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## Williston, VT: Evaluating Child Lead Screening Rates and a Potential Exposure

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# Williston, VT: Evaluating Child Lead Screening Rates and a Potential Exposure

**Ethan Harlow**

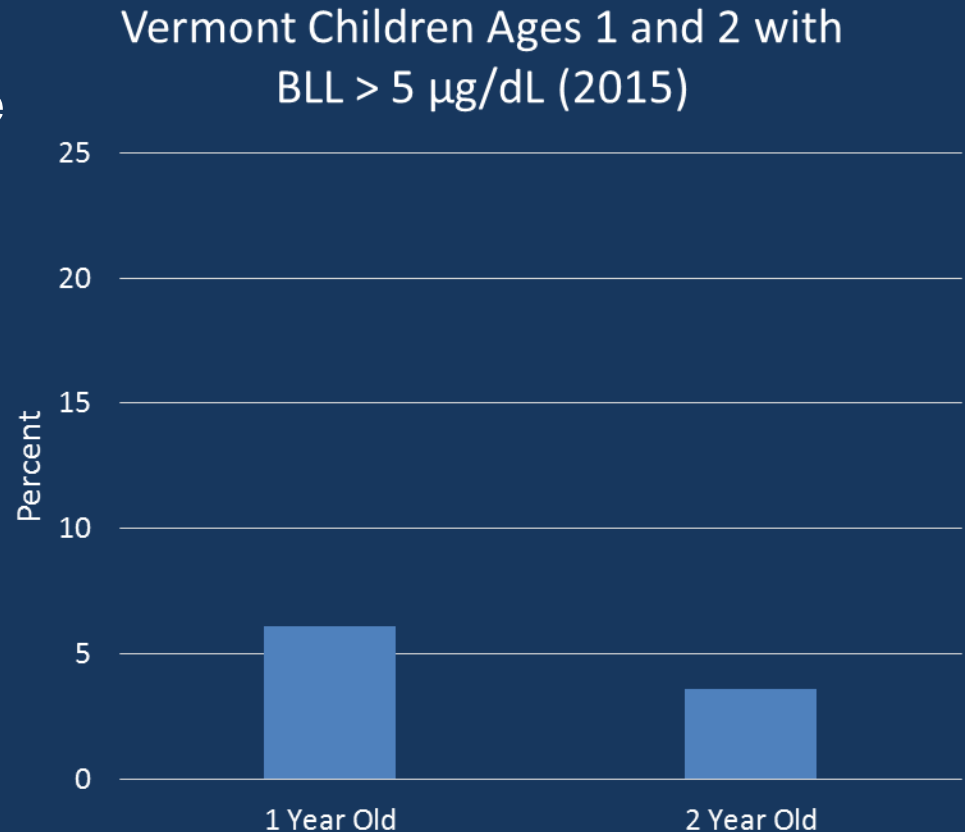
Family Medicine

Oct-Nov 2018

Thomas Chittenden Health Center, Williston, VT

# The Problem – Blood Lead Levels in Children

- Lead is a dangerous toxin - blood lead levels (BLLs)  $< 10 \mu\text{g}/\text{dL}$  harm children and can be irreversible<sup>1</sup>
- Lead Paint, lead in gas, lead sinkers for fishing, and lead shot used for duck hunting have all been outlawed due to the health risk to people and wildlife
- Any measurable level of blood lead has deleterious effects, especially on cognition<sup>1</sup> – this underscores the importance of preventing lead exposure



