



Update on Childhood Lead Poisoning Prevention in Maine

2018

A Report to the State of Maine Legislature
Committee on Health and Human Services

Submitted by:
Maine Department of Health and Human Services,
Maine Center for Disease Control and Prevention

January 2019

Table of Contents

Lists of Figures and Tables	ii
About this Report.....	1
A Brief Overview of Childhood Lead Poisoning in Maine	2
Executive Summary.....	3
Introduction	10
Identifying Lead-Poisoned Children through Blood Lead Level Testing	14
From Lead-Poisoned Child to Lead-Safe Housing: Inspections and Abatements	22
Lead Dust Testing: Identifying Lead in Homes Before Children are Poisoned	25
Primary Prevention: Community Contracts, Ongoing Media Campaign, Lead-Safe Housing Registry.....	29
Eradicating Childhood Lead Poisoning in Maine: Positive Progress and Measurement Challenges	37
Conclusions	40
Appendix A: Maine CDC Blood Lead Testing Guidelines.....	44
Appendix B: 2018 Lead Dust Testing Initiative Report Brief.....	46

Report Authors

This report was prepared by the following staff of the Childhood Lead Poisoning Prevention Unit, within the Maine Center for Disease Control and Prevention’s Environmental and Occupational Health Program.

Andrew E. Smith, SM, ScD

State Toxicologist & Environmental and Occupational Health Program Manager

For correspondence about this report: Andy.e.smith@maine.gov; 207.287.5189

Karyn Butts, MPH

Senior Health Program Manager, Childhood Lead Poisoning Prevention Unit

Eric Frohberg, MA

Supervisor, Childhood Lead Poisoning Control Section

Kathy Decker, MPH

Epidemiologist, University of Southern Maine

Figures

1. Environmental lead exposure in children is associated with decreases in intelligence quotient (IQ) test scores. An IQ of 100 is considered average. From Lanphear et al, Low-Level Environmental Lead Exposure and Children’s Intellectual Function: An International Pooled Analysis. <i>Environmental Health Perspectives</i> . 2005;113(7): 894–899.....	10
2. The Lead Poisoning Control Act (22 MRS §§ 1314-1329) construct.....	13
3. The Lead Poisoning Control Act construct with Lead Poisoning Prevention Fund activities (22 MRS § 1322-E)	13
4. Trends in percentages of one-year-old (12-<24 months) and two-year-old (24-<36 months) children enrolled in MaineCare tested for blood lead, 2013-2017	16
5. Percentages of one-year-old (12-<24 months) and two-year-old (24-<36 months) enrolled in MaineCare that were tested for blood lead in the years 2016-2017 (combined), by county	16
6. Trends in percentages of one-year-old (12-<24 months) and two-year-old (24-<36 months) <u>not</u> enrolled in MaineCare tested for blood lead, 2013-2017	17
7. Percentages of children born in 2014 who were screened for blood lead at least once before age two years or before age three years, in high-risk areas and the rest of Maine (i.e., excluding high-risk areas)	18
8. Trends in venous confirmation rates by initial capillary blood lead level (5-<10 µg/dL and 10-<15 µg/dL), 2015-2018. (*2018 data are through October.)	19
9. Trends in numbers of children with confirmed venous blood lead levels \geq 5 µg/dL and unconfirmed blood lead levels 5-<10 µg/dL, 2013-2017	19
10. Percentages of one-year-old (12-<24 months) and two-year-old (24-<36 months) children tested for blood lead, Lewiston/Auburn, 2013-2017.....	20
11. Numbers of dwelling units inspected for lead hazards and with orders to abate lead hazards in response to children identified with lead poisoning in the years 2013-2017.....	22
12. Total number of dwelling units inspected and total number of dwellings with orders to abate in 2017	23
13. Results from calendar year 2017 showing the number of homes with high levels of lead dust (\geq 40 µg /ft ² on floors or \geq 200 µg /ft ² on windowsills) found through the Department’s targeted mailing, website, and partner activities.....	27
14. Number of people reached through multimedia campaign components in 2017	35
15. Trends in numbers children less than six years (<72 months) of age with unconfirmed, confirmed, and estimated blood lead levels for the years 2003-2017.....	38
16. Trends in estimated numbers and percentages of children less than six years (<72 months) of age with blood lead levels \geq 5 µg/dL for the years 2003-2017	38
17. Calendar year 2017 numbers of children tested for blood lead, newly identified lead poisoned children, inspections resulting from either identifying lead poisoned children or presence of lead based substances, and resulting orders to abate lead hazards	41

Tables

1. Top ten Maine towns with the highest estimated numbers of children age 0-3 years with blood lead levels of 5 µg/dL or higher, 2010-2014	29
2. Community-based organizations under contract with the Department for lead poisoning prevention activities in high-risk areas	30

About this Report

This report has been prepared by request of the 128th Maine Legislature Committee on Health and Human Services per their letter dated April 18, 2018, to the Commissioner of the Department of Health and Human Services. This letter requests that the Department provide the following information to the Committee by January 15, 2019:

1. The latest trends on lead poisoning rates, screening practices, and successes of screenings in the MaineCare program and generally;
2. Actions of municipalities in high-risk areas and efforts of the Department to conduct outreach to municipalities from the Lead Poisoning Prevention Fund;
3. Efforts of the Department to promote primary prevention of lead poisoning; and
4. Updated information about the lead dust testing program.

This report also responds to the 2007 Chapter 186 Resolve “To Achieve Universal Blood Lead Level Screening in Maine Children,”¹ enacted by the 123rd Maine Legislature, which directs the Department to report annually to the Committee on the following:

1. Identification of areas of the State at high risk for having children with elevated blood lead levels;
2. Progress made in achieving universal blood lead screening in designated high-risk areas for children 12 to 24 months of age and children 25 to 72 months of age who have not previously been tested for blood lead levels or who have had a change in risk of exposure; and
3. Lessons learned in attempting to achieve universal blood lead screening and any recommendations for screening.

The Department has respectfully consolidated its response to the 128th Legislature’s request with the annual report mandated under the resolve into this combined report to respond to the significant overlap in information requested. It is the Department’s intention that this combined report will provide the Committee with context to better understand the issue of childhood lead poisoning in Maine and the Department’s progress towards eradicating it.

Data Found in this Report Available on the Maine Tracking Network

Some, but not all, of the data found in this report related to blood lead testing and children with lead poisoning may be found and explored further through the Maine Tracking Network, a web-based public health data portal. Users can query data about lead poisoning, blood lead testing, children living in poverty and pre-1950 housing and create customized maps and reports showing data for the State as well as Maine’s towns, high-risk areas, and counties.

Access the Maine Tracking Network: <https://data.mainepublichealth.gov/tracking>

¹ <http://www.mainelegislature.org/ros/LOM/LOM123rd/123S1/RESOLVE186.asp>

A Brief Overview of Childhood Lead Poisoning in Maine

(See the Introduction on pages 10-13 for additional information about lead poisoning in Maine.)

Lead poisoning is one of the major environmental health threats for children in Maine, but it is preventable. In young children, exposure to lead causes brain damage that can result in learning and behavioral problems. There is now national scientific consensus that there is no safe level of lead in a child's body.

Lead Poisoning is a Public Health *and* Housing Issue

Childhood lead poisoning in Maine remains primarily a consequence of exposure to dust from lead paint found in Maine's old housing stock. Young children between the ages of nine months and three years are most at risk because of the combination of crawling and play behavior, frequent hand-to-mouth activities, and their developing brains.

Profile of Children with Lead Poisoning in Maine*

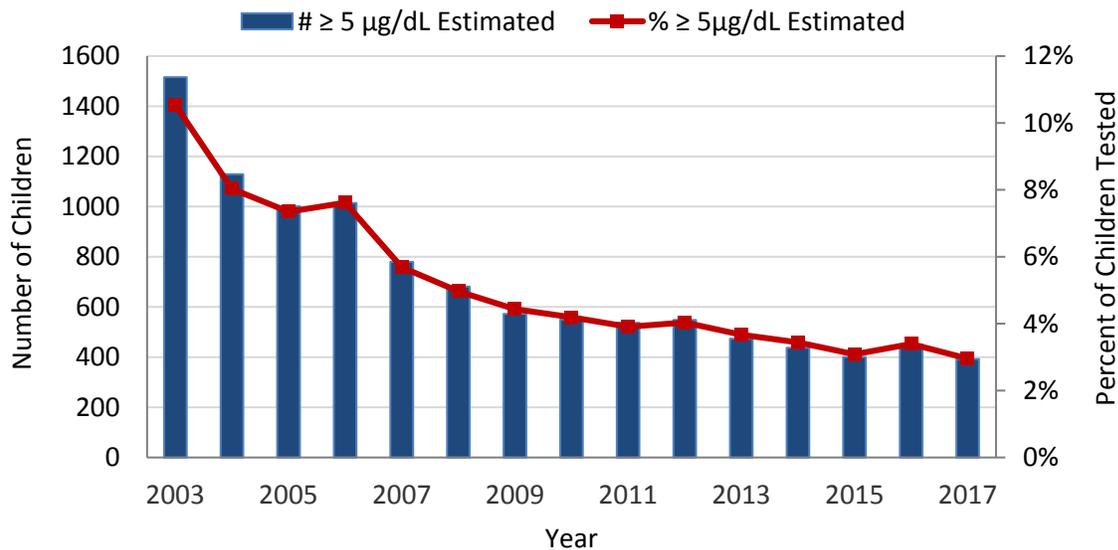
- 87% live in housing built before 1950
- 79% live in housing with identifiable lead paint hazards
- 73% are enrolled in MaineCare
- 69% live in rental housing
- 38% live in housing where a recent renovation has occurred
- Children who have unusual oral behavior tend to have higher blood lead levels (i.e., ≥ 10 $\mu\text{g}/\text{dL}$)

*From a new study published by Department staff and colleagues from Maine Medical Research Institute and Harvard School of Public Health in *Journal of Public Health Management and Practice* (2019; 25:S76-S83).

Executive Summary

In 1991, Maine established a statutory goal to eradicate childhood lead poisoning by the year 2010. This laudable goal has still not been met, though progress has been made. In 2003, an estimated 1,500 children, or 10 percent of children tested for lead in their blood, had a blood lead level at or above 5 micrograms of lead per deciliter of blood ($\geq 5 \mu\text{g}/\text{dL}$)—Maine’s current regulatory definition of lead poisoning. In 2017, an estimated 392, or 3 percent of children tested, were newly identified as lead poisoned.

Trends in estimated number and percentage of children less than six years (<72 months) of age with blood lead levels $\geq 5 \mu\text{g}/\text{dL}$



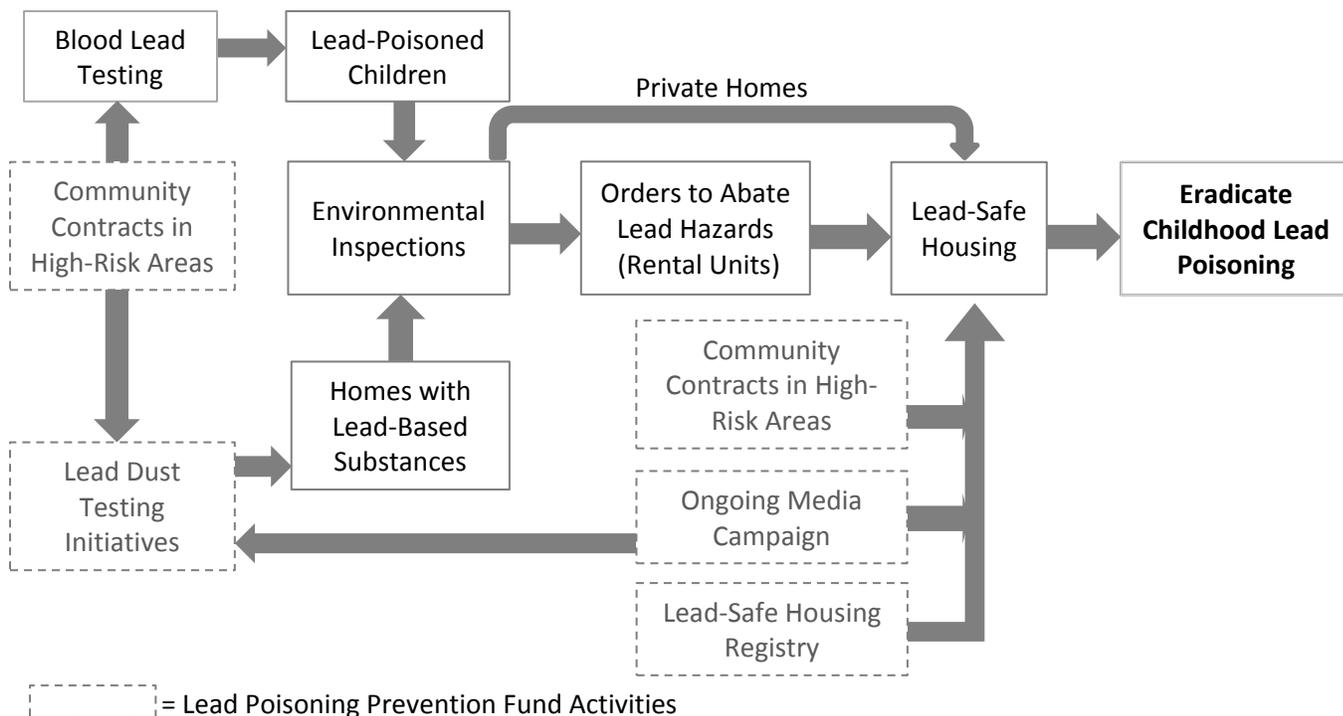
The Lead Poisoning Control Act is Maine’s approach to eradicating childhood lead poisoning.

Maine’s Lead Poisoning Control Act (LPCA), 22 MRS §§ 1314-1329, is the statutory foundation of the Department’s efforts to prevent and control childhood lead poisoning. The LPCA and its associated rules create a construct of linked provisions that are collectively intended to eradicate childhood lead poisoning by:

- Establishing mandates to test children for blood lead to identify children that meet the regulatory definition of lead poisoning;
- Requiring inspections for the presence of environmental lead hazards in all units in dwellings when a lead-poisoned child is identified in any individual dwelling unit (for single-family owner-occupied homes, inspections in response to identifying a lead-poisoned child living in the home are discretionary);
- Requiring orders to remove environmental lead hazards found in dwelling units to make them lead safe for current and future inhabitants (for single-family owner-occupied homes, the Department may provide technical assistance and guidance in lieu of enforcement); and
- Establishing the Lead Poisoning Prevention Fund (LPPF) to support community-based and statewide primary prevention activities aimed at helping families and property owners take actions to identify potential lead hazards and mitigate exposure to them before children are poisoned.

This executive summary and the full report that follows discuss the Department’s efforts to meet the mandates of each provision as a way to organize and provide helpful context to the Department’s response to the Committee’s request for the information contained in this report. The following figure illustrates the construct of the LPCA.

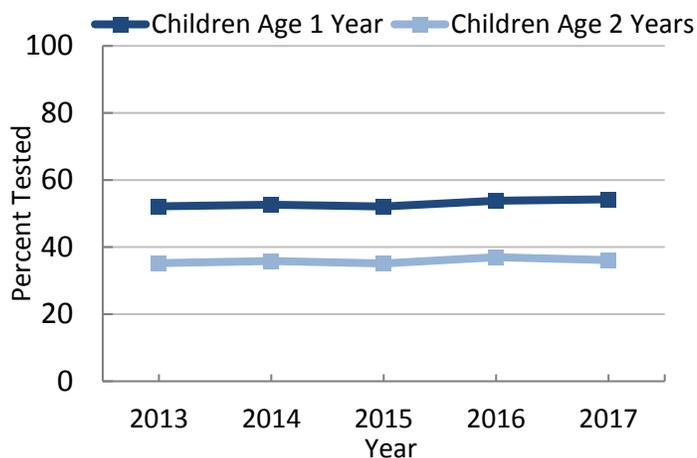
The Lead Poisoning Control Act (22 MRS §§ 1314-1329) construct with Lead Poisoning Prevention Fund activities (§ 1322-E)



Mandates for blood lead testing are not being met.

The LPCA mandates that all one- and two-year-old children covered by MaineCare be tested for lead in the blood. Maine falls far short meeting of this mandate—just over half (54%) of one-year-olds and only about one-third (36%) of two-year-olds covered by MaineCare were tested for blood lead in 2017. While Maine’s statewide blood lead testing rates have not been improving, blood lead testing rates are higher in some regions of the State. For example, both Franklin and Washington counties tested 70 percent of one-year-olds and 60 percent of two-year-olds that were enrolled in MaineCare during the 2016-2017 period.

Percentages of one-year-old (12-<24 months) and two-year-old (24-<36 months) children enrolled in MaineCare tested for blood lead



Not only is there a need to increase blood lead testing rates to meet mandates, but there is also a need to improve testing practices to increase confirmatory venous testing of capillary blood lead tests that are prone to false positives. Most children are initially tested for blood lead with a capillary specimen obtained by a finger stick. This procedure has the benefit of being easily performed in a provider's office and therefore typically does not require a separate visit to a medical laboratory. If the capillary lead test result is elevated, a confirmatory venous specimen is ordered, because capillary results can be contaminated by lead on the skin's surface, resulting in a false positive test result. A venous blood draw is a more involved procedure, and is more likely to require a visit to a medical laboratory. In 2017, nearly 200 children found to have an elevated capillary blood lead test result did not receive a confirmatory venous blood lead test. Consequently, dozens of these children (those who had true blood lead levels of 5 µg/dL or higher) did not receive State inspection services to identify lead hazards in their homes. That is, the LPCA requires that these services are provided only based on a confirmed blood lead level of 5 µg/dL or higher.

The Department has a goal of testing 75 percent of one-year-olds enrolled in MaineCare and 50 percent of two-year-olds enrolled in MaineCare for blood lead by the year 2020. As part of the effort to reach these goals, over the next year, the Department will fully deploy a blood lead module within the State's web-based immunization registry to help health care providers better identify children in need of blood lead tests, including confirmatory venous tests, and allow the State to track blood lead testing compliance and issue report cards to medical practices.

A recent Legislative mandate resulted in a major increase in the number of homes inspected for lead hazards.

