Ensuring the Future Accessibility of Drinking Fountains in Oklahoma and Beyond

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Executive Summary: For thousands of years drinking fountains, also known as water fountains, have delivered potable water to people. However, despite this relationship with people, drinking fountains have a long complex history in urban infrastructure in the United States. While once highly used and supported by the public, drinking fountain usage and maintenance have declined with the rise of bottled water. While public and stakeholder support for water access remains high, decades of negligence and increasing monetization have reduced publicly accessible drinking fountains. However, despite these declines, drinking fountains remain the primary source of free drinking water for students in schools and a vital source of clean water for the unhoused population in the United States. Drinking fountain usage also improves the health of a community while reducing plastic pollution. We encourage the passing of local regulations that mandate a minimum number of drinking fountains available, in addition to policies that cover installation and maintenance of drinking fountains, increasing investment in maintenance of publicly available drinking fountains, as well as increasing investment in research of accessibility of drinking fountains, health and safety of drinking fountains, and advancement in design of drinking fountains. While we focus on two major metropolitan areas in Oklahoma, these recommendations are applicable to all major metropolitan cities in the United States.

I. Drinking fountain importance

i. Environmental impact

Prior to 1990, drinking fountains were at the height of their popularity, after which bottled water rose in popularity (Kaplan 2011). As environmentally conscious minded movements grow (Dunlap and Mertig 1991; Evans Comfort 2020; Arora and Manchanda 2022), the use of drinking fountains, particularly drinking fountains that serve as refillable stations, can help meet sustainability goals (Uehara and Ynacay-Nye 2018). The use of drinking fountains as refilling stations reduces bottle waste (Ivanov 2015), is more economical than bottled water over a long-term period (Cradock et al. 2012), and helps increase sustainability of cities. Water bottles are a billion-dollar industry that use between 32-52 million barrels of oil and use 2000 times the energy as tap water to produce (Gleick and Cooley 2009; Kiernan 2009). In the United States, bottled water is sold at 266 times the value of tap water (Miller 2006). Additionally, as cities consider banning the sale of single use plastic water bottles (Timm 2014, Lee 2008) ensuring the availability of water accessibility throughout a community is necessary.

ii. Health impact

It is estimated that over 75% of the children in the US and over 80% of children in European countries are not meeting daily water intake standards (Suh & Kavouras 2019). American adolescent girls should be consuming 71 ounces of water in any form, and adolescent boys should be consuming 81 ounces per day, however adolescents in the United States report drinking less than 24 ounces of water a day (Petal et al. 2014). In addition to not drinking the recommended amount of water per day (Onufrak et al. 2014; Patel et al. 2014), children often substitute water for sugary beverages

with high caloric intake (Muckelbauer et al. 2009). American adult women should be consuming 72 ounces of water a day, and adult men should be consuming 104 ounces of water a day, however adult women on average only consume 43 ounces a day and adult men only consume 44 ounces a day (CDC 2022). When adolescents and adults consume less water than the recommended amount over long periods of time they may suffer from dehydration and experience physical and mental performance issues such as, dizziness, fatigue, short-term memory loss, and mood changes (Harvard 2023). In addition, dehydration can increase the risk of more severe medical conditions such as kidney stones, gallstones, urinary tract infections, and the inability to remain conscious (Harvard 2023). Furthermore, substituting sugary drinks for water has led to increased body weights and increased risk for diabetes in both children and adults (Vartanian et al. 2007). Increased body weight can lead to obesity which is estimated to affect 41.9% of the people in the US (Moores 2023) and about 130 million people in the US population have diabetes or prediabetes (CDC 2022). Both conditions are considered major morbidities that lower the quality of life and usually life expectancy. Replacing sugary beverages with water is linked to improved health outcomes (Popkin et al. 2010; Patel et al. 2014), including the prevention of dehydration and an increase in cognitive function in adolescents (D'Anci et al. 2006). Additionally, poor dental health outcomes may have links to the consumption of sugary beverages (Heller et al. 2001). The installation and maintenance of drinking fountains can encourage and provide alternatives to sugary beverage consumption. It has been found that providing clean filtered drinking water to children combined with promotion and education leads to an increase in water consumption (Patel et al. 2011). Lastly, drinking fountains encourage exercise (Ivanov 2015) by giving people a place to stop and rehydrate while exercising, allowing them to stay outside longer, increasing their health benefits.

