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Beyond the Paper: Trust after the boil water alerts—lessons from Jackson

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Abstract

Failures of Public Water System can erode community trust, with distrust persisting long after regulatory compliance is restored; however, evidence of trust dynamics following water infrastructure crises remains limited. In Jackson, Mississippi—where repeated boil water alerts disrupted daily life and schooling—we evaluated a school-based, student-led water testing intervention designed to support community trust and water literacy. Middle school students tested tap water for dissolved oxygen, pH, turbidity, and lead and shared results with parents using structured reports. Although most samples met recommended guidelines and no lead was detected, parental trust in both the water supply and governing institutions declined, while neutral responses decreased significantly. These patterns indicate recalibration of trust rather than reassurance. Trust outcomes were shaped less by measured water quality than by institutional context. Our findings highlight that compliance alone is insufficient to restore trust and point to schools as important intermediaries for participatory water governance.

Introduction

Access to safe drinking water is a basic human right. Currently, 2.2 billion people worldwide lack access to safe drinking water[1]. In 2022, an estimated 22 million Americans– nearly 7% of the country's population– were impacted by health-based violations of the Safe Drinking Water Act (SDWA)[2]. Health-based violations occur when contaminants in drinking water exceed regulatory thresholds or when required treatment standards are unmet. Under SDWA guidelines, public water systems (PWS) are responsible for protecting, treating, and distributing drinking water; maintaining and upgrading infrastructure; communicating transparently with the public through timely and accurate reporting; and developing emergency preparedness and response plans[3–5]. Drinking water quality in high-density urban areas is frequently compromised by combined pressures of high population density, aging infrastructure, and anthropogenic pollution[6]. Overburdened sewage networks often leak or overflow, allowing pathogens and nutrients to infiltrate groundwater and surface water supplies[7]. Socioeconomic inequalities further compound these challenges; disadvantaged urban communities are disproportionately exposed to lower-quality water and less reliable service, increasing their risk of adverse health outcomes[8].

The Jackson Water Crisis

Jackson, Mississippi (population: 141,000), is among the fastest declining urban areas in the U.S., losing 18.5% of its population between 2010 and 2024[9–11]. Nearly 82% of residents identify as Black, and 26.1% live in poverty[12]. Since 2010, extreme weather has repeatedly compromised Jackson's century-old PWS, resulting in water line main breaks, reduced pressure, and sewer overflows. Although the Environmental Protection Agency (EPA) issued a 2012 consent decree for multiple Clean Water Act violations[13] and a request for nearly $47 million in emergency state funding[14], persistent infrastructure and water quality problems remain unresolved[15]. For instance, between 2015 and 2021, 2,547 boil water alerts (BWAs) were issued to Jackson residents[16]. Given Jackson's failure to comply with the SDWA, an interim third-party manager – JXN Water – was appointed by the Department of Justice and currently manages Jackson's water system[17,18].

Disruptions to Jackson's drinking water access have had measurable downstream consequences on educational stability. Prior work demonstrated that BWAs increased unexcused absence rates by 1-10% across the Jackson Public School District (JPS), affecting up to 2,100 students per event, with middle schools disproportionately impacted[16].

Chronic absenteeism– already elevated in Jackson and across Mississippi– is a well-established predictor of long-term academic disengagement[19]. In this context, water system failures function not only as infrastructure disruptions that erode community trust, but also as destabilizing forces within educational systems–undermining attendance and amplifying household stress.

Defining trust and its importance after a water crisis

Trust is belief in the reliability, truth, ability, or strength of another party, reflecting a willingness to accept vulnerability based on expectations of beneficial action without direct control or oversight[20]. The Jackson Water Crisis cultivated community-wide distrust, eroding confidence in the tax-funded PWS, city water quality, the entities responsible for ensuring its safety, and the sources that communicate information about the water supply[21–23].

How do residents regain trust? A Novel Program Implementation and Evaluation

Since our prior analysis documenting the impact of BWAs on unexcused absences in Jackson, JPS closed 13 schools (24%), including two of its nine (22%) middle schools [16]. This follow-up paper examines the aftermath of the water crisis at a directly impacted public middle school, reporting the methods and results of a student-centered program piloted at Jackson's Blackburn Middle School (BMS). The program, *Trusting the Source*, aimed to empower students through education of water quality fundamentals, household tap water testing, and collaborative development of water quality reports to share with their parents/guardians. Program evaluation assessed the impact of these activities on parental trust in tap water and the responsible entities, while also delivering an engaging environmental science curriculum to a community affected by chronic absenteeism.

Results

From September 2024-April 2025, we partnered with BMS staff to deliver engaging lessons on water quality and environmental exposures. Pre-surveys were completed by 112 parents prior to testing. Eighty sixth- and seventh-grade students tested household tap water for dissolved oxygen (DO), pH, and turbidity; samples were additionally analyzed for lead using X-ray fluorescence (XRF). Post-surveys were completed by 83 parents, with 55 matched pre- and post-survey responses linked to water quality results included in analyses.

