



# **Impacts of Environmental Migration on Livelihood Resilience: A Comparative Analysis on Urban Migrants and Rural Non-migrants**

MDM THESIS

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MDM 2nd Semester

Class Roll: 3941

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Registration Number: 2016-818-031

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Institute of Disaster Management and Vulnerability Studies

University of Dhaka



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This thesis is submitted to the Institute of Disaster Management and Vulnerability Studies, University of Dhaka, for the partial fulfillment of the degree of Masters of Disaster Management (MDM)

## **DECLARATION**

I hereby declare that the presented findings of this research titled, “**Impacts of environmental migration on livelihood resilience: A comparative analysis on urban migrants and rural non-migrants**” are the results of my own sincere efforts and no part of this thesis has been submitted elsewhere for publication or degree.

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### Submission of MDM Research Thesis

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## ABSTRACT

Internal migration is becoming a common adaptation practice in the face of persisting climate change, disasters, and displacements; however, whether migration positively impacts the household resilience of migrant households is contentious. While past research has shown that urban migration might create enhanced income opportunities, livelihood resilience is not singularly dependent on the economic environment. This study seeks to compare the household resilience of two groups – (1) urban migrants who migrated to Dhaka due to environmental stresses and (2) rural non-migrants who are still living under similar stresses. The study has a sample of 640 (320 urban migrants and 320 rural non-migrants) and through a comparative research methodology, the study aims to establish whether environmental migration leads to an overall increase in livelihood resilience. The livelihood resilience of the two groups was measured following the framework developed by Speranza et al. (2014). Statistical analyses, specifically chi-square tests, independent sample T-tests, and multiple linear regression was used to examine patterns, associations, correlations, and differences among the relevant variables. The results indicate migration status has a negative impact on household livelihood resilience at a statistically significant level. More specifically, environmental migration was associated with significantly reduced buffer capacity, self-organization, and learning capacity, resulting in lower overall resilience scores. Among these dimensions, the smallest disparity between the two groups is observed in their buffer capacity, whereas the most significant difference is evident in their capacity for learning. The three dimensions of livelihood resilience also exhibit positive correlations with each other, whereby these collectively influence and reinforce one another. Additionally, it is found that socio-demographic characteristics including the household head's education status, monthly expenditure, and household size significantly predicted livelihood resilience.

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## **List of Acronyms**

BBS: Bangladesh Bureau of Statistics  
BC: Buffer Capacity  
CL: Capacity for Learning  
DF: Degrees of Freedom  
DFID: Department of International Development  
FAO: Food and Agriculture Organization  
GDP: Gross Domestic Product  
HH: Household  
IDI: In-depth Interview  
IOM: International Organization for Migration  
INGO: International Non-Governmental Organization  
LR: Livelihood Resilience  
MODMR: Ministry of Disaster Management and Relief  
NGO: Non-Government Organization  
SDG: Sustainable Development Goal  
SO: Self-Organization  
SPSS: Statistical Package for the Social Science  
Wash: Water Sanitation and Hygiene  
WHO: World Health Organization





CHAPTER 1:

INTRODUCTION

# Chapter One: Introduction

## 1.1 Background

The intensification of the climate crisis and the accompanying onslaught of weather-related disasters have pushed hundreds and thousands of people toward migration. Internal migration is becoming a common adaptation practice in the face of persisting environmental challenges (Tacoli, 2009). Environmental migrants originating from marginal areas, both voluntarily and as a last resort, are choosing urban centers with better economic opportunities as their destination (Displacement Solutions, 2012; Ionesco et al., 2016). However, rapid inward migration has led to unchecked urbanization and generated a new vulnerable community of the “urban poor,” who paradoxically are exposed to even greater environmental and health hazards after migration (International Organization for Migration, 2015).

Bangladesh ranked seventh on the list of nations most affected by the ongoing climate crisis between 2000 and 2019 according to Germanwatch's Global Climate Risk Index (CRI) (Eckstein et al., 2021), despite contributing only 0.56 percent of global greenhouse gas (GHG) emissions (Hasan & Chongbo, 2020). The globally changing climate is leaving its stamp on Bangladesh in the form of increasing magnitude and frequency of weather-related disasters including cyclones, floods, droughts, desertification, salinity intrusion, and rising sea levels (Parvin & Ahsan, 2013; Toufique & Islam, 2014; Khan et al., 2000). Increasing environmental extremes are triggering mass human mobility from disaster-prone zones of the country, and in 2020, Bangladesh ranked third worldwide in the number of new displacements by disasters with 4.4 million displaced people (IDMC, 2021). Unchecked migration has led to the proliferation of informal settlements in Dhaka, the capital of Bangladesh, and according to an estimate by the International Organization for Migration (2015), 70 percent of the residents living in the slums of Dhaka migrated there due to climatic shocks.

Depending on the context, human mobility is regarded both as a positive adaptation strategy and as an adverse impact of climate change (IPCC, 2022). As an adaptation strategy, migration is effective as it creates and diversifies safe livelihood options for vulnerable communities and thereby strengthens their resilience at the household level (International Organization for Migration, 2022). In fact, when highlighting the positive aspects of migration, past literature has mostly focused on enhanced economic and financial opportunities. However, in developing

nations such as Bangladesh, rural-to-urban migration might accompany hefty societal and personal costs for the migrant populations (Adger et al., 2020). Living conditions, loss of social bonds, and unsafe livelihood options available to the migrants may exacerbate existing inequalities and gaps and threaten the realization of many of the goals set by the 2030 Agenda for Sustainable Development (International Organization for Migration, 2022).

In recent literature, global policies and humanitarian operations, resilience, and particularly, livelihood resilience, has garnered major attention (Quandt, 2018; Speranza et al., 2014). As livelihoods are increasingly compromised in the face of global climatic and socio-economic changes, experts have linked resilience thinking to the livelihood approach in order to assess how livelihood practices alter household capabilities to deal with adverse external changes and to recover from the aftermath of crises (Speranza et al., 2014). The concept of livelihood resilience is thus relevant in the context of environmental migrants to capture whether migration contributes to the creation of more sustainable and resilient livelihoods, especially considering that the economic factor is often the principal driving force behind people's decision to move.

While a considerable volume of studies has focused on the drivers, nature, and consequences of environmental migration, there is a dearth of research investigating the complex relationship between environmental migration and livelihood resilience - a gap that the present study seeks to address. Through a comparative study between urban migrants who migrated to Dhaka due to environmental stresses and rural non-migrants who are living under similar stresses but have not chosen migration as an adaptation strategy, the study seeks to establish whether or not migration leads to an overall increase in livelihood resilience.

## **1.2 Statement of the Problem**

The study's problem statement highlights the urgent need to acknowledge the complex connection between environmental migration and livelihood resilience while distinguishing the different experiences of people who have moved to urban areas from those who have chosen to remain in rural contexts. In the face of growing environmental challenges, including climate change-related disruptions, resource scarcity, and natural disasters, people around the world are being forced to move from their homes, either to seek refuge in urban areas or to remain in their rural communities. It is recognized that this movement has significant socio-

economic consequences both in terms of destination as well as origin. However, previous research has often treated environmental migration and livelihood resilience as distinct concepts, failing to systematically contrast the responses and adaptations of urban migrants with those of rural non-migrants (Alam & Mamun, 2022).

The present study seeks to explore and understand the impact of environmental migration on people's ability to withstand and recover from challenges to their livelihoods. The study focuses on two distinct populations: rural residents who have chosen to stay in their villages and urban migrants who have moved for environmental reasons. The comparison between these two groups explores how environmental migration affects livelihood resilience in different environments. This research can prove to be significant in improving our comprehension of the nexus between migration, change in environment, and people's potential to adapt and thrive under changing conditions.

This study addresses this vacuum in the literature by focusing on three key questions: Firstly, it seeks to investigate how rural-to-urban migration from environmentally vulnerable zones affects the livelihood resilience of those who migrate to cities. Secondly, it aims to evaluate how rural non-migrants who chose to not migrate differ in terms of livelihood resilience. Finally, it aims to identify policy implications for enhancing the adaptive capacity of both migrant and non-migrant populations in the face of the ongoing climate crisis. Through this comprehensive comparative analysis, the study will provide insights that can inform the development of targeted policies, interventions, and community-based strategies that build resilience in the context of environmental change, ultimately leading to more effective and sustainable responses to the obstacles posed by migration and environmental change. As changes in the environment continue to drive people to move, it is critical that we understand how such patterns of movement affect people's ability to sustain, recover, and maintain their livelihoods. This fills a knowledge vacuum on the subtle impacts of environmental migration on different groups by exploring differences in livelihood choices, adaptation processes, and overall resilience between urban migrants and rural non-migrants (Stojanov et al., 2016).

### **1.3 Objectives of the Study**

As discussed, the overall objective of this study is to investigate how environmental migration impacts livelihood resilience at the household level. In order to achieve this, the specific objectives of the study are outlined below.

#### **Specific Objectives**

- To explore the push and pull factors of environmental migration.
- To measure the livelihood resilience score of urban environmental migrants of Dhaka and rural non-migrants of Bhola.
- To compare the livelihood resilience score of the two groups.
- To identify key socio-demographic characteristics that influence livelihood resilience.
- To provide evidence-based suggestions for establishing migration as a tool for building livelihood resilience in the context of environmental disruptions and climate change.

### **1.4 Rationale of the Study**

The study contributes to the global discourse on environmental migration by examining how it affects livelihood resilience. Comparing urban migrants and rural non-migrants, it provides insights into the different obstacles faced by these groups and the result of environmental variables on international migration dynamics. Previous literature has examined the result of environmental immigration on livelihoods, but much of it has lacked a full comparative examination of urban migrants versus rural non-migrants (Rana & Ilina, 2021). While previous research has helped shed light on certain parts of this particular issue, the current study aims to provide a more comprehensive perspective by directly contrasting the perspectives of these two unique groups. It can therefore identify nuanced differences in livelihoods, coping mechanisms, and overall adaptability, allowing for a more in-depth examination of how the migration context affects these characteristics. This comparative method adds to the current body of information and provides a more complete comprehension of the complicated interaction between environmental migration and livelihood resilience. At the national level, the study supports national policies and activities aimed at increasing the resilience of communities affected by environmental migration. The study recognizes the need for personalized responses that take specific needs into account by targeting both rural and urban locations. At the regional level, the study's findings can contribute to the development of

regional cooperation structures that promote the exchange of information and joint efforts to address the problems posed by environmental migration and promote sustainable lifestyles in different geographical locations.

There is a considerable amount of research on environmental migration, including livelihood resilience, but there are few in-depth studies that comprehensively compare the circumstances of migrants in urban hubs with those of non-migrants in rural areas. This comparative study is important for a number of reasons. Firstly, it seeks to provide a deeper understanding of the elements that make a difference in the livelihood resilience of both urban migrants and rural non-migrants. Access to a range of economic opportunities, services, and networks may be facilitated by urban migration, and this access may influence how migrants adapt to environmental change. Rural non-migrants, on the other hand, may be able to rely on customary livelihoods that are closely linked to regional ecosystems, thereby creating a particular kind of resilience.

Furthermore, this study can identify the particular difficulties and opportunities that migrants and non-immigrants face in the face of environmental shifts. This understanding is essential for effective initiatives and policies that can improve the adaptive capacity of both groups. By identifying the strengths and vulnerabilities of both urban migrants and rural non-migrants, policymakers can design policies that specifically address their needs (Siddiqui et al., 2021). Finally, the study hopes to advance the scholarly conversation on environmental migration and resilience by presenting empirical data that illustrates the various ways in which migration is linked to livelihood patterns. The knowledge gained from this research can be used to improve theories and frameworks already in use and add to our overall knowledge of how people and communities respond to changing environmental circumstances (Partelow, 2023).

The need to reconcile the discrepancies between studies of environmental migration and livelihood resilience, and to provide a comparative assessment that identifies trends with immediate implications for policy and community improvement, is the primary driver behind the need for this study (Ahsan et al., 2021). The study's goal is to contribute to a better understanding of the linkages between migration, livelihoods, and resilience by examining the lived experiences of both urban migrants and rural non-migrants in the face of a range of environmental challenges.

### **1.5 Significance of the Study**

The significance of the study is multi-dimensional and has implications for a diverse set of stakeholders, including policymakers, academics, and environmentally vulnerable communities. Primarily, the study addresses a significant gap within the existing literature by offering a full comparative evaluation of the influence of environmental migration on livelihood adaptation, showing variations between urban migrants and rural non-migrants. This comparative perspective is essential to generating evidence that can be used to inform evidence-based policy decisions. Additionally, the findings of the study are likely to provide useful insights for policymakers as well as practitioners interested in developing interventions to improve community resilience. Policymakers can tailor their approach to the individual needs and strengths of each group by examining the elements that enhance the resilience to the economic hardship of both urban migrants and rural non-migrants. This knowledge can be used to develop targeted interventions to improve adaptive capacity, access to resources, and social support networks.

Furthermore, the impact of the research goes beyond the academic world. By exploring the linkages between environmental migration and livelihood resilience, the study adds to the theoretical knowledge of how these elements interact and influence each other (Hossain et al., 2022). This can lead to the refinement and development of existing paradigms that can contribute to the wider academic debate on migration, resilience, and environmental change (Tacoli et al., 2014). The study's conclusions apply to communities dealing with environmental change and disruptions. Understanding the coping methods and resilience-building processes of both urban and rural migrants could help these groups cope more effectively with environmental shifts. The research findings can be used to initiate local programs that promote adaptive practices and resource management, ultimately contributing to a more sustainable future in the face of the globally changing climate.

In summary, the importance of this study lies in its ability to bridge the gap between environmental migration and employment resilience research, providing insights that can inform operational policy-making, enhance academic knowledge, and empower communities to proactively address the obstacles posed by environmental change (Laczko et al., 2009). The study contributes to a more holistic understanding of the livelihood impacts regarding migration within the framework of changing circumstances by comparing the lived experiences

of urban migrants and rural non-migrants. The significance of the study is linked to its ability to provide a more comprehensive understanding of the ways in which environmental migration affects socio-economic resilience for both urban migrants and rural non-migrants. The research can provide insights into the different problems and opportunities faced by these two groups in the context of changing environments by comparing them across the board. It recognizes the financial benefits that migration can bring but also seeks to uncover the less explored implications for additional aspects of resilience. In doing so, the study hopes to provide a more complex and complete understanding of the impact of migration on environmentally affected communities (Paz, 2022).

As changes in the environment continue to drive people to move, we must understand how such patterns of movement affect people's ability to sustain, recover, and maintain their livelihoods. The climate crisis and related disasters have already unleashed a wave of migration that is transforming our society. Internal migration is characterized by its complexity and unforeseen consequences. The lure of greater opportunity in cities attracts environmental migrants, but the rapid and unrestrained urbanization that follows is creating an entirely new kind of urban poor - people caught in a web of interconnected problems. The way forward requires a comprehensive strategy that addresses the wider range of issues that are intertwined with human mobility and environmental change. This work is important for a wide range of stakeholders because it can be used to develop targeted actions that improve the adaptive capacity of both migrating and non-migrating populations. In addition, the broad scope of the study could contribute to the global debate on environmental migration by encouraging international collaboration and the exchange of best practices. The implications of this research could lead to better policies that address the specific needs of migrant populations in the future, thereby improving long-term resiliency and sustainable development in the face of continuing environmental change.

## **1.6 Limitations of the Study**

While the study seeks to give crucial insights into the complex relationship between environmental migration and livelihood resilience, it is vital to recognize the limitations that may impact the interpretation and generalizability of its findings. One of the most crucial challenges in implementing this research was the selection of appropriate samples that would



represent the migrant and non-migrant populations appropriately. Environmental migration is a complex issue, influenced by a number of factors, and its definition, to this date, is controversial and lacks clarity. To address this, the research carefully specified the parameters that would be followed while choosing the participants of this study, for both the study groups. Following the precise criteria while choosing respondents, however, proved difficult during the field operations. Identifying respondents who met these criteria involved time, patience, and monetary considerations. To overcome these challenges, the study made use of local knowledge and expertise. Snowball sampling aided the identification of suitable respondents, while local knowledge provided useful insights for refining and modifying the criteria in response to contextual nuances. The combination of the two allowed the study to capture a wider range of scenarios associated with environmental migration and ensured a more accurate representation of both urban migrants and rural non-migrants.

A few other limitations in the implementation of this study are discussed below:

- **Temporal limitations:** As a cross-sectional study, this study was not able to capture continuous changes in livelihood resilience before and after they underwent the migration process. The impact of environmental migration on resilience may change over time as a result of changing socio-economic situations, government policies, and environmental conditions and, as experts have pointed out, longitudinal data would provide a more dynamic picture of these changes (Paul & Rahman, 2022).
- **Accuracy of data:** Accurate data collection from both urban migrants and rural non-migrants was difficult. Factors such as recall bias and social attractiveness bias can affect the accuracy and reliability of survey and interview data (Rashid, 2023). Moreover, respondents showed a tendency to exaggerate their experiences in the hopes of securing humanitarian assistance. These limitations can affect the accuracy of responses and, therefore, the conclusions of the investigation.
- **Contextual specificity:** The study's conclusions could be affected by possible sampling bias. Participants from urban and rural locations may not be typical of the larger population, limiting the generalizability of the findings to other countries or circumstances (Dupéré et al., 2019). In addition, certain groups of migrants or non-migrants, for example, those belonging to religious and cultural minorities, may have been under-represented, resulting in a distorted picture of their experiences. The

conclusions of the study may be contextually specific, influenced by the particular socio-cultural, economic, and environmental conditions of the sites studied. The study's findings may not be instantly applicable to other scenarios with various contextual variables.

- **Exogenous factors:** Livelihood resilience is a complex concept influenced by a wide range of social, economic, and environmental factors (Tanner et al., 2015). The study may not be able to account for external influences or events that may affect the livelihood resilience of both urban migrants and rural non-migrants. Other complicating variables, such as economic inequality, education, and resource availability, may influence both migration preferences and livelihood outcomes, making it difficult to attribute changes solely to migration (Swain, 2019).

While the study tries to examine the impacts of environmental migration, it may not adequately capture the wider complexities of adaptive capacity, such as social conventions, power dynamics, historical contexts, and institutional structures, all of which can have a significant influence on household livelihood resilience.

## 1.7 Operational definitions

**Environmental migrants:** Individuals or groups who are either forced or choose to leave their homes, either temporarily or permanently, due to sudden or progressive environmental changes that negatively impact their lives or living conditions, leading to migration within national borders or across international boundaries (International Organization for Migration, 2007).

**Trapped population:** People who do not move, but who are located in threatened areas, are at risk of becoming 'trapped' or having to stay behind, where they will be more exposed to environmental shocks and destitution (International Organization for Migration, 2019).

**Resilience:** The ability to adapt to impacts of hazards, self-organize, recover, and learn to preserve or enhance fundamental basic structures and functioning (United Nations Office for Disaster Risk Reduction, 2022).

**Livelihood:** The skills, tangible and intangible possessions, and activities of individuals and households that go into providing a means of subsistence (Chambers & Conway, 1992).

**Livelihood resilience:** The ability to handle external perturbations while preserving vital aspects of livelihoods including income production, food security, and access to critical services (DFID, 1999).

**Livelihood assets:** The assets and skills that people, households, or communities have or may access to support their way of life, and fundamental needs, earn a living, and develop resilience in the face of shocks (DFID, 1999).

**Environmental stresses:** Environmental stresses can be caused by either natural or human processes and have a negative impact on the environment, disrupting ecological balance, depleting natural resources, and impairing human health and wellbeing, among other impacts (International Organization for Migration, 2007).

**Adaptation strategy:** A planned approach or set of measures put into place to address the negative impacts brought on by changes in the environment, climate, or other external causes that aim to enhance the resilience and capacity of individuals, organizations, or communities to cope with and thrive in the face of changing conditions (United Nations Office for Disaster Risk Reduction, 2022).



**CHAPTER 2:**

**LITERATURE REVIEW**

## Chapter Two: Literature Review

### 2.1 Environmental migration: Through an analytical lens

Within the existing body of research, several terminologies and conceptual frameworks related to environmental migration can be found. These include but are not limited to climate change-induced migration, climate change migrants, ecological or environmental refugees, climate refugees, and so on ecological or environmental refugees (Dun & Gemenne, 2008). The greatest obstacle in defining migration resulting from environmental deterioration or change arises from the complex task of separating environmental drivers from other catalysts of human mobility. Further challenge emerges due to the lack of clarity concerning forced and voluntary migration. It remains unclear whether environmental migration should always fall under the category of forced migration or should the people who choose voluntary resettlement in the face environmental challenges also be considered environmental migrants.

In situations when sudden shocks in the environment, such as those caused by seismic activities or inundations, result in forced migration, the matter becomes less complex. Nevertheless, environmental migration frequently arises in situations when progressive environmental changes or processes of deterioration, such as desertification, directly impact persons who depend on the environment for their means of subsistence, thereby exposing them to livelihood stress. When environmental deterioration is a secondary rather than a primary driver of migration, the classification of such migrants becomes difficult (Dun & Gemenne, 2008).

As early as 1965, Esther Boserup, a renowned economist and agronomist, examined the interplay of population increase, agrarian practices, and environmental stresses. Although her research did not just revolve around migration, it effectively emphasized the impact of environmental changes on agricultural practices and subsequently, population dynamics (Boserup, 1965). The term "environmental refugees" gained popularity largely due to the efforts of Norman Myers. His article examines the possible implications of environmental changes, such as the rise in sea levels, on human populations, specifically focusing on the issue of displacement (Myers, 1980). Although his research has provided a foundation for scholarly discourse on the subject, it is crucial to acknowledge that the terminology he coined, has garnered much criticism owing to its of legal and ethical significance (Castles, 2002).

There appears to be a widespread consensus to credit El-Hinnawi (1985) with the initial formal use of the term 'Environmental Refugees' in his booklet published by the United Nations Environment Programme (UNEP). His study is based on individuals who are compelled to abandon their original dwellings due to sudden or prolonged environmental changes. El-Hinnawi's research made significant contributions to the discourse around the concept of environmental migration, but, like Myers, his choice of nomenclature was also subject to its fair share of critique. In the study, El-Hinnawi provides a comprehensive analysis of the primary consequences of migration triggered by environmental reasons, presenting a conceptualization of the individuals he refers to as 'environmental refugees.' He differentiated between three distinct groups of refugees:

- (1) temporarily displaced individuals due to environmental pressure, typically resulting from a natural calamity,
- (2) permanent displaced individuals who are compelled to relocate to a different region,
- (3) individuals who relocate inside their country's boundaries due to the deterioration of resources in their original habitat, resulting in an insufficient capacity to fulfill their fundamental requirements (El-Hinnawi, 1985).

As highlighted by several scholars, this particular conceptualization lacks adequacy as it fails to provide differentiation between environmental refugees and other categories of migrants, while also lacking a mechanism to discriminate among environmental refugees themselves (Castles, 2002; Bates, 2002). However, it is important to mention that scholars have had difficulties in deviating from this fundamental notion and many later suggested definitions have continued to be closely aligned with El-Hinnawi's initial framework, despite the many criticisms it has received (Dun & Gemenne, 2008). For instance, in 1988, three years subsequent to El-Hinnawi's work, Jacobson presented a working paper exploring this emerging group of forcibly displaced individuals. He proposed a classification that bears a resemblance to the one presented by El-Hinnawi. He differentiates between

- (1) temporary displacements that are linked to short-term environmental shocks,
- (2) permanent displacements that are associated with prolonged environmental stresses,
- (3) both temporary and permanent displacements attributable to gradual environmental transformation (Jacobson, 1988).

