

Knowledge-Behavior Gap in Tap Water Consumption in Puerto Rico: Implications for Water Utilities

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Abstract

The impacts of climate-related hazards are becoming a major concern for many people worldwide, especially those in vulnerable areas such as Puerto Rico. In September 2017, Hurricane Maria caused severe disruption to the island's drinking water supply due to power outages, causing major problems for utility companies. This led to water insecurity, particularly among residents, who could not access safe, reliable, adequate, and affordable drinking water. Disaster-related water insecurity challenges are coupled with widespread public mistrust of tap water, yet some residents still consume tap water despite the mistrust.

Alternatively, a portion of those who trust the tap water quality choose not to consume it. This knowledge-behavior gap needs to be explored to understand tap water consumption behaviors in the context of mistrust and insecurity. This study's main goal was to identify why residents mistrusted their tap water and their behaviors in response to or despite mistrust. Data collection included household surveys and interviews with residents (n=154) from May 2022 to July 2022. Thematic qualitative analysis shows residents generally mistrust tap water because of its poor quality over the past decade based on its palatability properties (taste, color, and smell). In addition, people trust or mistrust tap water because of their lived personal positive or negative experiences with the water utility service in Puerto Rico. This study can be used to develop strategies to address water insecurity and understand public trust in the tap water supply provided by water utilities. Ultimately, this research emphasizes the need for more studies to explore the knowledge-behavior gap in order to understand why some people consume tap water despite the mistrust and vice versa.

Keywords

Knowledge Behavior Gap, Public Mistrust, Drinking Water, Hurricane Maria

Introduction

Climate-related hazards are an increasingly common experience for people around the world, especially in vulnerable areas. The effects of climate-related hazards have been a focal point of international research, particularly their impact on public utilities and health. The issue of safe and reliable water supplies is becoming increasingly critical given these extreme climate events. Puerto Rico and its water utility have historically faced tremendous challenges in providing potable water to its citizens (Jain et al., 2014). In September 2017, Puerto Rico was hit by Hurricane Maria, a devastating storm that caused widespread damage to the water infrastructure and made it difficult to access safe and clean drinking water from the water utility, the Puerto Rico Aqueduct and Sewer Authority (PRASA) which serves approximately 97% of the island's population (Ghosh et al., 2021; Keenum et al., 2021; Miller et al., 2019). The rivers that serve as the primary drinking water sources were affected and polluted by debris from the hurricane, threatening

the quality of tap water provided to consumers (Cortés, 2018; Lloréns & Stanchich, 2019). The damage to the water infrastructure and piping systems resulted in water service disruptions for close to 5 months in the aftermath of Hurricane Maria (Yabe et al., 2021). Repair works on water infrastructure after Hurricane Maria have been stalled, delayed, or abandoned due to the government's slow and inadequate early responses, logistical stumbles (e.g., the delayed opening of ports), slow delivery of supplies to municipalities, and other response factors (Roque et al., 2020). Most of the electrical infrastructure that provides power for the water distribution systems was affected, giving rise to a prolonged post-hurricane recovery (Brown et al., 2018; Kwasinski et al., 2019; Lin et al., 2020; Subramanian et al., 2018). About 44% of Puerto Rico's inhabitants lost access to safe drinking water in the aftermath of the hurricane (Ghosh et al., 2021).

On the other hand, an estimated 40,000 Puerto Ricans faced water contamination in 2015, two years before Hurricane Maria (Keenum et al., 2021; Lin et al., 2020). A significant portion of PRASA-connected small communities in Puerto Rico exceeded the total fecal coliform limits set by the Safe Drinking Water Act and are still struggling to date (Fischbach et al., 2020). Although some PRASA water plants did not have efficient disinfection capability before Hurricane Maria, the situation has been exacerbated in the aftermath of the disaster with fecal contamination on the rise as the local population has primary and secondary contact with rivers, and reservoirs may still use them as a source of untreated drinking water (Sánchez-Colón et al., 2022).

Challenges to public health and water safety concerns in Puerto Rico were documented before Hurricane Maria. For instance, a high incidence of *Salmonella* sp. in the water systems in Puerto Rico was recorded seven years prior to Hurricane Maria (Hunter et al., 2010). However, these issues have become more prominent in the hurricane's aftermath. The uncertain quality of tap water supplied by PRASA has caused concerns about the potential health risks for residents in Puerto Rico (Jain et al., 2014). These health problems are attributed to many water system challenges, including climate, contamination, and damaged infrastructure (Hunter et al., 2010; Keenum et al., 2021; Lin et al., 2020). Furthermore, during the water

79 shortage periods in the aftermath of Hurricane Maria, Puerto Rico recorded many health complications,
80 such as leptospirosis alongside diarrhea, pink eye, and skin rashes (Lin et al., 2020; Michaud & Kates,
81 2017). However, despite the concerning reports about the state of water systems in Puerto Rico, the exact
82 reasons for the public's mistrust of tap water from PRASA remain unclear (Preston et al., 2020).

83 In the context of the water sector, disasters can have a profound impact on essential services, such
84 as water utilities (Ghosh et al., 2021; Jain et al., 2014; Keenum et al., 2021; Miller et al., 2019) and the
85 health impacts of poor water quality (Hunter et al., 2010; Lin et al., 2020; Michaud & Kates, 2017).
86 However, the causes behind public mistrust in tap water, especially five years after Hurricane Maria, remain
87 underexplored (Preston et al., 2020). In understanding the public mistrust and consumption behaviors
88 regarding tap water in Puerto Rico, it is also crucial to shed light on the actual safety status of tap water.
89 Generally, the U.S. Environmental Protection Agency (EPA) regulates public water systems and sets legally
90 enforceable standards regarding the maximum levels of certain contaminants in drinking water (CDC, 2022;
91 US EPA, 2015b). PRASA, as a public water utility, is required to comply with these standards. However,
92 compliance and actual safety can vary due to different factors, including the aftermath of a natural disaster
93 like Hurricane Maria.

94 Following Hurricane Maria, PRASA and other stakeholders have made significant efforts to restore
95 and improve the water system (Delilah Roque et al., 2020; Preston et al., 2020). In ideal conditions, when
96 the water infrastructure is functioning properly, the water treated and supplied by PRASA should meet
97 EPA's Safe Drinking Water Act standards. However, infrastructural damage, contamination risks, and
98 delays in restoration efforts post-disaster may compromise the water quality temporarily, leading to
99 advisories for citizens to boil water before use or rely on bottled water.

100 This study attempts to address these gaps by asking, “What are the tap water consumption behaviors
101 in Puerto Rico?” We also ask, “Why do residents mistrust tap water in Puerto Rico despite recovery efforts
102 after Hurricane Maria?”(Jain et al., 2014; Yu et al., 2015). Beyond the specific context of Puerto Rico, the
103 issues explored in this study are applicable to other regions worldwide facing similar climate-related

hazards and their impact on water utilities and public health. By using this new theoretical lens, we hope to contribute fresh insights to the water-sector literature and provide practical recommendations for water utilities dealing with similar challenges.

To contribute to the knowledge of public mistrust of tap water, we used mixed research methods to study residents' tap water consumption trends and their perceptions of tap water and their lives after Hurricane Maria. We conducted household surveys (n=154) and interviews with residents (n=154) from May 2022 to July 2022 in Loíza, Comerío, and Aguas Buenas. The interviews ascertained their experiences, thoughts, and suggestions on the water quality in Loíza, Comerío, and Aguas Buenas after Hurricane Maria.

Literature Review

Public Mistrust of Drinking Water

Public mistrust is sometimes treated as synonymous with distrust or misplaced trust (Breakwell, 2020) and refers to the uncertainty about whether trust should be offered. Public mistrust, in this paper, refers to a lack of confidence and belief in the safety and quality of the water provided by public water utilities such as PRASA. Without trust or belief in a system, every effort made by water utilities to provide potable water that end users will consume would prove futile. Public mistrust affects social behavior by creating a sense of risk; however, there may not be conclusive evidence of the effects of these risks (Breakwell, 2020; Calman, 2002). Literature shows examples of promising water interventions that proved ineffective because there was public mistrust of project engineers from water utilities (Borland & In, 2014; Harvey & Reed, 2006). Some studies have found a direct correlation between the mistrust of tap water providers or bottled water companies and the public consumption rates from these sources (Doria, 2006). A separate study also found that university students who trusted their local water utility to deliver safe drinking water were likelier to drink from tap water sources. In contrast, those who mistrusted their government and university were more likely to drink bottled water (Grupper et al., 2021; Saylor et al., 2011).

The sources of public mistrust of tap water include individual and household indicators of socioeconomic status such as education level, household income, and racial or ethnic minority status (Pierce

et al., 2019; Pierce & Gonzalez, 2016). However, regardless of individual and household indicators of socioeconomic status, people are more likely to mistrust their tap water when it is unpalatable than when it is unsafe (Pierce & Lai, 2019; Spackman & Burlingame, 2018). The palatability of tap water is measured by its aesthetic characteristics, such as color, odor, and taste. A slight change in the color, odor, or taste of drinking water may raise suspicion (Young et al., 1996). In the United States, water quality is governed by primary and secondary regulations (CDC, 2022). Primary regulations limit contaminants that may impact human health (US EPA, 2015b), while secondary regulations guide parameters associated with aesthetic qualities such as taste, color, and odor (US EPA, 2015a). Traditionally, it is expected that adequately treated water should not only meet primary standards for health safety but also align with secondary standards, thereby presenting little to no color, taste, or unpleasant odor (Kearns et al., 2015). However, even when health-based standards are met, aesthetic issues can still arise because secondary standards may not be regulated or enforced. These aesthetic qualities can significantly influence public perception and trust in water utilities, even when the water is safe to consume from a health standpoint. The palatability ratings drive alternative drinking consumption, particularly bottled water consumption preferences over tap water (Huerta-Saenz et al., 2012). These palatability perceptions are important in distinguishing between tap and household filtered water drinkers, even when respondents have similar perceptions about unfiltered tap water safety, contamination, and health risks (Triplett et al., 2019). While literature assesses some sources of public mistrust for drinking water, there is a gap in why Puerto Ricans may express mistrust in tap water, especially after the post-Hurricane Maria recovery process. Puerto Rico's vulnerability to climatic events such as Hurricane Maria, which damaged its water infrastructure managed by PRASA, coupled with the socioeconomic vulnerabilities of residents who rely heavily on tap water from PRASA, makes it essential to study why there is public mistrust of tap water in Puerto Rico.

The Knowledge-Behavior Gap

Puerto Rico tends to perform worse in providing safe drinking water than the mainland United States due to a combination of a lack of investment in infrastructure, maintenance, testing, and the effects of natural

disasters (Hunter et al., 2010; Karim et al., 2020; Keenum et al., 2021). Hurricanes and tropical storms have made it difficult to ensure water quality meets US EPA standards on the island (Ferré et al., 2019; Kaufman, 2019; Keenum et al., 2021; Sánchez-Colón et al., 2022). In 2021, of the 78 municipalities in Puerto Rico, 17 were considered severe violators of the Safe Drinking Water Act by the US EPA. On the other hand, 400 out of the 456 drinking water utilities in the US have had some violations within the last 3 years (Mueller & Gasteyer, 2021). It is not uncommon to find tap water with high levels of fecal coliform contamination (Holman et al., 2014) and heavy metals (Apeti et al., 2012; Ortiz-Colón et al., 2016) in conjunction with unappealing palatability characteristics such as foul odor and color (Gonzalez, 2002; Jain et al., 2014). While the water quality in some municipalities may be better than others, the available studies demonstrate that water quality in many municipalities is not up to US EPA standards. Researchers have linked poor water quality to severe health implications for residents. Water-related diseases such as diarrhea have increased because of the poor water quality on the island (Ferré et al., 2019; Ghosh et al., 2021; Hunter et al., 2010). While there is extensive knowledge among scientists about the poor piped water conditions supplied by PRASA, it is unclear to what extent the population of Puerto Rico is aware of the health implications of the poor water quality.

Moreover, although a survey has not been done to measure the population's awareness, it is possible to infer that people may be aware but choose to consume tap water regardless of the potential health risks, as more than half the population on the island has used tap water as a drinking water source as of 2017 (Lin et al., 2020; Michaud & Kates, 2017). The knowledge-behavior gap theory is a concept in the field of public health that posits that individuals may have knowledge about healthy behaviors, such as the importance of regular exercise or eating a balanced diet, but they may not engage in those behaviors (Ajzen, 1991; Michie et al., 2011; Sligo & Jameson, 2000). The literature on this theory has been growing in recent years, with many studies focusing on identifying the factors contributing to the gap between knowledge and behavior. Some of the key factors that have been identified include social and environmental factors, such as access to healthy food options or safe places to exercise, and individual factors, such as lack of self-efficacy

(confidence in one's ability to carry out a behavior) or time constraints (Jones et al., 2009; Sligo & Jameson, 2000). Additionally, the knowledge-gap behavior may be fueled by health beliefs, such as perceived susceptibility to a particular health problem; health literacy, including the understanding of health information and ability to use it in decision-making; and psychological factors, such as lack of motivation or habit formation (Jones et al., 2009; Sligo & Jameson, 2000).

