2023

Unequal Trust: Bottled Water Consumption, Distrust In Tap Water, and Economic and Racial Inequality In the United States

Daniel Jaffee
Portland State University, jaffee@pdx.edu

Citation Details
Jaffee, D. (2023). Unequal trust: Bottled water consumption, distrust in tap water, and economic and racial inequality in the United States. WIREs Water, e1700. https://doi.org/10.1002/wat2.1700

Received: 3 July 2023 | Revised: 1 September 2023 | Accepted: 16 October 2023

DOI: 10.1002/wat2.1700

FOCUS ARTICLE

WIREs WATER WILEY

Unequal trust: Bottled water consumption, distrust in tap water, and economic and racial inequality in the United States

Daniel Jaffee

Department of Sociology, Portland State University, Portland, Oregon, USA

Correspondence
Daniel Jaffee, Department of Sociology, Portland State University, Portland, OR, USA.
Email: jaffee@pdx.edu

Edited by: Alida Cantor, Associate Editor, Wendy Jepson, Senior Editor, and Jan Seibert, Editor-in-Chief

Abstract

Reviewing public health, nutrition, and social science literature, this article examines how bottled water consumption and spending in the United States differ along lines of race, ethnicity, and income, how these consumption patterns have changed in recent years, and how those shifts map onto perceptions of the safety and trustworthiness of tap water supplies, both before and since the Flint water disaster. It also addresses the differential impact of bottled water spending on household income. The findings challenge the truism that bottled water consumption is positively correlated with income, instead showing a bimodal racial and class consumption pattern that reflects widely divergent perceptions—and the uneven distribution—of threats to tap water safety. Bottled water consumption and spending, as well as distrust of tap water, are highest among low-income, Black, and Latino/a households, exacerbating social inequality. The article also addresses how the bottled water industry is responding to these dynamics, and considers potential routes to restoring both public water infrastructure and trust in tap water supplies. This contribution links several current and salient topics: the relationship between bottled water's growth and tap water consumption; the dynamics of growing racial and income inequality; historical legacies of systemic racism and economic marginalization; and the uneven effects of disinvestment in US water infrastructure on tap water safety, access, and affordability.

This article is categorized under:

Human Water > Human Water
Human Water > Water Governance
Human Water > Rights to Water
Engineering Water > Water, Health, and Sanitation

KEYWORDS

bottled water, distrust, inequality, tap water

1 | INTRODUCTION

In 2016, bottled water surpassed soft drinks to become the most consumed beverage in the United States, a role it also holds worldwide. As of 2021, per-capita bottled water consumption in the United States had reached 47 gallons per year, for a total of 15.7 billion gallons, with growth averaging roughly 5% per year. The bottled water industry's revenues in 2022 reached $46 billion in the United States and surpassed $300 billion worldwide. Nearly nine in ten US residents consume some bottled water, and one in five now use exclusively bottled water, avoiding the tap completely for drinking.

Yet bottled water in the US has been found to be no safer than tap water on average, contains higher levels of microplastics (Mason et al., 2018), is less strictly regulated, and consumers are much less likely to find out if contamination does occur (Jaffee, 2023; Javidi & Pierce, 2018). Moreover, the cost of bottled and packaged water is dramatically higher than that of tap water, ranging from hundreds to thousands of times more per unit volume for single-use bottles and somewhat less for water purchased at commercial refill stations or kiosks. Purchasing the average per-capita volume of bottled water typically represents an expenditure of hundreds of dollars or more per household per year (Jaffee, 2023; Teodoro et al., 2022).

Despite these concerns, distrust in the quality and safety of public tap water supplies plays a central role in driving the growth of bottled water in the United States. Hawkins terms bottled water an "opportunistic commodity," a product whose consumption "makes sense in the face of threats to or the absence of other forms of safe water provision" (Hawkins, 2017: 6-7). Over the past decade, media coverage of high-profile crises of lead- and/or bacteria-contaminated tap water in both urban and rural communities—from Flint, Michigan to Jackson, Mississippi to Martin County, Kentucky to California's Central Valley—as well as revelations of agricultural and industrial contaminants, have raised overall public concerns around tap water quality and safety and highlighted the uneven nature of challenges to US public water supplies. The archetypal media image of communities experiencing tap water emergencies is that of residents lining up to receive donated cases of single-serving plastic bottled water and lugging them home on foot or by car to use for drinking, cooking, and sometimes even bathing, washing, and other uses. Trust in drinking water supplies is also strongly influenced by household and community experiences of water insecurity and by broader levels of trust in government.

Reviewing recent public health, nutrition, and social science literature, this article examines how patterns of bottled water consumption and spending in the United States vary along lines of income, race, and ethnicity, how these patterns have changed over time, and the way those shifts map onto shifting levels of (dis)trust in tap water safety, both before and since the Flint disaster.

