NEW HAMPSHIRE

Healthy Homes & Lead Poisoning Prevention Program

2015 LEAD EXPOSURE SURVEILLANCE REPORT

State of New Hampshire

Department of Health and Human Services

Division of Public Health Services

Healthy Homes & Lead Poisoning Prevention Program

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF MAPS

660 NH CHILDREN HAD ELEVATED BLOOD LEAD LEVELS EQUAL TO OR ABOVE 5µG/DL IN 2015

EXECUTIVE SUMMARY

The New Hampshire (NH) Department of Health and Human Services (DHHS), Division of Public Health Services (DPHS), Healthy Homes & Lead Poisoning Prevention Program (HHLPPP) is mandated to collect the blood lead test results of children and adults who are residents of New Hampshire. In 2015, **13,372** children (15.7%) in New Hampshire under the age of 6 years were tested for blood lead levels. Of those children tested, 53% were aged 12 to 23 months and 27% were aged 24 to 35 months.

Among these children tested, **660** (4.9%) had elevated blood lead levels equal to or above (≥) 5 micrograms per deciliter (µg/dL), the reference level set by the Centers for Disease Control and Prevention (CDC).[1] Of these 660 children with Elevated Blood Lead Levels (EBLLs), 82% were White and 70% were insured by Medicaid.

Over 54% of new elevations ≥5 µg/dL in 2015 were identified among children residing in communities designated as New Hampshire's 21 highest-risk communities for lead exposure. However, the number of children with new blood lead elevations ≥5 µg/dL decreased from 2014.

Eighty-two children had blood lead levels ≥10 µg/dL. Among these 82 children, 62 were new elevations that occurred in 2015 in which nurse case management and environmental investigations were initiated. The remaining twenty children were already in case management from previous years. One child had a confirmed, venous blood lead level ≥45 µg/dL, resulting in medical chelation therapy, a procedure for the most severe cases of lead poisoning.

[1]CDC has established the reference level of 5 µg/dL to identify children with blood lead levels that are much higher than most children's levels. Approximately 500,000 children in the U.S. exceed this reference level, which is based on the U.S. population of children ages 1 to 5 who are in the highest 2.5% of children tested for lead in their blood. While no safe blood lead level in children has been identified, a level of ≥5 µg/dL indicates a recommendation for case management and action to reduce the child's future lead exposure (CDC, 2016).

WHILE THE NUMBER OF ADULTS TESTED FOR BLOOD LEAD ELEVATIONS INCREASED IN 2015, THE NUMBER OF ELEVATIONS ≥5 µG/DL DECREASED

In 2015, we also noted that **21.6%** of New Hampshire's refugee children under the age of six years old who were tested for lead poisoning had elevations ≥5 µg/dL, as compared to 4% of children tested statewide. An estimated 40% of school-age children have had a blood lead elevation ≥5 µg/dL at some point in their lives. Fortunately, the proportion of historical elevations among school-age children is declining.

The HHLPPP environmentalists initiate investigations at the residential homes of all children who have blood lead levels that are ≥10 µg/dL to identify the potential source(s) of the child's poisoning. When a poisoned child resides in a multi-unit property with lead hazards, environmentalists often investigate other units in the same property. In 2015, the HHLPPP investigated 155 housing units. As a result of these investigations, the DHHS issued 120 Administrative Orders of Lead Hazard Reduction (Orders) for the removal of lead hazards at 40 properties. An additional 20 letters with specific recommendations on strategies to make the home safe from lead hazards were sent to the parents of children with an elevated blood lead level (EBLL) who own their own homes.

Surveillance data were also collected statewide for adults over the age of 16 years tested for blood lead. A total of **2,697** adult blood leads were reported to the HHLPPP, of which **378** had new elevations ≥5 µg/dL. While the number of adults tested for blood lead elevations increased in 2015, the number of elevations ≥5 µg/dL decreased as compared to 2014.

Funded to build capacity among New Hampshire's licensed lead professionals, the HHLPPP administered licenses to 3 Lead Inspectors, 18 Risk Assessors, 5 Trainers, 92 Abatement Contractors, 35 Abatement Supervisors, and 135 Abatement Workers in 2015.

The HHLPPP continues to be successful in securing funding from the CDC, the U.S. Environmental Protection Agency, New Hampshire Office of Medicaid, State General Funds, the Preventive Health and Health Services Block Grant, and the dedicated Lead Poisoning Prevention Fund to support staff and program activities. In addition to our federal partners, the HHLPPP collaborated with both internal partners (e.g., Environmental Public Health Tracking Program) and external partners (e.g., Community Health Institute, Conservation Law Foundation, the Cities of Manchester and Nashua Health Departments) in delivering services for the prevention of childhood lead poisoning.

NOTABLE 2015 ACCOMPLISHMENTS ATTRIBUTED TO THESE PARTNERSHIPS INCLUDE:

- Hiring of a full-time Health Promotion Advisor to provide education and outreach to high risk communities.

- Plans for the deployment of a new, state-of-the-art surveillance and case management software were initiated, with a target deployment period of spring 2017. This software will improve the quality of surveillance data used to inform the legislature and to educate healthcare providers and citizens.

- Passage of Senate Bill 135, which established a legislatively-appointed Commission on Childhood Lead Poisoning Prevention and Screening and tasked the Commission with exploring strategies for primary prevention and increasing blood lead testing rates.

- Passage of Senate Bill 135, which established a goal of an 85% testing rate for one- and two-year-old children living in Universal screening communities or who are enrolled in Medicaid, Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), or Head Start.

- Passage of Senate Bill 135, which established parent and property owner notification for children with elevations between 5 – 9 µg/dL with education about lead risk factors and hazards.

Despite these accomplishments, the HHLPPP and statewide public health activities directed towards eliminating childhood lead poisoning experienced challenges including: incomplete reporting of lead testing data necessary to inform public health activities; limited public health resources; difficulties reaching our highest risk populations to ensure adequate screening rates among them; and maintaining lead prevention as a top priority among stakeholders.

It is our hope and anticipation that through exemplary leadership and strong partnerships, as well as collaborations with our stakeholders and all residents of this State, the near future will be witness to tremendous progress in reducing childhood lead poisoning in New Hampshire.

INTRODUCTION

No one intentionally allows a child to become lead poisoned. Yet, in 2015, over 73,000 children in the state of New Hampshire between the ages of 5 and 18 years old had, at one point in time, more than 5 micrograms per deciliter (µg/dL) of lead detected in their blood.[2] Lead-based paint in our housing stock is the single largest contributor to elevated blood lead levels (EBLLs) in children and, in New Hampshire, over 300,000 housing units contain potential lead hazards (ACS, 2015). Lead is a neurotoxicant with well-documented and lasting adverse health effects (CDC, 2015). Primary prevention strategies that control or eliminate lead sources before children are exposed remain the preeminent public health approach to the problem of lead poisoning and are the only effective way to prevent the neurodevelopmental and behavioral abnormalities associated with lead exposure. Unfortunately, it is estimated that thousands and thousands of New Hampshire children have already experienced blood lead levels known to impair academic performance and affect life success.

New Hampshire has many advocates working tirelessly to reduce the risk of childhood lead poisoning. Through their efforts, the statewide paradigm is slowly shifting from being reactive to childhood blood lead poisoning to investing in prevention strategies. In July 2015, Senate Bill 135 (SB135) was signed into law, changing New Hampshire's lead Statute, RSA 130-A, *Lead Paint Poisoning Prevention and Control,* and establishing a legislatively-appointed Childhood Lead Poisoning Prevention and Screening Commission (Commission). The Commission was tasked with identifying primary prevention strategies to reduce lead poisoning and methods to increase the number of young children being tested for lead poisoning. The Commission brought key stakeholders together and continues to work towards identifying primary prevention strategies that control or eliminate lead sources *before* children are exposed to prevent lead poisoning. Policy recommendations from this Commission will be brought to the legislature for the 2017 legislative season.

Prior to the passage of SB135, public health intervention in New Hampshire was initiated when a child had an EBLL ≥10 µg/dL. This intervention included Nurse case management and an investigation of the home to identify potential sources of poisoning. Changes to New Hampshire's lead law lowered the action level to 5 µg/dL, bringing it in closer alignment with the federal CDC's reference level. Parents of children who test at or greater than (≥) 5 µg/dL that live in a rental unit are mailed educational materials informing them to work with their landlords and advise against renovating, repairing, or painting activities. Parents who

[2] Five µg/dL is the reference level set by the Centers for Disease Control and Prevention to identify children with lead levels higher than most children in the United States and who require case management and action to reduce children's future lead exposure (CDC, 2016).

own their own home are also contacted and provided educational material to assist in identifying and eliminating potential lead exposure hazards safely and legally. Landlords who own a building where a child has an elevated blood lead receive educational materials on the hazards of lead poisoning, standards for identifying and eliminating lead hazards, and information on the United States (U.S.) Environmental Protection Agency's (EPA's) Renovation, Repair, and Paint (RRP) program.

THE IMPACT OF CHILDHOOD LEAD POISONING

New Hampshire has some of the oldest housing stock in the United States. More than half of New Hampshire's housing stock was built before lead-based paint was banned in 1978 (EPHT, 2014). Children living in houses and apartments built prior to 1978 are at increased risk for lead exposure. Lead paint does not have to be peeling or flaking to pose a threat. Even in well-maintained homes, lead paint can create toxic dust without being visibly disturbed. Any lead-painted surfaces that are subject to friction or abrasion can generate lead dust. When windows or doors are opened and closed, the paint on the window or door rubs against the paint of the frame or jamb and creates very fine particles of lead paint dust that fall on the windowsill and floor. It takes only trace amounts of this lead dust to poison a child. Remodeling or renovating a pre-1978 house or apartment without using lead safe work practices poses one of the greatest risks of lead poisoning. When interviewing parents of children with recent elevated blood leads, approximately one-third of parents reported that renovations occurred during the past six months (HHLPPP, 2015).

Due to normal developmental behaviors, infants, toddlers, and young children under the age of three years are especially vulnerable to lead exposure. These children come into close

contact with lead in their environments through laying, sitting, crawling, and playing on the floor and in areas where lead paint dust collects. Age appropriate hand-to-mouth behavior and placing objects in their mouths also results in ingestion of lead-contaminated dust. Infants and toddlers ingest lead when they explore their environment and relieve teething discomfort by mouthing lead-painted objects and surfaces. In addition, 50% of the lead ingested by an infant is absorbed, compared to only 5 to 15% of that ingested by an adult (Council, 1993).