Participant Characteristics

Respondents were predominantly Black (98.1%), mostly female (49.1%), and between 35-44 years of age (41.5%). The majority reported a household size greater than four (52.7%) and working full-time (64.0%). The greatest proportion of respondents (32.4%) reported an annual household income between $25,000 and $49,999. Educational attainment was broadly distributed, with the largest group achieving an associate's degree or higher (32.7%), while 26.5% had not completed high school (Table 1).

Assessing Trust in Water Quality

The mean baseline trust score was 0.59 (n=51, SD=0.19), indicating that, on average, parents reported neutral levels of trust. Pre-trust scores were similar across subscales: 0.57 (SD=0.24) for trust in water, and 0.60 (SD=0.18) for trust in organizations. After water quality testing, mean overall trust declined to 0.48 (n=53, SD=0.25). Among parents completing all trust-related items (n=49), overall trust declined significantly (mean change=-0.12, SD=0.27, p=0.0030). Similarly, both subscales had statistically significant negative changes: -0.10 for trust in water (SD=0.30, p=0.0236), and -0.13 for trust in organizations (SD=0.27, p=0.0015) (Table 2). Despite a decline in mean overall trust, 30.6% of parents demonstrated increased trust between surveys, and 36.5% reported increased trust in Jackson's water supply. Fewer parents (28.6%) had improved trust in organizations (Table 2).

Prior to water testing, 32.7% agreed their water was safe to drink and 43.6% of parents had no opinion. When specifically asked about feelings of safety after discussing water test results with their child, 16.7% of parents reported improved feelings of safety, while 57.4% felt 'about the same' and 14.8% had no opinion. Half of the parents (50.0%) agreed to feeling more knowledgeable about water quality after their child shared results, while a quarter of parents (25.9%) disagreed.

Water Quality Testing

Students interpreted water quality results for each measured property as falling below, within, or above EPA-recommended ranges. The mean DO level (11.1 mg/L; SD=1.8) was high, with nearly 93% of samples above 8.5 mg/L). In contrast, most samples were within the recommended range for pH (90.1%, mean=8.1, SD=0.5; recommended: 6.5-8.5) and turbidity (74.5%, median=0 NTU; recommended: ≤1 NTU). However, 24.5% of samples exceeded acceptable turbidity levels with results ranging from 2-5 NTU. All samples tested negative for lead using XRF analysis (Table 3).

Changes in parental trust were assessed across all scales, grouped by water quality interpretation, using two-sample t-tests, no statistically significant differences were found. The mean trust change score tended to be lower (less positive) when tap water exceeded recommended levels. For instance, those with high DO (n=46) had a mean trust change of -0.120 (SD=0.264), compared to -0.096 (SD=0.337) for those with DO in range (p=0.8798). Similar non-significant trends were observed for high pH (p=0.1448), and turbidity (p=0.6890) (Table 2).

Pre-Survey Response Differences by Direction of Trust Change

When participants sought information about the water supply, the most common source – regardless of whether trust increased or decreased – was the water utility company's website. Local news sources were an equally popular selection among parents with negative trust change (41.2% of those with scores ≤0). None of the parents with positive trust change (scores >0) selected this option. Two-sample t-tests revealed statistically significant differences in mean trust change for two information sources. Parents using local government websites (n = 8) experienced significantly more positive change (p=0.0216). Those selecting local news (n = 15) showed a significantly lower mean trust change (p=0.0403).

44.4% of all respondents knew where to find city water quality reports; only 41.7% reviewed them occasionally, and 54.2% declined reviewing them. Fisher's Exact tests found no significant differences between directionality of trust change and knowing where to reports. Priority concerns for city water supply were contaminants (36.7%) and lack of transparency (28.6%). The most selected concern by parents showing a negative change was 'contaminants' (41.2%); those with positive trust change prioritized 'lack of transparency' (33.3%). Subjective descriptions of home tap water varied across the 19 descriptors provided. Only 12.7% described their tap water as 'high quality' while 16.4% selected 'unsafe' (Table 4). 'Safe' was selected by 38.2% of parents with negative trust change, compared to 6.7% of parents with positive trust change (p=0.038).

The frequency that participants reported drinking tap water was statistically different between trust change direction groups. A greater proportion of parents in the positive group never or rarely drank tap water (93.3%) compared to 64.7% of those with negative changes (p=0.043). Parents in the positive change group were more likely to report not using a water filter system, (73.3% vs. 62.5%) though the difference was not significant (p=0.527). Most parents had never tested their tap water (85.7%; p=0.179) (Table 4).

Variations in Trust Change

Wilcoxon signed-rank tests compared five trust questions between surveys (Table 5). Confidence that local authorities provide accurate water quality reports decreased significantly from pre- to post-survey (exact p=0.0254). This decline persisted among participants with high DO levels. Non-significant negative trends were observed for trust in tap water safety, confidence in meeting city standards, trust in the utility company, and trust in JXN Water. When grouped by water quality, two declines were significant: trust in the utility company among participants with high DO (exact p=0.0460), and trust in the third-party manager among those with high turbidity (exact p 0.0410).

