

“THAT’S WHAT WE CALL ‘AESTHETICS,’ NOT A PUBLIC HEALTH ISSUE”: THE SOCIAL CONSTRUCTION OF TAP WATER MISTRUST IN AN UNDERBOUNDED COMMUNITY

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In the United States, underbounded communities—urban disadvantaged unincorporated neighborhoods characterized by high-poverty and high residential density lying just outside the border of an incorporated municipality—often lack consistent access to clean and safe water. Poor water quality and inadequate infrastructure shape residents’ risk perceptions, often leading to tap water mistrust, but little is known about the broader social, political, and economic drivers of water quality in these settings or about how such drivers inform the social construction of risk across different stakeholder groups. Using an underbounded African-American/Hispanic neighborhood in the Tampa Bay metropolitan region as a case study, we illustrate how tap water mistrust is socially constructed and how these constructions contrast between neighborhood residents and government officials. Interviews and participant observation with these groups reveal that tap water mistrust emerges from the nexus of inadequate infrastructure, poor housing conditions, challenges relating to the affordability of piped water, and jurisdictional disconnects. We call for interventions that foreground participatory research, integrate social and cultural context into technical solutions, and prioritize equitability in decision making.

Keywords: Water insecurity, water infrastructure, risk perception, underbounding, environmental justice

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On January 31, 2022, residents of the Holly Court Apartments in Tampa’s University Area Community gathered at a rally in the parking lot outside their building and shouted, “You can’t push us out!” The residents were protesting their eviction for speaking out about poor water quality—evictions are a common tactic in this community used by landlords to silence residents and sideline protests. One protester was Lavaria, a resident in the building who, in an interview with a local newspaper, claimed, “Our babies get UTIs from bathing in contaminated water in the

bathroom” (Scott, 2020). Other residents were also speaking out—to the media, to our research team, to anyone who would listen. Residents complained of bodily rashes, burning eyes, and nausea when showering. Delila, a young mother who used to live in the building, told us, “The water...smell[s] like sewage.” Many residents we spoke with, like Delila, repeated the phrase “I just don’t trust it,” referring to tap water; she relied on bottled water for bathing and cooking. Those who could not afford to buy water accessed bathrooms and taps through a carefully orchestrated network of friends and fast-food restaurants in the community.

This was not the first time the residents of Holly Court had experienced water problems. In 2018, the Department of Health was pressed to investigate and found excess levels of chlorine and iron (seven times the maximum contaminant level established by the United States EPA’s national primary/secondary drinking water regulations); these were the only two chemicals the state tested. These findings prompted a change in management company for the apartment complex, and the problem was reportedly “fixed.” Yet, residents we spoke with did not trust the water and cited additional problems with color, taste, and smell. Joe, a water engineer who had been with the county for nine years, told us, “You can drink crappy tasting water all day long and it’s not necessarily a health consequence to you.... What you smell in the water doesn’t necessarily mean it’s bad for you.” For many residents, this was not—and is still not—a viable solution.

The University Area Community is like many urban disadvantaged unincorporated communities throughout the United States. Decades of municipal underbounding have led to wide-scale disinvestment in public infrastructure (Wells et al., 2022). Underbounding is the process of excluding certain residential communities, often of African-American, Hispanic/Latino/a/x, and Native American populations, from city boundaries, thereby precluding residents from access to municipal water and sewer services (Aiken, 1985). Over time, this practice has resulted in unwanted land use in these communities, such as the location of industries that produce hazardous wastes, which contaminate local soil, water, and air (Durst, 2018; Mohai et al., 2009; Stillo & MacDonald Gibson, 2017; Wells et al., 2020). Underbounding also often results in unsafe or inadequate water and sanitation infrastructure and prevents residents from participating in decision making about utilities and services (Anderson, 2010; Méndez-Barrientos et al., 2022; Rivera, 2023; Wells et al., 2020; Workman & Shah, 2023).

While research on water infrastructure in underbounded and other urban communities in the Global North is starting to accelerate (Meehan et al., 2020a; Meehan et al., 2020b; Méndez-Barrientos et al., 2022; Rivera, 2023; Wells et al., 2022; Workman & Shah, 2023; Zheng et al., 2022), this literature tends to situate water quality risk as a technoscientific outcome of chemical and biological contamination that prioritizes expert knowledge over personal experiences (Chelcea, 2023; Kiessling & Maxwell, 2021; Wilson et al., 2023). As a result, the perceptions of community residents are rarely integrated into risk assessments, leaving tap water mistrust as a technical challenge for water scientists and engineers to solve (Brulle & Pellow, 2006; Stoffle et al., 1991; Wells et al., 2022; Wilson et al., 2023). Checker (2007), for instance, demonstrates how environmental risk assessments often dismiss the experiences of low-income people of color because of the inability to find “scientific proof” to demonstrate chemicals in their water and soil have caused their health problems. Here, we argue that residents’ perceptions of water quality are informed by their diverse experiences not only with water but also with housing conditions, affordability challenges, and jurisdictional disconnects between governmental and regulatory agencies.

Risk perception of drinking water quality is influenced by many factors, including sensorial information (especially flavor and odor), trust in public utilities and governance, information from media coverage, prior experience, socioeconomic status, and societal and personal marginalization and vulnerability (Alameddine et al., 2017; Chelcea, 2023; Doria, 2010; Gutiérrez-Capitán et al., 2019; Hu et al., 2011; Mumbi & Watanabe, 2020; Wilson et al., 2023). Thus, environmental risk perceptions connect with sociocultural categories and constructs of health, science, community, and justice (Haenn, 2003). Following Wilson and colleagues (2023), we argue that trust in water systems depends on various factors, and “distrust may at times be a warranted and understandable response to experiences of water insecurity and injustice” (p. 2). Since risk perception is interconnected with social, economic, and political issues that surround water treatment and its delivery, environmental justice struggles like those experienced in the University Area Community must be considered broadly in a web of systems of discrimination and “infrastructural violence,” or the ways in which infrastructures materialize and channel structural violence (Rodgers & O’Neill, 2012; Wells & Whiteford, 2022). In this way, infrastructural violence and underbounding are linked processes

of disenfranchisement that create or exacerbate environmental risks, which threaten human health and well-being (Brulle & Pellow, 2006; Bullard et al., 2008). In addressing these issues, we contribute to environmental justice research by highlighting differential risk perceptions between residents and water management officials in an underbounded urban community, so revealing the complexity of perceptions of water mistrust and insecurity challenges.

