

# Case Study Brief: The NH Water Well-Ness Initiative to Protect Pregnant WIC Participants from Contaminants in Private Well Water



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# INTRODUCTION

In September 2020, the New Hampshire Department of Environmental Services (NH Dept. of Environmental Services) and the New Hampshire Department of Health and Human Services (NH Dept. of Health and Human Services) began the NH Water Well-Ness Initiative to protect pregnant people enrolled in the federal Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) program and their infants from arsenic in private well water. In parts of New Hampshire, arsenic is a naturally occurring contaminant found in groundwater that is particularly harmful to infants and young children. This case study describes the pilot phase of this five-year program. The goal of the pilot was to conduct well water quality testing for arsenic and filter

pitcher distribution in two counties to evaluate the project design before scaling up statewide. The lessons learned from the NH Water Well-Ness Initiative can be used to inform other private well water testing and filter distribution programs, especially programs that focus on families with infants and young children.

*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>*

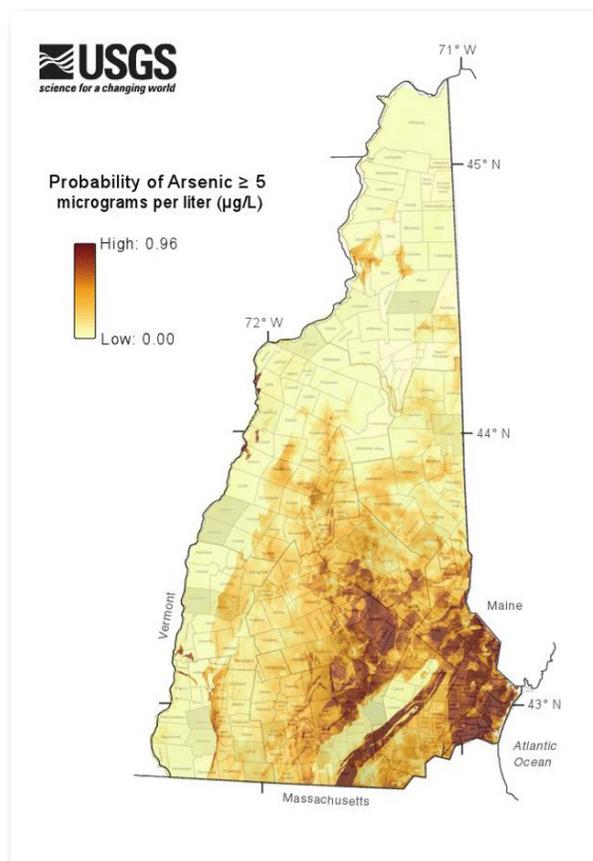
*The research team also developed and compared estimates of the population reach and costs for widespread implementation of each case study policy or program based upon the prevalence of families with children 0–5 experiencing low income with concerns about tap water and/or lack of access to safe home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

## PROGRAM RATIONALE

The NH Water Well-Ness Initiative seeks to raise awareness about the health risks of arsenic in private well water and to reduce the cost of safe water for pregnant people experiencing low income. Arsenic is a naturally occurring contaminant in New Hampshire groundwater. Effective July 2021, New Hampshire adopted a state maximum contaminant level (MCL) for arsenic in drinking water of 5 parts per billion (ppb) that is more stringent than the federal MCL for arsenic of 10 ppb.<sup>1(p1)</sup> This state policy is enforceable against public water suppliers but not against private wells. New Hampshire only regulates private well water through its building code and a real estate sales disclosure policy.<sup>2</sup>

This regulatory gap for arsenic in private well water and research about the health effects of arsenic motivated the NH Water Well-Ness Program. Almost half (46 percent) of New Hampshire residents rely on private wells for their home water supply.<sup>3</sup> The NH Dept. of Environmental Services estimates that 25 percent of these private wells exceed the state's new 5 ppb MCL for arsenic.<sup>1</sup> A Dartmouth College study of mothers and infants in New Hampshire found that even low levels of arsenic exposure from private well water can have adverse child health effects.<sup>4(p1)</sup> Research also suggests that prior well water testing programs focused on testing alone without offering any support to obtain water filters or bottled water, did not necessarily result in those households taking

action to treat unsafe well water.<sup>5,6,7</sup> These studies informed the program's decision to reduce barriers to safe home drinking water by providing free water testing for arsenic and free water filter pitchers and filter cartridges.



Credit: U.S. Geological Survey, Department of the Interior/USGS; [Scientific Investigations Report 2021-5156](#)

## COMMUNITY PARTNERS

The NH Water Well-Ness Initiative builds New Hampshire's community capacity to address water quality issues through strategic partnerships across the sectors of environmental protection, health, nutrition assistance, and scholarly research. The NH Departments of Environmental Services and Health and Human Services collaborated to develop the program and apply for funding. The NH Dept. of Environmental Services is tasked with protecting the state's groundwater and conducting programs to protect public water systems and private wells.

