2015 CHILDHOOD LEAD POISONING SURVEILLANCE REPORT

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

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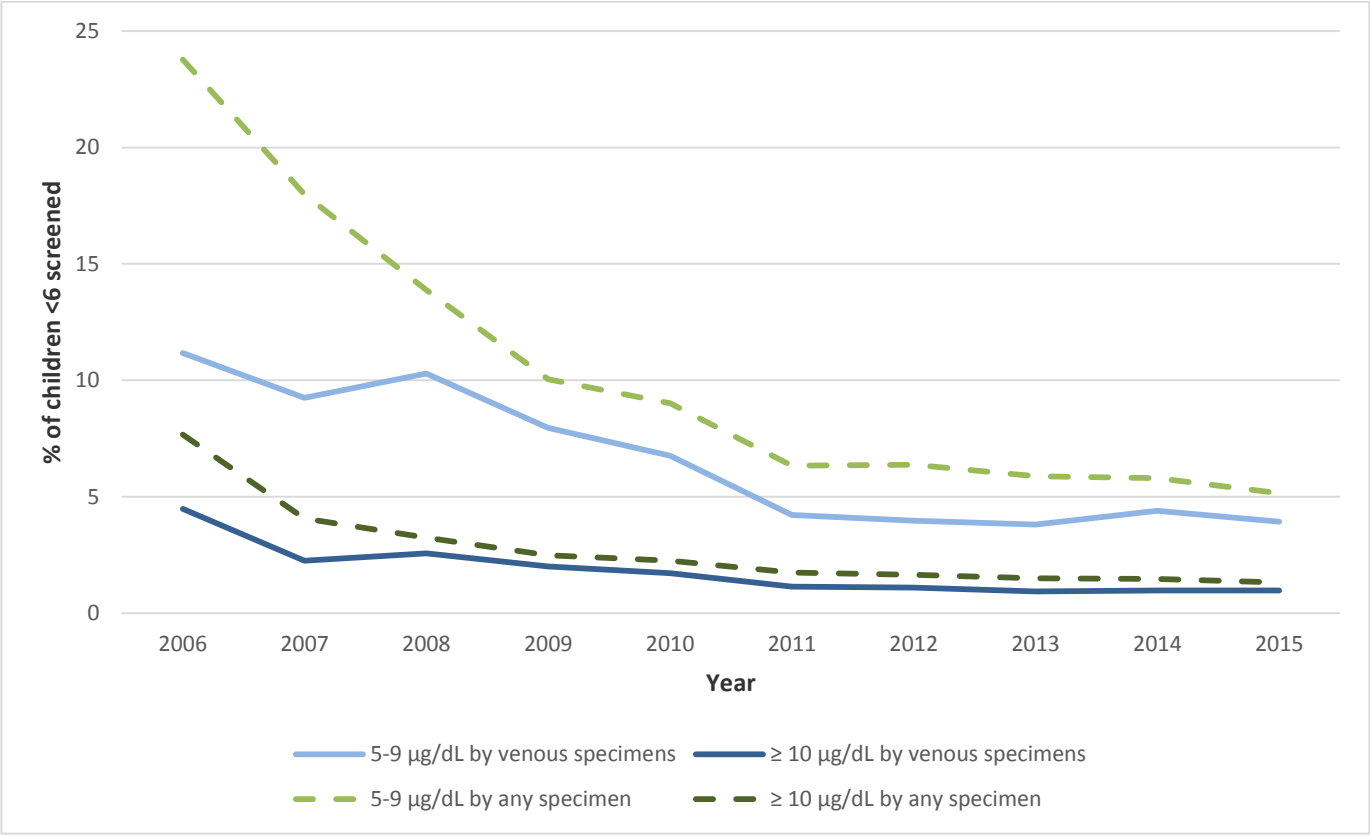
Numbers at a Glance

Among Philadelphia children under the age of 6 years old, there was:

- A decrease in newly identified children with venous blood lead levels ≥10 µg/dL from 4.5% of children screened for lead poisoning in 2006 to 1.0% in 2015.
- A decrease in newly identified children with any blood lead levels ≥10 µg/dL from 7.7% of children screened for lead poisoning in 2006 to 1.3% in 2015.

Figure 1. Trend of lead poisoning by venous and any blood specimen type among children <6 years old living in Philadelphia, 2006-2015.



Introduction

Lead poisoning

By far the major source of childhood lead poisoning in Philadelphia is lead paint. Many homes in Philadelphia built before 1978 have lead paint on the inside and outside of the building. When old paint cracks and peels it makes lead dust. Children get lead poisoning from swallowing flakes of paint or paint dust on their hands and toys. Children can also breathe in lead dust. Even small amounts of lead can cause very serious 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

Some of the health problems caused by lead poisoning may never go away. The best thing we can do is to prevent a child from becoming lead poisoned in the first place.

PDPH Lead and Healthy Homes Program

The Philadelphia Department of Public Health (PDPH) has a long and successful history of preventing lead poisoning in children. PDPH's Lead and Healthy Homes Program (LHHP), formerly known as Childhood Lead Poisoning Prevention Program, has over forty years of experience alleviating conditions which cause childhood lead poisoning and educating social service and childcare providers, clinicians, families and children about the importance of preventing lead poisoning and performing lead screening. LHHP has been able to expand lead poisoning prevention activities through grant funding from the Centers for Disease Control and Prevention and the Department of Housing and Urban Development.

LHHP continues to promote healthy homes and prevent lead poisoning through the following activities:

- 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 Law Department.
- Conducting surveillance on childhood lead poisoning 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.

Explanation of the Data

Childhood lead poisoning in the State of Pennsylvania is a reportable condition, which means that healthcare practitioners, laboratories, and healthcare facilities must report the health concern to Pennsylvania Department of Health (PA DOH). PA DOH receives reports of all tests for childhood lead poisoning, even if the child does not have any lead in their blood.

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 ≥10 µg/dL within a calendar year, that child would only be counted once for that year.

The most reliable way to determine if a child has been poisoned by lead is a blood test from a venous specimen, or blood that is taken from a vein. While not ideal, some lead tests are done using a capillary blood specimen, or

blood that is taken from a finger prick. Other times, PDPH does not receive information about the blood specimen, so it is classified as an unknown specimen type. Therefore, we present data by the type of blood test the child received in order to show all potential childhood lead poisoning cases.

For this report we use the following definitions:

Blood lead level (BLL): Micrograms per deciliter of lead from a venous blood specimen. BLLs 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 who were screened by the total number of children under the age of 72 months living in Philadelphia, multiplied by 100.

Incidence rate: Incidence rate is calculated by dividing the number of children under the age of 72 months with a newly identified BLL of concern by the total number of children under the age of 72 months who were screened, multiplied by 100. BLL rates in this document will be reported as incidence rates, or newly identified case rates.

$$\frac{\text{\# children with BLLs of concern}}{\text{\# children screened for lead poisoning}} \text{ X } 100$$

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 for Lead Poisoning

PDPH recommends that all children should get screened for lead poisoning between the ages of 8 to 12 months, and again at the age of 24 months. It is recommended that all lead screening uses venous blood specimens for better accuracy in detecting lead in the blood.

