TRUST IN SOURCES OF INFORMATION ON TAP WATER QUALITY IN POPULATIONS EXPERIENCING A WATER CRISIS

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TABLE OF CONTENTS

TABLE OF FIGURES

1 EXECUTIVE SUMMARY

During a water crisis, trust is a key factor in communicating with residents about the safety of their tap water. Failures by US community water systems to deliver safe drinking water are more likely to impact low-income and minority communities, populations less likely to trust official sources. The research objective was to determine which information sources are most trusted concerning tap water quality among populations that have experienced a drinking water crisis. A community-based participatory research approach was used to develop and field surveys of sample populations in Newark, New Jersey, and Watts in Los Angeles, California, two low-income and minority communities with legacy water quality issues stemming from environmental injustice. The surveys found that community organizations and activists are more trusted sources of information about water quality than city and county governments or water utilities. The research suggests that agencies tasked with delivering critical information concerning tap water safety to residents will improve community trust in their messages if community organizations and activists deliver them.

2 INTRODUCTION

In 2018, during the fourth year of the Flint Water Crisis, I was invited to join a community working group led by Flint's First Trinity Missionary Baptist Church. The State of Michigan had recently ended the distribution of bottled water to the city's residents, and the church wanted to ensure its community still had access to safe drinking water. However, they struggled to find the funding to purchase, transport, and store large quantities of bottled water. The working group was assembled to explore options to continue and expand their water distribution efforts. On my first visit to the church, just a few blocks south of Flint's City Hall, I saw a line of cars waiting to receive bottled water stretched for three blocks. Some residents waited in line for hours, only to find that the day's supply was exhausted.

The workshop led me to collaborate with the church and other Flint community organizations to design and pilot-test a novel water distribution program that would enable the church to provide residents with an unlimited supply of treated city water. The program included a containerized water treatment system, supplies of reusable jugs for residents, and support for the church's volunteers. I initially assumed the program would only be needed until the city's

lead service lines were replaced. However, local community organizers often told me that many residents would never drink tap water again regardless of the city and state's actions to repair the water system.

A significant program component was focused on building trust with the community in the safety of the water being treated and distributed at the church. We hosted public meetings where residents spoke about the participatory process used to develop the program and provided the community members who volunteered to distribute the water with equipment to test the water for lead and communication channels with which to socialize the results. This helped demonstrate to the residents that their neighbors were vouching for the safety of their water rather than the city, the state, or the public utility. Within six months, the church was able to end bottled water distribution and instead provide treated city water in reusable jugs. Six years later, after significant repairs to the service lines in Flint, this program is still operating in four Flint neighborhoods. Despite Flint's water meeting the Safe Drinking Water Act standards for several years (O'Neill, 2023), many residents still refuse to drink tap water.

2.1 Our Failing Drinking Water System

The US faces a drinking water crisis. Chronic underinvestment has left water infrastructure outdated and on the verge of collapse in many places across the country (NRDC, 2023). In the US, roughly 95 percent of the US population receives some or all its water from a community water system (CWS), which the US Environmental Protection Agency (EPA) classifies as a public water system that supplies water to the same population year-round (US EPA, 2023). While 52,000 CWSs in the US serve 286 million people, 82 percent of US households get their water from just 8 percent of CWSs that comprise the large municipal water systems (Factoids, 2008).

CWSs are subject to the 1974 Safe Drinking Water Act (SWDA), which established a comprehensive framework for protecting the quality of drinking water provided by public water systems. The SWDA sets standards, mandates monitoring and reporting requirements, and provides for regulatory oversight to ensure that drinking water is safe for consumption. The SDWA also authorized the EPA to set national standards for drinking water quality, including maximum contaminant levels (MCLs) for various contaminants that may be present in drinking water and treatment techniques and monitoring requirements to ensure compliance. The SWDA

requires CWSs to monitor their water quality regularly, report the results to the EPA and state regulatory agencies, and provide customers with annual Consumer Confidence Reports (CCR). CCRs detail the quality of the drinking water supplied, including information on contaminants detected, compliance with standards, and potential health concerns. While the EPA sets national standards, the SDWA allows states to assume primary enforcement responsibility for regulating and enforcing drinking water within their borders. States are permitted by the SWDA to adopt their own drinking water standards, but these must exceed or stay within the federal standards.

Unfortunately, this framework for monitoring and reporting is not uniformly enforced. A 2020 NRDC analysis of the EPA data showed that between 2018 and 2020, 186 million people in the United States - a staggering 56 percent of the country's population - drank water from drinking water systems with measurable amounts of lead, which the EPA and health experts agree is unsafe at any detectable level (Fedinick, 2016). In fact, according to the EPA's data, states and the EPA took formal enforcement action against just 11.2 percent of the over 8,000 violations that occurred in 2015—leaving 88.8 percent free from any formal enforcement action (Fedinick, 2016). Beyond the documented violations, the NRDC report's authors describe several tactics utilities use to avoid reporting violations, such as selective sampling and using test methods that avoid detecting contamination. For example, if I am a customer of the Los Angeles Department of Water and Power, the largest public water utility in the country, and I receive a water quality report from the utility or look up their public water testing data on the internet, I will be shown a single water quality standard for a water system which includes some of the wealthiest and the lowest-income neighborhoods in the country. These neighborhoods experience very different water quality, which I've observed in sample collection and testing over the last four years.

US drinking water infrastructure is suffering from decades of underinvestment. According to the EPA's 2023 Drinking Water Infrastructure Needs Survey and Assessment, the US must spend $625 billion over the next twenty years to maintain the current infrastructure and bring failing systems into compliance. While the 2022 Inflation Reduction Act includes $15 billion in funding to replace lead service lines and $11.7 billion in general-purpose funding through the Drinking Water State Revolving Fund, these investments fall far short of meeting the projected needs. The American Society of Civil Engineers estimates a $434 billion gap between the committed funding and the amount needed to bring drinking water, wastewater, and

stormwater into compliance (AWWA, 2021). These estimates of the funding gap do not consider the future impacts of climate change, which compound the investment needed to repair the country's aging infrastructure. A 2016 EPA study estimated that the cost of adapting the nation's water infrastructure to climate change could range from $488 billion to $944 billion over the next twenty years (US EPA, 2023)

Ultimately, the burden of financing the upkeep of our aging water infrastructure will fall on the rate-paying public. According to the American Water Works Association, a utility industry group, many utilities will face a significant challenge in keeping water affordable for everyone they serve (AWWA, 2021). Low-income and minority communities, which are most likely to be served by a failing water system, are also the least able to afford the higher taxes and rate increases needed to maintain their water quality.

In 2010, the United Nations General Assembly, through Resolution A/RES/64/292, declared safe and clean drinking water and sanitation a human right essential to the full enjoyment of life and all other human rights (The Right, 2010). For US citizens, access to safe and clean water remains highly dependent on their income and zip code. According to the 2023 Fifth National Climate Assessment, over one thousand CWSs, primarily those serving people who are economically disadvantaged, rural, or indigenous, are providing poor-quality water and are not prepared to cope with climate-change-driven flooding, drought, and waterborne-diseases (Hayhoe, 2023).