Methods

The research on which we draw was conducted over nine months of fieldwork in the University Area Community, where we partnered with the University Area Community Development Corporation (CDC) (Combs and Diaz, authors of this article), a community-based nonprofit with deep roots in the community that facilitated our research (www.uacdc.org). Three of us (Vidmar, Zheng, and Awad, authors of this article) volunteered with our 10-week Block-by-Block program, in which volunteers met with residents in their homes to learn about their needs and challenges and provided various resources and forms of support. These focused interactions with residents resulted in additional contacts through referral sampling. We also attended and participated in the University Area CDC's weekly community garden harvest and other occasional events and activities where we could interact with community residents. Our contacts with the University Area CDC also helped us meet and speak with key informants—water sector professionals in the city and county.

Overall, we conducted 135 hours of participant observation, 28 rapid assessments (brief, structured interviews lasting roughly five minutes), and 24 in-depth semi-structured interviews ranging from 30 minutes to an hour each (some conducted virtually due to COVID-19-related restrictions). Participant eligibility included adults (18+) who lived or had lived within the boundaries of the University Area in the last 10 years. We received verbal informed consent from all participants, and all names identified in interview excerpts are pseudonyms. Data were collected from May 2021 to February 2022. Semi-structured interview questions sought to understand differential perceptions of water and sanitation insecurity and were tailored to the participant's expertise and experience. Rapid assessment questions were developed from recurrent information in interviews, such as descriptive sensory characteristics, to deepen our understanding of water and sanitation perceptions. Data from the rapid assessments were examined

using descriptive statistics and cross-tabulation analysis (including Fisher's Exact tests) to identify key themes and associations (Trotter et al., 2001). We recorded and transcribed the interviews for thematic analysis using inductive coding to identify recurrent themes (Bernard et al., 2017). For example, codes such as smell, rent, and money that repeatedly emerged in interviews revealed themes of the sensory properties of water, housing infrastructure, and insecurity. We also attended meetings, workshops, rallies, and other public forums, recording our observations in fieldnotes. Finally, we used secondary data, including census information, newspaper articles, environmental reports, and governance documents from water utilities, to broaden our understanding of water quality challenges and related issues in the community.

Local understandings of water quality both intersect with and diverge from authoritative perceptions of water challenges by "outside experts" (Nader, 1972). In the sections that follow, we compare and contrast these perspectives in the broader context of drivers of tap water mistrust. We argue that mistrust can be understood as a social construction (Andrews, 2012; Oktem, 2016), shared and expressed differently across stakeholder groups. We examine how social constructions of tap water mistrust are informed by water infrastructures, housing conditions, finances and affordability, and the different ways in which water is governed and managed by the city and the county.

The "Aesthetics" of Water Quality

People in Tampa use a lot of "un" words to describe the University Area Community: unincorporated, underbounded, underserved, under-resourced. All convey the same observation—no municipality has wanted to incorporate the community and provide it with adequate services for people to live safe and healthy lives. As a result, residents face a multitude of interconnected social, health, economic, and environmental challenges (Hinds, 2019; Lehigh et al., 2020; Wakhungu et al., 2021; Wells et al., 2020). Census data from the American Community Survey (2015-2019) tell part of the story (United States Census Bureau, 2019). About 79% of the 11,894 residents in the University Area Community represent historically marginalized groups (50% identify as Hispanic and 27% as Black). Approximately 90% of residents are renters. Many lack formal education (31% have a high school degree or higher), 33% are unemployed, and 26% of households fall below the federal poverty level.

The United States EPA's EJScreen tool (<https://www.epa.gov/ejscreen>) also reveals that the community ranks at or above the 90th percentile (compared nationally) for hazardous waste proximity, PM_{2.5} (fine particulate matter), air toxics cancer risk, traffic proximity, and wastewater discharge (United States Environmental Protection Agency, 2022). Basic water and sanitation is of greater concern, however, to residents in our study. Based on ground-truthed (Sadd et al., 2013) maps of water and sewer access that we obtained from the city and county, we estimate that approximately 1,972 (about 20%) of residences did not have piped water or sewer access and relied on private drinking water wells or bottled water and onsite wastewater treatment such as septic systems—even though city water and sewer networks are in close proximity.

To tell us about their water, residents used their senses, with odor, color, and taste as the primary attributes for determining risk. Whether receiving public or private water, some residents used terms such as “bad,” “sewage,” and “eggs” to describe the smell, and “funny,” “bad,” and “metal” to describe the taste. Many residents simply remarked, “I just don't trust it.” Similar to our study, Doria and colleagues (2009) found in a cross-national mixed methods survey that water quality is primarily estimated using organoleptics (color, odor, and taste) and that risk perception is strongly influenced by these characteristics. As Gutiérrez-Capitán et al. (2019) argue, these sensory indicators are not just individual perceptions but biologically based indicators for determining health risks.

On a sweltering summer day, Delila recalled her experiences at Holly Court Apartments. Her memories of living there are full of itchy skin, rashes, smelly water, delinquent landlords, and, with a dismissive shake of her head, she sums it up as “a medical headache.” Fortunately, with support from the University Area CDC, she and her family were able to move to another property and are much happier. During our conversation, she exclaimed that their landlord actually listens and acts on their complaints. Still, Delila says, “If it smells like [sewage], don't drink it.” Here, as previous studies suggest (Fragkou & McEvoy, 2016; Pierce et al., 2019), prior experience with poor water quality can influence risk perception and tap water mistrust. These experiences, combined with other insecurities (e.g., food, housing, transportation), also inform distrust in other sectors (Brewis et al., 2019).

Marta, a Mexican immigrant who founded a local legal aid nonprofit, described how some

residents rely on bottled water because of their experiences “back home” in Mexico. When asked if she thought residents would ever drink their tap water if they believed it was safe, she said “no” and explained, “It's because we're not used to it, no...they're comfortable just buying bottles of water, having bottles of water at home.... That's not going to change just like that, because we're so used to buying water in Mexico.” Marta explains that the social and cultural layers involved in tap water mistrust vary and often continue as people move to new places. Fragkou & McEvoy (2016), for instance, found in their study in two Latin American cities that prior experiences with poor water quality and long-standing distrust of water utilities and government services increased perceptions of risk and were embedded in everyday decisions involving water, often with reliance on bottled water. In the United States, Javidi & Pierce (2018) found that Hispanic households were the largest population to perceive their water as unsafe.

