

Public Perception of Drinking Water Quality in the United States: A Thirty-Three Year (1990-2023) Systematic Review of Primary Research Articles

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Abstract Public perception of drinking water quality reflects thoughts, trust, and beliefs about whether drinking water poses a risk to health and well-being. This perception is often shaped by sensory qualities such as appearance, taste, color, and odor. We conducted a systematic review of peer-reviewed articles published between 1990 and 2023 to (a) assess public perceptions of drinking water quality and (b) identify the factors influencing these perceptions in the United States. A systematic search of eight databases yielded 19,225 publications, of which 64 articles met the inclusion criteria for analysis. Most of these studies were published between 2006 and 2023. Of the 64 articles reviewed, 24 (37.5%) reported tap water as safe for drinking, while 19 (29.6%) cited bottled water as safe. Additionally, 1 (1.6%) identified well water, 2 (3.1%) filtered water, and 1 (1.6%) spring water as safe. Over the past five years, a decline in the number of studies affirming tap water's safety was observed, alongside an increase in studies favoring bottled water. Factors influencing public perceptions included the organoleptic properties of water (taste, smell, and color), socio-demographic characteristics, health risk concerns, past negative experiences with water utilities, trust in water systems, and media influence and public awareness. Although many respondents express trust in tap water quality, ongoing challenges with public water systems are eroding this trust, leading to increased reliance on bottled water. Addressing these issues through infrastructure improvements, public education, and community engagement is crucial to restoring long-term confidence in drinking water quality. Systematic review registration: The systematic review protocol was registered (CRD42024545308) and is published on PROSPERO.

Keywords: public perception, water quality, trust, organoleptic properties

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1. Introduction

Safe drinking water is sourced from public water systems, private wells, and bottled water [1]. Public perception of water quality is primarily influenced by sensory attributes such as taste, appearance, odor, and color [2]. However, these perceptions are often shifting and may not always align with scientific assessments [3]. In recent years, incidents like the 2014-2015 Flint water crisis [4] and water quality challenges in Jacksonville, Florida [5], and Jackson, Mississippi [6] have heightened public awareness and concern over drinking water safety. These events have exposed the vulnerabilities in the nation's water infrastructure, driving concerns about emerging contaminants, aging systems, and environmental degradation [7].

Public perception of water quality plays a pivotal role in shaping water management, policy development, and public health interventions [8]. Trust in government agencies such as the Environmental Protection Agency (EPA), water providers, and other stakeholders is essential for maintaining public confidence in drinking water systems. The Environmental Protection Agency enforces the Safe Drinking Water Act, which mandates several initiatives such as annual consumer confidence reports, source water assessments, and state compliance reports to enhance public understanding of drinking water quality. Water utilities are also required to notify consumers promptly in the event of any violations of health standards [9]. Clear communication, effective regulation, and accountability are crucial for building and sustaining this trust [10]. When trust erodes, individuals often seek alternatives such as bottled water or private wells, which result in health, economic, and environmental

consequences [11]. The global surge in bottled water consumption, with over a million bottles purchased every minute, exacerbates environmental challenges as only 20% of these bottles are recycled, while the remainder contribute to landfills, pollution, and greenhouse gas emissions [12].

Public perception drives water consumption behaviors, hygiene practices, and environmental stewardship [13]. Also, concerns over water quality drive many consumers to install filtration systems or avoid tap water altogether [14]. Studies show that distrust in tap water is more common among non-white populations, particularly Latinx and Black communities, who often turn to bottled water and, in some cases, sugary beverages as alternatives [15]. Indigenous communities similarly demonstrate lower levels of trust in municipal water systems, resulting in higher avoidance of tap water [16,17]. These disparities highlight the influence of public perception on consumers.

Additional factors that shape public perception include sensory attributes of water, perceived risks, trust in suppliers, past water quality issues, and information disseminated through media and social networks [18]. A comprehensive national study using data from the 2013 American Housing Survey found that perceptions of water quality were closely linked to socioeconomic factors such as education, income, minority status, and foreign-born nativity, with Latin American immigrants showing particularly low levels of trust in tap water [19].

Understanding public perception of drinking water quality and the factors influencing it is critical for policymakers, water providers, and other stakeholders. With this knowledge, targeted interventions, policies, and communication strategies can be developed to build public trust, address challenges, and ensure equitable access to safe drinking water for all communities. By prioritizing transparency, stringent regulation, and active public engagement, a more resilient and sustainable drinking water infrastructure that meets the needs of current and future generations can be developed.

The objective of this systematic review is to identify, appraise and synthesize available literature on the public perception of drinking water quality in the United States. Through this review, we aim to provide evidence-based and actionable insights into the public's perception of drinking water quality in the United States. It is our anticipation that the findings will offer valuable guidance in the development of policies and programs aimed at enhancing the public perception of drinking water quality.

Review questions

1. What are the public perceptions of drinking water quality in the United States?

2. What are the factors influencing public perception of drinking water quality?

2. Materials and Methods

2.1. Protocol and Registration

This review followed the reporting guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analysis for Protocols 2015 (PRISMA-P- Table 2) [21] and guidance for dissemination of results [22]. The study protocol was registered in the International Prospective Register of Systematic Reviews Database (PROSPERO) (available at <https://www.crd.york.ac.uk/prospéro>) in May 2024 with registration number CRD42024545308

2.2. Search Strategy and Keywords

This study systematically reviewed all published works in the United States on public perception of drinking water quality from 1990-2023. The search used concepts of drinking water, perception, quality, and the United States. The following terms were included for the drinking water concept: drink* water, potable water, bottled water, tap water, well water, filter* water, pipe* water, spring water, rainwater collection, water kiosk, sachet water, community water, water supply, lake water, faucet, private water, domestic water, and household water. The perception concept included the following terms: perception, insight, discernment, knowledge, awareness, attitude, trust, confidence, view, satisfaction, perspective, transparency, belief, and influence. The third concept of quality included the following terms: quality, purification, safety, pollut*, contamin*, microbiology, water chemistry, toxicity, constitution, condition, risk, treatment, and testing. For the United States concept, the University of Alabama at Birmingham's Research Guide on PubMed via LHL: Hedges (2024) United States search hedge that is currently in progress was consulted. Terms were selected for all the 50 states in the United States, and the territories of American Samoa, Guam, Micronesia, Northern Mariana Islands, Puerto Rico, and the United States Virgin Islands.

This search string was constructed and run by an academic librarian adhering to PRISMA-S in consultation with the principal investigators. One limit was applied to the search, the year limiter of 1990-2023. Databases used for the search were: ABI INFORM (ProQuest), APA PsycINFO (Ebsco), Agricultural and Environmental Science Collection (ProQuest), CINAHL Complete (Ebsco), Cochrane Library (Reviews), COMPENDEX (Engineering Village), PubMed, Web of Science, and Google Scholar. Databases were searched from January 1, 1990, to December 31, 2023. For the full PubMed strategy, see Table 2. Results were uploaded and deduplicated in Covidence.

Table 1. A PECO framework [20]

PECO	Characteristics assessed
Population of interest	Residents of the United States
Exposure	Factors influencing
Control	N/A
Outcome	Perception of drinking water quality

Table 2. PRISMA-P 2015 checklist

Section and topic	Item No.	Checklist Item	
A). Administrative Information			
Identification	1a	Identify the report as a protocol of a systematic review	
Update	1b	Identify protocol as an update of a previous systematic review if applicable	
Registration	2	Name of registry and registration number	
B). Authors			
Contact		Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	
Contributions		Describe contributions of protocol authors and identify the guarantor of the review	
Amendments		If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	
Support			
Sources	5a	Indicate Sources of financial or other support for the review	
Sponsor	5b	Provide name for the review funder and/or sponsor	
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s) and/or institution(s), if any, in developing the protocol	
C). Introduction			
Rationale	6	Describe the rationale for the review in the context of what is already known	
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	
D). Methods			
Eligibility Criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	
Information Sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	
Search Strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	
E). Study Records			
Data Management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	
Selection Process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility, and inclusion in meta-analysis)	
Data Collection Process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	
Data Items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	
Data Synthesis	15a	Describe criteria under which study data will be quantitatively synthesized	
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency	
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed	

Table 3. A table showing the search strategy (attached)

<u>"drink* water"[tiab]</u>	<u>perception[tiab]</u>	<u>quality[tiab]</u>	<u>"United States"</u>
"potable water"[tiab]	insight[tiab]	purification[tiab]	"United States"[Mesh]
"bottled water"[tiab]	discern*[tiab]	safety[tiab]	individual states/territories with Mesh
"tap water"[tiab]	knowledge*[tiab]	pollut*[tiab]	individual states/territories
"well water"[tiab]	awareness[tiab]	contamin*[tiab]	
"filter* water"[tiab]	attitude[tiab]	microbiology[tiab]	
"pipe* water"[tiab]	trust[tiab]	"water chemistry"[tiab]	
"spring water"[tiab]	confiden*[tiab]	toxicity[tiab]	
"rainwater collection"[tiab]	view[tiab]	constitution[tiab]	

<u>"drink* water"[tiab]</u>	<u>perception[tiab]</u>	<u>quality[tiab]</u>	<u>"United States"</u>
"water kiosk"[tiab]	satisfact*[tiab]	condition[tiab]	
"sachet water"[tiab]	perspect*[tiab]	risk[tiab]	
"community water"[tiab]	transparen*[tiab]	treatment[tiab]	
"water supply"[tiab]	belief[tiab]	testing[tiab]	
"lake water"[tiab]	"Perception"[Mesh]	"Water Quality"[Mesh]	
faucet[tiab]	Trust[Mesh]	"Water Purification"[Mesh]	
"private water"[tiab]	Attitude[Mesh]	"Water Pollutants"[Mesh]	
"domestic water"[tiab]	Awareness[Mesh]	"Water Microbiology"[Mesh]	
"household water"[tiab]	Knowledge[Mesh]		
"Water Wells"[Mesh]			
"Drinking Water"[Mesh]			
"Water Supply"[Mesh]			

2.3. Inclusion and Exclusion Criteria

Inclusion criteria: The following criteria were used to select articles from the databases

1. Peer reviewed primary study published in English language from the United States
2. Investigation time: 1990-2023
3. Study that reported the public perceptions of drinking water quality and factors influencing it.

Exclusion criteria

1. Study not related to or not focused on public perception of drinking water quality.
2. Studies that are not based on empirical or primary research.
3. Study not published within the years 1990-2023

Retrieved articles were imported into Rayyan where irrelevant articles were removed. The remaining papers were downloaded for eligibility assessment and data extraction.

2.4. Assessment of Methodological Quality

Papers selected for retrieval were assessed by two independent reviewers for methodological validity prior to inclusion in the review using standardized critical appraisal instruments from the Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI) [23]. Disagreements were resolved through discussions between the reviewers or with a third reviewer

2.5. Data Extraction

The following information were extracted using a data extraction form based on 'JBI-MAStARI collection form for intervention reviews. Data extracted covered the following points (JBI-MAStARI.

- Study details: title, author, publication details, location
- Study design: type of study, duration, outcomes measured.
- Participant demographics: setting, inclusion and exclusion criteria, population size and demographics.
- Intervention characteristics: duration, type, and mode of intervention.
- Outcomes: measure of outcome used; any other outcomes analyzed.

- Results: raw data
- Conclusions: author and reviewer conclusions.

Each article selected for the final review was independently assessed by KO and JI for its relevance to the study. Any differences in judgment were resolved through discussion with SK. We utilized a PRISMA flow diagram, [Figure 1](#), to refine the selection process. The screening process involved four stages: (1) examining article titles generated by keyword searches, (2) evaluating abstracts, (3) reviewing the full text of the articles, and (4) determining their relevance to the review. Additionally, a table was created to document the study design, population demographics, interventions assessed, and key outcomes relevant to the review. The second reviewer (JI) independently cross-checked the extracted data and tabulated results for accuracy. All articles deemed appropriate for inclusion were independently rated for relevance by both reviewers. Over the course of two months, both authors held regular meetings to review progress and resolve any issues.

