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Community Coping Strategies for Protecting Health During Waterlogging Disasters: A Sociological Perspective from the Indus River Region of Sindh

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ABSTRACT

Waterlogging is a recurring public health and environmental challenge in the lower Indus River region of Sindh, where stagnant water creates widespread health risks and disrupts daily life. This study examines the coping strategies adopted by local communities to protect their health during waterlogging disasters. A mixed-methods approach was employed, combining quantitative data from 300 households with qualitative insights from 30 interviews and focus group discussions. Quantitative findings show that diarrhea (71.3%), skin infections (59.3%), and malaria (52%) were the most commonly reported health problems. The most widely used coping practices included the use of ORS (72.3%), mosquito nets or coils (67.7%), and boiling drinking water (63%). Regression analysis revealed significant predictors of effective coping, including income level ($B = 0.21$, $p = 0.001$), education ($B = 0.17$, $p = 0.004$), social support ($B = 0.29$, $p < 0.001$), and access to healthcare ($B = 0.14$, $p = 0.030$), collectively explaining a meaningful proportion of coping effectiveness. Qualitative findings further indicated that community support, traditional remedies, economic hardship, and perceived government neglect strongly shape how residents respond to waterlogging. Overall, the study highlights the need for public health policies that integrate community knowledge, address structural barriers, and strengthen local resilience in disaster-affected regions.

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1. INTRODUCTION

Waterlogging is one of the most persistent environmental and social challenges affecting the lower Indus River region of Sindh (Haider et al., 2025). Each year, heavy rainfall, inadequate drainage systems,

and rising groundwater levels create prolonged stagnant water conditions that disrupt everyday life and pose serious health risks to local communities (Tian et al., 2025). Waterlogging not only damages agricultural land and housing structures (Tseng et al., 2025) but also creates ideal conditions for the spread of waterborne and vector-borne illnesses such as diarrhea, skin infections, malaria, and dengue (Khushi et al., 2024; Mertens et al., 2025). For rural populations with already limited access to healthcare infrastructure, these health threats become even more severe. As a result, understanding how communities themselves cope with these risks is crucial for improving public health outcomes and designing responsive disaster-management strategies (Buriro et al., 2025).

From a sociological perspective, community coping strategies are shaped by social networks, cultural norms, collective experience, and shared knowledge (Khoso et al., 2025; Shah, 2024). In the Indus River belt, where communities have historically lived close to flood-prone and waterlogged zones, people have developed unique informal practices to protect their health (Shah et al., 2020). These practices may include local methods of water purification, communal efforts to drain stagnant water (Khowaja et al., 2024), reliance on traditional healing systems, and the mobilization of extended family or neighborhood networks (White et al., 2009). Such coping mechanisms demonstrate the role of social capital and collective resilience in managing disaster-related stress and safeguarding community well-being (Ying et al., 2024; Asirvatham, 2024). Sociology therefore provides a useful lens for understanding not only what coping strategies exist but also how these strategies emerge, who participates in them, and how effective they are in minimizing health risks (Gale et al., 2016).

Moreover, waterlogging disasters expose structural inequalities related to poverty, sanitation, infrastructure, and healthcare access (Uzair et al., 2025). Many rural areas of Sindh lack proper drainage systems, safe drinking water sources, and functioning health facilities (Mahessar et al., 2015). These conditions force communities to depend heavily on self-help strategies rather than formal government support (Zaka et al., 2025). Vulnerable groups particularly women, children, the elderly, and low-income households face greater challenges during waterlogging because of reduced mobility, limited resources, and higher exposure to contaminated water (Arif et al., 2019). Studying community coping strategies therefore helps highlight which social groups are more at risk and how their needs can be integrated into long-term public health planning (Harris, 2016).

