

## Research Paper

## Restroom access and health among people experiencing homelessness: A focus on San Diego, CA

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### ABSTRACT

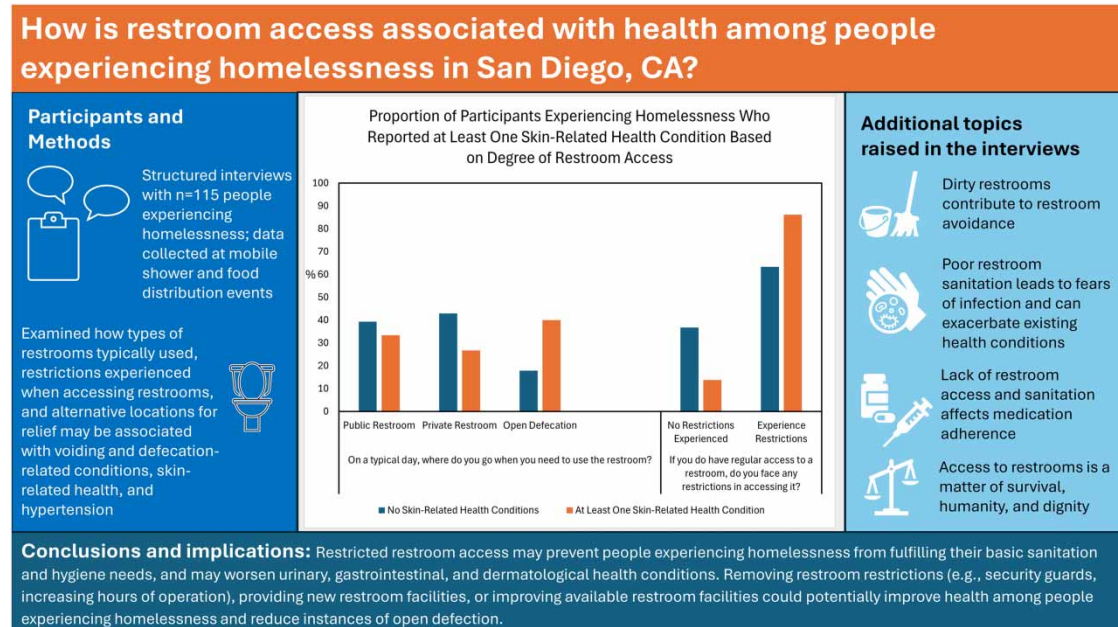
Access to restrooms is vital to personal and public health, particularly among people experiencing homelessness (PEH). This study investigated how restroom access is associated with three domains of self-reported physical health (voiding and defecation-related conditions; skin conditions; and hypertension) among PEH in San Diego, CA. Data from 115 structured interviews with PEH (67.8% male, 40.0% mono-rationally White, 57.4% rough sleeping) indicated that 37.4% ( $n = 43$ ) reported typically using public restroom facilities, 38.3% ( $n = 44$ ) reported typically using private facilities, and 23.5% ( $n = 27$ ) reported typically engaging in open defecation. There were moderate to strong associations between urinary, gastrointestinal, and dermatological health conditions and stressors/barriers related to restroom access. The proportion of participants with  $\geq 1$  skin-related health conditions who engaged in open defecation was substantially higher (40%) compared to participants who reported no skin-related health conditions who engaged in open defecation (17.9%) ( $\chi^2(df = 1, 108) = 5.25, p = 0.02$ ). Participants who reported  $\geq 3$  voiding or defecation-related health conditions or  $\geq 1$  skin-related health conditions reported higher mean restroom-related impediments to health relative to participants without these health conditions. Restricted restroom access may prevent PEH from fulfilling their basic sanitation and hygiene needs, and may exacerbate urinary, gastrointestinal, and skin health conditions.

**Key words:** gastrointestinal diseases, homelessness, hygiene, skin diseases, toilet facilities, urologic diseases

### HIGHLIGHTS

- Unhoused people with three or more voiding or defecation health issues, or one skin condition, report elevated adverse health from poor restroom sanitation and hygiene.
- Open defecation and restricted restroom access are linked to high prevalence of skin-related conditions among unhoused people.
- Lack of restroom access and poor sanitation can hinder medication adherence and lead to restroom avoidance.

