

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

CHILDHOOD LEAD POISONING

Surveillance Report

2016



Department of
Public Health

CITY OF PHILADELPHIA

Contents

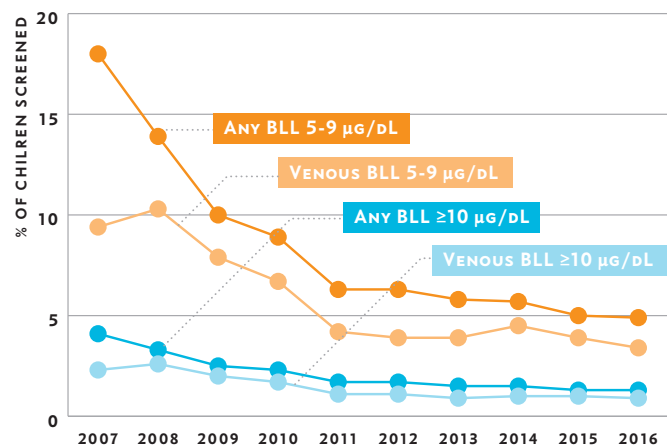
Introduction	1
Lead Poisoning	1
PDPH Lead and Healthy Home Program	1
Tracking Lead Exposure, Risk Factors, and Outcomes	2
Explanation of the Data	2
Screening Recommendations	4
Philadelphia Lead Paint Disclosure & Certification Law	4
Screening Rates for Lead Exposure Remain High	5
Lead Exposure is Occurring 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 in 2016, there was a decrease in newly identified children with venous blood lead levels ≥ 10 $\mu\text{g}/\text{dL}$ from 2.3% of children screened for lead poisoning in 2007 to 0.9% in 2016.

FIGURE 1.

Trend of lead exposure by venous and any blood specimen type among children <6 years old living in Philadelphia, 2007-2016.*



*5-9 & ≥ 10 $\mu\text{g}/\text{dL}$ 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 may never go away. The best response to the problem is to prevent a child from becoming lead exposed 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 the 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.

These activities include:

- Providing education 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

For more information about LHHP and access to educational materials, please visit <http://www.phila.gov/health/childhoodlead/index.html>.

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 blood lead levels (BLLs). When LHHP becomes aware of a child with a BLL ≥ 10 micrograms per deciliter ($\mu\text{g}/\text{dL}$) who has not already been identified, LHHP contacts the child's parents or guardian and initiates services, including educational visits, lead inspections and in some cases financial help to remediate lead hazards.

If a child has a BLL between 5-9 $\mu\text{g}/\text{dL}$, LHHP offers education services to help families understand how to ensure their child is not further exposed to lead. In this report, we have added a new section called "Services Provided to Children with Elevated BLL", which reports on the outcomes for children with a newly identified BLL $\geq 10\mu\text{g}/\text{dL}$ in 2016.

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

EXPLANATION OF THE DATA

Childhood lead exposure in the State of Pennsylvania is a reportable condition, which means that all healthcare practitioners, laboratories, and healthcare facilities must report the health concern to Pennsylvania Department of Health (PA DOH). PA DOH receives reports of all blood lead tests among <16 years old, even those with no lead detectible. Results for Pennsylvania residents are sent by laboratories and healthcare providers to PA DOH.

Blood lead tests are reported individually. Therefore, one child may have multiple test reports. This document summarizes data for each child rather than by tests. 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 tests 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 venous 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 mean 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 should be screened for lead at ages 12 and 24 months or at 36-72 months if there is not proof of prior screening. 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 (µg/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:

phila.gov/health/ChildhoodLead/LeadPaintLaw.html



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 2014 received at least one test before they turned 2 years old, compared to 58% of children born in 2005. However, only 26% of children born in 2014 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

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	57.6	15.2	72.6	34.1	86.4
2006	70.8	18.5	80.4	41.2	91.8
2007	72.0	19.6	81.0	40.2	91.4
2008	72.4	21.3	81.8	38.8	91.5
2009	73.7	22.0	83.3	40.4	91.9
2010	73.3	22.1	82.6	40.3	91.8
2011	70.6	22.7	81.3	40.0	--
2012	72.2	23.9	82.7	41.6	--
2013	72.3	25.4	82.9	43.1	--
2014	74.9	26.3	--	--	--

Notes:

Screening rates are shown by birth cohort (i.e., children born in a given year). The number of children born during 2005 through 2014 is based on PDPH's 2014 Vital Statistics Report, Vital Status Events by Zip Code – Supplemental Tables.

