Water, Sanitation, and Hygiene (WaSH) Insecurity in Unhoused Communities of Los Angeles, California

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Abstract

Background: Access to water and sanitation is a basic human right; however, in many parts of the world, communities experience water, sanitation, and hygiene (WaSH) insecurity. While WaSH insecurity is prevalent in many low and middle-income countries, it is also a problem in high-income countries, like the United States, as is evident in vulnerable populations, including people experiencing homelessness. Limited knowledge exists about the coping strategies unhoused people use to access WaSH services. This study, therefore, examines WaSH access among unhoused communities in Los Angeles, California, a city with the second-highest count of unhoused people across the nation.

Methods: We conducted a cross-sectional study using a snowball sampling technique with 263 unhoused people living in Skid Row, Los Angeles. We calculated frequencies and multivariate analyses to describe (1) How unhoused communities cope and gain access to WaSH services in different places? Moreover, (2) What individual-level factors contribute to unhoused people's ability to access WaSH services?

Results: Our findings reveal that access to WaSH services in Los Angeles is most difficult at night. Reduced access to overnight sanitation resulted in 19% of the sample population using buckets inside their tents and 28% openly defecating in public spaces. Bottled water and public taps are the primary drinking water source, but 6% of the sample reported obtaining water from fire hydrants, and 50% of the population stores water for night use. Unhoused people also had limited access to water and soap for hand hygiene throughout the day, with 17% of the sample relying on hand sanitizer to clean their hands. Shower and laundry access was also among the most limited services reducing people's ability to maintain body hygiene practices and limiting employment opportunities. Our regression models suggest that access to WaSH is not homogenous. Community differences exist, with the odds of having difficulty accessing sanitation services being two times greater for those living outside of Skid Row (95% CI: 1.08-6.37) and three times greater for people who have been unhoused for more than six years compared to people who have been unhoused for less than a year (95% CI: 1.36-8.07).

Conclusion: Overall, this study suggests a need for more permanent and 24-hour accessible WaSH services for unhoused communities living in Skid Row, including restrooms, drinking water, water and soap for hand hygiene, showers, and laundry services.

Background

Access to water and sanitation are recognized as a basic human right. The United Nations (UN) General Comment 15 on the right to water, for instance, issued by the Committee on Economic, Social and Cultural Rights declares that a person has the right to have sufficient, safe, physically accessible, and affordable water for personal needs without any form of discrimination [1]. Additionally, in 2010, through the Resolution 64/292, the UN's General Assembly recognized the human right to water and sanitation [2]. The inclusion of water and sanitation as a human right may seem like an advancement. However, in practice, global water reports estimate that 1 in 3 people or 1.6 billion people worldwide live without safe

drinking water and 2.8 billion without safely managed sanitation services [3]. Additionally, the access to hygiene remains globally an unrecognized human right thus limiting progress in improving public health. Water, sanitation, and hygiene (WaSH) insecurity is the absence of and inadequate access to WaSH services that result in experiences that increases an individual's exposure to preventable water-related health risks. Experiences of WaSH insecurity are disproportionally found among impoverish communities living in low and middle-income countries (as seen in the work of [4–6]). However, WaSH insecurity is also present in high-income countries like the United States (US), where vulnerable communities including unhoused people lack continuous access to safe, sufficient, reliable, and affordable WaSH services. Unfortunately, little is known of the true magnitude of how WaSH insecurity among unhoused people in the US, as the needs of unhoused people remain largely underexplored which leave these communities underserved.

While the term "homeless" continues to dominate mainstream discourse and government reports, it stigmatizes people with lived experience. Therefore, throughout this paper, we will be using the term "unhoused" to refer to people or individuals with lived experience of homelessness. The term unhoused is preferred and used by grassroots organizations and people with lived experience in the community because it maintains the humanity of the people discussed [7]. Addressing the WaSH service needs of unhoused communities is critical. In global water reports, the US often claims to have universal access to safely managed drinking water and sanitation services [8–10]. The Joint Monitoring Programme (JMP) of the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), for example, produce global estimates on progress made related to WaSH. In JMP's most recent assessment based on 2020 household data, the US reported that 99.67% of its population has access to safely managed drinking water from acceptable sources that are free of contaminants [3]. The US also reported that roughly 97.47% of its housed population has access to safely managed sanitation services, with no data provided for hygiene services [3]. However the literature on household WaSH insecurity suggests it does exist in the US and it disproportionally affects migrant farming communities, Indigenous communities, and low-income urban communities [9, 11–15]. Reports such as the ones provided by the JMP are limited by the data countries share. In the US, water estimates come from the American Housing Survey (AHS) and the US Environmental Protection Agency's Safe Drinking Water Information System datasets [10, 16–18]. The unit of measurement on which these datasets are based is at the household unit, which automatically excludes unhoused people. While initiatives are underway in counting unhoused communities in census data, there is no data available up to date that accounts for the WaSH needs and WaSH insecurity experiences of unhoused communities in the US.

Restricting WaSH insecurity to household-level analyses excludes the lived experiences and service needs of those who do not have access to permanent housing. While limited, the WaSH insecurity literature that focuses on unhoused communities suggests that poor access to services leads to and perpetuates a cycle of poverty [19, 20]. In other words, for unhoused people, WaSH insecurity exacerbates their stigmatization and social exclusion. For example, DeMyers, Warpinski, and Wutich's (2017) study in Phoenix, Arizona, found that based on people's living conditions (in shelters, encampments, with or without a roof), WaSH insecurity affects people differently. At the same time, WaSH insecurity prevents

the transition out of homelessness by aggravating health problems that contribute to mental health deterioration and joblessness, increasing a person's susceptibility to long-term homelessness [19]. Similarly, Leibler et a. (2017) study in Boston, Massachusetts, found that poor access to hygiene facilities (and consequently, poor hygiene practices) led to poor physical health and increased risk of infectious diseases, evident in unhoused people who cope with mental health problems and substance use [21]. When interviewing unhoused people, activists, and stakeholders in Fresno, California, Speer (2016) study found that the lack of infrastructural WaSH access in cities is an example of the aggressive policies aimed to criminalize, exclude, and remove encampments from public spaces [22]. This limited access to WaSH infrastructures, including sanitation facilities forces unhoused people to practice open defecation, as seen in Capone et al.'s (2018) study in Atlanta, Georgia. Capone and colleagues found thirty-nine open defecation sites near shelter and soup kitchens that tested positive for pathogens, which poses an increased risk of infection by faecal-oral route in unhoused communities [16, 23]. Furthermore, the criminalization of unhoused communities pushes people into hazardous spaces and further disconnects them from much-needed services [24, 25]. Pushing unhoused people to hazardous environments is seen in the work of Flanigan and Welsh (2020) that found unhoused people living along the San Diego River are more socially isolated and disconnected from services compared to those living in downtown areas [25]. Flanigan and Welsh report that unhoused people live along the riverbed to avoid police harassment and encampment sweeps [25]. In addition to creating barriers to access safe WaSH services, living in secluded areas raised the risk of exposure to contaminated water and disease outbreaks [25, 26].

Previous work on WaSH access among the unhoused has been limited in scope, and three main research gaps exist. First, from a geographic perspective, research in Los Angeles, an area with the second-highest count of people experiencing homelessness across the nation, roughly 66,436 people, on a single night in January 2020, remains underexplored [27]. To the authors ' knowledge, no studies have addressed the experiences and needs of unhoused people living in Los Angeles. Second, no known study has comprehensively assessed WaSH access among the unhoused in Los Angeles, including drinking water, sanitation, and hygiene (showers, laundry services, and handwashing stations). Understanding the interim-level services, specifically WaSH service needs of unhoused communities is crucial for informing policy and creating programs that address and improve both the health outcomes and living environments of these vulnerable communities. Lastly, the temporal aspects of WaSH insecurity have not been fully recognized or considered among the unhoused. Given that the hours of operation can vary for any given service, limits to WaSH access can force the unhoused to resort in unsafe WaSH coping strategies. With the exception of Kuhlmann's study on menstrual hygiene access in Missouri [28] and Maroko et al. (2021) study on sanitation access in New York [29], no known study has captured how WaSH access changes throughout the day for unhoused communities.

In this study, we explore WaSH insecurity is in Los Angeles, a city that has historically been struggling with a homelessness crisis [30, 31] with the goal of shedding light on the WaSH insecurity experiences that unhoused communities face. We focus our research in Skid Row, a 50 blocks area in Downtown Los Angeles where an estimated 4,662 people experience homelessness in a single night, and roughly 2,100 live outdoors in tents, vehicles, and makeshift shelters [32]. While the community of Skid Row hosts one

of the largest encampments, it is also confronted with public health equity issues raised by both community-based efforts [33–35] and the County of Los Angeles Department of Public Health [36]. The Los Angeles Community Action Network (LA CAN), for instance, released in 2013 and 2017 two reports that advocate for the City of Los Angeles to improve the access to water, sanitation, and consistent trash collection [33, 34]. In 2017, the Los Angeles Central Providers Collaborative (LACPC), a community-based group of Skid Row residents and grassroots organizations, released an audit report of public toilets available in the community. The report found that only nine public toilets were available in Skid Row for a population of roughly 1,777 unsheltered individuals in 2017 [35]. This is approximately 198 unhoused people per toilet. Thus, our study is significant because it will contribute to existing local knowledge while also help expand our understanding of WaSH insecurity experienced by unhoused communities and the daily barriers they encounter in accessing services. The knowledge and findings gathered from this study will also bring new insight into the persistent inequities of WaSH access that unhoused communities experienced.

To address the unmet needs of unhoused people, this study will move beyond the household to address WaSH insecurity in Los Angeles, California, at the houseless. Specifically, this study addresses two main questions: (1) How do unhoused communities cope and gain access to WaSH services in different places? and (2) What individual level (gender identity, racial/ethnic, age, sleeping location, and duration a person has been unhoused) factors contribute to unhoused people's ability to access WaSH services? Ultimately, this study seeks to advance our understanding of WaSH insecurity for unhoused people in Los Angeles to highlight the need for interim-level services that can help improve people's lives and health through affordable, safe, and reliable access to WaSH services.