Recent research emphasizes that climate change is likely to increase extreme weather events, including intense rainfall and flooding, in South Asia (Khoso et al., 2024; Yadav, 2022). As these environmental pressures grow, community-based adaptation strategies become even more important (Forsyth, 2013). Understanding how people protect their health at the household and community level can inform both local government policies and national disaster risk-reduction frameworks (Malalgoda et al., 2016). This research, focused on the Indus River region of Sindh, aims to contribute to this emerging field by examining the everyday practices, behaviors, and collective actions that communities use to reduce health risks during waterlogging disasters. By exploring these strategies through a sociological lens, the study highlights the interconnectedness of environmental stress, public health, and community resilience (Khoso et al., 2022; Farooq, 2023). It also underscores the importance of integrating local knowledge into disaster-management policies (Bang, 2024). Ultimately, this research seeks to provide insights that can support more effective, culturally appropriate, and community-centered approaches to health protection in waterlogged regions.

Statement of problem

Communities living in the lower Indus River region of Sindh continuously experience the negative effects of waterlogging, a recurring environmental hazard that threatens both daily life and public health (Haider et al., 2025). Persistent stagnant water caused by heavy rainfall, weak drainage systems, and rising groundwater levels leads to increased exposure to contaminated water and a higher risk of diseases such as diarrhea, typhoid, malaria, and skin infections (Mishra, 2023). These challenges are intensified by deep-rooted structural problems, including poor sanitation facilities, limited access to clean drinking water, and inadequate healthcare services in rural areas (Jan et al., 2024). As a result, vulnerable groups particularly women, children, elderly individuals, and low-income households face

greater difficulties in managing health risks during waterlogging disasters (Cutter, 2017). Although local communities have developed their own informal coping strategies based on cultural norms, shared experiences, and social support networks, there is limited sociological research that explores how these strategies work, how effective they are, and which social groups benefit or remain disadvantaged (Bonevski et al., 2014). The absence of such understanding creates a major gap between community needs and government disaster-management policies (Palttala, 2012). Therefore, the central problem is the lack of systematic, sociologically grounded research on community health-related coping strategies during waterlogging disasters in Sindh (Bhutto et al., 2024) which restricts the development of effective, community-centered interventions for reducing health risks in these disaster-prone areas (Matharage et al., 2024).

Research Gap

Despite the recurring nature of waterlogging in Sindh's lower Indus basin and its severe public health implications, a significant knowledge gap persists. There is a lack of in-depth sociological inquiry into the informal and culturally-grounded coping mechanisms that communities themselves employ to mitigate health risks. Existing understanding remains limited regarding how social networks, shared knowledge, and collective experience concretely translate into protective health actions during these disasters. Furthermore, the differential access and effectiveness of these strategies across various social strata such as women, the elderly, and the economically disadvantaged are not sufficiently examined. This obscures the role of existing social inequalities in shaping resilience and vulnerability. Consequently, the intricate relationship between community-level social capital and health outcomes during environmental stress is poorly documented. The absence of this critical sociological perspective creates a disconnect between local realities and external interventions. Therefore, a systematic investigation is needed to document, analyses, and evaluate these indigenous coping practices. This will bridge the current gap and provide a foundation for designing equitable, culturally-sensitive, and effective public health and disaster-management policies that build upon, rather than overlook, community strengths.

2. METHODS

Study Design

The study will use a mixed-methods research design to investigate community coping strategies for health protection during waterlogging disasters in the lower Indus River region of Sindh. This approach combines both quantitative and qualitative methods to provide a thorough understanding of how communities respond to health risks. Quantitative methods will measure the prevalence and patterns of coping strategies across different demographic and socio-economic groups, while qualitative methods will offer in-depth insights into participants' experiences, perceptions, and motivations. By integrating these two approaches, the research aims to capture both measurable outcomes and the sociocultural context that shapes coping practices, which is essential for developing community cantered public health interventions.

Participant Recruitment

Participants were selected using a combination of purposive and stratified sampling techniques to ensure representation across age, gender, socio-economic status, and geographic location, including both rural and semi-urban settlements affected by waterlogging. First, the study area was stratified into three zones based on severity of waterlogging (high, medium, low. From each zone, villages were randomly selected. Within selected villages, households were chosen using systematic random sampling from local household lists. Special attention was given to vulnerable groups, such as women, children, the elderly, and low-income households, who face greater health risks during disasters. The quantitative component targeted 300 households, while the qualitative component included 40 in-

depth interviews and 6 focus group discussions. Participants were briefed on the study objectives and procedures, and informed consent was obtained prior to data collection to ensure ethical compliance.