2.6. Data Analysis

Descriptive data on study type, author, project year, study design, countries of focus, country of publication, and methods were entered into a Microsoft Excel database. The main outcomes from studies were extracted and summarized.

Quality of study

To assess the quality of the studies, each article was evaluated based on whether it was published in a peer-reviewed journal, under the assumption that peer-reviewed articles have undergone thorough scrutiny by independent reviewers prior to publication.

3. Results

A total of 19,225 publications were identified from nine databases, out of which 6,036 were duplicates and 12,907 were excluded based on title and abstract. Ninety-six articles were selected for full text review. The most common reasons for exclusion were that the study was not focused on perception of drinking water quality (n=21), was repeated (n=5), used secondary data (n=4) and news article (n=2). Finally, 64 publications were included in this systematic review. The results of this review are organized into characteristics of literature included,

respondents' perceptions of drinking water quality and the factors influencing the perception of drinking water quality. Figure 1 shows the PRISMA 2020 flow diagram for the systematic reviews which included searches of databases, registers and included articles.

The articles reviewed in this study span 33 years (1990-2023) and provide insights into public perception of drinking water quality across the United States. Tables 4 and 5 below respectively summarized the characteristics of the 64 articles.

3.1. Characteristics of Literature Included

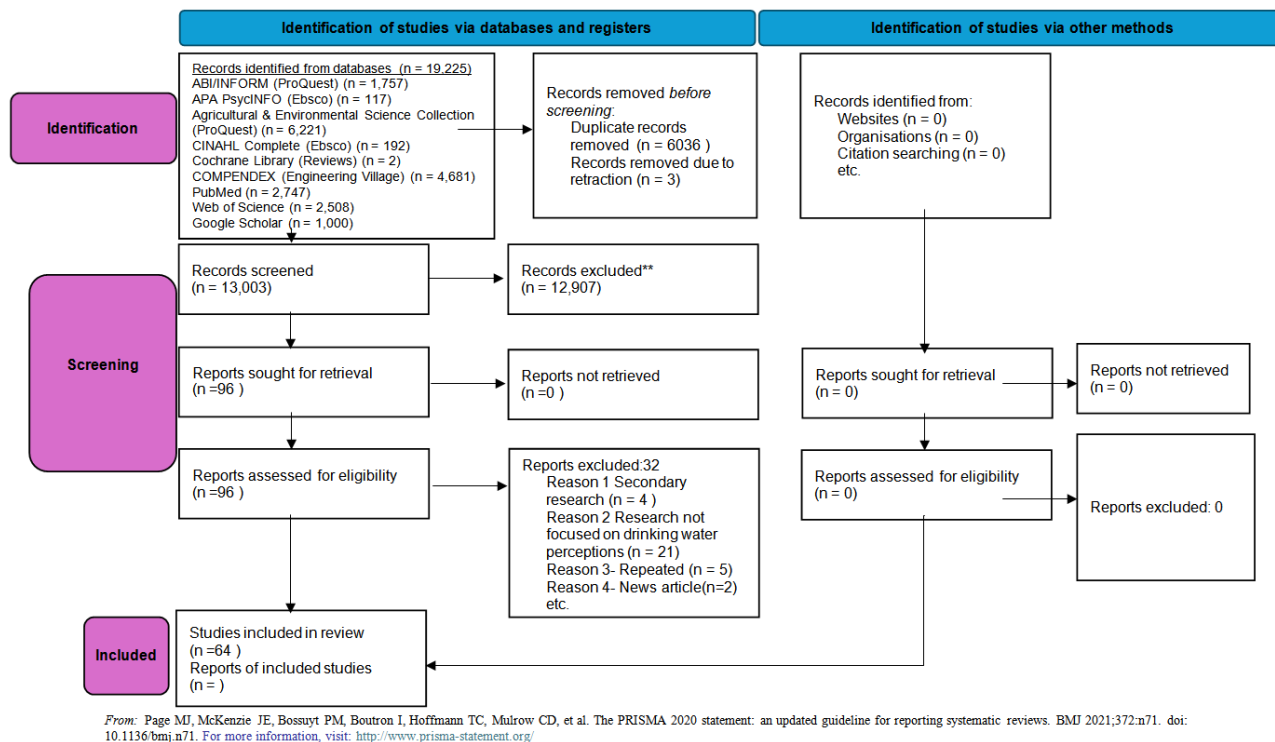


Figure 1. PRISMA 2020 flow diagram for new systematic reviews which included searches of databases, registers and other sources (supporting documents)

Table 4. Excel sheet showing the included articles, outcomes and authors' conclusions (supporting document)

Author & date	Title/link	Location and participants	Research design and sample size	Public perception of drinking water quality	Factors influencing public perception	Authors conclusion
Anderson (2007).	Drinking water quality perception along the United States-Mexico border (Master's thesis, The University of Texas School of Public Health).	US-Mexico border. A (random) convenience sample of households and participants were over 18 years of age.	Quantitative: Data were collected from a total of 608 participants, of which 303 were living in the United States and 305 in Mexico.	In the U.S., 23.5% preferred unfiltered tap water as their primary source, versus 17.4% in Mexico. 41% of participants consumed unfiltered tap water. Bottled water was chosen by 16.8% of U.S. participants and 23.3% in Mexico, totaling 40.1%.	Perception factors, especially taste, were cited as main reasons for not selecting unfiltered tap water as a primary drinking water source. .	Understanding what influences drinking water source preference can aid in the development of risk communication strategies regarding water quality
Araya et al., (2023).	Beyond the Pipes: How User Perceptions Influence Their Water and Wastewater Infrastructure Interactions in Texas Colonias. https://doi.org/10.1061/JSWBAY.0001000	Texas. Participants were residents of a non-border colonia in central Texas.	Quantitative & Qualitative: 92 households, representing 404 individuals. Thirty-one surveys were conducted in Spanish, and 61 were conducted in English.	33% of households experiencing service interruptions, 41% reporting pipe breaks, and 32% noting concerns about water quality, including smell, color, or taste issues	Household income, water infrastructure and occupancy levels influence perception. Both service interruptions and the pursuit of alternative drinking water sources were found to be statistically significant in relation to income level and the number of occupants in the household.	Residents' perceptions of water safety shaped their water use, leading them to favor alternatives like bottled water or to modify tap water by filtering or boiling it.
Chatterjee et al., (2022).	Consumer perception and information in a model of household water	Florida. 2018 survey of water customers of Jacksonville Electric	Quantitative: 4958 respondents began the survey and 3718 reached the end, resulting in a	25% of the respondents reported some problems with the smell of the tap water, approximately 58% at least 'somewhat	Factors influencing the public perception include perception of risk, age and organoleptic properties	Concerns about water safety are the main driver of bottled water consumption.

	usage: The case of Jacksonville, FL. https://doi.org/10.1016/j.wre.2022.100207	Authority (JEA), the primary municipal water utility in Northeast Florida	completion rate of 75%. Working sample used 2614 responses	agree' that their tap water smells fine.		Additionally, water quality reports and measures of water hardness influence drinking water choices
Bauer et al., (2022).	Perceptions of tap water associated with low-income Michigan mothers' and young children's beverage intake. https://doi.org/10.1017/S1368980022001136	Michigan. In winter 2020, Medicaid-insured individuals who gave birth at a large Midwestern hospital between fall 2016 and fall 2020 were invited via email to complete a survey (N = 3,881)	Quantitative: Of the 606 participants who completed eligibility screening, 550 (90.8%) qualified, and 500 (90.9%) provided valid survey data on tap water perceptions, beverage intake, and infant feeding practices.	Two-thirds (66.2%) of mothers believed their tap water was safe to drink without a filter, while 21.6% were unsure. Their perceptions influenced both their own and their children's consumption of tap and bottled water	Perceptions influenced by household income, negative messaging about tap water and friends' and family members' experiences with tap water	Low-income Michigan mothers often have doubts about tap water safety and negative perceptions, which may lead to less healthy and more expensive beverage choices for both themselves and their children
Benson et al., (2006).	Arsenic Consumption and Health Risk Perceptions in a Rural Western US Area. https://ageconsearch.umn.edu/record/23963	Churchill County, Nevada. Churchill County, Nevada had approximately 23,000 residents, with an estimated 13,500 who relied on private wells for water supply in 2002	Quantitative: The results from 351 households were analyzed	Seventy-five percent of respondents consumed tap water, but only 38% treated it. About 66% of tap water drinkers were exposed to arsenic levels above 10 ppb. Treatment practices influenced consumption patterns, and among the 98 respondents unconcerned about arsenic risks, 60% had exposure above 10 ppb.	Awareness of Arsenic as a potential contaminant in local groundwater related to the amount of information available through television, radio and especially locally distributed newspapers	Educational efforts are needed to help those who rely on private water supplies understand treatment techniques, including expectations for contaminant removal.
Colburn et al., (2023).	Determinants of tap water mistrust among Phoenix, Arizona Latinx adults. https://doi.org/10.2166/wh.2023.267	Phoenix, Arizona. English- and Spanish-speaking adults (18–65 years) who self-identify as Hispanic or Latinx were recruited for the survey	Quantitative: 492 survey responses were analyzed	Fifty-one percent mistrusted their tap water, despite less than half having prior issues with it. Fewer than 20% had adequate access, 30% reported acceptable quality, and 25% experienced low water distress. Most preferred bottled water for its taste, smell, and perceived safety, with over 60% of them also distrusting tap water.	Perceptions of drinking water influenced by taste, smell, and past negative experiences. Mistrust is higher among those dealing with hard water, mineral deposits, or unpleasant taste and odor	Over half of the participants did not trust tap water, linked to taste and smell concerns, leading many to rely on bottled water or gallon containers.
Eck et al., (2019).	A survey of perceptions and attitudes about water issues in Oklahoma: A comparative study. https://doi.org/10.1111/j.1936-704X.2019.03321.x	Oklahoma. general public, students from the College of Agriculture Sciences and Natural Resources (CASNR) at Oklahoma State University, & water professionals	Quantitative: The 2018 Water Issues in Oklahoma survey followed up on the 2008 survey. With 2,000 surveys sent, the adjusted response rate was 22.9% (n = 414), including 103 post-secondary students and 104 water professionals.	Most respondents used public water supplies and felt their home drinking water was safe. Students and water professionals were more satisfied than the general public (40% were over the age of 65). All three demographic groups prioritized clean drinking water.	Age and level of awareness on water issues influenced perception. Age was a key factor in information delivery and learning preferences as the older participants favored fact sheets and print articles versus the younger demographic preference for social media and information videos	Authors recommend more education and outreach to inform public on water issues. Understanding the target demographic is important.
Eck et al., (2020).	Postsecondary Students' Perceptions of Water Issues and Water-Related Educational Interests. 10.34068/joe.58.03.15	Oklahoma. University of Oklahoma Agriculture students	Quantitative: 103 agriculture students .	52 percent reported being satisfied with their home drinking water, yet 74% used either a water treatment system or water filter at home. 70% felt that resource use and resource protection should be balanced.	Students' views of water issues were influenced by personal conversations, class presentations, and financial factors, each influencing 41% of participants.	The authors reported a wide range of water issues that were important to the agriculture students. Clean drinking water, in particular, was a top priority.