In June 2015, the Legislature amended the LPCA's definition of childhood lead poisoning to match the U.S. Centers for Disease Control and Prevention's (CDC) blood lead reference level. CDC's blood lead reference level is set to represent the 97.5th percentile blood lead level in a random sample of U.S. children, which in 2012 was 5 µg/dL. This change required the Department to lower the threshold at which it must inspect dwelling units for the presence of lead hazards from a blood lead level of 15 µg/dL (or 10 µg/dL in certain cases) to 5 µg/dL. This change in the regulatory definition of a lead-poisoned child resulted in a seven-fold increase in the number of dwelling units inspected for lead hazards, and a six-fold increase in dwelling units under orders to remove identified lead hazards (also called orders to *abate* lead hazards).

Number of dwellings inspected for lead hazards and orders to abate issued in response to presence of a lead poisoned child.



The LPCA requires the Department to inspect *all* dwelling units in a multi-family dwelling when a lead poisoned child is found in any one dwelling unit. In 2017, this requirement resulted in the Department inspecting an additional 571 dwelling units for lead hazards. These additional inspections resulted in 163 orders to abate identified lead hazards to make these dwelling units lead safe. These additional units inspected and abated represent primary prevention of lead poisoning because they identify and control lead hazards *before* a child is poisoned.

New enforcement authority is helping to improve compliance with abatement orders.

The 2015 amendments to the LPCA also gave the Department new authority to issue administrative penalties for violations of the Act. Prior to these amendments, the Department’s authority to enforce violations of the LPCA was limited. While most landlords and property managers of properties under an abatement order cooperate with the Department, some do not. It can sometimes take many months, if not years, to get landlords to abate lead hazards. Since 2016, the Department has engaged in 26 enforcement actions—mostly with property owners who have failed to abate lead hazards in a timely way or who have rented vacant units before abatement activity is completed. From those actions, the Department has collected \$4,275 in fines, and has \$137,375 in uncollected fines that may require referral to the Attorney General’s Office for collection. The Department believes having this new enforcement authority has improved landlord responsiveness to orders to abate hazards.

Lead dust testing initiatives help find lead paint hazards before children are poisoned.

The major provisions of the LPCA are focused on identifying and removing lead hazards in residences to create lead-safe housing, and ultimately eradicate childhood lead poisoning. Currently, the process of identifying lead hazards in dwellings is driven primarily by first identifying children with lead poisoning through blood lead testing. However, the LPCA also contains provisions that allow the Department to inspect a dwelling based solely on the presence of lead-based substances (see figure of LPCA construct on page 4).

As lead dust is considered the most common cause of lead poisoning in young children, the Department provides free lead dust tests to families with children at risk for lead poisoning to identify homes with lead-based substances before children are poisoned. There are two major ways the Department makes these preventative lead dust tests available to families: through mass media activities, including an annual targeted mailing to all Maine families with one-year-old children, and through a partnership with the Department’s Home Visiting Program. These two lead dust testing initiatives complement one another, as the targeted mailing effort is more likely to elicit responses from families living in single-family, owner-occupied homes, whereas lead dust testing through home visitors primarily reaches families living in rental homes. In 2017, Maine families performed lead dust tests in a total of 222 dwelling units through these two initiatives. In 56 of these homes, lead dust levels were high enough that the Department either provided technical assistance on ways to safely clean up lead dust, or referred the home for an environmental lead inspection.

Efforts to scale up these lead dust testing initiatives have proved challenging. In the fall of 2018, the Department doubled the number of homes that received the targeted mailing by sending the mailing to families that have one-year-old children and to families that have two-year-old children. Preliminary returns indicate that this doubling of offers for a free lead dust test only yielded a 40 percent increase in requests for lead dust tests. The Department also continues to work with the Home Visiting Program to scale up its lead dust testing initiatives, with only modest increases in the total number of homes tested so far.

The Lead Poisoning Prevention Fund supports primary prevention at the State and local level.

In 2005, the Legislature established the Lead Poisoning Prevention Fund (LPPF) under the LPCA (22 MRS § 1322-E-F). The Department is the steward of this dedicated source of revenue that comes from a fee of \$0.25 assessed on every gallon of paint sold in the State. The LPPF is to be used for designated prevention purposes, including contracts for community-based outreach and education programs, an annual targeted mailing to young families, lead dust testing initiatives (discussed above), an ongoing major media campaign, and the operation of a lead-safe housing registry (see figure of LPCA construct

on page 4). The LPPF activities focus on primary prevention interventions intended to assist families and landlords with identifying and addressing lead paint hazards *before* a child is poisoned.

Through the LPPF, the Department provides \$35,000 in annual funding to a community-based organization in each of the five highest-risk areas for lead poisoning in the State as follows.

High-Risk Area	Community Partner
Augusta/Gardiner	Healthy Communities of the Capital Area
Bangor	City of Bangor, Public Health Department
Biddeford/Saco	Coastal Healthy Communities Coalition
Lewiston/Auburn	Healthy Androscoggin
Portland/Westbrook	City of Portland, Division of Public Health

Community partners typically work with local agencies and organizations such as public libraries, service clubs, child care providers, health care providers, public health nurses, community outreach workers, trained peer educators, and landlord associations to provide information to families and local property owners during events, classes, and through neighborhood networks. Partners also use local mass media channels (public transit, print, and broadcast) to promote lead poisoning prevention and blood lead testing. Over the last two years, these community-based partners have increased efforts to engage with local municipal officials and stakeholders to build local ownership of lead poisoning prevention. Over the coming year, the Department will be assessing whether to expand its community-based approach to the communities of Waterville and Skowhegan, as well as to reinstate funding to Sanford, which was previously funded as a high-risk area.

To complement its highly-targeted community-based funding in high-risk areas, the Department uses the LPPF to conduct statewide prevention activities to reach the communities across the state that are not classified as high-risk, and which together account for 60 percent of the State’s burden of childhood lead poisoning (the remaining 40 percent of children identified with lead poisoning live in high-risk areas). These statewide activities reached tens of thousands of families in 2017 through: print materials, including an annual targeted mailing offering a free home lead dust test kit to parents of young children (reach: 26,091); YouTube videos in English and Somali on how to do a home lead dust test (reach: 7,539); a web site (reach: 11,650); and a pilot social media paid advertising campaign (reach: 74,768).

The LPCA also includes directives to allocate funds from the Lead Poisoning Prevention Fund to the Department of Environmental Protection (DEP) to implement a lead-safe housing registry (22 MRS § 1322-E(3)(G)). In 2012, DEP established the registry within an existing tool, MaineHousingSearch.org, an online rental housing listing and search site funded jointly by Maine State Housing Authority, Maine DHHS, 211, DEP, and the Breathe Easy Coalition. Through MaineHousingSearch.org, property owners can include information about lead in units listed on the site by choosing one of three lead-safe status categories. People searching for rental housing can search for units using these categories. Each year, visitors to the site conduct about 200 searches using the lead status categories. As of October 2018, there were 1,035 units listed on the site with one of the three lead-safe categories designated. The DEP has expressed interest in transferring ongoing responsibility for administering the registry to the Department.

There are challenges and opportunities on the horizon.

The Department has successfully implemented the 2015 mandates to significantly increase lead inspection activity, which has resulted in more orders to abate lead hazards and more lead-safe dwelling units. The resources the Legislature appropriated to support this increased regulatory activity (five environmental lead inspection coordinators at the Department and over \$400,000 per year to fund contracted inspection services and resulting laboratory services) have largely been sufficient. However, any further significant increase in demands for inspection activity will challenge these newly expanded resources.

The most significant challenge on the horizon is the potential for the U.S. CDC to lower the federal blood lead reference level. The U.S. CDC is evaluating a proposal to lower the blood lead reference level from 5 µg/dL to 3.5 µg/dL. The reference level is set at the 97.5th percentile blood lead level in U.S. children and there are published findings that the 97.5th percentile blood lead level in U.S. children is now 3.5 µg/dL. Maine's statutory and regulatory definition of a lead poisoned child is matched to U.S. CDC's adopted reference level. The Department estimates that lowering the State's definition of lead poisoning to a blood lead level of 3.5 µg/dL could double the current annual caseload of children identified with lead poisoning, which would require substantial additional resources to manage. Department scientists, in collaboration with other researchers, have demonstrated that lead paint hazards are usually found when inspecting homes of children with blood lead levels as low as 5 µg/dL and reported these findings in a recently published study. The Department has not performed a similar study on the extent to which hazards will be found when inspecting dwellings in response to blood lead levels less than 5 µg/dL.

The Department's existing resources may also be challenged if efforts to increase blood lead testing and confirmatory venous testing results in lead poisoned children being identified in numbers that significantly exceed current declining trends in cases of newly identified lead poisoned children.

Finally, an expected lowering of federal standards used to identify the presence of lead dust hazards will both increase inspection activity resulting from lead dust testing initiatives and will increase abatement activity through identification of more hazards from the use of the lower standards. Both will add to the current workload.

The major opportunity on the horizon is a new blood lead module that will be fully deployed within the State's web-based immunization registry in the coming year. The module will help health care providers better identify children in need of blood lead tests, including confirmatory venous tests, and allow the State to track compliance with testing mandates at the medical practice level, and to develop practice-level blood lead testing report cards. The Department can identify best practices among the top performers and target efforts to improve blood lead testing among those most in need.

Conclusions

The major conclusions of this report are as follows.

- Childhood lead poisoning continues to decline, but in 2017, over 300 children were newly identified as lead poisoned.
- Blood lead testing remains low among one- and two-year-old children enrolled in MaineCare, and the statutory mandate for universal testing of this population of children is far from being met. There remains a clear need to increase blood lead testing rates; to this end, the Department is:

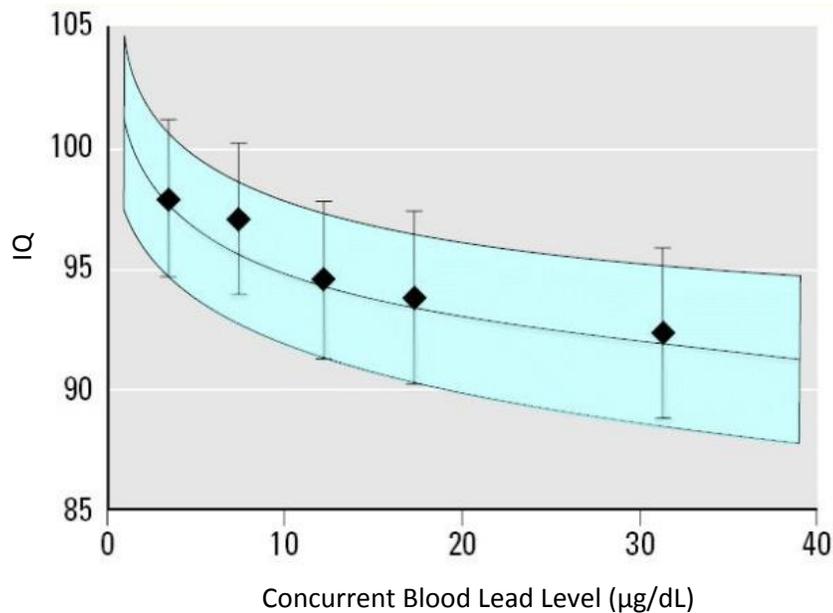
1. Developing a blood lead module within the State’s web-based immunization registry to help health care providers better identify children in need of blood lead tests, including confirmatory venous tests, and to allow the Department to track compliance with testing mandates and guidelines and issue report cards for medical practices;
 2. Continuing to fund high-risk communities to promote blood lead testing within their communities; and
 3. Continuing with the recently expanded targeted mailing campaign to families with one- and two-year-olds to promote blood lead testing and offer free lead dust testing.
- The 2015 LPCA amendments resulted in a substantial increase to the Department’s major primary prevention activity (i.e., identifying and removing lead hazards from homes before children are poisoned). In 2017, the Department inspected more than 570 dwelling units in which a lead poisoned child was not previously identified because of the statutory requirement to inspect all dwelling units in a multi-family dwelling when a lead poisoned child is found in any single dwelling unit. This was in addition to inspecting nearly 300 dwelling units that were associated with a lead poisoned child.
 - The Department expanded its targeted mailing lead dust testing program in 2018 to reach families with either a one-year-old or a two-year-old child. The Home Visiting facilitated lead dust testing program had only modest increases in 2018 compared to 2017. The Department also designed and piloted a social media (Facebook) campaign to promote lead dust testing.
 - The Department is providing \$35,000 in annual funding to a community-based organization in each of the five highest-risk areas for lead poisoning for education and outreach activities to enable the public to take precautionary actions to prevent exposure to lead.

More than 360 dwelling units were issued orders to abate lead hazards to make them lead safe in 2017 as a result of a seven-fold increase in inspections. This is a major increase in abatement activity over prior years, which leads to an important question: Is this increase sufficient to accelerate progress toward the goal of eradicating childhood lead poisoning? In the full report, we consider this question, and importantly, we have the tracking systems in place to monitor annual trends of lead poisoned children.

Introduction

Lead poisoning is one of the major environmental health threats for children in Maine, but it is preventable. In young children, exposure to lead can cause brain damage and is associated with loss of intellectual function as measured by intelligence quotient (IQ) tests (Figure 1), decreased reading readiness, speech and language delays, and behavioral problems. Lead exposure during early childhood is also associated with long-term socioeconomic outcomes, including decreased future income and earnings and downward social mobility decades later. The toxic effects of lead on a child's brain are associated not only with high levels of lead measured in a child's body (referred to as a child's blood lead level), but also with lower blood lead levels that were once considered safe. There is now broad, national scientific consensus that there is no safe level of lead in a child's body.

Figure 1: Environmental lead exposure in children is associated with decreases in intelligence quotient (IQ) test scores. An IQ of 100 is considered average. From Lanphear et al, Low-Level Environmental Lead Exposure and Children's Intellectual Function: An International Pooled Analysis. *Environmental Health Perspectives*. 2005;113(7): 894–899



Blood Lead Thresholds for Action

As the public health field has learned more about the adverse effects of lead at lower and lower blood lead levels, the U.S. Centers for Disease Control and Prevention (U.S. CDC) has repeatedly lowered the blood lead level at which they recommend interventions to stop a child's exposure to lead. Between the years 1960 and 1991, U.S. CDC dropped the intervention threshold from 60 micrograms of lead per deciliter of blood ($\mu\text{g}/\text{dL}$) to 15 $\mu\text{g}/\text{dL}$. In 2012, in recognition that there is no identified safe level of exposure to lead, U.S. CDC stopped using a blood lead level of 10 $\mu\text{g}/\text{dL}$ as a "level of concern" and adopted a reference level for having an elevated blood lead level that represented the 97.5th percentile blood lead level in a random sample of U.S. children as a way to identify children with elevated blood lead levels in comparison to the population. Since 2012, the U.S. CDC's blood lead reference level has been 5 $\mu\text{g}/\text{dL}$. In 2015, the Department, in response to a legislative mandate to align the regulatory

definition of lead poisoning with U.S. CDC's blood lead reference level, lowered Maine's blood lead level for individual intervention to 5 µg/dL.

Lead Poisoning is a Public Health and Housing Issue

Lead poisoning in Maine remains primarily a consequence of exposure to old lead paint found in older housing. Lead paint that is chipping, peeling, cracking, or disturbed due to normal wear and tear, damage, lack of maintenance, or repairs and renovations turns into lead dust. Ingesting this lead dust is the most common cause of childhood lead poisoning in Maine. Lead dust settles on surfaces such as floors and windowsills—places where young children crawl, play, put their toys, look outside, and set down bottles and pacifiers. Young children, especially those between nine months and three years of age are at highest risk for exposure to lead dust due to their hand-to-mouth behavior, crawling, and developing brains.



Young children are at highest risk for exposure to lead dust due to their hand-to-mouth behavior, crawling, and developing brains.

Profile of Children with Lead Poisoning in Maine

Department staff, working with colleagues from the Maine Medical Center Research Institute and Harvard School of Public Health, recently published findings from an analysis of the results from 351 environmental lead inspections.² The study is one of the first to describe identified lead hazards in homes of children with blood lead levels as low as 5 µg/dL. The study reported that among children identified with blood lead levels \geq 5 µg/dL in Maine:

- The vast majority (87%) are associated with housing that was built before 1950. The amount of lead added to paint used for residential purposes was much higher in the years before 1950. The U.S. banned lead in paint in 1978.
- Nearly all (79%) live in housing with identifiable lead paint hazards
- Most (73%) are enrolled in MaineCare.
- Most (69%) live in rental housing.
- In many (38%) cases, families report a recent renovation of some sort to their home or rental unit.
- Children who have unusual oral behavior tend to have higher blood lead levels (i.e., \geq 10 µg/dL).

Maine's Lead Poisoning Control Act

Maine's Lead Poisoning Control Act (LPCA), 22 MRS §§ 1314-1329, is the statutory foundation of the Department's efforts to prevent and control childhood lead poisoning. The Department administers the LPCA through the State's public health agency, the Maine Center for Disease Control and Prevention (CDC). The LPCA and its associated rules create a construct of linked provisions that are collectively intended to eradicate childhood lead poisoning by creating lead-safe housing units and preventing exposure to lead before children are poisoned.

²Cluett R., Fleisch A., Decker K., Frohberg E., Smith A.E. Findings of a Statewide Environmental Lead Inspection Program Targeting Homes of Children with Blood Lead Levels as Low as 5 µg/dL. *Journal of Public Health Management and Practice*. 2019;25:S76-S83.

https://journals.lww.com/jphmp/Fulltext/2019/01001/Findings_of_a_Statewide_Environmental_Lead.13.aspx

In specific, as shown in Figures 2 and 3, the major provisions of the LPCA are designed to:

- Identify children with lead poisoning by establishing mandates for testing children for blood lead;
- Require inspections for the presence of environmental lead hazards in all units in a dwelling if a lead poisoned child is identified in any unit; for single family owner occupied homes, inspections in response to identifying a lead-poisoned child residing in the home are discretionary;
- Order the removal of environmental lead hazards found in dwelling units to make the dwelling units lead safe; and
- Fund community-based and statewide primary prevention activities aimed at helping families and property owners take actions to identify potential lead hazards and mitigate exposure to them before children are poisoned.

In the past two decades the Maine Legislature has made two major changes to the LPCA. In June 2015, the Legislature changed the State's definition of childhood lead poisoning to the U.S. CDC's blood lead reference level.³ In subsequent rulemaking, the Department lowered the blood lead level threshold that triggers an inspection of a dwelling unit for the presence of lead hazards from 15 µg/dL, or 10 µg/dL in certain cases, to 5 µg/dL.⁴ As described in greater detail later in this report, the result of this change in definition was a major increase in the number of environmental lead inspections conducted, as well as in the number of orders to abate issued.

