***Journal of Religion & Society* (JR&S)**
Available Online:
https://islamicreligious.com/index.php/Journal/index
Print ISSN: 3006-1296Online ISSN: 3006-130X
Platform & Workflow by: Open Journal Systems
https://doi.org/10.5281/zenodo.20558069

Health Challenges in the Wake of Floods: Evidence from Pakistan

Khadija Tariq Khan
Visiting Lecturer, Department of Social Work, University of the Punjab
Khadija.dsw@pu.edu.pk
Dr. Sonia Omer
Associate Professor, Department of Social Work, University of the Punjab, Lahore
Sonia.dsw@pu.edu.pk
Saad Siddique Khan
PhD Scholar, Department of Social Work, University of the Punjab, Lahore
saadsiddiquekhan123@gmail.com

Abstract
Among the most repeated and deleterious natural disasters in Pakistan are floods, with grave ramifications for community health, source of income and societal structures. The frequent floods aggravated by global warming, forest degradation and structural deficiencies have displaced several million, compromised health system, and developed environments enabling public health crises. This article analytically explores the health problems experienced by flood-impacted communities in Pakistan, contextualizing them within a wider context of South Asia where India, Bangladesh and Nepal experienced comparable climate-induced susceptibilities. This paper integrated academic literature, organizational documents and empirical case evidence by employing a narrative review method. Findings indicated interconnected challenges like communicable diseases, aggravation of non-communicable diseases, psychological breakdowns, child and maternal health challenges, insufficiency of food, structural dysfunctions in delivery of healthcare. This article assert that these consequences indicate not only environmental risks but also systemic disparities, ineffective disaster management, and budgetary insufficiency in healthcare. Analytical comparisons from adjacent nations demonstrate both common obstacles and prospective trajectories for resilience. Recommendations involve reinforcing disease scrutiny, allocating resources to climate responsive infrastructure of health, extending networks of community health workers, consolidating psychological well-being into crises response and integrating social justice in disaster risk readiness.

Keywords: *Environment Health, Health Policy, Climate Vulnerability, Community Resilience, Risk Assessment.*

Introduction
Floods represent a significant risk to the health and development of the Pakistani population, which has always been one of the most climate-prone countries in the world (Eckstein et al., 2019). Pakistan is located in South Asia, and it has agrarian economy that is expensive to maintain, due to dependence on monsoons, as well as the weak infrastructure, increases its vulnerability to hazards caused by the climate. Millions of residents were displaced; large fields of agriculture were flooded and health crises that lasted long after the water levels dropped due to the disastrous 2010 and 2022 floods (Government of Pakistan, 2022; UNOCHA, 2023). These cyclic occurrences shed some light on the intersection of environmental shocks and long-term gap in governance in

disaster management. The consequences of flooding on the health of the population far outlive instant harm or drowning loss of life. The post-disaster conditions contribute to the development of outbreaks of infectious diseases due to water pollution, lack of sanitation, and the development of health vectors ((National Institutes of Health - Pakistan & Center for Disease Control-(CDC-NIH), 2025). At the same time, displacement leads to the discontinuity of non-communicable health conditions, including diabetes and hypertension, and psychosocial stressor increases occurrences of mental health disorders (Yousuf et al., 2023). Vulnerable groups such as women, children, the elderly, and marginalized groups bear relatively higher costs, thus confirming the existing inequities. The study of the health consequences of floods in Pakistan is not only a national but also a regional necessity. In Bangladesh, India, and Nepal, the health crises caused by floods are also similar and therefore comparative analysis of these countries is required to put issues faced by Pakistan into perspective and identify lessons that can be transferred (Shrestha, 2015). With this in mind, this paper examines the problem of health among the people who have been affected by floods in Pakistan using the interdisciplinary approach where epidemiological, socio-political, and humanitarian approaches have been incorporated.

This research aims at achieving three objectives:

1. To determine and discuss the spectrum of health issues experienced by populations in Pakistan that have been affected by the floods.
2. To place these problems in context with the larger disaster-health literature of South Asia.
3. To present evidence-based recommendations that can be used to enhance health resiliency against frequent flooding.

This article contributes to academic, policy-making, and humanitarian debate on health risks in the face of climate through synthesizing existing research and institutional evidence.

Literature Review

Floods, Health and Vulnerability: Global and Regional Perspective

The disaster-health literature of the world highlights that floods are one of the deadliest and most common types of disasters that cause almost half of all weather-related crises that have been witnessed within the last 20 years (CRED, 2022). The health effects occur at several stages, such as a short-term trauma reaction, a medium-term explosion of infectious diseases, and a long-term aggravation of mental and chronic illnesses (Lee et al., 2020). In low- and middle-income nations, these stages are intensified by the poor state of infrastructure, the widespread poverty, and limited institutional capacity. South Asia, in particular, is specifically susceptible to this as it relies on the monsoons, there are numerous people residing within floodplains, and the governance is weak. Bangladesh is a highly studied area, and floods have been associated with cholera outbreak, malnutrition, and maternal death (Matsuyama et al., 2020). Bihar and Assam are the states in India that face frequent floods, which are linked to malaria and diarrheal outbreaks (Karmakar & Pradhan, 2019). The rural healthcare access is limited in Nepal, and floods make it worse especially among the mountain and Terai populations (Shrestha, 2015). Comparative research shows that, despite variations in particular health outcomes, the fundamental processes, which are the contaminated water, displacement, and services breakdown, are universal across the region.