If a child's blood lead level is elevated, PDPH recommends that that 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 Disclosure & Certification Law

Despite years of progress, each year significant numbers of children in Philadelphia suffer the irreparable harm of lead poisoning because of exposure to deteriorated lead paint and lead dust in their homes. More than half of these children are living in rental units. The Philadelphia Lead Paint Disclosure & Certification Law (Philadelphia Code Section 6-800) is designed to prevent children from becoming lead poisoned by requiring owners and landlords to certify that a property occupied by young children is lead safe or lead free. Specifically, the law applies to:

- Any landlord who rents Philadelphia properties built before 1978 to new tenants who will be living in the property with a child 6 years or under. Landlords must certify their rental property as Lead Safe or Lead Free, provide their tenants with certificates for tenants' signature, and provide copies of signed certificates to the Philadelphia Department of Public Health.
- Any seller of residential housing built before 1978. Sellers must disclose the absence or presence of lead-based paint or lead-based paint hazards.

Student housing and housing owned or subsidized by the Philadelphia Housing Authority or privately owned but currently leased under the Housing Choice Voucher Program is exempted from the law. For more information about this law, please visit: http://www.phila.gov/health/ChildhoodLead/LeadPaintLaw.html

Screening Rates for Lead Poisoning Remain High

Many children under the age of 6 continue to get screened for lead poisoning. There has been an increase in children screened by the age of 3 from 72% of children born in 2005 to 88% of children born in 2012.

Figure 2. Children <6 years old screened by year, 2006-2015.

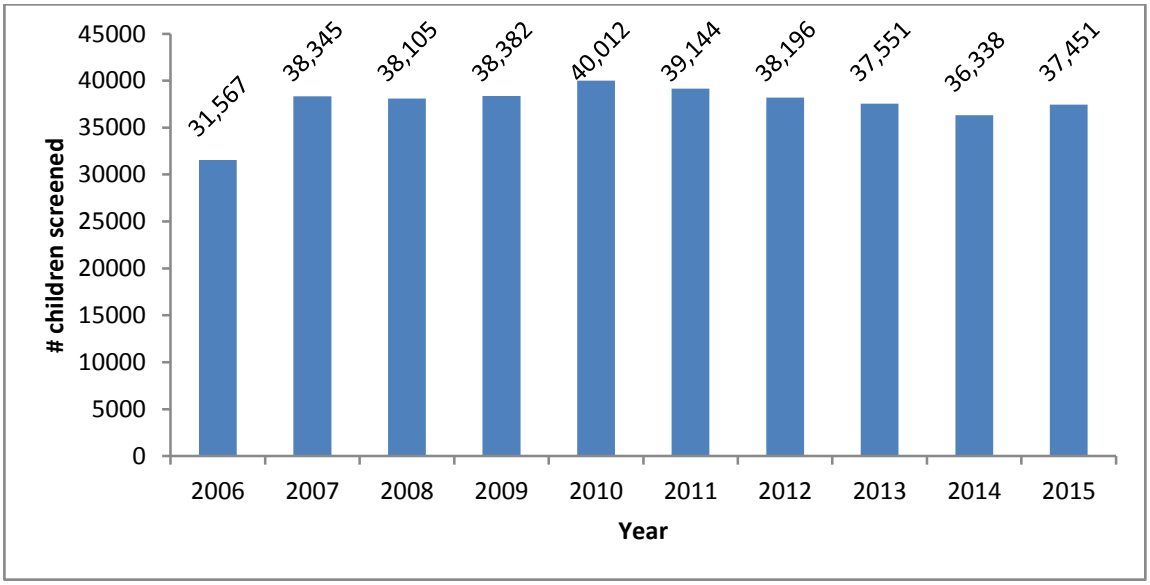


Table 1. Age of screening by year, 2011-2015.

Year	% children under 1 year old (<12 months) screened	% 1 year old (12-23 months) children screened	% 2 year old (24-35 months) children screened	% children under 6 years old (<72 months) screened
2011	40.7	54.1	47.8	32.7
2012	38.1	52.7	49.1	31.9
2013	37.0	54.2	50.1	31.4
2014	36.0	51.8	51.5	30.4
2015	40.4	53.7	53.2	31.3

Table 2. Screening rates among children born in 2005 through 2013.

Birth Cohort	% children screened by 2 years old (<24 months)	% children screened by age 3 years old (<36 months)	% children screened by age 6 years old (<72 months)
2005	57.4	72.2	86.0
2006	70.4	80.1	91.4
2007	72.2	81.2	91.6
2008	73.0	82.5	92.2
2009	73.6	83.2	91.9
2010	73.7	83.0	-
2011	70.9	81.6	-
2012	76.4	87.6	-
2013	72.9	-	-

Figure 3. Percentage of children born in 2012 tested for lead at least once by the age of 2 years old by zip code.