Like Marta, for many residents of the University Area Community, tap water mistrust has resulted in reliance on bottled water. Drawing on rapid assessment data, the relationship between tap water mistrust and bottled water use is statistically significant (Fisher's Exact Test=15.18, df=8, $p=0.05$, Cramer's $V=0.58$, $n=23$), with 57% of respondents reporting they always used bottled water and 65% rating their tap water as “fair” or “poor.” When household tap water was rated as excellent, residents almost never used bottled water, but when residents rated their water as satisfactory, fair, or poor, they almost always did so. For example, Rachel, a former community resident, described her water: “It smells. It was really bad. So you can't drink it, so you're forced to buy bottled water. Sometimes you don't want to bathe in it, but you have no other choice.” While buying bottled water makes Rachel, Marta, and other residents “feel safe,” there are health and economic impacts from reliance on bottled water. Alternative sources of water are typically more expensive than tap water (Javidi & Pierce, 2018; Parag & Roberts, 2009; Stoler et al., 2020) and may be less healthy (Rosinger & Young, 2020).

Residents shared cultural knowledge about the relationship between water, contamination, and health, which foreground marginalization, inequitable politics, dismissal of user knowledge, and histories of harm shared cultural knowledge (see also Wilson et al., 2022). During interviews with city and county officials, we shared the perceptions we were hearing from residents. We explained that risk perceptions of water quality

by residents centered on sensory details (smell, taste, appearance, color, turbidity, and so on), with people commonly explaining, “Our water smells like sewage.” City and county officials reacted to these comments with some degree of skepticism. Mark, a county water resources engineer, remarked, “There’s a difference between contaminated and just, ‘I don’t like the water.’ That’s what we call ‘aesthetics,’ not a public health issue.” Ian, a city water engineer, further explained that the presence of hydrogen sulfide often found in private wells affects the taste and smell of the water (e.g., like rotten eggs), but it does not pose a threat to public health unless found in high concentrations. As Spackman and Burlingame’s (2018) research on the “sensory politics” of early water quality regulation illustrates, when organoleptic characteristics became an individual matter of taste (or “aesthetics”) rather than scientific judgment, people’s experiences became marginalized. Over time, technocrats came to view perceptions as complaints of personal and public disapproval rather than “actual” hazards. As a result, “consumers’ sensory aesthetic knowledge remains circumscribed in its ability to act” (Spackman & Burlingame, 2018, p. 367).

In our research, water quality aesthetics were an important part of the social construction of tap water mistrust. At the same time, lack of trust between water consumers and water governance was a critical factor (see also Doria et al., 2009; Grupper et al., 2021a; Grupper et al., 2021b; Johnson & Scicchitano, 2005; Leahy & Anderson, 2008). Officials often did not trust residents’ perceptions of their water if it was only based on sensory details without scientific testing, that is, “expert” evaluation (Checker, 2007; Haenn, 2003; Kiessling & Maxwell, 2021). However, in the University Area Community, there is widespread distrust of water and officials who espouse that water is safe and clean even though it has not been tested. A notable example raised by some residents was the Flint water crisis, which demonstrated that municipal services, “experts,” and “testing” were not always trustworthy and that residents’ experiences were devalued or dismissed (Pieper et al., 2017; Sobek et al., 2020). As Fragkou and McEvoy (2016) argue, investment in water infrastructure is only as effective as the trust residents have in their governance system. If interventions are not connected with sociocultural understandings and decision making, the “epidemic of tap water distrust and disuse” will continue despite expensive investments in water infrastructure services (Montoya et al., 2021; Wells et al., 2021).

Plumbing Past the Curb Stop

Tap water mistrust is sometimes tied to housing insecurity (Doria et al., 2009), where aging or deteriorating water infrastructure results in water quality challenges “past the curb stop” (Jepson, 2014; Meehan et al., 2020b; Rosinger et al., 2020). For example, Deitz and Meehan (2019) found residents in mobile homes had consistent water service challenges related to connections, fittings, and plumbing that compromised access, pressure, reliability, and quality. These challenges heighten perception of risk, especially when compounded with insecurity of housing status (Meehan et al., 2020b; Pierce et al., 2019; Pierce & Jimenez, 2015), as reflected by several residents we talked with who lived in mobile home parks within the community. Jerry, for example, distrusted his tap water, even though it was piped water provided by the city, because of the old, deteriorating pipes he knew were not replaced when they added the connection. Laura, another resident of the mobile home park, told us about significant flooding and sewage overflows yearly in her mobile home, which she believed compromised her water quality.

Apartment units in the University Area Community also had plumbing problems. Gloria, a mother of two and frequent visitor to the community garden, had lived in the neighborhood for only a few years but hoped to move out soon because of the many housing infrastructure and landlord problems she and her family faced. With a sigh, she provided a litany of plumbing challenges: foundation issues, corrosion, red rings in the bathtub, sewer backups, pests, sewage overflow and flooding in the yard, and tap water that was white, powdery, and smelled like chlorine. She knew that the water and sewer service was provided by the city and associated a lot of the problems that she and her family faced with the pipes in her home: “Our grey water does not drain to the city. It just drains into the yard. We would not even complain about something like this to them because larger, more impactful things go unaddressed for months and months or indefinitely.” As Meehan et al. (2020b) found, rental status is often correlated with residents feeling disempowered to ask for help due to fear of eviction, an increase in rent, and/or a lack of maintenance from the property owners. Our rapid assessments supported this finding in the University Area Community when we asked respondents to describe plumbing problems and the quality of their plumbing service (Fisher’s Exact Test=25.06, $df=16$, $p=.001$, Cramer’s $V=0.56$, $n=20$). A total of 55% of respondents reported that aging or inadequate plumbing infrastructure contributed to

many challenges, including slow drains and sewer backups, and 40% rated their plumbing as “fair” or “poor.” While Gloria had water and sewer service from the city, she did not trust it.