Health Effects of Floods in Pakistan

With several decades of academic attention devoted to the topic of disaster health in Bangladesh, the academic literature on the same topic in Pakistan is comparatively smaller, but now it has significantly grown with the disastrous floods of 2010 and 2022. One area of interest has been the infectious disease burden, and several studies have reported acute watery diarrhea, cholera, malaria, and dengue cases surging in flood-affected communities, both of which are mainly caused by stagnant water, overcrowding in shelters, and the collapse of sanitation infrastructure (Arshad et al., 2022; Kirsch et al., 2012). Another theme of high importance has been maternal and child health because floods have affected the delivery and immunization programs and antenatal services, which have increased maternal and infant deaths, malnutrition issues in children have been known before, particularly during the 2022 floods (Sajid & Belvis, 2021; UNICEF, 2022).

Despite this, existing studies on mental health outcomes are growing, where post-traumatic stress disorder (PTSD), depression, and anxiety among disaster survivors are identified to be very common, and worsened by stigma and lack of mental health services in disaster environments (Bhutto & Suyuhan, 2025; Nimra et al., 2023). In line with these, it has been reported that a disaster such as floods greatly interrupts health systems in terms of hospitals, supply chains and health workers, as it occurred in the 2010 disaster where primary healthcare delivery in rural Sindh and Punjab failed and communities were left to the mercy of humanitarian aid (Shabir, 2013; Sherin, 2010).

Lastly, researchers emphasize that vulnerability and inequity significantly influence the health outcomes of floods in Pakistan, gender, socioeconomic status, and geography are key factors, women are systemically disadvantaged to access health services, and the limitations on services and delayed aid are prevalent among marginalized groups in such provinces as Sindh and Balochistan (Hashmi, 2012; Ochani et al., 2022).

Regional Experiences from Bangladesh, India and Nepal

The comparison studies with the neighboring countries in South Asia provide crucial information in explaining and reducing the health impacts of floods that occur in Pakistan. Bangladesh, a common paradigmatic example of case study in disaster management, has introduced community-based early warning systems and strengthened primary health-care systems that can efficiently decrease post-flood outbreaks of communicable diseases, especially cholera and diarrheal diseases as shown by Rahaman and Saba (2023).

Studies of the health outcomes related to flooding in India predict the co-morbidity of waterborne and vector-borne diseases, and, at the same time, highlight the systematic gaps in maternal and infant health, especially among marginalized communities (Gupta et al., 2021).

On the other hand, the topography of Nepal is mostly mountainous, which predisposes unique vulnerability characteristics, through which floods and landslides hinder the provision of health-care services in remote rural regions. However, the empirical experience of Nepal suggests that disaster reduction should be incorporated into decentralized health-system structures (Adhikari et al., 2019).

In the contexts under analysis, the empirical evidence points out that social inequities, which are limited by the classes, caste, and gender, increase the risks

of health, which is prevalent in Pakistan. Simultaneously, the case studies from region shows that governance with flexibility, investments in durable infrastructure of health, and community-focused readiness strategies can mitigate the health burden of disasters. Tactfully generalized, these lessons highlight not only the commonalities of the problems of climate-induced flooding in South Asia but also the opportunities of Pakistan to strengthen its health-system resilience by means of transnational transfer of knowledge.

Analytical and Theoretical Perspectives

In the literature, the need to put environmentally unsafe situations within contextual associations with structural susceptibility is emphasized. Wisner and colleagues (2004) still maintain the Pressure and Release (PAR) model as one of the most significant constructs defining the manner in which disaster is provoked by the combination of natural hazard and social susceptibility. Poverty, lack of governance, and gender inequities are some of the basic factors that can be explained by floods in the Pakistani context. Similarly, the analytical framework of One Health (the combination of human, animal, and environmental health) offers a strong analytic prism to evaluate the post-flood zoonotic risks of leptospirosis and wildlife-borne, including leptospirosis and vector-borne diseases (Destoumieux-Garzon et al., 2018).

Literature Gaps

Despite the growth in the range of literature on flood-related health issues in Pakistan, there are numerous gaps that remain in the available literature. Much of the available material is mostly descriptive and event-based and does not focus on longitudinal studies of the long-term health consequences, including chronic illness, disability, and intergenerational malnutrition. Mental-health considerations, especially, have not yet been properly investigated, few small-scale studies have been conducted as per the post-traumatic stress disorder, depression, and anxiety in the survivors with virtually no systematic review of the access to or effectiveness of the mental-health interventions.

Similar limitations are seen in maternal and child-health studies where limited researches have been done using disaggregated data in explaining how gender, socioeconomic, and rural-urban inequalities affect health. Also, there is little health-systems research on the topic in this environment, often not considering how governance weaknesses, financing gaps and inadequate institutional coordination contribute to disaster-related health vulnerabilities. Lastly, the number of comparative and cross-regional studies that situate the experience of Pakistan in the context of other South Asian and the global experience is also low, thus limiting the opportunities of policy transfer and adaptive learning.