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

FIGURE 1.

Children <6 years old screened by year, 2007-2016.

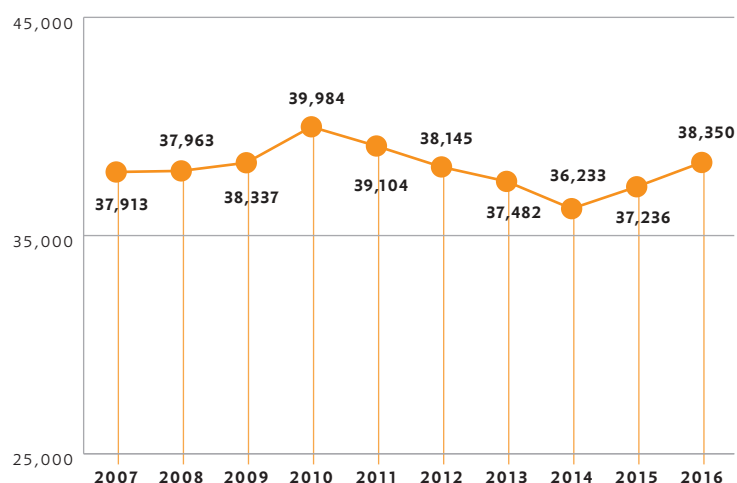


FIGURE 2.

Percentage of children born in 2014 tested for lead at least once by the age of 2 by zip code.

**CHILDREN
SCREENED
BY AGE 2**

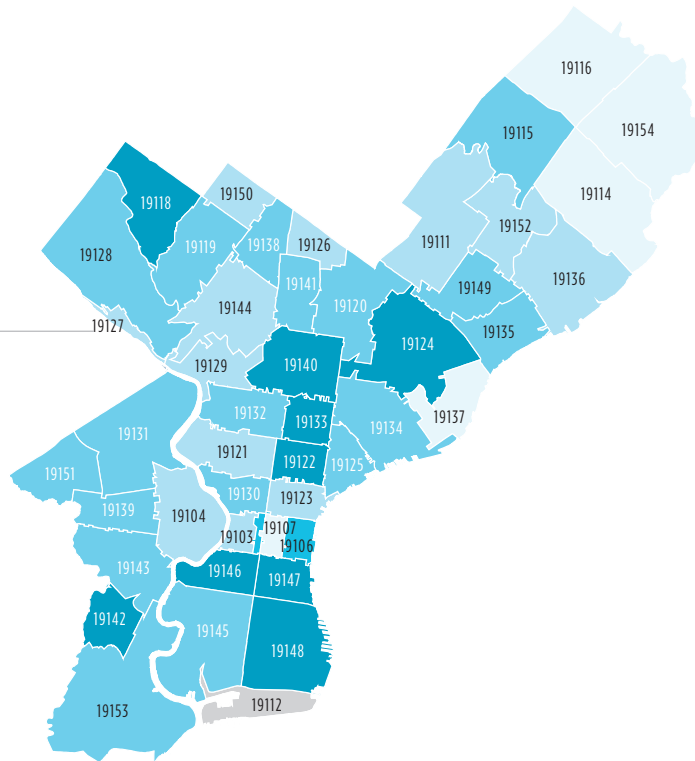
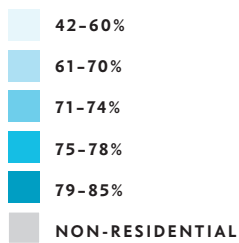
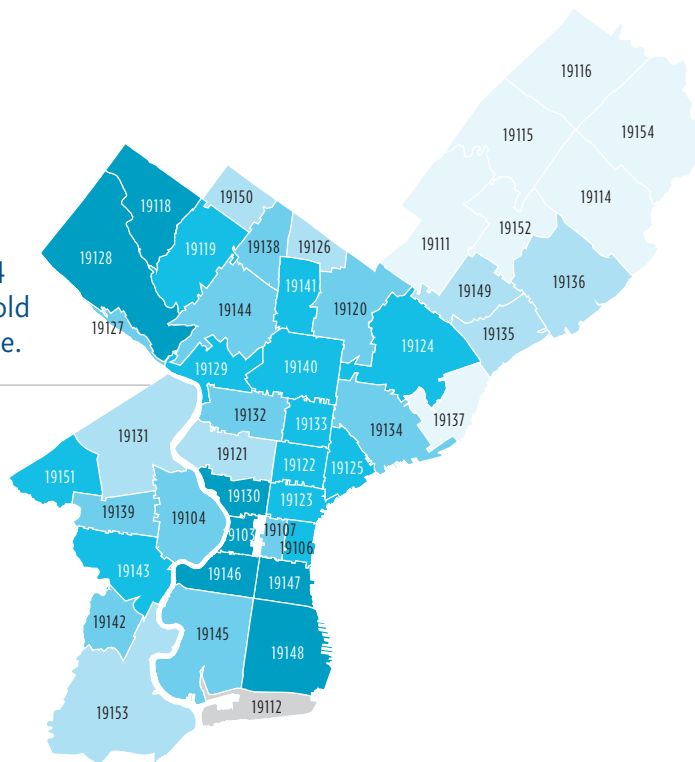
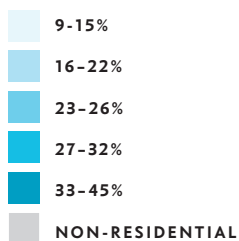