Lead can accumulate in the body over months or years of exposure. This accumulation can have a number of adverse health effects. According to a report released from the President's Taskforce on Environmental Health Risks and Safety Risks to Children,[3] even low-level lead exposures less than 5 µg/dL can affect attention, executive functions, visual-spatial skills, speech, language, and fine and gross motor skills and can result in increased impulsivity and aggression (Children, 2016). Blood lead levels less than 10 µg/dL are associated with increases in behavioral effects and decreases in hearing, cognitive function, and postnatal growth. Very high levels, greater than 40 µg/dL, are associated with severe health effects, some with observable symptoms, including abdominal pain. Extremely high levels, over 80 µg/dL, can induce convulsions and cause loss of muscle control and even death.

Of all of lead's negative impacts on a child's health and development, it is lead's damage to a child's developing brain that is of the most concern. Young children are most vulnerable for lead exposure due to their developmentally appropriate behaviors at the same time that their brains are rapidly developing. Between birth and 2 years of age, children develop more neural connections in areas of language, higher

cognitive function, and sensory pathways (vision and hearing) than at any other time in their lives (JP Shonkoff, 2000). Lead exposure interferes with key aspects of the development of the brain's anatomical architecture, including synapse development and the biochemical connections between synapse terminals, namely reducing the efficacy of the neurotransmitter Dopamine, the dominate neurotransmitter in the Frontal Lobe (areas of Executive Function) of the brain (Needleman, 1990). Once a child's health or cognition has been harmed by lead, the effects can be permanent and persist from childhood through adulthood.

[3] The President's Taskforce on Environmental Health Risks and Safety Risks to Children is comprised of representatives across nine federal agencies and departments, including the U.S. Departments of Agriculture, Education, Energy, Health and Human Services, Homeland Security, Housing and Urban Development, Justice, Labor, and Transportation, as well as the Consumer Product Safety Commission, Environmental Protection Agency, Council of Economic Advisers, Council on Environmental Quality, Domestic Policy Council, National Economic Policy Council, Office of Management and Budget, and Office of Science and Technology Policy.

TESTING CHILDREN FOR LEAD EXPOSURE IN NEW HAMPSHIRE

Diagnostic and screening tests for blood lead levels play a critical role in the determination and classification of the health of an individual, especially children, and provide the DPHS with information on community lead levels. This information is important for monitoring population health. Blood lead level tests can also be used to measure the effectiveness of public health education and prevention activities.

The public health goal for testing is the prompt identification of children with EBLLs, as there is no safe level of lead exposure and even low levels of exposure have harmful effects on the health and development of the child and negative impacts on the community.

The current *New Hampshire Childhood Lead Poisoning Screening and Management Guidelines*[4] developed by the HHLPPP provide recommendations to healthcare providers on when to test a child for lead poisoning, what methods can be used, and what follow-up schedule is necessary. In accordance with the *Guidelines,* recommendations for blood lead screening focus on the population most at risk in terms of age, socioeconomic status, age of housing, renovations occurring in the home, and other known risk factors. Several factors influence the rate of lead poisoning in a community. The CDC recommends that cities and towns with 27% or more pre-1950 housing stock are considered high-risk communities. Some communities are determined to be at an even higher risk for lead poisoning ("highest-risk") due to additional factors, including the percentage of the population under the age of six; the percentage under the age of six living in poverty; the percentage of children under the age of six enrolled in Medicaid or other federal assistance programs; and special populations living in the communities. A list of the highest-risk communities is included in the **Technical Notes and Acronyms.**

In high-risk communities, the HHLPPP recommends a "universal" screening approach, with all children tested at 1 year old and again at 2 years old. Older children, up to 6 years old, who have not previously been tested while living in their current residence, should also be tested. If they have moved to a new residence, begun attending a child care facility built prior to 1978, have been exposed to a pre-1978 renovation project, or have exhibited at-risk behavior since the time of their last blood test, a new blood test should be conducted.

[4] Available at http://www.dhhs.nh.gov/dphs/bchs/clpp/documents/screening.pdf.

In low-risk communities, the HHLPPP recommends a "targeted" screening approach. For children between ages 1 and 2 years old who live in low-risk communities, providers use a *Lead Exposure Risk Questionnaire* to identify children with individual risk factors that will require blood lead testing. This questionnaire should also be used for children ages 3 to 6 years old who reside in targeted communities, have not been previously tested, have renovation activities taking place at home, have moved to a new residence, have begun attending a child care facility built prior to 1978, or have exhibited high-risk behavior. A positive or uncertain response to *one or more* questions on the *Lead Exposure Risk Questionnaire* denotes that testing is necessary.

All children enrolled in Medicaid or Head Start, regardless of town of residence, are currently required to have a blood lead test at both 1 and 2 years of age. In addition, children 3 to 6 years old who have not previously been tested, regardless of town of residence, should also be tested.

A description of the algorithm that the HHLPPP uses for classifying blood lead test results for public health surveillance and case definition purposes is provided in the **Technical Notes and Acronyms.**

2015 PEDIATRIC SURVEILLANCE DATA

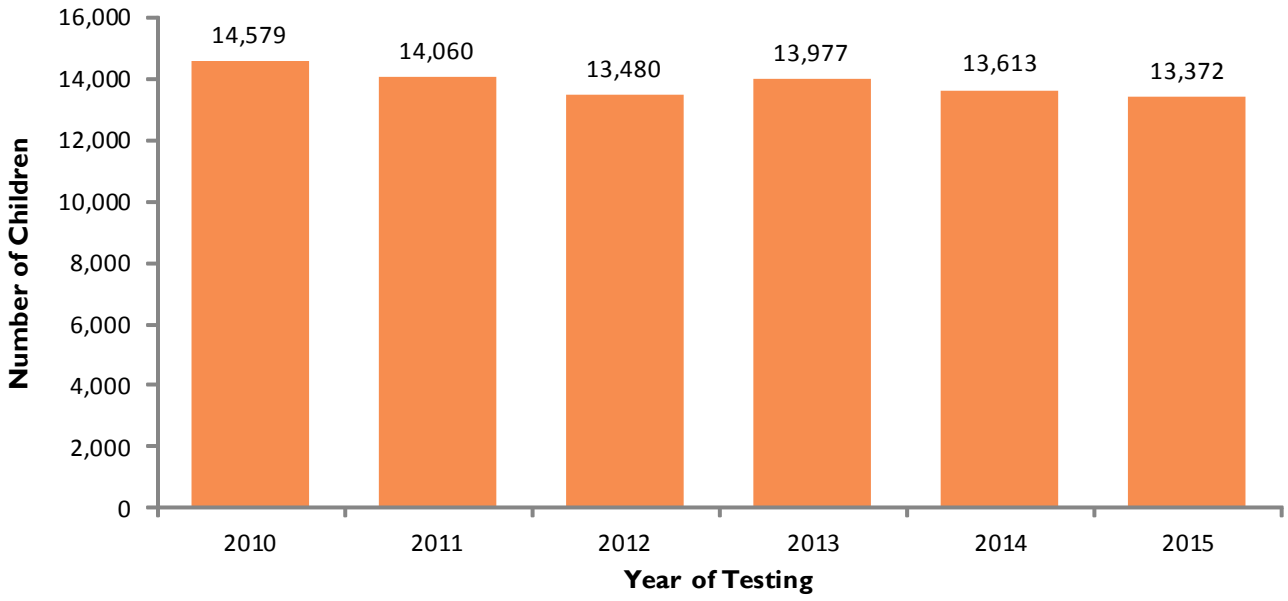
NEW HAMPSHIRE'S PEDIATRIC TESTING RATES

Historically, pediatric blood lead testing rates in New Hampshire have been influenced by several factors, including:

- The number of children eligible for testing;
- Current legislation and its enforcement;
- Knowledge and practices of healthcare workers;
- Collaboration among public health partners;
- Community activism;
- Public health program priorities and available resources;
- Public knowledge about lead hazards; and
- Special epidemiologic investigations in response to perceived/potential epidemics.

FIGURE 1

Annual Number of Children Tested for Blood Lead Ages 0 – 6 Years in NH, 2010 - 2015



Over the last 6 years, the annual number of children tested for EBLL has declined gradually as shown in **Figure 1.**

A majority (80%) of 2015 tests were conducted among children who were aged 12 – 23 months (1 year old) and 24-35 months (2 years old) at the time of testing. Evidence-based lead testing guidelines from CDC and the American Academy of Pediatrics, mirrored in the *New Hampshire Childhood Lead Poisoning Screening and Management Guidelines,* focus on these two age groups as the most vulnerable. Other vulnerable populations which remain a focus of New Hampshire's screening guidelines include refugee children, those with siblings with EBLLs, and those who have not been previously tested.

The number of blood lead tests by town is influenced by the underlying child population of that town. In fact, more than 75% of all 2015 tests were conducted in towns where more than 75% of our State's population of children under 6 years old reside, including Concord, Derry, Dover, Hudson, Keene, Manchester, Merrimack, Nashua, Rochester, and Salem. The 2015 testing rates in high-risk towns where universal testing is recommended fell short of expectations and targets of 100% testing for one and two year olds. The highest testing rates for any towns with populations of more than 500 children under the age of six years old was observed in Berlin, a community traditionally known for its high-risk of lead elevation. A complete listing of the count and BLL testing rates and distribution of elevations in New Hampshire communities is posted on the HHLPPP website (http://www.dhhs.nh.gov/dphs/bchs/clpp/).

As **Table 1** below indicates, in 2015, only 54% of children 12 – 23 months living in New Hampshire's Universal testing communities were tested, while only 35%, of children living in these Universal testing communities were tested during their second year of birth (24 - 35 months). In 2015, we also noted that about 20% (1,614) of children living in universal communities were screened for lead poisoning during both the first and second years of life. These proportions of one- and two-year-old children screened falls short of New Hampshire's 2017 target goal set by legislation of testing 100% of one- and two-year-olds living in universal communities.