Family et al., (2019).	Reasons why low-income people in urban areas do not drink tap water. https://doi.org/10.1016/j.adaj.2018.12.005	California. Clients attending 4 public health centers in Los Angeles County (LAC)	Quantitative: Between October and December 2013, 1,230 participants completed the Water Consumption Survey (86% response rate), with 1,171 included in the final analysis.	48% of participants reported drinking tap water daily compared with 58% who reported drinking bottled water daily.	The health belief model construct of perceived health risks significantly predicted why survey participants did not drink tap water	Children from low-income communities who drink mostly bottled water, are vulnerable to the effects of not receiving adequate fluoride and are at higher risk of developing caries.
Garcia et al., (2016).	A comparison of water-related perceptions and practices among West Texas and South New Mexico Colonia residents using hauled-stored and private well water. https://www.jstor.org/stable/26330513	Texas and New Mexico. Data for this study were collected from December 2012 to March 2013 as part of Phase 1 of an ongoing research project on point-of-use (POU) water treatment systems and environmental justice.	Quantitative: Data from 47 participants were collected; of these, 46 met inclusion criteria;	Majority of the respondents had negative perceptions of their water supply and perceived daily water supplies as not potable. Most participants viewed their water as unsafe (67%), with bad smell (64%) and taste (72%). A majority (73%) were concerned about chemical contamination, and nearly half (44%) reported water-related intestinal illness.	Perceived health risks and organoleptic properties (smell and taste) of water are factors that influenced residents perceptions	Colonias residents without water infrastructure, relying on unregulated wells and storage, found their water unacceptable due to smell, taste, and contamination concerns. Despite linking it to family illnesses, they still used it for daily drinking.
Graydon et al., (2019)	Bottled water versus tap water: Risk perceptions and drinking water choices at the University of South Florida. https://doi.org/10.1108/IJSHE-01-2019-0003	Florida. The survey invitation was sent to about 7,500 USF-Tampa undergraduate and graduate students, faculty, and staff aged 18 or older during the spring 2016 semester.	Quantitative: 561 participants responded (7.5 %).	Significantly more minorities (30.9 percent) reported consuming eight or more bottles of water (heavy consumers) in the past week than compared to Whites (23.5 per cent). No statistical difference was found between gender ($F=2.293$, $p=0.131$). Significant differences were revealed between ethnicity/race ($F = 8.476$, $p < 0.05$), position at USF ($F=2.807$, $p<0.05$), and political identification ($F=3.305$, $p<0.05$).	Concerning ethnicity/race, minorities consumed an average of 8.05 bottles of water in the past week ($SD = 12.4$), which was nearly three more bottles of water consumed in the past week than White/Caucasians (mean = 5.09; $SD = 7.8$). Those who identified as conservative consumed 7.34 bottles of water compared to liberals 4.82 bottles. Convenience (mean 2.08 vs. 3.32 in heavy consumers), perceived safety (mean 1.86 vs. 3.14 in heavy consumers), and taste (2.06 vs. 3.97) were identified as factors influencing consumption.	Investing in tap water infrastructure and a tap water promotion campaign would make help make progress toward reducing bottled water consumption
Gholson (2017).	A Survey of Public Perception and Attitudes about Water Resources in Texas (Doctoral dissertation). https://hdl.handle.net/1969.1/161464	Texas.	Quantitative: The survey was sent to 1,275 randomly selected Texas residents in August, 2008 following methods described in Boellstorff et al. (2010); 419 surveys (33%) were completed and returned	(23.5%) indicated that bottled water is their primary drinking water source. A large majority (81.3%) of those primarily receiving their drinking water from private supplies believed groundwater in their area to be of good or excellent quality and only 3.1% did not know or did not have an opinion regarding local groundwater quality.	The source of the drinking water influenced residents perception. Majority (81.3%) of those who believed groundwater to be of good quality also perceived their drinking water to be good.	Texans are concerned with water availability after experiencing the worst one-year drought on record in 2011 and the majority of respondents are taking personal action in an effort to conserve water for the future
Gholson et al., (2018)	Consumer water quality evaluation of private and public drinking water sources. https://doi.org/10.1016/j.adaj.2018.12.005	Texas. Participants were residents of a non-border colonia in central Texas.	Quantitative: The survey was sent to 1,275 randomly selected Texas residents in 2008 and 1,655 in 2014.	Most respondents rated their drinking water as high quality, with 81.4% believing their tap water is safe. Among those with private water	The use of water treatment system and source of drinking water are key in influencing perceptions of	Sixty-five percent of private well users never tested their water, yet 81.3% believed local groundwater was of

	2166/wh.2018.206		The response rare was 33% in 2008 and 29% in 2014 .	sources, 92.1% felt their tap water is safe. However, only 57.0% of those who primarily drink bottled water consider their tap water safe.	drinking water quality	good or excellent quality.
Gitter et al., (2023).	Texas Well User Stewardship Practices Three Years after Hurricane Harvey. https://doi.org/10.3390/w15223943	Texas.	Quantitative: In October 2020, an online follow-up survey was sent to 436 private well users affected by Hurricane Harvey in 2017, with 69 responses (15.8% return rate).	77.6% (n = 52) of well users felt their water was safe, while 19.4% were unsure and just 3% (n = 2) considered it unsafe. The highest percentage of those who felt their water was safe also drank it from the kitchen tap (76.9%).	Previous experience with wellhead submersion or a positive bacteria test were more likely to influence well stewardship practices (testing and disinfection) and to report the feeling that well water was safe	Well users tend to maintain their wells at higher rates than those reported in other communities, but there continues to be a critical need to provide outreach regarding well maintenance practices, especially before natural disaster events occur.
Gorelick et al., (2011).	Perceptions about water and increased use of bottled water in minority children. doi:10.101/archpediatrics.2011.83	Wisconsin. Department of Pediatrics, Medical College of Wisconsin, Children's Research Institute, Milwaukee.	Quantitative: Between September 2009 and March 2010, 639 parents of children treated in an urban/suburban pediatric emergency department participated in the survey	About 44.8% of parents reported their children primarily drink bottled water. African American and Latino parents were significantly more likely to provide only or mostly bottled water than non-Latino white parents with over 20% of Latino and African American parents using only bottled water compared to less than 10% of non-Latino white parents.	Race, ethnicity, convenience, and perceived health risks were found to be determinants of bottled water use.	Minority parents were more likely to exclusively provide bottled water to their children. Disparities in bottled water use stem from differing beliefs and perceptions about water. Interventions aimed at reducing bottled water consumption in minority families should consider these community-specific factors.
Gruppe r et al., (2021).	How perceptions of trust, risk, tap water quality, and salience characterize drinking water choices. https://doi.org/10.3390/hydrology8010049	The greater Roanoke area in western Virginia limited study population to customers of the local water utility whose water was sourced from surface water reservoirs	Quantitative: The sampling frame used publicly available addresses, cross-listing data with the utility to exclude residents who sourced their home water from wells. A random sample of 800 resulted in 385 responses.	Majority of residents (53%) had generally favorable impressions of their tap water quality, ranking their tap's smell, odor, taste, and general characteristics as very or extremely acceptable. Almost two-thirds of the respondents (64%) drank primarily from a single water source.	Exclusive tap water drinkers had significantly higher trust (mean = 7.60) compared to bottled water drinkers (mean = 5.26, Cohen's d = 1.32) and sink filter or mixed water drinkers (mean = 5.75, Cohen's d = 1.23). They also have more favorable tap water quality evaluations, lower perceptions of its risk, pay more attention to tap water changes, and have higher trust in their water managers.	Effective communication on utility processes would help to strengthen ties and trust between utilities and public and improve community drinking water behavior.
Güngör - Demirci et al., (2016).	How do people make a decision on bottled or tap water? Preference elicitation with nonparametric bootstrap simulations. https://doi.org/10.1111/wej.12181	California. San José State University	Quantitative: A paper survey was distributed to 141 Civil and Environmental Engineering students (with water/environmental track) of San José State University during October 2015.	The results showed that tap water (62.5%) was preferred over bottled water (34.6%) by the respondents	Gender: Although tap water from the water fountain was preferred to bottled water, female participants (less than 50%) tended to prefer bottled water more than males (less than 30%). Earning level-Low earners preferred bottled water (35%) vs. high earners (<30%). For tap water users, cost was top priority followed by convenience and health impacts; for bottled water users, health impact was the top priority followed	The choice between bottled or tap water is subjective and depends heavily on people's preferences.

					by taste and odor and convenience.	
Hobson et al., (2007).	Bottled, filtered, and tap water use in Latino and non-Latino children. doi:10.1001/archpedi.161.5.457	Utah. A convenience sample of parents of children cared for in an urban public health center in Salt Lake City, Utah	Quantitative: During the 2-week study period, 296 patients visited the clinic, and 216 parents (73.0%) completed the survey	30.1% said they never drank tap water and 41.2% said that they never gave it to their children. Of the children who drank no tap water, 59.6% always drank bottled water and 35.6% drank only water that had been filtered. Approximately 40% of the 89 parents who never gave their children tap water did not give fluoride supplements	The reasons for avoiding tap water were taste, fears of illness or perceived health risks, and being told by someone to avoid tap water. Latino families avoid drinking tap water because they fear it causes illness	Unnecessary use of bottled and filtered water may result in adverse dental health outcomes. Families need guidance regarding the safety, low cost, and dental health benefits of drinking tap water
Hu et al., (2011).	Bottled water: United States consumers and their perceptions of water quality. https://doi.org/10.3390/ijerph8020565	Data from 21 US states. Data were collected 2004 through 2009 (region 8 and 9, 2004; region 7, 2006; region 6, 2008; and region 4, 2009).	Quantitative: The final sample size was 5,823	Over 13% of respondents primarily used bottled water, while 45.4% often used it. The average perception of surface water quality was 1.99 (fair), and groundwater quality was slightly higher at 2.22. Additionally, about 15% of respondents felt their home drinking water was unsafe.	Groundwater quality perception, safe drinking water perception, age, gender, and region of residence were found to be significant predictors	When local water is perceived as unsafe or low quality, U.S. consumers are more likely to rely on bottled water as their primary source. Concerns about safety increase the frequency of bottled water purchases, regardless of whether the primary source is a small water system or a large municipal supply.
Huerta-Saenz et al., (2012).	Tap or bottled water: drinking preferences among urban minority children and adolescents. https://doi.org/10.1007/s10900-011-9415-1	Philadelphia. Caretakers of children at a pediatric clinic and adolescents at an adolescent clinic in an academic community hospital in Philadelphia, PA.	Quantitative: A total of 208 study subjects completed the survey, 120 caretakers at the pediatric practice and 88 adolescents at the adolescent practice	Caretakers and adolescents rated bottled water higher than tap water in taste, clarity, purity, and safety. While 59% drank tap water and 80% drank bottled water, only 17% consumed tap water exclusively, 38% drank only bottled water, and 42% used both. Among tap water drinkers, 53% consumed unfiltered water, 30% filtered, and 16% boiled.	Perceptions of the qualities of water such as taste, clarity, purity, and safety seemed to drive drinking preferences	Public health strategies are needed to increase public awareness of the impact of bottled water consumption on oral health, household budgets and the environment.
Jakus et al., (2009).	Risk perceptions of arsenic in tap water and consumption of bottled water. Water Resources Research, 45(5). https://doi.org/10.1029/2008WR007427	A sample of people living in areas of the United States that have arsenic contamination in drinking water supplies	Quantitative: sample was obtained by targeting four regions of the United States that were in violation of the new federal standard for arsenic in drinking water (10 ppb). The public water supply systems of Albuquerque, New Mexico, Fernley, Nevada, and Oklahoma City, Oklahoma, were not in compliance with this federal standard for arsenic.	Almost 60% of the sample said they were "very concerned" about the water quality in drinking water sources. Water quality concerns were elicited before an arsenic information brochure was distributed and thus represent "prior" perceptions of water quality	Gender and education appear to have no statistical influence on perceived arsenic mortality risk. People in poorer health (health status) report higher subjective arsenic risks, perhaps resulting from a belief that they are more vulnerable to environmental contaminants than those who are in better health.	Water quality is the primary factor influencing perceived risk in bottled water purchases. While perceived risk significantly affects the quantity bought, purchases are driven by factors beyond price; risk provides a rational basis for choosing bottled water at a much higher cost than tap water.
Javidi & Pierce (2018)	U.S. Households' Perception of Drinking Water as Unsafe and its Consequences:	Representative sample of the nation and oversamples of the 15 largest	Quantitative: Sample size for all study variables is 39,085 observations	5% of non-Hispanic whites perceive their water source to be unsafe, as compared to over 8% of African	Racial and ethnic status influence choice of drinking water source. Hispanics and African Americans are	The economic consequences of household perception of drinking water as