## GRAPHICAL ABSTRACT



Safe water, sanitation, and hygiene (WaSH) practices are critical to human health, thriving communities, and healthy environments (World Health Organization 2024). Access to clean, reliable, and safe restrooms is a key component of WaSH, as such facilities promote personal hygiene, prevent the spread of infectious disease, and support personal dignity (Human Rights Watch 2017). Access to restrooms in public spaces is vital to address the WaSH-related needs and promote dignity of populations who regularly need to access restrooms outside of homes/personal dwellings, such as people experiencing homelessness (PEH), people with young children, people who menstruate, the elderly, people with physical disabilities, commuters, and tourists (Sommer *et al.* 2020; Maroko *et al.* 2021; Moreira *et al.* 2022; McIlroy 2023). PEH are particularly vulnerable when there is a shortage of restrooms in public spaces given they have few alternatives for safely relieving themselves or engaging in the most basic, health-promoting hygiene practices (e.g., handwashing). When sufficient restrooms are not available or accessible, PEH engage in practices detrimental to their own and others' health, such as 'holding it' until they can access safe facilities (e.g., in a shelter or business), or open defecation (Stolte & Hodgetts 2015). As such, PEH experience sanitation injustice – experiences of stigma and discrimination through systemic exclusion from private and public WaSH spaces, and punishment and criminalization for engaging in necessary actions to relieve themselves when sanitation resources are unavailable or inaccessible (Welsh Carroll *et al.* 2024). Furthermore, as evidenced by recent outbreaks of hepatitis A and shigellosis in major urban centers in the US, lack of access to well-maintained restrooms in public spaces can increase risk for fecal–oral route transmissible infectious diseases among PEH (Foster *et al.* 2018; Felner *et al.* 2020; City of Philadelphia 2023; Ohlsen *et al.* 2023). Additional research on the connections between access to restrooms and health inequities among PEH is warranted.

#### Prior research on restroom access and health among PEH

##### General health among PEH

Relative to people who have permanent, stable housing, PEH experience compounding health inequities. Many health conditions (e.g., skin health and cardiovascular health) are exacerbated by environmental conditions, systemic and structural stressors, and trauma experienced by PEH (Brown *et al.* 2012; Fazel *et al.* 2014; Vickery *et al.* 2021). Health among PEH is also shaped by factors such as lack of housing, lack of financial and material resources, insufficient healthcare access, low social support, chronic and acute stress, and disease comorbidity (Fazel *et al.* 2014). In one epidemiologic assessment of morbidity among PEH in Long Beach, CA (Chong *et al.* 2014), psychiatric disorders and cardiovascular conditions were the most common disease states (32 and 46% respectively), along with the use of medications to treat these chronic

diseases. Medication nonadherence was reported by 30% of participants. In addition, foot problems (including skin infections and other ailments) and hearing and vision problems were reported by participants, and described as commonly overlooked in health outreach efforts. In a meta-analysis of populations experiencing social exclusion in high-income countries (as defined by World Bank classification), PEH were found to have a high burden of diseases related to infection (e.g., hepatitis, tuberculosis), cardiovascular conditions, respiratory conditions, and mental health conditions (Aldridge *et al.* 2018).

### Restroom access and health

Health conditions experienced by PEH can also be directly related to or exacerbated by insufficient access to WaSH, including toilets and handwashing facilities. Prior research on restroom access and health has found that insufficient restroom access (public or private) can contribute to a range of negative health experiences, such as restriction of fluids, anxiety, stress, and ‘holding it’, and adverse health conditions such as constipation, urinary tract infections (UTIs), and risk for infectious disease (Winchester *et al.* 2023; Avelar Portillo *et al.* 2024). When restroom access is restricted, girls and women may engage in toilet avoidance, restrict fluid intake, and organize their schedules around restroom access (Camenga *et al.* 2019; Hartigan *et al.* 2020). Lack of sufficient restroom access is associated with anxiety which can be exacerbated among people with certain health conditions, such as irritable bowel syndrome (IBS) (Hartigan *et al.* 2020).

For PEH, access to hygiene and sanitation facilities, including restrooms, is fundamental to maintaining physical and mental health (Leibler *et al.* 2017; Neves-Silva *et al.* 2018). PEH may be more likely to contract infectious diseases (e.g., hepatitis A) and experience stigmatization due to lack of access to restrooms and other WaSH services (Foster *et al.* 2018; Felner *et al.* 2020). Other infections (e.g., MRSA nasal colonization), skin diseases (e.g., epidemic typhus and trench fever), and cutaneous ailments (e.g., tinea pedis, pitted keratolysis, seborrheic dermatitis) may be exacerbated for PEH due to lack of access to facilities to maintain personal hygiene (Stratigos & Katsambas 2003; Badiaga & Brouqui 2012; Arnaud *et al.* 2016; Leibler *et al.* 2019). When there is a persistent lack of public restrooms in settings where PEH reside or seek services, open defecation can become a common practice, exposing everyone (regardless of housing status) to infectious diseases and pathogens (Capone *et al.* 2018; Avelar Portillo *et al.* 2023). Providing new restroom facilities or improving available restroom facilities can decrease instances of open defecation, especially in neighborhoods with PEH (Amato *et al.* 2022).