Methods

This is a descriptive case series study of (n = 263) unhoused people with lived experience in the Los Angeles area. All study participants reported living in the Los Angeles region at the time of the interview. The surveys were collected in both Spanish and English in two months (June and July) in the summer of 2019. Before data collection, all study activities were reviewed and approved by the University of Southern California Institutional Review Board (IRB) (Protocol UP-18-00323). Participation in the study was anonymous and voluntary, and only unhoused adult participants over 18 who gave oral consent were enrolled. This study defines an unhoused person as not having a safe, permanent, and stable housing location (e.g., "living on the streets" in encampments, tents, vehicles, or other forms of makeshift housing). People living in emergency or temporary shelters also formed part of this definition as they do not have a permanent and stable place to live.

Only study participants who consented to and completed the questionnaire were included in the final analysis. Participants were gifted a meal card, bottled water, and hygiene kits regardless of whether they fully completed the survey interview process. The study mainly focused on the community of Skid Row (Fig. 1). However, while interviewed within the Skid Row community boundaries, some participants reported sleeping in other areas, including downtown Los Angeles and greater Los Angeles

neighbourhoods, as seen in Fig. 1. To protect the privacy and confidentiality of study participants, the sleeping locations shown in Fig. 1 are not the exact locations but placed at random within the street segment boundaries they reported frequently sleeping. Overall, our decision to focus on Skid Row was both pragmatic and strategic. Annual street counts conducted by Los Angeles Homeless Services Authority (LAHSA) routinely find many more unhoused communities in Skid Row than in the other neighbourhoods of Los Angeles. Furthermore, this is an area that historically has been a containment zone where most of the services and encampments are located [31].

Target Population

This study used a mixture of convenience and snowball sampling strategies to recruit participants, as participants are difficult to reach. Participants included unhoused participants who resided within the Skid Row community boundaries, stretching from 3rd to 7th Street (North and South) and Alameda to Main Street (East and West). Additionally, passers-by within the designated study area, which on occasion extended to participants in nearby tents and friends of participants, formed part of the study. The sample population also included Lava Mae^{x} © non-profit organization guests in two service locations of downtown Los Angeles: City Hall and St. Francis Centre. This partnership with Lava Mae^{x} helped provided the research team with a safe space to conduct surveys. In exchange, the team provided hygiene kits and bottled water to guests and people in nearby encampments, regardless of study participation.

Survey Data and Data Analysis

The survey instrument consisted of semi-structured and open-ended questions that explore the WaSH access and coping strategies of people with lived experience of homelessness. The survey was first piloted among the research team to improve the quality of questions. Then, the survey instrument was tested in Skid Row with thirty unhoused participants before making final revisions. One thing to note is that the fieldwork and data collection took place during the hottest two months of the year in Los Angeles (June and July). Each survey took approximately 30–90 minutes to complete. The survey instrument asked a series of demographic questions, including different living conditions, areas where they often rest at night, WaSH accessibility, and general health information. WaSH access questions were collected to represent different types of WaSH services utilized at different times of the day (e.g., morning, afternoon, and night). To measure WaSH insecurity, the questionnaire also asked participants about their daily hygiene practices, including showering, handwashing, clothing change, and laundering. The JMP typically measures hygiene in terms of hand hygiene practices, menstruation, and food hygiene. However, in this study, we expand the analysis to incorporate body hygiene that addresses unhoused communities' laundry and shower needs. Adding these two variables is important because current literature indicates that poor access to hygiene practices impacts people's self-esteem and the way others view them in their communities, which limits their ability to seek out services and employment [19, 20, 29, 37]. Furthermore, participants were asked whether they have had any health problems within 30 days from the interview date to understand better the health risks of people who are unhoused and possibly attributed to

inadequate access to WaSH services. Lastly, participants were provided with a space to express their main concerns and overall experiences in navigating access while being unhoused.

The data was collected using paper surveys, and each survey had a unique study identification. Each paper survey was abstracted and coded onto a database. In total, we collected 280 surveys, in which 17 were incomplete surveys that did not form part of the final analysis. Each variable coded was verified using a survey metadata. After completing the data abstraction and coding, it was reviewed and verified twice before entering the analysis phase. The coded data were imported into R Studio version 1.3.1093 to calculate descriptive statistics. Participants' sleeping locations at the time of their interview were geocoded using Esri Survey123, matched to the survey data, and then visualized using ArcGIS Pro version 2.7.

To address the first research question, we examined individual-data to summarize the coping strategies and WaSH service types the sample population reported accessing. Additionally, to measure whether differences exist among unhoused communities (question two), we utilize individual-level factors that may lead to difficulty accessing WaSH services. Specifically, we integrated generalized linear models (GLM) to measure the association between difficulty accessing different types of WaSH services and individual-level characteristics. The reasoning for choosing GLM as opposed to other statistical models is that it does not assume the dependent variable to be normally distributed. Additionally, the outcome variable in the models, “difficulty accessing restrooms, showers, laundry, drinking water, or handwashing stations,” is a binary variable (Yes/No). The independent categorical variables in the models included: gender identity, race and ethnicity, age, sleeping location, and duration a person has been unhoused. Associations tested were chosen based on the review of relevant literature and observing the lack of studies that explore heterogeneity among unhoused groups as it pertains to differing experiences accessing WaSH services.

Results

Population Characteristics

A total of 263 participants were included in the final analysis of this study. The housing status of participants varied across the sample: 25 stayed in emergency shelter systems, three in transitional housing programs, four stayed with family, and the remaining 231 participants reported sleeping in different unsheltered conditions at the time of interview. In this study, unsheltered living conditions refer to people sleeping in tents, makeshifts, vehicles, freeway bypasses, and other conditions without a roof. Table 1 summarizes our study population demographics. The majority of the study participants enrolled (n = 134) reported sleeping within Skid Row community boundaries (7th and 3rd and Alameda and Main streets). However, some participants also reported sleeping in other communities outside of Skid Row boundaries, including downtown Los Angeles (n = 92) and the greater Los Angeles area encompassing Santa Monica, Venice, Hollywood, and South Los Angeles areas (n = 37). Seventy percent of the population identified as male. The mean age was forty-eight years old. Only eight participants younger

than 24 years enrolled in the study. People of color overrepresented the sampled population, with approximately 41% of the participants identifying as Black or African American and 30% Latinx. People identifying as White were 15% of the study sample population. In total, 84% of the study population were chronically unhoused, meaning they have been continuously unhoused for more than a year. The sampled population reported experiencing housing insecurity for sixty-five months (5.4 years) on average, with only 41 participants reporting being unstably housed for less than a year.

Table 1
Frequency Distribution of Sample Population Demographics (N = 263)

Characteristic	Category	Count (%)
Housing status	Unsheltered	231 (87.83)
	Emergency shelters	25 (9.51)
	Family/friends	4 (1.52)
	Transitional housing	3 (1.14)
Community	Skid Row	134 (50.95)
	Downtown Los Angeles	92 (34.98)
	Greater Los Angeles	37 (14.07)
Gender identity	Male	180 (68.44)
	Transgender male	2 (0.76)
	Female	79 (30.04)
	Transgender female	1 (0.38)
	Missing	1 (0.38)
Age	18 to 24	8 (3.04)
	25 to 34	33 (12.55)
	35 to 44	55 (20.91)
	45 to 54	69 (26.24)
	55 to 61	60 (22.81)
	Greater than or equal to 62	32 (12.17)
	Missing	6 (2.28)
Race/ethnicity	Black/African American	109 (41.45)
	Latinx/Hispanic	80 (30.42)
	White	39 (14.83)
	Another group	17 (6.46)
	American Indian/Alaskan Native	11 (4.18)
	Asian and Pacific Islander	3 (1.14)
	Missing	4 (1.52)
Sexual orientation	Heterosexual	222 (84.03)

Characteristic	Category	Count (%)
	Bisexual	18 (6.34)
	Homosexual	13 (4.94)
	Asexual	1 (0.38)
	Other	2 (0.76)
	Missing	8 (3.04)

Table 1
Continued

Characteristics	Category	Count (%)
Duration of homelessness	Less than 1 year	41 (15.59)
	1–3 years	104 (39.54)
	4–6 years	42 (15.97)
	7 years or greater	65 (24.71)
	Missing	11 (4.18)

Note

Percentages equal to totals within each demographic characteristic.

To understand participants' current housing status, we inquired about the contributing factors that led participants to become unhoused. Table 2 highlight the main reported factors, with unemployment being one of the main factors (roughly 27%) reported among the sampled population. Additionally, roughly 16% of participants reported that their loss of housing resulted from the lack of affordable housing in Los Angeles and their inability to afford paying rent resulting in eviction. Substance use and misuse was the third most commonly reported cause of a person being unhoused (15.3%), followed by family conflict (15%). Furthermore, roughly eight percent of the sampled population reported the cause for being unhoused is due to their immigration status or criminal record. Lastly, a small percentage (3%) of participants reported being unhoused due to being victims of domestic violence.

Participants were also asked about the number of times they were forced to move their tents as a result of encampment sweeps enforced in different parts of the city by law enforcement. On average, sample population reported moving their tents and belongings at least nine times within 30-day period. Forty-one participants reported moving every day due to encampment sweeps. Ninety-nine participants (37.6%) also reported being cited for misdemeanors including not moving their tents, public urination, or jaywalking within 30-days from time of interview.

