Childhood Lead Testing and Poisoning Report: 2019 and 2020 Pennsylvania Birth Cohort Analysis

Childhood Lead Poisoning Prevention Program

Bureau of Epidemiology

Bureau of Family Health

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DEPARTMENT OF HEALTH

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Executive Summary

- Exposure to lead, even at low levels, can cause intellectual, behavioral, and academic deficits in children.
- Childhood lead exposure remains a significant public health concern in Pennsylvania, driven by aging housing stock and various environmental sources, and it disproportionately affects young children.
- Birth certificate data and neighborhood census data for the 2019 and 2020 birth cohorts were linked to blood lead test records to estimate the blood lead testing rates and the percentages of elevated blood lead levels (blood lead levels of 5 µg/dL or greater) across demographic groups and geographic areas, including counties and municipalities.

The goal of this report is to:

- Identify the characteristics of children with lower blood lead testing rates and those at higher risk of having elevated blood lead levels (EBLLs).
- Explore geographic variations in blood lead testing rates and the percentages of EBLLs among tested children at the county and municipal levels across the state.
- Compare recent trends in blood lead testing rates and the percentages of EBLLs among tested children by individual and neighborhood characteristics, as well as by county, to previous years (2015–2018 birth cohorts).

Key Findings:

- Among Pennsylvania children born in 2019 and 2020, 147,887 (57.5%) received blood lead testing before age two, and 2,418 (1.6%) of those tested had EBLLs on their first test.
- From 2015 to 2020, children's blood lead testing rates increased overall; however, testing rates remained lower among non-Hispanic White children and among children whose mothers did not complete high school, were not enrolled in the WIC program, and self-paid for delivery.

- EBLLs were more common among non-Hispanic Black children and among children whose mothers had lower educational attainment, were enrolled in the WIC program, self-paid for delivery, reported smoking or infections during pregnancy, and lived in poorer and older housing neighborhoods.
- While overall blood lead testing rates increased and the proportions of EBLLs declined among most children over time, these trends were not observed among children whose mothers self-paid for delivery.
- Most counties showed increasing testing rates over time, except for Mifflin, Pike, Snyder, and Union counties. Several counties with particularly low blood lead testing rates were concentrated in eastern Pennsylvania.
- The proportion of EBLLs varied widely across counties, with particularly high proportions in Berks, Bradford, Forest, Mifflin, Northumberland, Sullivan, and Warren counties. The trends in the proportion of EBLLS declined in most counties but showed a significant increase only in Elk County.

Definitions

Birth cohort	Children born to Pennsylvania resident mothers during the calendar year.
Age	The age of children at the time of their first blood lead test is categorized as follows: "under age one" refers to children from 0 to less than 12 months, and "under age two" refers to children from 0 to less than 24 months.
Capillary test	A minimally invasive method of obtaining a blood sample from capillaries, typically via a fingertip or heel prick, is used to determine the blood lead level (BLL).
Venous test	A diagnostic test that measures the BLL using a blood sample drawn from a vein using a needle.
Blood lead level (BLL)	The numeric result of a blood lead test, expressed in micrograms per deciliter (µg/dL).
Confirmed elevated blood lead level (EBLL)	One venous blood lead test ≥5 µg/dL or an initial capillary blood lead test ≥5 µg/dL with a subsequent confirmatory test (capillary or venous sample) ≥5 µg/dL done within 12 weeks of each other.
Unconfirmed elevated blood lead level (EBLL)	A single capillary blood lead test ≥5 µg/dL or an initial capillary blood lead test ≥5 µg/dL with a subsequent blood lead test done beyond 12 weeks.
Blood lead testing rate	The percentage of a birth cohort or a specific population group who had their first blood lead test. (Number of children tested for BLLs ÷ Number of children in the birth cohort) × 100.
Percentage of elevated blood lead level (EBLL)	The percentage of unconfirmed or confirmed EBLLs among tested children under age two. (Number of tested children with first EBLLs ÷ Number of children who had first lead tests under age two) × 100.
Municipality	A political subdivision of a state where a municipal corporation is established to provide general local government for a specific population concentration in a defined area.

Introduction

In Pennsylvania, childhood lead exposure and lead poisoning remain significant public health concerns due to older housing stock, industrial history, and environmental contamination. Lead-based paint, lead-contaminated dust or soil, and lead-containing pipes or copper pipes with lead solder are the most common sources of lead exposure in old houses and buildings built before the banning of lead-based paint in 1978. The U.S. Census Bureau's American Community Survey showed that approximately 27.7% of housing stock in Pennsylvania had potentially elevated lead risk due to the age of housing, which is higher than the national average of 16.4%.[1] Other potential sources of lead exposure include toys, ceramicware, home remedies, cosmetics, and some imported products. Children, especially infants and toddlers, are at high risk of lead exposure due to their frequent hand-to-mouth activities, more efficient body absorption of lead, and developing brains and nervous systems that are highly vulnerable to the toxic effects of lead.

Exposure to lead, even at low levels, can cause intellectual, behavioral, and academic deficits in children.[2,3] For this reason, the Centers for Disease Control and Prevention (CDC) redefined an elevated blood lead level (EBLL) from "level of concern" of 10 micrograms per deciliter (µg/dL) to the blood lead reference value (BLRV) of 5 µg/dL in 2012.[4] In 2021, CDC further reduced the BLRV from 5.0 µg/dL to 3.5 µg/dL based on the 97.5th percentile of the blood lead distribution in U.S. children aged 1–5 years.[5] In this report, we still used the BLRV of 5 µg/dL to identify whether children who were born in 2019 and 2020 had EBLLs before two years of age.

Lead poisoning is a preventable environmental health hazard that, if left unaddressed, can impact families regardless of race, ethnicity, or socioeconomic status. In recent years, there was a national reduction in children's BLLs as sources of lead exposure were reduced or eliminated. In recent years, the Pennsylvania Department of Health (Department) coordinated with federal and local agencies to provide resources to families for preventing childhood lead exposure and addressing EBLLs through multiple strategies, as outlined below:

- The **Lead-Free PA Initiative** is a comprehensive effort launched by the Wolf Administration in 2019 to address and mitigate lead exposure risks across Pennsylvania. This initiative aims to increase access to blood lead testing services for children, enhance local response efforts, and expand training for certified lead abatement professionals.
- Complementing the Lead-Free PA Initiative, the **Lead-Free Promise Project (LFPP)** is a coalition of over 60 organizations dedicated to eliminating lead-based paint poisoning in Pennsylvania. LFPP engages in public awareness campaigns and advocates for government programs that assist residents in removing lead hazards from their homes, promoting mandatory lead screening for all children at ages one and two, and ensuring that lead poisoning cases receive appropriate early intervention services.
- Through the federally funded **Childhood Lead Poisoning Prevention Program (CLPPP)**, the Department collaborates with six local health departments in Allegheny, Chester, Luzerne, Lehigh, Montgomery, and York counties to reduce lead exposure and promote lead poisoning prevention among children. Local partners use funding to enhance blood lead surveillance, including blood lead testing and reporting, strengthen population-based interventions, and improve processes to identify children with lead-exposure and link them to recommended services.
- Lead abatement efforts continue through the federally funded **Lead Hazard Control Program (LHCP)**, which provides funding to local partners to contract with certified lead professionals. The Department works with partners in targeted high-risk areas across the Commonwealth to identify and remove lead hazards in housing units occupied by low-income families with children aged 6 and under. The goal of the LHCP is to protect children from the long-term health effects of lead poisoning and to evaluate the overall living conditions within the home to promote healthier outcomes for families in Pennsylvania.
- The Department's **community health nurses (CHNs)** monitor EBLLs in children aged 0 to 6 years living in Pennsylvania. The Department's CHNs cover the counties and areas of the state not covered by the 11 county and municipal health departments (CMHDs).

The CMHDs include seven county (Allegheny, Bucks, Chester, Delaware, Erie, Montgomery, and Philadelphia) and four municipal (Allentown, Bethlehem, Wilkes-Barre, and York City) health departments, each with its own specific case management protocols. First, the CHNs coordinate with families and health care providers to facilitate timely retesting for children with EBLLs and encourage families to discuss the potential need for an environmental investigation with their health care providers. Besides parents, the CHNs work with the health care providers to facilitate referrals to obtain home inspections, with the goal of identifying the source of exposure and providing hands-on education to parents. CHNs also work to provide referrals to the WIC program and early intervention programs where appropriate. They also provide families with educational support to interpret laboratory results, identify potential sources of lead exposure, and implement preventive measures to reduce lead exposure risks.

- In 2022, the Department continued its ongoing collaboration with the Pennsylvania Department of Human Services on a **data-matching project** to share data between the Medicaid claims database and the lead surveillance database. This data match produces higher-quality lead data and better service provision for children enrolled in Medicaid.
- The Department operates a **toll-free lead information hotline** (1-800-440-LEAD) to provide information on lead poisoning prevention, blood lead testing, follow-up lead testing and care, and local resources for assistance.

The Department created an annual lead surveillance report that provides important information on lead testing among children under the ages of two and six, and their confirmation status of tested results by race and ethnicity, major municipality and county of residence, and urban or rural county of residence in a calendar year.[6] In the annual lead surveillance report, a cross-sectional analysis of lead testing data reported in a specific calendar year may underestimate the actual blood testing rate due to missing lead tests conducted before the study period. To fill this gap, this report uses a cohort study design to follow birth cohorts born to Pennsylvania resident mothers in 2019 and 2020 over a two-year period, providing actual estimates of blood lead testing rates and the percentages of tested children with EBLLs in the total population and across different demographic, socioeconomic, and geographic groups. This report aims to identify children with specific characteristics associated with lower blood lead testing rates and higher proportions of EBLLs. Additionally, it explores geographic variation in lead testing rates and the percentages of EBLLs at the county and municipal levels across Pennsylvania. This report also highlights temporal trends in lead testing rates and the percentages of EBLLs by individual and neighborhood characteristics and in each county through comparisons with analysis results from previous years (2015–2018 birth cohorts).

Methods

Birth cohort

In this report, only children born to mothers residing in Pennsylvania in 2019 and 2020 were included. Two birth cohorts were followed from birth up to two years of age to track whether they received any blood lead tests and whether their first lead test results were equal to or greater than the BLRV of 5 µg/dL. Children's individual characteristic data were obtained from the birth certificate datasets.

Reporting of blood lead test results and case investigations

In Pennsylvania, clinical laboratories are required to report all blood lead test results from both venous and capillary specimens for persons under 16 years of age to the Department (28 Pa. Code § 27.34). In addition, clinicians are required to report cases of lead poisoning (28 Pa. Code § 27.21a). Most reports are submitted electronically (either through electronic laboratory reporting or online key entry) to the Department through Pennsylvania's electronic reportable disease surveillance system, PA-NEDSS. Investigators reviewed, verified, and, when necessary, corrected critical information such as date of birth, address, and specimen source.

PA-NEDSS is designed to handle duplicate lead test reports from different entities. Several strategies are used in PA-NEDSS to ensure that all reports pertaining to the same patient are assigned to a single patient identifier. For the purposes of this report, blood lead tests with identical specimen collection dates and identical BLLs from the same patient were considered a single test. To track children's blood lead tests, all lead test records from 2019 to the first quarter of 2023, including screening tests, confirmatory tests, and follow-up tests, were included in the analysis.

Cases with EBLLs

In May 2012, the CDC accepted the recommendation from the Advisory Committee on Lead Poisoning Prevention to eliminate the term "level of concern" (associated with the level of 10 µg/dL) and to begin using a BLRV of 5 µg/dL based on the 97.5th percentile of the blood lead distribution among U.S. children. This BLRV was used to identify whether children had EBLLs in the previous birth cohort analysis reports [7, 8] and is also used for 2019 and 2020 birth cohorts in this report for consistency. We categorized each tested child's first blood lead test result as either an unconfirmed EBLL or a confirmed EBLL (see Definitions section).

To apply the CDC case definition, several data elements need to be evaluated. These data elements were handled as follows:

- If the specimen collection date was missing or illogical, either the laboratory receipt date or the result date was used. If all three dates were missing, the reported date was used.
- Specimens with unknown specimen sources or characterized as simply "blood" (as opposed to venous or capillary) were treated as capillary specimens.
- If a child's capillary test with an EBLL was obtained near the end of a year or as the child neared the upper limit of a particular age category, and if another EBLL test result was obtained within the next 84 days, the initial capillary test was considered to be a confirmed EBLL, even if the confirmatory test occurred in the following year or outside of the age category. For example, if a child had a first capillary test with an EBLL at 23

months of age in November 2021 and received a confirmatory test within 84 days (e.g., January 2022), this child was considered to have a confirmed EBLL under age two.