2.2 THE WATER-ENERGY NEXUS

My first experience with the interdependence between energy and water came while working in sub-Saharan Africa. In 2010, I began working with international NGOs and local Rural Electrification Authorities to develop renewable energy microgrids for remote communities far from the national grid. We would survey the residents about their anticipated electricity demand in the early stages of developing each project. In my projects, electricity for light was always the highest priority. The second highest priority, and by far the most significant energy demand, was pumping and distributing water (setting up a satellite and television to watch football games was always third). One project to provide the Maasai of Tanzania with solar panels for lighting became a project to power small water pumps for agriculture. Even at

the most miniature scale, a primary energy use is to provide water for drinking, cooking, and agriculture.

Every step of the water cycle—producing, moving, treating, and heating water and then collecting and treating wastewater—consumes energy (Water, 2016). The US EPA estimates that 4 percent of the country's annual electricity consumption is used to provide drinking water and wastewater at a cost of $4 billion (Fant, 2020). For municipalities, water and wastewater utilities are typically the largest consumers of energy, with combined water delivery and treatment services accounting for between 30 and 40 percent of annual energy expenses. In California, the US's most populated state, the water system uses approximately 20 percent of the state's electricity and 30 percent of its natural gas, accounting for more than 5 percent of the state's greenhouse gas emissions (Escriva-Bou, et al. 2020).

Almost every power source demands water in one form or another, be it to produce petroleum or wash coal, grow and distill biofuels, or drive and carry waste heat away from steam turbines. During recent droughts, some power plants in California have had to run below full capacity due to a lack of cooling water. A 2014 Department of Energy report describes how the scarcity, variability, and uncertainty around the availability of water resources are becoming more prominent, potentially leading to vulnerabilities in the U.S. energy system (Water, 2014).

The water-energy nexus's crux is that water availability depends on access to energy, and energy availability depends on access to water. The spoiler here is climate change. In many areas of the country, climate change is likely to increase people's demand for water while also shrinking water supplies (US EPA, 2023). Under all but the most optimistic climate change scenarios, the availability and cost of both electricity and water are projected to rise. The authors of the 2020 study "Climate Change Impacts and Costs to U.S. Electricity Transmission and Distribution Infrastructure" projected that electricity infrastructure costs across the US are projected to rise considerably under climate change, with annual costs increasing by as much as a quarter (Fant, 2020). Climate change is also projected to intensify drought across much of the country. During a drought, customer demands for water and energy increase, challenging water utilities to allocate their limited water resources between agriculture, drinking water systems, and energy generation. In an energy descent scenario characterized by dwindling oil supplies and climate change impacts, there are neither the energy resources to power community water systems nor the water resources to support power generation.

In summary, we are looking at a future in which safe drinking water in the US is less available and more expensive. Because drinking water systems are funded locally, the existing infrastructure and climate adaptation funding gaps will likely remain open for all but the most affluent communities. And when it is available, safe drinking water will become less affordable for low-income and minority communities. With insufficient funding to maintain the existing infrastructure, water quality and safety will continue to degrade in the near term, with the greatest impacts experienced by low-income and minority communities.

3 LITERATURE REVIEW

Public trust has emerged as an essential metric by which municipalities measure the performance of their community water managers. More than a few studies of the public's trust in their drinking water have been published, supplemented by scholarly research on psychological dimensions of trust. My exploration of published literature focused on studies that include data on minority and low-income communities. According to a 2019 study by The Natural Resources Defense Council (NRDC), race, ethnicity, and language have the strongest relationship to which communities have violations and inadequate enforcement of the SDWA (Fedinick, 2019). The NRDC's analysis of EPA data found that CWSs in marginalized communities are more likely to violate the SDWA and stay in violation for longer periods.

"The National Report Card on Safe Drinking Water Knowledge, Attitudes and Behaviors: A Survey of Adult Americans" was published on the 25th anniversary of the passage of the Safe Drinking Water Act (National, 1998). The authors report that three out of four adults (76%) express some concern about the quality and safety of their water, with 38% saying they are very concerned, and that 24% of those surveyed (representing some 65 million people) report that they do not drink water straight from the tap for reasons of taste, smell or health and environmental concerns. The average survey respondent had between two and three reasons for not drinking their tap water; for 69%, it is the taste, smell, or odor; for 49%, it is stories in the news about water pollution; and for 41%, it is the convenience of bottled water. The authors conclude that the practices of filtering tap water and drinking bottled water in the home have greatly increased in the past decade. The study also asked which sources of information about water quality and safety are believable. "Environmental or other public interest groups" were

most believable, followed by "your doctor or health care provider." "The state or federal government" was the least believable, followed by "your water company."

In "Mistrust at the tap? Factors contributing to public drinking water (mis)perception across US households," the authors examine data from the 2013 American Housing Survey to determine which socioeconomic indicators most influence the perception of water quality (Pierce, 2016). The authors conclude that lower education levels, lower household income, racial and ethnic minority status, and foreign-born nativity correlate to a distrust of tap water. The authors also conclude that the perception of water quality is not tied to known built environment or neighborhood risk factors affecting water safety and quality.

The authors of "U.S. Households' Perception of Drinking Water as Unsafe and its Consequences: Examining Alternative Choices to the Tap" examine data from the 2015 American Housing Survey to estimate how many households perceive drinking water as unsafe and instead use tap water alternatives such as bottled water (Javidi, 2018) The paper identifies ethnicity as a critical determinant of trust in drinking tap water, with Hispanic and African American residents 30% more likely to distrust their tap water and to choose tap water alternatives. Based on these findings, the authors derived a "back-of-the-envelope" estimate of the annual cost to US households of this behavior to be $5.56B.

The author of "Stopping the Drain on Household Budgets: Addressing Tap Water Mistrust Through Affordable Premise Plumbing Investments" examined customer complaints to The Los Angeles Department of Water and Power, the country's largest municipal water provider (Roquemore, 2019). The author concluded that 71% of the complaints are due to premise plumbing issues which are not the utility's responsibility to address. The author determined that the cost to households of installing point-of-use filters is significantly lower than tap water alternatives and recommends that municipalities establish programs to finance premise plumbing repairs for households.

A 2020 study commissioned by The American Water Works Association (AWWA, 2021) concludes that White adults and high-income earners with a water utility are far more likely than their African American and Hispanic counterparts to report their water is very safe.

In "Trust in Drinking Water Quality: Understanding the Role of Risk Perception and Transparency," the authors investigate how different drinking water customers perceive their tap water quality and the possible risks involved (Brouwer, et al. 2020). The authors applied

traditional and modern segmentation approaches based on four types of perspectives to determine different degrees of risk perception. The authors concluded that water suppliers are trusted more than municipal authorities and recommended that they differentiate themselves from government agencies when presenting water quality information to residents.

