



Original Article



Self-Reported Personal Hygiene Practices and Associated Factors among Prison Inmates in a Jail in Pakistan

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ABSTRACT

Prison inmates are a vulnerable population with increased risk of exposure to poor water, sanitation, and hygiene (WASH) conditions, which raises communicable diseases. **Objective:** To determine self-reported personal hygiene practices and associated factors among inmates in Nara Jail, Hyderabad. **Methods:** This institution-based cross-sectional observational study was conducted at Nara Jail, Hyderabad (November 2025–January 2026). Ninety-one inmates were selected through simple random sampling. Data were collected using a structured interviewer-administered questionnaire and a standardized observational checklist adapted from WHO WASH guidelines. Associations were analyzed using Chi-square or Fisher's exact tests, with statistical significance set at $p < 0.050$. **Results:** Although 96.7% of inmates acknowledged the importance of soap use, only 40.7% had prior awareness of formal WASH practices, and nearly all reported the absence of hygiene education during incarceration. While 94.5% reported handwashing after toilet use, 23.1% relied solely on water. Direct observation identified poor hygiene conditions, including unclean fingernails (42.9%) and visible dermatological conditions (31.9%). Poor fingernail hygiene was significantly associated with recent gastrointestinal morbidity ($p < 0.050$). **Conclusions:** There were significant gaps in formal WASH knowledge, institutional hygiene support, and observed hygiene conditions among prison inmates. Structural deficiencies in prison WASH infrastructure and lack of institutional health education contribute to preventable health risks, highlighting the need for evidence-based prison health reforms in Pakistan.

INTRODUCTION

Maintaining personal hygiene is a fundamental determinant of health and human dignity. It includes appropriate hand hygiene, safe water use, bathing, oral care, nail and hair cleanliness, and the use of clean clothing [1]. Adequate hygiene practices are essential to prevent communicable diseases, particularly those transmitted through fecal-oral routes, such as diarrhea, vomiting, skin

infections, and parasitic infestations [2]. In overcrowded and resource-limited environments, maintaining recommended hygiene behaviors becomes challenging, increasing the risk of infectious disease transmission and adverse health outcomes [3]. Prisons and jails are internationally recognized as high-risk institutional settings where overcrowding, limited infrastructure, and



inadequate access to water, sanitation, and hygiene (WASH) services compromise inmate health [4]. Globally, more than 10 million individuals are incarcerated, and this number continues to rise [5]. Although international standards such as the United Nations Standard Minimum Rules for the Treatment of Prisoners (Nelson Mandela Rules) emphasize adequate sanitation and healthcare services, implementation remains inconsistent, particularly in low- and middle-income countries (LMICs) [6]. Overcrowded cells, insufficient water supply, shared sanitation facilities, and limited access to hygiene materials create environments conducive to the rapid spread of communicable diseases [7]. Evidence from LMICs and Asian countries indicates that prison populations experience disproportionately higher rates of infectious diseases compared to the general population [8]. Studies conducted in Ethiopia and India have reported suboptimal hygiene practices and limited institutional WASH support among inmates [9, 10]. Research further highlights discrepancies between self-reported hygiene practices and directly observed hygiene conditions, often influenced by structural constraints and restricted access to hygiene supplies [11]. In Pakistan, prison health remains an under-researched public health issue. Reports indicate overcrowding, unsafe drinking water, and inadequate sanitation services in several prisons [12-14]. However, empirical data assessing personal hygiene practices and their association with health outcomes among Pakistani inmates remain scarce. By generating local evidence, this study provides a rationale for strengthening prison-based WASH infrastructure, institutional hygiene education programs, and policy-level interventions to protect inmate health and uphold human dignity.

Despite increasing global recognition of prison health as a public health priority, there is limited context-specific evidence from Pakistan examining both self-reported and directly observed hygiene practices and their association with recent morbidity. Most existing research in Pakistani prisons focuses primarily on tuberculosis and mental health, with limited attention to routine hygiene behaviors and WASH-related determinants. Therefore, this study was conducted to address this research gap. This study aimed to assess self-reported personal hygiene practices and their associated factors among prison inmates in a jail in Pakistan. Specifically, the objectives were to evaluate WASH-related knowledge, examine observed hygiene conditions, and determine their association with recent gastrointestinal morbidity.

