Perceptions of drinking water management and safety: A public survey of U.S. residents

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Abstract

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1. Introduction

Dramatic declines in mortality rates since the late 1800s are largely attributed to advances and adoption of clean water technologies (Cutler & Miller, 2005). However, even in the United States (U.S.), there is clear evidence of unequal access to safe drinking water and variable trust towards the entities responsible for providing clean drinking water (Meehan et al., 2020). Recent high profile drinking water crises in U.S. cities (notably Flint, Michigan and Jackson, Mississippi) highlight the intersection of water insecurity, racial injustices, and distrust in authorities responsible for delivering safe drinking water (Meehan et al., 2020; Meng, 2023; Pauli, 2020). The combination of regulatory/utility management system failures with historical power imbalances results in diminished trust by marginalized communities with public drinking water systems and the entities responsible for ensuring safety (Jaffee, 2024; Rosinger & Young, 2020).

Characterizing consumer perceptions of drinking water safety across the U.S. is a challenge due to the diversity in community composition, experiences, drinking water sources, and fragmentation in governance and responsibility of drinking water safety. Community water systems (CWS) provide water for household use to approximately 283 million Americans, while another 42.5 million Americans utilize self-supplied sources such as private wells (Dieter et al., 2018). The size, capacity, and population served by CWSs are highly variable. CWSs serving less than 10,000 people account for 91% of CWSs, but serve only 16% of the U.S. population; while the largest 9% of CWS provide water to 83% of the U.S. population (Levin et al., 2024). Among CWSs, 61% of withdrawals are from surface water but self-supplied water is overwhelmingly (98%) sourced from groundwater (Dieter et al., 2018).

On a national scale, drinking water provided through public utilities is considered safe based on compliance metrics set out by the U.S. Environmental Protection Agency, with 7-8% of CWSs reporting at least one violation annually (Allaire et al., 2018). However, the occurrence of these violations fall hardest on marginalized communities. The body of evidence shows that small and rural CWSs, especially those serving disadvantaged communities have higher likelihoods of drinking water violations (Allaire et al., 2018; Bae & Lynch, 2023; Levin et al., 2024; McDonald & Jones, 2018; Strosnider et al., 2017; Switzer & Teodoro, 2018). Increased rates of violations among small CWSs include limited technical capacity, smaller labor markets, reduced economies of scale, and economic constraints preventing investments in aging infrastructure (Levin et al., 2024; Scott et al., 2018; Switzer et al., 2016). While less frequent, large systems are not immune from failure to provide safe drinking water as demonstrated in Flint, Jackson, and other municipalities. These high profile failures lead to confirmation of preexisting distrust of

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government institutions by communities that have experienced marginalization (Jaffee, 2024). Tap water avoidance has consistently increased among children, Hispanics, non-Hispanic black, and lower socioeconomic status communities since the mid 2015 Flint Michigan crisis, suggesting decreased levels of trust in tap water (Rosinger & Young, 2020). Furthermore, emerging contaminants, such as per- and polyfluorinated substances, present new challenges to drinking water systems and the failure to rapidly address these contaminants further erodes trust in drinking water safety (Berthold et al., 2023; Domingo & Nadal, 2019; Levin et al., 2024). Underscoring perceptions about drinking water safety are people's trust in the institutions and public authorities responsible for providing safe water (Teodoro et al., 2022). While public trust in government institutions is at historically low levels (Pew Research Center, 2022), there is some limited evidence that the public may have higher trust in local public water utilities relative to other state, local, and federal institutions (Weisner et al., 2020).

The limited research on self-supplied water users indicates that private well users are more likely to perceive their water as safe relative to people on public water systems (Gholson et al., 2018; Hu et al., 2011). In the U.S., private wells are not regulated under the Safe Drinking Water Act or other rules to ensure safety/quality of the water and the management of those wells are left to the owner. Therefore, private well programs offered through local health departments or state extension services play an important role in educating well owners on the need for maintenance and water quality testing to ensure drinking water safety (Gholson et al., 2018; Wait et al., 2020). Evidence suggests rates of tap water contamination can be relatively high among private wells (Craun et al., 2010; Knobeloch et al., 2013; Pieper et al., 2015; Swistock et al., 2013) despite the belief in high water quality. Furthermore, relatively few well owner conduct regular testing or maintenance activities (Gholson et al., 2018; Kreutzwiser et al., 2011) and the educational support for these activities can be highly variable (Wait et al., 2020).

Decreased trust in water providers or water quality results in the increased reliance and usage of alternative sources of drinking water such as bottled water (Hu et al., 2011; Jaffee, 2024). Evidence also points to factors such as age, gender, race/ethnicity, and dissatisfaction with taste/color with increased reliance on bottled water sources (Doria, 2006; Gorelick et al., 2011; Hu et al., 2011; Rosinger & Young, 2020). Increased reliance on more expensive bottled water source further contribute to issues of water insecurity in already marginalized communities.

2. Methodology

2.a. Survey Instrument

The online survey was administered and distributed through the Qualtrics online panel in April 2023. Panels were recruited using gender, age, and race/ethnicity quotas to obtain approximately representative samples of the U.S. population. Panels were continuously sampled until a representative sample was obtained, with a total sample size of 1,100 respondent and estimated ±3% margin of error at 95% confidence (Dillman, 2011). Quality checks, performed by Qualtrics, excluded responses that failed attention or speed checks, IP address checks, or failed to meet representative demographic criteria. All participants were provided and agreed to a written informed consent agreement. The Texas A&M University Institutional Review Board reviewed the study protocol prior to distribution and deemed the study exempt from formal review.