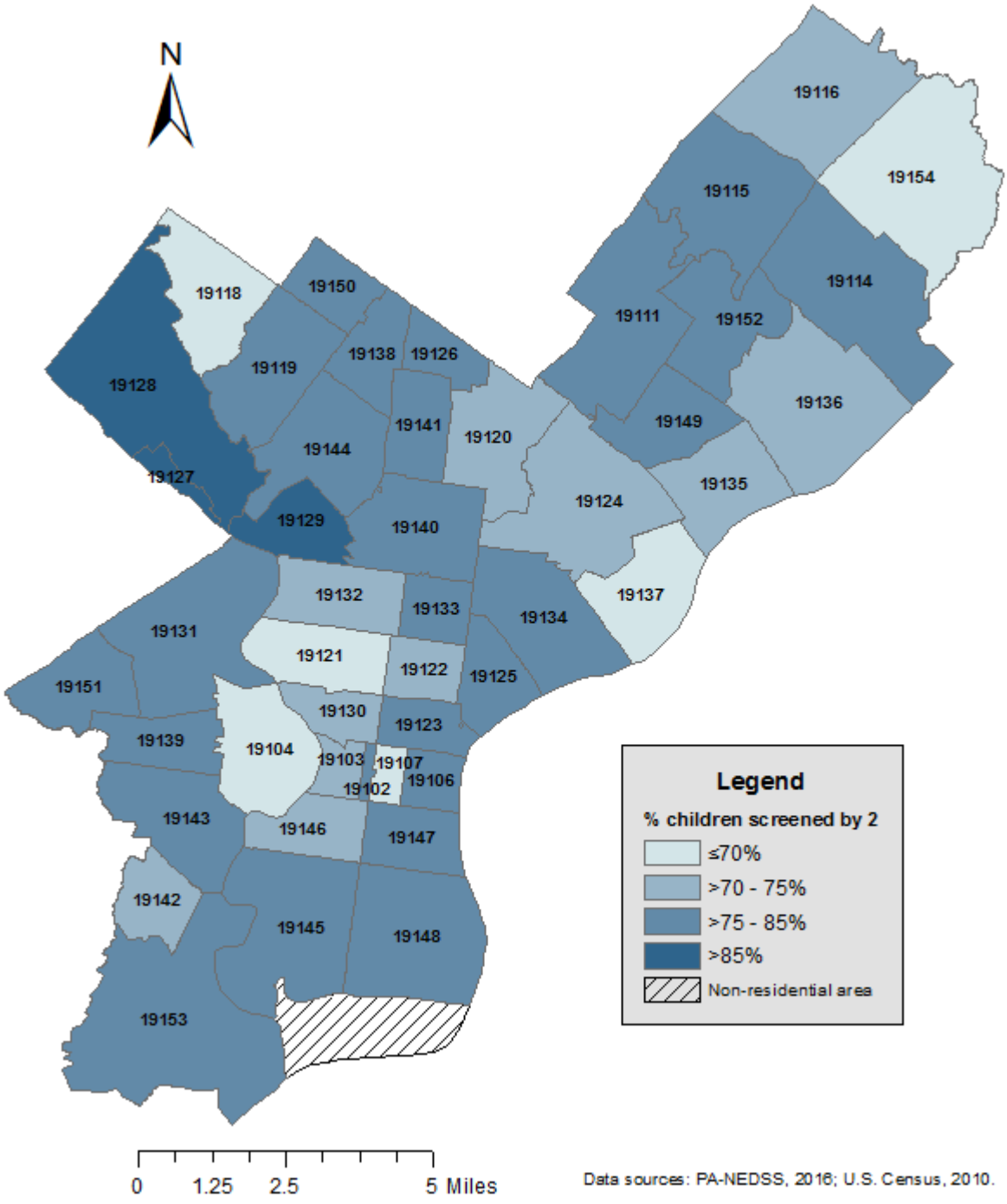
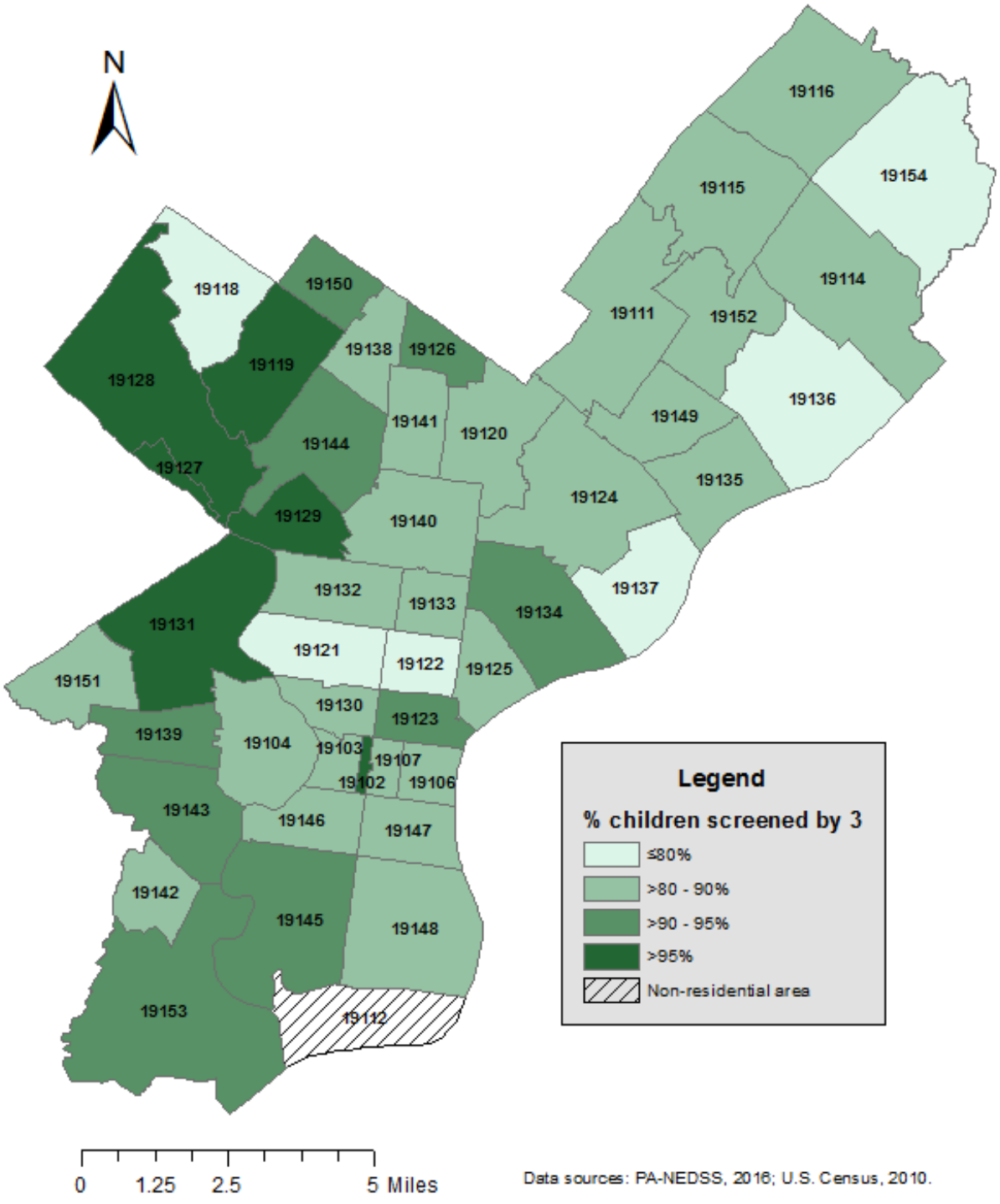


Figure 4. Percentage of children born in 2012 tested for lead at least once by the age of 3 years old.



Lead Poisoning Has Fallen Dramatically, but Persists in Some Zip Codes

Philadelphia has observed a decline in childhood lead poisoning from 2006 to 2015. In the following tables and figures, numbers associated with lead poisoning 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 poisoning 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 affect by lead poisoning. In tables 4 & 7, age group and sex are displayed from 2011 through 2014 compared to 2015.

Lead Poisoning Identified through Venous Blood Specimens

Figure 5. Trend of newly identified BLLs from venous blood specimens among children <6 years old screened for lead poisoning, 2006-2015.

