Independent University **Bangladesh (IUB)**

IUB Academic Repository

Department of Social Science and Humanities Graduate Thesis

2026-08

Gendered Heat Vulnerability and adaptation in Dhaka's Informal Settlements: A comparative study of Korail and Hazaribagh

Saddaf, Nafia

Independent University, Bangladesh (IUB)

https://ar.iub.edu.bd/handle/11348/1575

Downloaded from IUB Academic Repository



Independent University, Bangladesh (IUB)

School of Liberal Arts and Social Sciences

Thesis Topic:

Gendered Heat Vulnerability and adaptation in Dhaka's Informal Settlements:

A comparative study of Korail and Hazaribagh

Done By:

Nafia Saddaf |2412787

DST698 | Research/Field Work for Master Thesis

Summer 2026

Abstract

Heatwave is increasing at an alarming rate in relation with climate threat in rapidly urbanizing Bangladesh. Its effects are especially acute in informal settlements, where dense construction, heat-retaining materials, inadequate ventilation, insecure tenure, lack of basic services, and livelihood poverty combine to limit residents' capacity to respond. This study examines how women and men experience and respond to heatwaves in Korail and Hazaribagh, two informal settlements in Dhaka, and assesses whether climate and heat-related policies recognize these gendered realities. A comparative cross-sectional mixed-methods design was adopted. Of 120 household surveys administered, 110 were retained for analysis: 66 from Korail and 44 from Hazaribagh. The survey was complemented by six key-informant interviews, two focus-group discussions, field observations, and literature and policy review. Quantitative data were analysed descriptively, while qualitative evidence was coded thematically and integrated through triangulation. Findings reveal interconnected but gender-differentiated vulnerability. Men experienced prolonged outdoor exposure through transport and other informal livelihoods, where stopping work meant losing daily income. Women experienced sustained indoor heat through cooking, caregiving, unpaid domestic work, and home-based activities in small, poorly ventilated, tin-roofed dwellings. Illness, fatigue, sleep disruption, productivity decline, and income loss were widespread. Common responses, including hydration, bathing, fans, wet cloths, shade, and adjusted activity times, remained short-term coping measures constrained by poverty, unreliable electricity and water, poor housing, rental restrictions, and weak institutional support. Through the Sustainable Livelihood Framework, the study shows that heat erodes human, financial, and physical assets. It recommends gender-responsive settlement-level heat planning, improved housing and services, occupational safeguards, accessible healthcare, early warnings system, and participatory governance.

Keywords: Heatwave, gender, informal settlements, heat vulnerability and adaptation, Dhaka city.

Acknowledgement

I would like to express gratitude to Almighty Allah for granting me the patience, preservence, strength and knowledge to complete this thesis.

My sincere gratitude goes to my supervisor, Dr. Kazi Mahmudur Rahman, Professor, Department of Social Science and Humanities, School of Liberal Arts and Social Science, Independent University, Bangladesh for his encouragement, mentorship and guidance throughout this journey. His insights has helped me to find my direction in completing this work in terms of writing and field work. I am deeply grateful to the residents of Korail and Hazaribagh who generously shared their time, experiences, and perspectives. Their willingness to discuss the everyday effects of extreme heat, livelihood pressures, household responsibilities, health concerns, and coping practices made this study possible. I also thank the participants in the focus-group discussions and the key informants for contributing valuable contextual and institutional insights.

I extend my appreciation to the faculty members and administrative staff of the School of Liberal Arts and Social Sciences at Independent University, Bangladesh, for the academic environment and institutional support that enabled me to complete this thesis. A special thank you to Bushra and aafra, my academic partners and my best friend through my lows and high, deadlines. You both made this journey easy and I could learn so much from you both. Thank you to Maisha and Nafis who have helped me conducting survey at the field level. Motivated me when I doubted myself and pushing to become my best version

Lastly, I want to acknowledge my family and myself. This thesis is just not a study or an academic requirement but a problem I wanted to solve. Spend countless hours, faced setback, conducted field level survey at the unpredictable weather yet I overcame those through the end.

Funding Statement

This research was supported by a research grant from the School of Liberal Arts and Social Sciences at Independent University, Bangladesh. I am sincerely grateful to my supervisor and the Head of the Department for providing this financial support, which significantly contributed to the successful completion of this thesis.

Table of Contents

Abstract ..... —

Acknowledgements ..... —

Funding Statement ..... —

Table of Contents ..... —

List of Acronyms ..... —

List of Tables ..... —

Chapter 1: Introduction 10

1.1 Background of the Study 12

1.2 Problem Statement 12

1.3 Research Objectives 12

1.4 Research Questions 13

1.5 Significance of the Study 13

Chapter 2: Literature Review 14

2.1 Introduction 14

2.2 Extreme Heat as an Urban Climate Hazard 15

2.2.1 Heatwave Trends and the Urban Heat-Island Effect 16

2.2.2 Exposure, Sensitivity, and Adaptive Capacity 16

2.3 Informal Settlements as Heat-Vulnerability Hotspots 17

2.3.1 Housing and the Indoor Thermal Environment 17

2.3.2 Basic Services and Adaptive Capacity 18

2.4 Gender and Heat Vulnerability 18

2.4.1 Gendered Occupational Exposure 19

2.4.2 Household Adaptation, Constraints, and Strategies 19

2.5 Policy Responses and Implementation Gaps 20

2.6 Conceptual Framework 21

2.7 Chapter Summary 22

Chapter 3: Methodology 23
3.1 Research Design 23
3.2 Study Areas 24
3.3 Study Population, Sampling, and Sample Size 25
3.3.1 Inclusion Criteria 26
3.3.2 Exclusion Criteria 27
3.4 Data-Collection Methods 28
3.4.1 Household Survey 28
3.4.2 Key-Informant Interviews 28
3.4.3 Focus-Group Discussions 28
3.4.4 Field Observation 28
3.4.5 Literature and Policy Review 29
3.5 Data Analysis 30
3.6 Ethical Considerations 31
3.7 Methodological Framework 31
3.8 Methodological Limitations 32
3.9 Chapter Summary 32

Chapter 4: Results and Discussion 33
4.1 Socioeconomic and Livelihood Profile 33
4.1.1 Household Respondent Profile 33
4.1.2 Key-Informant Profile 34
4.2 Gendered Exposure and Sensitivity to Heat 34
4.2.1 Indoor Heat Exposure 35
4.2.2 Work, Cooking, Caregiving, and Daily Responsibilities 36
4.2.3 Physical-Health Effects 37
4.2.4 Mental-Health and Sleep Effects 37
4.2.5 Reproductive and Gender-Specific Health Concerns 38
4.3 Coping Strategies and Adaptive Capacity 39

4.3.1 Basic Services and Cooling Resources 40
4.3.2 Household and Livelihood Coping Practices 42
4.3.3 Gendered Barriers to Adaptation 44
4.3.4 Recommended Adaptation Strategies 47
4.4 Institutional Support and Policy Analysis 49
4.4.1 Institutional Reach in Korail and Hazaribagh 55
4.4.2 Policy Recognition of Gendered Heat Vulnerability 59
4.5 Heat-Vulnerability Index 63
4.6 Chapter Summary 68

Chapter 5: Conclusion and Recommendations 69
5.1 Summary of Findings 69
5.2 Findings through the Sustainable Livelihood Framework 70
5.3 Recommendations 70
5.4 Study Limitations 70
5.5 Future Research 71
5.6 Concluding Reflection 71

References 72
Appendices 79
Appendix A: Household Survey Questionnaire 80
Appendix B: Key-Informant Interview Guide 81
Appendix C: Focus-Group Discussion Guide 84
Appendix D: Consent Materials and Ethical Documentation 85
Appendix E: Field Pictures 86

List of Acronyms

Acronym	Meaning
AC	Air conditioning
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BDT	Bangladeshi taka
BMD	Bangladesh Meteorological Department
C40	C40 Cities Climate Leadership Group
DFID	Department for International Development
DNCC	Dhaka North City Corporation
DoE	Department of Environment
DSCC	Dhaka South City Corporation
FGD	Focus-group discussion
ICCCAD	International Centre for Climate Change and Development
IDS	Institute of Development Studies
IPCC	Intergovernmental Panel on Climate Change
ISET	Institute for Social and Environmental Transition
IUB	Independent University, Bangladesh
KII	Key-informant interview
LMIC	Low- and middle-income country
NAP	National Adaptation Plan

Acronym	Meaning
NASA	National Aeronautics and Space Administration
NGO	Nongovernmental organization
RMI	Rocky Mountain Institute
SLF	Sustainable Livelihood Framework
UHI	Urban heat island
UN	United Nations
UNDRR	United Nations Office for Disaster Risk Reduction
USD	United States dollar
WASA	Water Supply and Sewerage Authority
WASH	Water, sanitation, and hygiene

Introduction

1.1 Background of the study

Extreme heat is emerging as one of the most alarming and rapidly growing climate threats globally. Unlike the other climatic events such as cyclones, floods, and other sudden-onset disasters, heat is described as a silent disaster. Extreme heat affects livelihood, human health, work productivity, food security, economic stability, and water availability, particularly in low- and middle-income countries. As the adaptive capacity is limited. The recent analysis by the (World Bank, 2025) reported that Bangladesh ranked second in the world for population being exposed to high temperatures. The maximum temperatures increased by about 1.1℃ between 1980 and 2023. Its geographic location and low-lying delta make the country and its people more vulnerable to climatic events (Huq et al., 2024). However, the country is ranked among the most climate-vulnerable nations globally, facing extreme weather events, rising sea levels, and increasing temperatures that pose systemic risks to production, supply chains, and workers' livelihoods (World Bank, 2023)While the people actually say it feels like a 4.5℃ rise. In 2024, extreme heat has resulted in about 250 million lost workdays in Bangladesh, which is equivalent to a loss of US $1.3-1.8 billion (World Bank, 2025).

Rapid urbanization, industrialization, and population growth with continued expansion of infrastructure in small spaces. Bangladesh has experienced 35 documented heatwave events, according to the study by (Shahrujjaman et al., 2025) with the highest number recorded in 2021 and 2024. It has triggered severe heat island effects in urban environments (Shi et al.2022). Urban heat islands (UHIs) occur when a city experiences a warmer and higher temperature in comparison to rural areas (NASA Science Gov., 2025). UHIs have strong and long-lasting impacts, resulting in frequent extreme heat events that threaten health problems and ecosystems. Dhaka, the capital of Bangladesh, is known as one of the busiest cities in the Global South. According to the recent estimate, Dhaka has become the second largest city in the world, with approximately 37 million residents, making it one of the fastest-growing cities. Lack of green spaces, cramped infrastructure, and unplanned urban expansion have triggered the urban heat island. Within Dhaka, informal

settlements are among the most vulnerable environments. Studies show that about 4-5 million people currently reside in different informal settlements in Dhaka. The residents are home, typically small, crowded, poorly ventilated, and roofed with a tin roof; densely populated; overcrowding; insecure tenure; poor sanitation; and limited access to public services (water, electricity, adaptation measures). This creates a condition for the heat to be trapped inside the home for a longer period of time. As a result, their dwellings get exposed to heat outside and inside. According to the IPCC (IPCC,2022), heat vulnerability is the sensitivity of a system to adverse climate impacts and severe consequences of those impacts. It also consists of three dimensions: exposure, sensitivity, and adaptive capacity. A heatwave is defined as a maximum temperature that stays for a longer period of time. According to the Bangladesh Meteorological Department (BMD), heat waves have been classified into four categories: mild heat waves (36°C-38°C), moderate heat waves (38°C-40°C), severe heat waves (40°C-42°C), and extreme heat waves (over 42°C).

In Dhaka, Korail and Hazaribagh are known as two of Dhaka's largest and most densely populated informal settlements. Korail is known as the largest informal settlement in Dhaka, in Dhaka North. Hazaribagh, Dhaka South. Korail consists about 250,000 residents, while Hazaribagh has a population of about 50,000 (Rahman et al.,2025). Both settlements are identified by overcrowding, insecure land tenure, limited access to public services, and poor environmental conditions. At the same time, limited water accessibility, disruption of electricity, and financial constraints reduce households' ability to adopt effective cooling measures (ISET International, 2026). Heat vulnerability is not experienced equally among all the residents; men and women also experience it differently because of their livelihood, household responsibilities, access to resources, and mobility. Women are more likely exposed to indoor heat because of caregiving, cooking, and other unpaid domestic work. While men are more likely to experience prolonged period exposure through outdoor occupations such as rickshaw puller, street vending, transport worker, and day labor (Anjum and Aziz , 2025).

Despite the increasing concerns about heatwaves, climate research and policies in Bangladesh only focus on onset disasters rather than slow-onset events. Limited attention has been given to gendered heat vulnerability in urban informal settlements, creating significant research and policy

gaps. Therefore, this study aims to examine the heat vulnerability experiences across diverse livelihoods and how men and women have responded in both informal settlements in Korail and Hazaribagh. To assess the extent to which current policies recognize and address these gendered realties.

1.2 Problem Statement

Despite the growing frequency and intensity of heatwaves in Bangladesh, extreme heat remains one of the least prioritized climate risks in an urban context. Existing climate adaptation initiatives in Bangladesh continue to focus on coastal hazards and drought-prone areas rather than people living in heat-vulnerable urban environments, receiving less attention. Despite being much research done, every day sees the broader picture rather than focusing on the small immediate actions that need to be taken. From my perspective, this is one of the most important limitations in current heat-related research. Temperature alone does not determine vulnerability; rather, vulnerability is shaped by gender roles, access to public services, and institutional support. As a person living in Dhaka, the inequality of groups is very evident. This study addresses this research gap by examining heat vulnerability through a gender lens and assessing whether existing policies and intuitional responses adequately address these gendered realities.

1.3 Research Objectives:

The main objective of this study is to understand how heat vulnerability is experienced and responded to among men and women in Dhaka's informal settlements and to examine the extent to which existing policies address these gendered realities.

Specific Objectives:

1. To examine how exposure and sensitivity to extreme heat differ between women and men in their everyday lives within informal settlements, including indoor heat, cooking, caregiving, and paid and unpaid work.

2. To explore the coping and adaptation strategies that women and men adopt in response to heat and the gendered barriers that shape their adaptive capacity.
3. To assess which existing heat- and climate-related policies are addressed in the gendered heat vulnerability of informal settlement residents.

1.4 Research Questions

This study aims to answer the following research questions:

1. How do women and men in Dhaka's informal settlements experience vulnerability, exposure, and sensitivity to extreme heat?

2. Types of adaptation strategies used by men and women: What gendered barriers limit their adaptive capacity?

3. To what extent do existing heat and climate policies and plans address the gendered dimension of heat vulnerability?

1.5 Significance of the Study

This study is important because it examines heat vulnerability in Dhaka's informal settlement through a gender lens, where women and men may experience heat differently due to differences in work, caregiving responsibilities, resource access, and housing conditions. By focusing on Korail and Hazaribagh, the study provides context-specific evidence on how extreme heat affects the daily lives, health, livelihood, and adaptive capacities of vulnerable urban communities.

From a researcher's perspective, understanding these gendered differences is essential for designing effective and inclusive climate adaptation strategies. The findings of this study can serve as a practical guideline for developing gender-responsive heat action plans at the city and community levels. The study findings can also support policymakers, urban planners, NGOs, and development practitioners in identifying targeted interventions that address the specific needs of vulnerable communities living in informal settlements. Moreover, the research aims to contribute

to more equitable, context-specific, and sustainable approaches to urban heat adaptation in Bangladesh.

Chapter 2: literature Review

2.1 Introduction

This chapter reviews the existing literature relevant to gendered heat vulnerability in urban informal settlements and adopts a conceptual framework through which this study analyses. It is organized from a broader overview to a specific one. From extreme heat as an urban climate event to the reality of informal settlement effects on people's livelihoods, health, gender lens, and institutional environment that determine whose response succeeds. In Dhaka, a large population lives but faces different thermal temperatures. (IPCC, 2022).

This review brings together four aspects from this paper: urban heat and climate change research, informal settlement, insecure tenure, gender and livelihood studies, and adaptation policies. Urban heat and climate change research identify where heat concentrates but say little about daily life activities. Livelihood studies explain why income and work matter. Gender studies show unequal division of paid and unpaid labour. Policy research identifies the need for attention related to heat. The purpose of this chapter is to synthesize these insights, identifying their tension and establishing a conceptual gap for research in Korail and Hazribagh without anticipating the study's empirical findings.

2.2 Extreme heat as an urban climate hazard

2.1.1 Heatwave trends and urban heat island

Heatwaves have increased over the past few years, including their duration and intensity, especially in Global South countries. Unlike climate disaster events such as cyclones or floods, heat does not leave visible damage to infrastructure; rather, it leaves an invisible mark that causes severe problems. In an urban context, the hazard is amplified by the urban heat island effect, in which built surfaces absorb and re-radiate solar energy while vegetation and water bodies that would

otherwise moderate temperature are displaced by construction. Dhaka has a similar pattern. A study by (Abrar and Sarker (2022) mapped heat vulnerability under the concept of the urban heat island effect across the Dhaka Metropolitan Area. The built-up land accounts for well over half the city's surface, with dense and least vegetated districts registering the highest land surface temperatures. The (World Bank, 2025) records maximum temperature in Bangladesh rising by roughly 1.1°C since 1980, raising concerns in the country.

