areas of Philadelphia are most affected.

## EXPLANATION OF THE DATA

Childhood lead exposure in the Commonwealth of Pennsylvania is a reportable condition, which means that healthcare practitioners, laboratories, and healthcare facilities must report to Pennsylvania Department of Health (PA DOH). PA DOH receives reports from laboratories of all blood tests for lead, even those with no lead detectable.

Blood lead tests are reported, and one child may have multiple test reports. This document summarizes data for each child rather than for each test. For example, if one child had multiple lead tests with results  $\geq 10 \mu\text{g}/\text{dL}$  within a calendar year, that child would only be counted once for that year.

The most reliable way to test for lead is with a venous blood specimen, that is, blood that is taken from a vein. Blood tests using capillary blood specimens (taken by finger stick) may falsely identify lead as being elevated. Therefore, capillary blood specimens are not considered as reliable as venous blood specimens. For some tests, PDPH does not receive information about the source of blood specimens, so they are classified as unknown specimen type. In this report, we present data in two ways - venous samples only and all samples - in order to show the range of potential childhood lead exposure.

## DEFINITIONS

For this report we use the following definitions:

---

### Blood lead level (BLL):

Micrograms per deciliter of lead from a blood specimen. Elevated BLLs (EBLLs) in this report are classified as either 5-9 µg/dL or ≥10 µg/dL.

---

### Screening rate:

Screening rate is calculated by dividing the number of children under the age of 72 months (6 years) who were screened by the total number of children under the age of 72 months living in Philadelphia, multiplied by 100.

---

### Newly identified case rate:

This rate is calculated by dividing the number of children under the age of 72 months with a newly identified EBLL by the total number of children under the age of 72 months who were screened, multiplied by 100.

$$\frac{\# \text{ children with a newly identified EBLL}}{\# \text{ children screened for lead exposure}} \times 100$$

Rates of newly identified children with EBLLs, rather than all current EBLLs (prevalence, as described below) provides a more precise estimation of how lead exposure is changing from year to year. Most EBLL rates in this document will be reported as newly identified case rates.

---

### Existing cases:

Numbers listed using this term means we are presenting all children under the age of 72 months with an existing EBLL. Rather than showing the newly identified cases, existing cases includes children who were first identified with an EBLL in previous years, but still had a higher test result in the year measured. We use this measure to present the distribution of the amount of lead detected in blood over time.

---

### Birth cohort:

A birth cohort is defined as children born during specific calendar year in Philadelphia. These children are followed to track rates of screening. For example, children born from January 1st, 2012 through December 31st, 2012 are included in the 2012 birth cohort.

## SCREENING RECOMMENDATIONS

PDPH recommends that all children be screened for lead exposure between the ages of **8 to 12 months**, and **again at the age of 24 months**. In 2019, the City Council passed a law mandating that physicians conduct lead testing of children. It is recommended to use venous blood specimens when conducting lead screening for better accuracy in detecting lead in the blood.

If a child's blood lead level is elevated, PDPH recommends that the child should receive a follow-up test within the following time frames:

Result ( $\mu\text{g}/\text{dL}$ )	Time to Initiate Follow-up Test
5-9	3 months
10-14	3 months
15-19	1 to 3 months
20-24	1 to 3 months
25 or higher	Seek medical attention as soon as possible

## PHILADELPHIA LEAD PAINT DISCLOSURE & CERTIFICATION LAW

Despite years of progress, each year significant numbers of children in Philadelphia suffer harm from exposure to deteriorated lead paint and lead dust in their homes. More than half of these children live in rental units.

The Philadelphia Lead Paint Disclosure & Certification Law (Philadelphia Code Section 6-800) is designed to prevent lead exposure to children by requiring landlords to certify that a property occupied by young children is "lead safe" or "lead free".

**For more information about this law, please visit:**

<https://www.phila.gov/documents/lead-and-healthy-homes-resources-for-landlords>



# SCREENING RATES FOR LEAD EXPOSURE REMAIN HIGH

**More than 90% of Philadelphia children receive at least one lead screening test before they turn 6 years old. In addition, 75% of children born in 2016 received at least one test before they turned 2 years old, compared to 58% of children born in 2005. However, only 29% of children born in 2016 were tested fully in accordance with PDPH’s recommendations (i.e., at age 1 and again at age 2).**

**TABLE 1.**

Screening rates among children born in 2005 through 2016.