However, this categorization exhibits certain limitations as it overly accentuates the temporal aspect of displacement, while disregarding other significant elements. Furthermore, it fails to acknowledge the differentiation between forced and voluntary migration, a crucial distinction within the discourse on environmental migration (Suhrke, 1997). Later on, based on the amount of control people have over their displacement, Bates (2002) differentiated between environmental migrants and environmental refugees. He labeled people who maintain control over every aspect of their migration as environmental migrants, whereas, people undergoing involuntary migration who have no control over the process are identified as environmental refugees. Using Sen's (1985) capability approach, Assaduzzaman et al. (2020) draw lines between migration by choice and forced migration. Here, they further supported that the availability of people's freedom of choice should be the basis of this distinction.

Although individuals who migrate due to environmental factors may share similarities with refugees, such as the act of crossing a border following a disaster and requiring protection and support, IOM (2023) maintains that the term "environmental refugee" lacks a legal foundation within the framework of international refugee law. A growing consensus is emerging within pertinent entities, including the International Organization for Migration (IOM) and the United Nations High Commissioner for Refugees (UNHCR), advocating for the reduction of the term "refugee" in this context as employing these terminologies carries the risk of undermining the existing international legal framework established to protect the rights of refugees. The definition proposed by the IOM in their discussion session of migration and the environment in 2007 draws from the concepts provided by El-Hinnawi and Jacobson and categorizes environmental migrants as individuals or groups who are either forced or choose to leave their homes, either temporarily or permanently, due to sudden or progressive environmental changes that negatively impact their lives or living conditions, leading to migration within national borders or across international boundaries. The proposed idea has garnered widespread acceptance among researchers since its inception, and it is the definition that the present study follows.

## **2.2 Theoretical perspectives on environmental migration**

### **2.2.1 Push and Pull Theory**

In 1966, Professor Everett Spurgeon Lee conceptualized migration with the help of his “push and pull” theory. According to his theory, migration is governed by “push” factors associated with the area of origin and “pull” factors associated with the area of destination (Lee, 1966). Push factors refer to the conditions which compel people to change their residence permanently or semi-permanently. These factors include violence, gender bias, severe environmental degradation, frequent occurrence of natural disasters, limited livelihood opportunities, political instability, and so on. On the other end of the spectrum are the pull factors- the conditions that attract people to new locations. Some common pull factors are better housing and earning opportunities, access to education and healthcare, availability of transportation facilities, social security, and religious freedom. It is imperative to acknowledge that the push-pull framework offers a simplified perspective on the intricate dynamics of environmental migration. Migration decisions are frequently shaped by a confluence of push and pull influences, which have the potential to interact and undergo changes as time progresses. Furthermore, the outcomes of migration are influenced by various factors such as individual agency, cultural elements, legal frameworks, and policy initiatives.

### **2.2.2 Conflict Perspective**

Wallenstein defines conflict as a social situation where at least two parties compete simultaneously for the same limited resources (Wallenstein, 1990). This scarcity can encompass both material and ideological resources needed to fulfill demands. Conflict can lead to organized actors emerging and can also create issues of contention among existing organized actors. For Wallenstein, while scarcity is essential for conflict initiation, three factors are necessary for its occurrence: organized actors, at least one objective incompatibility, and a conscious intention to achieve goals. This unique definition emphasizes actor formation in conflict analysis, encouraging a comprehensive investigation beyond standard definitions.

Using Wallenstein’s definition, Swain (1996) explores environmental migration from the perspective of conflict and security theory. The study investigates potential actors and their conflicting behaviors, particularly in cases where large-scale population movements stem from



environmental degradation. This unique type of scarcity can give rise to organized actors and incompatibility among existing actors, potentially leading to conflicts at various societal levels. The paper identifies three conflict levels that could arise in a developing society due to scarcity caused by environmental migration: state versus state, state versus group, and group versus group conflicts. Environmental degradation, such as reduced production and loss of resources, may force mass migration, and in turn, strain host communities' resources. The influx of migrants may lead to increased competition for necessities, potentially hurting the hosts' interests. Incompatibilities induced by environmental migration can trigger opposing actors, which, coupled with conscious intentions to address scarcity, might result in conflicts.

Additionally, conflicts can emerge between developing countries when the host country accepts or opposes migrants, exacerbating tensions. Urban revolts and group conflicts may arise as environmentally affected groups exploit migration to challenge regimes or protect their interests against migrants. Population migration shifts power dynamics among actors in the host society, prompting actions to safeguard interests. Migrants carrying conflicts from their origin regions to receiving areas might lead to conflict initiation in the latter.

### **2.3 Trends in Environmental Migration in Bangladesh**

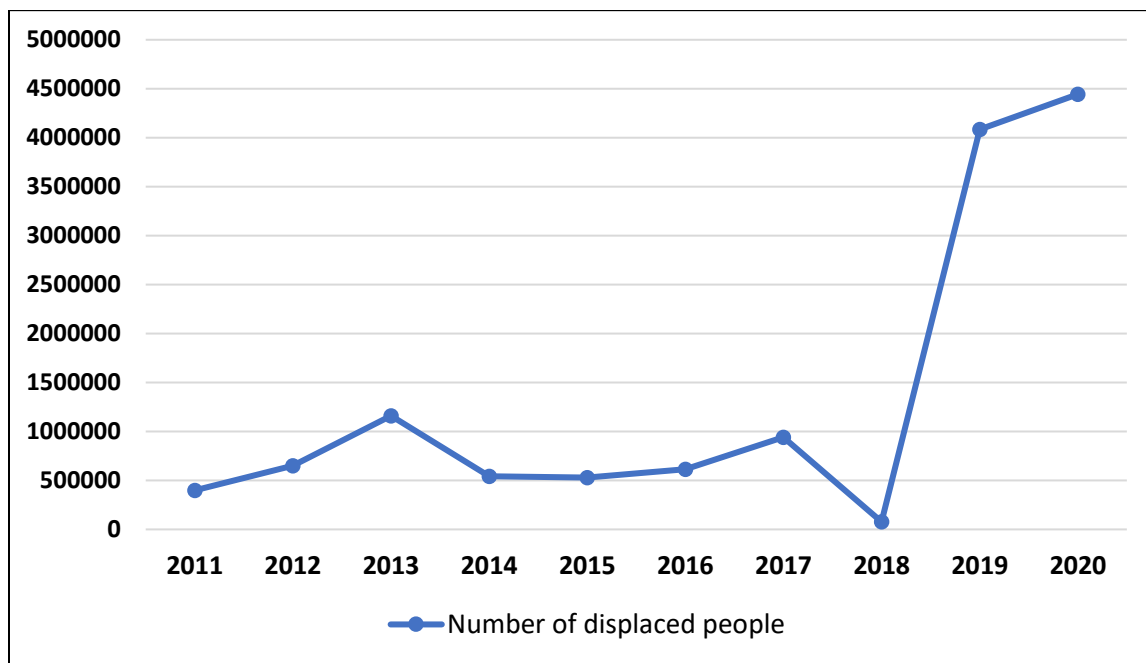
Bangladesh ranks seventh on the list of nations most affected by the ongoing climate crisis between 2000-2019 according to Germanwatch's Global Climate Risk Index (CRI) (Eckstein et al., 2021), despite contributing only 0.56 percent of global climate-changing emissions (Hasan & Chongbo, 2020). Aside from geographical vulnerability, poverty, environmental injustice, and political inaction are determinant factors of the climate migration crisis (Singh et al., 2020).

Bangladesh is gradually becoming a hub for climatic stresses such as frequent extreme weather events, soil salinity, cyclones, flooding, droughts, desertification, and rising sea levels ((Toufique & Islam, 2014; Parvin & Ahsan, 2013; Bhuiyan & Dutta, 2012; Khan et al., 2000). In 2020, Bangladesh ranked third worldwide in the number of new displacements by disasters with 4.4 million displaced people, as reported by the Internal Displacement Monitoring Centre (IDMC, 2021a). Although the displacements were initially in the form of evacuation, the extent of damage and loss determined whether these culminated in internal or cross-boundary migration.

A closer look at the data corresponding to climate and disaster-induced forced displacements can provide evidence of the upward soar of this trend. In the last decade, the highest number of climate-induced displacements seen in Bangladesh occurred between 2019 and 2020. As the chart suggests, between 2011 and 2020, the number of people displaced by disasters experienced a 9-fold increase.

**Figure 2.1**

*Trends in disaster-induced displacements in Bangladesh*

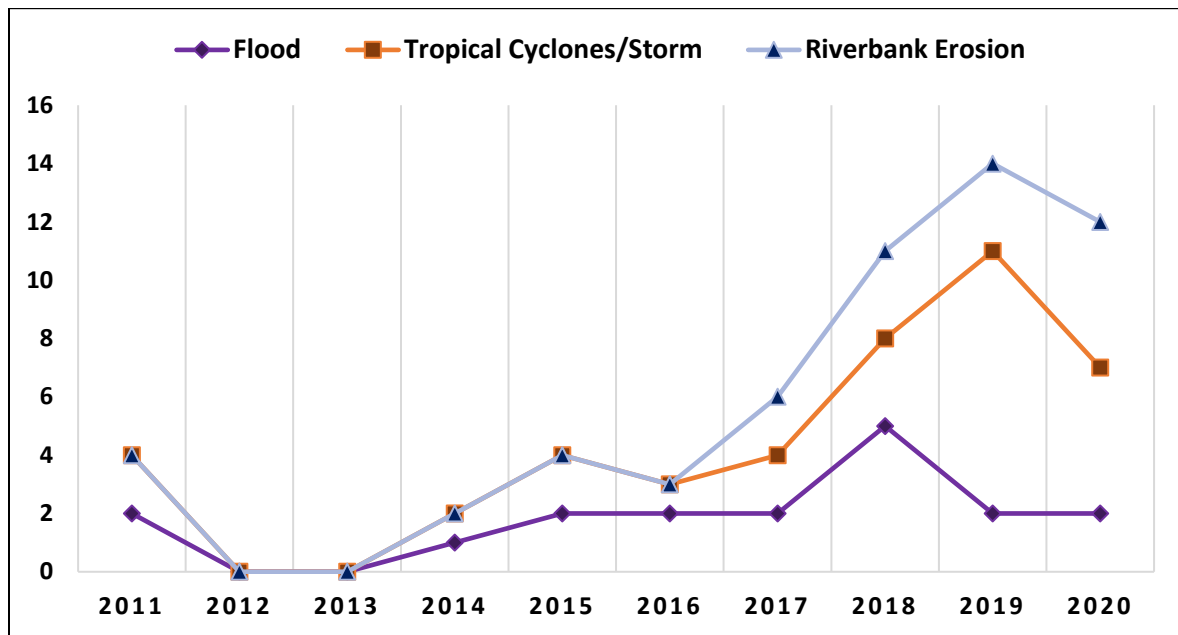


*Note.* Analysis based on data from IDMC (2021).

The data corresponding to the staggering augmentation in the number of disaster-induced displacements in Bangladesh supports the fact that in the last decade, the number of climate-induced hazards resulting in displacement has increased significantly. As contended by the IPCC (2022) and World Meteorological Organization (2022), this increasing magnitude and frequency of weather-related disasters cannot be explained by natural climatic variability and is a stamp of the globally changing climate. The data points to increasing events of floods, river-bank erosion, tropical cyclones, and storms as the primary causes of climate-induced displacements in Bangladesh. Because of the biophysical and socio-economic characteristics of Bangladesh, the coastal zones of the country often serve as ‘death traps’ for her inhabitants and are hotspots of climate change vulnerability World Bank Group (2021).

**Figure 2.2**

*Changing numbers of displacement-inducing climate hazards in Bangladesh*



*Note.* Analysis based on data from IDMC (2021).

Coastal erosion, flooding, and salinization directly impact people’s livelihoods and food security, exacerbating their socio-economic vulnerability. As the delta plain of Bangladesh has a very low mean elevation from sea level, only two-thirds of the country is less than 5 meters above sea level (Dastagir, 2015). Predictions support that a 45 cm rise in sea level rise will result in the permanent loss of 145 km long coastlines (Shamsuddoha & Chowdhury, 2007). For a country where agriculture still serves as the foundation of rural households, the loss of land at this rate surely has dire consequences in terms of forced migration.

#### **2.4 Resilience and livelihood resilience: Definition and concepts**

Sustainable development, in simple terms, can be viewed as the intersection between the world’s economic, social, and environmental concerns (More, 2019). Resilience, in social science, is the umbrella concept that encompasses sustainability’s natural and social components. Perrings (1998) defined resilience as the “*measure of the ability of a system to withstand stresses and shocks—its ability to persist in an uncertain world*”. Originating from the field of psychology, resilience was initially characterized by a positive adaptation mechanism in response to trauma, shocks, or stresses by scholars. The concept of resilience

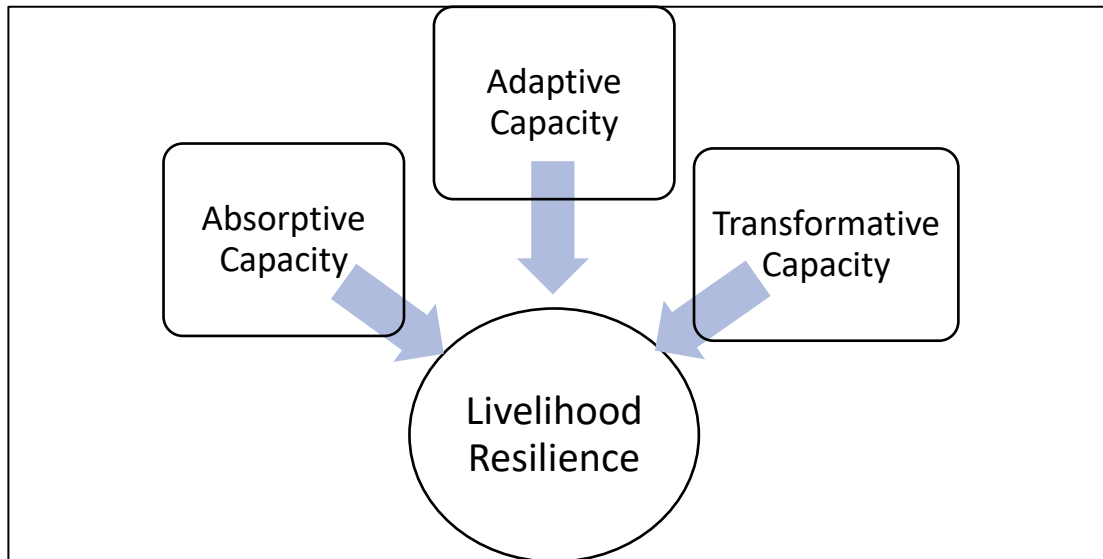
thinking was later adopted by socio-ecological systems (SES) scientists to signify an individual or a group's ability to withstand, recover from, and function after experiencing environmental, social, economic, or political shocks (Olsson et al., 2015). Resistance to change or variability is an important indicator of resilience; according to many experts, the larger the stress that a system can absorb and bounce back from, the higher its resilience (Walker et al., 2006). Ecologists have delineated two distinct interpretations of resilience as described by Pimm (1984): the first pertains to the rate at which a system returns to its equilibrium state after experiencing a disturbance. The second interpretation focuses on the magnitude of a disturbance required to destabilize a system from its stability domain. In the field of disaster management, resilience conveys a wide range of ideas, including the ability to adapt to the impacts of hazards, self-organize, recover, and learn to preserve or enhance fundamental basic structures and functioning (United Nations Office for Disaster Risk Reduction, 2022). Resilience thinking is frequently employed in the study of human-nature interrelationships as it allows the consideration of social, political, economic, cultural, physical and environmental dimensions in the shaping of people's vulnerability, susceptibility, and adaptive capacity (Speranza et al., 2014).

Different definitions of livelihood have been offered by social scientists, illustrating the concept's complexity and significance for comprehending human growth and well-being. According to Ellis (2008), "Livelihoods are the dynamic interface between a person or household and their natural, economic, social, and political environments." Chambers & Conway (1992) defined livelihood as the skills, tangible and intangible possessions, and activities that go into providing a means of subsistence. Thus, a livelihood approach focuses on both financial assets and non-financial assets to describe the resources individuals have and the methods they use to produce a living.

The idea of livelihood resilience comes from the more general idea of resilience, which was developed in the field of psychology and later applied to ecology and social systems. Resilience in the context of livelihoods is defined as having the ability to handle external perturbations while preserving vital aspects of livelihoods including income production, food security, and access to critical services (Speranza et al., 2014). According to the DFID (1999), when a livelihood can withstand and recover from stresses and shocks, and preserve or improve its capacities and resources, without undermining the livelihood prospects of the following

generation, it is said to be sustainable. This notion of livelihood resilience is supported by a number of empirical studies that explored the concept in different geographical, social, and economic contexts. Upreti et al. (2012) study, for example, looked at the livelihood resiliency of Nepali farmers in the context of disasters such as earthquakes. According to the study, the farmers' resilience after disasters was significantly influenced by social capital, informational availability, and their adaptive capacity. Furthermore, Saroar et al. (2019) examined coastal villages vulnerable to cyclones in Bangladesh and found that the main factors enabling communities to recover and rebuild their livelihoods following a cyclone were diverse livelihood options, community networks, and assistance from local institutions. In another study, Ripkey et al. (2021) investigated how Tanzanian pastoralists' livelihoods were impacted by climate change. The study emphasized the value of ecosystem services, loan availability, and information exchange in boosting pastoralists' ability to withstand stresses originating from climate change and market swings. These findings highlight three important attributes of livelihood resilience:

- **Absorptive Capacity:** According to Tanner et al. (2017), absorptive capacity is the capacity of people and communities to quickly bounce back from disruptions. It includes the ability to recover from an external shock while preserving critical resources necessary for earning a living.
- **Adaptive capacity** is the ability of people and groups to modify their livelihood means in correspondence to shifting conditions and stresses (Adger et al., 2020). When faced with difficulties or unpredictability, it refers to having the flexibility to recognize and introduce new means of subsistence and resource management techniques.
- **Transformative Capacity:** The ability to address the underlying causes of vulnerability by long-term changes and interventions in livelihood practices, as well as in the institutions and governance mechanism which shapes people's livelihoods is referred to as transformative capacity (Béné et al., 2017). In order to create resilience over time, this goes beyond short-term response or recovery and might need considerable changes in the social structure.

**Figure 2.3***Structural components of livelihood resilience*

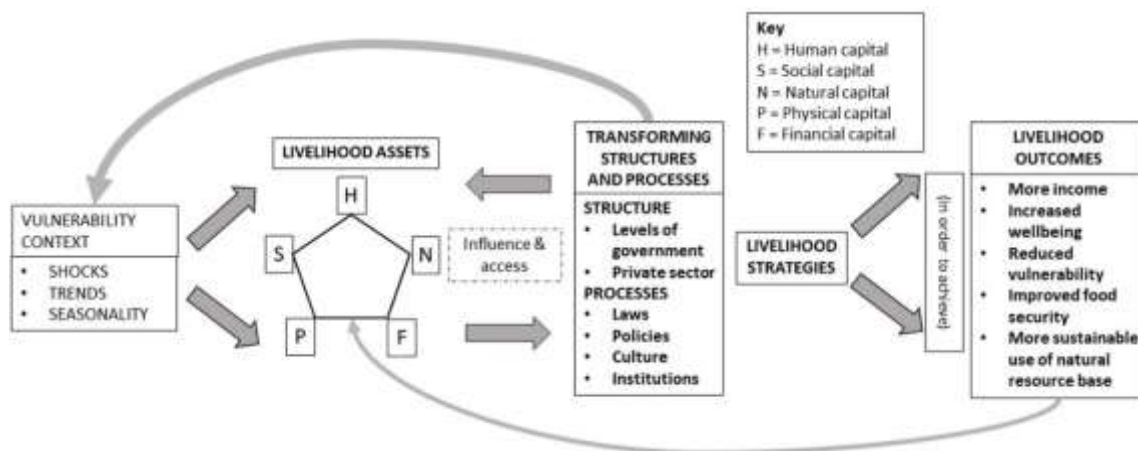
## 2.5 Theoretical frameworks on livelihood resilience

Chambers & Conway (1992) first introduced the notion of livelihood resilience in the broader context of sustainable livelihoods. Since then, many theoretical frameworks have been conceived to understand, assess, and capture the factors that influence the livelihood resilience of people. The most well-known of these models is perhaps the Sustainable Livelihoods Framework (SLF) was formulated by the United Kingdom's Department for International Development (DFID) during the latter part of the 1990s. This study employs a holistic methodology to comprehend and evaluate poverty and sustainable development, with a specific focus on rural and marginalized populations (DFID, 1999). The framework places significant emphasis on the dynamic interaction between different assets and institutions that exert influence on individuals' livelihoods and overall well-being. It first introduced the concept of core livelihood assets and delineated five distinct categories of livelihood assets, namely human, social, natural, physical, and financial, building on the social-capital theory (Frediani, 2010). This is a central notion in many of the frameworks developed later on livelihood resilience. These assets are deemed to be essential for individuals and households to actively engage in diverse livelihood strategies with the aim of generating income and ensuring the maintenance of well-being. The framework additionally recognizes the presence

of external factors that have the potential to jeopardize individuals' means of subsistence, including shocks and vulnerabilities. It also elaborates four distinct pathways towards achieving sustainable livelihoods which consist of enhancing livelihood assets, developing effective livelihood strategies, enhancing livelihood outcomes, and establishing a conducive policy and institutional framework. Through the utilization of this framework, professionals in the field of development are able to create interventions that are efficient in promoting sustainable livelihoods, improving overall well-being, and mitigating poverty within communities that are particularly susceptible (DFID, 1999).

**Figure 2.4**

*DFID's Sustainable Livelihoods Framework*



*Note.* Adapted from “Sustainable livelihoods framework” by the DFID, *Sustainable livelihoods guidance sheets* (p. 2), 1999. Copyright 1999 by the DFID.

Although the SLA has been instrumental in spearheading a comprehensive and inclusive methodology that prioritizes individuals, participation, and comprehensiveness, it has a tendency to disproportionately emphasize the local context and community. Natarajan et al. (2022) consider this failure to consider the interplay between local and global forces that shape livelihoods is a significant oversight, as it diverts attention away from macro-processes and structural factors. The framework also fails to adequately address the political dimensions and power dynamics that exist within communities (Serrat, 2008). As such, it diminishes the significance of class, gender, and power dynamics that influence individuals' means of subsistence. Critics contend that the SLF is deficient in terms of explicit theoretical underpinnings, instead placing greater emphasis on principles and methodologies. Grounded

in Sen's (1985) theory of human capabilities, there are significant conceptual and practical differences in the application of Sen's concepts in the SLF (Natarajan et al., 2022). While the SLF uses terms like 'capabilities,' 'assets,' and 'capital,' it does not fully capture the broader definition of Sen's concept of capabilities. The SLF tends to equate capabilities with the capacity to acquire resources, thereby disregarding Sen's idea of capabilities as a space of potential achievements and the process of using resources (Frediani, 2010).

In light of the aforementioned criticisms, Natarajan et al. (2022) attempted to provide a comprehensive sustainable livelihoods framework tailored to the demands and challenges of the 21st century. The original vulnerability context within the SLF focuses on localizing the origins of vulnerability while disregarding structural inequalities. Characterizing context as vulnerability restricts the potential for upward mobility and transformation of livelihoods. The revised Sustainable Livelihood Framework incorporates the notion of a "livelihood context," recognizing the broader environment in which livelihoods are formed. Distinguishing vulnerability from context in this manner acknowledges potential opportunities, thereby challenging the initial negative perspective (Natarajan et al., 2022).

