

Climate Change and Health Vulnerability in Korail and Rayer Bazar Slums, Dhaka, Bangladesh

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Research Article

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Abstract

Urbanization is accelerating, and climate change is becoming more severe, endangering environmental health in Dhaka's informal settlements, leaving communities such as Korail and Rayer Bazar particularly vulnerable to current and future threats. The aim of this study is to assess the climate-related health vulnerability in the Korail and Rayer Bazar slums and highlight how climate risks, environmental deprivation, socioeconomic vulnerability, and adaptive capacity interact to shape health risks in the Korail and Rayer Bazar slums in Dhaka. Relevant literature was searched in Scopus, Web of Science, PubMed, Google Scholar, and ScienceDirect. The time range of the articles searched in the databases ranged from 2002 to 2026. The review highlights the primary exposure pathways from climate change to increased risk of diarrheal disease, dengue and other vector-borne diseases, respiratory illness, cardiovascular strain, heat-related illness, social and psychological distress, and delayed healthcare seeking. Important differences were identified in these two settlements. Korail is comparatively better in terms of evidence, use of NGO services, and improved infrastructure support, but Rayer Bazaar has fewer climate-health research studies and is more dependent on informal coping mechanisms. Extreme climate hazards and a lack of water, sanitation, and hygiene infrastructure, combined with precarious socioeconomic conditions, create a disproportionately high health burden in Korail and Rayer Bazar that needs to be addressed through systemic urban upgrading and integrated vector management, both of which are essential to climate resilience.

1. Introduction

The most widespread understanding today is that climate change is becoming a critical public health threat which is affecting people and places differently. Climate change is a growing urban health concern because it changes the way people are exposed to heat, rainfall, water quality, flooding, service disruptions, and their ecological responses to vectors, and its effects on health are moderated by underlying vulnerabilities due to poverty, infrastructure gaps, and unequal health service and protection^{1,2}. In informal settlements, these risks are further exacerbated due to exposure and vulnerabilities being geographically clustered in areas where there is less access to safe sanitation, insecure housing, weak provision of formal services, and limited drainage^{2,3}. As a wider concern, this is a very topical issue for Dhaka, where huge growth in urban populations has occurred at a much faster pace than planned housing, drainage, sanitation, and even public health systems⁴⁻⁶.

Rapid migration from rural areas, demographic concentration, and uneven space development have led to the creation of one of the world's most unorganized, densely urbanized regions in Dhaka^{7,8}. Growth has been occurring alongside a significant increase in slums and other informal settlements, which provide shelter for a significant proportion of urban dwellers and are often situated on low-lying, marginal, vulnerable, and flood-prone areas⁹⁻¹¹. The long-term mapping and census activities in Dhaka have always demonstrated that rather than being a phenomenon on the outskirts of a city, informal settlements are indeed a major element of the metropolitan framework that has significant implications for exposure to environmental factors and health inequality^{12,13}.

The vulnerability of these settlements is determined by both exposure to climatic hazards and sensitivity, as well as the level of adaptive capacity. Characteristics of informal settlement types in Dhaka often include insecure housing, low water quality and poor drainage, shared or unsafe sanitation, limited health care services, weak waste management, and overcrowding^{14,15}. All these increase daily health risks and compound the impacts of extreme climate events on health. The association of poor sanitation, contaminated water, and crowded conditions with diarrheal disease, respiratory symptoms, skin conditions, and general physical vulnerability has been consistently observed in different research on Dhaka's slums community^{4,16,17}.

The relationship between climate change and disease is not a direct one but is a risk modifier. Bangladesh is witnessing the occurrence of higher temperatures, alteration of rainfall patterns, and an increase in climatic variability; Dhaka is seeing the effects of these and other factors that manifest themselves in urban settings, such as loss of wetlands, blockage of drainage, land-cover change, and heat retention^{18–20}. In Dhaka, the Urban Heat Island (UHI) effect has been aggravated due to urban expansion, and in some areas, the temperature has risen by several degrees compared to the surrounding zones^{4,8,21}. Hence, heat stress is influenced by both regional warming and local urban form, and the health impacts are significant for those who live in poorly ventilated homes with tin roofs, and also among outdoor and informal sector workers who have few places to rest during the daytime^{19,22,23}.

Additionally, flooding and waterlogging during the monsoon season due to the low-lying topography, encroachment on wetlands, and poor drainage systems cause contamination of the living environment and interference with mobility, services, and livelihoods^{7,20}. It has been observed that diarrhea, gastric disease, fever, cough, weakness, and poor mental health are correlated with flood and stagnant-water exposure in Dhaka's slums^{16,24}. The foundational epidemic evidence from Dhaka further indicates that floods can result in the rise of diarrheal disease, cholera, and that poor sanitation, unsafe water handling, low socioeconomic status, and poor hygiene further exacerbate the risk^{25,26}.

Dhaka's dense urban environment and the monsoon climate also provide certain conditions for the spread of Dengue. Dengue in Dhaka is not only a direct consequence of climate change but also due to the interplay of factors like temperature, humidity, timing of rains, waste management, rubbish, construction materials, shade, and very high population density^{23,27,28}. High temperature, high humidity, and increased rainfall can influence the breeding of the *Aedes*. As revealed in studies conducted in Dhaka, sources of productive breeding for the *Aedes* are tires, drums, refrigerator trays, parts of vehicles, flower tubs, materials that are used during construction work, and many of these are common in dense, low-income settlements of Dhaka^{23,27}. These same settlements are at risk for water insecurity, limited access to water, and other poor waste disposal systems, resulting in standing water and human contact with vectors⁷.