## The current study

### Context

In the current study, we focus on restroom access and health among PEH in San Diego, CA. The City of San Diego was identified in 2023–2024 as the United States’ ‘most expensive city’, as determined by median gross rent and annual housing costs (US News & World Report 2024). With some annual variation, the San Diego region (inclusive of the City and County of San Diego) is consistently ranked fourth or fifth in the nation for the number of people currently experiencing homelessness (point-in-time count data,  $n = 10,264$ ) (Haines 2023). The region experienced a decrease in public restroom availability over recent years, worsened by the COVID-19 pandemic. For example, a 2022 audit of public restrooms in the downtown neighborhood of the City of San Diego identified only two permanent 24-h public restroom facilities, which translates to an overnight ratio of one permanent toilet for every 190 unsheltered San Diegans living downtown (ratio does not account for all members of the public who may require access to restrooms) (Welsh Carroll *et al.* 2022). Since 2016, the City of San Diego has experienced outbreaks of hepatitis A and shigellosis, both of which disproportionately affected PEH and were tied, in part, to insufficient public restroom facilities (Felner *et al.* 2020; Ohlsen *et al.* 2023).

### Purpose

Thus far, much of the existing research has examined how access to restrooms (vs. no access) is associated with health among PEH, with less nuanced exploration of how varied forms of restroom access and related experiences (e.g., restrictions) are associated with health among PEH. We examined restroom access among PEH in four different ways: (1) typical restroom access (use of private facilities, public facilities, open defecation); (2) restrictions experienced; (3) where PEH go when restrooms are inaccessible; and (4) restroom-related impediments to health. Because lack of restroom access may impact a range of health concerns, we explored connections between restroom access and health conditions within three categories that restroom access may affect differentially. First, we focused on urinary and gastrointestinal health-related outcomes, which encompass concerns related to voiding and defecation (i.e., urgent need to pee, paruresis, UTI; Crohn’s, IBS, diarrhea), because adequate hygiene facilities (e.g., handwashing) and sanitation (e.g., toilets) may play a role in preventing such

conditions, or in mitigating symptoms (World Health Organization 2024). Second, we investigated the association between restroom access and dermatological health outcomes, as lack of access to hygiene may increase risk for skin conditions (Coates *et al.* 2020). Finally, we considered how restroom access may contribute to cardiovascular health outcomes, specifically hypertension, given this is a common health condition that increases in risk with normative ageing, and that PEH are especially vulnerable to due to lack of regular medical access (Ngo *et al.* 2021). Hypertension may increase restroom reliance because one symptom of hypertension is an increased need to urinate (Chen *et al.* 2023), and pharmacological interventions often involve diuretics (e.g., thiazide) (Mayo Clinic Staff 2023). We expect that PEH who report practicing open defecation, experiencing restrictions when accessing restrooms, and more restroom-related impediments to health will have worse health outcomes than those who do not report such experiences or impediments. In addition, we expect that PEH who report using public restrooms or practicing open defecation will report worse health outcomes than those who typically use private restroom facilities.

## METHOD

### Participants and procedure

The research question and study procedures were developed and facilitated through continuous engagement with our community partner, Think Dignity (TD). TD is a local non-profit organization focused on advancing basic dignity for PEH through legal services, policy advocacy, and provision of mobile services, including showers, food distribution, and mobile aid. In consultation with TD and drawing on prior empirical scholarship (Corradi *et al.* 2020, 2023; Avelar Portillo *et al.* 2023), we developed a comprehensive social survey for PEH in San Diego. We recruited survey participants between April 2022 and July 2022 from TD mobile shower and food distribution events ( $n = 8$ ). After obtaining free and informed verbal consent from participants, the survey was administered as a 30-minute, face-to-face, structured interview in which research team members read survey questions to participants and recorded responses via a tablet. All interviews took place at TD service events (e.g., at the Transitional Storage Center or at mobile food and/or shower distributions). Participants were invited to review a copy of the survey questions alongside the interviewer's verbal survey administration. The survey was administered as a structured interview due to the sensitivity of the questions, to provide participants with opportunities for further elaboration on responses, and to support the inclusion of participants with limited literacy. The survey was administered in English and Spanish, and included close-ended, multiple choice, and yes/no questions (with options to provide additional details/context as-needed). Participants received a \$25 gift card incentive for their time. Brief descriptions of key measures are provided in Tables 1 and 2; additional details on survey domains and interview administration are available in a separate publication (Swayne *et al.* 2023). The research was considered public health activity and exempted from full review by the San Diego State University Institutional Review Board.

### Measures

#### Demographic information

The survey assessed relevant participant demographics (Table 1), including: age, sex/gender identity, sexual orientation, race/ethnicity, current housing status, and location(s) where participants typically sleep. *Restroom access.* This study analyzed four dimensions of restroom access and experiences. Participants reported their (1) *typical restroom location*; for analysis, response options were recoded as (a) public facility (i.e., public restroom), (b) private facility (e.g., at a friend or family member's house; a private business), and (c) open defecation (e.g., use a plastic bag; in the bushes). Participants reported (2) *where they relieve themselves when restrooms are unavailable*, and open-ended responses were recoded into one of the available response options (see Table 2). Participants reported (3) *restrictions experienced when accessing restrooms*, and for analysis, responses were recoded as (a) no regular access; (b) no restrictions; (c) restricted hours; (d) gatekeeper (e.g., security guard); (e) physical/psychological safety; (f) population pressures/crowding; (g) cleanliness/sanitation. For any of the three restroom access variables previously described, we coded skipped questions or responses of 'prefer not to answer' as missing.