Ten years prior, in 2005, the Legislature established the Lead Poisoning Prevention Fund (LPPF) under the LPCA (22 MRS § 1322-E-F). The Department is the steward of this dedicated source of revenue that comes from a fee of \$0.25 assessed on every gallon of paint sold in the State. The LPPF provides resources for community-based and statewide efforts, including outreach and education to residents and landlords in high-risk areas, an annual targeted mailing to young families, lead dust testing initiatives, and the operation of a lead-safe housing registry. The LPPF efforts focus on primary prevention interventions intended to assist families and landlords with identifying and addressing lead paint hazards *before* a child is poisoned.

Report Organization

Because the LPCA undergirds all of the Department's childhood lead poisoning prevention efforts, the contents of this report follow the construct of the LPCA, with sections dedicated to each of the major components of the law and a final section that discusses progress made toward the LPCA's goal of eradicating childhood lead poisoning in Maine. Figures 2 and 3 below provide visualizations of the LPCA construct (without and with the activities of the LPPF, respectively) to show the relationship between the law's provisions and its intended outcomes.

³ The definition of Lead Poisoning in the LPCA, 22 MRS § 1315(5-C): "Lead poisoning" means a confirmed elevated level of blood lead that is injurious, as defined by rules adopted by the department using reference levels no higher than the 97.5th percentile of blood lead levels in children established by a national health and nutrition survey adopted by the federal Department of Health and Human Services, Centers for Disease Control and Prevention.

⁴ As amended in September 2016, the Rules Relating to the Lead Poisoning Control Act define lead poisoned or lead poisoning as a confirmed blood lead level that is equal to, or exceeds, 5 µg/dL (10-144 CMR Ch. 292). If the U.S. CDC establishes a new reference level, the Department will need to go through the rulemaking process to update the definition to align with the new federal reference level. This will also result in another operational increase with fiscal impacts to provide inspections at lower blood lead levels.

Figure 2: The Lead Poisoning Control Act (22 MRS §§ 1314-1329) construct

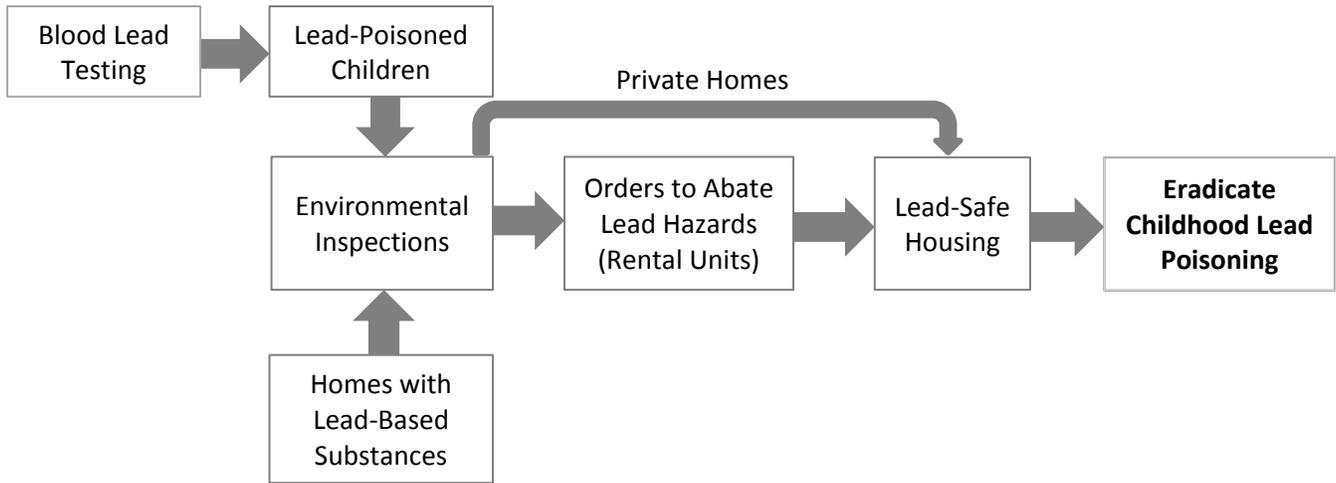
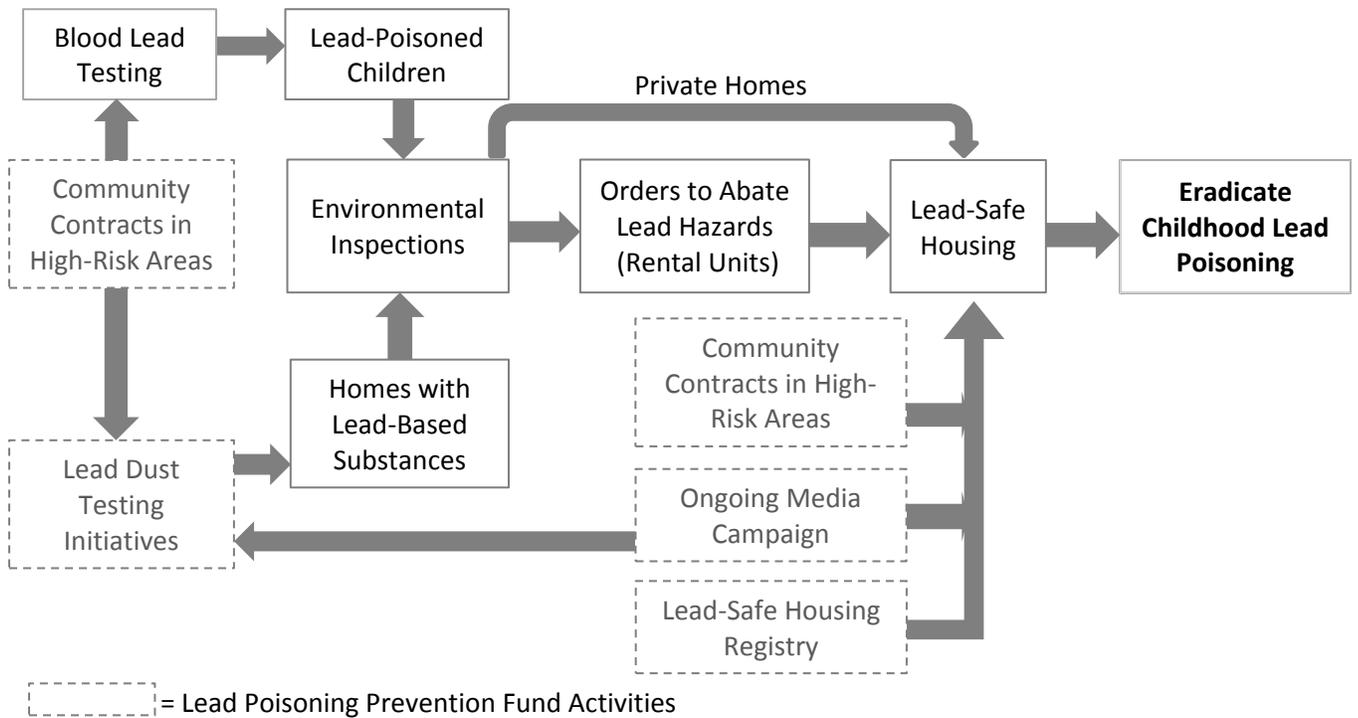


Figure 3: The Lead Poisoning Control Act construct with Lead Poisoning Prevention Fund activities (22 MRS § 1322-E)



Identifying Lead-Poisoned Children through Blood Lead Level Testing

Why test children for blood lead?

There are two main reasons why children receive blood lead tests. First, blood lead testing identifies children in need of interventions to reduce their blood lead levels and prevent severe effects. Although severe cases of lead poisoning are rare occurrences today, very high blood lead levels ($>70 \mu\text{g}/\text{dL}$) can cause serious health effects, including seizures, coma, and death. Blood lead testing identifies children with blood lead levels high enough to warrant medical intervention (i.e., chelation therapy) that can quickly reduce blood lead levels and prevent such acute effects. However, the vast majority of young children identified with lead poisoning do not need medical intervention, nor do they look or act sick. For most children, blood lead testing is the only way to identify if they have been poisoned and ensure they receive environmental interventions to identify and remove the source of their exposures to reduce their blood lead levels. Unfortunately, by the time a child is identified with lead poisoning through blood lead testing, lead may have already harmed the child's developing brain. In 2017, about one out of every 30 Maine children tested for blood lead was found to have a venous blood lead level of $5 \mu\text{g}/\text{dL}$ or higher.

The second reason to test children for blood lead is to identify and remove lead hazards from residential dwellings. As specified in the LPCA, blood lead testing is the only way to identify a child as meeting Maine's statutory definition of lead poisoning, which in turn triggers a series of statutory and regulatory requirements to inspect the child's dwelling for environmental lead hazards, and if hazards are found, to order the removal of the hazards. The LPCA also requires the Department to inspect all units in a multi-family dwelling when a case of lead poisoning has been found in any of the units. If hazards are found in those additional units they must also be removed. Thus, in Maine, testing children for blood lead also serves a primary prevention purpose by identifying and removing lead hazards from dwelling units and making those dwelling units lead safe for current and future child occupants.

What is blood lead testing?

Blood lead testing refers to the practice of obtaining a small sample of blood from a child and testing that specimen for the amount of lead it contains. Typically, blood lead testing is done in two stages: 1) initial testing of a capillary blood sample, and 2) follow-up confirmatory testing for any capillary blood lead test results of $5 \mu\text{g}/\text{dL}$ or higher with a venous specimen. Capillary samples are routinely collected in a health care provider's office by sticking a child's finger to obtain a small amount of blood. Under the LPCA, capillary blood samples can only be analyzed for lead either in a doctor's office, using a portable, instant analysis device called LeadCare II (a low-complexity laboratory method), or through submission to Maine's Health and Environmental Testing Laboratory (HETL) for analysis by high-



complexity laboratory methods.⁵ About one-quarter of all capillary blood lead samples are now analyzed in a provider's office using a LeadCare II device, with the benefit that families receive these blood lead test results during the office visit.

If the initial capillary test result has an amount of lead of 5 µg/dL or higher, a confirmatory venous blood specimen is obtained and must be submitted to HETL for analysis. A confirmatory venous specimen is required because capillary blood samples can become contaminated with lead on the surface of the finger and result in a false positive test result. Getting a venous sample often requires a visit to a medical laboratory staffed with a phlebotomist.

Statutory Requirements for Blood Lead Level Testing

Maine and federal laws require that all children covered by MaineCare be tested for blood lead at one year of age and two years of age (22 MRS §1317-D). All one- and two-year-old children not covered by the MaineCare program are also required to be tested for blood lead, unless in the professional judgment of the provider of primary health care, in conjunction with the use of the Department's lead poisoning risk assessment tool, the child's level of risk does not warrant a blood lead level test. The 123rd Maine Legislature also established a mandate for the Department to attempt to achieve universal blood lead level screening of one-year-old children living in identified high-risk areas of lead poisoning, and children from age two years up to six years that have not previously been tested for blood lead or have had a change in risk of exposure to lead associated with living in a dwelling built prior to 1950. For the purposes of evaluating progress made toward these statutory requirements, the Department considers children age 12 to less than 24 months (12-<24) as one year of age, and children 24 to less than 36 months as two years of age.

Progress Made Toward Statutory Requirements

Tracking blood lead testing rates among children covered by MaineCare requires linking data on MaineCare insurance status with data on blood lead test results. The Department has been annually performing a linkage of these two databases since 2015, using data back to the year 2013. Figure 4 shows that Maine continues to fall far short of the statutory mandate to test all one- and two-year-olds covered by MaineCare, and there is little evidence to suggest that testing rates are improving statewide. Just over half of one-year-olds and only about one-third of two-year-olds covered by MaineCare were tested for blood lead in 2017. There are much higher blood lead testing rates for one- and two-year-olds enrolled in MaineCare in some counties, demonstrating that higher rates are attainable (Figure 5). Washington and Franklin counties are especially noteworthy for testing 70 percent of one- and 60 percent of two-year olds. Blood lead testing rates for one-year-old children not enrolled in MaineCare are similar to rates for enrolled children, but rates for two-year-old children are lower (Figure 6).

⁵A high-complexity laboratory method is one in which the instrument used to measure the amount of lead in blood is more sophisticated and uses a methodology that requires more rigorous quality assurance and quality control, including the routine analysis of duplicate samples and calibration standards. The laboratory may also participate in proficiency testing in which it must periodically analyze blood samples received from an independent party where the lead content is unknown to the laboratory but known to the agency running the proficiency testing program.

Figure 4: Trends in percentages of one-year-old (12-<24 months) and two-year-old (24-<36 months) children enrolled in MaineCare tested for blood lead, 2013-2017

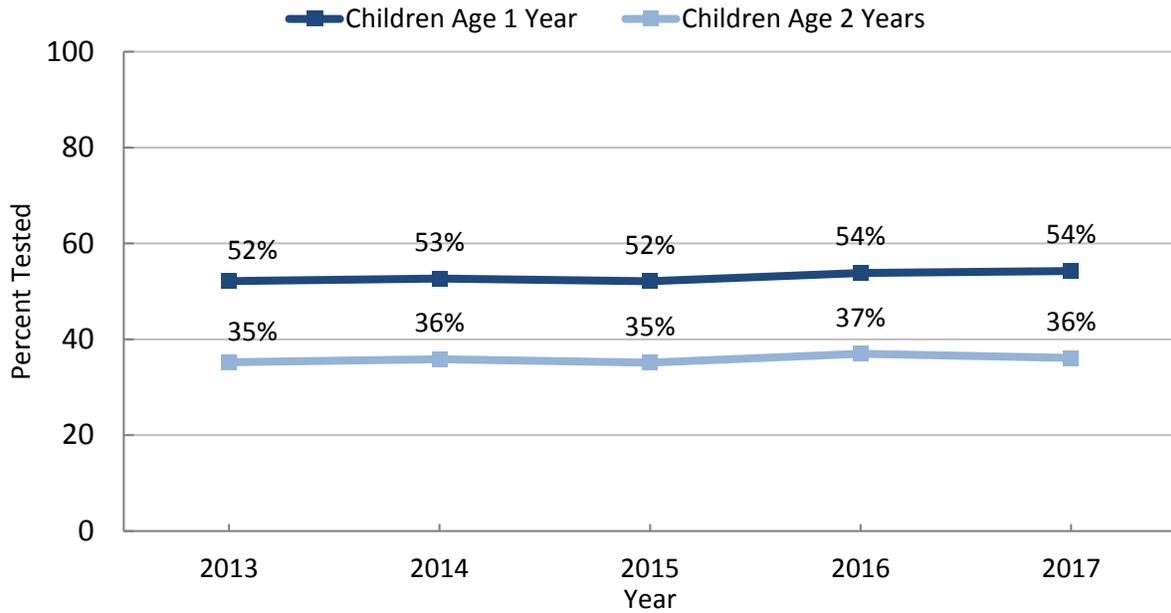


Figure 5: Percentages of one-year-old (12-<24 months) and two-year-old (24-<36 months) children enrolled in MaineCare that were tested for blood lead in the years 2016-2017 (combined), by county

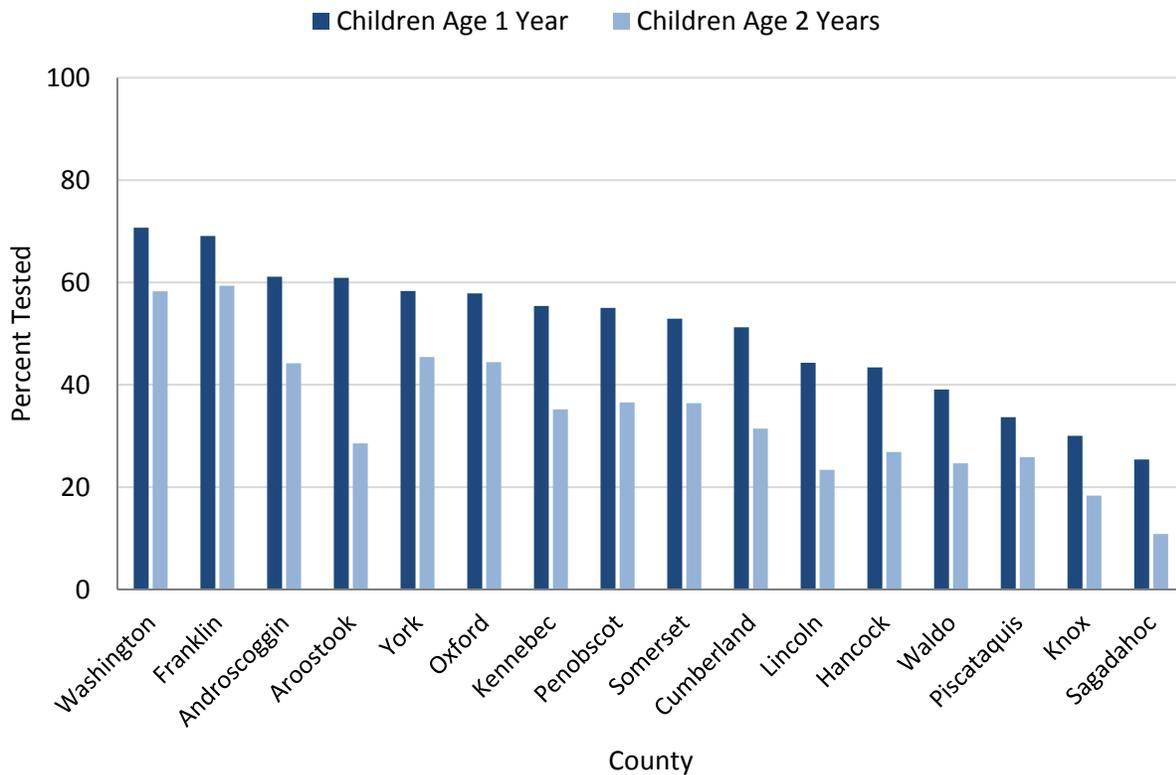
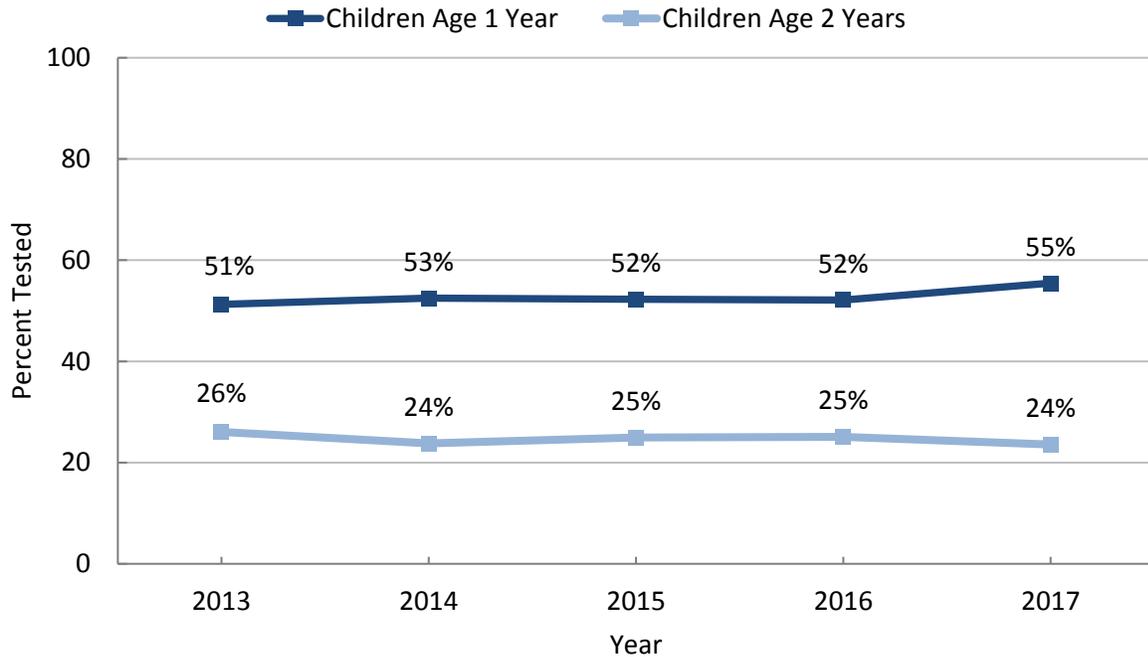