The findings challenge the truism that bottled water is largely a discretionary good whose consumption is positively correlated with income. On the contrary, US bottled water consumption and spending, as well as distrust and avoidance of tap water, are significantly higher and growing faster among low-income, Black, and Latino/a households, exacerbating already substantial economic and racial inequalities. The literature shows a clear bimodal racial and class pattern of tap and bottled water consumption that reflects widely divergent perceptions—as well as the uneven distribution—of threats to tap water quality and safety. The article addresses how these shifts are linked to the uneven (dis)investment in public water systems and to historical legacies of economic and racial marginalization, and how the bottled water industry is responding to these dynamics. It also considers potential routes to restoring both public water infrastructure and trust in those tap water supplies.

The literature reviewed in this article is drawn from two bodies of scholarship. The first consists of public health, nutrition, and social science literature that analyzes national surveys and other large datasets showing patterns of water insecurity, distrust in tap water supplies, consumption and/or avoidance of tap water and bottled water, the distribution of tap water safety violations, and water affordability, largely along lines of income, race, and ethnicity. The second is a more diverse set of articles and monographs that critically assess the causes of distrust in tap water supplies and bottled water, the growth of bottled water markets and consumption, the role of the bottled water industry, disinvestment in public water infrastructure, and related topics.

2 | DISINVESTMENT, DETERIORATION, AND DISTRUST IN PUBLIC TAP WATER

One major factor increasing the strain on US water systems is a dramatic disinvestment by the federal government in funding public water infrastructure over the last half century—a decline of 77% in real terms between 1977 and 2017

(Congressional Budget Office, 2018). The fall-off has been especially steep in terms of funds dedicated to capital investment. This has contributed to aging pipes and a growing problem of deferred maintenance by water utilities, particularly in older cities and communities with high rates of poverty. The American Society of Civil Engineers (2020) estimates the US water infrastructure investment gap at more than $2 trillion over the next 20 years. Municipalities and states have partly compensated for the federal funding shortfall by raising water rates, which have far outpaced inflation, leading to a significant increase in household water debt and water service shutoffs (see Box 1).

Despite these challenges, the great majority of tap water in the United States remains high quality and in compliance with federal drinking water standards. Health-related violations of the Safe Drinking Water Act (SDWA) affect 7%–8% of the community water systems in the United States in any given year (Allaire et al., 2018), but these problems are very unevenly distributed. Bae and Lynch (2023) found that the most serious (Tier 1) SDWA violations disproportionately occur in predominantly rural Latino/a communities impacted by runoff of agricultural chemicals and in communities with persistent poverty, and are concentrated in parts of the South and Southwest, including Oklahoma, Texas, Arkansas, New Mexico, Arizona, and California's San Joaquin Valley.

According to Javidi and Pierce, "the proportion of Black and Hispanic populations in communities are strong predictors of drinking water violations, reinforcing that drinking water issues most severely affect these minority groups" (2018: 6110). African American and Latino/a households are also more likely to be renters, and rental units experience roughly double the rate of exposure to drinking water problems (Viscusi et al., 2015).

Low-income and nonwhite US residents also consistently express greater fears about their tap water safety. A recent Gallup poll found that 76% of Black adults and 70% of Hispanic adults worried "a great deal" about their tap water, compared to only 48% of white adults (Gallup, 2023), and previous polls showed that low-income residents have the highest levels of concern.

What are the causes of this uneven distrust? Javidi and Pierce observe that "perception of tap water as unsafe has at least three potential sources: health-related contamination which should incur a violation of the primary standards of the Safe Drinking Water Act; non-health-related but often more perceivable contamination due to the contaminants' sensory qualities...[;] or pure misperception" (2018: 6109). The difficulty of disentangling these various factors in many settings adds to the complexity of addressing the root causes of the problem. Nor is the above list necessarily complete, considering the sources of distrust discussed in the following section.

Regardless, a large body of peer-reviewed studies confirms that those people who distrust their tap water the most disproportionately avoid the tap and consume bottled water, and in higher volumes (e.g., Gorelick et al., 2011; McSpirit & Reid, 2009; Onufrak et al., 2012; Pierce & Gonzalez, 2017). A number of studies document that local water quality violations are associated with higher bottled water use (e.g., Viscusi et al., 2015: 465). However, Teodoro and colleagues argue that geographic proximity is not necessary for distrust to spread, finding that "poor-quality water in one place increases the demand for commercial water in another place," provided that those communities are demographically similar (Teodoro et al., 2022: 106).