We sought to characterize (1) choice in primary drinking water source; (2) problems experienced with drinking water; (3) concern about drinking water contamination; (4) perceptions of trust and safety in drinking water quality and associated management entities; and (5) how people receive information about drinking water quality. Participants were asked for their main source of household tap water (municipal public supply, public rural water district, private ground or surface water, private rainwater collection) and their main source of drinking water (unfiltered tap, filtered tap, bottled/prepackaged, or other). We also asked if they had experienced any of 12 different potential drinking water issues. To

characterize concerns about contamination sources, we also asked how concerned they were about 10 different potential sources of contamination on a five point scale from *"not at all concerned"* to *"extremely concerned."*

Levels of responsibility and trust in different entities involved in drinking water management were assessed with 2 questions. First, participants were asked what level of responsibility (on a five point scale from *"no responsibility"* to *"full responsibility"*) they believed each of six different entities had for ensuring drinking water is safe. We also asked what the participants level of trust was in each of those entities (on a five point scale from *"do not trust at all"* to *"fully trust"*). To assess the public's perceived safety of drinking water, we asked participants to rate their drinking water safety on an ordinal scale from 0 through 10. We assessed sources of drinking water quality information by asking how often (five point scale from *"never"* to *"always"*) each of 11 different sources were used to get information about drinking water quality. Questions are documented in the supplementary information (Table S1).

2.b. Analysis

Survey responses were weighted to match marginal sex/gender, age group, race/ethnicity, and education proportions to national level benchmarks from the 5-year 2021 American Community Survey (ACS). We chose to weight gender using "male" and "non-male" binary responses because the ACS only provides binary responses for sex. This approach groups "female" and "other" respondents under the same marginal weight. Race and ethnicity were recoded at white or Caucasian and non-white categories due to small subpopulaiton sample sizes. Weights were developed by poststratification raking using the American National Election Study (ANES) weighting algorithm implemented in the *anesrake* R package (DeBell & Krosnick, 2009; Pasek, 2018). Weighted summary statistics were calculated using the *survey* R package (Lumley, 2004).

2.c. Models

We explored factors associated with changes in (1) primary drinking water source, (2) perceived safety of drinking water, and (3) perception of drinking water safety using regression-based approaches. Each of our models included demographic variables (Table S1), source of household tap water, and experience with any of (1) odd taste, (2) odd smell, (3) discolored water, or (4) cloudy water as explanatory variables. Primary drinking water source (unfiltered tap water, filtered tap water, or bottled water) was modeled using a multinomial logistic regression model (Agresti, 2002). We used proportional odds models (Agresti, 2002; McCullagh, 1980) to explore factors associated (1) trust in entities responsible for drinking water safety (five-point scale), and (2) self-reported rating (on scale 1-10) of drinking water safety. Multinomial logistic regressions were fit using the *svyVGAM* R package (Lumley, 2023) and proportional odds models were fit using the *survey* R package (Lumley, 2004). We calculated the generalized variance inflation factor (GVIF) to evaluate potential impacts of multi-collinearity among model predictors on our interpretation of the models (Fox & Monette, 1992). We report our model results as odds-ratios.

3. Results

3.a. Sources of drinking water and drinking water problems

The majority of respondents lived in homes with a municipal public water supply (56%, 1.6% SE) with 13.3% using some type of private water supply (Table 1). A relatively high percentage of respondents stats they did not know what the source of their tap water was (13.3%, 1.2% SE). The majority of respondents (65.5%) used unfiltered or filtered tap water as their main source of drinking water (Table 1). Bottled or pre-packaged water was the primary drinking water sources for 34.2% (1.6% SE) of respondents. Only 3.1% (0.6% SE) of respondents stated that they had not experienced any issues with their tap water (Table 2). Odd taste (27.5%, 1.4% SE), hardness or scale buildup (20.3%, 1.3% SE), and odd smell (18.8%,

1.3% SE) were the most common issues. Notably, 14.9% (1.1% SE) of respondent stated they have experienced a boil water notice.

Table 1: The proportion of respondents with the specified household water source and drinking water source.

Response	Proportion	SE
What is the source of your household tap water?		
Public supply - municipal	0.561	0.016
Public supply - rural water district	0.163	0.012
Private supply - well, river, pond	0.114	0.01
Private supply - rainwater harvest system	0.019	0.004
I don't know	0.139	0.012
Other	0.004	0.002
What is your main source of drinking water?		
Unfiltered tap water	0.28	0.015
Filtered tap water	0.375	0.015
Bottled/prepackaged water	0.341	0.016
Other	0.003	0.001

Table 2: Proportion of respondents that have experienced specified issues with their drinking water.