FIGURE 3.

Percentage of children born in 2014 tested for lead at the age of 1 year old and again at the age of 2 by zip code.

**CHILDREN
SCREENED
AT AGE 1
AND AGAIN
AT AGE 2**



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

Rates of lead exposure continued to decline in 2016. Nonetheless, 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.

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 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.

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.

FIGURE 4.

Trend of newly identified BLLs using venous blood specimens among children <6 years old, 2007-2016.

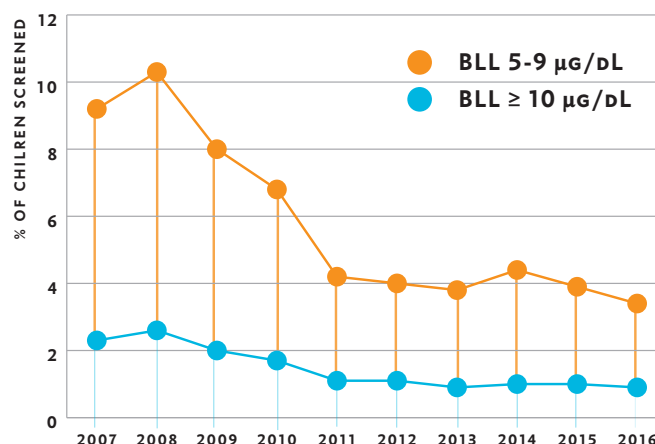


TABLE 2.

Number and percentage of newly identified BLLs using venous blood specimens among children <6 years old, 2007-2016.

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	37,913	3,553	876	9.4	2.3	3.8
2008	37,963	3,911	984	10.3	2.6	3.5
2009	38,337	3,037	771	7.9	2.0	3.4
2010	39,984	2,695	691	6.7	1.7	3.3
2011	39,104	1,641	449	4.2	1.1	2.7
2012	38,145	1,491	422	3.9	1.1	2.3
2013	37,482	1,469	348	3.9	0.9	2.2
2014	36,233	1,644	362	4.5	1.0	2.7
2015	37,236	1,469	371	3.9	1.0	2.7
2016	38,350	1,310	342	3.4	0.9	2.6

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 detectable amounts of lead in their blood. Therefore, this number represents the average BLL among those with any detectable amount of lead exposure.

TABLE 3.

Comparison of child demographics among different levels of lead exposure by venous blood specimens, 2016.

