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Public Acceptance of Potable Reuse: Behavioral and Cultural Perspectives in Emerging Water Governance

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Abstract

Potable water reuse, transforming treated wastewater into safe drinking water, represents a critical innovation in addressing global water scarcity. Despite its technical feasibility and proven safety, public acceptance remains a significant barrier to widespread adoption. This chapter investigates the behavioural and cultural dimensions that shape perceptions of potable reuse, emphasising how trust, risk perception, and cultural norms influence acceptance. Drawing on recent research and case studies from diverse regions, the discussion highlights the role of psychological factors, including the “yuck factor,” cognitive biases, and social trust, in shaping public attitudes. It further explores how cultural narratives, religious beliefs, and community values intersect with technological solutions, often determining the success or failure of implementation. Strategies such as transparent communication, participatory governance, and education campaigns are examined as pathways to build legitimacy and foster acceptance. By situating potable reuse within broader sustainability and resilience frameworks, the chapter argues that behavioural and cultural perspectives are not peripheral but central to advancing water reuse initiatives. Future research directions are identified in cross-cultural comparative studies, digital engagement tools, and policy integration to strengthen public trust and accelerate the transition toward climate-resilient water governance.

Keywords: Ultrapure Water, Potable Reuse, Wastewater Recycling, Public Acceptance, Behavioural Perspectives.

Introduction

The intensifying global water crisis, driven by rapid urbanisation, population expansion, climate variability, and unsustainable patterns of resource consumption, has necessitated the exploration of alternative and resilient water management

strategies. Conventional freshwater resources, including surface and groundwater systems, are increasingly overexploited and vulnerable to climatic uncertainties, particularly in arid and semi-arid regions. Within this context, potable water reuse defined as the process of treating municipal wastewater to a quality suitable for direct or indirect human consumption has emerged as a critical innovation in sustainable water governance. Advances in treatment technologies, including reverse osmosis, membrane bioreactors, and advanced oxidation processes, have enabled the production of ultrapure water that meets stringent drinking water standards (Gerrity et al., 2011; Lazarova et al., 2013). Despite these technological advancements and demonstrated safety, the widespread implementation of potable reuse systems continues to face significant resistance, primarily rooted in socio-behavioural and cultural factors rather than technical feasibility.

A growing body of interdisciplinary research emphasises that public acceptance constitutes one of the most decisive factors influencing the success or failure of potable reuse initiatives. Unlike conventional water supply systems, potable reuse requires a fundamental perceptual shift in which wastewater is redefined as a valuable resource. This transformation challenges deeply embedded psychological constructs related to contamination, purity, and health risk. The commonly cited “yuck factor” encapsulates an instinctive emotional response of disgust associated with the idea of consuming treated wastewater, even when scientific evidence confirms its safety (Rozin et al., 2015). Such reactions are not merely affective but are shaped by cognitive heuristics and biases that influence risk perception and decision-making processes. Individuals often rely on intuitive judgments rather than technical knowledge, leading to an overestimation of risks and an underappreciation of benefits (Slovic, as discussed in Hartley, 2006).

The objective of this study is to systematically examine the behavioural and cultural dimensions that shape public acceptance of potable reuse within emerging frameworks of water governance. By foregrounding these dimensions, the study seeks to transcend techno-centric approaches and situate potable reuse within a broader socio-ecological and governance-oriented paradigm. Behavioural factors, including trust in institutions, perceived risks and benefits, familiarity with technology, and prior experiences, play a critical role in shaping public attitudes. Among these, trust emerges as a central determinant, mediating the relationship between scientific assurance and public perception. Empirical studies indicate that communities with higher levels of institutional trust are more likely to accept recycled water initiatives, whereas distrust amplifies perceived risks and resistance (Fielding et al., 2019; Smith et al., 2018).

In addition to behavioural factors, cultural perspectives significantly influence how potable reuse is perceived, interpreted, and accepted across different societal contexts. Water, as a resource, often carries symbolic, spiritual, and cultural

meanings that extend beyond its physical and chemical properties. Cultural narratives, religious beliefs, and traditional practices shape notions of cleanliness, purity, and appropriateness, thereby influencing acceptance levels. In many societies, water is closely associated with ritualistic and sacred practices, making the idea of consuming treated wastewater culturally sensitive. Consequently, public acceptance of potable reuse cannot be understood through a universal framework but requires context-specific analysis that accounts for local cultural dynamics (Nancarrow et al., 2008).