In this study, our primary objective was to investigate the factors contributing to the mistrust of tap water among residents in Puerto Rico, as well as to examine their behaviors in response to or despite this mistrust. The context of Puerto Rico after Hurricane Maria presents a compelling backdrop for exploring the knowledge-behavior gap phenomenon. The island has experienced previous incidents of water contamination and challenges with water infrastructure (Ghosh et al., 2021; Michaud & Kates, 2017; Preston et al., 2020), which may have eroded trust in the safety and quality of tap water. Considering the existing literature on climate hazards and water management, there remains a critical gap in comprehending public mistrust of tap water, particularly in the aftermath of a disaster. Our study seeks to address this gap by specifically focusing on the post-Hurricane Maria context in Puerto Rico, where the devastation severely impacted the island's water infrastructure (Marcos, 2022). We employ the theory of the knowledge-behavior gap within the water management sector context.

The theory of the knowledge-behavior gap, often utilized in health behavior research, explores the disconnect between individuals' knowledge and their actual behaviors. By extending the theory of the knowledge-behavior gap to examine the persisting mistrust of residents in Puerto Rico towards the tap water supplied by PRASA, despite extensive efforts to restore water quality, our research contributes to the understanding of the specific factors influencing attitudes and behaviors in Puerto Rico. This approach offers a unique perspective that focuses on the complexities of knowledge and behavior alignment, or lack thereof, in the post-disaster setting, specifically in relation to tap water mistrust in Puerto Rico. By investigating the reasons behind the persistence of tap water mistrust among Puerto Rican residents, despite efforts to restore water quality, we aim to offer insights into the unique experiences, perceptions, and

challenges faced by the population in relation to their attitudes and behaviors towards tap water. This knowledge can inform the development of targeted interventions and strategies to address tap water mistrust and promote healthier water consumption practices in Puerto Rico.

Furthermore, our research contributes to the broader field of interdisciplinary research. By examining tap water mistrust from various perspectives, including public health, sociology, psychology, environmental science, and engineering, we embrace an interdisciplinary approach. This collaboration allows us to gain a comprehensive understanding of the multifaceted factors influencing tap water mistrust and the knowledge-behavior gap. By integrating insights from different disciplines, we develop more holistic and effective strategies to address tap water mistrust and promote behavior change. This contribution highlights the importance of interdisciplinary research in tackling complex issues related to water mistrust and emphasizes the need for collaboration across diverse fields to achieve meaningful and impactful outcomes.

Our contributions to the generic mistrust literature in the water sector are twofold, offering insights into the complex relationship between knowledge, behavior, and trust/mistrust in the context of tap water consumption. By investigating the knowledge-behavior gap, we provide a fresh perspective on tap water mistrust and its implications. Firstly, we explore the knowledge-behavior gap specifically related to tap water consumption behaviors. This means we examine the disconnect between individuals' knowledge and awareness about the quality and safety of tap water and their actual behaviors regarding its consumption. This approach allows us to understand why individuals may possess knowledge about tap water but still exhibit behaviors that indicate mistrust or avoidance of its consumption. Secondly, our research focuses on residents in Puerto Rico, who represent a vulnerable population highly reliant on public utilities. By studying this specific context, we gain insights into the unique challenges faced by this population and their responses to tap water mistrust. Puerto Rico's history of water-related issues, such as water quality concerns and infrastructure challenges, makes it an important case study for understanding how trust and mistrust in tap water influence behavior.

We applied mixed research methods to explore the tap water consumption behaviors and perceptions among residents of three municipalities in Puerto Rico. By combining surveys and interviews, we aimed to capture a comprehensive understanding of the residents' experiences and views. In sum, our study contributes to a more nuanced understanding of public mistrust in tap water, addressing a critical gap in the water sector literature. The insights gained from our study have the potential to inform policy and practice, improving water security for communities grappling with climate-related hazards and aging infrastructure.

Methods

This study follows mixed methods research to address the literature gap by reporting on water consumption behaviors in Loíza, Comerío, and Aguas Buenas, Puerto Rico. Surveys and semi-structured interviews (n=154) were conducted with respondents from households in all three communities from May to June 2022. A mixed-methods approach is crucial to comprehensively understand the knowledge-behavior gap in water consumption in Puerto Rico because it provides a deeper analysis while identifying trends and patterns in a large dataset (Snelson, 2016; Tashakkori et al., 2020). For example, the quantitative aspect can help establish the extent of the knowledge-behavior gap by measuring the discrepancy between what people “know” about tap drinking water and their actual water consumption behaviors by answering the quantitative questions; “What percentage of people consume tap water?” and “What percentage of residents in Puerto Rico mistrust tap water despite recovery efforts after Hurricane Maria?”. This information helps in quantifying the size of the knowledge-behavior gap and understanding its pervasiveness across different communities or demographic groups. On the other hand, the qualitative aspect offers a deeper insight into the reasons behind the knowledge behavior gap. Using qualitative research, we can answer “what” and “why” questions such as “What are the tap water consumption behaviors in Puerto Rico?” and “Why do residents mistrust tap water in Puerto Rico despite recovery efforts after Hurricane Maria?”. Through methods like interviews or focus groups, individuals' perceptions, beliefs, and experiences regarding water consumption can be explored (Snelson, 2016; Starr, 2014). For instance, in the Puerto Rican context,

qualitative data might reveal the impact of historical experiences, trust issues with PRASA, or cultural practices affecting water consumption behavior.

In essence, the mixed-methods approach offers the depth and breadth needed to tackle the complexities of the knowledge-behavior gap. By integrating both quantitative numerical data and qualitative narrative information, it provides a more comprehensive, balanced, and nuanced understanding of the problem, which is invaluable for developing effective solutions.

Study Area and Research Context

Our three study areas are Loíza, Comerío, and Aguas Buenas. Loíza is a densely populated, predominantly Black-Hispanic municipality about 39 km (24 miles) east of the capital city, San Juan. Comerío and Aguas Buenas are predominantly White-Hispanic municipalities about 44km (27 miles) and 32.7 km (20 miles), respectively, south of San Juan. The three municipalities were chosen based on the considerable damage to the water infrastructure from Hurricane Maria. After Hurricane Maria, all three communities spent close to two months without access to safe drinking water. Furthermore, these communities still experience an unsteady supply of safe drinking water to their homes due to faulty piping infrastructure and frequent power outages (Laskow, 2018; Marcos, 2022).

Data Collection

We conducted the surveys and interviews simultaneously. To qualify for an interview and survey, participants had to have (1) been 18 years old and above and (2) experienced Hurricane Maria with flooding on their streets or property with a subsequent change in their drinking water quality. Both requirements were to ensure that residents had experienced how tap water quality was before Hurricane Maria. We went through a comprehensive process of explaining the informed consent form in the language the research participants were most comfortable with. Research participants were also provided a \$25 gift card. One of four research assistants trained in research methods administered all surveys and interviews in Spanish and in person. The Institutional Review Board (IRB) of Iowa State University approved our project methods.

Surveys

To ensure that our survey adequately captured the demographics and water use behaviors of the population, we employed proven techniques for survey dissemination and participant recruitment. Door-to-door and snowballing techniques have been shown to be effective in recruiting research participants, particularly in community-based studies (Perez et al., 2013). For our participant selection, we used a combination of quota and purposive sampling, methods that have been endorsed for their balance of statistical rigor and flexibility in field conditions (Emmel, 2013; Tashakkori et al., 2020). Quotas proportional to the respective population size in each barrio helped ensure our sample was representative, while purposive sampling allowed us to focus on those at home and willing to participate. We combed through the neighborhoods in Loíza, Comerío, and Aguas Buenas, moving door-to-door to explain our research scope and inviting all who met our criteria to participate voluntarily in our surveys. This active engagement approach has been linked to higher response rates in survey studies (Dillman et al., 2014).

The surveys included 46 major questions and were completed in an average of 50 minutes. The surveys collected data on the demographics of the research participants, including age, gender, income, educational levels, years of residency, and race. In addition to demographics, the surveys were used to collect data on the types of drinking water sources (tap, filtered tap, well, stream, harvested rain, and bottled water) that residents used and whether or not they trusted these drinking water sources. The research assistants asked questions about the people's drinking water sources and whether or not they trusted these water sources. A total of 154 surveys were conducted. The full survey used for this study may be found in Appendix 1.

Interviews

We used a semi-structured interview guide to collect in-depth insights from the research participants. This approach, characterized by its balance of predetermined questions and opportunities for open-ended responses, has been widely accepted as effective for exploring perceptions, attitudes, and behaviors in qualitative research (Starr, 2014). By employing an audio recorder and note-taking, we ensured that

participant responses were accurately captured, a recommended strategy for minimizing data loss and researcher bias during interviews (Breakwell et al., 2006; Ranney et al., 2015). The interviews typically lasted about 15 to 30 minutes per participant. Following each interview, participants were then asked to complete the survey, aligning with the 'sequential explanatory design' of mixed-methods research that starts with qualitative data collection followed by quantitative data collection (McKim, 2017). During the interviews, we asked specific questions to draw out tap water consumption behaviors by asking about drinking water perceptions, impacts of water contamination, and responses or adaptation measures to respond to the perceptions. To capture tap water consumption behaviors, we asked, "*Do you drink water from a tap water source?*" followed by, "*If no, why do you not drink from the tap water source?*". Similarly, to capture perceptions about trust and mistrust, we then asked, "*Do you trust water from the tap water source?*" followed by, "*If yes, why do you trust the water from the tap water source?*" or "*If no, why do you mistrust the water from the tap water source?*" Finally, we asked, "*If you mistrust the water from the tap water source, what do you do to make it feasible for drinking?*" These questions helped us to understand the drinking water realities and the adaptation measures taken by residents in response to the mistrust situation in Loíza, Comerío, and Aguas Buenas. After our interviews and surveys had been conducted, we gave each participant a \$25 gift card for the time taken and willingness to share, in some cases, personal and sensitive details about their experiences, thoughts, and comments with us. We conducted 154 interviews in total. All recordings were then transcribed following the IRB requirements of making the participants anonymous.

Qualitative Narrative Analysis

We adopted a narrative analysis approach to analyze the data collected from the interview transcripts (Bamberg, 2012). This approach, known for its capability to locate narratives in context and extract meaningful insights from them, was apt considering the unstructured and open-ended nature of our interviews. Our unit of analysis was each individual participant's account regarding their water consumption behavior and their trust or mistrust in tap water. Following an inductive analysis approach, we allowed

themes to emerge naturally from the data instead of relying on predetermined categories (Yilmaz, 2013). We utilized a qualitative coding framework to categorize and group these emergent themes. The initial codes were developed based on patterns observed in the data and then refined iteratively throughout the analysis process. The central themes from the interviews were grouped based on whether or not people drink tap water. These two groups were further divided into those who trust tap water and those who mistrust tap water.

To ensure the reliability of the coding process, two researchers independently coded the transcripts, and the results were compared to assess the consistency of coding (O'Connor & Joffe, 2020). Discrepancies that arose were resolved through discussions between the researchers until a consensus was reached, indicating substantial agreement between the coders (Hallgren, 2012). The coding and analysis of the data continued until no new codes and themes emerged, and theoretical saturation was achieved, following the approach outlined by Glaser & Strauss (2017). The concept of theoretical saturation refers to an analytical technique that indicates that the existing interviews provide sufficient information for theory development. Throughout this process, instances of negative cases or interviews that did not align with the overall coding framework were carefully considered by the authors, leading to reflection and subsequent modifications to the coding scheme. Saturation was deemed to have been reached when the identified codes and themes demonstrated repeated occurrence during the analysis of new interviews.

Results

A total of 154 surveys were collected from Loiza, Comerío, and Aguas Buenas. Of that number, 55 surveys were collected in Loiza, with 57 surveys from Comerío and an additional 42 surveys from Aguas Buenas. Furthermore, 154 interviews were conducted in Loiza, Comerío, and Aguas Buenas. Of that number, 56 interviews were from Loiza, 61 from Comerío, and 37 from Aguas Buenas.

Sample Characteristics

Table 1 summarizes the distribution of the demographic information across the interviews. It also shows

352 each community's percentages of tap water trust and consumption patterns. Table 2 shows the distribution
353 of the qualitative themes from the interviews across all three communities.

