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“As Long As We Have the Mine, We’ll Have Water”: Exploring Water Insecurity in Appalachia

Water insecurity is a condition when affordability, reliability, adequacy, or safety of water is significantly reduced or unattainable resulting in jeopardized well-being. Water insecurity co-occurs with poverty and social and economic exclusion. It is gaining increasing attention from the scholarly community, but most work has focused on low- and middle-income countries. In this article, we explore water insecurity in Appalachian Kentucky. Throughout the Appalachia region, water access and quality are compromised as a result of contamination from extractive industries (such as coal mining) and failure of infrastructure investment. The water problems have been reported by journalists, activists, and social and natural scientists who describe a reliance on discolored, sulfuric, and sometimes toxic water to meet household needs. In this article, we build upon applied anthropology studies of human–environment interaction to answer the exploratory question: “Do patterns about water acquisition and consumption exist in Appalachian Kentucky?” Our methodologies included participant observation and informal go-along interviews at three sites based on convenience. The results are presented with rich ethnographic description, and reveal that preferences are influenced by the costs of water, the availability of water from different sources (wells, taps, mines, rain capture, etc.), and historic use patterns. We call for a culturally and historically informed approach to understand and measure water insecurity and water improvement efforts in Appalachia. Our ability to characterize water insecurity in low-resource settings in the United States will allow for better understanding and visibility of the water-related experiences of marginalized communities and serve as powerful policy inputs. [Appalachia, participant observation, water insecurity]

Introduction

Household water security is “the ability to access and benefit from affordable, adequate, reliable, and safe water for wellbeing and a healthy life” (Jepson et al. 2017:3). Water insecurity, then, is “a condition when at least one of these variables (affordability, reliability, adequacy, and safety) is significantly reduced or unattainable so as to threaten or jeopardize well-being” (Jepson et al. 2017:3).

Water insecurity co-occurs with poverty and social and economic exclusion and is gaining increasing attention from the scholarly community (e.g., Adams, Stoler, and Adams 2019; Wutich and Brewis 2014). Much of the work on water insecurity has focused on problems in low- and middle-income countries (Young et al. 2019), for example, among HIV-affected households in Lesotho (Workman and Ureksoy 2017), in urban (Wutich and Ragsdale 2008) and rural communities in Bolivia (Rosinger 2018), and among pregnant and postpartum women in western Kenya (Boateng et al. 2018; Collins et al. 2019). This and other work have shown that water insecurity has numerous deleterious consequences for physical health including reduced hygiene and increased diarrheal disease (Prüss-Ustün et al. 2014), dehydration (Rosinger 2015), and childhood morbidity (Ngure et al. 2014). Water insecurity also has negative consequences for psychological (Cooper-Vince et al. 2018; Stevenson et al. 2012; Wutich and Ragsdale 2008) and psychosocial wellbeing (Bisung and Elliott 2017).

Fewer studies and efforts have explored water insecurity in the United States. The bulk of scholarship centers around the water contamination crisis in Flint, Michigan (Gartin et al. 2010; Kruger et al. 2017; Pauli 2019; Radonic 2018), with additional studies at the Texas border (Jepson and Vandewalle 2016) and in Alaska (Eichelberger 2010, 2018). Recent scholarship on “plumbing poverty” has also brought attention to water problems in the

United States (Deitz and Meehan 2019). Thus, there is evidence that water insecurity is problematic in many parts of the United States, for a number of complex reasons (Young 2018, 2019).

One region of the United States in which water insecurity has received less attention is Appalachia. We previously encountered problems with water during fieldwork focusing on home gardening, food insecurity, and water quality in the region (see Wies 2014, 2018; Wies and Mays 2016). Therefore, for this project we focused specifically on perceptions of water insecurity. We sought to build upon applied anthropology studies of human–environment interaction to answer the question: “Do patterns about water acquisition and consumption exist in Appalachian Kentucky?” Our goals were (1) to highlight salient patterns of water acquisition, preference, and use and (2) to raise awareness of the nature of water insecurity in Appalachia and support current and future research in the area.