The NH Dept. of Health and Human Services administers the state Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and has expertise in arsenic-related health outcomes. WIC provides supplemental foods, referrals, and education supports to pregnant people and young children experiencing low income who are at nutritional risk. WIC programs are important community partners for home water quality-focused programs because more than two-thirds (67.6 percent) of the infants participating in WIC are exclusively fed infant formula, most often in a dry, powdered format that is mixed with plain water.<sup>8(p8)</sup>

The NH Dept. of Health and Human Services' Water Analysis Lab tested the water samples collected by program participants. An advisory

committee of representatives of the partners listed above and regional WIC agency directors provides feedback to inform the project's activities. Researchers at Dartmouth College's Children's Environmental Health and Disease Research Center and the Dartmouth Toxic Metals Superfund Research Program also played a key role in raising awareness about the health threat of arsenic in drinking water through regular presentations of their research findings to state agencies and the public.





## PROGRAM FINANCING

The NH Water Well-Ness Initiative accessed new funding from the New Hampshire Drinking Water and Groundwater Trust Fund (hereinafter “Trust Fund”).<sup>9</sup> The Trust Fund was established with money awarded to the State of New Hampshire from an environmental protection lawsuit, and provides grants and loans for water-related projects in New Hampshire.

The Trust Fund initially provided \$333,278 for all program costs.<sup>10</sup> When WIC clinics moved to virtual visits due to COVID-19, the Trust Fund provided an additional \$15,000 to mail water test kits to individual homes.



## KEY PROGRAM ACTIVITIES

The NH Water Well-Ness Initiative began in September 2020 and is anticipated to run for five and half years. The program includes the following activities:

1. Training WIC staff to screen WIC participants for a private well by a private contractor (120Water)
2. Screening of WIC clients for a home well by WIC staff
3. Mailing water sampling kits and written consent forms to eligible households by the private contractor
4. Analyzing water samples for arsenic by a public water analysis lab
5. Sending a filter pitcher and four filter cartridges to those with an arsenic exceedance by the private contractor
6. Conducting outreach and education to program participants by the private contractor

7. Performing follow-up surveys by the private contractor; and
8. Conducting data management to administer and evaluate the program by the private contractor

Training of WIC staff is conducted by the private contractor (120Water) hired by the NH Water Well-Ness Initiative to administer much of the program. Trained WIC staff screen pregnant WIC participants for a private well during the initial WIC visit and inform participants with a private well of their eligibility for free water testing. During the COVID-19 pandemic, these initial screenings are being conducted virtually. As a result, WIC staff obtain verbal consent to enter a participant’s contact information into a program database maintained by the private contractor. The private contractor then mails a water test kit

and a written consent form to the participant's home address. The participant mails back the water sample and consent form in a prepaid envelope to the Water Analysis Lab at the NH Dept. of Health and Human Services Public Health Laboratory. If water testing shows an exceedance of New Hampshire's MCL of 5 ppb for arsenic, the private contractor mails the participant a filter pitcher and four filter cartridges certified to remove arsenic, follows up with educational materials, and conducts

various surveys. These include a survey at the end of the pilot program to inform any modifications to the program design for the full-scale (statewide) program, ongoing follow-up questions to participants about filter use, and an exit survey with participants after they use the four filter cartridges provided by the program. Participants that complete the exit survey receive a voucher in the mail for two additional filter cartridges.

## PROGRAM DESIGN STRATEGIES TO REACH PREGNANT PEOPLE AND FAMILIES WITH YOUNG CHILDREN

The NH Water Well-Ness Initiative was specifically designed for pregnant people enrolled in the WIC program. The New Hampshire WIC Program annually serves between 12,000-14,000 women and young children experiencing low income at nutritional risk and about 25 percent of the state's WIC caseload are pregnant people.<sup>10,11</sup> Table 1 describes how the program was designed to reduce barriers to individual participation in the program.



*Courtesy of USDA WIC Breastfeeding Support*

**Table 1: Program Design Elements to Meet the Needs of WIC Families**

Potential Barrier to Participation	Program Design Element
Ensuring Participants Can Access Water Test Kits, Return Water Samples and Obtain Water Filters	To reduce the overall cost to participants, including their time, of accessing safe water, participants return water samples through the mail in pre-paid packaging, and the program mails the filter pitcher and replacement filters directly to participants' homes.
Addressing Issues Associated with Living in Rental Housing or a Home Owned by Another Person	Many WIC participants live in rental housing or homes where they are not the homeowner. Filter pitchers were selected to avoid the barrier of having to obtain landlord or homeowner approval for water treatment devices that would need to be connected to a plumbing system.
Maintaining Contact with Participants Through Frequent Changes of Address	The program budget assumed that up to 50 percent of pregnant people enrolled in WIC will have at least one change of address during their participation in the program. <sup>10(p12)</sup> To address this, the program follows up with participants to maintain contact with them and offers additional well water testing if a participant moves to a home with a different private well. <sup>10(p9)</sup>
Ensuring that Program Materials About the Risk of Harmful Contaminants in Untested Well Water, Water Sampling Instructions and Test Results Are Easy to Understand	Educational materials were developed to be easy to read and available in English and Spanish. The program also developed an educational video to guide participants through the process of home water sampling.