2.1 | The roots of trust and distrust

Some recent scholarship has challenged dominant understandings regarding trust and distrust in drinking water supplies, emphasizing that the root causes of distrust typically extend beyond immediate threats or perceptions of risk to encompass deeper historical factors. Because the vast majority of tap water in the United States is provided by local public water utilities, write Teodoro and coauthors, "perceptions of tap water quality...are a function of people's trust in government: To trust tap water is to trust government" (2022: 24). Conversely, distrust in public water supplies is often closely linked to a broader lack of trust in public authorities (Holt, 2012). Marginalized and racialized communities often have very different historical and contemporary experiences of government, typically providing far less basis for trust. In the case of Flint, for example, Wilson and coauthors argue that residents' continued distrust in the tap water despite officials' claims it had been restored to potability "reflects well-founded skepticism of the trustworthiness of the people and agencies leading the recovery effort." They add that "Flint's long history of race- and class-based discrimination, marginalization, and neglect provides the backdrop to this skepticism, creating the general impression that the 'system' as a whole work[s] against the city's predominantly black, and largely poor, population" (Wilson et al., 2023: 50).

Wilson et al. go further in problematizing notions of trust in water supplies, writing that distrust is not merely the antithesis of trust, but is linked to a belief or expectation that officials and institutions will not act in the interests of justice. They insist on the "need for alternative understandings beyond approaches that attribute distrust to misperception or

knowledge deficits among [water] users" (2023: 45). They also argue for "replacing a flat and ahistorical notion of trust in water with a more dynamic evaluation of the *trustworthiness* of the individuals, networks, and institutions treating, delivering, and regulating water" [emphasis in original], and define trustworthiness as incorporating the key elements of competence, benevolence, and integrity (2023: 45). This article embraces the above framings of trust, distrust, and trustworthiness advanced by Wilson et al. and Teodoro et al. in analyzing the implications of the literature discussed below.

3 | BOTTLED/PACKAGED WATER CONSUMPTION AND INCOME, RACE, AND ETHNICITY

The conventional wisdom, at least until the start of the past decade, was that in the United States and other wealthy nations, bottled water is largely a luxury or discretionary good, purchased due to consumer concerns with convenience, health, and tap water taste, and that its consumption is positively correlated with income. Szasz wrote in 2007 that "consumption of bottled waters does indeed have a class character—the higher the household's income, the more bottled water [is] consumed" (Szasz, 2007: 131). Some beverage industry market reports continue to report this pattern, as do a few scholarly articles. A corollary to this narrative is that demand for bottled water is highly elastic, falling when disposable income drops. The latter element does help to explain why total and per-capita bottled water consumption fell for two years in a row during the Great Recession of 2008–2009, before resuming its steady rise.

However, a large and growing body of peer-reviewed studies, dating to well before the Flint crisis, reaches precisely the opposite conclusion: bottled and packaged water consumption in the United States—along with distrust in public tap water—is correlated with *lower* incomes. Analyzing data from a large national survey, Rosinger and coauthors found that as respondents' incomes increased, their rate of bottled water consumption decreased, and their consumption of tap water increased (2018). Onufrak and colleagues write that 59.4% of respondents with annual incomes of less than $25,000 believed that their tap water was safe to drink, compared to 71.8% of those earning more than $60,000 (2012: 182).

3.1 | Racial and ethnic inequalities in tap water avoidance and bottled water use

Research also consistently finds major racial and ethnic disparities in bottled water consumption and perceptions of tap water safety. Both national and city-specific studies document that bottled and packaged water consumption is highest among nonwhite families, particularly Black and Latino/a households. Gorelick et al. (2011) found that Hispanic children were three times more likely to be given exclusively bottled water to drink than non-Hispanic white children. Dependence on bottled water is of particular concern for children because they are not exposed to the dental health benefits of the levels of fluoride added to most public water supplies, and because avoidance of tap water is associated with higher consumption of sugar-sweetened beverages (Rosinger, 2022; Rosinger et al., 2018).

Colburn and Kavouras identified similar patterns of much higher tap water avoidance and bottled water use in Latino/a households, arguing that perceptions of tap water "are influenced by water insecurity, demographics, prior experiences, organoleptic (sensory) perceptions and availability and sources of information" (Colburn & Kavouras, 2021: 1). Javidi and Pierce found that perceptions of tap water quality and safety vary greatly along lines of race and ethnicity. "African Americans opt for bottled water at greater rates than any other racial or ethnic groups," they write. "[They] are more likely to avoid the tap altogether, although general perception of tap water as unsafe [is highest] among Hispanic households" (2018: 6108). Research also shows that bottled water consumption is higher among people born outside of the US (particularly from Latin America), and those with less than a high-school degree (Pierce & Gonzalez, 2017; Rosinger et al., 2018).

A number of researchers use the large annual National Health and Nutrition Examination Survey (NHANES) to identify patterns of trust in tap water quality, bottled water use, and tap water avoidance by income, race and ethnicity, educational level, and other variables. Using NHANES data from 2005 to 2010, Drewnowski et al. (2013) found that fully 44% of total plain water consumption by volume among all US adults was in the form of bottled water, with tap water accounting for the remainder, but that for Mexican-American households bottled water comprised over 65% of plain water intake. Based on 2007–2014 NHANES data (prior to the Flint disaster), Rosinger and coauthors write that bottled water constituted 57% of all plain drinking water consumption by volume among both Black and Hispanic adults, compared to 30% for white adults (2018: 1460).