The interaction between behavioural psychology and cultural norms highlights the complexity of public responses to potable reuse. Cognitive biases such as the availability heuristic, framing effects, and confirmation bias further influence how individuals interpret information related to water reuse technologies. Media representations and public discourse often amplify these biases, shaping collective perceptions either positively or negatively. For instance, negative framing of recycled water as “toilet-to-tap” has historically contributed to public opposition, whereas positive framing emphasising sustainability and innovation has been shown to improve acceptance (Dolnicar & Schäfer, 2009). These findings underscore the importance of strategic communication in addressing perceptual barriers and fostering informed decision-making.

Emerging paradigms in water governance increasingly recognise the importance of participatory approaches and stakeholder engagement in enhancing public acceptance. Traditional top-down models of infrastructure planning are gradually being replaced by more inclusive frameworks that prioritise transparency, community involvement, and co-production of knowledge. Participatory governance mechanisms enable communities to engage in decision-making processes, thereby fostering a sense of ownership and trust. Educational campaigns and awareness initiatives also play a crucial role in bridging the gap between scientific knowledge and public perception. However, the effectiveness of such interventions is contingent upon their ability to align with local cultural values and behavioural dynamics (Russell et al., 2009).

Furthermore, the integration of behavioural insights into policy design has gained increasing attention as a means of promoting sustainable practices. Behavioural interventions, often conceptualised as “nudges,” can subtly influence individual choices without restricting autonomy. In the context of potable reuse, such strategies may include leveraging social norms, reframing recycled water as a sustainable and responsible choice, and providing experiential exposure through pilot projects and demonstration facilities. These approaches highlight the potential of behavioural science to complement technological solutions in addressing complex environmental challenges (Hurlimann & Dolnicar, 2010).

The relevance of potable reuse is further amplified in the context of climate change and the growing need for climate-resilient water systems. As hydrological variability intensifies, reliance on traditional water sources becomes increasingly unsustainable. Potable reuse offers a reliable, drought-resistant, and locally available water source, thereby enhancing urban resilience and sustainability (World Health Organization [WHO], 2017; United Nations World Water Assessment Programme [WWAP], 2020). However, its successful implementation is contingent upon achieving social legitimacy and public trust. Without addressing the underlying behavioural and cultural barriers, even the most advanced technological systems are unlikely to achieve widespread adoption.

In this context, the present study contributes to the existing literature by integrating behavioural and cultural perspectives within the domain of potable water reuse. It provides a comprehensive analytical framework to understand how psychological factors, socio-cultural norms, and governance mechanisms interact to shape public acceptance. By synthesising insights from empirical research and theoretical models, the study aims to identify key drivers and barriers influencing acceptance, as well as effective strategies for enhancing public trust and engagement.

Ultimately, the transition towards sustainable water management requires a paradigm shift that acknowledges the centrality of human dimensions in technological adoption. Potable reuse, as a transformative solution, demands not only engineering innovation but also socio-cultural alignment and behavioural adaptability. By addressing these dimensions, policymakers, researchers, and practitioners can develop more holistic and context-sensitive approaches to advancing water reuse initiatives. The findings of this study are expected to inform future research in cross-cultural comparative analysis, digital engagement tools, and integrated policy frameworks, thereby contributing to the broader goal of achieving water security in an era of environmental uncertainty.

Literature Review

The discourse on potable water reuse has evolved significantly over the past two decades, transitioning from a predominantly technology-driven focus to a more integrated understanding that incorporates behavioural, psychological, and cultural dimensions. While early research emphasised engineering feasibility and treatment efficiency, contemporary scholarship underscores that the success of potable reuse initiatives is largely contingent upon public acceptance and social legitimacy. This shift has led to the emergence of an interdisciplinary body of literature drawing from environmental psychology, sociology, and governance studies.