354 Table 1: Interview sample demographics

Demographic		Trust tap water but do not drink it		Mistrust tap water and do not drink it		Trust tap water and drink it		Mistrust tap water but drink it		Total	
		Obs (N)	%	Obs (N)	%	Obs (N)	%	Obs (N)	%	Obs (N)	%
Age (Years)	18 - 34	3	2	1	1	2	1	3	2	9	6
	35 - 54	3	2	11	7	5	3	1	1	20	13
	55 - 64	0	0	20	13	8	5	4	3	32	21
	65+	9	6	53	34	25	16	6	4	93	60
Gender	Male	3	2	21	14	11	7	5	3	40	26
	Female	12	8	64	42	29	19	9	6	114	74
Residency (Years)	0 – 10	1	1	8	5	4	3	2	1	15	10
	11 – 20	0	0	1	1	2	1	0	0	3	2
	21 – 30	1	1	5	3	1	1	4	3	11	7
	31 – 40	2	1	6	4	4	3	2	1	14	9
	40+	11	7	65	42	28	18	7	5	111	72
Education	Elementary	1	1	7	5	3	2	1	1	12	8
	Middle	1	1	10	6	4	3	0	0	15	10
	High School	8	5	46	30	13	8	8	5	75	49
	Bachelors	5	3	25	16	16	10	4	3	50	32
	Other/Missing	0	0	1	1	1	1	0	0	2	1
Race	AI / AN*	0	0	2	1	1	1	0	0	3	2
	Asian	0	0	0	0	0	0	0	0	0	0
	Black	0	0	25	16	13	8	3	2	41	27
	NH / PI**	0	0	0	0	0	0	0	0	0	0
	White	5	3	25	16	14	9	2	1	46	30
	Mixed	5	3	18	12	8	5	6	4	37	24
	Other/Missing	5	3	15	10	4	3	3	2	27	18
Community	Loiza	3	2	33	21	16	10	4	3	56	36
	Comerio	8	5	27	18	19	12	7	5	61	40
	Aguas Buenas	4	3	25	16	5	3	3	2	37	24

355 *American Indian / Alaska Native, **Native Hawaiian / Pacific Island

356 Table 2: Qualitative thematic framework of interviews

Trust	Consumption	Knowledge-Behavior Gap	Number of Observations (N)	Qualitative Reasons for Mistrust/Trust of Tap Water
Group A Mistrust Tap Water	A1 - Mistrust and Do Not Drink Tap Water	No	85	1. Aesthetics of Tap Water (Bad Taste, Smell, and Color) 2. Perceived Health Risks Associated with Tap Water
	A2 – Mistrust but Drink Tap Water	Yes	14	1. Perceived Substandard Treatment Process 2. Poor Piping System of Utility
Group B Trust Tap Water	B1 – Trust and Drink Tap Water	No	40	1. Good Experience from Decades of Usage 2. Perceived Excellent Treatment Process
	B2 – Trust but Do Not Drink Tap Water	Yes	15	1. Good Experience from Decades of Usage 2. Perceived Excellent Treatment Process

357 **Group A: Residents Who Mistrust Tap Water**

358 Group A represents the broad category of residents in Puerto Rico who mistrust the quality of tap water
359 provided by PRASA. Out of the 154 interviewed, 99 (64%) residents expressed mistrust toward their tap
360 water. Out of that number, 85 (86%) did not drink tap water entirely. This observation is expected as
361 mistrust in water sources is associated with non-consumption (Juran & Lahiri-Dutt, 2017; Kooy & Walter,
362 2019). Of residents who expressed mistrust in tap water and did not drink it, Loiza had 33 (39%), while
363 Comerio observed 27 (32%), and Aguas Buenas, 25 (29%) (Table 1). This difference in mistrust levels
364 could be attributed to the fact Loiza, located near the coast of Puerto Rico, has faced challenges with water
365 quality in the past. The municipality has had issues with contamination and infrastructure problems,
366 particularly after hurricane Maria. These events can erode trust in the local water supply and make residents
367 more cautious about consuming tap water. Comerio and Aguas Buenas, both mountainous areas, on the
368 other hand, might have had fewer reported incidents or a better track record in terms of water quality. The
369 coding framework shown in Table 2 for group A revealed that for residents who did not drink the tap water
370 as a result of their mistrust, their primary reasons for mistrust were the aesthetics of tap water characterized
371 by bad taste, color, and smell and the perceived health risks associated with drinking tap water. On the other

hand, for residents who drink tap water despite expressing their mistrust, their primary reasons for mistrust were the utility's poor treatment processes and the substandard piping systems of the utility.

Group A1: Residents Who Mistrust Tap Water and Do Not Drink Tap Water

The residents in group A1 display an alignment between their knowledge and behavior concerning the quality of their drinking water. They demonstrate a typical and appropriate reaction to their perceptive knowledge of the substandard quality of the water by avoiding its consumption. This group of residents, having had direct experience with the challenges associated with the water quality, abstain from drinking it.

Aesthetics of Tap Water

Across the three communities interviewed, our discussions made it apparent that most residents did not trust their tap water because of how it looked to them (Table 2). Many consumers in the United States have negative perceptions and mistrust their water quality due to its aesthetic appearance (Doria, 2009; Doria et al., 2009; Doria, 2006). The aesthetic aspects of tap water, including its taste, smell, and color, play a significant role in shaping people's perceptions and decisions about drinking it. In the case of Puerto Rico, these aesthetic characteristics can be categorized into three main factors: color, smell, and taste. It is worth noting that the experience of bad taste, smell, and color in tap water can often be related (Doria, 2009; Doria et al., 2009; Doria, 2006). For instance, unpleasant odors or flavors can contribute to the perception of poor water quality, while discoloration can also affect the taste and smell of the water. These factors can combine to create a negative overall aesthetic experience. However, it is important to recognize that the presence of one aesthetic issue does not necessarily imply the presence of others. In other words, tap water can have problems with taste, smell, or color individually, and these issues may not always occur together. For example, tap water might have a bad taste without any noticeable odor or discoloration, or it could have an off-putting smell without any visible color changes. The separation of these factors in the analysis allows for a more nuanced understanding of residents' concerns and preferences. By examining the specific grievances related to taste, smell, and color separately, it becomes possible to identify and address the

397 specific areas where improvements are needed in order to enhance the overall aesthetic quality of tap water.

398 *Bad Taste of Tap Water*

399 The taste of tap water in Puerto Rico has been reported by our interviewees to not be palatable. The frequent
400 water shortages may have led to increased pollutants that alter the taste of the tap water (Apeti et al., 2012;
401 Michaud & Kates, 2017). As a result, tap water provides a bad taste for residents in Puerto Rico.

402 Resident 53 said: *"I think the water has a lot of chemicals, making it difficult to drink. I can taste*
403 *the chemicals when I drink it. I have to put it in the fridge for a while before I can drink it."*

404 Resident 152 from Loiza said: *"The water tastes like the ocean, it tastes like salt, like the seawater*
405 *is getting in there somehow."*

406 Resident 145 noted that, *"the water tastes heavy, like it has minerals, it is hard to drink. I like the*
407 *bottled water because it goes down smoothly, is light, easy to drink. This is how it supposed to be."*

408 Resident 149 added, *"it doesn't happen for months, but sometimes it tastes like Clorox. When I see*
409 *this, it makes me think that it had a lot of bacteria and this was the quickest way to clean it."*

410 *Smell of Tap Water*

411 The smell of drinking water is no more appealing than its taste, according to the interviewees. The excessive
412 use of chemicals in the treatment of water for distribution has been found to emanate pungent smells that
413 may make consumption difficult for end users (Froese et al., 1999; Richardson & Postigo, 2012). The smell
414 of tap water played a substantial role in deciding whether to drink water from the taps. Residents recounted
415 that tap water smelled terrible, making it impossible to consume. A direct quote from Resident 20 explained
416 the situation: *"The water keeps going on and off and comes back after hours. There is lots of chlorine in*
417 *the water, which gives it a strong smell."*

418 Similarly, Resident 77 said: *"There are times when the water comes out very white and smells like*
419 *chlorine. I have to put it down for about 15 minutes for the smell of the chemicals to reduce before I can*
420 *drink it."*

Resident 151 added, *“After the last big storm (Maria), the water smelled like dead organisms when you open the faucet. There were a lot of fish that died and a lot of other animals like chickens, dogs, and cows. First, there was no water, but when it came back, you open the pipes and smelled like all those dead animals that drowned and decomposed in the waters for weeks and months.”*

Resident 142 commented, *“When there was a lot of problems with the water after Maria, it smelled like when you leave the clothes in the washer, and you forgot to put them on the sun to dry, and they started to dry inside the washing machine. They smell so bad you need to wash the clothes again! I knew I could not drink water that smelled like that.”*

Resident 154 said: *“I am not sure if it is my bathroom or it is the water, but to me, it smells like urine. I close the doors of the bathrooms and make sure there is no leakage on the sink to avoid that smell.”*

Color of Tap Water

The color of the primary source of tap water is also a prominent challenge for all three communities. We understood that the water could sometimes change color and become unappealing. We were also told that this issue has become much more prominent after Hurricane Maria.

Resident 33 lamented, *“The tap water is cloudy. It became cloudy after Hurricane Maria. Whenever it rains now, the tap water is cloudy.”*

Resident 148 said, *“Besides the odor when the water has Clorox is noticeable, this off-white color, sort of cloudy, not clear like the bottled water.”*

Resident 151 commented, *“At times, it has some sort of dirt, kind of brown or reddish sediment and cloudy.”*

Perceived Health Risks Associated with Tap Water

The literature has consistently demonstrated the negative impacts that substandard drinking water can have on human health. Adequate levels of water quality, as established by drinking water standards such as the US EPA’s Safe Drinking Water Act, are essential for the maintenance of good health (Bain et al., 2012; Buor, 2004). While previous studies have primarily examined the long-term health implications of water

quality issues by analyzing patterns of disease incidence (Cooper-Vince et al., 2018; Hunter et al., 2010; Kangmennaang et al., 2020), it has been observed that residents in Puerto Rico often experience immediate and noticeable reactions upon consuming tap water, which is a cause for concern. This is particularly true in the aftermath of natural disasters such as Hurricane Maria, where instances of waterborne illnesses such as leptospirosis and diarrhea have been reported. Furthermore, residents have reported feeling nauseous after consuming tap water, leading to a loss of trust in the safety and quality of tap water. This sentiment is exemplified by resident 12, who stated, *“The water comes out oddly colored, and when I drink, it makes me feel sick in my stomach. If I continue to drink it, I will contract a serious illness.”*

Resident 148 explained, *“I was very cautious after Maria, I boiled the water, but I still got diarrhea, and I will not forget how sick I was since then. I am just scared of the water.”*

Resident 145 said, *“I do not drink the water from the tap. I am afraid it will make me sick.”*

Group A2: Residents Who Mistrust Tap Water but Drink Tap Water

The residents in group A2 demonstrate a gap between their knowledge and behavior regarding the consumption of drinking water. Despite expressing skepticism towards the quality of tap water, these residents continue to consume it for a range of reasons, resulting in a paradoxical knowledge-behavior gap.

Perception of Substandard Treatment Process of Tap Water

Perceived poor treatment of their tap water is a reasonable reason for residents to mistrust tap water. However, the enigma in Puerto Rico is that although residents are armed with perceptions about the poor treatment of tap water, they still drink it regardless. The phenomenon was confusing because we expected that mistrusting tap water meant no or limited consumption. Resident 82, who does not trust his tap water but still drinks it, is quoted as saying, *“I have the impression that the tap water is not well treated. That it brings a lot of harmful chemicals and many contaminants. I still drink it sometimes.”*

Resident 141 added, *“I do not like the tap water because it is improperly treated, but I drink it many times just because I run out of bottled water. I do not have a car, and I depend on my kids to bring me food, water, and all the things I need. I do not want to inconvenience other people.”*

Perception of Substandard Piping Systems

Residents consistently expressed concerns about Puerto Rico's water utility service, PRASA. Despite documented efforts by PRASA to fix the problems associated with water utility services on the island (Bisbal-López, 2021; Caribbean Business, 2021), there is still a public outcry about the challenges with the water distribution system in Puerto Rico. Broken distribution lines, faulty valves, and in some cases, broken pumping stations characterize the water distribution systems on the island. These distribution systems have become damaged and have been under repair and maintenance over the years, especially in the aftermath of Hurricane Maria. Hearing about broken distribution lines or pumping stations regularly has caused residents to mistrust the tap water the failing system provides their homes. Nevertheless, although all the mistrust is harbored towards the tap water because of the piping system of PRASA, some residents drink tap water regardless. Resident 132, who mistrusts the tap water but still drinks it anyway, explains why by saying, *"I drink the tap water. I also use it for washing and cleaning, but I do not trust it because the pipes are broken, and sometimes the water changes color when it rains. It is not safe for drinking."*

Resident 143 stated, *"I heard the water had lead because of all of the old pipe system. I know lead is not good for anyone, but I am an older person, and it is not as bad as if I were a kid. So, I drink the water because although it might be bad is not that bad for me, personally."*

Group B: Residents Who Trust Tap Water

Group B represents the broad category of residents in Puerto Rico who trust in the quality of tap water provided by PRASA. 55 (35.7%) residents out of the 154 interviewed trusted their tap water. 40 of the 55 residents who trusted their tap water consumed it. The coding framework shown in Table 2 for group B revealed that for residents who trust and drink their tap water, their primary reasons for trusting it are good experiences from decades of usage and the utility's excellent treatment of the tap water. Similarly, residents who did not drink tap water despite reporting that they trusted it had the same reasons as their counterparts who drank tap water. These residents also trusted their tap water because they had good experiences from decades of usage and believed that the utility treated the tap water excellently.

