Risk Communication Strategies and Community Protective Behaviors against Water Contamination: A Case Study of Nukkai, Taraba State, Nigeria

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Abstract
Consumption of unsafe water leading to outbreak of diseases remains a critical public health challenge in developing countries, including Nigeria despite risk communication efforts. This study examines how risk communication strategies influence community responses to river water contamination among residents of the Nukkai community of Jalingo, Taraba State, Nigeria. The study was underpinned by Protection Motivation Theory (PMT) as an analytical framework and adopted a qualitative descriptive design that employed purposive sampling to conduct interviews with 18 residents actively dependent on the Nukkai River for domestic use. Data were analysed thematically to explore threat appraisal, coping appraisal, and the role of communication channels in shaping behavioural outcomes. Findings reveal a pronounced knowledge–action gap. Although residents demonstrate high awareness of waterborne diseases such as cholera and typhoid, functional risk perception is undermined by cognitive biases, including sensory-based risk assessment, the immune body myth, and misconceptions about natural purification. Mass media channels (radio and television) exhibit broad reach but limited behavioural influence, while clinic-based warnings from healthcare personnel are perceived as highly credible. However, a communication efficacy paradox emerges, wherein trust in medical advice is not matched by the capacity to act due to high response costs associated with water treatment. Economic rationalisation, low self-efficacy, cultural resistance to treated water, and fatalistic resignation collectively inhibit protective behaviours. The study concludes that ineffective risk communication in Nukkai is not rooted in information deficits but in structural and psychological constraints. It argues for a shift from top-down, fear-based messaging toward context-sensitive, low-cost, and efficacy-enhancing communication strategies that address economic barriers and lived realities.

Keywords: Risk communication; Protection Motivation Theory; water contamination; protective behaviour; Nigeria

Introduction

Access to safe drinking water remains a critical global challenge, particularly in Sub-Saharan Africa, where over 300 million people lack access to basic water services (WHO, 2023). In Nigeria, rapid urbanization and inadequate waste management systems have led to the severe degradation of surface water bodies (Ibrahim & Musa, 2022). One such example is the Nukkai River in Jalingo, Taraba State, which serves as a primary domestic and agricultural resource for peri-urban residents. Recent environmental assessments have ranked the Nukkai River's water quality as poor, with significantly elevated levels of fecal coliform and organic linked to anthropogenic activities such as open defecation and untreated sewage discharge (Jolly et al,

2025). Despite the scientific documentation of these health risks, a persistent knowledge-action gap exists among communities residing near the Nukkai Bridge. While risk communication efforts ranging from government health warnings to informal community alerts aim to discourage the consumption of raw river water, many residents continue to use the contaminated source. This mismatch between risk awareness and protective behavior suggests that traditional "information-only" communication strategies may be insufficient (Okonji, 2025).

To understand this phenomenon, scholars have increasingly turned to psychological frameworks such as Protection Motivation Theory (PMT). Originally developed by Rogers (1975), PMT posits that an individual's motivation to adopt protective behaviors is driven by two cognitive processes: threat appraisal (evaluating the severity and personal vulnerability to a hazard) and coping appraisal (assessing the efficacy and cost of taking action).[5] In the context of water contamination, risk communication is only effective if it successfully triggers these appraisals, leading to a protection motivation that outweighs the perceived costs of behavior change (Nelson et al., 2011).

While existing literature has applied PMT to water conservation and flood risks (Bubeck et al., 2012), there is a significant research gap regarding its application to localized riverine contamination in Northern Nigeria. Most studies in the region focus on the physicochemical properties of water rather than the psychological drivers of community response. Therefore, this study aims to assess the risk communication strategies currently in use at the Nukkai River and evaluate how residents' perceptions of threat and coping capacity influence their adherence to safety warnings. By doing so, this research provides evidence-based insights for designing more effective environmental health interventions in resource-limited urban settings.

Problem Statement

Despite documented evidence of the deteriorating water quality in the Nukkai River and its attendant public health risks, a critical knowledge-action gap persists in how the local community responds to these threats. It remains unclear whether residents are adequately informed about the specific dangers of using raw river water, or if existing health warnings are simply failing to resonate. This has led to a significant lack of understanding regarding the psychological and cognitive drivers that influence how Nukkai residents perceive and process water-related risks.