The given research is expected to fill these gaps by providing an overall synthesis of health issues faced by flood-impacted population in Pakistan, placing these issues in a national and regional context, and highlighting systemic injustices that must be addressed with the help of policies in the nearest future. By doing so, it will add to a more holistic understanding of the disaster-health nexus and the provision of evidence-based recommendations on how to build the resilient and equitable health systems.

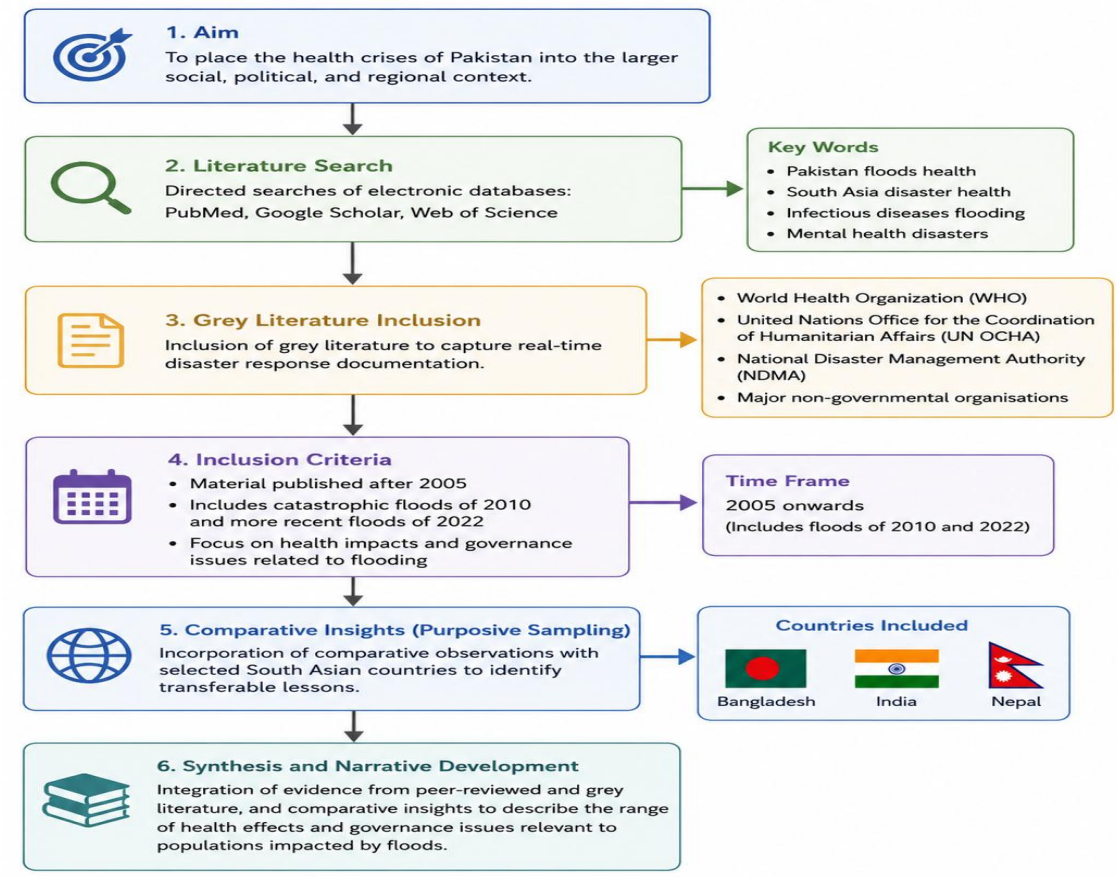
Methodology

The article is presented in the form of a narrative review. The style of the narrative is appropriate because the goal is not to gather epidemiological information, but to situate the health crises of Pakistan in a wider social, political and regional context. Directed search of electronic databases identified

the sources which included Pub Med, Google scholar and Web of science with key words as Pakistan floods health, South Asia disaster health, infectious diseases flooding and mental health disasters. Grey literature, including those reports made by the World Health Organization (WHO), the United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA), the National Disaster Management Authority (NDMA), and major non-governmental organisations, were included to make sure that real-time disaster response documentation was captured.

The inclusion criteria were very clearly defined and these specifically included the catastrophic floods of 2010 and further floods since 2010, such as those in 2022. Other lessons learnt through comparative observation with the countries of Bangladesh, India and Nepal were added where appropriate, following a purposive sampling process in order to provide some insights on what could be transferred. In spite of the fact that this strategy does not cover exhaustively, it encompasses the range of health effects and governance issues, which are relevant to populations impacted by floods (see Figure 1).

Figure 1: Methodology Framework



Findings

The results obtained after reviewing literature and case studies demonstrate the complex health issues that occur in the process and after significant floods in Pakistan. Such challenges can be conceptualised most effectively under five themes namely infectious diseases, maternal and child health, mental health, health system disruption, and vulnerability and inequity.

Infectious Diseases

The short-term and apparent effect of the flood in Pakistan has also been the rise of infectious diseases, especially waterborne and those that are transmitted by vectors. Stagnation of floods, polluted drinking water, and congested shelters are the favorable environments of cholera, acute watery diarrhea, hepatitis E, malaria, and dengue fever. In 2010, more than six million incidences of acute watery diarrhea were reported in the Sindh and Punjab provinces alone (Warraich et al., 2011). The same surveillance reports revealed post-floods in 2022 reported that malaria and dengue cases were up sharply especially in southern Sindh and Balochistan where stagnant water remained months on (WHO, 2022).