Group B1: Residents Who Trust Tap Water and Drink Tap Water

Group B1 exhibits an alignment between their knowledge and behavior regarding tap water consumption. These residents demonstrate normal and optimal behavior in regard to their trust in and consumption of tap water provided by PRASA. They exhibit a reaction that aligns with their positive perception of tap water.

Good Experience from Decades of Drinking Tap Water

Having excellent and reliable tap water is what most Puerto Ricans fight for. However, some residents on the island believe that their tap water is of outstanding quality and trust in its standards. These residents demonstrate their trust in the water by drinking it and using it for decades as their primary water source. These residents who have been living in Puerto Rico for a long time and using tap water for more than four decades with no issues have allowed the formation of positive perceptions about the quality of tap drinking. It could be inferred that the changes by the water utility company over the years have helped bolster the trust and consumption of tap water amongst these residents. These residents do not foresee any adverse consequences in using tap water and thus have unwavering faith and trust in it. Resident 39, who trusts in her tap water and drinks it, said: *“I have been drinking this water for a long time. It is not contaminated or anything, and I do not have to use a filter.”*

Resident 153 said, *“I never had any problems drinking the water, I have never gotten sick, why I would not trust it? I have been drinking this water since I was a kid, no one had water filters and none of these fancy things you have now. Bottle waters were a luxury! I am an old person already, so obviously, this water is not going to kill me, it is fine. The water is just fine.”*

Perception of Excellent Treatment Process of Tap Water

Residents of Puerto Rico who consume tap water and trust in its quality do so due to their belief in the effectiveness of the treatment processes implemented by PRASA. These residents may perceive that their water is treated in accordance with federal water standards and believe in the safety of the water.

520 Furthermore, some residents may associate the presence of chlorine in their tap water, as indicated by its
521 smell and taste, with good water quality. Resident 47 is quoted as saying, *“And I drink water from the tap.
522 Okay. Moreover, I would say it is pretty good, and it is treated properly.”*

523 Resident 146 said, *“I worked with PRASA for a while, and I know they are doing a good job because
524 I worked there. They treat the water well, and it is safe for people to drink.”*

525 **Group B2: Residents Who Trust Tap Water but Do Not Drink Tap Water**

526 Group B2 displayed a paradoxical pattern in their drinking water consumption behaviors. Despite
527 professing trust in the quality of the tap water, these residents reported not consuming it. Even if they trust
528 the quality of the water, residents talked about how convenient, affordable, and reliable it is to drink bottled
529 water compared to tap water. Some mentioned not drinking it because of the stigma associated with drinking
530 it and not wanting to fight with family members who did not trust the water.

531 Resident 147 said, *“I trust that the water is safe for people to drink, but I do not drink it because is
532 just easier to drink bottled water. I put the bottled in the fridge and I do not have to be filling out containers
533 that take a lot of space. My family is always fighting to see who fills out the containers, they are heavy to
534 lift and no one wants to do it. Bottled water is just convenient, easy to pick up.”*

535 Participant 144 expressed, *“Bottled water is now so cheap that why not drink that? It is not that
536 the water from the tap is bad water, but it has a taste sometimes and is kind of unpredictable. I like
537 predictability, something that tastes the same all of the time. So, I drink bottled water. And again, it is cheap
538 so why risk the different tastes, colors, odors. I like it when it is the same.”*

539 Resident 150 added, *“People in my family do not trust the water and they shame me for drinking
540 it. They say I am going to get sick, asking why you drink water? It is bad!...that it tastes bad. They made
541 me feel I am ignorant or uneducated for drinking it. They ask if I am being just cheap and that is why I
542 drink it. I just do not want to fight with them, so I drink the bottled water.”*

543 **Discussion**

544 Residents in Puerto Rico have a wide range of reasons and unique situations for choosing whether or not to

trust or mistrust their tap water. In addition to these reasons for trust or mistrust in their tap water, residents act on their trust or mistrust of tap water by choosing whether or not to consume it. The knowledge-behavior gap is evident when residents either trust in the quality of their tap water but, for some reason, do not drink it or when residents mistrust it with valid reasons but still go ahead to drink it.

Knowledge-Behavior Gap

The phenomenon of misaligned knowledge-behavior relationships among a group of residents amongst Group A2 residents presents a perplexing dilemma. Despite evidence of reasons for mistrust in the local water supply, such as poor piping systems, these residents continue to consume tap water. The context of Puerto Rico must be taken into consideration when examining this phenomenon. It is possible that financial constraints and lack of accessibility to alternative drinking water sources may play a role in this knowledge-behavior gap (Cortés, 2018; Delilah Roque et al., 2020; Yu et al., 2015). It has been observed that residents are less likely to seek out alternative sources of drinking water due to mobility and logistical difficulties (Apt, 2013; Banks et al., 2019; Wrisdale et al., 2017). These extenuating circumstances highlight the importance of ensuring that tap water quality meets acceptable federal standards and that the information is readily accessible to residents. Furthermore, this knowledge-behavior gap may have negative psychological implications, as residents are aware of the potential health hazards associated with the consumption of unsafe water yet continue to consume it due to a lack of feasible alternatives. Further research is recommended in order to understand and address this enigmatic behavior and ensure that residents are not forced to compromise their health due to financial constraints or other factors.

On the other hand, in an interesting reversal of the typical knowledge-behavior gap, some residents in Puerto Rico demonstrate trust in the safety of their tap water while refraining from consuming it. Despite having confidence in its quality, individuals may opt for alternative sources of drinking water due to the accessibility of other alternative water sources, such as bottled water, or external pressure from family or friends over the concerns of tap water quality issues. This phenomenon highlights the complex relationship between knowledge, perception, and behavior and underscores the importance of addressing not only water

quality issues but also broader systemic challenges to ensure residents' access to safe and reliable drinking water.

Knowledge-Behavior Alignment

Group A1 consisted of residents who believed that their tap water was unsafe for consumption and, as a result, did not use it. This sentiment is shared by a significant portion of the Puerto Rican population, as evidenced by ongoing concerns about the injustices experienced in the aftermath of Hurricane Maria. The aesthetic characteristics of the tap water, specifically appearance, smell, and taste, were identified as primary concerns among residents of Loíza, Comerío, and Aguas Buenas. It can be inferred that if these characteristics had been improved, a larger portion of the population might have continued to consume tap water. This observation is significant as it suggests that negative public perception and mistrust of tap water may be largely influenced by firsthand experiences with the water's appearance, smell, and taste, a correlation that has been previously established in the literature (de França Doria, 2009; Pierce & Gonzalez, 2016). Additionally, residents' concerns about the potential health hazards associated with tap water consumption were found to be validated by literature, with studies documenting a high incidence of waterborne diarrheal diseases in Puerto Rico and other Caribbean islands (Hunter et al., 2010). However, it is important to note that further research is needed to determine the accuracy of these negative perceptions and to understand the extent of water contamination in Puerto Rico.

On the other hand, Group B1 represents the situation where residents trust in tap water quality and use it as their primary drinking water source. This behavior is significant because despite the challenges and issues faced, the tap water in most communities in Puerto Rico generally meets the established drinking water criteria as set by regulatory standards (Mueller & Gasteyer, 2021). However, it is important to note that there have been instances where drinking water criteria have been violated, particularly in specific locations or during certain periods of time (Fedinick et al., 2017; Michaud & Kates, 2017). And, the way the public is informed of problems with water quality when/if they occur plays a role in the types of perceptions formed about tap water. Which is particularly important because of the increasing number of

vulnerable people in Puerto Rico, so the need for reliable information for tap water consumption decision-making is greater.

Opportunities and Recommendations for Utility Management

PRASA's monopoly status plays a significant role in water utility management in Puerto Rico. The lack of competition could result in a lack of motivation for PRASA to improve service quality and efficiency. Possible alternatives to this monopoly include decentralized water management or community-based water provision, which could offer more flexibility and adaptability, especially in rural areas. These decentralized systems have been successful across Añasco, Mayaguez, and Rincón, where water-sharing networks are used to overcome PRASA's inefficiencies (Roque et al., 2021). These alternatives would involve a shift from the top-down control of a single entity to a more participatory and inclusive approach, with local communities taking charge of their own water management. Such a shift could potentially lead to more sustainable water practices and a smaller knowledge-behavior gap.

The issue of the knowledge-behavior gap, as identified in this study, is a nuanced problem that needs a tailored approach to resolve. This gap is essentially a divergence between consumers' understanding of tap water quality provisioned by water utilities and their behavior in relation to it. The findings of this study reveal that while consumers may exhibit trust toward tap water, their consumption patterns often tell a different story. This discrepancy indicates that personal experiences with water utilities are a significant factor in shaping consumer behavior. Therefore, it becomes essential to address this knowledge-behavior gap in utility management.

To address the knowledge-behavior gap, the first recommendation would be to augment public education on potential risks associated with contaminated tap water. However, utility providers may be limited by budgetary and institutional constraints. Therefore, the emphasis should be on making the best use of available resources to maximize educational outreach. Secondly, the study suggests that community-wide initiatives should be fostered to tackle tap water quality issues. However, it is crucial to be mindful of the practical implications of such efforts, as utilities often operate under tight constraints financially.

Thirdly, there is a need for policies that strengthen the protection of tap water quality. While formulating and implementing such policies, it is essential to consider the realities of limited revenue and governmental support. Policies should be designed in such a way that they are effective despite these constraints. Lastly, it is recommended that an improved, robust system of routine monitoring and reporting of water consumption behaviors and quality be instituted. This would hold PRASA and other responsible entities accountable. The complexities of such an undertaking should not be underestimated, but a system of checks and balances is crucial for effective utility management.

While it important to acknowledge that water utilities often function in the context of complex settings, financial constraints, and environments, these strategies, while designed to tackle the identified knowledge-behavior gap, are also meant to take into consideration the realities and constraints of water utility management. By following these, utilities can not only bridge the gap but also ensure improved consumer satisfaction and efficient use of resources.

Limitations

While our study has provided insights into the tap water consumption behaviors and perceptions among residents in Puerto Rico, it is also important to acknowledge its limitations. One such limitation is potential respondent fatigue due to the length of our survey. The surveys, with 46 major questions, took an average of 50 minutes to complete. The length of the survey could have led to fatigue among the respondents, affecting their attention, accuracy, or willingness to provide comprehensive answers toward the end of the survey. Future studies may consider using shorter surveys or dividing the survey into several sessions to minimize this effect.

Another limitation is that our method of asking for permission to record interviews was met with resistance from some participants because of fear of the government redlining them. This limitation resulted in the loss of potential qualitative data that could have provided deeper insights into the reasons for mistrust in tap water among residents in Puerto Rico.

Despite these limitations, we believe that our study has shed new light on the issue of public mistrust in tap water, providing insights that can guide efforts to address this issue. We encourage future research to build upon our work, exploring this issue in different demographics and contexts and using methodologies that further minimize potential limitations.

Conclusion

The increased water contamination risks in Puerto Rico and the poor quality of tap water are very troubling. Extraordinary events like hurricanes, earthquakes, and the COVID-19 pandemic have exacerbated the water contamination risks and, consequently, the residents' way of life in Loíza, Comerío, and Aguas Buenas in Puerto Rico. The drinking water quality has been characterized by high levels of arsenic, high sedimentation, and pathogenic *Leptospira* spp contamination in the aftermath of Hurricane Maria.

Following the qualitative narrative model, to understand the relationships between residents of our study areas and their public mistrust of tap water, we explored residents' tap water quality perceptions and their tap water consumption behaviors. We identified four major themes through a comprehensive coding framework derived from in-depth interviews (N=154), demonstrated by repeating ideas representing the factors that catalyzed the positive and negative perceptions of tap water quality. We found a general public mistrust of the tap water provided by the public water utility service because of the impacts of Hurricane Maria on the water infrastructure and the palatability characteristics of tap water provided by the Puerto Rico Aqueduct and Sewer Authority (PRASA). We also found a knowledge-behavior gap amongst groups that either trust in the quality of their tap water but do not drink it for some reason or groups that mistrust the tap water with valid reasons but still go ahead to drink it.

This study demonstrated that it is essential to further develop evidence-based strategies to address the knowledge-behavior gap and to promote public trust in the safety and quality of tap water in Puerto Rico. Such strategies should be implemented in collaboration with local stakeholders, with a focus on improving the palatability characteristics of tap water and updating the water infrastructure. In addition, further research is needed to develop an understanding of the sociocultural and economic factors that influence the knowledge-behavior gap and the public mistrust of tap water in Puerto Rico.