TABLE 1

Proportion of Children Meeting Screening & Management Guidelines in NH, 2014–2015

Testing Guidelines (Testing Target, if applicable)	Percentage (Number) of Children 6 years or Under Meeting Testing Guidelines	
	2014	2015
Children living in Universal Communities tested within 1st year (12 - 23 mos.) of birth	55% (4,414 of 8,018)	54% (4,363 of 8,018)
Children living in Universal Communities tested within 2nd year (24 – 35 mos.) of birth	36% (2,958 of 8,078)	35% (2,865 of 8,078)
Children aged 3 – 6 years with first time lead testing, assuming residence is maintained	(765)	(779)
Children aged 1 and 2 years old insured by Medicaid & tested for lead (100% of children tested)	86% (5,302 of 6,165)	50% (4,766 of 9,405)
Children aged 1 and 2 years old receiving benefits from WIC & tested for lead (100% of children tested)	*	*
Children aged 1 and 2 years old enrolled in Head Start & tested for lead (100% of children tested)	*	*

**Data required to calculate this measure were unavailable at time of publishing.*

ELEVATED BLOOD LEAD LEVELS IN NEW HAMPSHIRE CHILDREN

In 2015, 13,372 children aged 6 years or younger were tested for lead poisoning. Of these, 660 children had an EBLL ≥5 µg/dL and 62 were new confirmed elevations ≥10µg/dL. Twenty children tested had elevations ≥10 µg/dL that were reported in previous years. Of those children tested, 51.4% were male and 82% where white. **Table 2** shows the distribution of childhood lead test results in 2015 stratified by age, sex, and race.

TABLE 2

Blood Lead Levels in Children 0 - 6 Years by Selected Characteristics in NH, 2015[6]

	Blood Lead Level						
AGE GROUP	**0 - 4 µg/dL Venous and Capillary Tests**	**5 - 9 µg/dL Venous and Capillary Tests**	**≥10 µg/dL Capillary Tests**	**New ≥ 10 µg/dL Venous Tests**	**Existing ≥ 10 µg/dL Venous Tests**	**Total Number**	**Percent in Subgroup**
0 to 11 months	653	20	0	2	0	675	5.05%
12 to 23 months	6,782	274	9	39	8	7,112	53.19%
24 to 35 months	3,479	162	13	10	4	3,668	27.43%
36 to 72 months	1,798	92	8	11	8	1,917	14.34%
SEX							
Female	6,174	279	12	24	7	6,496	48.58%
Male	6,535	269	18	38	13	6,873	51.40%
Other/Unknown	3	0	0	0	0	3	0.02%
RACE							
White	10,430	439	27	52	17	10,965	82.00%
Asian	408	17	0	1	1	427	3.19%
Black/African American	309	27	2	2	0	340	2.54%
American Indian/Alaska Native	13	0	0	1	2	16	0.12%
Native Hawaiian/Other Pacific Islander	10	0	0	0	0	10	0.07%
Other/Unknown	1,542	65	1	6	0	1,614	12.07%
TOTAL	**12,712**	**548**	**30**	**62**	**20**	**13,372***	**100%**

**Excludes 76 children with test results from unknown test type (capillary or venous)*

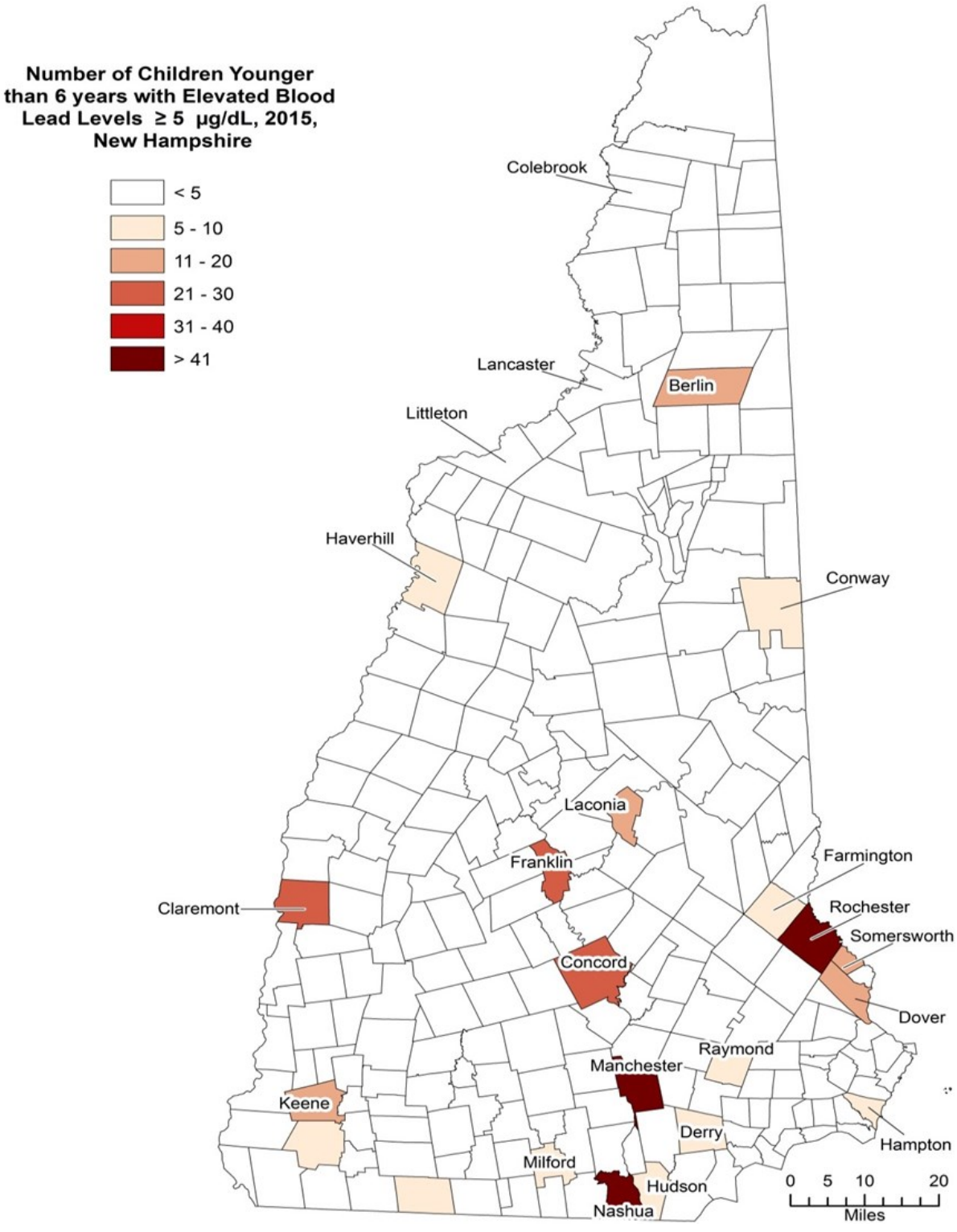
As shown in **Table 2**, most (63%) of the **62 newly** confirmed elevations greater than 10 µg/dL from venous tests were among children in the 12 – 23 month age group. It is worth noting that a majority (95%) of the children tested throughout 2015 had blood lead levels below 5 µg/dL, the level of public health concern.

Map 1 on the next page provides the geographic distribution of New Hampshire towns with the highest number of elevations ≥5 µg/dL reported in 2015. The towns with the highest number of elevations were Claremont, Concord, Franklin, Manchester, Nashua, and Rochester.

[6] **Capillary** – a blood lead test performed on a sample obtained from capillaries – via a finger stick, typically used for screening.
Venous – a blood lead test performed on a sample from veins – drawn via syringe, typically used for confirming blood lead levels.
New – represents blood lead elevations in children without prior history of elevations/public health action.
Existing – represents blood lead test elevations in children with a prior history of elevations/public health action

MAP 1

Distribution of Blood Lead Levels ≥5 µg/dL Among Children Younger Than 6 in NH, 2015



MEAN BLOOD LEAD LEVELS IN NEW HAMPSHIRE'S CHILDREN

The CDC uses a reference level of 5 µg/dL of blood to identify children whose blood lead levels are much higher than most children's levels and for whom initiation of public health action is recommended (Preventon, 2014). However, no safe blood level in children has been identified.

In 2015, the mean for New Hampshire children under the age of six who were tested for lead poisoning was 2.77 µg/dL. The highest mean value (3.08 µg/dL) were reported among children 36 to 72 months old and among American Indian children (7.95 µg/dL) as shown in **Table 3.** There was no noted difference in the mean BLL by sex.

TABLE 3

Blood Lead Levels by Age, Sex, and Racial Group for All Tests in NH, 2015

AGE GROUP	Number of Tests	Median Blood Lead Test Value, µg/dL	Mean Blood Lead Test Value, µg/dL	Highest Blood Lead Test Value, µg/dL
0 to 11 months	719	2	2.70	61
12 to 23 months	7,640	2	2.67	65
24 to 35 months	4,006	3	2.80	44
36 to 72 months	2,080	3	3.08	37
SEX				
Female	6,991	2	2.75	65
Male	7,451	2	2.78	46
Other/Unknown	3	2	2.00	2
RACE CATEGORY				
White	11,827	3	2.81	65
Asian	474	2	2.45	18
Black/African American	377	2	3.03	19
American Indian/Alaska Native	22	3	7.95	35
Native Hawaiian/Other Pacific Islander	10	2	2.00	3
Other/Unknown	1,735	2	2.45	44
NEW HAMPSHIRE	14,445*	2	2.77	65