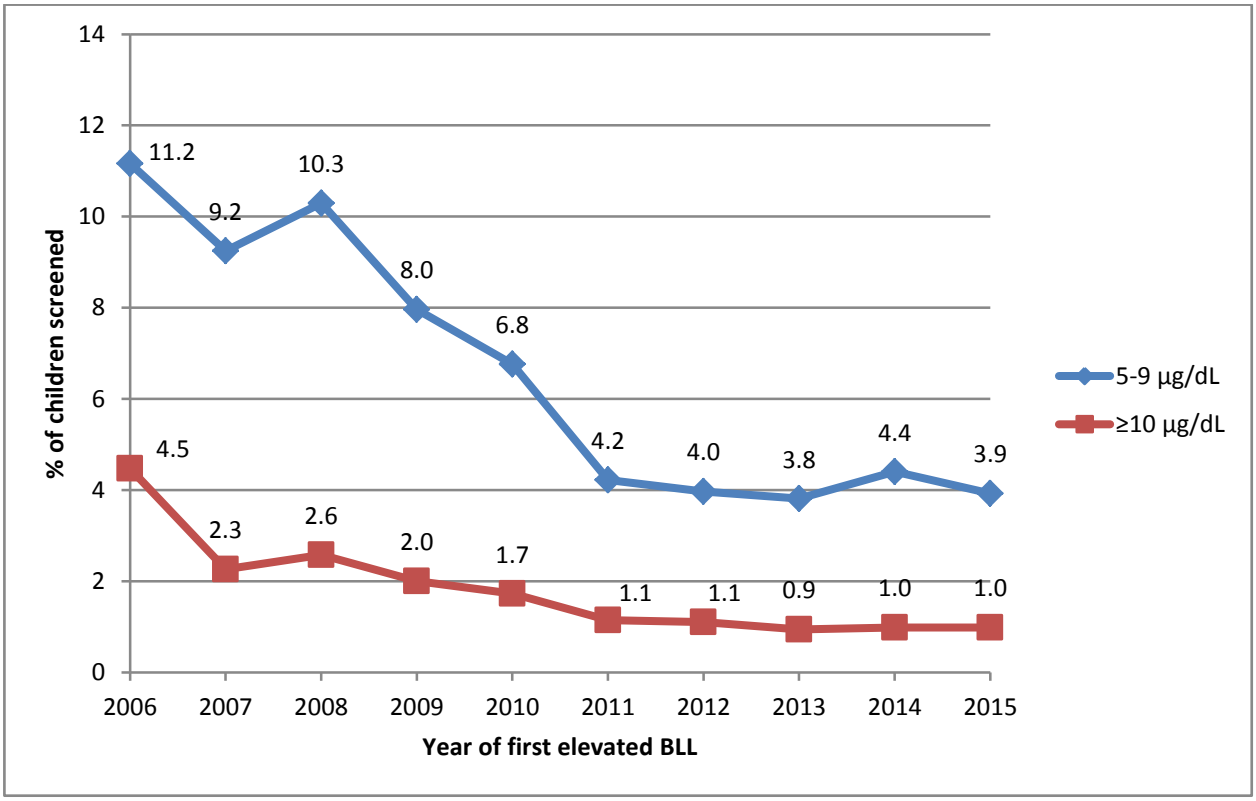


Figure 6. Distribution of all current venous BLLs ≤20 µg/dL by year among children <6, 2006-2015.

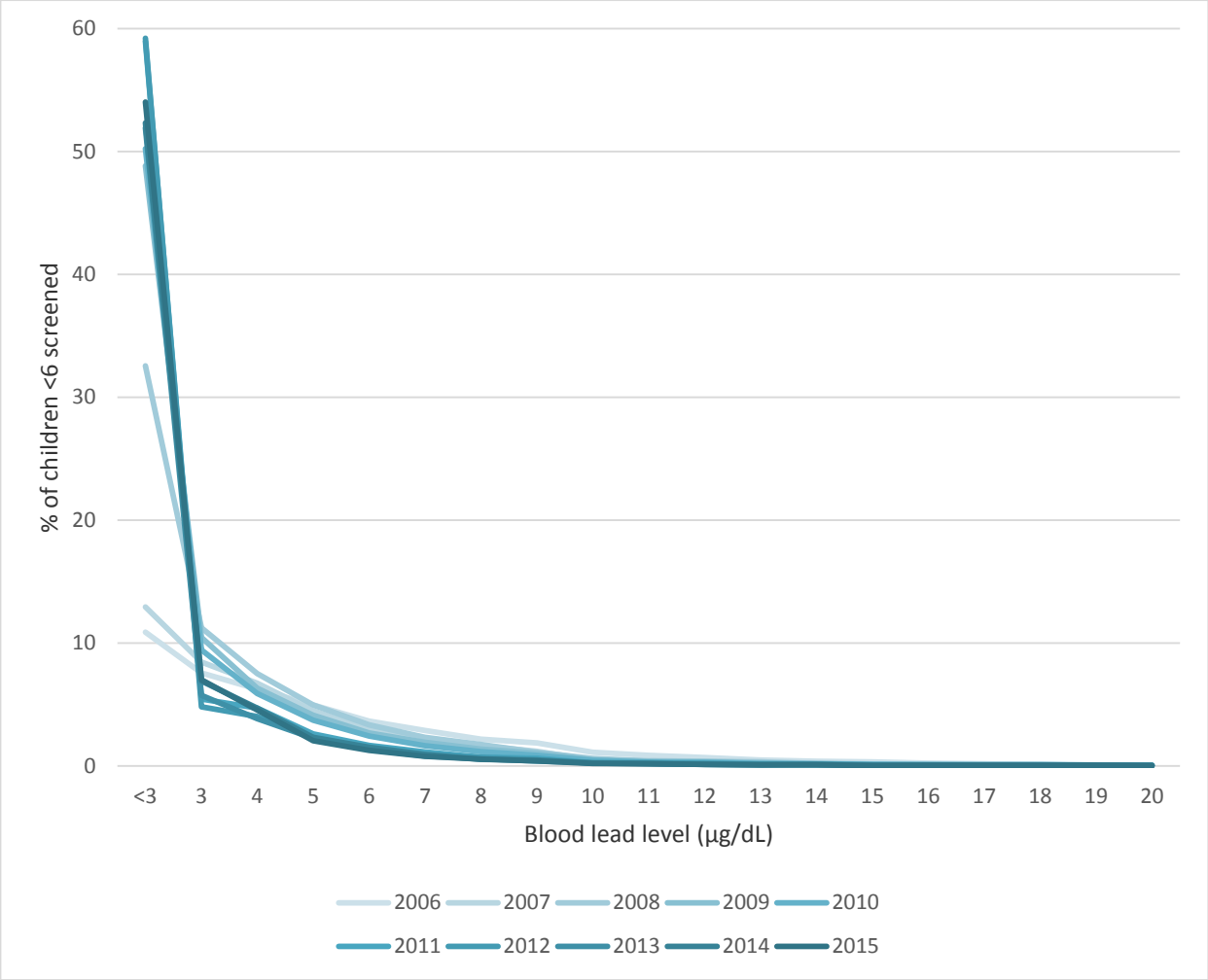


Table 3. Trend of newly identified BLLs using venous blood specimens among children <6 years old screened for lead poisoning, 2006-2015.