It is notable that respiratory and cardiovascular risks are less precisely quantified in Dhaka's slum specific studies. Existing studies show a variety of pathways leading to respiratory disease, Cardiovascular Disease (CVD), and allergic illness; a few relate to variable precipitation, stagnant weather, heat, air pollution, and flood-related disruption in Dhaka's slum community^{29–33}. There is evidence of an association between depression, anxiety, stress, and mental ill-health and exposure to floods and heat stress in Bangladesh, which are mediated by gender, poverty, housing, chronic morbidity, and social insecurity.^{22,34,35} For the residents of Dhaka's informal settlements, vulnerability to climate-health is thus context-dependent, arising from a combination of monsoon rainfall, urban density, vector ecology, housing materiality, drainage failure, lack of sanitation, limitations of health services and precarious livelihoods^{22,36}.

Although much literature exists on urban health, dengue, heat, informal settlement, and flood in Bangladesh, there does not seem to be systematic knowledge at the community level or comparative knowledge on the experience of exposures in cities and in specific Dhaka slums. Much of the research is focused on a specific hazard, on the city-wide pattern, or on a single settlement, and there are few comparative assessments of the harms and impacts of climate change on the health of communities of people in large slums^{2,4,37}. This gap is critical since vulnerability within cities and between settlements is different with respect to location, housing, drainage, water and sanitation facilities, connectivity of services, livelihood patterns, etc.^{2,9,38,39}. The need is now for a more integrated framework,

particularly for slum settlements where the components of exposure, sensitivity, and adaptive capacity are interrelated.

In the present study, this gap is being addressed by assessing the climate change exposure in the context of the climate hazard-environmental exposure- social vulnerability- health outcome nexus in Korail. First, an overall objective is to determine the interaction of climate-related hazards with each of the other elements in the system, like environmental conditions, socioeconomic vulnerability, infrastructure, and adaptive capacity that contribute to health risks in the two settlements. In particular, the manuscript aims to: (1) collate information on key climate-sensitive hazards that impact Dhaka's slum communities, (2) explain the appropriate exposure, sensitivity, and adaptive-capacity factors of Korail and Rayer Bazar, (3) discuss the key health risks and disease pathways that are vulnerable to climate, and (4) identify implications for urban climate adaptation.

2. Study Context

The research is set in the Dhaka division, an emerging megacity that has been highly influenced by high-density settlement, unplanned development, poor environment, socioeconomic, and spatial inequalities^{5,6,40}. Dhaka's urbanization has put a significant strain on the housing conditions, sanitation, waste management, drainage systems, and healthcare services, where informal settlements have grown into a major component of the metropolitan fabric^{4,6,10}. The major climate-related threats in this environment are extreme temperatures, excessive monsoon rains, urban flooding, waterlogging, and pollution that trigger poor drainage systems, sanitation breakdown, polluted water, housing material, waste accumulation, weak health services, and combine to create ongoing public health issues^{5,20,39,41}.

2.1 Korail slum

Korail is one of the largest informal settlements in Dhaka that has received ample attention due to its high population density, limited resources, and infrastructure, and is recognized as part of the city center^{15,39,42}. Recent evidence indicates that Korail covers approximately 100 acres with overcrowded housing, poor access paths, and is identified as being at high risk of waterlogging³⁹. There is a significant number of single rooms under a normal tin roof with common toilets and facilities that aggravate communicable disease and heat stress¹⁵. Studies comparing selected areas of Korail found that issues with water supply, drainage, sanitation, solid waste management, and hygiene have been recurrent, although the upgrading of infrastructure has led to improvements in water supply and other services in certain parts of the settlement⁴³. Nevertheless, land insecurity is an ongoing structural limitation, and waterlogging can affect hygiene behavior and the availability of access to all necessary service coverage^{39,43}.

2.2 Rayer Bazar slum

Another large settlement of low-income people is Rayer Bazar, which is situated in the Mohammadpur area of Dhaka, where low-income settlements with drainage problems, environmental stressors, sanitation, and waste are typical features of the urban fabric^{9,13,40}. There is also significantly less literature about Rayer Bazar than there is about Korail that has undergone direct peer review; that reflects an urge to recognize a fundamental gap in climate and health studies on this settlement³⁷. Rayer Bazar falls in the category of slum-dweller communities like other areas, which are densely populated settlements and lack adequate water, sanitation, waste management, and have limited access to health care facilities^{3,9}.

2.3 Comparative vulnerability context

For comparative research, Korail and Rayer Bazar are good locations as both sites are within the urban climate-sensitive system of Dhaka but are different in terms of difference in settlement morphology, infrastructure, environmental exposure, and access to services. Comparative design can aid in identifying the manner in which the common hazards of the city’s major slums are manifested at the community level in terms of exposure, sensitivity, and health vulnerabilities, which are lacking in the representation of Dhaka's climate-health literature ^{2,15,37}.

3. Methodology

3.1 Study Design

The study used a structured narrative review methodology for synthesizing evidence related to climate change, environmental exposure, health vulnerabilities, and adaptation for informal settlements (Korail and Rayer Bazar) in Dhaka, Bangladesh. The review was primarily focused on how climate-related hazards, environmental conditions, socioeconomic vulnerability, and adaptive capacity interact in determining health risks among people living in informal settlements. Evidence was synthesized based on the dimensions of exposure, sensitivity, and adaptive capacity, with particular emphasis on climate-sensitive pathways to health, vulnerable groups, health outcomes, and implications for adaptation and policy.

3.2 Literature Search Strategy

Scopus, Web of Science, PubMed, Google Scholar, and ScienceDirect were used for a comprehensive literature search. Publications from 2002–2026 were consulted, and most of the evidence selected was within the range of 2017–2026. The search strategy comprised words related to the objectives of this study: “climate change,” “health vulnerability,” “informal settlement,” “slum,” “Dhaka,” “Korail,” “Rayer Bazar,” “heat,” “flooding,” “waterlogging,” “WASH”, “dengue” and “environmental health”. Identified literature was analyzed as to its relevance to exposure to the environment, health risk, vulnerability, and adaptation in Dhaka's informal settlements on the basis of climatic context.