Year of Birth	% Screened by 2 Years Old (<24 months)	% Screened at 1 & Again at 2	% Screened by 3 Years Old (<36 months)	% Screened Twice by 3 Years Old (<36 months)	% Screened by 6 Years Old (<72 months)
2005	57.5	15.0	72.5	30.9	86.4
2006	70.6	18.2	80.3	36.6	91.8
2007	72.0	19.1	80.9	37.4	91.4
2008	72.3	20.7	81.8	38.1	91.5
2009	73.6	21.4	83.1	39.9	91.9
2010	73.1	21.6	82.4	39.7	91.8
2011	70.4	22.3	81.1	38.8	91.0
2012	71.9	23.4	82.3	38.2	92.1
2013	72.0	24.9	82.4	38.3	—
2014	74.2	28.7	83.9	45.0	—
2015	76.5	27.9	85.8	49.8	—
2016	75.1	28.6	—	—	—

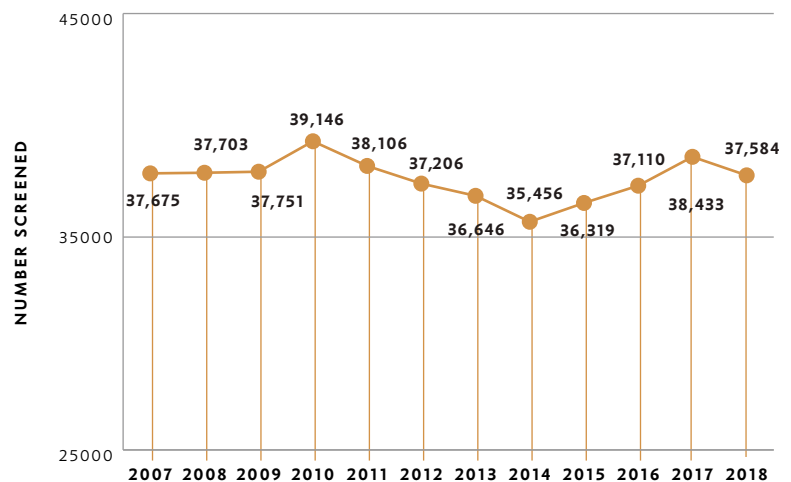
**Notes:**

Screening rates are shown by birth cohort (i.e. children born in a given year). The number of children born during 2005 through 2016 is based on PDPH’s 2016 Vital Statistics Report, Vital Status Events by Zip Code –Supplemental Table

Medicaid and PDPH recommend that children get screening at age 1 and again at age 2.

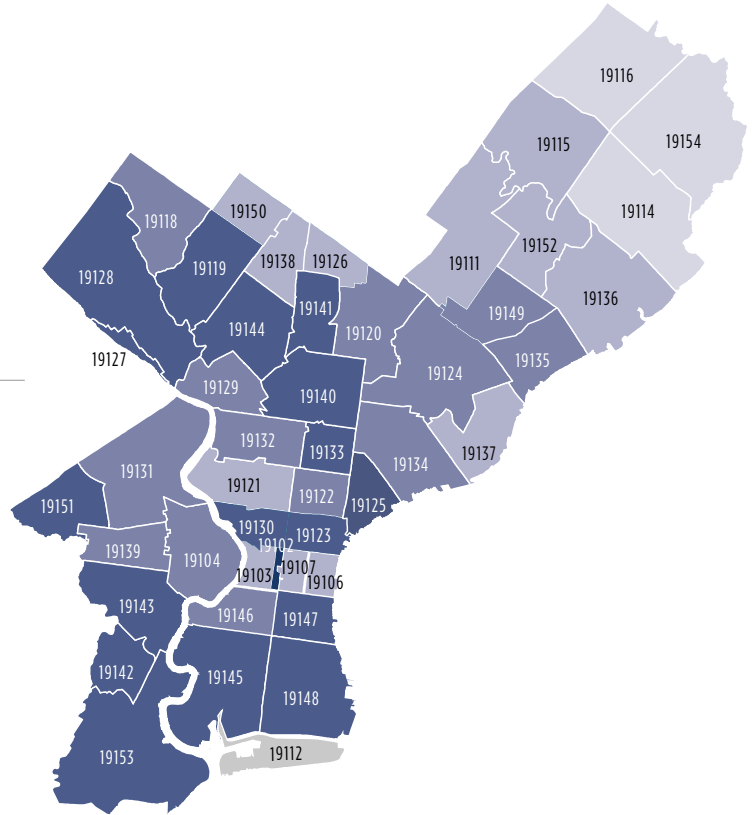
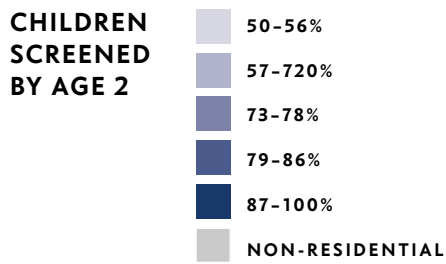
**FIGURE 2.**