Issue	Proportion	SE
Odd taste	0.274	0.014
Odd smell	0.187	0.013
Discolored water	0.117	0.01
Cloudy water	0.148	0.011
Staining of clothes, teeth, or skin	0.055	0.007
High salt content	0.031	0.005
Hardness or scale buildup	0.202	0.013
Corrosion of pipes or water fixtures	0.081	0.009
Boil water notice	0.149	0.011
Water shortage	0.094	0.009
None of the above	0.031	0.006
Other	0.031	0.006

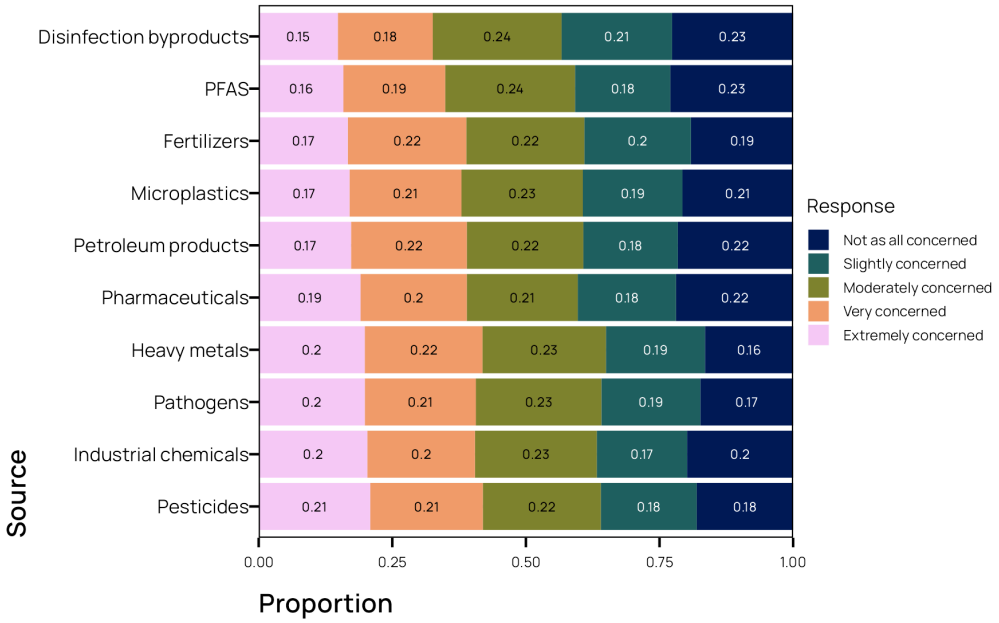

Figure 1: Contaminants of concern

We did not observe strong differences among response levels between different contaminants of potential concern (Figure 1). Pesticides (*extremely concerned* = 21%, 1.3% SE; *very concerned* = 21.1%, 1.3% SE), industrial chemicals (*extremely concerned* = 20.3%, 1.3% SE; *very concerned* = 20.1%, 1.3% SE), pathogens (*extremely concerned* = 19.9%, 1.3% SE; *very concerned* = 20.8%, 1.3% SE), and heavy metals (*extremely concerned* = 19.8%, 1.3% SE; *very concerned* = 22.0%, 1.3% SE) are sources that elicited the highest levels of concern across all respondents. Disinfection byproducts (*Not at all concerned* = 22.6%, 1.4% SE; *slightly concerned* = 20.7%, 1.3% SE) and PFAS (*not at all concerned* = 23.0%, 1.4% SE; *slightly concerned* = 17.8%, 1.2% SE) were sources of least concern.

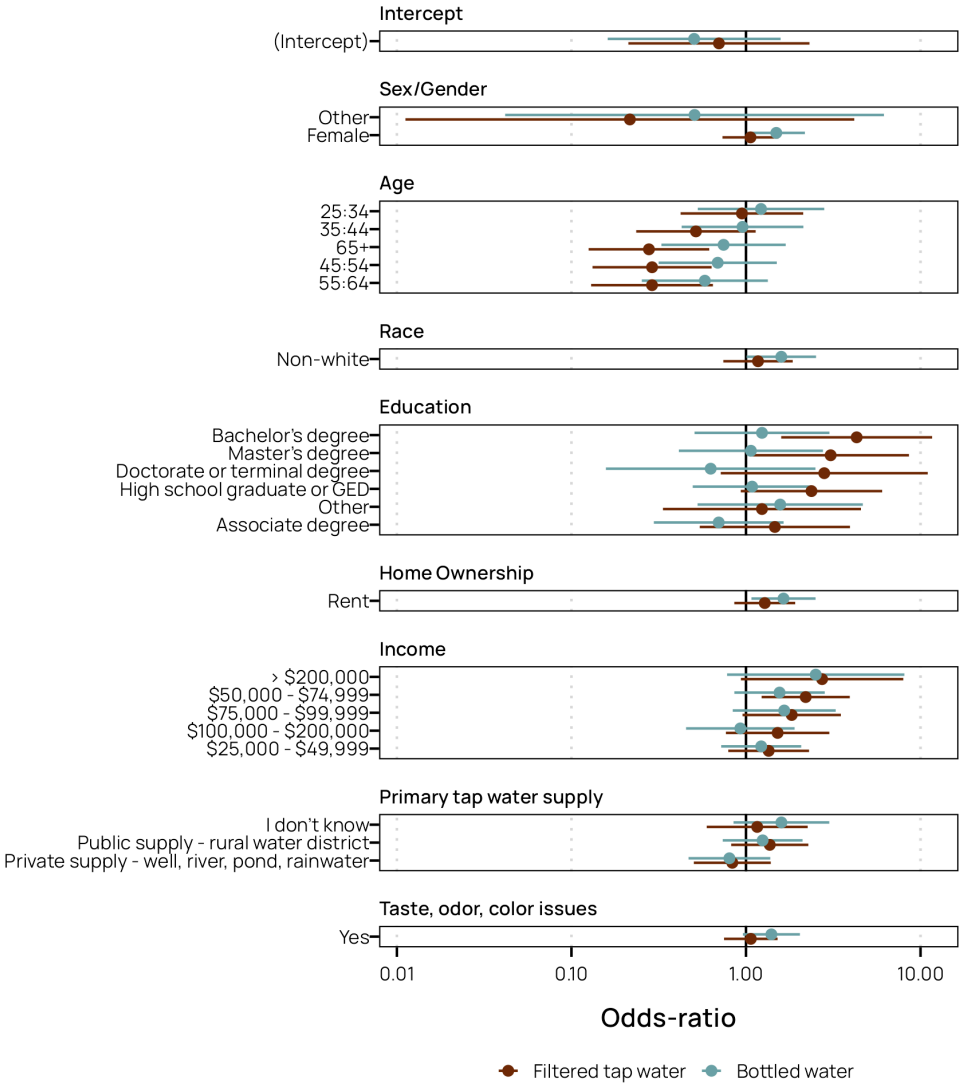

Figure 2: Primary drinking water model coefficients (odds-ratios) and 95% CIs. Odd-ratios are relative to unfiltered tap water.