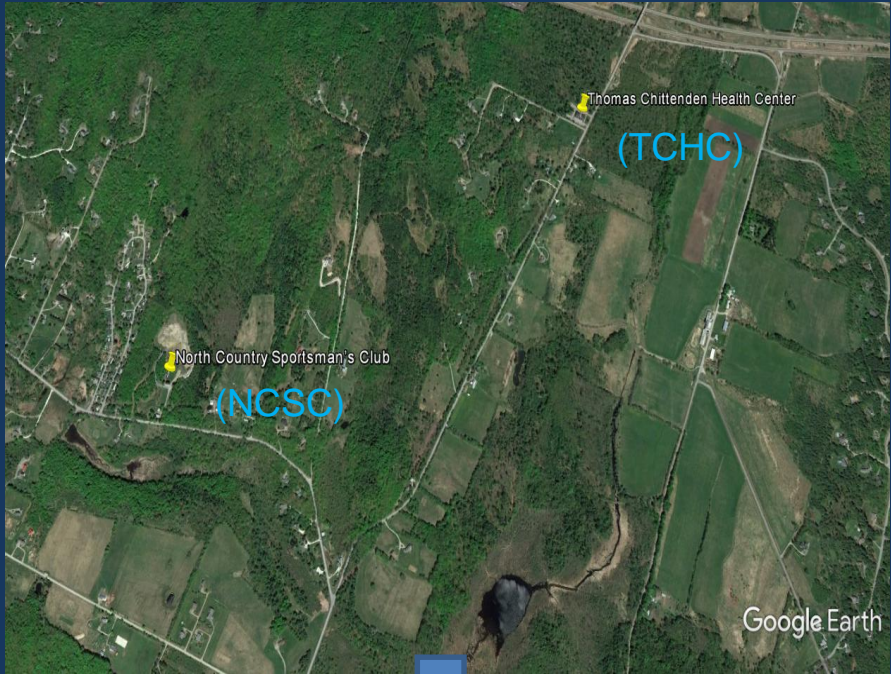
Data provided by the Vermont Department of Health

In 2015, 2 children, 2-years-old and younger, at Thomas Chittenden Health Center have had a BLL  $> 5 \mu\text{g}/\text{dL}$  at one point in their lives (3.45%)

# The Problem – Lead Exposure in Williston, VT

- Several data collections suggest that lead shot from *The North Country Sportsman's Club (NCSC)* in Williston has impacted the soil and headwaters of a stream within a local Wellhead Protected Area
- Levels of lead measured in the stream have been up to 10x safe drinking water limits\*
- Tom Blair, owner of the NCSC, estimated that 7500 pounds of lead is distributed onto the property every year (Seven Days, Nov. 18, 2009)
- The club has been operating for almost 50 years; assuming a uniform level of use over this time period, the volume of lead on the property could exceed 100 tons