Children <6 years old screened by year, 2007-2018.



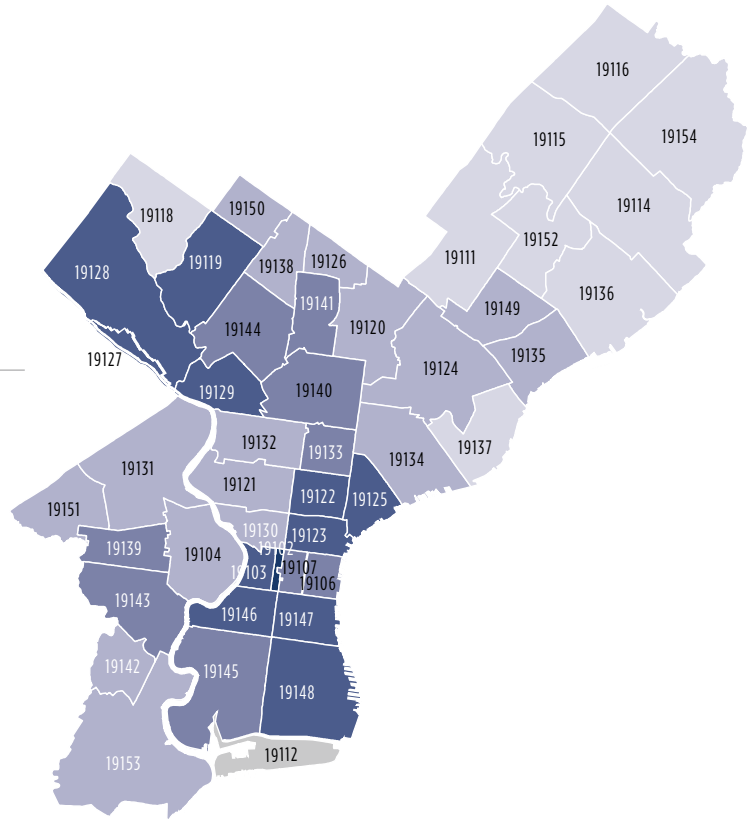
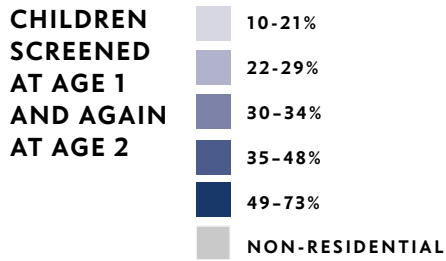
**FIGURE 3.**

Percentage of children born in 2016 tested for lead at least once by the age of 2 by zip code.



**FIGURE 4.**

Percentage of children born in 2016 tested for lead at the age of 1 year old and again at the age of 2 by zip code.





# LEAD EXPOSURE IS OCCURRING IN FEWER CHILDREN EACH YEAR, BUT REMAINS A CONCERN

**Rates of lead exposure among all blood specimen sources continued to decline in 2018, although the decline was small. There was a slight increase in venous EBLLs and EBLLs of any specimen type from 2017 to 2018 (see section “Lead Exposure Identified through All Types of Blood Specimens”). Certain areas of the city – particularly North Philadelphia and some parts of the West and Southwest Philadelphia – experience higher rates than the rest of the city. The number of children with very high lead levels (above 25 ug/dL and above 40 ug/dL) increased.**