The proportion of neutral ('no opinion') responses differed significantly between surveys, from 41.1% pre-survey to 29.7% post-survey. At the individual level, a paired t-test confirmed a statistically significant difference in the mean proportion of neutral responses (p=0.0261) (Table 6).

Fisher's exact tests identified significant differences in the direction of trust change by employment status (overall trust: p=0.041; water trust: p=0.050) and household size (water trust: p 0.020) (Table 7). Positive shifts in overall trust were observed in 20% of full-time workers, compared with 50.0% of part-time workers. Smaller households comprised a greater share of positive changes across all scales, accounting for 73.7% of increased trust in the water supply. Educational attainment and income showed no significant differences. Single parents more often reported positive changes in overall trust (78.6%) than married parents, though the difference was not significant (p=0.204).

Discussion

Prior to implementing *Trusting the Source*, we hypothesized that parental trust in Jackson's PWS would increase following student-led household tap water testing and result communication. Analysis revealed that the majority of home tap water samples were within the appropriate ranges for dissolved oxygen, pH, and turbidity. We did observe some high DO values. This is unsurprising, as many municipal water plants adjust the treatment process to increase DO, thereby improving taste and removing odors[EW1] [24]. Although elevated DO does not pose a direct human health risk[25] and has no health-based guideline, it may increase the likelihood of internal pipe corrosion, potentially releasing particulate matter or heavy metals into drinking water[26–28]. Further, there was no presence of lead found in any of the samples tested.

Parents received a student-curated *Tap Water Testing Report* to support the interpretation of their tap water testing results. The report emphasized that while elevated DO levels are not harmful to health, they may accelerate pipe corrosion and increase the risk of metal release. Despite most samples meeting pH and turbidity parameters and all testing negative for lead, water-related trust declined post-intervention. This decline likely reflects parents' interpretation of elevated DO levels within the broader context of Jackson's history of infrastructure failure and the perceived risk of adverse outcomes. These findings underscore how contextual and perceived risks– rather than objective measurements alone– can shape institutional trust. For parents to view Jackson's PWS as trustworthy, they must believe responsible agencies will reliably fulfill their obligations[29].

Although our findings suggest that the city's water meets safety standards, compliance alone is insufficient to restore trust in the context of historical infrastructure failure and institutional neglect[30]. Jackson residents assess water safety based on the perceived legitimacy and accountability of safeguarding organizations, rather than objective measures or water quality reports[31,32]. This mirrors a 2020 study in Flint, Michigan, where residents reported significantly lower trust in government and organizations after the water crisis[31].

Earlier models framed trust and distrust as opposite ends of a single continuum[33,34]. More recent work, however, treats them as distinct, yet co-occurring dimensions shaped less by objective risk and more by sociopolitical factors such as transparency, responsiveness, and equity in governance[35–39]. This framework also distinguishes trust from perceived trustworthiness. Within this multidimensional view, parents' stable or improved perceptions of safety– despite declining trust in water and institutions– may reflect increased knowledge gained through reviewing water quality reports and discussing results with their children. Similarly, Hamm et al,. (2023) documented pervasive distrust towards government institutions among Flint residents, noting that restoring trust may take generations[40].

The decrease in neutral ("no opinion") responses between surveys suggests greater certainty of personal views– reflecting a shift away from indifference or ambivalence towards the formation and expression more established trust-related beliefs[41,42]. This shift aligns with literature emphasizing the role of data access in democratic accountability and informed civic engagement[43]. It may also indicate increased perceived vulnerability, as parents evaluated the evidence and revealed underlying trust orientations. Rather than signaling program failure, the decline in trust likely represents an informed recalibration following exposure to water quality data within a context of repeated institutional breakdown. Collectively, these response changes suggest active contemplation of trust– a critical step toward trust formation. These findings also suggest that the intervention did not function as a simple trust-restoration tool, but rather as a mechanism for sense-making that shifted participants from uncertainty toward more articulated risk and policies. We view this as a realistic interpretation of empowerment—especially in a city that has experienced a major infrastructure failure. The distinction is important in post-crisis settings when trust is shaped by institutional history and perceived accountability as much as by current water quality metrics[44]. [EW2]

Differences in trust by employment status and household size suggest variation in family dynamics and opportunity for trust change. Parents employed less than full-time and those from smaller households were more likely to report positive trust changes, particularly for water-related trust. This suggests that, under certain conditions, parents may have greater capacity to engage with their children about school experiences[45], with important implications in West Jackson given high unemployment and labor force nonparticipation.

The frequency of BWAs is a key consideration— given that participating households were directly affected[EW3] . Inconsistent school attendance can destabilize household routines and cause parents to miss work. When BWAs lack clear explanation or effective notification, residents may infer ongoing safety problems, reinforcing deep distrust over time. This dynamic is especially salient given evidence that Black and Latino populations and individuals with

lower educational attainment are more likely to mistrust tap water safety – a concern amplified by the disproportionate impacts observed in the Flint Water Crisis[46].