While environmental research in Nigeria has extensively documented the physicochemical and biological pollution of water bodies, there is a profound scarcity of empirical data on the threat and coping appraisals as framed by the Protection Motivation Theory (PMT) that dictate whether a community heeds or ignores safety warnings. Without identifying if the failure to adopt protective measures stems from a low sense of vulnerability, the high cost of alternative water sources, or a lack of self-efficacy among the people, risk communication efforts will remain disconnected from the community's reality. This study addresses this gap by investigating how current communication strategies intersect with the internal cognitive processes of residents, providing an evidence-based framework for more effective environmental health interventions in Northern Nigeria.

Research Questions

This study seeks to provide answers to the following questions:

1. What is the current level of awareness among Nukkai residents regarding the specific public health risks and waterborne diseases associated with consuming raw water from the Nukkai River?
2. Through which communication channels (such as traditional media, community leaders, or health workers) do residents receive information regarding water-related health risks, and which are deemed most influential?

3. What are the prevailing attitudes of Nukkai residents toward water treatment practices,

Literature review

Risk Communication Strategies

Risk communication is fundamentally defined as a multi-directional exchange of information, advice, and perspectives between experts and those whose health or social well-being is under threat (WHO, 2021). Empirical studies suggest that effective strategies move beyond the information deficit model, which assumes that public inaction is merely a result of a lack of scientific knowledge (Bakker et al., 2024). Instead, contemporary conceptualizations emphasize Environmental Health Literacy (EHL), which integrates a community's ability to find, judge, and act upon risk information (Finn & O'Fallon, 2022). This shift recognizes that communication is not just about the dissemination of data but about the creation of actionable knowledge that addresses both the perceived severity of a threat and the practical ability of the population to respond.

Empirical research in the Global South indicates that while digital and mass media channels are efficient for broad reaching, they often lack the trust equity required to trigger behavioral change (Adewusi et al., 2023). Technocratic approaches are frequently criticized for being culturally agnostic and failing to bridge the knowledge-action gap, where residents remain aware of waterborne risks but lack the self-efficacy or financial means to adopt protective measures (Yudell, & Amon, 2024). This disconnect is often exacerbated by a lack of bidirectional feedback loops, where the concerns and local insights of the affected community are ignored by central health authorities, leading to messages that feel disconnected from the residents' lived economic reality.

Contaminated River Water

The contamination of river systems has evolved into a silent pandemic that threatens more than just ecological balance; it actively erodes the foundation of community health. Recent studies (WHO, 2024; MDPI, 2025) highlight that while many residents associate dirty water with immediate illness like diarrhea or cholera, the most dangerous threats are often invisible. Beyond the well-known bacterial risks, rivers in developing urban centers are increasingly becoming home to heavy metals and microplastics. These pollutants do not just pass through the body; they accumulate over time, leading to long-term health crises, including organ damage and developmental delays in children, which often go unnoticed until it is too late (NIH, 2025).

In many communities, the river is not just a water source but a central pillar of daily life used for everything from drinking and cooking to religious rites. However, this close relationship creates a dangerous paradox of habituation, where the constant presence of a polluted river leads to a psychological desensitization to the risk (Bakker et al., 2024). This perception gap is widened by the arrival of new, emerging contaminants like pharmaceutical residues and antibiotic-resistant bacteria, which current local water treatment methods are not equipped to handle, leaving even the careful residents vulnerable ((Balaram et al., 2023). The crisis is further complicated by the harsh economic reality that often dictates health choices. For many, the risk of drinking from a contaminated river is weighed against the response cost of buying expensive bottled water or spending hours gathering fuel to boil it (Adewusi et al., 2023).

Empirical Studies

Little, Kohl, and Wardropper (2023) investigated the factors motivating individuals to mitigate the harms of water pollutants. Utilizing an online survey (n=621%) across the Pacific Northwest and applying the Protection Motivation Theory (PMT), the researchers compared motivations for personal health versus environmental protection. Their findings were pivotal: self-efficacy (the belief in one's ability to act) emerged as the strongest predictor for both health and