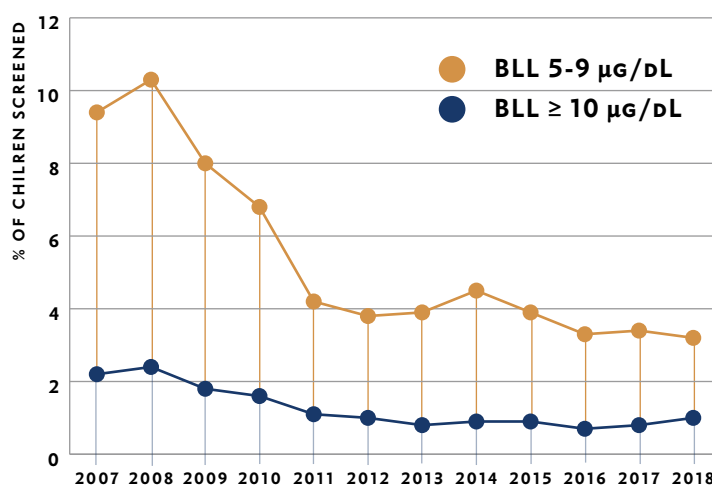
## LEAD EXPOSURE IDENTIFIED THROUGH VENOUS BLOOD SPECIMENS

The following tables and figures show BLLs among blood specimens derived from the vein, the most reliable measure of lead exposure in the blood.

In the following tables and figures, numbers associated with lead exposure are reported by either those identified through a test using venous blood specimens or any type of blood specimens (i.e., venous, capillary, or unknown). Using venous blood tests to calculate rates of lead exposure gives us a more precise estimate. However, by including children identified through any type of blood specimen in overall numbers, PDPH’s Lead and Healthy Homes Program can target prevention efforts to all children possibly affected by lead exposure.

**FIGURE 5.**

Trend of newly identified EBLLs using venous blood specimens among children <6 years old, 2007-2018.



\*5-9 & ≥10 µg/dL categories mutually exclusive

**TABLE 2.**

Number and percentage of newly identified BLLs using venous blood specimens among children <6 years old, 2007-2018.

Year	Number of Children Screened	Number of Children with BLL 5-9 µg/dL	Number of Children with BLL ≥ 10 µg/dL	Percent of Children with BLL 5-9 µg/dL	Percent of Children with BLL ≥10 µg/dL	Geometric Mean in µg/dL
2007	37,675	3,536	843	9.4	2.2	3.8
2008	37,703	3,894	914	10.3	2.4	3.4
2009	37,751	3,007	693	8.0	1.8	3.3
2010	39,146	2,655	634	6.8	1.6	3.1
2011	38,106	1,601	407	4.2	1.1	2.5
2012	37,206	1,426	363	3.8	1.0	2.2
2013	36,646	1,431	295	3.9	0.8	2.1
2014	35,456	1,608	331	4.5	0.9	2.6
2015	36,319	1,430	328	3.9	0.9	2.6
2016	37,110	1,235	272	3.3	0.7	2.5
2017	38,433	1,305	318	3.4	0.8	2.1
2018	37,584	1,199	369	3.2	1.0	2.3

**Notes:**

Calculated using the highest venous blood lead level a child had in a given year.

Geometric mean is an average that is often used to measure BLLs because it may be more accurate. It uses a calculation slightly different from the traditional (arithmetic) mean to adjust for outliers. The geometric mean is based on BLLs with detectible amounts of lead in their blood. Therefore, this number represents the average BLL among those with any detectible amount of lead exposure.

**TABLE 3.**

Distribution of existing BLL levels (venous) by category, 2013-2018.

BLL Category	2013	2014	2015	2016	2017	2018
<5	23,766	24,002	25,253	24,117	26,422	25,893
5-9	1,838	2,056	1,816	1,625	1,564	1,904
10-14	195	230	216	174	199	355
15-24	81	83	88	84	100	174
25-44	22	26	21	21	21	46
45+	7	<6	6	<6	8	15

**Notes:**

For each child, their highest prevalent (any existing, not restricted to new) BLL in a given year was identified and categorized.