Based on the multinomial regression model, we found limited effects of demographic variables, drinking water sources, and experience with odd taste, color, or smell on the odds of using bottled drinking water compared to unfiltered drinking water. Notably, females had 1.49 times the odds (95% CI [1.02, 2.17]) of using bottled drinking water instead of unfiltered tap water compared to males. Non-whites had 1.59 times the odds (95% CI [1.01, 2.52]) of using bottled drinking water instead of unfiltered drinking water compared to white respondents. Renters had 1.64 times the odds (95% CI [1.07, 2.50]) compared to homeowners.

Conversely, older respondents were more likely to use unfiltered drinking water compared to filtered water (45:54 age group: OR = 0.29, 95% CI [0.132, 9.636]; 55:64 age group: OR = 0.29, 95% CI [0.130, 0.647]; 65+ age group: OR = 0.278, 95% CI [0.002, 1.25]) but there was not strong evidence for differences in odds between bottled water and unfiltered drinking water among any of the age groups. Education also showed strong effects on the use of filtered drinking water. Having a bachelor's degree resulted in

4.31 times the odds of using filtered drinking water compared to those not graduating high school. A master's degree had a similarly large effect (OR = 3.06, 95% CI [1.09, 8,59]).

3.b. Sources of information

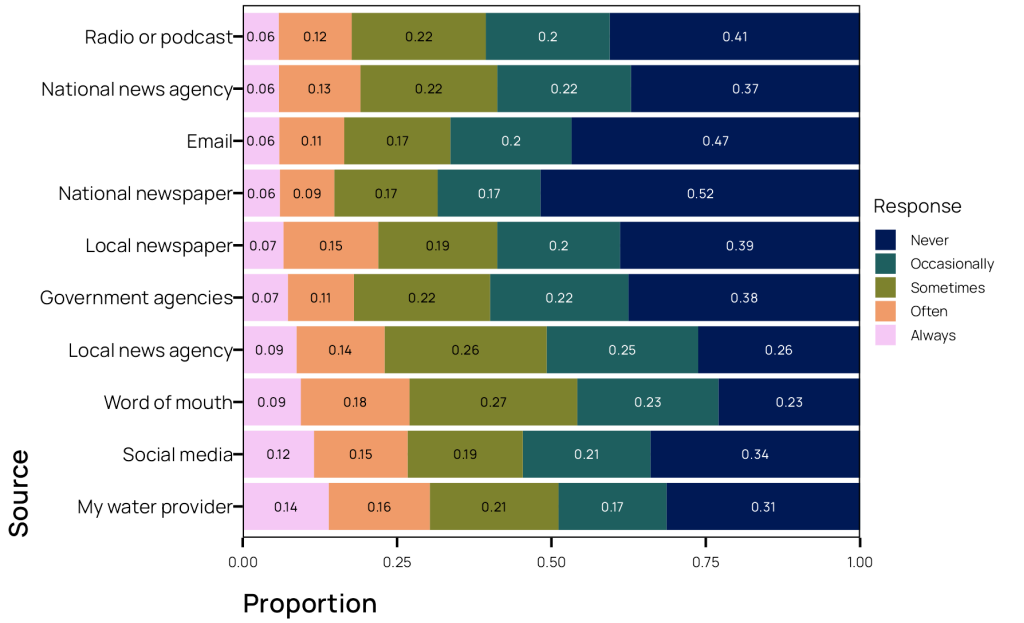

Figure 3: Sources of drinking water quality information.

Water providers appear to be the most relied upon source for information on drinking water with 13.9% (1.1% SE) and 16.4% (1.2% SE) of responses indicating water providers are *always* or *often* used as a source of information (Figure 3). Both social media (*always* = 11.5%, ±1% SE; *often* = 15.2%, ±1.1% SE) and word-of-mouth (*always* = 9.4%, ±1% SE; *often* = 17.6%, ±1.2% SE) are also frequent sources of information with similar or higher usage than local news agencies (*always* = 8.7%, ±0.9% SE; *often* = 14.3%, ±1.1% SE) or local newspapers (*always* = 6.6%, ±0.8% SE; *often* = 15.3%, ±1.1% SE). Some of the least utilized sources included radio or podcasts (*never* = 40.5%, ±1.6% SE; *occasionally* = 20.1%, ±1.3% SE), email (*never* = 46.7%, ±1.6% SE; *occasionally* = 19.6%, ±1.3% SE), national newspapers (*never* = 51.8%, ±1.6% SE; *occasionally* = 16.7%, ±1.2% SE), and government agencies (*never* = 37.5%, ±1.6% SE; *occasionally* = 22.4%, ±1.4% SE).

