

Case Study Brief: New Hampshire & Vermont Private Well Testing Via Primary Care Clinics



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INTRODUCTION

This case study describes an intervention conducted by Dartmouth's Children's Environmental Health and Disease Prevention Research Center in New Hampshire and Vermont from 2016–2018 to provide home well water test kits to families with infants through primary care clinics. The research team was interested in understanding parents' receptiveness to receiving information about private well testing at their child's pediatric practice. The study design was based on previous efforts to improve fluoridated drinking water assessments and blood lead level screening in pediatric healthcare settings.¹ Researchers hypothesized that more parents might complete a well water test at home if they received information from

their child's pediatrician, compared to if outreach materials were received in the mail or from a public health system. The researchers were also interested in testing the best follow-up methods to remind parents to complete their water test kit and to provide families with test results. The intervention found that families were most likely to test their home well water when test kits were provided to parents by a clinician and when the clinic conducted structured follow-up with families. The lessons learned from the program can be used to inform healthcare systems and government agencies that may undertake private well testing or other drinking water interventions through pediatric and primary care health clinics.

This case study is part of a series of six descriptive case studies of state and local safe home water access policies and programs. The research team collected and reviewed available background materials for each case and conducted semi-structured interviews with key informants about relevant community context and policies, program design, program implementation, and lessons learned. All six case studies and a summary report are available at: <https://www.hsph.harvard.edu/prc/projects/safe-home-water>

The research team also developed and compared estimates of the population reach and costs for widespread implementation of each case study policy or program based upon the prevalence of families with children 0–5 experiencing low income with concerns about tap water and/or lack of access to safe home tap water.



INTERVENTION RATIONALE

Private wells are unregulated by the federal government and contamination of private wells is common.² A significant percentage of people living in New Hampshire and Vermont rely on private wells where arsenic and other contaminants occur in groundwater. A Dartmouth College study that followed New Hampshire mothers and their infants over time found that 10–20 percent of pregnant people with a home well had an arsenic level above

the federal maximum contaminant limit (MCL) for arsenic of 10 parts per billion (ppb),³ and that even low levels of arsenic exposure can have adverse child health effects.^{4(p1)} Other contaminants of concern in private wells include radionuclides, bacteria, nitrates, and poly- and perfluoroalkyl substances (PFAS). Despite this, there is no current standard protocol at pediatric clinics to screen families for home drinking water safety.¹



COMMUNITY PARTNERS

The Dartmouth's Children's Environmental Health and Disease Prevention Research Center (Children's Center) partnered with the Dartmouth CO-OP Primary Care Practice-Based Research Network to design the intervention. The Children's Center is a multidisciplinary effort in collaboration with Stanford University, Harvard Medical School and the University of Miami.⁵ The Center's mission is to identify and address key emerging issues related to the health impacts of environmental exposures in early life. The Center currently focuses on childhood immune dysfunction, the health impacts of

arsenic on child health, and biomarkers of environmental exposures.⁵ The Dartmouth CO-OP Primary Care Practice-Based Research Network includes primary care clinicians, other healthcare professionals, and patient and family representatives from communities in Vermont, New Hampshire, and Maine.⁶ The Network is located at the Department of Community & Family Medicine at the Dartmouth Geisel School of Medicine and works to answer community-based healthcare questions and translate research findings into practice.⁶

INTERVENTION FINANCING

The research study was financed by grants to the Children’s Center from the US Environmental Protection Agency, the National Institute for Environmental Health Sciences, the National Center for Advancing Translational Sciences, and the National Institutes of Health.¹



KEY INTERVENTION ELEMENTS

The overall goal of the intervention was to better determine which methods of providing water test kits and conducting follow-up were most likely to result in home well water testing by families with infants. The study ran from 2016 to 2018, and its key elements were to:

1. Educate clinic staff and implement patient screening protocols;
2. Provide test kits to eligible families and provide follow-up reminders if relevant;
3. Receive test results from laboratories and report them to families and/or clinics.