Data Collection

Quantitative Data

Structured questionnaires were administered to selected households in areas of the lower Indus River region affected by waterlogging. The survey collected demographic details such as age, gender, education level, and household income. It also gathered information on the various coping strategies employed during waterlogging, including water purification, sanitation practices, use of mosquito nets, and traditional remedies, as well as the frequency of their implementation. Additional sections assessed participants' perceptions of the effectiveness of each strategy, access to healthcare facilities, and reliance on social support networks. A Likert scale ranging from 1 (not effective) to 5 (highly effective) was used to rate both preference and perceived efficiency of the coping strategies. Respondents were also asked about collective practices at the community level, such as joint drainage efforts or neighborhood assistance. This approach enabled the identification of commonly adopted strategies, differences across social and demographic groups, and overall patterns in community coping behaviors.

Qualitative Data

Semi-structured interviews were conducted with 40 participants from diverse age groups, genders, and socio-economic backgrounds to gain in-depth insights into coping with waterlogging. These interviews explored personal experiences, reasons for adopting particular health-protective strategies, challenges encountered, and perceptions of their effectiveness. Participants also discussed community-level practices, local cultural norms, and the use of traditional knowledge in managing health risks. Additionally, 6 focus group discussions were organized to capture shared experiences and collective coping mechanisms within communities. All interviews and FGDs were audio-recorded with consent, transcribed verbatim, and translated into English where necessary. The qualitative data complemented the survey findings by providing a nuanced understanding of social, cultural, and environmental factors influencing health-related behaviors during waterlogging disasters.

Data Analysis

Quantitative data were analyzed using SPSS version 26. Descriptive statistics (frequencies, percentages, means, standard deviations) were calculated for all variables. Chi-square tests were used to examine associations between socio-demographic factors and coping strategy adoption. Multiple linear regression analysis was performed to identify predictors of effective coping. For qualitative data, thematic analysis was conducted using NVivo 12. Transcripts were coded inductively, and emerging themes were identified, refined, and validated through researcher triangulation. The mixed-methods approach allowed for data integration at the interpretation stage, where quantitative and qualitative findings were compared and synthesized to provide a comprehensive understanding of community coping strategies.

Theoretical Framework

This study is grounded in the Social Capital Theory (Putnam, 2000) and Community Resilience Framework (Norris et al., 2008) Social capital theory helps explain how social networks, trust, and reciprocity within communities facilitate collective action and resource sharing during disasters. The community resilience framework provides a lens to understand how communities utilize their inherent strengths, adaptive capacities, and learning from past experiences to cope with and recover from environmental stressors like waterlogging. These theoretical perspectives guide the analysis of how social structures and community dynamics influence health-protective behaviours during waterlogging disasters.

Ethical Considerations

The study followed standard ethical procedures for research involving human participants. All respondents were clearly informed about the study's objectives, methods, and their voluntary role in participation. Informed consent was obtained from each participant. Confidentiality was guaranteed, and participants were reminded that they could withdraw from the study at any time without any consequences. The research instruments and procedures were reviewed and approved by the institutional ethics committee prior to data collection.

Limitations

This study has certain limitations. Some responses may be influenced by recall errors or social desirability bias, particularly regarding coping practices. The sample represents selected communities from the lower Indus River region, which may limit the generalizability of the findings to other districts of Sindh or Pakistan. The cross-sectional design limits causal inferences about the relationship between predictors and coping effectiveness. Future studies should include longitudinal designs, larger and more diverse samples across different geographic and socio-economic settings to enhance the broader applicability of the results.