environmental behaviors. Interestingly, while perceived severity only influenced environmental intentions, response efficacy and perceived vulnerability remained significant across both models. This suggests that for the Nukkai community, risk communication must move beyond scare tactics regarding river pollution and instead emphasize the residents' capacity to effectively treat their water. The role of technical data in shifting rural behavior was the central focus of Islam et al. (2011), who conducted a pre- and post-intervention survey among 120 women in coastal Bangladesh. By comparing groups that received general risk messages against those provided with specific E. coli contamination data, the study evaluated changes in safe water knowledge and consumption. The results demonstrated that while general communication improved basic knowledge, the inclusion of location-specific water quality information was significantly more effective in prompting household discussions and behavioral shifts. Similarly, Bell-Gam (2025) employed a descriptive survey of 150 respondents in Rivers State, Nigeria, to explore educational strategies for water conservation. Although Bell-Gam identified a high baseline awareness of pollution, a total lack of formal training remained a barrier. Both studies converge on a critical point: effective communication requires the dissemination of actionable, specific data through trusted, community-based channels to bridge the knowledge-action gap.

A significant challenge in water safety remains the invisibility of the threat a theme explored by both Lindell et al. (2015) and Okonji (2025). Lindell and colleagues utilized the Protective Action Decision Model (PADM) to examine how residents in Boston and Texas perceived different exposure paths during biological contamination emergencies. Their findings revealed that while people distinguish between specific risks (e.g., drinking vs. bathing), they overwhelmingly prefer the "path of least resistance," opting for bottled water over boiling or chlorinating. This behavioral tendency is further complicated in the Nigerian context, where Okonji (2025) identified a dangerous "perceptual mismatch" in rocky-hill settlements. Through a cross-sectional survey (n=97%), Okonji observed that while 100% of residents reported water-related illnesses, over half still perceived their water as "safe" simply because it appeared clear. This highlights a cognitive bias where visual clarity is falsely equated with biological safety.

The structural effectiveness of the messenger was evaluated by Ngobeka and Nyirenda (2024) in a mixed-methods study (n=398) in Zambia. Their objective was to determine why public outcry persisted despite official communication efforts. Data revealed that while the water authority utilized radio and SMS, they failed to adopt the public's preferred social media channels or provide feedback mechanisms. The study concluded that communication often fails when it relies on technical jargon and one-way dissemination. This mirrors Bell-Gam's (2025) recommendation that Nigerian facilitators must address cultural beliefs respectfully. These findings suggest that a successful communication strategy must transit from top-down institutional announcements to a multi-modal, non-technical dialogue.

Theoretical Framework: The Protection Motivation Theory (PMT)

The Protection Motivation Theory (PMT), originally developed by Rogers (1975), serves as the foundational lens for this study. Initially rooted in the study of fear appeals, PMT was designed to explain how individuals process risk information and are motivated to adopt protective behaviors when faced with a perceived health or environmental threat. The theory posits that protection motivation is the result of two distinct cognitive mediating processes: threat appraisal and coping appraisal. According to Rogers (1983), threat appraisal involves evaluating the perceived severity of the danger and perceived vulnerability (the likelihood of personal impact).

Coping appraisal in the other hand examines self-efficacy (the belief in one's ability to perform a protective action) and response efficacy (the belief that the action will effectively mitigate the threat), while weighing these against response costs, such as the financial or physical burden of securing safe water.

PMT has been extensively applied in public health and environmental studies to bridge the gap between risk awareness and behavioral change. In relations to the current study, PMT provides a structured mechanism to analyze why residents continue to use the Nukkai River despite its documented contamination. This study links PMT to the current situation by investigating how existing risk communication strategies such as radio announcements or community health talks intersect with the residents' internal cognitive processes. While government messages may successfully increase threat appraisal through fear of disease, they may fail to address the coping appraisal factors identified by Nowicki et al. (2022), such as low self-efficacy due to economic constraints. By mapping the responses of Nukkai residents onto these PMT variables, this study determines whether the lack of protective behavior stems from a low sense of vulnerability, the high cost of alternative water sources, or a lack of belief in treatment effectiveness. Ultimately, the theory allows the study to move beyond a simple awareness survey to a deeper understanding of the internal drivers that dictate whether Nukkai residents will heed or ignore safety warnings.

Methodology

This study adopts a qualitative descriptive research design, chosen for its capacity to explore the why behind the persistent knowledge-action gap. Unlike quantitative surveys, this approach facilitates a deep dive into the complex socio-cultural and economic dynamics that influence decision-making (Wimmer & Dominick, 2013). The study is situated at the Nukkai River in Jalingo, Taraba State, Nigeria, a site marked by intense anthropogenic activities including domestic water fetching, laundry, and irrigation. To ensure the data reflects actual behavior rather than hypothetical intent, a purposive sampling technique was employed to select 18 participants aged 18 and older who were found physically engaging with the river. This sample size was determined by the saturation principle, which is consistent with qualitative standards for exploring deep-seated psychological phenomena (Malterud et al., 2016).