We collaborated with TD to adapt the Household Water InSecurity Experiences ('HWISE') scale (Young *et al.* 2019) to measure (4) *restroom-related impediments to health* among PEH (eight items, Cronbach  $\alpha = 0.87$ , Likert response, Never = 1 to 5 = All the time). Items assessed various aspects of restroom-related sanitation, hygiene, and health. Mean scores were calculated for participants who responded to at least six items. In addition, participants had the opportunity to share open-ended comments, and interviewers captured participants' responses in narrative summary.

**Table 1** | Demographic characteristics of participants in the 2022 San Diego Project for Sanitation Justice Social Survey ( $n = 115$ )

	% ( <i>n</i> )	Mean (SD)
<b>Age in years</b>		$n = 106$ 53.08 (12.70)
<b>Gender identity</b>		
Male	67.82% (78)	
Female	23.48% (27)	
Non-binary	1.74% (2)	
Trans male/Trans man	0.87% (1)	
Prefer not to answer or missing	6.09% (7)	
<b>Sexual orientation</b>		
Heterosexual	82.61% (95)	
Gay or lesbian	2.61% (3)	
Bisexual	1.74% (2)	
Asexual	0.87% (1)	
Pansexual	0.87% (1)	
Prefer not to answer or missing	11.30% (13)	
<b>Race/ethnicity</b>		
White only	40.00% (46)	
Black or African American only	22.61% (26)	
Hispanic or Latino only	9.57% (11)	
American Indian or Native American only	1.74% (2)	
Asian only	0.87% (1)	
Multiracial	12.17% (14)	
Other	3.48% (4)	
Prefer not to answer or missing	9.57% (11)	
<b>Housing status</b>		
<b>Currently homeless</b>		
Yes	83.48% (96)	
No	14.78% (17)	
Prefer not to answer or missing	1.74% (2)	
<b>Sleeping locations of participants who are currently homeless</b>		
Outdoors	57.39% (66)	
Service	22.61% (26)	
Vehicle	15.65% (18)	
Someone else's place	6.09% (7)	
Own place	2.61% (3)	
Abandoned building/structure	1.74% (2)	
Other	3.48% (4)	
Prefer not to answer or missing	18.26% (21)	

Note: Missing values include 'prefer not to answer' or participant non-response (e.g., nine participants chose not to disclose or self-report their age). SD, standard deviation;  $\alpha$ , Cronbach alpha. Unless otherwise specified, % (*n*) is calculated against the full sample size ( $n = 115$ ).

### Health conditions

To derive the three measures of health status, we consolidated information across three self-reported measures of health. (1) First, *participants self-reported medical diagnoses*, and based on the distribution of closed and open-ended responses,

**Table 2** | Descriptive statistics of key variables from participants in the 2022 San Diego Project for Sanitation Justice Social survey ( $n = 115$ )

	% ( <i>n</i> )	Mean (SD)
<b>Restroom access variables</b>		
<b>Typical restroom locations for participants</b>		
Public facility	37.39% (43)	
Private facility	38.26% (44)	
Open defecation	23.48% (27)	
Missing	0.87% (1)	
<b>Where participants relieve themselves when restrooms are unavailable</b>		
Restroom available	8.70% (10)	
Secluded spot	11.30% (13)	
Outdoor	28.70% (33)	
Indoor	5.22% (6)	
Container	39.13% (45)	
Holding it	0.87% (1)	
Missing	6.09% (7)	
<b>Restrictions experienced when accessing restrooms</b>		
No restrictions	28.70% (33)	
No regular access	1.74% (2)	
Restricted hours	17.39% (20)	
Gatekeeper	36.52% (42)	
Physical/psychological safety	4.35% (5)	
Population pressures/crowding	2.61% (3)	
Cleanliness/sanitation	2.61% (3)	
Missing	6.09% (7)	
		$n = 108$
<b>Mean restroom-related impediments to health<sup>a</sup></b>		2.53 (0.99)
<b>Health diagnoses and symptoms</b>		
<b>Medical diagnoses</b>		
Inflammatory bowel responses	1.74% (2)	
Irritable bowel syndrome	6.96% (8)	
Ulcerative colitis	0.87% (1)	
Urination diagnoses	9.57% (11)	
Hepatitis	2.61% (3)	
Skin illnesses	13.91% (16)	
Hypertension	19.13% (22)	
Other chronic	13.04% (15)	
Other acute	1.74% (2)	
No medical diagnoses reported	38.26% (44)	
<b>Symptoms experienced</b>		
Urination issues	12.17% (14)	
Defecation issues	29.57% (34)	
Skin issues	19.13% (22)	

(Continued.)

