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A Community-Driven Intervention in Tuftonboro, New Hampshire, Succeeds in Altering Water Testing Behavior

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Abstract

Maximum contaminant levels created by the U.S. Environmental Protection Agency under the Safe Drinking Water Act do not apply to private wells. Rather, the onus is on individual households to undertake regular water testing. Several barriers exist to testing and treating water from private wells, including a lack of awareness about both well water as a potential source of contaminants and government-recommended water testing schedules; a health literacy level that may not be sufficient to interpret complex environmental health messages; the inconvenience of water testing; the financial costs of testing and treatment; and a myriad of available treatment options. The existence of these barriers is problematic because well water can be a source of hazardous contaminants. This article describes an initiative—undertaken by the Tuftonboro (New Hampshire) Conservation Commission, with support from state agencies and a research program at Dartmouth College—to increase water testing rates in a rural region with a relatively high number of wells. The project prompted more water tests at the state laboratory in one day than in the prior six years. This suggests that community-driven, collaborative efforts to overcome practical barriers could be successful at raising testing rates and ultimately improving public health.

Introduction

Approximately one-sixth of U.S. households obtain drinking water from a private well (Kenny et al., 2009). In New Hampshire, more than 40% of the population obtains household water from an unregulated well (Figure 1) (Kenny et al., 2009). Under the Safe Drinking Water Act (SDWA), the U.S. Environmental Protection Agency (U.S. EPA) regulates public drinking water supplies by establishing maximum contaminant levels

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(MCLs) and delegating enforcement to states and tribes to ensure water systems conform with the MCLs (Levine, 2012; Tiemann, 2010). The SDWA defines a contaminant as “any physical, chemical, biological, or radiological substance or matter in water.” Private well water is not tested for compliance with MCLs unless it (1) provides piped water for human consumption to at least 15 service connections (community water systems) or (2) regularly serves at least 25 of the same people for 60 days a year (nontransient, non-community water systems) (Tiemann, 2010; U.S. Environmental Protection Agency [U.S. EPA], 2012a). Therefore, households with wells are responsible for regular water testing to detect contaminants and for applying treatment when necessary.

Potential Human Health Effects of Drinking Water From Private Wells

Untreated water from private wells can be a source of unsafe levels of contaminants (Table 1) (Charrios, 2010; Committee on Environmental Health & Committee on Infectious Diseases [CEHCID], 2009; Walker, Shaw, & Benson, 2006). Ingestion of contaminated water can cause both acute and chronic illness and certain contaminants are particularly hazardous to fetuses, infants, and children (Brender et al., 2013; CEHCID, 2009; Dangleben, Skibola, & Smith, 2013; Farzan, Karagas, & Chen, 2013; Hexemer et al., 2008; Hilborn et al., 2013; Naujokas et al., 2013; Rahman et al., 2010; Reynolds, Mena, & Gerba, 2008; Smith & Steinmaus, 2009). Bacteria, viruses, and parasites cause gastrointestinal illnesses; contaminants, such as radon, arsenic, chromium, and trichloroethylene are carcinogenic; and studies associate consumption of nitrates with a host of health effects and abnormal fetal development (Ward et al., 2005). Few studies have explored complex mixtures of contaminants and their additive or synergistic effects on health (Ryker & Small, 2008).

In New Hampshire wells, several contaminants are found at levels of concern, including arsenic, radon, and uranium. Low levels of arsenic are likely in nearly 40% of New Hampshire's groundwater (Figure 2) (Ayotte, Cahillaine, Hayes, & Robinson, 2012). Public health officials estimate that approximately one in five New Hampshire wells has arsenic in excess of the U.S. EPA MCL of 0.01 mg/L (Montgomery, Ayotte, Carroll, & Hamlin, 2003). Arsenic is a concern due to both its status as a class 1 carcinogen (Anders et al., 2004) and its place atop of the 2011 Priority List of Hazardous Substances published by the Agency for Toxic Substances and Disease Registry, which is a ranking of substances based on a combination of their frequency, toxicity, and potential for human exposure at Superfund sites (Agency for Toxic Substances and Disease Registry, 2011). The major concern of ingesting inorganic arsenic is cancer, but dermatological, developmental, neurological, respiratory, cardiovascular, immunological, and endocrine effects are also evident (Hughes, Beck, Chen, Lewis, & Thomas, 2011; Martinez, Vucic, Becker-Santos, Gil, & Lam, 2011; Naujokas et al., 2013; Nuckols et al., 2011; Parvez et al., 2013; Rahman et al., 2010). Evidence is growing that links prenatal and early-life exposure to arsenic with long-term health implications (Farzan et al, 2013) and deleterious effects on the immune system (Dangleben et al., 2013).