	Examining Alternative Choices to the Tap. https://doi.org/10.1029/2017WR022186	metropolitan areas and HUD-assisted housing units		Americans and over 16% of Hispanics. 2,926 (7.31% using sampling weights) of the respondents perceived their tap water as unsafe to drink	approximately 20% more likely to choose bottled water over other sources relative to whites	unsafe are borne disproportionately by already disadvantaged minority groups, and emphasize the need for targeted policy interventions
Johnson (2000).	Utility Customers' Views of the Consumer Confidence Report of Drinking Water Quality. https://scholars.unh.edu/cgi/viewcontent.cgi?article=1445&context=risk	New Jersey. The utility selected a random sample of 977 customers from the 53,000 single home residential customers	Quantitative: Valid responses were received from 269 people out of the sample of 975, a response rate of 28%.	Consumers rated the drinking water quality from their utility as good (38%, 32%) or fair (33%, 31%) for overall quality and for taste, odor, clarity, or color. Similar proportions rated drinking water safety, but 31% expressed a lack of knowledge on this topic, which the CCR aims to address	Drinking water utilities, health care professional, newspaper, television are some of the factors that influence drinking water perceptions utilities	The majority of respondents want more information about the quality of their drinking water.
Kite - Powell & Harding (2006).	Nitrate Contamination in Oregon Well Water: Geologic Variability And The Public's Perception. https://doi.org/10.1111/j.1752-1688.2006.tb04508.x	Oregon. 476 drinking water wells in the Southern Willamette Valley that ODEQ tested in 2000-2001	Quantitative: Residents from 476 households with water tested in 2000-2001 were categorized into three groups based on nitrate-N concentrations in their wells. The mailed survey achieved a response rate of 51% (n = 102).	Participants rated their well water quality, with 69% considering it "good" or "excellent." Additionally, 55% expressed concern that agricultural fertilizer use in the Southern Willamette Valley could increase nitrate levels in their well water.	Opinions differed between agricultural landowners and nonagricultural landowners with regard to the impact that agricultural fertilizers may have on water quality	Participants were supportive of a range of regulatory actions that might be used by homeowners or landowners to address ground water contamination
Leveque & Burns, (2017).	Predicting water filter and bottled water use in Appalachia: a community-scale case study. https://doi.org/10.2166/wh.2017.219	The city of Morgantown (WV), Northcentral West Virginia.	Quantitative: A random sample of 5,492 residents from Morgantown, WV, and surrounding areas was obtained by a third-party contractor. Of these, 603 residents completed the survey, resulting in an 11.3% response rate.	37% of respondents primarily used bottled water for drinking, while 58% used a filter for tap water. Forty-six percent were satisfied with the taste, color, and odor of their tap water. Additionally, 60% disagreed or strongly disagreed with concerns about health risks from tap water (mean = 2.64), suggesting most felt there were few health risks associated with it.	The odds of consuming bottled water decrease by 0.78 with each unit increase in education, by 0.46 with better taste perceptions, and by 0.76 with greater environmental concern. Conversely, a one-unit increase in perceived health risks raises the odds by 1.36. Factors like gender, age, income, area satisfaction, surface water quality, and access to clean recreational water had no significant impact.	Strengthening education and communication about local tap water quality could reduce bottled water use, while household filters could serve as a viable alternative.
Leveque & Burns (2017).	A structural equation modeling approach to water quality perceptions. https://doi.org/10.1016/j.jenvman.2017.04.024	Northcentral West Virginia	Quantitative: A total of 603 residents completed the survey from November 2015 to January 2016., achieving a 11.3% response rate.	The structural equation model accounted for 50% of the variance in perceived health risks ($R^2 = 0.496$), 43% in organoleptic perceptions ($R^2 = 0.430$), 33% in perceived surface water quality ($R^2 = 0.314$), 25% in the likelihood of a chemical spill ($R^2 = 0.258$), and 12.5% in context ($R^2 = 0.125$).	The structural equation models showed that the perception of water quality was negatively influenced by perceived health risks, likelihood of chemical spill, and environmental concerns. However, it is positively influenced by perceived surface water quality, organoleptic perception, and satisfaction with living in the area	Perceptions of water quality and health risks associated with drinking tap water are based on various factors that must be understood for risk communication to be effective
Leveque & Burns (2018).	Drinking water in West Virginia (USA): tap water or bottled water—what is the right	West Virginia: An online questionnaire was administered to	Quantitative: Of the 23,800 students who received the email, 5,536	One-third of students primarily drank bottled water at home, while 39% used a filter and 26% consumed tap	Health risk perceptions, organoleptic perceptions (taste, odor, color), and	The water quality is known to be adequate. Campaigns should be focused on

	choice for college students?. https://doi.org/10.2166/wh.2018.129	the students of the university	began the survey. After excluding cases with over 60% incomplete responses, 4,188 were analyzed, resulting in an effective response rate of 17.6%.	water. On campus, 36% opted for bottled water, 31% used water fountains, and 29% brought their own water in reusable containers.	environmental concern predicted various behaviors. The odds of a student using on-campus water fountains increased by 2.23 for graduate students, 1.32 per unit increase in organoleptic perceptions, 1.33 per unit increase in environmental concern, and 1.52 if they primarily drank unfiltered tap water at home. Conversely, the odds decreased by 0.67 for females, 0.53 for students from West Virginia, and 0.85 per unit increase in perceived health risks	reducing bottled water use, and on increasing recycling rates
Long et al., (2018).	Public perception of quality and support for required access to drinking water in schools and parks. https://doi.org/10.1177/0890117116671253	Survey of the US public collected from August to November 2011.	Quantitative: Participants (n = 1218) aged 17 and older from 1055 US counties in 46 states	In schools, 90% of respondents felt the water was safe, while 82% felt the same about park water. Additionally, 87% found school water tasted good compared to 78% in parks. Furthermore, 96% supported mandatory access to water in schools, versus 89% in parks.	Taste was a influence to perception and support of drinking water access	Study provided evidence of public support for efforts to increase access to drinking water in schools and parks and documents overall high levels of perceived taste and safety of water provided in these settings
Marion. (2023)	Self-Reported consumption of bottled water v. tap water in Appalachian and Non-Appalachian Kentucky. 10.13023/jah.0502.04	Appalachian Region of Kentucky compared to other regions of Kentucky	Quantitative: n=356 Appalachian residents and n=1125 non-Appalachian Kentucky residents.	The frequency of Appalachian Kentuckians reporting drinking bottled water more often than tap water was significantly higher than non-Appalachian Kentuckians	Geographical location influences drinking water perceptions. Appalachian Kentuckians reported more concerns regarding tap water taste or smell (p = 0.005) and safety (p = 0.008) than non-Appalachians.	The 2013 data likely underestimates current bottled water preferences, as it predates recent public water issues. Updated data and targeted interventions are needed to build trust in public drinking water, particularly among populations like Appalachian Kentuckians.
Mahler, (2021).	Public perception trends of drinking water quality over a 32-year period in the Pacific Northwest, USA. 10.2495/EI-V4-N2-186-196	Adult residents of Idaho, Oregon and Washington	Quantitative: 1,200 residents in 1988, 1993, 1998, 2002, 2005, 2010, 2015 and 2019.	Over 78% of residents in all 11 surveys conducted over 32 years considered their drinking water safe. However, the number of people who felt this way declined over time.	Demographic factors of gender, age, formal education level, state of residence and community size impact the perception drinking water quality	Residents perceived their drinking water has become less safe and fewer people are using bottled water compared to 32 years go. Conversely, the use of secondary in-home filters has substantially increased in the last 32 years.
Mahler et al., (2014).	Drinking water issues and concerns of urban residents of the Pacific Northwest, USA. 10.2495/UW140171	Residents of Alaska, Idaho, Oregon and Washington.	Quantitative: Surveys were sent to 2,126 residents; the actual sample population was 1,886. Administered in 2002, 2007 and 2012 to evaluate changes over time	The 2002 survey served as baseline data. In 2012, 86.2% of urban residents considered their drinking water safe. However, 17.5% used water softeners, 26.5% used bottled water, and 34.6% used water filters alongside municipal water.	There were interactions with gender, age and education level of the respondents. Males were more likely than females to consider their home tap water safe (92.4% vs. 81.2%). Additionally, respondents under 40	Urban public has confidence that their drinking water supply in the Pacific Northwest is safe. Confidence could be increased further if public education on drinking water is more proactive.

					were less likely to view their tap water as safe compared to older individuals, with safety perceptions increasing with age.	
Mahler & Barber (2015).	University student perceptions of water resource issues and management in the Pacific Northwest, USA. https://www.witpress.com/Secure/eli brary/papers/WRM15/WRM15026FU1.pdf	Idaho. Students attending an Environmental Science Course at the University of Idaho were measured between 1993 and 2014	Quantitative: From fall 1993 to fall 2014, the same survey was conducted for 45 consecutive semesters, with 7,485 students participating. On average, 166 surveys were completed per semester, with an estimated response rate of over 94%	Over the 23-year study, 56.2% of students initially believed city tap water was safe. By week 15, this rose to 78.2%. At the start, 64.2% thought bottled water was safer than tap water, but this dropped to 16.1% by the course's end.	Classroom education about the Safe Drinking Water Act influenced students' perceptions on drinking water quality from 56.2% to 78.2%	College-level education equips students with accurate information, enabling them to make scientifically informed decisions about water-related issues.
Mahler et al., (2015).	Urban public satisfaction with drinking water since 2002 in the Pacific Northwest, USA. 10.2495/SDP-V10-N5-620-634	Residents of Alaska, Idaho, Oregon and Washington	Quantitative: The survey was administered to 2,200 residents in 2002, 2007 and 2012 to evaluate changes over time	Over 92%, 90% and 86% of survey respondents in 2002, 2007 and 2012, respectively, felt that water they obtained from the tap in their home was safe to drink. Over 28%, 34% and 26% of survey respondents reported that they often use bottled water in 2002, 2007 and 2012, respectively	Age, gender, and educational level impacted results.	Urban residents were satisfied that their home drinking water is safe. Over the last 10 years, there was a trend toward more skepticism and additional in-home treatment of drinking water.
Mahler & Barber (2016).	How urban residents improve their satisfaction with drinking water in the Pacific Northwest,	Residents of Alaska, Idaho, Oregon and Washington	Quantitative: Surveys were mailed in 2002, 2007, 2012 and 2015. Surveys were sent to n=2,100 residents a return rate of 52.9%	Over 84% of the urban residents consider their drinking water safe. 2015 survey numbers indicated that 18.6%, 24.7% and 39.9% of the survey respondents use water softeners, bottled water and water filters as an add on to municipally supplied drinking water, respectively	The demographic factors of gender, age and educational level impacted how urban residents viewed the safety of their water. Males, older adults, and respondents with some college education were more likely to consider their tap water safe.	Urban residents are generally confident in their tap water's safety, but concerns fuels significant markets for filters and bottled water. In less urban areas, the use of water filters and bottled water is 44% and 52% lower, respectively
Mahler et al., (2019).	Public concerns about water pollution between 2002 and 2017 in the Pacific Northwest, USA. 10.2495/EI-V2-N1-17-26	Adult residents of Alaska, Idaho, Oregon and Washington.	Quantitative mail-based survey instrument every 5 years (2002, 2007, 2012 and 2017) to measure change over 15 years. Response rates were over 50% after 3 mailings in 2002, 2007, & 2012 and 4 mailings in 2017.	Over the 15-year span of this survey study, a large majority believed that their drinking water supply was safe; however, satisfaction with this safety declined from 91.3% in 2002 to 83.1% in 2017	The perception of water quality is influenced by demographic information, including state of residence, community size, length of time residing in the region, gender, age and educational level	Since 2002, concerns about phosphates, nitrates, and pharmaceuticals have increased, while worries about pesticides and petroleum products have decreased. Perceptions of pathogen-related issues remain unchanged. However, perception of water quality have improved since 2002.
McSpirit & Reid (2011).	Residents' perceptions of tap water and decisions to purchase bottled water: a survey analysis from the Appalachian, big Sandy coal mining region of West	Mingo and Wyoming counties in West Virginia.	Quantitative: Every 12th home on randomly selected primary (highway) and secondary (back road) routes of Mingo and Wyoming Counties.	Most residents either agreed or strongly agreed that they buy bottled water	Factors influencing the perception of water quality include perceived tap water quality, income, issue saliency, and trust in the water treatment facility	Trust in the water plant significantly influenced perceptions of watershed impacts, water supply, and the decision to buy bottled water.