Gloria told us that she knew a water test would not pass in her house no matter what city officials said about the quality of the water or the quality of her sewer. She explained that she could only call maintenance with permission from their landlord. This was an added fee, so she avoided it unless it was a matter of “life or death.” Gloria’s feelings of insecurity and heightened perception of risk derived from the layering of water, sanitation, and housing infrastructure challenges created and exacerbated by socioeconomic inequities (Meehan et al., 2020b; Pierce et al., 2019; Pierce & Jimenez, 2015; Wells & Whiteford, 2022). Furthermore, our interviews revealed interconnected challenges related to the household-water-sanitation nexus, including the themes of “feeling trapped,” the challenges of access to housing, paying rent, low-income jobs, and governmental disconnects. As Checker (2007) found, Gloria’s personal experiences living in her residence as a low-income person of color and feeling powerless were enough “truth” for her, as she put it, of the inadequate water infrastructure that the water utility would be “unable to fix.” As Gloria lamented, “You just kind of take it as it is” and hope to find and afford a new place.

City and county water managers with whom we spoke agreed that housing infrastructure was connected with water and sanitation insecurity. While they empathized with residents like Gloria, they argued that they had limited capacity to help “after the curb stop.” For example, Ian explained that water quality was guaranteed only up to the meter because, after that, it was private property and the responsibility of the property owner. His job was water, and housing infrastructure challenges were “outside of their area,” as Gloria knew, if not a “life or death” situation, she would receive no help. So, whose responsibility is it? We went to the Department of Health to ask. There, we spoke with Margaret, who worked with county residents on water issues, and she confirmed that piping infrastructure could be a major contributor to water quality, especially if residents performed DIY fixes using different materials or pipes that did not fit correctly. She also noted that water heaters in apartments and townhomes could produce poor water quality if not cleaned and maintained regularly:

If your temperature is too low in your water heater, it just builds up sulfur and iron bacteria.

So it smells nasty coming up. So it’s got to be high enough to kill that...the inside of water heaters are absolutely the most disgusting bacteria-laden pits.

She explained that these were challenges that the property owner should oversee and that the housing-water nexus was entrenched in managerial and policy gaps such as this (Durst, 2018; Meehan et al., 2020b).

As Margaret suggested, many of our interlocutors took plumbing problems into their own hands with “DIY fixes.” Several residents discussed what they or their neighbors had done to fix piping and plumbing when maintenance was slow or nonexistent. Tom, a resident in the community since 1989, exclaimed, “Our water rots everything! Plastic, metal, you name it.” He described that his neighbors did not have hot water for three months and had continual backups in their bathtub, but their landlord did nothing. With a look of exasperation, Tom recalled watching his neighbor dig and fix the bathtub completely himself. In some ways, residents must find ways to harness their own agency, but often, as Wakhungu (2020) found in another Tampa neighborhood, landlord neglect resulted in little agency for residents to change their living conditions. Residents, fearful of being evicted or unable to hire a maintenance person, must figure out how to fix their infrastructure issues themselves, live with the deterioration, or move if they can afford it. In our rapid assessments, some residents who rated their plumbing quality as poor (due to backups and slow drains) said they sometimes had to rely on neighbors or local businesses for bathroom needs.

The kinds of challenges Tom listed could be exacerbated when inadequate household infrastructure experiences flooding. Charles, an employee at the University Area CDC and resident in the community, described a time when his apartment flooded so badly that he called maintenance. Knowing that “it would take forever,” he utilized his own skills and knowledge of plumbing to fix it. He acknowledged, however, that a resident without access or awareness of resources would have great difficulty doing this. In a separate study, Hinds (2019) investigated residents’ views of stormwater management, infrastructure, and redevelopment in the University Area Community and found that inadequate infrastructure, climate change, and power dynamics in local government intersected to create flooding disasters. Here, the interplay of inadequate housing, high rates of renting, infrastructure decline, dependence on and fear of landlords, and past-the-curb-stop

challenges discouraged involvement from water or sanitation officials (Johnson & Scicchitano, 2005; Meehan et al., 2020b).

Jurisdictional Ping Pong

An important factor in constructing notions of tap water mistrust was uncertainty about from where the water came. Half of the residents ($n=14/28$) we spoke with in the rapid assessment did not know the source of their water. This is not uncommon for unincorporated communities (Doria, 2010; Oliver, 1999). Residents in the University Area Community who did know where their water came from had varying uses for their tap. For example, 10 residents believed they were on city water, but only two said they drank water from the tap; the rest used bottled water. Kayla, an employee of the University Area CDC and former resident, had recently moved from the community to another area and said she loved her “new water” but did not know from where it came. Kayla did not drink or like the water in her apartment in the University Area Community and seemed more trusting of the water in her new apartment outside the community. She jokingly said that when she invited family and friends over to her new place, they raved about how good her water tasted. For Kayla, the source did not matter; rather, general trust living outside the community was a good enough reason to drink from the tap. Kayla’s reasoning fitted squarely with research by Doria et al. (2009), who found that tap water avoidance was linked to household water insecurity challenges, including access, affordability, adequacy, quality, taste, and risk perception, and revealed how stigmatization of tap water was context-specific, with “bad water” associated with poorer neighborhoods (Brewis et al., 2021).

The lack of awareness of tap water sources seemingly contradicted the assumption by some water managers with whom we spoke; residents who knew they were on centralized systems trusted their water, drank it, and considered it the best option to mitigate risk. Jack, a resident in the community for five years, explained that he received city water but that the water bill was much too high; he did not trust the tap water, so he did not drink it. Jack explained that he always used bottled water for drinking and cooking and only used the tap for cleaning and watering his plants. He emphasized that he loves where he lives but has suspicions about the quality of the water in the pond at his complex, which has turned him against his drinking water. As Doria (2010) found, context cues

such as experiences with taps, water pipes, bottles, characteristics of water consumption, locale, and suspicion of contaminants all influence risk perception and trust in services. Jack’s description of his water use and habits illustrates how perceived risk, even without organoleptic complaints, created preventative, risk-averse behavior (Doria, 2010). Further, because vulnerable populations are more likely to live in and near places with heightened contamination and water insecurity, context cues become an important part of constructing tap water mistrust (Brulle & Pellow, 2006; Deitz & Meehan, 2019; Javidi & Pierce, 2018).

