
**Report to
The Vermont Legislature**

**Lead Poisoning Prevention:
Report on 2023 Program Outcomes and Activities**

In Accordance with 18 V.S.A. § 1756

Submitted to: Vermont General Assembly

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Report Date: December 16, 2024



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Lead Poisoning Prevention: Report on 2023 Program Outcomes and Activities

Executive Summary

This annual report on the status of childhood lead poisoning prevention is submitted pursuant to 18 V.S.A. § 1756.

The mission of the Vermont Department of Health's Healthy Homes Lead Poisoning Prevention Program (Program) is to improve the health and safety of all Vermont home environments through surveillance, collaboration, education, and implementation of comprehensive policies and coordinated programmatic activities. The Program conducts a variety of lead education and outreach activities that are designed to prevent lead poisoning, encourage lead testing of 1- and 2-year-olds to meet the state's universal testing requirements, and support case management for children with elevated blood lead levels.

New methods were used this year to calculate annual blood-lead testing rates and to estimate the number of children with lead in their bodies. This means data from previous years cannot be compared to data from this year's report. However, Figure 1 in this Report uses the new method to calculate previous years data and to compare those data with this year's data.

Vermont made progress in 2023 increasing blood lead testing among children under 6 years old. The percentage of children under 6 years old who were tested increased from 23.8% in 2022 to 29.9% in 2023. The percentage of 1-year-olds tested increased from 78.0% in 2022 to 86.3% in 2023. The percentage of 2-year-olds tested increased from 66.7% in 2022 to 82.6% in 2023. Testing rates are at an all-time high.

Despite increased testing, remediation, and outreach efforts, lead is still a concern among children in Vermont. In 2023, 9,958 Vermont children under the age of 6 were tested for lead and lead was detected in 10.7% (n=1,061). Less than half of those (n=448) had levels greater than or equal to 3.5 micrograms per deciliter ($\mu\text{g}/\text{dL}$), the national blood lead reference value.¹ Among 1-year-olds tested (n=4,740), 10.0% (n=475) had elevated blood lead levels.² There were 212 (4.5%) 1-year-olds with blood lead levels greater than or equal to 3.5 $\mu\text{g}/\text{dL}$. Among 2-year-olds tested (n=4,366), 398 (9.1%) had elevated blood lead levels. There were 155 (3.6%) 2-year-olds who had blood lead levels greater than or equal to 3.5 $\mu\text{g}/\text{dL}$.

In 2023, the Program prioritized the following activities: continued work with the U.S. Department of Housing and Urban Development (HUD)-funded partners to reduce lead hazards in the homes of lower-income families; increased Vermont lead law compliance among rental property owners; work with Vermont Child Health Improvement Program (VCHIP) to improve testing rates among health care professionals; and educational outreach to parents of young children, emphasizing the importance of lead testing.

¹ The Center for Disease Control and Prevention (CDC) uses a blood lead reference value (BLRV) of 3.5 micrograms per deciliter to identify children with blood lead levels that are higher than most children's levels.

² Vermont's Blood Lead Screening, Reporting, and Response Rules defines "Elevated Blood Lead Level" as having a blood lead level of greater than zero micrograms per deciliter of human blood.

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Lead Poisoning Prevention: Report on 2023 Program Outcomes and Activities

Introduction

The Vermont Department of Health submits this report regarding its 2023 childhood lead poisoning prevention efforts pursuant to 18 VSA § 1756. This annual report documents the Department's efforts over the past year to detect and prevent lead poisoning in young children. It presents the latest data on the number and percentage of Vermont children younger than 6 years old who have been tested for lead, with a particular focus on universal testing of 1- and 2-year-olds. (The data focuses more heavily on tests for 1- and 2-year-olds because Vermont's 3-6-year-old children are only required to be tested if they did not receive a lead test previously.) Updated historical data on testing rates are also presented. In addition, the report describes 2023 outreach and educational activities intended to improve testing rates, and provides estimates of the annual public and private costs incurred in 2023 to prevent lead poisoning.

Measuring Progress

Testing young children for lead in blood is a critical step in the process of reducing the incidence of elevated blood lead levels. Generally, a child's exposure to lead can easily be identified through testing, and appropriate interventions can be initiated to prevent further exposure to this harmful toxicant. In addition, testing helps inform the development of lead poisoning prevention policies by giving the Department the opportunity to track statewide trends in childhood exposure to lead. Per 18 V.S.A. § 1755 and 1757, all health care providers in Vermont must test all Vermont children at 12 months and again at 24 months and all Vermont children 36 to 72 months who have not been previously tested.