**Capillary and venous tests*

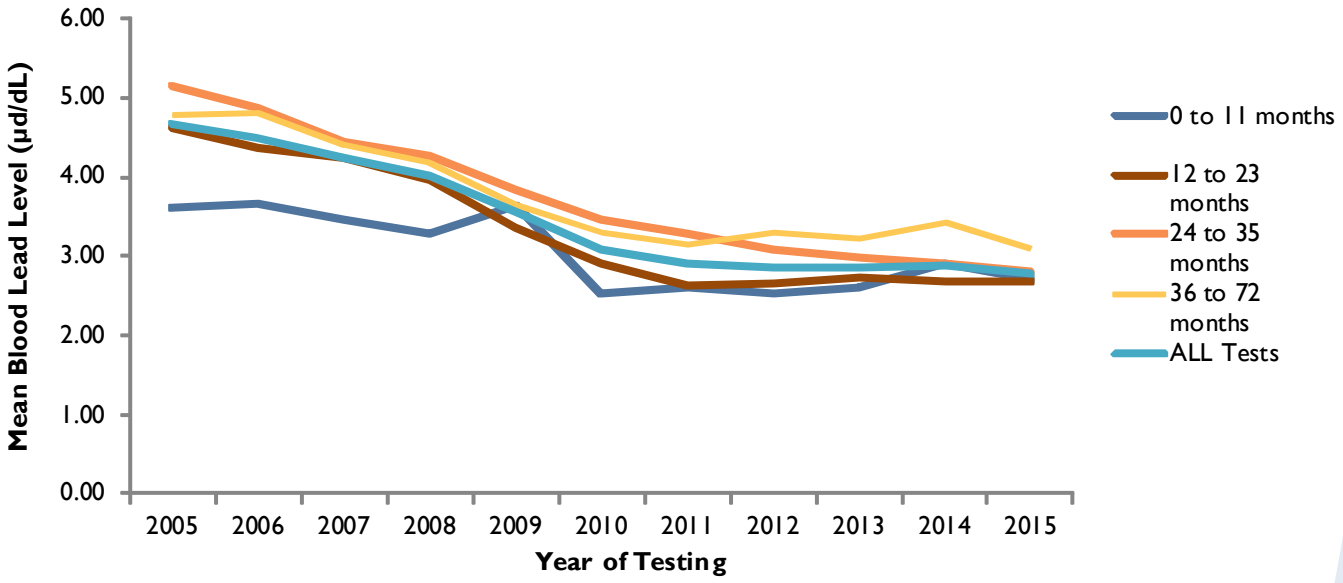
The mean blood lead levels for children residing in New Hampshire's 21 highest-risk areas (2.92 µg/dL) were significantly ($p < 0.0001$) higher than the mean levels observed in non-high risk communities (2.66 µg/dL) or statewide (2.77 µg/dL). Antrim and Rochester reporting the highest mean blood lead levels of 5.09 µg/dL and 4.80 µg/dL respectively. Other towns with high (≥ 3.0 µg/dL) mean blood lead levels among New Hampshire's highest risk communities included: Berlin, Claremont, Dover, Franklin, Greenville, Keene, Laconia, Pittsfield, Somersworth, Stratford, Troy, and Walpole.

High mean blood lead levels (with at least 30 tests performed) were also observed in communities not designated as highest risk, including Penacook (Mean = 6.51 µg/dL, 39 tests), Woodsville (Mean = 4.9 µg/dL, 53 tests), Hillsboro (Mean = 3.74 µg/dL, 90 tests), and Fitzwilliam (Mean = 3.74 µg/dL, 35 tests).

Over the last 10 years, the mean blood lead levels reported throughout the State have been dropping gradually, from 4.68 µg/dL (15,691 cumulative tests) in 2005 to 2.77 µg/dL (14,445 cumulative tests) in 2015, as shown in **Figure 2**. This trend in declining mean values has also been observed among all age and racial groups, except among American Indians/Alaska Natives.

FIGURE 2

Mean Blood Lead Level Trends Among Children Younger than 6 by Age Group in NH, 2005-2015



CHILDREN IN NEW HAMPSHIRE'S HIGHEST RISK COMMUNITIES

Funding requirements and best practices in public health surveillance recommend that public health agencies periodically evaluate communities in their jurisdiction to determine the likelihood that a child residing in a community may experience lead poisoning. Upon evaluation, the proper designation of a community's risk for lead poisoning facilitates better allocation of limited public health resources and adequately communicates the health risks to the public. In 2015, the HHLPPP reevaluated the risk level for lead poisoning among of New Hampshire's 234 communities and appropriately designated 21 communities (towns and cities) as the State's highest-risk communities. These 21 highest-risk communities, along with data for known risk factors for lead poisoning, are listed in **Table 4**.

TABLE 4

Highest-Risk Communities: Number of Elevations and Risk Factors in NH, 2015

COMMUNITY	Total Number of Children >10 µg/dL (2010-2015)	Total Number of Children 5 – 9 µg/dL (2010-2015)	% Pre-1950 Housing	% Insured by Medicaid	% Under 6 yo. Living Below Poverty	% Living in Rental Units	Designated Refugee Resettlement Area in last 5 Years
ANTRIM	4	37	40.7	14.8	18.7	23.5	No
BERLIN	5	203	58.8	23.4	25.2	39.5	No
CLAREMONT	12	182	49.6	18	9.6	35.7	No
CONCORD	32	157	37.8	14.8	13.7	45.3	Yes
DOVER	10	88	32.4	12.2	16.7	49.3	No
FRANKLIN	9	132	49.2	25.7	40.7	40.4	No
GREENVILLE	1	21	47.5	16.8	26.8	26.3	No
HAVERHILL	0	10	36.7	16.3	5.0	29.3	No
KEENE	7	*	41	11.3	18.8	44.6	No
LACONIA	15	87	37.7	23.2	27.3	43.4	Yes
LEBANON	3	29	30.9	11.1	17.2	50.7	No
MANCHESTER	127	1,197	43.9	16.8	23.6	51.5	Yes
NASHUA	35	415	23.7	13.8	20.1	43.3	Yes
NEW CASTLE	0	2	38.7	1.2	0	23.1	No
PITTSFIELD	5	32	40.3	21.7	30.7	40.9	No
RINDGE	1	72	22.4	10.7	15.6	23.5	No
ROCHESTER	30	227	27.1	17.7	34.8	36.0	No
SOMERSWORTH	7	96	34.3	16.3	22.4	43.5	No
STRATFORD	0	4	23.1	31.3	74.4	18.4	No
TROY	1	102	47.1	10.8	14.7	30.2	No
WALPOLE	2	67	51.3	10.2	19.9	27.8	No

** Data from specific site excluded from publication pending validation*

According to the 2010 U.S. Census, there are an estimated 30,339 children under the age of 6 years living in New Hampshire's 21 highest-risk communities. These children represent 36% of all children under the age of 6 residing in the New Hampshire. According to the Screening and Management Guidelines, 100% of one- and two-year olds living in these communities should have been tested for elevated blood lead, yet only 40% were tested.

TABLE 5

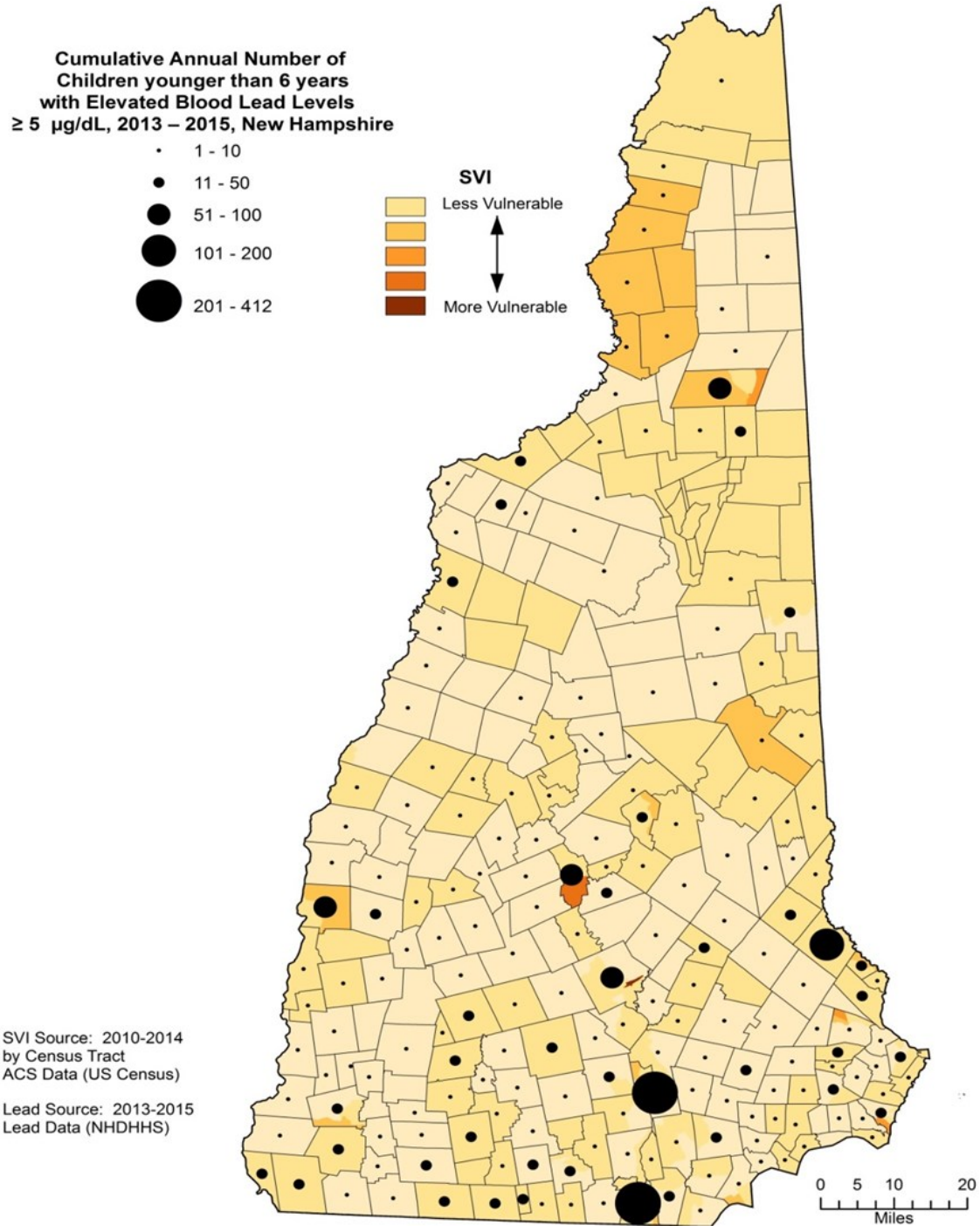
Highest-Risk Communities: EBLL Data in NH, 2015

COMMUNITY	0 - 4 µg/dL Venous and Capillary Tests	5 - 9 µg/dL Venous and Capillary Tests	≥ 10 µg/dL Capillary Tests	New ≥ 10 µg/dL Venous Tests	Existing ≥ 10 µg/Dl Venous Tests	Total
ANTRIM	22	< 5	0	< 5	0	27
BERLIN	167	15	< 5	0	0	183
CLAREMONT	146	21	0	< 5	< 5	170
CONCORD	396	13	0	< 5	< 5	417
DOVER	209	5	< 5	< 5	< 5	220
FRANKLIN	119	23	< 5	0	< 5	144
GREENVILLE	30	5	0	0	0	35
HAVERHILL	7	0	0	0	0	7
KEENE	255	13	< 5	< 5	0	271
LACONIA	165	12	< 5	< 5	0	180
LEBANON	86	0	0	0	0	86
MANCHESTER	1,754	83	< 5	7	< 5	1,848
NASHUA	1,117	48	< 5	8	< 5	1,176
PITTSFIELD	58	< 5	0	< 5	0	62
RINDGE	52	6	0	0	0	58
ROCHESTER	347	29	< 5	9	0	388
SOMERSWORTH	123	10	< 5	< 5	0	136
STRAFFORD	26	< 5	0	0	0	28
TROY	34	< 5	0	0	0	35
WALPOLE	29	< 5	0	0	0	30
TOTAL	**5,142**	**294**	**14**	**39**	**12**	**5,501**

< 5 = As per current DHHS Guidelines for Public Release of Public Health Data, the number of children less than 5 has been suppressed/masked to prevent potential identification. See http://www.dhhs.nh.gov/dphs/hsdm/documents/publichealthdata.pdf for more information.