# PILOT PROGRAM FINDINGS

The pilot program ran through September of 2021 in Rockingham and Hillsborough counties in southern New Hampshire. The pilot program budget estimate provided for up to 50 filter pitchers to be distributed. As of the end of September 2021, WIC offices in the two participating counties had screened 677 pregnant people and 51 (8 percent) reported using a private well (Table 2).<sup>12</sup> Forty-four participants were confirmed to have a private well and received a water sample test kit in the mail, and 18 (41 percent) of those participants mailed in a water sample for testing.<sup>12</sup> A total of 16 water samples were tested by the lab, and 6 filter pitcher kits were distributed to homes where the test results indicated the well water sample exceeded the state MCL for arsenic.<sup>12</sup>

These pilot program findings highlight the difficulty of estimating the number of pregnant WIC participants with a private well. Using statewide averages, the program originally estimated that a little less than half (46 percent) of the 3,800 pregnant people served by WIC clinics in a 24-month period would be on private wells; and about one-third (30 percent) of those would have an arsenic exceedance.<sup>10</sup> The program also did not account for the fact that less than 100 percent of participants would return their water sample and consent form.<sup>10</sup> In practice, just 8 percent of pregnant WIC participants screened during the pilot program were private well users (Table 2). Program staff suspect that the lower rate of private well usage among the pregnant WIC mothers may be due to overrepresentation of WIC clients in multi-unit housing and more densely populated areas that

**Table 2: Summary of Pilot Program Findings<sup>12</sup>**

Program Element	Number Reported
WIC Participants Screened for a Private Well	677
Participants Enrolled in Program	51
Participants Confirmed to Have a Private Well and Mailed a Water Sample Test Kit	44
Water Samples Mailed to Lab	18
Water Samples Tested by Lab	16
Water Samples with an Arsenic Exceedance	6
Filter Pitcher Kits Distributed	6
Filter Replacement Kits Delivered	5

are served by public water systems in the two counties selected for the pilot.

During the course of the pilot, the program found that the analytical methods used to detect arsenic by the water analysis lab also produced reports for four other toxic metals: copper, lead, manganese, and uranium. In order to address exceedances identified for those other four toxic metals, the project team expanded eligibility for filter pitchers from arsenic exceedance only to exceedances of any of the five metals. Due to the lower-than-expected rates of private well use and water samples returned, the program estimates that this can be done within the original program budget. Findings from the pilot program are being used to inform the full-scale program (Table 3).

**Table 3: Program Revisions Following the Pilot Phase of the Water Well–Ness Initiative**

Issue Identified	Program Activity Adopted to Address the Issue
<p><u>Accurately Screening People for a Private Well:</u> WIC participants often did not know whether their water source was from a public water supplier or a private well.</p>	<p>The private contractor will double check that enrollees are not on public water by comparing participant addresses against online maps of water system service areas.</p>
<p><u>Obtaining Consent:</u> participants did not always return the written consent form with their water sample which meant those samples could not be tested without additional follow-up.</p>	<p>WIC staff will use text messaging to follow up with participants regarding returning samples and consent forms. Revised educational materials provided to participants will also address the importance of including a signed consent form with a water sample.</p>
<p><u>Rate of Water Samples Returned for Testing:</u> less than half (41 percent) of pilot program recipients returned a water sample for testing.</p>	<p>The private contractor will follow up with people who received a test kit and a consent form but did not send either back. WIC staff straining will address this, and staff will use text messaging to follow up with participants. Revised educational materials provided to participants will also address this.</p>
<p><u>Addressing Other Toxic Metals Identified During Arsenic Testing:</u> The standard testing protocol for arsenic also yields results for copper, lead, manganese, and uranium.</p>	<p>The full-scale, statewide program will provide filter pitchers and replacement filter cartridges to participants with an exceedance for any of the five toxic metals (arsenic, copper, lead, manganese, and uranium) analyzed during testing.</p>

## PROGRAM IMPLICATIONS

The NH Water Well-Ness Initiative is a notable example of interagency collaboration between state agencies responsible for water quality and human health and nutrition assistance. These kinds of strategic partnerships help to build on existing community capacity to address private well water quality in New Hampshire. Preliminary data indicate a 41 percent return rate of the water test kits distributed by the program. This is higher than some other water testing programs in the Northeast<sup>13,14</sup> and could indicate the importance of using specific program design features to enable and support participation by families with infants and young children experiencing low income. The program findings also highlight the need for better state-level data on the prevalence of home water wells and demographic data about families reliant on home water wells. This data is crucial for accurate program planning, budgeting, and

effective implementation. While this project is focused on serving pregnant WIC participants, key program activities could be expanded for all WIC families with children under the age of 5.