METHODS

This cross-sectional observational study was conducted at Nara Jail, Hyderabad, Pakistan, from November 2025 to January 2026. Approval from the Ethical Review

Committee (ERC) was obtained from Liaquat University of Medical and Health Sciences (LUMHS), Approval No. LUMHS/REC/-872; dated 8th July 2025) before the data collection. Permission was also obtained from jail authorities. Participation was voluntary, and written or verbal informed consent was obtained from all eligible inmates. The sample size was calculated using the RaoSoft sample size calculator, and after adding a 10% allowance for non-response, the final sample size was 91 inmates. Simple random sampling was used to select participants from the official inmate list provided by jail administration. Inmates aged 18 years and above, incarcerated for at least four weeks, and willing to participate were included. Those who were critically ill, unable to communicate, or refused consent were excluded. Data were collected using two tools: a structured interviewer-administered questionnaire and a direct observational hygiene checklist. The questionnaire was developed based on the World Health Organization (WHO) guidelines on water, sanitation, and hygiene (WASH) in institutional settings and adapted from previously published prison hygiene assessment studies [15]. Thus, the questionnaire represents a standardized and validated tool for assessing WASH knowledge and practices. The tool was translated into Sindhi and Urdu and reviewed by public health experts for content validity. Two trained data collectors conducted face-to-face interviews in designated private areas within the prison to maintain confidentiality and minimize reporting bias. The questionnaire consisted entirely of structured closed-ended questions; no open-ended questions or qualitative interviews were conducted. Hygiene practices were assessed using a structured observational checklist, and data collectors were trained to follow standardized procedures to minimize observer bias. The questionnaire comprised three sections. The first section included sociodemographic and incarceration-related variables such as age, marital status, residence (urban/rural), education level, occupation before imprisonment, income before imprisonment, duration of incarceration, and number of inmates per cell. The second section assessed WASH-related knowledge and self-reported hygiene practices, including daily water consumption, access to toilet facilities, waiting time, availability of hygiene materials, frequency of handwashing before meals and after toilet use, materials used for handwashing, bathing frequency, clothes washing practices, and oral hygiene practices. Responses were recorded in categorical formats (Yes/No, Always/Sometimes/Never). Based on predefined criteria aligned with WHO hygiene standards, self-reported hygiene practices were categorized as adequate or inadequate. No Likert scale was used. The third section consisted of a structured observational checklist

assessing visible hygiene indicators such as cleanliness of clothes, hair, fingernails, teeth, and feet, and the presence of lice or visible skin conditions. Observations were recorded at the time of the interview without interfering with routine activities. Recent gastrointestinal morbidity was assessed through self-reported episodes of diarrhea and vomiting during the preceding two weeks.

Data were entered and analyzed using SPSS version 29.0. Descriptive statistics, including frequencies, percentages, and mean $\pm$ standard deviation, were used to summarize the variables. Associations between hygiene practices and selected variables were examined using Chi-square tests. Chi-square tests were applied where the assumptions of the test were met (i.e., expected cell counts ≥ 5 in at least 80% of cells), while Fisher's exact test was used in comparisons with small cell sizes to ensure accurate statistical inference. A p-value < 0.050 was considered statistically significant. Due to the relatively small number of outcome events, the assumptions required for reliable multivariable regression analysis (minimum events per variable) were not met; therefore, adjusted analysis was not performed.

RESULTS

A total of 91 inmates participated in the study. The mean age of participants was 35.5 ± 12.9 years. The mean duration of imprisonment was 5.6 ± 12.3 months, and inmates shared cells with a mean of 60.6 ± 26.5 individuals. All participants were male. Most inmates were married (66.7%) and resided in urban areas before imprisonment (71.4%). More than half had primary education or below, whereas 19.8% had attained college-level education or above. Before imprisonment, the majority were engaged in informal or miscellaneous occupations (61.5%). Sociodemographic and incarceration-related characteristics are presented, Table 1.

Table 1: Sociodemographic and Imprisonment-Related Characteristics of Inmates (n=91)

Variables	n (%)
Marital Status	
Single	39 (33.3%)
Married	60 (66.7%)
Education Status	
Illiterate	23 (25.3%)
Primary	31 (34.1%)
Secondary	19 (20.9%)
College and above	18 (19.8%)
Occupation Before Imprisonment	
Civil Servant	12 (13.2%)
Farmer	11 (12.1%)
Private Worker	12 (13.2%)
Other	56 (61.5%)

Daily Income Before Imprisonment (PKR)	
100-700	18 (19.8%)
701-1000	27 (29.7%)
1001-1500	20 (22.0%)
1501-2500	26 (28.6%)
Residence	
Urban	65 (71.4%)
Rural	26 (28.6%)

Although 97.8% of inmates recognized the importance of handwashing after toilet use and 96.7% believed that soap reduces disease transmission, only 40.7% had heard of formal WASH practices. Nearly all participants (96.7%) reported not receiving hygiene education during incarceration. While 94.5% reported always washing hands after toilet use, 23.1% relied solely on water without soap. Daily bathing was reported by 84.6% of inmates; however, only 34.1% brushed their teeth daily. Safe water intake was inadequate, with 95.6% consuming less than 2 liters per day, Table 2.