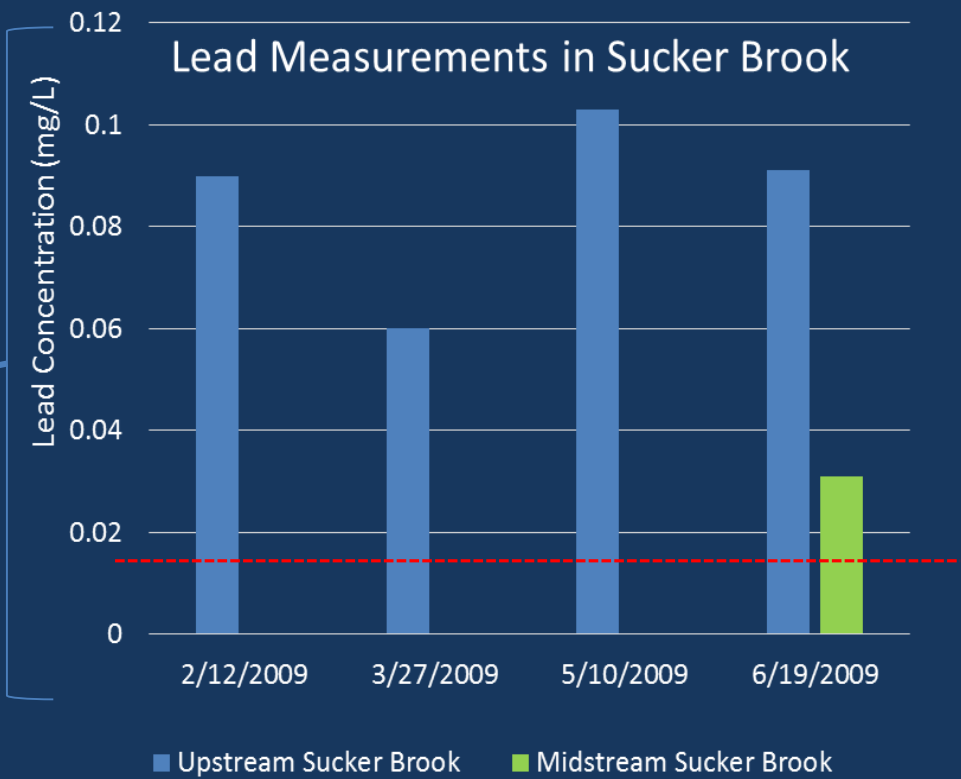
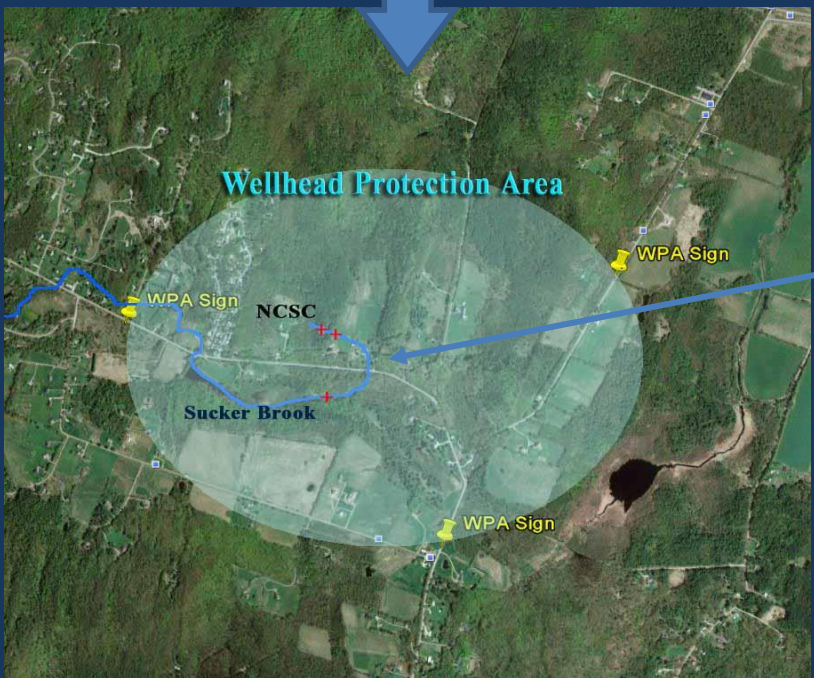
\*Data courtesy of Mona Boutin, see next slide



NCSC and Sucker Brook are located in a wellhead protection area (WPA), which is land that is state-regulated to prevent contamination of a well or well-field supplying a public water system.

Measurements conducted by Mona Boutin, who resides in close proximity to NCSC, suggest that lead is present in the Sucker Brook.

The population that resides within the WPA is estimated to be 138 people. Families that live outside the WPA may also have affected well water.



+ Upstream and Midstream Measurement Points

Toxic to Humans (0.015)

# The Costs of Lead Poisoning in Vermont

- Estimated **direct health care costs** of all children with elevated blood levels in 2006 was \$51,814 per year<sup>2</sup>
- Estimated costs of all children requiring **special education** due to lead poisoning (BLL>25µg/dL) in 2006 was \$219,841 per year<sup>2</sup>
- Estimated **loss of future earnings** in children whose blood lead levels are 5 µg/dL or greater is \$79 million per year<sup>2</sup>
- 2015 estimates in federal and state funding for **lead poisoning prevention** (primary prevention) was \$2,097,650<sup>3</sup>

# The Costs of Lead Poisoning in Vermont

- The estimated economic costs of eliminating lead exposure due to lead-based paint and the associated health benefits have been studied.
  - There has been data to suggest that each dollar invested in **lead paint hazard control** results in a return of \$17-\$221 or a net savings of \$181-269 billion<sup>4</sup>
- While lead-based paint is one of the strongest predictors of lead exposure in a home, **contaminated water and soil** is a non-trivial source of lead poisoning in this country<sup>5</sup>

# On Exposure: the State Legislature and the University of Vermont

Representative James McCullough,  
Chittenden-2 District

- Independent lead testing conducted by the Agency of Natural Resources confirmed that lead levels were excessive in Sucker Brook head waters
- Walked the headwaters of Sucker Brook and recovered two 5-gallon buckets of lead shot and soil from the range
- The Agency of Natural Resources are now requiring groundwater monitoring wells (4) in the most highly contaminated soils and conduct annual surface water sampling
- Soil removal will be required in certain areas of the range because of the lead levels
- “As of the end of April 2016, the range has not been in compliance with permits arranged by the Agency for acceptable lead management”