Year	Children with BLL of 5-9 µg/dL (N)	Children with BLL of ≥ 10 µg/dL (N)	Children Tested (N)	Children with BLL of 5-9 µg/dL (%)	Children with BLL of ≥ 10 µg/dL (%)
2006	3527	1413	31567	11.2	4.5
2007	3546	867	38345	9.2	2.3
2008	3923	981	38105	10.3	2.6
2009	3059	769	38382	8.0	2.0
2010	2706	691	40012	6.8	1.7
2011	1653	449	39144	4.2	1.1
2012	1516	420	38196	4.0	1.1
2013	1432	353	37551	3.8	0.9
2014	1603	357	36338	4.4	1.0
2015	1477	369	37451	3.9	1.0

Table 4. Comparison of demographics of children with newly identified BLLs using venous blood specimens between 2011-2014 to 2015.

	5-9 µg/dL		≥ 10 µg/dL	
Demographic	**2011-2014**	**2015**	**2011-2014**	**2015**
Age group (years)				
< 2	41.4	45.3	43.4	51.2
2-3	44.8	43.5	44.0	42.0
4-5	13.8	11.2	12.6	6.8
Sex				
Male	54.0	51.0	53.8	45.8
Female	46.0	49.0	46.2	54.2

Table 5. Trend of non-detect BLLs and descriptive statistics of BLLs using venous blood specimens, 2006-2015.

Year	# of non-detects*	Median BLL (µg/dL)	Geometric Mean BLL (µg/dL)**	Max BLL (µg/dL)
2006	165	4.2	4.3	47
2007	118	4.0	3.7	51
2008	6150	3.2	3.4	70
2009	13293	3.0	3.3	58
2010	14589	3.0	3.2	45
2011	16937	3.0	2.6	45
2012	15993	2.6	2.3	41
2013	11724	2.0	2.2	46
2014	13141	3.0	2.7	39
2015	13675	2.9	2.7	54

**Defined as BLLs that are 0 µg/dL, below the laboratory method's threshold for detecting lead in the specimen, or the test result value was not reported.

**Geometric mean is an average based on only BLLs with detectible amounts of lead in their blood.

Lead Poisoning Identified through Any Type of Blood Specimens

Figure 7. Newly identified BLLs from any blood specimens among children <6 years old tested for blood lead, 2006-2015.

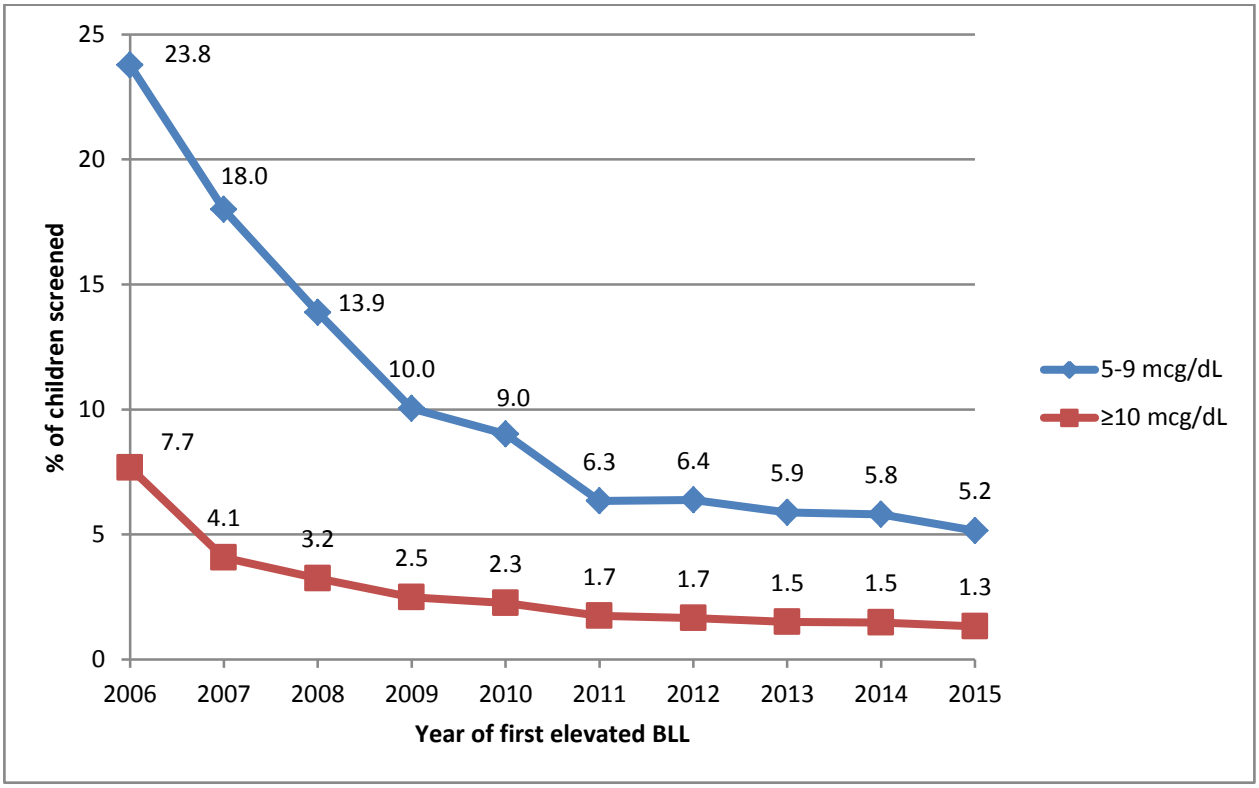


Table 6. Newly identified BLLs using any blood specimens among children <6 years old screened for lead poisoning, 2006-2015.

Year	Children with BLL of 5-9 µg/dL (N)	Children with BLL of ≥ 10 µg/dL (N)	Children Tested (N)	Children with BLL of 5-9 µg/dL (%)	Children with BLL of ≥ 10 µg/dL (%)
2006	7503	2421	31567	23.8	7.7
2007	6900	1561	38345	18.0	4.1
2008	5287	1236	38105	13.9	3.2
2009	3855	956	38382	10.0	2.5
2010	3608	904	40012	9.0	2.3
2011	2481	682	39144	6.3	1.7
2012	2436	633	38196	6.4	1.7
2013	2209	565	37551	5.9	1.5
2014	2108	537	36338	5.8	1.5
2015	1930	494	37451	5.2	1.3

Table 7. Comparison of demographics of children with newly identified BLLs using any blood specimens between 2011-2014 to 2015.

	5-9 µg/dL		≥ 10 µg/dL	
Demographic	**2011-2014**	**2015**	**2011-2014**	**2015**
Age group (years)				
< 2	48.4	49.6	45.8	51.3
2-3	42.5	41.6	44.0	43.3
4-5	9.1	8.8	10.2	5.4
Sex	54.6	51.9	55.0	53.1
Male	45.4	48.0	45.0	46.9
Female				

Table 8. Trend of non-detect BLLs and descriptive statistics of BLLs among all existing BLLs using venous blood specimens, 2006-2015.