Table 2
Frequency Distribution of Variables Associated with Causes of Homelessness

Cause	Count (%)
Unemployment	95 (26.46)
Unaffordable housing/eviction	57 (15.88)
Drug/alcohol misuse	55 (15.32)
Family conflict	54 (15.04)
Other*	30 (8.36)
Mental health disorder	26 (7.24)
Family/spousal death	16 (4.46)
Physical disability	15 (4.18)
Domestic violence/sexual abuse	11 (3.06)

Note

The percentages are based on 359 responses given by N = 263 since this was a multiple-response question. The “other” category includes immigration status and formerly incarcerated people/recently released from prison.

Drinking-Water Access

According to the JMP, access to drinking water is based on a service ladder that takes into account whether the service is accessible on premises, available at all times, and free from contaminants [38]. Based on this service ladder, the JMP categorizes access to drinking water into five categories: safely managed access, basic access (from an improved source located within 30-minutes), limited access (an improved source that exceeds 30-minutes to collect), unimproved source access (unprotected well or spring), and surface water access (river, canal, lake, pond, and dam). The JMP defines improved drinking water sources as those that provide accessible, continuous, and safe water, including those from piped water systems, boreholes, protected wells and springs, packaged water, delivered water, and rainwater [38]. In this study, zero percent of the population reported safely managed water available on household premises given that people are unhoused. Seventy-one percent of the sample population reported having at least basic access to improved drinking water from sources within 30 minutes of where they slept in the morning time. In other words, they obtained water from improved sources such as purchasing bottled water, asking business establishments for free water, or refilling plastic bottles using public fountains found in parks and libraries. Another ten percent of the sample population reported limited access to drinking water sources in the morning, which refers to people walking more than 30-minutes to obtain water. The remaining 13% reported varying distances to obtain drinking water in the morning. Lastly, six

percent of the sample population reported illegally opening fire hydrants to meet their daily drinking water needs in the morning. Access to drinking water, however, shifted at nighttime. While 81% of the sample reported having basic access to drinking water, roughly 50% of these participants refilled plastic bottles or purchased water during the day and stored it for night use. Access is reduced in the evening due to limited hours of operations in the main places people use to obtain water, including supermarkets, dollar stores, and public facilities (parks and libraries) that are not open overnight. At the same time, participants expressed safety concerns walking a few blocks at night to obtain drinking water from the few non-profits open at night. Only three percent of the sample population reported limited access to water and walking more than 30-minutes to obtain water at night, and six percent continued to relied on using fire hydrants for drinking water. When asked about the total water intake in a day, more than half of the population (54%) reported an intake of up to three (16 oz) bottled water a day. Only 35 participants reported an intake greater than six bottled water per day.

Sanitation Access

In addition to examining drinking water accessibility, participants reported their access to sanitation services. The JMP defines access to sanitation as the ability to safeguard access to facilities that are not shared among households and utilizing improved sources that properly dispose of human waste (through a sewer system and treated off-site) [39]. Access to sanitation is based on a five categorization ladder that includes: having safely manage access that safely disposes of and treat excreta off-site; having basic access that refers to having sanitation facilities not shared with other households; having limited access that refers to shared restroom facilities; having unimproved access such as access to latrines, buckets inside tents; and open defecation. Based on this sanitation access categorization, most of our study participants mainly reported having limited access to sanitation facilities, access to shared sanitation that fluctuated throughout the day. Figure 2 illustrates the different types of access the sampled population reported based on time of day.

Throughout the day, participants reported heavy reliance on public facilities, including restrooms in parks, libraries, staffed Pit Stop program toilets, and non-profit hygiene centers. Limited access to sanitation ranged from 63% in the morning, 76% in the afternoon, and 47% at night. At nighttime, limited access to sanitation facilities is further reduced, as only a few facilities are open and available overnight. The majority of the non-profit organizations and business establishments that people heavily rely on are not open overnight, with the exception of the ReFresh Spot and People Concern hygiene centers. As a result of reduced access to publicly available restrooms at night, 19% of participants reported coping with unimproved sanitation (using buckets inside their tents or plastic bottles) and 28% reported openly defecating and urinating in public spaces. The lack of overnight sanitation facilities also resulted in other coping strategies; six percent of the sample population reported holding it at night and waiting until the morning to use a restroom due to inaccessibility and lack of safe sanitation. Overall, 58% of participants reported that while finding a restroom to urinate is challenging, it is easier to cope with compared to when finding a restroom to defecate.

Hygiene

The JMP defines access to hygiene as having the ability to practice handwashing and safely manage menstruation. These measures fall short of capturing body hygiene, such as having the ability to shower and wash clothes, all of which are necessary to maintain health and prevent the risk of infectious diseases. Therefore, hygiene access in this study encompasses these measurements. First, handwashing is based on a three categorization ladder implemented by the JMP that includes: having basic availability to soap and water at home, having limited access to soap and water at home, or having no facility available on premises [40]. Since participants are unhoused, these categorizations do not adequately apply, as zero percent of participants had handwashing stations with soap and water access where they slept. Participants reported using public facilities, including public restrooms, business establishments, and non-profit organizations, to practice hand hygiene. Twenty eight percent of participants use these facilities to also refill plastic bottles with water that they use to rinse their hands inside their tents. Among the sampled population, 32% reported washing their hands with water, soap, and hand sanitizer before meals and after using sanitation services. Thirty percent of participants reported only having access to water and soap, while 17% reported only using hand sanitizer to clean their hands before meals and after using a restroom.

In terms of menstrual hygiene management, out of the 70 female participants interviewed in the sample population, fewer than half (n = 35) continue to have their menstrual cycle. Eight of these participants who still menstruate reported difficulty managing their menstrual hygiene due to limited access to menstrual products and facilities where they can clean their clothing items and bathe. As such, women reported coping with using toilet paper or clothing items to manage menstruation. Furthermore, one woman reported that managing her cramps was a challenge while experiencing homelessness. Three of unhoused women who still menstruate also reported feeling “dirty” and “smelly” due to not being able to afford and find menstrual products and access to showers. It is also important to note that six women in their reproductive years, were not taking any contraception, and reported no longer having their menstrual cycle. Unhoused women no longer experiencing their menstrual cycle may be attributed to trauma and stress-induced from living on the streets.

Accessibility to shower facilities to maintain body hygiene practices is also limited among the unhoused participants in this study. Seventy-three percent of the participants reported showering less than three times per week. Overall, only 27% of the sampled population reported showering almost every day (4 days or more in the week). The most common bathing source reported (765) were non-profit organizations, including the ReFresh Spot, a community-driven project that provides restroom, shower, and laundry access available 24-hours in the Skid Row community. In other instances, people used sinks in public parks and businesses to do a quick rinse with paper towels and water, also referred to by participants as a “bird bath” (n = 25). Participants also reported using buckets inside their tents to shower (n = 34). Participants reported that excessive wait times, an extensive waitlist system to access bathing facilities, or facilities being out of order further reducing their access to a shower. As a result, some participants reported coping by illegally tapping into fire hydrants to obtain water for bathing (n = 3) and using Los Angeles River (n = 2).

Access to laundry services to maintain personal hygiene is also limited among the unhoused studied. Across the sampled population, 91% of the participants reported washing their clothing items less than three times per month. Inaccessibility of laundry services was one of the most reported complaints. Study participants cited a lack of structural facilities and being unable to afford paying for these services in private laundromats. There were only a few available laundry facilities dedicated to serving unhoused communities. These include the ReFresh Spot that offers free laundry services, the People Concern that offers laundry services for a small fee, the Downtown Women's Center that offers free laundry service to women only, and the Laundry Truck LA mobile service that offers free services for a limited number of people per day. A small number of participants (a combined 14%) reported using buckets inside their tents or sinks from public parks to wash their clothes when they cannot access services provided by non-profits. Another 12% of participants reported, it is easier to throw away their clothes than wash them due to reduced access to these services in the communities where they reside. For people sleeping in neighborhoods outside of Skid Row, specifically those residing in greater Los Angeles area (n = 37) during the daytime reported commuting to Skid Row, the area with the most access, to access different hygiene services. The commute to Skid Row from the places people sleep at night can range between thirty minutes to one-hour one-way commute when traveling using public transportation and by foot.

Health Risks Related to WaSH Insecurity

In addition to collecting WaSH accessibility information, this study also collected health variables to capture health risks that are be associated with poor access to WaSH services. Table 3 represents a list of reported health outcomes that participants reported coping with within a 30-day period from the time of interview. The most common health problem reported was skin infections (40%) among the sample population that can result from lack of access to adequate bathing facilities. Participants also reported experiencing migraine headaches (35%) and dehydration (34%) which can result from lack of sufficient water intake. At least ten percent of participants reported dealing with urinary tract infections within a 30-day period that may be related to limited access to drinking water, restrooms, and delaying restroom use when there is no sanitation access at all times of the day. Diarrhea was also a commonly reported health condition that people were coping with around thirty days from the time of the interview (n = 55).

Table 3
Frequency Distribution of Health Reported Outcomes Over a 30-Day Period

Category	Health Outcome	Count (%)
Hygiene related	Skin infection	64 (39.02)
	Diarrhea	55 (33.54)

Table 3
Continued

Category	Health Outcome	Count (%)
Hygiene related	Fungus	27 (16.46)
	Head and body lice	9 (5.49)
	Typhus	5 (3.05)
	Hepatitis A	4 (2.44)
WaSH related	Migraine/headache	105 (35.12)
	Dehydration	103 (34.45)
	Constipation	59 (19.73)
	Urinary tract infection	32 (10.70)

Note

Total sample is N = 263; however, this was a multiple-response question. As a result, counts do not sum up the total sample size. Percentages are based on people who indicated a health condition experienced in the past 30-days from the interview time. These percentages are aggregated per sub-section. Missing data (n = 8) did not form part of the calculation.

