

## 2019 NPCR CANCER REGISTRY SUCCESS STORY

<b>CANCER REGISTRY:</b>	<b>New Hampshire State Cancer Registry</b>
<b>TOPIC:</b>	<b>Bladder Cancer and the New Hampshire Arsenic Drinking Water Standard</b>
<b>STORY CATEGORY:</b>	<b>Public Health Impact</b>
<b>TITLE:</b>	<b>Legislation to reduce cancer risk in New Hampshire by limiting arsenic exposure in drinking water</b>
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### SUMMARY

For decades, the New Hampshire State Cancer Registry has provided data to researchers in the Dartmouth Toxic Metals Superfund Research Program. Their work has greatly increased our understanding of the role of arsenic in bladder cancer risk, and the high risks affecting our New Hampshire population, due to drinking water arsenic levels, particularly in private wells, which serve nearly half of the state's residents. In 2019, Governor Sununu signed into law a bill that enabled the state to reduce the maximum contaminant level (MCL) for arsenic in public drinking water from 10 to 5 parts per billion. New Hampshire becomes the second state in the country to enact stricter controls on exposure to this carcinogen.

### CHALLENGE

At Dartmouth College, researchers have been studying the health effects of **arsenic** for more than two decades. Arsenic is an element that occurs naturally in certain bedrock formations (Figure 1): from the bedrock, it can seep into public and private drinking water supplies and is present in very high levels in some areas of New Hampshire. Health studies, many using **New Hampshire State Cancer Registry** data, have demonstrated that long-term ingestion of arsenic at low doses is associated with bladder, skin, and lung cancers. Arsenic can enter the water supply not only from bedrock, but also from pesticides used in farming and from old pressure-treated wood (purchased before 2003) which used to contain chromated copper arsenate (CCA). Arsenic exposure can also result from ingestion of contaminated food such as rice, and rice products including rice-based baby cereal. Several areas in New Hampshire have many wells with private drinking water that contains arsenic at levels above the EPA regulatory limit for public water systems. About three in every ten private wells across the state have arsenic above the state's new public water limit of 5 ppb.<sup>1</sup>

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<sup>1</sup> [https://www.dartmouth.edu/press-releases/dartmouth\\_research\\_supports\\_reduction\\_of\\_arsenic\\_levels\\_in\\_nh.html](https://www.dartmouth.edu/press-releases/dartmouth_research_supports_reduction_of_arsenic_levels_in_nh.html)

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New Hampshire ranks #1 for bladder cancer incidence in the country (Figure 2). For 2012–16 pooled data, New Hampshire’s age-adjusted incidence was 27.4 per 100,000 per year, more than twice as high as Washington D.C., the registry reporting the lowest incidence of 13.1 per 100,000 per year. In addition, New Hampshire’s incidence was statistically significantly higher than the incidence in 46 other states.<sup>1</sup>

