The public health response to arsenic contamination of drinking water wells in Alaska

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ABSTRACT:

Introduction: Chronic oral exposure to inorganic arsenic (As$_i$) is associated with a number of adverse health effects. The most characteristic symptoms of prolonged As$_i$ exposure include skin changes, although it is also neurotoxic and carcinogenic. In August 2018, the Alaska Environmental Public Health Program (EPHP) learned that elevated concentrations of As$_i$ had been measured in two groundwater wells that served a public building near Fairbanks, Alaska, USA. Due to the public health risk posed by elevated As$_i$ in drinking water, EPHP conducted an environmental investigation.

Methods: EPHP administered a survey to assess potential exposure and the occurrence of symptoms commonly associated with acute and chronic As$_i$ poisoning. EPHP also collected hair samples and conducted an education campaign to increase awareness among residents.

Results: Concentration of As$_i$ in the wells were above 9,000 μg/L, exceeding drinking water standards (10 μg/L) by several orders of magnitude. Of the hair samples received, 88% exceeded the reference value (0.9 μg/g). Survey results indicated some individuals were experiencing symptoms consistent with acute or chronic arsenic poisoning, including severe abdominal pain, hypertension, and peripheral neuropathy.

Conclusions: The large deposits of As$_i$ in this region are well known to academic researchers, regulators, and public health officials. Despite repeated historical attempts to notify residents of the potential for elevated As$_i$ in drinking water, many residents remained uninformed. The findings of our environmental investigation indicate that As$_i$ exposure is ongoing, and further underscore the importance of interdisciplinary cooperation to inform residents of the risk and to get their well water tested.