WaSH Access Inequities

We examined the individual-level factors that lead to difficulty accessing sanitation and hygiene services for the unhoused. Table 4 summarizes two of the model results from the generalized linear models. The models tested the factors associated with difficulty accessing sanitation (restrooms) and handwashing facilities among the sampled population. The reference groups in each of these models included: White male, people between 19–38 years of age, duration time a person has been unhoused to be less than a year, and the Skid Row community. The results from the model indicate that when we compared all three communities where people reported sleeping, the odds of having difficulty accessing sanitation services are two times greater for those living in greater Los Angeles area than for those people living on Skid Row and downtown Los Angeles (OR = 2.52, 95% CI: 1.08–6.37). Additionally, for people experiencing homelessness for more than six years, the odds of encountering difficulty accessing sanitation (restrooms) were three times greater than those who experience homelessness for less than a year (OR = 3.26, 95% CI: 1.36–8.07). Regarding racial differences in access to sanitation services, for people who identified as Black/African American and Latinx, the odds were 0.35 (95% CI: 0.13–0.84) and 0.30 (95% CI: 0.11–0.74), respectively, lower compared to unhoused people who identified as White, a minority group in the unhoused population residing in Los Angeles. Table 4 also illustrates the factors associated with difficulty accessing hand hygiene facilities. The model shows that unhoused people residing in

greater LA area were almost three times more likely to report difficulty accessing handwashing facilities compared to those living in Skid Row and downtown (OR = 2.53, 95% CI: 1.11–5.93).

Table 4
Generalized linear model (GLM) output results for difficulty accessing sanitation and hygiene facilities

	Sanitation			**Handwashing**		
Variable	OR	Lower bound (95% CI)	Upper bound (95% CI)	OR	Lower bound (95% CI)	Upper bound (95% CI)
Intercept	1.36	.39	4.89	.42	.12	1.42
Female	.98	.53	1.82	.93	.50	1.70
Race/Ethnicity						
White	-	-	-	-	-	-
Black/African American	.35*	.13	.84	1.05	.46	2.40
Latinx/Hispanic	.30**	.11	.74	.62	.27	1.46
Other	.49	.15	1.55	.77	.26	2.26
Age						
19–38	-	-	-	-	-	-
39–50	1.13	.46	2.79	2.41	.99	6.08
51–57	1.73	.72	4.18	1.63	.68	4.02
>57	.90	.39	2.05	1.58	.70	3.71
Time (years)						
Less than a year	-	-	-	-	-	-
1–3	1.49	.66	3.41	.95	.42	2.15

Table 4
Continued

	Sanitation			Handwashing		
Time (years)						
4–6	1.66	.64	4.38	1.14	.44	2.96
More than six years	3.26**	1.36	8.07	1.03	.44	2.45
Community						
Skid Row	-	-	-	-	-	-
Downtown LA	.95	.51	1.76	1.36	.74	2.52
Greater LA	2.52*	1.08	6.37	2.53*	1.11	5.93

Note

OR = odds ratio; CI = confidence interval. *p < 0.05; **p < 0.01

While no other statistically significant differences were observed for other WaSH services, including drinking water, shower, and laundry access, our sample population did report discrimination when accessing WaSH services. Thirty-nine percent of participants who identified as Black or African American and 42% of Latinx unhoused participants reported experiencing racial discrimination when trying to generally access WaSH services. In particularly, 42% of participants that reported discrimination when accessing sanitation services were Black or African American and 26% were Latinx. Most commonly reported places participants experienced discrimination when trying to access sanitation facilities was in business establishments (73%) and at public restrooms (15%). Two of the main reasons participants reported being discriminated when accessing sanitation facilities was due to the need to be a paying customer (45%) and appearance (29%). Additionally, 61% of the unhoused males in the sample reported experiencing gender discrimination more often when trying to access shower facilities compared to only 38% of unhoused women. Forty-three percent of these participants that experienced discrimination at shower facilities took place at shelter systems. Furthermore, 46% of Black unhoused participants also reported discrimination when accessing laundry facilities. The most commonly reported reason participants reported discrimination when accessing laundry facilities was due to appearance (45%) and not able to afford laundry services (15%).

Discussion

WaSH insecurity impacts the lives of communities across the globe, including vulnerable unhoused communities in Skid Row, Los Angeles. Safe, equitable, sufficient, reliable, affordable and dignified access to WaSH services is often not possible for unhoused people, especially at night. In Los Angeles, many of the unhoused participants we interviewed could not access sanitation at night, and shower or

wash their clothes regularly. The study findings suggest that the unhoused embark on different survival coping mechanisms to access and meet their daily WaSH needs. They rely on fire hydrants to obtain water for bathing and drinking. They urinate or defecate in buckets or plastic bottles inside their tents. Many also lack sufficient water for basic hand hygiene, showering, and laundry. The lack of basic WaSH services also makes it difficult for unhoused women to manage their menstrual health hygiene safely. The unhoused often have no other choice but to use public spaces (such as sidewalks and buckets) to openly defecate or urinate, wash their clothes, and shower. Overall, it creates barriers for people to fully manage their health, seek employment, and improve their living conditions.

In Los Angeles, unhoused residents studied live in an environment that is scarce of essential WaSH services, which further degrades their physical and mental health and reduces their opportunities for employment. In our study, the aspect of appearance was a common factor reported by participants in reducing their ability to access essential WaSH services. As the study of DeMyers, Warpinski, and Wutich (2017) in Phoenix highlights, WaSH insecurity serves both as a “driver and an inhibitor” of prolonged homelessness. In our study, participants reported difficulty accessing sanitation and hygiene services that enable them to maintain daily body hygiene that in essence would also allow them to be accepted in public spaces and be less discriminated when accessing other supportive services. In particular, limited access to sanitation and hygiene facilities was a problem for the study population, especially for women managing their menstrual hygiene who reported feeling smelly and dirty due to lack of access to shower facilities.

Similarly, Sommer et al. (2020), in their study of menstrual hygiene challenges among unhoused women in New York City, found similar results. Sommer et al. suggest that the absence of safe and private access to sanitation and hygiene services among the unhoused exacerbates menstrual stigma. The reduced access to these serves creates feelings of embarrassment and shame that “hinder women's ability to be comfortable during their periods” and attend to their personal daily activities [20]. Sebert Kuhlmann et al.'s (2019) study also explored the experiences of unhoused women in St. Louis, Missouri and concluded that the inability to afford hygiene products resulted in women engaging in various coping mechanisms, including using rags, tissues, toilet paper, children's diapers, or paper towels to manage menstruation [28]. In Manhattan, New York, Maroko et al. (2020) argues that spatial bias exist in the distribution of public services, with higher quality of sanitation services located in affluent neighborhoods and poorer quality services available among unhoused communities. Thus limiting access to sanitation that is private, safe, and accessible among unhoused women managing menstruation [20]. Overall, the absence of basic WaSH services to maintain a certain appearance and hygiene practices reinforces a cycle of homelessness as seen in Los Angeles and in other cities. The prejudicial attitudes towards unhoused people based on their physical appearance lead to exclusionary policies and further stigmatization that impacts people's ability to exist in public spaces and exit homelessness [41].

We also found a temporal inaccessibility of WaSH services in Los Angeles. Specifically, the evening was the most challenging time for people to access to sanitation services that are both open and safe to use. While 14% of the study population reported that they openly defecate during the afternoon, 28% are

forced to openly defecate at night. Business establishments typically close at 9:00 PM in the community, and most non-profit organizations are not available 24-hours, except for the ReFresh Spot, People Concern, and Union Rescue Mission shelter. As a result, accessing WaSH services is severely limited for an estimated 1,898 unhoused individuals living in the community of Skid Row at night [42]. In the morning and afternoon, participants reported utilizing public restrooms in parks and libraries and restrooms from non-profit organizations (e.g., shelters, soup kitchens, mobile showers, and religious organizations). These places tend to be free and open to the community until closure. However, while services may be more available during the morning and afternoon, participants reported long wait times, inconvenient hours, or out-of-service facilities. These factors discourage a person from maintaining hygiene practices, and forces them to resort to coping strategies, such as showering using buckets inside their tents, rinsing, and doing laundering in sinks of businesses and public restrooms, and throw away their clothing rather than wash it.

Inequities in WaSH Access

This study findings suggests that there is a service hub of WaSH services that that the unhoused report utilizing within the Skid Row community, compared to downtown Los Angeles and the greater Los Angeles area. Participants who reported sleeping in locations outside Skid Row boundaries such as Santa Monica Beach, Hollywood, or South Los Angeles commuted by bus, metro, or foot to access services (mainly shower and laundry). The commute from these neighbourhoods to Skid Row exceeds the JMP global standards for accessing drinking water and or other WaSH of 30-minutes [3]. These participants also expressed that they commuted to Skid Row in the morning and afternoon to access services but left the area at night due to safety reasons. WaSH services outside of Skid Row boundaries are rarely available due to community opposition and criminalization of homelessness through city ordinances. In Los Angeles, two major city ordinances exist that are heavily enforced, including the Los Angeles Municipal Code (LAMC) 41.18(d) that prevents people from sleeping in public areas between the hours of 6 AM to 9 PM [43]. The LAMC 56.11 is another city ordinance that limits unhoused people from having personal property exceeding the equivalent of a 60- gallon container [44]. This enforcement overlaps with street sweeps that sanitation workers conduct to remove encampments across Los Angeles. Moreover, police enforcement criminalizes other coping behaviours, including public urination and defecation, perpetrated due to inadequate access to WaSH [45, 46]. The passage of such anti-homelessness laws in Los Angeles creates environments that reinforce a cycle of poverty. It produces a system that punishes a vulnerable population for their existence and a criminal justice system that views them as pollution and a threat while actively diminishing an unhoused person’s ability to exist in public spaces [47, 48]. In Los Angeles, individuals are criminalized daily for their survival and coping mechanisms (e.g., sleeping in tents/vehicles and public urination/defecation), leading to infraction notices, misdemeanours, unpayable fines, and incarceration [45, 49]. These misdemeanours result in a criminal record that prevents people from qualifying for most housing services, essentially creating a cycle of sustained poverty [19, 34, 49]. The inaccessibility of publicly available WaSH services in Los Angeles serves as a form of oppression for a population that is often removed from public spaces to limit

their visibility and potential disruptiveness [48, 50]. As essential WaSH services remain difficult for the unhoused to access, reports of health outbreaks attributed to poor living environments and hygiene have become more pronounced in recent years [51, 52].