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Appendix

Appendix 1 Interview and Survey Sample (English)

Iowa State University is conducting a survey sponsored by the U.S. Environmental Protection Agency. The survey includes questions about drinking water practices and perceptions after disasters such as Hurricane Maria. The survey will take about 1 hour of your time to complete. We offer **\$25 Walmart Gift Cards as a token of our appreciation.** The information collected will be kept confidential, and it will only be used for academic purposes. **You may skip any question you do not wish to answer in the survey. Your participation in this survey is entirely voluntary and anonymous.** Participants **MUST** be 18 years or older.

Are you or someone in this house more than 18 years old?

- No – Sorry, you do not qualify for the study. Can you refer me to someone in this neighborhood 18 years or older who might be interested?
- Yes – Would you be interested in participating?
 - No – Can you refer me to someone in this neighborhood who might be interested?
 - Yes – Proceed.

If you have any questions or concerns regarding confidentiality or the study, don't hesitate to contact Dr. Cristina Poleacovschi (poleacov@iastate.edu) or Dr. Ivis Garcia Zambrana (801-833-4073 ivis.garcia@utah.edu) Thank you for your time!

PUBLIC PERCEPTIONS, ATTITUDE, KNOWLEDGE, AND AWARENESS

1. My household address is:

- a) Street 1: _____
- b) Street 2 (Apt. etc.) _____
- c) City _____
- d) State _____
- e) Zip code _____
- f) GPS Coordinates (to be filled out by researcher) _____
- g) Water Sample ID (to be filled out by researcher) _____

2. Do you get potable/drinking water services from the Puerto Rico Aqueduct and Sewer Authority (PRASA)? (1) Yes; (2) No; (3) I don't know

3. How long have you had potable water service from the Puerto Rico Aqueduct and Sewer Authority (PRASA)? (1) 1 to 5 years; (2) 6 to 10 years; (3) More than 10 years; (4) I don't know

4. Do you drink water from a tap water source?

(1) Yes, (2) No

5. If no, why do you not drink water from a tap water source?

6. If yes, the frequency with which you drink tap water daily is?

(1) Never; (2) Rarely (1 – 2 glasses); (3) Sometimes (3 – 4 glasses); (4) Often (4 to 5 glasses); (5) Always (More than 5 glasses)

- 971 7. **Do you trust water from the tap water source?**
 972 (1) Yes, (2) No
 973
 974 8. **If yes to Q7, why do you trust tap water?**
 975 _____
 976
 977 9. **If no to Q7, why do you mistrust tap water?**
 978 _____
 979
 980 10. **If you do not trust tap water, what do you do to make it more feasible to drink?**
 981 _____
 982
 983 11. **How do you get information about this process [related to Q10]?**
 984 _____
 985
 986 12. **Do you drink water from a filtered tap water source?**
 987 (1) Yes, (2) No
 988
 989 13. **If no, why do you not drink water from a filtered tap water source?**
 990 _____
 991
 992 14. **If yes, the frequency with which you drink filtered tap water daily is?**
 993 (1) Never; (2) Rarely (1 – 2 glasses); (3) Sometimes (3 – 4 glasses); (4) Often (4 to 5 glasses); (5) Always (More
 994 than 5 glasses)
 995
 996 15. **Do you trust water from the filtered tap water source?**
 997 (1) Yes, (2) No
 998
 999 16. **If yes to Q15, why do you trust filtered tap water sources?**
 1000 _____
 1001
 1002 17. **If no to Q15, why do you mistrust filtered tap water sources?**
 1003 _____
 1004
 1005 18. **If you do not trust filtered tap water sources, what do you do to make it more feasible to drink?**
 1006 _____
 1007
 1008 19. **How do you get information about this process [related to Q18]?**
 1009 _____
 1010
 1011 20. **Do you drink water from a well water source?**
 1012 (1) Yes, (2) No
 1013
 1014 21. **If no, why do you not drink water from a well water source?**
 1015 _____
 1016
 1017 22. **If yes, the frequency with which you drink well water daily is?**
 1018 (1) Never; (2) Rarely (1 – 2 glasses); (3) Sometimes (3 – 4 glasses); (4) Often (4 to 5 glasses); (5) Always (More
 1019 than 5 glasses)
 1020
 1021 23. **Do you trust water from the well water source?**

- 1022 (1) Yes, (2) No
 1023
 1024 24. If yes to Q23, why do you trust well water sources?
 1025 _____
 1026
 1027 25. If no to Q23, why do you mistrust well water sources?
 1028 _____
 1029
 1030 26. If you do not trust well water sources, what do you do to make it more feasible?
 1031 _____
 1032
 1033 27. How do you get information about this process [related to Q27]?
 1034 _____
 1035
 1036 28. Do you drink water from a bottled water source?
 1037 (1) Yes, (2) No
 1038
 1039 29. If no, why do you not drink water from a bottled water source?
 1040 _____
 1041
 1042 30. If yes, the frequency with which you drink bottled water daily is?
 1043 (1) Never; (2) Rarely (1 – 2 glasses); (3) Sometimes (3 – 4 glasses); (4) Often (4 to 5 glasses); (5) Always (More
 1044 than 5 glasses)
 1045
 1046 31. Do you trust water from the bottled water source?
 1047 (1) Yes, (2) No
 1048
 1049 32. If yes to Q31, why do you trust bottled water sources?
 1050 _____
 1051
 1052 33. If no to Q31, why do you mistrust bottled water sources?
 1053 _____
 1054
 1055 34. If you do not trust bottled water sources, what do you do to make it more feasible to drink?
 1056 _____
 1057
 1058 35. How do you get information about this process [related to Q34]?
 1059 _____
 1060
 1061 36. Do you drink water from a harvested rainwater source?
 1062 (1) Yes, (2) No
 1063
 1064 37. If no, why do you not drink water from a harvested rainwater source?
 1065 _____
 1066
 1067 38. If yes, the frequency with which you drink harvested rainwater is?
 1068 (1) Never; (2) Rarely (1 – 2 glasses); (3) Sometimes (3 – 4 glasses); (4) Often (4 to 5 glasses); (5) Always (More
 1069 than 5 glasses)
 1070
 1071 39. Do you trust water from the harvested rainwater source?
 1072 (1) Yes, (2) No

- 1073
1074 40. **If yes to Q39, why do you trust harvested rainwater sources?**
1075 _____
1076
1077 41. **If no to Q39, why do you mistrust harvested rainwater sources?**
1078 _____
1079
1080 42. **If you do not trust harvested rainwater sources, what do you do to make it more feasible to drink?**
1081 _____
1082
1083 43. **How do you get information about this process [related to Q42]?**
1084 _____
1085
1086 44. **Do you drink water from a stream/river source?**
1087 (1) Yes, (2) No
1088
1089 45. **If yes, the frequency with which you drink stream/river water is?**
1090 (1) Never; (2) Rarely (1 – 2 glasses); (3) Sometimes (3 – 4 glasses); (4) Often (4 to 5 glasses); (5) Always (More
1091 than 5 glasses)
1092
1093 46. **If no, why do you not drink water from a stream/river water source?**
1094 _____
1095
1096 47. **Do you trust water from the stream/river source?**
1097 (1) Yes, (2) No
1098
1099 48. **If yes to Q47, why do you trust stream/river water sources?**
1100 _____
1101
1102 49. **If no to Q47, why do you mistrust stream/river water sources?**
1103 _____
1104
1105 50. **If you do not trust stream/river water, what do you do to make it more feasible to drink?**
1106 _____
1107
1108 51. **How do you get information about this process [related to Q50]?**
1109 _____
1110
1111 52. **We would like to know your water drinking practices before/after Hurricane Maria; please indicate the**
1112 **following about sources of drinking water:**
1113

Please indicate your primary source of drinking water	Before Hurricane Maria	
	YES	NO
Tap Water	☐	☐
Filtered Tap Water (Please mention brand): _____	☐	☐
Well Water	☐	☐

Bottle Water (Please mention brand): _____	☐	☐
Harvested Rain Water	☐	☐
Stream / River	☐	☐
Other: Please Specify _____	☐	☐

1114
1115

Please indicate your primary source of drinking water	After Hurricane Maria	
	YES	NO
Tap Water	☐	☐
Filtered Tap Water (Please mention brand): _____	☐	☐
Well Water	☐	☐
Bottle Water (Please mention brand): _____	☐	☐
Harvested Rain Water	☐	☐
Stream / River	☐	☐
Other: Please Specify _____	☐	☐

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53. How long did it take for your tap water services from the Puerto Rico Aqueduct and Sewer Authority (PRASA) to be restored after Hurricane Maria? Please tell us the Month and Year

54. If Q53 includes [YES – NO] combination, Please tell us why you stopped using these water sources after Hurricane Maria

55. If Q53 includes [YES – YES] combination, Please tell us why you continued using these water sources after Hurricane Maria

56. If Q53 includes [NO – YES] combination, Please tell us why you started using these water sources after Hurricane Maria

1143 57. **Based on your experience with tap water, please indicate your opinion on the following statements:**
 1144

Water Quality Perception Variables	Not at all	Very small degree	Small degree	Moderate degree	Great degree	Very great degree
Tap water is usually of high quality.	☐	☐	☐	☐	☐	☐
There are health risks associated with drinking water in my home from my tap.	☐	☐	☐	☐	☐	☐
I am happy with the taste of my tap water.	☐	☐	☐	☐	☐	☐
I am happy with the color of my tap water.	☐	☐	☐	☐	☐	☐
I am happy with the smell of my tap water.	☐	☐	☐	☐	☐	☐
The water pipes and taps of my home are clean and well maintained.	☐	☐	☐	☐	☐	☐
Some friends told me negative comments regarding my tap water.	☐	☐	☐	☐	☐	☐
Some family members told me negative comments regarding my tap water.	☐	☐	☐	☐	☐	☐
Tap water has caused health problems for me or for someone in my family.	☐	☐	☐	☐	☐	☐
I trust my water service company (i.e., AAA/PRASA).	☐	☐	☐	☐	☐	☐
I am used to my tap water.	☐	☐	☐	☐	☐	☐
I am satisfied with the tap water pressure in my home.	☐	☐	☐	☐	☐	☐
My tap water is contaminated with lead or any chemicals.	☐	☐	☐	☐	☐	☐
My tap water has too much chlorine.	☐	☐	☐	☐	☐	☐
My tap water has too much limescale.	☐	☐	☐	☐	☐	☐
My tap water is too hard	☐	☐	☐	☐	☐	☐
I am worried about the quality of water and water contamination (e.g., chemicals) during the hurricane season	☐	☐	☐	☐	☐	☐
I am worried about the quality of water and water contamination (e.g., chemicals) after the hurricane season	☐	☐	☐	☐	☐	☐

1145
 1146
 1147 58. **How was your water quality before Hurricane Maria?**
 1148 (1) No noticeable change; (2) my water quality was very bad; (3) my water quality was bad; (4) my water quality
 1149 was good; (5) my water quality is very good.
 1150
 1151 59. **How was your water quality during the Hurricane Maria season?**

1152 (1) No noticeable change; (2) my water quality was very bad; (3) my water quality was bad; (4) my water quality
 1153 was good; (5) my water quality was very good.

1154
 1155 60. **How has your water quality changed after Hurricane Maria?**

1156 (1) No noticeable change; (2) my water quality is very bad; (3) my water quality is bad; (4) my water quality is
 1157 good; (5) my water quality is very good.