3.3 Eligibility Criteria

Table 1
Inclusion and exclusion criteria for evidence synthesis

Criterion	Inclusion	Exclusion
Publication Type	Peer-reviewed journal articles that have a verifiable DOI and theses.	Government reports, NGO Briefs, location websites, newspaper articles, and Wikipedia.
Geographic Scope	Korail, Rayer Bazar, Dhaka slums, Dhaka metropolitan area, Bangladesh.	Epidemiological studies conducted outside of Bangladesh that are not comparatively relevant.
Thematic Focus	Environmental Exposure, WASH, dengue, diarrheal diseases, heat stress, urban vulnerability, and climate hazards.	General clinical pathology, not related to climate change or specific to any slum driver.
Methodology	Observational cohort, RCTs (Randomized Controlled Trials), spatial GIS analysis, quantitative surveys, structured qualitative models.	Unverified Opinion pieces, data commentary.
Timeframe	Prioritizing the most recent data available for the period 2017–2026; very few sources are from 2002–2016.	Old epidemiological disease studies were substituted by new climatological models.

3.4 Data extraction and synthesis

Relevant information was extracted from the selected literature according to the objectives and conceptual framework of the review. The information extracted focused on climate and environmental hazards, exposure pathways, population characteristics, vulnerability factors, housing conditions, water, sanitation and hygiene (WASH), access to health services, health outcomes, adaptive-capacity characteristics, and reported adaptation and implications.

Descriptive and thematic evidence synthesis was performed. This focus included an examination of the interconnections between climate hazards, environmental exposure, social vulnerability, health impacts, and adaptive capacity. The findings were then structured to identify the similarities, differences, and gaps in settlement-level evidence on climate health in Korail and Rayer Bazar.

3.5 Study Selection

Literature retrieved in the selected databases was screened according to the objectives of the review and the context of the study. After relevance assessment, 65 peer-reviewed studies and theses were deemed acceptable for the final narrative synthesis. The evidence pieces selected for the study were then classified into major climate hazards, environmental pathways, health impacts, vulnerability, and adaptation measures.

4. Results

Table 2 summarizes all major climate-related hazards, environmental pathways, mechanisms of exposure, and possible impacts on health observed in slum communities of Dhaka. Results show that all the environmental hazards, like extreme heat, excess rainfall, waterlogging, flooding, air pollution, waste, and fecal contamination are interconnected. Stressors from these hazards can result in health risks due to the presence of heat, exposure to contaminated floodwaters, increased vector activity, chronic exposure to air pollution, and continuous exposure to contaminated water, surfaces, and food. Reported health impacts range from heat stress, dehydration, cardiovascular and respiratory diseases, diarrheal and waterborne diseases, dengue and other vector-borne diseases, to psychological stress.

Table 2
Climate hazards, environmental pathways, and potential health outcomes in Dhaka slum communities

Hazard	Environmental pathway	Exposure mechanism	Potential health outcome	Ref
Extreme heat and humidity	Urban heat island, tin housing, poor ventilation	Thermal stress in the indoor and outdoor environments for prolonged periods	Thermal stress, dehydration, cardiovascular stress, mental stress	22,44–46
Intense rainfall and waterlogging	Drain blockage, standing water, sanitation disruption	Contact with contaminated floodwater and unusable toilets	Diarrhea, cholera, typhoid, skin disease, psychosocial stress	22,47
Flooding and stagnant water	Breeding sites of Aedes in drains, containers, and waste	Rise of Aedes habitat around the home	Dengue and other vector-borne diseases	48–50
Air pollution and stagnant conditions	Traffic, dust, burning, industrial, and waste emissions	Chronic inhalation exposure	Respiratory disease, COPD, asthma, cardiovascular disease	51–53
Waste and fecal contamination	Open drains, poor fecal sludge management (FSM), weak garbage collection, industrial emissions	Frequent exposure to contaminated water, surfaces, and food	Diarrhea and other communicable diseases	54–56

Table 3 provides a comparison of the climate and environmental vulnerabilities at Korail and Rayer Bazar in terms of exposure, vulnerabilities, and adaptive capacities. Korail and Rayer Bazar exhibit high levels of flood exposure, along with high levels of heat stress and low-quality housing and sanitation. But the conditions and coping mechanisms differ in both settlements. Korail is highly exposed to flooding in the lakeshore area, has primarily Kutcha or Semi Pucca tin shade housing and limited formal health care services, and Rayer Bazar has a high level of waterlogging, limited access to sanitation, poor quality of single-room housing, and high dependence on informal health care and community-based coping mechanisms. In both communities, social capital and household adaptation, such as resource sharing, shared sanitation facilities, water storage, drainage practices, and reuse of greywater, show significant resilience attributes. However, for Rayer Bazar, quantitative socioeconomic vulnerability evidence is still limited.

Table 4 shows the health outcomes and quantitative evidence found in the studies examined that are associated with climate. Results show that there is evidence of a significant correlation between temperature fluctuations, flooding, environmental conditions affecting vector-borne diseases, air pollution, and health impacts. Cardiovascular and respiratory morbidity were associated with both variability and change in temperature, where warming and flooding were associated with increased diarrheal disease. An increase in temperature and the availability of standing water was also shown to increase the transmission of Dengue. Furthermore, increases in psychological distress were also linked with exposure to heatwaves and floods, especially among women, older people, and people with lower incomes. Air pollution further exacerbated respiratory exposure to the traffic workers and slum residents residing in the vicinity of the traffic and industrial pollution sources. In sum, evidence suggests that the climate change health risks for Dhaka's slum communities are complex and multifaceted, and environmentally driven vulnerabilities are influenced by housing, sanitation, socio-economic status, health care access, and adaptive capacity. This finding reinforces the need to combine all the interventions in an integrated manner, which should include heat, flooding,

Water, Sanitation and Hygiene (WASH), vector control, air quality, housing, access to health care, and community-based adaptation.