Figure 6: Trends in percentages of one-year-old (12-<24 months) and two-year-old (24-<36 months) children not enrolled in MaineCare tested for blood lead, 2013-2017

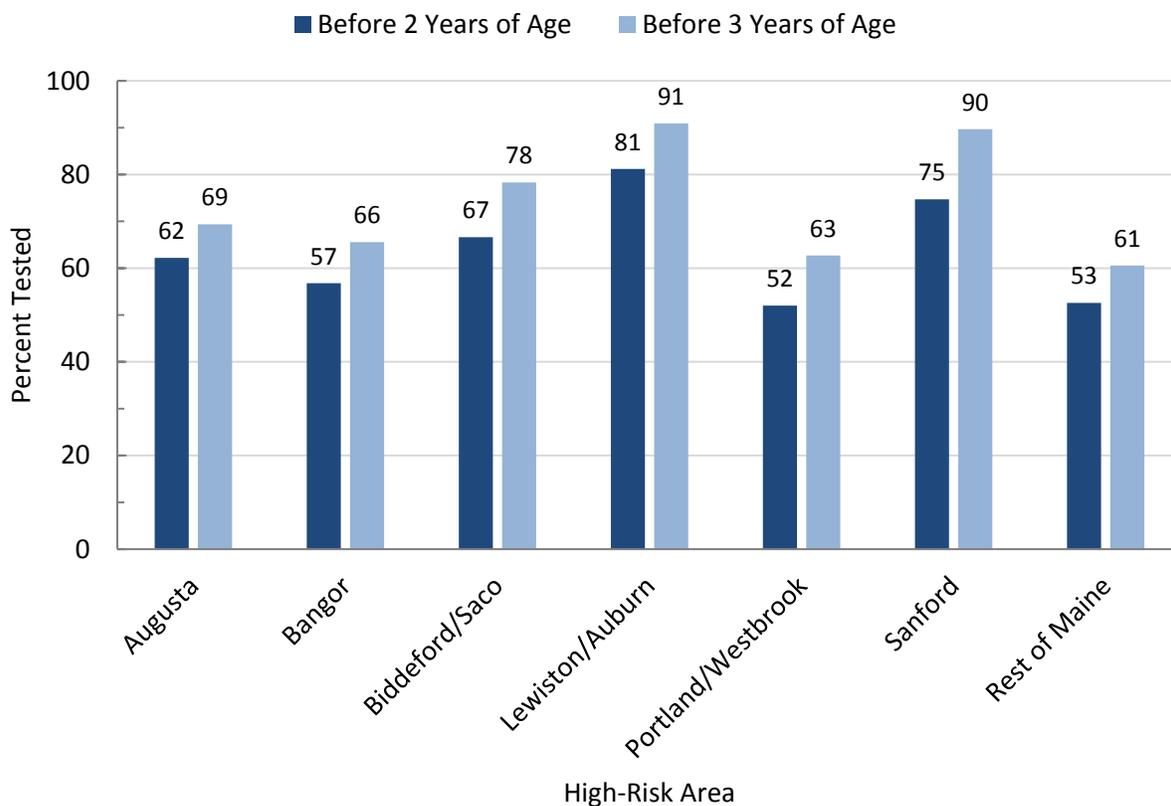


Progress Toward Universal Blood Lead Level Screening in High-Risk Areas

The 2007 Chapter 186 Resolve to Achieve Universal Blood Lead Level Screening of Maine Children directs the Department to “attempt to achieve universal blood lead level screening in high-risk areas” for children 12 to 24 months of age and for children 25 to 72 months of age who have not previously been tested or who have had a change in their risk of exposure. Understanding progress related to the resolve requires looking at blood lead testing data in a different way. To measure progress toward the conditions included in the resolve, the Department tracks blood lead testing among children born in a certain year to see if they have been tested at least once before turning two years old or at least once before turning three years of age.

Using these measures (called birth cohort measures), there is clear evidence of progress in attaining near universal testing of children in some of the identified high-risk areas for childhood lead poisoning in Maine as shown in Figure 7 (see page 29 for a discussion about identifying current high-risk areas). In Lewiston/Auburn, more 80 percent of children born in the year 2014 had their blood tested for lead before turning two years of age, and 90 percent before turning three years of age. Testing rates were nearly as impressive in Sanford, and were also higher in Biddeford/Saco relative to other high-risk areas and the rest of the State.

Figure 7: Percentages of children born in 2014 who were tested for blood lead at least once before age two years or before age three years in high-risk areas and the rest of Maine (i.e., excluding high-risk areas)



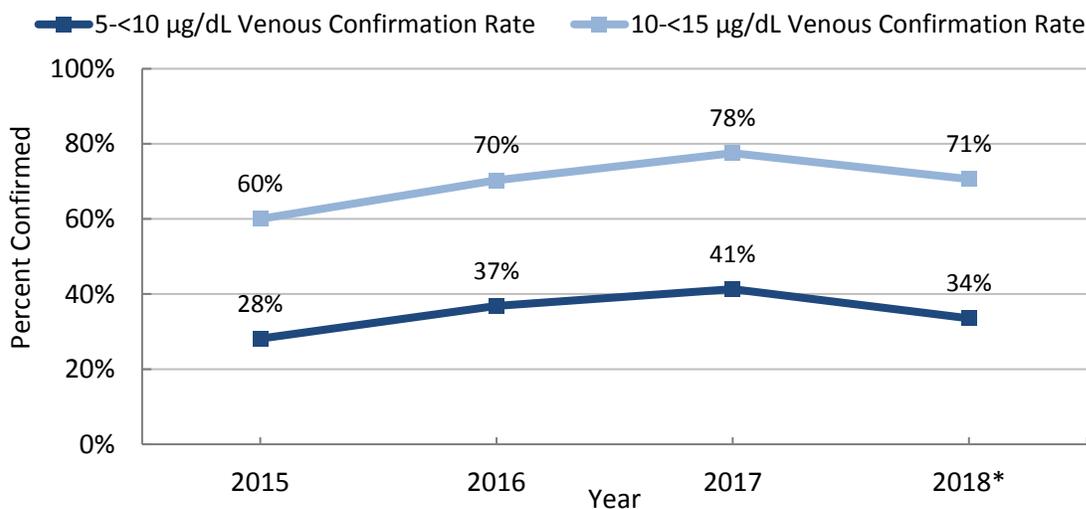
When assessing blood lead testing rates using the birth cohort measures, it is important to note that these measures indicate the percentage of children who have been tested at least once by age three. These measures should not be used to assess compliance with State mandates to test children at age one year and at age two years; testing a child at least once by age three years is not the same as testing a child at age one and two years. In Lewiston/Auburn, where 90 percent of children born in the year 2014 received at least one blood lead test before turning age three years, only about 46 percent of children who were two years old (i.e., 24-<36 months of age) in 2016 received a blood lead test that year.

Confirmatory Testing Rates Affect Numbers of Children with Lead Poisoning

The LPCA defines a lead poisoned child as having a *confirmed* blood lead level equal to or above the U.S. CDC’s blood lead reference level, which is currently 5 µg/dL. This means that the Department only provides services to identify and order the removal of lead hazards found in homes for children with confirmed venous blood lead levels of 5 µg/dL or higher. The Department issued new blood lead screening guidelines in 2015 calling on health care providers to confirm all initial capillary blood lead test results of 5 µg/dL and higher with a venous specimen (see Appendix A for the Department’s blood lead testing guidelines). This was a change from a prior long-standing recommendation to confirm all initial capillary results of 10 µg/dL and higher. The percentage of children with initial capillary test results of 5-<10 µg/dL that are confirmed with a venous specimen (referred to as the venous confirmation rate) is slowly increasing, but remains well below the venous confirmation rate for capillary test results of 10 µg/dL and higher. In 2017, less than 40 percent of capillary test results of 5-<10 µg/dL were confirmed

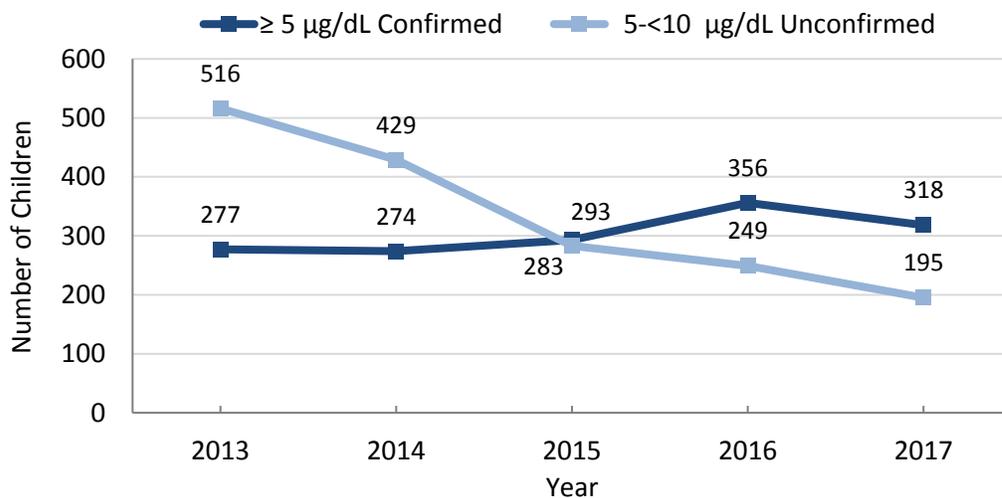
with a venous specimen within the recommended 90 days, as compared to more than 70 percent of capillary results of 10 µg/dL and above (Figure 8).

Figure 8: Trends in venous confirmation rates by initial capillary blood lead level (5-<10 µg/dL and 10-<15 µg/dL), 2015-2018 (*2018 data are through October)



In 2017, more than 13,000 children less than six years of age were tested for blood lead. Of these, 318 children had a venous blood level of 5 µg/dL or higher. Yet another 195 children with capillary blood lead levels of 5-<10 µg/dL did not receive a venous test to determine if they met the statutory definition of lead poisoning. The Department notifies providers of all children in need of venous confirmation testing upon receipt of an initial capillary blood lead test result of 5 µg/dL or higher, but does not currently have a system to send out reminders to providers for all elevated capillary tests. While there has been an increase in the number of children with elevated capillary test results who receive timely venous confirmatory tests (Figure 9), there are still too many children who are not receiving services to inspect their homes for lead hazards because of the failure to obtain a confirmatory test.

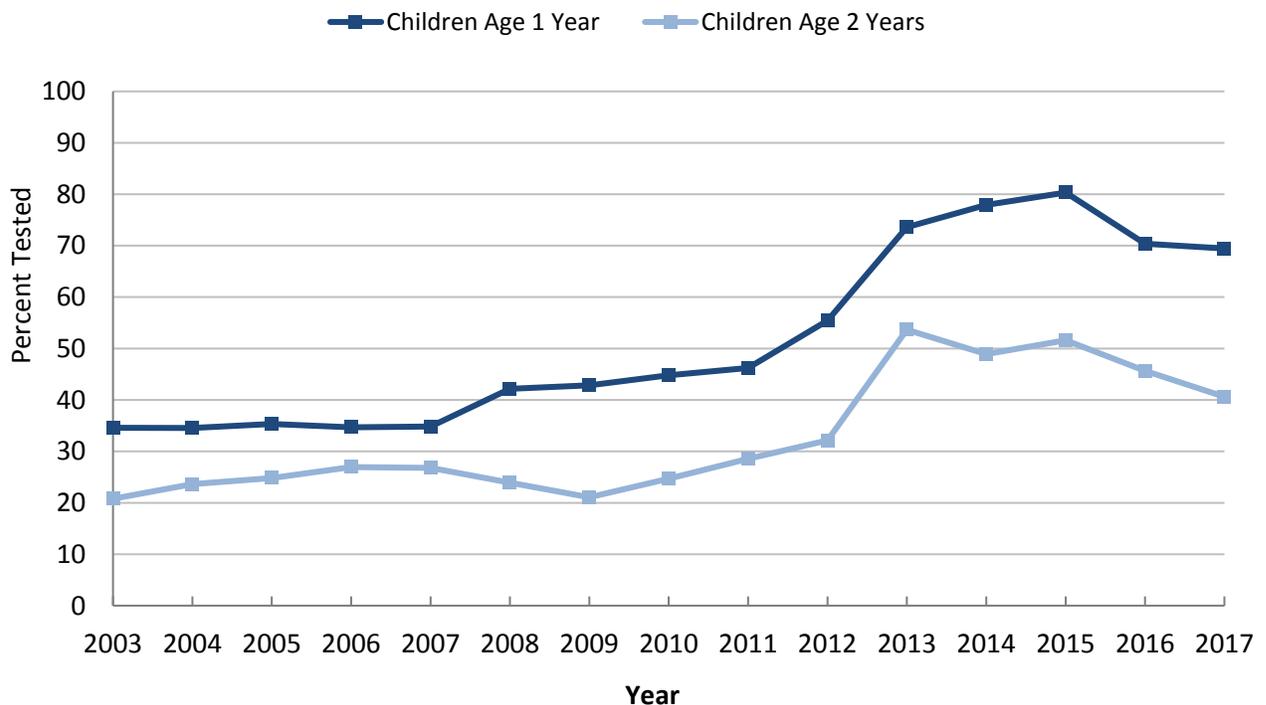
Figure 9: Trends in numbers of children with confirmed venous blood lead levels ≥ 5 µg/dL and unconfirmed blood lead levels 5-<10 µg/dL, 2013-2017



Challenges and Opportunities

The Department has a goal of annually testing 75 percent of one-year-olds enrolled in MaineCare and 50 percent of two-year-olds enrolled in MaineCare for blood lead by the year 2020. Statewide, blood lead testing rates remain low and trends are flat, and therefore it will be a challenge to attain these blood lead testing goals. As discussed above and shown in Figure 6, Washington and Franklin counties have much higher testing rates of children enrolled in MaineCare, demonstrating the Department’s goals are attainable. The Department has also documented a significant increase in blood lead testing rates for all one-year-old children in the span of a few years in the high-risk area of Lewiston/Auburn where testing rates increased from 46 percent in 2011 to between 70 and 80 percent in recent years (Figure 10).

Figure 10: Percentages of one-year-old (12-<24 months) and two-year-old (24-<36 months) children tested for blood lead, Lewiston/Auburn, 2013-2017



The Department believes that the geographic variation in population-level blood lead testing rates are driven by differences in blood lead testing at the individual health care provider practice level. Therefore, increasing testing rates statewide will require individual health care providers and practices to improve blood lead testing among their patients. Improving venous confirmation rates will also require a provider-level solution. To these ends, the Department has been working to improve providers’ knowledge of blood lead testing mandates and venous confirmation guidelines for several years, and in 2019 will launch a module within the State’s immunization registry to give providers and Department staff tools and information to track compliance with blood lead testing mandates and guidelines at the practice level for the first time.

Since 2015, the Department has been educating providers about Maine’s blood lead testing mandates and updated guidelines through mass mailings and presentations at medical conferences such as meetings of the Maine Chapter of the American Academy of Pediatrics. The Department has also provided technical assistance to support a few provider practices that have initiated projects to improve blood lead testing in their patient populations (e.g., through re-vamping work flow related to blood lead testing or the adoption of in-office blood lead testing). The Department has also implemented the 2012 amendments to the LPCA to allow providers to perform in-office blood lead testing using a portable, low-complexity blood lead analysis instrument—previously, all blood specimens were required to be sent to HETL for laboratory analysis of lead content. The objective of in-office blood testing is to provide families with blood lead test results during office visits to reduce any barriers to going to another location to have the blood lead sample drawn and to both discuss the need for and arrange a confirmatory venous test. About one-quarter of all capillary blood lead tests are now analyzed in provider offices.

The Department’s major new initiative to increase blood lead testing rates is to develop a blood lead module that will operate within the State’s existing web-based immunization registry (called ImmPact). Through the blood lead module, providers from the 350 medical practices that currently use ImmPact will be able to track the blood lead testing status of patients, receive and view prompts for patients needing follow-up blood lead tests when viewing immunization information, and electronically submit in-office blood lead test results to the Department. The blood lead module will also allow providers and the Department to run reports to assess blood lead testing rates and venous confirmation rates among practices’ patients. The Department will use these reports to identify and learn best practices from high-performing providers, and identify and offer technical assistance to low-performing providers. The Department will also use these reports to create blood lead testing “report cards” for provider practices, featuring their blood testing rates for one- and two-year-olds as well as confirmatory venous testing rates and comparisons against statewide rates. Providers will be able to access these performance reports within ImmPact, and the Department will distribute them directly to provider offices annually.