1158
 1159 61. **Based on the usage of water in your household, please indicate your opinion on the following statements:**

Adapted from HWISE Scale	Never (0 times)	Rarely (1 – 2 times)	Sometimes (3 – 10 times)	Often (11 – 20 times)	Always (more than 20 times)
I worry about not having enough water for all of my household needs.	☐	☐	☐	☐	☐
My tap water source has been interrupted or limited (e.g., water pressure, less water than expected).	☐	☐	☐	☐	☐
I could not wash my clothes because of problems with water quantity.	☐	☐	☐	☐	☐
I had to change schedules or plans due to problems with my water situation. (Activities that may have been interrupted include caring for others, doing household chores, agricultural work, income-generating activities, sleeping, etc.)	☐	☐	☐	☐	☐
I had to change what was being eaten in my household because there were problems with water quantity (e.g., for washing foods, cooking, etc.)	☐	☐	☐	☐	☐
I had to go without washing hands after dirty activities (e.g., defecating or changing diapers, cleaning animal dung) because of problems with water quantity.	☐	☐	☐	☐	☐
I had to go without bathing because of problems with water quantity (e.g., not enough water)	☐	☐	☐	☐	☐
There has not been as much water to drink as I would like for me, and my household	☐	☐	☐	☐	☐
I feel angry about my water quantity situation.	☐	☐	☐	☐	☐
I have gone to sleep thirsty because there wasn't any water to drink.	☐	☐	☐	☐	☐
There has been no useable or drinkable tap water whatsoever in my household.	☐	☐	☐	☐	☐
I feel ashamed/excluded/stigmatized because of the water quantity situation in my household	☐	☐	☐	☐	☐

1161

1162 62. Based on the usage of water in your homes, please indicate your opinion on the following statements:
1163

	Yes (1)	No (2)	I do not know (3)
I had a water leak in my household that required a repair after a disaster (e.g., Hurricane Maria)	☐	☐	☐
I have an ongoing leak INSIDE my house after a disaster (e.g., Hurricane Maria)	☐	☐	☐
I have had a water leak outside of my house in the yard that required a repair after a disaster (e.g., Hurricane Maria)	☐	☐	☐
I have had an ongoing leak OUTSIDE my house after a disaster (e.g., Hurricane Maria)	☐	☐	☐

1164
1165
1166 63. Based on your health and wellness, please indicate your opinion on the following statements:
1167

CD-RISC 10 Resilience Scale	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
I can adapt to change.	☐	☐	☐	☐	☐
I can deal with whatever comes.	☐	☐	☐	☐	☐
I try to see the humorous side of things.	☐	☐	☐	☐	☐
I believe stress can strengthen me.	☐	☐	☐	☐	☐
I tend to bounce back after illness or hardship.	☐	☐	☐	☐	☐
I can achieve goals despite obstacles.	☐	☐	☐	☐	☐
I can stay focused under pressure.	☐	☐	☐	☐	☐
I am not easily discouraged by failure.	☐	☐	☐	☐	☐
I think of myself as a strong person.	☐	☐	☐	☐	☐
I can handle unpleasant feelings.	☐	☐	☐	☐	☐

1168
1169 64. Based on your health and wellness, please indicate your opinion on the following statements:

Center for Epidemiologic Studies Depression (CES-D) Items	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
I was bothered by things that usually don't bother me.	☐	☐	☐	☐	☐
I did not feel like eating; my appetite was poor.	☐	☐	☐	☐	☐
I felt that I could not shake off the blues even with help from my family or friends.	☐	☐	☐	☐	☐
I felt I was just as good as other people.	☐	☐	☐	☐	☐
I had trouble keeping my mind on what I was doing.	☐	☐	☐	☐	☐
I felt depressed.	☐	☐	☐	☐	☐
I felt that everything I did was an effort.	☐	☐	☐	☐	☐
I felt hopeful about the future.	☐	☐	☐	☐	☐
I thought my life had been a failure.	☐	☐	☐	☐	☐

I felt fearful.	☐	☐	☐	☐	☐
My sleep was restless.	☐	☐	☐	☐	☐
I was happy.	☐	☐	☐	☐	☐
I talk less than usual.	☐	☐	☐	☐	☐
I felt lonely.	☐	☐	☐	☐	☐
People were unfriendly.	☐	☐	☐	☐	☐
I enjoyed life.	☐	☐	☐	☐	☐
I had crying spells.	☐	☐	☐	☐	☐
I felt sad.	☐	☐	☐	☐	☐
I felt that people disliked me.	☐	☐	☐	☐	☐
I could not get going.	☐	☐	☐	☐	☐

1170

1171

1172 65. Based on your understanding of community water experiences, please indicate your opinion on the

1173 following statements:

1174

Adapted from ShoCCS	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
Certain racial or ethnic groups have fewer chances to access high-quality potable drinking water without service interruptions.	☐	☐	☐	☐	☐
Low-income communities have fewer opportunities to access high-quality potable drinking water without service interruptions.	☐	☐	☐	☐	☐
Women have fewer opportunities to access high-quality potable drinking water without service interruptions.	☐	☐	☐	☐	☐
Older adults (65 years and older) have fewer chances to access high-quality potable drinking water without service interruptions.	☐	☐	☐	☐	☐
I have participated in a civil rights group or organization to advocate for improving access to high-quality potable drinking water without service interruptions.	☐	☐	☐	☐	☐
I have participated in an organization to advocate for improving access to high-quality potable drinking water without service interruptions.	☐	☐	☐	☐	☐
I have contacted a public official by phone, mail, or email to tell them how you felt about access to high-quality potable drinking water without service interruptions.	☐	☐	☐	☐	☐
I joined a protest march, political demonstration, or political meeting to advocate for improving access to	☐	☐	☐	☐	☐

high-quality potable drinking water without service interruptions.					
It is important to be an active and informed citizen on water issues such as access to high-quality potable drinking water without service interruptions.	☐	☐	☐	☐	☐
It is important to correct social and economic inequality related to access to high-quality potable drinking water without service interruptions.	☐	☐	☐	☐	☐
My responsibility is to get involved and make things better for my society's access to high-quality potable drinking water without service interruptions.	☐	☐	☐	☐	☐
People like me should participate in the political activity and decision-making of our country's access to high-quality potable drinking water without service interruptions.	☐	☐	☐	☐	☐

1175

1176 66. Do you have a metered connection for your water service from the Puerto Rico Aqueduct and Sewer
1177 Authority (PRASA)? (1) Yes; (2) No; (3) I don't know

1178
1179 67. Are you responsible for your water utility bill? (1) Yes; (2) No; (3) I don't know

1180
1181 68. Do you pay a flat rate for your water services from the Puerto Rico Aqueduct and Sewer Authority
1182 (PRASA)? (1) Yes; (2) No; (3) I don't know

1183
1184 69. How much do you pay every month (flat-rate) for water service from the Puerto Rico Aqueduct and Sewer
1185 Authority? _____dollars

1186
1187 70. How has your water bill changed in the past decade? (1) No noticeable change; (2) my water bill has increased;
1188 (3) my water bill has decreased

1189
1190 71. At the current rates, do you worry about having the ability (i.e., having the financial resources) to pay your
1191 water bill?
1192 (1) Not at all; (2) very small degree; (3) small degree; (4) moderate degree; (5) great degree; (6) very great degree.

1193
1194 72. How much MORE would you be willing to pay for improved reliability (specifically, pressure and reduced
1195 interruption of service) of your WATER service? Please answer "0" if you would not be willing to pay more
1196 for your water service for a more reliable system
1197 _____ USD increase in current water bill

1198
1199 73. How much MORE would you be willing to pay for improved quality (smell, color, taste, etc.) of your
1200 WATER service? Please answer "0" if you would not be willing to pay more for your water service for a
1201 more reliable system
1202 _____ USD increase in current water bill

1203
1204 74. I receive information about water distribution and quality through (choose all that apply)? (1) Neighbors,
1205 family, friends; (2) Neighborhood organizations in my neighborhood (including local church groups; (3)
1206 Nonprofits from outside my neighborhood; (4) Local government; (5) Central government; (6) Federal
1207 agencies; (7) Flyers/notices around the neighborhood; (8) Newspaper, TV, Radio; (9) Internet (Facebook or
1208 other social media) (10) Other, please specify _____ (11) I did not receive news

- 1209
- 1210 75. **The methods that are effective for providing me with the information about water distribution and**
- 1211 **quality are (choose all that apply)?**
- 1212 (1) Neighbors, family, friends; (2) Neighborhood organizations in my neighborhood (including local church
- 1213 groups; (3) Nonprofits from outside my neighborhood; (4) Local government; (5) Central government; (6)
- 1214 Federal agencies; (7) Flyers/notices around the neighborhood; (8) Newspaper, TV, Radio; (9) Internet
- 1215 (Facebook or other social media) (10) Other, please specify _____ (11) I did not
- 1216 receive news
- 1217
- 1218 76. **Is the current effectiveness of providing me information about water distribution from the utility?**
- 1219 (1) Extremely not effective; (2) Not effective; (3) Neutral; (4) Effective; (5) Very effective; (6) I do not know
- 1220
- 1221 77. **In addition to the above methods, I would prefer to receive information via (e.g., phone app): _____**
- 1222

1223 **DEMOGRAPHIC QUESTIONS**

1224 **Gender:** (1) Female (2) Male (3) Others/ Non-Binary, Please Specify: _____

1225

1226 **What is your age?** _____

1227

1228 **Are you of Hispanic, Latino, or Spanish origin?**

1229 (1) Not Hispanic, Latino, or Spanish origin; (2) Yes, Puerto Rican; (3) Yes, Haitian; (4) Yes, Dominican; (5) Yes,

1230 Cuban; (6) Other (please specify);

1231

1232 **What is your identified race (choose all that apply)?**

1233 (1) American Indian or Alaska Native; (2) Asian; (3) Black or African American; (4) Native Hawaiian or Other

1234 Pacific Islander; (5) White; (6) Mixed; (7) Other _____

1235

1236 **How long have you lived in this municipality?** _____ years

1237

1238 **What is the highest completed level of education?**

1239 (1) No schooling completed; (2) Elementary school degree; (3) Middle school degree; (4) High school diploma or

1240 equivalent (for example: GED); (5) Bachelor's degree (for example: BA, BS); (6) Associates degree (for example:

1241 AA, AS); (7) Other (please specify) _____

1242

1243 **How many people live in your household?** _____

1244

1245 **How many children under the age of 18 live in your household?** _____

1246

1247 **How many children under the age of 5 live in your household?** _____

1248

1249 **How many cars does your household have?** _____

1250

1251 **How would you describe your house?**

1252 (1) House; (2) Apartment; (3) Condo; (4) Mobile home/Trailer; (5) Other _____

1253

1254

1255 **Is your house...?**

1256 (1) Owned by you or someone in this household with a mortgage or loan; (2) Owned by you or someone in this

1257 household free and clear (without a mortgage or loan); (3) Rented; (4) Other _____

1258

1259 **Does your house have a property title?**

1260 (1) Yes; (2) No; (3) I don't know

1261

If not, please select the most appropriate

(1) Unresolved inheritance **(2)** Family land without being formally subdivided; **(3)** Private rescue land; **(4)** Government land; **(5)** Other (please specify)

Is this the first house you have owned? (1) Yes; (2) No

If **Yes**, and this is the first house you have owned, what is the **length of time you have owned this house?**
_____ years

What is your approximate monthly income?

_____ years

What is your employment status (choose all that apply)?

(1) Employed for wages or salary; **(2)** Self-Employed; **(3)** Out of work and looking for work; **(4)** Out of work but not currently looking for work; **(5)** A homemaker; **(6)** A student; **(7)** Retired; **(8)** Unable to work

What is your primary source of news (choose all that apply)?

(1) Newspaper; **(2)** Internet; **(3)** Television; **(4)** Radio; **(5)** social media; **(6)** Other _____

Frequency of following any of the above news sources:

(1) At least once per day; **(2)** At least once per week; **(3)** At least once per month; **(4)** Never

Do you have any comments or concerns about the water supply and quality in your city?

Appendix 2

Appendix 2 Interview and Survey Sample (Spanish)

La Universidad Estatal de Iowa y la Universidad de Utah está realizando una encuesta patrocinada por la Agencia de Protección Ambiental (Environmental Protection Agency) de los Estados Unidos. La encuesta incluye preguntas sobre prácticas de agua potable y percepciones después de desastres como el huracán María. Completar la encuesta le tomará aproximadamente 1 hora de su tiempo. Ofrecemos **\$25 tarjetas de regalo de Walmart como muestra de nuestro agradecimiento**. La información recopilada se mantendrá confidencial y solo se utilizará con fines académicos. **Puede omitir cualquier pregunta que no desee responder en la encuesta. Su participación en esta encuesta es totalmente voluntaria y anónima.** Los participantes **DEBEN** tener 18 años o más.

¿Usted o alguien en esta casa tiene más de 18 años?

- No – Lo sentimos, no califica para el estudio. ¿Puede recomendarle a alguien en este vecindario mayor de 18 años que pueda estar interesado?
- Sí, ¿le interesaría participar?
 - No. ¿Puede recomendarle a alguien en este vecindario que pueda estar interesado?
 - Sí – Continúe.

Si tiene alguna pregunta o inquietud con respecto a la confidencialidad o el estudio, no dude en comunicarse con la Dra. Cristina Poleacovschi (poleacov@iastate.edu) o la Dra. Ivis García Zambrana (801-833-4073 ivis.garcia@utah.edu) ¡Gracias por tu tiempo!