Water Insecurity in Appalachia

There are many forces shaping water insecurity in Appalachia. For example, the historical processes of de-investment and impoverishment contribute to the current state of water insecurity in Appalachia. President Lyndon Johnson formally declared the United States “war on poverty” during his January 1964 State of the Union address. In this speech, he specifically addressed the unique position of Appalachia:

Unfortunately, many Americans live on the outskirts of hope—some because of their poverty, and some because of their color, and all too many because of both. Our task is to help replace their despair with opportunity. This administration today, here and now, declares unconditional war on poverty in America. I urge this Congress and all Americans to join with me in that effort. It will not be a short or easy struggle, no single weapon or strategy will suffice, but we shall not rest until that war is won. The richest Nation on earth can afford to win it. We cannot afford to lose it. . . . Our aim is not only to relieve the symptom of poverty, but to cure it and, above all, to prevent it. No single piece of legislation, however, is going to suffice. *We will launch a special effort in the chronically distressed areas of Appalachia.*

In April of that same year, Lyndon B. Johnson visited the cities of Inez in Martin County and Paintsville in Johnson County in Eastern Kentucky. During his visit, community members held signs stating: “Coal is our bread and butter” and “Help Coal and you help all of Appalachia” (White House Naval Photographic Unit 1964).

The coupling of structural impoverishment and environmental extraction has contributed to the labeling of Appalachia as a “sacrifice zone” (Atwood 1975). The phrase “sacrifice zone” was first used to describe the coal-laden Appalachian region as a source of land, resources, and people providing energy sources to people all around the world. The region’s ecological resources and human capital have been exploited for decades by extractive industries and factory production. The result is a region dependent upon a national economy that depletes their resources, while providing low-wage, minimal-benefit jobs in return (Appalachian Regional Commission 2015). In this manner, the people of Appalachia are excluded from the potential for wealth and power that are generated for outsiders from their endemic resources. For these and other reasons, the “sacrifice zone” label has gained attention over the past decade, as journalists, advocates, and activists engage this metaphorical and literal term to contextualize the impoverishment of the region (Goodell 2006; Pruett 2017).

Thus, in Appalachia, water access and quality are compromised as a result of contamination from extractive industries (such as coal mining) and failure of infrastructure investment. The water problems have been reported by journalists and activists, including descriptions of reliance on discolored (due to contaminants), sulfuric, and sometimes toxic water to meet household needs (Becker 2017; Kounang 2018; Lonsdorf 2018). Social and natural scientists have also contributed to our scholarly understanding of household water in Appalachia (Arcipowski et al. 2017; Lee, Carey, and Jones 2017; Levêque and Burns 2017; McSpirit and Reid 2010), establishing the context for further inquiry into how people think about water and their water use decision-making practices.

As decades passed and generations worked to extract coal to support the growing nation’s energy needs, the local ecological resources—including water—continued to suffer the consequences. Poor water quality and availability are both persistent and acute in the Appalachian region. For example, crises such as the Martin County coal sludge disaster resulted in approximately 300 million gallons of toxic

waste and heavy metals released into the waterways (Scott et al. 2005, 2012, 2016; McSpirit, Hardesty, and Welch 2002; Shiber 2005; Wigginton, McSpirit, and Sims 2007). Therefore, in this article, we explore patterns of water insecurity in Appalachian Kentucky.

Methods

This exploratory, ethnographic study is situated within the larger body of water insecurity research, with a goal of continuing to extend those studies to impoverished locations within high-income countries. Methodologically, we drew on participant observation and informal go-along interviews. Participant observation emerged as the most appropriate method for inquiry for two reasons. First, this approach is useful for conducting research with vulnerable populations (Musante 2015), because it has the potential for humanizing everyday interactions and leveling—to the degree that can be—power disparities. Another benefit of participant observation was that we were able to approach the research questions from a grounded perspective, letting the participants guide us toward an understanding of water in their lives. Finally, we called upon participant observation because it serves as a key mechanism for understanding the construction of meaning amidst systems of inequity (Clifford 1986).

We used informal “go-along interviews” to complement participant observation. Go-along interviewing is a methodology that “entails embarking on a participant-guided tour of the real or virtual space within which the participants conducts his or her life” (Garcia et al. 2012:1395) and is particularly useful for studies in which the natural or built environment is fundamental to understanding participants’ perceptions about their surroundings. The approach is utilized across applied social science disciplines to examine topics such as health (Garcia et al. 2012), education (Trell and van Hoven 2010), and urban planning (Carpiano 2009; Kusenbach 2003). This method has also been used to interrogate experiences of water insecurity and aid in methodological innovations to understand human experiences with precarity (Collins et al. 2019).