These epidemics overrun the local health institutions and contribute to the existing sanitation shortage. Although children below the age of five are the main victims of cholera and diarrhea, the heavy reliance of the adult population by the vector-borne diseases further increases household vulnerability, as it impacts income earners. Similar results are revealed in comparative studies of India and Bangladesh, where seasonal floods have a close relationship with enteric and vector-borne diseases (Kulinkina et al., 2016; Shimi et al., 2010). However, these nations have developed superior surveillance and prompt action mechanisms than Pakistan, in part, because greater resources have been invested in the community-based health programs. This opposition highlights the importance of improving epidemiological surveillance and control of vectors as the key elements of disaster health planning in Pakistan.

Maternal and Child Health

Rapid maternal and child health (MCH) is another area that is placed under extreme stress due to floods. Interruption of antenatal services, immunisation services and unskilled birth attendants are some of the factors that lead to maternal and neonatal deaths. The situation in 2010 in the flooded areas of Pakistan denotes the ignorance of numerous women who had to give birth in unhygienic conditions with no trained staff (UNFPA, 2011; Warsi & Mansoor, 2023). The floods in 2022 only aggravated these risks where it was estimated that over 600,000 pregnant women were reported in flood-impacted regions with many not even having access to the simplest reproductive health care services (UNFPA, 2022).

The health of children is also not safe, with food insecurity and destruction of farming livelihoods as well as disturbance of the supplementary feeding programmes increasing cases of malnutrition. The report by UNICEF (2022) showed the acute malnutrition cascading beyond emergency levels in some of the flood-affected districts of Sindh, on top of existing high levels of stunting and wasting. Comparative evidence on Bangladesh shows that targeted reproductive and child health interventions in times of floods (including mobile health teams, cold chains to store vaccinations, nutritional supplements) can go a long way in reducing the impact of floods in the long term (Shimi et al., 2010). The comparative lack of such formal interventions in Pakistan points to a vulnerability in disaster preparedness, whereby MCH outcomes are much prone to recurrence of crisis.

Mental Health

Floods have mental health outcomes that are not entirely considered, but they are also a very important and expansive problem. There is a high level of psychosocial disturbances that are associated with displacement, loss of livelihoods, property damage and bereavement. The post-traumatic stress

disorder (PTSD) prevalence, depression, and anxiety rates of women and children were reported to be high in small-scale studies conducted in Pakistan after the 2010 and 2022 floods (Nimra et al., 2023; Yousuf et al., 2023). However, in reality, these needs are not met at all due to stigma, untrained professionals and the fact that there are almost no psychosocial support services. The invisibility of mental health problems in the context of disasters creates the cycle of ignoring the psychological well-being of survivors thus negating recovery and resilience.

Nepal and Bangladesh, on the contrary, have had pilot community-based psychosocial support programs within flood-prone areas, proving that it is possible to build mental health services into more comprehensive disaster response strategies (Adhikari et al., 2019; Chaudhary et al., 2017; Ray-Bennett et al., 2021). The poor development in this area in Pakistan reflects an acute difference in the disaster health policy, which demonstrates the need to integrate mental health into emergency preparedness and response.

Health System Disruption

Flooding in Pakistan is a regular occurrence which creates massive havoc in the health system crippling service provision at a time when it is very much required. Damage of infrastructure, such as submerged hospitals, collapsed rural clinics and ruined transport routes hinders access and delivery of care. The 2010 floods in Sindh and Punjab almost brought down primary healthcare services delivery in the rural areas, compelling people to depend on humanitarian organizations as the main providers of basic services (Warraich et al., 2011). The 2022 floods also demonstrated the same frailty where health facilities in over ten percent became non-functional (World Health Organization, 2023).

The disruption of supply-chains also hindered the distribution of crucial medicines, vaccines and medical supplies and the overworking of frontline health workers further demonstrated chronic human-resource deficits. The case in India, including such disaster-prone states as Bihar and Assam, shows the effectiveness of pre-positioning medical supplies and building mobile health clinics, which will be capable of sustaining the necessary services in case of disaster (Gupta et al., 2021). Such measures have not been systematically institutionalised in Pakistan and thus its health system remains highly retractory and relies on international humanitarian assistance. Not only does this compromise the sovereignty of disaster response, but it also slows down the recovery efforts.

Vulnerability and Inequity

The root of all the health challenges mentioned above is the widespread aspect of vulnerability and inequity. Gender, socioeconomic status, caste, and geography determine the level of exposure and impacts that populations are exposed to floods. In rural Pakistan, women are systemically disadvantaged to access healthcare services, such as cultural limitations to mobility, lack of female health workers, and lack of reproductive health services (Hashmi, 2012). Equally, isolated groups of Sindh and Balochistan tend to receive aid late because of remoteness and inadequate infrastructure, thus contributing to the further entrenchment of disparity. Poverty also increases the health dangers since the households are not able to resettle, reconstruct or even to afford medical services.