Table 3
Comparative Climate and Environmental Vulnerability of Korail and Rayer Bazar

Vulnerability dimension	Indicator	Korail evidence	Rayer Bazar evidence	Ref
Exposure: Flooding	Flood proneness index	Lakeside areas are at risk of flooding, and there is considerable spatial variation	Excessive flooding during sudden rainfall and wet conditions	39,57
Exposure: Heat	Heat stress exposure	High heat stress, UHI effect, unplanned housing with limited cooling	Drinking water scarcity worsens due to high heat stress, and the practice of personal hygiene worsens	57,58
Sensitivity: Housing	Housing quality index	Majorly tin shade Kutcha or Semi-pucca structure with high thermal absorption characteristics.	Most of the housing is poor quality, tin shade single room kutcha houses.	9,59
Sensitivity: WASH	Safe sanitation access during waterlogging	34.5% drop with waterlogging compared to normal conditions	Significantly reduced sanitation access; water entry and submerged toilets make latrines unusable	39,57
Sensitivity: Socioeconomic	Socioeconomic and Health Vulnerability Index – Bangladesh (SEHVI-BD)	9% severe, 30% moderate, 61% mild vulnerability	Settlement-specific quantitative evidence unavailable	9
Adaptive Capacity: Healthcare	Healthcare facility access	Limited formal facilities, reliance on unauthorized providers, and non-governmental organization (NGO) clinics	Limited access to formal health care, reliance on traditional healers, and pharmacy assistants	60,61
Adaptive Capacity: Social Capital	Community resource sharing	Social capital facilitates resilience by sharing resources and accessing facilities	Shared neighbor toilets, shared Wi-Fi routers, or communication devices help to build resilience within the community	57,58
Adaptive Capacity: Individual Coping	Heat adaptation strategies	Adjusting routines, migrating to natural shaded spots, raising floor levels, slope drainage, and tree planting	Migrating to natural shaded spots, saving water during supply, and greywater reuse as a form of household level coping	57,62

Table 4
Climate-Sensitive Health Outcomes, Quantitative Evidence and Adaptation Implications

Health outcome	Climate/environmental driver	Quantitative evidence	Vulnerable population	Main finding	Adaptation implication	Ref
Cardiovascular Disease	Temperature variability (1°C increase)	1.00% increase in emergency department (ED) visits (95% confidence interval (CI): 0.05%, 1.96%)	Older adults, low-income residents	Excessive temperature variations daily are associated with more CVD morbidity on a daily basis throughout the year.	Heat-health action plans, targeted outreach to older adults in slums	63
Respiratory Disease	Temperature variability (1°C increase)	2.77% increase in ED visits (95% CI: 0.24%, 5.20%); 7.45% among > 50 years	Older adults, outdoor workers	Respiratory morbidity increases with temperature fluctuation	Better airflow in slum housing, screening for respiratory health.	63
Diarrhea Disease	Daily mean temperature, flooding	Relative risk (RR) 3.4; projected 4.5–7.4% increase by 2100s under 1.5–2°C warming	Children, slum residents	Diarrhea hospitalization is driven by the increase in temperature and flooding	Safe water supply, flood-resistant sanitation, drainage improvement.	7
Dengue Fever	Temperature-dependent vectorial capacity	377 cases attributable in 2010; +583 per 1°C rise	Urban residents, slum dwellers near standing water	Rising temperatures have a profound effect on increasing the transmission potential of dengue	Vector control, early warning systems, and community clean-up of standing water	64
Psychological Distress	Heatwave exposure	Mean Perceived Stress Scale (PSS-10): 21.4 (exposed) vs. 17.3 (non-exposed)	Women, older adults, low-income groups	Heatwaves create a detectable psychological stress in addition to their physical effect	Community cooling centers, mental health support, gender-supportive measures	22
Psychological Distress	Flood exposure	Mean PSS-10: 22.0 (exposed) vs. 17.1 (non-exposed)	Women, older adults, low-income groups	Prolonged psychological distress caused by flooding	Flood resilient homes; quick mental health support in flood situations	22

Health outcome	Climate/environmental driver	Quantitative evidence	Vulnerable population	Main finding	Adaptation implication	Ref
Respiratory Symptoms	Traffic/indoor air pollution	Elevated symptoms among high-exposure groups	Traffic workers, slum residents near roads and industry	Exposure to air pollution exacerbates respiratory vulnerability associated with climate change	Air quality monitoring, use of less polluting fuels, and spatial planning, like separating housing and pollution sources	65

5. Discussion

This review revealed that climate and the intersection of climate with housing, WASH facilities, socio-economic factors, health access, and adaptive capacity form the basis of health vulnerability in Dhaka's informal settlements. An analysis of Korail and Rayer Bazar shows that informal settlements in the same city are not homogeneous and can therefore be exposed to a varying mix of exposures, sensitivities, and adaptive capacity.

Increasing indoor thermal exposure from poor-quality housing, tin roofs, lack of adequate ventilation, and inadequate access to cooling can lead to health problems. Also, exposure to extreme heat is an important concern for the slum residents. This is worsened by higher temperature fluctuations and the urban heat island phenomenon in Dhaka. The available evidence showed that increases in cardiorespiratory emergency visits were associated with a 1°C increase in temperature variability (cardiorespiratory emergency visits 1.00%, respiratory emergency visits 2.77%, over 50-year-olds 7.45%). These results stress the special susceptibility of older people and those who venture into poorly ventilated areas.

Another pathway of climate and health is flooding and waterlogging. Access to safe toilets can diminish when water cannot drain easily, water remains present, and sanitation becomes substandard, which can result in increased contact with exposed contaminated water. There was evidence reported in Korail indicating that waterlogging resulted in 34.5% less WASH access and a reported relative risk of diarrheal disease due to flooding-related conditions. These findings show that waterlogging impacts health not only in terms of its impact on mobility and livelihoods, but also via its impact on sanitation and environmental conditions.

The other climate-sensitive risks involve dengue and psychological distress. Exposure to increasing temperature, rainfall, humidity, and standing water was associated with facilitating dengue transmission, and exposure to heatwaves and floods was linked to higher scores on psychological distress. However, there can be heightened effects for women, the elderly, and low-income groups due to the cumulative effects of climate change and compounding social and economic hardships.

