Navigating Water Insecurity: Trust Dynamics and Sustainable Choices in Alaska Native Communities

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RESEARCH PROBLEM

Alaska Native (AN) communities have long grappled with issues of poor water quality and insecurity. Presently, a significant portion of AN households, roughly one-third, lack access to complete plumbing (Gasteyer et al., 2016). In AN communities with plumbing, studies reveal a deep-seated mistrust of tap water, stemming from historical mistrust towards government-affiliated agencies and negative individual perceptions of tap water quality (Mosites et al., 2020; Eichelberger, 2018, 2019). Tap water mistrust, which involves the lack of confidence, expectation, and the negative perceptions of users towards tap water, can lead to low consumption of tap water in AN communities. Studies have shown that many AN communities rely on sugar-sweetened beverages as a result of tap water mistrust, a behavior pattern which poses negative health risks for the population (Mosites et al., 2020; Onufrak et al., 2014). In lieu of tap water, many ANs tend to trust and rely on alternative water sources like bottled water, well water, snowmelt, rivers, and lakes for drinking (Ritter et al., 2014; Rowles et al., 2020). However, this reliance on alternative water sources carries potential negative consequences. For instance, a study evaluating the quality of off-grid water supplies in some Alaskan Native communities revealed the presence of arsenic and microbes in some groundwater wells, which could lead to waterborne illnesses among consumers (Rowles et al., 2020). The imbalance in trust in water sources can contribute to unequal exposure to potential contaminants, exacerbating existing disparities in water-related health risks within AN communities.

While tap water mistrust has been widely studied in the Alaska Native context, few studies have explored how the trust that Alaska Natives have in alternative sources of water such as well water, bottled water, rainwater, surface water, and snowmelt, influence tap water consumption. To address this gap, this research aims to gauge the trust that Alaska Natives vest in the various accessible water sources and explore the correlations between trust levels and tap water consumption patterns. Specifically, this research will answer the question "*how does trust in alternative sources of drinking water in Alaska Native communities influence tap water consumption behaviors in the community?"*

METHODOLOGY

As part of the research methodology, a semi-structured interview was administered to 50 residents of a community situated within the Norton Sound Region. Indigenous research approaches were primarily employed to recruit respondents (Lin et al., 2020; Wilson et al., 2021). Firstly, community engagement was done through a community workshop and sharing circle event to apprise community members of the research objectives and to build relationships and assure knowledge co-production (Ban et al., 2018; David-Chavez & Gavin, 2018). Additionally, a snowball sampling technique was implemented, wherein respondents were encouraged to recommend other community members who may wish to participate. Furthermore, informational flyers disseminated by the local Tribal Council and a radio broadcast announcement were utilized to inform community members about the research project and the survey.

Interview questions were loosely structured into segments, covering tap drinking water patterns, trust in tap water, trust in alternative water sources, as well as a demographic section. The interview guide encompassed open-ended questions such as “Where do you get drinking water in your household?”, “Why do you use this source?”, “Do you trust this source? Why or why not?”. The interview sessions lasted approximately one hour and were conducted at a mutually agreeable central location or at the participant's residence, depending on their preference. Interviews were recorded and transcribed verbatim or recorded through written notes. As a gesture of appreciation for their time and participation, all respondents received 50-dollar gift cards.

The interview guide underwent thorough review and received approval from the Alaska Area Institutional Review Board (IRB No. 2022-08-039-5). Moreover, all collected data was meticulously de-identified, with adherence to all IRB stipulations concerning data management and confidentiality to safeguard the safety and integrity of the research process.

After completing the data collection phase, the interviews underwent manual coding, employing a deductive-inductive approach for a nuanced analysis of the qualitative data (Azungah, 2018). Major recurring themes across the interviews, including trust in water infrastructure, trust in water quality, water accessibility, and health outcomes, were assigned macro codes to capture overarching concepts. Additionally, micro codes were applied to delve into finer details under each macro code. For instance, within the trust in water quality category, microcodes such as perceptions of aesthetic quality and knowledge of water treatment methods were utilized to provide more granular insights.

KEY FINDINGS AND IMPLICATIONS

Preliminary results reveal a pervasive mistrust of tap water in the community, aligning with the initial hypothesis, as residents exhibit a preference for alternative water sources such as groundwater wells, snowmelt, rainwater, and bottled water. This tap water mistrust is primarily attributed to four key factors: (1) outdated water infrastructure; (2) poor tap water aesthetic quality; (3) disruptions in water supply; (4) reports of negative health outcomes. Regarding trust in alternative water sources, respondents express the highest trust in well water, followed by bottled water, rainwater and snowmelt, and river water. Despite these preferences, the majority of residents favor all alternative sources over tap water, often citing superior quality.