Comparative knowledge supports the idea that the inequities are not particular to Pakistan but they are well rooted throughout South Asia. India and Bangladesh have caste and class hierarchies that provide post-disaster relief access to women based on their caste (Gupta et al., 2021), and gender norms and economic marginalisation limit health-seeking behaviours among women (Shimi et al., 2010). However, such policy innovations as women-oriented disaster relief programmes in Bangladesh indicate the opportunity to minimize gendered inequities. The relative lack of equity-oriented policies in Pakistan is a research gap and a policy blind spot that may restrict its ability to safeguard its most vulnerable groups in the case of floods.

Discussion

The current paper shows that the health impacts of flooding in Pakistan are complex, with infectious diseases, chronic illnesses, mental illnesses, maternal and child health, nutrition, and systemic derailments of health system being the implications. These dimensions are not to be understood as discrete entities but as syndemics that are interrelated to each other and reinforced in the framework of social vulnerability (Singer et al., 2017).

Structural Inequality and Vulnerability

In Pakistan, repeated disaster of health caused by floods highlight the key position of structural weaknesses that are deeply rooted and not isolated environmental risks. The combination of poverty, poor health facilities, sex disparities, and poor governance increases the effects of the disaster. Already affected by the lack of adequate health services, rural communities in Sindh and Balochistan always record high morbidity and prolonged patterns of recovery. Women and children side effects are pre-disposed due to limited mobility, lack of specialized services and cultural practices that restrict access to health care services (Hashmi, 2012). The observation is consistent with the Pressure-and-Release (PAR) model developed by Wisner and colleagues (2004) that theorises that disasters are a product of the severity of hazards compounded with some underlying vulnerability. In the Pakistani setting, the immediate precipitating factor is the flooding though the scale of subsequent health catastrophes is the result of the existing weaknesses in the health and governance sectors.

Lessons from South Asia

The similarities in misfortunes and countermeasures can be highlighted and compared with the similar evidence in Bangladesh, India, and Nepal. The implementation of community-based networks of health workers and early warning systems in Bangladesh has proved effective in reducing the number of mortality and morbidity due to floods despite the frequent occurrence of floods (Paul & Routray, 2011). The case of India on the investment in the surveillance of the epidemics that are spread by the vectors provides a relevant point of reference to the disjointed process of mosquito-borne epidemics in Pakistan (Karmakar & Pradhan et al., 2019). The experience of Nepal in involving local disaster preparedness committees demonstrates the potential of community ownership to enhance the resilience of resource-limited environments (Shrestha et al., 2015). According to the available literature, the following table is an overview of the health effects of flooding in Pakistan, Bangladesh, India and Nepal. It also emphasizes both similar problems and national specifics, as well as providing information about regional trends and lessons to Pakistan.

Table 1: Flooding and its health affect in South Asia: A comparison

Domain	Pakistan	Bangladesh	India	Nepal
Infectious Diseases	Frequent outbreaks of cholera, diarrhea, malaria, dengue; weak surveillance systems.	Strong cholera surveillance; rapid response to diarrheal disease outbreaks.	Vector- and waterborne disease surges in Bihar, Assam; stronger local response capacity.	Flooding exacerbates diarrheal diseases; outbreaks limited by smaller scale but hard to monitor in remote areas.
Maternal and child health	Severe disruption of antenatal care, deliveries, immunizations; high malnutrition rates post-flood	Mobile clinics and nutrition programs mitigate maternal/child risks.	Marginalized groups face care barriers; child malnutrition worsens post-disaster.	Access challenges in rural, mountainous regions; safe delivery services disrupted.
Mental health	High prevalence of anxiety, depression and PTSD.	Community-based psychosocial support integrated into disaster response.	Emerging recognition of psychosocial needs; limited formal services.	Pilot psychosocial interventions in disaster-prone rural communities.
Health system disruption	Floods damage hospitals, destroy supply chains, reliance on humanitarian aid.	Improved disaster-health infrastructure, though strained by major events.	Mobile clinics, prepositioned supplies used to maintain services.	Fragile system; rural access challenges amplified by floods/landslides.
Vulnerability and inequity	Gender, poverty, remoteness amplify health risks, marginalized groups face delayed aid	Gender-sensitive disaster programs reduce inequities.	Caste/class inequalities shape access to relief and healthcare.	Remote, rural populations highly vulnerable; limited government reach.

Taken as a whole, these lessons support the statement that technological interventions, such as applications of disease-surveillance, should be accompanied by corresponding social and institutional reforms, including decentralisation, community involvement, and fair distribution of resources.

Climate Change as a Multidimensional Risk

The climate change increases the vulnerability of Pakistan to floods. An example of how man-made global warming increases the health risks is the 2022 inundations, which could be attributed to unprecedented monsoon rainfall, increasing the number and severity of disasters (Government of Pakistan, 2022). It is predicted that extreme weather events will increasingly become common, and their effects will put a long-term strain on an already strained health infrastructure (Eckstein et al., 2019). Thus, the climate-health approach should be embraced. This requires incorporating health adaptation measures into the Nationally Determined Contributions (NDCs) in Pakistan under the Paris Agreement and investing in climate resilient health infrastructure, including raised facilities, renewable energy solutions and flood resistant supply chains.

Mental Health: The Move out of Margins and into Mainstream.