As an unincorporated community, the University Area Community is the court of a “ping pong game” of jurisdictional responsibility between the city and county water and wastewater departments. The county’s water and wastewater utilities have an urban service area prescribed by state statutes, which is outside city limits but does not cover the entire county. The City of Tampa has its own utility service area that provides water and sewer inside city limits, but through an interlocal agreement with the county (extraterritorial jurisdiction), the University Area Community is located in the city’s service area. As engineer Joe stated, “So while it’s [University Area Community] technically outside the city limits, it’s in their service area by agreement.” As a result, water and wastewater lines are interspersed unevenly across the community, and some are not utilized. Moreover, neither utility, city, nor county has been willing to completely service the community despite its location near municipal lines. The resulting mosaic of city, county, and private water and wastewater connections and systems is not just hydrologic, as Workman and colleagues (2021) argue, but rather is politically decided. The legal and political agreements over who has jurisdiction and who does not are used as an excuse to “ping pong” responsibility back and forth when problems are reported.

However, officials from the city and county argued that it was not just political will and action that perpetuated the University Area Community’s water problems. Officials described challenges with fiscal feasibility in figuring out where, who, and how residents could obtain municipal water services. Mark from the county explained:

We can’t go in there and serve them anyway. It’s the city. And the city’s got pipelines and stuff in there that cost a bunch of money...we have an interlocal agreement that defines those boundaries and what services can and can’t, what you can and can’t do, so that’s an interlocal agreement between the City of Tampa and our board...and it doesn’t matter who owns it,

it's a lot of money to put the pipes in, and so who's gonna pay for those pipes, the people that are there can't.

Yet, as Workman and colleagues (2021) argue, water provision is “sociotechnical,” not just an engineering problem but also a governmental choice. Durst (2018) found that fiscal or economic considerations were generally not associated with underbounding patterns and annexation decisions. Ian from the city's water utility was worried about the risk of non-payment, “So I think it's going to be important to think through, how are the bills going to get paid after this? Is that really a reasonable expectation, after we make these connections, right?” Fears of the failure of cost recovery and the perception that residents in informal settlements would be unable to pay for services and long-term maintenance are common across studies (Sinharoy et al., 2019).

According to Hutton and Chase (2016), economic factors and competing priorities faced by government officials are typical barriers to improvements at public, private, and individual household levels. Sinharoy and colleagues (2019) describe how lower taxation in unincorporated areas can limit infrastructure investments. As Joe explained:

The reality is that the city's first obligation is to its residents inside the city limits. So, if money is tight, and resources are limited, the city is going to choose to serve its citizenry first. So, people outside the city limits, even though they're in the inter-local [water service] area, even though they're their customers, yeah, they're going to take the backseat. And that's just a reality.

This dilemma emerged from selective annexation covenants of the community that continue to prevent access to safe water for some residents (Anderson, 2010; Jepson & Vandewalle, 2016; Lockhart et al., 2020; Méndez-Barrientos et al., 2022). Anand's (2017) concept of “hydraulic citizenship,” the recognition of belonging in quality water service, is out of reach for residents living in unincorporated areas like the University Area Community, further illustrating the socioeconomic and political marginalization of residents.

Pipe Dreams

Residents' experiences with water, perceptions of risk, and behavior contrast among stakeholders in the University Area Community. The factors underlying tap water mistrust also vary but emphasize sensory details or “aesthetics,” housing infrastructure challenges, affordability,

and governance. These factors reveal the ways in which risk is a social construction, expressed and experienced differently by community residents (Checker, 2007; Oktem, 2016). We found that water utility employees relied on techno-scientific approaches to risk in water management, where risk is perceived as empirically identifiable and measurable (Spackman & Burlingame, 2018; Wedgworth et al., 2014). Here, “experts” calculate risk as a probability to inform decision making alongside solutions calculated to enhance efficiency and economic feasibility (Kiessling & Maxwell, 2021; Wells et al., 2019). In the University Area Community, these divergent understandings have led to significant differences in perceptions of risk and trust between stakeholders. If left unaddressed, different understandings of risk can complicate communication (Lehigh et al., 2020) and jeopardize the sustainability of interventions (Montoya et al., 2021; Wells et al., 2021; Wells & Whiteford, 2022).

At the conclusion of our research, a new project emerged to address water and sanitation insecurity in the community—the Septic to Sewer Conversion and Drinking Water Connection Program, supported by the federal American Rescue Plan and Inflation Reduction Act. Property owners who want to connect their properties can apply to be evaluated for inclusion into the program based on specific criteria listed on the program website. Application to the program and subsequent connection costs are free for single-family properties, while multifamily properties have application and impact fees. After connection, all property owners are customers of the City of Tampa and have fees after hookup. While some residents see this as a major win for water quality improvement, other residents are concerned about the affordability of recurring costs and about the potential for gentrification and displacement. Some residents also feel distrustful of the project because of the history of neglect and unfulfilled promises by the local government. As Wilson and colleagues (2023) found, a key reason for distrust among water users is “histories of harm,” the reoccurring or past experiences of racism, insecurity, and indifference. Moreover, residents understand that even if they receive clean and safe water from the city, what happens after the curb stop with local plumbing can compromise these efforts. There are no provisions in the plan to assist property owners or renters with onsite infrastructure. Interventions such as the county's plan, therefore, require a holistic perspective that considers residents' experiences

and perceptions and understands tap water mistrust more broadly. We are actively working with the county on these measures.

We have demonstrated how ethnographic research can contribute to broader understandings of tap water mistrust and risk perception surrounding water quality and so fill the gap in understanding different perceptions between stakeholders. As anthropologists, we can use this fine-grained and context-sensitive information to advocate for local change and to shape how risk assessments for water quality are approached more broadly. Following suggestions by Brulle and Pellow (2006) and Checker (2007), we can work more collaboratively with environmental scientists and water managers to include the voices, perceptions, and desires of community residents who hold valuable knowledge about their experiences and practices that can reduce these exposures. In the University Area Community, for example, residents can use assessment scales to track long-term trends in water quality challenges and provide water managers with specific and localized onsite data, thereby participating in the risk assessment process (Heaney et al., 2011; Roque et al., 2022). Heyman and colleagues' (2022) recent analysis of the affordability of future water resources for marginalized communities should be a key consideration for the role of community participation in municipal service decisions. Overall, policy recommendations in underbounded communities are contingent on measures that enforce the implementation of changes because of the challenges of unincorporated status, historical exclusion, and continual neglect from municipal services.