The authors of "Community Voice on the Flint Water Crisis: A Trust Study, Needs Assessment, and Plan of Action" conducted research in Flint, Michigan, during and after the water crisis (Community, 2020) Their research involved more than 100 community meetings, 13 focus groups, and a qualitative analysis of 17 recorded community events. This is one of the few studies that evaluated the population's trust in specific individuals and institutions. The most trusted sources were community-based organizations, the Genesee County Health Department, other neighborhood residents, and local universities, including the University of Michigan. The least trusted sources were elected officials, the city council, and state and federal organizations, including the EPA and Michigan Department of Environmental Quality. The incumbent US President at the time, Donald Trump, was the least trusted source of information. The authors stressed the importance of informing the community about the comprehensive measures taken to address the crisis and to detail how public funds were spent. The authors recommended that municipal authorities make additional efforts to present the complex information about water infrastructure in simplified, layman's terms and consider language barriers in the community.

The authors of "How Perceptions of Trust, Risk, Tap Water Quality, and Salience Characterize Drinking Water Choices" sought to understand how relationships between water managers and the communities they serve spill over into drinking water behavior (Grupper, 2021.) The authors conclude that there is a correlation between tap water behavior and trust in water managers, with people who drink more tap water having a higher degree of trust in their water managers. The authors recommend that community water managers use community drinking water behavior as a surrogate for trust in their resiliency and adaptation planning.

In 2022, the U.S. Department of Housing and Urban Development commissioned a study to determine what data federal authorities are collecting on perceptions of drinking water quality (Sarkar, 2022). The author concluded that while federal authorities collect data on drinking water quality, no federal survey asks households about their perception of tap water quality. The author's literature review led him to conclude that those with negative views of their tap water are disproportionally ethnic or racial minorities and those with low incomes, which echoes

results of The National Environmental Education & Training Foundation's 1999 study. The author recommended that policymakers consider the public perception of their tap water when crafting policies on infrastructure and resilience.

My conclusions from reviewing the published literature are that the number of people drinking tap water has decreased in the last few decades, that tap water behavior is closely linked to trust in community water managers, and that trust in tap water is lower in minority and low-income communities. Unfortunately, these conclusions may be used to support opposing policy positions. For human rights and justice groups advocating for equity and universal access to safe drinking water, the research supports increased spending on infrastructure and on outreach programs to build trust in drinking water safety. However, for conservative groups advocating for reduced public investment and the privatization of public services, declining tap water use supports their arguments for reduced public investment (Anthony, 2009). Where allowed, private ownership of CWSs results in higher water prices and less affordability for low-income families (Zhang, 2022.)

4 RESEARCH OBJECTIVES

From my research I drew the following conclusions about the present and future states of drinking water in the US. First, large segments of the drinking water system fail to meet federal standards, and low-income or minority communities are more likely to receive water from a failing system. Second, the estimated $1 trillion in funding needed to maintain the current systems, bring failing systems up to code, and prepare for climate impacts will not be closed by raising rates or increasing local taxes. Third, because state and federal agencies have not been rigorously enforcing the SDWA, the CWSs need more incentive to change their behavior of underreporting and non-compliance. Fourth, rising energy costs, whether due to climate impacts, the depletion of energy reserves, or some combination of both, will drive up the cost of water from CWSs. And finally, we are headed towards a chronic state in which safe, potable drinking water is unaffordable for a growing number of people and out-of-reach for members of low-income and minority communities.

Unsafe drinking water is more than an inconvenience for low-income populations. The most found harmful contaminants in drinking water cause or exacerbate health issues and lead to lifelong disabilities in children. Residents who are aware of these risks and seek other sources are

forced to spend their limited time and money acquiring bottled water or tap water alternatives. Not having access to safe drinking water has health implications for children, even when they avoid drinking contaminated water. According to a 2019 study, children who do not drink tap water are more than twice as likely to drink sugar-sweetened beverages, which add empty calories to children's diets and may increase the risk of weight gain, obesity, and diabetes (Francis, 2019). Residents whose water is safe to drink but who do not trust the sources of information about the safety of their water experience the same penalties as those whose drinking water is known to be unsafe.

Based on these trends, the frequency and duration of drinking water system interruptions will increase. In low-income communities with a limited tax base to pay for the replacement of aging infrastructure, failing water systems may never be restored. Some, including Jackson, Mississippi, and parts of St Louis, Missouri, have been experiencing this reality for many years. The residents of these communities, which have demonstrated little trust in the city or utilities as sources of information, will need to be alerted when their water becomes unsafe to drink. Where contingency solutions are available, such as the program I have been running since 2018, trust must be rapidly established and maintained before they can be effectively deployed.

This leads to my primary research question - if residents of low-income communities do not trust city officials or utility representatives to inform them of whether their water is safe or unsafe to drink, then who do they trust? My literature review indicates trust is higher in community members than in government officials or utility representatives. Still, the studies I reviewed did not examine how the responses of low-income or minority populations differ from the general population. To better inform my water distribution program and the community organizations I work with, I sought to research which sources are the most trusted concerning tap water safety in low-income and minority communities.

My research hypothesis is: "Members of low-income or minority communities experiencing a water crisis are more likely to trust information about their water quality from community members than from municipal authorities." Beyond testing the hypothesis, the research will seek to determine which community agencies are the most trusted by different cohorts of community members.

I chose to research in two communities facing endemic water crises: Newark, New Jersey, and the Watts neighborhood of South-Central Los Angeles, California. Both are minority

communities with publicized water quality issues. Both are low-income, with a high percentage of residents living below the poverty line. Both have robust community organizations working to address long-standing environmental justice concerns with which I have collaborated over the last few years to address the lack of safe drinking water access.

4.1 NEWARK, NEW JERSEY

With a population of 305,344, Newark is the largest city in New Jersey. 93 percent of the city's residents are ethnic minorities, with 47 percent identifying as African Americans and 36 percent identifying as Hispanic. The poverty rate in Newark is 25.5 percent, more than double the national average of 11.5 percent.

The water crisis in Newark is a direct outcome of environmental racism. Most of Newark's African American population migrated to the city in the early 20th century, where they found discrimination in employment and housing availability. They were restricted to substandard housing fed by the oldest lead service lines. The city neglected the maintenance and repair of these older lines, which deteriorated as they aged and leached lead into the residents' water and plumbing.

In 2016, the New Jersey Department of Environmental Protection (DEP) found record-high lead levels in the drinking water in Newark public schools. The DEP subsequently ordered the city to implement more extensive monitoring of the lead levels in its drinking water. The expanded monitoring turned up some of the highest lead levels of any city in the country. Alarmed by the high lead levels in Newark's drinking water, the NRDC and Newark Education Worker's Caucus filed lawsuits against the City of Newark in 2018. No monetary damages were sought, only a solution to the problem. By 2021, after exposing nearly 200,000 people to high lead levels, the city declared that most lead service lines had been replaced.

However, the SWDA only applies to the CWS's service lines. The safety of the plumbing inside a residential or commercial building, known as the premise plumbing, is the building owner's responsibility. Once lead from service lines has leached into the water system, it easily becomes embedded in building pipes and fixtures. (McFadden et al., 2011). The cost of replacing lead-contaminated residential premise plumbing can be higher than the average home value in Newark and, therefore, out of reach for most homeowners. However, 79 percent of Newark's residents are renters – the highest rate of any city in the country, according to 2023 census data.