Radon is also commonly present in New Hampshire well water. Approximately 50%–60% of all private drilled wells in New Hampshire produce water with radon concentrations between 300 and 4,000 picocuries per liter (pCi/L) (New Hampshire Department of

Environmental Services, 2009). Although the ingestion risk of radon is smaller than the risk associated with inhalation, drinking water with radon increases the risk of developing stomach cancer (Catelinois et al., 2006; Hopke et al., 2000). Of the estimated 168 cancer deaths per year due to radon in drinking water, 11% of the deaths are from stomach cancer caused by ingestion (National Research Council, 1999; U.S. EPA, 2012b). Furthermore, radon in water vaporizes during normal usage and contributes to the overall level of radon in indoor air (Collman, Loomis, & Sandler, 1991).

A small number of New Hampshire wells contain uranium above the U.S. EPA MCL (0.03 mg/L). Possible biological effects of drinking uranium above 0.03 mg/L over a long period include vitamin D and iron homeostasis, bone volume decrease and healing interference, and adverse effects on the kidneys (Canu, Laurent, Pires, Laurier, & Dublineau, 2011). Lower levels of uranium in drinking water have also been associated with high blood pressure (Frisbie, Mitchell, & Sarkar, 2013).

Communicating With Households About Private Wells

Encouraging citizens to monitor their homes is a formidable task (Doyle et al., 1990) and studies indicate that a significant proportion of households are unaware of the need for regular water quality testing (Novokowski, Beatty, Conboy, & Lebedin, 2006). For example, in a rural area of Canada, only 8% of survey respondents had tested their well water at a frequency that met the recommended testing schedule and 20% of households that had tested did not know which tests were performed (Jones et al., 2006). Another study in two rural U.S. counties found that a quarter of respondents with wells had never thought about taking precautions to limit their children's exposure to contaminants, and only one-third of respondents had ever previously tested their water (Postma, Butterfield, Odom-Maryon, Hill, & Butterfield, 2011). At least one study concluded that education, income, age, and homeowner status are all significantly associated with water testing rates (Jones et al., 2005). Treatment rates are also low; a survey in a rural county in Nevada where the media reported extensively about arsenic in drinking water found that only 38% of residents applied treatment (Walker et al., 2006).

Hazard perception is another challenge. No time pressure exists to complete the testing and treatment process and certain contaminants found in well water possess characteristics that lead people to accept the risks associated with drinking well water (Covello, 2008). People may dismiss the risks associated with drinking water because of the following risk characteristics, which have also been identified as reasons people fail to address radon in indoor air (Doyle et al., 1990):

1. The objective probability of the health risk is often below the level at which people understand and respond appropriately;
2. Often no perceptual cues or reminders exist to alert people to the presence of the risk (e.g., arsenic is colorless, odorless, and tasteless in water);
3. Contaminants in well water are often of geological origin, so no villain exists to whom the household can easily assign blame or responsibility;

4. People's experience with the risk is generally benign in the sense that many have lived in their homes years without experiencing any easily attributable health effect;

5. The effect of the risk is far removed from the initial exposure (e.g., arsenic-induced cancer takes many years to develop);

6. Deaths due to contaminant consumption are not dramatic, occur singly, and are impossible to unequivocally relate to consumption; and

7. The risk is not the same for everyone but varies in complex ways depending on several dimensions (e.g., location, soil type, well structure).

Additional commonly reported obstacles to water testing and treatment rates include inconvenience, economic costs, inability to interpret test results, and uncertainty over the reliability of treatment companies or performance of systems (Jones et al., 2006; Kreutzwiser, de Loe, & Imgrund, 2010; Kreutzwiser et al., 2011; Montgomery et al., 2003). Self-installation treatment systems are available, but they have startup and maintenance costs, require skills to install, and are typically contaminant specific. Finally, water quality information and test results contain complex terms, labels, and numbers with various confounding units; thus, we suspect that health literacy levels are also an understudied contributor to low treatment rates. Health literacy is “the degree to which individuals have the capacity to obtain, process, and understand basic health information . . . needed to make appropriate health decisions (Ratzan & Parker, 2000),” and it refers to “... understanding and using information to make health decisions (Peerson & Saunders, 2009).” It includes the ability to use quantitative information (Berkman, Davis, & McCormack, 2010). Almost 9 out of 10 U.S. adults have difficulty applying everyday health information (Kutner, Greenberg, Jin, & Paulsen, 2006).