This year, the Department used new methods to calculate annual blood-lead testing rates and the number of children with lead in their bodies. This means data from previous years cannot be compared to data from this year's report. However, Figure 1 in this Report uses the new method to calculate previous years' data and to compare that data with this year's data.

To calculate annual blood-lead testing rates, the Department divides the number of tests performed by an estimated total number of Vermont children in each age group (i.e., under 6, 1-year-olds, and 2-year-olds). To estimate the number of Vermont children in each age group in the current year, the Department used to average the population of Vermont children from each age group from the previous three years. For example, to estimate the number of children under 6 in 2022, the Department averaged the population of Vermont children under 6 in 2019, 2020, and 2021. However, the number of children in Vermont is declining. In turn, using data from previous years with higher populations meant the Department's population estimates were higher than the actual population. This made the resulting testing *rates* too low (i.e., dividing the number of tests performed by a population estimate that was too high resulted in a falsely low rate). This year, the tables and figures use only the 2023 population estimates for Vermont children in each age group. This is a more accurate way to calculate annual testing rates.

To calculate the number of children with lead in their bodies, we used to use a child's venous test result. If they had no venous test, then we used their capillary test result. This method may have overestimated the number of children with lead in their bodies. This is because only some children with a detected capillary lead test get a confirmatory venous blood lead test. This year, we added

the total number of children with detected venous blood lead test results and a percentage³ of children with detected capillary test results. This is a more accurate way to estimate the number of Vermont children with lead in their bodies.

Table 1 presents 2023 data on the estimated number of young children who were tested for lead and the results of those tests.

Table 1
Blood Lead Tests and Results⁺ for Vermont Children ages 0 – 5 years, 2023

Age	Population [^]	# of Tests	No Lead Detected	≤3.4 µg/dL	3.5 to 4.9 µg/dL	≥5 µg/dL
Under 1	5,112	62 (1.2%)	47 (75.8%)	8 (12.9%)	*	*
1	5,494	4,740 (86.3%)	4,265 (90.0%)	263 (5.5%)	81 (1.7%)	131 (2.8%)
2	5,285	4,366 (82.6%)	3,968 (90.9%)	242 (5.5%)	76 (1.7%)	79 (1.8%)
3	5,654	449 (7.9%)	349 (77.7%)	58 (12.9%)	19 (4.2%)	22 (4.9%)
4	5,803	214 (3.7%)	176 (82.2%)	18 (8.4%)	7 (3.3%)	13 (6.1%)
5	5,959	127 (2.1%)	92 (72.4%)	22 (17.3%)	*	*
Total	33,307	9,958 (29.9%)	8,897 (89.3%)	611 (6.1%)	194 (1.9%)	254 (2.6%)

Notes:

+Estimated numbers and percents are calculated from a total number of children with detected venous blood lead tests plus a percentage of children with capillary tests. This differs from the methodology used in previous years legislative reports, therefore data in this table cannot be directly compared to data in prior legislative reports.

[^]Population is the 2023 single year of age Vermont population estimates.

* Indicates fewer than five cases in a category that year. A cell may also be suppressed when row and column totals are provided to prevent the computation of the cell with fewer than five cases. Suppression of small numbers ensures confidentiality and data reliability.

Ages: Under 1 year = less than 11 months, 1 year = 11-22.99 months, 2 years = 23-34.99 months, 3 years = 35-46.99 months, 4 years = 47-58.99 months, 5 years = 59-70.99 months.

Figure 1*

³ This percentage, called K factor is based on the historically observed rate of capillary test results found to be elevated upon confirmation with venous retesting.