MAP 2

Social Vulnerability Index and Blood Lead Elevations in NH, 2013 – 2015



In **Map 2**, the cumulative number of New Hampshire children under 6 years old with elevated blood lead levels ≥ 5 µg/dL between 2013 and 2015 was plotted over a layer of the social vulnerability of New Hampshire's towns and cities, as measured by a set of socioeconomic and demographic factors that affect the resilience of communities.

The factors considered when determining a measure for a community's social vulnerability index in New Hampshire include social economic status, household composition, disability, minority status, language, housing, and transportation.[7] Based on the data plotted on **MAP 2**, it is evident that towns with middle to high social vulnerability reported higher numbers of elevated blood lead levels ≥ 5 µg/dL between 2013 -2015.

RECIPIENTS OF MEDICAID, WIC, AND HEAD START

Current screening guidelines in New Hampshire recommend that all children enrolled in Medicaid, WIC, or Head Start, regardless of town of residence, be tested for blood lead at both one and two years old. In addition, current Federal law states that all children receiving Medicaid benefits have two blood lead tests, at both one- and two-years-old. Children in these populations are typically at a much higher risk for lead poisoning. At the time of this publication, data from the Head Start and WIC programs had not been made available for inclusion in this report.

Testing rates among one- and two-year-old children receiving Medicaid benefits have historically been below the required level of 100%. In 2012 and 2013, an estimated 52% of one-year-old and 31% of two-year-old Medicaid recipients had blood lead tests (HHLPPP, 2015). In 2014, an estimated 86% of one- and two-year-old Medicaid recipients had blood lead tests.

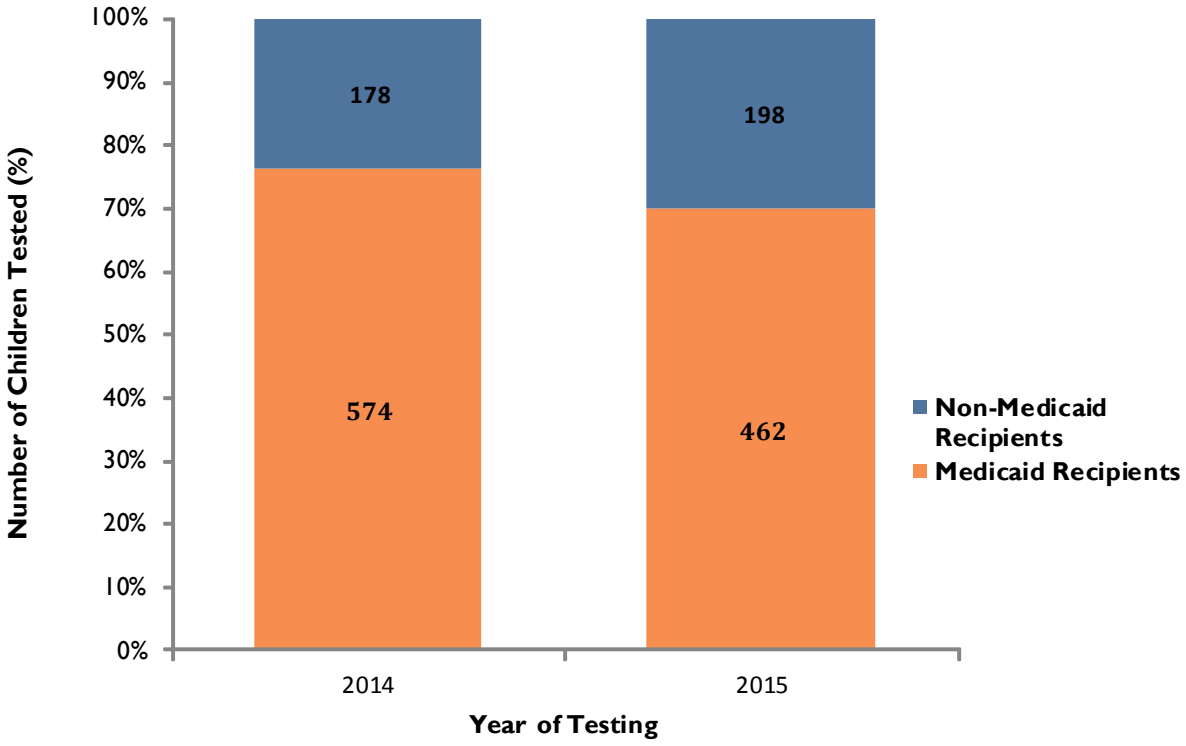
[7]A detailed description of the factors is posted online at http://nhvieww.aps.arcgis.com/apps/PublicGallery/index.html?appid=38764e6f2a894165a60dd5c983543221.

This proportion decreased to about 50% the following year (2015), similar to proportions observed in 2012 and 2013. The improvement in proportion of one- and two-year-olds Medicaid recipients who had blood lead tests in 2014 is likely due to the drop in Medicaid enrollees in 2014.

In any given year, Medicaid enrollees consistently comprise the majority of blood lead elevations ≥5 µg/dL reported among children under the age of six. As shown in **Figure 3**, 70% of 2015 elevations ≥5 µg/dL were among Medicaid enrollees. This population, therefore, represents a group of individuals who are at a higher risk for EBLLs.

FIGURE 3

Blood Lead Elevations (≥5 µg/dL) Based on Medicaid Enrollment in NH, 2014-2015



As shown in **Table 6** below, 40% of 2015 elevations ≥5 µg/dL in Medicaid recipients under six-years-old were among the 12 to 23 month group. A large majority of elevations were among white children, while elevations were split evenly between male and female children.

TABLE 6

Blood Lead Levels Among Medicaid Recipients by Age, Sex, and Racial Group in NH, 2015

	Blood Lead Level						
AGE GROUP	**0 - 4 µg/dL Venous and Capillary Tests**	**5 - 9 µg/dL Venous and Capillary Tests**	**≥ 10 µg/dL Capillary Tests**	**New ≥ 10 µg/dL Venous Tests**	**Existing ≥ 10 µg/dL Venous Tests**	**Total Number**	**Percent in Subgroup**
0 to 11 months	293	12	0	1	0	306	4.50%
12 to 23 months	3,153	174	3	27	5	3,362	49.40%
24 to 35 months	1,834	125	9	10	4	1,982	29.12%
36 to 72 months	1,064	72	6	6	8	1,156	16.98%
SEX							
Female	3,103	194	7	16	6	3,326	48.87%
Male	3,239	189	11	28	11	3,478	51.10%
Other/Unknown	2	0	0	0	0	2	0.03%
RACE							
White	5,561	328	16	40	15	5,960	87.57%
Black/African American	233	25	2	2	0	262	3.85%
Asian	191	11	0	1	0	203	2.98%
American Indian/Alaska Native	11	0	0	1	2	14	0.21%
Native Hawaiian/Other Pacific Islander	6	0	0	0	0	6	0.09%
Other/Unknown	342	19	0	0	0	361	5.30%
TOTAL	**6,344**	**383**	**18**	**44**	**17**	**6,806**	

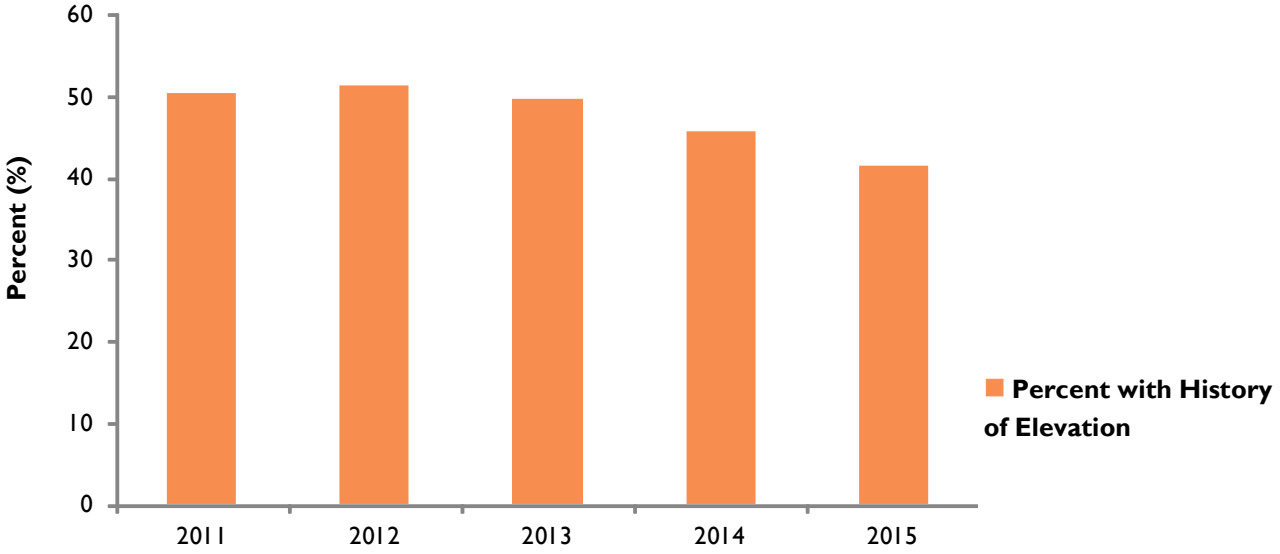
BLOOD LEAD ELEVATIONS AMONG PRE SCHOOL AND SCHOOL-AGE CHILDREN

In 2015, 181,339 children (ages 5-18) were enrolled in New Hampshire schools grades Kindergarten through 12. (Education, 2016). Using historical statewide blood lead surveillance data and methods described in the **Technical Notes and Acronyms** of this report, the HHLPPP estimated that 75,074 of these school-going children had a reported EBLL ≥5 µg/dL at some point in their lives. While the data does not include those children not tested and does not account for those who moved into or out of New Hampshire in this time frame, this number represents about 40% of children currently enrolled in New Hampshire schools.