3.c. Perceived responsibility, trust, and safety

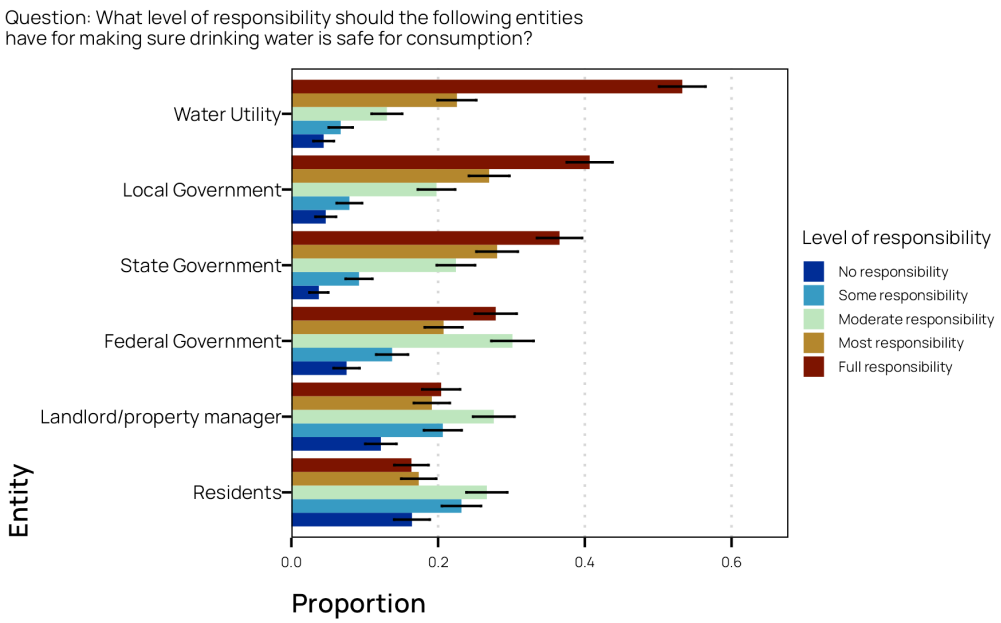

Figure 4: Weighted proportional responses for the level of responsibility people believe different entities have for ensuring drinking water safety. Bar lengths represent the mean proportional response with eror bars representing the 95% confidence interval.

In general, higher proportions of survey respondents assigned water utilities (53.3%, 95% CI [50.1%, 56.5%]), local government (40.7%, 95% CI [37.5%, 43.8%]), and state government (36.6%, 95% CI [33.5%, 39.6%]) with the highest levels of responsibility for ensuring safety of drinking water (Figure 4). Moderate responsibility was the most common response for the level of responsibility attributed to household residents (26.6%, 95% CI [23.9%, 29.4%]) and landlords/property managers (27.6%, 95% CI [24.8%, 30.4%]). A relatively high proportion of responses indicated residents have no responsibility for drinking water quality (16.4%, 95% CI [14.0%, 18.9%]). Relative to other governmental institutions, fewer people felt the federal government had full responsibility (27.9%, 95% CI [25.0%, 30.7%]) for drinking water safety.

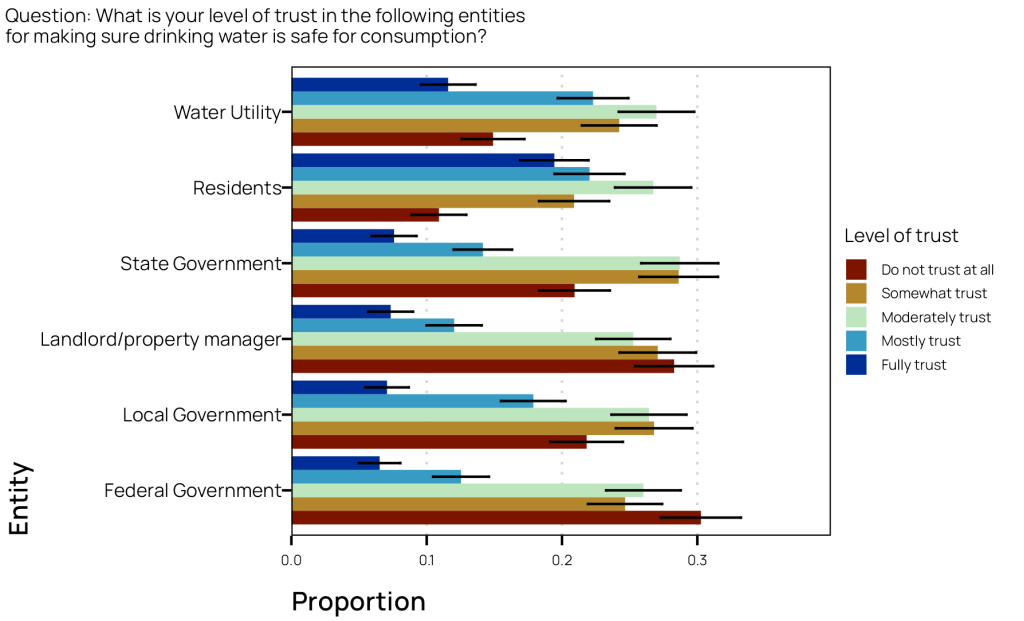

Figure 5: Weighted proportional responses for the level of trust people have in the entities responsible for ensuring drinking water safety. Bar lengths represent the mean proportional response with eror bars representing the 95% confidence interval.