While the unhoused residing in Los Angeles in our study experience WaSH insecurity, their experiences are not homogenous. WaSH insecurity is experienced differently among unhoused people, particularly for people of colour and people who sleep outside of Skid Row. Women are especially vulnerable and are forced to cope with limited access to restroom and shower facilities on top of the economic burden of managing their menstrual cycle. Some participants mentioned that they experience discrimination while waiting in line to use services such as a shower or sanitation. Specifically, Black and Latinx unhoused participants reported the experience forms of discrimination that prevent them from accessing shower services in shelter systems and restrooms in business and public establishments. Unhoused men also reported experiencing discrimination when accessing WaSH services more often than women, reducing their access to services that can meet their basic needs. Additionally, the trauma of living on the streets and being exposed to stressful WaSH environments can affect people differently. For women, openly defecating or showering inside their tents can pose a risk for physical violence or harassment. Additionally, in this study, six out of thirty-five female participants reported no longer having their menstrual cycle. Unhoused women who no longer have their menstrual cycle (a condition referred to as amenorrhea that affects one percent of the general population) may be due to trauma and stress-induced living on the streets [53]. Still, more measurements are needed to validate this finding. Of the 35 women that reported they continue to manage their menstrual cycle, 8 (or 22%) reported difficulty accessing feminine hygiene products. Generally, feminine hygiene products are expensive to purchase for the unhoused. Menstrual hygiene products are also not provided consistently in safety-net programs and shelter systems. The work of Kulhmann et al. in Missouri also report this added barrier for low-income women. Kulhmann et al. states that the inability to afford high-cost products becomes an added burden for women, particularly when they cannot use federally funded programs (e.g., Women, Infants, and Children and Supplemental Nutrition Assistance Program) to purchase hygiene products [28].

Impacts of WaSH Insecurity

The barriers to maintaining good hygiene are numerous for unhoused people. For example, shower facilities are not always at close proximity to participants, with some commuting long distances to access these services. Even when shower services are available in communities like Skid Row, it also does not guarantee people access as participants have to sign up early or they will be part of a long waitlist process that can last all day. Additionally, shower access is subject to out of order facilities or closed facilities. Overall, improving unhoused people's ability to shower regularly could help decrease skin infections and other health problems and improve employment options. Access to laundry services is limited by affordability and availability. In this study, 48% of participants reported relying on non-profit organizations for laundry services which charge small fees for laundering or are limited by hours of operation. While 39% of participants reported using private laundromats, access was limited by affordability and proximity.

In Los Angeles, the requirement of customer-only access to restrooms and appearance drastically reduces the well-being and capacity of the unhoused to maintain good sanitation practices that would allow them to look “presentable.” As a result, people resort to openly defecating or using buckets inside their tents to conduct their personal necessities. According to the Los Angeles County Public Health Department, being unhoused is becoming increasingly deadly, with an overall steady increase in the all-cause mortality rate of 2.3 times greater than the general population [54]. On average, four unhoused people die daily in Los Angeles [55]. Their life expectancy can be as low as 48 years for women and 51 for men, compared to the general population with a life expectancy of 83 and 79 years, respectively [56, 57]. This lower life expectancy can result from higher death rates, chronic illnesses, mental health, drug use, and disabilities that unhoused people experience compared to the general housed population [58, 59]. Living on the street, specifically in tents, near riverbanks, in RVs or vehicles, and overcrowded homeless shelters increase a person's exposure to health risks. A particular health risk includes communicable diseases exacerbated by malnutrition, poor hygiene practices, and exposure to harmful weather conditions such as cold temperatures and rain [55].

Importantly, skin-related diseases are the leading cause for which unhoused people to seek medical services [21, 60–63]. In this study, sixty-four participants reported experiencing skin infections. While our study did not collect information on the type of skin lesions and infections affecting participants, Leibler et al.'s (2017) study in Boston, Massachusetts found that unhoused people experience a higher prevalence of nasal colonization of staph compared to the general population. Leibler et al. found 16 unhoused people with MRSA nasal colonization resulting from limited hygiene and crowded living conditions [21]. Overall, skin conditions are made worse by a lack of sanitation and poor hand and body hygiene practices, putting unhoused individuals at a higher risk of infection.

Other endemic poor health outcomes in unhoused communities are head and body lice, scabies, and secondary bacterial infections, all of which can be WaSH preventable diseases [61]. In this study, nine participants reported having body and head lice within a 30-day period. These numbers are much smaller than other studies, including Bonilla et al.'s (2014) study in San Francisco with 203 unhoused people, of whom ten people had head lice and 60 reported body lice. Lice infestation can affect unhoused residents as they do not have consistent and reliable access to clean changes of clothing or bathing facilities [61, 64, 65]. In this study, we only found that a total of five participants had typhus, which is relatively more minor compared to Badiaga et al.'s (2012) study in Marseilles, France, which detected sixty-three people with antibodies against *Rickettsia typhi* [66]. This vector disease causes murine typhus. One of the reasons for these differences may be that more comprehensive testing is needed to measure the prevalence of this poor access to WaSH-related health outcomes.

Furthermore, dehydration and urinary tract infections were common health conditions reported by the sampled population. In this study, 103 participants reported experiencing dehydration in the past 30 days from the time of interview. While the data collection took place in the two hottest months of the year (June and July), heat exposure and lack of available drinking water can result in heat exhaustion. DeMeyers, Warpinski, and Wutich's (2017) study in Arizona found that lack of vegetation, urban heat

island effect, and lack of WaSH services are all factors that increased the risks of dehydration and heat exhaustion [19] for the unhoused. Lastly, our findings note that a number of people report holding off from using the restroom, especially in the evening time when facilities are closed and inaccessible. These coping strategies can lead people to encounter health problems like kidney and vaginal infections. In this study, 32 people reported urinary tract infections within 30 days of the interview, and 18 were women. Urinary tract infections can result when people delay using a restroom, and lack of adequate access to WaSH services can increase their risk of contracting infections. Women are at higher risk of contracting kidney and vaginal infections. For example, Wenzel et al.'s (2001) study found that many unhoused women in Los Angeles County encounter gynaecological symptoms. In addition to WaSH services, better health care support systems are needed to address unhoused women's needs [67].

Limitations and Recommendations

Overall, this study describes the WaSH insecurity experiences of unhoused communities living in and around Skid Row, Los Angeles. While this study has contributed to filling gaps in the existing scholarship, there are some limitations to this study. First, this study only surveyed 263 participants, accounting for less than one percent of the County and City of Los Angeles's total unhoused population. The small sample size may have resulted in less statistically significant results. The population is difficult to reach and access, so we used a mixture of snowball and convenience sampling to recruit participants. A random sampling technique to recruit participants would have made the results more generalizable. Additionally, the locations where we sampled some of the population may be attributed to location bias. We partnered with a WaSH non-profit organization on two occasions to provide us with a safe space to recruit participants, which may have led to oversampling population who knew of and use the services provided by the non-profit. As a result, there may have likely being newly unhoused people who were unaware that these services existed and so they were not interviewed, and thus this study may overestimate WaSH access among the unhoused. The type of questions we asked participants may have resulted in recall bias. Participants may not have remembered all of their daily habits within the timeframe given, specifically the WaSH related health outcomes they experienced over a 30-day period. In terms of health data, more in-depth menstrual hygiene management data is needed in this study to measure the way unhoused women cope with menstrual hygiene management, thus resulting in an additional study limitation. Since the population is mobile, there may have also been duplicate interviewees. If recognized, a survey was either omitted from the final analysis or used to validate their initial survey responses. More extensive mixed methods studies are necessary to disentangle these factors and include different cohorts to understand how poor access to WaSH services affects communities differently. The study findings describe the lived WaSH experiences of the unhoused people in the Skid Row community and beyond, and provide a better understanding of a population that is difficult to reach, understudied, and inhumanly treated.

It is important to note that this study does not capture all the intersectional vulnerabilities experienced among unhoused communities. There is a range of demographic groups within the unhoused communities interviewed in this study that experience WaSH insecurity differently. Integrating an

intersectionality lens is essential to consider the range of effects of WaSH insecurity on different groups of unhoused to raise awareness of equity, marginalization, and discrimination at the individual and structural levels. It is essential to highlight the marginalized identities among groups of people, including people who identify as transgender, as this study was limited in not capturing the perceptions of this group in more detail. Examining the experiences of other marginalized groups not examined in this study is vital in helping us further understand and acknowledge the added vulnerabilities people experience in accessing services and exiting homelessness.

There is a need to prioritize safe, dignified, affordable, accessible, sufficient, sufficient, reliable, and continuous access to WaSH services in vulnerable communities, including unhoused people [68]. To better understand and mitigate WaSH insecurity in the US and worldwide, there is also a need to move beyond the lens of household WaSH insecurity and include people experiencing homelessness to provide more informed and interdisciplinary knowledge. Furthermore, in Los Angeles, a collaboration between service providers, policymakers, health care systems, and researchers is needed to develop inclusive and equitable solutions. Indeed, improving the way we are addressing homelessness requires an integrative process. Service providers, particularly in the non-profit sector, play a vital role in this process as they work directly with the community and know their needs. The provision of housing with integrated services, including WaSH, can lead to a more comprehensive and successful way to meet the needs of the unhoused. One inclusive recommendation includes developing WaSH service models that are humane, dignified, and available 24-hours a day. The findings from this study highlight that providing safe and available services at all times of the day is needed to meet the needs of the unhoused in Skid Row and the surrounding areas. In Skid Row, the ReFresh Spot is an example of a successful model that works. Community members use the ReFresh Spot because the facilities are well maintained, have friendly staff, are clean, and available when needed. City officials could consider allocating money to WaSH infrastructures and facilities like the ReFresh Spot rather than installing temporary portable toilets and conducting encampment sweeps. In 2018, Los Angeles City officials spent 31 million dollars on street-clean ups [69]. These types of program interventions are not sustainable, humane, and do not target the root of the problem. Lastly, integrating the voices of unhoused residents at the decision-making tables could foster real change and improve these communities' health and living environments because they have the lived expertise and know what services are more valuable to them.