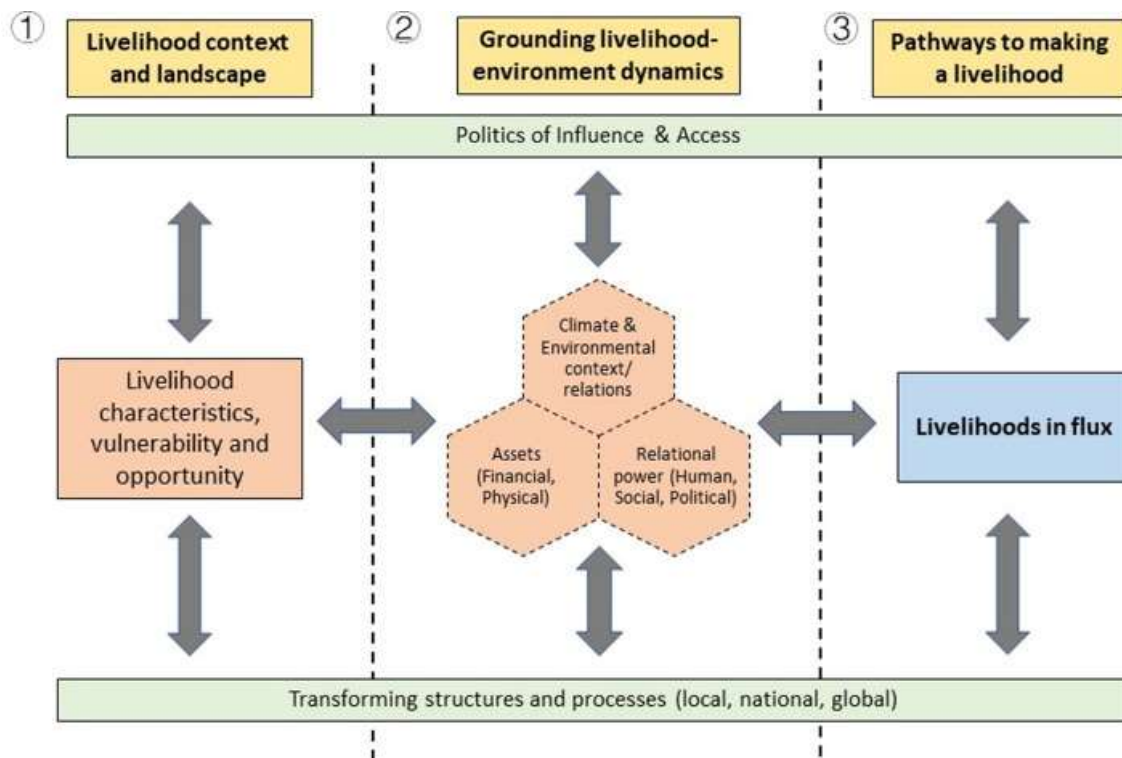
Moreover, the new framework encompasses various interrelated elements such as policies, norms, institutions, social groups, and the public and private sectors, in order to examine the ways in which livelihoods are shaped and perpetuated by both overarching forces and individual dynamics. The original assets pentagon in the SLF has been subject to criticism due to its inclination towards tacitly endorsing capitalism (Fine & Lapavistas, 2004).

The revised SLF framework restricts the 'relational power' and 'climate and environment context/relations' (Fuchs, 2002). Relational power encompasses the examination of material power dynamics, such as those related to social class, gender, and ethnicity, and their influence on the establishment and maintenance of individuals' means of subsistence. The study of climate and environment context/relations acknowledges the influence of climatic factors on people's means of living and examines their wider connections to livelihood resilience (Natarajan et al., 2022).



Figure 2.5

## Revised Sustainable Livelihoods Framework



Note. From “A sustainable livelihoods framework for the 21st century” by Nithya Natarajan, Andrew Newsham, Jonathan Rigg, and Diana Suhardiman, *A sustainable livelihoods framework for the 21st century* (p. 12), 2022, Elsevier Ltd. Copyright 2022 by the Authors.

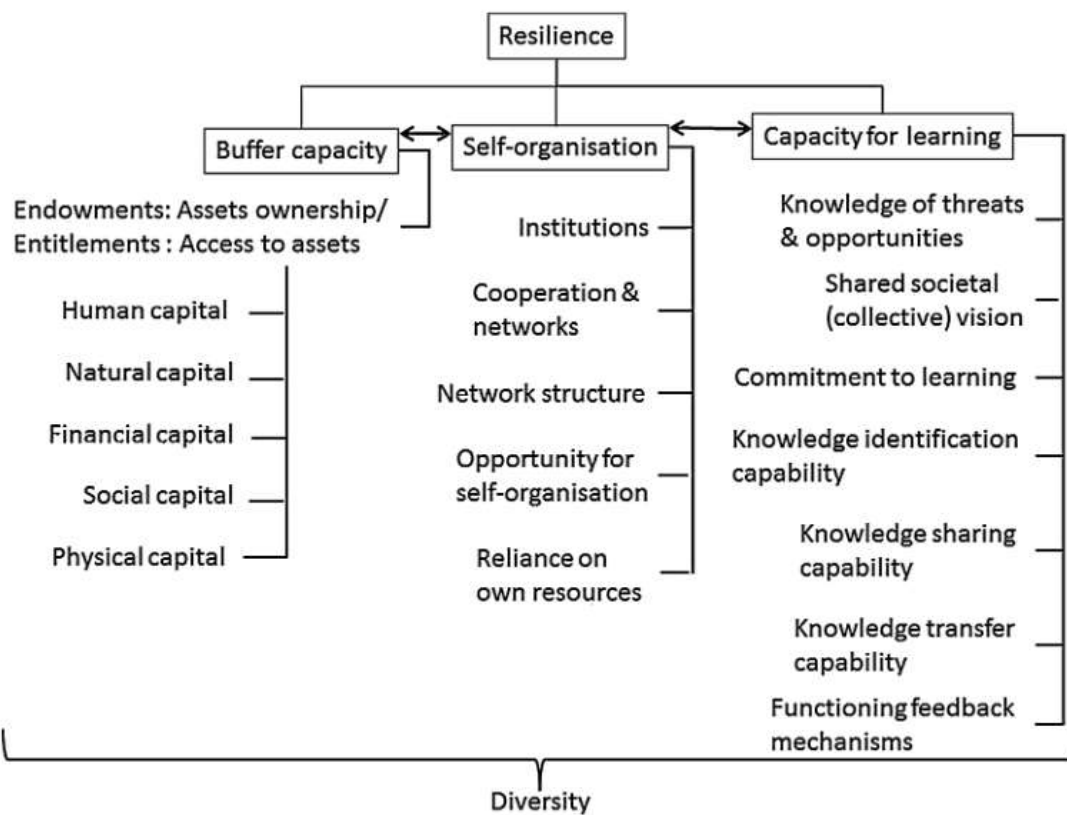
Speranza et al. (2014) argue that frameworks on resilience from a livelihood perspective often follow diverse methodologies but tend to focus primarily on specific dimensions of livelihoods. While the above frameworks pertaining to livelihoods follow a capital-based approach, Speranza et al. (2014) emphasize the significance of examining how shocks or stresses disrupt livelihood stability. Consequently, they highlight the need to conceptualize a framework which can be used to holistically analyze livelihood resilience in all of its components.

The framework developed by Speranza et al. (2014) provides an overview of the attributes and indicators linked to three dimensions of resilience: buffer capacity, self-organization, and capacity for learning. The concept of buffer capacity refers to the ability of a system to undergo changes while maintaining its structural integrity, functional capabilities, identity, and feedback mechanisms (Resilience Alliance, 2010). Self-organization emphasizes the influence of factors such as human agency, adaptive capacities, power dynamics, and social interactions

on the development of social resilience (Obrist et al., 2010). Within social systems, self-organization also pertains to the autonomous generation or reestablishment of various critical social components, including rules, norms, values, and organizational structures. This phenomenon occurs through the interplay of both top-down and bottom-up processes, without the imposition of external control (Fuchs, 2002).

**Figure 2.6**

*Indicator framework to measure livelihood resilience*



*Note.* From “A conceptual and analytical framework for characterising livelihood resilience” by Chinwe Ifejika Speranza, Urs Wiesmann, and Stephan Rist, *An indicator framework for assessing livelihood resilience in the context of social–ecological dynamics* (p. 112), 2014, Elsevier Ltd. Copyright 2014 by Elsevier Ltd.

In times of crises, social self-organization refers to the independent actions of individuals in shaping the occurrence, form, progression, and outcome of the crisis. Finally, the ability to acquire knowledge and skills represents the concept of capacity for learning, indicating that a resilient social-ecological system is characterized by its ability to garner lessons from previous

experiences and integrate them into present actions, thereby exhibiting memory and adaptability. That is to say, the process of learning encompasses more than the mere acquisition of knowledge and skills; it also involves the application of that knowledge in practical situations (Argyris & Schön, 1997).

## **2.6 Application of livelihood resilience frameworks in empirical studies**

The existing theoretical frameworks pertaining to livelihood resilience are characterized by their comprehensive nature and their applicability across diverse contexts. This section will exclusively focus on studies that are pertinent to the present research, which explore the connections between humans and nature, as well as analyze the ability of livelihoods to withstand and recover from climatic, economic, and social transformations.

Sadik & Rahman (2009) explore livelihood resilience as a function of productivity, sustainability, and risks associated with various livelihood assets and strategies employed to sustain one's livelihood. Their study evaluates the livelihood resilience of communities dependent on the Sundarban mangrove ecosystem in context of the increasing occurrence and severity of extreme weather phenomena, the loss of habitats, and the shifting ecological dynamics associated with climate change. The authors developed and tested a comprehensive framework for assessing livelihood resilience, consisting of qualitative and quantitative measures pertaining to natural, physical, human, social, and financial capital. The selection of indicators has been derived from three distinct dimensions, namely productivity, sustainability, and risk.

Following a similar capital-based approach, Quandt (2018) and Nasrnia & Ashktorab (2021) draw from the Sustainable Livelihood Framework to measure livelihood resilience. By considering the interplay of different capitals, Quandt (2018) distinguishes her study from contemporaneous research in the field and introduces the Household Livelihood Resilience Approach (HLRA). The approach recognizes that resilience is not solely dependent on individual resources but their interactions within the household context. This framework emphasizes the assessment of resilience beyond mere recovery and adaptive capacity, shifting the focus to how households can sustain or improve their well-being in the face of shocks and stresses. On a similar note, Nasrnia & Ashktorab's (2021) study on livelihood resilience in rural households in Iran explores various strategies and assets used by households to cope with and

recover from drought impacts. Both the papers emphasize the significance of access to resources and livelihood assets in building resilience, as these resources enable households to effectively manage shocks and adapt to changing conditions.

Many recent studies have used Speranza et al.'s (2014) framework on livelihood resilience due to its multi-faceted consideration of resilience. Emphasizing the necessity of conducting research that centers on the resilience of livelihoods within key ecological function zones for improving the lives and livelihoods of highly vulnerable groups residing in these areas, Zhao et al. (2022) undertook an assessment of farmers' livelihoods in Gannan, which provides important water-soil conservation functions to near the Yellow River in China. The authors employ a livelihood resilience evaluation index methodology that incorporates buffer capacity, self-organization, and learning capacity. The findings of the study suggest that farmers' livelihood resilience is generally low, with their capacity to self-organize being substantially stronger than their buffer and learning capacities. Significant factors that impact the resilience of farmers include ecological policy, the age of the household head, livelihood diversification, household size, and the level of environmental dependency (Zhao et al., 2022). Bauer et al. (2022) also examine the relationship between the dependence on ecosystem services and livelihood resilience in their study on indigenous forest families in the Amazon region using a similar analytical framework. Their findings highlight the importance of social networks and capital in providing crucial assistance to households with low financial resources.

Speranza's framework has also been applied in the context of disaster risk. Zhou et al. (2021) investigate the livelihood strategies and resilience of rural inhabitants residing in regions impacted by earthquakes in China, underscoring the pivotal role that livelihoods play in facilitating effective disaster risk management. The research findings indicate the residents' livelihood resilience is heavily dependent on their disaster preparedness and mitigation. Moreover, an analysis of the interplay between livelihood resilience and strategies reveals that heightened buffer capacity within the resilience framework correlates with an increased inclination among rural inhabitants to participate in non-agricultural activities as a means of generating income (Zhou et al., 2021). Within a similar geographical and socio-economic context, Fang et al. (2018) conduct an investigation into the impacts of natural disasters on the livelihood resilience of rural inhabitants situated in Sichuan, China. Deviating from the conceptualization elucidated within Speranza's model, in this study, the authors delineate their

assessment of livelihood resilience based on four distinct dimensions: namely, livelihood quality, livelihood promotion, livelihood provision, and disaster stress. The analysis reveals that the determinants of livelihood resilience are predominantly influenced by both livelihood provision and livelihood promotion, while concurrently exhibiting a negative correlation with disaster stress. The extent of impact of different natural disasters on livelihood resilience differs, with earthquakes having the most severe impact and droughts being the least influential. As a way forward, the study advocates for formulating incentive strategies to encourage healthcare professionals to remain in rural areas, the expanding of educational and healthcare services, improving access to agricultural land, and enhancing the economic sustainability of local agricultural businesses and maintains that these actions are crucial components for enhancing livelihood resilience (Fang et al., 2018).

Livelihoods play a significant role in post-disaster recovery (Peacock et al., 1987), as such, researchers have also employed livelihood resilience in the study of disaster displacements and relocation. Sina et al. (2019) examine the livelihood resilience in communities that were relocated following the 2004 Indian Ocean tsunami. The authors developed a methodology specifically designed to evaluate the livelihood sustainability in the aftermath of disaster-induced relocation. Their framework categorizes indicators for assessing resilient livelihoods into four separate categories, including individual coping ability, individual wellbeing, access to livelihood resources, and community's socio-physical robustness (Sina et al., 2019). The findings indicate that those who underwent relocation place higher emphasis on the first two dimension in comparison to the latter. This indicates that relocated individuals prioritize proactive self-reliance above external conditions when it comes to enhancing their livelihood resilience. On the other hand, in their study on the interrelationship between disaster-related resettlement and livelihood resilience, Liu et al. (2020) again draw on the Speranza's framework. Their study includes a comparison between the livelihood resilience of relocated and non-relocated households, and the findings reveal a lower resilience score among those who were relocated compared to their non-relocated counterparts.

## **2.7 Conceptual framework on environmental shocks, migration and livelihood resilience**

The interplay between migration and livelihood resilience has been widely recognized as crucial in the context of environmental disturbances, natural disasters, and climate change. The importance of livelihood resilience in facilitating effective recovery and reconstruction following environmental shocks has been emphasized by Mayunga (2007). The UNDP (2022) prioritizes the restoration of livelihoods, particularly for individuals who have experienced the loss of critical assets and resources, to promote self-reliance and decrease dependency on humanitarian assistance.

The significance of livelihood resilience in the process of recovering from environmental shocks has been emphasized early on, by scholars including Bolin & Bolton (1983), as well as Peacock et al. (1987). The observations provided by the authors shed light on the building back disaster-affected areas by restoring affected livelihoods. Costanza et al. (2007) take this notion further and state that a community's resilience and development in the aftermath of a major shock is interlinked with the restoration of its people's livelihoods.

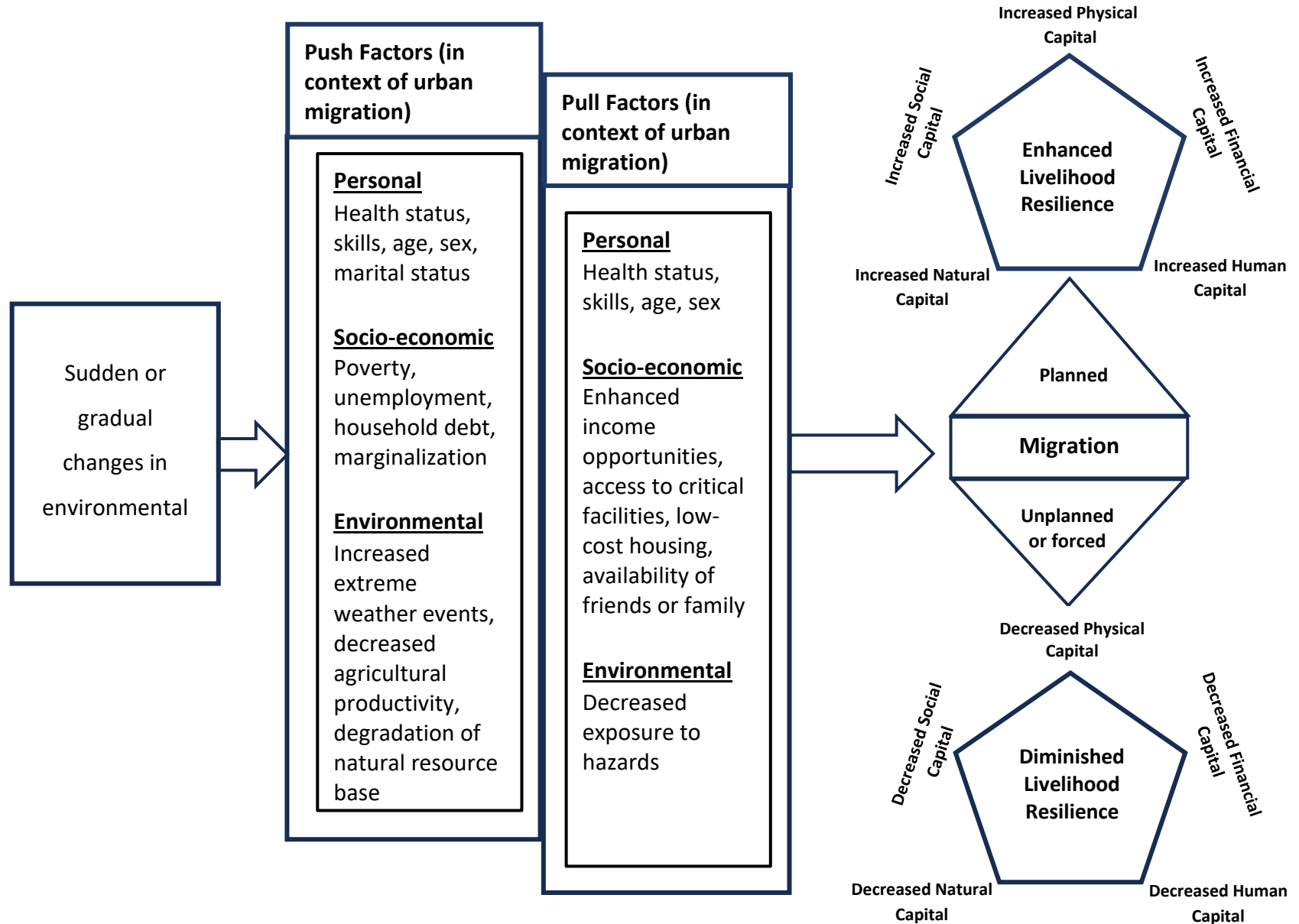
Furthermore, Gemenne & Blocher (2017) and Bardsley & Hugo (2010) propose that migration can serve as a potential adaptive strategy in response to environmental hazards. Tacoli's (2009) study delves into the significance of migration within the dynamic context of climate change and environmental crisis. The study reveals that migration serves as a strategic approach to diversify livelihoods, diminish vulnerability, and manage shifting environmental conditions. The research highlights the intricate interplay among migration, climate change, and mobility, emphasizing that migration is not solely propelled by crises but is an intentional adaptation strategy in regions susceptible to chronic environmental disturbances. This idea is also supported by Hoffmann et al's. (2022) research which found migration could act as a final resort for extremely vulnerable populations when facing challenges such as rising temperatures, shifts in rainfall patterns, and land degradation. These environmental changes pose significant risks to crucial aspects like food security, water availability, and health. Migration might be employed alongside other approaches to increase income sources for enhanced resilience. Building on the same notion, but from a different perspective, Mallick et al. (2020) examine the choice between migration and non-migration as a strategy for dealing with unforeseen disruptions to livelihoods. The research explores the connection between

socio-ecological systems and the conditions of livelihoods, aiming to understand the role of livelihood sustainability in shaping household and individuals' decisions to stay or leave. The results reveal that decisions regarding migration primarily depend on available livelihood options.

The aforementioned studies demonstrate that the pursuit of livelihood resilience and sustainability is a significant factor contributing to out-migration from environmentally vulnerable areas. Nevertheless, there is limited research examining environmental migrants' livelihood resilience after their migration. Gautam (2017) investigates the potential of seasonal migration in strengthening livelihood resilience. The study reveals that migration resulting from poverty coupled with environmental shocks in the Himalayan region in Nepal does not have a substantial impact in strengthening the livelihood resilience of the farming communities there. Liu et al. (2020) compare the livelihood resilience of households that were relocated and those that were not after a disaster, and the results show that the households that were relocated had a poorer resilience score than their non-relocated counterparts.

**Figure 2.7**

*Conceptual framework on relationship between environmental changes, push and pull factors of migration, and livelihood resilience*







# CHAPTER 3:

# METHODOLOGY

## Chapter Three: Methodology

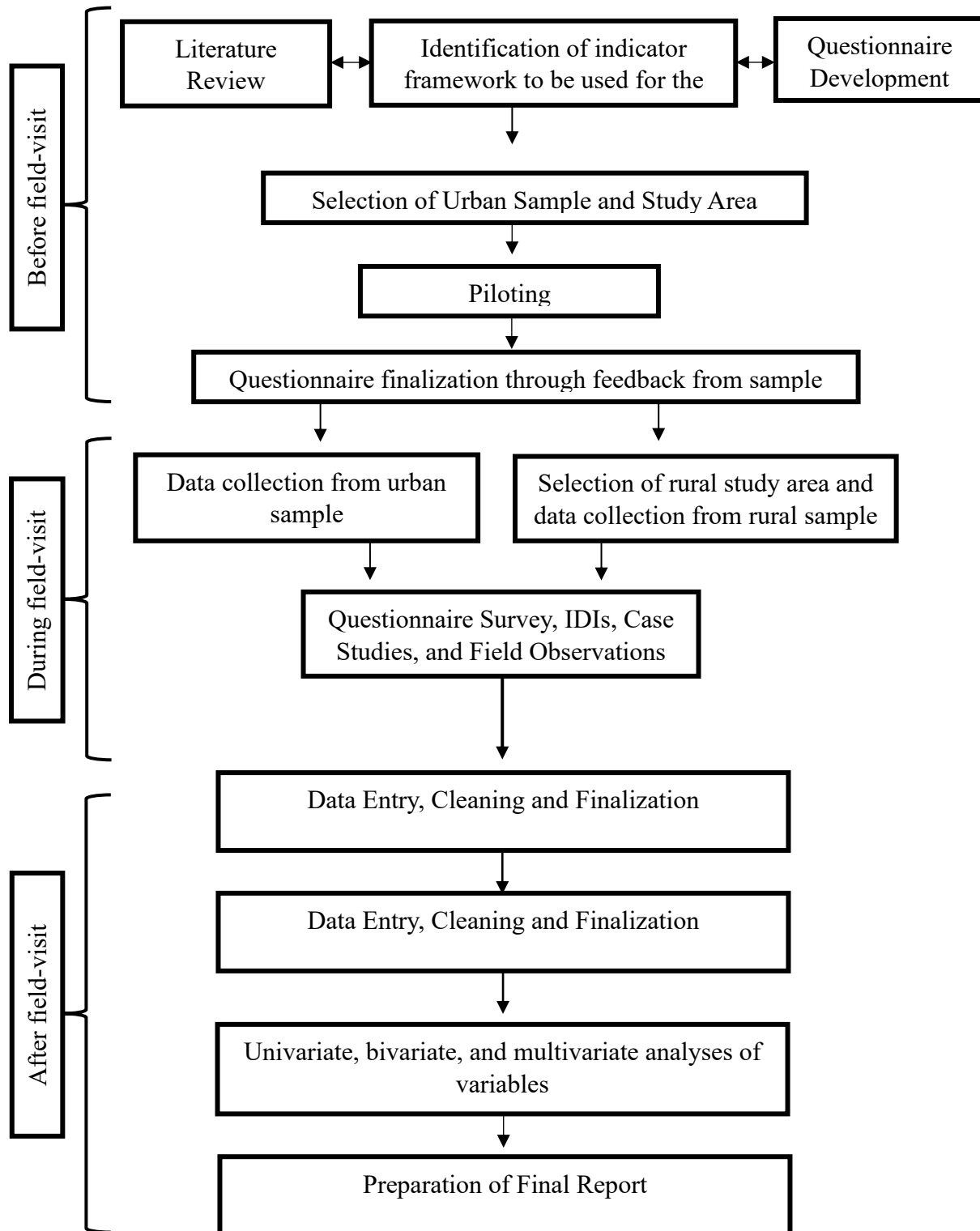
### 3.1 Research Design

The research design can be delineated into three discrete phases: inception, conceptualization, and execution. Initially, a comprehensive literature analysis was undertaken to investigate previous research and advancements in the field of environmental migration and livelihood resilience, with the objective of identifying areas where further research is needed. The literature review unveiled that environmental migration frequently arises from the pursuit of improved economic prospects and livelihood options. Nevertheless, the availability of credible evidence about the correlation between environmental resilience and enhanced livelihood resilience remains limited. As such, the purpose of this study was to examine and compare the level of livelihood resilience among those who have been forced to migrate due to environmental factors and those who have not migrated but are living in vulnerable environmental situations. The selection of the analytical framework and the identification of significant variables and indicators for quantification and comparison in this study were identified from relevant literature. The selection of the urban study area and study sample was conducted through the consultation of key informants. Once the key variables were identified, the questionnaire was developed and a preliminary piloting was conducted. Based on the comments received during the pre-testing phase, modifications were made to the questionnaire, resulting in its finalization.