Go-along interviewing is participatory and collaborative insofar as the method allows the researchers to literally walk alongside participants and see firsthand the objects of their narratives while hearing the explanations of their perceptions about the world (Cummins et al. 2007; Anderson 2004;

Evans and Jones 2011). Finally, go-along interviewing has yielded reliable results when examining challenging subjects (Carpiano 2009). Our go-along interviewing “probe” (De Leon and Cohen 2005) was water, broadly. For example, we would ask a participant, “Explain to us how you water your garden?” or “Where do you get your drinking water?” We asked about household water sources, including taps, bottled water sourced from outside of the community, and wells.

We approached the field site with an understanding of the histories of marginalization and inequality that mark rural Appalachian communities (Edwards, Asbury, and Cox 2006; Billings and Kingsolver 2018; Billings and Blee 2000). In this case, we were entering as both known and unknown entities, pivoting from previous discussions that focused on home gardening, food insecurity (Wies 2014), educational precarity (Wies and Mays 2016), and water quality (Wies 2018) to a new topic focusing on water acquisition and consumption. As “outsiders,” we were aware that our presence and our questions could cause fear or anxiety, and therefore we thought carefully about establishing rapport and trust. Due to the sensitivity of the topic and the need to maintain participant and community relationships, we were cautious with our inquiries and conversations were participant-led. We did not arrive with a list of items, nor did we probe when the topic seemed unwelcome to participants. Further, since recordings can change the power dynamics in interviews, we opted to keep only handwritten notes. Instead, we fully immersed ourselves in our surroundings and with people who wanted to tell stories about their world as it pertains to water.

As an exploratory study, Institutional Review Board Human Subjects research approval was sought.¹ Following consultation with representatives from the project’s home Institutional Review Board for Human Subjects, it was determined that the project did not meet the federal standards to be considered human subjects research, defined as “A systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge.” Therefore, we were advised not to prepare a Human Subjects Institutional Review Board proposal, as it would not be reviewed. Nonetheless, consent was obtained verbally and informally as we began our conversations with participants. To protect respondents further, exact geographic locations are not shared and pseudonyms are used for participant names.

Three of the four coauthors (JW, SC, and AM) visited three geographically distinct Eastern Kentucky field sites, and spoke with a total of 15 people. Throughout the intensive week-long project period, the total mileage traveled exceeded 1,500. Fieldwork in this region often requires intensive travel to get from one point to another, as the roadway infrastructure is sparse and often not connected by a shortest distance option. We selected the locations and sites based on convenience, relying upon previous research contacts and receptivity to meeting with us to discuss the topic of water. The results are presented with rich ethnographic description to capture the depth of the participant observation and go-along interviewing data.

Results

Field Site 1

We leave central Kentucky and drive southeast to our first site, a youth community center. The small-sized town represents a classic main street dominated by a three-story central courthouse. We park on Main Street and note the presence of shops and law offices, a few empty storefronts, and the overall quietness of the town's thoroughfare.

We arrive at our meeting place, a commanding three-story building situated in the center of Main Street. The first-floor coffee shop boasts warm hues, a large fireplace, and open spaces with tables, chairs, and couches. The high ceilings showcase towering windows in the front and back of the building, illuminating the space with natural light. Bookshelves serve as informal space markers, stocked with religious fiction books (e.g. the *Left Behind* series), others with decorative inspirational and motivational quotes. Light brown sisal woven coffee bean bags from Brazil and Colombia hang from the walls.

We are greeted immediately by our contact, John, a young professional who grew up here. After completing a bachelor's degree at a nearby public university, he returned to his hometown to support and develop the youth community center and manage the co-located public coffee shop. He tells us about the coffee shop, a small business supported by a local church to generate revenue to support the youth community center upstairs. One employee roasts the coffee beans on site, and sells additional beans to other local coffee shops. John's mother, who also lives in town, bakes the sweets that are for sale at the coffee shop counter. While we chat, town

professionals, including a former mayor, come and go, having meetings over coffee.