A notable strength of this intervention was its participatory design, with *Trusting the Source* co-created alongside BMS staff and community members and now freely available for classroom adoption. Despite intersecting challenges – including the closure of nearly 40% of Jackson Public Schools, chronic absenteeism, public safety issues, illegal dumping, and failing PWS infrastructure –parents and teachers demonstrated openness to trust-building through their willingness to be vulnerable and collective problem-solving. This openness fostered a collaborative environment that supported the co-development and implementation of an empowering project actively engaging parents in their child's learning.

Our findings suggest that schools may serve as critical trust intermediaries following infrastructure failure. Although student-generated data did not increase institutional trust, the intervention reduced ambivalence and catalyzed belief formation, evidenced by a significant decline in neutral responses. This shift underscores the role of educational settings as platforms for civic sense-making, even amid persistent trust erosion.

This evaluation has several limitations. Presentation of results to parents was standardized, and variation in parent-child communication may have influenced post-survey responses. We were unable to assess parents' prior experiences with historical water issues, which may have resurfaced negative emotions. Student experiences were outside the scope of this evaluation and were not formally assessed to avoid additional burden, limiting our ability to examine changes in students' interest, confidence or optimism regarding environmental health topics.

Future school-based programs should adopt teacher-driven strategies to engage parents throughout the entire intervention to improve completion of program materials. Although 112 baseline surveys were collected, the analytic sample was smaller (n=55) because inclusion required completing the surveys and undergoing water testing. This pilot demonstrates the feasibility of embedding environmental monitoring into public school curricula as a dual-purpose intervention that supports STEM education while strengthening community engagement with water governance. Scaling such programs in districts facing infrastructure precarity could position schools as early-warning systems and community trust nodes. This underscores a need for formal integration of educational institutions into municipal water resilience planning.

The Jackson Water Crisis is more than a headline; its impacts––exacerbated by a shifting burden of responsibility from government entities to individuals– have eroded trust in both the water supply and the entities tasked with managing it. The demonstrated unreliability of a resource such as water carries long-term consequences, signaling an institutional disregard for community well-being. Moving forward, institutions must recognize that transparency about past failures and incremental progress alone is insufficient to restore trust in communities historically let down by systems meant to protect them.

Jackson's water crisis illustrates how infrastructure failure cascades into educational disruption, household instability, and institutional distrust. While technical compliance is essential, restoring public confidence requires rebuilding relational trust through locally embedded institutions. Schools– particularly those serving historically marginalized communities– represent an underutilized platform for participatory water governance. By empowering students as scientific actors, this pilot demonstrates a pathway to strengthening community water literacy and positions education as a component of infrastructure resilience. Lesson Plans are provided in Supplementary Tables 1 & 2.

Methods

This program evaluation builds on our prior quasi-experimental analysis demonstrating that BWAs significantly increase unexcused absences in JPS. Given the disproportionate impact on middle school students, BMS was selected as a pilot site to test whether school-based water literacy intervention could mitigate downstream trust erosion following repeated infrastructure failures.

Program Details

During the 2024-2025 school year, we piloted the environmental health educational program, *Trusting the Source*, at BMS in Jackson, Mississippi. BMS serves the West Jackson neighborhood, which spans nine Census tracts and exhibits substantial demographic and socioeconomic variability. Compared with the City of Jackson overall, West Jackson has lower socioeconomic indicators, with median household incomes ranging from $23,000 to $41,000, and poverty rates between 23.2 and 49.2%[47]. The neighborhood also experiences markedly higher unemployment (23.4%, vs. 9.4% citywide) and a substantially larger share of residents outside the labor force (up to 77.8%)[48].

This program positioned the students as trusted knowledge brokers within their households while simultaneously serving as an applied STEM learning intervention. Youth participation at this developmental stage further promotes active citizenship and reinforces the value of community engagement[49,50].

In the fall of 2024, the *Trusting the Source* lesson plan (Supplementary Table 1) was co-created with Community Noise Lab staff (CNL), the BMS principal, and BMS teachers. CNL staff trained teachers on program implementation, including classroom-based tap water quality testing methods.

In January 2025, parents and guardians of sixth- and seventh-grade BMS students received a letter describing the *Trusting the Source* program and inviting participation. The letter included a QR code linking to a YouTube video that narrated program details.

Trusting the Source was implemented in Spring of 2025. BMS teachers and CNL staff co-led classroom lessons on water systems, treatment processes, drinking water properties, and water-related health impacts using the co-developed curriculum. Students received *From the Ground to the Glass*, an activity book published by CNL, to support their learning and interest in environmental health. Students were trained to collect household tap water samples using pre-assembled kits. Parents/guardians completed anonymous pre- and post-surveys to assess changes in trust after reviewing their child's test results.

Survey Instruments

Prior to tap water collection, parents/guardians completed a 54-item paper-based survey, administered by their children. No identifiers were collected. BMS teachers retrieved and managed the surveys using a folder system containing all program documents. The questionnaire collected parent demographics, household characteristics, and the grade(s) of students attending BMS. Items were organized into three sections: *About Your Water* (25 items), *Tap Water and Your Health* (7 items), and *Your Water Usage* (20 items). Most questions were close-ended and multiple choice.