Data collection was facilitated through face-to-face, semi-structured interviews conducted directly at the riverbank to capture immediate environmental cues and perceptions. These sessions, lasting 20–30 minutes, were conducted in English or Hausa to maintain cultural resonance and were recorded with participant consent. The resulting data were subjected to thematic analysis, a process involving the transcription of interviews, systematic coding, and the identification of recurring patterns across the responses. By integrating environmental observation with in-depth dialogue, this methodology aligns with the Protection Motivation Theory (PMT) framework, allowing for a nuanced analysis of how risk communication is received and processed within the local lived reality of the Nukkai community.

Data Presentations

RQ1: *What is the level of awareness regarding health risks?*

The study reveals that while Nukkai residents possess high nominal awareness of waterborne diseases (knowing names like cholera and typhoid), they lack functional risk perception. Key themes from their responses include:

Sensory-Based Risk Assessment

Their assessment of safety is governed by visual heuristics rather than biological reality. Consequently, while they are aware of the risks in theory, their personal threat appraisal is low

because they rely on the water's clarity and movement as false indicators of safety. Participant 4, (Male, 42 years) asserts:

> *"We hear about cholera on the radio, but look at the water today; it is flowing and clear. If it is not black or smelling, the sickness is not there."* Corroborating Participant 14, (Female, 31 years) said, *"I wait for the dirt to settle at the bottom of the bucket. Once the top is clear like glass, I know the dangerous things have gone down. You can see when water is bad, and this one looks fine."*

Hardened Body Myth

Most of the participant believed that their bodies are immune to diseases that might come from the river water. For instance, Participant 8, (male, 36 years) argued that:

> *"We have been drinking Nukkai water since I was a girl. Our bodies are not like city people; we are strong enough for this water."* Participant 18, (Male, 36 years) said, *"Our children play in this river and drink it while swimming. They might get a small fever, but their bodies learn to fight it. If you over-protect a child, they will become weak."*

Misconception of Natural Purification

> Participant 16, (Male, 22 years) revealed that, *"If I fetch from the middle where the current is strong, the germs cannot stay there. Moving water cleans itself."* Also, *"The sun hits this river all day. My father told me the heat of the sun on top of the water kills the small insects that cause sickness. By the time it flows past the bridge, it is pure."* (Participant 16, Male, 22)

RQ2: *Which channels are used and which are most influential?*

The findings indicate a clear divergence between reach and influence. While mass media (radio and TV) has the widest reach, it suffers from a relevance gap and is often ignored as background noise. In contrast, interpersonal and authoritative channels specifically healthcare personnel at local clinics are deemed the most influential. Residents view clinic-based warnings as highly credible because they are linked to direct health outcomes.

Mass Media Saturation vs. Practical Disconnect

> *"The radio jingles play once in a while but they don't know our problem. They aren't talking to us specifically in Nukkai."* (Participant 1, Female, 45) *"I hear the health talks on the TV sometimes about the issue of dirty water, but it feels like a story. They talk about 'treated water' as if it is flowing in every house, but here we only have the river."* (Participant 5, Male, 29)

Point-of-Care Warnings (Clinic-Based Advocacy)

> *"When I take my children to the clinic, the nurses warn me: 'Stop giving them Nukkai water.' They speak the truth, but when you get home and there is no borehole, the river is the only source*

Discussion of findings

The findings related to the first research objective reveal that although there is high awareness of waterborne diseases consistent with the findings of Bell-Gam (2025) functional risk perception is shaped by what Okonji (2025) describes as a perceptual mismatch**.** Similar to Okonji's observations, participants equate visual clarity with biological safety, as evidenced by their reliance on allowing water to settle until it appears clear like glass. This sensory-based risk assessment effectively neutralizes the perceived vulnerability component of Protection Motivation Theory (PMT). Although residents acknowledge the severity of cholera in abstract terms, their personal vulnerability is minimized through the immune body myth and misconceptions surrounding natural purification. This aligns with Little, Kohl, and Wardropper (2023), who noted that while perceived severity may influence general intentions, it is perceived vulnerability that

drives specific health-protective actions. In the Nukkai community of Jalingo, Taraba State, the invisible nature of the threat enables psychological desensitization, with residents believing their bodies have adapted to contaminants in the Nukkai River, thereby disregarding scientific health warnings.

