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## Examining the Cracks in Universal Water Coverage: Women Document the Burdens of Household Water Insecurity

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**ABSTRACT:** Universal access to safe drinking water is assumed to be a defining characteristic of cities in the Global North. This article documents the daily challenges facing working class women in Flint, Michigan, when the promise of modern water infrastructure cracks. In 2014, in order to reduce costs, Flint's drinking water source was switched from Lake Huron to the Flint River. This change, and specifically the way it was managed, resulted in contamination of the water supply with lead and pathogens. While the experience of Flint is now an emblematic case of water insecurity in the Global North, it is not unique. Through a case study developed in the context of a community-based participatory research project, this article details how water insecurity transferred the burden of clean water provisioning back to individual households, and specifically to women. Rather than being able to rely on the labour and technical expertise that have rendered water safe in the modern city, Flint residents were abruptly made responsible for ensuring their own water security. We detail how the Flint water crisis brought about a 'new normal'; we consider the ways in which it gave rise to a new relationship to potable water that was characterised by a (re)turn to bottled or filtered water (from tap water) and a shift in who is responsible for the labour necessary to render water safe. The women's testimonies that we present here illustrate how, when modern uniform water fails, people begin to see heterogeneous waters.

**KEYWORDS:** Water, water security, household water insecurity, infrastructure, gender, photovoice, Flint, USA, Global North

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### INTRODUCTION

Today, universal access to safe drinking water is widely assumed to be a defining characteristic of cities in the Global North (Meehan et al., 2020a). Extensive coverage is attributed to a highly centralised water supply system that renders water safe for human consumption through engineering expertise, treatment technologies, public policies and regulatory oversight, in what Melosi (2000) refers to as the "sanitary city". In fact, as Meehan et al. (2020a) argue, at the core of the myth of universal coverage in high-income countries is the pervasive view that water is safe enough to drink directly from the tap without the need for any mediating technology or intervention at the household level (Garcia-Cuerva et al., 2016; Ragusa and Crampton, 2016). In the nineteenth century, with the rise of the modern infrastructural ideal in the Global North, the labour and expertise for making water safe for human consumption shifted from individuals to the state; more recently, it has moved to private enterprise (Kaika, 2004; Linton, 2010; Melosi, 2000). Technical experts – rather than the individual – become responsible for interrogating heterogeneous water sources, passing them through filters, and adding chemicals to produce the

familiarly uniform water that consumers expect and which they have the luxury of consuming from their taps without added labour or thought (Kaika, 2004; Linton, 2010; Linton and Budds, 2014).

The myth of universal access to safe drinking water and its supporting modern infrastructural ideal in the Global North was exposed by the water crisis in Flint, Michigan. In 2014, the source of Flint's drinking water – provided by the Detroit Water and Sewerage Department (DWSD) – was switched from Lake Huron to the Flint River. This change, and specifically the way it was managed, resulted in contamination of the water supply with lead and pathogens such as *E.coli* and legionella (Davis et al., 2016; Masten et al., 2016). Flint residents were ostensibly connected to modern water infrastructure, but they faced water insecurity as pipes were delivering water that was not safe for human consumption. Drawing on Jepson et al. (2017), we define household water insecurity as a lack of safe, reliable, sufficient and affordable water for well-being and a healthy life. Soon after the switch to the Flint River, residents began to raise concerns about the quality of water coming out of their taps. Their evidence, however, was at first dismissed and then countered by state experts who attested to the safety of the water supply. To have their bodily experiences questioned and dismissed by the very people who were charged with protecting their health was an active act of social devaluation, one that further eroded trust in elected officials. Only after community activists, doctors and university researchers used the media to present evidence showing that lead levels were above the limit considered safe for human consumption, did state authorities admit to the problem. In January 2016, they finally declared the city to be in a state of emergency (Pauli 2019).<sup>1</sup> At that point, the National Guard was mobilised to set up distribution centres for bottled water and, soon afterwards, water filters began to be distributed to Flint households. Households across Flint came to depend on bottled and/or filtered water for drinking, preparing food, brushing their teeth, and bathing. With uncertainty over the water quality and its dangers, everyday bodily tasks that were mindless and ordinary for a majority of Americans became, for many Flint residents, complicated and extraordinary chores.

In this article we integrate data from photovoice and semi-structured interviews to explore what happens when the myth of universal water security in the United States cracks. We detail how water insecurity in Flint transferred the burden of clean water provisioning back to individual households, and specifically to women who are still disproportionately likely to be responsible for childcare and household tasks. Rather than being able to rely on the labour and technical expertise that have rendered water safe in the modern city, residents of Flint were abruptly made responsible for ensuring their own water security; they became responsible for knowing which waters in their city were safe and which were not. We argue that this is a reversal of the modern infrastructural ideal that sought to disconnect urban residents from the processes that produced the water that sustained their everyday lives. In transferring the burden of water security back to individual households – and specifically to women – the water crisis marked a return to the understanding of water as multiplicitous, rather than homogeneous.