Blood lead test and birth certificate data linkage process

After extracting blood lead test data for children born in 2019 and 2020 who had their first blood lead test under age two, we used the deterministic linkage method to match this data with the birth certificate data for the 2019 and 2020 birth cohorts. In this step, we extracted matched records that contained identical information on first name, last name, date of birth, gender, and residence ZIP code in both datasets. A simple random sampling method was used to select a subset of matched records after the linkage step for manual review and validation.

After the deterministic linkage, we used Match*Pro software to conduct probabilistic linkage on unmatched records from both datasets by calculating the likelihood that they belonged to the same person, even with minor differences (e.g., name spelling or address format). It assigns weights to matching fields (first name, last name, date of birth, gender, and residence ZIP code) and computes a score to determine the matches. After probabilistic linkage, we conducted a data review to manually assess the matched records with lower matching scores to determine whether they were true matches.

After these two linkage steps, a few multiple records in the blood lead test data were matched to the same birth certificate record or multiple birth certificate records were matched to the same record in the blood lead test data. In these cases, we manually reviewed these matched records one by one and retained only the one with the highest validity and reliability.

Statistical analysis

In Pennsylvania, while children enrolled in Medicaid are required to undergo lead screening, children not enrolled in Medicaid are not mandated by the state to be tested. However, the Department recommends that every child be tested for lead at 12 and 24 months of age. To investigate the percentages of children in the birth cohort who received a blood lead test at different ages, we calculated the blood lead testing rates for children who had their first blood lead test under age one and age two. The child's age was calculated as the year(s) between the birth date and the blood lead testing date.

To investigate the percentage of tested children with an initial capillary test result ≥5 µg/dL who were not retested for confirmation within the CDC recommended timeframe, we calculated the percentage of tested children with unconfirmed EBLLs under age two. To evaluate the potential risk of lead poisoning in children, we calculated the percentage of tested children with confirmed EBLLs under age two.

We calculated the blood lead testing rates and the percentages of unconfirmed and confirmed EBLLs among tested children in the total population, as well as by individual and neighborhood characteristics, for two separate birth cohorts. Children's individual characteristic data from the birth certificate datasets include the following variables:

- *Sex*: children's sex was grouped into male and female categories.
- *Race and ethnicity*: children's race and ethnicity were grouped into Hispanic, non-Hispanic Asian, non-Hispanic Black, non-Hispanic White, or other based on mothers' race and ethnicity.
- *Maternal educational attainment*: the highest level of education completed by a child's mother was categorized into four groups: I) <high school: did not complete high school; II) high school/some college: high school graduate or attended some college but did not earn an associate's or bachelor's degree; III) ≥college: completed a college degree or higher; IV) other: information missing or unknown.
- *Payment source for delivery*: the primary means by which the costs associated with childbirth are covered was categorized into private insurance, Medicaid, self-payment, or other. Self-payment for delivery refers to individuals who personally assume full financial responsibility for all costs associated with childbirth services, including hospital, physician, and related medical fees, without reimbursement from any third-party payer such as private health insurance, Medicaid, Medicare, or other government assistance programs.

- *WIC enrollment*: categorized as 'yes' (if the mother participated in WIC), 'no' (did not participate in WIC), or unknown.
- *Maternal smoking*: categorized as 'yes,' 'no,' or 'unknown' based on maternal smoking during the three months before or during pregnancy."
- *Maternal infection*: categorized as 'yes' (if the mother had any of the following infections during pregnancy: gonorrhea, syphilis, herpes, or chlamydia) or 'no.'
- *Maternal risk factor*: categorized as 'yes' (if the mother had any risk factors, including pre-pregnancy diabetes, gestational diabetes, pre-pregnancy hypertension, gestational hypertension, previous pre-term birth, previous poor pregnancy outcomes, vaginal bleeding, pregnancy resulted from infertility treatment, or previous cesarean, during pregnancy) or 'no.'

Neighborhood characteristics at the census tract level were extracted from the U.S. Census Bureau's American Community Survey (ACS) Data Profiles for 2019 and 2020. These characteristics were represented by the following variables:

- *Income*: median family income in the past 12 months.
- *Poverty*: the percentage of families living below the poverty line.
- *Old housing*: the percentage of housing units built before 1970.

Income, poverty, and old housing values in each census tract in Pennsylvania were categorized into quartiles based on their respective distributions across all census tracts in the state. Each child's residential address was geocoded to determine the corresponding census tract, and neighborhood characteristics at the census tract level (income, poverty, and old housing) were assigned to one of four groups: lowest, low, high, or highest. These groups corresponded to the quartiles of the respective neighborhood characteristics (1st, 2nd, 3rd, or 4th quartile). The geocoding process was performed using ArcGIS (Desktop Version 10.8.2; Redlands, CA: Esri).

In this report, we calculated blood lead testing rates and the percentages of unconfirmed EBLLs and confirmed EBLLs among tested children by county of residence for two separate birth cohorts. We developed linear regression models to assess statistically significant trends in the lead testing rates and percentages of confirmed EBLLs among tested children under age two, stratified by individual and neighborhood characteristics and by county, using 2015 to 2020 birth cohorts data. Here, blood lead testing rates and percentages of confirmed EBLLs among tested children in the 2015, 2016, 2017, and 2018 birth cohorts were estimated in previous reports.[7, 8] A p-value <0.05 for a test of linear trend indicates a statistically significant increasing or decreasing pattern. In addition to county-level estimates, we calculated blood lead testing rates and the percentages of confirmed EBLLs among tested children by municipality of residence for the combined 2019–2020 birth cohort due to the small population sizes in most municipalities. Finally, we created separate maps using ArcGIS to display the geographic distributions of lead testing rates and the percentages of confirmed EBLLs among tested children at both the county and municipal levels.

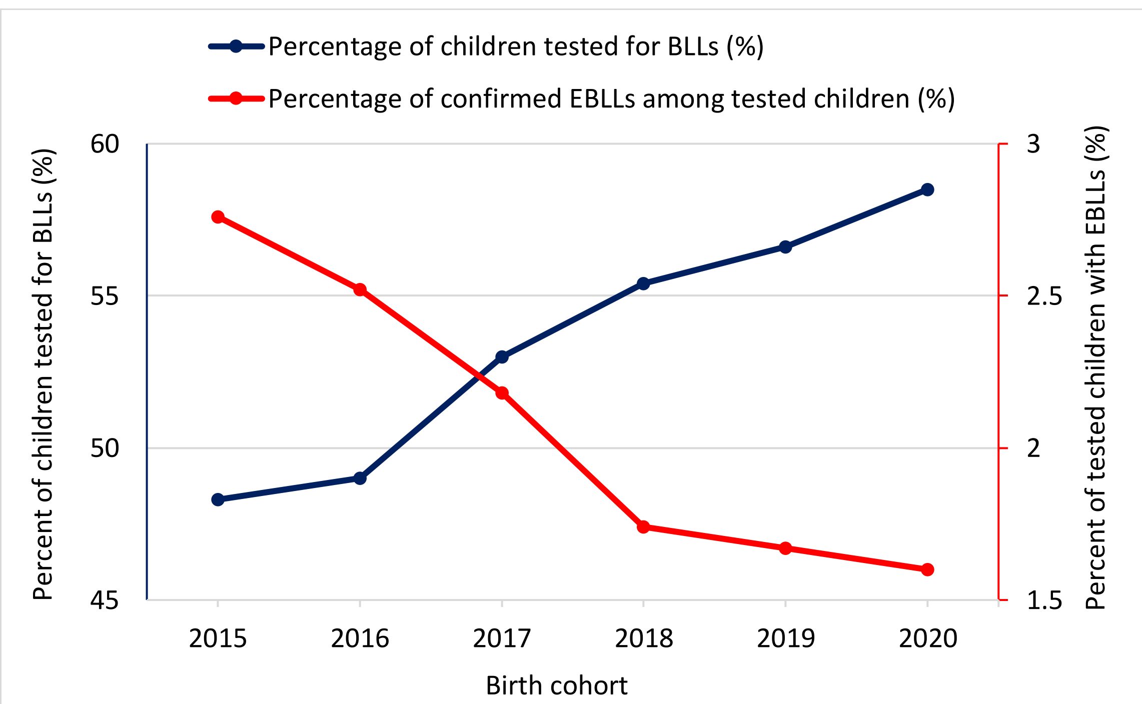
Findings

Statewide summary of blood lead testing rate and percentage of confirmed EBLLs

The following table and figures show the percentages of children tested for BLLs before two years of age and the percentages of confirmed EBLLs among tested children for different birth cohorts from 2015 to 2020. The results show a significantly increasing trend in blood lead testing rates and a significantly decreasing trend in the percentages of confirmed EBLLs among tested children.

Table 1. Percentage of children tested for BLLs before two years of age and percentage of confirmed EBLLs among tested children by birth cohort in Pennsylvania, 2015–2020

	Birth Cohort					
	2015	2016	2017	2018	2019	2020
Percentage of children tested for BLLs (%)	48.3	49.0	53.0	55.4	56.6	58.5
Percentage of confirmed EBLLs among tested children (%)	2.76	2.52	2.18	1.74	1.67	1.60



Summary of blood lead testing rate by individual and neighborhood characteristics

Table 2 shows the percentages of children tested for BLLs before one year and two years of age, categorized by individual and neighborhood characteristics, for the 2019 and 2020 birth cohorts. The results show that blood lead testing rates were relatively low in children with the following characteristics: non-Hispanic White, maternal education attainment less than high school, self-payment for delivery, not enrolled in WIC, no maternal infection, and living in neighborhoods with high income level, low poverty level, and lowest old housing level in both birth cohorts.

Table 3 shows trends in the percentages of children tested for BLLs before two years of age, categorized by individual and neighborhood characteristics, across the 2015–2020 birth cohorts. Blood lead testing rates in children with various characteristics showed an increasing trend from 2015 to 2020, with most trends being statistically significant. Blood lead testing rates among racial and ethnic minority children (Hispanic and non-Hispanic Black) and children with certain disadvantaged characteristics (maternal educational attainment less than high school, Medicaid as payment source for delivery, WIC enrollment, residence in neighborhoods with the lowest income level, highest poverty level, and highest old housing level) showed an increasing trend, though it was not statistically significant. Only children whose principal payment source for delivery was self-payment showed a decreasing trend in blood lead testing rates although it was not statistically significant.

Table 2. Number and percentage of children tested for BLLs before one year and two years of age by individual and neighborhood characteristics, 2019 and 2020 birth cohorts

	2019 Birth Cohort					2020 Birth Cohort				
	Total Birth	Age <1 yr[b]		Age <2 yrs[b]		Total Birth	Age <1 yr		Age <2 yrs	
Characteristics	No.[a]	No.	%	No.	%	No.	No.	%	No.	%
Sex										
Male	66,589	21,504	32.3	37,935	57.0	64,509	22,852	35.4	37,848	58.7
Female	63,923	20,237	31.7	35,988	56.3	62,002	21,932	35.4	36,116	58.2
Race and ethnicity										
Hispanic	16,445	4,793	29.1	10,132	61.6	16,472	5,243	31.8	10,322	62.7
Non-Hispanic Asian	5,741	1,907	33.2	3,524	61.4	5,525	2,160	39.1	3,619	65.5
Non-Hispanic Black	16,997	5,631	33.1	10,794	63.5	16,540	6,175	37.3	10,787	65.2
Non-Hispanic White	84,605	27,379	32.4	45,685	54.0	81,518	29,051	35.6	45,451	55.8
Other[c]	6,726	2,031	30.2	3,788	56.3	6,459	2,155	33.4	3,785	58.6
Maternal educational attainment										
<High school	15,347	3,428	22.3	6,793	44.3	14,852	3,539	23.8	6,579	44.3
High school/some college	55,093	18,055	32.8	32,474	58.9	52,968	19,136	36.1	32,189	60.8
≥College	58,367	19,618	33.6	33,624	57.6	57,776	21,874	37.9	34,720	60.1
Other[d]	1,707	640	37.5	1,032	60.5	918	235	25.6	476	51.9
Payment source for delivery										
Private insurance	72,388	24,194	33.4	41,551	57.4	70,145	26,297	37.5	42,057	60.0
Medicaid	44,917	14,944	33.3	27,687	61.6	43,288	15,822	36.6	27,328	63.1
Self-payment	5,849	347	5.9	727	12.4	5,973	375	6.3	804	13.5
Other[e]	7,360	2,256	30.7	3,958	53.8	7,108	2,290	32.2	3,775	53.1
WIC enrollment										
Yes	39,615	14,249	36.0	25,675	64.8	36,236	14,193	39.2	24,060	66.4
No	87,275	26,427	30.3	46,207	52.9	86,525	29,397	34.0	47,819	55.3
Unknown	3,624	1,065	29.4	2,041	56.3	3,753	1,194	31.8	2,085	55.6
Maternal smoking										
Yes	16,688	5,590	33.5	9,630	57.7	14,637	5,396	36.9	8,818	60.2
No	111,382	35,410	31.8	62,868	56.4	109,531	38,600	35.2	63,755	58.2
Unknown	2,444	741	30.3	1,425	58.3	2,346	788	33.6	1,391	59.3
Maternal infection										
Yes	8,836	2,945	33.3	5,431	61.5	8,292	2,936	35.4	5,122	61.8
No	121,678	38,796	31.9	68,492	56.3	118,222	41,848	35.4	68,842	58.2