An important discovery is that there is a different availability of evidence at Korail and Rayer Bazar. Korail has a relatively high amount of research at the settlement level and socioeconomic vulnerability assessments, as well as interventions by NGOs and infrastructure. However, settlement-specific climate-health evidence for climate-health financing in Rayer Bazar is very limited.

The results in general indicate that the design and execution of climate-health interventions must focus on overcoming the local climate challenges by introducing flood resilience in WASH facilities, enhancing drainage and sanitation systems, heat-adaptable housing, healthcare facilities, vector control, and strengthening community

adaptation. Meanwhile, more research at the settlement level is required in Rayer Bazar to understand its real exposure, sensitivity, and adaptation ability.

6. Conclusion

This current review reiterates that health vulnerabilities due to climate change in Dhaka's informal settlements are a multifaceted crisis, which is systematically created by the interplay of environmental risks, structural deficits and social inequities. This study underlines the complexity and the heterogeneity of informal settlements: slums like Korail and Rayer Bazar can have their own specific implications along the explained hazard-exposure-social vulnerability–health outcome nexus. Instead, they are communities that are varied and differ greatly in levels of adaptive capacities, infrastructural vulnerabilities, and climate exposure.

Both settlements are extremely vulnerable to the effects of extreme heat and flooding, but the manifestation of these risks in health outcomes depends on the local physical and institutional setup. Inhaling post-flooding activities in Korail, infrastructure upgrading targeting specific areas, and active NGO presence contribute to proactive structural coping mechanisms for the slum community. However, in Rayer Bazar, there is a significant lack of data and a heavy dependency on informal healthcare providers and the use of scarce resources for coping. These key gaps show that adapting to disasters with uniform, citywide action approaches are inherently inadequate to tackle the stark inequities that are inherent to Dhaka's informal settlements and that create environmental health risks.

But to achieve real climate resilience, cities must make paradigm changes in both urban planning and public health policies and prioritize decentralized, settlement-specific interventions on structural drivers. Priorities should include ensuring access to flood-resilient WASH facilities that are resilient to floods, creating formal epidemic surveillance ties between informal health care providers and formal epidemiological monitoring systems, and targeted plans for action on heat in thermal-absorbing tin housing. Finally, the disproportionate and current health, economic expenses, environmental justice, climate adaptation, and housing security of the marginalized population in Korail and Rayer Bazar constitute an urgent climate justice issue that demands immediate, structural intervention.

Declarations

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I have no competing interests.

Authors' Contributions

Golam Sakib Intisher Prochsad: Conceptualization, Methodology, Investigation, Formal analysis, Writing—original, Writing—review, editing, and Visualization.

References

1. Schwerdtle PN, Baernighausen K, Karim S, et al. A Risk Exchange: Health and Mobility in the Context of Climate and Environmental Change in Bangladesh—A Qualitative Study. *Int J Environ Res Public Health*. 2021; 18: 2629. DOI: 10.3390/ijerph18052629.

2. Hambrecht E, Tolhurst R, Whittaker L. Climate change and health in informal settlements: a narrative review of the health impacts of extreme weather events. *Environ Urban*. 2022; 34: 122–150. DOI: 10.1177/09562478221083896.
3. Hussainzad EA, Gou Z. Climate Risk and Vulnerability Assessment in Informal Settlements of the Global South: A Critical Review. *Land*. 2024; 13: 1357. DOI: 10.3390/land13091357.
4. Rahaman MA, Kalam A, Al-Mamun Md. Unplanned urbanization and health risks of Dhaka City in Bangladesh: uncovering the associations between urban environment and public health. *Front Public Health*. 2023; 11: 1269362. DOI: 10.3389/fpubh.2023.1269362.
5. Swapan M, Zaman A, Ahsan T, et al. Transforming Urban Dichotomies and Challenges of South Asian Megacities: Rethinking Sustainable Growth of Dhaka, Bangladesh. *Urban Sci*. 2017; 1: 31. DOI: 10.3390/urbansci1040031.
6. Roy S, Sowgat T, Mondal J. City Profile: Dhaka, Bangladesh. *Environ Urban Asia*. 2019; 10: 216–232. DOI: 10.1177/0975425319859126.
7. Haque F, Lampe FC, Hajat S, et al. Impacts of climate change on diarrhoeal disease hospitalisations: How does the global warming targets of 1.5–2°C affect Dhaka, Bangladesh? *PLoS Negl Trop Dis*. 2024; 18: e0012139. DOI: 10.1371/journal.pntd.0012139.
8. Uddin ASMS, Khan N, Islam ARMdT, et al. Changes in urbanization and urban heat island effect in Dhaka city. *Theor Appl Climatol*. 2022; 147: 891–907. DOI: 10.1007/s00704-021-03872-x.
9. Hasan MZ, Rabbani MG, Ahmed MW, et al. Assessment of socioeconomic and health vulnerability among urban slum dwellers in Bangladesh: a cross-sectional study. *BMC Public Health*. 2024; 24: 2946. DOI: 10.1186/s12889-024-20425-9.
10. Ahmed I. Factors in building resilience in urban slums of Dhaka, Bangladesh. *Procedia Econ Finance*. 2014; 18: 745–753. DOI: 10.1016/S2212-5671(14)00998-8.
11. Braun B, Aßheuer T. Floods in megacity environments: vulnerability and coping strategies of slum dwellers in Dhaka/Bangladesh. *Nat Hazards*. 2011; 58: 771–787. DOI: 10.1007/s11069-011-9752-5.
12. Gruebner O, Sachs J, Nockert A, et al. Mapping the Slums of Dhaka from 2006 to 2010. *Dataset Pap Science*. 2014; 2014(1). DOI: 10.1155/2014/172182.
13. Afroj, S. Urbanization and Informal Settlement Condition of Dhaka: A Review of Emerging Challenges and Policy Approaches. Epub ahead of print 11 January 2020. DOI: 10.5281/ZENODO.3604577.
14. Ahmed I. Background Paper: Factors pertaining to building resilience in urban slum settlements in Dhaka, Bangladesh. RMIT University. DOI: 10.25439/RMT.27346044.
15. Razzaque A, Chowdhury MR, Mustafa AHMG, et al. Cohort Profile: Urban Health and Demographic Surveillance System in slums of Dhaka (North and South) and Gazipur City Corporations, Bangladesh. *Int J Epidemiol*. 2023; 52: e283–e291. DOI: 10.1093/ije/dyad080.
16. Khan MMH, Gruebner O, Krämer A. Is area affected by flood or stagnant water independently associated with poorer health outcomes in urban slums of Dhaka and adjacent rural areas? *Nat Hazards*. 2014; 70: 549–565. DOI: 10.1007/s11069-013-0829-1.
17. Yasmin S. Impact of Climate Change on Urban Slum Dwellers in Bangladesh: A Case Study of Four Selected Slums in Dhaka City. *ACRI*. 2016; 4: 1–15. DOI: 10.9734/ACRI/2016/26501.
18. Jihan MdAT, Popy S, Kayes S, et al. Climate change scenario in Bangladesh: historical data analysis and future projection based on CMIP6 model. *Sci Rep*. 2025; 15: 7856. DOI: 10.1038/s41598-024-81250-z.
19. Kamruzzaman M, Kamal ASMM, Talukder A, et al. High-resolution WBGT-based assessment of urban heat stress in Dhaka, Bangladesh (2008–2017): Implications for Climate-Responsive Planning. *City and Environ Interact*.