Percent of 1 and 2 year-old Vermont children tested for lead

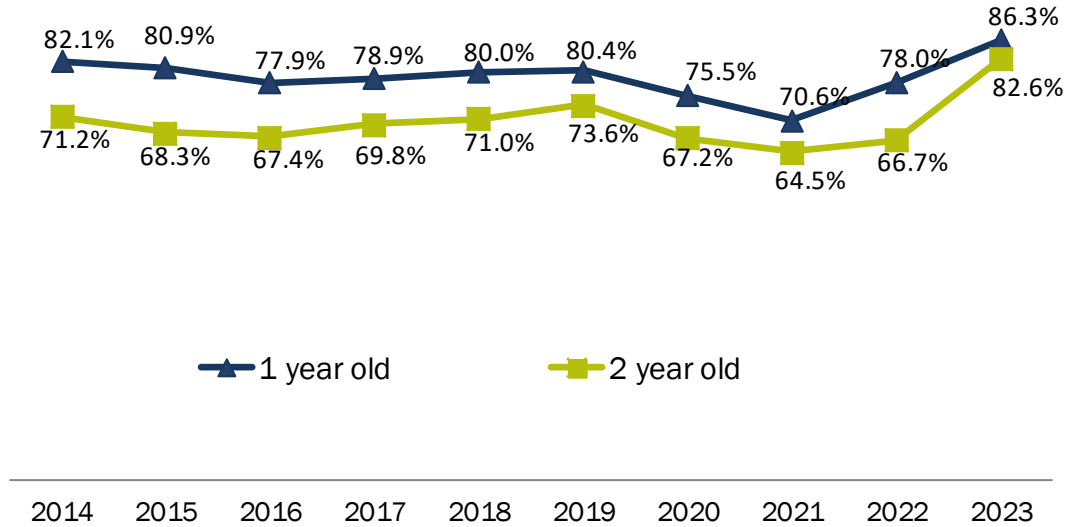


Figure 1 shows the percentages of 1- and 2-year-olds tested over the last 10 years. The percentages of both 1- and 2-year-olds tested increased in 2023. The percentage of 1-year-olds tested significantly increased from 78%, 95% confidence interval (CI) [77.9,78.1] in 2022 to 86.3%, 95% CI [86.2,86.4] in 2023. The percentage of 2-year-olds tested significantly increased from 66.7%, 95% CI [66.6,66.8] in 2022 to 82.6%, 95% CI [82.5,82.7] in 2023.

*This graph was recalculated using Vermont population estimates for individual years as the denominator instead of averaging the population from the previous three years; therefore, it cannot be directly compared with annual testing graphs in previous reports.

Figure 2*

Blood lead levels among Vermont children ages 1 and 2 *

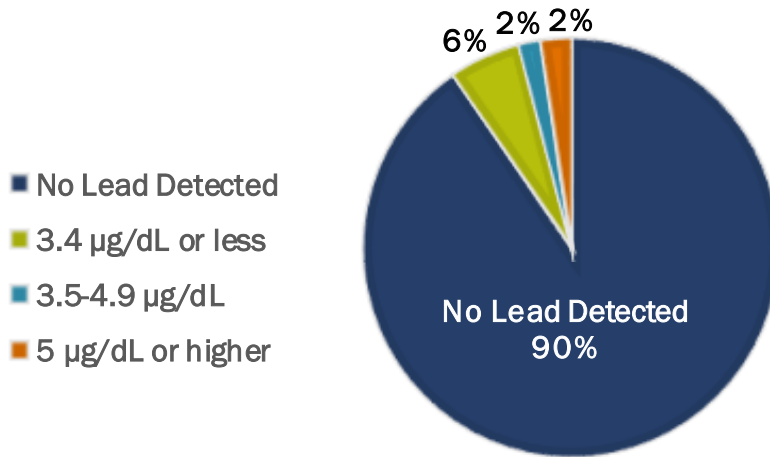


Figure 2 shows the breakdown of blood lead levels of 1- and 2-year-olds combined. Overall, 873 (10%) had some level of lead detected in their body.

*The method used to calculate blood lead levels differs from previous years, therefore, data in this chart cannot be directly compared to data in prior legislative reports.

Barriers to Universal Testing

Vermont law requires blood lead testing of all 1- and 2- year-olds, otherwise known as universal testing. Lead testing of 1- and 2-year-olds is a nationally recognized standard of pediatric care, and Vermont’s universal testing requirement is consistent with this standard. Until 2023, blood lead testing rates had never reached higher than 82% among 1-year-olds and 74% among 2-year-olds. In 2023, testing rates reached an all-time high, with 86.3% of 1-year-olds receiving tests, and 82.6% of 2-year-olds being tested.

To explore the barriers to universal testing, the Program conducted telephone interviews with parents and guardians of children aged 2-5 who had no blood lead tests on record with the Department of Health. Overall, 773 families were called and 361 telephone interviews were conducted. Another 11 survey responses were received electronically for a total of 372 families reached.

Key findings of survey regarding universal barriers to testing:

- 34% reported that their child had a blood lead test (in VT or out of state) but results were not provided to the Department.
- 18% reported that their child’s healthcare provider did not mention blood lead testing and 56% could not remember if they did.
- 80% agreed blood lead testing is very important, important, or fairly important.

Using the information gathered from the parent interview, the Program is working with health care practices to confirm that procedures are in place to transmit blood lead testing results to the Department in a timely and routine manner. The Program will also strengthen our existing *How Would You Know?* media campaign to increase the percentage of families who deem blood lead testing as important.