Characteristics	2019 Birth Cohort Total Birth No.[a]	Age <1 yr No.	Age <1 yr %[b]	Age <2 yrs No.	Age <2 yrs %[b]	2020 Birth Cohort Total Birth No.	Age <1 yr No.	Age <1 yr %	Age <2 yrs No.	Age <2 yrs %
Maternal risk factor										
Yes	53,749	16,849	31.3	30,557	56.9	54,577	18,984	34.8	31,876	58.4
No	76,765	24,892	32.4	43,366	56.5	71,937	25,800	35.9	42,088	58.5
Income										
Lowest	36,089	11,843	32.8	22,642	62.7	35,275	12,849	36.4	22,670	64.3
Low	29,520	9,980	33.8	16,563	56.1	28,492	10,598	37.2	16,536	58.0
High	32,410	9,368	28.9	16,780	51.8	31,984	10,387	32.5	17,267	54.0
Highest	30,728	9,927	32.3	16,895	55.0	29,003	10,235	35.3	16,411	56.6
Poverty										
Lowest	29,191	9,104	31.2	15,656	53.6	27,140	9,510	35.0	15,287	56.3
Low	32,620	10,312	31.6	17,422	53.4	32,678	11,309	34.6	17,902	54.8
High	30,015	9,715	32.4	16,716	55.7	29,463	10,432	35.4	16,989	57.7
Highest	37,143	12,064	32.5	23,246	62.6	35,703	12,913	36.2	22,879	64.1
Old housing										
Lowest	34,012	8,614	25.3	15,611	45.9	31,534	8,800	27.9	14,926	47.3
Low	30,141	9,529	31.6	16,309	54.1	28,954	9,976	34.5	15,948	55.1
High	30,516	10,659	34.9	18,808	61.6	29,834	11,540	38.7	18,902	63.4
Highest	34,300	12,393	36.1	22,312	65.0	34,662	13,848	40.0	23,281	67.2

[a] Total number of children with different characteristics in the 2019 and 2020 birth cohorts.

[b] The age of children at the time of their first blood lead test: Age <1 yr, children tested for BLL under age one; Age <2 yr, children tested for BLL under age two.

[c] Other race and ethnicity includes children whose race and ethnicity is other races and ethnicities, unknown or missing.

[d] Other maternal educational attainment includes children whose maternal education level is unknown or missing.

[e] Other principal source of payment for delivery includes children whose principal source of payment for delivery is unknown or missing.

Table 3. Trend in the percentages of children tested for BLLs before two years of age by individual and neighborhood characteristics, 2015–2020 birth cohorts

Characteristics	Blood lead testing rate (%) in birth cohort						Trend[a]	p-value[b]
	2015	2016	2017	2018	2019	2020		
Sex								
Male	48.5	48.9	52.7	55.4	57.0	58.7	+	<0.05
Female	48.0	49.2	53.3	55.4	56.3	58.2	+	<0.05
Race and ethnicity								
Hispanic	53.0	52.1	62.8	63.2	61.6	62.7	+	0.059
Non-Hispanic Asian	51.5	50.6	55.7	55.9	61.4	65.5	+	<0.05
Non-Hispanic Black	63.4	63.0	65.7	65.7	63.5	65.2	+	0.37
Non-Hispanic White	44.1	45.3	48.3	51.6	54.0	55.8	+	<0.05
Other[c]	51.3	53.7	56.8	59.6	56.3	58.6	+	<0.05
Maternal educational attainment								
<High school	44.5	43.2	47.3	46.8	44.3	44.3	+	0.91
High school/some college	54.1	53.9	57.5	59.2	58.9	60.8	+	<0.05
≥College	43.7	46.0	50.3	54.1	57.6	60.1	+	<0.05
Other[d]	39.6	46.1	50.1	53.5	60.5	51.9	+	<0.05
Payment source for delivery								
Private insurance	44.4	46.1	49.9	53.9	57.4	60.0	+	<0.05
Medicaid	59.7	59.1	63.6	64.1	61.6	63.1	+	0.17
Self-payment	17.0	13.5	15.1	13.9	12.4	13.5	-	0.10
Other[e]	48.4	49.7	52.0	51.9	53.8	53.1	+	<0.05
WIC enrollment								
Yes	61.4	60.4	65.6	66.3	64.8	66.4	+	0.056
No	40.7	42.8	46.5	50.2	52.9	55.3	+	<0.05
Unknown	44.8	45.6	50.6	52.0	56.3	55.6	+	<0.05
Maternal smoking								
Yes	53.7	54.0	56.5	58.1	57.7	60.2	+	<0.05
No	47.2	48.0	52.3	54.9	56.4	58.2	+	<0.05
Unknown	46.5	51.7	59.0	58.5	58.3	59.3	+	<0.05
Maternal infection								
Yes	57.2	56.4	59.7	62.5	61.5	61.8	+	<0.05
No	47.7	48.6	52.6	54.9	56.3	58.2	+	<0.05
Maternal risk factor								
Yes	47.6	48.6	52.7	55.5	56.9	58.4	+	<0.05
No	48.6	49.3	53.2	55.4	56.5	58.5	+	<0.05
Income								
Lowest	59.9	59.7	65.9	66.0	62.7	64.3	+	0.22
Low	50.0	50.7	55.4	58.0	56.1	58.0	+	<0.05
High	42.1	41.8	47.0	50.8	51.8	54.0	+	<0.05
Highest	39.8	43.1	47.6	51.7	55.0	56.6	+	<0.05

Characteristics	Blood lead testing rate (%) in birth cohort 2015	2016	2017	2018	2019	2020	Trend[a]	p-value[b]
Poverty								
Lowest	41.1	43.7	49.8	52.0	53.6	56.3	+	<0.05
Low	42.2	42.7	46.8	51.8	53.4	54.8	+	<0.05
High	47.2	47.8	52.2	55.7	55.7	57.7	+	<0.05
Highest	59.8	59.5	65.6	65.5	62.6	64.1	+	0.20
Old housing								
Lowest	33.9	35.3	40.5	44.8	45.9	47.3	+	<0.05
Low	44.6	45.1	49.3	52.5	54.1	55.1	+	<0.05
High	53.5	54.3	59.7	62.5	61.6	63.4	+	<0.05
Highest	60.6	61.5	67.3	67.2	65.0	67.2	+	0.078

[a] Trend = "+", increasing trend in blood lead testing rates from 2015 to 2020; "-", decreasing trend in blood lead testing rates from 2015 to 2020.

[b] A p-value <0.05 for a test of linear trend indicates a statistically significant increasing or decreasing pattern.

[c] Other race and ethnicity includes children whose race and ethnicity is other races and ethnicities, unknown or missing.

[d] Other maternal educational attainment includes children whose maternal education level is unknown or missing.

[e] Other principal source of payment for delivery includes children whose principal source of payment for delivery is unknown or missing.

Summary of percentage of EBLLs by individual and neighborhood characteristics

Table 4 shows the percentages of unconfirmed EBLLs and confirmed EBLLs among tested children under age two, categorized by individual and neighborhood characteristics, for the 2019 and 2020 birth cohorts. The results show that percentages of unconfirmed EBLLs and confirmed EBLLs were relatively high in children with the following characteristics: non-Hispanic Black, maternal education attainment less than high school, self-payment for delivery, WIC enrollment, maternal smoking, maternal infection, living in neighborhoods with the lowest income level, highest poverty level, highest old housing level.

Table 5 shows trends in the percentages of confirmed EBLLs among tested children under age two, categorized by individual and neighborhood characteristics, across the 2015–2020 birth cohorts. The percentages of confirmed EBLLs among tested children with various characteristics showed a decreasing trend from 2015 to 2020, with most trends being statistically significant. However, the decreasing trend in the percentages of confirmed EBLLs among children whose principal payment source for delivery was self-payment was not statistically significant.

Table 4. Number and percentage of unconfirmed and confirmed EBLLs among tested children under age two by individual and neighborhood characteristics, 2019 and 2020 birth cohorts

	2019 Birth Cohort					2020 Birth Cohort				
	Tested Children	Unconfirmed EBLLs[b]		Confirmed EBLLs[b]		Tested Children	Unconfirmed EBLLs		Confirmed EBLLs	
Characteristics	No.[a]	No.	%	No.	%	No.	No.	%	No.	%
Sex										
Male	37,935	441	1.16	658	1.73	37,848	354	0.94	589	1.56
Female	35,988	419	1.16	578	1.61	36,116	283	0.78	593	1.64
Race and ethnicity										
Hispanic	10,132	134	1.32	208	2.05	10,322	92	0.89	211	2.04
Non-Hispanic Asian	3,524	20	0.57	47	1.33	3,619	8	0.22	38	1.05
Non-Hispanic Black	10,794	148	1.37	306	2.83	10,787	100	0.93	268	2.48
Non-Hispanic White	45,685	511	1.12	590	1.29	45,451	392	0.86	588	1.29
Other[c]	3,788	47	1.24	85	2.24	3,785	45	1.19	77	2.03
Maternal educational attainment										
<High school	6,793	138	2.03	227	3.34	6,579	109	1.66	209	3.18
High school/some college	32,474	511	1.57	662	2.04	32,189	355	1.10	617	1.92
≥College	33,624	201	0.60	325	0.97	34,720	168	0.48	345	0.99
Other[d]	1,032	10	0.97	22	2.13	476	5	1.05	11	2.31
Payment source for delivery										
Private insurance	41,551	316	0.76	453	1.09	42,057	251	0.60	471	1.12
Medicaid	27,687	501	1.81	676	2.44	27,328	344	1.26	606	2.22
Self-payment	727	13	1.79	19	2.61	804	12	1.49	36	4.48
Other[e]	3,958	30	0.76	88	2.22	3,775	30	0.79	69	1.83
WIC enrollment										
Yes	25,675	380	1.48	613	2.39	24,060	293	1.22	531	2.21
No	46,207	465	1.01	592	1.28	47,819	326	0.68	625	1.31
Unknown	2,041	15	0.73	31	1.52	2,085	18	0.86	26	1.25
Maternal smoking										
Yes	9,630	185	1.92	218	2.26	8,818	141	1.60	185	2.10
No	62,868	659	1.05	997	1.59	63,755	477	0.75	965	1.51
Unknown	1,425	16	1.12	21	1.47	1,391	19	1.37	32	2.30
Maternal infection										
Yes	5,431	65	1.20	114	2.10	5,122	58	1.13	100	1.95
No	68,492	795	1.16	1,122	1.64	68,842	579	0.84	1,082	1.57

	2019 Birth Cohort						2020 Birth Cohort				
	Tested Children	Unconfirmed EBLLs		Confirmed EBLLs			Tested Children	Unconfirmed EBLLs		Confirmed EBLLs	
Characteristics	No.[a]	No.	%[b]	No.	%[b]		No.	No.	No.	%	No.
Maternal risk factor											
Yes	30,557	369	1.21	521	1.71		31,876	272	0.85	528	1.66
No	43,366	491	1.13	715	1.65		42,088	365	0.87	654	1.55
Income											
Lowest	22,642	418	1.85	668	2.95		22,670	307	1.35	628	2.77
Low	16,563	198	1.20	245	1.48		16,536	171	1.03	240	1.45
High	16,780	142	0.85	200	1.19		17,267	93	0.54	192	1.11
Highest	16,895	90	0.53	112	0.66		16,411	60	0.37	111	0.68
Poverty											
Lowest	15,656	91	0.58	108	0.69		15,287	60	0.39	116	0.76
Low	17,422	150	0.86	211	1.21		17,902	111	0.62	193	1.08
High	16,716	204	1.22	256	1.53		16,989	156	0.92	274	1.61
Highest	23,246	403	1.73	650	2.80		22,879	305	1.33	590	2.58
Old housing											
Lowest	15,611	88	0.56	121	0.78		14,926	46	0.31	114	0.76
Low	16,309	162	0.99	195	1.20		15,948	115	0.72	181	1.13
High	18,808	261	1.39	327	1.74		18,902	191	1.01	299	1.58
Highest	22,312	337	1.51	582	2.61		23,281	280	1.20	579	2.49

[a] Total number of children who received their first blood lead test before two years of age in the 2019 and 2020 birth cohorts.