As we have illustrated, tap water mistrust is constructed socially and culturally and is subject to power differences between stakeholder groups. This insight can be useful for developing or expanding theories of environmental justice and infrastructural violence (Rodgers & O'Neill, 2012; Wells & Whiteford, 2022). For example, the environmental justice literature demonstrates how race and class disparities produce household water insecurity and increased risk perception where infrastructural conditions (housing, piping, resources, and services) and structural systems (social, racial, political, and economic) intersect to perpetuate infrastructural violence (Bullard et al., 2008; Stillo et al., 2019; Stillo & Macdonald Gibson, 2018; Wakhungu et al., 2021). Anthropological approaches to risk perception and the

social construction of water quality, therefore, are pertinent to refocus water insecurity on the power relations that drive physical geographies of inequity (Meehan et al., 2020b; Whiteford et al., 2016; Workman et al., 2021).

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References

- Aiken, C. S. (1985). New settlement patterns of rural Blacks in the American South. *Geographical Review*, 75(4), 383-404.
- Alameddine, I., Jawhari, G., & El-Fadel, M. (2017). Social perception of public water supply network and groundwater quality in an urban setting facing saltwater intrusion and water shortages. *Environmental Management*, 59(4), 571-583.
- Anand, N. (2017). *Hydraulic city: Water and the infrastructures of citizenship in Mumbai*. Duke University Press.
- Anderson, M. W. (2010). Mapped out of local democracy. *Stanford Law Review*, 62, 931-1003.
- Andrews, T. (2012). What is social constructionism? *Grounded Theory Review*, 11(1), 39-46.
- Bernard, H. R., Wutich, A., & Ryan, G. W. (2017). Codebooks and coding. In H. R. Bernard, A. Wutich, & G. W. Ryan (Eds.), *Analyzing qualitative data: Systematic approaches* (2nd ed., pp. 125-159). Sage.
- Brewis, A., Meehan, K., Beresford, M., & Wutich, A. (2021). Anticipating elite capture: The social devaluation of municipal tap water users in the Phoenix metropolitan area. *Water International*, 46(6), 821-840.
- Brewis, A., Workman, C., Wutich, A., Jepson, W., Young, S., & the Household Water Insecurity Experiences—Research Coordination Network (HWISE-RCN). (2019). Household water insecurity is strongly associated with food insecurity: Evidence from 27 sites in low- and middle-income countries. *American Journal of Human Biology*, 32(1), e23309.

- Brulle, R. J., & Pellow, D. N. (2006). Environmental justice: Human health and environmental inequalities. *Annual Review of Public Health*, 27, 103-124.
- Bullard, R. D., Mohai, P., Saha, R., & Wright, B. (2008). Toxic wastes and race at twenty: Why race still matters after all of these years. *Environmental Law*, 38(2), 371-412.
- Checker, M. (2007). "But I know it's true": Environmental risk assessment, justice, and anthropology. *Human Organization*, 66(2), 112-124.
- Chelcea, L. (2023). Catch-all technopolitics: Water filters in New York City. *American Ethnologist*. [forthcoming]
- Deitz, S., & Meehan, K. (2019). Plumbing poverty: Mapping hot spots of racial and geographic inequality in U.S. household water insecurity. *Annals of the American Association of Geographers*, 109(4), 1092-1109.
- Doria, M. F. (2010). Factors influencing public perception of drinking water quality. *Water Policy*, 12, 1-19.
- Doria, M. F., Pidgeon, N., & Hunter, P. R. (2009). Perceptions of drinking water quality and risk and its effect on behaviour: A cross-national study. *Science of the Total Environment*, 407(21), 5455-5464.
- Durst, N. J. (2018). Racial gerrymandering of municipal borders: Direct democracy, participatory democracy, and voting rights in the United States. *Annals of the American Association of Geographers*, 108(4), 938-954.
- Fragkou, M. C., & McEvoy, J. (2016). Trust matters: Why augmenting water supplies via desalination may not overcome perceptual water scarcity. *Desalination*, 397, 1-8.
- Grupper, M. A., Schreiber, M. E., & Sorice, M. G. (2021a). How perceptions of trust, risk, tap water quality, and salience characterize drinking water choices. *Hydrology*, 8(1), 49.
- Grupper, M. A., Sorice, M. G., Stern, M. J., & Schreiber, M. E. (2021b). Evaluating determinants of social trust in water utilities: Implications for building resilient water systems. *Ecology and Society*, 26(4), Article 41.
- Gutiérrez-Capitán, M., Brull-Fontsere, M., & Jimenez-Jorquera, C. (2019). Organoleptic analysis of drinking water using an electric tongue based on electrochemical microsenors. *Sensors*, 19(1435), 1-16.
- Haenn, N. (2003). Risking environmental justice: Culture, conservation, and governance at Calakmul, Mexico. In S. Eckstein & T. Wickham-Crawley (Eds.), *Social injustice in Latin America* (pp. 81-102). Routledge.
- Heaney, C., Wilson, S., Wilson, O., Cooper, J., Bumpass, N., & Snipes, M. (2011). Use of community-owned and -managed research to assess the vulnerability of water and sewer services in marginalized and underserved environmental justice communities. *Journal of Environmental Health*, 74(1), 8-17.
- Heyman, J. M., Mayer, A., & Alger, J. (2022). Predictions of household water affordability under conditions of climate change, demographic growth, and fresh groundwater depletion in a southwest US city indicate increasing burdens on the poor. *PLOS ONE*, 17(11), e0277268.
- Hinds, K. (2019). Perceptions of infrastructure, flood management, and environmental redevelopment in the university area, Hillsborough County, Florida. [M.A. thesis, University of South Florida, Tampa].
- Hu, Z., Wright Morton, L., & Mahler, R. L. (2011). Bottled water: United States consumers and their perceptions of water quality. *International Journal of Environmental Research and Public Health*, 8(2), 565-578.
- Hutton G., & Chase, C. (2016). The knowledge base for achieving the sustainable development goal targets on water supply, sanitation and hygiene. *International Journal of Environmental Research and Public Health*, 13(536), 1-35.
- Javidi, A., & Pierce, G. (2018). U.S. households' perception of drinking water as unsafe and its consequences: Examining alternative choices to the tap. *Water Resources Research*, 54(9), 6100-6113.
- Jepson, W. (2014). Measuring 'no-win' waterscapes: Experience-based scales and classification approaches to assess household water security in colonias on the US-Mexico border. *Geoforum*, 51, 107-120.
- Jepson, W., & Vandewalle, E. (2016). Household water insecurity in the Global North: A study of rural and periurban settlements on the Texas-Mexico border. *The Professional Geographer*, 68(1), 66-81.
- Johnson, R. J., & Scicchitano, M. J. (2005). Uncertainty, risk, trust, and information: Public perceptions of environmental issues and willingness to take action. *Policy Studies Journal*, 28(3), 633-647.
- Kiessling, B., & Maxwell, K. (2021). Conceptualizing and capturing outcomes of environmental cleanup at contaminated sites. *Environment and Society: Advances in Research*, 12(1), 164-180.
- Leahy, J. E., & Anderson, D. H. (2008). Trust factors in community-water resource management agency relationships. *Landscape and Urban Planning*, 87(2), 100-107.
- Lehigh, G. R., Wells, E. C., & Diaz, D. (2020). Evidence-informed strategies for promoting equitability in brownfields redevelopment. *Journal of Environmental Management*, 261(1), 110150.
- Lockhart, S., Wood, E., & MacDonald Gibson, J. (2020). Impacts of exclusion from municipal water service on water availability: A case study. *New Solutions: A Journal of Environmental and Occupational Health Policy*, 30(2), 127-137.
- Meehan, K., Jepson, W., Harris, L. M., Wutich, A., Beresford, M., Fencel, A., London, J., Pierce, G., Radonic, L.,