3. FINDINGS AND DISCUSSION

TABLE 1: Socio-Demographic Characteristics of Respondents

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	158	52.7
	Female	142	47.3
Age Group	18–30 years	92	30.7
	31–45 years	121	40.3
	46–60 years	63	21.0
	60+ years	24	8.0
Education Level	No formal schooling	98	32.7
	Primary	87	29.0
	Secondary	66	22.0
	Intermediate+	49	16.3
Monthly Income (PKR)	< 20,000	119	39.7
	20,000–40,000	103	34.3
	41,000–60,000	52	17.3

The demographic table-1 highlights that the survey included 300 respondents who were nearly evenly split by gender, with males representing 52.7% and females 47.3%. The largest proportion of participants (40.3%) were aged 31–45 years, constituting the largest cohort. A notable finding from the education variable is that a majority of respondents (61.7%) had a primary level of education or less. Furthermore, the income distribution shows that most participants (74%) reported earning 40,000 PKR or less per month.

TABLE 2: Prevalence of Waterlogging-Related Health Problems

Health Problem	Frequency (n)	Percentage (%)
Diarrhea	214	71.3
Skin infections	178	59.3
Malaria	156	52.0
Dengue	87	29.0
Typhoid	102	34.0
Respiratory issues	131	43.7

The table-2 outlines the prevalence of various waterlogging-related health problems. Diarrhea was the most commonly reported issue, affecting a significant majority of respondents (71.3%). This was followed by skin infections (59.3%) and malaria (52.0%), indicating a high burden of these specific illnesses. Other notable health problems included respiratory issues (43.7%), typhoid (34.0%), and dengue (29.0%), collectively demonstrating a wide spectrum of health challenges associated with waterlogging in the affected area.

TABLE 3: Household Coping Strategies During Waterlogging

Strategy	Yes (%)	No (%)
Boiling water for drinking	63.0	37.0
Filtering water (cloth/sand/ceramic)	51.7	48.3
Use of ORS during diarrhea	72.3	27.7
Cleaning stagnant water around house	58.0	42.0
Use of mosquito nets/coils	67.7	32.3
Use of traditional remedies	48.0	52.0

Table-3 shows the use of Oral Rehydration Salts (ORS) during diarrhea episodes was the most widely adopted measure, reported by 72.3% of households. This was followed by the use of mosquito nets or coils (67.7%) and boiling water for drinking (63.0%), indicating a strong focus on preventing vector-borne diseases and waterborne illnesses. A majority of households also engaged in cleaning stagnant water around the house (58.0%) and filtering water using cloth, sand, or ceramic methods (51.7%), whereas the use of traditional remedies was the least common strategy, employed by less than half (48.0%) of the respondents.

TABLE 4: Perceived Effectiveness of Coping Strategies

Coping Strategy	Mean	SD
Boiling drinking water	4.21	0.92
Using mosquito nets/coils	4.03	1.01
Community drainage efforts	3.78	1.12
Health facility visits	3.64	1.21
Traditional healing practices	3.12	1.18

Table-4 shows that boiling drinking water emerged as the most effective coping measure, receiving the highest mean score (M = 4.21, SD = 0.92). This indicates that respondents strongly trust this method for reducing health risks during waterlogging. The use of mosquito nets or coils also showed high perceived effectiveness (M = 4.03, SD = 1.01), reflecting community awareness of vector control. Community drainage efforts received a moderate rating (M = 3.78, SD = 1.12), suggesting that while helpful, such collective actions may be inconsistent or limited by available resources. Visits to health facilities were rated slightly lower (M = 3.64, SD = 1.21), which may reflect challenges such as distance, cost, or limited availability of services in rural areas. Traditional healing practices received the lowest effectiveness rating (M = 3.12, SD = 1.18), indicating that although still used, these methods are generally viewed as less reliable compared to modern health-protective strategies.

TABLE 5: Community-Level Coping Practices

Practice	Frequency (n)	Percentage (%)
Joint cleaning/drainage drives	143	47.7
Sharing food/water supplies	119	39.7
Support from neighbors/relatives	187	62.3
Community health awareness sessions	68	22.7
Joint fumigation initiatives	54	18.0

Table-5 outlines community-level coping practices during waterlogging. The most common form of support reported was informal assistance from neighbors or relatives, utilized by 62.3% of respondents. Organized collective actions were also notable, with nearly half of the community (47.7%) participating in joint cleaning or drainage drives. Furthermore, practices like sharing food and water supplies were adopted by 39.7% of people. In contrast, more formally organized interventions such as community health awareness sessions (22.7%) and joint fumigation initiatives (18.0%) were less commonly reported practices.