We spend much of our time talking at the front table in the coffee shop, over the sounds of the coffee machines. John describes the youths served by the center, who are local middle and high school students living in poverty. According to him, the median annual household income within the 1-mile radius surrounding the teen center is less than \$25,000. He notes high rates of transiency and grandparent fostering, a pattern that is significantly higher in Kentucky than other states (Bratteli, Bjelde, and Piggatti 2008).

Compounding these household-level challenges are threats at the community level. The town is close to two major interstate highways, resulting in drug sales and use via the interstate pipelines (Wilson 2013). Much of this drug activity is opioid use. Needles are sometimes found in the back alley, and sometimes people shoot up by the dumpster in the parking lot. The previous summer, two 16-year-old girls were murdered in a drug deal "gone bad," and there are rumors that human trafficking is increasing via a truck stop down the road. In response to the ubiquity of opioid use, the coffee shop keeps Narcan to treat overdoses.

In his work as youth community center Director, John has visited many of the teens' homes. He describes their households as poorly managed, low-income places that look like "bad project housing." He notes that some children are a "living cliché" in that they live "across the tracks." The railroad tracks serve as a physical boundary demarcating the most impoverished and marginalized areas, with many of the wealthier residents living outside of downtown in the opposite direction. In these households, children often share a bed with sisters, brothers, and cousins; an observation that prompts John to say that mattresses are the most needed donation for the youth community center.

While visiting the families of the children he serves, he mentions that he is often offered tap water that appears brown or cloudy and smells "unnatural" and "sulfuric." Other children are living without running water or electricity, because parents or caregivers cannot afford the utilities. For all of these children, hydration is predominantly via soda or other sugar-sweetened beverages, which are often cheaper to buy than bottled water. He laughs gently when he says that the children are not supposed to drink soda when they are doing homework or participating in activities at the youth

community center and coffee shop. He believes they drink too much of that at home, thus he encourages them to drink the free filtered water made available at the youth center.

As morning wanders along, our conversations with John are increasingly interrupted by the ubiquitous “dings” from his smart phone. He explains that the youth community center hosts a federally subsidized free lunch program, and he will soon need to oversee the food and paperwork management for this important community service.

We therefore move to tour the youth community center on the second floor, where a handwritten sign stating “No Adults Allowed!” greeted us. The center is expansive, with several flat screen televisions and couches, and air hockey and Ping-Pong tables where children and teens can play games and interact with one another. We also climb narrow, steep stairs to the third floor, which is in the early stages of expansion renovations. Through a narrow door in the ceiling, we climb more stairs and emerge on the rooftop.

From this height, the landscape surrounding us summarizes the conditions of precarity shared through John’s stories. In one direction, the foothills of the Cumberland Mountains begin rolling into the blue sky. In another, white fences marking wealthy horse farms punctuate the landscape. Closer to the building, we see the train tracks and the recently closed grocery store, near a three-story dilapidated apartment building. Next door is the whitewashed courthouse, with the clock missing from atop its tower. For a few moments, we stare at a portrait of a rural duality: local children struggle to access an ecological resource, drinking water, while others far away benefit from local resource extraction that exacerbates this problem.

Field Site 2

The next day we drive farther south, the roads curvier until we are amid rolling hills in the Cumberland Mountain region of Kentucky. After several hours, we reach the home of Bill, Betty, and Barbara Williams. While enjoying fresh garden cucumbers and Ale-8-One (“Kentucky’s original soda”) from single-serve glass bottles, we spend time with the couple and their daughter who recently graduated from the nearby public university. Their rolling backyard is abundant with this year’s garden crops. Several blue, 55-gallon plastic containers are connected to the home’s downspouts to catch rain for watering the home garden.

We arrange to connect with Lance, Laura, and Laney Smith, an extended family household “down the road.” Mr. Smith is a coworker of Mr. Williams at the local vehicle manufacturing factory. Our plan is to arrive before Mr. Smith begins the third shift. Though we are ready to go, we need to wait until the other family finishes with supper. At 6 pm, when we finally do leave, the six of us pile into two cars. Driving past fast food restaurants such as Kentucky Fried Chicken, we muse about the beginnings of this now international business. We are reminded of the film *Fast Food Women* by Anne Lewis (1991), a remarkable documentary chronicling the labor shifts in eastern Kentucky when men were no longer working in coal, and women joined the part-time work force in the growing fast food industry.