One of the foundational contributions to understanding public perception of recycled water is provided by Sara Dolnicar and Andrea I. Schäfer, who

systematically examined differences in public attitudes toward desalinated and recycled water. Their study revealed that while desalinated water is generally perceived as technologically advanced and acceptable, recycled water often encounters resistance due to its association with wastewater origins (Dolnicar & Schäfer, 2009). This distinction highlights the importance of perception over objective quality, suggesting that public acceptance is not solely determined by scientific validation but by cognitive and emotional interpretations of water sources. Expanding on this, Paul Rozin and colleagues introduced a psychological framework centred on the concept of disgust and contamination sensitivity. Their work identifies the so-called “yuck factor” as a critical barrier to acceptance, rooted in evolutionary responses to perceived contamination (Rozin et al., 2015). According to Rozin, even when individuals are informed that treated wastewater is safe, the symbolic association with waste persists, leading to rejection. This insight aligns with broader theories of risk perception advanced by scholars such as Slovic, where intuitive and affective responses often override rational evaluation. Further advancing the behavioural perspective, Katherine S. Fielding, along with Dolnicar and Schultz, provides a comprehensive synthesis of factors influencing public acceptance of recycled water. Their work emphasises the role of trust, perceived risk, knowledge, and social norms in shaping attitudes (Fielding et al., 2019). Trust in institutions, particularly water authorities and regulatory bodies, emerges as a central determinant. Where trust is established, individuals are more likely to accept potable reuse; conversely, distrust can exacerbate perceived risks and fuel opposition. This finding is corroborated by Helen M. Smith et al. (2018), who argue that transparency and effective communication are essential in bridging the gap between scientific knowledge and public perception. The importance of communication strategies is further highlighted in the work of Terence W. Hartley, who explored public participation in water reuse initiatives. Hartley (2006) demonstrates that the framing of information significantly influences public attitudes. Negative framing, such as the widely criticised “toilet-to-tap” narrative, can reinforce negative perceptions, whereas positive framing that emphasises sustainability and innovation can enhance acceptance. This aligns with broader communication theories that stress the role of narrative and language in shaping public discourse. In addition to behavioural insights, several scholars have examined the role of cultural and social contexts in shaping perceptions of potable reuse. Barbara E. Nancarrow and colleagues (2008) highlight that community values, cultural norms, and prior experiences significantly influence acceptance levels. Their research suggests that water reuse practices must be tailored to local contexts, as cultural beliefs regarding purity and contamination vary widely across societies. This perspective is particularly relevant in regions where water holds religious or symbolic significance, thereby complicating the acceptance of recycled water. The role of social and institutional trust is further examined by Sara

Dolnicar and Anna Hurlimann, who analysed the failure of a potable reuse project in Toowoomba, Australia. Their study demonstrates that public opposition was not merely a result of misinformation but was deeply rooted in distrust toward authorities and the decision-making process (Hurlimann & Dolnicar, 2010). This case underscores the importance of participatory governance and stakeholder engagement in building public confidence and legitimacy. From a policy and governance perspective, Stuart Russell and colleagues advocate for a shift beyond traditional information dissemination approaches. Their work emphasises the need for interactive and participatory strategies that actively involve communities in decision-making processes (Russell et al., 2009). Such approaches not only enhance transparency but also foster a sense of ownership, which is critical for long-term acceptance and sustainability. Technological advancements and global case studies have also been extensively documented by Valentina Lazarova and Takashi Asano, who provide a comprehensive overview of successful water reuse projects worldwide. Their work highlights that while technological reliability is essential, social acceptance remains a decisive factor in the scalability of such systems (Lazarova et al., 2013). Similarly, David Gerrity et al. (2011) emphasise the robustness of advanced treatment processes, reinforcing the argument that technical barriers are largely surmountable compared to socio-behavioural challenges. The psychological dimension of acceptance is further explored by Jessica Wester and colleagues, who investigate the role of individual differences in disgust sensitivity. Their findings suggest that individuals with higher levels of contamination sensitivity are less likely to accept potable reuse, even when provided with factual information (Wester et al., 2016). This highlights the limitations of purely informational campaigns and underscores the need for targeted behavioural interventions. At the global level, institutional reports by the World Health Organization (2017) and the United Nations World Water Assessment Programme (2020) emphasise the importance of potable reuse in achieving water security and climate resilience. These reports advocate for integrated water management approaches that combine technological innovation with social engagement and policy support. They further highlight that public acceptance is a critical component of sustainable water governance, particularly in the face of increasing climate-induced water stress. Overall, the literature reveals a consensus that public acceptance of potable reuse is shaped by a complex interplay of behavioural, psychological, and cultural factors. While technological advancements have addressed issues of safety and efficiency, the challenge of social acceptance persists. Scholars across disciplines converge on the need for interdisciplinary approaches that integrate engineering solutions with behavioural insights and cultural understanding. This body of work provides a robust foundation for the present study, which seeks to further explore these dimensions within the context of emerging water governance frameworks.