Marginalisation of mental health in the paradigm of response to a disaster in Pakistan is still visible. Despite the fact that it has been proven that high levels of PTSD and depression exist, mental health is often sidelined in comparison to life-saving measures that take priority. However, psychological trauma has an immense impact on the recovery patterns, stability within the family, and community integration (Nimra et al., 2023). In turn, the inclusion of the psychosocial support into disaster health planning should be considered as unavoidable, particularly, in the case of women, children, and frontline workers.

Policy and Governance Gaps

The disaster-health governance in Pakistan is featured by the fragmentation and chronic underfunding. The National Disaster Management Authority (NDMA) is faced by constant budgetary and human resource shortages and provincial authorities are characterized by heterogeneity in capacity. Humanitarian actors often coordinate with each other and become overlapping or circumvent local government, which weakens accountability (Hashmi, 2012). Learning through the case of Bangladesh disaster-health committees, Pakistan will have gained by institutionalising district-level disaster-health units, which would ensure the establishment of local leadership and the ability to integrate with primary-care systems.

Conclusion

In Pakistan, floods, especially the disastrous ones of 2010 and 2022 have shown how environmental risks, the vulnerability of the population to danger, and structural injustice are all connected. The reviewed evidence shows that the population affected by floods faces a complex range of health issues, including the acute outbreaks of waterborne and vectors-borne infections, as well as the interference with maternal and child health services, in tandem with malnutrition prevalence and the growing but underreported mental health problems. These effects are not evenly spread nor are they randomized hence highlighting the disproportionate effects on women, children, and marginalized populations that are placed in the countryside and marginal areas thus emphasizing the amplifying effect of social and structural inequalities on the health risks associated with disasters. Besides, a repeat of the breakdown of health facilities, supply chains and primary care services in times of floods underscores sustained capacity and governance gaps that undermine Pakistan disaster response.

Meanwhile, comparative experience in Bangladesh, India and Nepal suggests that other approaches to community-based preparedness, combined health response, and resilient infrastructural systems can be achieved in the context of similar socio-political and climatic conditions. The examples provided demonstrate that the extent of disaster-prepared health systems and early warning systems, as well as decentralized government, ought to be proactively invested in to reduce the magnitude of health crises after floods. In the case of Pakistan, mobilization of resources to meet the short-term relief is not the sole challenge, but rather the need to incorporate resilience and equity in the long-term health planning.

It is therefore important to address the gaps in the literature so as to contribute to scholarship and practice. Further studies should go beyond the description of the disaster effects so that they can include longitudinal, intersectional, and systems-level approaches that reflect the long-term health impacts of floods and the vulnerability-making processes created by social forces. Specifically, there is an urgent need to conduct systematic research on the topic of mental health, maternal and child health disparities, and governance failures. By sealing these loopholes, both scholars and practitioners can be in a better position to inform evidence-based measures that will enhance resiliency at the same time, tackle the underlying causes of vulnerability.

In the end, development of a health system that can withstand frequent flooding requires a paradigm shift i.e., shift of reactive and relief-oriented strategies to preventive and proactive and equity-based strategies. This change would involve investing in climate-resilient health systems, making disaster risk reduction a key part of the policy of public health, improving epidemic-prone disease surveillance, and making sure that gender and social inclusion are among the main pillars of disaster planning. It is equally significant to promote inter-regional learning and cooperation in South Asia, where vulnerability and climatic threat require regional solutions to resilience. With references to local and regional experiences, Pakistan can now trace a path toward a more reactive, equal, and sustainable health system one that helps not just to curb the most immediate crises but also to protect the well-being of its most vulnerable groups in the times of rapidly evolving climate change.

Recommendations

Integrated digital health platforms with real-time disease surveillance and reporting capabilities are needed to enhance the health system's ability to withstand climate-related disasters and disease outbreaks, and governments and public health authorities should prioritize the development of such platforms. These systems would facilitate the early warning and response to outbreaks, especially for diseases sensitive to the weather, like malaria and dengue. Furthermore, entomological surveillance should be carried out in high-risk areas to ensure complete surveillance of disease vectors. Additionally, there is a need for ongoing education of healthcare personnel for outbreak detection, disease monitoring, and emergency response preparedness to improve a coordinated response and faster interventions in emergencies, strengthening local health systems.

There is a need to strengthen the resilience of infrastructure by building and upgrading health facilities that are elevated and resistant to floods to ensure continuity of essential health services in the event of disaster in vulnerable areas. Back up renewable energy systems such as solar energy is also significant

to keep critical medical equipment running during a power outage. Moreover, the decentralization of warehouses to maintain sufficient stocks and speed the delivery of vital medicines, vaccines and medical supplies to affected communities during emergencies should be undertaken.

A community-based psychosocial first aid training program for volunteers and frontline workers should be incorporated into the disaster response system, with the aim of providing mental health support. Mental health clinics also need to be established in displacement camps and disaster-stricken communities in order to offer on-going counselling, psychiatric and psychosocial support services on a mobile basis. Concurrently, culturally responsive campaigns of awareness raising and destigmatization of mental health and professional assistance are required to help them seek professional assistance when necessary.

Maternal and child health needs need to be emphasized during emergencies. To ensure maternal and neonatal health during floods and other disasters, secure emergency delivery centers with skilled healthcare workers and midwives should be set up. Immunisation programmes should also be continued by the use of mobile health outreach workers to ensure vaccination coverage for mobile and inaccessible people. In addition, focused nutrition interventions for pregnant women, breastfeeding mothers and children under 5 years old should be implemented as these populations are at a higher risk of experiencing malnutrition during climate-related emergencies. Disaster monitoring systems should also incorporate nutrition surveillance systems to facilitate the identification and prompt support of vulnerable groups.