The subsequent stage of the research focused on the collection of data from individuals who had migrated due to environmental factors. A simple frequency analysis showed that a significant proportion of the individuals who migrated to the urban study areas originated from the Bhola district of Barisal in Bangladesh. Therefore, Bhola was selected as the designated rural study area. The process of collecting field data encompassed several methods, including household surveys, observations, and in-depth interviews. Following the completion of the data collection phase, the data was digitized, cleaned, and finalized. The study utilized quantitative methods, specifically univariate, bivariate, and multivariate analysis, to examine patterns, relationships, and correlations among the relevant variables. Ultimately, the report was written and subjected to a thorough review process before its finalization.

Figure 3.1

Research design



### 3.2 Data Collection Framework

The measurement of livelihood resilience for this study was driven by the indicator framework developed by Speranza et al. (2014). The conceptualization of livelihood resilience in this framework is based on three dimensions: buffer capacity (BC), self-organization (SO), and the capacity for learning (CL). The livelihood resilience score is determined by the integration of several components across these three dimensions.

$$\text{Livelihood resilience} = \text{BC} + \text{SO} + \text{CL}$$

The concept of buffer capacity refers to the capacity of a system to effectively manage and minimize disruptions while maintaining its fundamental structure, functions, and identity. The indicators of this framework are centered on the five livelihood capitals, namely human, financial, physical, natural, and social. Self-organization relates to how human agency, adaptive capacities, and social interactions play a crucial role in establishing resilience. Consequently, community networks, trust in others, participation in affairs relating to group interest, and the extent of self-reliance were employed as means to measure self-organization. Capacity for learning refers to the household's aptitude to generate, get, and disseminate knowledge, alongside their ability to adapt livelihood activities in light of new knowledge and understanding. The indicators are organized based on the concepts of awareness, knowledge exchange, and transfer. Household-level indicators were chosen to quantify each dimension. To select the indicators of each contributing component, we referred to Zhao et al. (2022), Bauer et al. (2022), Zhou et al. (2021), Nasrnia & Ashktorab (2021), Liu et al. (2020), and Speranza et al. (2014).

**Table 3.1***Index for measurement of livelihood resilience used in the study*

<b>Dimension of Livelihood Resilience</b>	<b>Components</b>	<b>Sub-components</b>	<b>Description/ Evaluation</b>	<b>Sources</b>
<b>Buffer Capacity (BC)</b>	Human Capital	Literacy	Years of schooling completed by the household head	Ifejika Speranza et al., 2014
		Health	Number of members in the family with significant physical or mental impairments	Bauer et al., 2022
		Labor capacity	The ratio of working members in the household to the household size (Children below the age of 18 who are working members are counted as half)	Bauer et al., 2022
	Financial Capital	Per capita annual income	The ratio of total annual income to the total number of family members	Zhao et al., 2022, Ifejika Speranza et al., 2014
		Savings	Availability of household savings	Zhou et al., 2021
		Livelihood Diversification	Availability of diversity income sources	Adapted from Nasrnia & Ashktorab, 2021
	Physical Capital	Roof material	Material used in the roof of the accommodation used by the household	Adapted from Bauer et al., 2022

<b>Dimension of Livelihood Resilience</b>	<b>Components</b>	<b>Sub-components</b>	<b>Description/ Evaluation</b>	<b>Sources</b>
		Utilities	Whether the household has gas and electric connections	Adapted from Ifejika Speranza et al., 2014
		Sanitation	Accessibility to sanitation facilities measured on a 5-point scale	Adapted from Ifejika Speranza et al., 2014
		Road conditions	Quality of roads around the residence measured on a 5-point scale	Nasrnia & Ashktorab, 2021
		Basic facilities	Whether basic facilities such as markets and hospitals are accessible	Nasrnia & Ashktorab, 2021
	Natural Capital	Farmland	Whether the household owns any agricultural land	Nasrnia & Ashktorab, 2021
		Agricultural land	Whether the household owns their housing land	Ifejika Speranza et al., 2014
		Livestock	Number of livestock owned by the HH	Nasrnia & Ashktorab, 2021
		Clean water	Availability of clean water measured on a 5-point scale	Adapted from Ifejika Speranza et al., 2014

<b>Dimension of Livelihood Resilience</b>	<b>Components</b>	<b>Sub-components</b>	<b>Description/ Evaluation</b>	<b>Sources</b>
	Social Capital	Network of friends and relatives	Connectedness between kith and kins measured on a 5-point scale	Zhao et al., 2022
		Communication with neighbors	Communication with neighbors measured on a 5-point scale	Nasrnia & Ashktorab, 2021
		Network of social security	Number of insurances/ social safety nets owned by the household	Zhao et al., 2022
<b>Self-Organization (SO)</b>	Cooperation and networks		Number of groups the household members are part of	Ifejika Speranza et al., 2014
	Participation		Frequency of participation in collective affairs measured on a 5-point scale	Liu et al., 2020
	Trust in others		Supportability from kith and kin network in matters of lending and borrowing money measured on a 5-point scale	Ifejika Speranza et al., 2014
	Reliance on own resources		Time needed to reach the nearest mode of transportation used	Zhao et al., 2022

<b>Dimension of Livelihood Resilience</b>	<b>Components</b>	<b>Sub-components</b>	<b>Description/ Evaluation</b>	<b>Sources</b>
<b>Capacity for learning (CL)</b>	Cognitive ability		Whether the household is familiar with threats related to climate change	Adapted from Bauer et al., 2022 and Ifejika Speranza et al., 2014
	Knowledge		Investment made by the household per month in pursuit of education	Ifejika Speranza et al., 2014
	Skills and Training		Number of times a household member participated in an information/ skill development event in the last 12 months	Adapted from Ifejika Speranza et al., 2014
	Knowledge sharing		Whether there is information exchange between community members	Adapted from Ifejika Speranza et al., 2014





### 3.3 Selection of the Study Area

As previously stated, this research involves a comparison of livelihood resilience between environmental migrants and rural non-migrants. Consequently, two distinct study areas were necessary—one in an urban context and the other in a rural setting. For the urban migrant group, the study sites were selected within informal settlements in Dhaka district. In contrast, for the non-migrant group, areas within the Bhola district, prone to frequent disasters, were chosen as study sites.

#### 3.3.1 Urban Study Area

Urban environmental migrants were the primary focus of this study. Unregulated migration has resulted in the rise of many informal settlements in Dhaka. According to an estimate provided by the (International Organization for Migration, 2015), approximately 70 percent of residents in these slums had migrated due to climate-related shocks. Key informants and field practitioners, experienced in working with environmental migrants, were consulted to select study areas in Dhaka. One of these areas was the Bhasantek slum, situated in Mirpur, Dhaka, and the other was the Korail slum, located in Mohakhali, Dhaka. Both of these slums are located in close proximity to urban centers, offering economic opportunities that are often scarce in rural regions. However, life in these informal settlements is characterized by various challenges, including inadequate infrastructure, substandard living conditions, lack of legal recognition, and susceptibility to forced eviction. The slum dwellers also face severe environmental issues, such as extreme heat during summer and vulnerability to heavy rainfall during the rainy season. The surroundings of both slums are contaminated by unclean and polluted water sources, resulting in odorous pollution throughout the community.

**Table 3.2**

*Demographic information of urban study area*

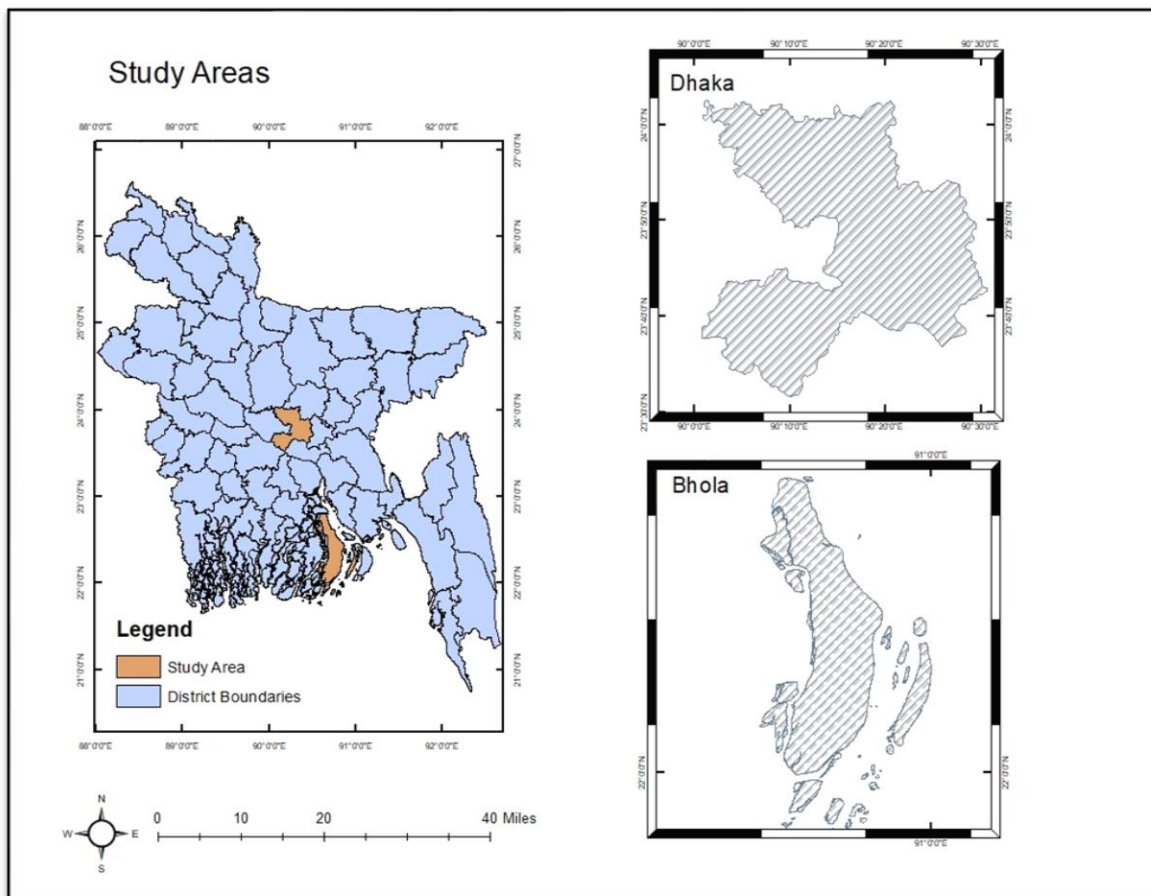
Attributes	Bhasantek Slum	Korail Slum
Area	40 acres	90 acres
Thana	Mirpur	Gulshan

Population	30,000	1.1 lac
Literacy Rate	-	20 %
Coordinates	23°48'21"N, 90°23'23"E	23°47'6"N, 90°24'32"E

*Note.* The data is compiled from *Illegal Gas, Power Connections: Syndicates make huge money from 3 slums*, by The Daily Star, 2019 (<https://www.thedailystar.net/frontpage/illegal-gas-power-lines-in-dhaka-slums-1793290>). Copyright 2019 by The Daily Star.

**Figure 3.2**

*Map of the study area*



### 3.3.2 Rural Study Area

After examining the data collected from Dhaka, it was found that a significant proportion of the environmental migrants originated from Bhola district. Consequently, Bhola was chosen as the

study location for the non-migrant group. Bhola encounters various environmental difficulties that have substantial ramifications for its ecosystems, communities, and overall development. The district's geographical proximity to the Bay of Bengal renders it susceptible to a wide range of environmental stressors, increasing its susceptibility to the impacts of climate change, sea-level rise, and natural calamities. One of the primary issues faced by the region is the increasing vulnerability to cyclones and storm surges as a result of its proximity to the shore (McNamara et al., 2016). These events can cause extensive damage to infrastructure, livelihoods, and the social fabric of communities.

**Table 3.3**

*Demographic information of rural study area*

Attributes	Bhola Sadar	Char Fasson
Area	413.16 sq km	1440.04 sq km
Rural Population	333104	373976
Density (per sq km)	988	287
Literacy Rate	33.8 %	35.7 %
Unions	13	14
Villages	122	73

*Note.* The data is compiled from *Population and Housing Census, Zila Report: Bhola*, by the Bangladesh Bureau of Statistics, 2011

([http://203.112.218.65:8008/WebTestApplication/userfiles/Image/PopCen2011/COMMUNITY\\_Bhola.pdf](http://203.112.218.65:8008/WebTestApplication/userfiles/Image/PopCen2011/COMMUNITY_Bhola.pdf)). Copyright 2011 by the Bangladesh Bureau of Statistics.

Furthermore, the district's susceptibility to riverbank erosion exacerbates these challenges, displacing communities and intensifying land loss. Mangroves, which play a crucial role in coastal protection and support diverse ecosystems, are under threat due to human activities such as shrimp farming and deforestation (Ahmmed et al., 2020). The depletion of these vital habitats not only weakens the district's resilience to natural disasters but also disrupts the delicate balance of local

ecosystems. In the face of these environmental challenges, the people of Bhola are forced to adapt and find innovative solutions to safeguard their livelihoods and well-being.

Data was gathered from two distinct sub-districts within Bhola, namely Bhola Sadar and Charfasson. For the non-migrant group, households were specifically selected from regions that faced considerable environmental strains. Within each sub-district, data was collected from two separate areas: one connected to the mainland and one located on a Char Island. In the Bhola Sadar sub-district, data was collected from Elisha Ghat, situated along the banks of the Meghna River, as well as from Char Madanpur, which is geographically isolated from the mainland due to the presence of the river. In Charfasson, the data collection sites included Kacchapia Ghat and Char Kukri Mukri, which bordered the Bay of Bengal.

### 3.4 Sample Size Calculation

The sample for the survey is as below-

Urban migrant households,  $n_1$ : **320**

Rural non-migrant households living under environmental pressures,  $n_2$ : **320**

The sample size,  $n$  for each group of this study is calculated using the Raosoft software (Raosoft, 2004). The sample is calculated using the following formula-

$$n = \frac{Z^2 p(1 - p)}{E^2}$$

Here,

The required sample size =  $n$

Z-score associated with the desired confidence level,  $Z= 1.96$  for a 95 percent confidence level

The margin of error or maximum allowable difference between the sample estimate and the population parameter,  $E= 5.5$  percent

Estimated population proportion,  $p= 50$  percent

As the study was conducted on two population groups with relatively homogenous characteristics, the margin of error for the study is kept a little high. For this study, these values are deemed appropriate considering the constraints of time and funds.

### 3.5 Sampling Strategy

The respondents of this study were chosen following the purposive sampling technique. Purposive sampling is a type of non-random selection employed by researchers to intentionally select particular individuals or groups from a population, guided by specified criteria. Purposive sampling is a commonly employed technique in qualitative research with the intention of ensuring that participants contribute pertinent and significant information. This approach was used because this study aims to gather insights from participants who possess particular characteristics, knowledge, and experiences that are relevant to the research question. The participants of each group of this study were selected as per the following criteria-

**Table 3.4**

*Sampling inclusion and exclusion criteria*

<b>Urban environmental migrants</b>	<b>Rural non-migrants</b>
<i>Inclusion Criteria</i>	<i>Inclusion Criteria</i>
<ul style="list-style-type: none"> <li>- Households which have migrated to Dhaka for sudden or progressive changes in their original environment that adversely affected their lives or living conditions, either temporarily or permanently</li> <li>- Migrant households who fall under the general category of urban poor and reside in informal settlements</li> <li>- Migrant households who have moved from their area of origin at least 6 months before the date of the interview</li> </ul>	<ul style="list-style-type: none"> <li>- Households living in high-risk disaster areas with recurrent climatic shocks</li> <li>- Households of which no single member is a migrant living away from the family</li> </ul>

<i>Exclusion Criteria</i>	<i>Exclusion Criteria</i>
- Households who have not primarily migrated due to environmental stresses/ shocks	- Households whose lives and livelihoods are not significantly affected by disasters/ climatic events

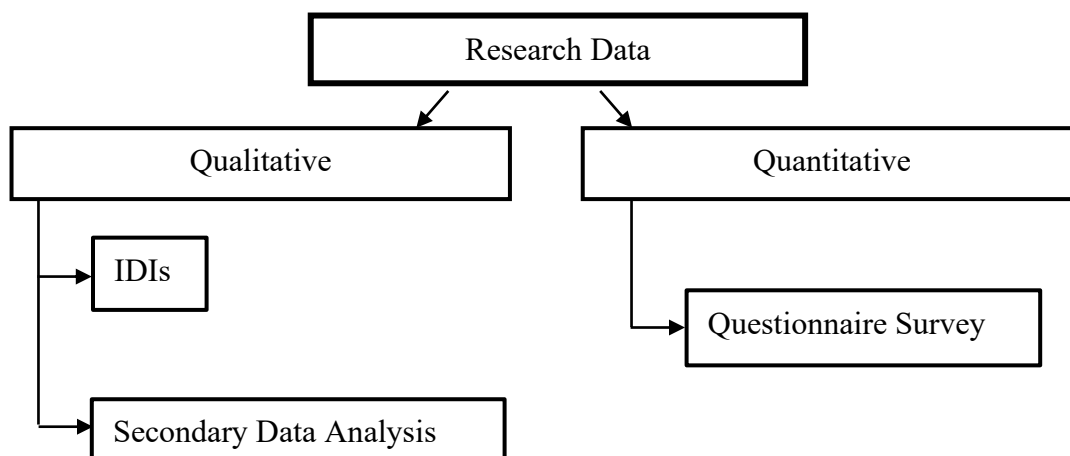
### 3.6 Methods of Data Collection

This research uses a mixed-method approach but primarily relies on quantitative means to extract relevant and informative data from the field. Household-level quantitative data helped to quantify and compare the different variables among the two research groups, while a number of in-depth interviews and case studies were conducted to explore the experiences of the study's participants in detail. The mixed method approach was chosen as it would help the researcher to illustrate the different perspectives that exist among the two study groups. The mixed research method followed was also beneficial to the researcher as it helped to build a stronger understanding through close communication and rapport building between the study participants and the researcher, which provided a higher sense of comprehension.

Under the domains of qualitative and quantitative analysis, different tools for data collection were used which is demonstrated in the following figure:

**Figure 3.3**

*Data Collection Tools*



- **Quantitative Data**

The research team conducted a total of 682 household surveys. The data collection period spanned from May 2023 to June 2023. The surveys were carried out through face-to-face interviews by enumerators who underwent professional training. Local field enumerators were also engaged to enhance insights in both study areas. Either the head of the household or their spouse was interviewed at each household. Following the data-cleaning process, 42 responses were excluded. Ultimately, 640 valid interviews were retained, consisting of 320 responses from migrant households and 320 from non-migrant households. The primary objective of the surveys was to gather information on various indicators of household livelihood resilience, as detailed in Table 3.1. These indicators were selected based on existing research, and prior to the survey, each indicator was adapted into one or more questions to effectively collect the necessary responses.

**Table 3.5**

*Number of migrant respondents under different data collection tools*

Tools	Number of Respondents			
	Study Areas			
	Bhasantek Slum	Korail Slum	Bhola Sadar Upazila	Char Fasson Upazila
IDI	8	7	8	7
Survey	206	114	176	144

- **Qualitative data**

Along with conducting the survey, the research team also conducted in-depth interviews with suitable respondents who were willing to share their insights, viewpoints, and experiences on different issues. 30 IDIs were conducted, among them, 15 were migrants and 15 non-migrants. The respondents were chosen based on specific criteria, such as their representation of minority groups, including single mothers, individuals who had encountered distinct challenges leading to migration, or those who had implemented effective adaptation strategies instead of migrating (for the non-migrant group).

Due to their ability to dive deeply into people's experiences and emotions, in-depth interviews were ideal for examining the complexities of environmental migration. The qualitative information



produced by these interviews was crucial for comprehending the subtleties and nuances of different issues. For instance, the survey data identified certain patterns and relationships, but in-depth interviews helped to contextualize and provide meaning to the data by examining the underlying causes or circumstances that contributed to the trends.

### 3.7 Data Analysis Strategy

#### 3.7.1 Calculating Livelihood Resilience (LR)

To obtain a household-level index of the contributing factors, we used the formula of Hahn et al. (2009) to normalize components:

$$CF_h = \frac{\sum_{i=1}^n W_{mi} M_{hi}}{\sum_{i=1}^n W_{mi}}$$

$CF_h$  indicates the contributing factor,  $n$  is the number of components for that factor,  $W_{mi}$  is the weight of each component  $m_i$ , determined by the number of components forming one CF, and  $M$  specifies the components for household  $h$ , indexed by  $i$ .

Because each of the sub-components is measured on a different scale, it was first necessary to standardize each as an index. The equation used for this conversion was adapted from that used in the Human Development Index (UNDP, 2019):

$$IndexS_h = \frac{S_h - S_{min}}{S_{max} - S_{min}}$$

where  $S_h$  is the original sub-component, and  $S_{min}$  and  $S_{max}$  are the minimum and maximum values, respectively, for each sub-component determined using data from both study areas. The standardized value ranges between 0 and 1, reflecting low or high vulnerability and resilience.

After each sub-component was standardized, the sub-components were averaged to calculate the value of each major component:

$$M_h = \frac{\sum_{i=1}^n indexs_h}{n}$$

Livelihood resilience is finally calculated using the contributing factors with the following equation:

$$LV_h = BC \left( \frac{\sum_{i=1}^5 Wmi Mhi}{\sum_{i=1}^5 Wmi} \right) + SO \left( \frac{\sum_{i=1}^4 Wmi Mhi}{\sum_{i=1}^4 Wmi} \right) + CL \left( \frac{\sum_{i=1}^4 Wmi Mhi}{\sum_{i=1}^4 Wmi} \right)$$

### 3.7.2 Statistical Analyses

- **Univariate analysis**

Descriptive statistics was used in the form of frequencies, percentages, means, medians, and standard deviations to describe and summarize the socio-demographic characteristics of the respondent households as well as the indicators of livelihood resilience.

- **Associations and correlations**

Chi-square tests were performed to identify and determine the nature of relationships between variables. Associations were tested between qualitative variables, such as, household's migration status and socio-demographic characteristics. The strength and direction of correlations were also identified between quantitative variables, such as, the different dimensions of livelihood resilience.

- **Comparison of means**

To determine if there are statistically significant differences among the components of livelihood resilience between the two groups under this study, (i.e., migrants and non-migrants), independent sample T-tests were performed.

- **Regression analysis**

Multiple linear regression analysis was performed to build predictive models that consider the simultaneous influence of multiple predictors such as migration status, family type, household size, income, etc. on livelihood resilience.