Recent research suggests public health officials must design interventions and materials to address these barriers. In Waterloo, Canada, removing the barriers of cost and inconvenience approximately doubled the background testing rate (Hexemer et al., 2008). A thorough analysis identified complacency and inconvenience as the most significant barriers and confirmed that household knowledge and better information alone were weak bases for predicting higher testing rates (Imgrund, Kreutzwiser, & de Loe, 2011).

Community-Level Interventions and Behavior Change

Community-based participatory research and other forms of community-engaged research encourage involvement of communities in the formation of research and solutions (Brown et al., 2012; O'Fallon & Dearry, 2002). Researchers and communities increasingly report that partnership-driven, community-level interventions are successful in promoting healthy behaviors (Brown et al., 2012; Downs et al., 2010). Partnership-driven efforts build social capital, empower households, and help develop locally appropriate management strategies (Arnold & Fernandez-Gimenez, 2007; Berkes, 2009; Downs et al., 2010). Findings suggest target populations may ignore messages when community leaders do not sufficiently participate in the design of interventions; thus, communication may not clarify the public health hazard and has the potential to expand the gap between perceived and actual risk.

High levels of public disinterest and apathy have been reported in many “technocratic” approaches (Covello, 2008; Doyle et al., 1991; Slovic, 1987).

Participatory testing and reporting refers to an approach that enables community members to participate in meaningful and empowering ways in the testing activity and reporting of results (Downs et al., 2010). The work described here was “participatory” in that 1) a local group of volunteers consulted an academic research program and state agency to conceive, design, and implement a water testing program; and 2) the volunteers led an effort to report the results to local leaders and the community with support from the other partners.

Methods

Partnership to Increase Well Water Testing Rates in Tuftonboro, New Hampshire

In 2012, the Tuftonboro Conservation Commission (TCC) initiated an effort to inform local residents about the potential health effects of well water. TCC began by inviting the Dartmouth Toxic Metals Superfund Research Program (DTMSRP) to present to the Tuftonboro Selectboard (Figure 3). A member of DTMSRP presented information about the health effects of contaminants in well water and provided information about protective actions. The selectboard responded with support for an informational campaign. TCC subsequently planned a well water testing service for residents in order to make testing accessible and reduce its overall inconvenience.

Table 2 outlines the timeline of the water testing campaign in 2012. In short, TCC contacted the New Hampshire Department of Health and Human Services Public Health Laboratory (NH DHHS Lab) to obtain water testing kits for distribution to residents. TCC disseminated and publicized information about well water and notified the community about dates TCC would distribute testing kits. After collecting samples, forms, and money, a volunteer delivered the time-sensitive samples to the NH DHHS Lab, which was a 70-minute drive (140 minutes round trip). The volunteer ensured correct transfer of test forms and samples, and TCC coordinated the delivery of results to residents. Residents were provided the option to choose a basic analysis, a standard analysis, a radiological analysis, or individual contaminants. Results were subsequently delivered to residents, and personally identifiable information was removed so the collective results could be presented to the selectboard by a member of DTMSRP. Finally, TCC organized a well water forum in collaboration with the New Hampshire Department of Environmental Services (NH DES) to answer residents’ questions about results and treatment. In total, TCC estimated it spent more than 100 man-hours organizing the campaign in 2012. TCC repeated the process in 2013.

Community and Partners Involved

TCC—TCC is composed of four year-round volunteer residents. Conservation commissions are composed of volunteers who work to study and protect local natural resources. Three members planned and carried out the water testing events, extending the mission of TCC to protect residents from the consequences of contaminants in well water. Tuftonboro is located in Carroll County, New Hampshire. Carroll County has fewer than 50,000 people and Tuftonboro has approximately 2,500, with the number of residents markedly increasing during the summer months. Tuftonboro is a summer vacation spot on the north shore of Lake Winnipesaukee, with a marina and many lakeside homes and rental cottages.

DTMSRP—DTMSRP is a research program funded by the National Institute of Environmental Health Sciences. A focus of the program is to investigate the health effects of arsenic in well water, and informing residents about arsenic in well water has been a priority of DTMSRP since its inception. The Research Translation and Community Engagement Cores maintain a Web site with frequently asked questions and water testing information. The Research Translation Core created a 10-minute movie, *In Small Doses: Arsenic*, about arsenic in wells. The cores frequently organize public events to promote water testing, and they have a prominent role in the coordination of the New Hampshire Arsenic Consortium, which is an annual meeting of regional professionals to share information on arsenic in well water.