Year	# of non-detect or null results*	Median BLL (µg/dL)	Geometric Mean BLL (µg/dL)**	Max BLL (µg/dL)
2006	216	4.3	4.0	0.1
2007	200	3.6	3.0	0.07
2008	7542	3.4	3.0	0.14
2009	16185	3.3	3.0	0.1
2010	18587	3.2	3.0	0.1
2011	20867	2.7	3.0	0.1
2012	19748	2.4	2.8	0.1
2013	15453	2.2	2.0	0.1
2014	16662	2.5	2.4	0.1
2015	17216	2.4	2.0	0.1

*Defined as BLLs that are 0 µg/dL or below the laboratory method's threshold for detecting lead in the specimen or of a laboratory did not report the test result value.

**Geometric mean is an average based on only BLLs with detectible amounts of lead in their blood.

Figure 8. Incidence of children with venous BLLs of 5-9 µg/dL by zip code, 2015.

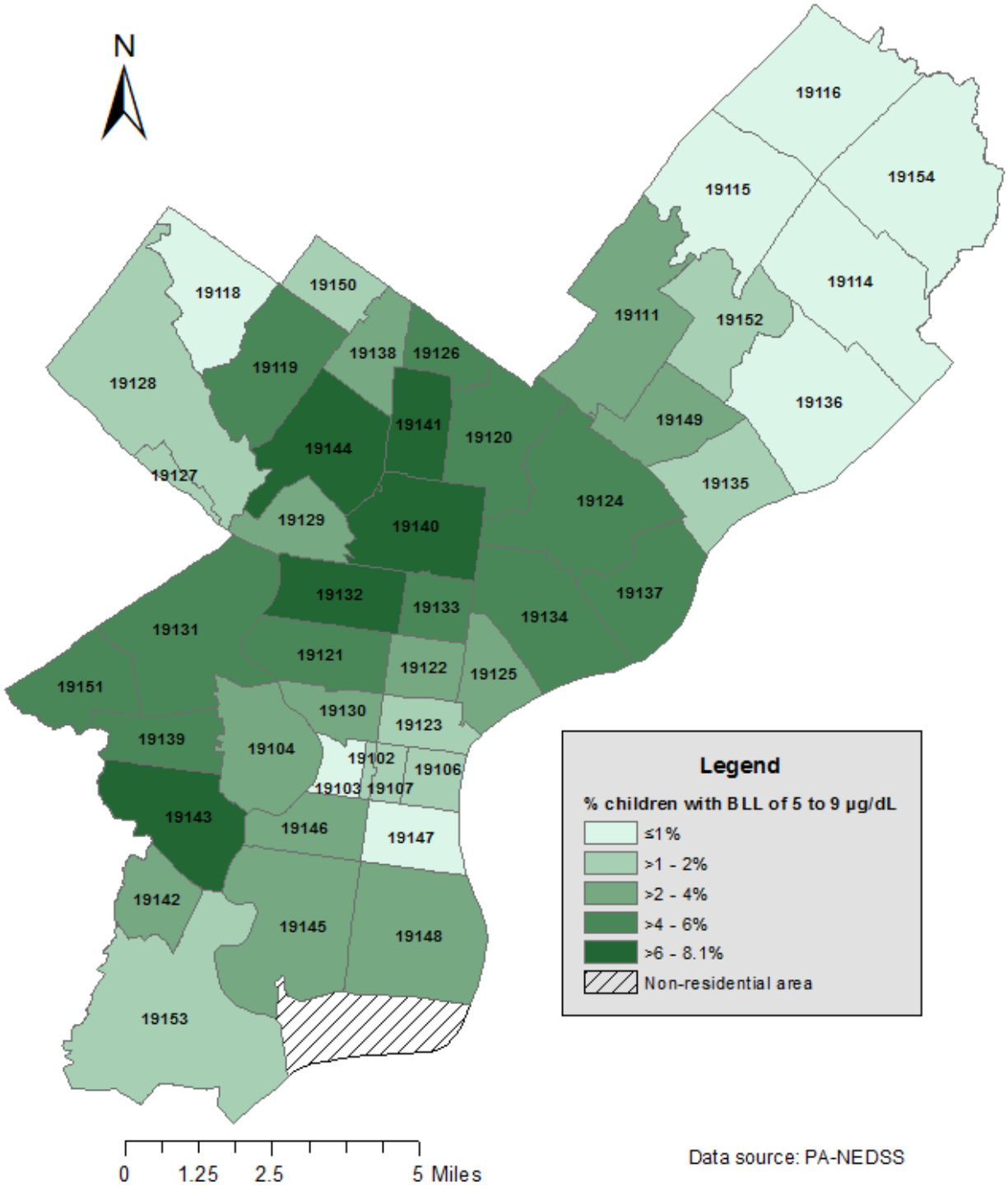
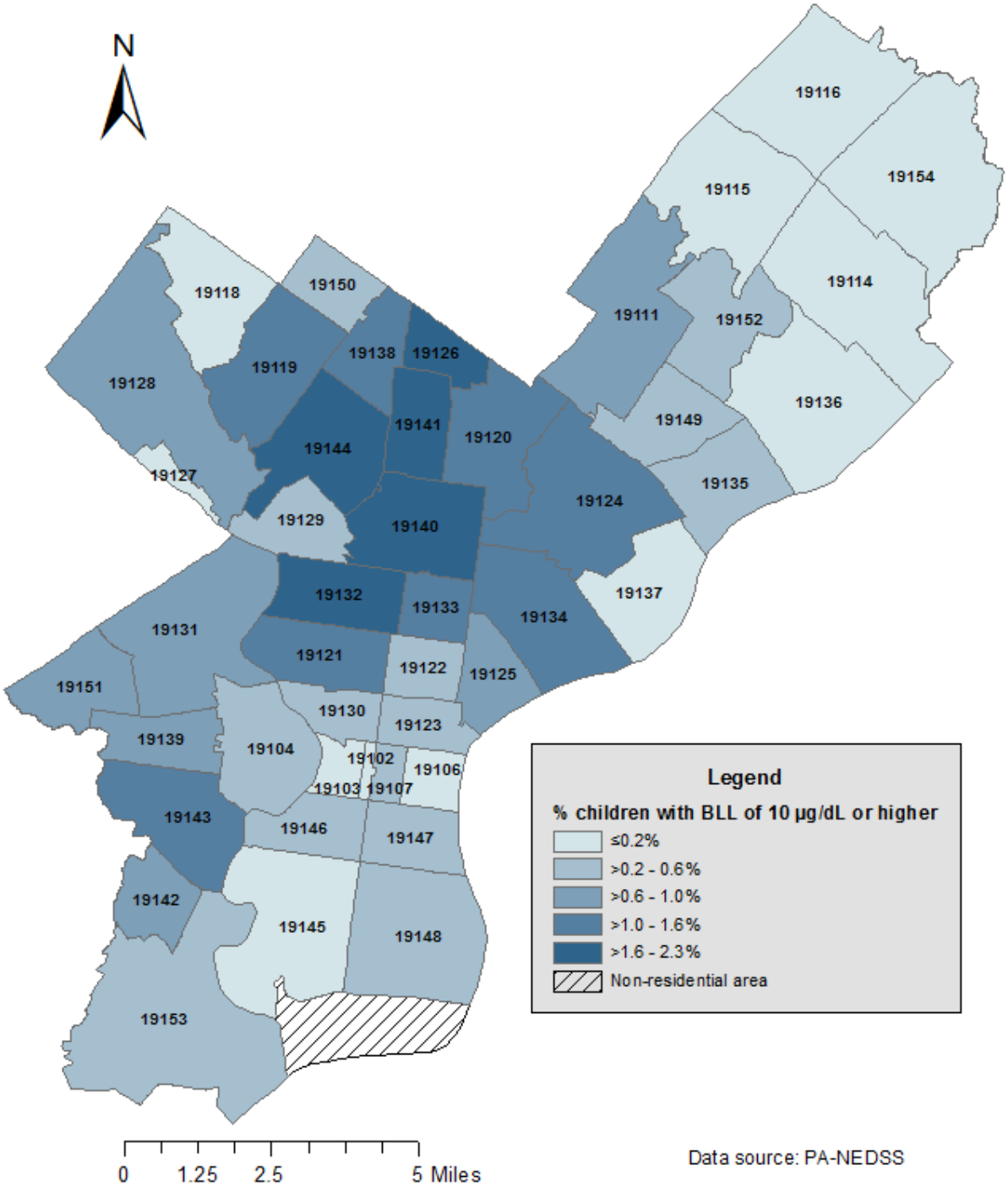