- Wells, E. C., Wilson, N. J., Adams, E. A., Arsenault, R., Brewis, A., Harrington, V., Lambrinidou, Y., McGregor, D., Patrick, R., Pauli, B., Pearson, A. L., Shah, S., Splichalova, D., Workman, C., & Young, S. (2020a). Exposing the myths of household water insecurity in the Global North: A critical review. *WIREs Water*, 7(6), e1486.
- Meehan, K., Jurjevich, J. R., Chun, N. M. J. W., & Sherrill, J. (2020b). Geographies of insecure water access and the housing-water nexus in US cities. *The Proceedings of the National Academy of Sciences*, 117(46), 28700-28707.
- Méndez-Barrientos, L. E., Fencl, A. L., Workman, C. L., & H. Shah, S. H. (2022). Race, citizenship, and belonging in the pursuit of water and climate justice in California. *Environment and Planning E: Nature and Space*. [forthcoming]
- Mohai, P., Lantz, P. M., Morenoff, J., House, J. S., & Mero, R. P. (2009). Racial and socioeconomic disparities in residential proximity to polluting industrial facilities: Evidence from the Americans' changing lives study. *American Journal of Public Health*, 99(3 Suppl.), S649-S656.
- Montoya, L. D., Mendoza, L. M., Prouty, C., Trotz, M., & Verbyla, M. E. (2021). Environmental engineering for the 21st century: Increasing diversity and community participation to achieve environmental and social justice. *Environmental Engineering Science*, 38(5), 288-297.
- Mumbi, A. W., & Watanabe, T. (2020). Differences in risk perception of water quality and its influencing factors between lay people and factory workers for water management in River Sosiani, Eldoret Municipality Kenya. *Water*, 12(8), 1-25.
- Nader, L. (1972). Up the anthropologist: Perspectives gained from "studying up." In D. H. Hymes (Ed.), *Reinventing anthropology* (pp. 284-311). Random House.
- Oktem, O. (2016). The social construction of water management and political culture. In O. Oktem (Ed.), *Water politics and political culture* (pp. 15-32). Springer International.
- Oliver, M. (1999). Attitudes and inaction: A case study of the manifest demographics of urban water conservation. *Environment and Behavior*, 31(3), 372-394.
- Parag, Y., & Roberts, J. T. (2009). Battle against the bottles: Building, claiming, and regaining tap-water trustworthiness. *Society & Natural Resources*, 22(7), 625-636.
- Pieper, K. J., Tang, M., & Edwards, M. A. (2017). Flint water crisis caused by interrupted corrosion control: Investigating "ground zero" home. *Environmental Science & Technology*, 51(4), 2007-2014.
- Pierce, G., Gonzalez, S. R., Roquemore, P., & Ferdman, R. (2019). Sources of and solutions to mistrust of tap water originating between treatment and the tap: Lessons from Los Angeles County. *Science of the Total Environment*, 694, 133646.
- Pierce, G., & Jimenez, S. (2015). Unreliable water access in U.S. mobile homes: Evidence from the American housing survey. *Housing Policy Debate*, 25(4), 739-753.
- Rivera, D. Z. (2023). Unincorporated and underserved: Critical stormwater infrastructure challenges in South Texas colonias. *Environmental Justice*. [forthcoming]
- Rodgers, D., & O'Neil, B. (2012). Infrastructural violence: Introduction to the special issue. *Ethnography*, 13(4), 401-412.
- Roque, A., Wutich, A., Quimby, B., Porter, S., Zheng, Z., J. Hossain, M. J., & Brewis, A. (2022). Participatory approaches in water research: A review. *WIREs Water*, 9(2), e1577.
- Rosinger, A. Y., Brewis, A., Wutich, A., Jepson, W., Staddon, C., Stoler, J., Young, S. L., and the Household Water Insecurity Experiences—Research Coordination Network (HWISE-RCN). (2020). Water borrowing is consistently practiced globally and is associated with water-related system failures across diverse environments. *Global Environmental Change*, 64, 102148.
- Rosinger, A. Y., & Young, S. L. (2020). In-home tap water consumption trends changed among U.S. children, but not adults, between 2007 and 2016. *Water Resources Research*, 56(7), 1-13.
- Sadd, J., Morello-Frosch, R., Pastor, M., Matsuoka, M., Prichard, M., & Carter, V. (2013). The truth, the whole truth, and nothing but the ground-truth: Methods to advance environmental justice and researcher—Community partnerships. *Health Education and Behavior*, 41(3), 281-290.
- Scott, L. (2020). University area CDC says contaminated water gave children UTIs, flooding caused ringworm. ABC Action News, WFTS Tampa Bay. <https://www.census.gov/programs-surveys/acs>. <https://www.abcactionnews.com/news/region-hillsborough/university-area-cdc-says-contaminated-water-gave-children-utis-flooding-caused-ringworm>
- Sinharoy, S. S., Pittluck, R., & Clasen, T. (2019). Review of drivers and barriers of water and sanitation policies for urban informal settlements in low-income and middle-income countries. *Utilities Policy*, 60, 100957.
- Sobeck, J., Smith-Darden, J., Hicks, M., Kernsmith, P., Kilgore, P. E., Treemore-Spears, L., & McElmurry, S. (2020). Stress, coping, resilience and trust during the Flint water crisis. *Behavioral Medicine*, 46(3-4), 202-216.
- Spackman, C., & Burlingame, G. A. (2018). Sensory politics: The tug-of-war between potability and palatability in municipal water production. *Social Studies of Science*, 48(3), 350-371.
- Stillo, F., Bruine de Bruin, W., Zimmer, C., & MacDonald Gibson, J. (2019). Well water testing in African-American communities without municipal infrastructure: Beliefs driving decisions. *Science of the Total Environment*, 686, 1220-1228.