In this context, the contributions of this article are threefold. First, as stated above, our empirical study illustrates what happens at the household level when the modern idea of uniform, reliable, potable water is revealed to be an unstable myth. We identify the burdens of water insecurity and who bears them when water infrastructure fails. Second, this article adds to our understanding of the gendered dimensions of water insecurity and infrastructural inequity in high-income countries. Scholars and practitioners concerned with water insecurity have long addressed the role of gender in water access and management, but these studies have primarily focused on low- and middle-income countries (Sultana, 2009, 2011; Truelove, 2011; Tsai et al., 2016; Hadley and Wutich, 2009; Wutich and Ragsdale, 2008). Inspired by this work and responding to our community partners' concern for the limited attention given to the gendered impacts of the Flint water crisis, our examination of the lived experiences of water insecurity seeks to transcend the north-south divide, allowing us to learn across diverse contexts. Third,

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<sup>1</sup> Newly elected mayor Karen Weaver declared the city to be in a state of emergency in December 2015, but it was not until January 2016 that Governor Snyder did the same.

this community-based participatory research contributes to the existing toolbox of methods for studying household water insecurity; in this, it complements the growing literature on security metrics (Wutich et al., 2017; Meehan et al., 2020a) with a narrative-focused approach that uses in-depth qualitative data to document the lived experiences of water insecurity.

### **WATER INSECURITY: A SHORT REVIEW**

The idea (and ideal) of universal water security in high-income countries is in part perpetuated by global development reports. For example, the WHO/UNICEF Joint Monitoring Programme, which tracks global progress towards the Sustainable Development Goal targets on drinking water, sanitation and hygiene, reports that 99 percent of the US population has access to drinking water that is safely managed and free from contamination. As Meehan et al. (2020a) argue, contrary to this auspicious picture of nearly universal coverage, growing literature indicates that water insecurity at the household and community levels is an issue for many people across the United States. More than two million people in the country live without running water and basic indoor plumbing, and many more lack access to contaminant-free drinking water and appropriate wastewater management (Meehan et al. 2020b; Roller et al., 2019).

Precisely how many people are affected by water insecurity is unknown. The United States Census, the primary method by which this issue is counted, tends to under-represent the most vulnerable communities. What is known is that water insecurity is racialised and poverty-correlated (Cory and Rahman, 2009; Deitz and Meehan, 2019; Wescoat et al., 2007). The literature shows that those who are significantly more likely to experience household water insecurity include Indigenous peoples living on reservations (Deitz and Meehan, 2019; Eichelberger, 2014), Latinx living near the US – Mexico border (Balazs and Ray, 2014; Jepson and Brown, 2014), African Americans in urban and rural areas (Gasteyer et al., 2016; Deitz and Meehan, 2019) and poor, rural white Americans (Pierce and Jimenez, 2015; Wescoat et al., 2007). Furthermore, it is predominantly the responsibility of women to resolve insecurity issues for their homes, making this a gendered issue as well (Coles and Wallace, 2005). Water insecurity occurrences are typically related to infrastructure absence or failure, affordability, or contamination. People might be connected to the grid, but the connection may be unreliable or the water untrustworthy. Thus, while the experience of Flint is now an emblematic case of water insecurity in the Global North, it is neither an extraordinary nor a unique occurrence.

Working primarily in the Global South, scholars have shown that having to negotiate access to water, and the implications of living without it, cause bodily distress; this is a term that recognises the nexus of negative physical, emotional and psychosocial experiences associated with water insecurity (Ennis-McMillan, 2006). The literature documents how gender disparities are reflected and reproduced, as women are the ones responsible for securing water for domestic use (Das and Safini, 2018; Geere and Cortobius, 2017; Harris et al., 2017; Stevenson et al., 2012; Sultana, 2009). Women often spend hours waiting for water delivery trucks, standing in line at public taps, or walking long distances to haul heavy containers of water back home (Wodon and Blackden, 2006; Ray, 2007; Stevenson et al., 2012). Sultana (2011) distinguishes between suffering *from* water and suffering *for* water. The author, in this way, identifies the interrelated but distinct hardships of living with limited access to water and living with access to poor quality water; the difficulty of accessing and managing water in contexts of insecurity is thereby also acknowledged. These sufferings encompass embodied and emotional distress; they also have implications for women's economic lives, as water provisioning constrains them from attending school or participating in income-generating activities (Truelove, 2011; Sultana, 2011). In addition, women may become vulnerable to exploitation when they come to depend on employers or other community members for access to water (Mehta, 1996). In other words, water insecurity is a form of symbolic and structural violence that takes away from opportunity and potential. Given that women in high-income countries are still disproportionately likely to be responsible for childcare and household tasks (Bianchi et al., 2012; Yavorsky et al., 2015), we sought to understand how water insecurity continues

to affect the lives of working-class women in Flint. While the context for water insecurity differs between the Global North and the Global South, the implications for emotional distress and gendered impacts in the face of water insecurity are not geographically bound. These shared experiences provide a base understanding for implementing research on water insecurity in the Global North.