Since premise plumbing is not subject to the SWDA, landlords have little incentive to test for lead and even less to incur the high cost of replacing contaminated plumbing in their rental properties. Even after replacing most lead service lines, Newark's residents will continue to be exposed to lead for decades.

4.2 Newark Water Coalition

Founded in 2018 in response to the lead crisis, the Newark Water Coalition (NWC) is one of Newark's frontline organizations fighting for clean water. NWC is a volunteer organization that advocates for safe water and distributes clean drinking water to Newark residents. Their platform includes demands for the city to conduct mandatory lead testing for all residents, to replace resident water pipes, to conduct blood tests for residents, to establish a long-term support program for victims of lead poisoning, and to place a moratorium on water utility bills until lead levels reach zero. In 2020, 501CTHREE, the nonprofit I co-founded, donated the first of four water treatment systems to NWC, along with equipment for lead testing. This enabled the NWC to switch from bottled water to treated water and to start a lead testing program for resident homes. NWC has recently expanded its mission to include other environmental justice issues including housing availability and air quality. In 2022, NWC agreed to collaborate with me to develop and conduct research on who their community members most trust for information about their water quality.

4.3 Los Angeles, California - Watts

Watts is a 1.12 square mile minority neighborhood in South Central Los Angeles, California. It is home to around 42,000 residents, making it one of the most densely populated areas of Los Angeles County. Watts has long been a flashpoint of African American activism. It was the center of a major uprising against police violence and brutality in 1965 and again following the acquittal of the four officers who beat Rodney King in 1992. The largest ethnic minority in Watts is now Hispanic, and it remains a low-income community with a poverty rate of 27 percent, over twice the national average.

Watts is ranked as one of the most polluted communities in California by the California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA). Pollution caused by diesel trucks, traffic, and other industries, poor drinking water

quality, and lead contamination in the soil and water have been linked to respiratory ailments, cancer, and cognitive impairment. The average life expectancy in Watts is fourteen years shorter than in nearby communities (Jones, 2022).

4.4 Better Watts Initiative

Established in 2016 by the Watts Labor Community Action Committee (WLCAC), the Better Watts Initiative (BWI) is a collaborative of community members and groups organized for environmental justice in Watts. Organizations that are members of BWI include the Black Community Health Task Force, Physicians for Social Responsibility LA, LA Right to Housing Collective, and California State University Dominguez Hills. In 2020, 501CTHREE donated a water treatment system to WCLAC and placed another under its supervision at Watts' Mafundi Building. Shortly thereafter, following NWC's model, BWI began testing resident's tap water for lead contamination. In 2022, BWI and 501CTHREE were awarded a grant from the Robert Woods Johnson Foundation to test the tap water of residences in Watts for lead contamination. Alongside this grant, BWI agreed to collaborate with me to develop and field a survey to research trusted sources of information on water quality. Several BWI members who participated in the research are graduate students at the University of Southern California, Los Angeles, necessitating that that institution's Institutional Review Board approve the survey instrument.

5 Methodology

5.1 Research Approach

Low-income and minority communities are notoriously difficult to research. The authors of *Explaining Rising Nonresponse Rates in Cross-Sectional Surveys* cite increasing concerns about privacy and confidentiality and declining cooperation due to "over-surveyed" households as key drivers. When I approached a community organization in Flint, Michigan, about researching residents' trust in tap water, I was advised not to bother due to the resident's survey fatigue after the water crisis. To overcome latent trust issues and privacy concerns in the two sample populations, I conducted the research using a community-based participatory approach (CBPR). CBPR is characterized by a collaborative and equitable partnership between researchers and community members (Collins, 2019). Rooted in social justice and empowerment principles,

CBPR has emerged as a potent tool for researching complex social issues. Central to CBPR is an equitable partnership between the researcher and community members.

Adopting the CBPR approach for this project was necessary and beneficial. It increased stakeholder engagement and participation by both organizations' members in sample collection. It also increased the likelihood that the results would be actionable and benefit community organizations and residents. Given the difficulty of navigating the Watts community and the barriers to building trust with residents, the CBPR stakeholder engagement approach was crucial to administering the survey within my time and budget constraints.

5.2 RESEARCH DESIGN

The primary objective of the research was to determine which sources of information about tap water quality are the most trusted. In keeping with the principles of CBPR, members of the two participating community organizations were involved in developing the research plan, in the design of the questionnaire, in sample selection, and developing and executing the survey methodology. The questionnaire design that resulted from the CBPR approach reflects feedback from members of the community organizations that agreed to canvas and collect the survey responses. Both organizations had input on the survey length, the method and technology options for administering the survey, the phrasing of questions, and additional information each felt was essential to collect while staying within certain constraints, such as protecting respondent privacy.

Both groups asked for the number of Likert scale response options to be minimized, as their experience with previous surveys indicated that this question type led to an increased number of incomplete responses. Both groups stressed the importance of offering the questionnaire in English and Spanish, so I contracted a professional translation service. The translations were reviewed and approved by native Spanish speakers in each organization, and their revisions were incorporated into the questionnaire. The Newark members asked for additional demographic information on the participant's ward of residence. The Watts members asked for additional information about the respondent's experience with their water quality and health issues that they perceive to be related to their water quality. The primary independent variable differs between the two; the questionnaire in Newark measures the respondent's trust in their tap water, and the questionnaire in Watts measures whether the respondent drinks their tap

water. This reflects the Watts group's preference for an objective measurement of tap water consumption and the Newark group's preference for measuring perceived trust.

5.3 Survey Administration

The final versions of the surveys were developed according to criteria agreed upon by each organization. The surveys were intended to be administered by the organization's staff using a tablet or other mobile device and were designed to be completed in two minutes or less. The survey was offered in English and Spanish, and the administrators had to speak both languages comfortably. The surveys began with a consent agreement, which the participant agreed to before data could be collected, and two screening questions to qualify that the participant was over eighteen years old and a current city resident.

The survey technique used was random intercept sampling. In Newark, the survey was administered at public events where NWC had a booth or other presence. To broaden the perspectives and demographics of the sample, the survey was administered in three of the city's four wards subjected to the water crisis. NWC agreed not to administer the survey at a branded NWC booth or table to avoid selecting participants with a bias towards trusting NWC or other community organizations. The Newark survey was administered between March 15 and June 21, 2023, during which 98 complete responses were collected.

The Watts survey was administered at residents' homes while a water sample was collected for a free lead test. For three months before survey administration began, BWI and WLCAC promoted free lead tests for Watts residents. Respondents were asked to participate in the survey after consenting to sample collection and were informed that opting out of the survey would not affect the free lead test. The survey results were periodically evaluated for a homogeneous geographic distribution of samples, and certain neighborhoods were oversampled to improve the distribution of the samples. The survey was administered between April 5 and August 18, 2023. Of the 531 residents who received free lead tests, 190 completed the survey.