Governments should encourage climate sensitive and climate resilient farming systems to reduce the risks of climate-related disasters to food producers to mitigate the larger social and economic effects. Also, scaling up social protection measures such as cash transfer programs and livelihood support for those impacted by flooding is crucial to support resilience and recovery of the community. Institutional level, disaster health units at district level should be standardized and strengthened for better coordination, preparedness and emergency health service delivery. Further, it is recommended that the health component of the National Disaster Management Authority be strengthened by having more budget allocated, institutional assistance and increased intersectoral cooperation. Last but not least, there is a need to improve regional cooperation with neighbouring countries like Bangladesh, India and Nepal in terms of joint disease surveillance programmes, disaster-health training programmes, and regional emergency preparedness activities to build regional health security.

References

Adhikari, R. P., Shrestha, M. L., Acharya, A., & Upadhaya, N. (2019). Determinants of stunting among children aged 0–59 months in Nepal: Findings from Nepal Demographic and Health Survey, 2006, 2011 and 2016. *BMC Nutrition,* *5*(37). DOI: https://doi.org/10.1186/s40795-019-0300-0

Arshad, T., Wajahat, A., Jabeen, A., & Ali, S. H. (2022). Malaria and dengue outbreaks during a national disaster in Pakistan: A rising concern for public health. *Journal of Global Health, 12*, 03076. DOI: 10.7189/jogh.12.03076

Bhutto, S., & Suyuhan, W. (2025). The psychological impact of floods on mental health and well-being: A sociological investigation in District

Hyderabad, Sindh Pakistan. *International Journal of Asian Education and Psychology, 1*(2).
Chaudhary, P., Vallese, G., Thapa, M., Alvarez, V. B., Pradhan, L. M., Bajracharya, K., Sekine, K., Adhikari, S., Samuel, R., & Goyet, S. (2017). Humanitarian response to reproductive and sexual health needs in a disaster: The Nepal Earthquake 2015 case study. *Reproductive Health Matters, 25*(51), 25–39. DOI: https://doi.org/10.1080/09688080.2017.1405664
CRED. (2022). *2021 Disasters in numbers [Report].* Available at: https://www.cred.be/sites/default/files/CredCrunch66.pdf
Destoumieux-Garzón, D., et al. (2018). The One Health concept: 10 years old and a long road ahead. *Frontiers in Veterinary Science, 5*(14). DOI: https://doi.org/10.3389/fvets.2018.00014
Eckstein, D., Künzel, V., Schäfer, L., & Winges, M. (2019). *Global climate risk index 2020*. Bonn: Germanwatch, 1, 1-50. Available at: https://www.germanwatch.org/sites/default/files/20-2-01e%20Global%20Climate%20Risk%20Index%202020_14.pdf
Government of Pakistan. (2022). *PAKISTAN FLOODS 2022 Post-Disaster Needs Assessment MAIN REPORT.* https://thedocs.worldbank.org/en/doc/4a0114eb7d1cecbbbf2f65c5ce0789db-0310012022/original/Pakistan-Floods-2022-PDNA-Main-Report.pdf
Gupta, G., Singh, A., Dikid, T., Saroha, E., & Sodha, S. V. (2021). Acute diarrheal disease outbreak in Muzaffarpur Village, Chandauli District, Uttar Pradesh, India. *Indian Journal of Public Health, 65*(Supplement), S34–S40. DOI: 10.4103/ijph.IJPH_1111_20
Hashmi, N. H. N. (2012). A critical analysis of 2010 floods in Pakistan. *African Journal of Agricultural Research, 7*(7). DOI: https://doi.org/10.5897/ajarx11.036
Karmakar, M., & Pradhan, M. M. (2019). Climate change and public health: a study of vector-borne diseases in Odisha, India. *Natural Hazards, 102*(2), 659–671. DOI: https://doi.org/10.1007/s11069-019-03594-4
Kirsch, T. D., Wadhwani, C., Sauer, L., Doocy, S., & Catlett, C. (2012). Impact of the 2010 Pakistan floods on rural and urban populations at six months. *PLoS currents, 4*, e4fdfb212d2432.
Kulinkina, A. V., Mohan, V. R., Francis, M. R., Kattula, D., Sarkar, R., Plummer, J. D., Ward, H., Kang, G., Balraj, V., & Naumova, E. N. (2016). Seasonality of water quality and diarrheal disease counts in urban and rural settings in south India. *Scientific Reports, 6*(1), 20521. DOI: https://doi.org/10.1038/srep20521
Lee, J., Perera, D., Glickman, T., & Taing, L. (2020). Water-related disasters and their health impacts: A global review. *Progress in Disaster Science, 8*, 100123. DOI: https://doi.org/10.1016/j.pdisas.2020.100123
Matsuyama, A., Khan, F. A., & Khalequzzaman, M. (2020). Bangladesh public health issues and implications to flood risk reduction. *Public Health & Disasters* (pp. 115–128). DOI: https://doi.org/10.1007/978-981-15-0924-7_8
National Institutes of Health - Pakistan & Center for Disease Control-(CDC-NIH). (2025). *Advisory for the prevention and control of vector borne diseases during floods.* Available at: https://www.nih.org.pk/wp-content/uploads/2025/09/Advisory-vector-borne%20disease-during-floods-2025.pdf
Nimra, Khan, A. A., & Iqbal, A. (2023). Screening and management of posttraumatic stress disorder (PTSD) among flood victimized individuals in