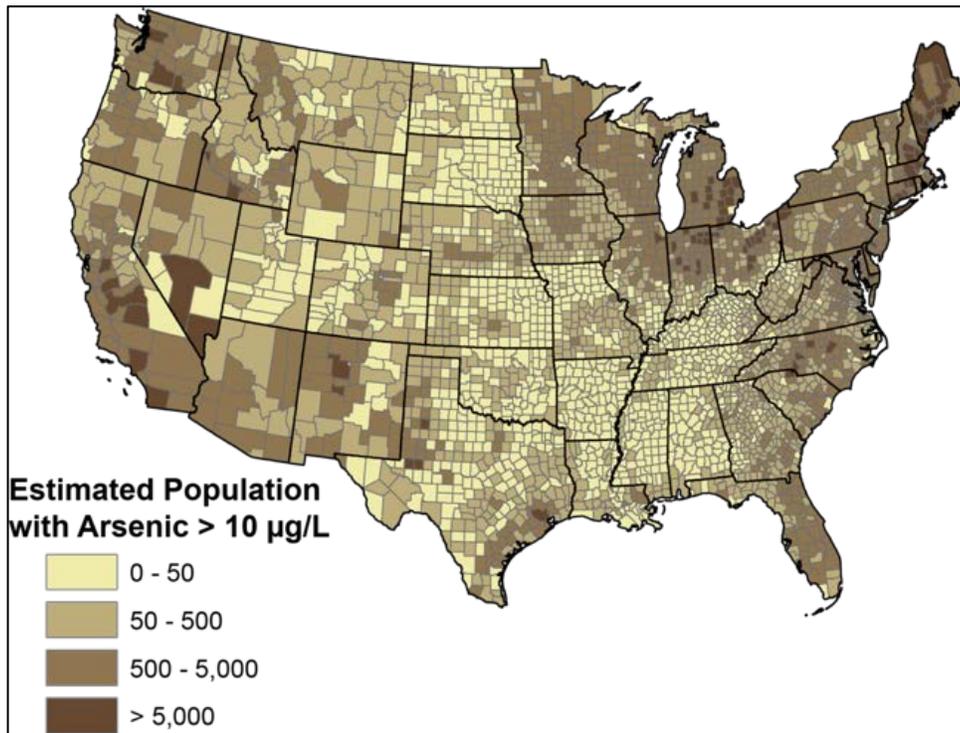


Figure 1. Map to show how many private domestic well users in each county may contain drinking water with arsenic levels of possible concern for human health. Source: United States Geological Survey<sup>1</sup>

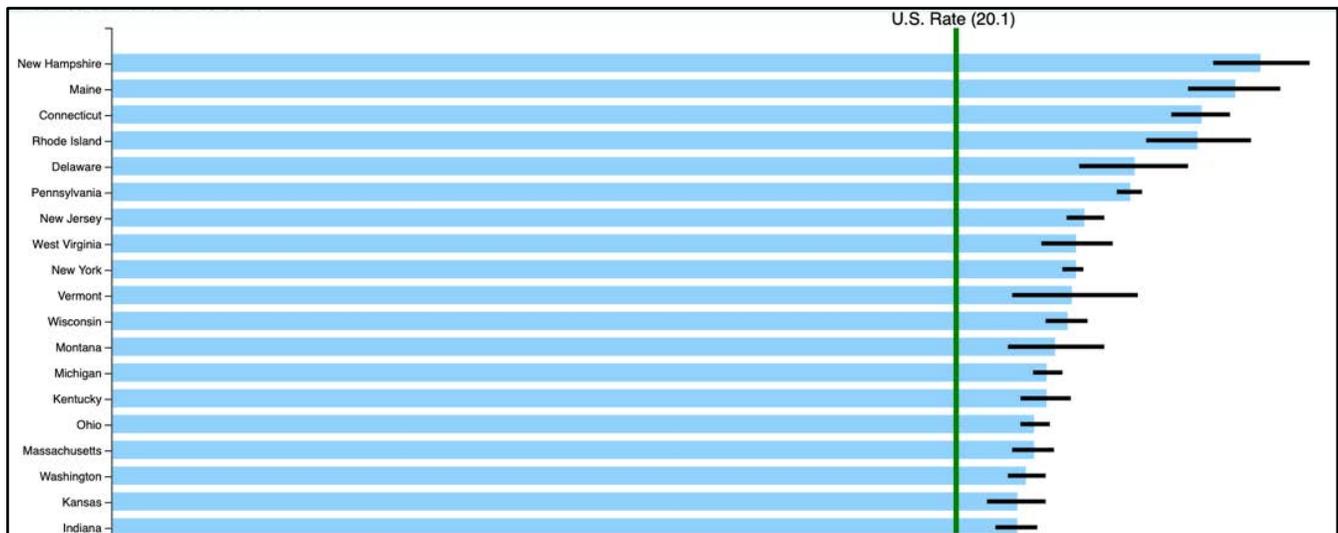


Figure 2. Urinary bladder cancer incidence per 100,000 people per year by state, 2012-16 (age-adjusted to 2000 U.S. standard)<sup>1</sup>

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### SOLUTION

Previous national regulations had made some progress towards reducing arsenic exposure. In 2001, the U.S. Environmental Protection Agency lowered the public drinking water standard for arsenic from 50 to 10 parts per billion (ppb), the level currently enforced in almost all other states.