PERCEPCIONES PÚBLICAS, ACTITUD, CONOCIMIENTO Y CONCIENCIA

1. La dirección de mi casa es:

- 1312 h) Calle 1: _____
1313 i) Apto. etc. _____
1314 j) Ciudad _____
1315 k) País _____
1316 l) Código postal _____
1317 m) Coordenadas GPS (a completar por el investigador) _____
1318 n) Identificación de la muestra de agua (a ser completada por el investigador) _____
1319
1320 2. ¿Recibe servicios de agua potable/potable de la Autoridad de Acueductos y Alcantarillados de Puerto Rico
1321 (PRASA)? (1) Sí; (2) No; (3) No sé
1322
1323 3. ¿Hace cuánto tiempo tiene el servicio de agua potable de la Autoridad de Acueductos y Alcantarillados de
1324 Puerto Rico (AAA)? (1) 1 a 5 años; (2) 6 a 10 años; (3) Más de 10 años; (4) No sé
1325
1326 4. ¿Bebes agua de una fuente de agua de la pluma?
1327 (1) Sí, (2) No
1328
1329 5. Si no, ¿por qué no bebe agua de una fuente de agua de la pluma?
1330 _____
1331
1332 6. En caso afirmativo, ¿la frecuencia con la que bebe agua de la pluma diariamente es?
1333 (1) Nunca; (2) Rara vez (1 a 2 vasos); (3) A veces (3 a 4 vasos); (4) A menudo (4 a 5 vasos); (5) Siempre (Más
1334 de 5 vasos)
1335
1336 7. ¿Confías en el agua de la fuente de agua de la pluma?
1337 (1) Sí, (2) No
1338
1339 8. Si la respuesta a la pregunta 7 es sí, ¿por qué confía en el agua de la pluma?
1340 _____
1341
1342 9. Si no a la P7, ¿por qué desconfía del agua de la pluma?
1343 _____
1344
1345 10. Si no confías en el agua de la pluma, ¿qué haces para que sea más factible beberla?
1346 _____
1347
1348 11. ¿Cómo obtiene información sobre este proceso [relacionado con Q10]?
1349 _____
1350
1351 12. ¿Bebes agua de la pluma filtrada?
1352 (1) Sí, (2) No
1353
1354 13. Si no, ¿por qué no bebe agua de la pluma filtrada?
1355 _____
1356
1357 14. En caso afirmativo, ¿con qué frecuencia bebe el agua de la pluma filtrada?
1358 (1) Nunca; (2) Rara vez (1 a 2 vasos); (3) A veces (3 – 4 vasos); (4) A menudo (4 a 5 vasos); (5) Siempre (Más
1359 de 5 vasos)
1360
1361 15. ¿Confías en el agua de la pluma, pero filtrada?

(1) Sí, (2) No

16. Si la respuesta a la pregunta 15 es sí, ¿por qué confía en el agua de la pluma filtrada?

17. Si no a la P15, ¿por qué desconfía de las fuentes de agua de la pluma filtrada?

18. Si no confía en las fuentes de agua de la pluma filtrada, ¿qué hace para que sea más factible beberla?

19. ¿Cómo obtiene información sobre este proceso [relacionado con P18]?

20. ¿Bebe usted agua de pozo?

(1) Sí, (2) No

21. Si no, ¿por qué no bebe agua de pozo?

22. En caso afirmativo, ¿la frecuencia con la que bebe agua de pozo diariamente es?

(1) Nunca; (2) Rara vez (1 a 2 vasos); (3) A veces (3 a 4 vasos); (4) A menudo (4 a 5 vasos); (5) Siempre (Más de 5 vasos)

23. ¿Confías en el agua de pozo?

(1) Sí, (2) No

24. Si la respuesta a la pregunta 23 es sí, ¿por qué confía en el agua de pozo?

25. Si no a la P23, ¿por qué desconfía en el agua de pozo?

26. Si no confía en el agua de pozo, ¿qué hace para que sea más factible?

27. ¿Cómo obtiene información sobre este proceso [relacionado con P27]?

28. ¿Bebes agua embotellada?

(1) Sí, (2) No

29. Si no, ¿por qué no bebe agua embotellada?

30. En caso afirmativo, ¿con qué frecuencia bebe agua embotellada diariamente?

(1) Nunca; (2) Rara vez (1 a 2 vasos); (3) A veces (3 a 4 vasos); (4) A menudo (4 a 5 vasos); (5) Siempre (Más de 5 vasos)

31. ¿Confías en el agua de la fuente de agua embotellada?

(1) Sí, (2) No

1413
1414 32. Si la respuesta a la P31 es sí, ¿por qué confía en agua embotellada?

1415 _____

1416
1417 33. Si no a la P31, ¿por qué desconfía en agua embotellada?

1418 _____

1419
1420 34. Si no confía en agua embotellada, ¿qué hace para que sea más factible beberla?

1421 _____

1422
1423 35. ¿Cómo obtiene información sobre este proceso [relacionado con Q34]?

1424 _____

1425
1426 36. ¿Bebes agua de lluvia recolectada?

1427 (1) Sí, (2) No

1428
1429 37. Si no, ¿por qué no bebe agua de lluvia recolectada?

1430 _____

1431
1432 38. En caso afirmativo, ¿con qué frecuencia bebe agua de lluvia recolectada?

1433 (1) Nunca; (2) Rara vez (1 a 2 vasos); (3) A veces (3 a 4 vasos); (4) A menudo (4 a 5 vasos); (5) Siempre (Más
1434 de 5 vasos)

1435
1436 39. ¿Confías en el agua de lluvia recolectada?

1437 (1) Sí, (2) No

1438
1439 40. Si respondió sí a la P39, ¿por qué confía en agua de lluvia recolectada?

1440 _____

1441
1442 41. Si respondió no a la P39, ¿por qué desconfía del agua de lluvia recolectada?

1443 _____

1444
1445 42. Si no confía en agua de lluvia recolectada, ¿qué hace para que sea más factible beberla?

1446 _____

1447
1448 43. ¿Cómo obtiene información sobre este proceso [relacionado con Q42]?

1449 _____

1450
1451 44. ¿Bebes agua de arroyo/río?

1452 (1) Sí, (2) No

1453
1454 45. En caso afirmativo, ¿con qué frecuencia bebe agua de arroyo/río?

1455 (1) Nunca; (2) Rara vez (1 a 2 vasos); (3) A veces (3 a 4 vasos); (4) A menudo (4 a 5 vasos); (5) Siempre (Más
1456 de 5 vasos)

1457
1458 46. Si no, ¿por qué no bebe agua de arroyo/río?

1459 _____

1460
1461 47. ¿Confías en el agua de la fuente del arroyo/río?

1462 (1) Sí, (2) No

48. Si la respuesta a la pregunta 47 es sí, ¿por qué confía en agua de arroyos/ríos?
49. Si respondió no a la pregunta 47, ¿por qué desconfía del agua de arroyos/ríos?
50. Si no confía en el agua de arroyos/ríos, ¿qué hace para que sea más factible beberla?
51. ¿Cómo obtiene información sobre este proceso [relacionado con Q50]?
52. Nos gustaría conocer sus prácticas de consumo de agua antes/después del huracán María.

Indique su principal fuente de agua potable	Antes del Huracán María	
	SÍ	NO
Agua de la pluma	☐	☐
Agua de la pluma, pero filtrada (mencione tipo, ej. destilación, carbon activado, osmosis inversa, etc.): _____	☐	☐
Agua de pozo	☐	☐
Botella de agua (mencione las marcas, ej. aquafina, econo, etc.): _____	☐	☐
Agua de lluvia recolectada	☐	☐
Arroyo / Río	☐	☐
Otros (especificar _____)	☐	☐

Indique su principal fuente de agua potable	Después del huracán María	
	SÍ	NO
Agua de la pluma	☐	☐
Agua de la pluma, pero filtrada (mencione tipo, ej. destilación, carbon activado, osmosis inversa, etc.): _____	☐	☐
Agua de pozo	☐	☐
Botella de agua (mencione las marcas, ej. aquafina, econo, etc.): _____	☐	☐
Agua de lluvia recolectada	☐	☐
Arroyo / Río	☐	☐
Otros (especificar _____)	☐	☐

53. ¿Cuánto tiempo tardó en restablecerse el servicio de agua corriente de la Autoridad de Acueductos y Alcantarillados de Puerto Rico (AAA) después del huracán María? Por favor díganos el mes y el año

54. Si Q53 incluye la combinación [SÍ – NO], díganos por qué dejó de usar estas fuentes de agua después del huracán María

55. Si Q53 incluye la combinación [SÍ – SÍ], díganos por qué siguió usando estas fuentes de agua después del huracán María.

56. Si Q53 incluye la combinación [NO – SÍ], díganos por qué comenzó a usar estas fuentes de agua después del huracán María

57. En base a su experiencia con el agua de la pluma, indique su opinión sobre las siguientes afirmaciones:

Variables de percepción de la calidad del agua	Para nada	Un poquito	Un poco	Indiferente	Mucho	Muchísimo
El agua de la pluma suele ser de alta calidad.	☐	☐	☐	☐	☐	☐
Hay riesgos para la salud asociados con beber agua de la pluma de mi casa.	☐	☐	☐	☐	☐	☐
Estoy feliz con el sabor del agua de mi pluma.	☐	☐	☐	☐	☐	☐
Estoy feliz con el color del agua de mi pluma.	☐	☐	☐	☐	☐	☐
Estoy feliz con el olor del agua de mi pluma.	☐	☐	☐	☐	☐	☐
Las tuberías de agua y la pluma de mi casa están limpios y bien mantenidos.	☐	☐	☐	☐	☐	☐
Algunos amigos me dijeron comentarios negativos sobre el agua mi pluma.	☐	☐	☐	☐	☐	☐

Algunos miembros de la familia me dijeron comentarios negativos sobre el agua de mi pluma.	☐	☐	☐	☐	☐	☐
El agua de mi pluma ha causado problemas de salud a mí o a alguien de mi familia.	☐	☐	☐	☐	☐	☐
Confío en mi compañía de servicio de agua (AAA).	☐	☐	☐	☐	☐	☐
Estoy acostumbrado el agua mi pluma.	☐	☐	☐	☐	☐	☐
Estoy satisfecho con la presión del agua de mi pluma.	☐	☐	☐	☐	☐	☐
El agua de mi pluma está contaminada con plomo o algún químico.	☐	☐	☐	☐	☐	☐
El agua de mi pluma tiene demasiado cloro.	☐	☐	☐	☐	☐	☐
El agua de mi pluma tiene demasiada cal.	☐	☐	☐	☐	☐	☐
El agua de mi pluma es demasiado dura (ej. poca presión, agua turbia, etc.)	☐	☐	☐	☐	☐	☐
Me preocupa la calidad del agua y la contaminación del agua (ej. productos químicos) <i>durante</i> la temporada de huracanes	☐	☐	☐	☐	☐	☐
Me preocupa la calidad del agua y la contaminación del agua (ej. productos químicos) <i>después</i> de la temporada de huracanes	☐	☐	☐	☐	☐	☐

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58. ¿Cómo era la calidad de su agua antes del huracán María?

(1) Ningún cambio notable; (2) la calidad de mi agua era *muy mala*; (3) la calidad de mi agua era *mala*; (4) la calidad de mi agua era *buena*; (5) la calidad de mi agua es *muy buena*.

59. ¿Cómo era la calidad de su agua durante la temporada del huracán María (Julio-Noviembre del 2017)?

(1) Ningún cambio notable; (2) la calidad de mi agua era *muy mala*; (3) la calidad de mi agua era *mala*; (4) la calidad de mi agua era *buena*; (5) la calidad de mi agua es *muy buena*.

60. ¿Cómo cambio la calidad de su agua después del huracán María?

(1) Ningún cambio notable; (2) la calidad de mi agua era *muy mala*; (3) la calidad de mi agua era *mala*; (4) la calidad de mi agua era *buena*; (5) la calidad de mi agua es *muy buena*.

61. Con base en el uso de agua en su hogar, indique su opinión sobre las siguientes afirmaciones:

Adaptado de la escala experiencias de inseguridad de agua en el hogar (HWISE)	Nunca (0 veces)	Poco frecuentemente (1 – 2 veces)	Algunas veces (3 – 10 veces)	A menudo (11 – 20 veces)	Siempre (más de 20 veces)
Me preocupa no tener suficiente agua para todas las necesidades de mi hogar.	☐	☐	☐	☐	☐

Mi fuente de agua de la pluma ha sido interrumpida o limitada (p. ej., presión de agua, menos agua de lo esperado).	☐	☐	☐	☐	☐
No pude lavar mi ropa por problemas con la cantidad de agua.	☐	☐	☐	☐	☐
Tuve que cambiar horarios o planes por problemas con mi situación de agua. (Las actividades que pueden haberse interrumpido incluyen el cuidado de los demás, las tareas domésticas, el trabajo agrícola, las actividades generadoras de ingresos, dormir, etc.).	☐	☐	☐	☐	☐
Tuve que cambiar lo que se estaba comiendo en mi hogar porque había problemas con la cantidad de agua (por ejemplo, para lavar alimentos, cocinar, etc.).	☐	☐	☐	☐	☐
Tenía que pasar sin lavarme las manos después de actividades sucias (por ejemplo, defecar o cambiar pañales, limpiar estiércol de animales) por problemas con la cantidad de agua.	☐	☐	☐	☐	☐
No me bañé debido a problemas con la cantidad de agua (p. ej., no había suficiente agua).	☐	☐	☐	☐	☐
No ha habido tanta agua para beber como me gustaría para mí y mi hogar.	☐	☐	☐	☐	☐
Me siento enojado por mi situación de cantidad de agua.	☐	☐	☐	☐	☐
Me he ido a dormir con sed porque no había agua para beber.	☐	☐	☐	☐	☐
No ha habido agua de pluma utilizable o potable en mi hogar.	☐	☐	☐	☐	☐
Me siento avergonzado/excluido/estigmatizado por la situación de la cantidad de agua en mi hogar.	☐	☐	☐	☐	☐