Eleven clinics in geographic areas of New Hampshire and Vermont with a high likelihood of naturally-occurring arsenic in groundwater and high prevalence of private well use participated in the study.¹ Participating clinics received educational materials and training about water

contaminants and how to talk to patients about private wells and water quality, free water test kits, and instructions on how to conduct follow-up with families.¹ A one-hour training was conducted on-site at each clinic for physicians, nurse practitioners, physician assistants, nurses and administrative staff, and participation ranged from 8-20 staff per clinic.

The water test kits provided to the clinics included a prepaid FedEx mailing envelope so that families could mail water samples back through FedEx drop boxes. To protect participant privacy, the water test kits provided to families were anonymized with an assigned random number. The laboratory reported results for each numbered sample to the research team and the research team then matched the numbered test results with participants and provided the results back to participants.

Researchers compared the impact of different methods of follow-up on water test completion and on the communication of test results. Participating clinics were assigned one of four follow-up approaches: 1) no additional follow-up conducted by the clinic; 2) clinician encouraged testing if testing was not completed by subsequent visit; 3) clinic provided with test

results and clinician determined follow-up if water test results were positive for contaminants; and 4) clinic provided with test results and a designated clinic staff member contacted the family to follow-up if testing was not completed or if water test results were positive for contamination.¹

STRATEGIES USED TO REACH PREGNANT PEOPLE AND FAMILIES WITH YOUNG CHILDREN

This study was specifically designed for households with an infant up to one year of age (Table 1). Families with infants were chosen as the focus of the study because these families make frequent visits to their pediatricians, creating more opportunities for distributing free water test kits and conducting follow-up. The study team produced posters and

other educational materials for use in clinic waiting rooms and exam rooms to encourage participation by eligible families. They trained clinic staff to discuss water quality with potential participants. De-identified, free test kits were provided to reduce the cost of water quality testing for families, while protecting the privacy of families with private wells.

Table 1: Intervention Design Elements to Meet the Needs of Families with Infants

Potential Barrier to Participation	Program Design Element
Ensuring Participants Can Access Water Test Kits and Return Water Samples	Test kits were provided at no cost to participants in pre-paid FedEx overnight return packaging. The use of FedEx enabled the return of water samples within 48 hours to the water analysis laboratory, but FedEx drop boxes may have been inaccessible to some participants.
Addressing Families' Fears That Their Water May Be Contaminated	Information was provided ahead of sampling and testing about what an exceedance means to increase participant confidence.
Protecting Participant Privacy	The study used de-identified test kits to protect participant privacy.
Ensuring that Water Sampling and Test Result Information is Easy to Understand	The research team developed user-friendly test kit instruction forms and water test result reporting forms for use with study participants.

INTERVENTION RESULTS AND FINDINGS

This section summarizes how many water test kits were completed during the intervention, the water quality results of samples submitted for testing, and ongoing work to provide private well water testing in collaboration with pediatric preventive care clinics.

Water Test Kit Utilization

The 11 clinics participating in the study distributed 240 testing kits, and 70 tests were returned for an average return rate of 29 percent (Table 2).¹ Across the participating clinics, the percentage of distributed tests kits returned ranged from 17 percent to 45 percent, depending upon who distributed the test kit and the level of follow-up provided.¹ The return rate was higher when the clinician as opposed to other clinic staff distributed the kits, and parents were more likely to return a water sample for testing when clinic staff conducted follow-up with parents to encourage them to return a water sample.¹ The characteristics of the families that chose to have their well water tested are unknown. Clinics did not collect demographic information such as race, primary language spoken, income or Medicaid/Children’s Health Insurance Program enrollment.

Water Quality Results

Twenty (28 percent) of the 70 test kits returned for analysis had at least one abnormal test result.¹ Ten samples (14 percent) tested positive for arsenic above the EPA’s MCL for arsenic of 10 ppb, and ten samples (14 percent) tested

positive for coliforms with one of the ten samples testing positive for E. coli bacteria.¹ This information was communicated to patients in writing along with their table of test results. Some patients also received verbal follow-up from their clinician. Patients with an exceedance were referred to state agencies for more information on potential mitigation strategies. The research team notified local and state public health agencies in New Hampshire and Vermont of the study in case participants contacted them.