	Virginia. https://doi.org/10.1080/08941920903401432		response rate = 42%, n = 256			
Merkel et al., (2012)	Parents' Perceptions of Water Safety and Quality. https://doi.org/10.1007/s10900-011-9436-9	Pennsylvania. Parents or full-time caregivers of children with permanent residence in Pennsylvania	Quantitative: 143 parents	70.6% of the respondents were satisfied with the color of their tap water, and 67.1% were happy with the smell of their tap water, but only 49.7% were satisfied with the taste of their water. 12.6% perceived their tap water could possibly make them ill.	Economic concerns were cited as reasons parents chose to use a particular source of water	Pennsylvania parents recruited from daycare centers across the state reported high satisfaction with the safety and quality of their tap water, which was preferred over bottled water for consumption and cooking
Olagunju et al., (2023).	Bottled vs tap water perceptions, choices and recommendations in a US Midwest university community (Southern Illinois University) https://doi.org/10.1108/IJSHE-01-2022-0007	Adult (18 years or older) members of the SIUE community, including students, faculty, current and retired employees and alumni.	Quantitative: The 781 survey responses included 392 undergraduate students (50.2% of total), 208 academic staff (26.6%), 98 faculty (12.5%), 39 graduate students (5.0%), 15 administration (1.9%), 5 alumni (0.6%), 20 other (2.6%) and 4 (0.5%) who did not identify affiliation	For tap water, most respondents were concerned about taste (70%) and quality concerns, including cleanliness of the water source (68%), worry about the building water pipes (64%), safety and health (61%) and treatment process (52%).	Black students reported higher bottled water use than white students, and students used more bottled water than faculty and staff. Respondents expressed concerns about bottled water cost, environmental impact, and the taste and safety of tap water.	Targeted information campaigns, infrastructure improvements for better taste, transparent reporting on lead levels, and distributing free reusable bottles to encourage tap water use in the community.
Onufrak et al., (2014).	The relationship of perceptions of tap water safety with intake of sugar-sweetened beverages and plain water among US adults. doi:10.1017/S1368980012004600	US adults aged ≥18 years	Quantitative: Nationally weighted data from the 2010 Health Styles Survey (n=4184)	13% of participants disagreed that their local tap water was safe to drink and 26.4 % of participants agreed that bottled water was safer than tap water.	Perceptions of tap water safety and preferences for bottled water and sugary drinks varied by region, age, race/ethnicity, income, and education. Non-white groups who viewed tap water as unsafe were more likely to consume less plain water. Hispanics who mistrusted tap water had twice the odds of consuming ≥1 sugary drink per day compared to those who did not.	One in eight Americans distrusts their local tap water, and one in four believes bottled water is safer. Addressing these perceptions is key to encouraging healthy beverage choices.
Onufrak et al., (2014)	Perceptions of tap water and school water fountains and association with intake of plain water and sugar - sweetened beverages. https://doi.org/10.1111/josh.12138	2010 US National Youth Styles mail survey	Quantitative: A total of n=1,197 responses were received from Youth Styles participants, resulting in a response rate of 49.9%.	19.2% of youth doubted the safety of local tap water, and 38.1% were concerned about school water fountains. Additionally, 43.6% drank plain water twice a day or less, while 47.2% consumed sugar-sweetened beverages daily.	Perceived tap water risk was higher for non-Hispanic Blacks (26.4%) and Hispanics (28.3%) than for non-Hispanic Whites (14.7%), and for lower-income youth (24.3%) compared to higher-income youth (15.3%). Among Hispanics, those who deemed school water fountains unsafe had greater daily SSB consumption (65.3%) than those who were neutral (43.5%) or considered them safe (38.3%)	Efforts to address perceptions of tap water and water fountains among youth may also influence youth to drink more water and less SSB at home.
Park et al., (2019).	Perceptions of drinking water safety and their	2015 Estilo online survey of US Hispanic	Quantitative: A survey was distributed to a	34% doubted the safety of their home tap water and 41% doubted their	Perceptions were shaped by ethnicity, education, and cultural	Recommend culturally appropriate

	associations with plain water intake among US Hispanic adults. https://doi.org/10.2166/wh.2019.015	adults conducted in both Spanish and English.	random sample of 3,414 adults (aged 18 and older), resulting in (n=1,000) Hispanic respondents collected between October and November 2015.	community's tap water, 65% believed bottled water was safer, and 69% said they would buy less bottled water if they trusted their tap water's safety.	change. Among Hispanic adults, those with only a high school diploma (36.7%) and those less acculturated (27.4%) were most likely to drink plain water once or less per day	intervention efforts on improving perceptions of tap water safety and negative impacts of bottled water.
Park et al., (2023).	Perceptions of water safety and tap water taste and their associations with beverage intake among US adults. https://doi.org/10.1177/08901171221150093	An online panel survey sample of U.S. adults aged 18 years and older	Quantitative : Data from the 2018 Summer Styles survey. 4088 adults completed the Summer Styles survey with a response rate of 73.2%	In 2018, 15% of adults doubted the safety of their home tap water, 39% believed bottled water was safer, and 26% disliked the taste of their local tap water.	Perceptions of tap water quality are influenced by age, race, education, income, marital status, region, and home ownership. Women, younger adults, Hispanic or Black individuals, unmarried people, low socio-economic residents, were more likely to have negative views of tap water and prefer bottled water.	Negative perceptions of tap water safety and taste, along with viewing bottled water as safer, were linked to lower tap water intake and higher daily bottled water SSB consumption. Programs to enhance water quality and improve perceptions of tap water are recommended.
Patel et al., (2010)	Perceptions About Availability and Adequacy of Drinking Water in a Large California School District. http://www.cdc.gov/pcd/issues/2010/mar/09_0005.htm	California. 26 California key stakeholders — including school administrators and staff, health and nutrition agency representatives, and families	Qualitative study: Authors conducted semi structured interviews with key stakeholders (n=26)	Negative perception of tap water quality was widespread among respondents. Students did not drink water from the school fountain water because of aesthetics and concerns that it contains contaminants	family members' negative perceptions about tap water may influence students' decisions to drink tap water.	A theme from this study was the concern regarding tap water safety . Another finding was worry about the appeal, taste, and appearance of water from school drinking fountains
Patel et al., (2014).	Middle school student attitudes about school drinking fountains and water intake. https://doi.org/10.1016/j.acap.2014.05.010	California. Students in 9 middle schools in Los Angeles, California. Participants were low students low-income, Latino population students in the district.	Quantitative: Students (n = 3211) in 9 California middle schools completed surveys between 2009 and 2011	The majority (59%) reported that school fountains were unclean, 48% said the water did not taste good, 33% believed the fountains could make them sick, 31% felt it was not safe to drink, and 24% thought the water was contaminated.	Sociodemographic characteristics such as age race and socio-economic status influences the perception of drinking water quality.	Negative attitudes toward school fountains were common among students. To boost water intake, it's crucial to improve and promote access to clean drinking water at school, home, and in community settings.
Patton et al., (2020).	Springing for safe water: drinking water quality and source selection in central Appalachian communities. https://doi.org/10.3390/w12030888	Kentucky, Virginia, and West Virginia. Households were recruited from communities surrounding known springs in three states.	Quantitative: A total of 23 survey responses were collected	Most respondents (82.6%) expressed distrust in their in-home tap water, which aligns with their preference for spring water and interest in formal water quality testing.	Aesthetic issues increased mistrust in water, with 42.1% of respondents citing concerns about taste, smell, color, or odor. Additionally, 21.1% expressed distrust due to aging infrastructure, while others noted health concerns and general lack of confidence in water quality.	Although point of use drinking water is widely available in Central Appalachia, many residents still opt for alternative sources. Efforts to improve water access and quality should account for the factors influencing consumer choices and decision-making processes.
Pierce & Gonzale z (2017)	Mistrust at the tap? Factors contributing to public drinking water (mis)perception across US households. https://doi.org/10.2166/wp.2016.143	2013 American Housing Survey	Quantitative: valid data on all relevant study characteristics for 126,424 of the 134,918 interviewed housing units in the survey (94%).	Over 90% of the sample view their drinking water as safe for consumption and cooking. However, nearly one-third of immigrant Latinos and other immigrants perceive their water as less safe compared to native-born respondents.	Perception of water quality is most influenced by individual demographic factors such as educational level, race, and immigrant status, particularly for respondents from Latin American countries	Understanding the factors shaping tap water perceptions helps improve drinking water policies. Improving the current information campaigns on tap water quality would help to bolster residents

						'perceptions
Saylor et al., (2011).	What's wrong with the tap? Examining perceptions of tap water and bottled water at Purdue University. https://doi.org/10.1007/s00267-011-9692-6	Indiana. A random sample of 2,045 Purdue University students, staff, and faculty was invited to participate in an online survey	Mixed methods: 677 surveys were completed for a response rate of 33.1%. Qualitative interviews with a purposive sample of university undergraduates (n = 21)	While 79.9% of respondents knew about lead contamination in some Purdue buildings, 64% still felt safe drinking campus tap water. Only 10% reported a loss of safety after the incident, and 13% had already considered campus tap water unsafe before the lead issue.	Key barriers to drinking tap water at Purdue include perceived risks and a preference for bottled water's taste and convenience. Interviews showed that trust in tap water's cleanliness significantly influences drinking water choices.	Campaign to promote tap water must address the Purdue community's concerns about the quality and safety of tap water, especially on campus
Scherzer et al., (2010).	Water consumption beliefs and practices in a rural Latino community: implications for fluoridation. https://doi.org/10.1111/j.1752-7325.2010.00193.x	California. Latino parents of young (1-5-year-old) children in one rural community in California's Central Valley.	Qualitative: 46 individuals participated	Residents prefer bottled or commercially filtered water over cheaper municipal tap water due to its poor taste, cloudy appearance, and unpleasant smell, reinforcing beliefs that the tap water is unsafe.	Organoleptic properties of tap water and risk perceptions influenced drinking water choices.	building trust in the municipal water supply requires effective communication strategies tailored to how the community best receives and understands information, both locally and in similar areas.
Schwartz et al., (1998).	Homeowner perceptions and management of private water supplies and wastewater treatment systems. https://www.jswc.org/content/53/4/315	New York. Three rural counties during three consecutive summers, 1989 to 1991	Quantitative: 244 homeowners with private water supplies and septic systems were surveyed: 94 from two towns in High County, 100 from across Medium County using local tax rolls, and 50 from three towns in Low County within one watershed.	Over 80% of the homeowners are satisfied with their water supply, yet nearly a third have coliform in their drinking water. In contrast, only 11% are unsatisfied, with more than half of them also testing positive for coliform.	Homeowners' use of water treatment devices, such as water softeners and activated carbon filters, significantly influenced their perceptions of drinking water quality.	There was neglect of basic maintenance for water supplies and septic systems. Inspections show poor conditions of private wells and springs, and homeowners have limited knowledge about their drinking water quality and septic system status
Silverman, (2007).	Community benefits and costs of surpassing drinking water quality standards. https://doi.org/10.1002/j.1551-8833.2007.tb07932.x	Ohio. Bowling Green residents	Quantitative: The study surveyed 590 residents in Bowling Green, Ohio, in 1997-98 before a major system upgrade, and 714 residents in 2004.	There was a significant increase in community satisfaction with municipal water quality, without raising overall drinking water costs. Higher municipal costs were balanced by reduced dependence on more expensive alternative water sources.	The upgrade of community drinking water infrastructure significantly influenced the perception of drinking water quality in Bowling Green.	Upgrading a municipal system significantly influences community satisfaction with water quality. Although upgrading increases the cost of treatment, the added expense for the utility may be offset by community benefits.
Sinton et al., (2021).	Potential health hazards of roadside springs: Results from Central New York. https://doi.org/10.1111/j.1936-704X.2021.3356.x	Central New York State Spring water users	Quantitative: 78 responses from Slaterville springs and 121 responses from Lisle	Most respondents (62% at Lisle and 81% at Slaterville) identified springs as their main drinking water source. 70% of respondents use the springs for drinking water multiple times a month and the common reason was its superior taste compared to their home water.	Roadside spring users are primarily influenced by the taste and aesthetic qualities of the water, which they find preferable to their home tap water.	90% or more of roadside springs contain pathogenic micro-organisms. Therefore there is a need to educate roadside spring users about the health risk in spring water
Slotnick & Leung (2023).	Water insecurity indicators are associated with lower diet and beverage quality in a national survey of lower-income United States adults. https://doi.org/10.1002/ajoc.12000	Web based survey. Participants were lower-income (<250% federal poverty guidelines) United States adults.	Quantitative: An online (Qualtrics) survey (n=1,789) facilitated by Prime Panels, was conducted between December 9 and 22, 2022	Among 1,798 lower-income U.S. adults surveyed, 53% showed at least one indicator of water insecurity: 48% doubted the safety of their tap water for drinking, 25% for cooking, and about 21% avoided tap water	Factors influencing water insecurity include gender, ethnicity, race, income, and food security.	Water insecurity is associated with poorer diet and beverage choices among low-income U.S. adults. Addressing water insecurity alongside food security and nutrition could