Humidity is also seen as a critical factor in the South Asia context. (Ramsay et al. 2024) argues that humid stress has been systematically overlooked for the people living in the informal settlements. In Dhaka, humidity coincides with the hottest months. Humidity reduces the ability for the body's to able to cool down through evaporation and creates heat exhaustion. Moreover, remote sensing studies demonstrate that land cover change has expanded high-temperature zones across Dhaka (Dewan et al., 2021). This evidence shows that it forms urban risk. Yet the surface temperature is not the same in the informal settlement as the air, it is seen indoor temperature is more. A thermal map can identify a hotspot without explaining who remains there during the day, who travels through it, and nighttime temperature. The dwellings' temperature is not cooler than the surrounding or actual temperature.

2.1. 2 Exposure, sensitivity and adaptive capacity are independent

The (IPCC, 2022) frames climate risk as an interaction among exposure, sensitivity, and vulnerability. In heat studies, this examines vulnerability through these three dimensions. Exposure refers to who is more exposed or in contact with heat. Sensitivity refers to why contact produces greater harm for some people, and adaptive capacity asks what resources allow people to reduce, prevent, and recover harm. In informal settlements, households do not have the ability to modify their roof, and this becomes a reason for increased exposure. Heat-related health concerns raise sensitivity, while medical expenses reduce the cost of investing in a cooling coping method. Health vulnerability is dynamic across all the sectors.

The sustainable livelihood approach adds a complementary dimension to this framework. Human, financial, natural, physical and social assets shape the strategies available to households (Chambers and Conway, 1992 ; Scoones 1998). In the context of urban heat and illness, it reduces labour productivity, earnings, and restricts access to water. The interconnectedness between the IPCC Framework and the Livelihood framework lies in explaining both immediate exposure and the chain through which it produces poverty.

2.2 Informal Settlements as a hotspot of heat vulnerability

2.2.1 The housing in the informal settlement and thermal environment

The most recent literature has recognized that for residents of informal settlements, it is the primary site of heat. Small rooms, rooms without any windows, weak cross-ventilation, tin roofs, and limited shade can produce high indoor temperatures. These influence thermal temperature and conditions, making the residents more exposed to heat (Ramsey et al., 2011, Linden et al.,2022). This literature challenges the common assumptions that being indoors is more harmful.

In built housing, it cannot be rebuilt from its core infrastructure. The fan only works when electricity is available as an immediate cooling mechanism. Despite having simple cooling strategies such as taking baths or opening windows. Due to societal norms, this becomes a hindrance too, especially for a woman. A woman cannot open a window due to privacy issues or wear as comfortable clothing as men can. Similarly, the households they live in are mostly rented, so installing coolers, insulation, and applying reflective roof depends on landlord permission. The key synthesis is that these do not operate as independent variables. Together they form a cohesive system that determines whether residents can convert awareness into effective adaptation strategies.

2.2.2 Basic services as determinates of adaptive capacity

The adaptive capacity depends on accessing basic public services such as water, electricity, and sanitation to prevent health impacts of heat and being aware of the coping strategies. (Satterthwaite et al., 2020) opposes that resilient building in informal settlements requires attention to precisely

these everyday services rather than climate-specific interventions layered on top. (Li et al., 2024) Develop this into the concept of invisible infrastructure: water supply, cooking arrangements, electricity connections that shape heat exposure, but very limited policy intervention exists. In Bangladesh, these must be addressed before it's too late. Heat increases the demand for water when supply is most strained. It intensifies the usage of electricity, creating load-shedding problems that turn off fans, one of the cooling methods. Without proper waste management and drainage, it worsens the sanitary conditions, resulting in outbreaks of diseases.

2.3. Gender and heat vulnerability in the informal settlement

2.3.1 The occupational exposure and its limitation

Most people see heat as a risk to people who work outdoors, and several interventions need to be in place. Interventions include shaded rest provisions, hydration facilities, work hour restrictions, vendors, and transport workers. This framing is supported for the population it addresses, and the study by (Shahrujjaman et al,. 2025) provides the evidence for it from Dhaka's context. The limitation is not about the frame but about more gender integration added to it. Outdoor informal work is male-dominated in South Asian countries. It is always seen that men are the affected group, not women, as they are less exposed outside. Women who work at home as unpaid and home-based work falls outside the frame entirely and is not taken into account properly. In informal settlements, women's exposure is more concentrated at the intersection of dwelling and unpaid care. Cooking adds as an additional radiant heat. (Anjum , 2024) Research focuses solely on everyday adaptation strategies in korail, what women do, and constraints they face by income, social norms, and decision-making power dynamics. Indoor exposure always exceeds outdoor exposure, but it is easily overlooked.

2.3.2 Household adaptation constraints and strategies

The household is treated as a single adaptive portion, but the resources are not properly mobilized. Decisions about buying a fan, paying for electricity, storing water, changing working hours, or seeking medical assistance depend on control over income and power. The analytical distinction should be based on long-term outcomes and sustainability for the residents to adapt with coping

strategies despite the limitations. This distinction helps to intercept the contradictions in the literature. People may possess behavioral knowledge and strong social networks while lacking the authority, finance, infrastructure, or recognition required for structural change.

Residents of informal settlements actively respond to heat conditions. The literature consistently highlights a wide range of low-cost behavioral responses: boosting fluid consumption, bathing frequently, wetting floors and clothes, opening windows and doors, sleeping outside, resting during peak times, and shifting tasks to cooler periods of the day. Hossain et al. (2024) classify adaptation into behavioral change, structural improvement, and resource mobilization, and observe that low-income families primarily depend on the first as the second and third are financially unattainable.

Sultana et al. (2025), conducting research in Korail, also discovered that residents were proactively adjusting routines and utilizing available resources. The discovery that residents prioritized lasting enhancements in housing quality over short-term solutions like cooling centers is important. It shows that the inclination for structural changes over behavioral adjustments exists among residents and is limited by opportunity rather than by knowledge. Structural adaptations such as reflective roof coatings, insulation, enhanced ventilation, shading, and green and blue infrastructure are proven to be effective. In many documented instances, they are cost-effective. The cool-roof initiatives show significant reductions in indoor temperatures at a reasonable expense. The consistent observation in the literature is that these measures fail to scale in informal settlements, with explanations focusing on cost, awareness, and technical capability.

The explanation of tenure, in contrast, is relatively overlooked. If the limiting factor is a lack of power to change a leased property, then efforts focusing on cost or awareness will be ineffective no matter how well they are created. Differentiating between these explanations necessitates data on tenure and adaptation assessed simultaneously, which is seldom gathered.

2.4 Policy recommendations and Implementation Gap

Bangladesh's adaptation framework has traditionally evolved in response to cyclones, flooding, coastal threats, agriculture, and readiness for disasters. Bangladesh's National Adaptation Plan

(2023–2050) broadens this agenda with climate-smart urban areas, resilient livelihoods, locally driven adaptation, governance, and capacity enhancement, while highlighting gender responsiveness as an overarching principle (Government of Bangladesh, 2022). New urban efforts indicate transformation. In 2023, Dhaka North named Asia's inaugural Chief Heat Officer, and the climate action strategy for 2024 in Dhaka incorporates heat resilience, public health, water management, and urban greening initiatives (Arsht-Rock Resilience Center, 2023; C40 Cities, 2024). UNDRR's (2025) policy evaluation highlights an increasing focus on heat awareness, health readiness, cool roofing, and urban development.

The alignment of these efforts indicates that heat is transitioning from the outskirts of policy to clear acknowledgment. Acknowledgment, however, does not equal execution. Heat responsibility is shared among meteorological, health, labor, housing, water, disaster management, and local government agencies. General commitments might be missing data at the settlement level, specific budgets, responsible agencies, or measures that indicate if high-risk populations are receiving protection. Gender language may stay procedural if it is not linked to particular experiences, authority in decision-making, and distribution of resources.

Another conflict arises between uniform warning systems and varying levels of vulnerability. Temperature limits facilitate effective communication; however, a standardized alert does not instruct a home-based worker on how to lower stove heat, offer a day laborer compensation for breaks, guarantee water during service outages, or aid a tenant unable to alter a roof. Successful heat management should link alerts to actions that are practical for various livelihoods and household responsibilities. This necessitates collaboration among various sectors and involvement from communities, rather than just improved forecasting.

2.5 Conceptual Framework

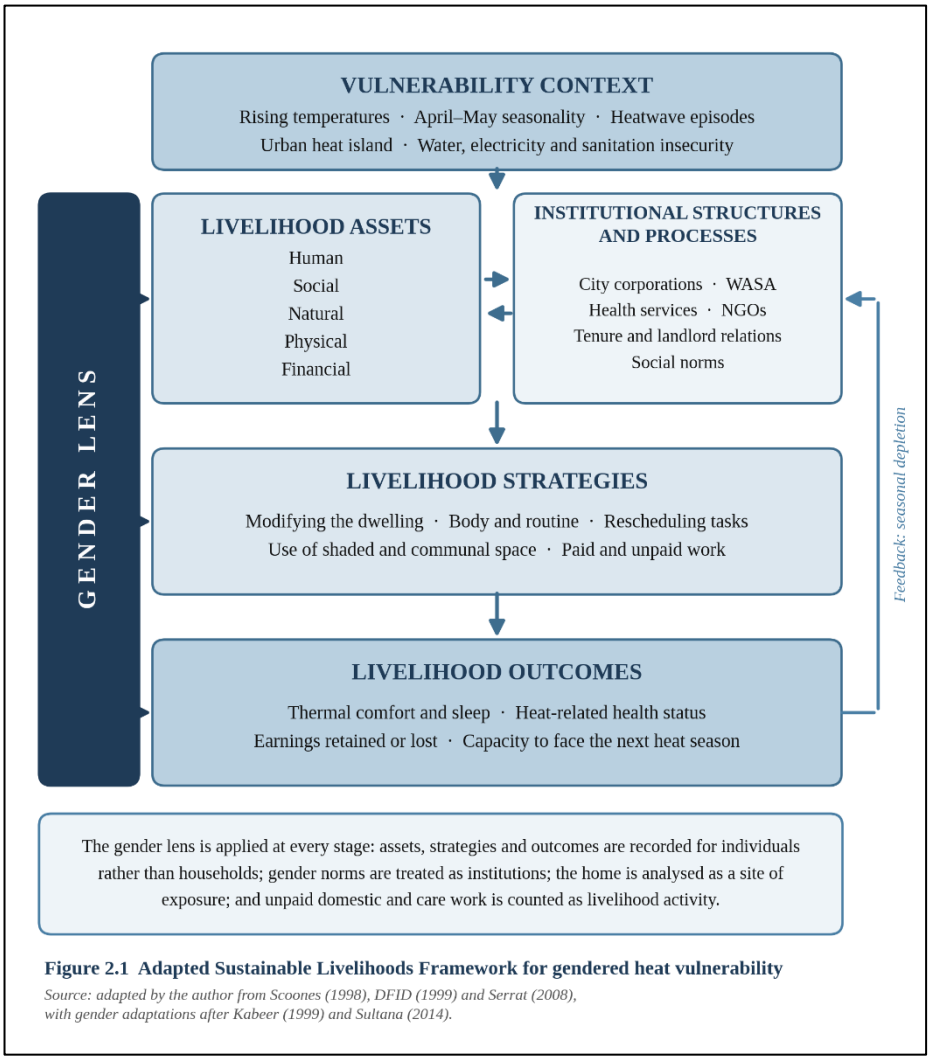


Figure 1Conceptual Framework of this study

This study adopts the Sustainable Livelihoods Framework (SLF) developed by (Chambers and Conway 1992), and later it was refined by (Scoones 1998), the Department for International Development (DFID,1999), and lastly it was refined by (Serrat,2008). This framework is used to examine the gendered heat vulnerability in Dhaka's informal settlement. However, relying on the original framework, this framework was adapted to the study's context, which incorporated both men and women's experiences and impacts of extreme heat.

The original SLF argues that people's livelihoods are shaped by the interaction between livelihood assets, vulnerability context, institutional structures and outcomes (Serrat, 2008). In this study, extreme heat is seen as a climate stressor with existing urban vulnerabilities. It includes poverty, inadequate and improper housing, and limited access to water, insecure tenure, and poor healthcare. It should not be viewed as an isolated environmental hazard; the framework recognizes that heat vulnerability is holistic rather than individual.

The original SLF is modified in four ways: (1) the analysis was conducted separately for women and men, (2) gender norms were treated as institutional factors, (3) the home was considered a major heat exposure zone, and (4) homemaker responsibilities are recognized as livelihood activities. Therefore, the adapted framework provides a useful lens for understanding livelihood, heat exposure, institutions, gender roles, and coping strategies that shape heat vulnerability among informal settlements. The framework is synthesized by exposure, which is produced through interaction of outdoor climate, indoor thermal conditions, occupation, and unpaid work. Sensitivity is shaped by health, age, workload, and livelihood dependence. Adaptive capacity emerges from control over income and time, tenure, public services, healthcare, social networks, and institutional support. Gender is a cross-sectional theme among the three dimensions.

The orientation guides the study to predetermine which gender, men and women, is more vulnerable. The question arises of how different genders with different livelihoods, household responsibilities, and settlement contexts differ. At the same time, it creates a pathway of exposure and barriers. It also provides a basis for policy assessment, a policy that is gender responsive to the extent of recognizing these interventions and enabling the resident to live a good life.

2.6 Chapter Summary

The primary understanding from the literature is that urban heat susceptibility is created socially. Increasing temperatures and humidity create the threat, but the extent of damage relies on urban design, housing conditions, infrastructure, economic vulnerability, gender dynamics, and

governmental action. These elements strengthen each other, which clarifies why significant daily coping can exist alongside ongoing vulnerability. A literature review derived from this synthesis does not predict the outcomes of the study; rather, it outlines the concepts and discussions that empirical research needs to investigate.

This study focuses on the intersection of these areas: the issue of gendered heat vulnerability in Dhaka's informal settlements has not been investigated using sex-disaggregated data that considers unpaid domestic labor as a livelihood, evaluates tenure in relation to adaptation, and contrasts settlements within various administrative jurisdictions.
The sustainable livelihood framework was subsequently implemented in relation to the three research objectives and their respective tools, while recognizing its limitations: its rural roots, its asset-oriented terminology, and its admitted shortcomings concerning power dynamics. The subsequent chapter outlines the method employed to implement this framework in Korail and Hazaribagh. For the informal settlements of Dhaka, this strategy focuses on more than just those who claim to feel hotter. It inquiries about the experience of heat in domestic, professional, and communal areas; how risks and expenses for coping are allocated among households; why certain strategies are only temporary; and if policies offer viable options for safeguarding. Analyzing these issues comparatively in Korail and Hazaribagh can provide evidence that is responsive to gender, sensitive to livelihoods, and mindful of the variety in informal urban settings.

Chapter 3: Methodology

This chapter explains the methodological approach used to investigate gendered heat vulnerability in the informal settlements of Korail and Hazaribagh in Dhaka. The study examined how women and men experience exposure and sensitivity to extreme heat and the coping and adaptation strategies available to them. The study also examined the barriers that shape their adaptive capacity and the extent to which existing policies recognize these differences. The questions include measurable household patterns as well as experiences and institutional processes. The research used a mixed-methods comparative case study design. A household survey provided information based on research objectives across two informal settlements. While the Key Informant Interviews (KIIs), Focus Group Discussions (FGDs), field observation, and literature and policy review supported context and evidence. The different data sources were integrated during interpretation to produce a more complete picture.

3.1 Research Design

The study adopted a mixed-method approach, both qualitative and quantitative. The method was used as primary field data were captured of the respondent experiences and responses of the fieldwork. Three case studies enabled closer attention to social livelihood and institutional and physical characteristics of Korail and Hazaribagh; comparing the two settlements helped to examine the common and different patterns of vulnerability without assuming that all informal settlements have identical housing conditions, livelihood structures, and relationships with urban context.

The design combined quantitative and qualitative evidence. The quantitative component consisted of a household questionnaire that highlighted respondent socio-demographic information, housing and services, heat vulnerability, health impacts, livelihood disruptions, and knowing institutional support in terms of policies. The findings were descriptive and thematic rather than spastically quantified for the informal settlement. The qualitative consisted of six KIIs, two FGDs, and field observation. These methods explored how respondents understood heat, why particular coping

strategies were used, how gender roles influenced daily exposure, and how support was absent. The literature and policy review supplied a secondary data component through which the empirical evidence could be compared with existing research and formal commitments (Creswell and Plano Clark, 2018).

3.2 Study Area

The **target population** of the residents of informal settlements within the Dhaka South and North. Two settlements were selected as study sites:

- **Korail (Dhaka North)—one** of the largest and most densely populated informal settlements in the city, home to an estimated 500,000 people on roughly 100 acres of land, where semi-permanent tin-and-scrap housing traps heat and residents depend heavily on shared and card water sources (Castellano et al., 2021; Mosaddek, 2025).

- **Hazaribagh (Dhaka South)—a** densely built, historically industrial neighborhood repeatedly identified as one of the city's most heat-exposed zones due to the urban heat island (UHI) effect and limited green cover (Moni, 2025).