Professor Don Ross, UVM Dept. of Plant and Soil Science

- Decades of shot deposits into the soil have created lead concentrations of up to 1200 mg/kg, which is soil that is 11% lead
- “Lead takes a long time and must be in high concentrations to solubilize and leech into the surface water, which it has in nearby streams and a pond”
- Water runoff from the range, dust, and soil particulates represent the greatest threats to lead poisoning in the vicinity
- Because the lead is heavily concentrated in some areas, the affected soil will have to be removed rather than treated with phosphorus
- It is speculative that the lead could penetrate deep enough into the ground to get into well water

# Methodology

## Background:

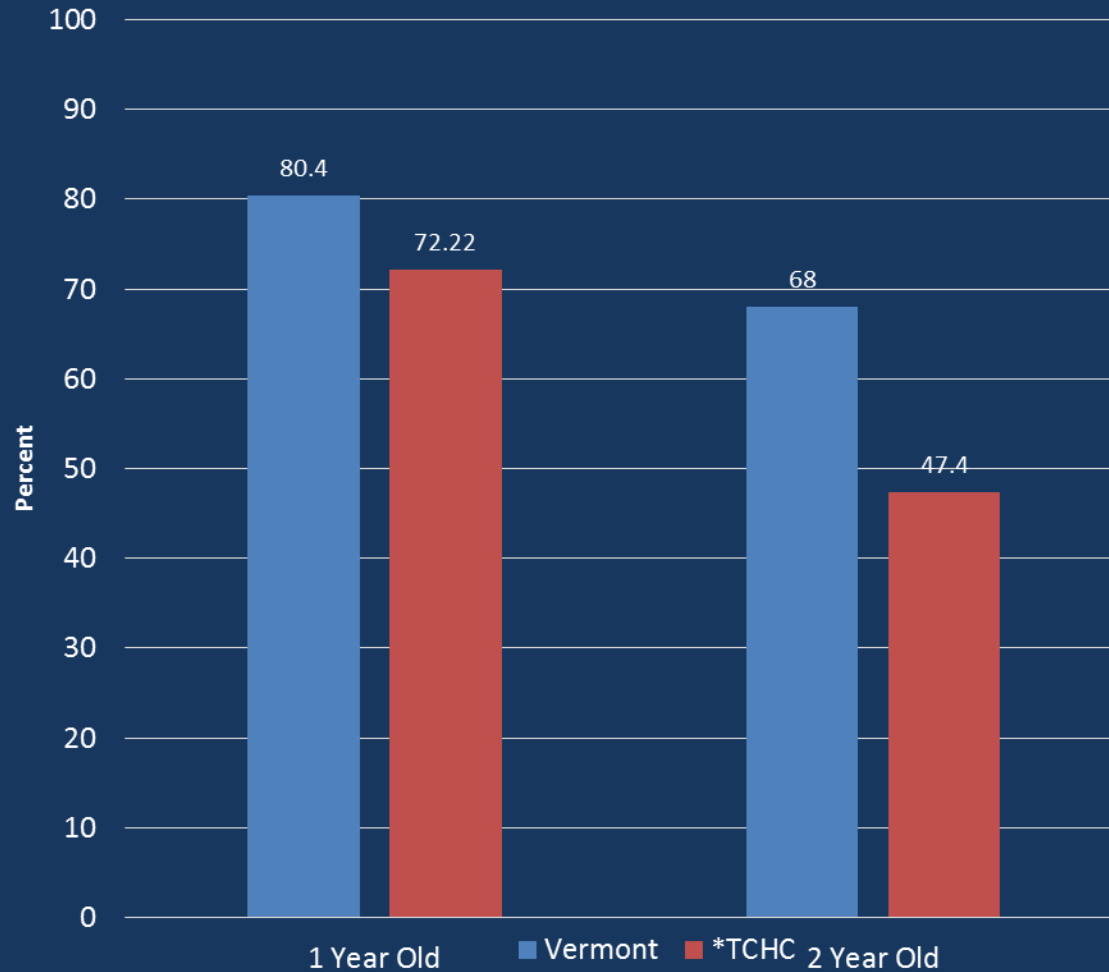
- Primary prevention is the most significant strategy for mitigating lead poisoning. This means ensuring that no children spend significant time in environments with lead-exposure hazards or ensure that lead is removed from the environment before exposure occurs.
- However, it may be possible that primary prevention is in jeopardy in this community by the range. It is important then that exposure to lead is identified through blood testing and subsequent interventions are made to improve the child's health and prevent further exposure.
- The Vermont Department of Health, Healthy Homes Lead Poisoning Prevention Program (HHLPPP) is working towards the goal of universal testing of 1- and 2-year-old children in VT at 12 month and 24 month Well Child visits.