iii. Public perceptions

For thousands of years drinking fountains, also known as water fountains or bubblers, have delivered potable water to people (Dunlap 1917; Shakerin 2004; Ivanov 2015). However, despite this relationship with people, drinking fountains have a long complex history in urban infrastructure in the United States due to a history of segregation, distrust in the government, and a believed lack of importance from a public policy perspective (Kaplan 2011; Ivanov 2015; Smith 2020). Despite this complex history, the public generally views drinking fountains as safe and supports water access in parks and schools (Hood et al. 2014; Long et al. 2018). However, middle school aged students tend to dislike and distrust drinking fountains more so than other groups of individuals with concerns over hygiene and water taste (Patel et al. 2014; Onufrak et al. 2014). Similarly, stakeholders have voiced concerns over appeal, taste, appearance, and safety of drinking fountain water (Patel et al. 2011).

iv. Student usage

Public schools are mandated by federal law to provide water for students (Title 42, U.S. Code, Section 1758(a)(5); Title 7, Code of Federal Regulations (7 CFR) Section 210.10(a)(1)(i); 7 CFR, Section 220.8(a)(1)), however as school budgets have been decreased, (Barnum 2020) investment in school infrastructure, such as drinking fountain maintenance, has declined (Smith 2020). Drinking fountains are the primary source of free drinking water in United States public schools (Patel et al. 2011). However, there are concerns that fountains do not always follow the recommended student-to-fountain ratios or are not properly maintained (Patel et al. 2011). Water may also be available through paid vending machines (Patel et al. 2011), however, this is prohibitive to students undergoing economic hardships.

V. Unhoused usage

A vital role drinking fountains have in urban infrastructure is providing access to clean water for the unhoused and impoverished population (Ivanov 2015). Unhoused individuals have a higher risk of hospitalization for dehydration due to inconsistent access to clean water (Hale 2019). As many public drinking fountains are located in parks, access can become restricted after dark which increases the risk of police altercations and/or citations for those that violate park rules in order to get water (Hale 2019). Furthermore, public access to drinking fountains can be seasonal. For example, to prevent the structural damage that can be caused by low and freezing temperatures, drinking fountains can be rendered inert as part of winterization preparation enacted by local municipalities often through parks

departments. Winterization preparation can occur as early as October and last until late March causing public drinking fountain access to be unavailable for upwards of six months of the year in some regions. Furthermore, parks are increasingly becoming privatized and urbanized with access to drinking fountains declining (Hale 2019). For existing drinking fountains that are publicly available and easy to access, many suffer from lack of maintenance and upkeep (Hale 2019).

II. Lack of policy and investment

i. Municipalities broadly

Drinking fountains are suffering from a lack of policy, a lack of investment in infrastructure, and a lack of research investment which threatens the future of drinking fountain access and accessibility. While some United States cities' building codes include drinking fountains alongside public restrooms, there are few established policies that mandate access to solitary public drinking fountains (Ivanov 2015; Smith 2020). There are even fewer policies and regulations establishing how locations of drinking fountains are determined, setting the minimum number of drinking fountains per population, and creating regular maintenance routines (Smith 2020). This lack of policy and attention on policy leads drinking fountains to be largely ignored by policy-makers and suffer from poor maintenance (Patel et al. 2011; Smith 2020) in addition to poor urban placement. Similarly, research and development in drinking fountains has been widely-ignored (Kaplan 2011; Smith 2020), leading to stagnation of drinking fountains development. Finally, as infrastructure investment declines, funding for drinking fountain creation and maintenance also declines (Gleick 2010; Phurisamban and Gleick 2017).

ii. City of Oklahoma City and City of Tulsa

The City of Oklahoma City (OKC) is the largest metropolitan city in the state of Oklahoma and 20th largest in the United States encompassing 434 km^2 with a population of approximately 680,000 people. The City of Tulsa (Tulsa) is the second metropolitan city in the state of Oklahoma and 47th largest in the United States encompassing 807 km^2 with a population of approximately 413,000 people. Despite their sizes, OKC and Tulsa are no different than much of the rest of the country, with little importance placed on drinking fountains in existing policies. The City of Oklahoma City and Tulsa utilize the ICC International Plumbing Code for regulations concerning drinking fountain access in enclosed buildings such as restaurants, commercial buildings, and schools. For outdoor publicly available drinking fountains, there exists one municipal code in OKC regarding the approval of type and location of drinking fountains by a health officer (Code 1970, § 9-414; Code 1980, § 31-154). The rest of OKC's attention on drinking fountains regard the inclusion in project development plans for schools (OKC 2013A), senior health facilities (OKC 2015), the installation along OKC Trails in Park and Recreation Bond Issues (OKC 2017), or as consideration as special features in the OKC Parks Master Plan (OKC 2013B). There are no outdoor policies in Tulsa and little inclusion in local projects. Currently, no policies exist for establishing the minimum number of drinking fountains that should be provided per population, or how the location of new outdoor drinking fountains is determined outside of needing approval by a health officer, or policies regarding maintenance of drinking fountains into the future. In the United States it is estimated that the state with the most water fountains per 100,000 people is Oregon with 14.77 and Oklahoma is estimated to have 1.82 water fountains per 100,000 people, which is lower than the US average of 5.01 water fountains per 100,000 people (QS Supplies 2023). By cities providing more clean accessible water fountains overall public health can increase by reducing dehydration.