Table 2 | Continued

	% (n)	Mean (SD)
No urination, defecation, or skin issue symptoms experienced	39.13% (45)	
<b>Physical disability</b>		
<b>Living with a physical disability</b>		
Yes	43.48% (50)	
No	48.70% (56)	
Missing	7.78% (9)	
<b>Self-reported disabilities<sup>b</sup></b>	<u>n = 50</u>	
Heart conditions	8.00% (4)	
Lung conditions	6.00% (3)	
Cancers	6.00% (3)	
Hypertension	2.00% (1)	
Kidney/bladder issues	8.00% (4)	
Liver issues	4.00% (2)	
Arthritis/joint problems	24.00% (12)	
Back issues	16.00% (8)	
Foot issues	8.00% (4)	
Chronic pain	8.00% (4)	
Sight problems	10.00% (5)	
Hearing problems	2.00% (1)	
Skin issues	2.00% (1)	
Mental illness	12.00% (6)	
Neurological illness	2.00% (1)	
Communicable illness	10.00% (5)	
Gut issues	6.00% (3)	
Diabetes	4.00% (2)	
<b>Aggregate health symptoms/conditions<sup>c</sup></b>		
≥3 Voiding or defecation-related health conditions	27.8% (32)	
≥1 Skin-related health condition	26.1% (30)	
Reporting hypertension	26.1% (30)	

Note: Missing values include 'don't know/can't remember', 'prefer not to answer' or participant non-response. SD = Standard deviation. Unless otherwise specified, % (n) is calculated against the full sample size (n = 115).

<sup>a</sup>Restroom-related impediments to health were assessed on a Likert scale, with 1 = Never to 5 = All the time.

<sup>b</sup>Participants reported disabilities in an open-ended question and could report experiencing more than one disability or chronic health condition. This resulted in a divergent report of n = 72 self-reported disabilities compared to n = 50 who responded yes to living with a disability. Percents for this item are calculated against the denominator of n = 50 who reported living with a disability, rather than the total sample of 115 participants.

<sup>c</sup>To create the aggregate health symptoms/conditions variables, we considered self-report data across each of the individual health indicators (i.e., medical diagnoses, symptoms experienced, self-reported disabilities). Additional details are reported in the Method section.

self-reported medical diagnoses were grouped into nine categories (e.g., urination diagnoses; see Table 2). (2) Participants then reported on *symptoms experienced*, and based on the distribution of response options, symptoms were grouped into the following categories: (a) urination issues; (b) defecation issues; (c) skin issues. (3) Finally, participants self-reported their physical ability status in response to two questions. As displayed in Table 2, open-ended responses to the second question were coded into 19 categories.

Given the large number of health conditions and experiences of disability reported, we consolidated information across the health condition variables to create three aggregate health symptoms/condition variables for areas of substantive interest in this study:

- (1) *Urinary and gastrointestinal health*: reporting  $\geq 3$  voiding and/or defecation-related health conditions or symptoms (yes/no)
- (2) *Dermatological health*: reporting  $\geq 1$  skin-related health conditions or symptoms (yes/no)
- (3) *Cardiovascular health*: reporting hypertension (yes/no)

## Analysis

We examined the distribution of response for each of the demographic, restroom access, and health condition variables by calculating frequencies (percent and  $n$ ) for categorical variables and means and standard deviations for continuous variables (Tables 1 and 2). We measured the association between the restroom access variables and the proportion reporting each health outcome using  $\chi^2$  tests of independence in SAS 9.4 (SAS Institute, Cary NC) ( $\alpha = 0.05$ ). Due to small cell sizes, we recoded 'where participants relieve themselves when restrooms are unavailable' into 'indoor/secluded spot' vs. 'outdoor/container/holding it'. Similarly, we recoded the restroom restrictions variable into 'no restrictions' vs. 'any restrictions' (e.g., no regular access, gatekeepers, population pressures/crowding). To examine the cross-sectional association between mean restroom-related impediments to health and report of each health outcome, we conducted two-sample  $t$ -tests ( $\alpha = 0.05$ ), whereby we compared the means on the restroom-related impediments to health scale between participants who reported vs. did not report each health outcome. We report Cramer's  $V$  for the measurement of effect size of the association between categorical variables in the  $\chi^2$  tests (Rea & Parker 2014; 0.10–0.19 = weak association; 0.20–0.39 = moderate association; 0.40–0.59 = strong association;  $> 0.60$  strong or very strong association), and Cohen's  $d$  for the measure of effect size of mean differences (Cohen 1988; 0.20 = small effect; 0.50 = medium effect; 0.80 = large effect). Responses to the open-response question about health and restroom needs and access were analyzed via summative qualitative content analysis (Hsieh & Shannon 2005) to identify general topics.

