

The Risk of Arsenic in Drinking Water in Somotillo Municipality, Nicaragua

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Introduction

- Arsenic is a chemical of major public health concern according to the World Health Organization. Even low levels of naturally occurring arsenic in drinking water has been linked to higher risks of cancer, diabetes, cardiovascular disease, respiratory disease, cutaneous issues, and impaired cognitive development in children (WHO, 2018)

The World Health Organization's provisional drinking water guideline for arsenic is no more than 10 ppb (0.01 mg/L)

- Arsenic is a known issue in Nicaragua, with contamination likely volcanic in origin. It is possible it entered groundwater through geothermally influenced water bodies (Gonzalez Rodriguez et al., 2019). Studies conducted in Nicaragua have found sources within the same community often have varying levels of arsenic - it has been hypothesized that this is because of the stratification and composition of aquifers, the depth of wells, as well as other factors (Delgado Quezada et al., 2020)
- Living Water Nicaragua identified a potential new WASH Program Area in Somotillo municipality, Chinandega department, Nicaragua in 2020



Somotillo municipality,
Chinandega department, Nicaragua

- Although several studies have documented groundwater contaminated with arsenic in the surrounding municipalities of San Juan de Limay and Pueblo Nuevo (Mendoza Aldana, 2010), a literature review yielded limited information about arsenic in Somotillo

Study Aim

- To determine the extent and distribution of arsenic contamination in Somotillo, including the identification of potentially affected aquifers.

Methodology

- A total of 42 water points in 20 communities were sampled between February 10-14, 2020
- The sampled water sources included 14 deep drilled wells (≥ 200 feet), 11 shallow drilled wells (< 200 feet), 12 hand-dug wells, 3 rivers, and 2 springs
- Arsenic, pH, turbidity, and Total Dissolved Solids were tested for each water point. Turbidity readings were taken at the water point, but all other parameters were tested at the Living Water Somotillo office. The HACH Arsenic Low Range Test Kit was used to evaluate arsenic concentrations



Results

- Arsenic was identified in 38% (n=16) of the water sources tested
 - Arsenic was detected in seven of the deep drilled wells (50%), three of the shallow drilled wells (27%), three of the hand dug wells (25%), and all three rivers (100%) - no water sample from a spring had detectable arsenic
 - Six of the drilled wells with detectable arsenic were drilled between 200 and 350 feet deep

Seven percent (n=3) of sampled water sources exceeded the WHO guideline for arsenic - two deep drilled wells and one hand-dug well

- The highest concentration of Arsenic found was from a thermal drilled well with five times the allowable limit of arsenic, while the other two wells had double the WHO guidelines for arsenic

Conclusion

- While there is arsenic present in Somotillo aquifers, it is not exceeding allowable parameters in most locations. Our findings suggest that certain types of water sources (thermal wells, wells between 200 and 350 feet, and rivers) may be more likely to have arsenic in Somotillo, while springs may be less susceptible
- Living Water is coordinating with the Ministry of Health, the Municipal Water and Sanitation Unit, and other NGOs to respond to these findings - the 70 households using contaminated water sources are being informed of the risk of drinking water contaminated with arsenic and the government is exploring corrective measures for those sources

Treatment for the removal of arsenic involves complicated maintenance and a high cost. An arsenic filtration system, such as the Kanchan Arsenic Filter, could be used where arsenic is relatively high and no other alternative for water is available.

- Living Water has proceeded with implementation of the WASH Program Area in Somotillo with the understanding that all water source development will need to include monitoring for arsenic. If a water source exceeds the WHO guidelines for arsenic, Living Water will not develop water sources within one kilometer of the location

References

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