	Children Screened in 2016 who Never Had BLL ≥5 µg/dL		Children with Newly Identified BLL 5-9 µg/dL		Children with Newly Identified BLLs ≥10 µg/dL		
	N=23,079	%	N=1,310	%	N=342	%	P-value
Age Group							<0.001
<2	11,355	49.2	621	47.4	148	43.3	
2-3	8,610	37.3	561	42.8	171	50.0	
4-5	3,114	13.5	128	9.8	23	6.7	
Sex							0.02
Female	11,246	48.7	588	44.9	158	46.2	
Male	11,810	51.2	720	55.0	181	52.9	

TABLE 4.

Distribution of existing BLL levels (venous) by category, 2012-2016.

BLL Category	2012	2013	2014	2015	2016
<5	25,881	24,019	24,226	25,539	24,106
5-9	2,189	2,099	2,285	2,060	1,899
10-14	395	319	297	311	282
15-24	161	129	128	131	147
25-44	54	37	42	34	41
45+	<6	10	<6	7	<6

Notes:

For each child, their highest prevalent BLL (any existing, not restricted to new) 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 5.

Trend of newly identified BLLs using any type of blood specimens among children <6 years old, 2007-2016.

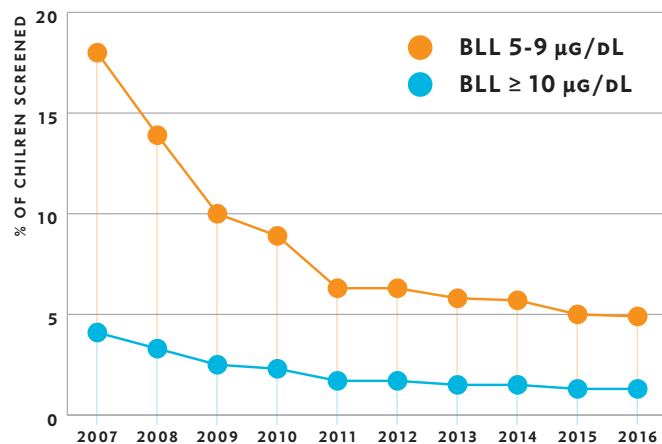


TABLE 5.

Number and percentage of newly identified BLLs using all types of blood specimens among children <6 years old, 2007-2016.

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	37,913	6,835	1,559	18.0	4.1	3.8
2008	37,963	5,263	1,239	13.9	3.3	3.5
2009	38,337	3,833	959	10.0	2.5	3.4
2010	39,984	3,568	903	8.9	2.3	3.3
2011	39,104	2,457	682	6.3	1.7	2.7
2012	38,145	2,396	632	6.3	1.7	2.3
2013	37,482	2,183	560	5.8	1.5	2.2
2014	36,233	2,062	538	5.7	1.5	2.7
2015	37,236	1,869	496	5.0	1.3	2.7
2016	38,350	1,889	503	4.9	1.3	2.6

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 detectable amounts of lead in their blood. Therefore, this number represents the average BLL among those with any detectable amount of lead exposure.

TABLE 6.

Comparison of child demographics among different levels of lead exposure by all types of blood specimens, 2016.

	Children Screened in 2016 who Never Had BLL ≥ 5 $\mu\text{g/dL}$		Children with Newly Identified BLL 5-9 $\mu\text{g/dL}$		Children with Newly Identified BLLs ≥ 10 $\mu\text{g/dL}$		
	N=33,352	%	N=1,889	%	N=503	%	P-value
Age Group							<0.001
<2	17005	51.0	909	48.1	232	46.1	
2-3	12597	37.8	819	43.4	236	46.9	
4-5	3750	11.2	161	8.5	35	7.0	
Sex							<0.001
Female	16361	49.1	880	46.6	215	42.7	
Male	16955	50.8	1007	53.3	285	56.7	

TABLE 7.

Distribution of existing BLL levels (all specimen types) by category, 2012-2016.