When asked for their level of trust in these entities for ensuring safety of drinking water, 30% (95% CI [27.3%, 33.2%]) of respondents expressed they do not trust the federal government at all (Figure 5). Only 6.5% (95% CI [4.9%, 8.1%]) indicated they fully trust the federal government for ensuring drinking water safety. State government fared slightly better, with 28.7% (95% CI [25.9%, 31.6%]) and 28.6% (95% CI [25.7%, 31.5%]) of respondents indicating they moderately trust or somewhat trust the state government for ensuring safety. Local and state government had rates of full trust (7.1%, 95% CI [5.5%, 8.7%] and 7.6%, 95% CI [5.9%, 9.3%], respectively) comparable to the low rate observed for the federal government (6.5%, 95% CI [5.0%, 8.1%]).

Water utilities appear to be more trusted by the public than other governmental institutions. While the proportion of responses indicating moderate trust (27.0%, 95% CI [24.2%, 29.8%]) and mostly trust (22.3%, 95% CI [19.7%, 24.9%]) are comparable to local, state, and federal government, much fewer people indicated that the "do not trust at all" the water utility (14.9%, 95% CI [12.6%, 17.2%]).

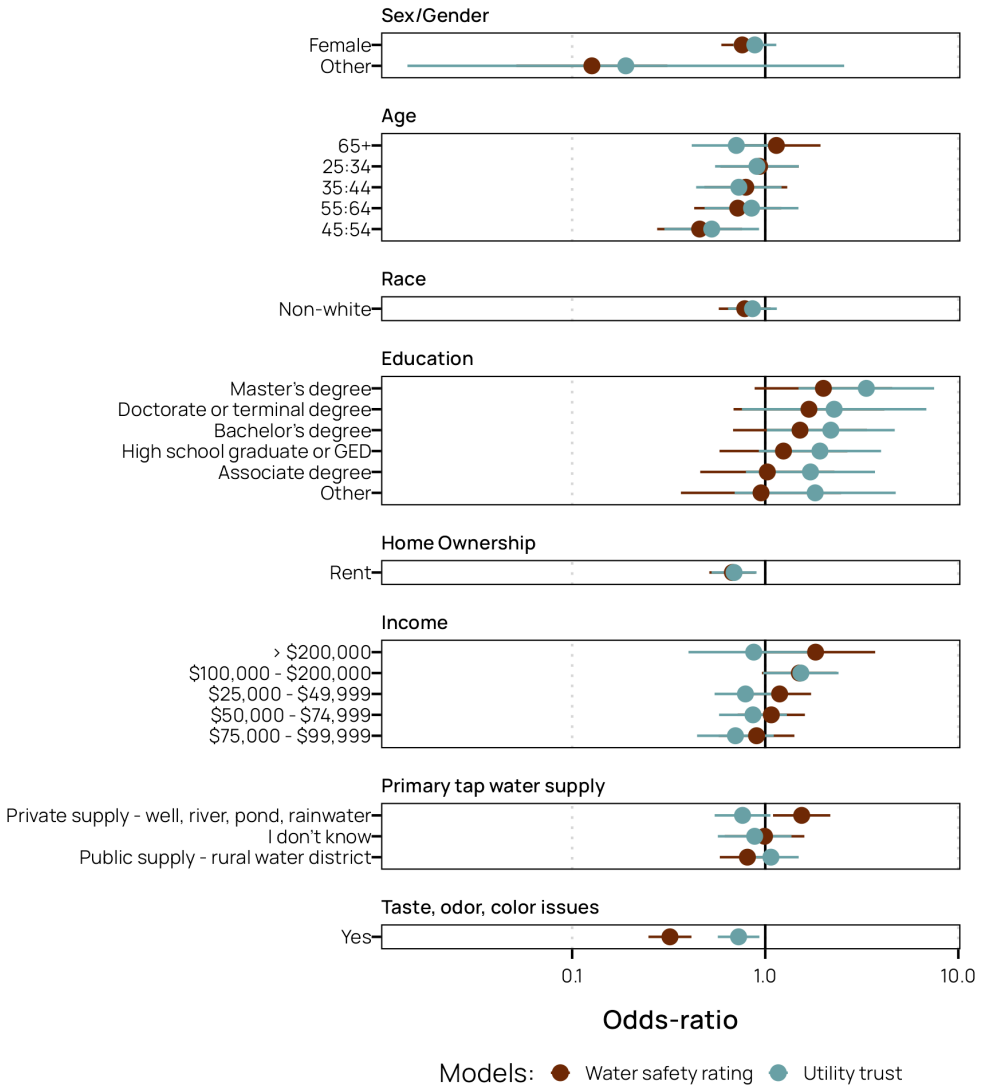

Figure 6: Estimated effect sizes (odds-ratios) and 95% confidence intervals of selected variables on (1) level of trust in drinking water utilities, and (2) perceived safety of drinking water.

The proportional odds model provides evidence that sex/gender, home ownership, household tap supply, and experience with taste/odor/color issues are associated with the perception of drinking water safety (Figure 6). Females were 1.32 times more likely to rate their drinking water less safe than males (OR = 0.76, 95% CI [0.59, 0.97]). Respondents identifying their gender as other had 7.69 times the odds (OR = 0.13, 95% CI [0.05, 0.32]) of rating their drinking water less safe than male respondents. Home ownership provided a strong signal with renters 1.49 times more likely to provide a lower drinking water safety ranking than homeowners (OR = 0.67, 95% CI [0.51, 0.89]). Respondents on private water supplies had 1.54 times that odds of providing a higher drinking water safety rating than people on municipal supplies (OR = 1.54, 95% CI [1.10, 2.16]). People that experienced taste/odor/color issues with 3.12 times more likely to provide a lower safety rating than those that never experienced an issue (OR = 0.32, 95% CI [0.24, 0.41]).