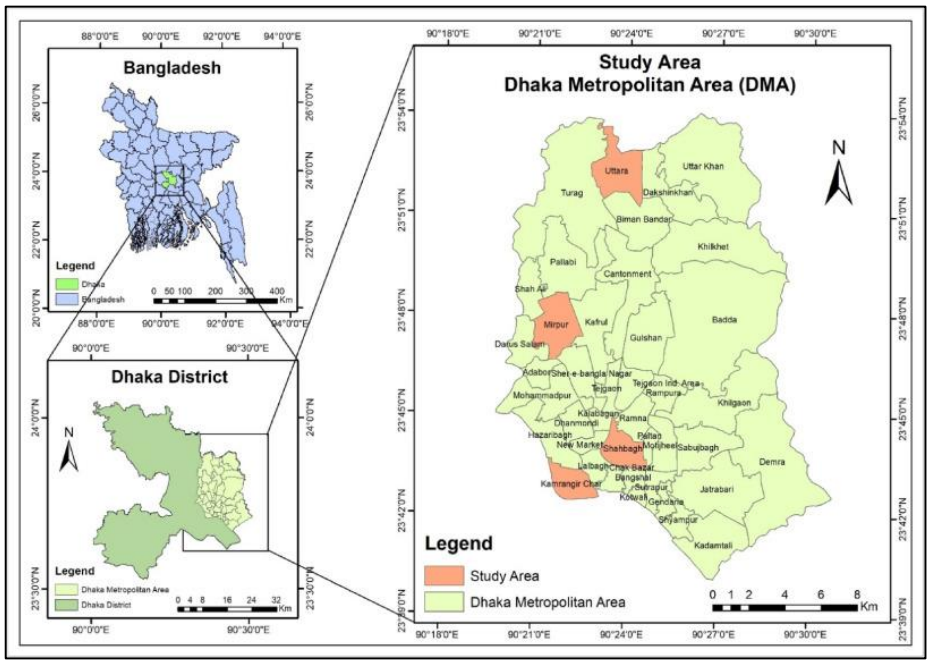


Figure 2 Map of Korail and Hazaribagh, source: Shahrujjamn et al., 2025

Site selection was purposive, based on two criteria. First, both settlements have been recent studies as highly heat-vulnerable and needed more attention, Hazaribagh and Korail rising by roughly 6–8°C above surrounding rural areas (Moni, 2025). Second, locating one site in Dhaka North and one in Dhaka South allows a comparative analysis of heat vulnerability across the two city corporations, which differ in vulnerability and adaptation strategies.

For the quantitative part, a total of 120 household surveys were conducted: 70 in Korail and 50 in Hazaribagh. The larger sample in Korail reflects its substantially greater population and higher settlement density, so the share of surveys broadly corresponds to the relative size of each community. Within each settlement, households were selected through random sampling from the dwellings in the study area, giving every household a comparable chance of inclusion and reducing selection bias. Wherever possible, the adult woman responsible for household management was interviewed, in keeping with the study's gender focus. The respondents aged 18+ years were interviewed for this study.

For the qualitative part, the sample comprised two focus group discussions (one in each settlement) with 6 people in each setting and having a gender balance and six key informant interviews (KIIs). These informants were chosen purposively because they could share their expert opinions in their respective fields and contribute to this study. The number of qualitative encounters was guided by the principle of data saturation, whereby data collection continues until no new data was found, known as content analysis (Saddaf et al., 2024)

3.3 Data Collection Methods

Data were collected using four complementary methods:

1. Household survey: A structured questionnaire was administered face-to-face in Bangla to the 120 sampled households. The instrument captured household demographics and socio-economic status; housing characteristics such as roofing and wall materials, ventilation, and room-sharing; access to water, electricity, and cooling; heat-related health symptoms experienced by household members, disaggregated by sex; and coping and adaptation strategies. These findings show that housing materials, service access, and gendered health burdens are central determinants of heat vulnerability in Dhaka's slums (Moni, 2025; Mosaddek, 2025).

2. Focus group discussions (FGDs): One FGD was conducted with the participation of women and men in each settlement, using a semi-structured guide to explore shared experiences of heat, the burden of cooking and care work, health effects, and the everyday strategies to cope with heat. FGDs were chosen because group interaction surfaces collective norms and shared coping practices that individual surveys may miss (Nyumba et al., 2018).

3. Key informant interviews (KIIs): The six KIIs used a semi-structured guide, and it was tailored to each informant's knowledge level, generating institutional and expert perspectives on water access, health-service pressures during heatwaves, institutional policies, and housing conditions.

4. Field observations: During the conducting of the survey, few field observations were made, such as housing conditions, roads, sanitation used, and people living by the riverside. How is their life different from the ones living near the main road? Both settlements had blue space.

3.5 Inclusion and Exclusion Criteria

Following the data screening, 110 respondents were used for data analysis, comprising 66 data points from Korail and 44 from Hazaribagh. The usable sample rate was 91.7 overall, 88.0% in Hazaribagh and 94.3% in Korail. The remaining were excluded during the data cleaning. The exclusion criteria were based on failure to meet the eligibility criteria, substantial in completeness, and no relevancy to the original study. The response lacking a certain response was removed. KII participants required relevant knowledge on the topic, while FGD participants were adult's residents who have been living in this area for over 5 years to share their community experiences.

Table 3.1 Overview of Methodological Tool

Data Collection Method	Sample Size	Instrument	Data Source
Household Survey	120	Household Questionnaire survey, random sampling	Residents of Korail, Hazribagh from diverse occupation
Key-Informant Interview	6	Semi- structured questionnaire	Government NGO Pharmacy owner Hospital Worker Landlord WASA
Focus Group Discussions	2	Semi structured questionnaire	Community people

3.4 Data Analysis Techniques

Survey replies were filtered, categorized, and input into an organized database. Data cleansing included verifying eligibility, identifying duplicates, addressing missing values, correcting range errors, and ensuring internal consistency. Following the screening, 110 valid records were kept. Descriptive statistics—such as frequencies, percentages, and important summary measures—were employed to display respondent traits and main indicators. Cross-tabulations analyzed Korail and Hazaribagh, investigating variations between women and men in their exposure, reported effects, coping strategies, and obstacles. When occupation or household role provided a more significant explanation than gender by itself, these factors were evaluated collectively. The analysis highlighted the orientation and magnitude of noted differences. Due to the limited and non-random nature of the sample, percentages reflect the respondents instead of the entire settlement population. Denominators were meticulously noted in cases of missing responses, and minor categories were merged solely when there was substantial justification. Thematic analysis of the KII, FGD, and observation materials was conducted, adhering to the process of familiarization, coding, theme development, review, definition, and interpretation outlined by Braun and Clarke (2006). The analysis integrated both deductive and inductive coding methods. Codes were deduced from the research questions and framework, encompassing exposure, sensitivity, adaptive capacity, livelihood assets, paid employment, unpaid caregiving, housing, services, health, coping strategies, gender-related obstacles, and institutional responses. Inductive codes identified problems that arose from participants' narratives and were insufficiently covered by the original framework.

Codes were analyzed across different participant types and study regions, focusing on contradictory instances. Themes necessitated consistent evidence, and quotations were chosen for their analytical significance. Observations reinforced contextual understanding, while policy documents were evaluated for target demographics, suggested actions, accountability, implementation strategies, and gender sensitivity. A thematic matrix connected every research

question to survey, KII, FGD, observation, and documentary data. Quantitative trends characterized the sample, whereas qualitative content illustrated processes and significance. Convergence boosted assurance, complementarity provided context, and divergence was explored. Institutional reports on available assistance, for instance, were contrasted with residents' knowledge and accessibility. This triangulation enhanced credibility and uncovered potential discrepancies between formal offerings and actual experiences.

3.5 Ethical Considerations

The study was conducted based on the principles of voluntary involvement, informed agreement, confidentiality, reducing harm, and respect. Prior to taking part, individuals were made aware of the study's objective, the nature of the questions to be posed, the anticipated use of the data, and their right to decline answering any question or to withdraw without facing consequences. Permission was secured prior to conducting surveys, interviews, and FGDs. Involvement did not influence access to services or support, nor was any assurance of immediate material advantage given.

Identifiers were reduced, analytical documents employed codes, and citations were anonymized. Data were held safely for research purposes. Inquiries about health, income, housing, and organizations were posed courteously and with as much confidentiality as the circumstances permitted. Unneeded identifying information was omitted. The thesis presented must include the name of the approving university or ethics organization and the approval reference, if relevant.

3.6 Scope and Limitations

Numerous constraints impact interpretation. Initially, the household sample was non-probabilistic, which means it does not allow for statistical generalization to the entire populations of Korail or Hazaribagh. Secondly, the cross-sectional approach recorded experiences from a single fieldwork period and was unable to assess seasonal variations, time-based adaptations, or long-term health impacts. Third, health symptoms, exposure, income reduction, and coping strategies were reported by the individuals themselves and may be influenced by memory inaccuracies, varying

interpretations of heat-related illnesses, or the desire to present oneself favorably. No ongoing indoor-temperature, humidity, physiological, or clinical data was gathered to independently measure exposure and health results.

Fourth, the final analytical sample of 110 was less than the 120 questionnaires distributed, and the omission of ten records may create bias if incomplete cases differed systematically from those kept. Fifth, FGDs can be swayed by dominant voices, whereas KIIs showcase professional viewpoints and might portray institutional actions more favorably than the actual experiences of residents. Gender comparison focusing mainly on women and men fails to encompass non-binary identities or all intersections of gender with age, disability, pregnancy, migration, occupation, and household influence. Ultimately, the two neighborhoods are unable to reflect the complete variety of informal communities in Dhaka. Transparent reporting, diverse livelihood and institutional viewpoints, two-location comparison, and triangulation diminished but did not eliminate these constraints. The research provides context-relevant evidence on trends, processes, and policy deficiencies without asserting conclusions beyond its framework and sample.

3.7 Chapter Summary

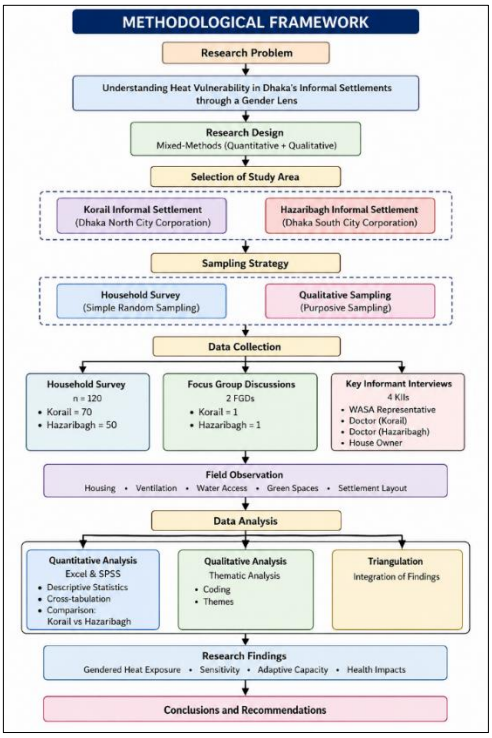


Figure 3 Methodological Framework

This methodological framework is used to give an overview about the whole section.It is the structured plan and acts as a roadmap. It outlines the specific approach, analysis methods and data collection tools to answer the research questions and objectives. Moreover this chapter summarized the overall study of how this has been conducted and how this methods will be efficient to address the problem. This research employed a cross-sectional comparative mixed-methods approach to examine gendered heat vulnerability in Korail and Hazaribagh. Out of 120 household surveys conducted, 110 were kept for analysis: 66 from Korail and 44 from Hazaribagh. The survey was supplemented by six intentionally chosen KIIs, two FGDs, field observations, and a review of literature and policy. Descriptive analysis was applied to quantitative data, thematic analysis was used for qualitative material, and the results were combined via triangulation. The methodological framework integrated exposure, sensitivity, and adaptive capacity with gendered livelihood resources and institutional settings. Ethical safeguards and methodological constraints were taken into account consistently, offering a clear foundation for the presentation of results in the next chapter.

Chapter 5: Results and Discussion

This chapter presents and describes the findings of the study, drawing household survey data from Korail and Hazaribagh and qualitative evidence from Key Informant Interviews (KII) and Focus Group Discussions (FGDs). The analysis is organized around the three research objectives and connected with the adapted sustainable livelihood framework (SLF). During the organization phase, several themes from the data's were developed. The framework conceptualized the vulnerability, adaptive strategies, and gender lens to examine how it affects women and men. This study gives a gendered pathway to understand the heat vulnerability in two of the most common settlements in Dhaka and how these two settlements play a big role in the country's economy and planning.

The chapter establishes the socioeconomic and livelihood profile of the respondents. Secondly, it examines how both genders experience heat differently through their jobs, responsibilities, household, and indoor exposure. Thirdly, the health impacts of heat among the respondents, both indoors and outdoors. Followed by strategies used by households to cope with extreme heat. More emphasis is given on the gendered barriers that hinder the adaptive capacity. Lastly, the chapter discusses institutional support from the KII evidence findings and respondents' answers in response to extreme heat.

5.1.0: Socioeconomic and livelihood profile of the study respondents

The survey data consisted of 120 respondents across two informal settlements of Dhaka, including 70 respondents from Korail and 40 from Hazirabagh. 58% women and 42% men participated in this survey. The two informal settlements showed diverse livelihoods even though the standard of living is low. In Korail, respondents were mainly domestic workers, homemakers, vegetable sellers, small entrepreneur shop (modi dokan) owners, and others. In contrast, Hazirabagh had more day laborers, rickshaw pullers, truck drivers, street vendors, house helpers, and many more.

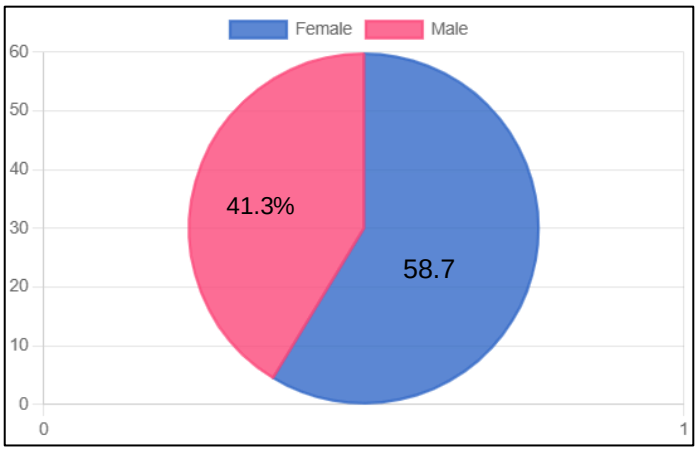


Figure 4: Gender Representation

The occupational profile reveals the distinct differences in the livelihood profile in both the informal settlements. In Korail, men were seen strongly in outdoor occupations, which included rickshaw pulling, different types of street vendors, and also other physically demanding jobs exposed to heat. While the women were more frequently represented as working women, such as domestic workers, garment workers, and tailors, some were represented as indoor or home-based workers. The Hazirabagh data showed a similar diversity with similar diversity of rickshaw pulling, van driving, and small shops (modi dokan), and in women, homemakers were mostly seen in comparison to Korail, where the percentage of working women is higher. This differentiation is important as the SLF framework does not highlight exposure as an isolated climatic condition; rather, vulnerability emerges through interaction between the vulnerability contexts and livelihood assets.

Occupation of Respondents	Percentage
Street/small vendors	36.6
Transport/drivers	7.3
Homemakers	21.2
Unemployed	6
Garments/tailoring	8.5
Day laborers	11.4
Domestic workers	3
Small business owners	4
Others	2

Figure 5 Respondents Livelihood

In both settlements the education level of the respondents is maximum, having primary education for about 53.6%. The respondent studied till grade 5 and then dropped out due to various reasons, one of the main reasons being poverty, having to earn money to support family. For females, the dropout rates were high due to societal norms, early marriages, and poverty. The secondary education was 35.7% combined in both settlements. The reason for not being able to complete the education was family responsibilities; to live in an urban place like Dhaka, one needs to have an income; otherwise, it is impossible to survive in this economy. Notably, 3.6% of respondents have a university degree. Despite having a university degree, the respondents expressed their disappointment with the job market in Dhaka, as they are unable to find a decent job with decent pay; they have to stay in this settlement so that their daily expenditure is not high.

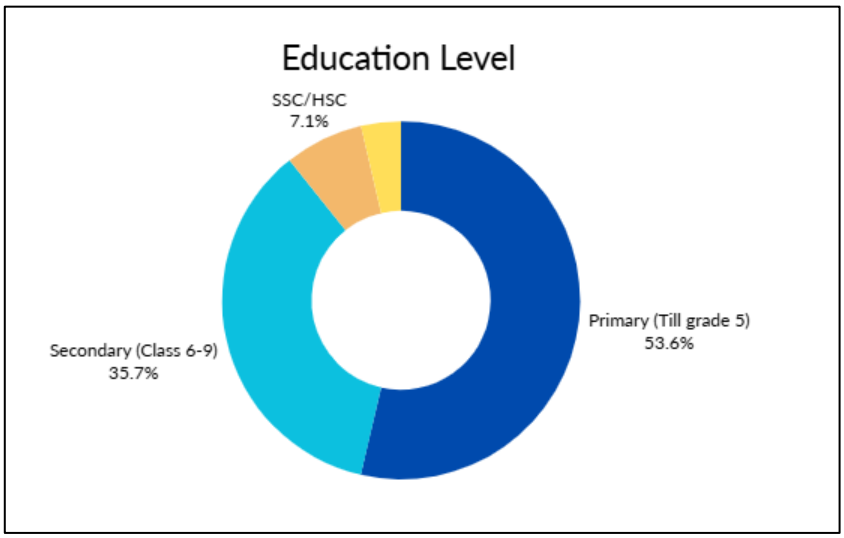


Figure 6: Respondents Education Level

Another indicator of structural instability is housing tenure. Renting was significantly more common than ownership among respondents whose tenure was clearly documented in both settlements. Of the 39 respondents in Hazaribagh and Korail who had tenure information on file, 94% were tenants, 4% were owners, and 2% had other types of tenure. Because people may not always have complete control over physical capital, rental reliance is significant inside the SLF. Insecure or rental tenure may limit occupants' ability to undertake structural changes, even when they find improvements that could lessen heat exposure, including changing ventilation or replacing roofing materials.