According to a report released from the President's Taskforce on Environmental Health Risks and Safety Risks to Children, BLLs less than 5µg/dL can affect attention, executive functions, visual-spatial skills, social behaviors, speech and language, and fine and gross motor skills (Children, 2016). Blood lead levels less than 10 µg/dL are associated with increases in behavioral effects and decreases in hearing, cognitive function, and postnatal growth. As shown in **Figure 4**, the number of school-age children who have had an EBLL has been dropping gradually over the last 5 years, with the lowest proportion (40%) reported in 2015.

FIGURE 4

Percent of School Age Children (5-18 Years) with History of an EBLL in NH, 2011-2015

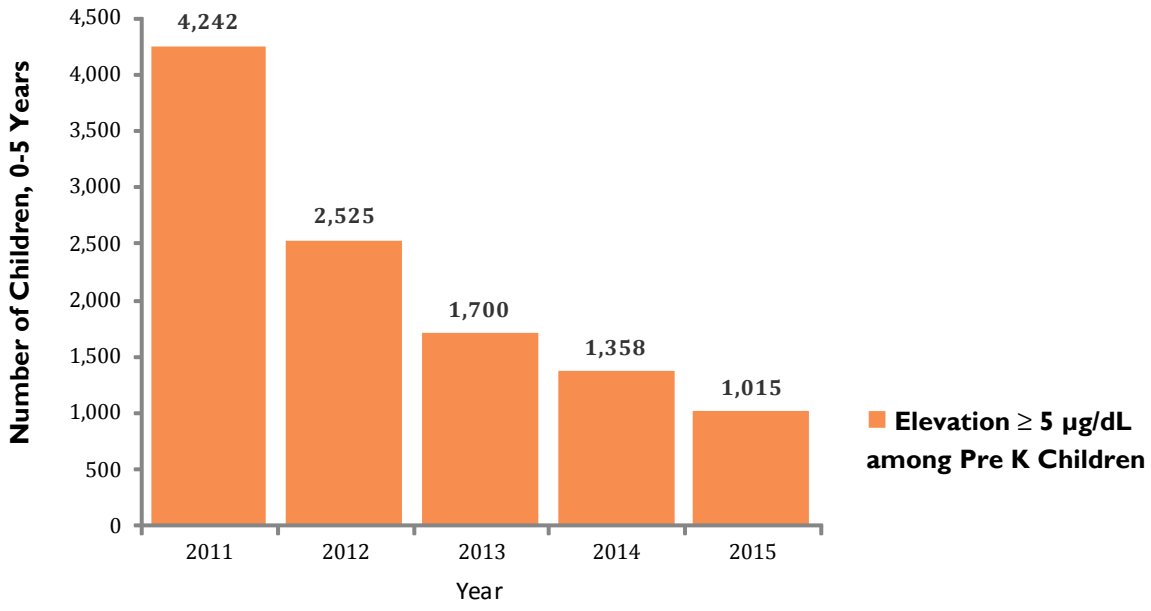


*State of New Hampshire Department of Education. School and District Profiles https://my.doe.nh.gov/profiles/profile.aspx

In 2015, there were 1,015 children younger than 5 years (Pre-Kindergarten age) who had a reported EBLL ≥5 µg/dL at some point in their lives. This number represents a notable 76% decline from the 2011 number of children younger than 5 years old with a history of an EBLL at some point in their lives (4,242), as shown in **Figure 5.**

FIGURE 5

Number of Pre-Kindergarten Children (0-5 Years) with a History of EBLL in NH, 2011-2015

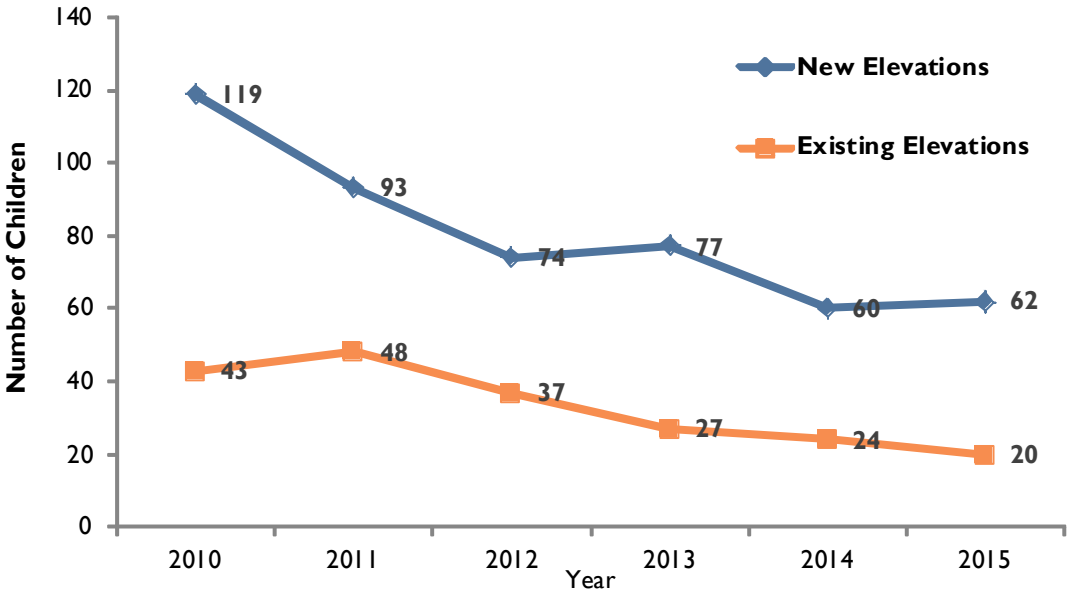


CHILDREN WITH ELEVATED BLOOD LEAD LEVELS OVER 10 µg/dl

In 2015, 660 New Hampshire children aged 6 years or younger had an EBLL ≥5 µg/dL. Eighty-two of these children had elevations ≥10 µg/dL confirmed by a venous blood test. Twenty of these children with an EBLL ≥10 µg/dL were cases from previous years and not *new* elevations. Sixty-two of these children had *new* elevations ≥10 µg/dL confirmed by a venous test, warranting Nurse Case Management and a home investigation. The highest confirmed blood level among all venous test elevations reported in 2015 was 51 µg/dL, as compared to 45 µg/dL reported in 2014.

FIGURE 6

Children Under the Age of 6 Years with New (Incident) and Existing (Prevalent) EBLL ≥10 µg/dL in NH, 2010-2015



LEAD POISONINGS AMONG REFUGEES IN NEW HAMPSHIRE

Refugees comprise a small but growing subpopulation in the state of New Hampshire. All children of refugee status aged 6 months to 16 years must be tested for EBLL within 90 days of arrival as part of the resettlement process. In 2015, 21.6% of all refugee children newly resettled in New Hampshire under the age of six years old tested for lead poisoning had an elevation ≥5 µg/dL, as compared to 4% of the general population of children tested in New Hampshire. Potential sources of lead exposure among newly arriving refugee children may vary, but can include lead-based paint on deteriorating structures, lead-containing traditional remedies, foods, ceramics, and utensils.

TABLE 7

Lead Poisoning Among Refugee Children (0-6 Years) in NH, 2015

	Blood Lead Level				
AGE GROUP	**0 - 4 µg/dL Venous and Capillary Tests**	**5 - 9 µg/dL Venous and Capillary Tests or Capillaries ≤10µg/dL**	**≤10 µg/dL Venous Tests Only**	**Total Number**	**Percent in Subgroup**
0 to 11 months	1	1	0	2	3.92%
12 to 23 months	8	3	0	11	21.57%
24 to 35 months	7	1	0	8	15.69%
36 to 72 months	24	4	2	30	58.82%
SEX					
Female	20	5	0	25	49.02%
Male	20	4	2	26	50.98%
RACE					
Black/African American	25	3	0	28	54.90%
White	7	2	0	9	17.65%
Asian	3	2	1	6	11.76%
Other/Unknown	5	2	1	8	15.69%
TOTAL	**40**	**9**	**2**	**51**	

HOW LEAD EXPOSURE IMPACTS NEW HAMPSHIRE'S CHILDREN

Lead exposure during childhood has a significant negative impact on a child's health. Some of these impacts of lead exposure may extend beyond a child's immediate physical health and welfare to include demands on the education, judicial, and child care systems. In earlier publications, the HHLPPP reviewed existing scientific literature that examined data on the varying levels of lead exposure and its impact on the academic potential of the exposed child. In this 2015 lead surveillance report, the HHLPPP examines the proportions of preschool and school-age children with histories of EBLLs and compares this data with that provided from agencies that provide services to children in New Hampshire with specific growth and developmental needs. Children with lead-associated developmental and neurological damage often require services to facilitate their learning and other developmental needs compared to children that have not been lead poisoned. In New Hampshire, DHHS programs, such as Special Medical Services, Partners in Health, and Family Centered Early Supports and Services, provide services to such children. These agencies target children with conditions

that affect their abilities to function daily, children who are at an increased risk for chronic physical, developmental, behavioral, or emotional conditions, and children who have a diagnosed, established condition that has a high probability of resulting in delay or are experiencing developmental delays. Twenty-three percent (3,562 of the 15,461) of the individuals who used these services between the years 2010 and 2015 were tested for lead poisoning. Among those children tested, 34% (1,227) reported having an EBLL $\geq$5 µg/dL, compared to an annual statewide average of about 4% of all screenings.

The mean blood lead level for all individuals receiving specialized services between 2010 and 2015 (4.09 µg/dL) was higher ($p<0.0001$) than the mean blood lead level for all children in the general population tested between 2010 and 2015 (2.89 µg/dL). Due to their medical conditions, some of these children will never enter into New Hampshire's public school system, while a portion of these children will enter the public school systems and receive special education services. Throughout this coming year, the HHLPPP will continue to work with the Special Medical Services, Partners in Health, and Family Centered Early Supports and Services and begin working with the New Hampshire Department of Education to explore the impact children with EBLLs have on our State's special education system.