NH DES—NH DES produces drinking water fact sheets, provides technical assistance about testing and treatment to residents, and conducts outreach to promote testing and treatment. Private well installation and related construction standards are administered by the New Hampshire Water Well Board. The board along with NH DES is primarily responsible for licensing well and pump contractors, maintaining well construction records, and adopting and enforcing standards for the construction of wells and the installation of pumps. NH DES recommends private well users test their water annually for bacteria and nitrates, and every three to five years for a suite of other contaminants. The agency also maintains a list of accredited labs that provide services locally.

NH DHHS Lab—The NH DHHS Lab provides analytical testing services of water, wastes, hazardous materials, soils, and other chemical matrices for all state agencies and citizens. The NH DHHS Lab's mission is to meet clients' needs and requirements, comply with all applicable quality assurance and quality control objectives, and comply with current applicable government standards and regulations. Its policy is to assist clients in understanding and interpreting the relevance of their test results by providing educational material and personal communication.

Results

In total, TCC collected and delivered 285 water samples to the NH DHHS Lab in July 2012 and July 2013 (Figure 4), which was more than triple the number of water samples tested at the same lab in the previous six years (the NH DHHS Lab tested just 83 water samples from Tuftonboro from 2006 to 2012). After the first sample collection event in 2012, the TCC delivered 122 water samples in July and then 37 other samples prompted by follow-up publicity and a Well Water Forum led by NH DES. In 2013, TCC collected and delivered a total of 163 water samples after the sample collection event and then 27 in the following months. Alarmingly, 28% of water samples exceeded the arsenic MCL and 23% were positive for total coliform bacteria. Of the 79 samples that underwent a radiological analysis, 24 water samples (34%) had greater than 2,000 pCi/L of radon, which is the NH DES recommended action level. The combined results are summarized in Table 3.

Discussion

We consider the participatory water testing program designed and implemented by TCC to be successful. The program raised awareness about the potential hazards of well water among local community leaders and empowered many residents to test their water. The reporting of results also sprouted other community-led testing initiatives in New Hampshire. Elements that contributed to the success of the program included the following:

- Targeted messages. TCC used local media to significantly raise public awareness, and the efforts to promote the water testing service were well timed.
- Support from the town selectboard. TCC worked together with the town select-board, keeping the town leaders informed about its actions, and the selectboard supported the TCC's testing service by providing reimbursement to the TCC member who transported the water samples to the NH DHHS Lab. Members of TCC attended selectboard meetings each month to report on progress leading up to the events. The meeting minutes are published and read by town residents.
- Persistence. TCC volunteered a substantial amount of time over the course of two years to plan, inform citizens, and hold events.
- Dedicated and compassionate volunteers. Informed members of TCC provided individual assistance to residents on what tests to select, how to draw the samples, and what payment to make.

The actions of TCC addressed factors that have previously been found to influence testing behavior. First, TCC likely changed local attitudes through a public information campaign focused on providing facts and stories about local residents who were dealing with contamination. The publicity may have boosted household knowledge and altered a common misperception that unsafe water must taste or smell abnormally. Second, TCC learned that the inconvenience of water testing may be an important structural constraint, especially in rural regions. TCC made water testing more accessible for people by distributing test kits, driving samples to the lab, and reducing the overall effort needed to obtain and interpret results. This reinforces previous findings that merely providing the public with information is not sufficient to ensure that decisions are consistent with the actual level of risk (Imgrund et al., 2011; Madajewicz et al., 2007; Walker, Shaw, & Benson, 2006).

The overall effectiveness of the program in reducing exposure is difficult to evaluate because we did not measure the rate of treatment and did not formally follow up with households about whether they acted on the test results. This limits our ability to analyze how people interpreted water test results and whether the information they received was actionable. Future programs should contain a mechanism to measure treatment rates, since water testing alone does not reduce exposure to contaminated water. Comments from TCC emphasized the need for clear and simple instructions with test kits and the need for water test results to highlight elevated levels of particular contaminants. We are also unable to definitively state that the water testing program increased the background water testing rate in Tuftonboro because private laboratories in New Hampshire do not release data on the number of samples tested at their facilities. It is possible a significant number of people used private lab services, which could mean 1) more people tested prior to the efforts of TCC, or 2) the number of water tests prompted by the TCC is higher, which would result in a smaller or larger increase of the background water testing rate, respectively.