Residents describe alternative sources using positive terms like "alive" and "tasty," whereas tap water is associated with negative descriptors like "dead" and "chlorine." Ongoing analysis will delve further into these patterns. Additionally, preliminary descriptive measures indicate that the older population, in particular, exhibits diminished trust in tap water.

The broader implications of these findings suggest a nuanced understanding of trust factors impacting tap water consumption patterns. The relationship between trust in alternative sources and tap water consumption emphasizes the need for targeted interventions and communication strategies to build trust in municipal water sources, especially among older community members. Moreover, the identified factors influencing trust offer valuable insights for designing community-specific initiatives aimed at fostering trust in tap water. Addressing accessibility concerns and enhancing perceptions of water quality can contribute to more sustainable water consumption practices.

Future steps may involve a more extensive survey to validate and generalize the findings across a larger population. Additionally, interventions focused on enhancing trust in tap water could be implemented, with tailored strategies for different age groups. The results also underscore the importance of considering cultural and emotional aspects in water management policies. This could involve community engagement initiatives, awareness campaigns, and infrastructure improvements to align with cultural preferences and foster positive perceptions of tap water.

REFERENCES

Ban, N. C., Frid, A., Reid, M., Edgar, B., Shaw, D., & Siwallace, P. (2018). Incorporate Indigenous perspectives for impactful research and effective management. In *Nature Ecology and Evolution* (Vol. 2, Issue 11, pp. 1680–1683). Nature Publishing Group. https://doi.org/10.1038/s41559-018-0706-0

David-Chavez, D. M., & Gavin, M. C. (2018). A global assessment of Indigenous community engagement in climate research. In *Environmental Research Letters* (Vol. 13, Issue 12). Institute of Physics Publishing. https://doi.org/10.1088/1748-9326/aaf300

Gasteyer, S. P., Lai, J., Tucker, B., Carrera, J., & Moss, J. (2016). BASICS INEQUALITY: Race and Access to Complete Plumbing Facilities in the United States. *Du Bois Review*, *13*(2), 305–325. https://doi.org/10.1017/S1742058X16000242

Lin, C. Y., Loyola-Sanchez, A., Boyling, E., & Barnabe, C. (2020). Community engagement approaches for Indigenous health research: Recommendations based on an integrative review. *BMJ Open*, *10*(11). https://doi.org/10.1136/bmjopen-2020-039736

Mosites, E., Seeman, S., Fenaughty, A., Fink, K., Eichelberger, L., Holck, P., Thomas, T. K., Bruce, M. G., & Hennessy, T. W. (2020). Lack of in-home piped water and reported consumption of sugar-sweetened beverages among adults in rural Alaska. *Public Health Nutrition*, *23*(5), 861–868. https://doi.org/10.1017/S1368980019002477

Onufrak, S. J., Park, S., Sharkey, J. R., & Sherry, B. (2014). The relationship of perceptions of tap water safety with intake of sugar-sweetened beverages and plain water among US

adults. *Public Health Nutrition*, *17*(1), 179–185. https://doi.org/10.1017/S1368980012004600

Ritter, T. L., Lopez, E. D. S., Goldberger, R., Dobson, J., Hickel, K., Smith, J., Johnson, R. M., & Bersamin, A. (2014). Consuming Untreated Water in Four Southwestern Alaska Native Communities: Reasons Revealed and Recommendations for Change. *National Environmental Health Association (NEHA) Source: Journal of Environmental Health*, *77*(5), 8–13. https://doi.org/10.2307/26330156

Rowles, L. S., Hossain, A. I., Aggarwal, S., Kirisits, M. J., & Saleh, N. B. (2020). Water quality and associated microbial ecology in selected Alaska Native communities: Challenges in off-the-grid water supplies. *Science of the Total Environment*, *711*. https://doi.org/10.1016/j.scitotenv.2019.134450

Wilson, N. J., Montoya, T., Arseneault, R., & Curley, A. (2021). Governing water insecurity: navigating indigenous water rights and regulatory politics in settler colonial states. *Water International*, *46*(6), 783–801. https://doi.org/10.1080/02508060.2021.1928972