The Program also conducted a separate survey to examine differences in universal testing among three health care practice types: pediatric practices, family medicine practices, and naturopathic practices. Of the 8,081 children associated with a pediatric practice in Department records only 14% (1,133 patients) were overdue for blood lead testing. Patients associated with family medicine and naturopathic practices were more likely to be overdue (32% and 53%, respectively), but there are fewer children associated with those practices (678 and 98 patients, respectively). The Program will continue to conduct outreach to all types of practices and examine if targeted outreach efforts are needed for different types of practices.

Practice Type	Total Number of 1- and 2-year-olds	Number Overdue	% Overdue	% of Total
Pediatrics	8,081	1,133	14%	59%
Family Medicine	2,118	678	32%	36%
Naturopathic	184	98	53%	5%

2023 Education, Outreach and Actions Taken

Outreach and support for health care professionals and education to the public is an integral part of the Program’s work. The Program conducts a variety of lead education and outreach activities intended for families with young children and healthcare providers that is designed to prevent lead poisoning, encourage lead testing of 1- and 2-year-olds, and support case management for children with high blood lead levels. Listed below is a sample of education, outreach and actions taken by the Program in 2023.

Programmatic Activities and Outreach

- Conducted outreach during Lead Poisoning Prevention Week (October 22-28, 2023) using the *How Would You Know?* campaign materials and Halloween-themed poster and video on our social media channels.
- Referred families to HUD-funded partners (Vermont Housing Conservation Board and Burlington Lead Program) to reduce lead hazards in the homes of lower-income families.

Targeted Education

- Called, texted or emailed 192 families with children who had any venous detected level of lead and provided lead poisoning prevention education materials.
- Provided 127 environmental investigations, educational home visits and follow-ups for families of children with venous blood lead levels of 5 µg/dL or greater, the level at which the Program offers a home visit.

- Mailed 9,835 postcards to families with 10-month-old children and 22-month-old children who were born in Vermont reminding them to have their children tested for lead.
- Mailed 1,737 packets including educational materials and follow-up testing recommendations to families whose children had any detected capillary blood lead level.
- Provided lead education to 67 callers.

Testing Outreach

- We continued to partner with VCHIP to promote proper adherence to the blood lead testing guidelines, help health care practices achieve high lead testing rates, and improve reporting rates of lead testing results. VCHIP offered peer-to-peer support and strategies to practices with low testing rates. More specifically, they:
 - Provided outreach to 33 family, pediatric, and naturopathic practices, promoting adherence to testing guidelines, addressing barriers to universal testing, and offering quality improvement opportunities.
 - Leveraged relationships with Blueprint Quality Improvement Facilitators and Family and Child Health Coordinators (FCHCs) to discuss declining lead testing rates and to support outreach to practices.
 - Presented lead testing education to family medicine providers at The University of Vermont Medical Center, University of Vermont, Larner College of Medicine, Family Medicine Grand Rounds on October 23, 2023.
- Local district office Healthy Homes Designees provided WIC staff education on the importance of blood lead testing in accordance with Vermont Pediatric Blood Lead Testing and Treatment Guidelines and made referrals to medical homes for blood lead testing to WIC children who were overdue for blood lead testing, needed venous confirmation, or needed a venous retest.

Planned Activities and Recommended Actions

In 2024, the Program will continue with efforts to reduce lead poisoning by making homes safer for children and increasing blood lead testing rates for 1- and 2-year-olds. This will be achieved through educating parents, providing technical assistance to health care professionals, and enforcing the lead testing rules.

Specific activities for the Program to increase testing rates include:

- Continue to send reminder postcards with lead testing information to all families whose children were born in Vermont and are ages 10 and 22 months.
- Continue to provide Vermont Child Health Improvement Project (VCHIP) with a list of practices with poor testing rates (e.g., more than 40 percent of 1- and 2-year-olds overdue for lead testing) to contact. Practices that have fully engaged in ongoing discussions with VCHIP have shown improvement in testing rates. Examine whether different outreach efforts are needed for pediatric, family medicine and naturopathic practices
- Continue to work with Lead Care II users to improve the accuracy and timeliness of lead test reporting.
- Support local health office staff who educate the public about lead poisoning prevention; encourage their area health care providers to perform lead testing; and educate families enrolled in WIC about the importance of lead testing and provide referrals to primary care providers when a child is identified as overdue.