[b] Children's first blood lead test result of unconfirmed EBLLs or confirmed EBLLs in the 2019 and 2020 birth cohorts.

[c] Other race and ethnicity includes children whose race and ethnicity is other races and ethnicities, unknown or missing.

[d] Other maternal educational attainment includes children whose maternal education level is unknown or missing.

[e] Other principal source of payment for delivery includes children whose principal source of payment for delivery is unknown or missing.

Table 5. Trend in the percentages of confirmed EBLLs among tested children under age two by individual and neighborhood characteristics, 2015–2020 birth cohorts

	Percentages of confirmed EBLLs among tested children (%) in birth cohort							
Characteristics	2015	2016	2017	2018	2019	2020	Trend[a]	p-value[b]
Sex								
Male	2.82	2.53	2.14	1.70	1.73	1.56	-	<0.05
Female	2.69	2.51	2.22	1.78	1.61	1.64	-	<0.05
Race and ethnicity								
Hispanic	3.57	3.02	2.56	2.12	2.05	2.04	-	<0.05
Non-Hispanic Asian	3.34	3.53	2.73	2.29	1.33	1.05	-	<0.05
Non-Hispanic Black	4.41	4.37	3.46	2.52	2.83	2.48	-	<0.05
Non-Hispanic White	2.14	1.90	1.70	1.44	1.29	1.29	-	<0.05
Other[c]	2.26	2.08	2.22	1.61	2.24	2.03	-	0.59
Maternal educational attainment								
<High school	4.57	4.85	3.94	2.94	3.34	3.18	-	<0.05
High school/some college	3.05	2.80	2.52	2.14	2.04	1.92	-	<0.05
≥College	1.84	1.56	1.32	1.06	0.97	0.99	-	<0.05
Other[d]	4.65	5.10	4.32	1.65	2.13	2.31	-	<0.05
Payment source for delivery								
Private insurance	1.96	1.75	1.52	1.18	1.09	1.12	-	<0.05
Medicaid	3.68	3.54	2.98	2.40	2.44	2.22	-	<0.05
Self-payment	5.49	4.22	3.41	4.35	2.61	4.48	-	0.33
Other[e]	2.93	2.40	2.44	2.00	2.22	1.83	-	<0.05
WIC enrollment								
Yes	3.29	3.19	2.73	2.17	2.39	2.21	-	<0.05
No	2.28	2.01	1.75	1.46	1.28	1.31	-	<0.05
Unknown	3.01	1.99	2.76	1.71	1.52	1.25	-	<0.05
Maternal smoking								
Yes	2.96	3.07	2.53	2.10	2.26	2.10	-	<0.05
No	2.69	2.38	2.10	1.67	1.59	1.51	-	<0.05
Unknown	3.97	3.96	2.60	2.10	1.47	2.30	-	<0.05
Maternal infection								
Yes	3.15	2.61	2.79	2.28	2.10	1.95	-	<0.05
No	2.73	2.51	2.13	1.69	1.64	1.57	-	<0.05
Maternal risk factor								
Yes	2.71	2.74	2.26	1.76	1.71	1.66	-	<0.05
No	2.78	2.40	2.13	1.72	1.65	1.55	-	<0.05
Income								
Lowest	4.47	4.24	3.64	2.92	2.95	2.77	-	<0.05
Low	2.18	2.01	1.88	1.65	1.48	1.45	-	<0.05
High	1.94	1.89	1.57	1.23	1.19	1.11	-	<0.05
Highest	1.43	1.10	0.92	0.75	0.66	0.68	-	<0.05

Characteristics	Percentages of confirmed EBLLs among tested children (%) in birth cohort 2015	2016	2017	2018	2019	2020	Trend[a]	p-value[b]
Poverty								
Lowest	1.42	1.32	1.08	0.80	0.69	0.76	-	<0.05
Low	1.93	1.49	1.45	1.24	1.21	1.08	-	<0.05
High	2.18	2.22	1.98	1.69	1.53	1.61	-	<0.05
Highest	4.33	4.01	3.42	2.71	2.80	2.58	-	<0.05
Old housing								
Lowest	1.63	1.49	1.13	0.90	0.78	0.76	-	<0.05
Low	1.70	1.61	1.38	1.20	1.20	1.13	-	<0.05
High	2.77	2.35	2.27	1.75	1.74	1.58	-	<0.05
Highest	4.03	3.85	3.27	2.67	2.61	2.49	-	<0.05

[a] Trend = "+", increasing trend in percentages of confirmed EBLLs among tested children from 2015 to 2020; "-", decreasing trend in percentages of confirmed EBLLs among tested children from 2015 to 2020.

[b] A p-value <0.05 for a test of linear trend indicates a statistically significant increasing or decreasing pattern.

[c] Other race and ethnicity includes children whose race and ethnicity is other races and ethnicities, unknown or missing.

[d] Other maternal educational attainment includes children whose maternal education level is unknown or missing.

[e] Other principal source of payment for delivery includes children whose principal source of payment for delivery is unknown or missing.

Summary of blood lead testing rate by county and municipality

Table 6 shows the percentages of children tested for BLLs before one year and two years of age, categorized by county of residence, for the 2019 and 2020 birth cohorts. The results show that blood lead testing rates were particularly low (≤40%) in children living in the following counties among both birth cohorts: Bucks, Carbon, Columbia, Mifflin, Monroe, Pike, Snyder, Susquehanna, Union, and Wyoming.

Table 7 shows trends in the percentages of children tested for BLLs before two years of age, categorized by county of residence, across the 2015–2020 birth cohorts. Blood lead testing rates showed an increasing trend in most counties of residence, with the majority being statistically significant. However, some counties of residence showed a decreasing trend in blood lead testing rates, and a few of them with particularly low blood lead testing rates, such as Mifflin, Pike, Snyder, and Union, displayed a statistically significant decline.

Map 1 and **Map 2** show the geographic distributions of the percentages of children tested for BLLs under age two at the county level for the 2019 and 2020 birth cohorts, respectively. Children's blood lead testing rates varied widely across counties. For both birth cohorts, counties of residence with relatively low blood lead testing rates were mainly located in eastern Pennsylvania. Some counties of residence with particularly low blood lead testing rates, such as Carbon, Juniata, Mifflin, Monroe, Pike, Snyder, Susquehanna, Union, and Wyoming, were concentrated in certain regions of eastern Pennsylvania.

Map 3 shows the geographic distribution of the percentages of children tested for BLLs under age two at the municipal level for the combined 2019–2020 birth cohort. Most municipalities with relatively low blood lead testing rates were mainly concentrated in counties with particularly low blood lead testing rates. However, a few municipalities with low blood lead testing rates were dispersed among counties with medium or high blood lead testing rates.

Table 6. Number and percentage of children tested for BLLs before one year and two years of age by county of residence, 2019 and 2020 birth cohorts

	2019 Birth Cohort					2020 Birth Cohort				
	Total Birth	Age <1 yr		Age <2 yrs		Total Birth	Age <1 yr		Age <2 yrs	
County	No.[a]	No.	%[b]	No.	%[b]	No.	No.	%	No.	%
Adams	847	499	58.9	590	69.7	819	505	61.7	573	70.0
Allegheny	12,870	6,852	53.2	9,534	74.1	12,150	7,095	58.4	9,303	76.6
Armstrong	614	367	59.8	496	80.8	574	407	70.9	476	82.9
Beaver	1,544	565	36.6	807	52.3	1,524	686	45.0	936	61.4
Bedford	414	257	62.1	287	69.3	432	250	57.9	295	68.3
Berks	4,685	437	9.3	2,412	51.5	4,349	475	10.9	2,289	52.6
Blair	1,196	473	39.5	691	57.8	1,176	614	52.2	799	67.9
Bradford	511	98	19.2	343	67.1	510	93	18.2	330	64.7
Bucks	4,743	755	15.9	1,525	32.2	4,549	833	18.3	1,534	33.7
Butler	1,615	972	60.2	1,145	70.9	1,673	1,056	63.1	1,186	70.9
Cambria	1,218	756	62.1	878	72.1	1,192	763	64.0	850	71.3
Cameron	25	2	8.0	17	68.0	28	4	14.3	22	78.6
Carbon	521	110	21.1	181	34.7	601	141	23.5	232	38.6
Centre	1,079	401	37.2	467	43.3	1,060	392	37.0	441	41.6
Chester	5,089	1,715	33.7	2,587	50.8	4,985	1,777	35.6	2,582	51.8
Clarion	395	184	46.6	238	60.3	359	181	50.4	207	57.7
Clearfield	723	338	46.7	472	65.3	676	362	53.6	465	68.8
Clinton	403	104	25.8	182	45.2	411	107	26.0	197	47.9
Columbia	562	83	14.8	181	32.2	542	58	10.7	214	39.5
Crawford	886	372	42.0	463	52.3	822	319	38.8	402	48.9
Cumberland	2,586	449	17.4	1,092	42.2	2,589	739	28.5	1,362	52.6
Dauphin	3,263	786	24.1	1,740	53.3	3,326	875	26.3	1,907	57.3
Delaware	6,207	2,180	35.1	3,909	63.0	6,137	2,635	42.9	4,150	67.6
Elk	296	90	30.4	169	57.1	253	105	41.5	155	61.3
Erie	2,772	1,148	41.4	1,841	66.4	2,592	1,182	45.6	1,765	68.1
Fayette	977	298	30.5	492	50.4	804	360	44.8	489	60.8
Forest	34	19	55.9	23	67.6	30	13	43.3	20	66.7
Franklin	1,568	49	3.1	775	49.4	1,456	57	3.9	820	56.3
Fulton	120	15	12.5	56	46.7	114	16	14.0	57	50.0
Greene	172	24	14.0	136	79.1	161	106	65.8	131	81.4
Huntingdon	369	188	50.9	234	63.4	365	189	51.8	221	60.5
Indiana	795	384	48.3	492	61.9	775	442	57.0	495	63.9
Jefferson	478	157	32.8	245	51.3	470	202	43.0	273	58.1
Juniata	262	58	22.1	96	36.6	310	72	23.2	133	42.9
Lackawanna	2,045	668	32.7	993	48.6	2,030	640	31.5	955	47.0
Lancaster	6,879	985	14.3	2,746	39.9	6,834	1,138	16.7	2,958	43.3

County	2019 Birth Cohort					2020 Birth Cohort				
	Total Birth	Age <1 yr		Age <2 yrs		Total Birth	Age <1 yr		Age <2 yrs	
	No.[a]	No.	%[b]	No.	%[b]	No.	No.	%	No.	%
Lawrence	787	328	41.7	427	54.3	808	385	47.6	479	59.3
Lebanon	1,594	66	4.1	677	42.5	1,550	252	16.3	698	45.0
Lehigh	4,261	1,024	24.0	2,150	50.5	4,067	1,023	25.2	1,927	47.4
Luzerne	3,227	1,058	32.8	1,808	56.0	3,150	1,139	36.2	1,856	58.9
Lycoming	1,184	264	22.3	558	47.1	1,167	246	21.1	566	48.5
McKean	258	107	41.5	196	76.0	169	57	33.7	129	76.3
Mercer	992	459	46.3	544	54.8	996	509	51.1	580	58.2
Mifflin	545	132	24.2	218	40.0	527	94	17.8	183	34.7
Monroe	1,417	150	10.6	342	24.1	1,365	113	8.3	328	24.0
Montgomery	8,398	2,655	31.6	4,459	53.1	8,226	2,716	33.0	4,458	54.2
Montour	242	15	6.2	105	43.4	220	22	10.0	112	50.9
Northampton	2,711	366	13.5	1,158	42.7	2,726	369	13.5	1,146	42.0
Northumberland	920	125	13.6	423	46.0	876	140	16.0	438	50.0
Perry	542	151	27.9	228	42.1	467	127	27.2	219	46.9
Philadelphia	20,312	6,661	32.8	14,054	69.2	19,649	7,176	36.5	13,931	70.9
Pike	273	76	27.8	108	39.6	253	69	27.3	93	36.8
Potter	118	4	3.4	102	86.4	129	6	4.7	96	74.4
Schuylkill	1,331	693	52.1	879	66.0	1,275	662	51.9	852	66.8
Snyder	398	43	10.8	99	24.9	373	39	10.5	101	27.1
Somerset	592	313	52.9	373	63.0	580	316	54.5	351	60.5
Sullivan	53	7	13.2	29	54.7	45	9	20.0	25	55.6
Susquehanna	252	31	12.3	81	32.1	248	33	13.3	80	32.3
Tioga	258	21	8.1	102	39.5	242	39	16.1	114	47.1
Union	385	49	12.7	111	28.8	404	48	11.9	122	30.2
Venango	429	178	41.5	249	58.0	435	213	49.0	328	75.4
Warren	318	202	63.5	241	75.8	283	193	68.2	212	74.9
Washington	1,907	937	49.1	1,387	72.7	1,769	1,036	58.6	1,324	74.8
Wayne	367	160	43.6	212	57.8	413	210	50.8	244	59.1
Westmoreland	3,002	1,628	54.2	2,066	68.8	2,823	1,751	62.0	2,228	78.9
Wyoming	237	38	16.0	83	35.0	203	38	18.7	64	31.5
York	4,441	962	21.7	1,919	43.2	4,398	865	19.7	1,456	33.1

[a] Total number of children living in different counties in the 2019 and 2020 birth cohorts.