## RESEARCH DESIGN

This article draws on data collected during 2019; the data-collection process used a community-based participatory research model that integrated photovoice and semi-structured interviews (Radonic et al., under review). We drew on these two qualitative methods to develop a case study design which was valued for offering in-depth descriptions and insightful explanations of a small number of cases in a real-world context (Yin, 2014). We used purposive sampling to recruit eight women of different ages and life experiences who had lived in Flint throughout the water crisis. This provided eight detail-rich case studies that illustrated the fissures in the myth of universal water access in the United States and revealed how water insecurity transferred the burden of labour and knowledge for clean water provisioning back to households. This collaborative, qualitative study adds to the more quantitative view of piped water insecurity in the United States and Canada that has been developing in the scholarship (Meehan et al., 2020a, 2020b; Wutich et al., 2017).

Photovoice is a participatory method whereby participants take photographs that they believe answer a particular question and then explain what the pictures mean to them (Wang and Burris, 1997). The objective is to stimulate community discussion through eliciting grassroots narratives which elaborate on the participants' understanding of a central issue (Harper and Gubrium, 2017). Our study was guided by the following question, which was collectively identified by participating women: "As a woman, how does the water crisis affect you?" This question – asked in the present tense – highlighted that, contrary to official narratives declaring the Flint water crisis "over", for residents the crisis continues due to its lasting impact on the water pipes, peoples' bodies, and peoples' trust in water governance. With the goal of creating grassroots narratives of the water crisis, while also documenting individual women's stories of water insecurity, the initial photography collection session was followed by semi-structured interviews inspired by a life-history approach (Slater, 2000). Interviews addressed women's biographical relationship to Flint, how they became aware of the crisis, how it altered their daily lives and routines, and the labour they did to provide clean water for themselves and their families.

To analyse the data, we developed a community-driven data-coding process. Participants attended a workshop to collaboratively identify emerging themes from the photos they had taken, and to help guide the analysis of the photographs, the narratives of the photographs, and the interview data. To do this, we adapted a pile sort method for purposes of inductive coding. Each woman was given a deck of photographs taken by all participants, asked to individually sort all photos into piles by themes of their choice, and then to assign a short descriptor to each pile. Every woman then shared with the group how they had organised the photos and what title they had given to each pile. As we compared each person's piles and themes, collective themes began to emerge. Through dialogue, we synthesised the multitude of emerging themes into more inclusive ones, with immediate feedback from participants about whether or not the summarisation captured their experience. Including participants in coding served to ensure that they informed how the data was analysed. In this way, community-driven data coding allowed for a productive dialogue among academic researchers, community researchers and participants, in which mutual expertise was valued and incorporated into ongoing analysis of the data.

## STUDY CONTEXT: WATER INSECURITY IN FLINT

The 2014 Flint water crisis did not emerge as a sudden catastrophe, but rather from a long, slow history of what Rodgers and O'Neill (2012) refer to as "passive infrastructural violence". Flint is located in the

'Rust Belt' of the United States, a region that experienced steep industrial decline in the second half of the twentieth century. Flint was a thriving industrial city into the 1970s, a history several of our participants recalled with pride; however, a combination of mortgage redlining, blockbusting by real estate agents, and relocation by white residents into suburban areas led to racially motivated disinvestment in the 1960s and 1970s (Highsmith, 2015). In the late 1970s and early 1980s, as the car manufacturing industry ordered layoffs and plant closures in response to the energy crisis and economic recessions, Flint's population and economic base continued to shrink drastically (Sadler and Highsmith, 2016; Sadler and Lafreniere, 2017).

Between 1960 and 2015, the city's population dropped from nearly 200,000 to below 100,000, and the racial demographics of the city shifted from 17.5% African American in 1960 to 53.7% African American in 2010 (U.S. Census Bureau, 1961; United States Census Bureau, nd). African Americans were paid significantly less than their white counterparts, contributing further to the reduced tax base of the city (Sugrue, 1998; Highsmith, 2015). During this same period, unemployment rose significantly. In 1960 Flint had an unemployment rate of 5.4% for men and 7.4% for women – which was on par with the national average – but by 2010, Flint's unemployment rate was 14%, a full 4.4% above the national average (U.S. Bureau of Labor Statistics, 2021; U.S. Bureau of Labor Statistics, 2021; U.S. Census Bureau, 1961).

Disinvestment and depopulation affected the city's tax base, which could not support the sprawling infrastructure of the city. From the 1980s to the 2000s, Flint struggled to pay for basic social services, cutting what Luce (2012) and Peck (2012) call "tomorrow services", things like infrastructural maintenance and education that, according to neoliberal policy, are non-essential for present functioning. While this was not a deliberate attempt to sabotage the city's water infrastructure, it was a violence of neglect by government officials; the water treatment and delivery system had been permitted to decay to the point where, by the time the switch to Flint River water was made in 2014, conditions were already very poor (Mascarenhas, 2018).