## RESULTS

### Description of the survey sample

We conducted 115 structured interviews (Table 1). The survey sample was predominantly male-identified (67.2%,  $n = 78$ ), heterosexual (82.6%,  $n = 95$ ), mono-rationally White (40.0%,  $n = 46$ ), ranged in age from 21 to 87 years ( $M_{\text{age}} = 53.08$ ,  $SD = 12.70$ ) and self-described themselves as being currently homeless (83.5%,  $n = 96$ ). Among participants who self-described themselves as being currently homeless, the majority reported rough sleeping (e.g., 57.4% sleeping outdoors,  $n = 66$ ). Participants varied in their self-reported typical restroom access (Table 2), with 37.7% ( $n = 43$ ) reporting use of public facilities, 38.6% ( $n = 44$ ) reporting private facilities, and 23.7% ( $n = 27$ ) reporting open defecation. Approximately 39.1% ( $n = 45$ ) described relieving themselves in a container, 28.7% ( $n = 33$ ) reported relieving themselves outdoors, and 16.5% ( $n = 19$ ) described relieving themselves indoor or in a secluded spot. The overall degree of restroom-related impediments to health was 2.53 ( $SD = 0.99$ ), which corresponds to 'rarely' or 'sometimes' experiencing restroom-related impediments to health. Regarding aggregate health symptoms/conditions, 27.8% ( $n = 32$ ) of participants reported experiencing three or more voiding or defecation-related health conditions, 26.1% ( $n = 30$ ) reported experiencing one or more skin-related health conditions, and 26.1% ( $n = 30$ ) reported hypertension. Additional details on the distribution of unique self-reported medical diagnoses, symptoms, and disability are reported in Table 2.

### Restroom access and voiding or defecation-related health conditions

There were no significant differences in the proportion of participants who reported experiencing  $\geq 3$  voiding or defecation-related health conditions based on their typical restroom location, restrictions faced when accessing restrooms, and where they relieve themselves when they cannot access a restroom. However, the reported mean restroom-related impediments to health for participants who reported  $\geq 3$  voiding or defecation-related health conditions was 3.02 ( $SD = 0.99$ ), which was significantly greater than the mean (2.34,  $SD = 0.92$ ) for those who reported  $< 3$  voiding or defecation-related health conditions ( $t = -3.40$  ( $df = 106$ ),  $p = 0.0009$ ; Cohen's  $d = 0.71$ ).



### Restroom access and skin-related health conditions

The proportion of participants who reported experiencing  $\geq 1$  skin-related health conditions differed from those who reported no skin-related health conditions based on where they typically used the restroom ( $\chi^2$  (df = 2,  $n = 114$ ) = 6.29,  $p = 0.0432$ ; Cramer's  $V = 0.23$ ). Specifically, the proportion of participants with  $\geq 1$  skin-related health conditions who engaged in open defecation was substantially higher (40%) compared to participants who reported no skin-related health conditions who engaged in open defecation (17.9%). Furthermore, the proportion of participants with  $\geq 1$  skin-related health conditions who used private restrooms was lower (26.7%) compared to the proportion of participants with no skin-related health conditions who typically used private restrooms (42.9%). In addition, the proportion of participants who reported  $\geq 1$  skin-related health conditions differed from those who reported no skin-related health conditions based on whether they experienced restrictions when accessing restrooms ( $\chi^2$  (df = 1,  $n = 108$ ) = 5.25,  $p = 0.0219$ ; Cramer's  $V = 0.22$ ). The proportion of participants with  $\geq 1$  skin-related health conditions who experienced restrictions when accessing restrooms was higher (86.2%) relative to the proportion of participants without skin-related health conditions who experienced restrictions when accessing restrooms (63.3%). In addition, the proportion of participants with  $\geq 1$  skin-related health conditions who did not experience restrictions when accessing restrooms (13.8%) was substantially lower than the proportion of participants without skin-related health conditions who did not experience restrictions when accessing restrooms (36.7%). There were no differences in the proportion of participants with skin-related health conditions based on where participants relieve themselves when they cannot access a restroom ( $p = 0.3663$ ). However, the reported mean restroom-related impediments to health for participants who reported  $\geq 1$  skin-related health conditions was 2.87 (SD = 1.07), which was significantly greater than the mean (2.41, SD = 0.45) for those who did not report skin-related health conditions ( $t = -2.21$  (df = 106),  $p = 0.0291$ ; Cohen's  $d = 0.47$ ).

### Restroom access and hypertension

Neither the restroom access variables nor the restroom-related impediments to health variables were associated with hypertension.