Respondents were not compensated for taking part in the survey. In Newark, a grant was provided to NWC to compensate survey administrators at the organization's discretion. In Watts, administrators were compensated hourly for administering the survey and collecting tap water samples. They were paid the same amount whether the residents completed the survey or declined to participate. The Newark survey was fielded using Qualtrics, as the NWC group

members had experience with this platform. The Watts survey was fielded using Google Forms. Access to both data sets was password-protected and only accessible to select group members.

5.4 Study Measures

Several demographic measures were collected, with slight variations between the two surveys based on community organization feedback. Both surveys measured the respondents' zip code, ethnicity, dwelling type, rent or own, and the number of people and children living in the household. The Newark survey added the ward and the number of people over 64 years living in the household. The Newark survey asked about the respondent's age and the number of years they had lived in the community; the Watts group felt these questions might be perceived as overly invasive and asked them to be removed from the survey.

The primary independent variable was explored differently in response to community organization requests. The Newark survey asks, “Do you agree with this statement: I trust that the tap water in my home is safe to drink” and allows a 4-point Likert scale agree/disagree response. This question is absent from the Watts survey, as the group wanted only behavioral measures concerning tap water use. The next question measures tap water behavior and asks, “Please tell me whether each of the following statements describes your household or not?” Respondents were given the option to select yes or no to each of the following options: “We drink unfiltered tap water,” “We drink filtered tap water,” “We boil water before drinking it,” and “We drink bottled water.”

The next set of questions measured why respondents might not drink tap water. To the question, “Which of the following describes why your household might not want to drink unfiltered tap water?” respondents were given the option to select yes or no to each of the following options: “I dislike the taste, smell, or color of my tap water,” “Stories I heard in the news about water contamination,” “My health care provider recommended it,” “I don't trust the water company,” and “I was told by friends or family not to drink tap water.” The Newark survey added the option “I find it more convenient to drink bottled water.”

My primary research objective was to determine which agencies are most trusted for information about water quality. The next question asked, “Which of the following do you trust to inform you that your water is safe or unsafe to drink?” and respondents were given the option to select yes or no to each option. In Watts, the first response option was “Los Angeles

Department of Water and Power," and in Newark, it was "The water utility." The remaining options were: "City or county government," "Your health care provider," "Your place of worship," "Friends and neighbors," and "Community organizations & activists."

A measure of current information sources about tap water quality was initially included in both surveys but removed from the Watts survey at BWI's request. The question was, "From which of the following sources do you receive information about the safety of your tap water?" Respondents were given the option to select yes or no to each option. The response options were: "The water utility," "City or county government," "Your health care provider," "Your place of worship," "Friends and neighbors," and "Community organizations & activists." A follow-up question asked, "Have you received information about your drinking water quality from any of the following in the last year?" and presented the same response options as the previous question.

Both organizations wanted to measure which communication channels residents preferred to receive information about their water quality. The question "How would you prefer to be informed about a water quality or safety problem that affects your home? offered the options yes/no options "Television," "Radio," "Mail," "Phone call," "Email," and "Text message." The Newark survey follows up with a clarifying question "In case of an emergency, what is the single best way to inform you about a water quality or safety problem that affects your home?" and presents the same options as the previous question.

The Watts group was also interested in measuring residents' lived experiences with their water and its perceived impact on their health. Three questions were added to the Watts survey with a 4-point Likert scale agree/disagree response. The questions were "How frequently is your water discolored?", "How frequently does your water have a foul taste?" and "How frequently does your water have a foul smell?" An additional open-ended question asked, "Please describe any adverse health effects you have experienced due to your home's drinking water."

The complete text of the questionnaires is presented in Appendix A.

5.5 LIMITATIONS

Early in developing the research method with the two community organizations, it became clear that the participatory research approach would limit my ability to make generalized conclusions by combining the measurements from both communities. The two community groups differed in their research objectives. The Newark group wanted to evaluate the value of

their outreach efforts and compare their impact with other agencies. The Watts group focused on where resources should be applied in the community and how research the findings might be used for issue advocacy with municipal authorities. Both groups had members experienced in fielding surveys, and each had strong and differing opinions on which measures should be included and how certain questions should be phrased. These differences resulted in unique surveys for each community, with only a few identical questions. Both groups wanted more measures to reduce the survey administration time, which led to more extensive use of dichotomous questions instead of scaled ones. The resulting surveys are broad in scope but could have benefited from more depth. Both groups had different opportunities to field the survey, so the same sampling method was not used. So, while I have drawn broad conclusions from both surveys, the measures from both will be examined separately.

6 RESULTS

6.1 DEMOGRAPHICS

The sample demographic measures from the Newark and Watts populations are presented in Table 1.

TABLE 1: SAMPLE DEMOGRAPHICS

Which of the following best describes your housing?	Newark (n=95) Count	Percentage	Watts (n=194) Count	Percentage
Apartment or Condominium	55	57.89%	91	46.91%
Multiple-family home	17	17.89%	21	10.82%
Single-family home	23	24.21%	82	42.27%

Do you rent or own your home?	Newark (n=95) Count	Percentage	Watts (n=194) Count	Percentage
Own	8	8.42%	47	24.23%
Rent	87	91.58%	147	75.77%

What is your ethnicity?	Newark (n=95) Count	Percentage	Watts (n=190) Count	Percentage
American Indian or Alaskan Native	0	0.00%	1	0.53%
Asian	2	2.11%	0	0.00%
Black or African American	38	40.00%	75	39.47%
Hispanic or Latino	44	46.32%	110	57.89%
Multiracial	6	6.32%	0	0.00%

Some Other Race	3	3.16%	4	2.11%
White	2	2.11%	0	0.00%

How many people currently live in your household?	Newark Mean	Watts Mean
Between the ages of 19 and 64 - 1	3.23	--
Under 19	4.30	--
Over 64	0.12	--
All ages	--	3.69
Children under 18	--	2.60

	Newark (n=96)		Watts (Not measured)	
How many years have you lived in Newark?	Count	Percentage	Count	Percentage
Less than 1	13	13.54%	--	--
1 to 5	18	18.75%	--	--
5 or more	65	67.71%	--	--

	Newark (n=93)		Watts (Not measured)	
Which ward do you currently live in?	Count	Percentage	Count	Percentage
Central	4	4.30%	--	--
East	37	39.78%	--	--
North	12	12.90%	--	--
South	32	34.41%	--	--
West	8	8.60%	--	--

6.2 TAP WATER TRUST

The two populations received two different measures of trust in their tap water. The Newark population was asked how much they trust their tap water on a four-point Likert agree/disagree scale, with the results presented in Table 2. Both populations were asked about their water consumption behavior at home, with the results presented in Table 3, and their motivations for not drinking tap water were measured, with the results presented in Table 4.