The state government's response to Flint's failing economy was to invoke state control of the city government via the appointment of an emergency manager (EM). EMs are non-elected officials whose authority supersedes that of the elected mayor and the city council. As EMs had already done in several other Michigan cities, Flint's EM imposed severe austerity measures without addressing the structural factors that had led to the city's decline (Fasensfest, 2019). The appointment of the EMs – first from 2002 to 2004, and then from 2011 to 2015 – left many Flint citizens feeling as though their democratic voice had been taken from them and with it their control over their city (Pauli, 2019). The loss of democratically elected representation and the state and local government's history of cutting social services in a city struggling to get by undermined citizen trust in government. Thus, trust was already low when – in an effort to reduce costs to the city and balance the budget – the EM made the decision to switch from sourcing water from Detroit to using the Flint River (Fasensfest, 2019). In April 2013, Flint's EM signed onto the Karegnondi Water Authority (KWA); the KWA intended to build a pipeline to deliver raw water from Lake Huron to Southeast Michigan in order to replace water purchases from the Detroit Water and Sewage Department (DWSW). The DWSW was notified of the decision and, before the KWA pipeline was completed, terminated its contract with the city of Flint. Negotiations to extend the contract failed. The use of Flint River water was then chosen as a temporary solution while the KWA pipeline was completed (Davis et al., 2016). This decision, however, did not take into consideration the industrial pollution of the Flint River, the age and disrepair of the water treatment infrastructure in the city, or the objections raised by the city council (Pauli, 2019).

Figure 1. Where it all started- Flint's Water Treatment Plant<sup>2</sup>.



Source: Photo by Tonya F-T (2019).

The causes of the Flint water crisis were a combination of infrastructural breakdowns, institutional failures and the particularities of water chemistry, all of which were in the context of what Ranganathan (2016) refers to as "racial liberalism". The Flint water treatment plant had been largely unused since the 1970s and was "woefully underprepared" to take over the responsibility of making Flint River water safe to drink (Masten et al., 2016). Water utility officials failed to properly treat Flint River water for corrosion control, which caused the water flowing through lead pipes to wear away the protective coating and begin leaching lead into the water supply (Pieper et al., 2017). Without corrosion control, the treated Flint River water lacked one chemical – phosphate ions – that the Detroit water had. In addition, Flint River water is slightly more acidic (lower pH level) than the water from Detroit and has higher levels of chloride ions, in part from road salt used for de-icing during the winter, both of which increase its corrosive effect. In short, there was a difference in the quality of the respective waters before and after treatment. While the Michigan Department of Environmental Quality and the city water utility were aware that there were problems, the city's emergency manager pushed forward the switch to the Flint River (Stanley, 2016).

These failures, coupled with the state's efforts to cover up and deny the existence of the problem, led to a deep distrust by our participants of both the water and the government. The existing lack of trust in the government that was brought on by the city's history with emergency managers was further compromised, not only by their failure to provide clean water to their citizens, but by their decision to obscure their failure and insist that the water was safe to consume. Local authorities acknowledged there was a problem only after local pediatrician Dr. Hanna-Attisha began documenting that children in Flint were presenting with unusually high blood-lead levels, and when external water testing by Dr. Marc

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<sup>2</sup> The titles for all the pictures included in this article were created by the individual photographers. All of them participated in the photovoice project.

Edwards and his team from Virginia Tech showed elevated lead levels in the water (Hanna-Attisha et al., 2016; Pieper et al., 2017).

Given our water governance structure, the government is expected to be a reliable source of information about the quality of the water. From its inception, modern water and infrastructure systems were built through the operation of technical experts (Kaika, 2004; Linton, 2010). It is thus part of the expectation of living in a modern state that there should be experts with the necessary knowledge and resources to produce safe, homogeneous drinking water (Gandy, 2004; Melosi, 2000). After the truth about the water crisis came out, the city government stepped up to attempt to fix things. The water was switched back and the lead lines in the city are in the process of being replaced by new pipes; by late 2016, both city officials and some researchers declared the crisis over (Stein, 2019). For our participants, however, even three years after the crisis was far from over.

Figure 2. The crisis continues today.



Source: Photo by Carma L. (2019)

In 2019, when we spoke to them, participants were still experiencing fluctuations in water quality and, after having been lied to so deliberately, they no longer even knew whom to trust. A participant who had lived in the city throughout the crisis told us, "I don't trust [the water], because I don't trust the testing mechanisms that the city and the state have done (...). I don't trust that they are doing the proper testing because they don't want to see any negative results" (Interviewee 001, 16 March 2019, Flint). Every one of our participants expressed some variation on this idea: that the government had lied about the quality of water or had given bad advice on how to treat the water to make it safe to drink. While the state has tightened its drinking water standards in response to the public outcry around the crisis, city officials have repeatedly failed to meet its state obligations for monitoring drinking water for lead and copper levels (Fonger, 2020; LeBlanc, 2019).<sup>3</sup> Residents perceive that the government and, by extension, the water that it is responsible for treating and delivering, still cannot be trusted; in response, rather than being able to count on the state assuming these burdens, they themselves have continued to proactively provide safe water for their households.

<sup>3</sup> According to the state, the city was in violation of the *Safe Drinking Water Act* because it had fallen short of the number of water samples required to be tested on a biannual basis to meet state rules.