### 3.8 Ethical Issues and Considerations

In this research, utmost importance has been placed on upholding participants' rights to privacy, security, and dignity. Ethical considerations and sensitive matters were addressed impartially, avoiding any influence from the researcher team's personal opinions or perspectives. Throughout the data collection process, a clear explanation was provided to the study's respondents, clarifying that the information they shared would be treated with the utmost confidentiality. Moreover, voluntary participation was a fundamental principle. Respondents were given the autonomy to

decide whether they wanted to answer the questions or decline at any point without facing any negative consequences. This ensured that participants engaged in the study willingly and without any form of pressure.

Several critical issues were taken into account during the study, including:

- **Informed Consent:** Participants were fully informed about the study's objectives, procedures, and potential implications. They were provided with all the relevant information to make an informed decision about their involvement.
- **Voluntary Participation:** Participants were under no obligation to take part in the study. Their decision to participate or not was entirely their choice, and they were free to withdraw from the study at any stage.
- **Confidentiality:** The information shared by participants was treated with confidence. Measures were in place to ensure that their data would not be disclosed to anyone beyond the research team.
- **No repercussions for non-participation:** Participants who chose not to participate faced no negative consequences whatsoever. The research team respected their decision to not take part in the interview.

The study sought to uphold these values and considerations in order to protect the ethical treatment of participants, cultivate a research environment that is perceived as trustworthy, and guarantee the validity and reliability of the data acquired.



## CHAPTER 4:

# RESULTS AND FINDINGS

## Chapter Four: Results and Findings

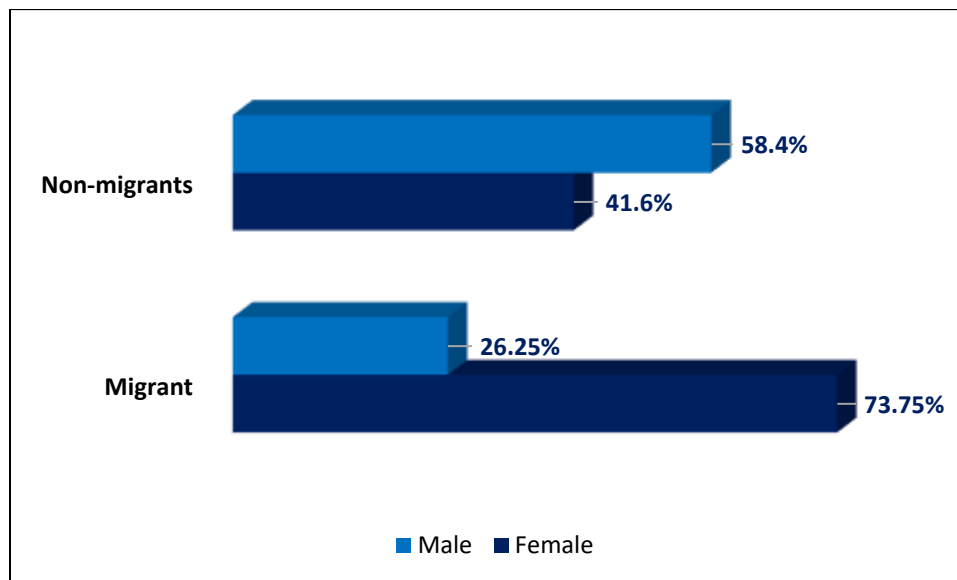
### 4.1 Socio-demographic characteristics of the respondents

#### 4.1.1 Gender of the respondent

As mentioned earlier, only the household head or their spouse were accepted as respondents in this study. By the household head, we refer to the main earning member of the household. Among the 320 respondents, the majority of 73.75 percent were females and around 26.25 percent were males. The discrepancy in the ratio between male and female respondents was because when the interviews were conducted, most male earning members were away from their houses. However, since the unit of analysis of this study was households instead of individuals, this was not considered an issue. Among the 320 respondents from the non-migrant group, around 58 percent were males and 42 percent were females. In the rural areas, females were less interested in participating in the research and showed the tendency to direct the enumerators to talk to their spouses.

**Figure 4.1**

*Gender of the respondents*

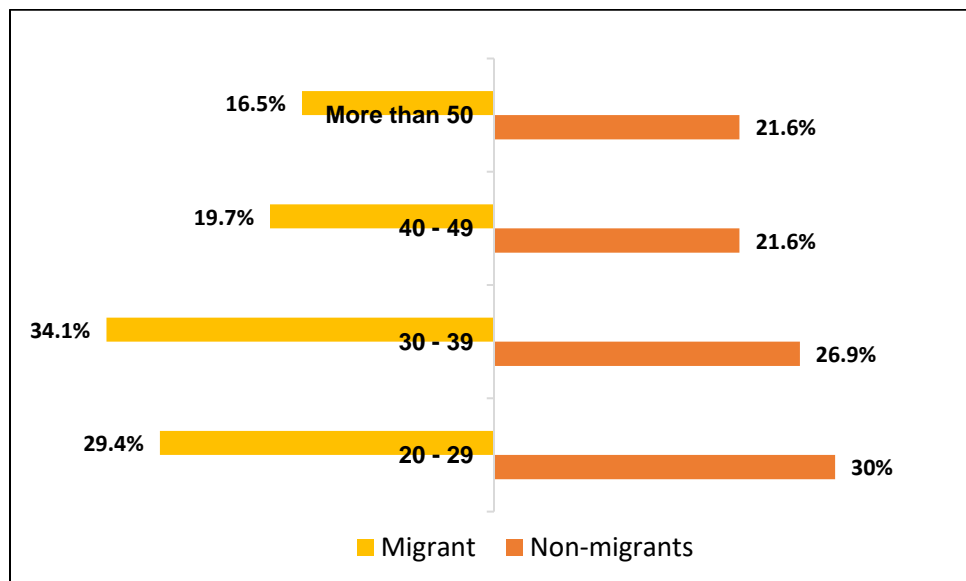


### 4.1.2 Age range

Respondents of this study were all above the age of 18. From the chart, it is seen migrants have a larger proportion of respondents in their thirties (34.1 percent vs. 26.9 percent) and slightly fewer respondents aged over 50 (16.9 percent vs. 21.6 percent) compared to non-migrants. Both migrant and non-migrant populations have a relatively similar distribution of respondents in their twenties and forties. The age distribution among migrants may reflect their reasons for migration, such as seeking employment or educational opportunities, which are more common among young adults. The higher proportion of respondents in their thirties among migrants could also be related to the age at which people are more likely to migrate for work or study. The slightly higher percentage of individuals aged over 50 among non-migrants could indicate that older individuals are less likely to migrate, perhaps due to family ties, established careers, or the desire to stay in their home region.

**Figure 4.2**

*Age ranges of the respondents*



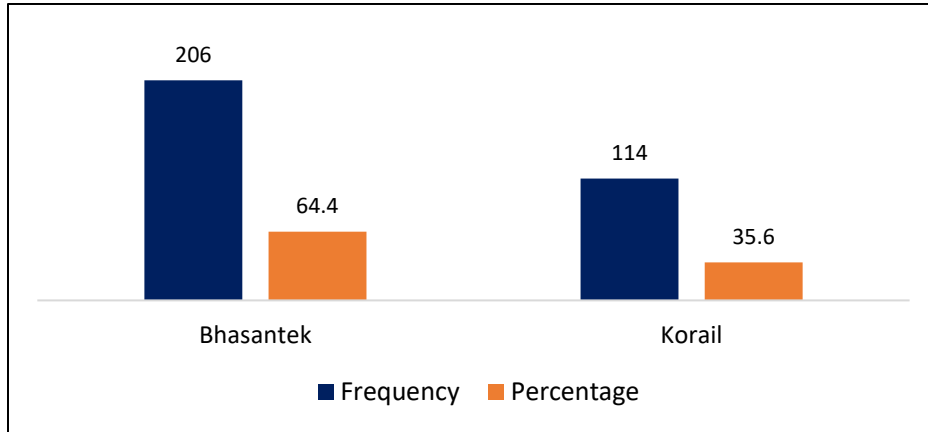
### 4.1.3 Residence

As mentioned previously, the respondents of the migrant group were selected from two slums of Dhaka. The first slum we visited was the Bhasantek slum in Mirpur. After around 160 interviews were conducted, the study area was changed to Korail slum in Mohakhali. However, in Korail, many of the slum dwellers did not meet the inclusion and exclusion criteria set by

this study to be included in the environmental migrant group. As such, the research team again conducted interviews in Bhasantek to meet the target sample. Finally, 206 respondents were selected from Bhasantek and 114 from Korail.

**Figure 4.3**

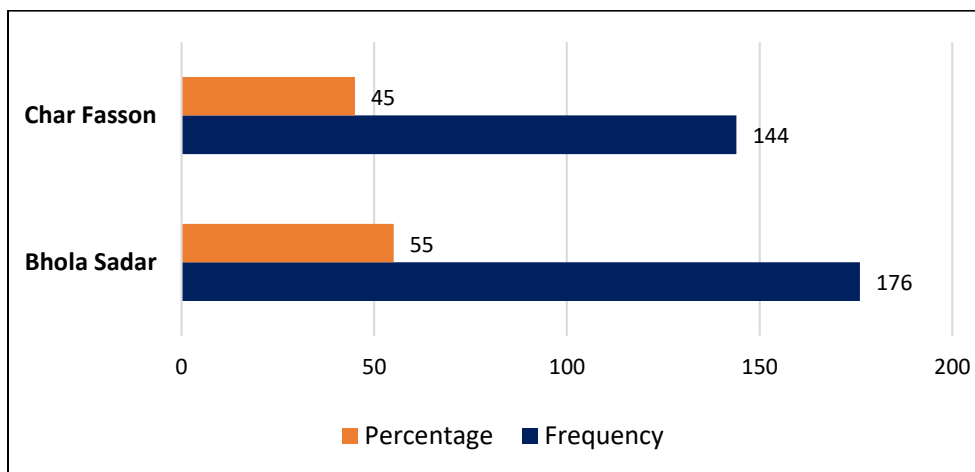
*Residence of the migrant respondents*

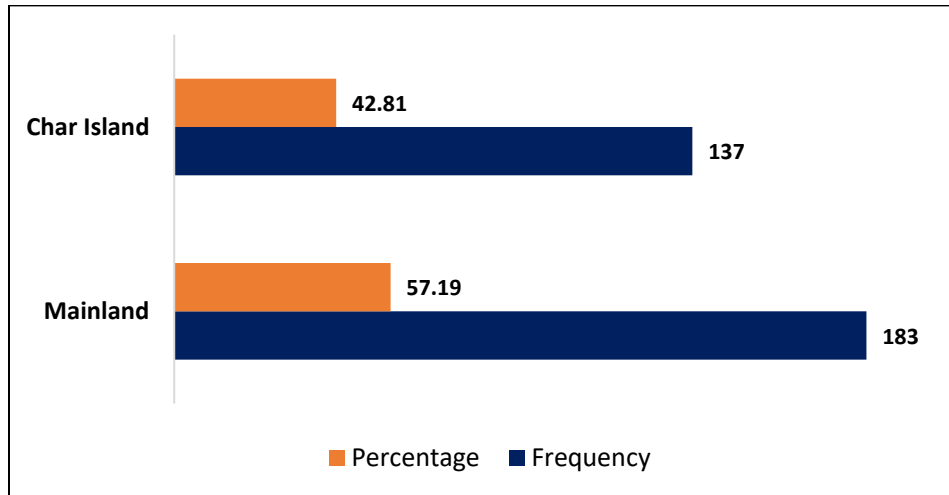


In Bhola, the respondents of the non-migrant group were selected from two different Upazilas, namely, Bhola Sadar and Charfasson. Again, in each upazila, data was collected from one mainland area and one char island. More respondents who met the criteria set for the non-migrant group were found in Bhola Sadar and comprised around 55 percent of the total respondents. The remaining 45 percent were from Char Fasson. Contrastingly, around 57 percent of these respondents lived in areas connected to the mainland and 43 percent lived in remote char islands.

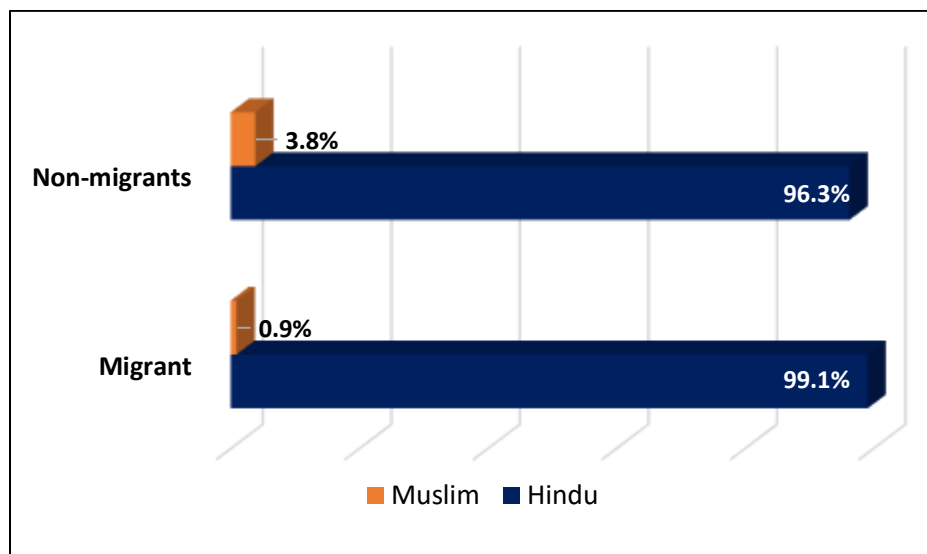
**Figure 4.4**

*Residence of the non-migrant respondents by sub-districts*



**Figure 4.5***Residence of the non-migrant respondents by region***4.1.4 Religious orientation**

The religious orientation of the migrant households in this study was extremely homogenous, as almost 99 percent of the respondents were Muslims. Although the research team tried to include representation from different religious groups, it proved to be very difficult as the number of non-Muslim residents in the study was very low, and non-Muslim households who met the criteria set for the migrant group were almost non-existent.

**Figure 4.6***Religious identity of the respondents*



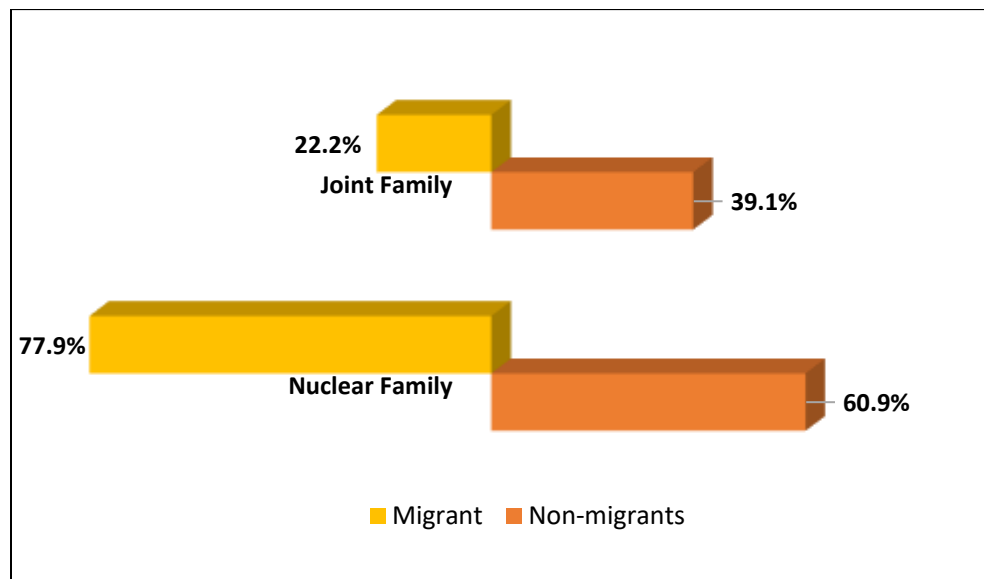
The religious orientation of the non-migrant households was less homogenous compared to the migrant group, However, more than 96 percent of the respondents were Muslims and only around 4 percent were Hindus. Respondents with religious identities were not found.

#### 4.1.5 Type of families

The majority of migrant families (77.9%) are nuclear families and a smaller proportion of migrant families (22.2%) are joint families. Among non-migrants, nuclear families are still the majority, accounting for 60.9% of the total. However, a comparatively high number of joint families were found among the non-migrants, nearing about 38 percent. This suggests migrant families are more likely to adopt the nuclear family structure compared to non-migrant families. This could be due to various factors such as urbanization, employment opportunities, and changing societal norms, which may influence migrants to live in smaller family units. Non-migrant families, on the other hand, exhibit a higher tendency to maintain the joint family structure, which may be influenced by cultural traditions, a desire for mutual support, and a more stable geographical location.

**Figure 4.7**

*Type of households of the respondents*



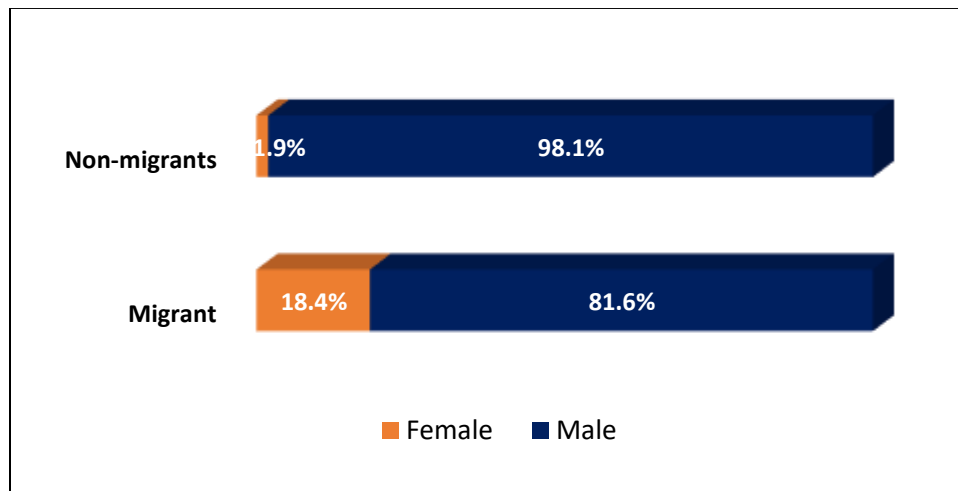
#### 4.1.6 Gender of the Household Head

The study found a good number of households among the migrant group were headed by females. Although more than 81.6 percent of the households were male-headed, around 18.4

percent of these were headed by female members. In many of these cases, the females were divorced or abandoned. It was rarely the case that the households were headed by females when their spouses were present or able to earn a living. Among non-migrants, only 1.9 percent of households have female heads while the majority of households (98.1 percent) have male heads. Female-headed households among migrants might reflect the economic empowerment of women who take on leadership roles in their households after migration. In contrast, among non-migrants, the prevalence of male-headed households could be linked to cultural norms and historical roles of men as breadwinners and heads of households

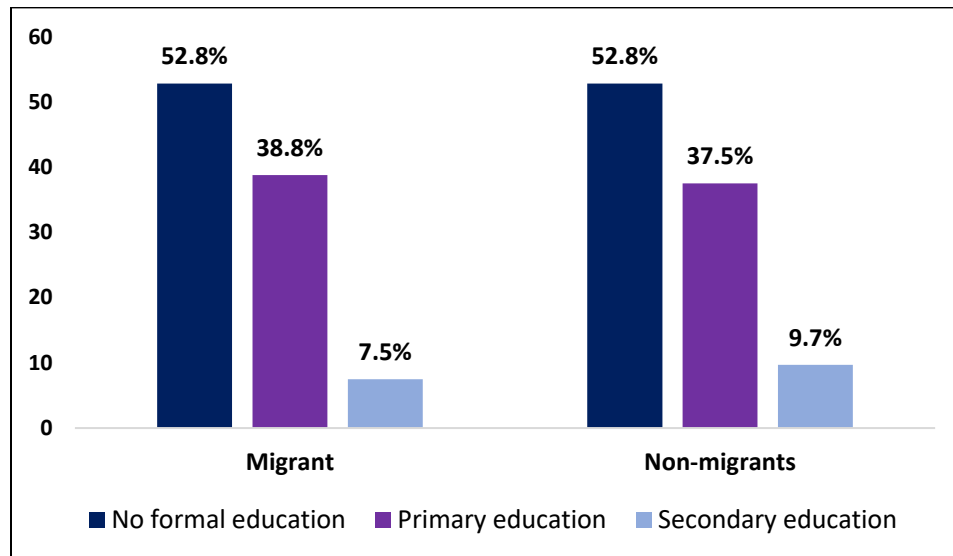
**Figure 4.8**

*Gender of the household head of respondents*



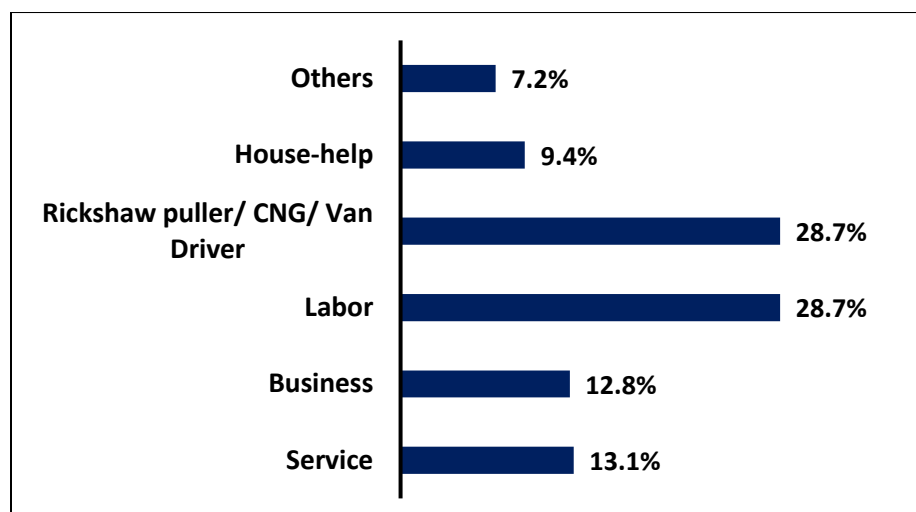
#### 4.1.7 Educational status of the head of household

The data shows that the distribution of educational attainment levels is quite similar between migrants and non-migrants. Both groups have approximately the same percentage of household heads with no formal education (52.8%), suggesting that a significant portion of both populations lacks basic formal schooling. The proportion of individuals with primary education is also similar, with slightly more migrants having reached this level (38.8% vs. 37.5% for non-migrants). There is a slight difference in the percentage of individuals with secondary education, with a lower percentage among migrants (7.5%) compared to non-migrants (9.7%). The data suggests that educational attainment levels are roughly comparable between migrants and non-migrants, with both groups having a substantial proportion of individuals with no formal education or only primary education.

**Figure 4.8***Educational status of the household head*

#### 4.1.8 Occupation of the head of household

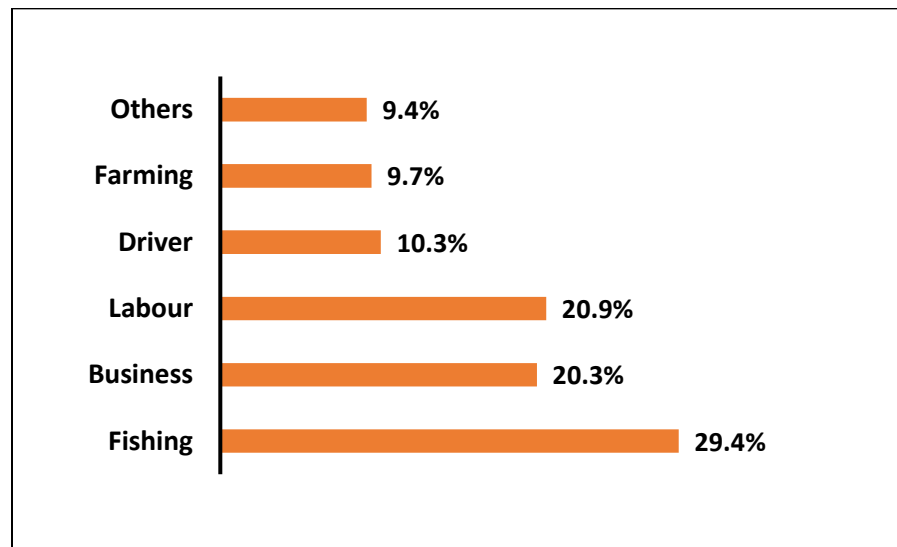
The most common occupation among the heads of the households was wage labor or working as a rickshaw puller, CNG, or van driver. Business, mostly in the form of running a shop, was also a popular occupation. Among the female heads, household, and labor were the most common professions. The study found both male and female heads employed in the garments sector. Some were also involved in service jobs, mostly as security guards, cleaners, and shopkeepers.