ENVIRONMENTAL INVESTIGATIONS AND NURSE CASE MANAGEMENT

The HHLPPP environmentalists initiate investigations at the residential homes of children with EBLLs ≥10 µg/dL to identify the potential source(s) of the child's poisoning. When a poisoned child resides in a multi-unit property with lead hazards, environmentalists often investigate other units in the same property. During 2015, under the authority of RSA 130-A, the HHLPPP visited the homes of 59 children under the age of six to identify potential sources of lead poisoning and provide outreach and education. Of these 59 children, 17 children lived in residences that were owner-occupied and the remaining 42 lived in rental units. A total of 155 individual residences were investigated for lead hazards. These investigations resulted in the HHLPPP issuing 120 Administrative Orders of Lead Hazard Reduction (Orders) on 40 properties to remove all lead exposure hazards contained in the property.

An additional 20 parents of children with EBLL who own their own homes received Letters of Recommendation from the HHLPPP that included information to help them locate a U.S. Department of Housing and Urban Development (HUD) lead-based paint hazard control grant program, identify a contractor certified in lead-safe work practices, and educational material to help them work lead safely through "Do-It-Yourself" (DIY) projects.

A total of 62 children under the age of six with EBLL over 10 µg/dL entered into Nurse case management with the HHLPPP, bringing the total case load up to 250 children. These children received home visits from Public Health Nurses to discuss follow-up testing, diet, hygiene, and methods to help reduce the child's BLL. The Public Health Nurses also work with providers to ensure these children receive the follow-up testing and developmental screening they need.

ELEVATED BLOOD LEAD LEVELS IN ADULTS

Most adults who are exposed to lead are exposed through their employment or hobbies. The U.S. Occupational Safety & Health Administration (OSHA) lead regulations mandate that employers provide medical monitoring to their employees who, on any given day, are exposed to airborne lead above the "action level" of 30 µg/m^3 (micrograms per cubic meter of air).

Since November 2015, the surveillance case definition for an EBLL used by the CDC and National Institute of Occupational Safety and Health (NIOSH) includes workers age 16 and older with blood lead concentrations ≥5 µg/dL of whole blood, in a venous blood sample (NIOSH, 2016). This case definition is used by the Adult Blood Lead Epidemiology and Surveillance (ABLES) program, the Council of State and Territorial Epidemiologists (CSTE), and CDC's National Notifiable Diseases Surveillance System (NNDSS).

The U.S. Department of Health and Human Services recommends that EBLLs among all adults be reduced to less than 10 µg/dL. The OSHA Lead Standards require workers to be removed from lead exposure when EBLLs are ≥50 µg/dL (construction industry) or 60 µg/dL (general industry) and allow workers to return to work when the EBLL is below 40 µg/dL. The OSHA Lead Standards also give the examining physician broad flexibility to tailor special protective procedures to the needs of individual employees. Therefore, the most current guidelines for management of lead-exposed adults should be implemented by the medical community at the current CDC/NIOSH reference EBLL of 10 µg/dL.

In 2015, a total of 2,697 adults in New Hampshire were screened for lead poisoning, as shown in **Table 8**. Among those tested in 2015, a total of 378 adults had EBLLs ≥5 µg/dL. Although 2015 occupation-specific data are currently incomplete, most elevations ≥5 µg/dL for data with occupation listed were reported among workers and residents of the cities of Franklin, Laconia, Manchester, and Nashua. Males typically predominate (71%) the gender distribution of adult blood lead testing and elevations, primarily because they are more likely to be engaged in occupations and hobbies that are associated with lead exposure, such as industrial painting and construction.

TABLE 8

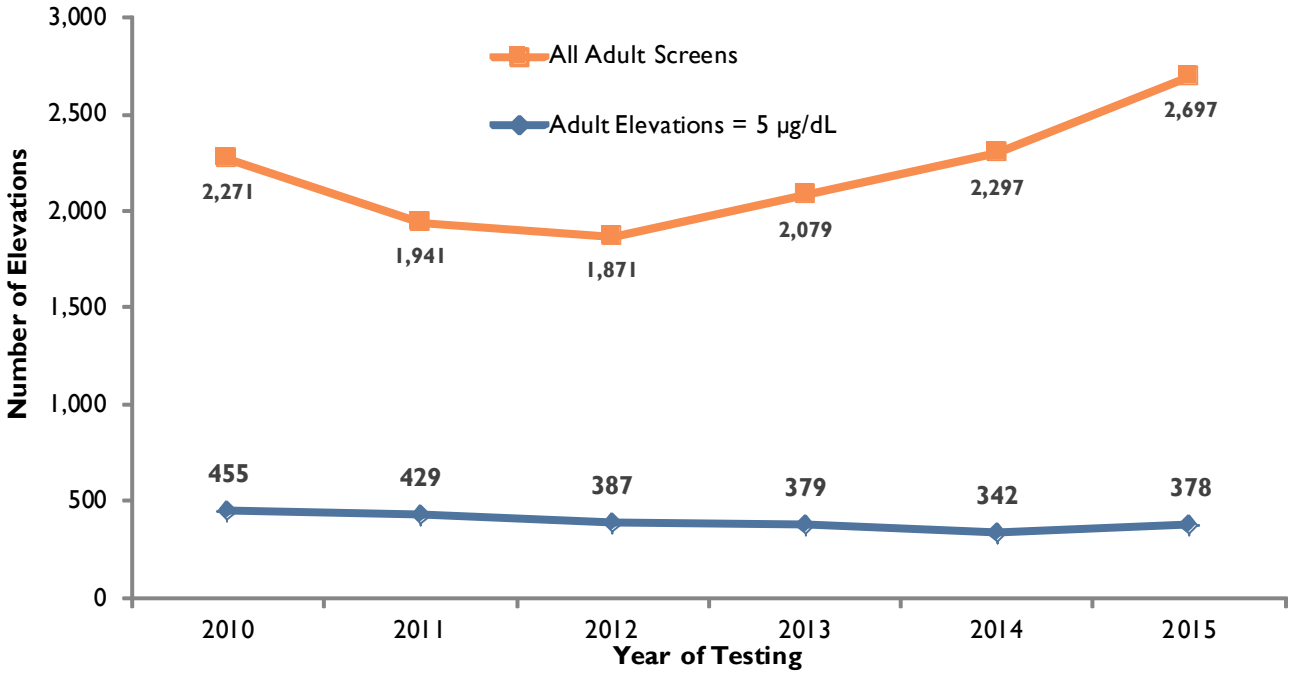
Trends in Adult Blood Lead Testing and EBLL in NH, 2015

		Blood Lead Level			
AGE GROUP	**Total Tested**	**5 to 9 µg/dL**	**10 to 24 µg/dL**	**25 to 39 µg/dL**	**≥40 µg/dL**
17 - 30 years	586	41	37	3	0
31 - 40 years	550	45	23	3	1
41 - 50 years	496	39	20	2	1
51 - 60 years	553	51	36	3	1
61 - 70 years	330	29	24	3	0
71 + years	171	11	5	0	0
UNREPORTED	11	0	0	0	0
SEX					
FEMALE	779	14	11	0	0
MALE	1913	200	134	14	3
UNREPORTED	5	2	0	0	0
OCCUPATION					
UNREPORTED	2,669	210	135	11	3
PAINTER	3	0	0	0	0
BRIDGE PAINTER	2	.	2	0	0
DELEADING WINDOWS	2	1	0	1	0
MECHANIC	2	0	1	0	0
BRIDGE WORKER	1	1	0	0	0
COMPUTER RECYCLING - SHREDDER	1	1	0	0	0
DELEADER	1	1	0	0	0
DESIGNER	1	0	1	0	0
SAND BLASTING	1	1	0	0	0
GLASS WINDOW INSTALLER	1	0	1	0	0
GROUP LEADER	1	0	0	0	0
LABORER	1	0	0	0	0
LEAD REMOVAL	1	0	1	0	0
MAINTENANCE SUPERVISOR	1	0	0	1	0
OWNER/MANAGER	1	0	1	0	0
PAINTER - PAINT SHOP	1	0	0	0	0
PIT - UTILITY	1	0	1	0	0
PRODUCTION MANAGER	1	1	0	0	0
PRODUCTS MANAGER	1	0	0	0	0
REMODELING / CONSTRUCTION	1	0	1	0	0
RENOVATOR	1	0	0	1	0
UNEMPLOYED	1	0	0	0	0
FOUNDRY	1	0	1	0	0
TOTAL	**2,697**	**216**	**145**	**14**	**3**

Since 2012, there has been a steady increase in the number of adults tested for lead exposure in New Hampshire. This increase has been accompanied by a slight but steady decline (2%) in the annual number of elevations ≥5 µg/dL reported during that same period, as shown in **Figure 7.**

FIGURE 7

Trends in Adult Blood Lead Testing and Elevations (≥5 µd/dL) in NH, 2010 - 2015



PRIMARY PREVENTION – KEEPING LEAD EXPOSURES FROM HAPPENING

REMOVING LEAD HAZARDS FROM HOUSING

Through private monies and funding from the HUD historically awarded to the Cities of Nashua and Manchester and to the New Hampshire Housing Finance Authority's Lead-Based Paint Hazard Control Programs, approximately 1,300 units housing low-income families have had lead hazards removed in the last decade. According to the 2010 U.S. Census, over 346,793 pre-1980 units statewide may contain lead hazards. An estimated 18,000 of these units house young children under the age of six living in one of New Hampshire's 133 universal "high-risk" communities. Of these 18,000 units, 2,478 house low-income families with children under the age of six (EPHT, 2014). Based on research conducted by Gould, the cost of lead abatement was in the range of $1,387 to $12,450 per housing unit (in 2013 dollars) (Gould, 2009). Removing the lead hazards in these targeted 2,478 homes would cost New Hampshire an estimated $3.4 to $30.9 million (EPHT, 2014).

BUILDING CAPACITY AMONG LICENSED LEAD PROFESSIONALS

The HHLPPP focuses grant funding received from the EPA on maintaining a lead accreditation certification program to build capacity among lead professionals and contractors in the private sector to support the removal of lead hazards in residential housing. In 2015, New Hampshire's licensed lead professionals included 3 Lead Inspectors, 18 Risk Assessors, 92 Lead Abatement Contractors, 35 Supervisors, 135 Workers, and 5 Trainers. These lead professionals were brought together in November 2017 through the New England Lead Conference, held in Portsmouth, New Hampshire, to discuss best practices, changes in legislation, and State and federal laws.