1530 62. Con base en el uso de agua en su hogar, por favor indique su opinión sobre las siguientes afirmaciones:
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	Sí (1)	No (2)	No sé (3)
Tuve un lliko de agua en mi hogar que requirió reparación después de un desastre (p. ej., el huracán María).	☐	☐	☐
Tengo un lliko continuo DENTRO de mi casa después de un desastre (p. ej., el huracán María).	☐	☐	☐
He tenido un lliko de agua fuera de mi casa en el patio que requirió reparación después de un desastre (p. ej., el huracán María)	☐	☐	☐
He tenido un lliko AFUERA de mi casa después de un desastre (p. ej., el huracán María)	☐	☐	☐

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 1533 63. Basado en su salud y bienestar, por favor indique su opinión sobre las siguientes afirmaciones:
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Escala de resiliencia Connor-Davidson (CD-RISC 10)	Muy en desacuerdo	En desacuerdo	Ni de acuerdo ni en desacuerdo	En acuerdo	Totalmente de acuerdo

Puedo adaptarme al cambio.	☐	☐	☐	☐	☐
Puedo lidiar con lo que venga.	☐	☐	☐	☐	☐
Intento ver el lado humorístico de las cosas.	☐	☐	☐	☐	☐
Creo que el estrés puede fortalecerme.	☐	☐	☐	☐	☐
Tiendo a recuperarme después de una enfermedad o dificultad.	☐	☐	☐	☐	☐
Puedo lograr metas a pesar de los obstáculos.	☐	☐	☐	☐	☐
Puedo mantenerme concentrado bajo presión.	☐	☐	☐	☐	☐
No me desanimo fácilmente por el fracaso.	☐	☐	☐	☐	☐
Me considero una persona fuerte.	☐	☐	☐	☐	☐
Puedo manejar sentimientos desagradables.	☐	☐	☐	☐	☐

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64. Basado en su salud y bienestar, indique su opinión sobre las siguientes afirmaciones:

Artículos del Centro de Estudios Epidemiológicos y de Depresión (CES-D)	Muy en desacuerdo	En desacuerdo	Ni de acuerdo ni en desacuerdo	En acuerdo	Totalmente de acuerdo
Me molestan cosas que normalmente no me molestan.	☐	☐	☐	☐	☐
No tengo ganas de comer; mi apetito es pobre.	☐	☐	☐	☐	☐
Siento que no puedo deshacerme de la tristeza ni siquiera con la ayuda de mi familia o amigos.	☐	☐	☐	☐	☐
Siento que soy tan bueno como otras personas.	☐	☐	☐	☐	☐
Tengo problemas para mantener mi mente en lo que estoy haciendo.	☐	☐	☐	☐	☐
Me siento deprimido.	☐	☐	☐	☐	☐
Siento que todo lo que hago requiere esfuerzo.	☐	☐	☐	☐	☐
Siento esperanza en el futuro.	☐	☐	☐	☐	☐
Pienso que mi vida ha sido un fracaso.	☐	☐	☐	☐	☐
Siento miedo.	☐	☐	☐	☐	☐
No puedo dormir bien.	☐	☐	☐	☐	☐
Soy feliz.	☐	☐	☐	☐	☐
Hablo menos de lo habitual.	☐	☐	☐	☐	☐
Me siento solo.	☐	☐	☐	☐	☐
La gente es antipática.	☐	☐	☐	☐	☐
Disfruto la vida.	☐	☐	☐	☐	☐
Tengo ataques de llanto.	☐	☐	☐	☐	☐
Me siento triste.	☐	☐	☐	☐	☐
Siento que la gente no me quiere.	☐	☐	☐	☐	☐
Siento que no puedo comenzar el día.	☐	☐	☐	☐	☐

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65. Según su comprensión de las experiencias de agua de la comunidad, indique su opinión sobre las siguientes declaraciones:

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Adaptado de desarrollo de la escala corta de conciencia crítica (ShoCCS)	Muy en desacuerdo	En desacuerdo	Ni de acuerdo ni en desacuerdo	En acuerdo	Totalmente de acuerdo
Ciertos grupos raciales o étnicos tienen menos posibilidades de acceder a agua potable de alta calidad sin interrupciones del servicio.	☐	☐	☐	☐	☐
Las comunidades de bajos ingresos tienen menos oportunidades de acceder a agua potable de alta calidad sin interrupciones en el servicio.	☐	☐	☐	☐	☐
Las mujeres tienen menos oportunidades de acceder a agua potable de alta calidad sin interrupciones del servicio.	☐	☐	☐	☐	☐
Los adultos mayores (65 años o más) tienen menos posibilidades de acceder a agua potable de alta calidad sin interrupciones en el servicio.	☐	☐	☐	☐	☐
He participado en un grupo u organización de derechos civiles para abogar por mejorar el acceso a agua potable de alta calidad sin interrupciones del servicio.	☐	☐	☐	☐	☐
He participado en una organización para abogar por mejorar el acceso a agua potable de alta calidad sin interrupciones en el servicio.	☐	☐	☐	☐	☐
Me comuniqué con un funcionario público por teléfono, correo o correo electrónico para decirles cómo se sentía acerca del acceso a agua potable de alta calidad sin interrupciones en el servicio.	☐	☐	☐	☐	☐
Me uní a una marcha de protesta, manifestación política o reunión política para abogar por mejorar el acceso a agua potable de alta calidad sin interrupciones del servicio.	☐	☐	☐	☐	☐
Es importante ser un ciudadano activo e informado en temas de agua como el acceso a agua potable de alta calidad sin interrupciones en el servicio.	☐	☐	☐	☐	☐
Es importante corregir la desigualdad social y económica relacionada con el acceso a agua potable de alta calidad sin interrupciones del servicio.	☐	☐	☐	☐	☐
Mi responsabilidad es involucrarme y mejorar las cosas para el acceso de mi sociedad a agua potable de alta calidad sin interrupciones en el servicio.	☐	☐	☐	☐	☐
Las personas como yo debemos participar en la actividad política y en la toma de decisiones del	☐	☐	☐	☐	☐

acceso de nuestro país a agua potable de alta calidad y sin interrupciones en el servicio.					
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1544 66. **¿Tiene un contador de agua de la Autoridad de Acueductos y Alcantarillados de Puerto Rico (AAA)?** (1)
 1545 Sí; (2) No; (3) no sé

1546 67. **¿Es usted responsable de su factura de servicios públicos de agua?** (1) Sí; (2) No; (3) No sé

1548 68. **¿Pagas la misma tarifa todos los meses por tus servicios de agua no importa la cantidad que uses de la**
 1549 **Autoridad de Acueductos y Alcantarillados de Puerto Rico (AAA)?** (1) Sí; (2) No; (3) No sé

1551 69. **¿Cuánto paga mensualmente por el servicio de agua de la Autoridad de Acueductos y Alcantarillados de**
 1552 **Puerto Rico?** _____ dólares

1554 70. **¿Cómo ha cambiado su factura de agua en la última década?** (1) Ningún cambio notable; (2) mi factura de
 1555 agua ha aumentado; (3) mi factura de agua ha disminuido

1557 71. **Con las tarifas actuales, ¿le preocupa tener la capacidad (es decir, tener los recursos financieros) para**
 1558 **pagar su factura de agua?**
 1559 (1) Nada de preocupado; (2) Casi nada de preocupado; (3) Un poco preocupado (4) Moderadamente
 1560 preocupado; (4) Muy preocupado; (5) Extremadamente preocupado

1562 72. **¿Cuánto MÁS estaría dispuesto a pagar por una mayor confiabilidad (específicamente, presión y menos**
 1563 **interrupciones) de su servicio de AGUA? Responda "0" si no estaría dispuesto a pagar más por su servicio**
 1564 **de agua por un sistema más confiable**
 1565 _____ USD de aumento en la factura actual del agua

1566 73. **¿Cuánto MÁS estaría dispuesto a pagar por una mejor calidad (olor, color, sabor, etc.) de su servicio de**
 1567 **AGUA? Responda "0" si no estaría dispuesto a pagar más por su servicio de agua por un sistema más**
 1568 **confiable**
 1569 _____ USD de aumento en la factura actual del agua

1571 74. **¿Recibo información sobre la distribución y la calidad del agua a través de (elijá todas las que**
 1572 **correspondan)?** (1) Vecinos, familiares, amigos; (2) organizaciones vecinales en mi vecindario (incluidos
 1573 grupos de iglesias locales); (3) organizaciones sin fines de lucro fuera de mi vecindario; (4) gobierno local; (5)
 1574 gobierno central; (6) agencias federales; (7) volantes/avisos en el vecindario; (8) Periódico, TV, Radio; (9)
 1575 Internet (Facebook u otras redes sociales) (10) Otro, por favor especifique _____ (11)
 1576 No recibí noticias

1577 75. **¿Que métodos son efectivos para obtener información sobre la distribución y la calidad del agua**
 1578 **(seleccione todos los que correspondan)?**

1580 (1) Vecinos, familiares, amigos; (2) organizaciones vecinales en mi vecindario (incluidos grupos de iglesias
 1581 locales); (3) organizaciones sin fines de lucro fuera de mi vecindario; (4) gobierno local; (5) gobierno central;
 1582 (6) agencias federales; (7) volantes/avisos en el vecindario; (8) Periódico, TV, Radio; (9) Internet (Facebook u
 1583 otras redes sociales) (10) Otro, por favor especifique _____ (11) No recibo noticias

1584 76. **¿Es la efectividad actual de proporcionarme información sobre la distribución de agua de la empresa de**
 1585 **servicios públicos?**
 1586 (1) Extremadamente ineficaz; (2) No efectivo; (3) Neutro; (4) Efectivo; (5) Muy eficaz; (6) No sé

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77. Además de los métodos anteriores, preferiría recibir información a través de (por ejemplo, aplicación de teléfono): _____

PREGUNTAS DEMOGRÁFICAS

Género: (1) Femenino (2) Masculino (3) Otros/No binario, especifique: _____

¿Cuál es tu edad? _____

¿Eres de origen hispano, latino o español?

(1) no de origen hispano, latino o español; (2) Sí, puertorriqueño; (3) Sí, haitiano; (4) Sí, dominicano; (5) Sí, cubano; (6) Otro (especificar) _____

¿Cuál es su raza identificada (elija todas las que correspondan)?

(1) indio americano o nativo de Alaska; (2) asiático; (3) negro o afroamericano; (4) nativo de Hawái u otras islas del Pacífico; (5) Blanco; (6) mixto; (7) Otro _____

¿Hace cuánto vive en este municipio? _____ años

¿Cuál es el nivel educativo más alto completado?

(1) sin escolaridad completa; (2) título de escuela primaria; (3) título de escuela intermedia; (4) diploma de escuela secundaria o equivalente (por ejemplo: GED); (5) Licenciatura (por ejemplo: BA, BS); (6) título de asociado (por ejemplo: AA, AS); (7) Otro (por favor especifique) _____

¿Cuántas personas viven en su hogar? _____

¿Cuántos niños menores de 18 años viven en su hogar? _____

¿Cuántos niños menores de 5 años viven en su hogar? _____

¿Cuántos autos tiene su hogar? _____

¿Cómo describirías tu casa?

(1) Casa; (2) Apartamento; (3) Condominio; (4) Casa móvil/Remolque; (5) Otro _____

¿Es tu casa...?

(1) De su propiedad o de alguien en este hogar con una hipoteca o préstamo; (2) De su propiedad o de alguien en este hogar libre y claro (sin hipoteca o préstamo); (3) Alquilado; (4) Otro _____

¿Tu casa tiene título de propiedad?

(1) Sí; (2) No; (3) No sé

Si no, por favor seleccione el más apropiado

(1) Herencia no resuelta (2) Terreno familiar sin subdividir formalmente; (3) tierra de rescate privado; (4) terrenos del gobierno; (5) Otros (especificar)

¿Es esta la primera casa que ha tenido? (1) Sí; (2) Sí

En caso **afirmativo**, y esta es la primera casa que ha tenido, **¿cuánto tiempo ha tenido esta casa?** _____ años

Ingreso mensual aproximado:

\$ _____ al mes

¿Cuál es su situación laboral (elijá todas las que correspondan)?

(1) Empleado por sueldo o salario; (2) Trabajador por Cuenta Propia; (3) Sin trabajo y buscando trabajo; (4) Sin trabajo, pero actualmente no buscando trabajo; (5) un ama de casa; (6) un estudiante; (7) Jubilado; (8) Incapaz de trabajar

¿Cuál es su principal fuente de noticias (elijá todas las que correspondan)?

(1) Periódico; (2) Internet; (3) Televisión; (4) Radio; (5) Redes sociales; (6) Otro _____

Frecuencia de seguimiento de cualquiera de las fuentes de noticias anteriores:

(1) Al menos una vez al día; (2) Al menos una vez por semana; (3) Al menos una vez al mes; (4) Nunca

¿Tiene algún comentario o inquietud sobre el suministro y la calidad del agua en su ciudad?