[b] The age of children at the time of their first blood lead test: Age <1 yr, children tested for BLL under age one; Age <2 yr, children tested for BLL under age two.

Table 7. Trend in the percentages of children tested for BLLs before two years of age by county of residence, 2015–2020 birth cohorts

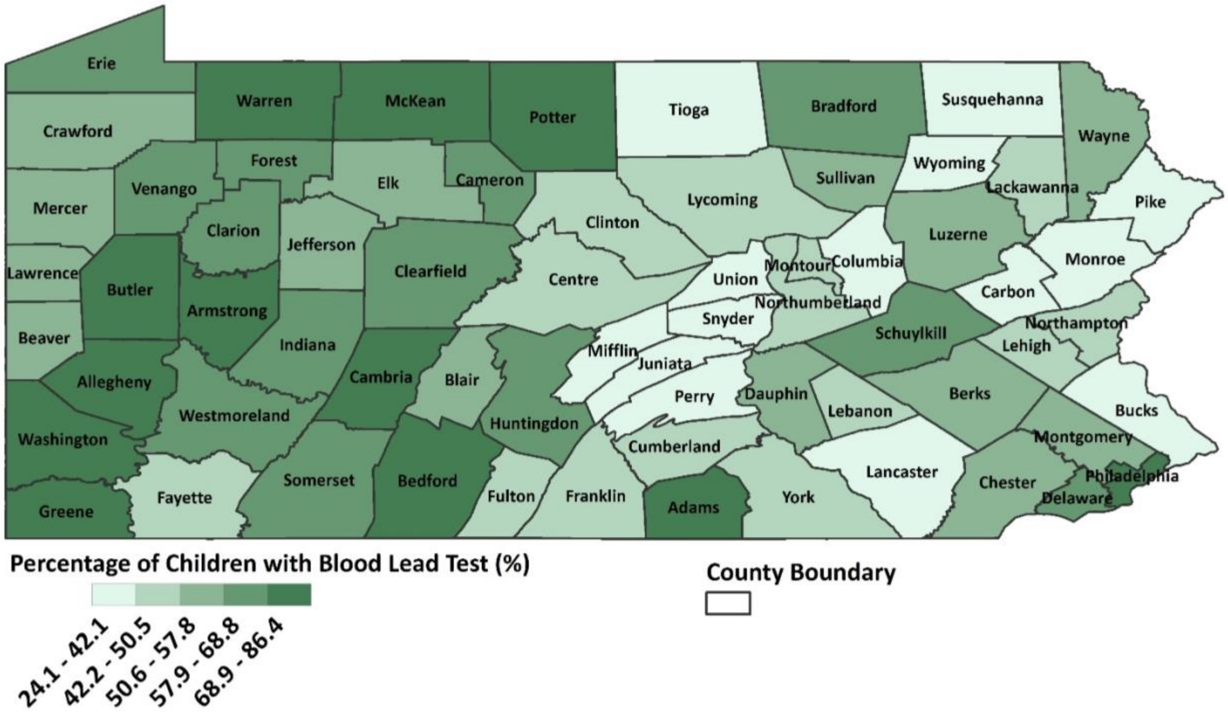
	Blood lead testing rate (%) in birth cohort							
County	2015	2016	2017	2018	2019	2020	Trend[a]	p-value[b]
Adams	45.2	48.3	54.0	69.5	69.7	70.0	+	<0.05
Allegheny	57.7	64.7	73.1	75.7	74.1	76.6	+	<0.05
Armstrong	67.4	75.3	81.5	84.9	80.8	82.9	+	0.052
Beaver	44.1	46.6	56.0	52.4	52.3	61.4	+	<0.05
Bedford	60.1	62.9	69.0	70.0	69.3	68.3	+	0.056
Berks	42.0	38.1	41.4	48.8	51.5	52.6	+	<0.05
Blair	52.3	52.4	61.4	59.3	57.8	67.9	+	<0.05
Bradford	48.7	54.2	50.0	65.5	67.1	64.7	+	<0.05
Bucks	34.9	35.9	37.6	34.8	32.2	33.7	-	0.23
Butler	50.3	53.3	67.8	76.0	70.9	70.9	+	<0.05
Cambria	53.0	52.3	65.3	73.9	72.1	71.3	+	<0.05
Cameron	75.6	71.8	83.3	62.2	68.0	78.6	-	0.82
Carbon	42.3	40.9	43.3	47.7	34.7	38.6	-	0.44
Centre	46.2	43.7	48.8	43.0	43.3	41.6	-	0.19
Chester	38.8	39.9	47.8	49.6	50.8	51.8	+	<0.05
Clarion	42.5	49.1	45.4	48.4	60.3	57.7	+	<0.05
Clearfield	59.5	59.7	61.7	60.1	65.3	68.8	+	<0.05
Clinton	53.7	49.0	49.6	50.1	45.2	47.9	-	0.077
Columbia	38.6	42.3	34.3	38.2	32.2	39.5	-	0.54
Crawford	37.9	43.4	42.0	41.7	52.3	48.9	+	<0.05
Cumberland	20.9	21.4	26.5	33.3	42.2	52.6	+	<0.05
Dauphin	32.6	28.7	38.9	47.8	53.3	57.3	+	<0.05
Delaware	56.6	60.0	62.2	62.2	63.0	67.6	+	<0.05
Elk	57.6	43.6	48.2	50.8	57.1	61.3	+	0.32
Erie	54.7	55.4	61.6	64.3	66.4	68.1	+	<0.05
Fayette	51.5	48.2	50.7	51.1	50.4	60.8	+	0.16
Forest	41.2	40.0	47.8	42.1	67.6	66.7	+	<0.05
Franklin	39.3	39.2	42.9	57.3	49.4	56.3	+	<0.05
Fulton	47.6	50.9	52.1	54.7	46.7	50.0	+	0.95
Greene	66.1	59.4	74.1	75.4	79.1	81.4	+	<0.05
Huntingdon	56.0	53.7	63.1	58.8	63.4	60.5	+	0.16
Indiana	46.2	49.6	54.0	64.8	61.9	63.9	+	<0.05
Jefferson	45.3	45.4	44.3	49.0	51.3	58.1	+	<0.05
Juniata	46.4	43.9	40.3	47.9	36.6	42.9	-	0.42
Lackawanna	37.0	36.5	42.0	45.7	48.6	47.0	+	<0.05
Lancaster	28.6	24.8	31.8	32.5	39.9	43.3	+	<0.05
Lawrence	40.4	44.8	52.6	58.9	54.3	59.3	+	<0.05

County	Blood lead testing rate (%) in birth cohort						Trend[a]	p-value[b]
	2015	2016	2017	2018	2019	2020		
Lebanon	33.0	32.0	38.2	41.6	42.5	45.0	+	<0.05
Lehigh	39.0	38.1	44.3	48.1	50.5	47.4	+	<0.05
Luzerne	49.7	52.0	54.7	57.5	56.0	58.9	+	<0.05
Lycoming	50.2	50.9	53.3	48.2	47.1	48.5	-	0.21
McKean	72.7	75.5	78.0	83.2	76.0	76.3	+	0.46
Mercer	46.0	44.2	51.6	51.6	54.8	58.2	+	<0.05
Mifflin	48.7	42.4	42.3	41.5	40.0	34.7	-	<0.05
Monroe	27.1	29.5	31.2	35.3	24.1	24.0	-	0.51
Montgomery	47.9	50.0	52.6	54.5	53.1	54.2	+	<0.05
Montour	47.0	40.6	41.1	41.0	43.4	50.9	+	0.49
Northampton	29.7	32.4	36.0	41.0	42.7	42.0	+	<0.05
Northumberland	57.3	52.4	53.4	53.8	46.0	50.0	-	0.072
Perry	34.3	38.8	38.0	40.9	42.1	46.9	+	<0.05
Philadelphia	67.9	68.0	73.3	73.4	69.2	70.9	+	0.43
Pike	49.8	46.8	50.7	43.3	39.6	36.8	-	<0.05
Potter	72.5	69.8	82.2	80.8	86.4	74.4	+	0.33
Schuylkill	59.5	61.3	64.6	69.0	66.0	66.8	+	<0.05
Snyder	39.6	31.8	30.4	33.8	24.9	27.1	-	<0.05
Somerset	46.8	46.3	60.9	68.9	63.0	60.5	+	0.094
Sullivan	48.8	39.1	51.1	43.9	54.7	55.6	+	0.19
Susquehanna	30.8	30.2	27.7	29.0	32.1	32.3	+	0.39
Tioga	43.6	39.1	42.0	34.9	39.5	47.1	+	0.78
Union	34.8	34.8	32.9	30.9	28.8	30.2	-	<0.05
Venango	38.9	41.5	40.5	47.0	58.0	75.4	+	<0.05
Warren	50.0	51.8	50.1	63.6	75.8	74.9	+	<0.05
Washington	48.5	50.1	59.7	69.2	72.7	74.8	+	<0.05
Wayne	41.7	42.4	46.2	54.0	57.8	59.1	+	<0.05
Westmoreland	48.9	51.8	61.8	59.9	68.8	78.9	+	<0.05
Wyoming	33.9	28.4	33.3	36.7	35.0	31.5	+	0.69
York	36.8	35.5	36.2	43.3	43.2	33.1	+	0.78

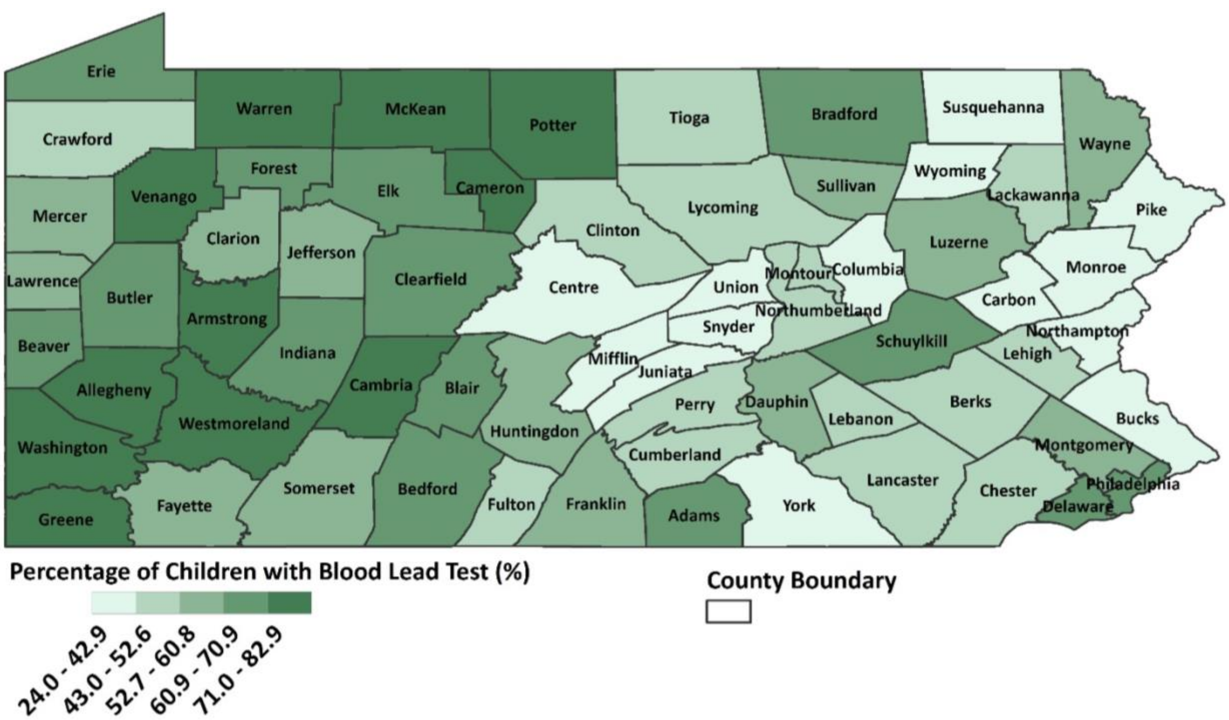
[a] Trend = "+", increasing trend in blood lead testing rates from 2015 to 2020; "-", decreasing trend in blood lead testing rates from 2015 to 2020.