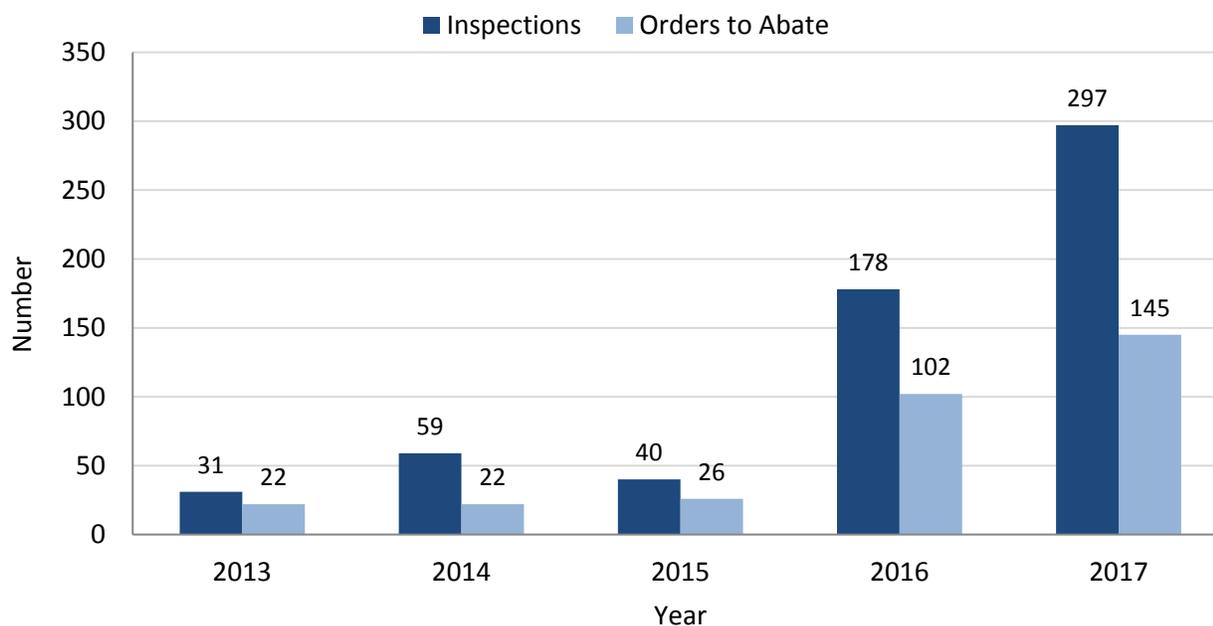
As of January 2019, the Department is working through final testing of the module, and has begun testing the electronic submission of in-office test results with one large pediatric practice. The Department intends to fully deploy the module during the summer of 2019, and issue the first round of provider practice blood lead testing report cards in the fall of 2019.

From Lead-Poisoned Child to Lead-Safe Housing: Inspections and Abatements

As illustrated in Figure 2 (page 13), when a case of lead poisoning has been found in a dwelling unit, Maine’s LPCA requires the Department to inspect all dwelling units in the dwelling for lead hazards (22 MRS § 1320-A).⁶ The Department may, at its discretion, also inspect owner-occupied, single-family residences when a child with lead poisoning has been identified as residing in or receiving care in that residence. If lead hazards are found, the Department must order the owner to abate the hazards.⁷ In the case of owner-occupied, single-family residences, the Department may provide technical assistance instead of enforcement activity.

The 2015 amendments to the LPCA resulted in a lowering of the regulatory blood lead level threshold that triggers the inspection of dwelling units for the presence of lead hazards from a confirmed blood lead level of 15 µg/dL, and in some cases 10 µg/dL, to 5 µg/dL. This decrease in the threshold resulted in a seven-fold increase in dwelling units inspected and a six-fold increase in dwellings under orders to abate identified lead hazards (Figure 11). In 2017, 297 dwelling units were inspected for lead hazards, resulting in orders to abate lead hazards for 145 dwellings. An additional 571 units were inspected because of the statutory requirement to inspect *all* dwelling units in a dwelling when a lead poisoned child is found in any one dwelling unit. Inspections in these additional units resulted in orders to abate lead hazards in 163 dwellings units. All combined, in 2017 the Department inspected 869 dwelling units for lead hazards and issued orders to abate lead hazards for 308 dwelling units (Figure 12).

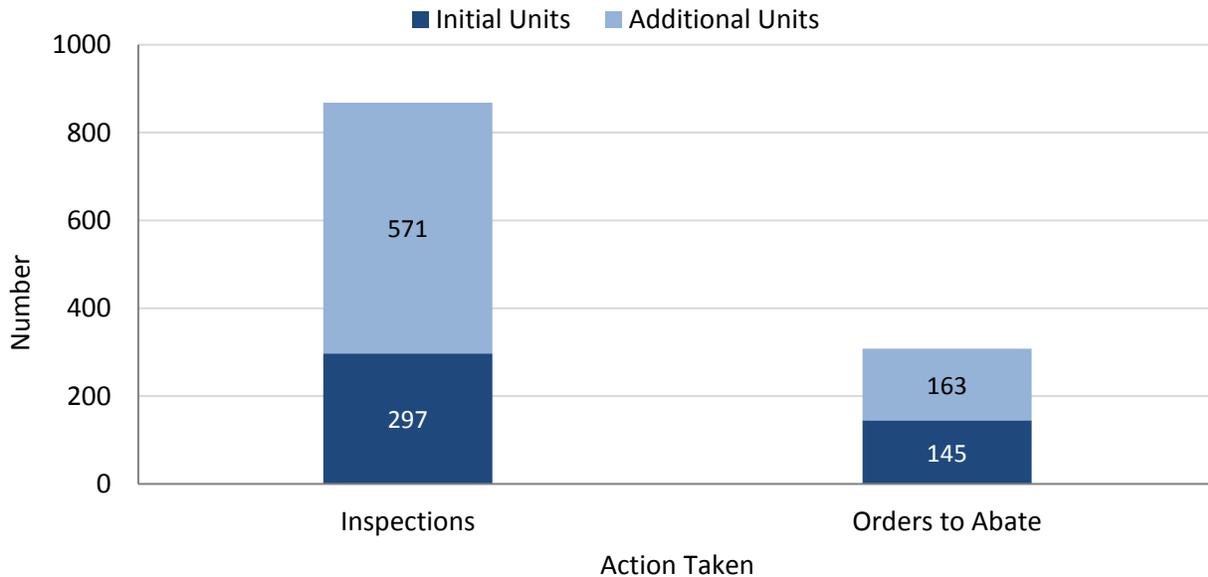
Figure 11: Numbers of dwelling units inspected for lead hazards and with orders to abate lead hazards in response to children identified with lead poisoning in the years 2013-2017



⁶ Under the LPCA, “dwelling” means a structure, all or part of which is designed or used for human habitation, including a dwelling unit (22 MRS § 1315(2)), and “dwelling unit” means any room, group of rooms, or other areas of a structure designed or used for human habitation (§ 1315(3)).

⁷ “Lead abatement” means any measure or set of measures designed to permanently (for at least 20 years) eliminate lead-based paint hazards (§ 1315(4-B)).

Figure 12: Total number of dwelling units inspected and total number of dwelling units with orders to abate in 2017



New Enforcement Authority

While most landlords and managers of properties under an abatement order cooperate with the Department, some do not. It can sometimes take many months if not years to get landlords to abate lead hazards. The 2015 amendments to the LPCA gave the Department the ability to assess administrative penalties for violations of the Act. The penalties can be up to \$500 per violation, per day, and can be administered directly by the Department. Prior to this amendment, the Department could only enforce violations through a court-ordered fine of not more than \$500 per violation of a section of the Act, or by imprisonment for not more than six months, or by both.

Under its new authority to assess administrative penalties, the Department has initiated 26 enforcement actions against property owners, mostly for failure to make timely progress on orders to abate identified lead hazards or for renting a vacant unit before abatement activity is completed. To date, the Department has collected \$4,275 in penalties and has \$137,375 in outstanding fines that may require assistance from the Attorney General’s office to collect. The Department believes having this new enforcement authority has improved landlord responsiveness to orders to abate hazards.

Challenges and Opportunities

The major increase in inspection services has required the ongoing appropriation of increased funding. The funding has been needed to pay for the following:

- Expanded contractual services of licensed environmental lead inspectors who conduct the inspections of dwelling units for lead hazards;
- Increased laboratory costs for the analysis of lead samples (dust, soil, water) collected during inspections; and
- Five additional Department staff positions (environmental lead inspection coordinators) to review inspection reports, issue orders to abate lead hazards, determine if it is safe for a child to remain in the home while awaiting abatement of lead hazards, and provide technical assistance to landlords, tenants, and homeowners.

Current appropriations have been adequate to carry out these services. LPPF resources have supported other costs associated with this expansion of services, including the purchase of a new instrument for HETL to increase the number of samples that can be analyzed in a day and to allow the older instrument to serve as a back-up to avoid disruption of services should there be an equipment failure.

The Department's existing resources could be challenged should the annual number of children newly identified as lead poisoned significantly increase. There are two ways that an increase in newly identified lead poisoned children will occur. If the Department is successful in significantly increasing blood lead testing rates as described in the prior section of this report, more children will be identified with lead poisoning and more dwelling units will subsequently require inspection services and orders to abate lead hazards. More lead poisoned children will also be identified if the Department is successful in increasing the number of children that receive venous confirmation blood lead tests.

The number of newly identified lead poisoned children will also increase if U.S. CDC adopts a new, lower blood lead reference level. Maine's statutory definition of a lead poisoned child is directly linked to the U.S. CDC blood lead reference value, which itself is based on the 97.5th percentile blood lead level in a random sample of U.S. children age one to five years. U.S. CDC is currently considering an update of their blood lead reference level from 5 µg/dL to 3.5 µg/dL, as more recent survey data of blood lead levels in U.S. children indicate the estimated 97.5th percentile of blood lead levels is 3.5 µg/dL.⁸ If the U.S. CDC adopts a new blood lead reference level of 3.5 µg/dL, the Department will be required by statute to amend rules to lower the blood lead threshold for identifying a lead poisoned child. The Department estimates that lowering the blood lead threshold from 5 µg/dL to 3.5 µg/dL could double the current caseload of children identified as lead poisoned which would pose a significant challenge to the Department without additional resources.

Finally, the Department could see an increase in orders to abate lead hazards and requests for technical assistance when thresholds for identifying lead dust hazards are lowered. In July 2018, the U.S. Environmental Protection Agency (EPA) proposed lowering its standards used to identify lead dust hazards in homes to match the U.S. Department of Housing and Urban Development (HUD) current lead dust action levels.⁹ Current U.S. EPA dust-lead hazard standards (i.e., the standards used by the Department) are 40 micrograms of lead per square foot (µg/ft²) for floor surfaces and 250 µg /ft² for windowsill surfaces. U.S. HUD lead dust action levels are 10 µg /ft² for floors and 100 µg /ft² for windowsills. Adoption of the lower lead dust standards is expected to result in only a modest increase in dwelling units found with lead hazards in Maine, which in turn would result in a modest increase in the number of orders to abate. In a recently published study of the results from inspections of homes of lead poisoned children in Maine, 79 percent of dwelling units inspected had lead hazards using the current U.S. EPA standards, versus 86 percent when using the U.S. HUD action levels.¹⁰ The Department therefore anticipates only a minor fiscal impact related to the changes to the U.S. EPA standards as currently proposed.

⁸Caldwell K.L., Cheng P.Y., Jarrett J.M., Makhmudov A., Vance K., Ward C.D., Jones R.L., Mortensen M.E. Measurement Challenges at Low Blood Lead Levels. *Pediatrics*. 2017;140(2):e20170272. <https://www.ncbi.nlm.nih.gov/pubmed/28771411>

⁹ <https://www.federalregister.gov/documents/2018/07/02/2018-14094/review-of-the-dust-lead-hazard-standards-and-the-definition-of-lead-based-paint>. Accessed December 19, 2018.

¹⁰Cluett R., Fleisch A., Decker K., Frohberg E., Smith A.E. Findings of a Statewide Environmental Lead Inspection Program Targeting Homes of Children with Blood Lead Levels as Low as 5 µg/dL. *Journal of Public Health Management and Practice*. 2019;25:S76-S83. https://journals.lww.com/jphmp/Fulltext/2019/01001/Findings_of_a_Statewide_Environmental_Lead.13.aspx

Lead Dust Testing: Identifying Lead in Homes Before Children are Poisoned

The major provisions of the LPCA are focused on identifying and removing lead hazards in residences to create lead-safe housing and ultimately eradicate childhood lead poisoning. Currently, the process of identifying lead hazards in homes is driven primarily by first identifying children with lead poisoning through blood lead testing and then inspecting their homes. However, the LPCA also contains provisions that allow the Department to inspect homes where there are lead-based substances without first identifying cases of lead poisoning in those homes (see Figures 2 and 3, page 13).

As lead dust is considered the most common cause of lead poisoning in young children, the Department provides free, do-it-yourself lead dust tests to families with children at risk for lead poisoning to identify homes with lead-based substances before children are poisoned. The Department uses LPPF resources to pay for the costs of these home lead dust tests as “identification of lead sources” is one of the stated prevention purposes of the LPPF (22 MRS 1322-E(3)(C)).

There are two major ways the Department makes these preventative lead dust tests available to families: through an annual targeted mailing to all Maine families with one-year-old children, and through a partnership with the Department’s Maine Families Home Visiting Program. In 2018, the Department provided the Committee with a report of its findings following a yearlong pilot study to determine the feasibility of conducting preventative lead dust testing via Maine Families home visitors. (The two-page brief of that report is included in this report as Appendix B.) In short, the pilot study demonstrated that both of the Department’s lead dust testing initiatives find lead dust in about 25 percent of homes tested and have similar costs to find one unit with elevated lead dust at \$211 through Maine Families and \$280 through the targeted mailing. The pilot also revealed that 80 percent of families that do a home lead dust through the Maine Families Home Visiting Program lived in rental units, compared to only 40 percent of families who tested through the targeted mailing, making these two initiatives complementary to each other. In 2017, families conducted 222 lead dust tests in homes through these two initiatives combined; updates on each initiative as well as a discussion of the Department’s efforts to scale up both initiatives follow.



Above: Home lead dust testing involves taking samples of a square foot area of two floor surfaces (shown here) and a windowsill which are analyzed at HETL to see if there is any lead dust present in the samples.

Lead Dust Testing through a Targeted Mailing

Since 2009, the Department has annually mailed an offer to receive a free, do-it-yourself lead dust test to all households with children who were born in the prior calendar year (11,000 to 13,000 families per year). Families can request a free lead dust test through a postage-paid reply card or through an online form. The Department provides families with the test kit, instructions, and online how-to videos in

English and Somali to help families perform the lead dust test.¹¹ In addition to the targeted mailing, families with young children who live in older housing may request a free home lead dust test kit at any time through the online form, or through brochures distributed through partner organizations or at some healthcare provider offices. To date, more than 1,500 households have completed a test for lead dust through the targeted mailing and these other distribution methods, with 134 households tested in 2017.

Lead Dust Testing through Maine Families Home Visiting Program

In 2012, the Department began what it calls facilitated lead dust testing specifically to help families who may have had trouble accessing its targeted mailing lead dust testing offer. When a lead dust test is facilitated, a trained facilitator assists a family with doing a lead dust test, ensures the test is mailed to the laboratory for analysis, and may help a family understand the test results. The Department partners with the Maine Families Home Visiting Program to provide facilitated lead dust tests to families enrolled in the program who may be at risk for lead poisoning (i.e., live in pre-1950 housing). In the 12 months since completing a pilot to assess the feasibility of this partnership in November 2017, 118 families have completed lead dust tests through Maine Families.

What happens if a family finds a high level of lead dust in their home?

Once a family completes a home lead dust test either through the targeted mailing or with the support of a Maine Families home visitor, staff of the Maine CDC's Childhood Lead Poisoning Prevention Unit communicates results to families and provides appropriate follow up, including teaching a family how to properly clean up lead dust and providing a free lead dust re-test to ensure that the cleaning was effective. For families that identify very high lead dust levels, the Department will provide a professional, comprehensive environmental lead inspection, to determine if the home has lead hazards that are in need of abatement.¹² A total of 56 homes that were tested through the targeted mailing and partnership with the Maine Families Home Visiting Program found high levels of lead dust, and 19 of those had levels so high they were referred for a professional environmental lead inspection.

Challenges and Opportunities

The Department inspects far fewer homes as a result of these lead dust testing initiatives as compared to the number of homes it inspects after identifying a child with lead poisoning. Yet, home lead dust testing is a cost-effective method of identifying dwelling units with high levels of lead dust. The Department's approximate per unit cost to identify a dwelling unit with high lead dust levels through the targeted mailing and other mass media vehicles (web site, partner activities, provider offices) is \$280, and it is \$211 through the partnership with the Maine Families Home Visiting Program.