To establish a baseline perceptions of water quality, parents were asked about trust in authoritative and elected entities responsible for water safety, sources of information about the water supply, confidence in water quality reporting, and perceptions of their tap water. Trust was assessed using four five-point Likert-scale items (1=Strongly agree to 5=Strongly disagree) measuring trust in the water utility company, confidence in infrastructure maintenance, trust in state and local government, and trust in the EPA. A fifth trust-related item assessed trust in water quality under third-party management using three ordinal response options. Participants described their tap water by selecting all applicable adjectives from a list of 19 and rated agreement with the statement that their tap water tastes good on a five-point Likert scale.

To examine the relationship between perceptions of tap water and self-reported health, participants selected any symptoms experienced from not drinking water from a list of 16 dehydration-related symptoms. Participants also reported any known household health issues potentially related to water supply.

Participants reported the volume of tap water consumed by themselves and their children. Visual aids depicting common vessel sizes labeled in milliliters and ounces (oz) were provided, and participants circled the size typically used. Participants then reported the number of glasses of tap water consumed per day in the summer months. Parallel questions assessed bottled water use for parents and children, with images of common bottle sizes provided. Total water consumption was calculated by multiplying the vessel volume (oz) by the number of glasses or bottles reported.

To assess post-participation changes in trust and water quality perceptions, parents completed a 12-item paper-based post-survey. All items structured as five-point Likert scales (1=Strongly Agree or Very Confident; 5=Strongly Disagree or Not Confident). Two items assessed perceived water safety after reviewing test results, including changes in feelings following their child's testing. Trust across governance levels was measured using five items assessing the water utility company, mayor and city council, governor, elected officials, and third-party water managers. Two additional items assessed confidence in the accuracy of local water quality reports and whether the City meets health standards. Parents also reported perceived changes in their water quality knowledge after reviewing results.

Measuring Change in Trust

A trust scale was developed to quantify the magnitude and direction of changes in parental trust after receipt of their child's water testing results (Supplementary Table 3). Eight pre-survey items and ten post-survey items assessed trust or confidence in water supply and authoritative entities responsible for water safety.

Items were reverse-coded so higher agreement or confidence corresponded to higher scores (5=Strongly Agree; 1=Strongly Disagree), with one item in each survey scored on a three-point scale. To harmonize scales, item responses were min-max normalized to a 0-1 range (1). For participants completing all relevant items, normalized pre- and post-survey responses were averaged to create composite trust scores (range: 0-1). Trust change was calculated as the post-composite score minus the pre-composite score (range -1 to 1).

Trust specific to water quality and safety was distinguished from trust in organizations by constructing separate subscales using the same analytical approach. Water-related trust may be shaped by testing results, whereas institutional trust reflects broader sociopolitical contexts, including historical performance, governance perceptions, and individual experiences, and values[51–53]. This distinction allows identification of potential drivers of trust change – direct evidence, institutional perceptions, or both.

The water trust subscale included three pre-survey and four post-survey items, while the organizational trust subscale consisted of five pre-survey and six post-survey items assessing authoritative entities. Subscale scores ranged from -1 to 1 and were categorized as positive (> 0) or negative (≤ 0) trust change.

Water Quality Test

Students collected three 4-oz samples of room-temperature tap water from home kitchen faucets using school-issued kits. Before sample collection, water was allowed to run for 60 seconds. Bottles were capped, sealed in provided plastic bags, and returned to school, where samples were refrigerated until in-class testing.

DO, pH, and turbidity were measured using a DR900 portable colorimeter (Hach, 2013) following manufacturer protocols. CNL staff calibrated instruments each morning prior to testing and conducted manufacturer-recommended accuracy checks and comparison tests at the end of each testing day.

Dissolved oxygen, pH, & Turbidity measurements

DO was measured by filling a high range DO AccuVac® Ampul containing an oxygen-activated reagent with tap water. After reagent dissolution, samples developed a purple hue proportional to DO concentration. Ampuls were analyzed using a DR900 colorimeter (program 445 Oxygen, Dis HR AV) at 520 nm, with results recorded in mg/L O_2. A dissolved oxygen meter was used to validate results.

For pH measurement, a 10mL tap water sample was mixed with 1 mL of Phenol Red Indicator Solution, inverted, and analyzed using the colorimeter (program: 461 pH). Results were recorded in pH units. Instrument calibration was performed using a clear pH 7.0 buffer following the same the same procedure prior to sample testing.

Turbidity was measured by analyzing a 10 mL sample using the colorimeter (program: 745 FAU), with results reported in Formazin Attenuation Units (FAU). Measurements were validated using a standard solution prepared by diluting 5.00 mL of 4000 Nephelometric Turbidity Unit (NTU) formazin standard with 95 mL deionized water to create a 200 FAU formazin standard.