In addressing the second research objective, the study identified a sharp divergence between the reach of communication channels and their actual influence on behaviour. Although mass media particularly radio and television saturates the information environment, it suffers from a relevance gap, with messages dismissed as impersonal narratives. A similar phenomenon was reported by Ngobeka and Nyirenda (2024), who found that technical, one-way dissemination failed to stimulate behavioural change. In contrast, warnings issued by health personnel at local clinics emerged as the most credible and influential sources of information. This supports Islam et al.'s (2011) argument that location-specific and interpersonal communication is more effective in prompting household-level discussions. However, residents experience a unique communication–efficacy paradox, while they trust medical warnings, they lack the structural capacity to act on them. This suggests that risk communication in Nigeria and Taraba State in particular must evolve from top-down announcements to a multimodal, trust-based dialogue that reflects the lived realities of communities, as advocated by Bell-Gam (2025).

Regarding the third objective, the findings indicate that prevailing attitudes toward water treatment are poor and driven more by economic rationalization than by a lack of health literacy. Within PMT, the response cost including the price of charcoal for boiling or chemicals for treatment is perceived as disproportionately high relative to the perceived threat. This reflects the path-of-least-resistance theory proposed by Lindell et al. (2015), whereby individuals gravitate toward the easiest available option. For Nukkai residents, the easiest option is, unfortunately, the most dangerous: consuming untreated water, as the cost of safety directly competes with the cost of daily food. This elevated response cost produces low self-efficacy, which Little et al. (2023) identified as the strongest predictor of protective behaviour. Statements such as "safe water is for rich people" reveal a profound lack of belief in personal capacity to act. As Nowicki et al. (2022) argue, when communication amplifies fear without enhancing the means to respond, the outcome is fatalistic resignation. In Nukkai, this fatalism manifests in reliance on prayer and ineffective settling methods, underscoring that until risk communication addresses the economic barriers to water treatment, information alone will not bridge the knowledge–action gap.

Conclusion

The outcome of the study is that residents of the Nukkai community in Taraba State displayed a knowledge-action gap regarding water contamination. This is not due to a lack of information but a collection of several factors, including cognitive biases and socio-economic challenges. The results established that while residents possess some level of awareness of waterborne diseases, their threat appraisal is hampered by a negative perception where the residents equate visual clarity of water with safety and believe in the myth of the hardened body that diseases cannot affect. These factors led the residents to distance themselves from the risks of the Nukkai River. Furthermore, even when the threat is validated by trusted sources like healthcare personnel, the coping appraisal remains poor due to the high response cost of treatment, such as boiling or chemical treatment. Therefore, the residents are negligent; they are making rational, but dangerous, choices based on economic factors where immediate survival needs take precedence over long-term health protection. The implication is that without addressing these underlying psychological and financial barriers, risk communication against consuming contaminated water will continue to fail in the Nukkai community of Jalingo, Taraba State.

Recommendations

In order to cover the gap between risk communication and protective behaviour among

residents of Nukkai and similar settings in Nigeria regarding the following, the following are recommended:

1. Government and health agencies must move beyond the use of fear appeals that only emphasise the severity of cholera and other related diseases associated with contaminated water to a more focused communication that focuses on increasing self-efficacy through low-cost and accessible treatment techniques.
2. Local government should launch community-led "Water Safety Workshops" that provide science-based knowledge of contaminated water using simple languages to dismantle erroneous knowledge. The workshop should further provide hands-on training for cheap filtration methods instead of promoting costly boiling or use of chemicals.
3. The study identified economic rationalisation as the primary barrier to treatment. Therefore there is a need for the government to integrate the distribution of water treatment chemicals (e.g., WaterGuard) into existing primary healthcare programmes or maternal health vouchers at the Nukkai community clinic, ensuring that those most at risk (women and children) have zero-cost access to safety.
4. Above all, government should provide other safer sources of water, such as drilling more boreholes and connecting pipe water to households in the community.

References

Adewusi, A., Adebayor, O., & Ojo, T. (2023). Trust equity and behavioral change in water-related risk communication: Evidence from the Global South. *Journal of Environmental Management*, 328, 116901.