### Additional topics raised about health and restroom access

Content analyses of open-ended data on the connections between health and restroom access yielded 32 unique responses, of which nine were not relevant (i.e., 'no' or did not provide a response that answers the question) and three were subsequently recoded as valid responses to other questions in the survey. Although two of the remaining 20 responses reiterated the role of restrictions in creating *difficulty accessing restrooms* and affecting health ('key codes [access codes] make it difficult'; 'customer only bathrooms'), the topics raised by participants tended to highlight that lack of cleanliness and upkeep of restrooms and facility inadequacies make it difficult to maintain and sustain health. Ten responses described how *facilities are inadequate*, such that they lack necessary features and supplies to maintain health and hygiene (e.g., 'needed to wash hands and couldn't') and six described an overall *lack of cleanliness* of restrooms that possibly contributes to restroom avoidance (e.g., 'cleanliness is the thing that worries me the most'). Indeed, five responses directly linked concerns about *sanitation and infection* regarding their existing health conditions. As described by one participant, 'kidneys cause more damage as I have to hold it more, coupled with my weak immune system makes me wary of using public bathrooms.' The open-ended data also raised health domains that were not sufficiently covered in the quantitative analysis. For example, three responses centered on *restroom access and medication*. Each response was unique and touched on how medication use increases need for restrooms ('blood pressure medication makes me pee'), how medication use often requires clean water ('less access to water to take medication'), and how ordinary health maintenance behaviors can be criminalized in public restrooms ('they think insulin is drugs and you get arrested'). Finally, although the sample was predominantly cisgender male, three responses focused on access to restrooms as a matter of *survival, humanity, and dignity*, including discussions around menstrual hygiene management. As one participant described, 'stigma, female needs is embarrassing, shame for not having access, messy restroom, restroom not sanitary, awkward shower in public, needs a curtain or door in shower.'

## DISCUSSION

Restroom access experiences were moderately associated with adverse dermatological health, such that a greater proportion of participants who experienced restrictions when accessing restrooms (e.g., security guard), or who typically

engaged in open defecation (as opposed to using public or private restrooms) also reported one or more skin-related health conditions. This pattern of associations may be due to the connection between restroom access and maintenance of personal sanitation and hygiene. Participants who experienced one or more skin-related health conditions, or who reported three or more voiding or defecation-related health symptoms or conditions also reported an overall higher mean level of restroom-related impediments to health relative to participants who did not report such health conditions. These moderate to strong associations suggest that participants with urinary and gastrointestinal health conditions and dermatological health conditions may experience an elevated burden of restroom-related sanitation, hygiene, and health stressors (e.g., lack of restroom access to relieve themselves or wash hands). Enriching the quantitative analyses, participants further described how lack of cleanliness and inadequate facilities in restrooms are detrimental to their health and discourage use of public restrooms. In addition, participants shared how inadequate restroom access or facilities (e.g., privacy) and punishment in WaSH spaces can disrupt medication adherence, adversely affect health (e.g., hypertension, menstrual health), and reinforce stigma.

The findings underscore and bolster other research suggesting that gatekeepers to restrooms and other WaSH resources adversely affect health (McGuire *et al.* 2022), particularly among PEH (Felner *et al.* 2020; Welsh Carroll *et al.* 2024). The presence of a security guard or other perceived restriction to access (e.g., 'customers only' sign) may worsen an existing health condition (e.g., UTI, constipation, Crohn's disease) by delaying relief, and possible increase instances of open defecation (Amato *et al.* 2022). Gatekeepers may exclude PEH from accessing restrooms through unequal enforcement of restrictions (e.g., selectively barring access among PEH and people who appear to be unsheltered) or reinforce various forms of trauma through intimidation and outright sanctions or punishment (Neves-Silva *et al.* 2018). Although emerging research indicates a more nuanced relationship between security guards and PEH – ranging from punitive control to maintenance of safety and harm reduction (Maier *et al.* 2024) – other research has highlighted how PEH are systematically denied their rights to safe access to WaSH, including restrooms, due to their marginalized social standing, and how this exclusion is enforced via discriminatory policies and social control agents such as security guards and police (Welsh Carroll *et al.* 2024; Neves-Silva *et al.* 2018; Felner *et al.* 2020).

Triangulating across the open-response and quantitative results, participants indicated that lack of cleanliness of restrooms and inadequate facilities may contribute to restroom avoidance. In combination with restrictions, substandard restroom facilities can create pressures to engage in open defecation. Open defecation, experiencing restrictions when accessing restrooms, or reporting a higher degree of restroom-related impediments to health was associated with a higher proportion of reporting skin-related health conditions. Prior research has identified skin-related infectious diseases and cutaneous skin conditions as common health concerns among PEH (Stratigos & Katsambas 2003; Badiaga & Brouqui 2012; Arnaud *et al.* 2016; Leibler *et al.* 2019). Future research may examine how improving restroom access and facilities, reducing or eliminating restrictions, or decreasing overall stress and negative health experiences related to restrooms may prevent or mitigate adverse skin-related health conditions among PEH. For example, research in the City of San Francisco found that implementing several restroom improvements (e.g., new restrooms, improving facilities, increasing hours) decreased the amount of open defecation in the neighborhood (Amato *et al.* 2022); future research could examine whether such interventions could improve dermatologic health among PEH. Skin infections can pose a tremendous lifetime economic burden, and thus it is especially important to prevent such adverse outcomes in economically vulnerable populations (American Academy of Dermatology 2017; Coates *et al.* 2020). In practice, additional work to increase the total number of restrooms, improve restroom upkeep, and reduce restrictions to restroom access may be viable approaches to mitigate WaSH-related health concerns among PEH. The current study provides further evidence of the vital role that restroom access may play in the maintenance of personal hygiene and skin health among PEH. Furthermore, skin conditions may be more visible than other physical health conditions experienced by PEH. Increasing efforts to address health concerns that may serve as visible markers of homelessness, such as through increasing WaSH access as a preventative, may help to mitigate stigma and increase opportunities for social and economic mobility among PEH (Bonds & Martin 2016; Felner *et al.* 2020).