- Stillo, F., & MacDonald Gibson, J. (2017). Exposure to contaminated drinking water and health disparities in North Carolina. *American Journal of Public Health*, 107(1), 180-185.
- Stillo, F., & MacDonald Gibson, J. (2018). Racial disparities in access to municipal water supplies in the American South: Impacts on children's health. *International Public Health Journal*, 10(3), 309-323.
- Stoffle, R. W., Traugott, M., Stone, J. V., McIntyre, P. D., Jensen, F. V., & Davidson, C. C. (1991). Risk perception mapping: Using ethnography to define the locally affected population for a low-level radioactive waste storage facility in Michigan. *American Anthropologist*, 93(3), 611-635.
- Stoler, J., Pearson, A. L., Staddon, C., Wutich, A., Mack, E., Brewis, A., & Rosinger, A. Y. (2020). Cash water expenditures are associated with household water insecurity, food insecurity, and perceived stress in study sites across 20 low- and middle-income countries. *Science of the Total Environment*, 716, 135881.
- Trotter, R. T., Needle, R. H., Goodsby, E., Bates, C., & Singer, M. (2001). A methodological model for rapid assessment, response, and evaluation: The RARE program in public health. *Field Methods*, 13(2), 137-159.
- United States Census Bureau. (2019). *2015-2019 American community survey*. U.S. Census Bureau. <https://www.census.gov/programs-surveys/acs>
- United States Environmental Protection Agency. (2022). *EJScreen*. United States Environmental Protection Agency. <https://www.epa.gov/ejscreen>
- Wakhungu, M. J. (2020). An ethnography of WaSH infrastructures and governance in Sulphur Springs, Florida. [Ph.D. dissertation, University of South Florida, Tampa].
- Wakhungu, M. J., Abdel-Mottaleb, N., Wells, E. C., & Zhang, Q. (2021). Geospatial vulnerability framework for identifying water infrastructure inequalities. *Journal of Environmental Engineering*, 147(9), 04021034.
- Wedgworth, J. C., Brown, J., Johnson, P., Olson, J. B., Elliott, M., Forehand, R., & Stauber, C. E. (2014). Associations between perceptions of drinking water service delivery and measured drinking water quality in rural Alabama. *International Journal of Environmental Research and Public Health*, 11(7), 7376-7392.
- Wells, E. C., Lehigh, G. R., Combs, S., & Ballogg, M. (2020). Diversity improves design: Sustainable place-making in a suburban Tampa Bay brownfield neighborhood. In S. J. Garren & R. Brinkmann (Eds.), *Case studies in suburban sustainability* (pp. 131-149). University Press of Florida.
- Wells, E. C., Lehigh, G. R., & Vidmar, A. M. (2021). Stakeholder engagement for sustainable communities. In R. Brinkmann (Ed.), *The Palgrave handbook of global sustainability* (pp. 1-13). Palgrave Macmillan.
- Wells, E. C., Vidmar, A. M., Webb, A. W., Ferguson, A. C., Verbyla, M. E., de los Reyes III, F. L., Zhang, Q., & Mihelcic, J. R. (2022). Meeting the water and sanitation challenges of underbounded communities in the U.S. *Environmental Science & Technology*, 56(16), 11180-11188.
- Wells, E. C., Webb, W. A., Prouty, C. M., Zarger, R. K., Trotz, M. A., Whiteford, L. M., & Mihelcic, J. R. (2019). Wastewater technopolitics on the southern coast of Belize. *Economic Anthropology*, 6(2), 277-290.
- Wells, E. C., & Whiteford, L. M. (2022). The medical anthropology of water and sanitation. In M. Singer, P. I. Erickson, & C. E. Abadía-Barrero (Eds.), *A companion to medical anthropology* (2nd ed., pp. 160-197). Wiley-Blackwell.
- Whiteford, L., Cairns, M. R., Zarger, R. K., & Larsen, G. (2016). Water, environment, and health: The political ecology of water. In M. Singer (Ed.), *A companion to environmental health: Anthropological perspectives* (pp. 219-235). John Wiley.
- Wilson, N. J., Montoya, T., Lambrinidou, Y., Harris, L. M., Pauli, B. J., McGregor, D., Patrick, R. J., Gonzalez, S., Pierce, G., & Wutich, A. (2023). From "trust" to "trustworthiness": Retheorizing dynamics of trust, distrust, and water security in North America. *Environment and Planning E: Nature and Space*, 6(1), 42-68.
- Workman, C. L., Cairns, M. R., de los Reyes III, F. L., & Verbyla, M. E. (2021). Global water, sanitation, and hygiene approaches: Anthropological contributions and future directions for engineering. *Environmental Engineering Science*, 38(5), 1-16.
- Workman, C. L., & Shah, S. H. (2023). Water infrastructure as intrusion: Race, exclusion, and nostalgic futures in North Carolina. *Annals of the American Association of Geographers*. [forthcoming]
- Zheng, M., Wutich, A., Brewis, A., Kavouras, S. (2022). Health impacts of water & sanitation insecurity in the Global North: A scoping literature review for U.S. colonias on the Mexico border. *Journal of Water & Health*, 20(9), 1329-1342.