BLL Category	2012	2013	2014	2015	2016
<5	33,795	33,524	30,114	30,170	33,883
5-9	3,398	3,145	2,956	2,710	2,674
10-14	562	493	455	426	411
15-24	242	196	194	185	217
25-44	70	51	60	51	54
45+	<6	12	<6	7	9

Notes:

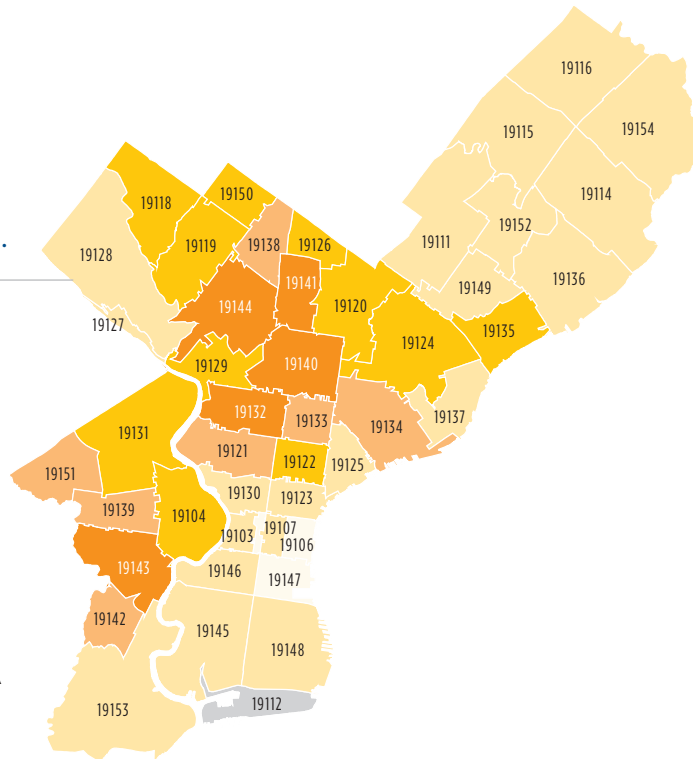
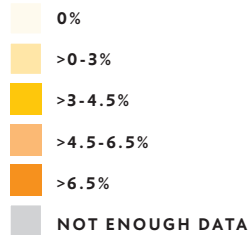
For each child, their highest recorded BLL in a given year was identified and categorized.

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 6.

Newly identified children with venous BLLs of $\geq 5 \mu\text{g}/\text{dL}$ by zip code, 2016.

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



SERVICES PROVIDED TO CHILDREN WITH ELEVATED BLL

TABLE 8.

Services provided by the Department of Public Health to children with newly identified elevated BLLs in 2016.

Services Type	Number of Children	Percent (%)
Educational visit	283	71.6
Inspection	199	50.4
Remediation	125	31.6
Proceeded to Lead Court	64	16.2

Notes:

Total count (N=395) 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 7.

Poverty vs. elevated BLL by zip code.