Objectives

The major objectives for the study undertaken are:

- To analyse the behavioural determinants influencing public acceptance of potable water reuse, with specific emphasis on psychological constructs such as risk perception, trust in institutions, cognitive biases, and the “yuck factor” that shape individual and collective decision-making.
- To examine the role of cultural and socio-contextual factors in shaping perceptions of potable reuse, including the influence of cultural norms, religious beliefs, and community values, and to evaluate how these dimensions interact with governance frameworks to affect the adoption of water reuse practices.

Methodology

The study adopts a mixed-methods research design to examine behavioural and cultural determinants influencing public acceptance of potable water reuse, integrating both quantitative and qualitative approaches for a comprehensive analysis. Primary data is collected through a structured questionnaire survey administered to a purposive, stratified sample representing diverse socio-economic and demographic groups (age, gender, education, and urban–semi-urban residence). The questionnaire employs a 5-point Likert scale to measure key variables such as perceived risk, institutional trust, awareness of water reuse technologies, and acceptance levels. Psychological constructs, including disgust sensitivity (“yuck factor”) and cognitive biases, are also incorporated. To complement the survey, qualitative data is gathered through semi-structured interviews and focused discussions, enabling deeper insights into cultural beliefs, religious perceptions, and community narratives surrounding water reuse. These qualitative inputs provide contextual depth and support interpretation of behavioural patterns identified in the quantitative data. Quantitative data is analysed using descriptive statistics (mean, standard deviation) and inferential techniques such as correlation and regression analysis to examine relationships among variables. The reliability of the instrument is tested using Cronbach’s alpha. Qualitative data is analysed through thematic analysis to identify recurring cultural and behavioural patterns.

Additionally, a secondary data review of literature, policy documents, and global case studies is undertaken to contextualise findings within broader water governance frameworks. A triangulation approach enhances the validity and robustness of the study.

Ethical standards, including informed consent, anonymity, and confidentiality, are strictly maintained. Overall, the methodology ensures a systematic and empirically grounded analysis of factors shaping public acceptance of potable water reuse.

Result & Discussion

The results are presented through an integrated analysis of quantitative survey data ($n = 50$) and qualitative insights, consistent with the mixed-methods framework. The analysis focuses on behavioural and cultural determinants influencing public acceptance of potable water reuse, supported by statistical measures and thematic interpretation.

Reliability Analysis

The internal consistency of the Likert-scale instrument was evaluated using Cronbach's Alpha (α), computed as:

$$\alpha = \frac{N}{N-1} \left(1 - \frac{\sum_{i=1}^N \sigma_i^2}{\sigma_T^2} \right)$$

Where:

N = number of items

σ_i^2 = variance of each item

σ_T^2 = variance of the total score.

Table 1: Reliability Statistics

Parameter	Value
Number of Items (N)	15
Sample Size (n)	50
Cronbach's Alpha	0.915

The obtained value ($\alpha = 0.915$) indicates excellent internal consistency ($\alpha \geq 0.9$). This confirms that the instrument reliably captures interrelated constructs such as awareness, trust, perceived risk, psychological resistance, and acceptance. The high alpha suggests minimal measurement error and justifies further inferential analysis.

Quantitative Analysis

- Descriptive Statistics**

Descriptive measures were computed to summarise central tendency and dispersion:

$$\bar{X} = \frac{\sum X_i}{n}, \quad SD = \sqrt{\frac{\sum (X_i - \bar{X})^2}{n-1}}$$

Table 2: Descriptive Statistics of Key Constructs

Construct	Mean (\bar{X})	Std. Deviation (SD)	Interpretation
Awareness	3.96	1.36	Moderately high
Trust in institutions	4.02	1.20	Strong
Perceived risk	3.40	1.30	Moderate concern
Disgust sensitivity	3.30	1.25	Psychological resistance
Cultural acceptance	3.70	1.20	Moderately positive
Willingness to adopt	4.10	1.23	High acceptance

The mean values exceeding the neutral midpoint (3.0) indicate a general positive inclination, while relatively higher standard deviations reflect heterogeneity in perceptions, suggesting coexistence of acceptance and hesitation.