Conclusion

Water from private wells is largely unmonitored and private well users are often unaware of the potential presence of contaminants. In the absence of protective laws, convincing households to follow recommended testing schedules is necessary to protect public health. Participatory programs that reduce the barriers to testing and treatment can help certain communities increase the likelihood of protective behaviors. The pilot program described here was successful in raising local awareness and prompting residents to test their water. Further programs and research should explore the other testing and treatment constraints.

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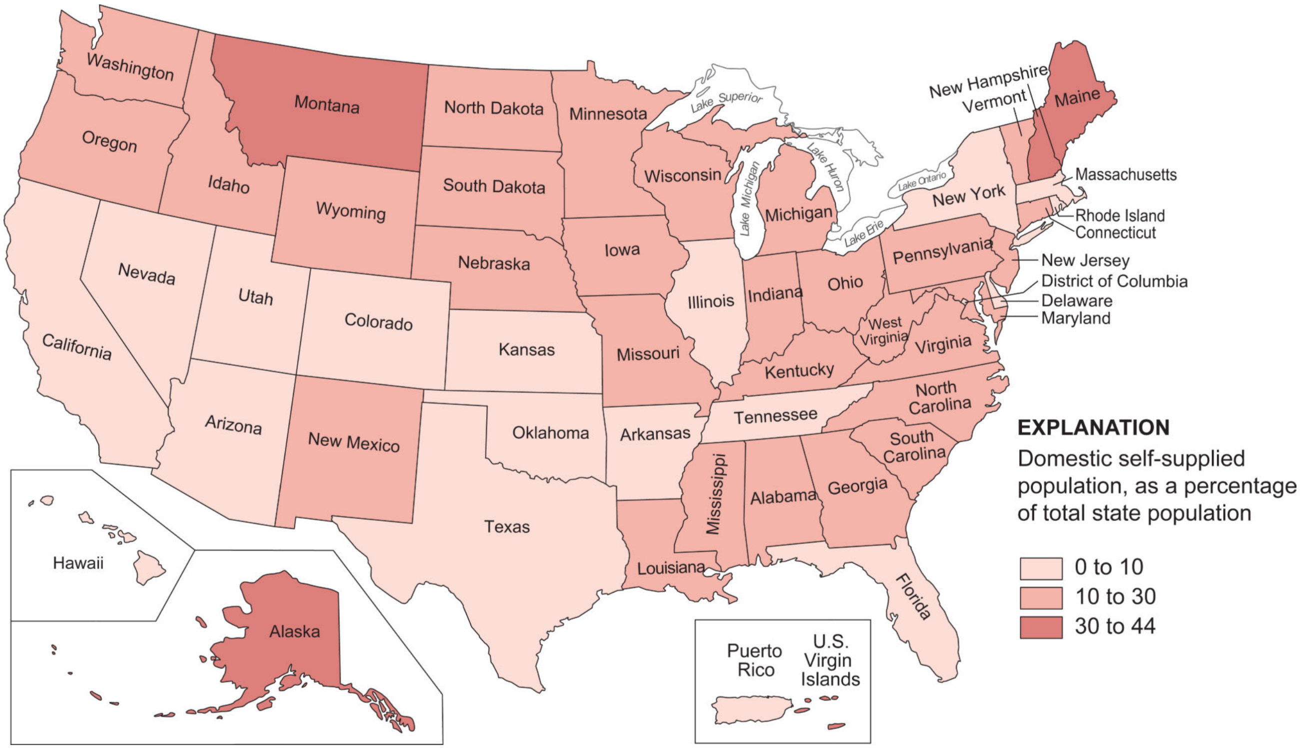

FIGURE 1.

Percentage of Total State Population With a Self-Supplied Domestic Water Source

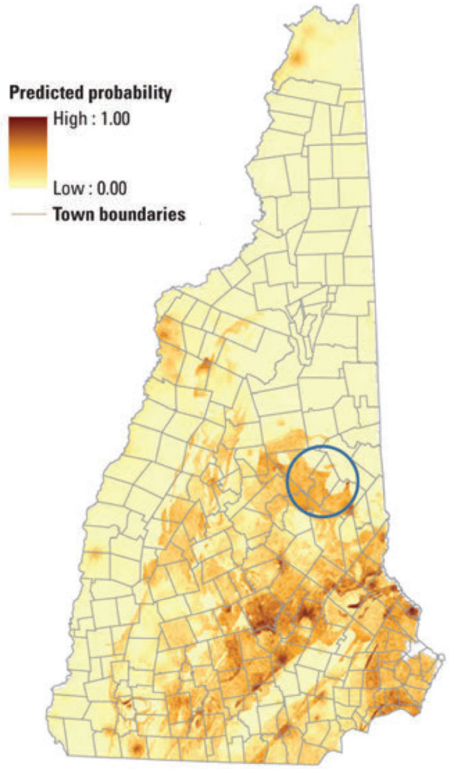

FIGURE 2.