TABLE 2: TRUST IN TAP WATER

Do you agree with this statement: I trust that the tap water in my home is safe to drink	Newark Count	Newark Percentage	Watts Count	Watts Percentage
Agree	14	14.58%	N/A	N/A
Disagree	31	32.29%	N/A	N/A
Strongly agree	4	4.17%	N/A	N/A
Strongly disagree	47	48.96%	N/A	N/A
Total	96		N/A	

TABLE 3: TAP WATER BEHAVIOR

Please tell me whether each of the following statements describe your household or not: [yes/no]	Newark (N=96)		Watts (N=190)	
	Count	Percentage	Count	Percentage
We drink unfiltered tap water - Yes	17	17.71%	52	27.37%
We drink filtered tap water - Yes	53	55.21%	43	22.63%
We boil our tap water before drinking it - Yes	33	34.38%	90	47.37%
We drink bottled water - Yes	89	92.71%	182	95.79%

TABLE 4: TAP WATER MOTIVATIONS

Which of the following describes why your household prefers not to drink unfiltered tap water? (yes/no)	Newark (N=96)		Watts (N=190)	
	Count	Percentage	Count	Percentage
I dislike the taste, smell, or color of my tap water	58	60.42%	106	55.79%
Stories I heard in the news about water contamination	70	72.92%	116	61.05%
My health care provider recommended it	20	20.83%	30	15.79%
I don't trust the water company	46	47.92%	78	41.05%
I was told by friends or family not to drink tap water	59	61.46%	79	41.58%
I find it more convenient to drink bottled water	70	72.92%	N/A	N/A

6.3 TRUST IN SOURCES OF INFORMATION

Table 5 presents the result of the primary inquiry concerning which sources are trusted for information about water quality.

TABLE 5: TRUSTED SOURCES OF TAP WATER SAFETY INFORMATION

From which of the following sources do you receive information about the safety of your tap water? (yes/no)	Newark (n=92)		Watts (n=190)	
	Count	Percentage	Count	Percentage
The water utility	28	30.43%	56	29.47%
City or county government	35	38.04%	58	30.53%
Your health care provider	26	28.26%	77	40.53%
Your place of worship	17	18.48%	38	20.00%
Friends and neighbors	45	48.91%	59	31.05%
Community organizations & activists	58	63.04%	82	43.16%

6.4 COMMUNICATION PREFERENCES

Communication preferences were measured in the Newark population. A separate question, not included in these results and a component of the lead testing program, was asked of the Watts population. The results from the Newark survey are presented in Table 6.

TABLE 6: COMMUNICATION PREFERENCES

How would you prefer to be informed about a water quality or safety problem that affects your home? (yes/no)	Newark (n=91)		Watts (Not measured)	
	Count	Percentage	Count	Percentage
Television	47	51.65%	--	--
Radio	28	30.77%	--	--
Mail	63	69.23%	--	--
Phone call	52	57.14%	--	--
Email	63	69.23%	--	--
Text message	52	57.14%	--	--
Message app	47	51.65%	--	--
Social media post	49	53.85%	--	--

In case of an emergency, what is the single best way to inform you about a water quality or safety problem that affects your home? (yes/no)	Newark (n=91)		Watts (Not measured)	
	Count	Percentage	Count	Percentage
Television	17	18.68%	--	--
Radio	1	1.10%	--	--
Mail	26	28.57%	--	--
Phone call	17	18.68%	--	--
Email	7	7.69%	--	--
Text message	20	21.98%	--	--
Message app	0	0.00%	--	--
Social media post	3	3.30%	--	--

6.5 PERCEIVED WATER QUALITY CONCERNS

The Watts survey included measures of the participants' perceived water quality, including taste, smell, and color. It also measured the participants' perceived health issues due to their water quality. The results from the Watts survey are presented in Table 7.

TABLE 7: PERCEIVED TAP WATER QUALITY CONCERNS

How frequently is your water discolored?	Newark (Not measured)		Watts (n=190)	
	Count	Percentage	Count	Percentage
Never	--	--	70	36.84%

Rarely	--	--	33	17.37%
Sometimes	--	--	56	29.47%
Often	--	--	15	7.89%
Always	--	--	16	8.42%

How frequently does your water have a foul taste?	Newark (Not measured)		Watts (n=190)	
	Count	Percentage	Count	Percentage
Never	--	--	110	57.89%
Rarely	--	--	19	10.00%
Sometimes	--	--	32	16.84%
Often	--	--	11	5.79%
Always	--	--	18	9.47%

How frequently does your water have a foul smell?	Newark (Not measured)		Watts (n=190)	
	Count	Percentage	Count	Percentage
Never	--	--	117	61.58%
Rarely	--	--	22	11.58%
Sometimes	--	--	33	17.37%
Often	--	--	8	4.21%
Always	--	--	10	5.26%

7 Analysis

Further investigation of the survey results allows for additional insights into the behaviors and preferences of the sample populations.

7.1 Population Comparison

I first wanted to examine if the two groups' population demographics were sufficiently alike to draw generalized conclusions. I used three measures—type of dwelling, rent or own, and ethnicity—to compare the demographics of the sample populations. I ran a Chi-squared test on each to determine if the populations had a distribution of each measure that fell within a 95% confidence interval. The results below confirm the null hypothesis that the sample populations do not have similar distributions of dwelling type, ownership, or ethnicity.

Table 8: Population Comparison

	Value	df	p-value
Type of Dwelling	2.855	4	0.582
Rent or Own	1.531	1	0.216

Ethnicity	3.505	2	0.173

7.2 Factors Affecting Trust

Does receiving information about water quality from an agency increase the likelihood of trusting the agency's information about whether the tap water is safe or unsafe to drink? The Newark questionnaire measured trust in sources and whether the respondent had received information from the source. I used a chi-squared analysis to compare the binary measures "Have you received information about your drinking water quality from any of the following in the last year?" with "Which of the following do you trust to inform you that your water is safe or unsafe to drink?" The resulting p-values are shown in the table below.

Table 9: Comparing Trust with Receiving Information

	Which of the following do you trust to inform you that your water is safe or unsafe to drink?					
Have you received information about your drinking water quality from any of the following in the last year?	The Water Utility	City of County Government	Your Health Care Provider	Your Place of Worship	Friends & Neighbors	Community Organization & Activists
The Water Utility	**0.0002**	**0.0009**	0.0730	**0.0081**	0.5300	0.1800
City of County Government	0.0200	**3.70E-06**	0.1600	0.4600	0.9900	0.2300
Your Health Care Provider	0.1300	0.3800	**0.0001**	**0.0410**	0.4700	0.7100
Your Place of Worship	**0.0120**	0.2400	**0.0063**	**0.0001**	0.6800	0.4100
Friends & Neighbors	0.6900	0.5900	0.1700	0.1600	**4.80E-09**	0.3300
Community Organization & Activists	0.9000	0.5100	0.8600	0.5000	0.3900	**2.10E-07**

The p-values below 0.05 at the intersection of each information source indicate a statistically significant relationship between trusting a source of information and receiving information about tap water quality from the same source.

7.3 Factors Affecting Tap Water Behavior

Homeowners and renters experience different levels of control over tap water quality. Homeowners can install a filtration system and update older plumbing and fixtures, whereas renters are limited in how they may affect or improve the property. Are homeowners more likely than renters to drink unfiltered tap water? Both surveys measured dwelling type and whether the

household drinks tap water, allowing this question to be investigated for both locations using a chi-squared test for fit.