Bakker, K., Kooy, M., & Shofiani, N. (2024). Beyond the information deficit model: Environmental health literacy and the psychological habituation to polluted water sources. *Global Environmental Change*, 84, 102782.

Balaram, V., Sawant, S. S., & Rathore, S. S. (2023). Emerging contaminants and pharmaceutical residues in surface waters: Vulnerability of domestic treatment methods. *Environmental Science and Pollution Research*, 30(12), 34102–34118.

Bell-Gam, H. I. (2025). Educational strategies for water conservation and risk awareness: A descriptive survey in Rivers State, Nigeria. *Nigerian Journal of Environmental Education*, 14(1), 45–62.

Bubeck, P., Botzen, W. J., & Aerts, J. C. (2012). A review of risk perceptions and other factors that influence flood mitigation behavior. *Risk Analysis: An International Journal*, 32(9), 1481–1495.

Finn, S., & O'Fallon, L. R. (2022). Environmental health literacy: Concepts and strategies for effective community engagement. *Annual Review of Public Health*, 43, 115–132..

Ibrahim, M., & Musa, A. S. (2022). Urbanization and the degradation of surface water bodies in Northern Nigeria: A review. *Journal of African Earth Sciences*, 186, 104423.

Islam, M. S., Yunus, M., & Zaman, K. (2011). The impact of technical contamination data on household water safety behaviors in coastal Bangladesh. *Water Resources Research*, 47(8). https://doi.org/10.1029/2010WR010123

Jolly, S., Abubakar, B., & Garba, M. (2025). Environmental assessment of fecal coliform and organic pollutants in the Nukkai River, Jalingo. *Journal of Nigerian Environmental Science*, 21(2), 88–104.

Lindell, M. K., Arlikatti, S., & Huang, S. K. (2015). Protective Action Decision Model: Perceived exposure paths during biological contamination emergencies. *Risk Analysis*, 35(10), 1823 1842.

Little, J. C., Kohl, P. A., & Wardropper, C. K. (2023). Motivation for personal health versus environmental protection: Applying Protection Motivation Theory to water pollutants. *Journal of Environmental Psychology*, 89, 102045.

Malterud, K., Siersma, V. D., & Guassora, A. D. (2016). Sample size in qualitative interview studies: Guided by information power. *Qualitative Health Research*, 26(13), 1753–1760.

MDPI Water. (2025). Antimicrobial resistance in riverine ecosystems: The impact of anthropogenic pressure on community health efficacy. *Water*, 17(3), 412.

National Institutes of Health (NIH). (2025). *Long-term health impacts of heavy metals and microplastics in urban water systems*. U.S. Department of Health and Human Services.

Nelson, T. F., Gortmaker, S. L., & Xuan, Z. (2011). Protection motivation and behavioral change in environmental health contexts. *Social Science & Medicine*, 72(6), 896–903.

Ngobeka, P., & Nyirenda, M. (2024). Structural effectiveness of risk messengers: A mixed methods study of water authority communication in Zambia. *Journal of Health Communication*, 29(4), 210–225.

Nowicki, S., Charles, K. J., & Bradley, D. J. (2022). Coping appraisals and economic constraints in rural water safety. *Current Opinion in Environmental Sustainability*, 56, 101180.

Okonji, K. S. (2025). Perceptual mismatch and water-related risk in rocky-hill settlements: A cross-sectional analysis in Nigeria. *International Journal of Hygiene and Environmental Health*, 248, 114102.

Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *The Journal of Psychology*, 91(1), 93–114.

Rogers, R. W. (1983). Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation. In J. Cacioppo & R. Petty (Eds.), *Social Psychophysiology: A Sourcebook* (pp. 153–176). Guilford Press.

Wimmer, R. D., & Dominick, J. R. (2013). *Mass media research: An introduction* (10th ed.). Cengage Learning.

World Health Organization (WHO). (2021). *Risk communication and community engagement (RCCE) action plan guidance*. WHO Press.

World Health Organization (WHO). (2023). *Progress on household drinking water, sanitation and hygiene 2000-2022: Special focus on gender*. UNICEF and WHO.

World Health Organization (WHO). (2024). *Guidelines for drinking-water quality: Small water supplies and emerging chemical risks*. WHO Press.

Yudell, M., & Amon, J. J. (2024, January 23). *What's next for public health? Health Affairs Forefront*. https://doi.org/10.1377/forefront.20240118.594418