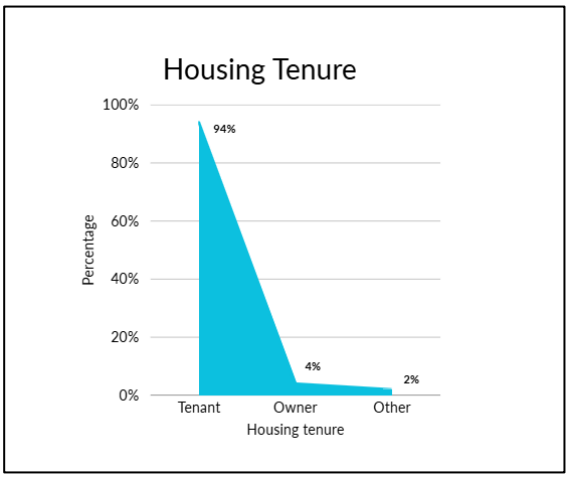


Figure 7 Housing Tenure

The income-stability data also showed evidence of livelihood uncertainty. Eleven respondents in Hazaribagh cited daily wage labor as a key source of financial stability, ten claimed monthly income, and many reported seasonal work, reliance on family members, or a combination of these sources. In addition to regular salary, the Korail dataset also includes daily wage labor, street vending, and revenue reliant on household members. Because the ability to avoid heat exposure depends in part on the capacity to absorb missed working time, these livelihood factors are important for heat vulnerability. According to recent data from Bangladesh, social networks can offer crucial informal assistance, but wealth and resource availability have a significant impact on low-income households' ability to adapt to excessive heat (Sultana et al., 2025).

The socioeconomic profile determines the context of vulnerability in which heat is felt. The respondents see heatwaves not only as climatic events but rather as a result of gendered labor, informal employment, limited financial resources, and insecure housing. This supports the use of the SLF frameworks because the effect of heat depends on people's resources and their ability to convert these assets into livelihood strategies to live.

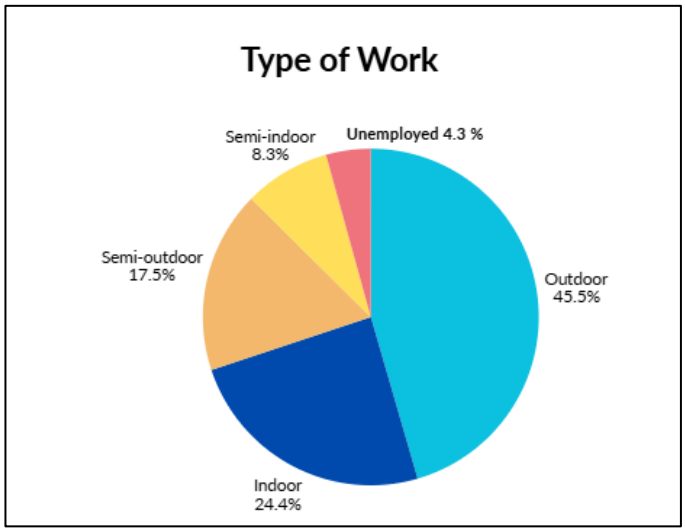


Figure 8 Type of work

These findings strongly coincide with Sultana et al. (2025), where the study conducted in Korails found that income and housing were the main reasons for the residents to adapt to heat, while

unequal distribution of resources increased vulnerability. The study showed long-term improvement rather than relying on temporary coping mechanisms. This study extends this argument by demonstrating that livelihood insecurity is also gendered. Men and women both live in the same settlement, but their vulnerability and coping strategies differ from each other.

The large proportion in the settlement are homemakers, who are more important and often left behind in this process as they do not have any income and contribute to the country's economy. This is consistent with (Li et al. 2024), who argue that heat vulnerability in the Global South is shaped by "invisible infrastructure." The occupational exposure usually generates an unambiguous conclusion where it shows men are the most vulnerable group; this reasoning is underpinned by the study by (Shahrujjaman et al. 2025). Therefore, the study does not interpret gender as a vulnerability of heatwaves; rather, it shows gender structures as a pathway through which livelihood conditions translate into heat exposure and adaptive capacity.

5.1.2 KII Respondent profile

KII Representative	Organization	Study Area	Professional Role	Reason for Selection	Key Areas Explored During the Interview
Pharmacy Owner **KII 1**	Community Pharmacy	Korail	The owner is a frontline healthcare provider responsible for providing basic medical advice and medicine to the residents	The respondent has been in this area over 15years+. Frequent interaction with community members seeking treatment for	-Perception of climate change and its impacts over the last 15years. - Vulnerability difference seen in different weather

				heat related illness.	-Pattern of heat related illness and seeking behavior changes - What type of treatment or medicine the residents use during heatwave
WASA Representative **KII 2**	Water Supply and Sanitation (WASA)	Korail	Responsible for managing water booth for the residents of Korail.	The respondent was selected to understand the relationship between extreme heat, water consumption, and access to essential services.	-Changes in water demand during heatwaves, water accessibility -Storage practices, supply challenges - To understand if there is enough water supply to all the residents.

Medical Officer **KII 3**	Healthcare Facility	Hazaribagh	Own its pharmacy shop, give basic treatment such as measuring pressure, checking diabetics for free. Give medical advice for treating patients from surrounding community.	Selected as the personal has relevant clinical experience and can identify proper heat related illness and conditions and give right treatment.	-To know the heat related diseases, the most vulnerable group in Hazaribagh area. -To understand how accessible healthcare and medical assistance is.
Land Lord **KII 4**	Community	Hazaribagh	The landlord gives housing to residents. Takes a monthly rent about BDT 3,000 monthly with water facilities, electricity has to be paid differently	-To understand a landowner perspective in informal settlement is quite important. - The challenges the landowner face to provide facilities	- Types of facilities tenants receive - Any type of complain they receive - Do they receive any institutional or government support to make the housing in the

					informal settlement better.
NGO Represntative **Research and Policy Officer** **KII 5**	Non-governmental Organization	Urban Informal Settlement	Researcher and policy specialist with previous experience studying heat vulnerability in informal settlements	-The respondent was selected as they conducted a recent study on the impact of heatwave in informal settlement on the outdoor workers in Dhaka - Expertise in urban heat, climate related policies consultation and gender dimension	Heat vulnerability frameworks, policy gaps dimension of heat exposure. To provide recommendations for long term adaptation.
Department of Environment Representative (DoE)	Government	Ministry of Environment	Manages legal enforcement, oversees environmental clearance compliance, reporting and	-Knowledge about existing policies and plans - How government is working towards	Existing and future and policies and initiatives by government. Barriers the government has to face in

Deputy Director **KII 6**			coordinating with	building a climate friendly resilient settlement	order to access and mobilize funds

A total of sexy key informants representing diverse sectors: health, water, research, development sector and the government. The selection was done purposively to gain expert knowledge on heat vulnerability in informal settlements. The selected respondents included two similar medical field representative to compare both the settlements, one WASA representative, NGO representative and government who have been working in this field. Their professional and knowledge provided insights to this research to understand gender lens in health impacts, water accessibility, existing vulnerability and existing adaptation practices, policy and institutional responses. Additionally, these interview complemented the household survey and field observations by offering a broader understanding of the structural and institutional factors influencing heat vulnerability in Korail and Hazaribagh informal settlements.

5.2 Gendered exposure and sensitivity to extreme heat

5.2.1 Indoor heat and differentiated exposure

The survey demonstrated that extreme heat is experienced strongly within the home. 8% of respondents shared that their homes were extremely or very hot during peak summer hours and during heatwaves. The overall perception of severe indoor heat was high for both genders. The timing of heat was also concentrated in the afternoon; around 85% of women respondents mentioned the afternoon as the period of worst indoor heat in comparison to 66.7% of male respondents. The rest believe late morning and night are the high temperatures inside the

household. This difference suggested that women's exposure cannot be adequately assessed through occupational location alone. Men's faces with prolonged direct exposure cannot be adequately assessed through outdoor work, but women may experience a more persistent indoor exposure because the home is simultaneously their workplace, place of residence, and community. Overall, 78.6% of respondents mentioned they mentioned indoor heat in the afternoon, followed by 10.7% in the morning. Some respondents revealed that nighttime indoor heat 7.1% of respondents informed that it causes insomnia, being late to work, and difficulty in sleeping. The rest of the respondents believe early morning heat is not as effective as daytime.

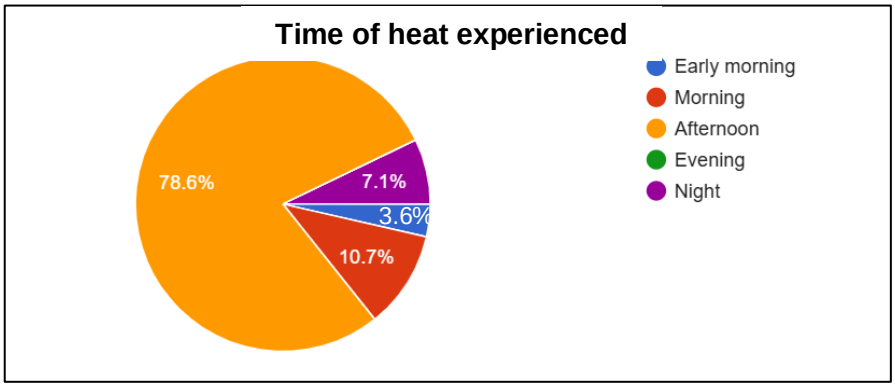


Figure 9 Time when indoor heat is experienced most

This finding complements the adapted SLF because it supports that home is the site of exposure within physical capital. An informal settlement is just not an asset that protects residents from climate hazards; it's a roof, ventilation, size, electricity, and water supply that shape heat exposure. Recent studies (Hossain et al., 2026; Shahrujjaman et al., 2025; Islam et al., 2025) also showed similarity where poor housing conditions and limited access to essential services are central constraints on heat adaptation, while emphasizing that women experience additional challenges because household work and paid work overlap (Sultana, 2024). A recent study (Shahrujjaman, 2025) of 416 informal workers in Dhaka found that outdoor workers reported higher overall heat-related symptom scores than indoor workers, particularly for weakness, headaches, and muscle cramps because of direct sun exposure and physical exertion. Additionally, the indoor environments can generate heat stress.

One of the female respondent mentioned *" I feel like I am inside a boiling water pan when I am inside the house"*

5.2.2 Heat, work, cooking and daily responsibilities

The high proportion of respondents changed their working or daily activity schedules during extreme heat. Mostly the homemakers and those who own their own small shop, vegetable or fish sellers, or any other street vendors have the luxury to adjust their timing and working hours according to the weather. The rest of the respondents have to abide by the rules of their workplace and cannot take breaks or have the flexibility to work in different hours. However, the findings emphasize that changing a schedule does not necessarily mean reducing exposure or vulnerability. Starting working earlier, taking breaks or shifting domestic tasks may represent adaptation, but these strategies may redistribute the burden across the day. These findings agree with (Sultana et al. 2025) who found that residents of Korail actively modified their routines and relied on available resources to cope with heat. The present studies extend this argument by showing that routine modification is also gendered. Men who are paid may alter work hours, whereas women have to complete cooking and household tasks within the day; if they do not do it, they face domestic violence.

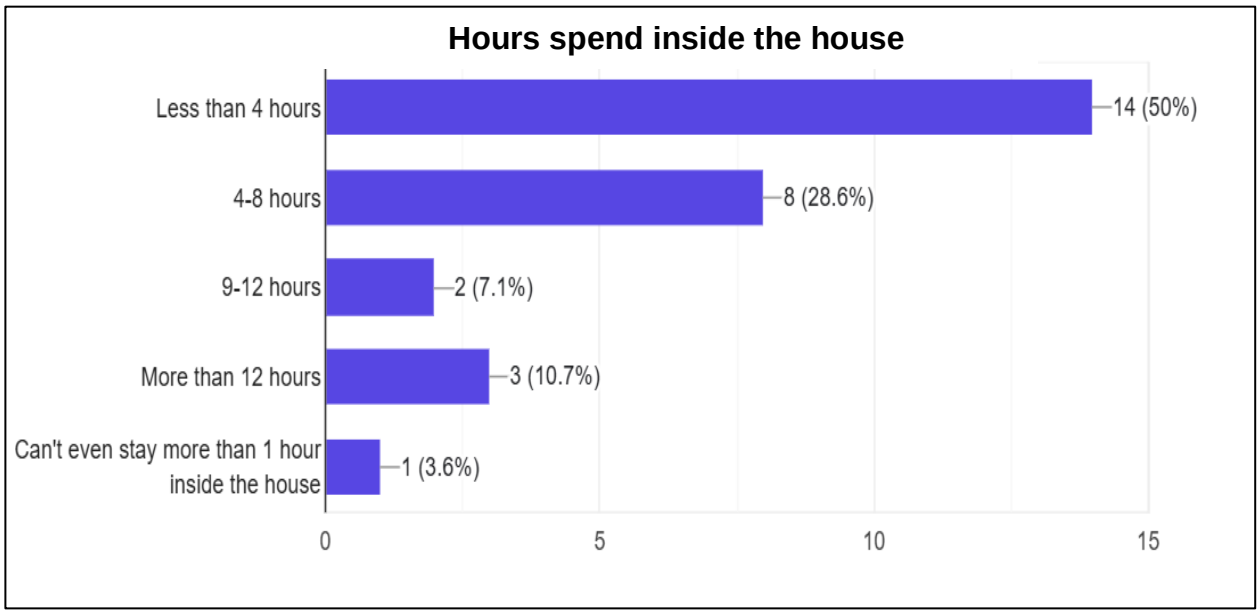


Figure 10 Hours Spend inside the house by women of both settlement

The primary source of cooking used by most female in both the settlement is gas cylinder and rest uses firewood (Lakri). So firewood causes more pollution and trap of heat inside the house making it more vulnerable to women cooking.

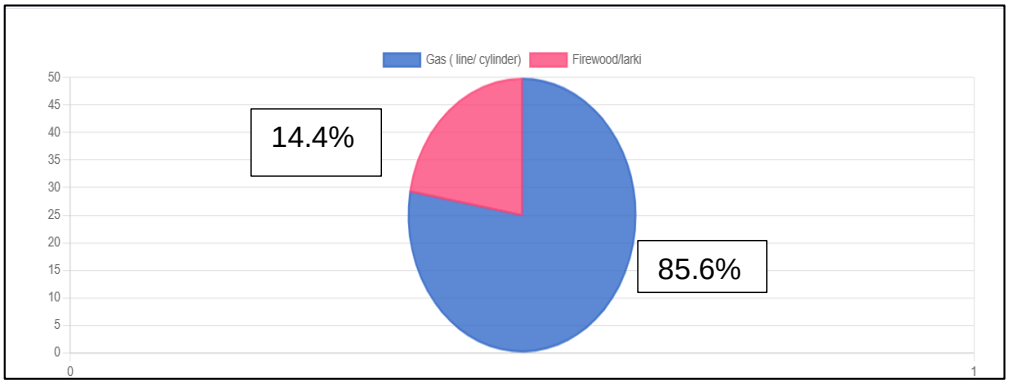


Figure 11 Cooking method used in informal settlement

The study by (Li et al. 2024) argues that women's heat exposure is only due to assigned responsibility. However, the present study adds an important livelihood dimension: domestic work does not simply increase women's exposure; it can also limit their ability to withdraw from exposure. Women do not have the convenience to rest outside the house, as they have to look after the household inside all the time no matter how unbearable the heat is. This illustrates having slight

knowledge about heat or having the freedom of flexible hours during heat to rest. Adaptation is shaped by social conditions, resources, and knowledge.

One the female respondents shared that *"Due to heat, my husband comes irritated and takes his frustration on me, do not care about me that I am also facing the same thing inside the house"*

5.2.3 Physical Health impacts due to heatwave

The health findings demonstrates that one of the most vulnerable factor impacted due to heat is both physical and mental health. Headache and dehydration were common among both women and men, while 57% men who works outdoor as day labourers, rickshaw puller and street vendor. While most men reported heat exhaustion and sleep disturbance more frequently than women. The findings of (Shahrujjaman et al., 2025) also found that outdoor informal workers experiences higher heat related symptoms in comparison to woman especially physical exertion headache , dizziness and dehydration.

Nevertheless woman vulnerability shouldn't be over looked. The study shows that sensitivity operates through different livelihood pathways, women reported having greater responsibility in homemaker and also working women. Working women have barely time to rest as after their workplace they also have to look after their household at home, the cycle repeats everyday which causes more health issues in women compare to men (Ramsay et al., 2021). The 66% high proportion of respondents who worked outdoor revealed that their income reduced during heatwaves as well as their wellbeing. This findings shows that extreme heat is increasingly becoming an economic as well as public health risk. Fever, skin rashes, food poisoning were commonly seen among the respondents and they also brought up their children faces this as well.