	1016/j.tjnut.2023.08.019			altogether		enhance the well-being of vulnerable groups
Stigler Granados et al., (2019).	Attitudes, perceptions, and geospatial analysis of water quality and individual health status in a high-fracking region. https://doi.org/10.3390/w11081633	Texas. Residents of Frio County, Texas, which is within the Eagle Ford Shale region.	Quantitative: The total number of participants in the study was 75 and all were residents living within the Eagle Ford Shale region. Of those 75 participants, 18 agreed to well water testing	Forty percent of respondents filtered their water, while 61% noticed changes in taste, smell, or appearance in the past year. Of those, 39% reported odor changes, 20% noted bad taste, and 47% observed discoloration, with water appearing yellow, brown, or rusty.	Water quality perceptions may be influenced by nearby fracking activities.	Residents' mistrust likely arises from the oil industry's negative reputation for environmental management, resulting in it being blamed for poor water quality and negative health and environmental effects.
Triplett et al., (2019).	Perceptions of quality and household water usage: A representative study in Jacksonville, FL. https://doi.org/10.1007/s11294-019-09735-6	Florida. The data were based on a telephone survey of randomly selected households in Jacksonville, FL, conducted during March 2016.	Quantitative: In total, 529 complete responses were collected, resulting in a 7.1% response rate.	Concerns over safety and health risks from unfiltered tap water lead to greater consumption of bottled water. However, these concerns do not influence the use of water filters. Issues related to unpleasant odors in water are associated with a rise in the use of water filters.	The perception of water quality is influenced by race, household income, risk perception, home ownership, and family size	African-American respondents are more inclined to use bottled water and less likely to use filtered tap water compared to Caucasian respondents, even when factors such as household income, home ownership, and family size taken into consideration
Victory (2014).	Risk perception, drinking water source and quality in a low-income Latino community along the US-Mexico border. https://www.proquest.com/dissertations-theses/risk-perception-drinking-water-source-quality-low/docview/1537080764/se-2	Nogales, Arizona.	Quantitative: Ninety participants were surveyed, all from households with annual incomes under \$30,000. These families were served by a public water utility, mainly relied on bottled water, and had at least one child living at home.	Ninety-eight percent of respondents were concerned that drinking local tap water might lead to illness. Most respondents (79%) avoided drinking tap water due to contamination fears but stated they would drink it if they were assured of its safety, even if the taste was not ideal (73%).	The concerns about illness from tap water contamination influences increased consumption of bottled water.	Latinos prefer bottled water over tap water due to concerns about illness from tap water consumption. Interventions aimed at educating families on proper cleaning of reusable water containers and perceived risks associated with tap water would be helpful.
Victory et al., (2022).	Risk perceptions of drinking bottled vs. tap water in a low-income community on the US-Mexico Border. https://doi.org/10.1186/s12889-022-14109-5	Arizona. Between Feb-May 2012, participants were recruited during regular business hours from Mariposa Community Health Center (MCHC)	Quantitative: Low-income Latino households (n = 90) from Nogales, Arizona were interviewed	Most participants (79%, n=71) avoided local tap water due to fears of chemical or microbial contamination, while only 17% (n=15) cited a preference for the taste of bottled water. Participants generally disagreed with the statement, 'It is safe to drink my tap water,' and strongly agreed with, 'It is safe to drink bottled water.'	Respondents avoided tap water consumption because of fear of illness or perceived health risks (98%), and microbial/chemical contamination (79%)	Efforts should prioritize developing educational and outreach programs to evaluate the safety and potential risks of tap water consumption.
Vidmar et al., (2023)	THAT'S WHAT WE CALL 'AESTHETICS,' NOT A PUBLIC HEALTH ISSUE": THE SOCIAL CONSTRUCTION OF TAP WATER MISTRUST IN AN UNDERBOUNDED COMMUNITY. https://doi.org/10.17730/1938-3525-82.4.342	Tampa Bay, Florida. Adults (18+) who lived or had lived within the boundaries of the University Area in the last 10 years	Qualitative study: 24 in-depth semi-structured interviews and 28 rapid assessments	There is a significant relationship between mistrust of tap water and bottled water use, with 57% of respondents stating they always rely on bottled water and 65% rating their tap water as "fair" or "poor."	Perceptions of tap water are influenced by factors such as insufficient infrastructure, substandard housing conditions, issues with the affordability of piped water, and geographical challenges.	To improve perceptions of tap water quality, interventions should emphasize approach incorporate social and cultural contexts and ensure fairness in decision-making processes.

Viscusi et al., (2015).	The private rationality of bottled water drinking. https://doi.org/10.1111/coep.12088	Online survey - Knowledge Networks (KN) Web-based panel4 in October 2009. A total of 1,639 panelists were invited to participate in the survey.	Quantitative: Of the 1,066 who agreed, 58 did not give an answer to one or more of the key analysis variables and therefore were excluded	More than 40% of the participants believe bottled water has a better taste than tap water, and nearly one-third think it is safer. A slightly smaller portion views bottled water as more convenient than tap water.	Respondents' perceptions of bottled water quality is influenced by safety, taste, and convenience.	Consumers are more inclined to perceive bottled water as safer or better-tasting if they have experienced issues with tap water or reside in states with frequent EPA water quality violations. These perceptions of improved safety, taste, and convenience increase bottled water usage.
Wedgworth et al., (2014).	Associations between perceptions of drinking water service delivery and measured drinking water quality in rural Alabama. https://doi.org/10.3390/ijerph110707376	Alabama. Three rural counties in Alabama.	Quantitative: From January to December 2012, households (n=910) from three rural Alabama counties were recruited in a cluster-randomized order by study team personnel.	Thirty-five percent of respondents experienced low water pressure, 15% noted intermittent service, and nearly 20% reported issues with water aesthetics, such as taste, odor, or color.	Events such as main breaks, , system flushing, pump activations or shutdowns, and can cause abrupt changes in water pressure and influence consumers perception of drinking water quality.	Reports from consumers proved insufficient for predicting microbial risks in small water supplies. However, feedback on low water pressure, a known contamination risk factor, could be valuable in monitoring drinking water service delivery.
Weisner et al., (2020).	Tap water perceptions and socioeconomics: Assessing the dissatisfaction of the poor. https://doi.org/10.1016/j.spc.2019.08.008	Florida. Urban neighborhoods in Palm Beach County, Florida.	Quantitative: Survey data was collected from 96 households throughout the study area from December 2017–April 2018.	The findings indicate that residents in lower socioeconomic areas are less satisfied with the taste and quality of their tap water and tend to consume more bottled water than those in higher socioeconomic areas.	Concerns over the taste and quality of tap water influence bottled water consumption among lower-income households, resulting in the added financial strain of paying for both household water and bottled water.	Improving the organoleptic properties of tap water—specifically odor, clarity, and taste—by treating secondary contaminants should be a top priority for water utilities to boost customer satisfaction and consumption.
Woolridge (2006).	Public perception of, attitudes toward, and general knowledge of the Tulsa water supply and its quality. Oklahoma State University. https://www.proquest.com/dissertations-theses/public-perception-attitudes-toward-general/docview/304944987/se-2	Tulsa, Oklahoma	Quantitative :Of the total 112 returned questionnaires only one was deemed not usable	Most respondents (57%) rated the overall quality of their drinking water as good, with men more frequently assigning this rating compared to women, who more often rated it as fair. Regarding safety, 65% rated their water as good, 16% as fair, and 5% as poor.	Pathogens and agricultural activities are seen as the primary threats to water quality. Higher-income individuals and men generally view their drinking water quality more favorably than lower-income individuals and women. Additionally, men show greater support for the Clean Water Act than women.	The study also revealed that residents' top concern was protection for the water quality in the Tulsa area
Yang et al., (2023).	Exploring the relationship between public trust toward the water sector and the use of bottled water within US shrinking cities. https://doi.org/10.1061/(ASCE)WR.1943-5452.0001619	21 US shrinking cities (e.g., Cincinnati, Detroit, Flint, Pittsburgh, St. Louis	Mixed methods: Survey was deployed in December 2019. The final sample consisted of 521 valid responses, greater than the minimum sample size (n=385)	Over 60% of respondents who frequently drink bottled water are mainly concerned with water properties and quality. In contrast, more than 50% of those who rarely consume bottled water are influenced by personal opinions.	Age, level of education, ability to pay water bills and the number of water-quality issues experienced by the consumer affect drinking water perceptions and trust	Low water use can affect water quality in shrinking cities. It is imperative that utilities encourage increased tap water consumption by adopting ways that build trust with consumers
Yang & Faust (2019).	Human–water infrastructure interactions: Substituting	An online survey was deployed in June 2016 to 21	Mixed methods: The final sample consisted of 451 valid responses	Sixteen percent of respondents chose bottled water for its convenience, compared	Organoleptic properties influenced perceptions of drinking water.	Water-use behavior is strongly influenced by localized factors

	services received for bottled and filtered water in US shrinking cities. https://doi.org/10.1061/(ASCE)WR.1943-5452.0001126	US shrinking cities.		to just 3% who preferred filtered water for the same reason. The primary motivation for drinking bottled water was aesthetics (35%), including taste, smell, or color, while 15% believed it had fewer contaminants than tap water.	Additionally, being aware of local water-quality reports was associated with greater likelihood of using filtered water and bottled water for other household needs.	such as culture or consumer relationships and trust
York et al.,(2011).	Household bottled water consumption in Phoenix: A lifestyle choice. https://doi.org/10.1080/02508060.2011.610727	Phoenix, Arizona. We conducted this study at the downtown Phoenix farmers' market.	Mixed methods: Researchers surveyed individuals on three days in November 2008 and 109 surveys were collected with a 92% response rate	Lower-income households were 17.1% less likely to buy bottled water. Latinos were 86.9% less likely, while those with higher education were 59.6% more likely to purchase it regularly.	Ethnicity, education and income influenced drinking water perceptions.	Bottled water consumption is more closely tied to lifestyle choices than environmental concerns. Low-income respondents are less likely to buy bottled water, due to cost and other competing needs

Table 5. Characteristics of the included articles (supporting document)