Scaling up home lead dust testing through these vehicles is a challenge. Annually, between 1.5 and 3 percent of households that receive the targeted mailing request a free lead dust test kit. Response rates in this range meet commercial marketing benchmarks of success for direct mail response. However,

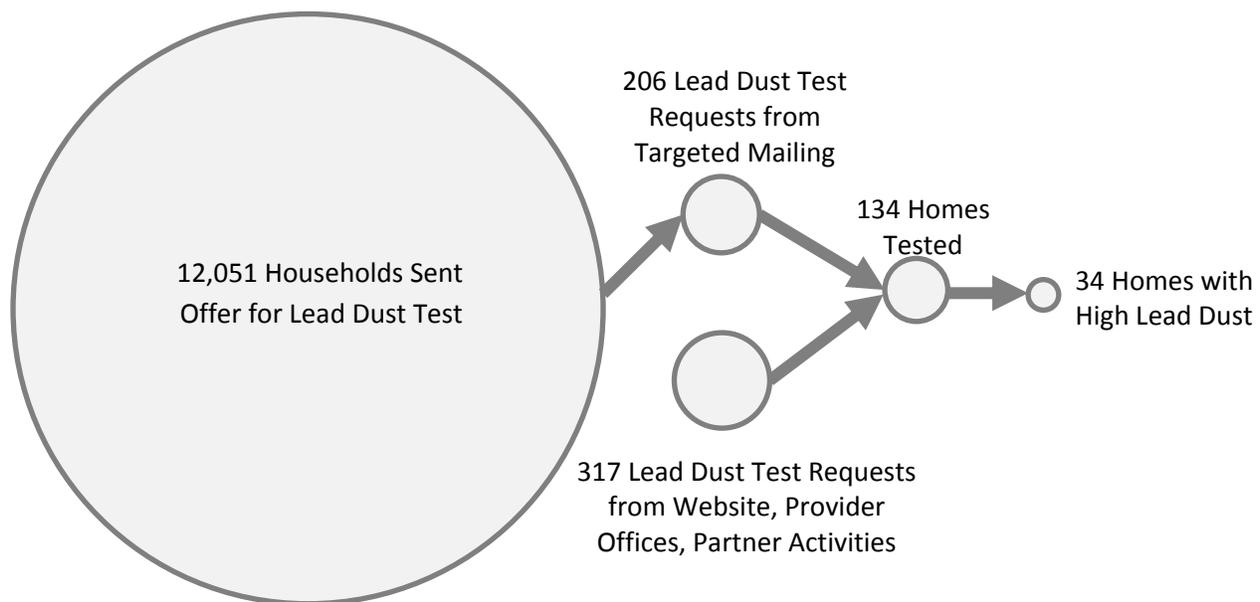
¹¹ Videos are available on the Maine CDC YouTube channel at https://www.youtube.com/playlist?list=PLuTLj1WGRICIoIPBpI2aX0_EWIC_tZHB2.

¹² Until 2019, for its home lead dust tests, the Department had set 200 µg/ft² on a floor or 2000 µg /ft² on a windowsill as the concentration thresholds above which the Department will conduct a comprehensive, professional inspection for lead hazards. This threshold was set prior to the recent expansion of environmental lead inspection staff when the Department only had resources to coordinate additional inspections in units where children were thought to be in imminent danger. Beginning in 2019, the Department will offer inspections to families with lead dust levels of 40 µg /ft² on floors and 250 µg /ft² on windowsills.

responses to the Department’s annual targeted mailing have been declining in recent years, with the lowest response to date occurring in 2017 when only 206 households requested a lead dust test kit (Figure 13). In 2018, the Department doubled the mailing to include all households with children born in the prior two calendar years, sending out offers for a free lead dust test to more than 22,000 households throughout the State in October 2018. Doubling the mailing provides parents of two-year-olds a second chance to participate in the lead dust testing offer as they received the mailing the prior year when their child was a one-year-old. Preliminary results indicate that this doubling has only yielded a 40 percent increase in the number of lead dust tests requested over the number requested from the 2017 mailing, suggesting there may be diminishing returns associated with a repeated mailing in consecutive years.

In summer of 2018, the Department conducted a pilot paid social media campaign to promote lead dust testing to families with young children who live in pre-1950 housing. During the pilot campaign, the Department spent about \$2,700 on Facebook advertisements targeted to parents of young children in Maine and received 66 test kit requests. In 2019, the Department will have final results of its social media pilot and expanded targeted mailing and will use these results to determine the most effective avenues for scaling up home lead dust testing through mass media and partner activities.

Figure 13: Results from calendar year 2017 showing the number of homes with high levels of lead dust ($\geq 40 \mu\text{g}/\text{ft}^2$ on floors or $\geq 250 \mu\text{g}/\text{ft}^2$ on windowsills) found through the Department’s targeted mailing, website, and partner activities



It has also been a challenge to scale up facilitated lead dust testing efforts, with only modest increases in the number of homes tested in 2018 (118) over the yearlong pilot period (91). The low volume of testing is likely due to competing priorities and needs of families participating in the Maine Families Home Visiting Program. Home visitors work with families to identify needs and priorities and make decisions about if and when to do a home lead dust test. Some families may choose not to do a home lead dust test if they are concerned that it will result in eviction.¹³ The Department is working with the Maine Families Home Visiting Program to provide in-person trainings for home visiting agencies that had a lower volume of testing and will be exploring facilitated lead dust testing partnerships with other agencies and programs that provide home-based services to young children and families.

¹³ Under the LPCA, a family with children may not be evicted due to the discovery of lead-based paint in a rental unit (22 MRS § 1322). However, if the tenant is in breach of their lease agreement or is behind in rent payments the landlord may have cause for eviction. Home visitors discuss the potential impact conducting a lead dust test may have so that families may make an informed decision about doing a lead dust test.

Primary Prevention: Community Contracts, Ongoing Media Campaign, Lead-Safe Housing Registry

Community Contracts in High-Risk Areas

The LPCA specifies that resources from the LPPF must be allocated for specific prevention purposes, including for contracts to support “community outreach programs to enable the public to identify lead hazards and take precautionary action to prevent exposure to lead” (22 MRS § 1322-E(3)(A)). Based on this directive, the Department has been providing contracts to community-based organizations in areas at high-risk for childhood lead poisoning for the past 10 years.

In 2016, the Department updated its prior identification of high-risk areas for childhood lead poisoning. This was done by analyzing the distribution of children with blood lead levels of 5 µg/dL and above among Maine towns, using data covering the years 2010-2014 for children less than three years of age (i.e., the children most at risk for childhood lead poisoning). Based on this new analysis, the Department selected the five municipalities or contiguous municipalities with the greatest number of children with lead poisoning as high-risk areas (Table 1). This updated analysis showed that Lewiston/Auburn, Portland, Biddeford, Bangor, and Augusta are the top high-risk areas.

Table 1: Top ten Maine towns with the highest estimated numbers of children age 0-3 years with blood lead levels (BLLs) of 5 µg/dL or higher, 2010-2014¹⁴

Town	Number of Children Tested for Blood Lead	Estimated Number of Children with BLLs \geq 5 µg/dL	Estimated Percent of Children with BLLs \geq 5 µg/dL among Children Tested
1. Lewiston	2,891	261	9.0
2. Portland	3,049	176	5.8
3. Auburn	1,433	97	6.7
4. Biddeford	1,614	87	5.4
5. Augusta	944	65	6.8
6. Bangor	1,907	63	3.3
7. Sanford	1,242	57	4.6
8. Waterville	924	50	5.4
9. Skowhegan	644	48	7.4
10. Westbrook	789	40	5.1

In January 2017, the Department competitively awarded new contracts to community-based organizations in these five high-risk areas, providing \$35,000 annually to each organization (Table 2). The Department can renew these contracts through the year 2021. In the high-risk areas of Portland, Biddeford, and Augusta, community-based partners are also providing services to the nearby communities of Westbrook, Saco, and Gardiner, respectively, all of which are in the top 15 towns with the highest numbers of children with lead poisoning.

¹⁴ Data on lead poisoning burden and rates for Maine towns, including data for the most recent time period (2013-2017), are available on the Maine Tracking Network, <https://data.mainepublichealth.gov/tracking>.

Table 2: Community-based organizations under contract with the Department for lead poisoning prevention activities in high-risk areas

High-Risk Area	Community Partner
Augusta/Gardiner	Healthy Communities of the Capital Area
Bangor	City of Bangor, Public Health Department
Biddeford/Saco	Coastal Healthy Communities Coalition
Lewiston/Auburn	Healthy Androscoggin
Portland/Westbrook	City of Portland, Division of Public Health

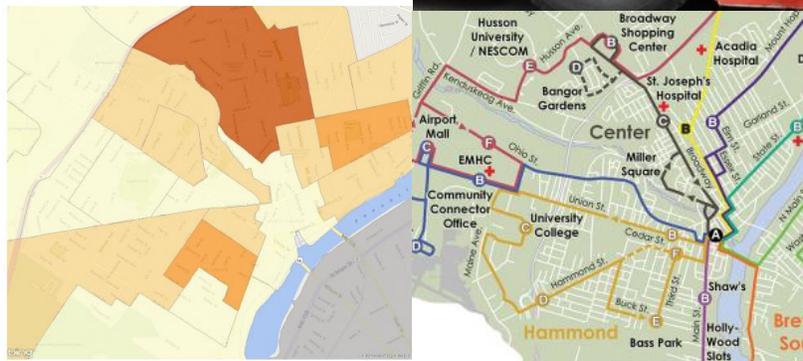
The overall goal of the contracts in high-risk areas is to create a community-based system that: a) targets at-risk populations and the causes of childhood lead poisoning; b) promotes increased blood lead testing; and c) ultimately contributes to decreases in the number of children identified with lead poisoning in each high-risk area. Through these contracts, Maine CDC has created a targeted health promotion strategy that requires each community partner to develop local collaborations and partnerships, conduct local mass and small media campaigns, and provide direct interpersonal contacts to raise awareness about lead poisoning prevention among local property owners, parents, health care providers, and decision-makers. These strategic components were selected because they are evidence-based recommendations of the U.S. Community Preventive Services Task Force for creating changes in community health.¹⁵ Within these components, the Department works with each partner to develop a work plan with specific activities and performance measures based on the needs and assets in each community.

Partners typically work with local agencies and organizations such as public libraries, service clubs, child care providers, health care providers, public health nurses, community outreach workers, trained peer educators, and landlord associations to provide information to families and local property owners during events and classes, and through neighborhood networks. Partners also use local mass media channels (public transit, print, broadcast) to promote lead poisoning prevention and blood lead testing.

Right: The Department’s community partner in Bangor promotes lead poisoning prevention messages by placing ads on buses that service routes in high-risk neighborhoods.



Estimated Number of Children with a Blood Lead ≥ 5 ug/dL by Census Block Group, Bangor, Maine 2003-2007 Age Group: 0-36 Months



¹⁵ Community Preventive Services Task Force. 2014. What Works: Health Communication and Social Marketing. <http://www.thecommunityguide.org/about/What-Works-Health-Communication-factsheet-and-insert.pdf>

Following are highlights of community-based activities conducted by partners in each of the high-risk areas over the past two years, including examples of the partners' efforts to build broad local support within their municipal governments and among other stakeholders to address childhood lead poisoning.

Augusta/Gardiner

- Established a Lead Poisoning Prevention Advisory Coalition made up of representatives of local government, early childhood, and housing service provider agencies to share resources and provide information about ways agencies can promote lead poisoning prevention and blood lead testing
- Partnered with the Augusta Housing Authority to send mailings to landlords of subsidized rental units in Augusta with information about lead poisoning prevention
- Distributed information about lead-safe work practices to property owners and contractors along with building permits issued by the City of Augusta and City of Gardiner for pre-1978 residences
- Trained childcare providers, staff of local WIC clinics, and Maine Families home visitors about lead poisoning prevention

Bangor

- Participated on the Housing Task Force, convened by the City of Bangor to look at housing and housing quality issues, including the issue of lead poisoning, in the city
- Conducted a direct mailing to more than 300 local property owners who redeem vouchers through Bangor's General Assistance and Shelter Plus Care programs
- Developed a partnership with the local WIC clinic and Bangor Public Health Nurses to provide clients with lead poisoning prevention resources, including lead dust cleaning kits and instructions

Biddeford/Saco

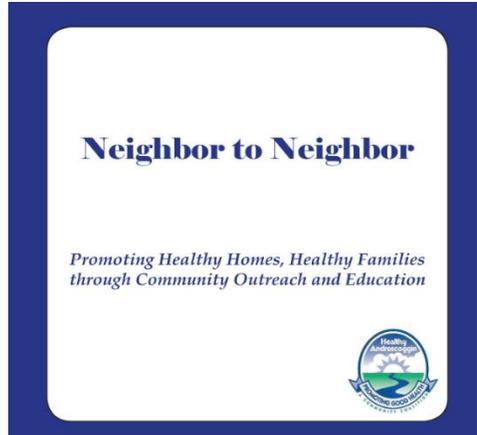
- Partnered with the Biddeford Housing Authority to revive Biddeford's inactive landlord association in order to provide a forum for landlords to learn about lead and other issues
- Joined Biddeford's Neighborhood Planning Committee to ensure lead in housing is included in any discussions; the committee includes representatives from the City's departments of Community Development, Planning, Police, Parks and Recreation and is focused on safe, healthy, affordable housing
- Joined the steering committee of BiddefordReady!, a community-based network of stakeholders focused on improving school readiness for young children to advocate for lead poisoning prevention and the need for blood lead testing
- Ran public service advertisements before movies at two local movie theaters

Lewiston/Auburn

- Served as a member of the City of Lewiston's Public Health Committee and the Rental Registration and Inspection Program Sub-committee charged with making recommendations to the City Council on ways to improve housing quality and safety
- Provided support to the City of Lewiston for the successful application for funding through the U.S. HUD Lead Hazard Control Grant Program to provide funding to local landlords to abate lead hazards
- Served in a leadership role on the Healthy Neighborhoods Planning Council
- Partnered with the City of Lewiston to host housing forums to educate landlords about lead and other issues affecting rental properties

- Received a U.S. EPA Environmental Justice Collaborative Problem Solving grant to work on building a network of local landlords to address lead poisoning and healthy homes issues
- Established a system of peer (neighbor-to-neighbor) education about lead poisoning prevention among New Mainers through which trained community members educate their neighbors and friends about lead poisoning
- Partnered with a local health care practice to assess blood lead testing data captured through electronic medical records and develop solutions to improve blood lead testing

Below: The Department’s community partner in Lewiston/Auburn provides flip books to trained community members who use them to educate neighbors about lead poisoning.



Portland/Westbrook

- Established a Lead Poisoning Prevention Committee to bring together representatives from the City of Portland, the City of Westbrook, local service provider agencies, and health care providers to identify and implement lead poisoning prevention activities throughout the high-risk area
- Partnered with the City of Portland’s program that administers the city’s U.S. HUD Lead Hazard Control Grant to educate property owners about the assistance available to landlords through the grant
- Sent a letter from the City of Portland’s Director of Public Health to local pediatric and family practice health care providers to encourage improvements in blood lead testing in the high-risk area
- Partnered with City of Portland’s Maternal and Child Health nurses to educate families that receive visits from the nurses about lead poisoning prevention and blood lead testing
- Provided training to staff of local child care providers, agencies that provide home-based services for families, agencies that provide services to immigrants, and Head Start so they can identify families with children who may be at risk for lead poisoning and refer them to prevention resources



Ongoing Multimedia Campaign

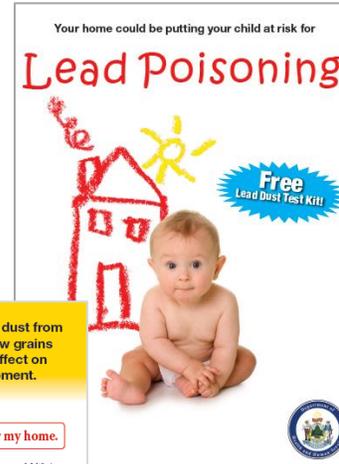
The LPCA includes directives for the Department to carry out mass media activities, including:

- An ongoing lead poisoning prevention major media campaign (22 MRS § 1322-E(3)(B) and 1317(B));
- Targeted educational mailings to families on how to identify and prevent exposure to potential lead hazards and the importance of blood lead testing (§1322-E(3)(C)); and
- Provision of posters and brochures on the dangers of painting and removal of old paint in pre-1978 homes to retailers and stores that offer paint and paint removal supplies (§1329).

Using the LPPF, the Department has operationalized these mandates through the following activities. Figure 14 shows the reach of these activities for the year 2017.

Online and Print Resources: The Department maintains a set of web pages and tipsheets on a range of lead poisoning prevention topics (e.g., risk factors and causes of lead poisoning, how a blood lead test is done, how to look for lead hazards, how to keep children away from lead, how to prevent bringing lead home from jobs that involve working with lead, etc.) and tailored for a range of audiences (e.g., parents and landlords). The website also includes extensive information for providers on blood lead testing and follow-up guidelines, as well as resources for providers interested in requesting approval for in-office blood lead testing. In 2017, there were 11,650 pageviews of the Department’s lead poisoning prevention web pages.

Annual Targeted Mailing: Since 2009, the Department has annually mailed a brochure with an offer to request a free lead dust test kit to all households with children born in the prior calendar year. Since the beginning of the targeted mailing, the Department has mailed the brochure to more than 123,000 Maine families. The brochure encourages families to identify if their children are at risk for lead poisoning and includes a postage paid reply card and link to an online order form which families can use to request additional information about lead poisoning and a free lead dust test. Through the targeted mailing, the Department has distributed more than 6,000 requested tipsheets about various aspects of lead poisoning prevention. In 2018, the Department expanded the targeted mailing to reach parents of children born in the two prior calendar years (i.e., households with one- and/or two-year-olds). The free lead dust test promoted through targeted mailing is also one of the key ways that families can identify lead dust problems in their homes before children are poisoned. (For more on this aspect of the targeted mailing, see the section of this report on lead dust testing efforts, page 25.)



It only takes a very small amount of dust from lead paint—about as much as a few grains of sand—to have a very serious effect on your child’s growth and development.

For more information, return this card or order online: maine.gov/healthyhomes

Send me a free lead dust test kit for my home.

Send me information on (check as many as you would like):

- Testing my child for lead.
- Having my home inspected for lead.
- Learning about lead-safe home renovation or repair.
- Learning about other sources of lead such as soil, toys and old painted furniture.
- Learning how to protect my family from lead because my job involves painting or house repair.

Your Name: _____
Mailing Address: _____

This information will be used to help prevent childhood lead poisoning in Maine, and only for that purpose.

Please tear off this card and drop it in the nearest mailbox or order online: maine.gov/healthyhomes

**Left and Above:
The Department’s
targeted mailing
brochure with
offer for a free
lead dust test.**

To support the targeted mailing and the families that request a free lead dust test through the mailing, the Department created a YouTube video that show families how to perform a lead dust test.¹⁶ The video is available in English and Somali. In 2017, the videos had a combined total of 7,539 views.

¹⁶ Videos are available on the Maine CDC YouTube channel at https://www.youtube.com/playlist?list=PLuTLj1WGRICIoIPBpl2aX0_EWIC_tZHB2.



Pilot Social Media Advertising Campaign: In the summer of 2018, the Department conducted a pilot paid advertising campaign on Facebook. The pilot campaign was designed to assess the effectiveness of using Facebook to promote lead poisoning prevention knowledge among parents of children at risk for lead poisoning and get them to order lead dust tests. Over the course of the pilot, the Department spent about \$2,700 to post ads on Facebook. The ads reached a total of 75,000 people, and resulted in a 23 percent increase in traffic to the Department’s lead poisoning web pages, as well as 66 orders for lead dust tests. The Department will build on the pilot campaign to explore ways to use social media as part of its ongoing major media campaign and lead dust testing initiatives.