2026;30:100329. DOI: 10.1016/j.cacint.2026.100329

20. Edelman DJ. Managing the Urban Environment in Dhaka, Bangladesh. *CUS*. 2025; 13: 110–148. DOI: 10.4236/cus.2025.132006.
21. Dewan A, Kiselev G, Botje D, et al. Surface urban heat island intensity in five major cities of Bangladesh: Patterns, drivers and trends. *Sustain Cities Soc*. 2021;71:102926. DOI: 10.1016/j.scs.2021.102926.
22. Xunda Y, Moskalenko K, Rahaman MA, et al. Climate-induced vulnerability and health outcomes in urban Bangladesh: the mediating role of psychological stress. *Front Public Health*. 2026;14:1860955. DOI: 10.3389/fpubh.2026.1860955.
23. Islam MY, Mohiuddin Md, Tanvir Hossain K, et al. Trend of heat waves in Dhaka Metropolitan City and its impact on livelihood and health of exposed people. *Arab J Geosci*. 2024; 17: 232. DOI: 10.1007/s12517-024-12027-x.
24. Akther H, Ahmad MM. Livelihood under stress: The case of urban poor during and post-flood in Dhaka, Bangladesh. *Geogr J*. 2021; 187: 186–199. DOI: 10.1111/geoj.12379.
25. Schwartz BS, Harris JB, Khan AI, et al. DIARRHEAL EPIDEMICS IN DHAKA, BANGLADESH, DURING THREE CONSECUTIVE FLOODS: 1988, 1998, AND 2004. *Am J Trop Med Hyg*. 2006; 74: 1067–1073. DOI: 10.4269/ajtmh.2006.74.1067.
26. Hashizume M, Wagatsuma Y, Faruque ASG, et al. Factors determining vulnerability to diarrhoea during and after severe floods in Bangladesh. *J Water Health*. 2008; 6: 323–332. DOI: 10.2166/wh.2008.062.
27. Paul KK, Dhar-Chowdhury P, Haque CE, et al. Risk factors for the presence of dengue vector mosquitoes, and determinants of their prevalence and larval site selection in Dhaka, Bangladesh. *PLoS ONE*. 2018; 13: e0199457. DOI: 10.1371/journal.pone.0199457.
28. Roy S, Biswas A, Shawon MstTA, et al. Land use and meteorological influences on dengue transmission dynamics in Dhaka city, Bangladesh. *Bull Natl Res Cent*. 2024; 48: 32. DOI: 10.1186/s42269-024-01188-0.
29. Dibya TB, Proma AY, Dewan SMR. Poor Respiratory Health is a Consequence of Dhaka's Polluted Air: A Bangladeshi Perspective. *Environ Health Insights*. 2023;17:11786302231206126. DOI: 10.1177/11786302231206126.
30. Sherris AR, Begum BA, Baiocchi M, et al. Associations between ambient fine particulate matter and child respiratory infection: The role of particulate matter source composition in Dhaka, Bangladesh. *Environ Pollut*. 2021; 290: 118073. DOI: 10.1016/j.envpol.2021.118073.
31. Siddiqui SA, Jakaria M, Amin MN, et al. Chronic air pollution and health burden in Dhaka city. *Eur Respir J*. 2020; 56: 2000689. DOI: 10.1183/13993003.00689-2020.
32. Chowdhury MdA, Hasan MdK, Islam SLU. Climate change adaptation in Bangladesh: Current practices, challenges and the way forward. *The J Clim Change Health*. 2022;6:100108. DOI:10.1016/j.joclim.2021.100108.
33. Kibria G, Pavel HR, Miah MdR, et al. Impacts of Climate Change in Bangladesh and its Consequences on Public Health. *J Stabil Environ. Mgt* 2022; 1: 359–370. DOI: 10.3126/josem.v1i3.48002.
34. Wahid SS, Raza WA, Mahmud I, et al. Climate-related shocks and other stressors associated with depression and anxiety in Bangladesh: a nationally representative panel study. *Lancet Planet Health*. 2023; 7: e137–e146. DOI: 10.1016/S2542-5196(22)00315-1.
35. Hayward G, Ayeb-Karlsson S. 'Seeing with Empty Eyes': a systems approach to understand climate change and mental health in Bangladesh. *Clim Change*. 2021; 165: 29. DOI: 10.1007/s10584-021-03053-9.
36. Chowdhury SA. Climate Migration and Urban Vulnerability: Livelihood and Health Implications in Dhaka's Slum Settlements. *Growth Change*. 2026; 57: e70137. DOI: 10.1111/grow.70137.