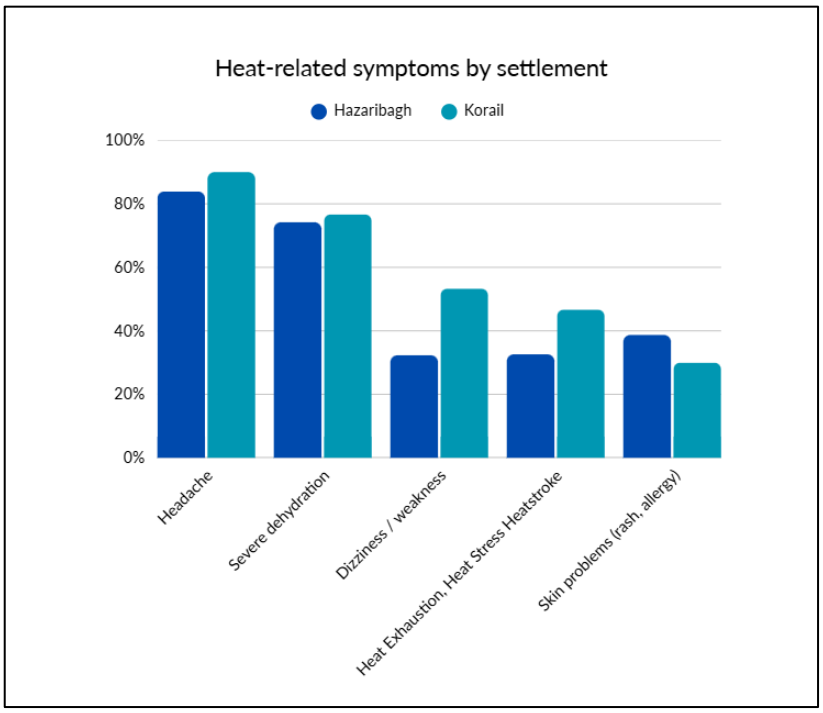


Figure 12 Symptoms due to heat

The respondents mentioned several heat related symptoms and the above fig: 09, where it shows both the settlements in Korail and Hazaribagh. Headache was most seen respondents 90.0% and 83.9%. Severe dehydration was reported almost in equal percentage in both of the settlements, Dizziness and weakness was shown in 53.3%, 32.3% Hazaribagh was seen. Heat exhaustion, heat stress, heatstroke was seen 46.7 % and 32.6% in informal settlement especially for outdoor workers. Skin problem were seen in respondents and also in immediate family member in both the settlement, 38.7% Hazaribagh and 30.0% Korail. The KII 1 and 3 also mentioned these heat related symptoms heat exhaustion, illness, dehydration, headache, skin problems and dizziness.

The two informal settlement highlights the absence of recover. For men the loss of income during heat decreases financial capital; for women the continued repeated cycle of household responsibilities depletes human capital. Both are a form of seasonal depletion. Health care use was among 84% of the respondents visiting a doctor, clinic or pharmacy during hot season from March to June because of heat related illness. However, this should not be interpreted as casual heat related morbidity estimation because the question relied on the respondents which might create biasedness. The usage of healthcare indicated that heat was perceived as a health care burden

within Korail and Hazaribagh. The finds are also consistent with the evidence (Hossain et al.,2024) in Rajshashi where the households reported heat exhaustion, dehydration and other physical health impacts while their socioeconomic conditions influenced their coping strategies. The present adds a gendered dimension by showing that similar heat events can generate different livelihood for both women and men. Thus, a question arises why a particular group in both gender experiences different levels of heat stress.

Case Study 1



"The poor remain poor and we have no choice. There is no government intervention to make our life better. We have to adapt to heat as we have no choice."

Source: Fieldwork photograph and interview conducted by Nafia Saddaf

"We Adapt Because We Have No Choice" — the Story of Abdul Alem Salam

Abdul Alem Salam has been living in korail since the past fifteen years. He has been doing the same work since then selling fluids like sugarcane, lemon juice etc. In the nearby houses seen in the picture, the tin house. The tin holds heat all day and stay inside.

While he I working outside, he doesn't have any shade above his head, he has to sell sugarcane juices in the scorching heat. He believes he generates more income during this time. As during heat sugarcane helps to relieve stress and heat. People stop for a cold drink. Over the past years he has seen how the heat has increased over time and how climate change has impacted him.

Despite working so hard, he did not have risen income whereas his living expenditure increased, the rent has gone up. Working at fifty seven his body does not support him. So, when he feels to unwell, his wife comes and takes his place. She leaves her household responsibilities and take care of his job and then go back to home and do the chores. She is more vulnerable than me. I have the luxury to sit in more comfortable clothing but she doesn't.

In this fifteen years, I have not received any institutional support to make my life better, I just have to live with whatever I have right now. Maybe

5.2.4 Mental Health impacts due to heatwave

In the informal settlements, mental health was seen to be one of the emerging factor. While recent studies highlighted more on physical health aspect somewhere mental health was neglected. Respondent highlighted stress and anxiety among most frequently faced,

Sleep disturbance was seen to be linked with both psychological and physical wellbeing. In dwellings where roofs and wall absorb most heat especially people living in tin roofs. The study also supports this (Ramsay et al., 2021). Lack of sleep impacts the nexyt day work productivity increases irritation. The gender lens comes in which shows for a women she has to manage household childcare and if the women is a working woman also work. Due to heat people tend to be more irritable. So when the children throws tantrum, husband shows irritation, this feels like shared burden (UN Women 2026; Sultana et al. 2025). In korail, it has been women with dual responsibilities rather than a shared responsibility. Mental health remains lack of heat health in Bangladesh.

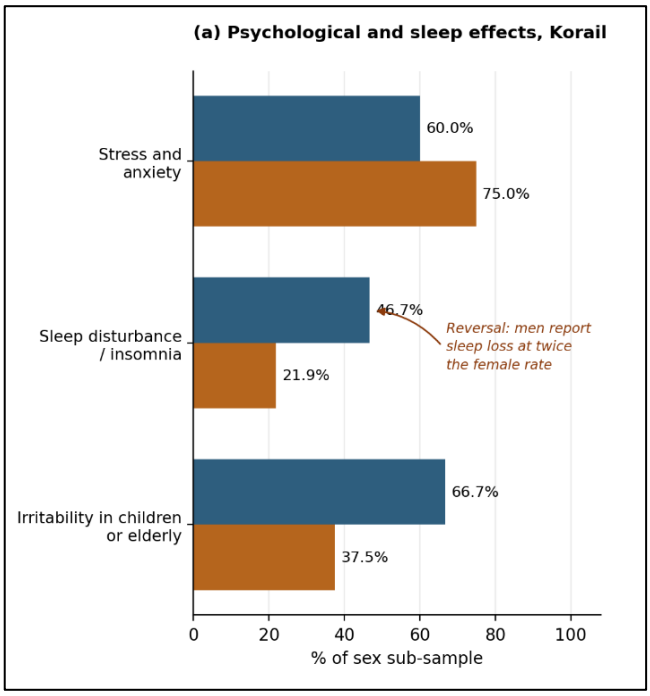


Figure 13 Mental Health Symptoms

The study data showed that there is evident sleep disturbance in the gender difference in the opposite direction from the expected pattern where 46.7% of men reported sleep disturbance

compared with 21.9% of women. These statics are important because in many studies it shows women are vulnerable and lot of emphasis are given on that and men are left behind. In the above figure 10 it can be seen that how each mental health has affected both the gender. Stress and anxiety was found more in women 75% and men 60%. Insomnia was found more in men than women. The study had one interesting finding that children and elderly male feel more irritated than females. Due to the irritation, conflicts, domestic violence occurs. These consequences has led to a decline in their livelihoods. Among 85.5% respondents reported that extreme heat reduced their own or their income during hot season. About 92.7% respondent mentioned that extreme heat during March-June effected their productivity and mental health.

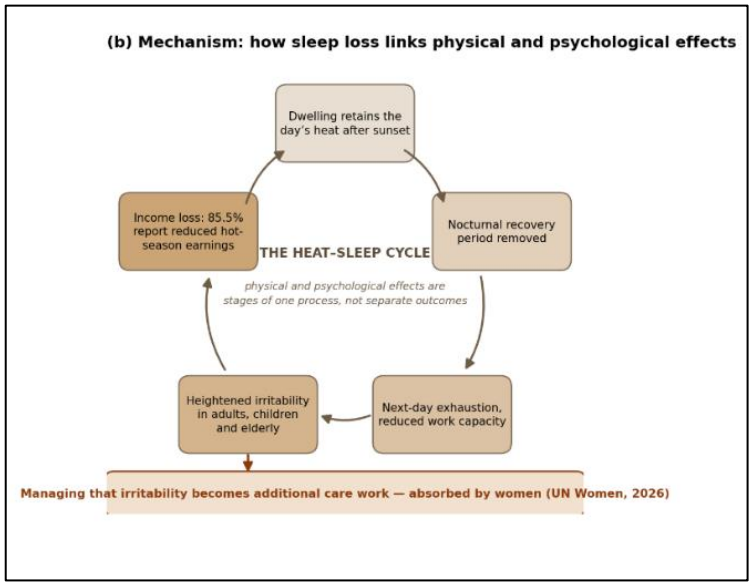


Figure 14 Flowchart of heat sleep cycle

This flowchart show that after heat is trapped it removes the recovery phase. As a result it causes exhaustion and reduce the work capacity of a person. This brings in behavioral changes like irritation, being annoyed. This also causes family dynamic and income loss. For day laborers their wage depends on daily and their productivity. Each day their working hour and productivity is not the same.

5.2.5 Pregnancy, breastfeeding and menstrual hygiene

The most obvious gendered sensitivity was found to be reproductive and menstrual health. Extreme heat poses unique obstacles for managing menstruation hygiene, pregnancy, and breastfeeding, according to 78.3% of Hazaribagh respondents and 80% Korail respondents who answered the question. Both female and male in the informal settlement raised concern as a highly alarming where initiatives are require as there is lack of it. Some male respondents have mentioned that women can adapt well, there is nothing we can do. So, we just have to move with flow and suffer.The KII 2 hospital representative was categorical, describing pregnant women as extremely sensitive to heat, which produces restlessness and can affect foetal movement. Hazaribagh respondents independently identified the same group.

From the focus group done in Hazribagh, the group mentioned that women are affected because "they go through body changes such as pregnancy, menstrual health, it becomes difficult to survive in extreme heat" Moreover, in Korail's respondent mentioned the discomfort they have to face when they are menstruating as sanitary napkins becomes irritating and itchy causing skin rashes. Also females who are not aware of sanitary usage they use dry cotton clothes. Due to lack of space and privacy they cannot hang certain clothes outside in the fear of judgement by the people.

FGD from Korail woman connected this by saying "*Cannot hang wet clothes or use extra water because water is rationed."*

In the settlement, the management of menstrual hygiene is not limited by knowledge or preference, but rather by the intersection of natural capital, no shaded outdoor space, physical capital, no private drying area or privacy for women. The mention of menstrual, pregnancy and breastfeeding into institutional planning, policies is so limited that it seems invisible. Poor socioeconomic status has consistently been found to be the most significant factor raising the risk of preterm birth, low birthweight, and stillbirth associated with prenatal heat exposure, according to a large and growing body of studies (Syed et al., 2022).

5.3 Resources, coping and adaptive capacity

5.3.1 Basic services and cooling as livelihood assets

The studies found access to basic services emerged as one of the main determinants of adaptation strategies. It is shown that drinking water access during peak summer was described as moderate by 78.1% of females and 50% of males. An interesting finding was that most of the respondents in both settlements did not describe the water access as completely unavailable; a relatively low proportion reported it was not easy access, and no respondents reported no access at all. Women reported more difficulties in accessing drinking water than men despite women also carrying a greater burden of household and caregiving responsibilities. Thus, water is simultaneously a physical asset and a gendered resource.

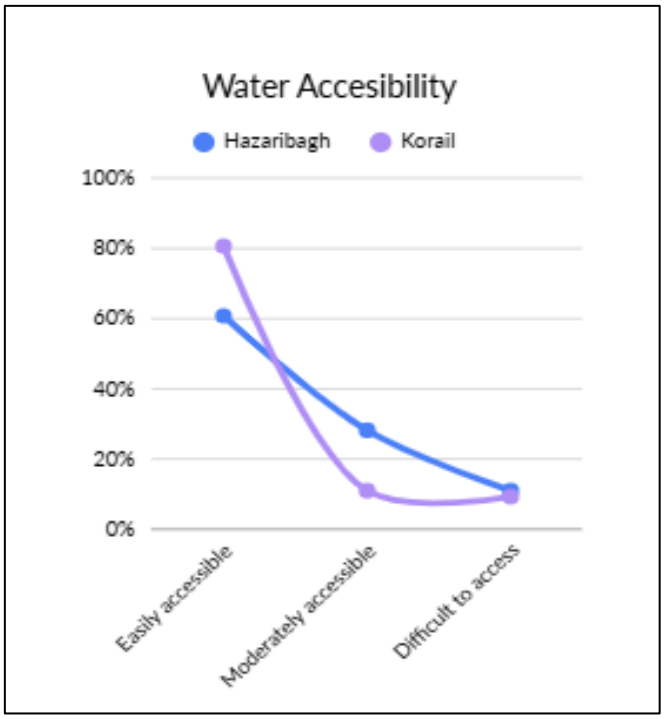


Figure 15 Access to Water

In contrast to water, electricity was more of a constraint. 82.3% reported frequent short-duration load shedding, while another five reported frequent load shedding. Fans were seen as the principal

and only cooling method by respondents where electricity was directly relied on. 2% of the respondents had AC as their cooling strategy, and 40% of respondents had fridges in their homes, which became a cause of heat exposure and more disruption in the area. The presence of a fan should not be interpreted as an effective cooling strategy, as a fan cannot remove heat from a room, and it depends on electricity availability, thermal characteristics, and ventilation of the dwelling. The everyday issue faced by the respondents revealed that the cramped space, poor ventilation, trap heat zone, and frequent load-shedding, therefore, demonstrate the difference between having a physical asset and being able to convert that into effective adaptive capacity. This distinction closely reflects the gender-sensitive modification of the SLF Kabeer' resources achievement is relevant here, where a household resource does not imply equal ability of household members to use the resources. However, the author Li et al. (2024) argues that electricity and water supply form "invisible infrastructure" that can substantially reduce heat risk in low-income communities.

Sanitation conditions further increased heat exposure. 96.8% of respondents stated that settlement sanitation conditions worsened significantly during extreme heat. Respondents referred to waste accumulation, toilet odors, standing water smells, and drainage problems. This suggests that heat vulnerability is not produced by temperature alone; it emerges through the interaction of heat with existing environmental and infrastructural constraints.

5.3.2 Everyday coping strategies during heat

The studies found access to basic services emerged as one of the main determinants of adaptation strategies. It is shown that drinking water access during peak summer was described as moderate by 78.1% of females and 50% of males. An interesting finding was that most of the respondents in both settlements did not describe the water access as completely unavailable; a relatively low proportion reported it was not easy access, and no respondents reported no access at all. Women reported more difficulties in accessing drinking water than men despite women also carrying a greater burden of household and caregiving responsibilities. Thus, water is simultaneously a physical asset and a gendered resource. Respondents relied overwhelmingly on low-cost behavioral strategies. All the respondents mentioned that drinking water when the heat becomes

unbearable becomes constant. Sitting directly under a fan was reported by 15 women (46.9%) and 20 men (66.7%). Moving to shaded spaces was reported by 17 women (53.1%) compared with eight men (26.7%). Bathing, opening doors or windows, and using wet clothes were also common.

The gender difference is quite evident, as 72% of women who stayed home lack shade and are trapped inside their homes. While 15% of men who work outdoors reported lower use of shade, as they do not get the opportunity to rest properly. Outdoor workers, about 30% of whom are not paid, such as shopkeepers, vegetable sellers, fish sellers, lime juice sellers, and rickshaw pullers, have more exposure to finding shade to rest up. The shade in Korail is to sit underneath a tree or any place where a small proportion of shade is available. Whereas in Hazaribagh, the respondent uses blue space, the lake, which is nearby their area. These methods should not be interpreted as differences in awareness of coping strategies, as these are shaped by how people do their activities and spend time despite the constraints. 40% of women have reported skipping cooking during hot hours as their immediate coping strategy; they start early in the morning or later at night. Some women do not have the luxury of cooking later, as getting gas is difficult during a heatwave. Women who use wood fires to cook are more vulnerable to heatwaves, as they live behind closed doors; the smoke gets trapped into the house, making it feel like an oven. Nevertheless, cooking later is not an adaptation strategy but rather a thermal response, as it needs to be done for the family to eat.

The findings support the study of (Hossain et al., 2024) categorization of heat adaptation into behavioral change, structural refinement, and resource mobilization. The study also found that low-income households relied heavily on behavioral and passive strategies because more effective cooling ways were barriers because of socioeconomic conditions. The study by (Li et al. 2024) also mentions about focusing on infrastructure heat intervention rather than only on individual behavior. The present study provides empirical support in realm of this argument that residents are already behaviorally, maybe the impact is not visible. How the respond and their perspective matters. Their hand are tied as some things are beyond their reach and control to seek adaptation measures.