Future studies should consider how to measure network analysis of WaSH facilities. For example, identifying the best location to provide WaSH services in the different communities and characteristics of effective interventions could be identified to make WaSH services more accessible. Additionally, studies should consider measuring the psychosocial health outcomes attributed to WaSH insecurity among unhoused communities. Measuring emotional stress is critical to capture in both scholarly research and policy implementation as unsafe and inadequate access to essential WaSH services can lead to emotional stress and exacerbate mental health diagnoses. Furthermore, studies should consider exploring the effects of WaSH insecurity on medication adherence in the Los Angeles unhoused population [70, 71].

Conclusion

In this study, we highlight the need for WaSH services for unhoused people in Skid Row, Los Angeles. Although high-income countries like the US report high rates of access to basic WaSH services, vulnerable and disadvantaged populations, including unhoused people, face WaSH insecurity daily. The results of this study suggest that inaccessibility to WaSH results is not homogenous; some groups among the unhoused are more vulnerable than others in accessing services. Additionally, this study sheds light on the daily challenges and coping strategies of unhoused communities in Los Angeles where there is a lack of sufficient, safe, affordable, reliable, and continuously accessible WaSH services for this population. Access to safely managed sanitation services is most difficult and unreliable at night, as there are only a limited number of facilities open at night. Due to the inaccessibility of WaSH services, many unhoused people engage in different survival coping strategies, such as utilizing buckets inside their tents or openly urinating and defecating. Unhoused people engage in survival strategies because they may be safer than walking a few blocks or miles to a shelter at night. These practices are also more affordable and accessible as most public restrooms are closed at night or have limited resources. Many cited using the sinks of public restrooms or businesses to do laundering and even traveling long distances to access one of the few public shower facilities available in the community of Skid Row. While these coping strategies are necessary for daily survival in unhoused communities, they highlight the need for infrastructural investment in WaSH facilities to provide a safe, sufficient, reliable, affordable, level of service that is continuously available day and night that the unhoused can access with dignity.

The lack of basic WaSH services for this vulnerable population can result in a cycle of poverty, prolonged homelessness, deterioration of physical and mental wellbeing, and further stigmatization. Addressing WaSH insecurity among unhoused communities can help reduce health risk and transmission of preventable infectious diseases and improve wellbeing. This is crucial to meeting basic human rights, and even more critical during the current global COVID-19 pandemic, where constant and reliable access to WaSH services reduces the risk of transmission. Tackling WaSH insecurity among unhoused people will also help create healthier unhoused communities and improve the public health of the surrounding communities.

Declarations

Availability of data and materials

Not applicable.

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LJAP, YC, MF, and GK conceptualized the study. LJAP, CK, AV, JG, DJA, and NA formulated and revised survey instrument, collected, processed, and analysed data. LJAP conducted the final analysis and wrote the first draft of the manuscript. All authors critically revised the manuscript.

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Ethics declarations

Ethical approval and consent to participate

This study was reviewed and approved by the University of Southern California Institutional Review Board (IRB)in Los Angeles, California, USA under Protocol UP-18-00323. The IRB found this study to be exempt review due to the minimal risk nature of the research and containing no identifiable participant information. Nevertheless, oral consent were utilized. Participation in the study were provided with a copy of the consent form and only unhoused adult participants over 18 who gave oral consent were enrolled in the study. If the participant did not consent, the survey interview were not conducted.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

References

1. UN Committee on Economic Social and Cultural Rights (CESCR). General Comment No. 15: The Right to Water (Arts. 11 and 12 of the Covenant). 2003. Accessed 3 Feb 2022. https://www.refworld.org/docid/4538838d11.html.
2. United Nations (UN) General Assembly. The human right to water and sanitation: Resolution adpted by the General Assembly A/RES/64/292. 2010. Accessed 13 Jan 2022. https://www.refworld.org/docid/4cc926b02.html.
3. World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) Joint Monitoring Programme. Progress on household drinking water, sanitation, and hygiene 2000–2020: Five years into the SDGs. 2021. Accessed Feb, 2022. https://washdata.org/sites/default/files/2022-01/jmp-2021-wash-households_3.pdf
4. Alhassan H, Kwakwa PA. When water is scarce: the perception of water quality and effects on the vulnerable. Journal of Water Sanitation and Hygiene for Development. 2014;4(1):43–50. https://doi.org/10.2166/washdev.2013.140.
5. Sultana F. Suffering for water, suffering from water: emotional geographies of resource access, control and conflict. Geoforum. 2011;42(2):163–72. http://dx.doi.org/10.1016/j.geoforum.2010.12.002.
6. Truelove Y. (Re-)Conceptualizing water inequality in Delhi, India through a feminist political ecology framework. Geoforum. 2011;42(2):143–52. http://10.0.3.248/j.geoforum.2011.01.004.

7. Slayton N. Time to retire the word ‘homeless’ and opt for ‘houseless’ or ‘unhoused’ instead? Architectural Digest. 2021 May 21; Accessed 13 Jan 2022. https://www.architecturaldigest.com/story/homeless-unhoused
8. Jepson WE, Wutich A, Colllins SM, Boateng GO, Young SL. Progress in household water insecurity metrics: a cross-disciplinary approach. WIREs Water. 2017;4(3):e1214. https://doi.org/10.1002/wat2.1214.
9. Meehan K, Jepson W, Harris LM, Wutich A, Beresford M, Fencl A, London J, et al. Exposing the myths of household water insecurity in the global north: a critical review. WIREs Water. 2020;7(6):1–20. https://doi.org/10.1002/wat2.1486.
10. Wescoat JL, Headington L, Theobald R. Water and poverty in the United States. Geoforum. 2007;38(5):801–14. https://doi.org/10.1016/j.geoforum.2006.08.007.
11. Balazs C, Morello-Frosch R, Hubbard A, Ray I. Social disparities in nitrate-contaminated drinking water in California’s San Joaquin Valley. Environmental Health Perspectives. 2011;119(9):1272–8. https://doi.org/10.1289/ehp.1002878.
12. Balazs CL, Ray I. The drinking water disparities framework: on the origins and persistence of inequities in exposure. American Journal of Public Health. 2014; 104(4):603–11. https://doi.org/10.2105/AJPH.2013.301664.
13. Jepson W. Measuring “no-win” waterscapes: experience-based scales and classification approaches to assess household water security in colonias on the US-Mexico border. Geoforum. 2014;51:107–20. http://dx.doi.org/10.1016/j.geoforum.2013.10.002.
14. Deitz S, Meehan K. Plumbing Poverty: Mapping Hot Spots of Racial and Geographic Inequality in U.S. Household Water Insecurity. Annals of the American Association of Geographers. 2019;109(4):1092–109. https://doi.org/10.1080/24694452.2018.1530587.
15. Meehan K, Jurjevich JR, Chun NMJW, Sherrill J. Geographies of insecure water access and the housing–water nexus in US cities. Proceedings of the National Academy of Sciences of the United States of America. 2020;117(46):28700–7. https://doi.org/10.1073/pnas.2007361117.
16. Capone D, Cumming O, Nichols D, Brown J. Water and sanitation in Urban America, 2017–2019. American Journal of Public Health. 2020;110(10):1567–72. https://doi.org/10.2105/AJPH.2020.305833.
17. World Health Organization (WHO) and the United Nations Children’s Fund (UNICEF) Joint Monitoring Programme. JMP methodology: 2017 update and SDG baselines. 2018. Accessed 22 May 2021. https://washdata.org/sites/default/files/documents/reports/2018-04/JMP-2017-update-methodology.pdf.
18. World Health Organization (WHO) and the United Nations Children’s Fund (UNICEF) Joint Monitoring Programme. Data sources. 2021. Accessed 20 May 2021. https://washdata.org/monitoring/methods/data-sources
19. Demyers C, Warpinski C, Wutich A. Urban water insecurity: a case study of homelessness in Phoenix, Arizona. Environmental Justice. 2017;10(3):72–80. http://doi.org/10.1089/env.2016.0043.