General activities for the Program in 2024 include:

- Continue to provide outreach, conduct environmental investigations, and provide case management to families with children that have confirmed elevated blood lead levels.
- Add lead poisoning, testing, and housing information that includes geographic information system (GIS) maps featuring areas of elevated blood lead levels, older housing stock, and low-income status to the Environmental Public Health Tracking portal.
- Provide “Healthy Homes” training to Community Ambassadors to raise awareness and comfort with engaging with community members as part of the EPA-funded Environmental Justice Grant.
- Create lead prevention outreach videos aimed at building awareness among refugee and immigrant communities.
- Continue to collaborate with the Department’s Asbestos and Lead Regulatory Program to educate rental property owners and childcare facilities on the requirements of the Vermont regulations pertaining to lead exposure.
- Maintain and expand partnerships with internal and external partners, such as:
 - Vermont Housing and Conservation Board
 - Burlington Lead Program
 - Vermont Child Health Improvement Program
 - Environmental Public Health Tracking Program
 - Asthma Program
 - Asbestos and Lead Regulatory Program
 - Office of Local Health and WIC

Estimates of Public and Private Costs

In the public sector, the Program expended an estimated \$418,200 in fiscal year 2023. The Vermont Housing and Conservation Board expended \$1,588,283 from HUD for lead poisoning prevention, and the Burlington Lead Program spent an estimated \$1,397,801 in HUD Lead Hazard Control funds. Combined, these organizations spent an estimated \$3,404,283 to reduce lead poisoning in 2023. This amount is up from 2021 and 2022 (\$1,678,529 and \$2,363,625, respectively).

A study completed by Dartmouth College as part of the *Get the Lead Out of Vermont* Task Force Report in 2006 estimated direct health care costs of all children with elevated blood lead levels at \$51,814 per year and special education costs at \$219,841 per year (considered to be an underestimate because they were calculated only for those children with blood lead levels 25 µg/dL or greater).⁴ The report also estimated lost future earnings at more than \$79 million per year for Vermont children (calculated in 2006 and for children with blood lead levels 5 µg/dL or greater). Testing costs incurred by families, insurers, and health care professionals are not represented in these cost estimates.

⁴ Carlson, C., Y. Feng, D. McClurg, and J. Trummel. "The Costs of Lead Poisoning in Vermont." Dartmouth Center for Evaluative Clinical Sciences (CECS) (2006): 1-27. <https://ago.vermont.gov/wp-content/uploads/2018/03/The-Cost-of-Lead-Poisoning-in-Vermont.pdf>.

Another study on the social and economic benefits of lead hazard control estimated a return of \$17 to \$221 for every dollar spent on lead hazard control.⁵ This would suggest that for the \$3,404,283 spent in 2023 on reducing lead hazards and preventing poisoning, the State of Vermont could see a return on investment (ROI) of between \$57,872,814 to \$752,346,587. This estimate takes into account the costs of lead hazard control, reduced health care costs, lifetime earnings, tax revenue, special education costs, behavioral disorders, and crime.

The Pew Center on the States released an issue brief, *Cutting Lead Poisoning and Public Costs*, in 2010. Their research indicated that despite dramatic improvements over the past 30 years, lead poisoning remains a serious hazard for hundreds of thousands of young children in the United States. They concluded that returns on large-scale lead abatement efforts would yield at least \$17 for each dollar invested, which translates to a net benefit of \$181 to \$269 billion. These benefits would be observed in reduced health care utilization, reduced IQ loss, decreased special education needs, higher earnings, and fewer behavior problems and crime.

⁵ Gould, E. (2009, July). Childhood lead poisoning: Conservative estimates of the social and economic benefits of lead hazard control. *Environmental Health Perspectives*, 117(7), 1162-1167. Retrieved February 21, 2017, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2717145/>.

Appendix: Statute

18 V.S.A. § 1756. Annual report

(a) The Commissioner shall, at least annually, analyze and summarize all aggregate lead screening and testing information provided by physicians, health care facilities, and laboratories and provide this information to all other local and State agencies involved with case management and lead hazard reduction.

(b) The Commissioner shall also, at least annually, provide to the General Assembly, the health community, and the general public an analysis and summary of such data and a progress report on the Commissioner's efforts to prevent lead poisoning in young children in a format that is easily understandable to nontechnical readers. The report shall include:

(1) The number and percentage of children under the age of six who have been screened and tested for lead poisoning and the number found to have lead poisoning at various levels.

(2) Estimates of the public and private costs incurred since July 1, 1993, to prevent, correct, or treat lead poisoning.

(3) An analysis of barriers to universal blood screening of children under the age of six years.

(4) The Commissioner's recommendations for action. (Added 1993, No. 94, § 3.)