Characteristics	Number of articles	Percent (%)
1). Year of publication		
1990-2019	46	71.9
2020-2023	18	28.1
2). Region of the United States		
Northeast	6	9.4
Midwest	4	6.3
West	13	20.3
South	24	37.5
Multiple states(mail based)	10	15.6
Online	7	10.9
3). Settings		
Rural	9	14.1
Urban & rural	30	46.9
Urban	25	39.1
4). Study design		
Qualitative	3	4.7
Quantitative	56	87.5
Mixed methods	5	7.8
5). Types of drinking water		
Tap water	41	64.1
Bottled water	17	26.6
Well water	3	4.7
Filtered water	2	3.1
Spring water	1	1.6

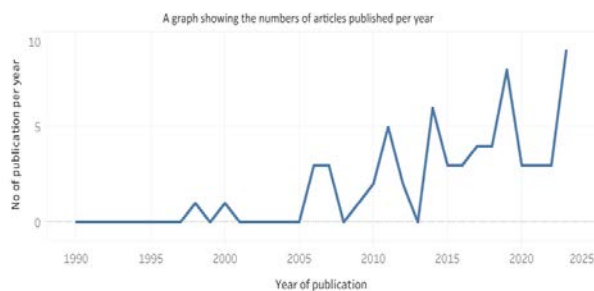


Figure 2. A graph showing the number of articles published per year

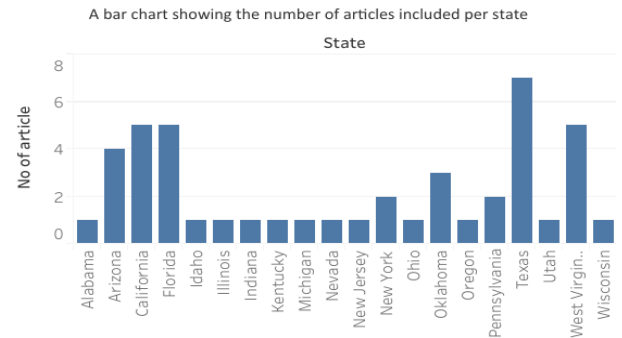


Figure 3. A bar chart showing the number of studies included per state

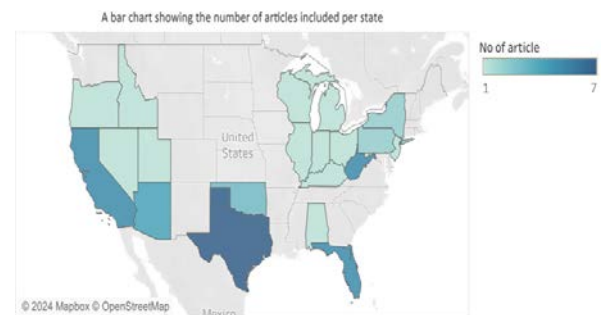


Figure 4. The map of the United States showing number of articles included per state

The majority (71.9%) were published prior to 2020. The included articles reported public perception of drinking water quality in the Northeast (9.4%), Midwest (6.3%), West (20.3%), South (37.5%) regions of the United States, multiple states (15.6%) and online (10.9%). In this review, the state with the highest number of publications was Texas 7(10.9%), followed by Florida 5(7.8%), California 5(7.8%), West Virginia 5(7.8%) while 15.6% of the articles surveyed respondents across multiple states. The setting reported most by the authors was urban and rural (46.9%), followed by urban (39.1%), and rural (14.1%). The study design used by most of the authors was quantitative (87.5%), followed by mixed methods (7.8%) and qualitative (4.7%). Figure 2 is a graph showing the number of articles published per year. Similarly, Figure 3 presents a bar chart of the number of

studies included per state and [Figure 4](#) shows the map of the United States showing number of articles included per state

3.2. Based on Articles Published Between 1990 and 2019, the Following Key Characteristics of Participants and Perceptions Regarding Drinking Water Were Identified

Age: Across studies, younger populations, such as university students and young adults, often exhibited different drinking water behaviors compared to older adults. For example, university students preferred bottled water due to concerns about taste and safety, while older adults generally relied more on tap water and water filtration systems.

Gender: Gender played a significant role in drinking water choices. Women tended to prefer bottled water over tap water more than men, often citing concerns about safety and taste. Men, on the other hand, were more likely to rate the quality of tap water as favorable.

Education: Higher levels of education were associated with a greater likelihood of using water filters and bottled water. Educated individuals often expressed more concern about contaminants and were more informed about water quality issues. However, they were also more likely to engage in practices such as water filtration over bottled water consumption.

Socioeconomic Status: Socioeconomic status significantly influenced water preferences. Lower-income individuals were less likely to buy bottled water due to its cost, but they were also more skeptical about the safety of tap water. Higher-income individuals were more likely to afford bottled water, and they reported greater satisfaction with tap water.

Perception of Safety: Perceptions of safety strongly impacted water choices. Those who believed their tap water was unsafe were more likely to consume bottled water. This belief was particularly common among minority groups and lower-income communities, who reported greater distrust in their local water supplies.

Perception of Taste: Taste was frequently cited as a reason for choosing bottled water over tap water. Bottled water was preferred when individuals found tap water's taste or smell to be unpleasant, which was often linked to a perception of poor water quality.

Location: Geographic location influenced water perceptions. Urban residents generally had more confidence in their tap water compared to those living in rural areas, who often relied on private wells and expressed greater concerns about contaminants. In regions with known water quality issues, such as areas affected by fracking, residents

3.3. Based on Articles Published Between 2020 and 2023, the Following Key Characteristics of Participants and Perceptions Regarding Drinking Water Were Identified

Age: Younger adults and students tended to have more negative perceptions of tap water, often preferring bottled water due to concerns about safety, taste, and quality. Older adults and residents in rural areas, such as well users, showed more trust in their local water sources but often engaged in additional practices like filtration.

Gender: Women and younger adults, particularly in lower-income groups, were more likely to mistrust tap water and rely on bottled water. Additionally, women were shown to experience higher levels of water insecurity, which influenced their drinking water choices.

Education: Higher levels of education were associated with more awareness of water quality and the use of filtration systems. Educated individuals were more likely to engage in water-related stewardship practices. However, education also played a role in shaping negative perceptions among some groups, particularly when individuals were more aware of contaminants and environmental risks.

Socioeconomic Status: Lower-income households consistently exhibited greater mistrust of tap water, relying more on bottled water despite the financial burden of purchasing it. Socioeconomic disparities significantly influenced drinking water perceptions, with those in poorer neighborhoods reporting dissatisfaction with tap water taste and quality.

Perception of Safety: A significant number of participants expressed concerns about the safety of their tap water, often citing chemical or microbial contamination as a primary reason for choosing bottled water. Perceptions of safety were influenced by income, past water-related issues, and access to information about water treatment.

Perception of Taste: Taste played a critical role in drinking water preferences, with many individuals citing unpleasant taste, odor, and appearance as reasons for avoiding tap water. Bottled water was often preferred for its perceived superior taste.

Location: Geographic location strongly influenced water perceptions. Residents in rural areas, such as those in Central Appalachia or shrinking cities like Flint and Detroit, were more likely to distrust their tap water. Urban residents, particularly those in lower socioeconomic neighborhoods, reported dissatisfaction with water quality, leading to higher bottled water consumption.

3.4. Respondents' Perceptions of Drinking Water Quality

Forty-one articles reported respondents' perceptions of tap water quality. Twenty-four reported tap waters to be safe for drinking while seventeen reported tap waters as unsafe. Nineteen articles surveyed respondents about perceptions of bottled water quality and reported bottled water as safe. Similarly, one article reported well water, two filtered water and one spring water were all perceived to be safe for drinking by respondents. [Table 5](#) below shows the number of studies where respondents reported drinking water as safe or unsafe and [Figure 5](#) shows a graph of the number of articles per year that reported bottled water and tap water as safe or unsafe for drinking.

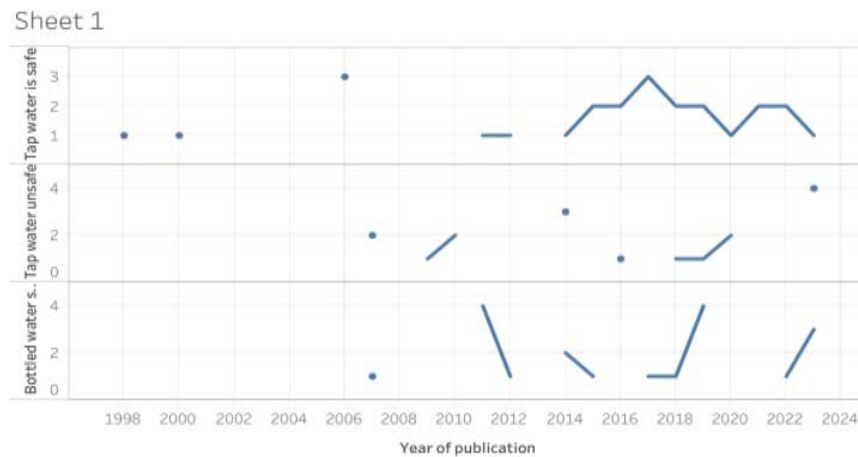


Figure 5. A graph showing the number of articles per year that reported bottled water and tap water as safe or unsafe for drinking

Table 6. A table showing the number of articles where respondents reported drinking water as safe or unsafe

Types of drinking water mentioned in the included articles	Number of published articles (%)	Number of articles where respondents perceived drinking water as safe (%)	Number of articles where respondents perceived drinking water as unsafe(%)
Tap water	41 (64.1)	24 (37.5)	17 (26.6)
Bottled water	19 (29.6)	19 (29.6)	0
Well water	1(1.6)	1 (1.6)	0
Filtered water	2(3.1)	2 (3.1)	0
Spring water	1(1.6)	1(1.5)	0

3.5. Factors Influencing the Perception of Drinking Water Quality

The studies included in this review identified several key factors influencing respondents' perceptions of drinking water quality. These factors include organoleptic properties (taste, smell, and color), socio-demographic characteristics, health risk perceptions, prior negative experiences with water utilities, trust in water systems and management, and media influence and public awareness.

Organoleptic properties: Fifteen studies highlighted the sensory characteristics of water such as taste, smell, and color as major determinants of drinking water quality perception. Negative sensory experiences, such as a bad taste, unpleasant odor, or discoloration, significantly undermined trust in tap water, often prompting individuals to seek alternative sources such as bottled or filtered water. These organoleptic properties are frequently associated with safety concerns and are a primary reason consumers avoid tap water in favor of what they perceive to be safer options.

Socio-demographic characteristics: Twenty-six studies emphasized the significant role of socio-demographic factors in shaping perceptions of drinking water quality. Variables such as income, education, race/ethnicity, gender, household size, and geographic location were found to influence water source preferences. For instance, low-income and minority communities were more likely to mistrust tap water and choose bottled water as a safer alternative. Reviewed studies indicated that Hispanics and African Americans were approximately 20% more likely to select bottled water compared to their white counterparts, reflecting a deeper mistrust rooted in socio-economic and historical contexts.

Perceived health risks: Twelve studies reported that concerns about health risks and fear of illness heavily

influenced respondents' drinking water choices. Concerns about contaminants such as arsenic, lead, or industrial chemicals frequently led individuals to question the safety of tap water. These health-related fears were significant drivers of bottled water consumption, particularly in communities where public awareness of waterborne diseases and contamination risks was heightened.

Previous negative experiences with water utilities: Three studies highlighted past negative experiences with water systems, such as exposure to lead contamination or substandard water quality, had lasting effects on public perceptions. Individuals who had encountered poor service or contamination were more likely to avoid tap water, even if improvements had since been made, opting instead for alternatives like bottled water or home filtration systems.

Trust in water systems and management Nine studies underscored the importance of trust in local water utilities, government agencies, and regulatory bodies, such as the Environmental Protection Agency (EPA), in shaping perceptions of water safety. Lower levels of trust often corresponded with higher reliance on bottled water, reflecting a broader lack of confidence in public water systems. Transparency, communication, and regulatory oversight were identified as key factors in building or eroding this trust.