When we arrive, we maneuver our cars into the driveway amidst other cars and a pick-up truck. We are warmly greeted by Mr. and Mrs. Smith and Granny Smith (Mr. Smith’s 92-year-old mother), finding ourselves among a group of friends and family accustomed to sharing the wisps of evening summers and home garden crops. In the entryway, a folded flag is displayed in a case with military medals of accomplishment. Photographs adorn shelves throughout the room, children and grandchildren smiling. Some of the photographs are of Appalachian homesteads and landscape hanging in frames on the wall. Adjacent to the front window and entry door hangs a carved wooden cuckoo clock.

Once inside, we are shown to two new couches in the living room. We line up in them, as do our three hosts and the Williams. Laura encourages AM to experiment with the recliner option on the couch, and we all laugh as she is suddenly horizontal. Granny Smith sits caddy corner to us. She seems delighted at the chaos that our arrival has brought, her eyes are twinkling as she looks around at the audience of six visitors.

AM asks about water, and the conversation begins. The first thing the family brings up is their household well. The well was dug by Mr. Smith’s father and grandfather. The family collectively describes the story, in a rhythm that suggests they have heard and told the story many times over. Mr. Smith’s grandfather dug into the earth to craft the well, while his father would send down rocks to line the interior of the well.

Their performative story speaks to the pride that people have in their household wells, stories

that JW and AM have heard in other Appalachian field settings. These wells, often co-located with dwellings (trailer homes, prefabricated homes, and single-family homes), carry stories of intergenerational pride and commitment. They were built by hand, dug into the earth, the linings constructed with stones laid by males to provide water for a family. Well water was characterized as “cool,” “natural,” and “clean,” and used for drinking and watering gardens.

The Smiths used the well for many years for all of their water, until what they referred to as the “coal blasting” in the region contaminated it. Coal blasting, the practice of using explosives such as dynamite to reveal coal seams for extraction, led to crude oil redistribution in the earth and the well started bringing up pockets of the oil. This entirely changed the way they used and viewed water within the household. The oil in the water was untenable, they described it as “graphite tar” and the water was “nasty.” They were not alone in this experience; at a nearby relative’s house, they could even smell the oil in the bathroom.

The family was forced to plan their routine around their water because the oil-tainted water appeared in the taps sporadically. For example, Mr. Smith laughs lightly when he remembers creating a barrier out of socks to place over the shower head to capture any crude oil that might come from the tap. As he concludes sharing this memory, his mother speaks up. She said that she stopped washing her hair because she did not want it to be doused in crude oil, because it was very difficult to get the oil out. She says, “Sometimes you were lucky, you could shower and not have any oil in your water. But then you’d get a squirt of it.” She also began taking the family’s laundry to the laundromat in town because she did not want to risk ruining their clothing. She laughs, and looks around, pleased with the audience’s attention.

The rest of the family joins in recounting how they responded to the contamination. At one point, they put in plastic piping to insert a filter to catch the oil, but the filter would wear down every 18 months, and it was costly and time consuming to repair. As this solution failed, the family started going down the hill, across the railroad track, and through the fence to the dairy house on their farm, where another well provided water that was not infiltrated with oil for some of their needs, particularly related to cooking and cleaning.

After several years of negotiating their lives with oil in their household water, they explored the possibility of connecting with municipal utility services, what they referred to as “city water.” Other houses along their road were getting hookups, so it seemed a likely possibility. After discussing back and forth with the city water services, they learned that the city was not planning on laying pipe as far as their house; pipes would end a half mile away.

One Friday afternoon, however, the workers laying pipe came to the house and said that they were going to leave the ditch digging machine over the weekend, and showed Mr. Smith’s dad where the pipe would need to be laid to get the water to their house. Mr. Smith and his father dug the ditch and laid pipe over the weekend, returning the equipment as though it had not been used. Later, the water company came with papers that Mr. Smith’s dad signed, stating that the house would be supplied with city water and turning over ownership of the pipes to the company. However, the Smith family preferred to use the well water with crude oil for the home garden after converting to city water for the household. They would fill 55-gallon barrels with well water, and then use that to water the garden. The well water is free of cost, and had always served the garden well.

Mr. Smith’s mother says that she remembers how badly she wanted city water, and how hard it was for her to run her household with oil in the water. She shows us a few baskets that she learned how to weave at a craft class run by the county extension agent, and jokes that she always enjoyed her crafts. Those hobbies contrast to household chores, which she says she still does not like to do, because of the hardships caused by water insecurity.