Table 2: WASH-Related Knowledge and Self-Reported Hygiene Practices (n=91)

Variables	n (%)
Heard About WASH	
Yes	37 (40.7%)
No	54 (59.3%)
Received Hygiene Education in Prison	
Yes	3 (3.3%)
No	88 (96.7%)
Water Consumption	
< 2 Liters/Day	87 (95.6%)
≥ 2 Liters/Day	4 (4.4%)
Handwashing After Toilet	
Always	86 (94.5%)
Sometimes	5 (5.5%)
Handwashing Material	
Water Only	21 (23.1%)
Water and Soap	70 (76.9%)
Daily Bathing	77 (84.6%)
Daily Tooth Brushing	31 (34.1%)

Only 63.7% of inmates had hygienic clothing, while 42.9% had dirty fingernails. Clean teeth were observed in just 54.9% of participants. Signs of lice infestation were present in 12.1%, and 31.9% showed visible skin conditions, including scabies. Regarding morbidity, 9.9% of inmates reported experiencing diarrhea in the preceding two weeks, and an equal proportion reported vomiting during the same period, Figure 1.

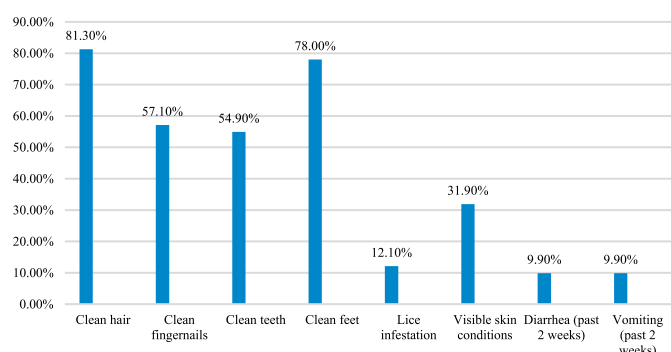


Figure 1: Observed Hygiene Status and Recent Illness Among Inmates (n=91)

The association between selected sociodemographic variables and awareness of WASH practices was examined using Chi-square and Fisher's exact tests where appropriate. No statistically significant association was observed between age group, occupation, or daily income and WASH awareness ($p > 0.050$). However, educational status was significantly associated with WASH awareness ($p = 0.030$), with inmates having secondary education or above being more likely to have heard of WASH practices, Table 3.

Table 3: Association Between Sociodemographic Characteristics and Awareness of WASH Practices (n=91)

Variables	Category	Heard About WASH, n (%)	Not Heard, n (%)	p-value
Age Group	≤ 35	19 (41.3%)	27 (58.7%)	0.890
	> 35	18 (40.0%)	27 (60.0%)	
Education Status	Illiterate/Primary	24 (34.8%)	45 (65.2%)	0.030*
	Secondary and above	13 (59.1%)	9 (40.9%)	
Occupation	Civil Servant	6 (50.0%)	6 (50.0%)	0.910
	Farmer	4 (36.4%)	7 (63.6%)	
	Private Worker	5 (41.7%)	7 (58.3%)	
	Other	22 (39.3%)	34 (60.7%)	
Income (PKR)	100-700	7 (38.9%)	11 (61.1%)	0.980
	701-1000	11 (40.7%)	16 (59.3%)	
	1001-1500	9 (45.0%)	11 (55.0%)	
	1501-2500	10 (38.5%)	16 (61.5%)	

There was no statistically significant association between daily water consumption and recent diarrhea or vomiting ($p = 0.498$). Although all reported cases occurred among inmates consuming less than 2 liters per day, this difference did not reach statistical significance, Table 4.

Table 4: Association Between Daily Water Consumption and Recent Morbidity (n=91)

Water Consumption	Diarrhea Yes, n (%)	Diarrhea No, n (%)	Vomiting Yes, n (%)	Vomiting No, n (%)	p-value
< 2 L/day	9 (10.3%)	78 (89.7%)	9 (10.3%)	78 (89.7%)	0.498
≥ 2 L/day	0 (0.0%)	4 (100%)	0 (0.0%)	4 (100%)	

Fisher's exact test demonstrated a statistically significant association between observed fingernail cleanliness and recent gastrointestinal morbidity. Inmates with unclean

fingernails had higher odds of diarrhea compared with those with clean fingernails (OR = 2.97, 95% CI: 0.69-12.7). A similar pattern was observed for vomiting (OR = 2.97, 95% CI: 0.69-12.7). However, the confidence intervals were wide, reflecting the small number of cases, and included unity, indicating that the estimates should be interpreted with caution, Table 5.