We identified difference among some age groups, but a clear pattern was not evident. Respondents in the 45-54 age bracket were 2.22 times more likely to provide a lower drinking water safety rating than the 18-24 year old age group.

4. Discussion

5. Notes

(Switzer & Teodoro, 2018) finds interaction between race and other socioeconomic factors particularly important. For communities of lower socioeconomic status, race plays an even larger role in predicting the likelihood of SDW violations. This may suggest non-white poor communities have higher propensity for distrust in water quality, but we fail to incorporate these interactions in our model due to sample sizes.

6. Acknowledgements

TBD

7. Author Contributions

AB: Conceptualization, Investigation, Project administration, Supervision, Writing - review & editing. AM: Data curation, investigation, methodology, writing - original draft. SD: Investigation, methodology, writing - original draft. MS: Methodology, formal analysis, software, visualization, writing - original draft.

References

Agresti, A. (2002). *Categorical Data Analysis* (2nd ed). Wiley-Interscience.

Allaire, M., Wu, H., & Lall, U. (2018). National Trends in Drinking Water Quality Violations. *Proceedings of the National Academy of Sciences*, *115*(9), 2078–2083. https://doi.org/10.1073/pnas.1719805115

Bae, J., & Lynch, M. J. (2023). Ethnicity, Poverty, Race, and the Unequal Distribution of US Safe Drinking Water Act Violations, 2016-2018. *The Sociological Quarterly*, *64*(2), 274–295. https://doi.org/10.1080/00380253.2022.2096148

Berthold, T. A., McCrary, A., deVilleneuve, S., & Schramm, M. (2023). Let's Talk about PFAS: Inconsistent Public Awareness about PFAS and Its Sources in the United States. *Plos ONE*, *18*(11), e294134. https://doi.org/10.1371/journal.pone.0294134

Craun, G. F., Brunkard, J. M., Yoder, J. S., Roberts, V. A., Carpenter, J., Wade, T., Calderon, R. L., Roberts, J. M., Beach, M. J., & Roy, S. L. (2010). Causes of Outbreaks Associated with Drinking Water in the United States from 1971 to 2006. *Clinical Microbiology Reviews*, *23*(3), 507–528. https://doi.org/10.1128/CMR.00077-09

Cutler, D., & Miller, G. (2005). The Role of Public Health Improvements in Health Advances: The Twentieth-Century United States. *Demography*, *42*(1), 1–22. https://doi.org/10.1353/dem.2005.0002

DeBell, M., & Krosnick, J. A. (2009). *Computing Weights for American National Election Study Survey Data* (Issue nes12427). http://www.electionstudies.org/resources/papers/nes012427.pdf

Dieter, C. A., Maupin, M. A., Caldwell, R. R., Harris, M. A., Ivahenko, T. I., Lovelace, J. K., Barber, N. L., & Linsey, K. S. (2018). *Estimated Use of Water in the United States in 2015* (Issue 1441, p. 65). https://doi.org/10.3133/cir1441

Dillman, D. A. (2011). *Mail and Internet Surveys: The Tailored Design Method*. Wiley.

Domingo, J. L., & Nadal, M. (2019). Human Exposure to Per- and Polyfluoroalkyl Substances (PFAS) through Drinking Water: A Review of the Recent Scientific Literature. *Environmental Research*, *177*, 108648. https://doi.org/10.1016/j.envres.2019.108648

Doria, M. F. (2006). Bottled Water versus Tap Water: Understanding Consumers' Preferences. *Journal of Water and Health*, *4*(2), 271–276. https://doi.org/10.2166/wh.2006.0023

Fox, J., & Monette, G. (1992). Generalized Collinearity Diagnostics. *Journal of the American Statistical Association*, *87*(417), 178–183. https://doi.org/10.1080/01621459.1992.10475190

Gholson, D. M., Boellstorff, D. E., Cummings, S. R., Wagner, K. L., & Dozier, M. C. (2018). Consumer Water Quality Evaluation of Private and Public Drinking Water Sources. *Journal of Water and Health*, *16*(3), 369–379. https://doi.org/10.2166/wh.2018.206

Gorelick, M. H., Gould, L., & Nimmer, M. (2011). Perceptions about Water and Increased Use of Bottled Water in Minority Children. *Archives of Pediatrics & Adolescent Medicine*, *165*(10), 928. https://doi.org/10.1001/archpediatrics.2011.83

Hu, Z., Morton, L. W., & Mahler, R. (2011). Bottled Water: United States Consumers and Their Perceptions of Water Quality. *International Journal of Environmental Research and Public Health*, *8*(2), 565–578. https://doi.org/10.3390/ijerph8020565

Jaffee, D. (2024). Unequal Trust: Bottled Water Consumption, Distrust in Tap Water, and Economic and Racial Inequality in the United States. *Wires Water*, *11*(2), e1700. https://doi.org/10.1002/wat2.1700

Knobeloch, L., Gorski, P., Christenson, M., & Anderson, H. (2013). Private Drinking Water Quality in Rural Wisconsin. *Journal of Environmental Health*, *75*(7).