**Figure 4.9***Occupation of the household head of the migrant group*

The most common occupation among the heads of the households of the non-migrant group was fishing, labor, and business. The household heads were also found to work as drivers, driving motorcycles, CNGs, and vans. Although most households reared livestock, it was the main occupation of only 4 households. Agriculture and farming was found to be the profession of 10 percent of the household heads.

**Figure 4.10**

*Occupation of the household head of the non-migrant group*



Migrant households tend to have household heads engaged in a mix of service, business, labor, and driving-related occupations. This diversity in occupations could reflect the diverse backgrounds and opportunities that migrants encounter in their destination areas. Non-migrant households, on the other hand, exhibit a different mix of occupations, including fishing, farming, and business. These occupations might be more closely tied to the local economy and resources available in their home regions. The presence or absence of certain occupations in each group likely reflects the economic activities and opportunities available in their respective areas, which can be influenced by factors such as geography, industry, and local traditions.

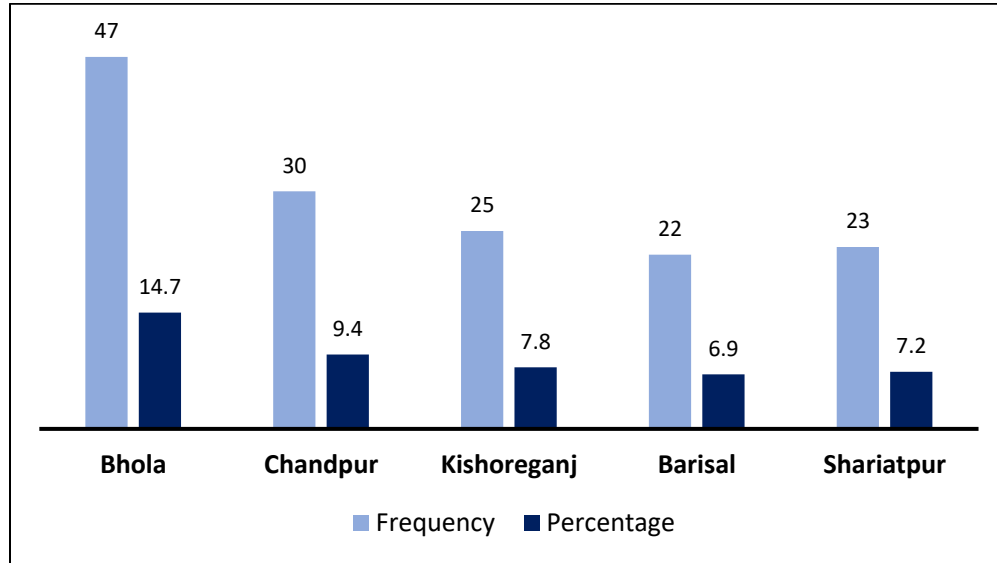
#### **4.1.9 Districts generating environmental migrants**

By running a frequency analysis on the original districts of the migrants, it was revealed that the highest percentage of the migrants, 47 of the 320, come from Bhola district. As such, it was selected as the study site for the non-migrant group. Other districts that were found to be generating a high number of environmental migrants were Chandpur, Kishoreganj, Bhola, and

Shariatpur. Notably, the Meghna River runs through each of these districts and has been highlighted by the migrants as a significant and detrimental environmental factor.

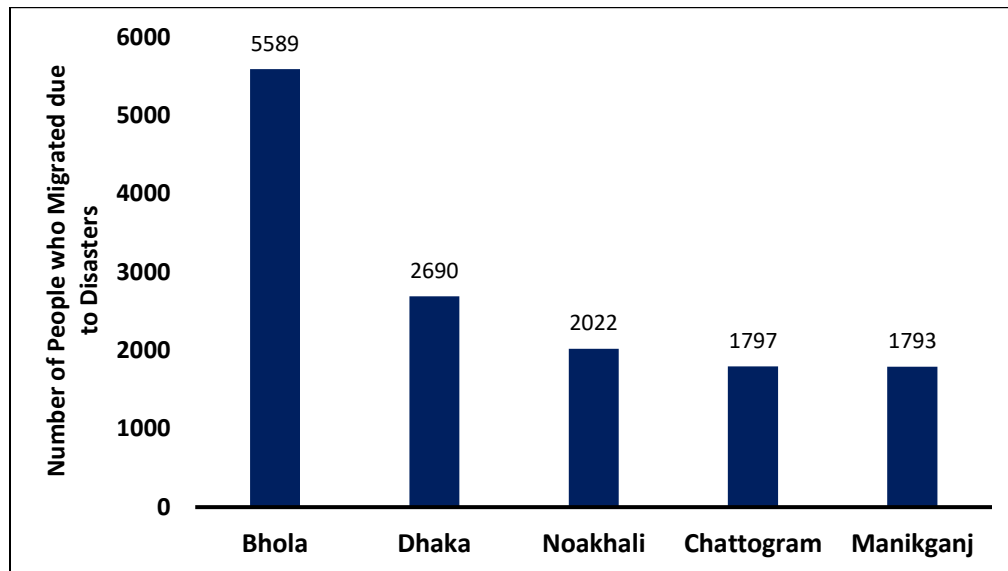
**Figure 4.11 (a)**

*Top environmental migrants generating districts according to this study*



**Figure 4.11 (b)**

*Top environmental migrants generating districts according to the Bangladesh Bureau of Statistics (BBS)*



*Note.* Adapted from “Distribution of Population for Cause of Migration by Division and District 2015-2020” by the Bangladesh Bureau of Statistics, 2021, *Bangladesh Disaster-related Statistics 2021*, p.156

([https://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/b343a8b4\\_956b\\_45ca\\_872f\\_4cf9b2f1a6e0/2022-06-19-13-40-ddf8d0fd849e94d733a06d2d38dcd90b.pdf](https://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/b343a8b4_956b_45ca_872f_4cf9b2f1a6e0/2022-06-19-13-40-ddf8d0fd849e94d733a06d2d38dcd90b.pdf)).

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It is noteworthy that the finding from this study suggesting Bhola is the leading district in generating environmental migrants aligns with data from a report by the Bangladesh Bureau of Statistics (2021), which was published after the completion of our survey. In particular, Bhola is identified as the district that contributed the highest number of individuals migrating due to disasters. Figure 4.11 illustrates the top five districts from which people migrated due to disasters between 2015 and 2020 according to the BBS.

#### 4.1.10 Summary of socio-demographic characteristics of the migrant group

The socio-demographic characteristics of the environmental migrants are summarized in the following table-

**Table 4.1**

*Socio-demographic characteristics of Migrant households (N= 320)*

Variables	Categories	Frequency	Percent
Gender identity of the respondent	Female	236	73.75
	Male	84	26.25
Age of the respondent	20 - 29	94	29.4
	30 - 39	109	34.1
	40 - 49	63	19.7
	More than 50	54	16.9
Residence	Bhasantek	206	64.4
	Korail	114	35.6
Religious orientation	Hindu	3	0.9
	Muslim	317	99.1
Type of family	Nuclear Family	249	77.9
	Joint Family	71	22.2

<b>Variables</b>	<b>Categories</b>	<b>Frequency</b>	<b>Percent</b>	<b>Mean</b>	<b>Std. Deviation</b>
Head of household	Female	59	18.4		
	Male	261	81.6		
Occupation of the head of household	Service	42	13.1		
	Business	41	12.8		
	Labor	92	28.7		
	Rickshaw puller/ CNG/ Van Driver	92	28.7		
	House-help	30	9.4		
	Others	23	7.2		
Education status of household head	No formal education	169	52.8		
	Primary education	121	38.8	0.14	0.17
	Secondary education	30	7.5		
Average household size	1-3 members	70	21.9		
	4-6 members	220	68.7	4.54	1.4
	More than 7 members	30	9.4		
Average household income	Less than BDT 10,000	62	19.38		
	BDT 10,000 - 14, 999	169	52.9	12064	4061.4
	More than BDT 15, 000	89	27.9		
Average household expenditure	Less than BDT 10,000	62	19.38		
	BDT 10,000 - 14, 999	169	52.9	11198.4	3788.1
	More than BDT 15, 000	89	27.9		

#### 4.1.11 Summary of socio-demographic characteristics of non-migrant group

The socio-demographic characteristics of the environmental migrants are summarized in the following table-

**Table 4.2**

*Socio-demographic characteristics of non-migrant households (N= 320)*

Variables	Categories	Frequency	Percent
Gender	Female	133	41.6
	Male	187	58.4
identity of the respondent	20 - 29	96	30
	30 - 39	86	26.9
	40 - 49	69	21.6
	More than 50	69	21.6
Residence	Bhola Sadar	176	55
	Char Fasson	144	45
Residence	Mainland	183	57.19
	Char Island	137	42.81
Religious orientation	Muslim	308	96.3
	Hindu	12	3.8
Type of family	Nuclear Family	195	60.9
	Joint Family	125	39.1
Head of household	Female	6	1.9
	Male	314	98.1
Occupation of the head of household	Fishing	94	29.4
	Business	65	20.3
	Labor	67	20.9
	Driver	33	10.3
	Farming	31	9.7
	Others	30	9.4



<b>Variables</b>	<b>Categories</b>	<b>Frequency</b>	<b>Percent</b>	<b>Mean</b>	<b>Std. Deviation</b>
Education status of household head	No formal education	154	48.1	0.18	0.17
	Primary education	123	38.4		
	Secondary education	43	13.4		
Average household size	1-3 members	32	10	5.39	1.75
	4-6 members	209	65.3		
	More than 7 members	79	24.7		
Average household income	Less than BDT 10,000	48	15	15130.	7421.65
	BDT 10,000 - 14, 999	111	34.7		
	More than BDT 15, 000	161	50.3		
Average household expenditure	Less than BDT 10,000	57	17.8	14186.	6683.78
	BDT 10,000 - 14, 999	121	37.8		
	More than BDT 15, 000	142	44.4		

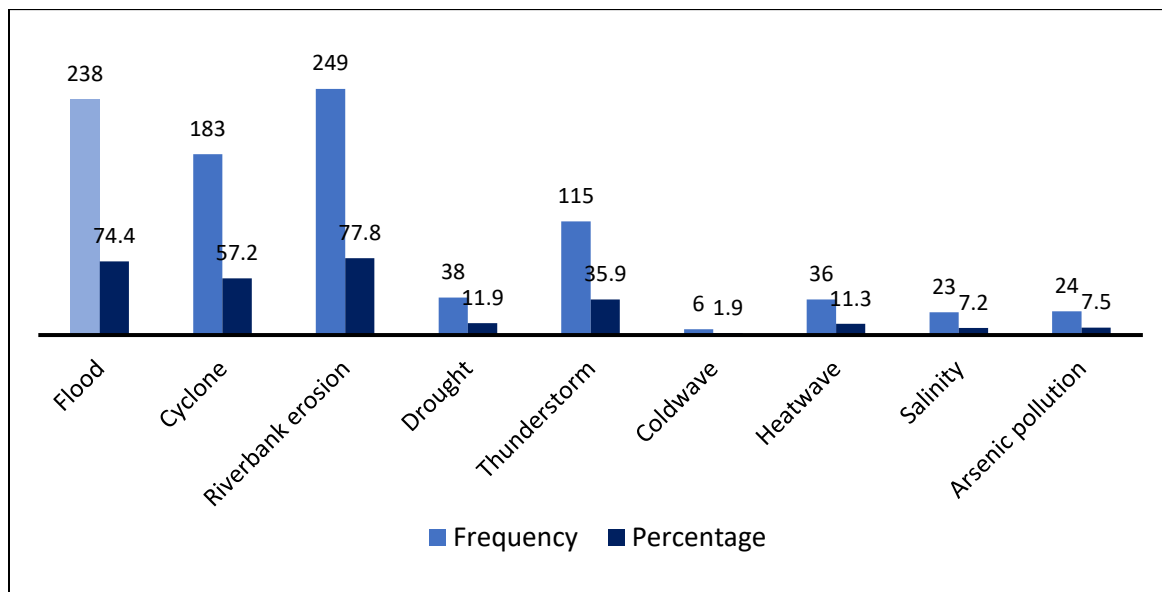
## 4.2 Disaster experience and drivers of migration among the migrants

### 4.2.1 Past disaster experience of the migrants

All of the environmental migrants interviewed in this study have faced disasters in some form or other. The most common disaster experienced by the migrants was riverbank erosion with an exposure rate of 77.8 percent, followed by floods at 74.4 percent, and cyclones at 57.2 percent. A good percentage of the migrants have also witnessed thunderstorms and lightning. Other disasters that have been experienced by migrant households sparingly include droughts, heatwaves, salinity intrusion, cold waves, and arsenic pollution. The disasters impacted the households negatively in a number of ways, including housing damage or loss, income setbacks by damage to crops, animals, and assets, contamination of water sources (both freshwater and saltwater intrusion), food insecurity, health problems, and so on.

**Figure 4.12**

*Disaster experience of the migrants*



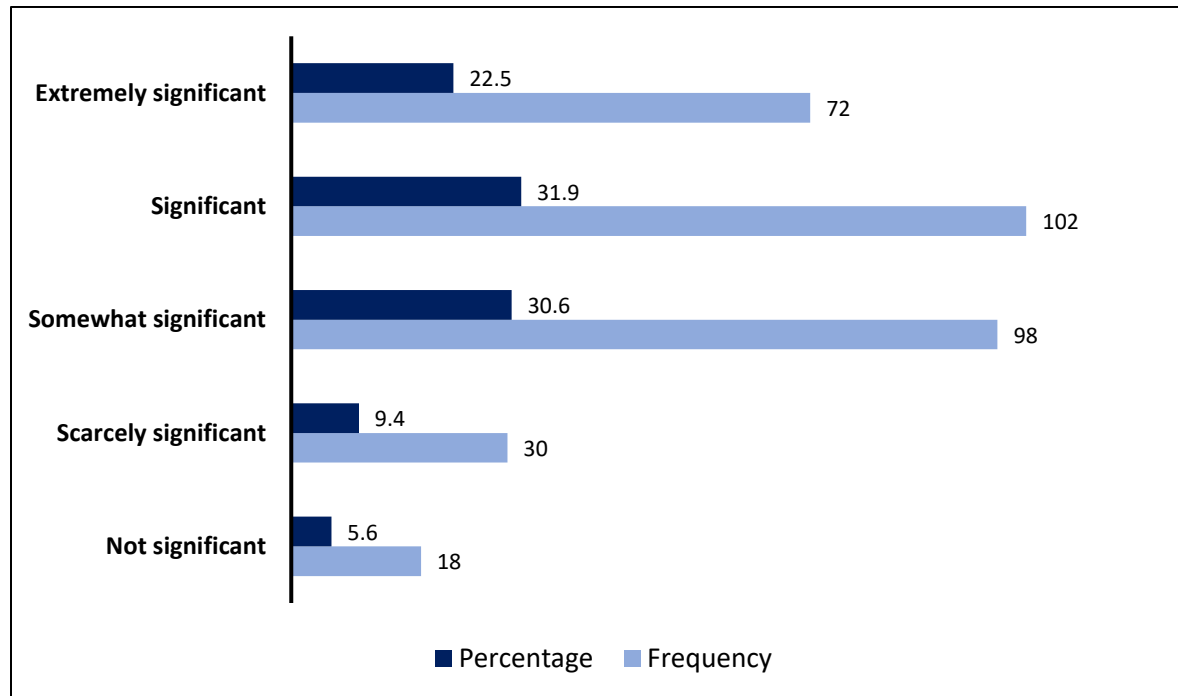
### 4.2.2 Significance of environmental factors in migration decision

The migrants were asked about how significantly environmental factors affected their decision to migrate to Dhaka. For 22.5 percent of the households, environmental events, especially natural disasters, played an extremely significant role in shaping their migration decision. These households had mostly lost their residence or important livelihood assets to environmental disturbances. For 31.9 percent of the migrants, environmental factors were

significant drivers and for another 30.6 percent, these factors were somewhat significant. The remaining households had mostly decided to migrate due to the compounding impacts of environmental events and not directly because of them.

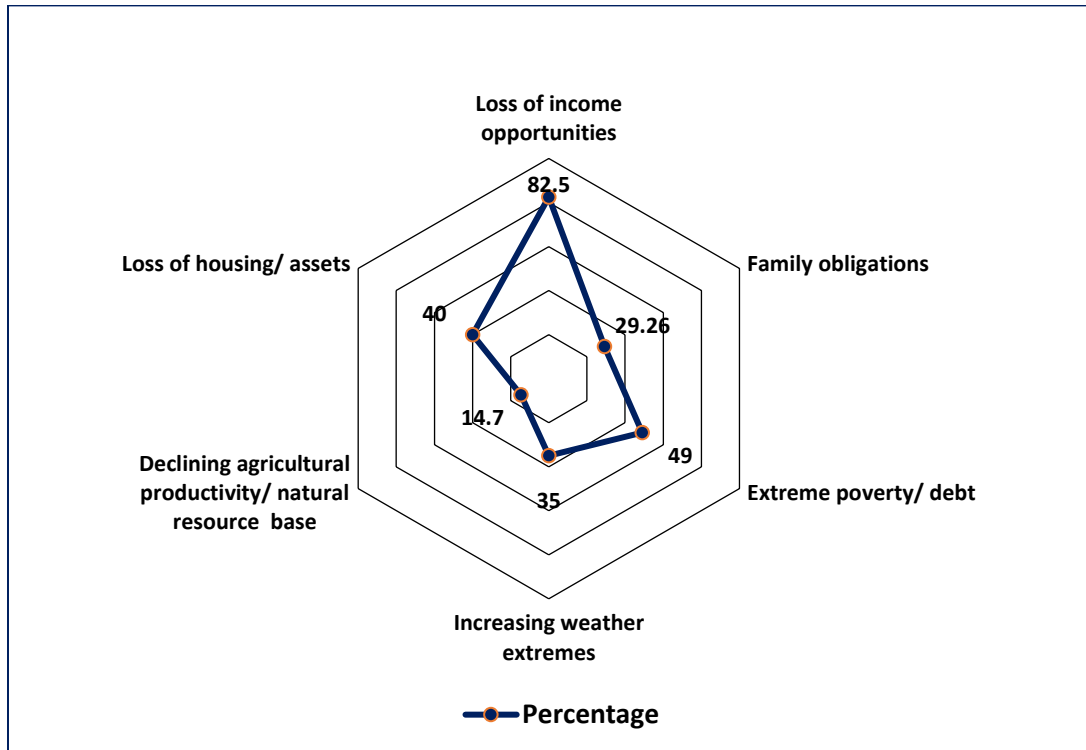
**Figure 4.13**

*Significance of environmental factors in migration decision*



#### 4.2.3 Push factors of migration

To comprehend the drivers of migration, various options were presented to the migrant group in addition to environmental factors. These encompassed loss of employment opportunities, educational pursuits, family responsibilities, health conditions, income setbacks, increasing extreme climatic occurrences, poverty, and more. Respondents were prompted to provide multiple responses for migration triggers. The data presented in the table shows the predominant driver for migration is the loss of income opportunities of the household head. The following prominent responses were poverty and debt, loss of housing and assets, increasing extreme weather events, and loss of housing and assets which were cited by 49 percent, 40 percent, and 35 percent of the migrants respectively. 29 percent of the migrants listed family obligations as a driver of migration and around 15 percent said the declining productivity from agricultural work influenced their decision to migrate.

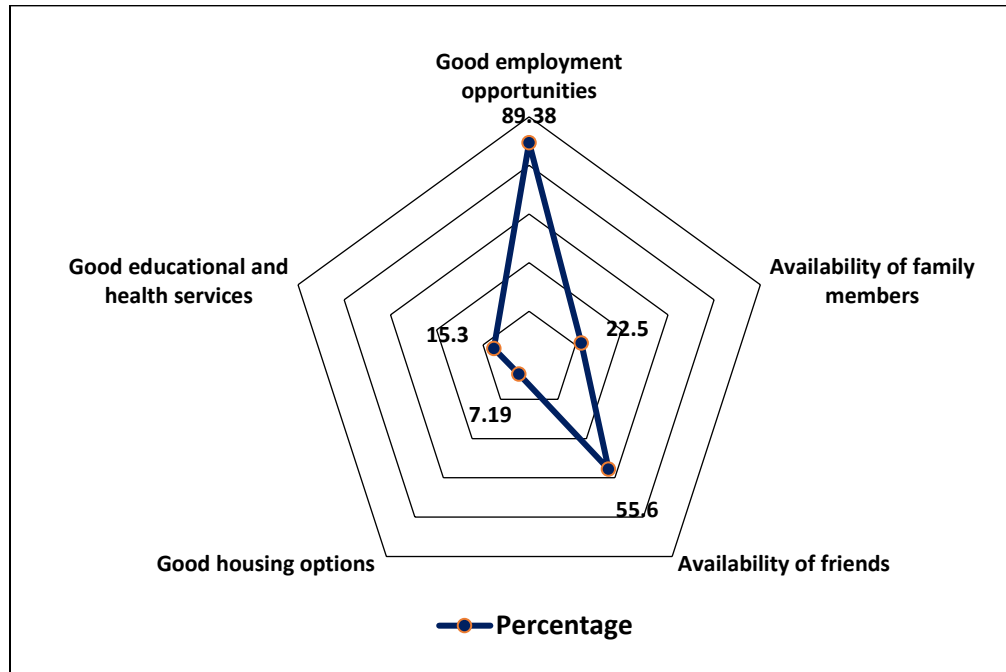
**Figure 4.14***Push factors of migration*

#### 4.2.4 Pull factors of migration

The migrants were also asked which factors influenced them to migrate to Dhaka specifically. Almost 90 percent of the migrants have specified employment opportunities as a significant factor influencing their choice of destination. An additional 55.6 percent indicated that the presence of friends and known people and 22.5 percent said the availability of family members are important factors, highlighting the significance of social networks in the decision-making process related to migration. Around 15 percent of the households chose Dhaka as their destination as they believed there would be good educational and health services available there. Lastly, around 7 percent of the migrants migrated to Dhaka as they believed there would be affordable and safe housing options available in the city.