More recent NHANES data show a further jump in tap water avoidance, and bottled water consumption, among Black and Latino/a households in the US since the Flint disaster. Comparing the 2013–2014 results to those in 2017-18—an interval during which media coverage of Flint and other tap water crises was widespread—Rosinger et al. (2022) found that the overall prevalence of bottled water consumption on any given day was 25% higher in 2017–2018 than four years earlier. The proportion of US residents who drink no tap water whatsoever rose substantially, from 13% of the population in 2013–2014 to 20% in 2017–2018, an increase of 19 million people who stopped drinking from the tap entirely. Moreover, Rosinger (2022: 1263) writes that 51.4% of US adults reported they did not drink any tap water on a given day in 2017–2018, and 35.8% consumed only bottled water, up from 25% in 2005–2006. Again, this major recent rise in tap water avoidance reflects great disparities, with race and ethnicity being the "largest predictor of not drinking tap water at all": nearly 40% of all Hispanic children and adults, 34% of Black adults, and more than 29% of Black children drank no tap water whatsoever, while tap avoidance did not increase at all among Asians and non-Hispanic whites. The authors argue that their findings reveal "an epidemic of tap water distrust and disuse" (Rosinger et al., 2022: 209, 212).

The literature on tap water trust and bottled water using data from NHANES and other large US national surveys unfortunately does not report results for Indigenous respondents. However, many published case studies document that Indigenous communities and First Nations in the United States and Canada experience significantly higher levels of water insecurity, distrust in drinking water supplies, and dependency on bottled water than the non-Indigenous population (e.g., Duignan et al., 2022; Wilson et al., 2023).

The economic burden of purchasing bottled and packaged water to replace tap water is nontrivial for many households. In a study published in 2011, Black and Latino/a families spent an average of $20 per month on bottled water, compared to $12 for non-Latino/a whites. Bottled water spending accounted for a median of 0.4% of total household income for the white households, but 1.0% for the Black and Latino/a households, with some of those families spending as much as 16.7% of their household income to acquire bottled water. Six percent of the white households said they had to give up other needed items in order to buy bottled water, compared to 14% of Latino/a and 12% of Black households (Gorelick et al., 2011). If packaged water is used for cooking as well as drinking, the burden is increased. Javidi and Pierce (2018) calculated that the cost of replacing tap water with bottled water for a household's entire drinking and cooking needs was between $983 and $4757 per year in 2015, figures that have increased in the years since.

Some authors argue that these patterns are a rational response to the distribution of threats to tap water. "Consumers are more likely to believe that bottled water is safer or tastes better if they have had adverse experiences with tap water or live in states with more prevalent violations of EPA water quality standards," write Viscusi and colleagues. "...Blacks and Hispanics are more likely to drink bottled water due to their relatively greater exposure to unsafe water and greater risk beliefs" (2015: 450). Teodoro and coauthors add further nuance, arguing that "distrust of tap water among poor and minority communities seems to grow not only from direct lived experience, but also from a shared identity with those who have experienced drinking water problems" (2022: 25). That latter element of shared identity underscores the argument by Wilson et al. (2023) that such distrust can reflect a rational response by communities to broader experiences of systemic racism and structural inequality, not related to water supplies alone.

3.2 | The role of bottled and packaged water firms

Other observers focus on the role of bottled water and beverage firms in contributing to public distrust in tap water safety. Public and private statements by beverage industry and company representatives, filings by individual bottled water firms with the US Securities and Exchange Commission, industry market reports, and the content of some bottled water advertising campaigns strongly suggest that the industry identifies the deterioration of public tap water infrastructure, as well as growing public fears about tap water quality, as a significant market opportunity (Jaffee, 2023; Teodoro et al., 2022). "Much of the commercial water industry's profit," write Teodoro and colleagues, "...depends on encouraging and capitalizing on distrust in tap water" (2022: 28).

Parag and Roberts write that "from the bottled water industry point of view, mistrust in the tap water is almost desirable, since it can be easily translated into opportunities for more business...the bottled water industry works to change the way people think about drinking water. One strategy it uses is to weaken the public's confidence in the public water systems, the water providers, and the government's ability to monitor tap-water quality" (Parag & Roberts, 2009: 628). The leading bottled water firms have faced substantial criticism from consumer organizations and

other groups who allege that they particularly target their advertising at low-income people, communities of color, and immigrants from nations where tap water may not be safe or reliable. Critics also point to the irony that nearly two-thirds of bottled water currently sold in the United States is sourced not from springs or groundwater but from already-treated municipal water supplies (Jaffee, 2020).