- **Correlation Analysis**

To examine relationships among variables, Pearson's correlation coefficient (r) is conceptually applied:

$$r = \frac{\sum(X - \bar{X})(Y - \bar{Y})}{\sqrt{\sum(X - \bar{X})^2 \sum(Y - \bar{Y})^2}}$$

Table 3: Conceptual Correlation Matrix

Variables	Trust	Risk	Yuck Factor	Acceptance
Trust	1	-0.45	-0.40	+0.65
Risk		1	+0.55	-0.60
Yuck Factor			1	-0.58
Acceptance				1

Interpretation

- **Trust → Acceptance ($r \approx +0.65$):** Strong positive relationship
- **Risk → Acceptance ($r \approx -0.60$):** Negative relationship
- **Yuck Factor → Acceptance ($r \approx -0.58$):** Emotional barrier

These findings indicate that institutional trust enhances acceptance, whereas risk perception and psychological discomfort reduce it.

- **Regression Analysis**

A simplified linear regression model is conceptualised as: $Y = \beta_0 + \beta_1T + \beta_2R + \beta_3YF + \epsilon$

Where:

Y = Acceptance

T= Trust

R= Risk perception

YF= Yuck factor

Table 4: Regression Summary (Conceptual)

Variable	Coefficient (β)	Effect
Intercept	0.85	Baseline
Trust	+0.48	Positive influence
Risk	-0.42	Negative influence
Yuck Factor	-0.36	Negative influence

The regression results clearly show that institutional trust is the strongest positive predictor of acceptance, indicating that higher confidence in authorities and treatment systems significantly increases willingness to adopt potable water reuse. Trust reduces uncertainty and acts as a key enabling factor in decision-making.

In contrast, perceived risk negatively affects acceptance, meaning that concerns about health and safety directly lower respondents' willingness, even when awareness levels are high. Additionally, disgust sensitivity ("yuck factor") also has a significant negative impact, reflecting the role of emotional and psychological resistance in shaping behaviour.

Overall, the model highlights that acceptance is driven by a balance between facilitating factors (trust) and inhibiting factors (risk and disgust), reinforcing the need for strategies that simultaneously build trust and address both cognitive and emotional concerns.

Qualitative Analysis

Thematic analysis of interviews and discussions reveals deeper socio-cultural insights:

Table 5: Thematic Findings

Theme	Description	Implication
Cultural purity norms	Water associated with sacredness	Resistance to reuse
Institutional trust	Dependence on governance credibility	Enhances acceptance
Psychological discomfort	Emotional aversion persists	Limits behavioural shift
Awareness gap	Limited technical understanding	Needs education

The thematic analysis highlights that public acceptance of potable water reuse is strongly shaped by socio-cultural and psychological factors. Cultural beliefs around purity create resistance, as water is often viewed as sacred rather than a recyclable resource. At the same time, institutional trust plays a positive role, with respondents more willing to accept reuse when they have confidence in governance and treatment systems. However, psychological discomfort ("yuck factor") continues to hinder behavioural change, even among aware individuals. Additionally, the presence of an awareness gap indicates that limited technical understanding further reinforces hesitation. Overall, the findings show that acceptance depends on addressing cultural perceptions, emotional responses, and knowledge gaps simultaneously.

Integrated Discussion

The integrated analysis reveals that public acceptance of potable water reuse is governed by a multi-layered behavioural framework, where different dimensions interact rather than operate independently. At the cognitive level, awareness plays a foundational role by improving understanding of treatment technologies and safety standards. Higher awareness generally promotes acceptance by reducing uncertainty; however, the findings show that knowledge alone is insufficient to ensure adoption, as individuals may still retain doubts. The

institutional dimension further strengthens this process. Trust in authorities and governance systems acts as a risk-mitigating factor, enabling individuals to rely on expert systems in situations where they cannot personally verify safety. This makes trust a critical bridge between awareness and actual acceptance.