20. Sommer M, Gruer C, Smith RC, Maroko A, Hopper K. Menstruation and homelessness: challenges faced living in shelters and on the street in New York City. Health & Place. 2020;66:102431. http://10.0.3.248/j.healthplace.2020.102431
21. Leibler JH, Nguyen DD, León C, Gaeta JM, Perez D. Personal hygiene practices among urban homeless persons in Boston, MA. International Journal of Environmental Research and Public Health. 2017;14(8):928. https://doi.org/10.3390/ijerph14080928.
22. Speer J. The right to infrastructure: a struggle for sanitation in Fresno, California homeless encampments. Urban Geography.2016;37(7):1049–69. https://doi.org/10.1080/02723638.2016.1142150.
23. Capone D, Ferguson A, Gribble MO, Brown J. Open defecation sites, unmet sanitation needs, and potential sanitary risks in Atlanta, Georgia, 2017–2018. American Journal of Public Health. 2018;108(9):1238–40. https://doi.org/10.2105/AJPH.2018.304531.
24. Goodling E. Intersecting hazards, intersectional identities: A baseline Critical Environmental Justice analysis of US homelessness. Environment and Planning E: Nature and Space [Internet]. SAGE Publications; 2020;3(3):833–56. https://doi.org/10.1177/2514848619892433.
25. Flanigan S, Welsh M.Unmet needs of individuals experiencing homelessness near San Diego waterways: the roles of displacement and overburdened service systems. Journal of Health and Human Services Administration. 2020;43(2):105–130. https://doi.org/10.37808/jhhsa.43.2.3.
26. Rose J. Unsheltered homelessness in urban parks: perspectives on environment, health, and justice in Salt Lake City, Utah. Environmental Justice. 2019;12(1):12–6. http://doi.org/10.1089/env.2018.0023.
27. Henry M, Mahathey A, Morrill T, Robinson A, Shivji A, Watt R, et al. The 2019 annual homeless assessment report (AHAR) to Congress. Washington D.C. 2020. Accessed 20 Dec 2021. https://files.hudexchange.info/resources/documents/2019-AHAR-Part-1.pdf.
28. Sebert Kuhlmann A, Peters Bergquist E, Danjoint D, Wall LL. Unmet menstrual hygiene needs among low-income women. Obstetrics and Gynecology. 2019;133(2):238–44. 10.1097/AOG.0000000000003060.
29. Maroko AR, Hopper K, Gruer C, Jaffe M, Zhen E, Sommer M. Public restrooms, periods, and people experiencing homelessness: an assessment of public toilets in high needs areas of Manhattan, New York. PLoS ONE. 2021;16(6): e0252946. https://doi.org/10.1371/journal.pone.0252946
30. Holland G. Why L.A. County's homelessness crisis has been decades in the making. Los Angeles Times. 2019 Jun 5. Accessed 30 Jan 2022. https://www.latimes.com/local/california/la-me-ln-homeless-housing-crisis-count-history-skid-row-20190605-story.html
31. Moore Sheeley K, Katz AB, Klein A, Richards J, Verri FJ, Vestal M, et al. The making of a crisis: a history of homelessness in Los Angeles. 2021. Accessed 20 Mar 2022. https://luskincenter.history.ucla.edu/wp-content/uploads/sites/66/2021/01/LCHP-The-Making-of-A-Crisis-Report.pdf

32. Los Angeles Homeless Services Authority (LAHSA). 2020 Greater Los Angeles homeless count results. 2020. Accessed 20 Dec 2021. https://www.lahsa.org/homeless-count/.
33. Los Angeles Congress Action Network (LACAN). The dirty divide in Downtown Los Angeles: a call for public health equity. 2013. Accessed 20 Mar 2022. https://cangress.org/publications/.
34. Los Angeles Community Action Network (LACAN). Dirty divide: “out of service” 2017 update. 2017. Accessed 20 Mar 2022. https://cangress.org/publications/.
35. Los Angeles Central Providers Collaborative. No place to go: an audit of the public toilet crisis in Skid Row. 2017. Accessed 20 Mar 2022. https://lafla.org/wp-content/uploads/2017/08/No-Place-To-Go-final.pdf.
36. Fielding JE, Freedman JE, Bellomo AJ, Williams TS, Taylor JE. Report of findings: request from City of Los Angeles to address public health issues in the Skid Row area of downtown Los Angeles. 2012. Accessed 20 Jan 2022. http://www.ladowntownnews.com/la-county-public-health-report-on-skid-row-march-21-2012/pdf_87fb0226-ae86-11e1-9f3c-001a4bcf887a.html.
37. Leibler JH, Liebschutz JM, Keosaian J, Stewart C, Monteiro J, Woodruff A, et al. Homelessness, personal hygiene, and mrsa nasal colonization among persons who inject drugs. Journal of Urban Health. 2019;96:734–40. http://10.0.3.239/s11524-019-00379-9.
38. World Health Organization (WHO) and the United Nations Children’s Fund (UNICEF) Joint Monitoring Programme. Drinking water. 2022. Accessed 2 Jan 2022. https://washdata.org/monitoring/drinking-water.
39. World Health Organization (WHO) and the United Nations Children’s Fund (UNICEF) Joint Monitoring Programme. Sanitation. 2022. Accessed 2 Jan 2022. https://washdata.org/monitoring/sanitation.
40. World Health Organization (WHO) and the United Nations Children’s Fund (UNICEF) Joint Monitoring Programme. Hygiene. 2022 [cited 2022 Jan 1]. Accessed 2 Jan 2022. https://washdata.org/monitoring/hygiene.
41. Clifford S, Piston S. Explaining public support for counterproductive homelessness policy: the role of disgust. Political Behavior. 2017;39:503–25. https://doi.org/10.1007/s11109-016-9366-4.
42. Los Angeles Homeless Services Authority (LAHSA). 2019 Greater Los Angeles homeless count results. 2019. Accessed 30 May 2021. https://www.lahsa.org/news?article=557-2019-greater-los-angeles-homeless-count-results&ref=hc.
43. Los Angeles Municipal Code. Sitting, lying, or sleeping or storing, using, maintaining, or placing personal property in the public right-of-way. 1968. Accessed 2 Jan 2022. https://codelibrary.amlegal.com/codes/los_angeles/latest/lamc/0-0-0-128514#JD_41.18.
44. Los Angeles Municipal Code. Storage of personal property. 2016. Accessed 2 Jan 2022. https://clkrep.lacity.org/onlinedocs/2014/14-1656-s1_ORD_184182_4-11-16.pdf
45. Holland G, Zhang C. Huge increase in arrests of homeless in L.A.—but mostly for minor offenses. Los Angeles Times. 2018 Feb 4. Accessed 30 May 2021. https://www.latimes.com/local/politics/la-me-homeless-arrests-20180204-story.html

46. Shure N. The politics of going to the bathroom. The Nation. 2019 May 23. Accessed 11 Feb 2022. https://www.thenation.com/article/archive/toilet-urination-disability-access/.
47. Bonds E, Martin L. Treating people like pollution: homelessness and environmental injustice. Environmental Justice. 2016;9(5):137–41. http://doi.org/10.1089/env.2016.0021.
48. Mitchell D. The annihilation of space by law: The roots and implications of anti-homeless laws in the United States. Antipode. 1997;29(3):303–35. https://doi.org/10.1111/1467-8330.00048.
49. United Nations (UN) General Assembly. Report of the special rapporteur on extreme poverty and human rights on his mission to the United States of America: note/ by the Secretariat. Geneva: UN. 2018. Accessed 30 Jun 2021. https://digitallibrary.un.org/record/1629536?ln=en.
50. Stuart F. On the streets, under arrest: policing homelessness in the 21st century. Sociology Compass. 2015;9(11):940–50. https://doi.org/10.1111/soc4.12324.
51. Center for Disease and Control Prevention (CDC). Widespread person-to-person outbreaks of hepatitis A across the United States. 2022. Accessed 17 Mar 2021. https://www.cdc.gov/hepatitis/outbreaks/2017March-HepatitisA.htm.
52. County of Los Angeles Department of Public Health. Acute communicable disease control. 2018. Accessed 17 Mar 2021. http://www.publichealth.lacounty.gov/acd/vectortyphus.htm.
53. Nawaz G, Rogol AD. Amenorrhea. National Center for Biotechnology Information. 2020. Accessed 30 Jun 2021. https://www.ncbi.nlm.nih.gov/books/NBK482168/
54. Los Angeles CountyDepartment of Public Health. Recent trends in mortality rate and causes of death among people experiencing homelessness in Los Angeles County. 2019. Accessed 30 Jun 2021. http://publichealth.lacounty.gov/chie/reports/HomelessMortality_CHIEBrief_Final.pdf
55. Ray L-O. In sunny Los Angeles, more homeless people die from the cold than in SF and NYC combined. LA Taco. 2021 Jan 19. Accessed 20 Feb 2021. https://www.lataco.com/homeless-la-death-hypothermia/#:~:text=According to the Los Angeles,hypothermia and other underlying conditions.&text = Since 2019%2C 12 unhoused people,from hypothermia in Los Angeles.
56. Gorman A, Blair Rowan H. The homeless are dying in record numbers on the streets of L.A. Kaiser Health News. 2019 Apr 24. Accessed 20 Feb 2021. https://khn.org/news/the-homeless-are-dying-in-record-numbers-on-the-streets-of-l-a/
57. Lopez S. Column: he died Sunday on a West L.A. sidewalk. He was homeless. He is part of an epidemic. Los Angeles Times. 2019 Sep 4. Accessed 17 Mar 2021. https://www.latimes.com/california/story/2019-09-04/homeless-deaths-los-angeles-coroner-record.
58. Ngo AN, Turbow DJ. Principal component analysis of morbidity and mortality among the United States homeless population: a systematic review and meta-analysis. International Archives of Public Health and Community Medicine. 2019;3:025. doi.org/10.23937/2643-4512/1710025.
59. O'Connell J. Premature mortality in homeless populations: a review of the literature. The New England Journal of Medicine. 2005;19.
60. Leibler JH, Robb K, Joh E, Gaeta JM, Rosenbaum M. Self-reported animal and ectoparasite exposure among urban homeless people. Journal of Health Care for the Poor and Underserved.

2018;29(2):664–75. 10.1353/hpu.2018.0050.