Presence of Lead

Water samples were analyzed for lead using a Bruker TRACER 5g handheld X-ray fluorescence (XRF) analyzer (Bruker, Billerica, MA, USA). Testing was conducted by CNL staff in the Jackson, MS laboratory after completion of student water quality testing. The instrument, equipped with factory calibrations, was operated using the pre-installed water-testing program. Results were reported as positive or negative for lead, with negative results indicating concentrations below the level of detection (LOD).

Data Analysis

Survey responses were manually entered into Excel for data cleaning. Water testing results were merged with ID-matched pre- and post-survey responses (N=55). Data was descriptively analyzed using Stata, version 19.0 (StataCorp, 2025). Categorical variables are reported as n (%) and continuous variables as mean (SD).

Analyses compare parents'/guardians' trust perceptions before and after receiving their child's water testing results. Paired two-sided t-tests were used to assess pre-post differences across all three trust scales. Differences in trust by interpretation of water quality results were evaluated using t-tests stratified by interpretation group for each measured parameter.

Fisher's Exact Tests were used to identify differences between the direction of trust change and categorical variables, including demographics, water quality results, and selected pre-survey items (e.g., information sources, symptoms, and perceived water properties).

Wilcoxon signed-rank tests were used to assess pre-post differences for items included in both surveys and were repeated within each water quality interpretation group. Exact p-values and direction of effect are reported.

This project was reviewed by Brown University's Institutional Review Board and classified as program evaluation and non-human subjects research under federal regulations. All data were collected anonymously and pertained only to water quality rather than individuals, aside from demographic information.

Declarations

All involved (students, parents, administration, and teachers) agreed to participate in this water quality educational program.

References

1. UNICEF, WHO. *Progress on Household Drinking Water, Sanitation and Hygiene 2000–2022: Special Focus on Gender*. Who/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene; 2023. Accessed August 17, 2025. https://www.unwater.org/sites/default/files/2023-07/jmp-2023-wash-households-launch-version_0.pdf
2. U.S. EPA. National Enforcement and Compliance Initiative: Increasing Compliance with Drinking Water Standards. National Enforcement and Compliance Initiatives. April 2, 2025. Accessed August 17, 2025. https://www.epa.gov/enforcement/national-enforcement-and-compliance-initiative-increasing-compliance-drinking-water-0
3. U.S. EPA. Public Water System Supervision Program Water Supply Guidance Manual. Drinking Water Requirements for States and Public Water Systems. January 7, 2025. Accessed August 8, 2025. https://www.epa.gov/dwreginfo/public-water-system-supervision-program-water-supply-guidance-manual
4. U.S. EPA. Overview of the Safe Drinking Water Act. Safe Drinking Water Act. January 23, 2025. Accessed August 8, 2025. https://www.epa.gov/sdwa/overview-safe-drinking-water-act
5. U.S. EPA. Public Notification Rule. Drinking Water Requirements for States and Public Water Systems. June 11, 2025. Accessed August 8, 2025. https://www.epa.gov/dwreginfo/public-notification-rule
6. Kaur M, Hewage K, Sadiq R. Investigating temporal dynamics of urban densification on the buried water infrastructure performance. *Cities*. 2022;129:103836. doi:10.1016/j.cities.2022.103836
7. Renwick DV, Heinrich A, Weisman R, Arvanaghi H, Rotert K. Potential Public Health Impacts of Deteriorating Distribution System Infrastructure. *Am Water Works Assoc*. 2019;111(2):42-53. doi:10.1002/awwa.1235
8. Jepson WE, Wutich A, Colllins SM, Boateng GO, Young SL. Progress in household water insecurity metrics: a cross-disciplinary approach. *WIREs Water*. 2017;4(3):e1214. doi:10.1002/wat2.1214
9. Toukabri A, Delbé C. New 2022 Population Estimates Show Most Large Cities and Towns Grew Faster or Lost People at Slower Rate. US Census Bureau. May 18, 2023. Accessed September 24, 2025. https://www.census.gov/library/stories/2023/05/large-cities-no-longer-biggest-population-losers.html