Media influence and public awareness: Five studies discussed the role of media coverage and public awareness in influencing perceptions of water quality. High-profile events such as the Flint and Michigan water crisis, amplified by media outlets, contributed to widespread mistrust of tap water in affected areas and beyond. Public health campaigns and media reports also played a role in shaping public opinion, either by raising awareness of potential risks or reinforcing negative perceptions.

4. Discussion

The studies reviewed in this systematic review span 33 years (1990-2023) and provide insights into public perception of drinking water quality across the United States. The review includes a variety of research designs, ranging from quantitative surveys to mixed methods and qualitative studies, often focusing on specific populations such as low-income communities, minorities, and residents in areas with known water quality issues. These studies were conducted in diverse geographical locations, including border regions, rural areas, urban centers, and states like Florida, Texas, Michigan, and Arizona. Sample sizes varied greatly across studies, ranging from smaller, localized samples to larger, nationally representative datasets. The studies captured respondents' perceptions of their drinking water quality along with factors influencing the perceptions such as socio-demographics, trust in local water systems, and the role of infrastructure.

The perception of tap water quality emerged as a dominant theme across many of the reviewed studies. Negative perceptions often stem from concerns about safety, taste, smell, and appearance. For example, Araya et al. (2023) found that in Texas colonias, 32% of households reported issues with their tap water's smell, color, or taste [24]. Similarly, studies in Michigan [25] and Phoenix [26] revealed that concerns about contamination, taste, and organoleptic properties played a major role in driving mistrust of tap water. Public trust in water systems was another recurring factor, with studies like that [19] highlighting that individual demographic factors, such as race and immigrant status, strongly influenced perceptions of water safety. In many cases, perceptions of poor tap water quality led individuals to seek alternatives, such as bottled water, filtering systems, or even spring water [27].

Many studies documented a preference for bottled water over tap water, often tied to perceptions of greater safety and better taste. For example, Huerta-Saenz et al. (2012) found that both adolescents and caretakers in urban minority populations rated bottled water higher in taste, clarity, and safety than tap water [28]. Other studies, such as those by Levêque & Burns (2018), indicated that individuals frequently opted for bottled water due to perceived health risks associated with tap water, despite evidence showing that bottled water may not always be of superior quality [29]. Bottled water consumption is often linked to socio-demographic factors, such as ethnicity, income, and education levels. Minority populations, particularly Latinx and African American communities, have been shown to favor bottled water due to mistrust of tap water, as reported by [30, 31]. This mistrust is rooted in historical inequities, such as discriminatory housing policies that confined minority populations to areas with substandard infrastructure. Additionally, socio-economic barriers, including limited access to affordable filtration systems, reinforce reliance on bottled water despite the economic burden. Cultural practices, such as the preference for traditional water sources in Indigenous communities, further highlight the need for inclusive and culturally sensitive public health interventions.

Additionally, economic concerns sometimes exacerbate bottled water consumption, especially in communities

where tap water is perceived as unsafe or inadequate. Studies like those of Chatterjee et al. (2022) and Mahler (2021) emphasized the role of risk perception and trust in shaping water consumption behaviors [5,32]. Trust in local water providers and government agencies was often a significant determinant of perception. Studies showed that mistrust, particularly in minority and low-income communities, contributed to a preference for bottled water over tap water. Media coverage and environmental factors, such as the Flint water crisis, also heightened public awareness and skepticism regarding tap water quality. Tap water quality perceptions were closely linked to infrastructure issues, such as old or deteriorating pipes, contamination risks, and inadequate treatment processes. In some studies, like those conducted in West Virginia [33] and Texas [34], respondents reported issues such as high levels of contaminants and poor water pressure, leading to greater reliance on alternative sources of water.

Studies that focused on private well water highlighted unique challenges and perceptions. For example, Benson et al. (2006) reported that in rural Nevada, 75% of respondents relied on tap water sourced from wells, with concerns about contaminants like arsenic [35]. Similarly, Gitter et al. (2023) found that even after experiencing events like Hurricane Harvey, many well users in Texas still believed their water was safe, despite having been exposed to microbial contamination risks [36]. Perceptions of well water quality were frequently tied to the lack of infrastructure and regulatory oversight. In areas where well water was the primary drinking source, concerns about contamination and inadequate testing were prevalent, as seen in [37, 38].

Bottled water quality was generally perceived as superior to tap water, although this was not always the case. Factors influencing bottled water quality perceptions included its convenience, accessibility, and marketing by bottled water companies. In some instances, environmental concerns about plastic waste and cost were raised, but the overall perception remained that bottled water was a safer and more reliable option than tap water, as discussed by Viscusi et al. (2015) [39].

The differences between the results reported in studies published from 1990-2019 and those published from 2020-2023 on drinking water perceptions and preferences reflect shifts in public awareness, socio-political factors, and technological advances. In the more recently published studies, younger adults continued to express mistrust of tap water, but this was compounded by increased awareness of environmental concerns such as microplastics in bottled water. There was also a noticeable increase in younger adults advocating for water safety. In the more recently published studies, women remained more likely to consume bottled water than men, but the focus also expanded to include issues related to water insecurity and the burden of ensuring safe drinking water, particularly in lower income households. Higher education still correlated with awareness in the more recently published studies, but there was a stronger focus on environmental stewardship, such as reducing bottled water consumption due to sustainability concerns. Educated individuals were also more vocal about water safety concerns, especially related to water treatment failures. Socioeconomic disparities became even more pronounced,

with low-income households reporting higher levels of water insecurity and dissatisfaction with water services. In some areas, such as Flint, Michigan, bottled water became a necessity due to systemic water safety failures.

State-specific trends in water distrust, such as in Texas and Michigan, are shaped by a combination of socio-economic and environmental factors. In Texas, the presence of colonias—unincorporated communities with limited access to safe drinking water—exacerbates mistrust due to inadequate infrastructure and historical neglect. Similarly, Michigan's water crises, including the highly publicized Flint incident, have led to a long-term erosion of trust in public water systems. These incidents underscore the role of historical events and systemic challenges in shaping public perceptions, particularly in communities disproportionately affected by environmental injustice and economic disparities.

Concerns about tap water safety persisted in the more recently published studies, but there was also growing scrutiny of bottled water due to environmental concerns like plastic pollution. Additionally, public perception shifted more toward distrust in water governance, with events such as the Flint water crisis reinforcing fears. Taste remained a factor, but there was an increased focus on water safety and the long-term environmental impact of bottled water consumption. As a result, more individuals in the 2020-2023 period opted for home water filtration systems to improve the taste of tap water without contributing to plastic waste. Geographic differences in water perception became even more evident in the later period, particularly in regions affected by public water crises, such as Flint and Detroit. Urban and rural areas alike faced challenges, but rural residents were more likely to distrust centralized water systems and prefer local or private wells. Between 2020-2023, there was a noticeable increase in environmental awareness, with more individuals concerned about the environmental impact of bottled water consumption (e.g., plastic pollution and microplastics), which was less prominent in the 1990-2019 period. In the more recent period, there has been a stronger narrative around distrust in public water governance and infrastructure, especially in the wake of highly publicized water safety failures. This was not as widely prevalent in the earlier period, where the focus was more on individual health risks rather than systemic failures. While concerns about safety and taste remain consistent across both periods, the 2020-2023 articles reveal heightened environmental awareness, growing mistrust in water systems, and increased socioeconomic disparities, all of which influence modern perceptions of water quality and behavior.

Emerging issues such as climate change, water scarcity, and advancements in water treatment technology are likely to influence future perceptions of drinking water quality. Climate change is expected to increase the frequency of droughts and extreme weather events, exacerbating water insecurity. Technological advancements, such as decentralized water treatment systems and smart monitoring technologies, hold promise for rebuilding public trust. However, these innovations must be accompanied by transparent communication to ensure equitable access and adoption across socio-economic groups.

Comparing the U.S. findings with public perceptions in

countries like Canada and South Africa highlights unique challenges. In Canada, public trust in water systems remains relatively high due to stringent water quality regulations and proactive communication strategies. Conversely, in South Africa, water perceptions are heavily influenced by historical inequalities and inconsistent service delivery, like patterns observed in some U.S. minority communities. These comparisons emphasize the importance of addressing systemic inequities to improve public confidence in water systems globally.

Strengths and Limitations

There are some limitations to this systematic review. The included studies predominantly focus on specific regions within the United States, which may limit the generalizability of the findings to other geographic areas. As with any systematic review, there is the potential for publication bias, where studies reporting significant findings are more likely to be published than those with non-significant results. This could lead to an overestimation of the impact of certain factors influencing drinking water perceptions and skew the review's conclusions. Many of the studies included in the review are cross-sectional, capturing respondents' perceptions at a single point in time. Longitudinal studies tracking changes in public perception over time are limited, making it difficult to understand how perceptions evolve in response to policy changes, environmental events, or improvements in water infrastructure. Most of the studies included in the review rely on self-reported data from respondents. Self-reported perceptions may be influenced by recall bias, social desirability bias, or a lack of knowledge about actual water quality, potentially limiting the accuracy of the findings. Addressing these limitations in future research could enhance our understanding of public perceptions of drinking water quality and contribute to more targeted and effective policy interventions.

Implications for practice and policy

Based on the findings from this systematic review, several recommendations can be made to improve public perception of drinking water quality in the United States. Successful policy interventions offer valuable lessons for improving trust in water systems. For instance, the implementation of community-based water quality monitoring programs in California has empowered residents to participate actively in ensuring safe drinking water. Similarly, Philadelphia's Water Revenue Assistance Program (WRAP) has addressed affordability concerns by providing financial assistance to low-income households. These examples illustrate the importance of integrating community engagement and economic support into water governance strategies to rebuild trust.

1. Enhance public communication and transparency: There is a need for more transparent communication from water utilities and regulatory bodies. Providing regular, clear, and accessible updates on water quality, treatment processes, and potential risks can help rebuild trust in public water systems, particularly in communities where trust has been eroded.

2. Invest in infrastructure improvements: Addressing the aging and deteriorating water infrastructure should be a priority. Improvements in water treatment processes, as well as the replacement of outdated pipes and plumbing systems, can reduce contamination risks and improve the

organoleptic properties (taste, smell, color) of tap water, leading to improved public perceptions.

3. Targeted public health campaigns: Tailored public health campaigns are essential to educate populations about the actual safety of tap water versus the perceived safety of bottled water. These campaigns should focus on communities with heightened mistrust, such as minority populations and low-income areas, and should address concerns surrounding contaminants and health risks.

4. Community engagement and involvement: Engaging communities in water quality monitoring and decision-making processes can empower residents and enhance their trust in the system. Water utilities should prioritize community partnerships and allow for greater public participation in ensuring safe drinking water.

5. Support for vulnerable populations: Policies should be developed to ensure equitable access to safe drinking water, especially for vulnerable populations relying on private well water or those living in rural or low-income urban areas. This may include subsidies for filtration systems, expanded water testing programs, and interventions to address specific health risks related to contaminated water sources.

Conclusion

This systematic review highlights the complexities surrounding public perception of drinking water quality in the United States over the past 33 years. The findings suggest that perceptions are influenced by multiple factors, including organoleptic properties (taste, smell, and color), socio-demographic characteristics, health risk perceptions, prior negative experiences with water utilities, trust in water systems and management, and media influence and public awareness. Negative perceptions of tap water often drive individuals to turn to alternatives such as bottled water, which carries its own economic and environmental costs.

To improve public confidence in drinking water, policymakers and water utilities must focus on addressing infrastructure challenges, enhancing transparency, and fostering community trust. Effective public health interventions that promote education about water safety and ensure equitable access to clean drinking water are critical in reshaping perceptions. By prioritizing these efforts, the United States can work toward building a more resilient and trusted public water system that meets the needs of all its citizens.

Conflicts of Interest

The authors declare no conflicts of interest exist.

Authors Contributions

KO conceived and designed the study under the supervision of SK. MY is a University Librarian who designed the search strategy and extracted the articles from the databases. KO and JI independently screened and assessed the articles for eligibility. KO and JI extracted the results from the excel sheet. KO drafted the manuscript.

All authors critically reviewed the manuscript and approved the final version.

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