## RESULTS AND DISCUSSION

The women in our study were African American, middle-class residents of Flint. At the time of the water crisis, they were either employed, self-employed or retired, and they all lived in formal housing that was connected to the municipal water system. While water affordability is a critical issue for many households in Flint, this had not been an issue for the women in this study prior to the water crisis. In describing their everyday relationship to water, which followed from the state's failure to provide safe drinking water, the women who participated in the study described physical, emotional and financial burdens they have had to assume to cope with water insecurity. Coping strategies are characterised as spontaneous and reactive responses developed in the event of sudden shocks (Berkes and Jolly, 2001). We use the term 'burden' because, in their narratives, the women described the work involved in accessing and managing their everyday relationship to water as a heavy load, one that exhausted their bodies, their minds and their household economies in interrelated ways. Focusing on the mundane, testimonies about the water crisis revealed that when the invisible infrastructures that produce modern water deteriorate, the notion that modern water is uniform, universal and forever is abruptly revealed to be a myth.

### The burdens of water insecurity

One major type of burden described by the women was the physical burden, which encompassed the effects on the body of acquiring and managing water as well as the effects of contact with contaminated water. Physical burdens included skin irritations and discolorations that were uncomfortable and visible to others, as well as hair dryness and hair loss. Women saw a correlation between the onset of skin and hair problems and their use of Flint River water. They recognised, however, that (echoing the physicians they had visited) a direct causation between exposure to contaminated Flint water and these bodily problems was difficult to determine, which was itself a source of frustration for many.

Physical burdens also included bodily strain and wear (particularly on the backs, shoulders and knees) resulting from carrying heavy cases of water bottles. Most of the women either lived alone or were the head of their household and caregivers for children and elderly relatives. As such, they had assumed the responsibility of identifying sites across the city where bottled water was available; they would then wait in long lines to acquire it, transport it home, carry it inside, arrange for its storage, and ensure its convenient and consistent availability around the home. Cases of bottled water offered at the local distribution centres usually weighed between 24 and 40 pounds; at times, women were bringing up to eight cases home at once. If carrying such weight under normal conditions is strenuous, imagine doing it while trying to keep your balance on the icy ground that is common during the long Michigan winter. Afraid of running out, as they would easily go through six cases a week for a household of four, women described stockpiling water. Cases were stored in the basement and then brought upstairs or were kept in tidy piles along hallways or inside the shower. They also described gradually reducing their consumption because the physical burden was too much to handle. As one woman, the head of a household of four, explained, "We were using about a case and a half every single day and because it's so exhausting, we're down to like four cases a week now because I'm so tired. (...). I get so tired of carrying that I've noticed I don't drink as much" (Interviewee 004, 14 March 2019, Flint). Like this woman's household, many others in Flint continue to use bottled water even years after the crisis was declared over. While acquiring water in Flint does not involve walking to a well or standing outside at a prepaid water meter, their description in terms of the embodied impacts is similar to what is described in the literature from the Global South. Both require a significant time commitment for obtaining and transporting the water and a reliance on bottled water for drinking (Ray, 2007; Stevenson et al., 2012; Sultana, 2011).

Figure 3. Carrying water in steel-toed boots.



Source: Photo by Carma L. (2019)

In their testimonies, women also described economic burdens. As anthropologists, we understand that the economy is not limited to market exchanges, that it also includes one's ability to survive and thrive in a particular environment. Women participants did mention the dollar cost of paying for drinking water, many explaining that they had turned to buying bottled water from stores because supplies at the water distribution centres would run low or because the times of day at which the water was offered made it impossible for working women to access. As one woman explained,

We would go and get in the long line, sometimes I would get up super early, you have to get up early in the morning so we wouldn't be in line all day because you have to go to work or school or whatever (...) 5:00? 4:00? Just to get ready and then to go out and stand in lines, people were in line early, probably like 6:00 and they didn't start giving them out until 8, but you had to get in line early if you had something to do (Interviewee 007, Workshop, 6 April 2019, Flint).

As this quote illustrates, women with full-time day jobs often woke up hours earlier in order to go wait in line for water, as it would be gone by the time they got out from work in the evening. Even then, everyone had stories of waiting for many hours as their cars crawled forward, only to see the last case being taken away by someone a few cars ahead of them. Watching the clock and wondering if any bottles would be left by the time they reached the front of the line was described as being frustrating and

stressful. Knowing themselves as privileged for having a car, several of the women also volunteered to pick up water for neighbours or friends who could not themselves drive.

As part of the economic burdens brought by the water crisis, women denounced having to pay for expensive monthly water bills when they could not even use the water for basic household chores. They recognised that part of the water bill included the water and sewer service fee but remarked that the city was failing to provide them with a usable service. As one woman described it, "Then you saw the water bills that continued to soar, and soar, and soar and you couldn't even, half the time you wasn't even using the water, the only thing it was good for was flushing" (Interviewee 006, 14 March 2019, Flint). Many described this as adding insult to injury. A national study found that, in fact, in 2015 – in the middle of the water crisis – Flint had the most expensive water service in the country (Food and Water Watch, 2018).