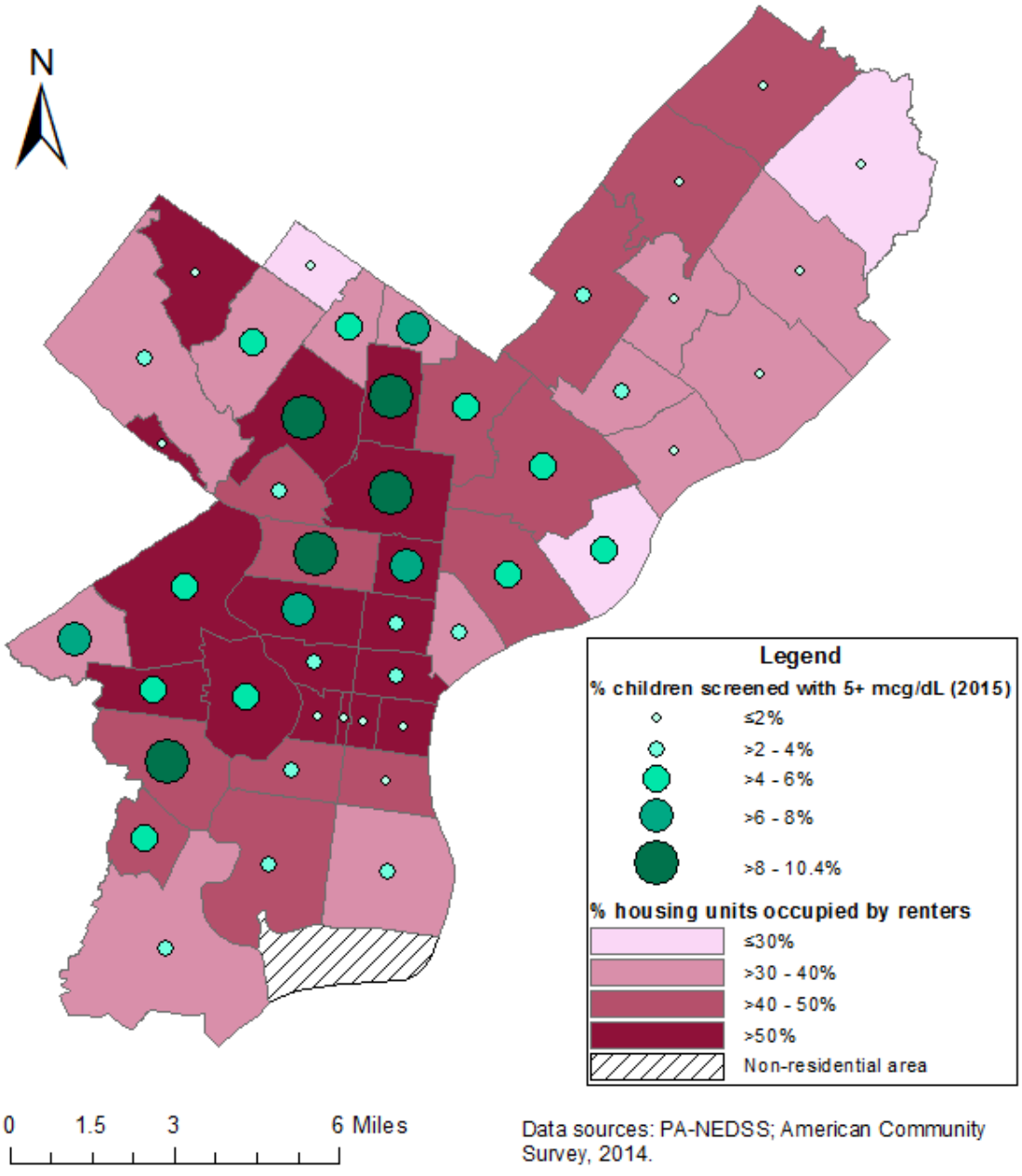
Figure 9. Incidence of children with venous BLLs of ≥10 µg/dL by zip code, 2015.



Living in Rental Properties, Household Income, and Age of Housing may be Risk Factors of Lead Poisoning in Children