Mr. Smith and Mr. Williams illustrate a more nuanced relationship between water security and health. They describe the automobile components factory where they work, noting that the taps at the factory are sourced from the nearby river, which operates downstream from a major regional sewage treatment facility. After multiple reports that employees were getting sick after drinking the factory’s tap water, the company began providing employees with five-gallon bottles of water to consume while working, and employees are provided new bottles when requested, even if they were bringing it home to drink. The men interpret this practice as a message that the tap was unsafe.

We head back to our research housing as the sun begins to set. Mountains that invite and protect us throughout the day change when the sunlight is gone, emerging as monsters amidst the poorly lit two-lane roads. The overall lack of infrastructure in the region manifests in ways that go far beyond water.

Field Site 3

For our third field site, we drive several more hours into the southeastern corner of Kentucky to visit with Lynn, an elderly, feisty woman who has spent her entire life in this region. In the early hours, the sun slowly creeps over the mountains and the ground remains covered with dew well into mid-morning. Along one rural road, we see a man walking along his driveway to the hillside with an empty gallon jug and a household cooking pot. It is not unusual for people to collect the day's water as it drips down the side of mountain rocks.

We arrive at Lynn's house after getting lost a couple of times, her street is difficult to find because the roads are narrow and the signage is poor. We pull into the driveway and see many varieties of herbs growing on the small porch leading to the door of her trailer. We knock and Lynn is excited to see us, especially AM, whom she has previously connected with during AM's ethnographic study of Appalachian home gardens.

As we share greetings and introductions, we swap canned fruit preserves from the Smiths and Williams family for canned peppers from Lynn. We settle onto the couches in the living room, eating corn on the cob smothered with Blue Bonnet margarine and drinking cans of Diet Coke. We quickly learned that one cob was not enough—there is more, and we are encouraged to continue eating and to help ourselves to the corn boiling in a pot on the stove.

After some small talk, we drive down the road into the holler. People in houses decorating the narrow road are all connected to Lynn via kin: daughters, sons, and cousins. The garden sits on a slope at the intersection of two narrow roads. Hidden in the hills behind the houses is an abandoned coal mine, which is used as a source of "mine water." Mine water is water that floods abandoned mines. It is described in similar ways as well water, as "clean" and "natural." One advantage of mine water is that it is often spatially located above a household and holds a significant-sized pool, therefore making it

a pumpable water source. Mine water is used for drinking water and other domestic water uses such as hygiene and cooking.

Lynn walks us through the garden, noting that she has planted more than she did last year. She explains how she spaced the corn, beans, potatoes, and other plants, and how the corn is positioned on the plot to prevent storm winds from blowing over the corn crop when afternoon thunderstorms barrel through the hollow. As we walk through the rows of plants, she explains that she does not own the land the garden is planted upon. Lynn's parents made an agreement with the landowners, who moved out of state in 1974, to clear the land of trees and the old homestead in exchange for use of the land.

She brings us to the well on the low side of the garden, and explains that her father dug the well and laid the stones that line the well. AM challenges us to the task, since she has pulled water out of this well on previous visits. We remove the protective cover and drop the bucket, which is tethered to a crossbar with a sturdy rope. It was a bit of a struggle, but we eventually pull up a full bucket of cool well water. Lynn encourages us to have a refreshing drink, and we quietly decline. She does not ask us again.

We ask if Lynn ever uses the well to water her garden, and she said that she does sometimes. Before we can ask any more about her uses of the well, she leads the conversation away from the topic of water, and invites us to walk through the garden and pick beans for ourselves. At the garden gates, AM circled back to asking about the use of water from abandoned coal mines, hoping for an indication that we could walk up to the coal bank. AM prompted her one more time, asking if she ever used water from the coal mine, and she stated that she did not. Instead, she said that she uses city water, but she knows other people who run pumps from abandoned coal mines to the home for daily use. SC asks why, and Lynn narrows her eyes and says that other people cannot afford city water.

In previous messages, Lynn was enthusiastic about showing us this unique water acquisition strategy. But Lynn was no longer interested in chatting about water. She pivots the conversation back to teaching us how to space corn and tomatoes properly in a garden, and we enjoy an abundance of warm, fresh green beans. The vegetables from this garden supply the household and family members with food access as well as surplus food that is sold,

and sometimes gifted or swapped, at the weekly farmer's market.