**Figure 4.15**

*Pull factors of migration*

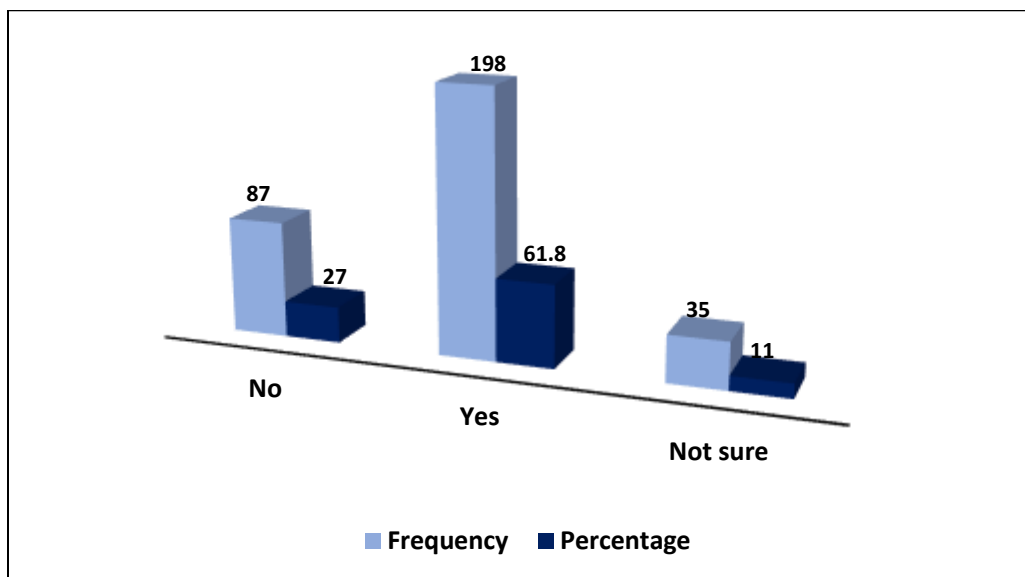


**4.2.5 Migration and socio-economic security**

The migrants were asked about whether or not they believed migration has helped them in increasing their socio-economic status and quality of life.

**Figure 4.16**

*Perception towards migration increasing socio-economic status*



A high proportion of almost 62 percent of the migrants responded in the affirmative and said that their migration has increased their access to income opportunities, housing, educational, and health services. For nearly 27 percent of the respondents, migration did not lead to enhanced socio-economic status. Lastly, 11 percent of the respondents are unsure about whether or not their quality of life had improved post-migration.

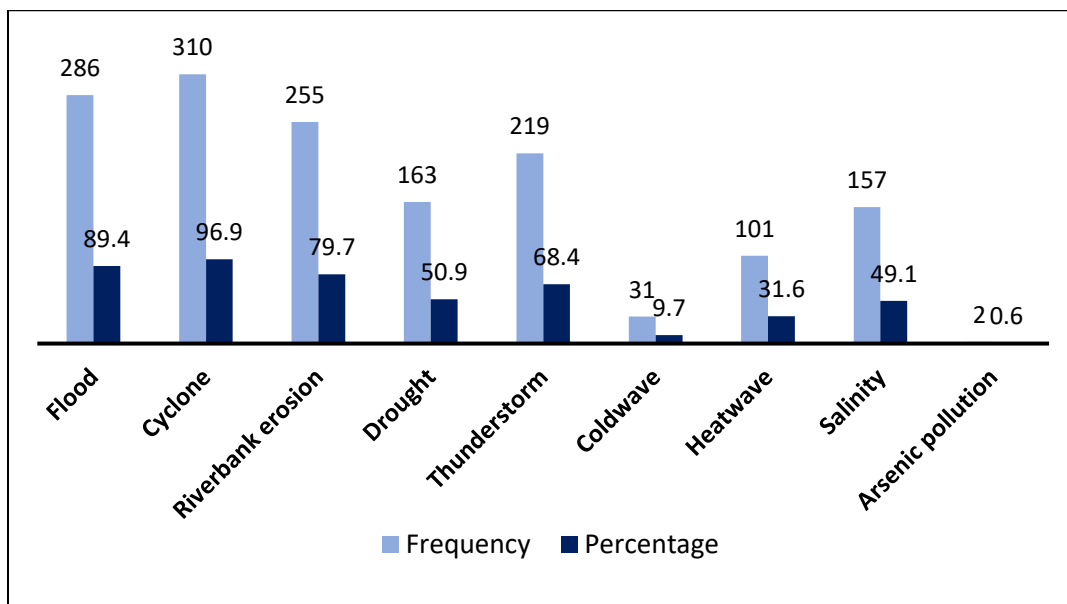
### 4.3 Disaster experience and migration perception among the non-migrants

#### 4.3.1 Past disaster experience

The non-migrants interviewed in this study have been selected under the criteria that they reside in areas that are highly vulnerable to disasters. As such, all the respondents have faced disasters in some form or other. The most common disasters experienced by the migrants were cyclones with an exposure rate of 96.9 percent, followed by floods at 89.4 percent, and riverbank erosion at 79.7 percent. Around 69 percent of the non-migrants witnessed thunderstorms and 51 percent have witnessed droughts. Another 49 percent have experienced salinity intrusion and 31.6 percent have experienced heat waves.

**Figure 4.17**

*Past disaster experiences of the non-migrants*



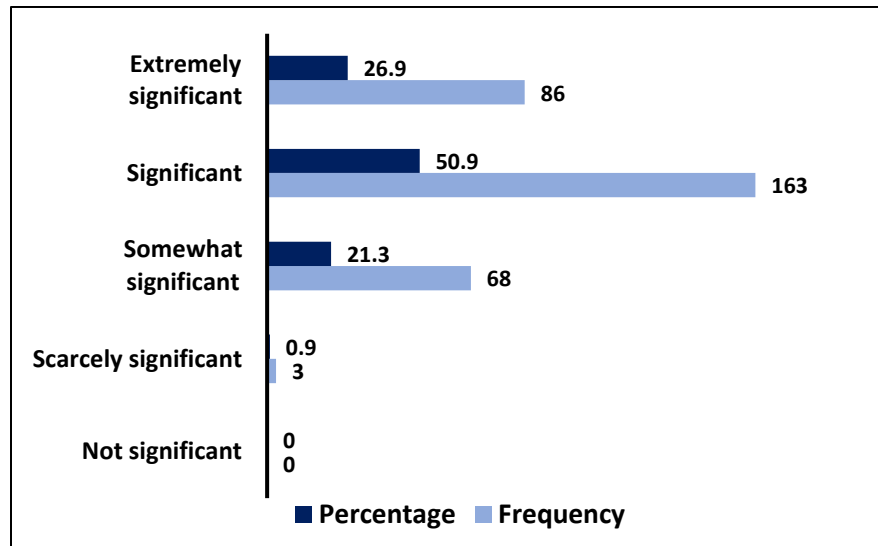
#### 4.3.2 Significance of environmental impacts on lives and livelihoods

The non-migrants were asked to rate how significantly environmental factors negatively affected their lives and livelihoods. For 26.9 percent of the households, environmental events,

especially natural disasters, had extremely significant negative impacts. 50.9 percent of the non-migrants cited environmental factors negatively affected their livelihoods and for another 21.3 percent, these impacts were somewhat significant.

**Figure 4.18**

*Significance of environmental impacts on lives and livelihoods*

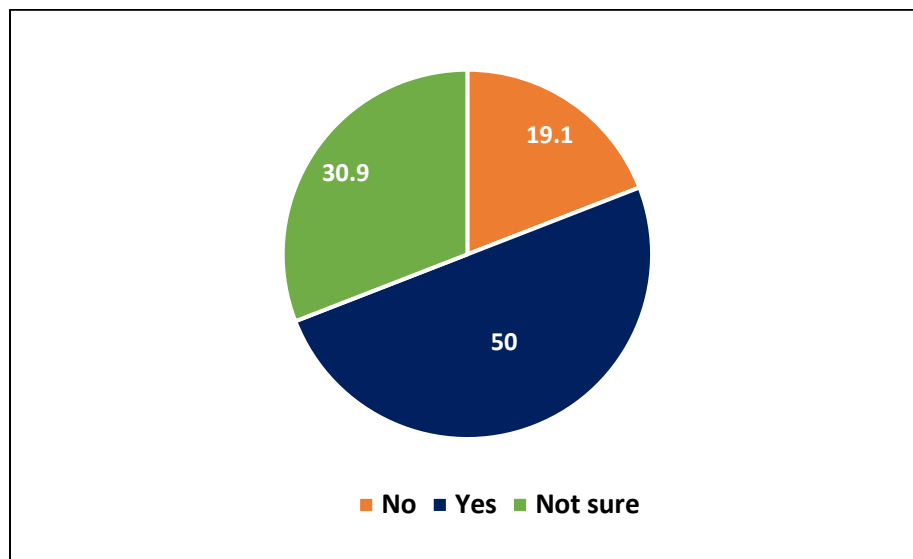


### 4.3.3 Migration and socio-economic security

The non-migrants were also asked whether or not they believed migrating out of their location would help them in increasing their socio-economic status and quality of life.

**Figure 4.19**

*Perception towards migration increasing their socio-economic security*



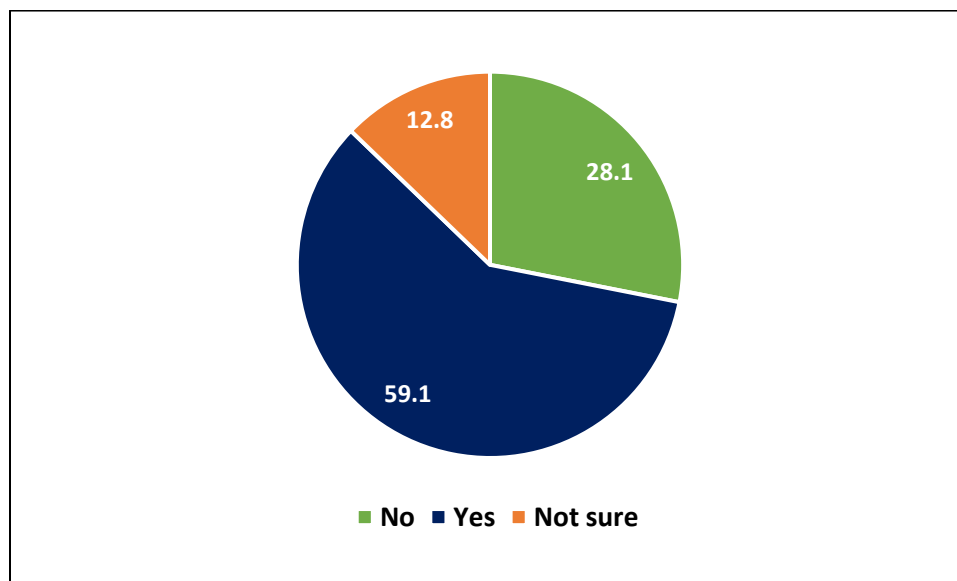
Half of the total number of respondents believed that migration would lead to increased socio-economic well-being. Nearly 31 percent of the respondents did not consider migration as an effective method of improving their socio-economic status. The remaining 19.1 percent of the respondents are unsure what changes to their socio-economic status would come if they underwent migration.

#### 4.3.4 Attitude towards migration

To explore the non-migrant household's stance on migration, they were asked if they planned to migrate in the future. The general attitude among the respondents concerning migration was more positive, as 59 percent of them responded they were willing to migrate. About 28 percent of the households did not see migration as a viable option, whereas, 12.8 percent were undecided on the matter.

**Figure 4.20**

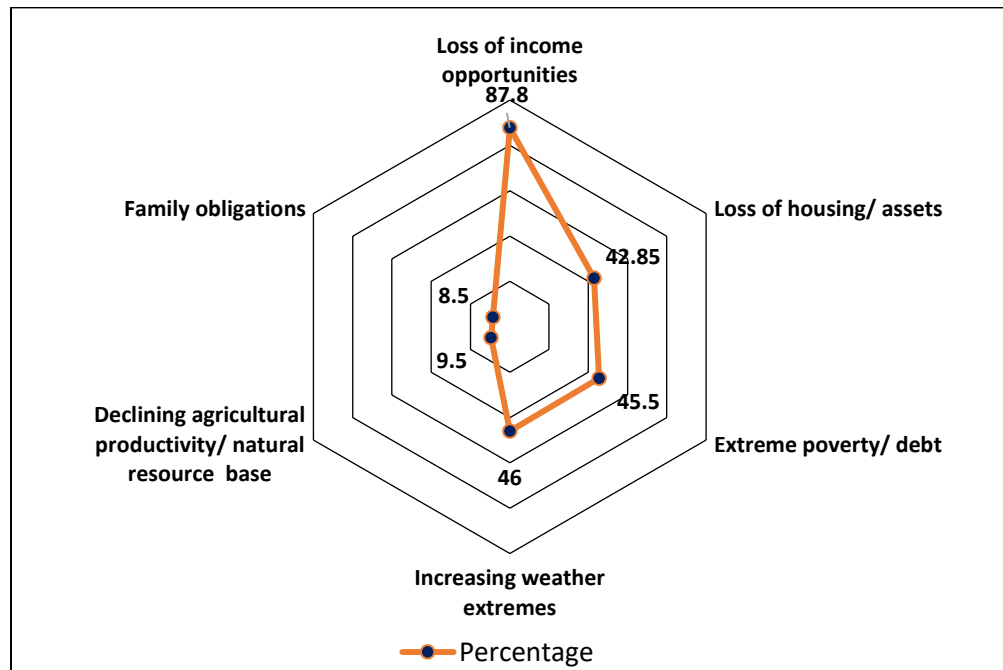
*Plan to migrate in the future*



#### 4.3.5 Push factors of migration

189 respondents responded in the affirmative to the previous question and were further asked about the main contributing factors behind their decision to migrate. The data presented in the table again shows that even among the non-migrant group, the most prominent driver influencing migration decisions is the loss of income opportunities.



**Figure 4.21***Push factors of migration for non-migrants*

Other significant responses were poverty and debt, loss of housing and assets, increasing extreme weather events, and loss of housing and assets which were cited by 45.5 percent, 42.85 percent, and 46 percent of the migrants respectively. 8.5 percent of the migrants listed family obligations as their driver of migration and around 9.5 percent said the declining productivity from agricultural work is influential behind their intention to migrate.

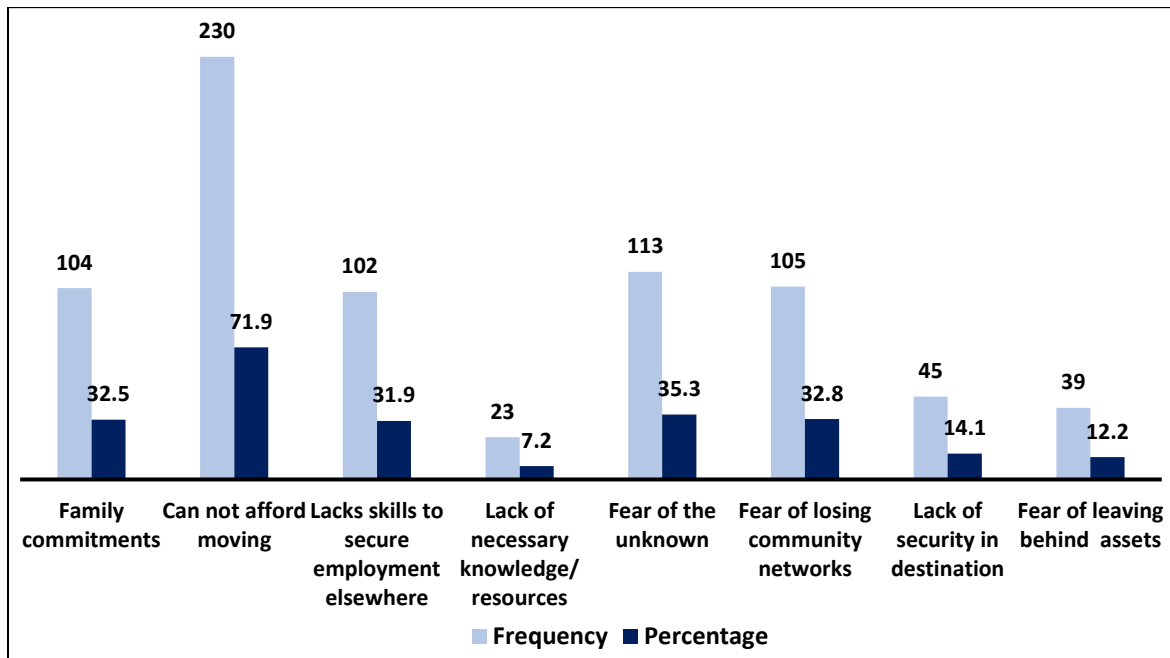
#### 4.3.6 Pull factors of migration

All of the respondents from the non-migrant group were asked which factors influenced them to not migrate till then. Respondents were presented with different options and asked to select multiple reasons for which they opted not to migrate. The table reveals that the most common reason for not migrating is that the households believe they will not be able to bear the costs of relocating their families. This perception is reflected by around 72 percent of the respondents. Around 35 percent of the respondents have not migrated as they fear the uncertainties accompanying migration, while another 32 percent said they did not have the skills to secure a livelihood anywhere other than their hometown. The latter belief was mostly supported by household heads who were involved in fishing. Almost equal proportions of respondents nearing 32 percent identified family commitments and the fear of losing

community bonds as their reason for not migrating, again highlighting the influence of social capital in migration-related decisions. Some other factors that acted as pull factors to the area of origin were the perceived lack of security in the destination area, the fear of leaving behind assets, as well as the lack of necessary knowledge and resources needed for migration.

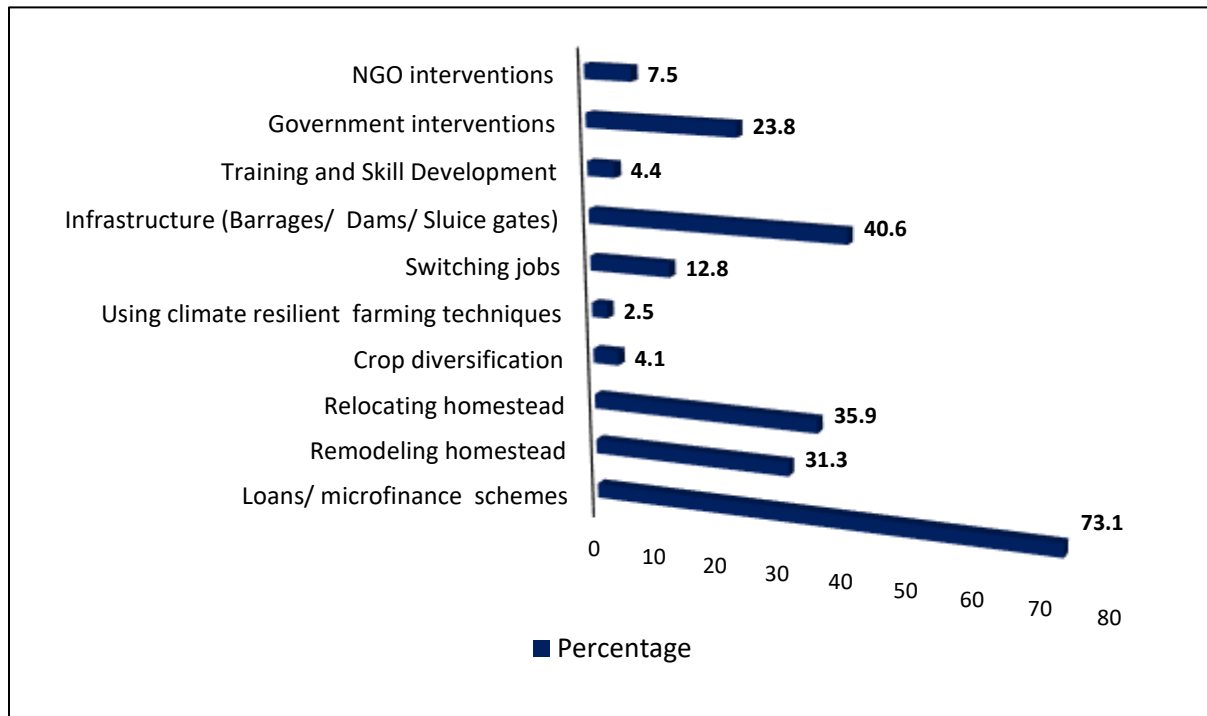
**Figure 4.22**

*Pull factors of non-migration*



#### 4.3.7 Adaptation measures in lieu of migration

The non-migrant households were asked which measures helped them in adapting to their environment and frequent climatic shocks. The most common adaptation was cited as loans by 73 percent of the respondents. Taking loans was a common practice among the respondents in order to survive against income variability or replace assets that had been damaged by environmental disturbances. Infrastructure in the forms of barrages and dams was identified as the second most effective adaptation measure by 40.6 percent of the households. Relocating homesteads as well as remodeling damaged houses were mentioned by 35.9 percent and 31.3 percent of the respondents as useful adaptation practices respectively.

**Figure 4.23***Adaptation measures in lieu of migration*

Government interventions, especially in the form of relief goods after disasters were recognized as useful by 23.8 percent of the respondents. Some other measures that were identified include changing professions from farming or fishing, assistance from NGOs, training and skill development, crop diversification, and using climate-resilient cropping techniques.

#### **4.4 Descriptive analysis of components of livelihood resilience**

##### **4.4.1 Buffer capacity**

Buffer capacity, in the context of this study, is defined as a household's ability to absorb disturbances or changes while maintaining its core characteristics, functions, and identity. This capacity is closely interrelated with the concept of livelihood capitals and their dynamic nature. Consequently, a practical interpretation of buffer capacity in this study involved quantification of the livelihood assets that households leverage to improve their livelihood outcomes. The effectiveness of buffer capacity is influenced by how livelihood strategies either deplete or enhance these capitals. The components of buffer capacity include the following

#### 4.4.1.1 Human Capital

Human capital is measured using three sub-components: household head's educational level, number of household members with significant physical or mental impairments, and labor capacity of households.

- **Educational status of household head**

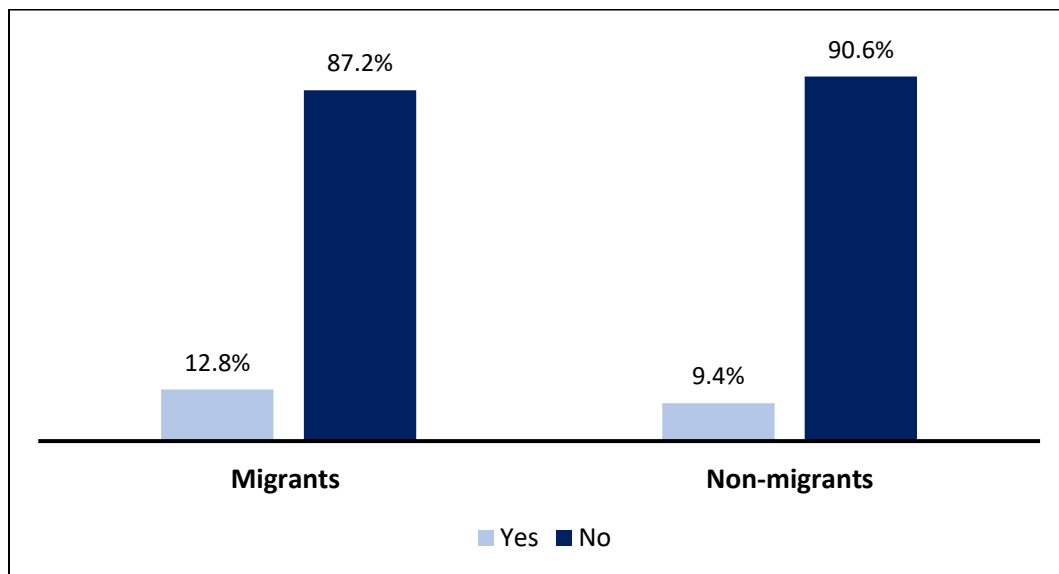
The status of household heads from the two groups indicates that the proportion of migrants was greater in no-formal and primary education, while more non-migrant heads had a secondary-level education. Overall, more than 50 percent of the household heads from both groups had no formal education. A more detailed discussion on this variable can be found in section 4.1.7, under the findings of the socio-demographic characteristics of the respondents.

- **Significant physical or mental impairments**

The migrant households reported the presence of a comparatively greater number of family members with physical or mental impairments than the non-migrant households.