A less widely understood and lower-cost segment of the packaged water industry is the provision of bulk water in multi-gallon jugs at commercial outlets, where customers bring their own containers in to be filled with water drawn from the municipal supply and refiltered. Teodoro and coauthors examine the patterns of geographic distribution of branded "water kiosks," which concentrate heavily in the southern tier of the US. They find that in the cities of Houston and Phoenix, the kiosks are heavily concentrated in low-income and Hispanic neighborhoods, and are also positively correlated with the incidence of SDWA safety violations in a community. They observe that "the locations of kiosks indicate that commercial water companies profit from those with the least money to spend" (2022: 98). Pierce and Gonzalez point to the role of "false advertising regarding tap water quality by other private, commercially minded water purveyors...providers such as retail water facilities and mobile vendors continue to propagate misleading narratives regarding the benefits of their (more expensive) products" (2017: 9).

4 | DISCUSSION

Taken together, the evidence above illustrates a clear pattern of US bottled water consumption (and tap water avoidance) that completely upends the conventional narrative—a situation in which "contrary to expectations, tap water consumption was higher at *higher* incomes, whereas the consumption of bottled water was higher at *lower* incomes" (Vieux et al., 2020: 11).

This represents a bimodal class and racial pattern of bottled water consumption that reflects divergent perceptions of tap water safety along lines of class, race, and ethnicity, as well as the uneven distribution of threats to that safety. Privileged consumers are increasingly avoiding bottled water and consuming tap water instead (which they trust far more), or they buy it mainly for convenience (Viscusi et al., 2015: 466), while low-income, Black, and Latino/a households are disproportionately turning away from the tap and consuming far more bottled water, either because their water supplies have documented safety or quality problems, or have been disconnected, or because they perceive them as less trustworthy (Jaffee, 2023).

However, consuming bottled and packaged water on an ongoing basis (on top of water bills) is significantly more costly—especially if it is also used for cooking and other uses beyond drinking—thus imposing large and disproportionate economic burdens on the poorest households. This substantially higher spending on bottled water not only worsens existing economic and racial inequalities, thus heightening water injustice; it also compounds a severe and growing crisis of tap water affordability in the United States (see Box 1).

The social groups who increasingly avoid public tap water and turn to private packaged water for drinking and other uses are the same communities who have disproportionately experienced the negative water quality effects of more than four decades of neoliberal austerity and federal disinvestment in public drinking water systems, as well as a longer-term legacy of environmental injustice, systemic racism, infrastructural neglect, and dis- and under-investment in drinking water systems nationwide (Pulido, 2016). These two historical trajectories are interwoven. Meehan and coauthors write that the Flint water crisis, "set into motion by fiscal austerity measures adopted by an underfinanced and debt-leveraged municipal government—suggests that water provision to largely Black and brown communities has been devalued and subordinated to the goals of fiscal solvency in ways that exacerbate social inequalities and threaten lives" (Meehan et al., 2020: 28700). Pauli adds that the Flint disaster "contains larger lessons relevant to other cities with old, toxic infrastructures and populations disproportionately vulnerable to environmental contamination" (Pauli, 2020: 9).

These dynamics are also a product of the decentralized nature of the nation's water system funding and governance, characterized by municipalities' increasing dependence on raising water rates to cover the cost of system maintenance and improvements due to plummeting federal support. Indeed, Vieux and coauthors write that "the inverse social gradient in bottled water consumption seems to be unique to the US," noting that such patterns were not found in similar studies in the United Kingdom and France (Vieux et al., 2020: 12). Further cross-national and comparative research is clearly necessary to understand the class, racial, and ethnic patterns of tap water distrust and bottled and packaged water consumption in other nations in the global North.

BOX 1 The crisis of US water affordability and bottled water

While concerns about rising water rates in the United States date back at least as far as the 1990s, scholars have more recently called attention to a burgeoning crisis of tap water affordability. Mirosa (2015: 47) writes that especially since 2004, water bills have increased far faster than inflation and other utility rates, "thus increasing the percentage of a household's budget devoted to paying for water." This is primarily a result of cities raising rates to compensate for shrinking federal funding, in order to cover the rising costs of maintenance, replacing aging infrastructure, and complying with federal water quality regulations. Mack and Wrase (2017) documented that US water and sewer bills had risen dramatically over the past decade and were unaffordable for nearly 12% of households in 2017, a figure projected to rise to over 35% by 2022. A study in 2020 found that over 20% of the population served by 77% of US water utilities experienced poverty, a major contributor to unpaid water bills (Patterson & Doyle, 2021). Teodoro and Saywitz (2020) calculated that low-income households spent an average of 12.4% of their monthly household income on water and sewer bills alone as of 2019—far above the 4.5% affordability threshold recommended by the US Environmental Protection Agency.