[b] A p-value <0.05 for a test of linear trend indicates a statistically significant increasing or decreasing pattern.

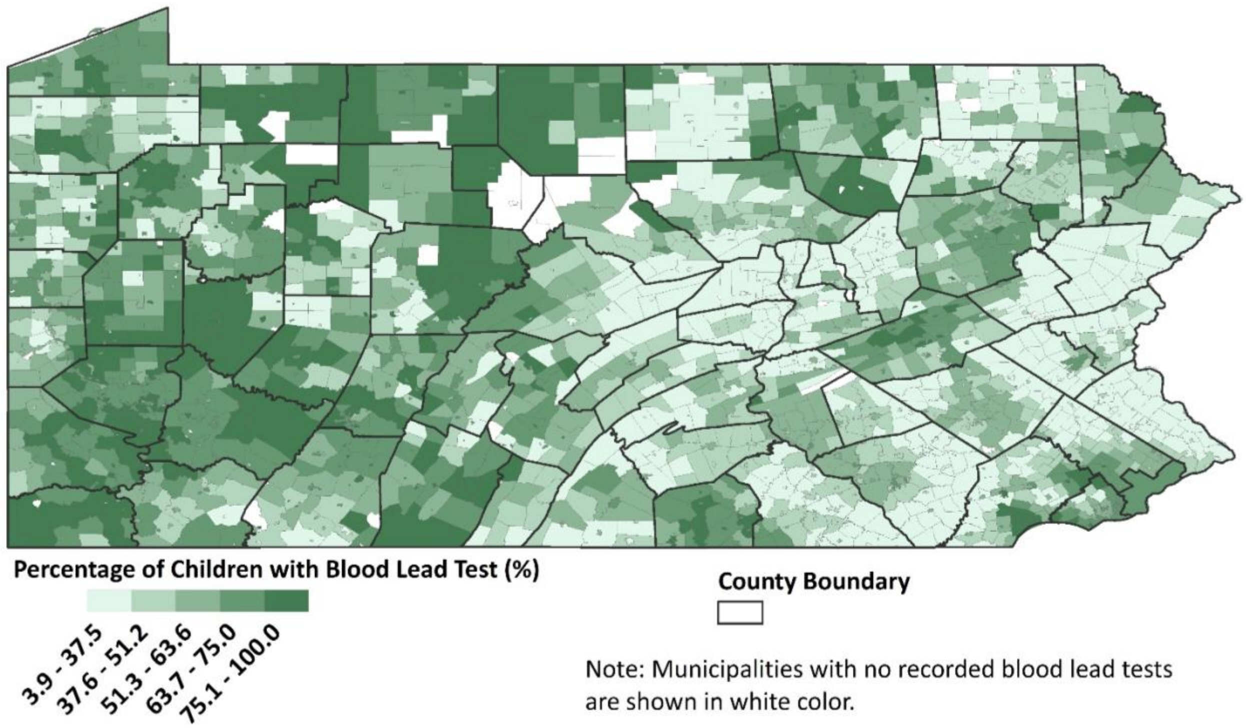
Map 1. Percentage of children tested for BLLs before two years of age by county of residence, 2019 birth cohort



Map 2. Percentage of children tested for BLLs before two years of age by county of residence, 2020 birth cohort



Map 3. Percentage of children tested for BLLs before two years of age by municipality of residence, combined 2019–2020 birth cohort



Summary of percentage of EBLLs by county and municipality

Table 8 shows the percentages of unconfirmed and confirmed EBLLs among tested children under age two, categorized by county of residence, for the 2019 and 2020 birth cohorts. The percentages of confirmed EBLLs were particularly high (≥2.5%) in the following counties among both birth cohorts: Berks, Bradford, Forest, Mifflin, Northumberland, Sullivan, and Warren.

Table 9 shows trends in the percentages of confirmed EBLLs among tested children under age two, categorized by county of residence, across the 2015–2020 birth cohorts. The percentages of confirmed EBLLs showed a decreasing trend in most counties, with several showing statistically significant declines. However, trends in the percentages of confirmed EBLLs increased in some counties, with Elk County showing a statistically significant increase.

Map 4 and **Map 5** show the geographic distributions of the percentages of confirmed EBLLs among tested children under age two at the county level for the 2019 and 2020 birth cohorts, respectively. The percentages of confirmed EBLLs varied widely across counties of residence. Counties with particularly high percentages of confirmed EBLLs were not clearly concentrated in any specific regions of the state. However, most counties in the Susquehanna Valley Region and Allegheny National Forest Region showed relatively high percentages of confirmed EBLLs for both birth cohorts.

Map 6 shows the geographic distribution of the percentages of confirmed EBLLs among tested children under age two at the municipal level for the combined 2019–2020 birth cohort. In most municipalities, the number of confirmed EBLL cases was zero due to small population sizes. Not surprisingly, municipalities with relatively low percentages of confirmed EBLLs were more commonly found in counties with low percentages of confirmed EBLLs than in counties with high percentages of confirmed EBLLs. Municipalities with relatively high percentages of confirmed EBLLs were sparsely distributed across counties, even in those with low percentages of confirmed EBLLs.

Table 8. Number and percentage of unconfirmed and confirmed EBLLs among tested children under age two by county of residence, 2019 and 2020 birth cohorts

County	2019 Birth Cohort					2020 Birth Cohort				
	Tested Children	Unconfirmed EBLLs[b]		Confirmed EBLLs[b]		Tested Children	Unconfirmed EBLLs		Confirmed EBLLs	
	No.[a]	No.	%	No.	%	No.	No.	%	No.	%
Adams	590	5	0.85	5	0.85	573	3	0.52	4	0.70
Allegheny	9,534	101	1.06	116	1.22	9,303	85	0.91	120	1.29
Armstrong	496	8	1.61	4	0.81	476	4	0.84	4	0.84
Beaver	807	9	1.12	11	1.36	936	10	1.07	13	1.39
Bedford	287	3	1.05	3	1.05	295	6	2.03	5	1.69
Berks	2,412	83	3.44	86	3.57	2,289	46	2.01	97	4.24
Blair	691	16	2.32	16	2.32	799	23	2.88	20	2.50
Bradford	343	4	1.17	9	2.62	330	6	1.82	12	3.64
Bucks	1,525	5	0.33	14	0.92	1,534	4	0.26	9	0.59
Butler	1,145	3	0.26	8	0.70	1,186	9	0.76	3	0.25
Cambria	878	19	2.16	10	1.14	850	12	1.41	13	1.53
Cameron	17	0	0.00	0	0.00	22	0	0.00	0	0.00
Carbon	181	3	1.66	2	1.10	232	1	0.43	6	2.59
Centre	467	1	0.21	1	0.21	441	2	0.45	7	1.59
Chester	2,587	12	0.46	29	1.12	2,582	12	0.46	23	0.89
Clarion	238	6	2.52	5	2.10	207	6	2.90	2	0.97
Clearfield	472	3	0.64	6	1.27	465	2	0.43	3	0.65
Clinton	182	3	1.65	4	2.20	197	3	1.52	5	2.54
Columbia	181	1	0.55	4	2.21	214	3	1.40	4	1.87
Crawford	463	6	1.30	4	0.86	402	4	1.00	8	1.99
Cumberland	1,092	8	0.73	10	0.92	1,362	6	0.44	16	1.17
Dauphin	1,740	13	0.75	14	0.80	1,907	14	0.73	22	1.15
Delaware	3,909	29	0.74	38	0.97	4,150	22	0.53	35	0.84
Elk	169	0	0.00	4	2.37	155	0	0.00	6	3.87
Erie	1,841	37	2.01	21	1.14	1,765	23	1.30	21	1.19
Fayette	492	6	1.22	11	2.24	489	6	1.23	10	2.04
Forest	23	3	13.04	1	4.35	20	0	0.00	1	5.00
Franklin	775	9	1.16	18	2.32	820	11	1.34	15	1.83
Fulton	56	0	0.00	1	1.79	57	2	3.51	1	1.75
Greene	136	2	1.47	5	3.68	131	2	1.53	2	1.53
Huntingdon	234	3	1.28	2	0.85	221	1	0.45	3	1.36
Indiana	492	5	1.02	3	0.61	495	7	1.41	3	0.61
Jefferson	245	5	2.04	4	1.63	273	4	1.47	3	1.10
Juniata	96	3	3.13	2	2.08	133	1	0.75	3	2.26
Lackawanna	993	7	0.70	23	2.32	955	7	0.73	15	1.57

County	2019 Birth Cohort					2020 Birth Cohort				
	Tested Children	Unconfirmed EBLLs[b]		Confirmed EBLLs[b]		Tested Children	Unconfirmed EBLLs		Confirmed EBLLs	
	No.[a]	No.	%[b]	No.	%[b]	No.	No.	No.	%	No.
Lancaster	2,746	31	1.13	59	2.15	2,958	16	0.54	56	1.89
Lawrence	427	5	1.17	6	1.41	479	6	1.25	7	1.46
Lebanon	677	17	2.51	18	2.66	698	6	0.86	14	2.01
Lehigh	2,150	34	1.58	22	1.02	1,927	16	0.83	20	1.04
Luzerne	1,808	37	2.05	31	1.71	1,856	28	1.51	32	1.72
Lycoming	558	6	1.08	15	2.69	566	5	0.88	12	2.12
McKean	196	2	1.02	3	1.53	129	2	1.55	7	5.43
Mercer	544	11	2.02	8	1.47	580	8	1.38	13	2.24
Mifflin	218	0	0.00	7	3.21	183	0	0.00	5	2.73
Monroe	342	1	0.29	1	0.29	328	1	0.30	2	0.61
Montgomery	4,459	27	0.61	46	1.03	4,458	15	0.34	40	0.90
Montour	105	2	1.90	0	0.00	112	1	0.89	2	1.79
Northampton	1,158	11	0.95	10	0.86	1,146	4	0.35	14	1.22
Northumberland	423	7	1.65	20	4.73	438	11	2.51	19	4.34
Perry	228	3	1.32	4	1.75	219	6	2.74	5	2.28
Philadelphia	14,054	123	0.88	362	2.58	13,931	104	0.75	306	2.20
Pike	108	0	0.00	3	2.78	93	0	0.00	0	0.00
Potter	102	0	0.00	2	1.96	96	0	0.00	2	2.08
Schuylkill	879	20	2.28	22	2.50	852	12	1.41	18	2.11
Snyder	99	2	2.02	1	1.01	101	1	0.99	0	0.00
Somerset	373	6	1.61	3	0.80	351	6	1.71	4	1.14
Sullivan	29	0	0.00	1	3.45	25	0	0.00	1	4.00
Susquehanna	81	1	1.23	1	1.23	80	0	0.00	1	1.25
Tioga	102	0	0.00	2	1.96	114	1	0.88	2	1.75
Union	111	1	0.90	2	1.80	122	1	0.82	3	2.46
Venango	249	7	2.81	7	2.81	328	4	1.22	5	1.52
Warren	241	5	2.07	9	3.73	212	2	0.94	9	4.25
Washington	1,387	24	1.73	13	0.94	1,324	14	1.06	6	0.45
Wayne	212	0	0.00	1	0.47	244	3	1.23	2	0.82
Westmoreland	2,066	19	0.92	22	1.06	2,228	13	0.58	23	1.03
Wyoming	83	0	0.00	3	3.61	64	0	0.00	1	1.56
York	1,919	37	1.93	38	1.98	1,456	4	0.27	37	2.54

[a] Total number of children who received their first blood lead test before two years of age in the 2019 and 2020 birth cohorts.

[b] Children's first blood lead test result of unconfirmed EBLLs or confirmed EBLLs in the 2019 and 2020 birth cohorts.