III. Policy recommendation

While public and stakeholder support for water access remains high, decades of negligence and increasing monetization have reduced publicly accessible drinking fountains. Over 2 billion people lack access to clean drinking water (CDC 2022) and implementing changes at the local level is one of the most effective ways to increase access to clean drinking water. In addition, providing clean drinking water benefits not only the people who need the water access, but also cities and states as improved access eases the burden on the health system from dehydration and contaminated water consumption issues. The most pressing issues for local drinking fountains include lack of access and availability, lack of maintenance, and lack of attention from policy-makers. Most of the issues plaguing drinking

fountains have persisted for years due to budget decreases and overall lack of infrastructure investment (Hale 2019; Barnum 2020; Smith 2020). By implementing policies focused on increasing access to drinking fountains, investing in maintenance of fountains, and increasing research into technological advances, such as motion sensors, filter sensors, and fountains turning off and on based on temperature, attention can be given to this vital source of clean water for students and the unhoused population in the United States. Additionally, as municipalities increase focus on drinking fountains the health of a community will improve while simultaneously reducing plastic pollution.

i. Pass local regulations that mandate a minimum number of drinking fountains available within a jurisdiction in addition to updating policies that cover installation and maintenance of drinking fountains.

The importance of drinking fountains in urban infrastructure is overlooked and poorly maintained in a vast majority of cities in the United States (Patel et al. 2011; Smith 2020). By creating regulations that set a minimum number of drinking fountains per population and establish installation and maintenance policies or updating regulations on public access to drinking fountains to allow for 24-hour free water access, drinking fountains can be prioritized as a way to increase sustainability, water access, and improve the overall health of cities. The benefits of passing this policy include ensuring access to potable water to all members of the community in perpetuity, access to clean drinkable water at all times, and an increase in accessibility for clean drinking water. However, the installation and maintenance of new drinking fountains would involve high continuing investment from the municipality. Costs of drinking fountain installation and maintenance is highly variable community to community and dependent on infrastructure and local government organization. However, a ten-year cost analysis of a school district found water fountain installation and maintenance cost between $12,000-27,000 in total suggesting overall financial burden is low (Cradock et al. 2012). Tap water costs a municipality an average of $0.005 per gallon (Miller 2006). The City of Oklahoma City has a $74 million budget allotted to the Parks and Recreation Department with specific programs tailored to recreation, health, and wellness (The City of Oklahoma City 2023) that is suitable to fund drinking fountain initiatives. Similarly, the City of Tulsa has $35 million allotted to the Cultural Development and Recreation Department which houses the parks department and health and wellness programs (The City of Tulsa 2023), which could provide funds to increase investment. Additionally, if populations decrease over time excess drinking fountains that require continued maintenance could become cost-prohibitive to the community, as money is wasted on maintaining fountains that people are not actively using. Therefore, it is important that new policies adequately address location selection for new fountains in the urban landscape, as too many fountains in low traffic areas cost money but have low utilization by the public. Many cities recognize the need for increasing water fountain availability but a lack of policy addressing the minimum number of drinking fountains per person in a jurisdiction means few changes have occurred.

ii. Increase investment in the maintenance of publicly available drinking fountains.

As society continues to become more urbanized (Satterthwaite 2009; Buhaug and Urdal 2013), investment in infrastructure is necessary to support growing populations. Within urban spaces Hale (2019), recommended the placement of drinking fountains at bus stops as a potential solution for access to water by the unhoused and impoverished. Additionally, drinking fountains placed along the periphery of parks and outdoor spaces that have restricted hours can increase access to unhoused and impoverished members of the community (Hale 2019). Beyond urban communities, rural communities generally lack access to drinking fountains due to an overall lack of infrastructure. However, city halls, town squares, and community centers within these communities can be potential locations for drinking fountain installation. Despite public schools being mandated by federal law to provide water for students, declines in school budgets (Barnum 2020) have caused overall infrastructure investment to decline. Investing in updating and maintaining drinking fountains can help ensure access for the student body. The benefits of passing this policy include ensuring continued access to established drinking fountains. Additionally, as funds have already been used to install drinking fountains, maintenance can prevent unnecessary replacement costs. However, the