Dr. Celia Chen leads Dartmouth's Toxic Metals Superfund Research Program, which has focused its research on toxic metals, including arsenic, since the program's inception in 1995. In addition to the research focusing on methylmercury fate and transport led by Dr. Chen, over the years the group has produced a wealth of research that has examined many of the health impacts of arsenic to address a public health impact of significant concern to NH residents. Dr. Karagas has received New Hampshire State Cancer Registry data for many of her IRB-approved studies and the research group has published papers relating arsenic consumption to cancer outcomes in northern New England. For example, the group's findings "support an association between low-to-moderate levels of arsenic in drinking water and bladder cancer risk in New England. In addition, historical consumption of water from private wells, particularly dug wells in an era when arsenical pesticides were widely used, was associated with increased bladder cancer risk and may have contributed to the New England excess."<sup>2</sup>

Based on the increasing volume of evidence from Dartmouth's Superfund Research Program, Children's Environmental Health Center, and other arsenic research around the country, showing arsenic health effects at levels below the federal MCL of 10 ppb, and the high incidence and high probability of arsenic in NH private wells,<sup>3</sup> the NH Legislature took action. House Bill 1592 directed the NH Department of Environmental Services (NHDES) to report on the cost, efficacy and public health impact to lower the MCL. The NHDES report recommended NH lower the arsenic MCL for public water from 10 to 5 ppb. HB 261 adopted this recommendation and was passed by the NH Legislature in June 2019 and signed by the Governor in July 2019.

New Hampshire and New Jersey are currently the only states using 5 ppb as their standard. Nonetheless, about a third of public water systems in New Hampshire have detectable arsenic in their drinking water supply and about the same fraction of private wells have arsenic levels above 5 ppb.

In addition to their research, Dartmouth's Toxic Metals Superfund Research Program leads the work of the NH Arsenic Consortium through partnerships with the NHDES, the NH Department of Health and Human Services, U.S. Geological Survey and other state and federal agencies. The Consortium provides updated research on arsenic at annual meetings and works with its members to provide outreach and education to NH citizens to reduce exposure to arsenic through water and food. The Consortium membership continues to grow and is fueled by the ongoing research from Dartmouth, as well as the dedication of all the supporting agencies to help private well users reduce their arsenic exposure. Development of a *Road Map to Reduce Arsenic Exposure in NH* is currently underway.

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<sup>2</sup> Baris D, et al. Elevated Bladder Cancer in Northern New England: The Role of Drinking Water and Arsenic. J Natl Cancer Inst. 2016 May 2;108(9).

<sup>3</sup> Ayotte, J.D., et al., 2012, Estimated probability of arsenic in groundwater from bedrock aquifers in New Hampshire, 2011: U. S. Geological Survey Scientific Investigations Report 2012-5156, 25 p., at <http://pubs.usgs.gov/sir/2012/5156/>.

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### RESULTS

New Hampshire's state legislature approved a bill that was signed into law by Governor Sununu on July 12, 2019. House Bill 261 will cut the level of arsenic allowed in public drinking water from 10 to 5 parts per billion (ppb), effective in July of 2021. New Hampshire is only the second state to make this change, after New Jersey. The legislature's goal is to accrue health benefits from New Hampshire's stricter regulation of public drinking water supplies, which are used by approximately half of the population. In addition, it is hoped that the publicity associated with this change will encourage the other half of the population to test their private well water, and to treat their water as needed to achieve an arsenic level in line with or lower than the new standard.

“Reducing maximum arsenic levels in public drinking water is consistent with the decades of research from Dartmouth and others linking the contaminant to negative health effects,” says Chen.<sup>4</sup>

### SUSTAINING SUCCESS

NHSCR continues to encourage NHSCR data use by researchers, and monitors bladder cancer rates & 5-year survival. NH DHHS participates in messaging to the public on cancer risk factors, including exposure to environmental constituents and contaminants.

### REGISTRY CONTACT INFORMATION

New Hampshire State Cancer Registry may be contacted through its website: <https://geiselmed.dartmouth.edu/nhscr/> or by telephone: 603 653 6630.

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<sup>4</sup> <https://news.dartmouth.edu/news/2019/07/dartmouth-research-informs-nh-action-arsenic-drinking-water>