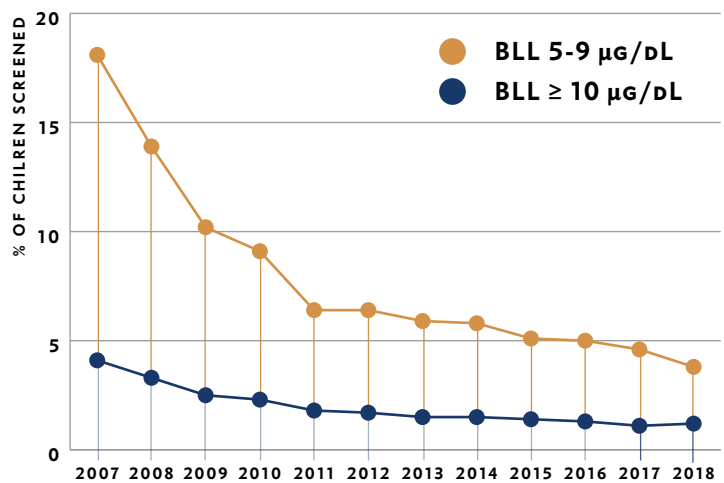
These numbers do not necessarily represent newly identified BLLs. Some children may have had a newly identified BLL in a previous year, but continued to get tested in the following years for monitoring purposes. Please see the section titled "Explanation of Data" for more information.

## LEAD EXPOSURE IDENTIFIED THROUGH ALL TYPES OF BLOOD SPECIMENS

The following tables and figures show BLLs among blood specimens derived from any source (i.e. venous, capillary, or unknown blood specimen type).

**FIGURE 6.**

Trend of newly identified BLLs using any type of blood specimens among children <6 years old, 2007-2018.



\*5-9 & ≥10 µg/dL categories mutually exclusive

**TABLE 4.**

Number and percentage of newly identified BLLs using all types of blood specimens among children <6 years old, 2007-2018.

Year	Number of Children Screened	Number of Children with BLL 5-9 µg/dL	Number of Children with BLL ≥ 10 µg/dL	Percent of Children with BLL 5-9 µg/dL	Percent of Children with BLL ≥10 µg/dL	Geometric Mean in µg/dL
2007	37,675	6,827	1,544	18.1	4.1	3.8
2008	37,703	5,250	1,251	13.9	3.3	3.4
2009	37,751	3,833	957	10.2	2.5	3.3
2010	39,146	3,560	900	9.1	2.3	3.2
2011	38,106	2,454	679	6.4	1.8	2.6
2012	37,206	2,388	632	6.4	1.7	2.4
2013	36,646	2,173	560	5.9	1.5	2.2
2014	35,456	2,050	537	5.8	1.5	2.5
2015	36,319	1,845	494	5.1	1.4	2.4
2016	37,110	1,850	475	5.0	1.3	2.3
2017	38,433	1,771	435	4.6	1.1	2.1
2018	37,584	1,434	433	3.8	1.2	2.1

**Notes:**

Calculated using the highest venous blood lead level a child had in a given year.

Geometric mean is an average that is often used to measure BLLs because it may be more accurate. It uses calculation slightly different from the traditional (arithmetic) mean to adjust for outliers. The geometric mean is based on BLLs with detectible amounts of lead in their blood. Therefore, this number represents the average BLL among those with any detectible amount of lead exposure.

**TABLE 5.**

Distribution of existing BLL levels (all specimen types) by category, 2013-2018.

<b>BLL Category</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
<5	33,237	32,223	33,443	34,208	35,818	34,626
5-9	2,828	2,666	2,373	2,413	2,160	2,297
10-14	381	369	326	299	275	387
15-24	143	142	134	148	139	194
25-44	39	44	35	35	30	60
45+	7	<6	7	7	11	20

**Notes:**

For each child, their highest recorded BLL in a given year was identified and categorized.