Figure 4. Waiting in line for water at the distribution centre.



Source: Photo by Glo I. (2019)

As described above, women cited the time wasted waiting to get water, as well as the difficulty of managing water pickup as part of their daily routine. They described a new time-consuming relationship to water; a 'new normal' where they had to bring bottled water into the house, haul it around, and set it up for everything from brushing their teeth to cooking. Everyone described morning routines that could take twice as long as before, for now they had to warm up water on the stove, in a microwave, or in crockpots in order to wash up, and had to use bottled water to brush their teeth and wash their faces. As their recognition of the untrustworthiness of the water sank in, women turned to bottled water for all personal hygiene tasks. As one woman said when describing the morning routine of her grandchildren, "Wash their face, used bottled water, brushed their teeth, use bottled water, to wash their hands, it was bottled water for everything" (Interviewee 006, 14 March 2019, Flint). This sentiment was reiterated by all participants.

Figure 5. A crockpot in the bathroom to heat bottled water for washing up.



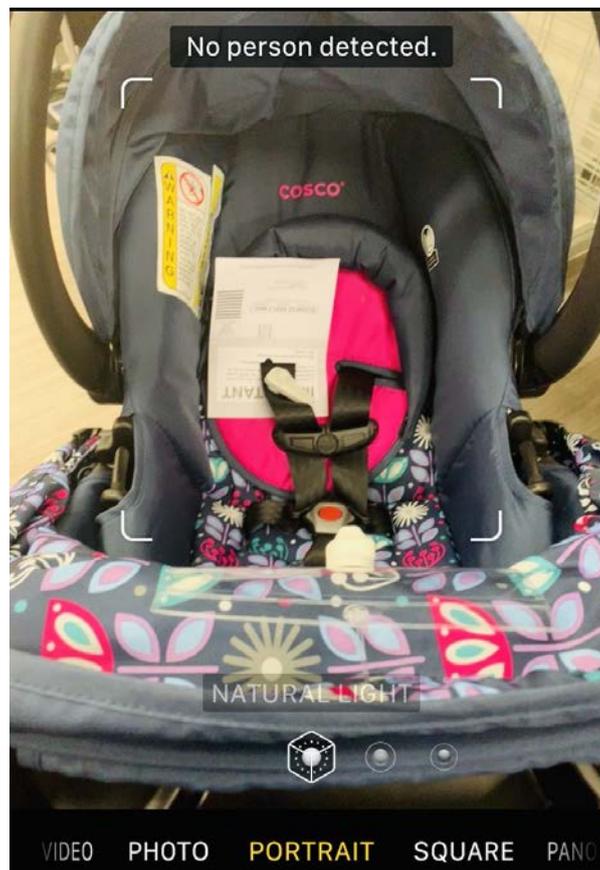
Source: Photo by Nina L. (2019)

All households eventually installed water filters in their kitchen sinks and showers, but even then, women described their hesitation at using that water for cooking or bathing. "I didn't really trust the filters", one woman told us, "so even though the filter was there we continued on with using the bottled water. It just got to be crazy" (Interviewee 006, 14 March 2019, Flint). To minimise contact with the untrustworthy water, short showers became the norm for most women. The filters themselves presented additional challenges, as participants described the irritation of filters only fitting on certain types of taps, or the time and expense of having to change them far more frequently than the manufacturer recommended. For a couple of our shorter participants even being able to see the indicator light and reach the shower filter to change it was difficult, adding to the exhaustion caused by accomplishing daily chores.

Finally, women described the emotional burdens the water crisis brought into their lives. This resonates with other studies that have shown how water insecurity is an emotional burden, which is reflected in idioms of denial, anger, fear, exhaustion and worry (Hadley and Wutich, 2009; Wutich and Ragsdale, 2008). In Flint, emotional burdens included living in fear of water and, relatedly, the mental strain of having to decipher what information to trust and how to relate to different waters to reduce their present risk. Describing their potable water as "poisoned", they used words such as "afraid" or "petrified" to describe their feelings as they dealt with water. Official sources on water safety such as the city government and the water department added to the confusion by putting out contradictory statements over very short periods of time. Participants described receiving a boil advisory one week, only to be told the next week not to boil the water because it would concentrate the lead. Contradictory recommendations on safety measures led to increasing frustration and confusion about who to trust and what to do. Women also cited the constant angst and fear they lived with around the uncertainty of their future, not knowing the long-term effects of exposure to polluted water on their health or that of their children. This water whose quality was uncooperative and unwieldy made people fear the effect of its unknowing consumption on their children and on their own bodies. As one participant summed it up, "[

am] trying to reconcile what actually happened and the fears of possible issues in the future, because we still don't know what all effects (...) we probably won't know for years what effects it really had" (Interviewee 001, 16 March 2019, Flint). Women of reproductive age were particularly concerned, afraid that they would be unable to bear children or that any babies they did have would be affected by the lead their mothers had consumed.

Figure 6. No person detected.