Kreutzwiser, R., De Loë, R., Imgrund, K., Conboy, M. J., Simpson, H., & Plummer, R. (2011). Understanding Stewardship Behaviour: Factors Facilitating and Constraining Private Water Well Stewardship. *Journal of Environmental Management*, *92*(4), 1104–1114. https://doi.org/10.1016/j.jenvman.2010.11.017

Levin, R., Villanueva, C. M., Beene, D., Cradock, A. L., Donat-Vargas, C., Lewis, J., Martinez-Morata, I., Minovi, D., Nigra, A. E., Olson, E. D., Schaider, L. A., Ward, M. H., & Deziel, N. C. (2024). US Drinking Water Quality: Exposure Risk Profiles for Seven Legacy and Emerging Contaminants. *Journal of Exposure Science & Environmental Epidemiology*, *34*(1), 3–22. https://doi.org/10.1038/s41370-023-00597-z

Lumley, T. (2004). Analysis of Complex Survey Samples. *Journal of Statistical Software*, *9*(8). https://doi.org/10.18637/jss.v009.i08

Lumley, T. (2023). *svyVGAM: Design-Based Inference in Vector Generalised Linear Models*. https://cran.r-project.org/package=svyVGAM

McCullagh, P. (1980). Regression Models for Ordinal Data. *Journal of the Royal Statistical Society. Series B (Methodological)*, *42*(2), 109–142. https://doi.org/10.1111/j.2517-6161.1980.tb01109.x

McDonald, Y. J., & Jones, N. E. (2018). Drinking Water Violations and Environmental Justice in the United States, 2011–2015. *American Journal of Public Health*, *108*(10), 1401–1407. https://doi.org/10.2105/AJPH.2018.304621

Meehan, K., Jepson, W., Harris, L. M., Wutich, A., Beresford, M., Fencl, A., London, J., Pierce, G., Radonic, L., Wells, C., Wilson, N. J., Adams, E. A., Arsenault, R., Brewis, A., Harrington, V., Lambrinidou, Y., McGregor, D., Patrick, R., Pauli, B., … Young, S. (2020). Exposing the Myths of Household Water Insecurity in the Global North: A Critical Review. *Wires Water*, *7*(6), e1486. https://doi.org/10.1002/wat2.1486

Meng, Q. (2023). Urban Water Crisis and Its Relationship to Health Inequities against Black Communities in the USA: Spatial Analytics of the Jackson Region in Mississippi. *Journal of Cleaner Production*, *411*, 137356. https://doi.org/10.1016/j.jclepro.2023.137356

Pasek, J. (2018). *anesrake: ANES Raking Implementation*. https://cran.r-project.org/package=anesrake

Pauli, B. J. (2020). The Flint Water Crisis. *Wires Water*, *7*(3), e1420. https://doi.org/10.1002/wat2.1420

Pew Research Center. (2022). *Americans' Views of Government: Decades of Distrust, Enduring Support for Its Role*. https://www.pewresearch.org/politics/2022/06/06/americans-views-of-government-decades-of-distrust-enduring-support-for-its-role/

Pieper, K. J., Krometis, L.-A. H., Gallagher, D. L., Benham, B. L., & Edwards, M. (2015). Incidence of Waterborne Lead in Private Drinking Water Systems in Virginia. *Journal of Water and Health*, *13*(3), 897–908. https://doi.org/10.2166/wh.2015.275

Rosinger, A. Y., & Young, S. L. (2020). In-home Tap Water Consumption Trends Changed among U.S. Children, but Not Adults, between 2007 and 2016. *Water Resources Research*, *56*(7), e2020WR027657. https://doi.org/10.1029/2020WR027657

Scott, T. A., Moldogaziev, T., & Greer, R. A. (2018). Drink What You Can Pay for: Financing Infrastructure in a Fragmented Water System. *Urban Studies*, *55*(13), 2821–2837. https://doi.org/10.1177/0042098017729092

Strosnider, H., Kennedy, C., Monti, M., & Yip, F. (2017). Rural and Urban Differences in Air Quality, 2008–2012, and Community Drinking Water Quality, 2010–2015 — United States. *MMWR. Surveillance Summaries*, *66*(13), 1–10. https://doi.org/10.15585/mmwr.ss6613a1

Swistock, B. R., Clemens, S., Sharpe, W. E., & Rummel, S. (2013). Water Quality and Management of Private Drinking Water Wells in Pennsylvania. *Journal of Environmental Health*, *75*(6).

Switzer, D., & Teodoro, M. P. (2018). Class, Race, Ethnicity, and Justice in Safe Drinking Water Compliance. *Social Science Quarterly*, *99*(2), 524–535. https://doi.org/10.1111/ssqu.12397

Switzer, D., Teodoro, M. P., & Karasik, S. (2016). The Human Capital Resource Challenge: Recognizing and Overcoming Small Utility Workforce Obstacles. *Journal AWWA*, *108*(8). https://doi.org/10.5942/jawwa.2016.108.0093

Teodoro, M. P., Zuhlke, S., & Switzer, D. (2022). *The Profits of Distrust: Citizen-Consumers, Drinking Water, and the Crisis of Confidence in American Government*. Cambridge University Press.

Wait, K., Katner, A., Gallagher, D., Edwards, M., Mize, W., Jackson, C. L. P., & Pieper, K. J. (2020). Disparities in Well Water Outreach and Assistance Offered by Local Health Departments: A North Carolina Case Study. *Science of the Total Environment*, *747*, 141173. https://doi.org/10.1016/j.scitotenv.2020.141173

Weisner, M. L., Root, T. L., Harris, M. S., Mitsova, D., & Liu, W. (2020). The Complexities of Trust between Urban Water Utilities and the Public. *Sustainable Water Resources Management*, *6*(3), 50. https://doi.org/10.1007/s40899-020-00407-6