TABLE 6: Barriers to Effective Coping During Waterlogging

Barrier	Frequency (n)	Percentage (%)
Limited access to clean drinking water	198	66.0
Lack of drainage systems	217	72.3
Poor access to healthcare	164	54.7
Financial constraints	182	60.7
Limited awareness of preventive measures	131	43.7

As identified in Table-6, the barriers to effective coping during waterlogging, the most frequently cited challenge was the lack of drainage systems, reported by 72.3% of respondents. This was closely followed by limited access to clean drinking water, a barrier for 66.0% of the population. Furthermore, financial constraints (60.7%) and poor access to healthcare (54.7%) were significant obstacles, while a considerable proportion (43.7%) also cited limited awareness of preventive measures as a hindering factor.

TABLE 7: Association Between Socio-Economic Status and Coping Strategy Adoption (Chi-Square Test)

Variable	χ^2 Value	df	p-value	Interpretation
Income level Boiling water	14.82	3	0.002	Significant association
Education level Use of mosquito nets	9.41	3	0.024	Significant association
Gender Participation in community efforts	5.33	1	0.021	Significant association
Age Use of traditional remedies	3.12	3	0.373	Not significant
Variable	χ^2 Value	df	p-value	Interpretation

The chi-square analysis presented in Table-7 reveals several significant relationships between socio-economic factors and the adoption of specific coping strategies during waterlogging. Notably, a significant association exists between higher income levels and the practice of boiling water for drinking (p=0.002), and similarly, education level is significantly linked to the use of mosquito nets or coils (p=0.024). Furthermore, gender shows a significant association with participation in community efforts (p=0.021). In contrast, the analysis found no significant association between a respondent's age and their use of traditional remedies (p=0.373).

TABLE 8: Regression Analysis Predictors of Effective Coping

Predictor	β (Coefficient)	Std. Error	p-value	Interpretation
Income level	0.213	0.061	0.001	Significant predictor
Education	0.168	0.058	0.004	Significant predictor
Social support	0.297	0.072	<0.001	Strong predictor
Access to healthcare	0.141	0.066	0.030	Significant
Gender	0.034	0.049	0.482	Not significant

Table-8 presents the results of a regression analysis identifying key predictors of effective coping. The analysis indicates that social support is the strongest and most significant positive predictor of an individual's coping effectiveness score ($\beta = 0.297$, $p < 0.001$). Furthermore, both higher income levels ($\beta = 0.213$, $p = 0.001$) and higher education levels ($\beta = 0.168$, $p = 0.004$) are also statistically significant predictors of better coping. Access to healthcare shows a significant, though comparatively weaker, positive relationship ($\beta = 0.141$, $p = 0.030$). In contrast, the analysis found that gender was not a significant predictor of coping effectiveness in this model ($\beta = 0.034$, $p = 0.482$).

TABLE 9: Themes Generated from Qualitative Analysis

Theme	Description	Example Response (Short & Non-identifying, in English)	Theme	Description
1. Collective Action & Social Support	Communities rely heavily on neighbors and relatives for help with drainage, food, and safety.	"In our village, everyone works together to remove the water."	1. Collective Action & Social Support	Communities rely heavily on neighbors and relatives for help with drainage, food, and safety.
2. Traditional Health Practices	Use of herbal remedies and local healers is common due to limited health facilities.	"People first try herbal and traditional treatments."	2. Traditional Health Practices	Use of herbal remedies and local healers is common due to limited health facilities.
3. Perceived Government Neglect	People feel abandoned and unsupported by local authorities.	"We receive very little support from the government."	3. Perceived Government Neglect	People feel abandoned and unsupported by local authorities.

4. Economic Hardship as a Major Barrier	Low-income families struggle to buy medicines, nets, or clean water.	"Because of poverty, we cannot afford many things we need."	4. Economic Hardship as a Major Barrier	Low-income families struggle to buy medicines, nets, or clean water.
5. Environmental Stress & Fear of Disease	Prolonged waterlogging creates anxiety and health concerns.	"Every year the water stays for long, and we fear more diseases."	5. Environmental Stress & Fear of Disease	Prolonged waterlogging creates anxiety and health concerns.