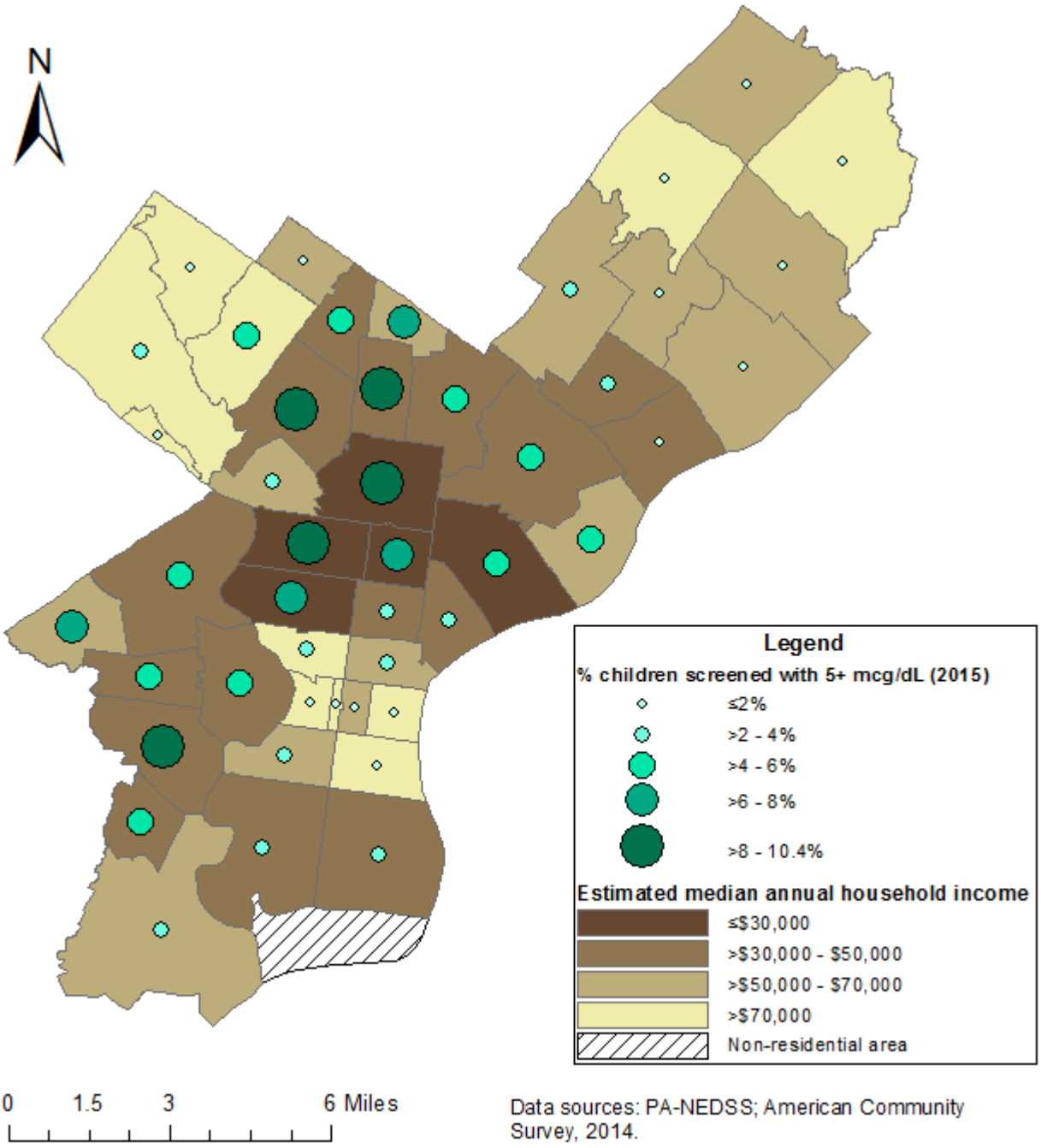
In the following figures, possible risk factors of lead poisoning are presented by zip code, along with the rate of lead poisoning in the respective zip code. While definitive associations cannot be made based off of the maps below, these maps may guide prevention efforts and direct future research.

Figure 10. Percentage of rental housing units and incidence of BLLs ≥5 µg/dL in 2015 by zip code.



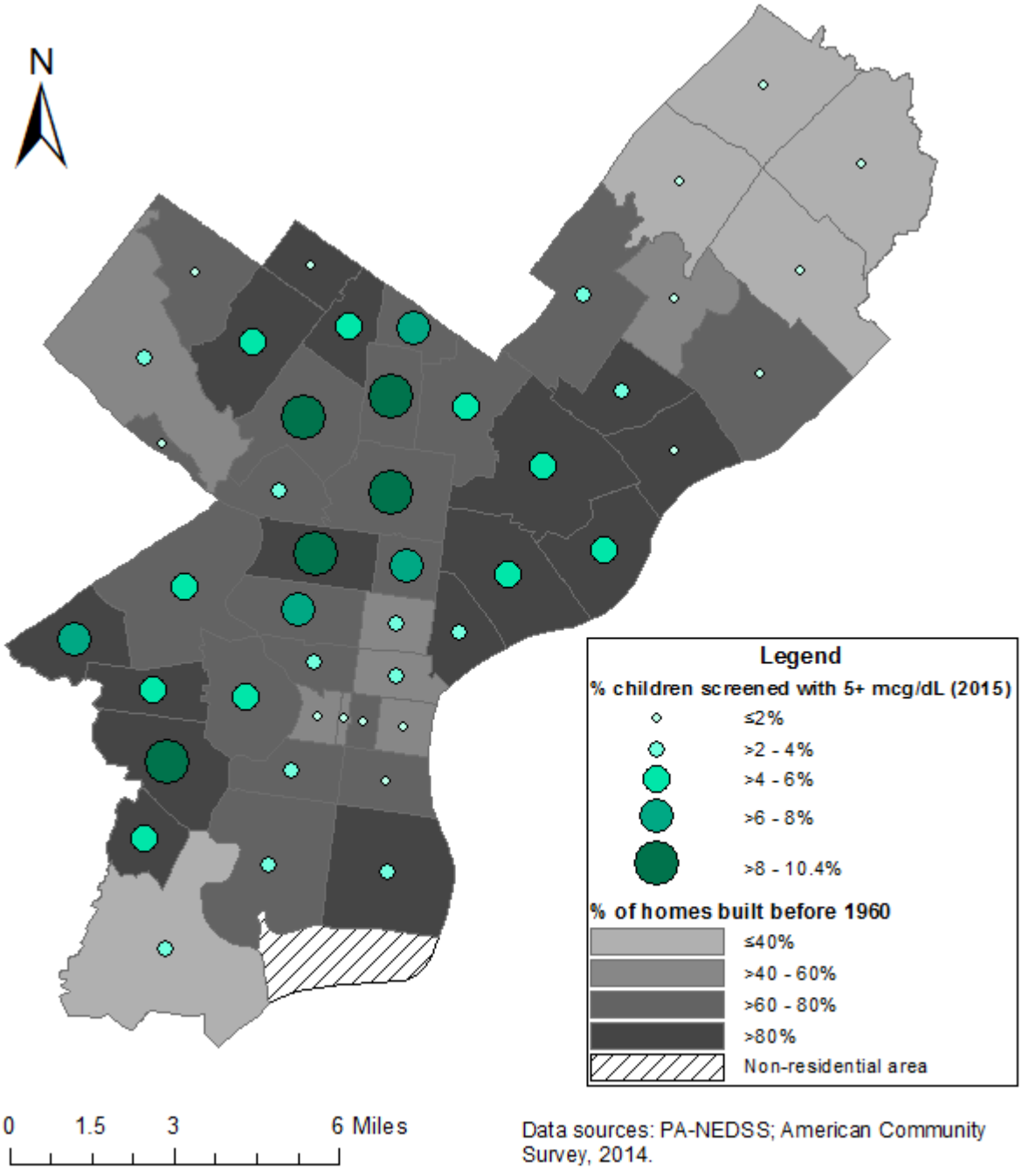
Data sources: PA-NEDSS; American Community Survey, 2014.

Figure 11. Median annual household income and children and incidence of BLLs ≥5 µg/dL in 2015 by zip code.



Data sources: PA-NEDSS; American Community Survey, 2014.

Figure 12. Housing units built before 1960 and incidence of BLLs ≥5 µg/dL in 2015 by zip code.



Data sources: PA-NEDSS; American Community Survey, 2014.

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