10. U.S. Census Bureau, Population Division. Intercensal Estimates of the Resident Population for Incorporated Places in Mississippi: April 1, 2010 to April 1, 2020. Published online November 2024. https://www.census.gov/data/tables/time-series/demo/popest/intercensal-2010-2020-cities.html
11. U.S. Census Bureau, Population Division. Annual Estimates of the Resident Population for Incorporated Places in Mississippi: April 1, 2020 to July 1, 2024. Published online May 2025. https://www.census.gov/data/tables/time-series/demo/popest/2020s-total-cities-and-towns.html
12. U.S. Census Bureau. Jackson city, Mississippi. Census Bureau Profile. 2023. Accessed August 18, 2025. https://data.census.gov/profile/Jackson_city,_Mississippi?g=160XX00US2836000
13. U.S. EPA. City of Jackson - Mississippi Clean Water Act Settlement. Enforcement. May 3, 2013. Accessed August 18, 2025. https://www.epa.gov/enforcement/city-jackson-mississippi-clean-water-act-settlement
14. Vicory J. Jackson mayor pens letter to officials requesting millions in relief as water crisis unfolds. The Clarion-Ledger. March 4, 2021. Accessed August 18, 2025. https://www.clarionledger.com/story/news/2021/03/04/jackson-mayor-requests-millions-state-feds-amid-water-crisis/4584061001/
15. Warren A. 'The Next Flint' | Suit filed against Jackson, MSDH over lead in drinking water. WLBT3. October 19, 2021. Accessed August 18, 2025. https://www.wlbt.com/2021/10/19/next-flint-suit-filed-against-jackson-msdh-over-lead-drinking-water/
16. Kim M, De Vito R, Duarte F, et al. Boil water alerts and their impact on the unexcused absence rate in public schools in Jackson, Mississippi. *Nat Water*. 2023;1(4):359-369. doi:10.1038/s44221-023-00062-z
17. Flowers CC. The "Blackest City in America" Is the Embodiment of Environmental Injustice. TIME. January 28, 2025. Accessed August 18, 2025. https://time.com/7210560/jackson-mississippi-environmental-injustice/
18. *U.S. vs City of Jackson, MS*.(S.D. Miss. (U.S. District Court for the Southern District of Mississippi) 2022). Accessed August 18, 2025. https://www.epa.gov/system/files/documents/2022-11/U.S.%20v%20City%20of%20Jackson%20MS%20Complaint%20w%20Attachments_Filed.pdf
19. Bose D. Report: Mississippi schools face chronic absenteeism - Mississippi Today. *Mississippi Today*. https://mississippitoday.org/2025/10/16/report-mississippi-schools-face-chronic-absenteeism/. October 16, 2025. Accessed January 13, 2026.
20. Mayer RC, Davis JH, Schoorman FD. An Integrative Model of Organizational Trust. *Acad Manage Rev*. 1995;20(3):709-734. doi:10.2307/258792
21. Jenkins P, Roberts-Lewis K, Smith B, Riddley CL. Desensitized to Trauma: The Jackson Water Crisis, Environmental Injustice, and Implications for Public Health Social Work. *Soc Work Public Health*. Published online September 10, 2025:1-9. doi:10.1080/19371918.2025.2558961
22. Safarpour H, Spearing LA. Temporal public perceptions and experiences during water service disruptions: the case of Jackson, Mississippi. *Environ Res Infrastruct Sustain*. 2024;4(1):015003. doi:10.1088/2634-4505/ad1bb8
23. Walker AR. Some mothers struggle to trust that Jackson water is safe to drink. *Mississippi Today*. https://mississippitoday.org/2023/07/06/jackson-water-crisis-mothers-caregivers/. July 6, 2023. Accessed October 6, 2025.
24. Cleveland Water Department. DO in H2O: What is Dissolved Oxygen and How Does it Affect Your Water? City of Cleveland Water. July 25, 2022. Accessed January 21, 2026. https://www.clevelandwater.com/who-we-are/news/do-h2o-what-dissolved-oxygen-and-how-does-it-affect-your-water
25. Gruber R, Axmann S, Schoenberg MH. The influence of oxygenated water on the immune status, liver enzymes, and the generation of oxygen radicals: a prospective, randomised, blinded clinical study. *Clin Nutr*. 2005;24(3):407-414. doi:10.1016/j.clnu.2004.12.007
26. Hussein Farh HM, Ben Seghier MEA, Taiwo R, Zayed T. Analysis and ranking of corrosion causes for water pipelines: a critical review. *Npj Clean Water*. 2023;6(1):65. doi:10.1038/s41545-023-00275-5
27. National Research Council (US) Safe Drinking Water Committee. Chemical Quality of Water in the Distribution System. In: *Drinking Water and Health: Volume 4*. Vol 4. National Academies Press (US); 1982. Accessed August 11, 2025. https://www.ncbi.nlm.nih.gov/books/NBK216607/
28. Sarin P, Snoeyink VL, Bebee J, et al. Iron release from corroded iron pipes in drinking water distribution systems: effect of dissolved oxygen. *Water Res*. 2004;38(5):1259-1269. doi:10.1016/j.watres.2003.11.022
29. Kelp C, Simion M. What is trustworthiness? *Noûs*. 2023;57(3):667-683. doi:10.1111/nous.12448
30. Boufides CH, Gable L, Jacobson PD. Learning from the Flint Water Crisis: Restoring and Improving Public Health Practice, Accountability, and Trust. *J Law Med Ethics*. 2019;47(S2):23-26. doi:10.1177/1073110519857310
31. Sobeck J, Smith-Darden J, Hicks M, et al. Stress, Coping, Resilience and Trust during the Flint Water Crisis. *Behav Med*. 2020;46(3-4):202-216. doi:10.1080/08964289.2020.1729085
32. Taylor C. Michigan says Flint water is safe to drink, but residents' trust in government has corroded. The Conversation. May 4, 2018. Accessed August 5, 2025. http://theconversation.com/michigan-says-flint-water-is-safe-to-drink-but-residents-trust-in-government-has-corroded-95358
33. McKnight DH, Choudhury V, Kacmar C. Developing and Validating Trust Measures for e-Commerce: An Integrative Typology. *Inf Syst Res*. 2002;13(3):334-359. doi:10.1287/isre.13.3.334.81
34. Rotter JB. Interpersonal trust, trustworthiness, and gullibility. *Am Psychol*. 1980;35(1):1-7. doi:10.1037/0003-066x.35.1.1
35. Alessandro M, Cardinale Lagomarsino B, Scartascini C, Streb J, Torrealday J. Transparency and Trust in Government. Evidence from a Survey Experiment. *World Dev*. 2021;138:105223. doi:10.1016/j.worlddev.2020.105223
36. Badman RP, Wang AX, Skrodzki M, et al. Trust in Institutions, Not in Political Leaders, Determines Compliance in COVID-19 Prevention Measures within Societies across the Globe. *Behav Sci*. 2022;12(6):170. doi:10.3390/bs12060170
37. Lee Y. Government for Leaving No One Behind: Social Equity in Public Administration and Trust in Government. *SAGE Open*. 2021;11. doi:10.1177/21582440211029227
38. Lewicki RJ, Brinsfield C. Chapter 3: Measuring trust beliefs and behaviours. In: *Handbook of Research Methods on Trust*. Edward Elgar Publishing; 2011:29-39. Accessed July 25, 2025. https://doi.org/10.4337/9780857932013.00011