Table 5: Association Between Observed Fingernail Cleanliness and Recent Morbidity (n=91)

Fingernail Cleanliness	Diarrhea Yes, n (%)	Diarrhea No, n (%)	p-value	Vomiting Yes, n (%)	Vomiting No, n (%)	p-value
Not Clean (n=39)	6 (15.4%)	33 (84.6%)	0.004	6 (15.4%)	33 (84.6%)	0.003
Clean (n=52)	3 (5.8%)	49 (94.2%)		3 (5.8%)	49 (94.2%)	

DISCUSSION

This study assessed hygiene practices, WASH-related knowledge, and associated factors among prison inmates in Pakistan using both structured self-reported measures and direct observation. The demographic profile of inmates in this study is consistent with recent prison-based research conducted in low- and middle-income countries (LMICs), where incarcerated populations predominantly consist of young to middle-aged males with low to moderate educational attainment [10, 11]. More than half of the inmates had primary education or below and were engaged in informal occupations before imprisonment. Overcrowding was evident, with inmates sharing cells with a large number of individuals. Similar patterns of overcrowding and institutional constraints have been reported in contemporary prison health studies, emphasizing structural limitations within LMIC correctional facilities [14]. A key finding of this study was the discrepancy between self-reported hygiene practices and directly observed hygiene conditions. Although most inmates reported frequent handwashing and bathing, direct observation revealed substantial levels of poor fingernail hygiene, dental hygiene deficiencies, and visible skin conditions. Comparable inconsistencies between reported and observed hygiene behaviors have been documented in prison settings in South Asia and Africa [12, 13]. Such differences may reflect social desirability bias inherent in self-reported data, as well as structural barriers including limited access to water, hygiene materials, and sanitation facilities [14]. Despite high awareness of handwashing after toilet use and the role of soap in disease prevention, formal awareness of WASH as a structured public health concept was limited. Nearly all inmates reported not receiving hygiene education during incarceration, indicating the absence of organized prison-based health promotion programs. Similar findings have been reported in recent prison health literature, where informal hygiene knowledge was not supported by institutional education initiatives [15, 16]. Water access

was critically inadequate, with nearly all inmates consuming less than two liters per day, below recommended minimum standards for drinking and personal hygiene. Although no statistically significant association was observed between water consumption and recent gastrointestinal morbidity, uniformly low water availability may have reduced variability and limited the ability to detect meaningful statistical associations. International WASH research consistently emphasizes that inadequate water access fundamentally compromises hygiene practices and infection prevention in institutional settings [7, 17]. Educational status demonstrated a significant association with awareness of WASH practices, supporting evidence that education influences health knowledge and preventive behaviors [14]. However, education was not associated with observed hygiene practices, reinforcing the understanding that institutional conditions often supersede individual-level determinants within correctional settings. The study also found a statistically significant association between observed fingernail cleanliness and recent gastrointestinal morbidity. Although the number of morbidity cases was small, inmates with unclean fingernails showed higher proportions of reported diarrhea and vomiting. However, multivariable analysis to adjust for potential confounders such as education level, overcrowding, and duration of imprisonment was not performed due to the limited number of outcome events, which may influence the observed associations. Poor nail hygiene may facilitate fecal-oral transmission of enteric pathogens, particularly in overcrowded environments with shared sanitation facilities. Recent intervention-based evidence has demonstrated that improved hand hygiene significantly reduces diarrheal episodes in high-density living conditions [18]. Furthermore, contemporary systematic reviews continue to identify inadequate hand and nail hygiene as a major contributor to diarrheal disease burden in institutional settings [19, 20]. Overall, the findings reinforce emerging evidence that prisoners' health outcomes are primarily shaped by institutional determinants rather than individual awareness alone. Without adequate WASH infrastructure, hygiene materials, and structured health education programs, improvements in inmate health remain limited.

This one-center study in the NARA Jail, Hyderabad, restricts the generalization to other prisons in Pakistan that may vary in their overcrowding levels, resources, and geographical location. The cross-sectional design does not allow developing causal associations between hygiene practices and morbidity outcomes. Future studies will need to involve water quality testing of bacteriological contamination, microbiological stool testing and will have

to measure other consequences like skin infections and parasitic infestations. Female prisons should also be considered in studies to investigate gender-specific hygiene requirements.

CONCLUSIONS

This study demonstrates that although prison inmates in Pakistan possess basic awareness regarding hygiene practices, significant institutional deficiencies in WASH infrastructure and hygiene education persist. The discrepancy between self-reported and observed hygiene conditions, along with the association between poor fingernail hygiene and recent gastrointestinal morbidity, highlights the urgent need for structured prison-based WASH interventions. Strengthening institutional water supply, sanitation facilities, hygiene material availability, and health education programs is essential to reduce communicable disease risks and improve inmate health outcomes.

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Authors' Contribution

Conceptualization: MN

Methodology: MN, FS, NN, FJ

Formal analysis: FS

Writing and Drafting: MN, H, NZ, ZQ

Review and Editing: MN, FS, NN, FJ, H, NZ, ZQ, SAN

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

All the authors declare no conflict of interest.

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