Source: Photo by Nina L. (2019)

They also highlighted the emotional conditioning it required to adapt to their new relationship to water, a relationship that was both time-consuming and mentally absorbing. As one woman explained,

The shower works, the sink works. If it works, I should be able to use it. So it's challenging mentally to come to terms with the fact that this is your reality, and that doesn't happen overnight. You do not want to believe that you got to go through all that every day (Interviewee 001, 16 March 2019, Flint).

As this illustrates, women were not only describing the burden of coping with water insecurity but of coping with the failure of modern water. As part of this new normal, women highlighted how water had suddenly come to take over their lives. One woman explained that,

[Water is] everything, you're talking about cooking a pot of greens? Okay, that's a half a case of water, because we're going to get the silver bowl, we're going to pour four bottles in, that's what I think about when I do stuff now, everything is water! Water, water, water! (Interviewee 004, Workshop, April 2019, Flint).

In her interview, she echoed the idea of how water had become the primary theme around which most domestic interactions were organised:

My time was consumed with water. And at one point I felt like I was reduced to a bottle of water because when I went to teach my foster daughter how to cook I said, now you're going to need three bottles of water because we're going to boil two eggs and when I said it like that it was like.. what? (Interviewee 004, 14 March 2019, Flint).

In a review of water insecurity studies, Wutich and Brewis (2014) explained that lack of water or limited access to it can become a marker of social failure, as those experiencing it become stigmatised when they are unable to maintain hygienic norms. This situation is maybe even more persistent in urban areas of high-income countries where universal access to (safe) water is assumed to be the norm for urban households and a high standard of bodily and household hygiene becomes, by extension, a baseline expectation for proper urban citizenship. The women we interviewed described spending an inordinate amount of time ensuring that their bodies maintained hygienic norms while at the same time striving to protect themselves from the possible negative effects of water. Previously automatic practices such as brushing teeth or taking a quick bath became involved and painstaking tasks and were new sources of pain and difficulty. For example, one woman explained that:

We took quick showers. We started to run the water more. In order to, I don't know, get past what may have been the bad water. At this point it was a mind thing, every time we turned the water on, we thought something might be wrong with it. We started using the bottled water to brush our teeth. If we wanted to cook potatoes or pasta, anything that had to do with water, we were using bottled water by the end (Interviewee 003, 18 March 2019, Flint).

Conversely, women talked about taking a bath or filling a glass with ice from the refrigerator as a newfound luxury. One woman summed this up when explaining, "I still haven't taken a bath here in my home, I just don't want to. I was in Ann Arbor and Ypsilanti, I took one every day, I was like, I'm in heaven!" (Interviewee 007, 14 March 2019, Flint).

The significant mental, physical and economic burdens posed by the water crisis were exacerbated by the lack of clear, trustworthy information available to participants. In the next section, we outline the ways that women in our study turned to family and friends and to the Internet, to seek out reliable information on the water crisis and how best to respond.

### **Research and information sharing as a coping strategy**

As the section above illustrates, the women we interviewed exhibited a remarkable capacity for coping with the stress and risks brought upon them by the water crisis. At a pragmatic level, the three types of burdens described above show the labour required of women to cope with the water crisis; they had no choice but to access alternative water sources – bottled water and filtered tap water – and establish a new normal whereby different water sources were differentially used in their domestic routine. In order to deal with the unexpected onset of water insecurity, participants also recognised that they needed reliable information about the quality of the waters available to them and about their accessibility. The state experts who were responsible for providing this information to the public were seen as the source of conflicting and inaccurate information throughout the crisis; they were also broadly identified as the source of the water crisis, having failed to adequately treat the Flint River water and thus causing water with high lead levels to be delivered to local households. The women thus did not consider state experts to be trustworthy sources of water-related information. They identified two coping strategies that they had developed instead, in order to be able to access and manage water after the switch from Detroit to Flint water rocked their everyday lives: they began to share information about water through their social networks and they engaged in self-directed fact-finding research on water quality.

Women described first turning to family members and friends for information on how to deal with their new relationship to tap water. These conversations were less a fact-finding mission and more informal surveys that were aimed at identifying the trends of what was happening and what seemed to work. Women described calling around to see what other people were doing, paying attention to how they were making decisions based on their own individual experiences. They inquired how the tap water looked, smelled and tasted at each other's houses and, accordingly, what measures friends and family were taking to protect themselves. Coming from fellow Flint residents and trusted members of their social circles – many of whom had some expertise in the health or water fields – recommendations such as "It's better to not boil the water" and "Flush the pipes in the early morning" helped women sort through conflicting official messages. Later, when Flint residents had to turn to alternative sources of potable water, social networks became essential for sharing information regarding availability of water and changing schedules at distribution centres. They also exchanged information on where to find free water filters and how to correctly install and replace them. It was thus the sharing of water-related information among community members that enabled women to cope with the water crisis. Recent studies have found that in conditions of water scarcity, inter-household water sharing is not an uncommon practice (Wutich et al., 2018); while such a practice was not mentioned by any of the women, they did draw attention to the importance of inter-household sharing of water-related information.