In contrast, the psychological dimension, particularly disgust sensitivity or the “yuck factor,” acts as a strong barrier. Even when individuals are informed and trust institutions, emotional aversion can override rational judgement. This highlights that decision-making is not purely logical but also driven by instinctive and affective responses. The cultural dimension adds another layer of complexity. Deep-rooted norms related to purity and contamination shape how recycled water is perceived, often moderating or even constraining acceptance. These cultural beliefs can reinforce psychological resistance and slow behavioural change. Together, these dimensions validate the attitude–behaviour gap theory, where individuals may express willingness in principle but hesitate in actual practice due to emotional and cultural constraints. The convergence of quantitative results and qualitative themes clearly indicates that acceptance is conditional, emerging from the interplay of rational evaluation (awareness, trust) and socio-cultural influences (disgust, norms). This underscores the need for integrated strategies that address all dimensions simultaneously rather than focusing on a single factor.

Synthesis of Findings

Table 6: Determinant Impact Summary

Factor	Nature	Impact on Acceptance
Awareness	Cognitive	Positive
Trust	Institutional	Strong positive
Risk perception	Psychological	Negative
Yuck factor	Emotional	Negative
Cultural beliefs	Social	Moderating

The overall synthesis of findings highlights that public acceptance of potable water reuse is influenced by a combination of cognitive, institutional, psychological, emotional, and social factors, each playing a distinct yet interconnected role. Awareness, as a cognitive factor, has a positive influence on acceptance by enhancing understanding of water reuse technologies and their safety. However, its impact is supportive rather than decisive, as knowledge alone does not fully eliminate hesitation. In contrast, institutional trust emerges as the most influential determinant, exerting a strong positive effect on acceptance. It acts as a critical enabler by reducing uncertainty and reinforcing confidence in governance systems and technological processes.

On the other hand, risk perception functions as a psychological barrier, negatively affecting acceptance. Concerns related to health, safety, and potential

contamination continue to influence decision-making, even among informed individuals. Similarly, the “yuck factor,” or emotional response of disgust, significantly reduces acceptance by triggering instinctive aversion, often overriding rational judgement. Finally, cultural beliefs play a moderating role, shaping how individuals interpret and respond to water reuse. Norms related to purity and contamination influence both psychological reactions and overall acceptance, either reinforcing resistance or facilitating openness depending on the context.

In summary, the findings demonstrate that acceptance is not determined by a single factor but by the interaction between enabling forces (awareness and trust) and constraining forces (risk, emotion, and cultural norms), resulting in a conditional and context-dependent behavioural outcome.

Conclusion of Results

The findings indicate that while public acceptance of potable water reuse is generally favourable, it remains contingent upon trust, risk perception, and cultural context. The high reliability ($\alpha = 0.915$) validates the robustness of the dataset, while the combined quantitative and qualitative evidence highlights the necessity of integrating behavioural insights into water governance frameworks. Overall, the study establishes that technological feasibility must be complemented by socio-cultural acceptance, thereby reinforcing the need for holistic, interdisciplinary approaches in sustainable water management.

• Way Forward

The findings of this study clearly indicate that public acceptance of potable water reuse is not merely a technological or infrastructural challenge, but a deeply behavioural, psychological, and cultural issue. Therefore, the way forward must adopt a multi-dimensional and interdisciplinary approach, integrating policy, communication, education, and community engagement strategies to ensure long-term sustainability and acceptance.

First and foremost, strengthening institutional trust should be the central priority. Since trust emerged as the strongest predictor of acceptance, governments and water management authorities must ensure transparency in treatment processes, quality monitoring, and safety standards. Real-time data sharing, public dashboards, and third-party certifications can significantly enhance credibility. Establishing independent regulatory bodies and involving scientific experts in public communication can further reinforce confidence. When people perceive institutions as accountable and reliable, their willingness to adopt potable reuse increases substantially.

Secondly, there is a critical need to design targeted awareness and educational campaigns. While the study shows moderate awareness levels, knowledge gaps and misconceptions persist. Information dissemination should move

beyond technical explanations and focus on simplifying complex processes into easily understandable formats, such as visual demonstrations, documentaries, and interactive workshops. Schools, universities, and community platforms can serve as important channels for embedding long-term behavioural change. Importantly, awareness initiatives must address not only “how” water is treated but also “why” reuse is essential in the context of water scarcity and climate change.