Goal: Evaluate the lead screening rates in children, identify possible barriers to achieving the HHLPPP's goal of universal screening at TCHC, and educate providers on the risks of lead exposure in the NCSC vicinity

Methodology: A subset of providers at TCHC were interviewed to determine how screening is performed at the clinic and what they believed were barriers to achieving universal screening of children. An in depth chart review was also performed to measure lead screening rates for 1- and 2-year-olds at TCHC.

# Results – Lead Screening Rates

Percent of 1 and 2 year-old Children Tested for Lead  
(2015)



\*Study of 18 1-year-old and 38 2-year-old children

# Results – Barriers to Performing Universal Lead Screening

Assessment of 5 providers at Thomas Chittenden Health Center

1. How do you screen for lead poisoning in children at TCHC?
  - The majority (80%) attempt to screen children without risk stratifying
  - The majority (80%) attempt to screen children at 1 and 2 years of age
  - 60% attempt to universally screen 1- and 2-year-old children
  
2. What barriers exist in achieving universal lead screening in children at TCHC?
  - Lack of consistent exposure to and familiarity with Well Child visits (60%)
  - Forgetting or not being reminded to order the test (60%)
  - Provider education regarding lead screening guidelines (20%)
  - Parental opposition to drawing blood for lead screening (20%)
  - Cost reimbursement, lack of insurance coverage, staffing/resources, and time were not considered barriers by any providers

# Effectiveness of Intervention and Study Design

## Effectiveness

- Our research has allowed us to hear what families in the community are experiencing and what their perceived risks of lead exposure are in the vicinity of the shooting range
- Clinicians are now more aware of the potential risks of lead exposure in the community
- Our EMR data has allowed clinicians at TCHC to see how their screening rates compare to others in Vermont
- Our survey has highlighted that lead screening rates could be increased at TCHC by directing resources to promote clinician education rather than increase patient awareness, improve work flow, or resource allocation
- A pamphlet was created to educate providers on lead screening guidelines and suggest changes to the EMR notification system that may be effective

## Limitations

- Our EMR study of lead screening rates required that all lead screening tests be entered into the EMR – there is some concern that some data has not been entered because TCHC refers patients to UVM for lead testing
- Unable to evaluate the effectiveness of the pamphlet and acceptability of the EMR notification recommendations

# Future Projects

- Continue to follow yearly trends in lead screening after providing providers with educational pamphlet
- Optimize EHR reminder system at TCHC so that all providers are made aware of what screening tests are due at 1- and 2-year-old Well Child visits and follow trends
  - Improving the DM/HM notification system to include pop-up message warnings and categorize notifications based on type (i.e. immunization, blood test)
- Pamphlet outlining how patients residing within the boundaries of the Wellhead Protection Area may be at an increased risk of lead exposure and provide measures they can take to reduce risk in their children
- Advocate for Best Management Practices for shooting club, like the NCSC, created by the Environmental Protection Agency by supporting Williston select board members and Vermont House Representatives
  - Controlling runoff with lime and vegetation
  - Reclaiming and recycling shot
  - Switching to a more safe shot such as steel or tungsten
- Continue to monitor lead levels in Sucker Brook to measure NCSC progress and encourage families with well water in the area to have their water tested for lead

# References

1. Centers for Disease Control and Prevention/National Center for Environmental Health. *Publications List*. November 25, 2011; Available from: <http://www.cdc.gov/nceh/lead/publications/>.
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5. Lanphear BP et al. (2000). Cognitive deficits associated with blood lead concentrations <10 mg/dL in US children and adolescents. *Public Health Reports*, 115:521–529.

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