The scrutiny of what was in their tap water resulted in a wariness and a subsequent desire for information regarding the contents of the bottled water that they were using instead. Most of the women described doing Internet research and making their own empirical observations about the different brands and types of bottled water, as well as the quality of the plastics for each brand. With humour, several women described themselves as unexpectedly becoming "water connoisseurs", sardonically commenting on the contrast between their new relationship to water and the growing hype trend for specialty waters. Pointing to her dive into water research, one woman explained that,

You begin to taste the difference, that each brand had a different flavour to it. So I began to read, you know you never think that water has ingredients and then I began to read and found out that one of them had baking soda, one of them had salt looks like... are you kidding me, in water? I thought water was just water (Interviewee 007, 14 March 2019, Flint).

She went on to explain how the water crisis made her pay attention to the "fine details" of the different waters available to her, an inquisitive attention that had never before entered into her everyday relationship to water. Based on what they learned about the different types of water and plastics, the women decided which kinds to use and how to manage it. One woman, for example, explained that,

I take the bottled water and go home, and I look and it's purified, but it's not purified by reverse osmosis. The water even tastes different, depending upon who is purifying it. Because the regulations on bottled water aren't that great. Then you have the issue of the water and the plastic, so there's cautions about the water getting too cold and freezing, the water getting too hot, where you store it outside (Interviewee 008, 12 March 2019, Flint).

She became hyperaware of how water reacted with plastic and what happened to it under extreme temperatures, information they had never needed or worried about prior to the water crisis. Their research helped them to feel confident that they were choosing the safest alternative water sources and managing the bottled water in the safest way possible by storing it in temperature-controlled environments. Scholars have found a gradual decrease in the use of tap water and a corresponding increase in the consumption of bottled water among non-whites and individuals in low-income brackets (Hobson et al., 2007; Rosinger and Young, 2020). This trend intensified in areas around emblematic cases of tap water contamination. As these women's relationship to bottled water shows, consumption of it is not a passive activity.

Figure 7. Storing water inside takes space but keeps plastic safe.



Source: Photo by Glo I. (2019)

## CONCLUSIONS

Attention to water insecurity in the United States is growing, largely as a result of regular residents calling attention to uneven access to safe drinking water across the country. The rich narratives of the women who participated in this study indicated that they had to shoulder considerable physical, emotional and economic burdens due to the everyday labour required to cope with the abrupt onset of water insecurity in their lives. While they were all middle-class residents of a high-income country, their experiences resembled those of women experiencing water insecurity in low-income countries – waking early to provide safe water for their families to use in their morning routines, waiting in long lines for bottled water, and worrying constantly about how safe their water really is. Technically connected to the water system, they still – to use Sultana's (2011) words – suffered from, and for, water.

What distinguished their experiences from those documented in the literature was that water insecurity was a shock; it was a sudden fracturing of the long-standing expectation of unmediated household access to clean, safe drinking water. As described by these women, the Flint water crisis brought about a new normal; they found themselves in a new relationship to potable water that was characterised by a (re)turn to bottled or filtered water from tap water, and a shift in responsibility whereby they themselves had to expend the labour necessary for rendering water safe. Even as inhabitants of what Melosi (2000) refers to as the "sanitary city", Flint residents (once again) assumed the responsibility for ensuring their own water security instead of relying on the technical expertise and regulations of municipal water providers. The testimony of the women participants illustrated how, when modern uniform water fails, people begin to see heterogeneous waters.

Their coping strategies further drew attention to two interconnected issues that are central to the politics of water security; these two issues – safety and trust – deserve further empirical attention. This study was conducted at a point when the water crisis was officially over, and after state officials and some academic scientists had declared the water running through the pipes to be safe. Everyday attention to water infrastructure sensitised many residents to the plurality of water as well as to water monitoring.

There is now a growing awareness and concern over what existing monitoring protocols are in place and what these protocols fail to capture, including variability in water quality within homes over time. Thus, despite the tighter drinking water rules in place, the women who participated in this study – and many more Flint residents as reported in the news – continued to limit their use of tap water. They did not trust the water because they distrusted the water governance system that was testing it, treating it, and delivering it to their homes. Their continuous avoidance of tap water is not rooted in a misconception about tap water and its quality; rather, it illustrates that the concept of 'safe drinking water' and the threshold of acceptable risks is always relational to other water sources, to people's everyday relationship with those waters, and to the institutions that manage them.

Furthermore, the very experience of water insecurity and the enduring distrust of the urban governance system are rooted in broader sociopolitical processes, namely Flint's urban history of deindustrialisation, racialised dispossession, and racial segregation. Thus, we echo Meehan et al. (2020a) in restating that experiences of water insecurity need to be contextualised in broader historical relationships that recognise institutionalised inequalities in the management of urban water infrastructures. These inequalities trickle down and manifest themselves at the household level, differentially shaping the burdens and coping strategies available to people within and across households. To address the broadening fissures of universal water security in the Global North, we thus encourage further research that takes an intersectional perspective on interrogating the effects of, and responses to, household inequalities in water access.

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