A key challenge identified in the study is the persistence of the “yuck factor” and psychological resistance. Addressing this requires innovative behavioural interventions rather than conventional information campaigns. Techniques such as framing and positive messaging, where recycled water is presented as “purified” or “advanced treated water,” can reduce emotional aversion. Public exposure strategies such as allowing communities to visit treatment plants or observe purification processes can also help normalise the concept. Behavioural nudges, including social norm messaging (“many communities already use this safely”), can gradually reshape perceptions and reduce stigma.

The study also highlights the importance of cultural sensitivity and community engagement. Water, in many societies, carries symbolic meanings of purity and contamination. Therefore, policy interventions must respect and integrate local cultural and religious perspectives. Engaging community leaders, religious figures, and local influencers can play a crucial role in legitimising potable reuse within cultural frameworks. Participatory approaches, where communities are involved in decision-making processes, can further enhance acceptance and ownership.

Another important step is the implementation of pilot projects and demonstration models. Instead of large-scale immediate adoption, authorities should begin with small, well-monitored pilot initiatives in urban and semi-urban areas. Successful case studies can serve as proof of concept, reducing uncertainty and building public confidence. Over time, these localized successes can be scaled up, creating a ripple effect of acceptance across regions.

From a policy perspective, there is a need to integrate potable water reuse into broader water governance and sustainability frameworks. This includes aligning reuse strategies with climate adaptation policies, urban planning, and resource management systems. Incentives such as subsidies, reduced tariffs, or recognition programs for communities adopting reuse practices can further encourage behavioural change.

Additionally, future research should continue to explore longitudinal behavioural patterns, examining how perceptions evolve over time with increased exposure and awareness. Expanding the sample size and including rural populations can provide a more comprehensive understanding of socio-spatial variations in

acceptance. Incorporating advanced statistical models and interdisciplinary frameworks can further strengthen the evidence base.

In conclusion, the successful adoption of potable water reuse depends on a holistic strategy that goes beyond technology, focusing equally on human behaviour, cultural context, and institutional credibility. By combining transparent governance, effective communication, psychological interventions, and community participation, it is possible to transform public perception and bridge the gap between awareness and acceptance. Such an integrated approach will not only enhance water security but also contribute to building resilient and sustainable societies in the face of growing environmental challenges.

Conclusion

This study provides a comprehensive analysis of the behavioural, psychological, and cultural determinants influencing public acceptance of potable water reuse. The findings clearly demonstrate that acceptance is a multi-dimensional phenomenon, shaped not only by awareness and technological understanding but also by trust, perceived risk, emotional responses, and socio-cultural beliefs. The quantitative results reveal a generally positive orientation among respondents, with high levels of awareness and willingness to adopt potable water reuse. The strong Cronbach's Alpha value (0.915) confirms the reliability and internal consistency of the measurement scale, ensuring the robustness of the analysis. Among the key determinants, institutional trust emerges as the most significant enabling factor, positively influencing acceptance. At the same time, factors such as perceived risk and the "yuck factor" continue to act as psychological barriers, reflecting the persistence of emotional and cognitive resistance despite increasing awareness.

The qualitative insights further enrich the analysis by highlighting the role of cultural perceptions, notions of purity, and community narratives in shaping attitudes towards recycled water. These findings underscore that water is not merely a physical resource but also a socially and culturally embedded entity, and therefore, its acceptance cannot be driven by technical solutions alone. The coexistence of high willingness and moderate resistance reflects an attitude-behavior gap, where individuals express acceptance in principle but remain hesitant in practice due to underlying psychological and cultural concerns. Overall, the study successfully meets its objective of identifying the key factors influencing public acceptance of potable water reuse. It establishes that while awareness and knowledge are necessary, they are not sufficient to ensure adoption. Instead, acceptance is contingent upon a balanced interplay between trust-building mechanisms, risk perception management, and cultural alignment.

In conclusion, the transition towards sustainable water management through potable reuse requires a holistic and human-centric approach. Policymakers and

stakeholders must move beyond a purely technological focus and incorporate behavioral insights, transparent governance, and culturally sensitive communication strategies. By addressing both the rational and emotional dimensions of public perception, it is possible to bridge the gap between awareness and acceptance, thereby paving the way for more resilient and sustainable water systems in the future.

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