A Comprehensive Review and Field Study of Arsenic in Texas Drinking Water, Local and Statewide: Seeking Safe Water, Quantifying Public Health Risks, and Assessing the Effect of Climate Change

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This project was meant to assess the public health risk posed by arsenic (As) in Texas drinking water on a local and statewide scale, find out if climate was affecting As concentrations statewide, and test the viability of both small scale and large scale solutions. The procedures include: (1)Modified Gutzeit method and ICP-MS were used to quantify As concentration; (2)a Linear regression was performed on total statewide annual violations and average PDSI, (3)an EPA equation (LADE x Cancer Slope Factor) gave cancer risks based on As concentrations found, and this risk was multiplied by the population exposed for total cases;(4)ICP-MFS testing on local water after reverse osmosis (RO) treatment; (5)New Hampshire (NH) was analyzed before and after enacting a 5ppb As MCL (maximum contaminant level) in 2021, as well as compared to Vermont (VT), a similar state that which remained under a 10ppb MCL. Results showed that 82% of local public samples were above the MCL. Local residences showed lower levels of As post-rain. Drought and the number of As violations had an r-score of 0.373, meaning drought was correlated with more As violations statewide. The local projected cancer rate was 6.7/1000. Statewide, 18,000-36,000 cancer cases will occur. RO reduced the local water to <0.5ppb. NH had a (.95 CL) significant reduction in mean Z-scores compared to VT after establishing a 5ppb As MCL in 2021. VT started off better but NH had less violations raw and proportionally after 2021. This project shows that As is a significant public health risk in Texas which gets worse during droughts but can be solved with filters or legislative change to reduce our MCL to 5ppb. The EPA/water companies can also focus their testing/preparation on expected droughts, when As will be at its peak.

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