61. Maness DL, Khan M. Care of the homeless: an overview. American Family Physician. 2014;89(8):634–40. https://www.aafp.org/afp/2014/0415/p634.html.
62. Popkin BM, D'Anci KE, Rosenberg IH. Water, hydration, and health. Nutrition Reviews. 2010;68(8):439–58. https://doi.org/10.1111/j.1753-4887.2010.00304.x.
63. Raoult D, Foucault C, Brouqui P. Infections in the homeless. Lancet Infectious Diseases. 2001;1(2):77–84. https://doi.org/10.1016/S1473-3099(01)00062-7.
64. Bonilla DL, Cole-Porse C, Kjemtrup A, Osikowicz L, Kosoy M. Risk factors for human lice and bartonellosis among the homeless, San Francisco, California, USA. Emerging Infectious Diseases. 2014;20(10):1645–51. https://doi.org/10.3201/eid2010.131655
65. Bonilla DL, Kabeya H, Henn J, Kramer VL, Kosoy MY. Bartonella quintana in body lice and head lice from homeless persons, San Francisco, California, USA. Emerging Infectious Diseases. 2009;15(6):912–15. https://doi.org/10.3201/eid1506.090054.
66. Badiaga S, Benkouiten S, Hajji H, Raoult D, Brouqui P. Murine typhus in the homeless. Comparative Immunology, Microbiology and Infectious Diseases. 2012;35(1):39–43. https://doi.org/10.1016/j.cimid.2011.09.008.
67. Wenzel SL, Andersen RM, Gifford DS, Gelberg L. Homeless women's gynecological symptoms and use of medical care. Journal of Health Care for the Poor and Underserved. 2001;12(3):323–41. doi:10.1353/hpu.2010.0797.
68. Kayser GL, Moriarty P, Fonseca C, Bartram J. Domestic water service delivery indicators and frameworks for monitoring, evaluation, policy and planning: a review. International Journal of Environmental Research and Public Health. 2013;10(10):4812–35. https://doi.org/10.3390/ijerph10104812.
69. Holland G. L.A. takes more heat for spending millions of dollars cleaning up homeless camps. Los Angeles Times. 2019 Apr 5. Accessed 20 May 2021. https://www.latimes.com/local/lanow/la-me-ln-homeless-camp-protest-20190405-story.html
70. Coe AB, Moczygemba LR, Gatewood SBS, Osborn RD, Matzke GR, Goode JVR. Medication adherence challenges among patients experiencing homelessness in a behavioral health clinic. Research in Social and Administrative Pharmacy [Internet]. Elsevier Inc; 2015;11(3):e110–20. https://doi.org/10.1016/j.sapharm.2012.11.004.
71. Wang I, Dopheide JA, Gregerson P. Role of a psychiatric pharmacist in a Los Angeles "Skid-Row" safety-net clinic. Journal of Urban Health. 2011;88:718–23. https://doi.org/10.1007/s11524-011-9573-6.

Figures

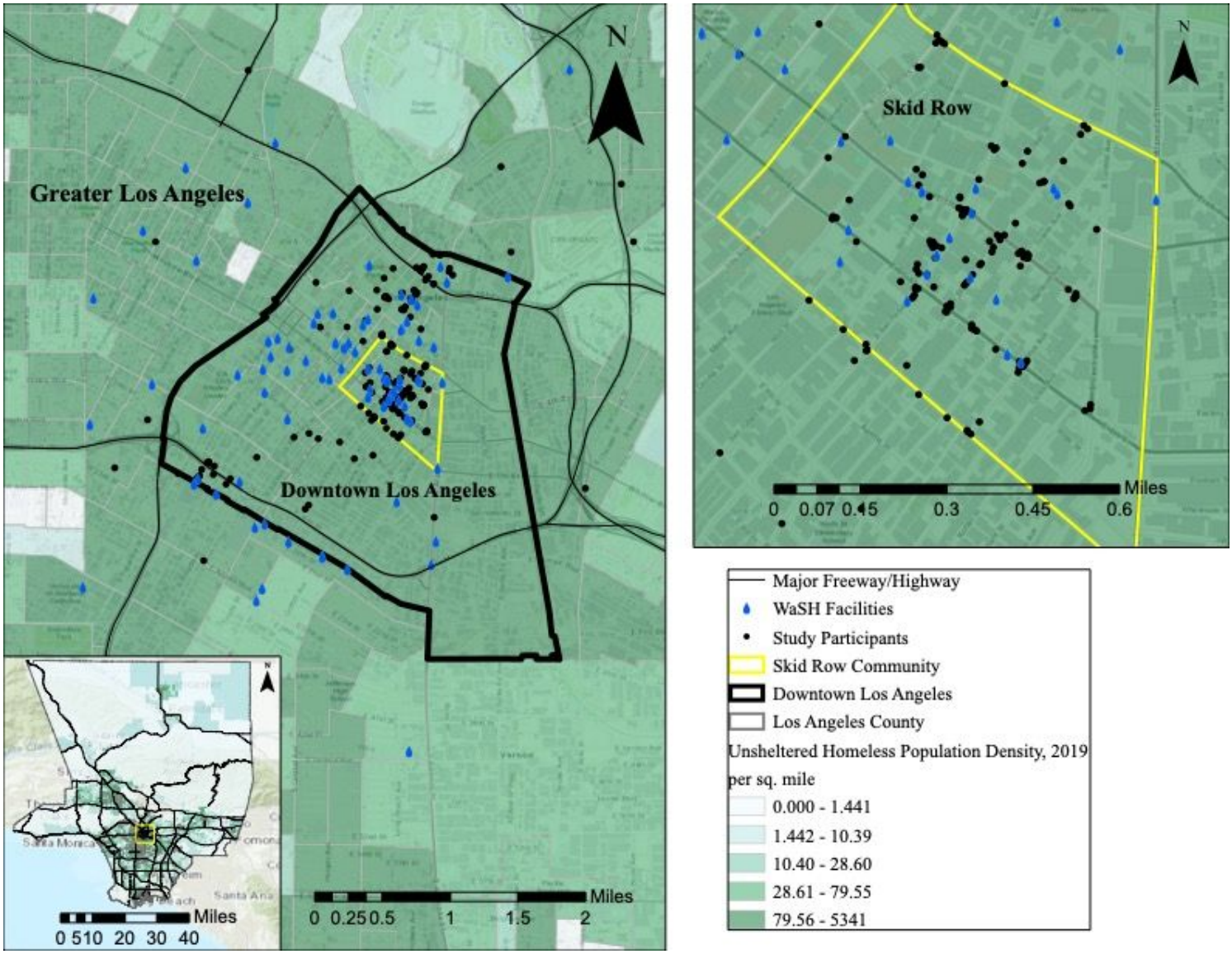

Figure 1

Study area and study participants overlapped with LA County's unhoused population density.

Source: Los Angeles Homeless Services Authority point-in-time estimated in 2019.

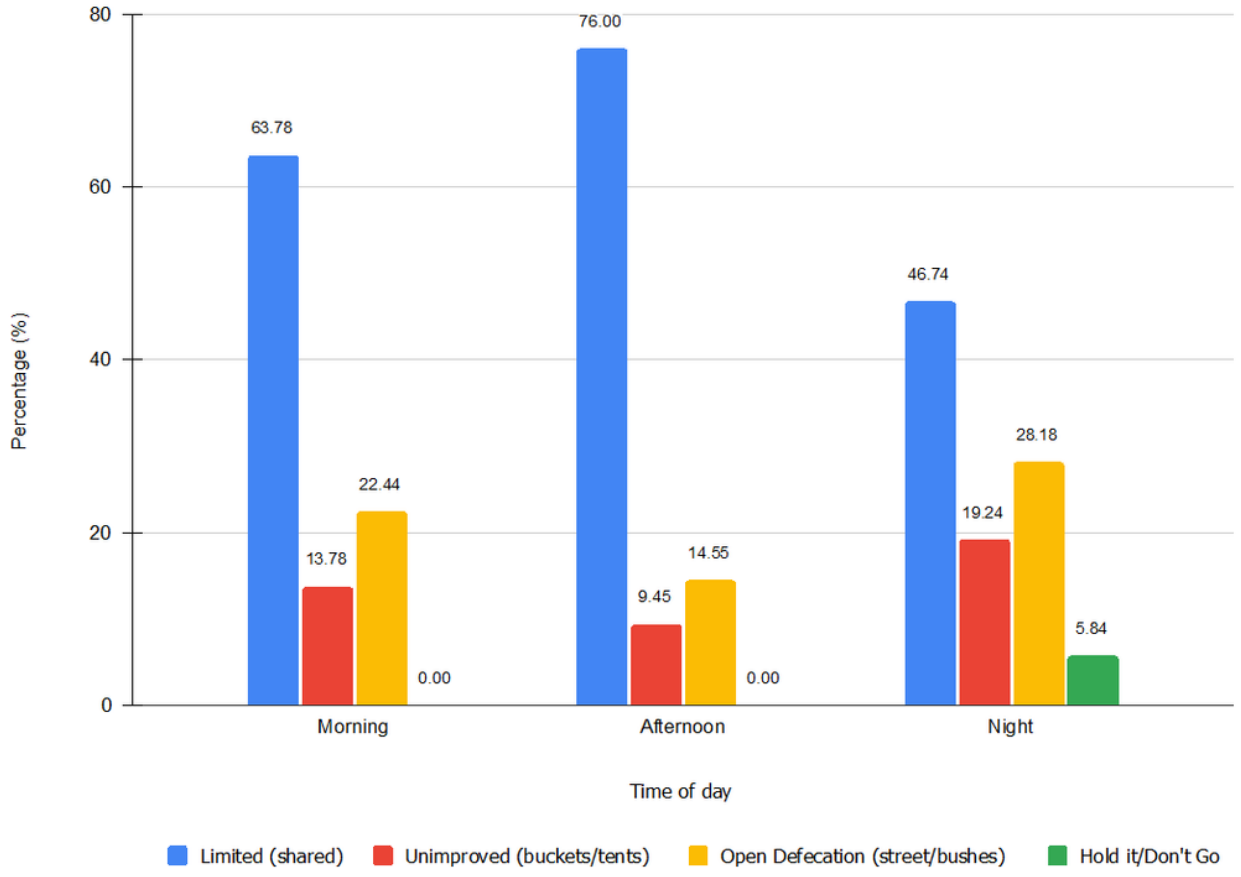

Figure 2

Access to different sanitation facilities based on time of the day (n = 263).

Note: The categorization is based on the Joint Monitoring Programme benchmark ladder for sanitation access.