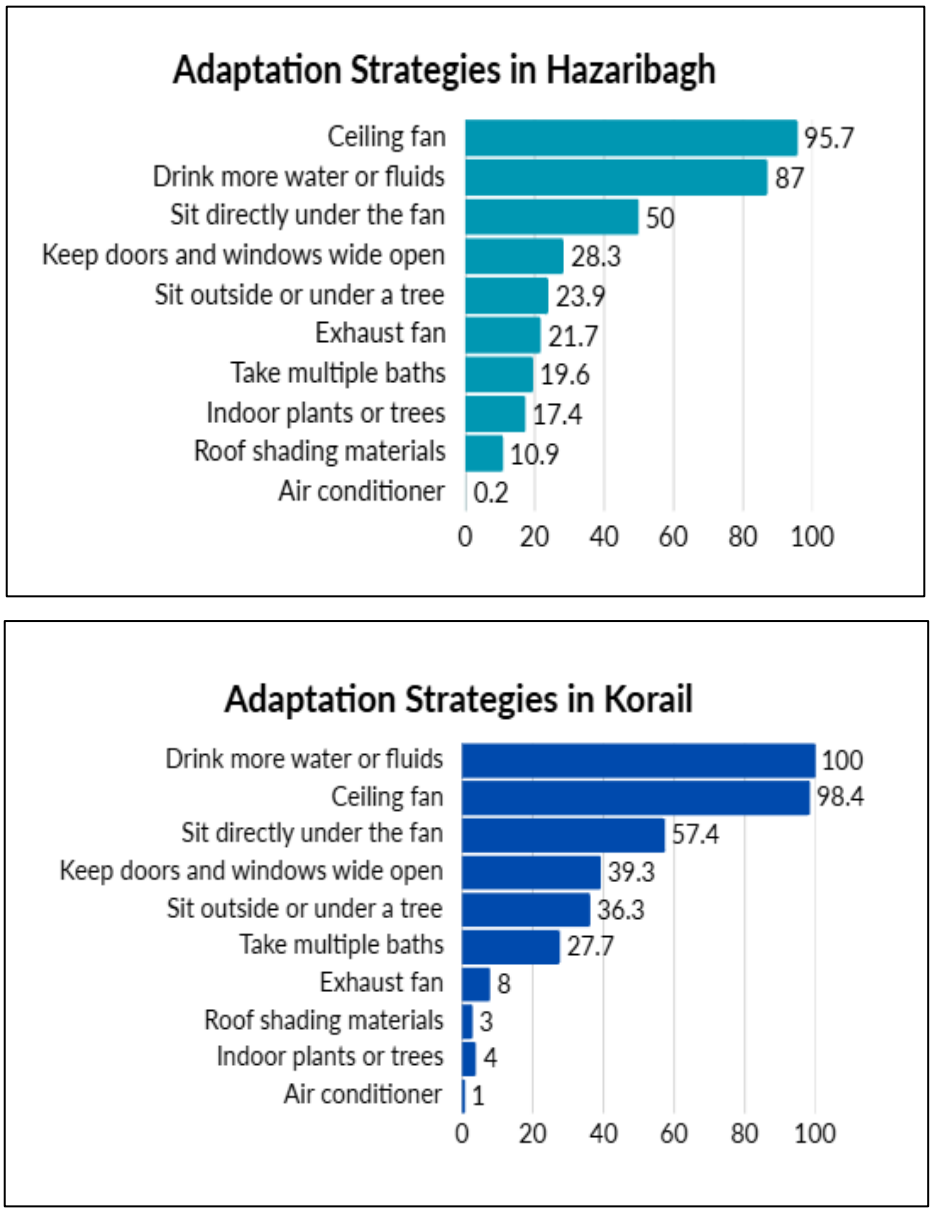


Figure 16: Functional cooling methods and immediate cooling behavior

Case Study 2: “Cooling Down Is Not as Easy as Turning on a Fan” — the Story of Sultana Begum

At 23 years old, **Sultana Begum** has spent most of her life in Hazribagh, where she has lived for the past 10 years. Despite working having education till secondary, I was married off early and burden with household responsibilities. The extreme heat continues to shape her daily life. After working all day at home, all she wants is to sit under a fan and rest. However, even this simple form of relief is uncertain. Frequent voltage fluctuations often make fans ineffective during the hottest periods of the day.

Her home has a tin roof and windows, but the surrounding buildings block airflow, turning the house into a confined and overheated space, especially at night. Cooking becomes even more uncomfortable because the fan must be switched off while using the gas cylinder. To cope with the heat, Sultana relies on small, everyday strategies. She takes frequent baths, repeatedly washes her face and hands, and uses table fans whenever electricity is available. Yet, these coping mechanisms provide only temporary relief.

"We cannot easily move somewhere else because living outside the settlement is too expensive."

5.3.3 Barriers and limitations to adaptation

The respondents mentioned several barriers that create obstacles to cope with heat. Financial barriers are one of the drivers. Between a quarter and a third of respondents in both settlements identified landowners and rental restrictions as an obstacle. The KII respondents, including the pharmacy owner, also echoed this statement. The lowest rent started from BDT 2500, and also the tenant’s lack of knowledge to improve ventilation in their houses. In the settlement it was seen that rents reach up to BDT 10,000 with utility fees on top. Tenants cannot raise a roof, install anything, or make a space for a window without the landlord's permission.

One of the female respondents mentioned, *"If I had to change anything this settlement, I would tell the house owner to provide better housing with open spaces and windows."*

The framework also connects the respondent's view that informal institutional processes work from landlord-tenure relations, and insecure tenure determines whether this can be converted into strategies. In the international literature it echoes that without formal land tenure the people cannot intervene in any coping strategy. In India, cool-roof coatings start at about USD 30 per roof, whereas the cheapest air conditioner costs USD 365. Cool-roof initiatives in Ahmedabad and Hyderabad have reduced indoor temperatures in low-income dwellings by 2–5°C. Cost and technology are not the obstacle (World Economic Forum, 2026; Third Derivative, 2024).

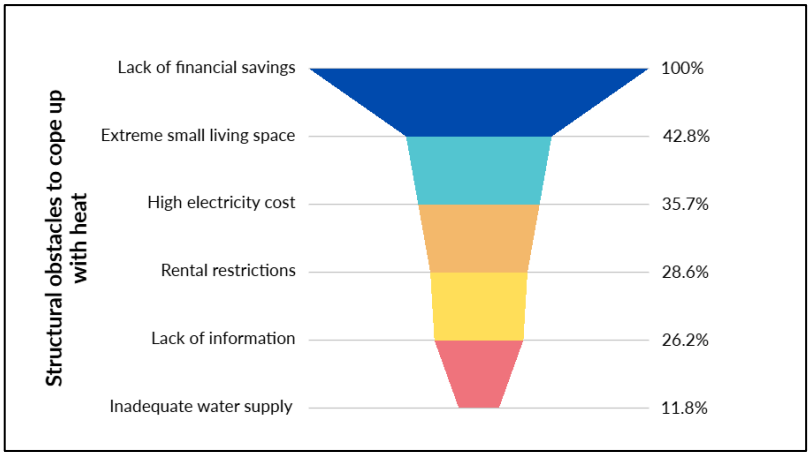


Figure 17: Obstacles to cope with heat

About 56% of both men and women cited a lack of savings as a hurdle. 40.6% of women and 60.0% of males reported living in cramped or small spaces. While 21.9% of women and 43.3% of men cited landlord or rental limitations, 31.2% of women and 50.0% of men claimed high electricity expenses. These results are significant because they contradict an adaptation narrative that emphasizes individual behavior as the primary source of responsibility. Already, residents are changing their habits by showering, utilizing fans, drinking more water, and shifting to shaded areas. The financial and physical context in which those decisions are made frequently restricts their ability to adjust. Sultana et al. (2025), whose Korail study discovered that while disparities in

resource access exacerbate vulnerability, individual income and social capital are crucial for adaptation. Additionally, the survey discovered that locals favored long-term housing upgrades over short-term fixes. In a similar vein, Hossain et al. (2024) discovered that low-income households in Bangladesh frequently rely on less efficient passive techniques and lack sufficient cooling supplies.

As a result, the structural barriers roughly match the financial and physical capital of the SLF. More significantly, they show that adaptive ability is more than just having an understanding of heat. Even when a person is aware that they should stay cool, drink water, or take a break during the hottest part of the day, these tactics become challenging when housing is congested, electricity is intermittent, water access is unpredictable, and income depends on continuing employment.

5.3.4 Recommended adaptation strategies

The findings of this study suggest that to reduce the vulnerability in the informal settlements requires intervention at the individual, household, community, and policy levels. The adaptive strategies mentioned are very basic to the individual level rather than holistic and institutional support. Similar findings from previous studies have reported on requiring contextualized heat adaptation measures. Based on the findings, literature, recommendations from focus group discussions, KII, respondents (KII 2, 4, 5, and 6), and own observation,, the following adaptation strategies are proposed:

1. Livelihood and occupational adaptation strategies:

- Introducing flexible working hours for the outdoor workers, giving two short breaks to increase workers' productivity
- Establish shaded rest areas for street vendors, transport workers and day laborers, also a separate area for women

2. Household and Individual Adaptation

- Increase awareness of heat-related illness and preventive measures

- Encourage simple adaptation measure awareness, such as use of damp clothing and towels to remove sweat, adequate drinking water, spray bottles wearing cotton clothing, having saline and enough fluids, etc. (Jay et al., 2021)
- Usage of an electric/gas cylinder stove instead of woods
- Developing a heat-resilient plan and guidelines for informal settlements
- Promoting the usage of insulated materials such as roof painting and wall insulations
- Providing incentives for landlords from the government to improve housing quality.

3. Community-Based Adaptation

- Making few community people volunteer who can spread heat-related illness and awareness about how they can adapt to heat and negotiate with house owners for any problems they face. (KII 1,2,3)
- Spreading awareness through community meetings, miking, posters and announcements
- Building community trust funds to work towards making the community a place to live (KII 6)
- Expand water points through affordable card systems in the settlements (KII 2)
- Increase urban green spaces and tree plantation programs (KII 5)
- Introduce combination of blue-green infrastructure in informal settlements
- Clean and restore existing water bodies in Korail
- Make a space for cooling spaces

4. Strengthening Health Sector

- Establishing proper and primary medical facilities with onsite doctors in informal settlements (FGD 1)
- Ensuring the availability of doctors and adequate medicine supplies during extreme events such as heatwave
- Creating and educating awareness about the impact of heat related illness and impacts

5. Policy and Institutional Recommendations:

- Integrate heat and gender into national disaster preparedness plan and policies in details with stronger enforcement
- Develop a separate settlement-level adaptation plans
- Establish gender-responsive heat indicators with adaptation policies and in urban planning
- Promoting green, blue and cooling spaces as an adaptation strategies in the informal settlements
- Building stronger enforcement and fines if any adaptation strategies is not monitored properly.
- Developing heat early warning system (Sultana et al., 2025)

5.4 Institutional Support, Gap and Policy Analysis

5.4.1 Limited Institutional Reach in settlements

One of the least effective elements of the respondents' adaptive environment seems to be institutional assistance. Of the 62 Korail respondents, 54 (87.1%) reported that no government, city corporation, non-governmental organization, or other organization has offered significant heatwave-related assistance or awareness campaigns in the community. Relationships with NGO practitioners, city corporation officials, government representatives, or community leaders were described by very few. This finding is important for the third research goal because it indicates a disconnect between citizens' perceptions of institutional assistance and the growing awareness of heat as an urban climate danger. As well as the majority of respondents have expressed that they never received any heat related institutional support or aware about any policy. The framework also shows that vulnerability context creates stress, livelihood assets determine the resources that exist to respond to different livelihood strategies in a household and determine how the institutions can support or transformed accordingly. Both the settlement showed they are actively adapting to the resources which are low cost and short term, they are highly dependent on them. Furthermore, the gender lens demonstrates that institutional interventions cannot be considered gender neutral. For example building a cooling centre, make it available for all, but women may not get access to

it due to societal norms, household duties. The KII also mentioned government led intervention are required to identify the actual gaps, reflect on the gap of the policies and the effectiveness of it. Limited awareness, inadequate coordination, insufficient resources and lack of coordination in stakeholders.

The study's by (Sultana et al., 2025) and (li et al.,2024) argues that heat health intervention is more vital and needs government more immediate attention. This study shows that relying solely on and individual respondent or profession, the governance and strategies needs to be holistic and more contextualized for the community. This study should not be interpreted as no support reported that no institutional programme exists. The programmes are there but no strong enforcement. The survey measure residents experience and the need for support. All the KIIs mentioned that the support is absent and does not reach to the right people in the informal settlement and even if the support is avaible the respondents are not aware of it or don't know how to access it. the SLF views institutions as the structures and procedures that dictate how assets become livelihood strategies, this distinction will be particularly crucial for Objective 3. Institutional weakness becomes a component of the vulnerability setting itself when residents are unable to obtain warnings, health services, cooling places, or other interventions.

In 2023, Bangladesh appointed the first Chief Heat Officer in Asia for Dhaka North. Heat policy reviews at the national level document the creation of heat action plans, urban planning strategies, public education campaigns, health-sector preparation, and public-private partnerships, including a cool roofs initiative specifically designed to lower indoor temperatures in urban slums (UNDRR, 2025). The goal of the CHF 499,930 national Heatwave Early Action Protocol is to provide early warning, drinking water distribution, cash grants, and cooling stations to 123,700 persons in Dhaka. In the two settlements under study, none of this architecture has reached four out of five homes.

Case Study 3: “If I Don't Work Today, My Family Won't Eat Tomorrow” — the Story of a 35-Year-Old Day Laborer in Korail

For a 35-year-old day labourer living in Korail, extreme heat is not something that can be avoided. It is something that must be endured. Every morning begins with the same uncertainty: finding work. If work is available, he leaves home early and spends hours carrying heavy materials under the open sky. If there is no work, there is no income. There is no monthly salary, no paid leave, and no safety net.During the focus group discussion, he explained that the heat has become increasingly difficult to tolerate. Headaches, dizziness, body pain, dehydration, and exhaustion have become part of his daily routine. By midday, his clothes are completely soaked with sweat, but stopping to rest is rarely an option.

The physical burden of working outdoors does not end when the workday is over. Returning home provides little relief. His small rented room remains unbearably hot long after sunset, making it difficult to sleep and recover before the next day. Like many other residents, his family has developed its own coping strategies. They drink more water, take frequent baths, wet the floor, and sit outside whenever possible to catch a little breeze. However, these are temporary solutions rather than long-term adaptations. He explained that no one had ever provided information about heat-related illnesses, dehydration, or ways to protect themselves during heatwaves. There were no cooling centers, no awareness campaigns, and no government programs designed specifically for workers in informal settlements. His experience also reveals a painful reality: climate change does not create new inequalities; it deepens the inequalities that already exist. For workers whose survival depends on daily wages, adapting to extreme heat is not a choice but a necessity.

"There are policies for many things, but nobody thinks about people who work in this heat every day."

5.4.2 Policy Analysis of Heat-Related Policies in Bangladesh

Policy	Relevancy	Evidence from this study	Policy gaps identified	Policy recommendations
National Adaptation Plan (2023–2050)	• The plan identifies urban adaptation, climate smart cities, gender sensitive WASH and resilience for vulnerable communities • The urban poor community is also recognized	• Respondents reported sanitation problem, water shortages, unreliable electricity, overcrowded housing and limited institutional support. • Women in informal settlement experienced greater indoor exposure because of cooking and caregiving responsibilities.	• No specific implementation framework for heat adaptation in informal settlement • No existing operational guidelines for gender-responsive heat action plan	• Develop settlement-level heat adaptation plans • Establish adaptation strategies such as green space, blue space, cooling spaces and integrate gender-responsive heat indicators into urban adaptation planning and policies.

Bangladesh Climate Change Strategy and Action Plan (BCCSAP), 2009	• Health, infrastructure, disaster management, research and institutional strengthening as key adaptation pillars.	• Respondents reported health problems, reduced work capacity and housing-related heat exposure. • The respondent mentioned lack of awareness about heat related problems	• Heat is not explicitly treated as a distinct urban hazard. • Gendered heat vulnerability remains largely absent.	• The gap in the policy is the missing term: urban heat, indoor heat and gender-specific adaptation measures.
National Plan for Disaster Management (2021–2025)	• Heat waves have recently been recognized as disasters within the national disaster management framework.	• KII participants reported that institutional responses were mostly reactive and usually appeared only after disasters such as fires.	• No community-level heat preparedness plans. • No localized early-warning awareness and mechanism	• Develop heat early-warning systems for informal settlements • Integrate heat into national disaster preparedness plans.