Table-9 reveals five central themes that characterize the community's experience during waterlogging. These include a strong reliance on collective action and social support among neighbors, the common use of traditional health practices due to limited access to formal healthcare, and a widespread sentiment of perceived government neglect. Furthermore, economic hardship is consistently identified as a critical barrier to obtaining necessary supplies, while the situation also generates significant environmental stress and a persistent fear of disease among residents.

Theme 1: Collective Action and Community Support as a Foundation of Coping

Respondents consistently highlighted the central role of collective action in managing the hardships caused by waterlogging. Many described how neighbors come together during difficult days to clear stagnant water, share resources, and provide emotional reassurance. Several participants emphasized that community cooperation feels like a protective shield, reducing stress and creating a sense of unity. One respondent shared that when drainage around homes becomes overwhelming, "everyone gathers to help, because no one can handle the water alone." Others pointed out that the simple act of working side by side brings comfort and strength, especially when official support is limited. These experiences reflect how social support becomes a crucial coping mechanism, transforming individual struggle into shared responsibility.

Theme 2: Reliance on Traditional Health Practices Amid Limited Healthcare Access

A significant number of respondents explained that traditional remedies remain a common choice, largely due to the limited availability of formal healthcare services in waterlogged areas. Participants described using herbal mixtures, home-based treatments, and advice from local healers to manage illnesses such as diarrhea, skin infections, and fever. One participant noted that during heavy waterlogging, reaching a hospital is difficult, making "traditional methods the first option we turn to." Others shared that these practices are not only familiar but also culturally trusted, passed down through generations. This reliance shows how traditional healing becomes both a necessity and a meaningful part of the community's coping culture.

Theme 3: Strong Sentiments of Government Neglect

Across interviews, respondents expressed a deep sense of disappointment toward government authorities, repeatedly stating that they feel overlooked during waterlogging disasters. Many described waiting for drainage machinery, health teams, or clean water supplies that rarely arrive on time if at all. One respondent commented that "we mostly help ourselves because no one from the government shows up when the water rises." Such perceptions contribute to frustration, helplessness, and distrust, reinforcing the belief that the community must depend on its own efforts. This sense of neglect strengthens community bonding but also highlights structural gaps in disaster management and public health services.

Theme 4: Economic Hardship as a Barrier to Effective Coping

Participants frequently described economic challenges as one of the biggest obstacles to protecting their health during waterlogging. Low-income households struggle to afford essential items such as clean drinking water, mosquito nets, medicine, or transportation to health facilities. One respondent explained that even when they know what preventive measures to take, "poverty stops us from doing what is right for our health." The financial strain becomes more intense when waterlogging damages homes or reduces income from daily-wage work. These accounts illustrate how economic insecurity restricts coping options, forcing families to depend on low-cost or less effective strategies.

Theme 5: Environmental Stress and Fear of Disease

Respondents described experiencing ongoing stress due to prolonged waterlogging and the constant threat of diseases like malaria, diarrhea, and skin infections. Many shared that stagnant water around their homes creates a feeling of unease, especially at night when mosquitoes increase. One participant expressed fear that "every year the water stays longer, and we worry about what diseases it will bring next." This persistent anxiety affects not only physical health but also emotional well-being. The anticipation of illness, combined with the uncertainty of how long the water will remain, intensifies psychological stress across households. This theme underscores how environmental conditions directly shape emotional and mental states during disasters.

Discussion

The findings of this study reveal that communities in the lower Indus River region of Sindh rely on a combination of household-level practices, community cooperation, and traditional knowledge to protect their health during waterlogging disasters (Khadim et al., 2022). The quantitative results demonstrated that waterlogging is strongly associated with a range of illnesses, with diarrhea, skin infections, and malaria emerging as the most prevalent health problems (Sharif et al., 2024). These outcomes reflect typical health risks observed in flood-prone rural environments, where stagnant water, poor sanitation, and limited healthcare access heighten vulnerability (Hussain et al., 2021). The widespread use of ORS, mosquito nets, and boiling water indicates that households prioritize low-cost and easily accessible preventive strategies (Khowaja et al., 2024). These practices also align with communities' perceptions of effectiveness, as boiling water and mosquito control methods were reported as the most effective approaches. This suggests that, even under resource constraints, households are aware of and actively use practices that meaningfully reduce health risks.