2022: An intervention study. *Pakistan Journal of Social Research, 05*(01), 543–551. DOI: https://doi.org/10.52567/pjsr.v5i01.1375
Ochani, S., Aaqil, S. I., Nazir, A., Athar, F. B., Ochani, K., & Ullah, K. (2022). Various health-related challenges amidst recent floods in Pakistan: Srategies for future prevention and control. *Annals of Medicine and Surgery, 82*, 104667. DOI: https://doi.org/10.1016/j.amsu.2022.104667
Paul, B. K., & Routray, J. K. (2011). Flood proneness and coping strategies: The experiences of two villages in Bangladesh. *Disasters, 35*(1), 85–109. DOI: 10.1111/j.1467-7717.2009.01139.x
Ray-Bennett, N. S., Corsel, D. M. J., Goswami, N., & Bhuiyan, M. H. (2021). RHCC intervention: strengthening the delivery and coverage of sexual and reproductive health care during floods in Bangladesh. *International Journal of Human Rights in Healthcare, 14*(4), 327-347.
Rahaman, M. A., & Saba, Z. (2023). Capturing the effectiveness of early warning and sustainable community-based early action interventions for disaster risk reduction in Bangladesh. *In Handbook of Flood Risk Management and Community Action* (pp. 85–98). DOI: https://doi.org/10.1201/9781003315247-9
Sajid, O., & Bevis, L. E. (2021). Flooding and child health: Evidence from Pakistan. *World Development, 146*, 105477. DOI: https://doi.org/10.1016/j.worlddev.2021.105477Get rights and content
Shabir, O. (2013). A summary case report on the health impacts and response to the Pakistan floods of 2010. *PLoS Currents, 5*. DOI: https://doi.org/10.1371/currents.dis.cc7bd532ce252c1b740c39a2a827993f
Sherin, A. (2010). Flood related health issues in Pakistan. *KUST MEDICAL Journal, 2* (2). DOI: https://www.kmuj.kmu.edu.pk/article/view/7999
Shimi, A. C., Parvin, G. A., Biswas, C., & Shaw, R. (2010). Impact and adaptation to flood. *Disaster Prevention and Management an International Journal, 19*(3), 298–313. DOI: https://doi.org/10.1108/09653561011052484
Shrestha, S. (2015). Challenges and opportunities of public health research in Nepal. *Kathmandu University Medical Journal, 12*(1), 1–3. DOI: https://doi.org/10.3126/kumj.v12i1.13624
Singer, M., Bulled, N., Ostrach, B., & Mendenhall, E. (2017). Syndemics and the biosocial conception of health. *The Lancet, 389*(10072), 941–950. DOI: https://doi.org/10.1016/S0140-6736(17)30003-X
UNFPA. (2011). Pakistan flooding: One year later. *United Nations Population Fund*. Available at: https://www.unfpa.org/news/pakistan-flooding-one-year-later
UNFPA. (2022). Women and girls bearing the brunt of the Pakistan Monsoon floods. *UNFPA Pakistan.* Available at: https://pakistan.unfpa.org/en/news/women-and-girls-bearing-brunt-pakistan-monsoon-floods
UNICEF. (2022). *Insights from Pakistan Integrated and child-responsive early recovery assistance to address complex losses and damages following the 2022 floods.* Available at: https://www.unicef.org/innocenti/media/12166/file/UNICEF-Innocenti-CS-Pakistan-Report-2025.pdf
UNOCHA. (2023). Pakistan: 2022 Monsoon Floods - Situation Report No. 19 (As of 12 August 2023). *OCHA*. Available at: https://www.unocha.org/publications/report/pakistan/pakistan-2022-monsoon-floods-situation-report-no-19-12-august-2023

Warraich, H., Zaidi, A. K., & Patel, K. (2011). Floods in Pakistan: A public health crisis. *Bulletin of the World Health Organization, 89*, 236-237.

Warsi, A., & Mansoor, N. (2023). Floods in Pakistan; are pregnant women at a greater risk? *Journal of the Pakistan Medical Association, 73*(05), 1169. DOI: https://doi.org/10.47391/jpma.7941

Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2004). *At risk: Natural hazards, people's vulnerability and disasters* (2nd ed.). Routledge.

World Health Organization. (2023). *Impact in 2022: Pakistan*. Available at: https://www.who.int/emergencies/funding/health-emergency-appeals/2022/impact-in-2022/pakistan#:~:text=The%20devastating%20floods%20in%20Pakistan,urgent%20need%20of%20health%20assistance.

Yousuf, J., Mehmood, H., Aquil, S., Rija, A., Rahmat, Z. S., & Malikzai, A. (2023). Effects of floods on the mental health of Pakistanis: a commentary. *Annals of Medicine and Surgery, 85*(5), 2253–2255. DOI: https://doi.org/10.1097/ms9.0000000000000590