National Urban Health Strategy (2014)	• Emphasizes equitable access to health services. • Improved urban health infrastructure.	• Pharmacy and hospital KIIs identified the absence of nearby government health facilities and high treatment costs given the income of informal settlement people	• Heat-related health issues in to incorporated in this plan	• Establish mobile health services during heat waves. • Strengthen primary health care in informal settlements by providing the right doctors and adequate medicine supply.
National Strategy for Water Supply and Sanitation (2014)	• Promotes Access to drinking water and sanitation services.	• Water demand increases during summer (hot season). • Many residents were unaware of the WASA water-booth	• Insufficient awareness • Weak service delivery in informal	• Expand community water points by card system. • Spread awareness

		registration system in Korail.	settlements.	through mike and posters about this
Bangladesh Housing Policy (2016)	• Recognizes the importance of adequate housing and shelter for vulnerable population	• KII participants identified tin roofs, poor ventilation and overcrowding as major factor to heat exposure.	• Housing policy does not include heat standards in the informal settlement or about proper housing.	• Introduce heat-resilient housing guidelines. • passive cooling designs • Incentives for landlords to improve housing quality.
Bangladesh Delta Plan 2100	• Promotes climate-resilient infrastructure, ecosystem restoration and urban environment	• Respondents repeatedly identified trees, shade and improved ventilation as preferred interventions.	• Limited intervention of adaptation strategies despite being researches	• Increase urban greening. • Tree planting • Blue-green infrastruct

	al management.		done into national planning to implement in informal settlements.	ure in informal settlements.

Source: Authors analysis from various published sources

5.5 Heat Vulnerability Index based on livelihood groups

A simple vulnerability index is developed to compare the heat vulnerability across different occupation groups. The index consisted of five dimension which came from this study: exposure to heat, financial constraints, adaptive capacity, health impact and institutional support. The score ranges from 1 to being least vulnerable to 5 the most vulnerable. The scores were assigned based on survey findings, KII and field observations.

Table 3: Heat Vulnerability Index

Occupation	Exposure	Health Impacts	Financial Barriers	Adaptive Capacity	Institutional Support	Overall Score
Day Laborers	5	5	5	4	5	4.8
Street/small vendors	5	4	5	4	5	4.6
Domestic workers	4	4	5	4	5	4.4
Transport Workers (rickshaw puller, van driver)	5	4	4	4	5	4.4

Homemaker	4	5	4	4	4	4.2
Garment/Tailoring	4	4	4	3	5	3.8
Unemployed	2	3	2	3	4	2.8
Small Business Owners (Modi Dokan, Bkash Shop etc)	3	3	3	4	4	3,2

5.6 Chapter Summary

This chapter examined the gendered heat vulnerability in Dhaka's informal settlement through the Sustainable Livelihood Framework (SLF). The findings demonstrated that heat vulnerability is more than just high temperature and exposure. This is strongly influenced by housing condition, gender role, financial barriers, and livelihood patterns. Women experience greater indoor exposure, and working women experience double exposure because of cooking, caregiving, and working responsibilities. While men experienced a higher level of outdoor exposure by working in the scorching sun. Residents of both settlements relied on low-cost coping strategies such as finding shade to sit in, drinking more water, using a fan, and others. However, poverty, inadequate cramped housing, unreliable basic services, lack of awareness, and limited institutional support constrained adaptive capacity. The findings also revealed a relevant policy gap, recognizing the need to incorporate informal settlement voices into national plans and policies. Overall the study suggests that heat vulnerability in informal settlements requires immediate attention to have effective adaptation strategies with gender-responsive livelihoods and locally led interventions.

6. Conclusion

This study examined how women and men experience and respond to heatwaves in the Korail and Hazaribagh informal settlements. Also, if the existing policies and institutional responses address these gendered realities in relation to climate change. The findings resulted from the interaction of gendered work, poor housing, insecure livelihoods, financial constraints, inadequate services, and weak institutional reach. Residents are not passive: they repeatedly alter their routines and use the resources available to them. However, most responses provide temporary coping rather than reducing the structural causes of exposure.

The findings demonstrate different, overlapping pathways of vulnerability. Men were more concentrated in outdoor workers such as rickshaw pulling, transport, street vendor day labor, and other outdoor work involving direct sunlight and physical exertion. Their capacity to rest was constrained by daily-wage dependence and the absence of paid leave or shaded workspaces. Women experienced substantial indoor exposure because cooking, caregiving, cleaning, and home-based or paid work kept them inside small, poorly ventilated rooms in the settlement. About 85% of women, compared with 66.7% of men, identified the afternoon as the worst period of indoor heat. Working women often experienced a double burden, moving from paid work and domestic responsibilities without adequate recovery. Pregnancy, breastfeeding, and menstrual hygiene created additional needs that were largely invisible in heat planning or studies. Health and livelihood effects reinforced one another. Headache, dehydration, dizziness, weakness, skin problems, exhaustion, and sleep disturbance were widely reported, and 84% of respondents indicated using a doctor, clinic, or pharmacy during the hot season. Stress and anxiety were more frequently reported by women, whereas reported sleep disturbance was higher among men. Adaptive capacity was constrained by the material environment. Residents immediately cope by drinking water, bathing, using fans and wet cloths, opening doors and windows, seeking shade, sitting near available blue space, and shifting cooking or working times.

Additionally, the sustainable livelihood framework clarifies how these conditions combine. Extreme heat forms part of the vulnerability context, but its consequences depend on access to livelihood assets and on the institutions that govern those assets. The framework also shows that

that rent does not guaranteed the full access to public services. A household may own a fan, but load shedding and poor ventilation reduce its cooling methods. Water may available but their might be scarcity, cost, storage, and caregiving responsibilities influence access. A tenant may understand that a roof or window should be improved but lack the landlord's permission. Gender shapes each process: women and men may live in the same household while having different control over time, income, mobility, and cooling resources. Institutions and policies are therefore not external to vulnerability; they determine whether limited assets can become effective livelihood strategies. The central livelihood outcome observed was continued survival under heat, rather than secure and sustainable resilience.

Initially, the Dhaka North and South City Corporations ought to create settlement-level, gender-sensitive heat action plans that involve multiple stakeholders: community members, healthcare providers, water authorities, property owners, employees, non-profits, and local leaders. Plans must convert warnings into actionable steps that are practical at the local level and employ indicators broken down by gender, occupation, age, disability, and reproductive status. Residents should receive communication via community volunteers, pharmacies, public announcements, posters, mobile messages, and reliable local networks. Secondly, heat adaptation must focus on safeguarding physical well-being and livelihoods. Cool-roof coatings, enhanced ventilation, shaded pathways and markets, revitalized water bodies, trees, drinking water sources, and secure community cooling areas need to be increased. Landlords ought to be given incentives linked to enforceable minimum standards for heat-resilient housing, whereas tenants must be safeguarded against displacement or rent hikes after upgrades. Dependable electricity, water, drainage, waste disposal, and sanitation should be regarded as essential heat-health infrastructure. Third, outdoor and informal laborers need shaded rest spaces, hydration stations, adaptable schedules, and brief safe breaks during intense heat. Emergency funds or income assistance would enable daily-wage workers to avoid risks. During the hot season, primary health and mobile services need to be enhanced, ensuring sufficient staff, availability of oral rehydration supplies, increased awareness of heat-related illnesses, mental health support, and services that address pregnancy, breastfeeding, and menstrual hygiene. Monitoring must evaluate if women with limited mobility and unpaid caregiving duties can effectively access public interventions.

The research utilized a non-probability sample from two settlements; hence, the results reflect the participants and cannot be statistically applied to all informal settlement inhabitants in Dhaka. The cross-sectional design encompassed a single fieldwork period and was unable to assess seasonal or long-term variations. Self-reported heat exposure, health issues, income reduction, and coping might be influenced by recall or reporting bias. Out of the 120 questionnaires distributed, ten were excluded during the screening process, resulting in a final analytical sample of 110. The study did not encompass ongoing indoor and outdoor temperature, humidity, physiological, or clinical assessments. FGDs could have been swayed by dominant voices, and KII narratives might not completely represent residents' service access. Ultimately, a comparison between women and men cannot encompass all intersections of gender with age, disability, pregnancy, occupation, migration, and household authority.

Future studies should follow households across seasons and multiple years to examine cumulative heat exposure, livelihood erosion, and adaptation over time. Larger probability-based surveys across more Dhaka settlements would improve generalizability, while paired indoor–outdoor sensors, humidity or wet-bulb measures, sleep tracking, and clinical data would strengthen exposure and health assessment. Research should investigate unpaid care, intra-household allocation of cooling resources, reproductive health, disability, older age, children, and diverse gender identities in greater depth. The study ultimately shows that gendered heat vulnerability is produced through the organization of urban life. Men's outdoor work, women's indoor and care responsibilities, insecure housing, unreliable services, and livelihood poverty create different but connected forms of risk. Residents already adapt with considerable knowledge and effort; the failure lies in expecting low-income households to solve a structurally produced hazard through individual behavior. Effective adaptation must protect livelihood assets, redistribute institutional support, and give informal-settlement residents a meaningful role in designing safer homes, workplaces, services, and heat policies. Only then can coping become sustainable and equitable resilience.

References

Adrienne Arsht-Rockefeller Foundation Resilience Center. (2023). *The scorching divide: How extreme heat inflames gender inequalities in health and income*. Atlantic Council.

Ahmed, B., Kamruzzaman, M., Zhu, X., Rahman, M. S., & Choi, K. (2013). Simulating land cover changes and their impacts on land surface temperature in Dhaka, Bangladesh. *Remote Sensing, 5*(11), 5969–5998. https://doi.org/10.3390/rs5115969

Akbari, H., Menon, S., & Rosenfeld, A. (2009). Global cooling: Increasing world-wide urban albedos to offset CO2. *Climatic Change, 94*, 275–286. https://doi.org/10.1007/s10584-008-9515-9

Andrijevic, M., Crespo Cuaresma, J., Lissner, T., Thomas, A., & Schleussner, C.-F. (2020). Overcoming gender inequality for climate resilient development. *Nature Communications, 11*, Article 6261. https://doi.org/10.1038/s41467-020-19856-w

Anjum, G., & Aziz, M. (2025). Climate change and gendered vulnerability: A systematic review of women's health. *Women's Health, 21*.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101.

Campbell, S., Remenyi, T. A., White, C. J., & Johnston, F. H. (2018). Heatwave and health impact research: A global review. *Health & Place, 53*, 210–218.

Castellano, R., Dolšak, N., & Prakash, A. (2021). Willingness to help climate migrants: A survey experiment in the Korail slum of Dhaka, Bangladesh. *PLOS ONE, 16*(4), e0249315. https://doi.org/10.1371/journal.pone.0249315

Chambers, R., & Conway, G. R. (1992). *Sustainable rural livelihoods: Practical concepts for the 21st century* (IDS Discussion Paper No. 296). Institute of Development Studies.

Chersich, M. F., Pham, M. D., Areal, A., Haghighi, M. M., Manyuchi, A., Swift, C. P., Wernecke, B., Robinson, M., Hetem, R., Boeckmann, M., & Hajat, S. (2020). Associations between high temperatures in pregnancy and risk of preterm birth, low birth weight, and stillbirths: Systematic review and meta-analysis. *BMJ, 371*, m3811.

Climate Champions. (2023). *Dhaka North becomes the first city in Asia to appoint a chief heat officer*. https://www.climatechampions.net/news/dhaka-north-becomes-the-first-city-in-asia-to-appoint-a-chief-heat-officer/

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE Publications.

Datey, A., Bali, B., Bhatia, N., Khamrang, L., & Kim, S. M. (2023). A gendered lens for building climate resilience: Narratives from women in informal work in Leh, Ladakh. *Gender, Work & Organization, 30*(1), 158–176. https://doi.org/10.1111/gwao.12667

Department for International Development. (1999). *Sustainable livelihoods guidance sheets*.

Ebi, K. L., Capon, A., Berry, P., Broderick, C., de Dear, R., Havenith, G., Honda, Y., Kovats, R. S., Ma, W., Malik, A., Morris, N. B., Nybo, L., Seneviratne, S. I., Vanos, J., & Jay, O. (2021). Hot weather and heat extremes: Health risks. *The Lancet, 398*(10301), 698–708. https://doi.org/10.1016/S0140-6736(21)01208-3

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods, 18*(1), 59–82. https://doi.org/10.1177/1525822X05279903

Harlan, S. L., Brazel, A. J., Prashad, L., Stefanov, W. L., & Larsen, L. (2006). Neighborhood microclimates and vulnerability to heat stress. *Social Science & Medicine, 63*(11), 2847–2863.

Hossain, I., Rana, M. S., Haque, A. K. M. M., & Al Masud, A. (2024). Urban household adaptation to extreme heatwaves: Health impacts, socio-economic disparities and sustainable strategies in Rajshahi. *Discover Sustainability, 5*, Article 518.

Hossain, M. A., Sultana, S., & Siddiqui, M. R. (2022). Effects of the nature of urban development on land surface temperature at the neighbourhood scale in Dhaka City, Bangladesh. *Environment and Urbanization ASIA, 13*(2), 284–303. https://doi.org/10.1177/09754253221121299

Hussain, N. (2023). Remote sensing-based geostatistical hot spot analysis of urban heat islands in Dhaka, Bangladesh. *Singapore Journal of Tropical Geography*, *44*(3), 438–458. https://doi.org/10.1111/sjtg.12507

Intergovernmental Panel on Climate Change. (2022). *Climate change 2022: Impacts, adaptation and vulnerability*. Cambridge University Press. https://doi.org/10.1017/9781009325844

Intergovernmental Panel on Climate Change. (2023). *Climate change 2023: Synthesis report*. https://doi.org/10.59327/IPCC/AR6-9789291691647

International Labour Organization. (2019). *Working on a warmer planet: The impact of heat stress on labour productivity and decent work*. https://www.ilo.org/publications/working-warmer-planet-impact-heat-stress-labour-productivity-and-decent

Jabeen, H. (2014). Adapting the built environment: The role of gender in shaping vulnerability and resilience to climate extremes in Dhaka. *Environment and Urbanization*, *26*(1), 147–165. https://doi.org/10.1177/0956247813517851

Jabeen, H. (2019). Gendered space and climate resilience in informal settlements in Khulna City, Bangladesh. *Environment and Urbanization, 31*(1), 115–138.

Jabeen, H., Johnson, C., & Allen, A. (2010). Built-in resilience: Learning from grassroots coping strategies for climate variability. *Environment and Urbanization, 22*(2), 415–431.

Jay, O., Capon, A., Berry, P., Broderick, C., de Dear, R., Havenith, G., Honda, Y., Kovats, R. S., Ma, W., Malik, A., Morris, N. B., Nybo, L., Seneviratne, S. I., Vanos, J., & Ebi, K. L. (2021). Reducing the health effects of hot weather and heat extremes: From personal cooling strategies to green cities. *The Lancet, 398*(10301), 709–724.

Kabeer, N. (1999). Resources, agency, achievements: Reflections on the measurement of women's empowerment. *Development and Change, 30*(3), 435–464.

Kabir, M. H., & Ryhan, M. A. (2024). Spatiotemporal variation of land surface temperature and urban heat islands in Dhaka City: A geospatial approach. *The Dhaka University Journal of Earth and Environmental Sciences, 13*(1), 1–19.

Kjellstrom, T., Holmer, I., & Lemke, B. (2009). Workplace heat stress, health and productivity—An increasing challenge for low and middle-income countries during climate change. *Global Health Action, 2*(1), 2047.

Kovats, R. S., & Hajat, S. (2008). Heat stress and public health: A critical review. *Annual Review of Public Health, 29*, 41–55.

Li, H., Bardhan, R., & Debnath, R. (2024). Heatwave interventions must reduce invisible gendered challenges in the Global South. *PLOS Global Public Health, 4*(10), e0003625. https://doi.org/10.1371/journal.pgph.0003625

Moni, S. A. (2025, July 8). Burning at both ends: Urban heat and the daily struggle of Dhaka's marginalised women. *The Business Standard*. https://www.tbsnews.net/thoughts/burning-both-ends-urban-heat-and-daily-struggle-dhakas-marginalised-women-1183616

Mosaddek, N. (2025). *Assessing socio-economic disparities in heat-stress vulnerability and adaptive capacity: A comparative study of higher-class residents and slum dwellers in Dhaka*. International Centre for Climate Change and Development.

Nyumba, T. O., Wilson, K., Derrick, C. J., & Mukherjee, N. (2018). The use of focus group discussion methodology: Insights from two decades of application in conservation. *Methods in Ecology and Evolution*, *9*(1), 20–32. https://doi.org/10.1111/2041-210X.12860

People's Courage International, & ISET International. (2026). *Hot cities make hard work harder: Strengthening health and livelihood resilience for informal workers in South and Southeast Asian cities*.

Rahman, M. H., Chakraborty, T., & Alam, M. S. (2020). Exploring the effect of biophysical composition on land surface temperature to identify urban heat clusters using remote sensing technique: A case study on Dhaka City, Bangladesh. *Journal of Bangladesh Institute of Planners, 13*(1), 153–167. https://doi.org/10.3329/jbip.v13i1.76807

Ramsay, E. E., Fleming, G. M., Faber, P. A., Barker, S. F., Sweeney, R., Taruc, R. R., Chown, S. L., & Duffy, G. A. (2021). Chronic heat stress in tropical urban informal settlements. *iScience, 24*(11), 103248. https://doi.org/10.1016/j.isci.2021.103248

Ryhan, M. A., & Kabir, M. H. (2023). *Spatial risk assessment of urban heat island and its impacts on public health in Dhaka City*. Bangladesh Red Crescent Society.

Scoones, I. (1998). *Sustainable rural livelihoods: A framework for analysis* (IDS Working Paper No. 72). Institute of Development Studies.