TABLE 10: DWELLING TYPE AND TAP WATER BEHAVIOR

	Newark		Watts	
Frequencies	No	Yes	No	Yes
Apartment or condominium	48	7	50	37
Multi-family house	11	6	18	3
Single-family house	20	4	70	12
Total	79	17	138	52

Chi-Squared Tests	Value	df	p-value
Newark	4.562	2	0.102
Watts	18.557	2	< .001

The p-value for the Newark test is above the 95 percent confidence interval, confirming the null hypothesis that the type of dwelling does not correlate to drinking unfiltered tap water. The p-value for the Watts test is above the 95 percent confidence interval, indicating a relationship between housing type and drinking unfiltered tap water. The instances of apartment or condominium dwellers in Watts drinking unfiltered tap water are higher, and further investigation is warranted to determine if this is due to a lack of control over their premise plumbing or influenced by other factors, such as the affordability of tap water filters.

Both questionnaires measured the respondent's agreement with several reasons for not drinking tap water. Does agreement with the measures provided correlate with not drinking tap water? I used a chi-squared analysis to compare the responses to "Which of the following describes why your household prefers not to drink unfiltered tap water?" with the response to "Please tell me whether each of the following statements describes your household or not: We drink unfiltered tap water". The results are in the following table:

TABLE 11: REASONS FOR NOT DRINKING TAP WATER

Which of the following describes why your household prefers not to drink unfiltered tap water?	Newark (n=96)			Watts (n=190)		
	Value	df	p-value	Value	df	p-value
I dislike the taste, smell, or color of my tap water	0.022	1	0.882	5.276	1	**0.022**

Stories I heard in the news about water contamination	0.057	1	0.812	0.175	1	0.676
My health care provider recommended it	2.619	1	0.106	0.013	1	0.910
I don't trust the water company	0.006	1	0.938	1.285	1	0.257
I was told by friends or family not to drink tap water	1.808	1	0.179	0.617	1	0.432
I prefer to drink bottled water	0.132	1	0.716	N/A		

Only one of the factors correlated with not drinking tap water was the measure "I dislike the taste, smell, or color of my tap water" in the Watts survey. This confirms the null hypothesis that agreeing with a reason for not drinking tap water does not broadly correlate with not drinking it, except when the respondent directly experiences a taste, smell, or color of the water they dislike.

While interviewing residents about the Flint water crisis, local community organizers relayed their poor opinion of the city's outreach to Hispanic residents during the water crisis. I was told that the city did not effectively reach out to the Hispanic community or translate warnings about the danger of drinking the city's tap water into Spanish. As a result, many residents were first informed of the water crisis in their city while watching nationally broadcast Spanish-language television. One anecdote I heard was that recent immigrants were accustomed to boiling tap water, a necessary measure in some of their home countries to combat bacterial contamination. However, this measure does not eliminate lead, which is more soluble in hot water, and boiling water before drinking it is more likely to concentrate the lead.

To see if this showed up in my survey results, I examined if the respondent's ethnicity had a statistically significant effect on their answer to the measure: "Please tell me whether each of the following statements describes your household or not: We boil our tap water before drinking it." The results of the chi-squared analysis are in the table below:

TABLE 12: ETHNICITY AND BOILING TAP WATER

	Please tell me whether each of the following statements describe your household or not: - We boil our tap water before drinking it			
	Newark (n=94)		Watts (n=189)	
What is your ethnicity? - Selected Choice	Counts: No	Yes	Counts: No	Yes
Asian	2	0	0	1
Black or African-American	23	14	42	32
Hispanic or Latino	28	16	54	56

Multiracial	5	1	3	0
Some Other Race	1	2	0	1
White	2	0	N/A	N/A

	Value	df	p-value
Newark	4.523	5	0.477
Watts	5.973	4	0.201

The result supports the null hypothesis that ethnicity is not positively correlated with the behavior of boiling tap water. However, 33 percent of Newark and 48 percent of Watts respondents reported boiling tap water, which could pose a health hazard if lead is present in their tap water.

8 CONCLUSION

In my past few years of working in communities experiencing a water crisis, it's been a struggle to inform vulnerable populations that their tap water was unsafe to drink and that safe alternatives were available. My research leads me to expect many more of these scenarios are coming. Increased storm intensity driven by climate change already impacts water quality in southern US states. State policies intended to reduce taxes on middle-income households are affecting the ability of CWSs in low-income and minority communities to maintain their aging infrastructure, leading to endemic water quality problems in communities such as Jackson, Mississippi, and St. Louis, Missouri. Long-term projections of the costs to prepare and adapt CWSs for climate impact are significantly higher than spending projections. The relatively small number of CWSs that serve a large percentage of the US are unprepared for systemic shocks such as electrical grid and energy production interruptions, such as those experienced during severe winter storms that hit the South in the winters of 2021 and 2022 and nowhere in the US is prepared for a long-term drawdown of the energy resources needed to keep CWSs operating.

I expect an increasing need for distributed water resources in low-income and minority communities across the US to meet the urgent needs of residents affected by diminishing water quality. Because of the high cost and potential ill health effects of tap water alternatives, it will be imperative for civic leaders to keep residents informed of when their water is safe or unsafe to drink and to direct them to safe drinking water alternatives effectively. My research indicates that residents are more likely to trust these instructions if community organization members

communicate them than if the source is city officials or utility representatives. I found it surprising that the least trusted source of information about water quality in both communities was "your place of worship," given how active religious organizations are in distributing resources in these communities. Many of my water distribution programs are co-located with food pantries at religious institutions. Further investigation of this result is warranted, given the amount of aid to these communities filtered through religious organizations.

My analysis of the Newark survey results indicates a statistically significant relationship between receiving information from the source and trusting the source. This indicates that organizations charged with communicating with residents during water emergencies should maintain regular communication with residents about their water quality. Most municipalities require CWSs to inform their ratepayers about their system's water quality, but these reports are often highly technical and not easily understood by residents. It would be worth studying if regular and more easily understood communication increased community trust in CWSs.

Many community organizations, including the two that participated in my research, were established in response to environmental injustices resulting from a legacy of racism and neglect by public utilities and local government. In my experience, cooperation between these factions is rare and more likely adversarial or downright hostile. While it may be counterintuitive to recommend that the utilities and city government turn to community organizations to alert residents to water safety issues and where to obtain safe drinking water, my research indicates that residents are more likely to trust these sources.

8.1 Summary of Findings

In my research, sample populations from communities that have experienced a water crisis were less likely to report drinking unfiltered tap water than more recent national surveys measured. Among the Newark sample, where trust in the safety of their tap water was directly measured, the trust values were lower than those reported in other national surveys of tap water trust. When asked why their household prefers not to drink tap water, the top response from both sample populations was "stories I heard in the news about water contamination."

Among the two sample populations, "community organizations and activists" were the most trusted source of information about water quality, and "your place of worship" was the least trusted, followed by "city or county government" and "the water utility." The second most

trusted among the Newark sample was “friends & neighbors,” while “your health care professional” was the second most trusted among the Watts sample. Receiving communications about water quality is positively correlated with trust in the source of information regarding water quality. Experiencing tap water quality issues did not have a consistent correlation with not drinking tap water, and neither did dwelling type, ethnicity, or any other factor.