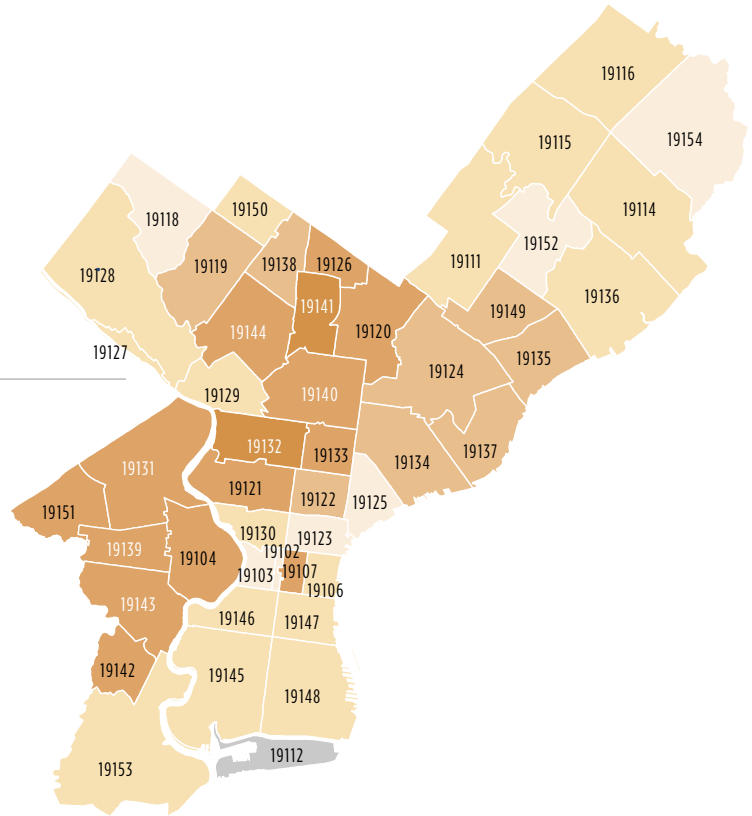
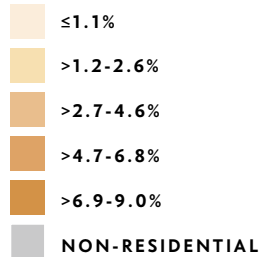
These numbers do not necessarily represent newly identified BLLs. Some children may have had a newly identified BLL in a previous year, but continued to get tested in the following years for monitoring purposes. Please see the section titled "Explanation of Data" for more information.



**FIGURE 7.**

Newly identified children with venous BLLs of  $\geq 5 \mu\text{g/dL}$  by zip code, 2018

**CHILDREN WITH BLLS  $\geq 5 \mu\text{g/dL}$**



## PDPH SERVICES PROVIDED TO CHILDREN WITH NEWLY IDENTIFIED ELEVATED BLL

**TABLE 6.**

Services received by children with newly identified BLLs  $\geq 10 \mu\text{g/dL}$  in 2018. **More than half of children with newly identified EBLLs received services from PDPH in 2018.**

Services Type	Number of Children	Percent (%)
Educational visit	209	48.3
Inspection	153	35.3
Remediation	136	31.4
Proceeded to Lead Court	85	19.6
No PDPH services provided	159	36.7

**Notes:**

Total count (N=433) includes children with newly identified BLLs by venous or unknown specimen types. For case management purposes, these cases are considered eligible for PDPH services.

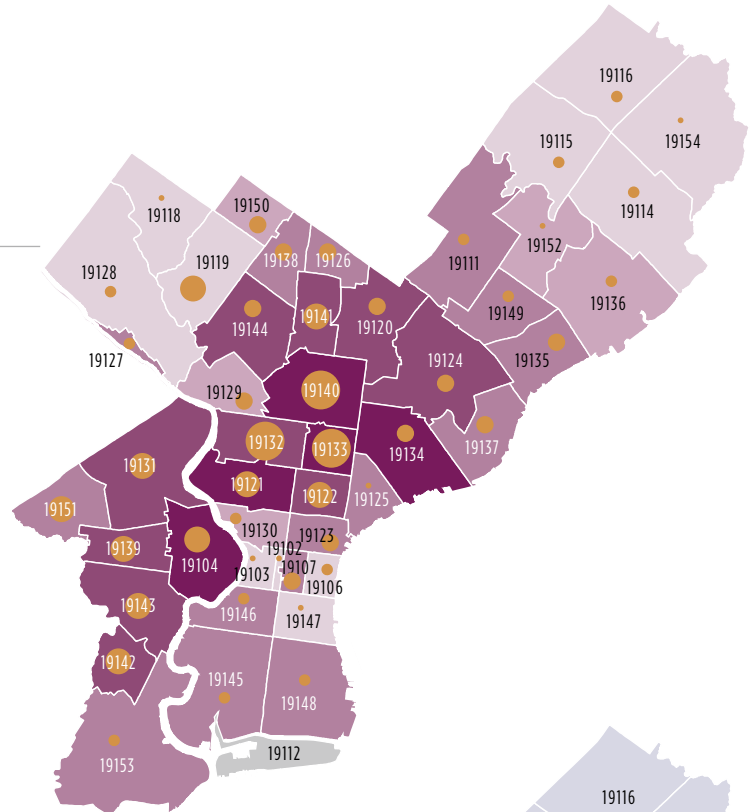
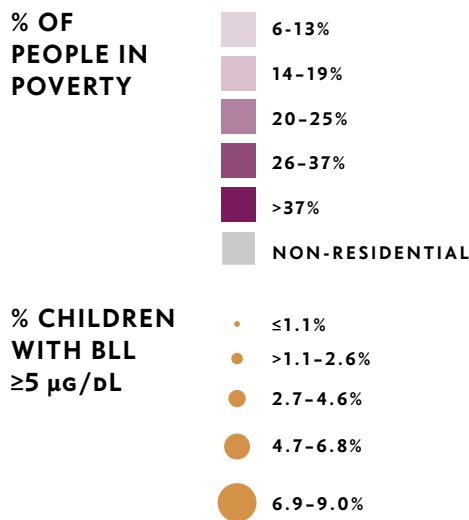
Services such as educational visit, inspection, remediation, and Lead Court are not mutually exclusive.