### SUGGESTED CITATION

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## REFERENCES

1. New Hampshire Department of Environmental Services. Arsenic in New Hampshire Well Water. Published online March 2021. Accessed April 12, 2021. <https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/dwgb-3-2.pdf>
2. Changelab Solutions. Clean Water is a Bedrock Issue: A Multi-Channel Approach to Promoting Well Testing in New Hampshire. Published online November 29, 2018. Accessed June 21, 2021. [https://www.changelabsolutions.org/sites/default/files/CLS-BG177-Water-Regulation-%26-Policies\\_CASE-STUDY-%233-NewHampshire\\_v04\\_FINAL\\_20181129.pdf](https://www.changelabsolutions.org/sites/default/files/CLS-BG177-Water-Regulation-%26-Policies_CASE-STUDY-%233-NewHampshire_v04_FINAL_20181129.pdf)
3. Borsuck M, Rardin L, Paul M, Hampton T. Arsenic in Private Wells in NH. Thayer School of Engineering at Dartmouth and Dartmouth Toxic Metals Superfund Research Program; 2014:48. Accessed April 12, 2021. <https://cpb-us-e1.wpmucdn.com/sites.dartmouth.edu/dist/8/2068/files/2019/02/Wellreport-15i2011.pdf>
4. Children's Environmental Health and Disease Prevention Research Center at Dartmouth. Project 1: Childhood Immune Function. Accessed June 28, 2021. <https://geiselmed.dartmouth.edu/childrenshealth/overview/project-1/>
5. Flanagan SV, Gleason JA, Spayd SE, et al. Health protective behavior following required arsenic testing under the New Jersey Private Well Testing Act. *Int J Hyg Environ Health*. 2018;221(6):929-940. doi:10.1016/j.ijheh.2018.05.008
6. Flanagan SV, Spayd SE, Procopio NA, Chillrud SN, Braman S, Zheng Y. Arsenic in private well water part 1 of 3: Impact of the New Jersey Private Well Testing Act on household testing and mitigation behavior. *Sci Total Environ*. 2016;562:999-1009. doi:10.1016/j.scitotenv.2016.03.196
7. He X, Karagas MR, Murray C. Impact of receipt of private well arsenic test results on maternal use of contaminated drinking water in a U.S. population. *Sci Total Environ*. 2018;643:1005-1012. doi:10.1016/j.scitotenv.2018.06.228
8. U.S. Food and Nutrition Service. WIC Breastfeeding Data Local Agency Report: FY2018. United States Department of Agriculture; 2019:171. Accessed November 1, 2021. <https://fns-prod.azureedge.net/sites/default/files/resource-files/FY2018-BFDLA-Report.pdf>
9. NH DWG Trust Fund. Mission. Accessed April 12, 2021. [https://www4.des.state.nh.us/nh-dwg-trust/?page\\_id=32](https://www4.des.state.nh.us/nh-dwg-trust/?page_id=32)
10. New Hampshire Department of Environmental Services. Request for Proposals: Program Services for Distribution of Filter Pitchers and Filter Cartridges to At-Risk Mothers and Infants Exposed to Arsenic in Private Water Supply Wells. NH Department of Administrative Services. Published June 24, 2019. Accessed April 12, 2021. <https://das.nh.gov/purchasing/Docs/Bids/RFP%20DES%202019-11.pdf>
11. USDA Food and Nutrition Service. WIC Program: Total Participation. Published June 4, 2021. Accessed June 21, 2021. <https://fns-prod.azureedge.net/sites/default/files/resource-files/26wifypart-6.pdf>
12. Smith T. New Hampshire Water Well-Ness Initiative: Filter Pitchers to Protect New Hampshire's at-Risk Mothers and Infants from Arsenic in Drinking Water from Private Wells. *120Water*; 2021.
13. Murray CJ, Olson AL, Palmer EL, et al. Private well water testing promotion in pediatric preventive care: A randomized intervention study. *Prev Med Rep*. 2020;20:101209. doi:10.1016/j.pmedr.2020.101209
14. Zheng Y, Flanagan SV. The Case for Universal Screening of Private Well Water Quality in the U.S. and Testing Requirements to Achieve It: Evidence from Arsenic. *Environ Health Perspect*. 2017;125(8). doi:10.1289/EHP629