8.2 LIMITATIONS

My research had several factors that limited the generalizability of the study. The sampling method in Newark only considered residents who could be intercepted at daytime public events, which could affect the study's internal validity. Other populations, such as the elderly, those with disabilities, and those employed on weekends, could have been underrepresented. Privacy considerations and both community’s lack of trust in data collection led to minimizing the number of demographic measures, which limited my ability to evaluate whether my sample represents the general population’s age and income. The CBPR process led to the questionnaire, which began with a single set of measures for both communities, to diverge in response to stakeholder input. This, combined with the difference in sampling methodology, limits the data aggregation and the research's external validity to other communities. To promote external validity and generalizability, future studies on this topic that engage in CBPR should limit the variation in measures between populations and attempt to collect additional demographic measures.

8.3 RECOMMENDATIONS

For municipalities and water utilities:

- Both contaminated water and tap water alternatives have potential ill health effects, so cities should promptly communicate with residents about whether tap water is safe or unsafe to drink.
- Residents trust community organizations more than city government and water utilities, so cities and utilities should partner with community organizations to develop and deliver communication strategies for residents.

- There is a strong relationship between residents' trust in sources of information and receiving information about tap water; to build trust, residents should receive frequent and easy-to-understand information about whether tap water is safe to drink.

For community organizations:

- While many community organizations are working in response to environmental justice concerns brought on by neglect from the city and utilities, the needs of their residents may be better served if they engage with the city and water utilities on creating and delivering information for residents concerning tap water safety and behavior.
- Community organizations engaged in environmental justice activism should leverage their status as trusted sources of information to expand their programming around tap water quality, which could include residential tap water testing, providing residents with solutions such as filters and contingency water distribution, and helping residents apply for grants to address premise plumbing issues.

For non-local organizations:

- When deploying contingency solutions or funding the remediation of tap water issues, national organizations will increase the trust in and efficacy of their programming by involving grass-roots community organizations in program development and outreach.

For further study:

- Water utilities' communications with residents tend to be highly technical, opaque, and written to fulfill EPA requirements; it is worth examining whether residents' trust in water utilities increases with more frequent and understandable communication.
- Health outcomes in these communities may be improved by determining which interventions by community organizations lead to increased trust in tap water in communities with safe tap water and healthier tap water behaviors in communities with tap water safety issues.

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10 APPENDIX A

The Newark and Watts survey questionnaires, presented side-by-side for comparison:

Newark	Watts
How many years have you lived in Newark? (multiple choice, best answer) - Less than 1 - 1-5 - 5 or more	N/A
What is your zip code? (open entry)	What is your zip code? (open entry)
Which ward do you currently live in? (multiple choice, best answer) - North - South - East - West - Central	N/A
What is your age? (multiple choice, best answer) - 19 - 20-24 - 25-29 - 30-34 - 35-39 - 40-44 - 45-49 - 50-55 - 55-59 - 60-64 - Over 64	N/A
What is your ethnicity? (multiple choice, best answer) - Asian - American Indian or Alaskan Native - Black or African American - Hispanic or Latino - Multiracial - White - Other	What is your ethnicity? (multiple choice, best answer) - Asian - American Indian or Alaskan Native - Black or African American - Hispanic or Latino - White - Other
Which of the following best describes your housing? (multiple choice, best answer) - Apartment or condominium - Multiple-family home - Single-family home	Which of the following best describes your housing? (multiple choice, best answer) - Apartment or condominium - Multiple-family home - Single-family home
Do you or your family own or rent your housing? (multiple choice, best answer)	Do you or your family own or rent your housing? (multiple choice, best answer)

- Own - Rent	- Own - Rent
How many people currently live in your household? - Under the age of 18: (open numerical entry)	How many people live in your home at least half of the time? (open numerical entry)
How many people currently live in your household? - Between the ages of 19 and 64: (open numerical entry)	How many children under the age of 18 live in your home at least half of the time? (open numerical entry)
How many people currently live in your household? - Over the age of 64: (open numerical entry)	N/A
Do you agree with this statement: I trust that the tap water in my home is safe to drink: (multiple choice, best answer) - Strongly agree - Agree - Disagree - Strongly disagree	N/A
Please tell me whether each of the following statements describe your household or not: (multiple choice, all that apply) - We drink unfiltered tap water - We drink filtered tap water - We boil our tap water before drinking it - We drink bottled water	Please tell me whether each of the following statements describe your household or not: (multiple choice, all that apply) - We drink unfiltered tap water - We drink filtered tap water - We boil our tap water before drinking it - We drink bottled water
Which of the following describes why your household might not want to drink unfiltered tap water? (multiple choice, all that apply) - Stories I heard in the news about water contamination - I dislike the taste, smell, or color of my tap water - Stories I heard in the news about water contamination - My health care provider recommended it - I don't trust the water company - I was told by friends or family not to drink tap water - I find it more convenient to drink bottled water	Which of the following describes why your household might not want to drink unfiltered tap water? (multiple choice, all that apply) - Stories I heard in the news about water contamination - I dislike the taste, smell, or color of my tap water - Stories I heard in the news about water contamination - My health care provider recommended it - I don't trust the water company - I was told by friends or family not to drink tap water
From which of the following sources do you receive information about the safety of your tap water? (multiple choice, all that apply) - The Water Utility - City of County Government - Your Health Care Provider - Your Place of Worship - Friends & Neighbors - Community Organization & Activists	N/A

Have you received information about your drinking water quality from any of the following in the last year? (multiple choice, all that apply) - The Water Utility - City of County Government - Your Health Care Provider - Your Place of Worship - Friends & Neighbors - Community Organization & Activists	N/A
Which of the following do you trust to inform you that your water is safe or unsafe to drink? (multiple choice, all that apply) - The Water Utility - City of County Government - Your Health Care Provider - Your Place of Worship - Friends & Neighbors - Community Organization & Activists	Which of the following do you trust to inform you that your water is safe or unsafe to drink? (multiple choice, all that apply) - The Water Utility - City of County Government - Your Health Care Provider - Your Place of Worship - Friends & Neighbors - Community Organization & Activists
N/A	How frequently is your water discolored? ((multiple choice, best answer) - Never - Rarely - Sometimes - Often - Always
N/A	How frequently does your water have a foul taste? (multiple choice, best answer) - Never - Rarely - Sometimes - Often - Always
N/A	How frequently does your water have a foul smell? (multiple choice, best answer) - Never - Rarely - Sometimes - Often - Always
N/A	Please describe any adverse health effects you have experienced due to your home's drinking water: (open entry)
How would you prefer to be informed about a water quality or safety problem that affects your home? (multiple choice, all that apply) - Television	How would you prefer to be informed about a water quality or safety problem that affects your home? (multiple choice, all that apply) - Phone call

- Phone call - Mail - Email - Text message - Social media	- Email - Text message