39. Moody GD, Lowry PB, Galletta DF. It's complicated: explaining the relationship between trust, distrust, and ambivalence in online transaction relationships using polynomial regression analysis and response surface analysis. *Eur J Inf Syst*. 2017;26(4):379-413. doi:10.1057/s41303-016-0027-9
40. Hamm JA, Carrera JS, Fossen JAV, et al. Conceptualizing trust and distrust as alternative stable states: lessons from the Flint Water Crisis. *Ecol Soc*. 2023;28(3). doi:10.5751/ES-14410-280314
41. Kankaraš M, Capecchi S. Neither agree nor disagree: use and misuse of the neutral response category in Likert-type scales. *METRON*. 2025;83(1):111-140. doi:10.1007/s40300-024-00276-5
42. Krosnick JA. The Causes of No-Opinion Responses to Attitude Measures in Surveys: They Rarely Are What They Appear to Be. In: *In Survey Nonresponse*. Wiley; 2002:88-100. Accessed August 12, 2025. https://web.stanford.edu/dept/communication/faculty/krosnick/docs/2002/2002%20The%20causes%20of%20no-opinion%20responses%20to%20attitude%20measures%20in%20surveys-.pdf
43. Mößner N. Trusting the Media? TV News as a Source of Knowledge. *Int J Philos Stud*. 2018;26(2):205-220. doi:10.1080/09672559.2018.1450079
44. Miller JD, Staddon C, Salzberg A, Lucks JB, Bruine de Bruin W, Young SL. Self-reported anticipated harm from drinking water across 141 countries. *Nat Commun*. 2024;15(1):7320. doi:10.1038/s41467-024-51528-x
45. Kopp M, Lindauer M, Garthus-Niegel S. Association between maternal employment and the child´s mental health: a systematic review with meta-analysis. *Eur Child Adolesc Psychiatry*. 2024;33(9):3025-3042. doi:10.1007/s00787-023-02164-1
46. Pierce G, Gonzalez S. Mistrust at the tap? Factors contributing to public drinking water (mis)perception across US households. *Water Policy*. 2017;19(1):1-12. doi:10.2166/wp.2016.143
47. U.S. Census Bureau. Selected Economic Characteristics. Published online 2023.
48. U.S. Census Bureau. Work Status in the Past 12 Months. Published online 2023. Accessed September 25, 2025. https://data.census.gov/table/ACSST5Y2023.S2303?q=jackson,+MS&t=Income+and+Earnings:Income+and+Poverty&g=1400000US28049002100,28049002200,28049002300,28049002400,28049002500,2
49. Birdwell J, Scott R, Horley E. Active citizenship, education and service learning. *Educ Citizsh Soc Justice*. 2013;8(2):185-199. doi:10.1177/1746197913483683
50. Nicoll K, Fejes A, Olson M, Dahlstedt M, Biesta G. Opening discourses of citizenship education: a theorization with Foucault. *J Educ Policy*. 2013;28(6):828-846. doi:10.1080/02680939.2013.823519
51. Bennett M. Trusting groups. *Philos Psychol*. 2024;37(1):196-215. doi:10.1080/09515089.2023.2179478
52. Contessa G. It Takes a Village to Trust Science: Towards a (Thoroughly) Social Approach to Public Trust in Science. *Erkenntnis*. 2023;88(7):2941-2966. doi:10.1007/s10670-021-00485-8
53. Furman K. Beliefs, values and emotions: An interactive approach to distrust in science. *Philos Psychol*. 2024;37(1):240-257. doi:10.1080/09515089.2023.2266454.

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