Probability of Arsenic Concentration in Groundwater From Bedrock Aquifers in New Hampshire Exceeding 0.01 mg/L

As estimated from a U.S. Geological Survey model. Tuftonboro is located inside the blue circle. Adapted from Ayotte et al., 2012.

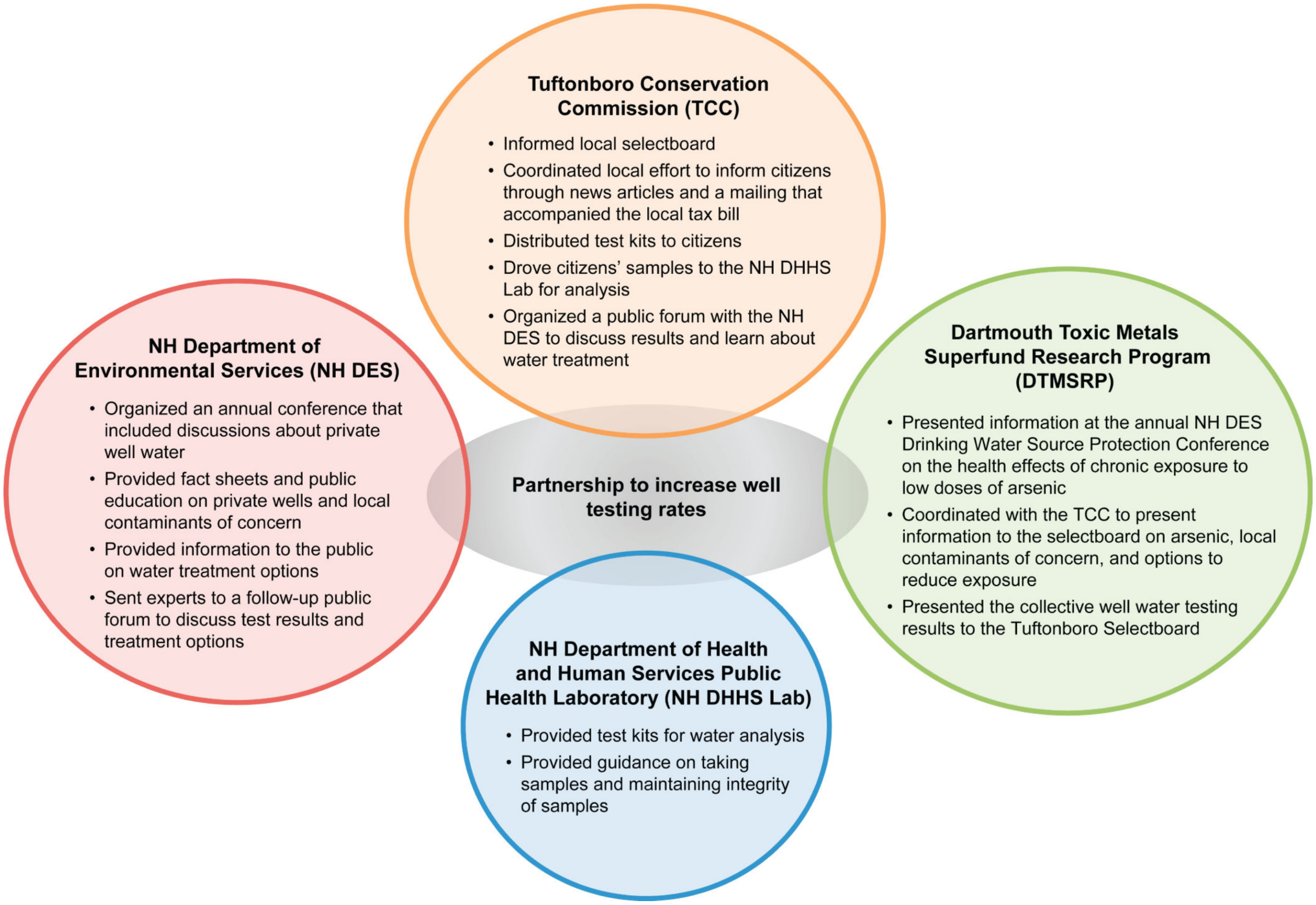

FIGURE 3.