Table 9. Trend in the percentages of confirmed EBLLs among tested children under age two by county of residence, 2015–2020 birth cohorts

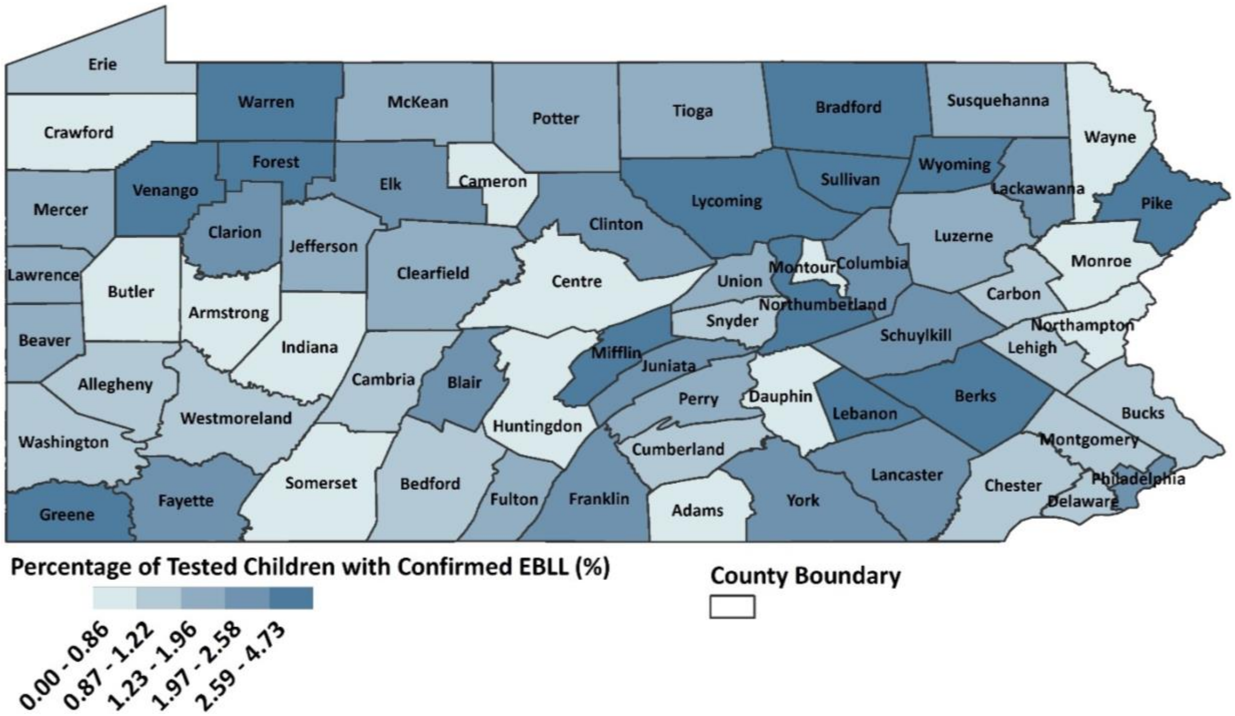
County	Percentage of confirmed EBLLs among tested children (%) in birth cohort						Trend[a]	p-value[b]
	2015	2016	2017	2018	2019	2020		
Adams	0.48	1.60	1.97	0.51	0.85	0.70	-	0.67
Allegheny	2.17	1.88	1.55	1.23	1.22	1.29	-	<0.05
Armstrong	2.54	1.96	1.76	0.84	0.81	0.84	-	<0.05
Beaver	0.67	1.03	0.58	1.22	1.36	1.39	+	0.054
Bedford	2.68	3.73	1.70	1.01	1.05	1.69	-	0.12
Berks	6.23	6.44	5.38	3.71	3.57	4.24	-	<0.05
Blair	2.62	3.76	2.04	2.92	2.32	2.50	-	0.48
Bradford	2.99	3.04	2.88	3.38	2.62	3.64	+	0.48
Bucks	1.19	1.26	0.93	0.66	0.92	0.59	-	<0.05
Butler	0.75	0.94	0.77	1.11	0.70	0.25	-	0.28
Cambria	2.58	2.00	0.85	1.80	1.14	1.53	-	0.22
Cameron	2.94	3.57	11.43	0.00	0.00	0.00	-	0.38
Carbon	2.39	1.65	3.19	1.93	1.10	2.59	-	0.79
Centre	0.85	0.76	0.53	0.20	0.21	1.59	+	0.74
Chester	2.06	1.19	0.82	0.75	1.12	0.89	-	0.14
Clarion	0.56	3.08	5.08	2.81	2.10	0.97	-	0.85
Clearfield	0.68	0.22	1.08	0.96	1.27	0.65	+	0.42
Clinton	3.52	3.02	2.58	1.91	2.20	2.54	-	0.089
Columbia	3.17	2.07	1.65	5.00	2.21	1.87	-	0.83
Crawford	4.25	3.24	2.03	1.59	0.86	1.99	-	<0.05
Cumberland	2.01	0.88	1.60	1.51	0.92	1.17	-	0.30
Dauphin	3.01	3.03	2.42	1.61	0.80	1.15	-	<0.05
Delaware	2.34	2.02	1.34	0.84	0.97	0.84	-	<0.05
Elk	0.59	1.54	1.53	2.26	2.37	3.87	+	<0.05
Erie	2.70	2.02	1.74	1.58	1.14	1.19	-	<0.05
Fayette	2.22	2.08	0.53	1.03	2.24	2.04	+	0.99
Forest	7.14	0.00	9.09	0.00	4.35	5.00	-	0.85
Franklin	0.92	1.36	2.18	1.00	2.32	1.83	+	0.25
Fulton	0.00	5.08	4.76	1.56	1.79	1.75	-	0.83
Greene	3.31	1.34	1.56	3.92	3.68	1.53	+	0.97
Huntingdon	0.87	1.00	1.69	2.04	0.85	1.36	+	0.62
Indiana	1.39	1.23	1.69	1.34	0.61	0.61	-	0.093
Jefferson	1.77	2.44	1.42	3.42	1.63	1.10	-	0.65
Juniata	0.81	2.38	7.14	2.86	2.08	2.26	+	0.92
Lackawanna	2.84	2.95	2.78	2.28	2.32	1.57	-	<0.05
Lancaster	4.27	5.23	3.97	3.51	2.15	1.89	-	<0.05
Lawrence	1.91	1.31	1.75	2.02	1.41	1.46	-	0.55

County	Percentage of confirmed EBLLs among tested children (%) in birth cohort						Trend[a]	p-value[b]
	2015	2016	2017	2018	2019	2020		
Lebanon	4.02	4.10	3.62	1.86	2.66	2.01	-	<0.05
Lehigh	3.22	2.37	1.81	1.29	1.02	1.04	-	<0.05
Luzerne	1.72	1.45	1.96	2.16	1.71	1.72	+	0.68
Lycoming	2.50	2.42	2.73	3.44	2.69	2.12	-	0.93
McKean	3.80	1.80	1.66	2.06	1.53	5.43	+	0.61
Mercer	2.12	1.61	1.65	1.68	1.47	2.24	+	0.95
Mifflin	2.73	3.83	2.81	1.19	3.21	2.73	-	0.69
Monroe	0.28	0.48	0.67	0.78	0.29	0.61	+	0.55
Montgomery	2.18	1.44	1.63	1.08	1.03	0.90	-	<0.05
Montour	1.98	2.27	1.16	1.25	0.00	1.79	-	0.31
Northampton	1.86	1.57	1.83	1.66	0.86	1.22	-	0.082
Northumberland	3.88	4.29	4.22	3.53	4.73	4.34	+	0.46
Perry	1.64	1.94	2.54	0.48	1.75	2.28	+	0.94
Philadelphia	3.86	3.63	3.19	2.46	2.58	2.20	-	<0.05
Pike	0.75	0.00	1.40	0.83	2.78	0.00	+	0.69
Potter	5.56	1.11	0.90	0.00	1.96	2.08	-	0.39
Schuylkill	3.48	2.39	3.04	1.93	2.50	2.11	-	0.12
Snyder	2.72	2.86	0.74	1.37	1.01	0.00	-	<0.05
Somerset	3.82	1.32	2.30	1.25	0.80	1.14	-	0.078
Sullivan	15.00	0.00	8.33	0.00	3.45	4.00	-	0.32
Susquehanna	3.66	2.70	1.35	1.22	1.23	1.25	-	<0.05
Tioga	0.69	0.85	0.00	0.00	1.96	1.75	+	0.26
Union	2.16	5.56	2.27	2.42	1.80	2.46	-	0.47
Venango	5.83	4.05	4.66	5.43	2.81	1.52	-	0.056
Warren	2.34	1.61	4.21	1.79	3.73	4.25	+	0.21
Washington	1.72	1.83	1.16	0.96	0.94	0.45	-	<0.05
Wayne	1.84	2.23	2.33	1.48	0.47	0.82	-	0.059
Westmoreland	0.91	1.42	0.92	0.75	1.06	1.03	-	0.77
Wyoming	2.33	0.00	1.04	3.45	3.61	1.56	+	0.49
York	3.17	3.88	2.47	1.67	1.98	2.54	-	0.17

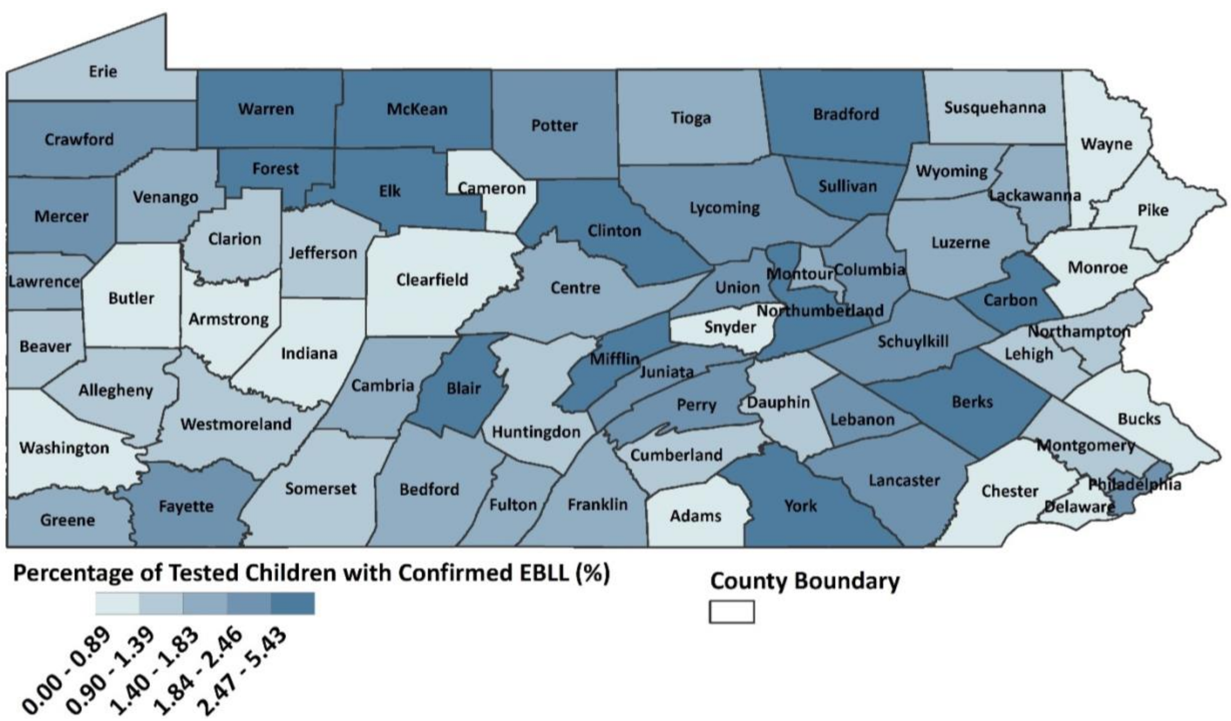
[a] Trend = "+", increasing trend in the percentages of confirmed EBLLs among tested children from 2015 to 2020; "-", decreasing trend in the percentages of confirmed EBLLs among tested children from 2015 to 2020.

[b] A p-value <0.05 for a test of linear trend indicates a statistically significant increasing or decreasing pattern.