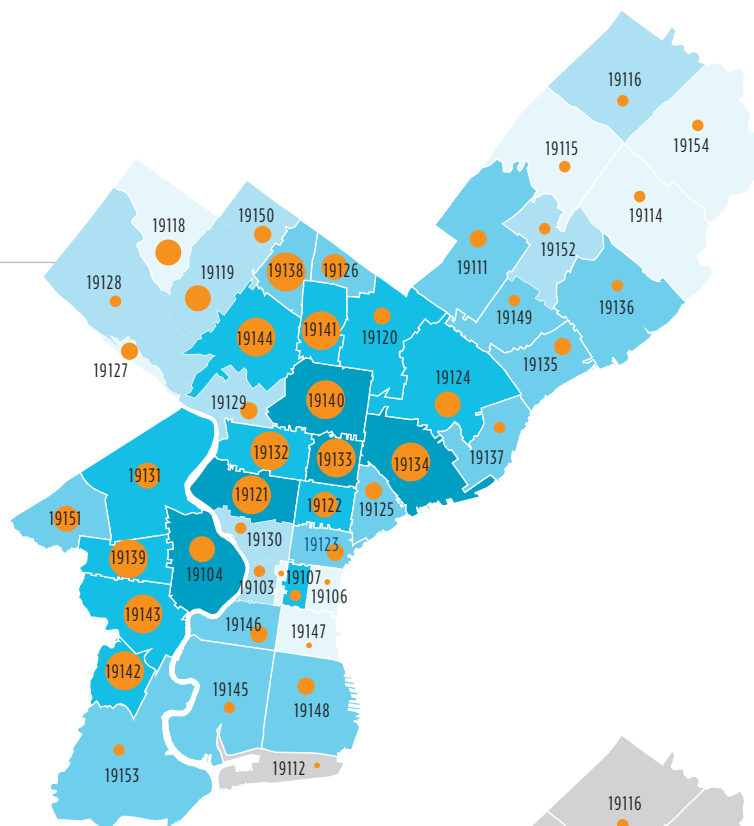
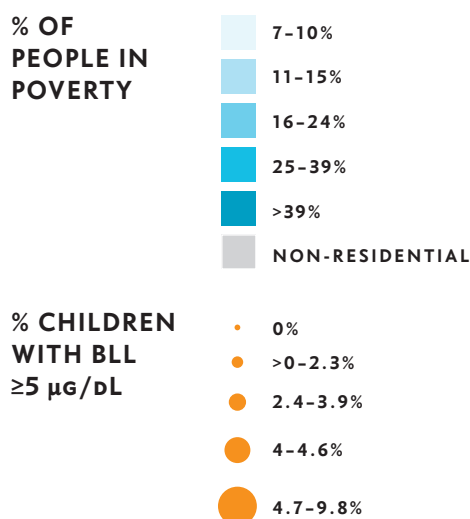
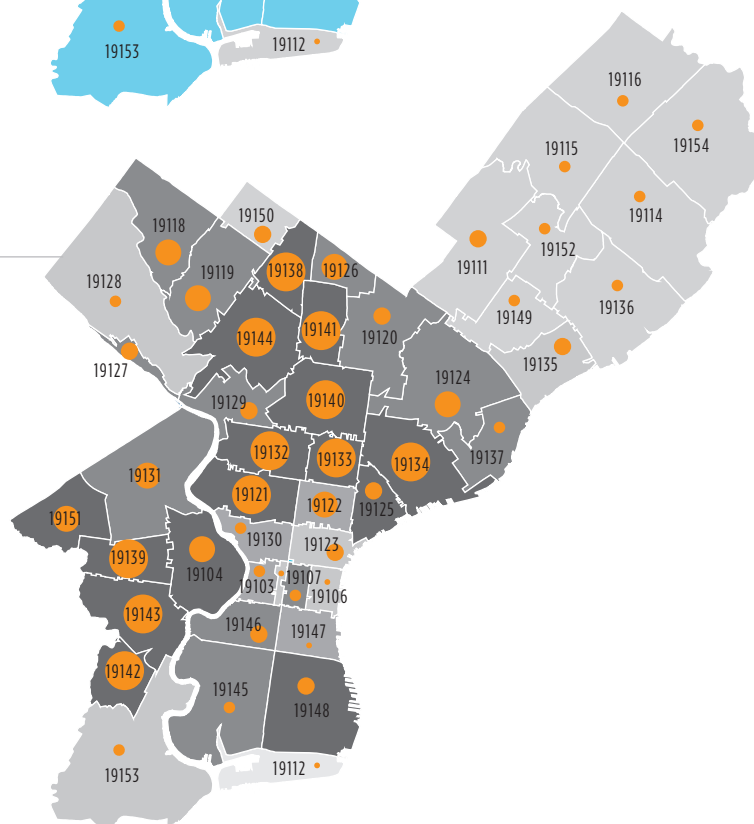
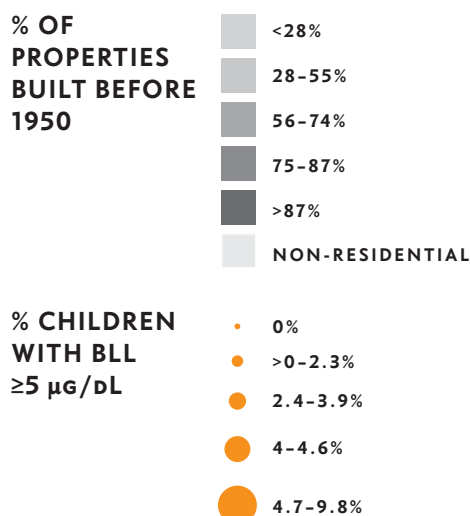


FIGURE 8.

Housing units built before 1950 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