# POVERTY AND AGE OF HOUSING ARE ASSOCIATED WITH ELEVATED BLOOD LEAD LEVELS IN CHILDREN

*Risk factors for lead exposure are presented by zip code in the figures below.*

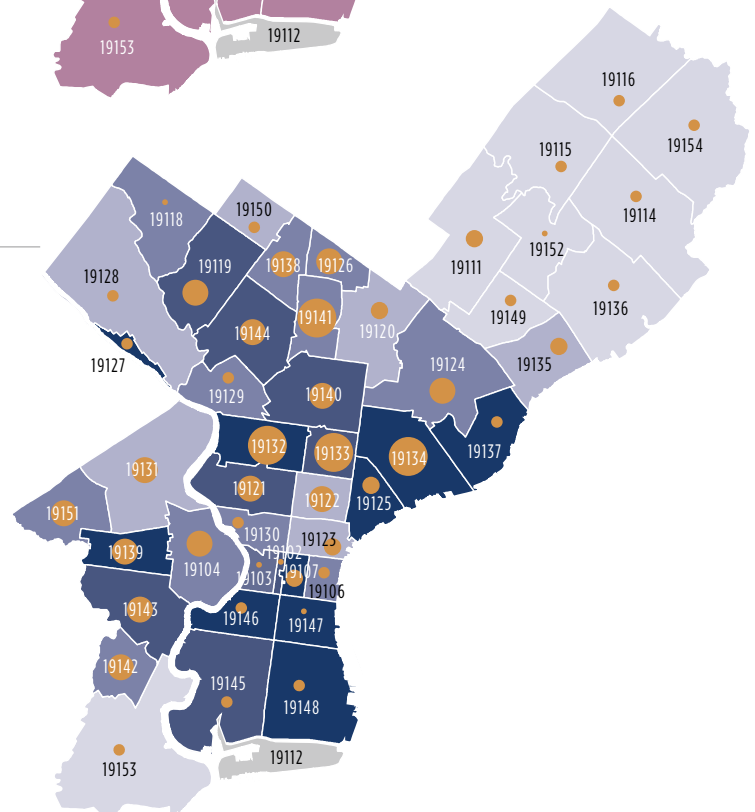
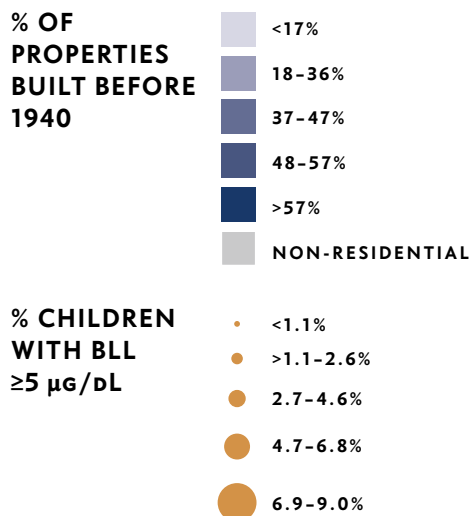
**FIGURE 8.**

Poverty vs. elevated BLL by zip code.



**FIGURE 9.**

Housing units built before 1940 vs. elevated BLL by zip code.





For more information, please contact:

Lead and Healthy Homes Program

Philadelphia Department of Public Health

2100 West Girard Avenue, Building #3

Philadelphia, PA 19130-1400

Tel: 215-685-2788