Left: Facebook advertisement used during the pilot social media campaign

Poster and Brochures for Hardware Stores: As per the LPCA (22 MRS § 1329), the Department provides posters and brochures for retailers and stores that sell paint and paint removal supplies to display. The poster and brochure are designed to educate families embarking on home, do-it-yourself projects about the dangers of sanding, scraping, and disturbing old lead-based paint. Originally distributed to stores statewide in 2010, the Department’s community-based partners check stores in each high-risk area to see if the stores have materials and educate them about the State law requiring them to display the materials. The Department replenishes materials by request for stores outside of the high-risk areas.

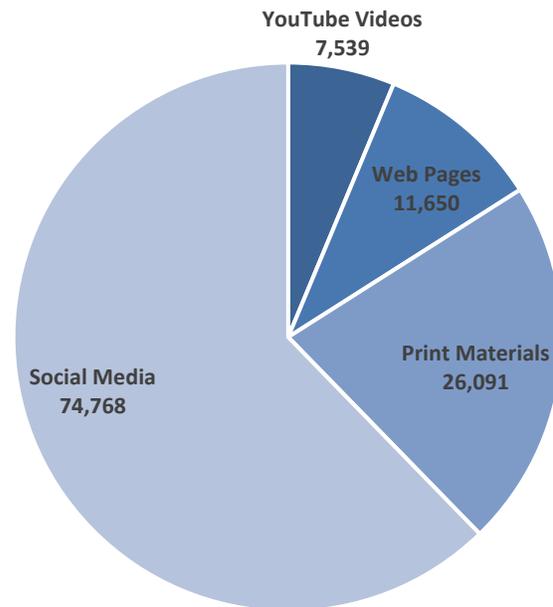
Lead-Safe Housing Registry

The LPCA includes directives to allocate funds from the LPPF to the Department of Environmental Protection (DEP) to implement a lead-safe housing registry (22 MRS § 1322-E(3)(G)). In 2012, DEP established the registry within an existing tool, MaineHousingSearch.org, an online rental housing listing and search site funded jointly by Maine State Housing Authority, Maine DHHS, 211, DEP, and the Breathe Easy Coalition. Through MaineHousingSearch.org, property owners can include information about lead in units listed on the site by choosing one of three lead-safe status categories. People searching for rental housing can search for units using these categories. Each year visitors to the site conduct about 200 searches using the lead status categories. As of October 2018, there were 1,035 units listed on the site with one of the three lead-safe categories designated. The DEP has expressed interest in transferring ongoing responsibility for administering the registry to the Department.



Above: Poster and brochure required to be posted in stores that sell paint or paint removal supplies

Figure 14: Number of people reached through multimedia campaign components in 2017



Challenges and Opportunities

The Department, with input from an Advisory Board, continues to evaluate how to most effectively use the resources of the LPPF. Currently, the Department is assessing whether or not to expand community-based prevention in high-risk areas, and working to scale up its lead dust testing and media campaign activities which are the Department's primary means of reaching families who live outside of the high-risk areas. While 40 percent of children identified with lead poisoning live in the high-risk areas, 60 percent of children identified with lead poisoning live elsewhere.

A challenge with expanding the Department's community-based efforts is that this approach needs sufficient population density and children identified with lead poisoning in order to make the activities efficient and effective. The community-based approach is less effective in towns with less population and fewer cases of lead poisoning. Given these considerations, the Department is exploring ways to provide funding in Sanford where the population and number of lead poisoning cases are both likely high enough to support a community-based approach. The Department previously funded lead poisoning prevention activities in Sanford as it had been among the top five high-risk communities until the Department updated its analysis of high-risk areas in 2016. The Department is also assessing whether or not the community-based approach would work in the communities of Waterville and Skowhegan where there is less population and fewer children identified with lead poisoning (current funding provided in Augusta can be viewed as a pilot of these communities). For towns that are not in the top 10 for lead poisoning, the Department believes that reaching those communities through its statewide media activities may be the most efficient use of resources.

The Department also sees that there is opportunity to work with our community-based partners and other stakeholders to engage municipalities in sharing ownership of lead poisoning prevention with the State. Currently, there is opportunity only at the local level to develop new or implement existing

policies (e.g., building codes related to chipping and peeling paint) to address housing quality and/or the maintenance or removal of lead-based paint in rental units prior to rental units being occupied. Progress has been made to engage local officials and other stakeholders in each high-risk area—there is now at least one committee, task force, or other similar group in each high-risk area where lead poisoning prevention solutions are at minimum being discussed. With the exception of Lewiston/Auburn, these local discussions have only just begun and have not yet resulted in any significant local policy changes. In Lewiston/Auburn, the Lewiston Area Public Health Committee has been focused on addressing lead poisoning prevention for several years; the City of Lewiston and local organizations have multiple federal, State, and private grants to support lead poisoning prevention initiatives; and in 2018 the City Council began debate over whether or not to implement a Rental Housing Registration and Inspection Program as a way to prevent rental units with lead hazards (and other safety hazards) from being rented until the hazards are addressed.

Eradicating Childhood Lead Poisoning in Maine: Positive Progress and Measurement Challenges

In 1991, the Maine Legislature established a goal to eradicate childhood lead poisoning by 2010 (22 MRS §1314-A). While progress has been made, nearly ten years after this deadline hundreds of children were newly identified as lead poisoned in 2017. Measuring progress toward this goal is complicated by the recent change in the statutory definition of lead poisoning. When this goal was first established, the U.S. CDC blood lead “level of concern” was $\geq 10 \mu\text{g}/\text{dL}$. The number of children newly identified with a confirmed blood lead level of $\geq 10 \mu\text{g}/\text{dL}$ dropped from 285 for the year 2003 to 68 for the year 2017, representing a four-fold decrease over this 14-year period. The statutory threshold for lead poisoning shifted in 2015 to a blood lead level of $\geq 5 \mu\text{g}/\text{dL}$. There were 318 children newly identified with a confirmed blood lead level $\geq 5 \mu\text{g}/\text{dL}$ for the year 2017.

Counting the total number of children with a confirmed blood lead level of $\geq 5 \mu\text{g}/\text{dL}$ is currently imprecise. Maine CDC only began recommending that medical providers confirm capillary blood lead levels in the 5- < 10 $\mu\text{g}/\text{dL}$ range in 2015. In 2017, there were 195 children identified as having a capillary test result of 5- < 10 $\mu\text{g}/\text{dL}$ who did not receive a confirmatory venous test (see Figure 9, page 19). Some number of these children with unconfirmed results would have been found to have a venous blood lead level of $\geq 5 \mu\text{g}/\text{dL}$. Consequently, the direct count of the number of children with a confirmed blood lead level of $\geq 5 \mu\text{g}/\text{dL}$ is an underestimate of the total number of children with a blood lead levels of $\geq 5 \mu\text{g}/\text{dL}$ among children tested for blood lead.

Maine CDC scientists have developed an approach for estimating the number of children with a capillary blood lead level of 5 to < 10 $\mu\text{g}/\text{dL}$ *likely* to have a confirmed venous blood lead level of $\geq 5 \mu\text{g}/\text{dL}$. This approach makes use of recent empirical data showing that on average 38 percent of children with a capillary blood lead level of 5 to < 10 $\mu\text{g}/\text{dL}$ had a venous confirmatory test result of $\geq 5 \mu\text{g}/\text{dL}$. This approach, when combined with the observed number of children with a confirmed blood lead level of $\geq 5 \mu\text{g}/\text{dL}$, provides an estimate of the expected total number of children with a confirmed blood lead level of $\geq 5 \mu\text{g}/\text{dL}$ among the population of children tested for blood lead. Figure 15 shows the trend in this estimated count, along with the trends for observed counts of confirmed and unconfirmed blood lead levels of $\geq 5 \mu\text{g}/\text{dL}$.

Tracking progress toward meeting the goal of eradicating childhood lead poisoning will also be complicated by any significant changes in blood lead testing rates statewide. Higher blood lead testing rates are clearly possible as demonstrated in several Maine communities (see Figure 10, page 20) and more broadly, among some counties (see Figure 5, page 16). A significant increase in blood lead testing rates statewide will identify significantly more lead poisoned children which may appear as a lack of progress in eradicating childhood lead poisoning.

A common public health practice to account for changing testing rates is to evaluate trends in the *percentage* of lead poisoned children among the population tested, rather than evaluating trends in the actual count of lead poisoned children. The percentage measure adjusts to the number of children tested, and progress is monitored by evidence of a dropping percentage, indicating a reduction in *risk* of lead poisoning. Because the number of children tested for blood lead has remained fairly stable over the past 14 years (at 13,000-14,000 children annually), to date, trends are nearly identical whether based on counts or percentage measures (Figure 16). However, if more children who are at lower risk of lead poisoning are tested, the percentage measure will decrease for this reason alone rather than because of any actual reductions in the risk of lead poisoning.

Figure 15: Trends in numbers children less than six years of age (<72 months) with unconfirmed, confirmed, and estimated blood lead levels for the years 2003-2017

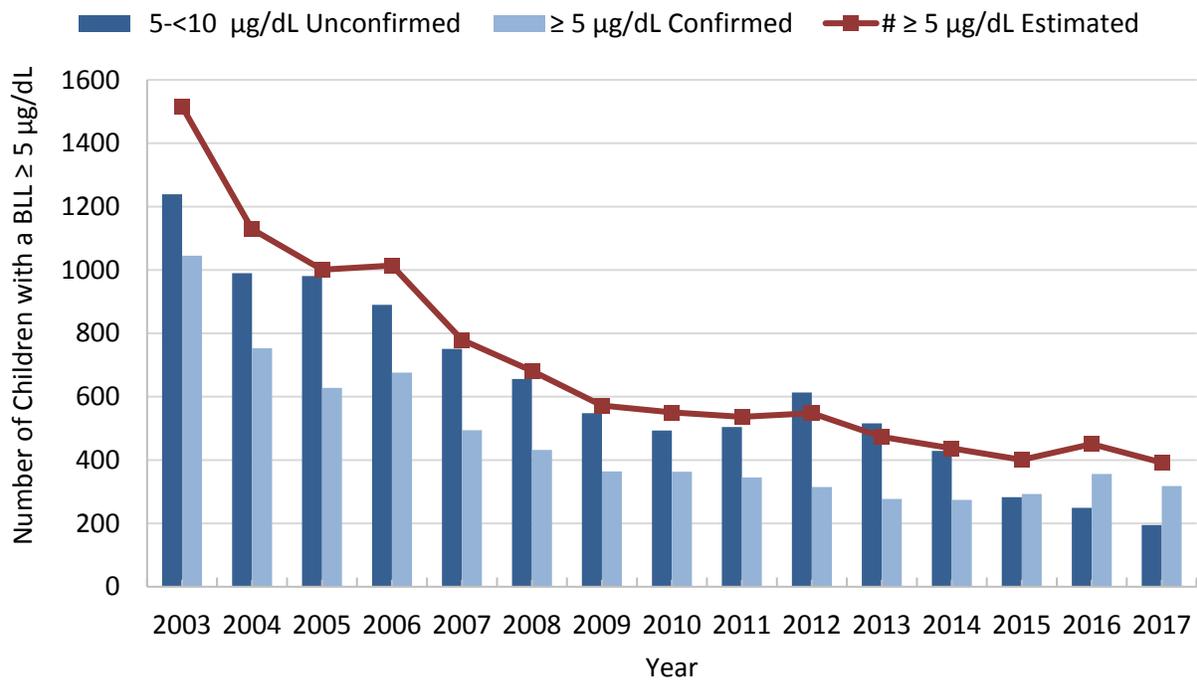
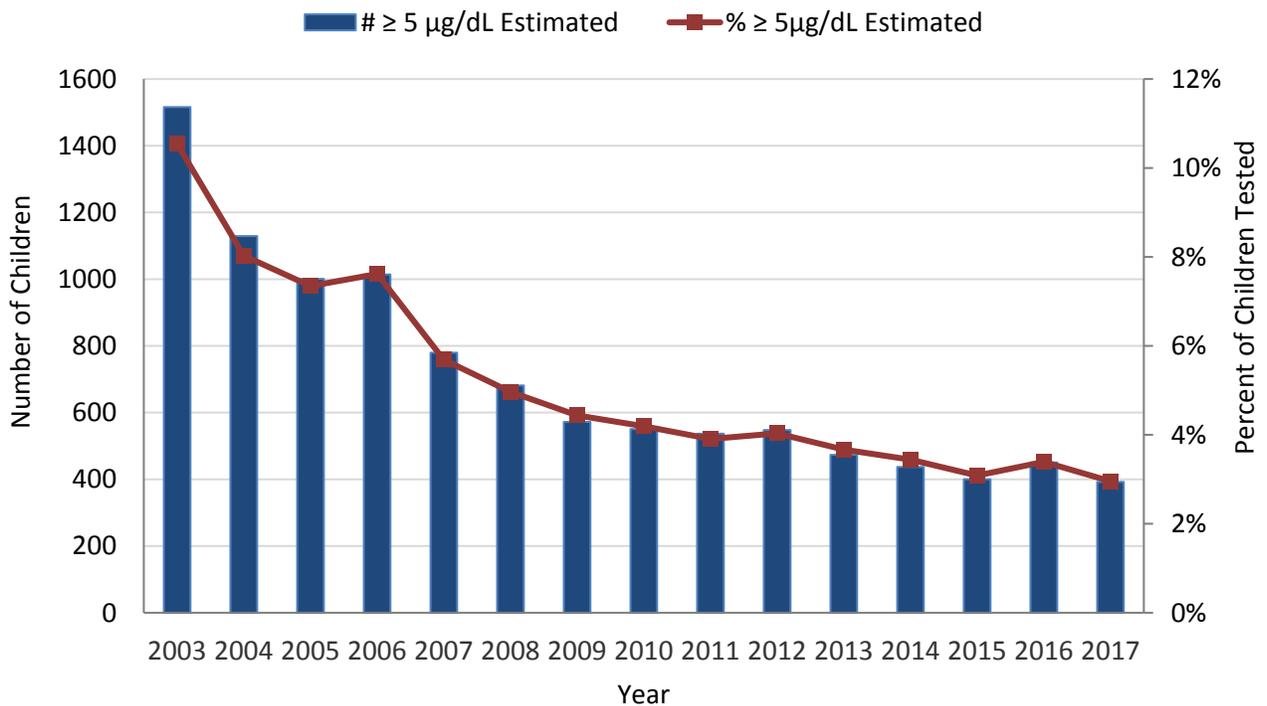


Figure 16: Trends in estimated numbers and percentages of children less than six years of age (<72 months) with blood lead levels $\geq 5 \mu\text{g/dL}$ for the years 2003-2017



While cognizant of these short-term challenges to tracking progress, the Department will continue to monitor trends in lead poisoning using both the count and percentage measures, while also evaluating the potential effect of any increases in testing rates or confirmation rates. The Department will update these trends annually and make them publicly available on the Maine Tracking Network, the Department's web-based data portal (<https://data.mainepublichealth.gov/tracking/>).

Conclusions

The major findings of this report are as follows.

- Childhood lead poisoning continues to decline, but in 2017, more than 300 children were newly identified as lead poisoned.
- Blood lead testing remains low among one- and two-year old children enrolled in MaineCare, and the statutory mandate for universal testing of this population of children is far from being met.
- The 2015 LPCA amendments resulted in a substantial increase to the Department's major primary prevention activity (i.e., identifying and removing lead hazards from homes before children are poisoned). In 2017, the Department inspected more than 570 dwelling units in which a lead poisoned child was not previously identified because of the statutory requirement to inspect all dwelling units in a multi-family dwelling when a lead poisoned child is found in any single dwelling unit. This was in addition to inspecting nearly 300 dwelling units that were associated with a lead poisoned child.
- The Department expanded its targeted mailing lead dust testing program in 2018 to reach families with either a one-year-old or a two-year-old child. The Home Visiting facilitated lead dust testing program had only modest increases in 2017 and 2018. The Department also designed and piloted a social media (Facebook) campaign to promote lead dust testing.
- The Department is providing \$35,000 in annual funding to community-based organizations in the five highest-risk areas for lead poisoning for education and outreach activities to enable the public to take precautionary actions to prevent exposure to lead.

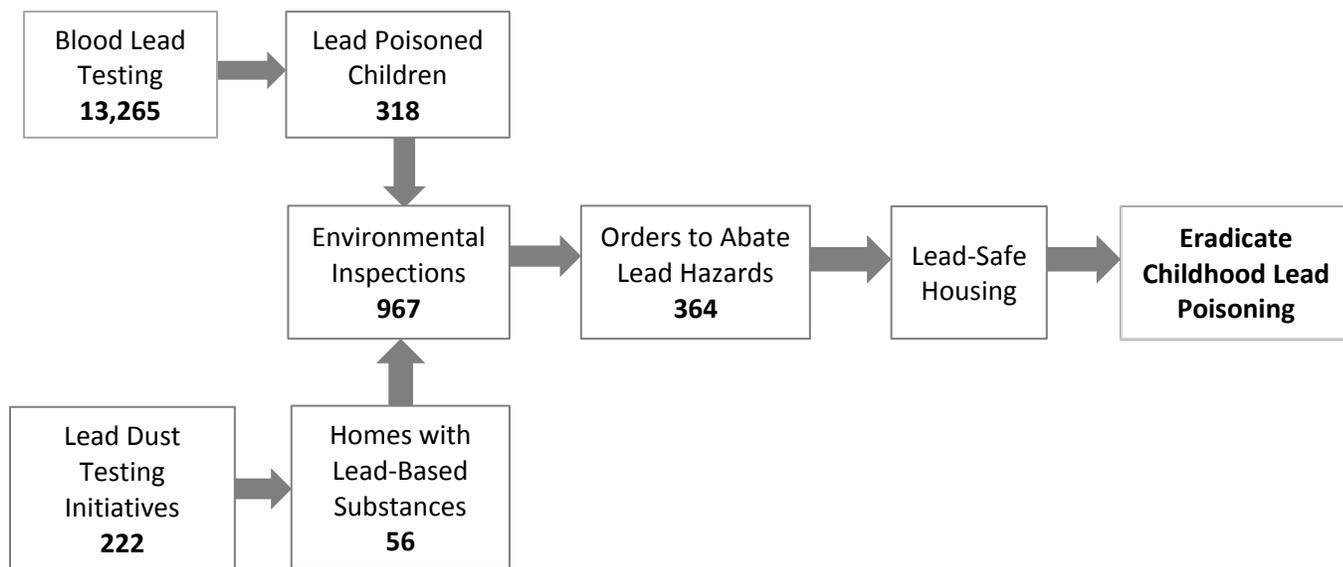
Under the construct of the LPCA, the primary means to accelerate progress toward the goal of eradicating lead poisoning are to:

1. Increase blood lead testing to more completely identify children who meet the regulatory definition of lead poisoned, which in turn will increase inspection activity and enforcement activity;
2. Lower regulatory thresholds that trigger inspection and/or abatement actions; and/or
3. Increase lead dust testing and related activities that can identify dwellings with lead-based substances before a child is lead poisoned and that can also trigger inspection and enforcement activity.