Serrat, O. (2008). The sustainable livelihoods approach. *Knowledge Solutions, 21*, 1–6. Asian Development Bank.

Shahrujjaman, S. M., Sikder, B. B., Zahid, D., & Pal, B. (2025). Heat wave adaptation strategies among informal workers in an urban setting: A study in Dhaka City, Bangladesh. *Natural Hazards Research, 5*(3), 509–522. https://doi.org/10.1016/j.nhres.2025.01.006

Shahrujjaman, S. M., Sikder, B. B., Zahid, D., & Uddin, S. I. (2025). Comparative study of heat-related symptoms among indoor and outdoor informal workers: A pilot study in Dhaka, Bangladesh. *The Journal of Climate Change and Health, 26*, 100576. https://doi.org/10.1016/j.joclim.2025.100576

Sorensen, C., Murray, V., Lemery, J., & Balbus, J. (2018). Climate change and women's health: Impacts and policy directions. *PLOS Medicine, 15*(7), e1002603. https://doi.org/10.1371/journal.pmed.1002603

Sultana, F. (2014). Gendering climate change: Geographical insights. *The Professional Geographer, 66*(3), 372–381. https://doi.org/10.1080/00330124.2013.821730

Sultana, Z., Mees, H. L. P., Mallick, B., Driessen, P. P. J., & Bailey, A. (2025). Rising temperatures, rising vulnerabilities: Individual and community adaptation to heat stress in urban slums of Bangladesh. *Sustainable Cities and Society, 132*, 106803. https://doi.org/10.1016/j.scs.2025.106803

Syed, S., O'Sullivan, T. L., & Phillips, K. P. (2022). Extreme heat and pregnancy outcomes: A scoping review of the epidemiological evidence. *International Journal of Environmental Research and Public Health, 19*(4), 2412. https://doi.org/10.3390/ijerph19042412

Tabassum, A., Park, K., Seo, J. M., Han, J. Y., & Baik, J. J. (2024). Characteristics of the urban heat island in Dhaka, Bangladesh, and its interaction with heat waves. *Asia-Pacific Journal of Atmospheric Sciences, 60*, 479–493.

Tawsif, S., Alam, M. S., & Al-Maruf, A. (2022). How households adapt to heat wave for livable habitat? A case of a medium-sized city in Bangladesh. *Current Research in Environmental Sustainability, 4*, 100159. https://doi.org/10.1016/j.crsust.2022.100159

Third Derivative, & RMI. (2024). *Really cool roofs: How breakthrough materials can save lives, carbon, and money in a warming world*. RMI.

Trahan, A., Walshe, R., & Mehta, V. (2023). Extreme heat, gender, and access to preparedness measures: An analysis of the heatwave early warning system in Ahmedabad, India. *International Journal of Disaster Risk Reduction, 99*, 104080. https://doi.org/10.1016/j.ijdrr.2023.104080

United Nations Human Settlements Programme. (2022). *World cities report 2022: Envisaging the future of cities*. https://unhabitat.org/wcr/

United Nations Office for Disaster Risk Reduction. (2025). *Country heat policy review: Bangladesh*.

UN Women. (2026). *Gender-differentiated and age-specific risks of heat stress in a warming world: Implications for equality and resilience*.

World Bank. (2025). *An unsustainable life: The impact of heat on health and the economy of Bangladesh*. https://www.worldbank.org/en/news/press-release/2025/09/16/bangladesh-faces-health-and-economic-risks-from-rising-temperature-world-bank

World Bank Group. (2022). *Bangladesh country climate and development report*. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099510110202254063

World Economic Forum. (2026, April). *4 ways heat action plans can protect women in South Asia*.

World Health Organization, & World Meteorological Organization. (2015). *Heatwaves and health: Guidance on warning-system development*. World Health Organization.

Annex:

A. Household Survey Questionnaire:

Purpose of the Survey: This survey aims to understand how residents of informal settlements experience extreme heat, how it affects their health, livelihoods, housing conditions, and how communities cope with rising temperatures. The information collected will be used only for academic research purposes.

Target respondents: Adult women and men. The same questionnaire is used for both, so that gendered differences can be compared; aim for a balanced number of female and male respondents.

Mode: Face-to-face, one respondent at a time. Estimated time: 25–30 minutes.

What it measures: the *perceived* and reported experience of heat (not instrument-measured temperature), organised around exposure, sensitivity, adaptive capacity, and gender.

Interviewer instructions:

- Translate into Bangla and pilot with 3–4 respondents before full fieldwork.
- Read the consent statement first; continue only if the person agrees.
- Use a female enumerator for female respondents where possible, in a private setting.
- Closed questions: tick or circle. Open questions (marked *Open*): record the answer in the respondent's own words.
- Do not record names. Keep all responses confidential. Any question may be skipped.

Enumerator Note: *"I am a master's student studying how extreme heat affects people living in this settlement, and whether women and men experience it differently. Your participation is voluntary and your answers are confidential. You may skip any question or stop at any time. May I continue?"*

Consent: ☐ Yes ☐ No *(if No, stop)*

Respondent ID: _____ Date: _____ Location: _____ Interviewer: _____

Section A. Socio-economic and Household Profile

1. Sex: ☐ Female ☐ Male ☐ Other
2. Age: ☐ 18–29 ☐ 30–39 ☐ 40–49 ☐ 50–59 ☐ 60+
3. Marital status: ☐ Married ☐ Unmarried ☐ Widowed/Separated
4. Education: ☐ None ☐ Primary ☐ Secondary ☐ Higher
5. Main occupation: ☐ Outdoor work ☐ Home-based work ☐ Indoor job ☐ Housework only ☐ Unemployed ☐ Other: ____
6. Household size: ____ Children under 5: ____ Adults 60+: ____
7. Years in this settlement: ☐ <1 ☐ 1–5 ☐ 6–10 ☐ >10
8. Housing — Roof: ☐ Tin/CI sheet ☐ Concrete ☐ Other; Rooms: ☐ 1 ☐ 2 ☐ 3+; Ventilation/window: ☐ Yes ☐ No; Tenure: ☐ Own ☐ Rent

Section B. Heat Exposure and Daily Experience

9. In summer, how hot does your home feel during the day? ☐ Not hot ☐ Somewhat hot ☐ Very hot ☐ Unbearable
10. When is the heat worst? (tick all) ☐ Morning ☐ Midday ☐ Afternoon ☐ Evening ☐ Night
11. On a hot day, about how many hours do you spend inside the home? ☐ <4 ☐ 4–8 ☐ 9–12 ☐ >12
12. Do you cook regularly? ☐ No ☐ Yes → Fuel: ☐ Gas ☐ Firewood ☐ Other; Location: ☐ Inside the room ☐ Shared kitchen ☐ Outside
13. During extreme heat, do you change your work or daily activity hours? ☐ No ☐ Yes → *Open:* How? ____
14. *Open:* How does a very hot day affect your routine, from morning to night?

Section C. Health and Functional Impacts

15. Heat-related symptoms you have felt (tick all): ☐ Headache ☐ Dizziness/weakness ☐ Dehydration/thirst ☐ Skin problems ☐ Sleep disturbance ☐ Other: ____ ☐ None
16. Children or elderly in your home affected by heat? ☐ No ☐ Yes → How: ____
17. Does heat affect your sleep? ☐ Not at all ☐ Sometimes ☐ Often ☐ Almost every hot night
18. Does heat reduce your ability to work or do daily tasks? ☐ Not at all ☐ Slightly ☐ Moderately ☐ Severely
19. *(For women — optional, skip if uncomfortable):* Does heat create particular difficulties related to pregnancy, breastfeeding, or menstrual hygiene? ☐ No ☐ Yes → *Open:* ____
20. *Open:* How does heat affect your work, cooking, and caregiving responsibilities?

Section D. Water, Energy and Cooling Access

21. Access to drinking water during heat: ☐ Easy ☐ Moderate ☐ Difficult ☐ Very difficult
22. Does your water use rise in hot weather, and do you face shortages? ☐ No ☐ Yes → *Open:* How do you manage / who collects it? ____
23. Electricity: ☐ Stable ☐ Sometimes unstable ☐ Frequent cuts
24. Do you have a working fan? ☐ Yes ☐ No

Section E. Coping and Adaptation

25. What do you do to stay cool? (tick all) ☐ Open windows/doors ☐ Fan ☐ Bathing/wet cloth ☐ Drink more water ☐ Stay in shade ☐ Reduce/avoid cooking ☐ Leave home ☐ Other: ____
26. When it is very hot, can you leave home to reach a cooler place? ☐ Yes, easily ☐ Sometimes ☐ No

27. Are there places or activities you avoid during extreme heat? ☐ No ☐ Yes → Which: ____
28. Do you spend extra money to cope with heat (water, ice, electricity, fan, medicine)? ☐ No ☐ Yes → roughly per week: ____
29. *Open:* What makes it hardest for you to keep cool, and what would help you most?

Section F. Gender Roles and Inequality

30. In your home, who decides on spending for cooling (fan, electricity, repairs)? ☐ Myself ☐ Spouse ☐ Joint ☐ Other: ____
31. Do your household and care duties increase during heat? ☐ No ☐ Yes → How: ____
32. *Open (key question):* How do men and women experience heat differently in your household or community? *(Probe for: work, mobility, clothing, cooking, caregiving, rest, sleep.)*
33. Do social norms or expectations affect how you cope (clothing, staying indoors, going out alone)? ☐ No ☐ Yes → *Open:* Explain ____

Section G. Awareness and Support

34. Have you received any heat/climate warning or support? ☐ No ☐ Yes → from whom: ____
35. *Open:* Who do you think should be responsible for helping people here cope with heat, and has anyone actually helped?
36. *Open:* If you could change one thing in your home or settlement to reduce heat stress, what would it be?
37. *Open:* Is there anything else about living with heat here that you would like to share?

B. Key Informant Interview

Questions were tailored according to the respondents. This is the common questionnaire.

1. How does your work/organization relate to extreme heat or informal settlements in Dhaka?
2. How serious is extreme heat for informal settlements in Dhaka? Who do you think is most vulnerable and why?
3. Has the severity or attention to urban heat changed in recent years in your experience?
4. Do you observe differences in how women and men are affected by extreme heat?
5. Are there any groups of women or men who are particularly vulnerable (e.g., pregnant women, elderly women, outdoor male workers)? Why?
6. What is currently being done by your organization or others to address urban heat?
7. Do these interventions actually reach informal settlements and vulnerable groups, especially women?
8. What are the main barriers in addressing heat vulnerability?
9. Is heat vulnerability currently measured or monitored in any systematic way in your institution?
10. Who is currently responsible for addressing heat impacts in informal settlements, and how well do different agencies coordinate?
11. In your view, where does responsibility fall the most — local government, national government, NGOs, or communities? Why?
12. What would a "gender-responsive heat intervention" look like in practice in informal settlements?
13. What one or two changes would most improve heat resilience for women and men in informal settlements?
14. Is there anything important about urban heat and informal settlements that we have not discussed? Or any suggestions or advice

KII Details:

KII Representative	Organization	Study Area	Professional Role
Pharmacy Owner **KII 1**	Community Pharmacy	Korail	The owner is a frontline healthcare provider responsible for providing basic medical advice and medicine to the residents
WASA Representative **KII 2**	Water Supply and Sanitation (WASA)	Korail	Responsible for managing water booth for the residents of Korail.
Medical Officer **KII 3**	Healthcare Facility	Hazaribagh	Own its pharmacy shop, give basic treatment such as measuring pressure, checking diabetics for free. Give medical advice for treating patients from surrounding community.

Land Lord **KII 4**	Community	Hazaribagh	The landlord gives housing to residents. Takes a monthly rent about BDT 3,000 monthly with water facilities, electricity has to be paid differently
NGO Reprenstative **Research and Policy Officer** **KII 5**	Non-governmental Organization	Urban Informal Settlement	Researcher and policy specialist with previous experience studying heat vulnerability in informal settlements
Department of Environment Representative (DoE) **Deputy Director** **KII 6**	Government	Ministry of Environment	Manages legal enforcement, oversees environmental clearance compliance, reporting and coordinating with

Annex C: Focus Group Discussion

1. What is a very hot day like here? Which times of day, or parts of the settlement, are worst?
2. Is heat becoming worse in recent years compared to before? What has changed?
3. (Gender — key): Do women and men spend the hot hours differently, and whose daily work or duties are most affected — cooking, caregiving, outdoor work?
4. Are there things women cannot easily do during heat because of social expectations (going out, resting, what to wear)?
5. How does heat affect people's health and sleep here? Who suffers most — children, the elderly, pregnant women, the sick?
6. What do people do to cope with heat, and do neighbors help each other? What stops people from coping better (money, water, electricity, housing, space)?
7. Has anyone — government, NGOs, or community leaders — helped with heat here? Who do you think *should* be responsible?
8. During extreme heat, what changes in household responsibilities or workload? Who carries more burden?
9. Have you noticed people becoming less able to work or do daily tasks during extreme heat? Who is most affected and why?
10. If you could change one thing to reduce heat stress in this settlement, what would it be? Anything else to add?

Annex D: Ethical Form Consideration

Ethical Considerations for Household Survey

Nafia Saddaf

ID: 2412787

Independent University, Bangladesh

Email: 2412787@iub.edu.bd

Date: 25 June 2026

Subject: Informed Consent for Household Survey Participation

Study Title: Gendered Heat Vulnerability and adaptation in Dhaka's Informal Settlements: A comparative study of Korail and Hazaribagh

Dear Participant,

I am conducting this research as part of my Master's thesis in the Department of Development Studies at Independent University, Bangladesh. The purpose of this study is to understand how women and men experience heat differently in informal settlements in Dhaka and to identify existing coping and adaptation strategies.

Your participation in this survey is completely voluntary. The survey will take approximately 25–30 minutes to complete. You may choose not to answer any question or withdraw from the study at any time without any consequences.

All information collected during this survey will remain strictly confidential and will be used only for academic purposes. Your name and any personal identifying information will not be included in any report, publication, or presentation.

By participating in this survey, you confirm that you have understood the purpose of the study and voluntarily agree to participate.

Thank You.

Ethical Considerations for Key Informant Interviews (KII)

Nafia Saddaf

ID: 2412787

Independent University, Bangladesh

Email: 2412787@iub.edu.bd

Date: 25 June 2026

Subject: Informed Consent for Key Informant Interview Participation

Study Title: Gendered Heat Vulnerability and adaptation in Dhaka's Informal Settlements: A comparative study of Korail and Hazaribagh

Dear Participant,

I am conducting this research as part of my Master's thesis in the Department of Development Studies at Independent University, Bangladesh. The purpose of this study is to explore gendered heat vulnerability in Dhaka's informal settlements and to understand how institutions, service providers, healthcare professionals, and community organizations perceive and respond to heat-related challenges.

Your participation in this interview is entirely voluntary. The interview will take approximately 30–45 minutes. You may refuse to answer any question or withdraw from the interview at any stage without any consequences.

With your permission, notes will be taken during the interview. Audio recording will only be conducted with your consent.

All information shared during the interview will remain confidential and will be used only for academic purposes. Your identity and organizational affiliation will not be disclosed without your permission.

By participating in this interview, you confirm that you have understood the purpose of the study and voluntarily agree to participate.

Thank You.

Annex F: Field Pictures

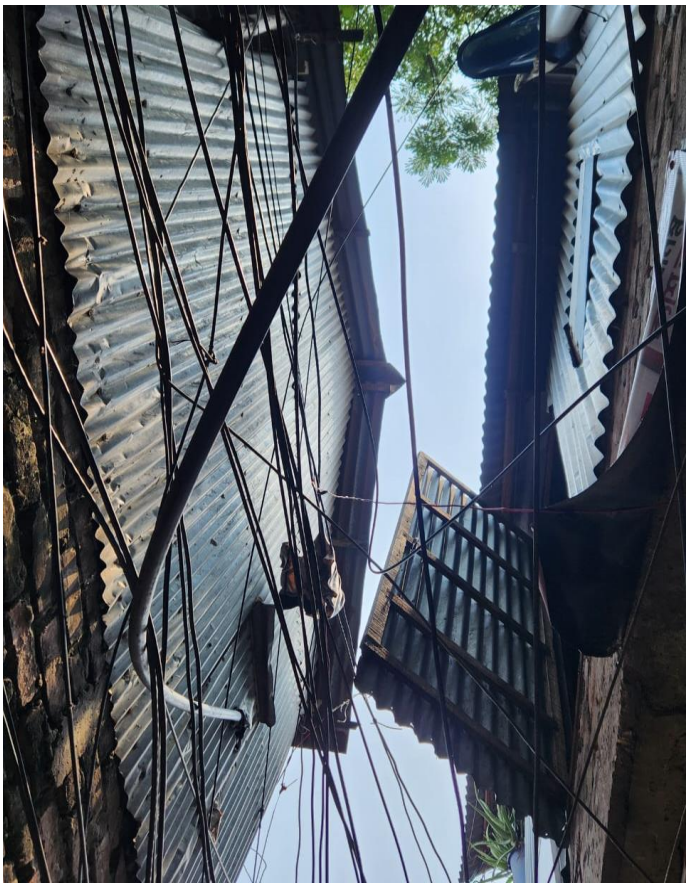













৫ মিনিটে ল্যাব
প্রিন্ট ছবি
অনলাইন
জন্মনিবন্ধন
করা হয়।
জুতা খুলে
প্রবেশ
করুন