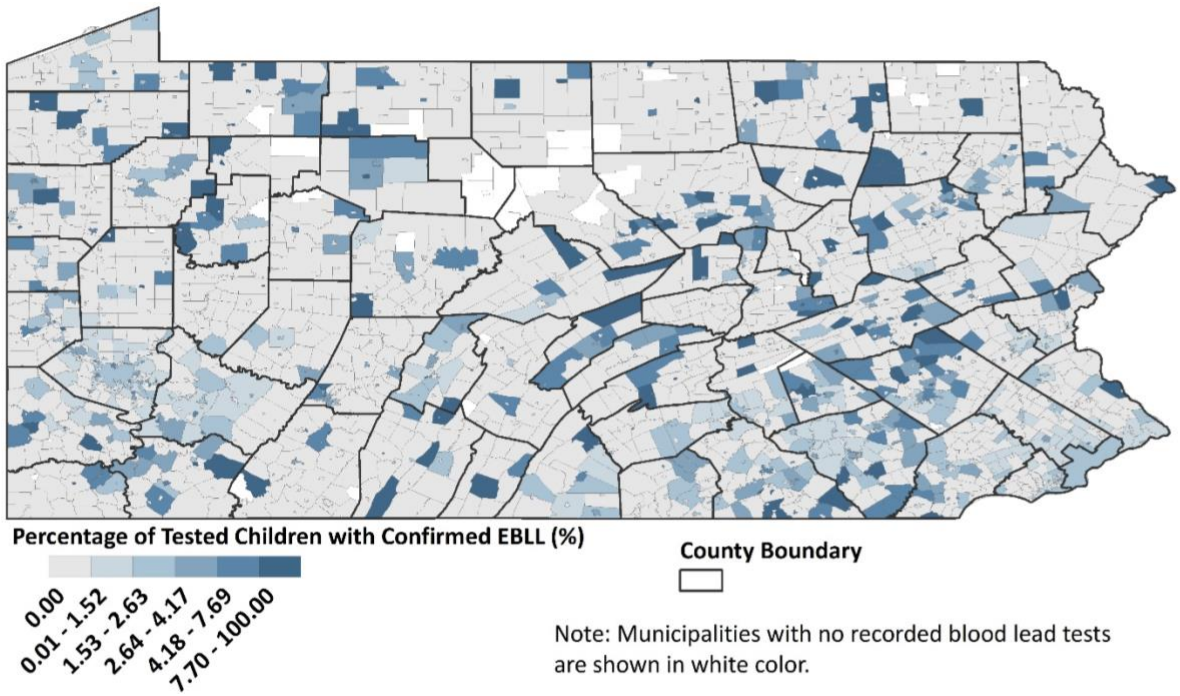
Map 4. Percentage of confirmed EBLLs among tested children under age two by county of residence, 2019 birth cohort



Map 5. Percentage of confirmed EBLLs among tested children under age two by county of residence, 2020 birth cohort



Map 6. Percentage of confirmed EBLLs among tested children under age two by municipality of residence, combined 2019–2020 birth cohort



Limitations

It is important to note that childhood lead surveillance data have inherent limitations that may impact the interpretation of findings. First, 7,260 and 7,243 blood lead test records could not be successfully linked to birth certificate data due to inaccurate or incomplete identifying information in the 2019 birth cohort and 2020 birth cohort, respectively, representing 8.9% and 9.4% of tested children in that cohort. These unmatched test records may lead to an underestimation of the blood lead screening rate. The inherent limitations associated with accuracy errors in both deterministic and probabilistic linkage methods may introduce bias into the analyses despite the use of manual review to verify matched record pairs and minimize such errors. Additionally, Allegheny County and Philadelphia are the only counties in Pennsylvania with mandatory lead testing requirements for all children at 9–12 months and 24 months of age. Except for these two counties, in Pennsylvania only children insured by the Medicaid program are required to be screened for lead. As a result, blood lead testing is focused on children at high risk for lead exposure, rather than being conducted universally, making it difficult to interpret EBLL percentages across geographic areas. The results presented in this report should be interpreted in light of local blood lead screening policies.

Discussion

From 2015 to 2020, blood lead testing rates for children under age two increased significantly and the proportions of tested children with EBLLs decreased significantly in Pennsylvania. We hypothesize that the significant increase in childhood lead testing rates is the results of coordinated efforts made by federal, state, and local public health agencies to raise public awareness, expand access to point-of-care testing and health care services, and enhance data tracking and outreach initiatives. The significant decline in the proportions of tested children with EBLLs indicates a meaningful reduction in childhood lead exposure in Pennsylvania.

Among children born in Pennsylvania in 2019 and 2020, nearly 60% received their first lead screening test before age two, and 1.6% of tested children had BLLs above the reference level of 5 µg/dL. Children with certain individual and neighborhood characteristics, such as being non-Hispanic White, having mothers with lower educational attainment, no WIC enrollment, and self-payment for delivery, had lower lead testing rates. These findings highlight disparities in testing coverage that may limit early detection of lead exposure among specific population groups. Additionally, EBLLs were more prevalent among non-Hispanic Black children and children whose mothers had lower educational attainment, were enrolled in the WIC program, self-paid for delivery, reported smoking or infections during pregnancy, and resided in economically disadvantaged and older neighborhoods.

Disparities in lead testing rates and the proportions of EBLLs across different population groups may stem from multiple factors. First, socioeconomic barriers, such as mothers' lower education attainment, lack of WIC enrollment, and self-payment for delivery are probably associated with reduced access to health care and missed screening opportunities. Limited awareness and knowledge of lead exposure risks may contribute to the higher incidence of lead elevations observed among racial and ethnic minority population such as non-Hispanic Black children and children born to mothers with lower educational attainment. Environmental risks, including residence in older or poorer neighborhoods, may elevate lead exposure as well. These findings underscore the need for targeted public health interventions to effectively and timely mitigate these risks and the potential health impacts caused by lead exposure.

From 2015 to 2020, lead testing rates increased, while the proportions of tested children with EBLLs decreased across various demographic and socioeconomic groups. However, among children born to women whose primary source of payment for delivery was self-payment, we observed a decreasing trend in lead testing rates but an increasing trend in the proportions of EBLLs. This pattern suggests that out-of-pocket costs associated with lead screening may be a barrier discouraging these parents from obtaining timely testing for their children. Given the relatively small number of uninsured children and the substantial costs associated with treating a child with lead-poisoning, providing free lead screening tests may be a cost-effective strategy.

Blood lead testing rates among children varied widely across counties in Pennsylvania, with notably low rates concentrated in several eastern Pennsylvania counties, including Carbon, Juniata, Mifflin, Monroe, Pike, Snyder, Susquehanna, Union, and Wyoming. We observed that municipalities with low testing rates were primarily clustered within counties with low testing rates, though some low-testing municipalities were scattered in counties with medium or high rates. The geographic distribution of EBLL proportions among two birth cohorts demonstrated substantial variability across counties. At the municipal level, municipalities with high EBLL proportions were dispersed statewide, including in counties with low EBLL proportions. Most counties demonstrated increasing trends in lead testing rates over time, except for Mifflin, Pike, Snyder, and Union counties. While trends in the proportions of EBLLs declined in the majority of counties, Elk County experienced a notable increase. Geographic variation in lead testing rates across counties and municipalities may be influenced by factors such as access to health care, public health infrastructure, socioeconomic status, health care provider practices, and local policies. Geographic variations in the proportions of EBLLs may be affected by environmental lead exposures, socioeconomic conditions of residents, and local regulatory and remediation efforts. This heterogeneity underscores the need for local public health interventions that address disparities in adherence to lead screening guidelines and the risk of lead exposure.

Point-of-care blood lead testing could increase lead screening rates because it simplifies the testing process and provides rapid results, making it more convenient for patients and providers, especially in under-resourced areas where access to traditional laboratory services is limited. However, point-of-care lead testing has several limitations including reduced analytical accuracy and precision compared to standardized laboratory methods, increased susceptibility to environmental contamination and operator error, and inconsistencies across different testing devices, potentially leading to misdiagnosis (false-negative or false-positive results) and inappropriate follow-up management.

The CDC's Morbidity and Mortality Weekly Report indicates that during January–May 2020, 34% fewer U.S. children had BLL testing compared with those during January–May 2019, with an approximately 10,000 children with EBLLs missed.[9] Factors such as health care provider and laboratory closures, along with parental concerns about COVID-19 exposure, likely contributed to testing delays, potentially leading to an underestimation of childhood lead testing rates for the 2019 and 2020 birth cohorts in our analysis. Nevertheless, the results showed that lead testing rates for these two cohorts were higher compared to those of earlier birth cohorts. The Department will continue to systematically estimate lead testing rates to monitor ongoing trends across different population groups and areas and provide essential evidence to support data-driven policy decisions.

To mitigate the risks of lead exposure and poisoning in high-risk populations in Pennsylvania, the Department recommends the implementation of multifaceted, evidence-based strategies.

- First, the Pennsylvania General Assembly should enact a law expanding childhood lead testing requirements to all children at least once between 9 and 24 months.
- Second, the Department should continue working with its sister agencies in developing an action plan for when EBLLs are detected. Reducing lead exposure crosses multiple state agencies and thus requires multi-agency cooperation.
- Third, to reduce residential lead exposure in older houses and buildings, commonwealth agencies, county and municipal governments, should apply to any available grants to

support the removal of lead paint, the replacement of lead-containing pipes, and temporary relocation during remediation.

- Fourth, to enhance health care provider adherence to lead testing guidelines, the Department should use their Office of Health Equity stakeholder calls (like the Health Equity Action Team) to help distribute lead testing training and clinical decision support tools to primary care providers in areas of the state with low testing rates.
- Fifth, the Department should launch and support public awareness campaigns with sister agencies to target parents, health care providers, and property owners to raise awareness about lead exposure and poisoning risks, the importance of lead screening and follow-up testing, and lead-safe cleaning and renovation practices.
- Sixth, counties and municipalities should update their codes and ordinances to require landlords to test and certify rental properties built before 1978 as lead safe or lead free. This would mimic current law and practice in Philadelphia. Finally, to improve the quality of lead testing data reporting, the Department should establish clear reporting requirements, standardize data collection formats, and implement robust validation procedures to ensure data accuracy and completeness.
- Finally, parents are advised to test homes built before 1978 for lead, keep children away from peeling paint and dust, and follow recommended lead testing schedules for children. Community organizations should assess old buildings for lead hazards, educate the public, and implement lead-safe practices during renovations. Healthcare providers should follow the CDC and state guidelines for blood lead testing in children, promptly report lead testing results, providing counseling and education regarding lead hazard, and facilitate home inspections and lead remediation services. To achieve these objectives, state health department should collaborate across sectors, including housing authorities, environmental agencies, and community organizations, to identify and address risks. Improving data sharing, strengthening surveillance systems, and aligning with federal programs such as the CDC's Childhood Lead Poisoning Prevention Program can further improve the effectiveness of targeted, coordinated, and equitable interventions.

References

1. America's Health Rankings analysis of U.S. Census Bureau, American Community Survey, United Health Foundation, AmericasHealthRankings.org. https://www.americashealthrankings.org/explore/measures/housing_leadrisk/PA.

2. National Toxicology Program. NTP monograph on health effects of low-level lead. NTP Monogr. 2012 Jun;(1):xiii, xv-148.

3. ATSDR Case Studies in Environmental Medicine: Lead Toxicity. 2017. https://www.atsdr.cdc.gov/csem/lead/docs/CSEM-Lead_toxicity_508.pdf

4. Advisory Committee on Childhood Lead Poisoning Prevention. Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention. 2012.

5. Ruckart PZ, Jones RL, Courtney JG, LeBlanc TT, Jackson W, Karwowski MP, Cheng PY, Allwood P, Svendsen ER, Breysse PN. Update of the Blood Lead Reference Value - United States, 2021. MMWR Morb Mortal Wkly Rep. 2021 Oct 29;70(43):1509-1512.

6. Pennsylvania Department of Health: Childhood Lead Poisoning Prevention Program. 2022 Childhood Lead Surveillance Annual Report.

7. Childhood Lead Testing and Poisoning Report: Pennsylvania Birth Cohort Analysis. 2020. Childhood Lead Poisoning Prevention Program Bureau of Epidemiology Bureau of Family Health.

8. Childhood Lead Testing and Poisoning Report: 2017 and 2018 Pennsylvania Birth Cohort Analysis. 2022. Childhood Lead Poisoning Prevention Program Bureau of Epidemiology Bureau of Family Health.

9. Courtney JG, Chuke SO, Dyke K, et al. Decreases in Young Children Who Received Blood Lead Level Testing During COVID-19 — 34 Jurisdictions, January–May 2020. MMWR Morb Mortal Wkly Rep 2021;70:155–161.

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This report can be found at: https://www.health.pa.gov/Pages/default.aspx.