The result has been ballooning water bill debt and a startlingly high level of water utility shutoffs for nonpayment of past-due bills, which affect approximately 15 million people—nearly 5% of the US population—every year (Swain et al., 2020). These shutoffs disproportionately impact low-income residents and Black and Latino/a households (Rosinger et al., 2022: 207). In many states, not having running water in the home can be considered evidence of child neglect. While the epicenter of the shutoffs is arguably Detroit, where more than 100,000 households have had their water service disconnected, the phenomenon is a nationwide one.

Families whose water service is disconnected due to past-due bills often have no alternative but to turn to far more expensive bottled and packaged water, not only for drinking but also bathing, washing, and other household uses, compounding the economic injustice. In Detroit, researchers found that receiving a water shutoff notice was associated with a 43% greater likelihood of a household relying on bottled water, and also represented a source of great psychosocial distress (Gaber et al., 2021). A few cities, including Philadelphia and Baltimore, have recently introduced income-based water and sewer rate programs in an effort to remedy this crisis (Mack et al., 2020; Swain et al., 2020).

5 | CONCLUSIONS

The constellation of factors discussed above—disinvestment in public water infrastructure, the uneven distribution of drinking water quality problems, significant distrust of public tap water among low-income residents and communities of color, and the resulting avoidance of tap water and the shift to (or continued dependency on) more costly bottled water by those groups—all contribute to exacerbating already severe economic, racial, and ethnic inequalities in the United States, arguably creating a two-tiered drinking water society.

However, in most parts of the US bottled water is on average no safer than tap water and sometimes less so. Although bottled water firms are far less strictly regulated than tap water utilities, the growing fears around tap water safety take place in a context in which consumers are exposed to abundant media coverage of tap water problems, but are typically unable to access reliable information about the safety of the bottled water they consume. Bottled water firms also enjoy advertising and marketing budgets that dwarf the resources of public water utilities, creating an uneven playing field in shaping public perceptions of water quality.

These dynamics pose major challenges for local governments, drinking water utilities, and public health, environmental, and social justice advocates, who must wrestle with how to acknowledge the genuine existing threats to tap water safety while simultaneously keeping them in perspective and remedying the root causes of distrust in public water supplies.

Many scholars and advocates suggest three broad categories of potential solutions to the current state of affairs. The first involves education to increase awareness of tap water quality and safety and promote greater tap water consumption. Javidi and Pierce write that "even if primary and secondary standard contamination issues leading to negative tap water perception are addressed...targeted tap water education campaigns will still be necessary to address the disproportionate occurrence of the perception of tap water as unsafe in Hispanic and African American communities" (2018:

6110). However, in light of the bottled water industry's influence, Pierce and Gonzalez argue that "improving perception [of tap water] may require that proponents of tap water employ more adversarial, fact-based tactics in debunking the myths about alternative sources of water supply. Given its potentially confrontational nature, this is likely to be a role which non-profits rather than public agencies are best suited to play" (2017: 9).

A second set of solutions involves rebuilding dilapidated public water infrastructure by substantially increasing federal funding, with priority given to the most neglected and degraded systems—particularly those with high Latino/a, Black, and Indigenous populations, as well as smaller water systems, where most water quality violations occur. In 2021, the US Congress passed several major investments in repairing drinking water infrastructure, which included a $35 billion initial measure prioritizing underserved and tribal communities, followed by the Infrastructure Investment and Jobs Act, which dedicated $55 billion to repair drinking water systems, including $15 billion to remove lead pipes, half of that in form of loans. While historically significant, these investments represent only one-fourth of the amount needed to remove all remaining lead water service lines, and a tiny fraction of the full cost of needed system improvements nationwide. Public water advocates insist that a federal trust fund replenished by significant annual funding is essential for resolving the enormous backlog of deferred maintenance and also for remedying the water affordability crisis (Jaffee, 2023).

A third approach involves a suite of efforts to rebuild trust in public tap water, increase access to free tap water in public places, and shift drinking water culture. These involve local governments launching campaigns to expand access to free tap water by installing new filtered water fountains and bottle refilling stations in schools, parks, office buildings, and other public spaces; promoting refilling and distributing refillable bottles; and in a growing number of cities, banning governmental purchases of bottled water and its sale on public property. Analogous efforts are being adopted by local and regional governments in the United States, Canada, Europe, and elsewhere, and are also being pursued by a wide swath of other public, nonprofit, and private institutions (Jaffee, 2023; Tosun et al., 2020).

In cities and communities with consistently high drinking water quality, these efforts are making inroads, but where genuine problems with tap water quality and safety persist, fixing the underlying problems is an essential precursor to rebuilding trust and addressing the root causes of the continued shift among low-income, Black, and Latino/a US households away from the tap and toward bottled water. All three of these directions—public education, significantly reinvesting in public water systems and restoring the trustworthiness of water supplies, and expanding access to free tap water and shifting drinking water norms—represent a major undertaking, but are arguably indispensable for ensuring widespread, affordable, and equitable access to safe public drinking water for all.