Throughout this report, the Department has presented the most recently compiled annual numbers for children tested for blood lead, children identified as lead poisoned, inspections of dwelling units for lead hazards, and orders to abate lead hazards. This report also presents numbers for inspections resulting from lead dust testing and other initiatives to identify lead based substances in dwellings *before* a child is lead poisoned. It is instructive to view these numbers all together within the visual construct of Maine's Lead Poisoning Control Act (Figure 17). Figure 17 makes clear that testing of children for blood lead is currently the primary way the Department identifies housing that should be inspected for lead hazards. The mailing of offers of free lead dust test kits to all Maine families with a one-year-old child, and the partnership with Maine's Home Visiting Program to promote facilitated lead dust testing have, in combination, contributed to 20 percent of the inspection activity achieved by testing children for blood lead. There are opportunities to increase both blood lead testing and lead dust testing (as detailed

in this report), and doing so will add to inspection and abatement activity that will further accelerate trends in decreasing the annual number of newly identified lead poisoned children.

Figure 17: Calendar year 2017 numbers of children tested for blood lead, newly identified lead poisoned children, inspections resulting from either identifying lead poisoned children or presence of lead based substances, and resulting orders to abate lead hazards.



More than 360 dwelling units were issued orders to abate lead hazards to make them lead safe in 2017. This is a major increase in abatement activity over prior years, which leads to an important question: Is this increase sufficient to accelerate progress toward the goal of eradicating childhood lead poisoning? Answering this question is difficult as we cannot easily determine how many dwelling units are not lead-safe and also potentially inhabitable by families with young children. Housing built before 1950 is more likely to have lead paint and that lead paint is more likely to have much higher concentrations of lead.

The Department has documented that nearly 90 percent of childhood lead poisonings in Maine are associated with pre-1950 housing, and that 70 percent of poisonings are associated with rental units. Based on the most recently available U.S. Census data, there are about 61,000 rental units in Maine that were built before 1950. But not all 61,000 rental units can be inhabited by families with young children, not all would be affordable to families living in poverty, nor would all of them contain lead paint. A more relevant comparison may be the estimated 2,200 Maine families with children under age five years who live in poverty and in pre-1950 dwellings¹⁷—likely our highest-risk population for lead poisoning. But this number does not consider the existing housing stock available to these families should lead abatement activity cause them to relocate to other rental units. If the relevant housing stock in need of being made lead safe is closer to 2,200 dwelling units, it can be argued that the Department has now achieved a

¹⁷ U.S. Census 2013-2017 American Community Survey data estimates there are 9,100 Maine families with children age less than 5 years living in poverty. The Department’s survey data of mothers who have recently given birth reported 24 percent of families living in housing built before 1950, which is similar to the U.S. Census estimate that 28 percent of Maine housing was built prior to 1950. Using both sources of information, the Department estimates that about 2,200 Maine families with children that are both living in poverty and living in pre-1950 housing.

level of intervention that potentially impacts more than 10 percent of the highest-risk housing annually. An intervention this large should be sufficient to impact current trends in the annual number of newly identified lead poisoned children. If, however, the relevant housing to be made lead safe is closer to 61,000 dwelling units, even the recent and substantial increase in inspection and abatement activity will require many years to have a major impact on annual trends of newly identified children with lead poisoned. Time will tell, and importantly, we have the tracking systems in place to monitor annual trends of lead poisoned children.

Following are the Department's next steps towards achieving mandates of the LPCA.

- 1. Continue work to increase blood lead testing.** There remains a clear need to increase blood lead testing rates; to this end, the Department is:
 - Developing a blood lead module within the State's web-based immunization registry to help health care providers better identify children in need of blood lead tests, including confirmatory venous tests, and allow the State to track compliance with testing mandates and guidelines and issue report cards for medical practices;
 - Continuing to fund high-risk communities to promote blood lead testing within their communities; and
 - Continuing with the recently expanded targeted mailing campaign to families with one- and two-year-olds that will promote blood lead testing while also offer free lead dust testing.

Additionally, the Department's Office of MaineCare Services Clinical Team will work with the Maine CDC Childhood Lead Poisoning Prevention Unit to develop a comprehensive strategy to improve blood lead testing rates among children enrolled in MaineCare.

- 2. Continue implementing increased inspections of dwellings units for children with blood lead levels at the current statutory definition of lead poisoning.** The Department has just completed its second year of a seven-fold increase in inspection activity, that also resulted in more enforcement activity. In order to maintain this expanded work, the Department will need to:
 - Continue to extend the five limited-period environmental inspection coordinator positions to support the increased inspection and activity as well as provide technical assistance in response to identified lead hazards in single-family owner-occupied homes; and
 - Continue the appropriation of funds necessary to support the expanded contracted services for licensed lead inspectors and the funds necessary to support the resulting laboratory services to analyze inspection-related samples for lead content.
- 3. Expand targeted lead dust testing initiatives.** Lead dust is considered the most common cause of lead poisoning in young children, and lead dust test results are currently the primary means the Department uses to initiate inspection activity without relying on blood lead testing. Over 200 Maine families took advantage of the Department's offer for free lead dust test kits in 2017. To expand lead testing initiatives, the Department will:
 - Continue the 2018 expansion of the targeted mailing of lead dust test kits to both families with one-year-old and two-year-old children and evaluate its efficacy and cost effectiveness;
 - Continue to work with Maine's Home Visiting Program to increase their annual number of completed facilitated lead dust test kits; and
 - Explore new opportunities to incorporate lead dust testing into other home visiting opportunities, such as public health nursing and local code enforcement.

4. **Track progress, evaluate, and report.** The Department has developed robust methods for tracking progress toward eradicating childhood poisoning, tracking blood testing rates for both MaineCare and non-MaineCare enrolled children, tracking inspection and abatement activity, and the success of lead dust testing initiatives. High-risk areas of lead poisoning have been mapped, and for some communities, maps extend down the census block group level to allow for highly targeted local interventions.

Appendix A

Maine CDC Childhood Lead Poisoning Prevention Unit



Pediatric Blood Lead Screening Guidelines

Efforts to identify potential lead hazards and prevent lead exposure should begin early in a child's life. Dust from deteriorating, damaged, or exposed lead paint in older homes is the most common source of pediatric lead poisoning. Providers and families may request free lead dust testing for lead hazards before a child becomes poisoned: 287-4311, maine.gov/healthyhomes.

Recommended Blood Lead Screening Schedule

Follow the Maine CDC Recommended Confirmation and Follow-up Testing Schedule if blood lead level is $\geq 5 \mu\text{g}/\text{dL}$.

Age	Children Covered by MaineCare	Children <u>NOT</u> Covered by MaineCare
1 year (9-17 months)*	Blood lead test mandatory**	Blood lead test unless annual risk assessment questionnaire is negative.
2 years (18-36 months)	Blood lead test mandatory**	Blood lead test unless annual risk assessment questionnaire is negative.
3-5 years (36-72 months)	<ol style="list-style-type: none"> If not previously tested: Conduct blood lead test If previously tested: Blood lead test yearly unless annual risk assessment questionnaire is negative. 	Yearly blood lead test unless annual risk assessment questionnaire is negative.

*Test children as they become mobile. **Maine and federal laws require tests at 1 and 2 years for children covered by MaineCare.

Annual Risk Assessment Questionnaire

- Does your child spend more than 10 hours per week in any house built before 1950?
- Does your child spend more than 10 hours per week in any house built before 1978 that was renovated or remodeled within the last 6 months?
- Does your child spend time with an adult whose job exposes him/her to lead? (Examples: construction, painting, metalwork)
- Does your child have a sibling or playmate that has been diagnosed with lead poisoning?

NEW!

The pediatric blood lead reference level is $5 \mu\text{g}/\text{dL}$.

In all cases, if a blood lead test result is $\geq 5 \mu\text{g}/\text{dL}$, follow up according to Maine CDC's "Recommended Confirmation and Follow-up Schedule."

Additional Recommendations

At-Risk Populations

- Consider a blood lead test between 9 and 72 months for children in the following at-risk groups.
- Families that qualify for programs such as WIC, Head Start, SNAP
 - Recent immigrants or international adoptees
 - Children whose parents immigrated to the U.S.

Clinical Conditions

- Consider a blood lead test, regardless of age, if children have any of the following conditions.
- Unusual oral behavior, pica, developmental delays, behavioral problems, ADHD
 - Unexplained illness: severe anemia, lethargy, abdominal pain
 - Ingestion of paint chip or object that might contain lead

Recommended Testing Schedule for Recently Arrived Refugee Children

- Perform a blood lead test for children 6 months to 16 years upon entry to the U.S.
- Within 3-6 months of initial test, conduct follow-up test for children 6 months to 6 years, regardless of initial test result.
- Consult U.S. CDC guidelines: cdc.gov/nceh/lead/publications/refugeetoolkit/pdfs/cdcrecommendations.pdf



Recommended Confirmation and Follow-up Schedule For Pediatric Blood Lead Levels $\geq 5 \mu\text{g/dL}$

NEW! The Maine CDC provides a full lead investigation of a child's home environment when a venous blood lead test result is $\geq 5 \mu\text{g/dL}$.

Capillary Lead Test Confirmation Schedule

Confirm all capillary blood lead levels $\geq 5 \mu\text{g/dL}$ with venous samples, according to the following schedule.

Capillary Blood Lead Level	Confirm with Venous Test Within*
5-9 $\mu\text{g/dL}$	3 months
10-44 $\mu\text{g/dL}$	1 month
45-59 $\mu\text{g/dL}$	48 hours
60-69 $\mu\text{g/dL}$	24 hours
70+ $\mu\text{g/dL}$	Immediately as an emergency test

*The higher the capillary test result, the more urgent the need for a confirmatory venous test. A venous test must be done prior to initiation of Maine CDC services.

Lead Poisoning Prevention Tips for Families

- Keep children away from peeling or chipping paint.
- Wash children's hands before eating and going to bed.
- Clean floors, windowsills, and tabletops with wet mops or rags once a week.
- Wash toys once a week and keep toys away from areas with chipping paint.
- Feed your child at a table or in a highchair.
- Avoid sanding and scraping paint in old homes.
- Call Maine CDC or visit our website for more information.

Venous Lead Test Follow-up Schedule

For all venous blood lead levels $\geq 5 \mu\text{g/dL}$, conduct follow-up venous blood lead tests, according to the following schedule.

Venous Blood Lead Level	Follow-up Venous Test Schedule	Long-Term Follow-Up**	Maine CDC Response
5-9 $\mu\text{g/dL}$	3 months	When <5 resume screening schedule	<ul style="list-style-type: none"> • Environmental investigation • Case management by phone
10-14 $\mu\text{g/dL}$	Within 3 months	6-9 months	<ul style="list-style-type: none"> • Environmental investigation • Case management by phone • Offer home visit from public health nurse
15-19 $\mu\text{g/dL}$	Within 2 months	3-6 months	
20-44 $\mu\text{g/dL}$	Within 1 month	1-3 months	
$\geq 45 \mu\text{g/dL}$	<ul style="list-style-type: none"> • Repeat venous blood test immediately. • Chelation therapy as indicated • Consider consult with New England Pediatric Environmental Health Specialty Unit: 617-355-8177 	Based on chelation protocol	

**Long-term follow-up should only begin after blood lead begins to decline and child is living in a lead-safe environment.

For additional guidance on the management of children at risk of lead exposure, see the 2012 Advisory Committee on Childhood Lead Poisoning Prevention statement: "Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention" (cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf).

Appendix B:

Maine CDC

Lead Dust Testing via Maine Families Home Visiting Program Pilot Test Overview

February 9, 2018



About the Pilot

- A partnership between Maine CDC and the Maine DHHS-funded Maine Families Home Visiting Program
- Purpose: Assess feasibility of providing free, facilitated home lead dust tests to families with children at risk for lead poisoning enrolled in the Home Visiting Program
- Timeframe: December 1, 2016 – November 30, 2017
- Lead Dust Test Volume
 - Budgeted: 200 lead dust tests
 - Completed: 91 lead dust tests
- Cost and Funding Source
 - \$4,641 in laboratory fees, paid for by Lead Poisoning Prevention Fund
 - No additional funding was provided to Maine Families Home Visiting Program



What is facilitated home lead dust testing?

- The purpose is prevention – to find and address lead dust in the home before a child is poisoned, raise awareness, and encourage blood lead testing
- Uses trained, in-home service providers
- Helps families overcome barriers and complete a do-it-yourself test kit for lead dust in the home
- Kit includes three lead dust wipe samples, two for floors and one for a windowsill
- Supplements Maine CDC's broader efforts to promote non-facilitated lead dust testing:
 - Annual targeted mailing mailed directly to families with 1-year-olds
 - Website
 - Brochures distributed by health care providers and community organizations

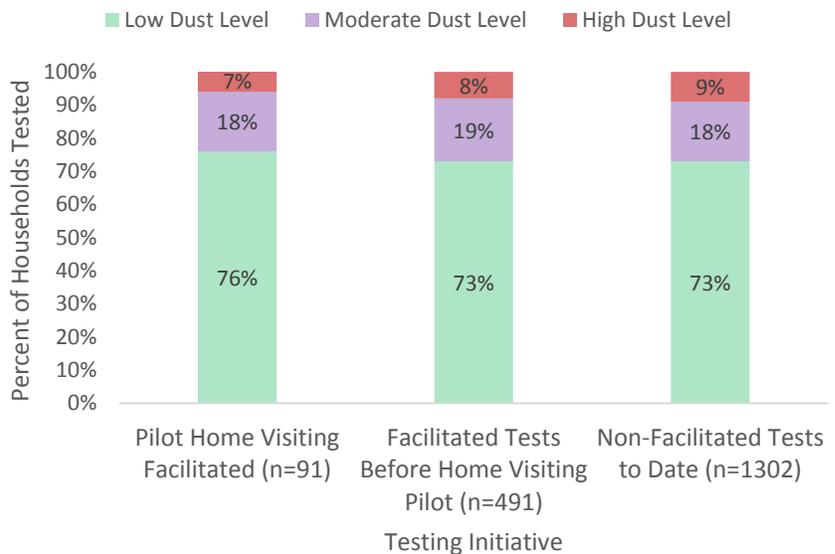
What did we learn during the pilot?

1. Most of the lead dust tests were done in areas at high-risk for childhood lead poisoning, and by agencies that had prior experience with lead dust testing.
 - 60% of tests were done in the high-risk areas of Lewiston/Auburn, Biddeford/Saco, and Portland
 - No tests done in the high-risk areas of Augusta and Bangor

County	Number of Tests Completed
Androscoggin	25
York	25
Cumberland	20
Kennebec	7
Aroostook	4
Penobscot	3
Sagadahoc	2
Hancock	1
Oxford	1
Somerset	1
Waldo	1
Washington	1
Franklin	0
Knox	0
Lincoln	0
Piscataquis	0

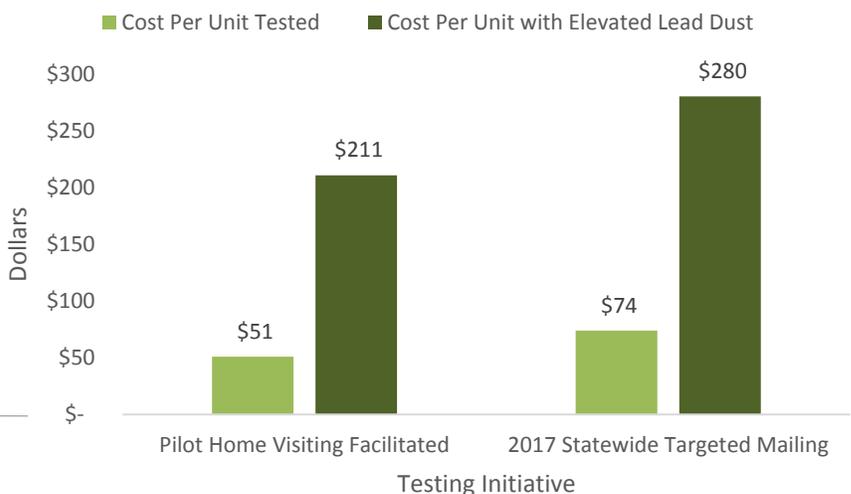
2. Facilitated lead dust testing through home visitors finds homes with lead dust problems consistent with the Department’s other lead dust testing initiatives.

- 80% of tests completed were done in rental units compared to 40% of tests done through the targeted mailing.



3. Facilitated lead dust testing through home visitors is as cost efficient as the Department’s other lead dust testing initiatives as a means to identify lead dust.

- Direct costs for pilot were laboratory analysis (\$51 per test kit); Direct costs for targeted mailing include printing, postage, and laboratory analysis



4. The number of facilitated lead dust tests completed was lower than expected due to concurrent changes to home visiting program requirements.

- New Home Visiting data system and performance measures were competing priorities.
- Anecdotal reports from home visiting agencies also indicate that some families refused testing over concerns it would result in eviction or other landlord retaliation; underscores connection between lead poisoning, poverty, and housing quality and some families may feel they have to choose between finding out if they have lead dust in their home or risking a crisis or major disruption in their housing.

Conclusions and Path Forward

- Partnership with Maine Families Home Visiting is feasible and cost-efficient relative to other Maine CDC lead dust testing initiatives
- Supplements Maine CDC’s other lead dust testing initiatives; reaches different, at-risk population
- Maine CDC recommends continuing the pilot with double the testing volume and broader geographic reach
- Expand evaluation to assess effectiveness of the program in preventing lead exposures and encouraging blood lead testing for children at-risk for lead poisoning.