37. Borg FH, Greibe Andersen J, Karekezi C, et al. Climate change and health in urban informal settlements in low- and middle-income countries – a scoping review of health impacts and adaptation strategies. *Glob Health Action*. 2021;14:1908064. DOI: 10.1080/16549716.2021.1908064.
38. Uddin N. Assessing urban sustainability of slum settlements in Bangladesh: Evidence from Chittagong city. *J Urban Manag*. 2018; 7: 32–42. DOI: 10.1016/j.jum.2018.03.002.
39. Rahman MM, Chongsuvivatwong V, Geater AF, et al. Differences in access to water, sanitation, and hygiene facilities among residents of Korail Slum, Bangladesh, during normal vs. water-logging situations. *PLoS One*. 2025; 20: e0332534. DOI: 10.1371/journal.pone.0332534
40. Badhan IM, Siddika A. Evaluating the Policy Outcomes for Urban Resiliency in Informal Settlements Since Independence in Dhaka, Bangladesh: A Review. *NJEDP*. 2019; 17: 97–110. DOI: 10.54028/NJ20191797110.
41. Nurunnabi ASM, Sony SA. Impact of Climate Change on Public Health and Adaptation Policies: Bangladesh Perspective. *Mugda Med Coll J*. 2025; 8: 157–163. DOI: 10.3329/mumcj.v8i2.85831.
42. Sultana R, Birtchnell T, Gill N. Urban greening and mobility justice in Dhaka's informal settlements. *Mobilities*. 2020; 15: 273–289. DOI: 10.1080/17450101.2020.1713567.
43. Degert I, Parikh P, Kabir R. Sustainability assessment of a slum upgrading intervention in Bangladesh. *Cities*. 2016; 56: 63–73. DOI: 10.1016/j.cities.2016.03.002.
44. Rahman MM, McKeon K, Luglio D, et al. Compounding effects of heat and high humidity on cardiovascular morbidity in Dhaka, Bangladesh: An implication of climate crisis. *Sci Total Environ*. 2025; 995: 180220. DOI: 10.1016/j.scitotenv.2025.180220.
45. Hanifi SMA, Sagar MdS, Reidpath DD. Impact of Housing Construction Materials on Indoor Temperatures in Urban Slums of Dhaka, Bangladesh. *J Urban Health*. 2026; 103: 334–343. DOI: 10.1007/s11524-026-01078-y.
46. Nipa RP, Rahman MM. Analysing the Impact of Microclimatic Variation on Urban Residential Environment: A Study of Dhaka City. *Dhaka Univ J Earth Env Sci*. 2026; 15: 27–45. DOI: 10.3329/dujees.v15i1.92321.
47. Nithila AN, Shome P, Islam I. Waterlogging induced loss and damage assessment of urban households in the monsoon period: a case study of Dhaka, Bangladesh. *Nat Hazards*. 2022; 110: 1565–1597. DOI: 10.1007/s11069-021-05003-1.
48. Chowdhury SMMH, Rashid MA, Trisha SY, et al. Dengue Investigation Research in Bangladesh: Insights From a Scoping Review. *Health Sci Rep*. 2025; 8: e70568. DOI: 10.1002/hsr2.70568.
49. Ak M. The Perfect Storm for Dengue in Bangladesh: How Climate, Pollution, And Urbanization Are Feeding a Relentless Killer—The Mosquito. *MJNHC*; 8. Epub ahead of print 20 April 2026. DOI: 10.30654/MJNH.100066.
50. Khan MdSI, Sayem MdA, Mothashin Md, et al. Dengue among suspected patients with dengue admitted at a tertiary level hospital in Mymensingh region of Bangladesh: A hospital-based epidemiological study. *PLoS Negl Trop Dis*. 2025; 19: e0013047. DOI: 10.1371/journal.pntd.0013047.
51. Pavel MRS, Zaman SU, Jeba F, et al. Long-Term (2003–2019) Air Quality, Climate Variables, and Human Health Consequences in Dhaka, Bangladesh. *Front Sustain Cities*. 2021; 3: 681759. DOI: 10.3389/frsc.2021.681759.
52. Manisalidis I, Stavropoulou E, Stavropoulos A, et al. Environmental and Health Impacts of Air Pollution: A Review. *Front Public Health*. 2020; 8: 14. DOI: 10.3389/fpubh.2020.00014.
53. Raza WA, Mahmud I, Rabie TS. Breathing Heavy: New Evidence on Air Pollution and Health in Bangladesh. *The World Bank*. Epub ahead of print 18 January 2023. DOI: 10.1596/978-1-4648-1919-3.
54. Amin N, Raj S, Green J, et al. Variation in exposure in neighborhoods of Dhaka, Bangladesh across different environmental pathways: The influence of human behavior on fecal exposure in urban environments. *PLoS One*. 2026; 21: e0319883. DOI: 10.1371/journal.pone.0319883