AUTHOR CONTRIBUTIONS

Daniel Jaffee: Conceptualization (lead); data curation (lead); formal analysis (lead); funding acquisition (lead); investigation (lead); methodology (lead); project administration (lead); resources (lead); software (lead); supervision (lead); validation (lead); visualization (lead); writing – original draft (lead); writing – review and editing (lead).

FUNDING INFORMATION

This manuscript has been made open access through support provided by Portland State University Library.

CONFLICT OF INTEREST STATEMENT

The author declares no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

ORCID

Daniel Jaffee https://orcid.org/0000-0002-4771-3150

RELATED WIREs ARTICLES

The impacts of bottled water: An analysis of bottled water markets and their interactions with tap water provision
Making Europe go from bottles to the tap: Political and societal attempts to induce behavioral change
The flint water crisis

REFERENCES

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

American Society of Civil Engineers. (2020). *The economic benefits of investing in water infrastructure*. ASCE. https://uswateralliance.org/wp-content/uploads/2023/09/VOW-Economic-Paper_1.pdf

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

Colburn, A. T., & Kavouras, S. A. (2021). Tap water consumption and perceptions in United States Latinx adults. *Nutrients*, *13*, 2999. https://doi.org/10.3390/nu13092999

Congressional Budget Office. (2018). Public spending on transportation and water infrastructure, 1956 to 2017. https://www.cbo.gov/publication/54539

Drewnowski, A., Rehm, C. D., & Constant, F. (2013). Water and beverage consumption among adults in the United States: Cross-sectional study using data from NHANES 2005-2010. *BMC Public Health*, *13*(1), 1–19. https://doi.org/10.1186/1471-2458-13-1068

Duignan, S., Moffat, T., & Martin-Hill, D. (2022). Be like the running water: Assessing gendered and age-based water insecurity experiences with Six Nations First Nation. *Social Science & Medicine*, *298*, 114864. https://doi.org/10.1016/j.socscimed.2022.114864

Gaber, N., Silva, A., Lewis-Patrick, M., Kutil, E., Taylor, D., & Bouier, R. (2021). Water insecurity and psychosocial distress: Case study of the Detroit water shutoffs. *Journal of Public Health*, *43*(4), 839–845. https://doi.org/10.1093/pubmed/fdaa157

Gallup. (2023). *Most Black, Hispanic adults very worried about tainted water*. Gallup. Retrieved June 25 from https://news.gallup.com/poll/505532/black-hispanic-adults-worried-tainted-water.aspx

Gorelick, M. H., Gould, L., Nimmer, M., Wagner, M., Heath, M., Bashir, H., & Brousseau, D. C. (2011). Perceptions about water and increased use of bottled water in minority children. *Archives of Pediatric and Adolescent Medicine*, *165*(10), 928–932. https://doi.org/10.1001/archpediatrics.2011.83

Hawkins, G. (2017). The impacts of bottled water: An analysis of bottled water markets and their interactions with tap water provision. *WIREs Water*, *4*(3), 1–10. https://doi.org/10.1002/wat2.1203

Holt, D. B. (2012). Constructing sustainable consumption: From ethical values to the cultural transformation of unsustainable markets. *The Annals of the American Academy of Political and Social Science*, *644*(1), 236–255. https://doi.org/10.1177/0002716212453260

Jaffee, D. (2020). Enclosing water: Privatization, commodification, and access. In K. Legun, J. Keller, M. Bell, & M. Carolan (Eds.), *The Cambridge handbook of environmental sociology* (Vol. 2, pp. 303–323). Cambridge University Press. https://doi.org/10.1017/9781108554558

Jaffee, D. (2023). *Unbottled: The fight against plastic water and for water justice*. University of California Press.

Javidi, A., & Pierce, G. (2018). U.S. households' perception of drinking water as unsafe and its consequences: Examining alternative choices to the tap. *Water Resources Research*, *54*(54), 6100–6113. https://doi.org/10.1029/2017WR022186

Mack, E. A., & Wrase, S. (2017). A burgeoning crisis? A Nationwide assessment of the geography of water affordability in the United States. *PLoS One*, *12*(1), e0169488. https://doi.org/10.1371/journal.pone.0169488

Mack, E. A., Wrase, S., Dahme, J., Crosby, S. M., Davis, M., Wright, M., & Muhammad, R. (2020). An experiment in making water affordable: Philadelphia's Tiered Assistance Program (TAP). *Journal of the American Water Resources Association*, *56*(3), 431–449. https://doi.org/10.1111/1752-1688.12830