Table 2: Intervention Results¹

240 test kits distributed

70 kits completed

20 completed kits had abnormal test results

Highest completion rate of test kits (45 percent) was from the clinic with a designated clinic staff member to follow up if testing was not completed

Average completion rate of test kits was 29 percent

Building Community Capacity

After the study concluded, the NH State Public Health Laboratory provided water test kits to the Children's Center to distribute to primary care clinics in New Hampshire and Vermont. Clinics could make the test kits available to families at a cost of \$15 for an arsenic-only test kit and \$85 for a more comprehensive test kit.¹ For well water test ordering, the NH State Public Health Laboratory adopted the user-friendly forms generated by the intervention team during the study. The study authors are currently seeking funding to implement a more permanent iteration of this program in New England, and also hoping to make changes to the electronic health record to prompt clinicians to routinely screen for and record a patient's drinking water source.



Why Arsenic is Bad

- In children, it can affect growth and brain development.
- For pregnant women, it may cause low birth weight and affect brain development in babies.
- People who drink water with too much arsenic for many years are more likely to get cancer.

One in every 5- 10 wells in our region has unhealthy levels of Arsenic

Has Your Well Been Tested?

Did this testing include arsenic, a common natural contaminant in our groundwater?

If you cannot answer YES, to both of these questions, then your well should be tested.



Is Your Well Water "HEALTHY" For You & Your Children?

Protect Your Family Testing Information Inside

www.DartmouthCoopProject.org

THE CHILDREN'S ENVIRONMENTAL HEALTH & DISEASE PREVENTION RESEARCH CENTER AT DARTMOUTH

Contact Us Today!
Ph: 603.653.3440

Information Provided by the Children's Environmental Health and Disease Prevention Research Center at Dartmouth with support from NIEHS: P01 ES022832 / U.S. EPA: FD83544201

Program brochure courtesy of Dartmouth's Children's Environmental Health and Disease Prevention Research Center

How to Test Your Well Water

Certain minerals or chemicals may be present in your water, depending on the geology and land use in your area.

1. **Call a certified lab** and ask for a test kit for arsenic. (See below for websites that have certified labs in your state)
2. If you have NEVER tested your well water, you should ask for a kit that includes **arsenic plus bacteria, nitrates, and fluoride**. Other tests may be offered and/or recommended, but depending on your budget, you should consider at least these four. Costs may vary by lab. Arsenic alone is ~ \$10/test. Your health department can advise you. (See contact info below.)
3. **Do the test.**
 - Your test kit will arrive in the mail. Follow the directions and mail bottles back to lab.
4. **Get your results.**
 - If you have too much arsenic in your water, or you are not sure you understand your test results, consult the resources below to get expert help.

Test Your Water Today!

It's up to you to make sure that your water is safe to drink.

New Hampshire
You can call for a list of certified labs or see the website below.
NHDES Drinking Water & Groundwater Bureau
(603) 271-2513
(603) 271-5171 (fax)
http://des.nh.gov/organization/divisions/water/dwgb/well_testing/index.htm

Vermont
You can order test kits from the Health Department Laboratory at:
(800) 660-9997 toll free in VT or
(802) 863-7335 or use another certified drinking water lab available on website:
http://healthvermont.gov/enviro/ph_lab/water_test.aspx#private

Program brochure courtesy of Dartmouth's Children's Environmental Health and Disease Prevention Research Center

IMPLICATIONS

Healthcare clinics and pediatricians are potentially important partners for water quality interventions. They have access to expectant families and families with infants and young children; regularly conduct screenings of patients; and are a respected source of information for families about topics that impact health like home water quality. The clinics that participated in this intervention successfully implemented a screening protocol to identify families with a private well. The project team's partnership with the Dartmouth CO-OP Primary Care Research Network and their work to educate clinics about how private well water contamination can influence child health may have motivated clinics to participate in the intervention. The intervention also demonstrates the importance of conducting follow-up with families about water testing when their children are an age when they are most susceptible to water contaminants like arsenic.



Program poster courtesy of Dartmouth's Children's Environmental Health and Disease Prevention Research Center

SUGGESTED CITATION

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