There was no association observed between restroom access and hypertension among PEH in the quantitative analysis, although at least one participant shared that 'blood pressure medication makes [them] pee'. Prior research indicates a disproportionate burden of hypertension among PEH (Ngo *et al.* 2021), and consistent with such prior research, nearly 26% of the sample in the current study self-reported a diagnosis of hypertension. It is possible that the associations between restroom access and hypertension among PEH are less direct (e.g., already captured through urinary health conditions), or that

restroom access is more directly related to behaviors connected to maintenance of hypertension (e.g., medication use, lifestyle factors). For example, other research has found that managing hypertension while experiencing homelessness may be more challenging because of difficulties accessing healthy food and clean water (Groton *et al.* 2021). Indeed, in an ancillary item-level analysis of our restroom-related impediments to health scale, 32% of the participants indicated that their food was at least sometimes impacted by restroom access/inaccess. Future research should examine the direct and indirect ways in which restroom access may be connected to hypertension.

The findings of the current study must be interpreted considering several limitations. Due to small sample size, results are largely descriptive. Future studies with larger, adequately powered sample sizes can further estimate the magnitude of associations between restroom access experiences and health outcomes while adjusting for potential confounders. Participants self-reported their health conditions, and there was no clinician-administered assessment for verification. Although the health measures allowed participants to share health experiences and symptoms not included in our list of provided options, we did not directly query other health experiences that have been identified as commonly experienced among PEH (e.g., foot health, substance use, menstrual health), or analyze the association between restroom access and mental health (e.g., anxiety), which has been suggested in prior research (Avelar Portillo *et al.* 2024). Future research may consider using a standardized health symptom or health condition checklist augmented for health conditions commonly experienced among PEH. The research was conducted in San Diego, which has one of the nation's largest populations of PEH. However, restroom access and health experiences may differ among PEH across geographic regions, which could affect generalizability. Although the focus of the current study was on restroom access, the findings point to overall (unmet) WaSH needs, including showers, laundry, and menstrual hygiene management, which future studies should explore. The sample was predominantly cisgender male and middle aged, which may constrain the self-reported health experiences represented in the dataset (e.g., fewer self-reported experiences of menstrual hygiene maintenance). Nevertheless, we also note several strengths of the current research. The measures of restroom access and restroom-related impediments to health were grounded in prior research, and the overall study approach was developed in the context of a community-based participatory research partnership, which centered the lived realities and needs of the participants. The structured interview format helped build rapport between researchers and participants, gave participants opportunities to seek clarification or elaborate upon responses, and generally minimized missing data on key variables. Although we aggregated health symptoms and conditions for the purposes of the quantitative analysis, we also report all self-report diagnosis, symptom, and disability data to increase knowledge on this underserved and understudied population.

## CONCLUSIONS

Future research should incorporate a standardized assessment of health conditions to improve measurement of the associations between restroom access and health, and incorporate more data (e.g., increasing inclusion of PEH with different lived experiences, geographic diversity, different restroom policy environments) to better understand how different and shared experiences with restroom access shape health among diverse PEH. Restrictions, lack of cleanliness and inadequate facilities in public restrooms, and open defecation were all associated with worse urinary, gastrointestinal, and dermatological health outcomes among PEH. It is highly unlikely that open defecation is a volitional choice, and as implied by the open-response data, such behavior is likely a result of restroom avoidance (i.e., due to gatekeeping, or physical/health safety concerns). Removing restrictions (e.g., security guards, increasing hours of operation), providing new restroom facilities, or improving available restroom facilities could potentially alleviate perceived restroom-related impediments to health among PEH and reduce instances of open defecation. Based on the myriad results highlighted, particularly regarding stigma, future work should also explore how increasing restroom access alongside other necessary WaSH-related services for PEH, such as laundry services, provision of menstrual products, and sharps and biowaste disposal, contributes to PEH's health and overall social and economic mobility.

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## DATA AVAILABILITY STATEMENT

Data cannot be made publicly available; readers should contact the corresponding author for details.

## CONFLICT OF INTEREST

The authors declare there is no conflict.

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