Partners Involved in a Pilot Project to Increase Well Testing Rates in Tuftonboro, New Hampshire

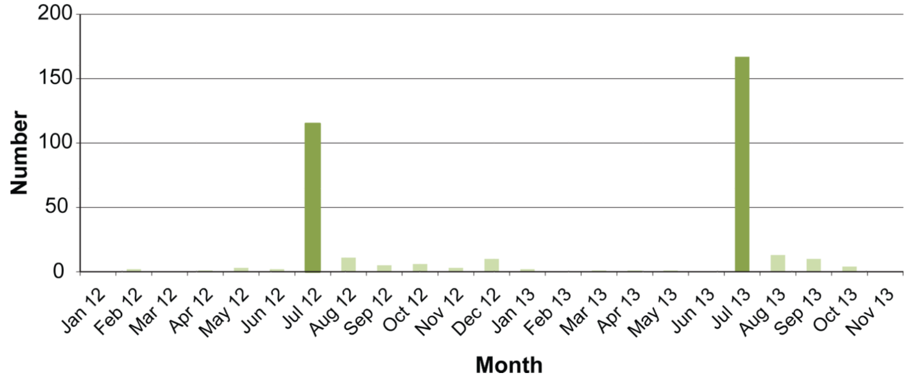

FIGURE 4.

Number of Well Water Samples Processed by the New Hampshire Department of Health and Human Services Lab from Tuftonboro, Melvin Village, and Mirror Lake in Each Month of 2012–2013

The Tuftonboro Conservation Commission held community water testing events in July 2012 and July 2013. Over the previous six-year period, the state lab processed a total of 83 samples from these three communities.

TABLE 1

Sources, Human Health Benchmarks, and Possible Health Effects of Contaminants Potentially Present in New Hampshire Domestic Well Water[a]

Contaminant	Source	Human Health Benchmark		Possible Health Effects
		Value	Type[b]	
Arsenic	Erosion of natural deposits; runoff from historic pesticide or insecticide application; industrial waste	0.01 mg/L	MCL	Increased risk of several cancers; circulatory problems; endocrine disruption
E. coli; Legionella; Giardia; Cryptosporidium	Human and animal fecal waste; some are naturally present	Goal = zero; No more than 5.0% samples total coliform positive in a month		Gastrointestinal illness (diarrhea, vomiting, cramps); Legionnaires' disease
Fluoride	Naturally in water in a few parts of the U.S.	4.0 mg/L	MCL	Dental fluorosis at high doses; increased risk of bone fractures
Lead	Corrosion of household plumbing; erosion of natural deposits	0.015 mg/L	U.S. EPA action level	Children: developmental delays; possible deficits in attention span and learning abilities Adults: kidney problems; high blood pressure
Manganese	Soil; aquifers; gasoline	0.05 mg/L	Secondary MCL	Neurological effects; manganism; some evidence that shower inhalation can cause toxicity
Nitrate	Fertilizer use; manure; sewage and septic-system effluent; aquifer materials	10 mg/L	MCL	Neural tube defects; central nervous system defects; oral cleft defects; musculoskeletal defects; congenital heart defects; methemoglobinemia; possible promoter of carcinogenesis
Nitrite		1 mg/L		
Radon	Radioactive decay of uranium in aquifer; building materials	2000 pCi/L	NH DES action level	Increased risk of lung cancer for radon in air; increase in risk of stomach cancer for ingested radon
Uranium	Aquifers	0.03 mg/L	MCL	Increased risk of cancer; kidney toxicity
Volatile organics and pesticides (e.g., MtBE)	Dry cleaning and gasoline; leaking storage tanks and pipelines; gasoline spills; air deposition; unidentified sources	0.013 mg/L	NH DES HBSL for MtBE	Compound-specific effects

Department of Environmental Services; HBSL = health-based screening level.

[a]Modified and adapted from DeSimone, Hamilton, & Gillom, 2009 and AAP Committee on Environmental Health and Committee on Infectious Diseases, 2009.