continued maintenance of drinking fountains would involve continued investment from the municipality. Funds to install and maintain drinking fountains by municipalities or states may be collected by the municipality applying for funding such as the CARES Act, US EPA grants, USDA grants, The Drinking Fountain Association grants and The Water Fountain Fund. The applications would detail how the funds would be specifically used to update and maintain existing water fountains for students and adults. For example, Denver, Colorado used CARES Act Funding to replace and update water fountains with more technologically advanced systems such as FloWater which will provide purified safe drinking water for students and adults in schools (Frenkel 2021). In Oklahoma specifically there was approximately 74 million dollars allocated to the City of OKC Parks and Recreation Department and 35 million dollars allocated to City of Tulsa Parks and Recreation Department in 2023 (The City of Oklahoma City 2023, The City of Tulsa 2023). This money is used for health programs in the City and can be shifted to include updating and maintaining drinking fountains throughout the community.

iii. Increase the total number of drinking fountains per 100,000 people by increasing accessibility of drinking fountains, health and safety of drinking fountains, and advancement in design of fountains.

Globally the United States has one of the lowest averages of water fountains per 100,000 people, with most countries averaging 12.63 fountains per person while Oklahoma alone averages only 1.82 fountains per person (QS Supplies 2023). To increase the number of fountains in The City of Oklahoma City an additional 131.8 fountains would need to be installed in the metropolitan area. Drinking fountains range in price from $1000-4000 (Berls Commercial Supply 2023; Haws Company 2023; Elkay Manufacturing Company 2023) depending on brand and technology available, which would cost The City of Oklahoma City an estimated $131,828.60 to $527,314.40 investment. For the City of Tulsa, 44.65 more drinking fountains would need to be installed (cost estimate: $44,645 to $178,580). Additionally, research in drinking fountain usage, placement, technological advancement, and health has been largely underutilized (Kaplan 2011; Smith 2020). Increasing investment in engineering and design can help limit water waste usage, improve the longevity of drinking fountain structures, and help limit the need for winterization. Which is possible by adjusting annual operating budgets to include funds towards drinking fountain upgrades aimed at implementing filtration advancement and filtration monitoring. The benefits of passing this policy include ensuring safe and healthy potable water access into the future. Additionally, by investing in design advancements drinking fountains can become more effective, last longer, and need less maintenance than older designs. However, this policy recommendation is the most cost prohibitive of all the recommendations due to the high upfront cost of drinking fountain implementation. Despite the cost, this recommendation will have the largest direct impact on a community by increasing access to water.

IV. Conclusions

As we move ever closer to The United Nations 2030 Agenda for Sustainable Development, it is becoming more important than ever to identify solutions that can advance the 17 Sustainable Development Goals. Access to clean water is Goal 6 of the United Nations Sustainable Development Goals: *Ensure Availability and Sustainable Management of Water and Sanitation for All* (United Nations 2022), and focusing on drinking fountains as a solution to inconsistent or lack of clean water access can help United States cities achieve this goal. Additionally, increasing sustainability of cities is Goal 11 of the United Nations Sustainable Development Goals: *Make Cities and Human Settlements Inclusive, Safe, Resilient, and Sustainable* (United Nations 2022), and the increased creation of drinking fountains can help communities achieve this goal by reducing reliance on plastic water bottles while providing access to clean water regardless of income.

We advise the best policy for implementation due to the combination of feasibility and least investment is *Increase investment in the maintenance of publicly available drinking fountains.* This recommendation involves the least investment as drinking fountains have already been installed and proper continued maintenance can prevent unneeded replacement costs. By implementing this policy, the usage of drinking fountains and access to drinking fountains can be increased in The City of Oklahoma City and The City of Tulsa, which would further increase health outcomes and lower plastics usage while meeting sustainability goals. Implementing none of

the suggested recommendations will ensure further degradation of our publicly available drinking fountains, increase plastic pollution, as well as increase undue hardships and even lethal consequences for the impoverished and unhoused communities in Oklahoma. While every recommendation involves investment from the municipality, as long-term issues surrounding water access will continue to grow, being proactive will ultimately reduce costs in the future. Finally, while the two largest metropolitan areas in Oklahoma are highlighted in this piece, these recommendations are applicable to all major municipalities in the United States as all municipalities have the opportunity to increase water access to their community by allotting funds budgets that include continued maintenance of municipality-owned structures.

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