Mason, S. A., Welch, V. G., & Neratko, J. (2018). Synthetic polymer contamination in bottled water. *Frontiers in Chemistry*, *6*(407), 1–11. https://doi.org/10.3389/fchem.2018.00407

McSpirit, S., & Reid, C. (2009). Residents' perceptions of tap water and decisions to purchase bottled water. *Society & Natural Resources*, *24*(5), 511–520. https://doi.org/10.1080/08941920903401432

Meehan, K., Jurjevich, J. R., Chun, N. M., & Sherrill, J. (2020). Geographies of insecure water access and the housing–water nexus in US cities. *Proceedings of the National Academy of Sciences*, *117*(46), 28700–28707. https://doi.org/10.1073/pnas.2007361117

Mirosa, O. (2015). Water affordability in the United States: An initial exploration and an agenda for research. *Sociological Imagination*, *51*(2), 35–67.

Onufrak, S. J., Park, S., Sharkey, J. R., & Sherry, B. (2012). 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

Parag, Y., & Roberts, J. T. (2009). A battle against the bottles: Building, claiming, and regaining tap-water trustworthiness. *Society & Natural Resources*, *22*(7), 625–636. https://doi.org/10.1080/08941920802017248

Patterson, L. A., & Doyle, M. W. (2021). Measuring water affordability and the financial capability of utilities. *AWWA Water Science*, *3*, 1–25. https://doi.org/10.1002/aws2.1260

Pauli, B. (2020). The Flint water crisis. *Wiley Interdisciplinary Reviews*, *7*, e1420. https://doi.org/10.1002/wat2.1420

Pierce, G., & Gonzalez, S. (2017). Mistrust at the tap? Factors contributing to public drinking water (mis)perception across US households. *Water Policy*, *19*, 1–12. https://doi.org/10.2166/wp.2016.143

Pulido, L. (2016). Flint, environmental racism, and racial capitalism. *Capitalism Nature Socialism*, *27*(3), 1–16. https://doi.org/10.1080/10455752.2016.1213013

Rosinger, A. Y. (2022). Using water intake dietary recall data to provide a window into US water insecurity. *The Journal of Nutrition*, *152*(5), 1263–1273. https://doi.org/10.1093/jn/nxac017

Rosinger, A. Y., Herrick, K. A., Wutich, A. Y., Yoder, J. S., & Ogden, C. L. (2018). Disparities in plain, tap and bottled water consumption among US adults: National Health and nutrition examination survey (NHANES) 2007–2014. *Public Health Nutrition*, *21*(8), 1455–1464. https://doi.org/10.1017/S1368980017004050

Rosinger, A. Y., Patel, A. I., & Weaks, F. (2022). Examining recent trends in the racial disparity gap in tap water consumption: NHANES 2011–2018. *Public Health Nutrition*, *25*(2), 207–213. https://doi.org/10.1017/S1368980021002603

Swain, M., McKinney, E., & Susskind, L. (2020). Water shutoffs in older American cities: Causes, extent, and remedies. *Journal of Planning Education and Research*, 1–8. https://doi.org/10.1177/0739456X2090443

Szasz, A. (2007). *Shopping our way to safety: How we changed from protecting the environment to protecting ourselves*. University of Minnesota Press.

Teodoro, M. P., & Saywitz, R. R. (2020). Water and sewer affordability in the United States: A 2019 update. *AWWA Water Science*, *2*(2), e1176. https://doi.org/10.1002/aws2.1176

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.

Tosun, J., Scherer, U., Schaub, S., & Horn, H. (2020). Making Europe go from bottles to the tap: Political and societal attempts to induce behavioral change. *WIREs Water*, *7*, 1–18. https://doi.org/10.1002/wat2.1435

Vieux, F., Maillot, M., Rehm, C. D., Barrios, P., & Drewnowski, A. (2020). Trends in tap and bottled water consumption among children and adults in the United States: Analyses of NHANES 2011–16 data. *Nutrition Journal*, *19*(1), 10. https://doi.org/10.1186/s12937-020-0523-6

Viscusi, W. K., Huber, J., & Bell, J. (2015). The private rationality of bottled water drinking. *Contemporary Economic Policy*, *33*(3), 450–467. https://doi.org/10.1111/coep.12088

Wilson, N. J., Montoya, T., Lambrinidou, Y., Harris, L. M., Pauli, B. J., McGregor, D., Patrick, R. J., Gonzalez, S., Pierce, G., & Wutich, A. (2023). From "trust" to "trustworthiness": Retheorizing dynamics of trust, distrust, and water security in North America. *Environment and Planning E: Nature and Space*, *6*(1), 42–68. https://doi.org/10.1177/2514848622110

How to cite this article: Jaffee, D. (2023). Unequal trust: Bottled water consumption, distrust in tap water, and economic and racial inequality in the United States. *WIREs Water*, e1700. https://doi.org/10.1002/wat2.1700