The results further demonstrate how socio-economic factors shape coping capacity. Statistical findings confirm that income, education, and social support significantly contribute to the adoption and effectiveness of coping strategies (Nadeem et al., 2025). Households with higher income levels and better education were more likely to engage in practices such as boiling water or using mosquito nets, reflecting the role of structural inequalities in determining who can protect themselves effectively. Social support emerged as the strongest predictor of coping effectiveness, highlighting the centrality of collective action in this region. These quantitative findings directly correspond with qualitative insights, where respondents consistently emphasized the importance of neighbor support, shared work, and joint drainage efforts (Ntontis et al., 2021). Thus, coping is not only an individual activity but a deeply social process grounded in strong community ties.

Despite these strengths, several barriers continue to restrict effective health protection. Limited drainage infrastructure, inadequate access to clean water, and financial constraints were repeatedly identified as major challenges (Janjua et al., 2021). The qualitative evidence adds further depth to this understanding, revealing strong sentiments of government neglect and the emotional strain caused by recurring environmental hazards. These themes show that coping capacity is not solely influenced by household knowledge or cultural practices but also by systemic gaps in infrastructure and institutional support (Bhutto et al., 2025). The reliance on traditional health practices reflects both cultural continuity and necessity, as formal healthcare becomes difficult to access during waterlogging. Although these remedies remain culturally meaningful, participants acknowledged their limitations compared to

modern treatment, which aligns with the lower perceived effectiveness reported for traditional practices (Sadique et al., 2025).

From a theoretical perspective, the findings support the relevance of Social Capital Theory in disaster contexts. The strong social networks and community cooperation observed in this study exemplify how bonding social capital (within communities) facilitates resource sharing and collective action during crises. Additionally, the Community Resilience Framework helps explain how communities draw upon their collective memory, adaptive capacities, and local knowledge to navigate waterlogging challenges. However, the limited bridging social capital (connections to external resources and institutions) is evident in the reported government neglect, suggesting that while communities are internally resilient, their connections to formal support systems are weak.

Overall, the findings demonstrate that community coping strategies are shaped by a combination of structural inequalities, cultural norms, and social relationships (Ullah et al., 2024). Households exhibit strong resilience through collective action and practical health-protective behaviours, yet their capacity is constrained by persistent institutional shortcomings. From a sociological perspective, this study underscores that community resilience is not merely a natural attribute but is produced through social networks, shared experience, and informal knowledge systems operating within broader structural constraints.

4. CONCLUSION

This study provides a comprehensive sociological understanding of how communities in the lower Indus River region of Sindh respond to the health challenges posed by recurring waterlogging. The findings show that households rely on a blend of practical preventive measures such as boiling water, using mosquito nets, ORS, and filtering water, coupled with strong community support and culturally rooted practices. These strategies demonstrate the adaptive capacity of local populations who navigate environmental stress with limited resources. However, the results also reveal that coping effectiveness is unevenly distributed, influenced significantly by socio-economic status, access to healthcare, and the availability of social support networks.

The qualitative themes further highlight feelings of government neglect, economic hardship, and emotional stress, pointing to deeper structural issues that shape vulnerability. While communities display strong internal resilience, their coping strategies are often compensatory responses to the absence of adequate public infrastructure and institutional support. Therefore, strengthening community health outcomes during waterlogging requires more than promoting individual behaviour change it demands systemic improvements in drainage facilities, water supply, healthcare accessibility, and public health outreach.

In conclusion, the study emphasizes the need for disaster-management and public health policies that build upon local knowledge while addressing structural inequities. By integrating community perspectives, supporting local collective action, and expanding access to essential services, government agencies and development organizations can create more effective, equitable, and culturally responsive interventions. Such efforts are critical for enhancing long-term resilience in waterlogged regions and protecting the health and well-being of vulnerable populations.

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