55. Shahriar ATMd, Darain KhM-, Islam MT. TOWARDS ENVIRONMENTALLY SAFE FAECAL SLUDGE MANAGEMENT IN INFORMAL SETTLEMENTS OF BANGLADESH: A CONTEXT-SENSITIVE MODEL. *Khulna Univ Stud.* 2022; 104–119. DOI: 10.53808/KUS.2022.ICSTEM4IR.0059-se.
56. Farzana FD, Hossain D, Rahman M, et al. Understanding water, sanitation, and hygiene situation through participatory appraisal in urban slum of Dhaka City. *Eur J Env Public Health.* 2024; 8: em0165. DOI: 10.29333/ejeph/15585.
57. Chaiti RI. Examining the Impact of Climate Variability on Urban WASH Facilities: A Cross-Sectional Study on the WASH-Specific Intervention and Non- Intervention Urban Slums. Available from: <https://bdracs.org/wp-content/uploads/2025/03/Urban-WASH-Rafiana-Islam.pdf> (2022).
58. Sultana Z, Mees HLP, Mallick B, et al. Rising temperatures, rising vulnerabilities: Individual and community adaptation to heat stress in urban slums of Bangladesh. *Sustain Cities Soc.* 2025; 132: 106803. DOI: 10.1016/j.scs.2025.106803.
59. Chakraborty S, Islam SMN, Iqbal KF, et al. Health impact assessment of slum dwellers in Rayer Bazar: Water, Sanitation and Hygiene. *Green Univ Rev Soc Sci.* 2018;4. Available from: https://siteadmin.green.edu.bd/uploads/documents/journal-article/2_1700199743_article-document.pdf (2018).
60. Adams AM, Islam R, Yusuf SS, et al. Healthcare seeking for chronic illness among adult slum dwellers in Bangladesh: A descriptive cross-sectional study in two urban settings. *PLoS ONE.* 2020; 15: e0233635. DOI: 10.1371/journal.pone.0233635.
61. Mahmudunnabi. Facilitators, barriers and requirements for addressing perinatal depression in urban slums through mobile phone-based interventions in Bangladesh: A qualitative study. 2024. Available from: https://livrepository.liverpool.ac.uk/3194694/1/201582355_Nov2024.pdf (2024).
62. Jabeen H, Johnson C, Allen A. Built-in resilience: learning from grassroots coping strategies for climate variability. *Environ Urban.* 2010; 22: 415–431. DOI: 10.1177/0956247810379937.
63. Rahman MM, Garcia E, Lim CC, et al. Temperature variability associations with cardiovascular and respiratory emergency department visits in Dhaka, Bangladesh. *Environ Int.* 2022; 164: 107267. DOI: 10.1016/j.envint.2022.107267.
64. Banu S, Hu W, Guo Y, et al. Projecting the impact of climate change on dengue transmission in Dhaka, Bangladesh. *Environ Int.* 2014; 63: 137–142. DOI: 10.1016/j.envint.2013.11.002.
65. Hossain I, Niloy L. Indoor Air Pollution and Respiratory Symptoms among Residents in Urban and Rural Community. *MRAJ.* 13. Epub ahead of print 2025. DOI: 10.18103/mra.v13i5.6305.

Figures

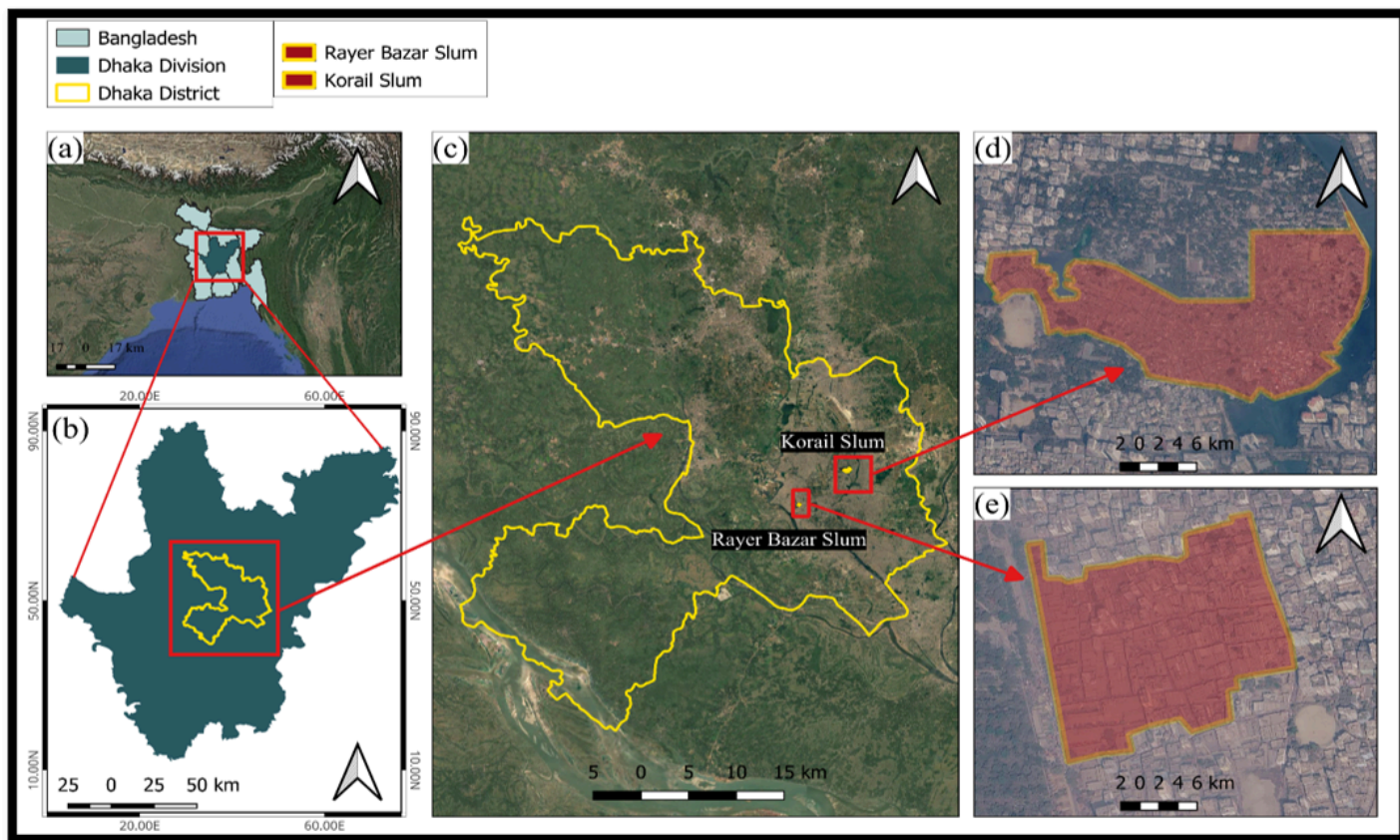


Figure 1

Geographic location of Korail and Rayer Bazar slums within Dhaka, Bangladesh (Source: Author)