Discussion

The participant observation and go-along interviews revealed that the individuals and families with whom we spoke shared patterns and perceptions about the preferred sources of water and reasons for these preferences. The most preferred options for obtaining water were naturally occurring sources such as wells, mines, and water catchment containers. Water for domestic use, that is, washing dishes, bathing, and cooking, was sourced from the tap (city water), wells, and abandoned coal mines. Concerning water sourcing and acquisition, at all field sites, households that we visited had access to "city water."

These acquisition preferences correspond to the reasons for preference. There are many ways that participants described "different" types of water and its varying characteristics: some water is cleaner, cooler, tastes better, possesses more healing qualities, and is more healthful (for people and/or plants). Although all participants with whom we spoke had access to city water, accessed through taps connected to households, it was uniformly *not* the source of first choice for consumption. City water was considered suspicious, unclean, and unreliable. For example, the preference for watering gardens is to use collected rainwater or well water because people feel that the water is "cleaner." This untreated water is seen as purer and more potent than treated water sourced from municipal structures, which has been used for generations and is understood to have high mineral and chemical content that is harmful for gardens and for canning freshly gardened food. Indeed, as described in field site two, the Smith family continued to use the well water with crude oil for the home garden after converting to city water for the household.

Preferences also pivoted on health issues, which were made visible via the go-along interviewing process, providing an essential mechanism for understanding the relationship between place and health. For example, in our observations about water consumption for hydration, the absence of tap water for drinking is a significant theme. In visiting multiple households and field sites, we were never offered a glass of tap water. In the majority of cases, we were offered soda in single-serve cans or bottles. When we were offered water, it was always offered in a single-use bottle. Our observations indicate that the costs

of water acquisition decision-making pose health risks for those living in the region.

Conclusion: The Political Economy of Everyday Poverty in Appalachia

These results support the need for a culturally and historically informed approach to understand and measure water insecurity and water improvement efforts in Appalachia. Participants' perceptions and explanations reflect cultural norms and political economic systems. From an outsider's perspective, there are political economic pressures upon the perception of preferred sources and reasons for those preferences. We were surrounded by the visible markings of poverty and structural inequality throughout our fieldwork: multiple family members cohabitating in mobile homes; open pits of refuse near homes and the roads; billboards for opioid abuse recovery centers; and crowded fast food restaurants.

Given the history of Appalachia as a sacrifice zone, families rely on the natural environment through the use of homestead wells and mines for domestic water supplies. A primary challenge related to water security across the three field sites was water access. For some households, paying for municipal water was not only prohibitively expensive, it also violated cultural values surrounding adaptability and resilience (e.g., tapping into mine water reserves), self-sufficiency (e.g., do-it-yourself unregulated water connections to municipal sources), and sovereignty (e.g., using well water from "the mountain" and distrust of tap water). Beyond access, individuals we spoke with were concerned about water quality, with natural sources considered to be "purer" and "cleaner" than tap water.

The limitations of this exploratory project are important to acknowledge. These three descriptions do not describe all experiences in Appalachia, nor can they be generalized to the entirety of the communities we visited. Our fieldwork period was short, and thus we could not capture how participants negotiated water access and quality over time. However, the results of this exploratory research prompt us to consider how to study water insecurity in high-income nations with areas of significant impoverishment.

From this exploratory work, we advocate for continued studies of water insecurity in Appalachia.

For example, experiences of water insecurity in Appalachia should be quantified using an appropriately validated scale. Quantifying the impacts of water insecurity on health and wellbeing would help to highlight the consequences of water problems for humans and the broader environment. Future research to understand the extent and consequences of water insecurity in the Appalachia should also take into account the cultural values expressed by key informants in these interviews; namely, water sovereignty, water preference, perceived quality, and cost. Finally, future research and activism must be informed by the political economy of the region and the unique nature of community organizing that has emerged from purposeful and long-term de-investment and exploitation (Lyson and Falk 1993; Fisher 1993). Our ability to understand water insecurity in low-resource settings in the United States will allow for better understanding and visibility of the water-related experiences of marginalized communities and serve as powerful policy inputs.

Note

1. Ball State University and Northwestern University provided support for this project, no external funding sources were obtained.

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