[b]MCL = maximum contaminant level; U.S. EPA = U.S. Environmental Protection Agency; NH DES = New Hampshire

TABLE 2

Timeline of Partnership and Events

Month in 2012	Event[a]
May	Three TCC members attend the NH DES Drinking Water Source Protection Workshop. Dr. Josh Hamilton of DTMSRP presents information on the potential health effects of arsenic in New Hampshire well water.
	TCC researches the issue of contaminants in well water and presents the information at the next TCC meeting. TCC agrees to approach the Tuftonboro Selectboard about organizing a public information program.
	A member of the DTMSRP presents information to the Tuftonboro Selectboard about the potential health effects of common contaminants, a regulatory overview, and information about other local ordinances. The Tuftonboro Selectboard responds with support for an informational campaign. TCC meets to discuss a plan of action.
	TCC contacts several water testing labs to determine the cost of testing and service options.
June	A member of TCC continues to attend selectboard meetings to report progress, receive formal approval, and to ensure the proposed project was covered by the local media.
	TCC produces two articles about arsenic and other pollutants found in New Hampshire wells and the potential health effects. The articles appear in the town newsletter and a local paper. A reporter from the paper also publishes an article about a resident who had discovered an extremely high level of arsenic in their water.
	TCC announces plans to offer a water testing service and produces posters and a supplemental instruction sheet for residents. TCC also posts notices at three post offices and the library.
July	TCC distributes water testing kits at the town transfer station. Members of the TCC set up displays that include handouts from DTMSRP and NH DES. TCC makes three trips to the NH DHHS Lab to pick up test kits because demand exceeds estimations.
	In shifts, members of TCC collect water samples at the town transfer station. TCC checks residents' paperwork and collects money for the cost of water tests. The samples are properly bagged and refrigerated. The next morning two members deliver the samples to the state lab and help technicians organize the samples.
August	As residents receive water test results from the state lab, several members help people interpret reports or refer people to NH DES for technical assistance.
September	TCC begins planning a public forum for residents to include information about interpreting water test results and treatment options.
	TCC prepares a notice to be included with tax bills and a press release to advertise the Well Water Forum.
October	The first collection event in 2012 prompts 122 water samples. A member of DTMSRP presents the collective results of the water tests.
November	NH DES and TCC hold a Well Water Forum where testing and treatment specialists present information on interpreting water tests and respond to questions about water treatment.
	TCC distributes, collects, and delivers additional test kits to the NH DHHS Lab.

[a]TCC = Tuftonboro Conservation Commission; NH DES = New Hampshire Department of Environmental Services; DTMSRP = Dartmouth Toxic Metals Superfund Research Program; NH DHHS = New Hampshire Department of Health and Human Services.

TABLE 3

Tuftonboro Area Homeowner Survey, June 2012 and June 2013

Parameter	Samples	Limit Type[a]	Limit Value	# Above Limit	%
Total coliform bacteria	258	MCL	0 cts/100/mL[b]	61	23.64
Noncoliform counts	258		>200 cts/100/mL	40	15.50
E. coli bacteria	258	MCL	0 cts/100/mL	14	5.43
Analytical gross alpha	8	MCL	15 pCi/L	0	0.00
Arsenic	275	MCL	0.01 mg/L	77	28.00
Chloride	246	SMCL	250 mg/L	4	1.63
Copper	237	SMCL	1.0 mg/L	1	0.42
Copper-stagnant	232	SMCL	1.0 mg/L	22	9.48
Fluoride	240	MCL	4.0 mg/L	10	4.17
Fluoride SMCL	240	SMCL	2.0 mg/L	33	13.75
Hardness	237		250 mg/L	0	0.00
Iron	237	SMCL	0.3 mg/L	17	7.17
Lead	237	AL	0.015 mg/L	1	0.42
Lead-stagnant	232	AL	0.015 mg/L	23	9.91
Manganese	237	SMCL	0.05 mg/L	20	8.44
Nitrate	246	MCL	10 mg/L	21	8.54
Nitrite	246	MCL	1 mg/L	0	0.00
Radon	79		2000 pCi/L	24	30.38
Sodium	237	SMCL	250 mg/L	1	0.42
Uranium	237	MCL	.030 mg/L	0	0.00
pH	237		pH <6.5	37	15.61
	237		pH >8.5	8	3.38
Volatile organic compounds	3	MCL	varies with compound	0	0.00
Alkalinity	2			0	0.00

[a]MCL = maximum contaminant level for public water systems; SMCL= secondary maximum contaminant level for public water systems; AL= action level for public water systems.

[b]PRESENT is unacceptable.