U.S. ENVIRONMENTAL PROTECTION AGENCY'S RENOVATE, REPAIR, AND PAINTING (RRP) RULE

According to the HHLPPP surveillance data, over one-third of children with an EBLL ≥10 µg/dL live in a home with recent or ongoing renovations. The EPA's Lead Renovation, Repair, and Painting Rule (RRP Rule) requires that firms performing renovation, repair, and painting projects that disturb lead-based paint in homes, child care facilities, and preschools built before 1978 be certified by EPA, use certified renovators who are trained by EPA-approved training providers, and follow lead-safe work practices. In 2015, there were 1,910 RRP certified firms and 10,314 certified renovators in New Hampshire (EPA, 2016). As consumer demand for lead safe renovators increases, it is expected that the number of RRP certified firms and renovators will increase to meet these demands. To help drive consumer demand, the EPA is implementing a "Look for the Logo" campaign to increase consumer education and awareness on the importance of hiring individuals who are lead-safe certified.

TECHNICAL NOTES AND ACRONYMS

CLASSIFICATION OF COMMUNITIES AS TARGETED, UNIVERSAL, AND HIGHEST-RISK

Targeted Communities: These are defined as communities where a targeted approach for lead testing is warranted. A targeted approach is used in communities designated as low risk. For children between ages one- and two-years-old who live in low-risk communities, providers use a *Lead Exposure Risk Questionnaire* to identify children with individual risk factors that will require blood lead testing. This questionnaire should also be used for children ages 3 to 6 years old who have not been previously tested, have renovation activities taking place at home, have moved to a new residence, have begun attending a child care facility built prior to 1978, or have exhibited high-risk behavior. positive or A uncertain response to *one or more* questions on the *Lead Exposure Risk Questionnaire* denotes that testing is necessary.

Universal Communities: These are communities designated as high-risk communities for Lead poisoning. Children living or visiting these communities are at an elevated risk for lead poisoning. In these communities, the HHLPPP recommends a "universal" screening approach in which all children are tested at one-year-old and again at two-years-old. Older children, up to 6 years old, who have not previously been tested while living in their current residence, if in a universal community, should also be tested. If they have moved to a new residence, begun attending a child care facility built prior to 1978, have been exposed to a pre-1978 renovation project, or have exhibited at-risk behavior since the time of their last blood test, a new blood test should be conducted.

Highest-Risk Communities: Historically, the HHLPPP has focused on eight communities deemed "highest-risk" that included Berlin, Claremont, Franklin, Laconia, Manchester, Nashua, Newport, and Rochester.
A comprehensive evaluation of New Hampshire's 234 communities was completed in 2015 and the Program determined that there are twenty-one communities of highest-risk. These communities include: Antrim, Berlin, Claremont, Concord, Dover, Franklin, Greenville, Haverhill, Keene, Laconia, Lebanon, Manchester, Nashua, New Castle, Pittsfield, Rindge, Rochester, Somersworth, Stratford, Troy, and Walpole. Our future actions will incorporate periodic evaluations of community trends to identify new or previously unidentified highest-risk areas. All highest-risk communities are also Universal screening communities.

HHLPPP'S ALGORITHM FOR CLASSIFYNG BLOOD LEAD TEST RESULTS

Public Health Concern: A child under the age of six years old with a capillary or venous blood test result between 5 and 9 µg/dL that was performed by a laboratory that is Clinical Laboratory Improvement Amendments (CLIA)-approved or an approved point-of-service instrument.

Public Health Action: A case of an elevated blood lead level is defined as a child under the age of six with a confirmed venous blood test result based on a test performed by a laboratory that is CLIA-approved. To avoid duplicative child case counting in any given year, only the highest venous test result is used to define a child's annual level of poisoning. A child tested for blood lead levels in New Hampshire may be tested multiple times, as recommended by pediatric healthcare providers. Consistent with public health surveillance, tests are classified in such ways as to best describe the child's levels of poisoning in the given year.

Blood Lead Sampling Techniques: Several factors can influence the quality of blood lead measurements. The ubiquity of lead in the environment makes contamination of specimens during collection a major source of error. Blood collected by venipuncture (venous) has a low likelihood of contamination compared to blood collected by finger stick (capillary). Capillary specimens are a successful method for blood lead testing, provided that the finger is washed thoroughly with soap and water prior to the collection procedure to minimize the risk of contamination.

Confirmed Test Result: A confirmed blood lead test result is one obtained from a venous blood sample that has been tested by CLIA-approved laboratory.

Confirmed Elevation Greater than 10 µg/dL: The DHHS shall investigate cases of lead poisoning in children reported under RSA 141-A whose blood lead level meets or exceeds 10 µg/dL of whole venous blood, as reported on 2 separate tests except that a blood level may be designated as elevated by the health care provider when the level reported meets or exceeds 10 µg/dL on the first venous test. With such a declaration, a second test shall not be required.

Incidence (Elevations) Greater than 10 µg/dL: A child with a confirmed venous elevation of blood lead poisoning based on a sample collected in a given year if the child has no prior reports/history of elevations above the threshold level used in defining an elevation (e.g., 10 µg/dL).

Prevalence (Elevations) Greater than 10 µg/dL: A child with a confirmed venous elevation of blood lead poisoning based on a sample collected in a given year if the child has a prior reports/history of confirmed elevations above the threshold level used in defining an elevation (e.g., 10 µg/dL).

ESTIMATING CHILDREN ENROLLED IN SCHOOL WITH A PRIOR HISTORY OF ELEVATION ≥5 µG/DL

To calculate the number of school-age children with a prior history of elevation ≥ 5 µg/dL in any given year, the number of children aged 5 to 18 years in that year with a prior history of elevation ≥5 µg/dL, as based on historical data from the HHLPPP surveillance database, was extracted. For example, for 2015, children born between 1997 and 2009, inclusive, that had a prior history of elevation reported to HHLPPP were included in this dataset as the total number of K – 12 children with a history of an elevation. An estimate of the total number of children enrolled in school was obtained from the State of New Hampshire's Department of Education postings (https://my.doe.nh.gov/profiles/profile.aspx).

HHLPPP SURVEILLANCE DATA QUALITY

The measures (counts and rates) in this report are considered best possible estimates that may be limited by a few factors, including: late reporting of test results by reporting sources; incomplete information reported; updates in case definitions for lead poisonings; and changing program priorities. The HHLPPP staff continuously review data in the New Hampshire DHHS Lead Poisoning Surveillance System and implement measures to contain factors that may compromise the quality and integrity of data. These measures include: data comparisons with ancillary databases containing relevant data (e.g., vital statistics); increasing the number of reporting sources reporting data electronically; and developing user-friendly means for secure electronic data reporting by providers using point -of-service lead analyzing devices to avoid data quality associated with illegible data on paper and fax reports.

ACRONYMS

ABLES	Adult Blood Lead Epidemiology & Surveillance
BLL	Blood Lead level
CDC	Centers for Disease Control and Prevention
CLIA	Clinical Laboratory Improvement Amendments
CSTE	Council of State and Territorial Epidemiologists
DHHS	Department of Health and Human Services
DIY	Do It Yourself
DPHS	Division of Public Health Services
EBLL	Elevated Blood Lead Level
EPA	U.S Environmental Protection Agency
HHLPPP	Healthy Homes and Lead Poisoning Prevention Program
HUD	US Department of Housing and Urban Development
NIOSH	National Institute Occupational Safety and Health
NNDSS	National Notifiable Diseases Surveillance System
OSHA	Occupational Safety and Health Administration
RRP	Renovate, Repair and Paint
SB	Senate Bill
US	United States
WIC	Special Supplemental Nutrition Program for Women, Infants, and Children

ABBREVIATIONS

µg/dL	Micrograms per deciliter
µg/m^3	Micrograms per cubic meter

REFERENCES

ACS. (2015). *American Community Survey*. Washington DC: US Census.

CDC. (2015). *Educational Interventions for Children Affected by Lead.* Washington, DC: Centers for Disease Control and Prevention and Stakeholders.

CDC. (2016, December 7). *Update of Blood Lead Levels in Children*. Retrieved December 7, 2016, from Centers for Disease Control and Prevention: https://www.cdc.gov/nceh/lead/acclpp/blood_lead_levels.htm

Children, P. T. (2016). *Key Federal Programs to Reduce Childhood Lead Exposures and Eliminate Associated Health Impacts.* Washington DC: President's Taskforce on Environmental Health Risks and Safety Risks for Children.

Council, N. R. (1993). *Measuring Lead Exposure in Infants, Children, and Other Sensitive Populations*. Washington, DC: National Academy Press.

Education, D. o. (2016, December 7). *Attendance and Enrollment Reports*. Retrieved December 7, 2016, from NH Department of Education: http://education.nh.gov/data/attendance.htm

EPA. (2016, December 7). *Locate Certified Renovation and Lead Dust Sampling Technician Firms*. Retrieved December 7, 2016, from US Environmental Protection Agency: https://cfpub.epa.gov/flpp/pub/index.cfm?do=main.firmSearch

EPHT. (2014). *Economic Burden of Environmentally Attributable Illness of Children in New Hampshire.* Concord, NH: Department of Health & Human Services.

Gould, E. (2009). *Childhood Lead Poisoning: Conservative Estimates of the Social and Economic Benefits of Lead Hazard Control.* Environmental Health Perspectives.

HHLPPP. (2015). *New Hampshire Healthy Homes and Lead Poisoning Prevention Program 2014 Lead Surveillance Report.* Concord, NH: NH Department of Health and Human Services.

JP Shonkoff, D. P. (2000). *From Neurons to Neighborhoods: The Science of Early Childhood Development.* New York: National Academy Press.

Needleman, H. L. (1990). *The Long Term Effects of Low Doses of Lead in Childhood.* Washington DC: JAMA.

NIOSH. (2016, December 7). *National Institute of Occupational Safety and Health Adult Blood Lead Epidemiological Surveillance*. Retrieved December 7, 2016, from Centers for Disease Control and Prevention ABLES: http://www.cdc.gov/niosh/topics/ables/description.html

Preventon, C. f. (2014). *Lead: New Blood Lead Level Information.* Atlanta, GA: Centers for Disease Control and Prevention.