**Figure 4.24**

*Household members with physical/ mental impairments*



#### 4.4.1.2 Financial capital

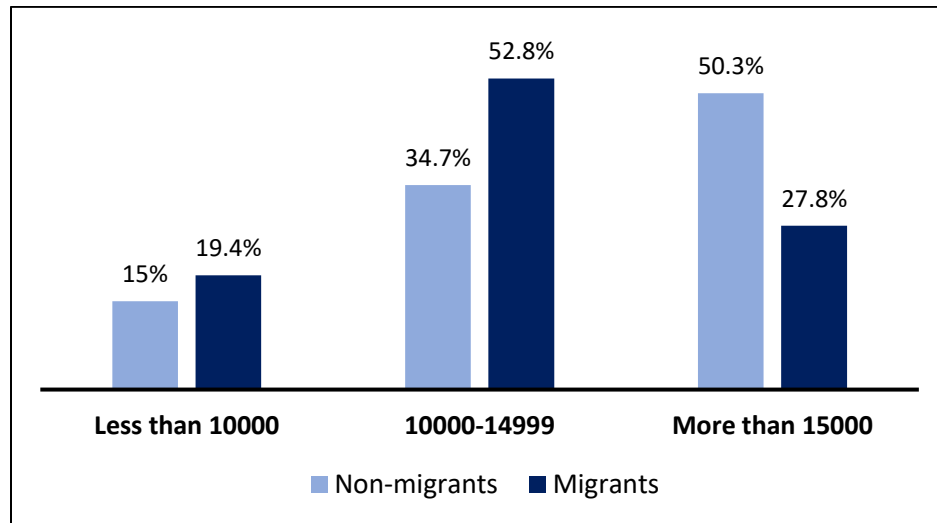
Financial capital is measured using three sub-components: per capita annual income, household savings, and income diversity.

- **Per capita annual income**

The per capita annual income of the households was measured by the ratio of annual family income to the number of household members. Notably, more than half of the migrant households had a monthly income of less than BDT 15,000, while around the same proportion of non-migrants had an income greater than BDT 15,000. In terms of household sizes, however, non-migrants had a greater number of family members than migrants.

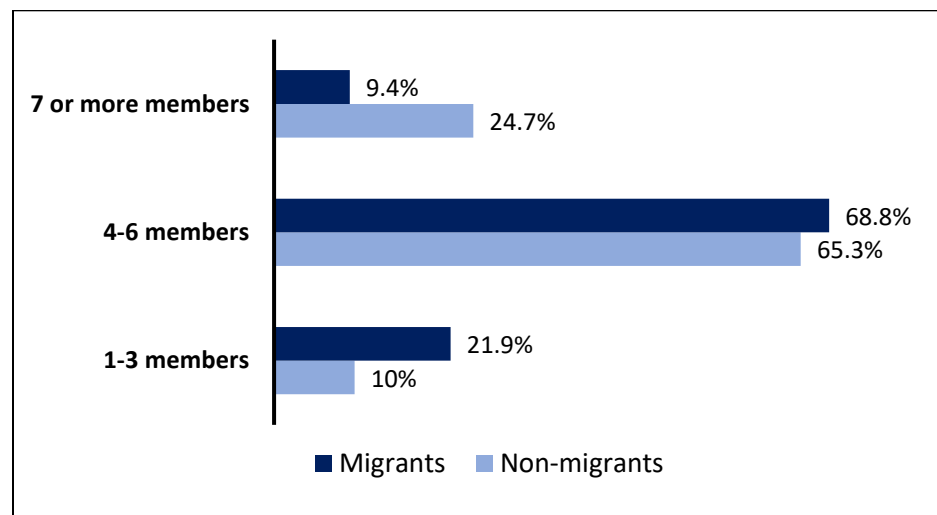
**Figure 4.25**

*Average monthly household income*



**Figure 4.26**

*Average household size*

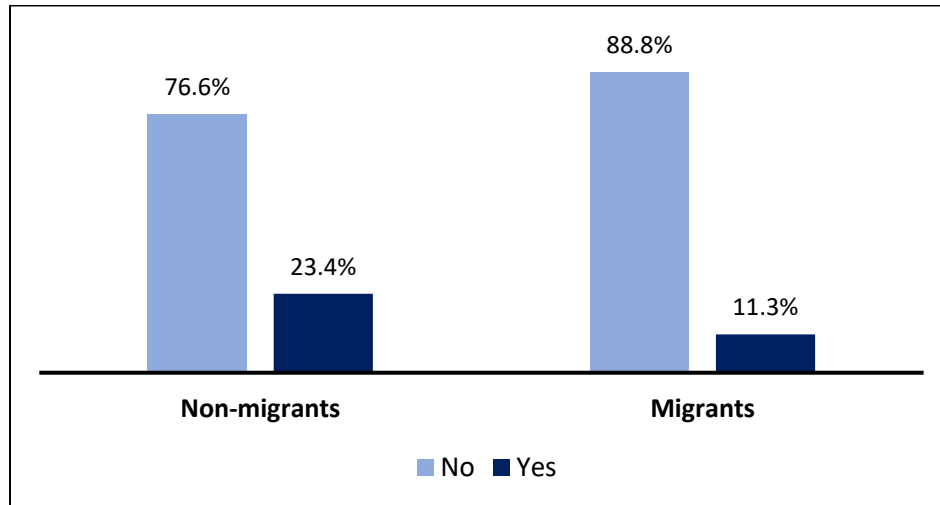


- **Household savings**

Around 88.8 percent of the migrant households reportedly did not have any savings. In case of the non-migrant group, the number was lower at 76.6 percent, indicating that more non-migrant households had the ability and practice of saving money for the future.

**Figure 4.27**

*Availability of household savings*

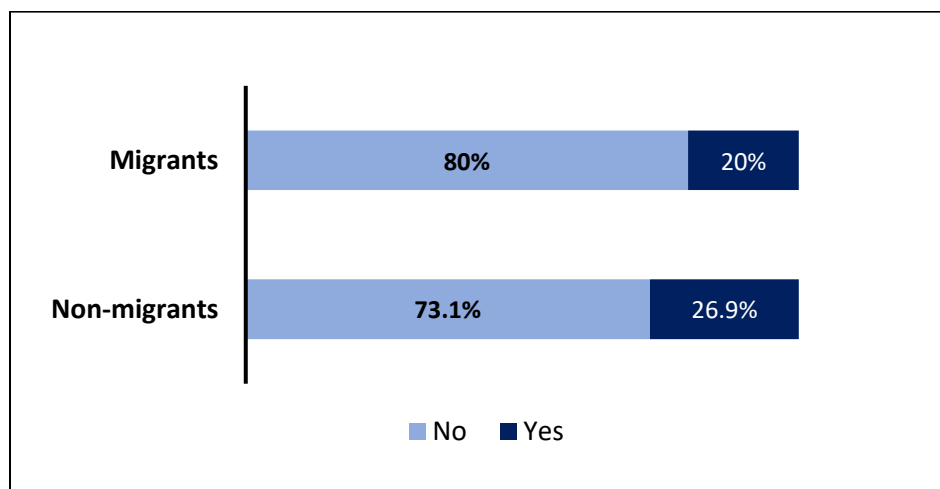


- **Income diversity**

Only around 20 percent of the migrants had more than one income source. In contrast, around 27 percent of the non-migrants reportedly had diversity in their sources of income.

**Figure 4.28**

*Income diversity*



#### 4.4.1.3 Physical capital

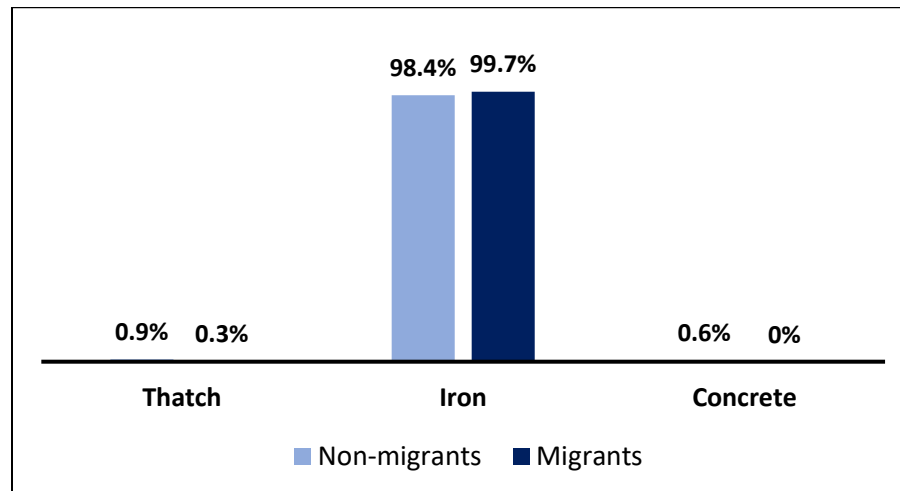
Physical capital is measured using five sub-components: material of the roof of the household's residence, availability of utilities, access to safe sanitation facilities, condition of roads around the residence, and access to basic facilities.

- **Roof material**

Almost all of the households under this study, across both migrant and non-migrant groups, lived in houses with tin roofs. Very few respondents lived in houses made of thatch and almost no concrete houses were found.

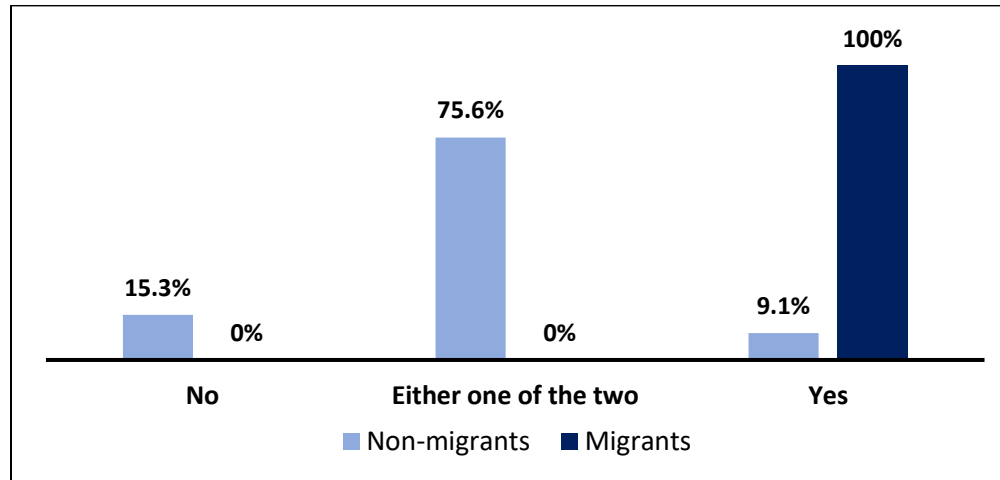
**Figure 4.29**

*Material of roof*



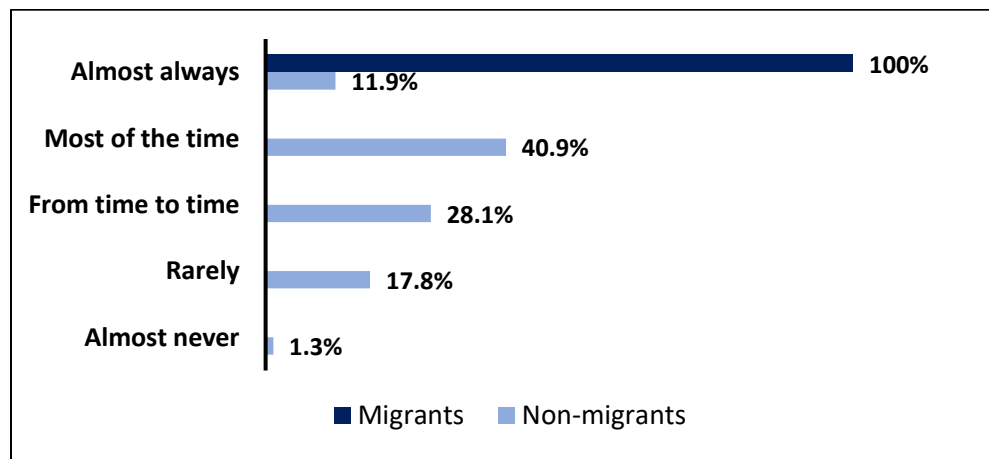
- **Utilities**

The respondents were asked whether they had electricity and gas connections in their houses. All of the migrant households had access to either in-house or common gas connections. Migrant households also had electricity connections although, there were complaints of prolonged load shedding from many. In contrast, only about 9 percent of the non-migrant households had both electric and gas connections. The majority, around 75 percent of the households had either one of the two utilities and 15 percent of the households had neither.

**Figure 4.30***Utility connections*

- **Sanitation**

The respondents were asked about how many months in a year they had access to safe sanitation facilities. The migrant households reported that although the available sanitation facilities within the slums were sub-par, these were safe and useable throughout the year. On the other hand, the non-migrant households expressed greater difficulties in accessing safe sanitation facilities. Especially, many households reported that during the monsoon, their sanitation facilities were damaged by rain, waterlogging, and floods. Some households even indicated that they did not have any separate sanitation facilities and shared that they still practiced open defecation.

**Figure 4.31***Access to safe sanitation*

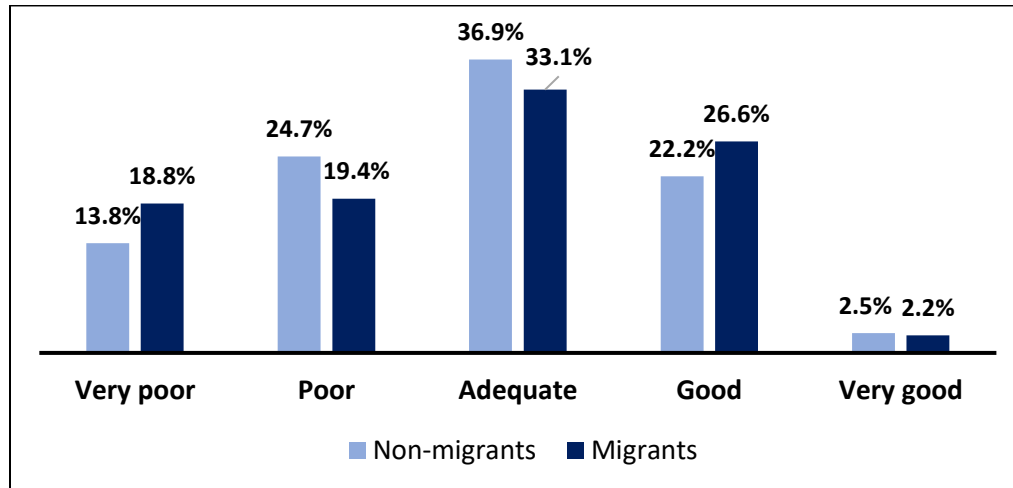


- **Condition of roads**

Surprisingly, both migrant and non-migrant households reported a similar level of satisfaction with the condition of roads around their houses. Most of the respondents across the groups found the road conditions to be adequate or good.

**Figure 4.32**

*Condition of roads*

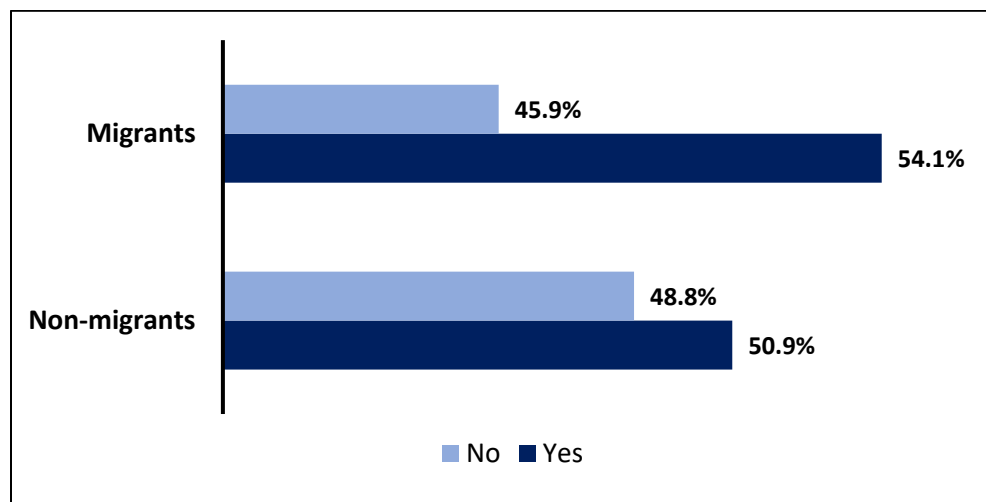


- **Access to facilities**

Not much of a difference was found in terms of the two groups' access to basic facilities including hospitals and markets. However, a greater proportion of the migrants did report that basic facilities were accessible to them.

**Figure 4.33**

*Barriers to accessing basic facilities*

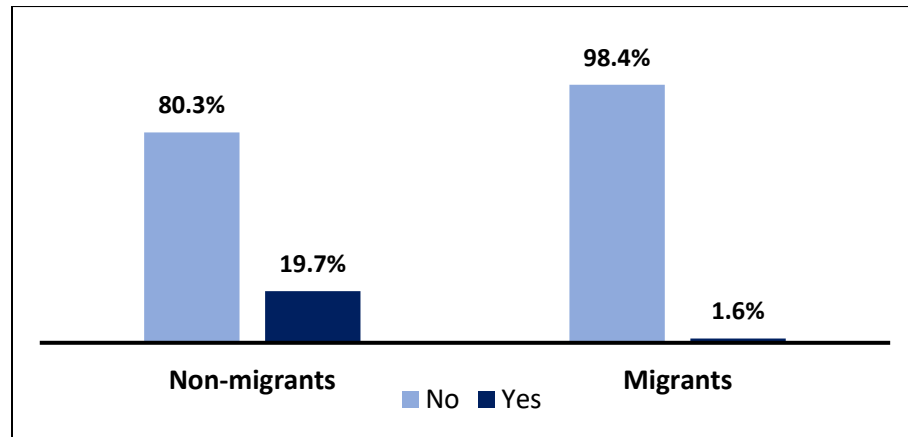


#### 4.4.1.4 Natural Capital

- Ownership of agricultural land

**Figure 4.34**

*Ownership of agricultural land*

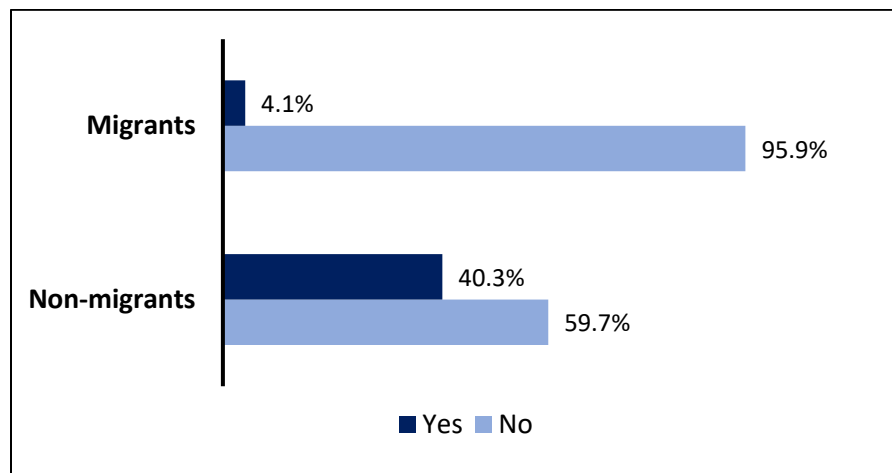


Only around 1.6 percent of the migrant respondents owned farming land. This is because many of these households lost their lands and assets to environmental hazards. Moreover, before migrating, many households chose to sell their lands for money or because they were scared to leave their assets behind unattended. In contrast, around 20 percent of the households reported that they owned agricultural land.

- Ownership of housing land

**Figure 4.35**

*Ownership of housing land*



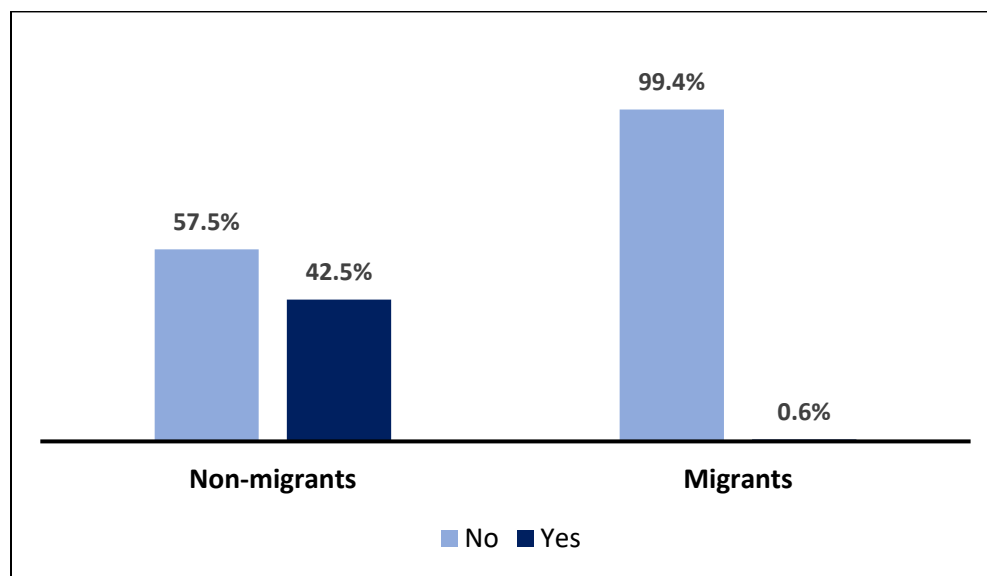
Ownership of housing land differed between the two groups. Almost 60 percent of the non-migrants owned the houses they lived in, compared to 4 percent among the migrants. The migrants lived in houses they rented for cheap in informal settlements under the threat of eviction.

- **Ownership of livestock**

Although the practice of livestock rearing was found in the slums, not even 1 percent of the migrant households owned livestock. In contrast, more than 42 percent of the non-migrants reared livestock, which served as an additional income source.

**Figure 4.36**

*Ownership of livestock*

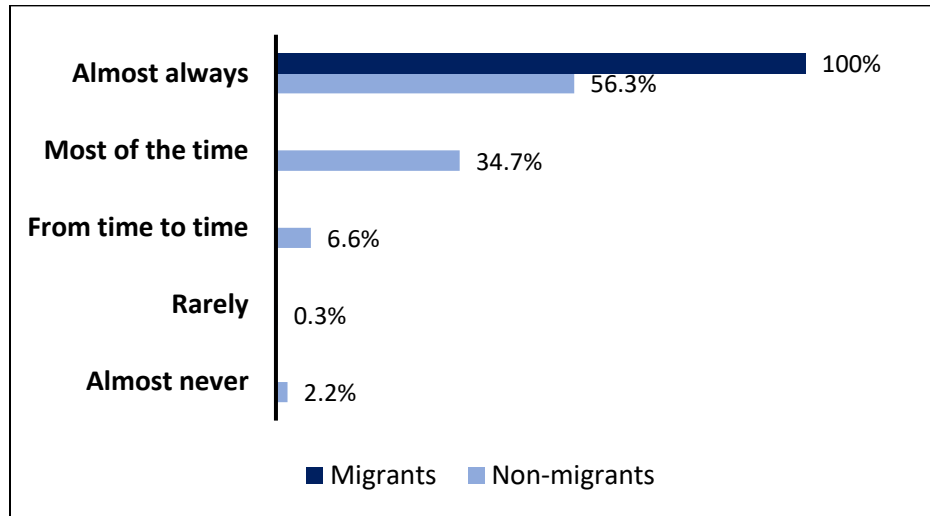


- **Access to clean water**

Since the slums were equipped with piped water supply, all of the migrant households reported that they had access to clean water, throughout the year, with minor disruptions. On the other hand, almost none of the non-migrant households had access to piped water. Instead, they relied on common tube wells, ponds, and rivers for water. The majority of the households, however, did not suggest that this was a difficulty for them.

**Figure 4.37**

*Access to clean water*



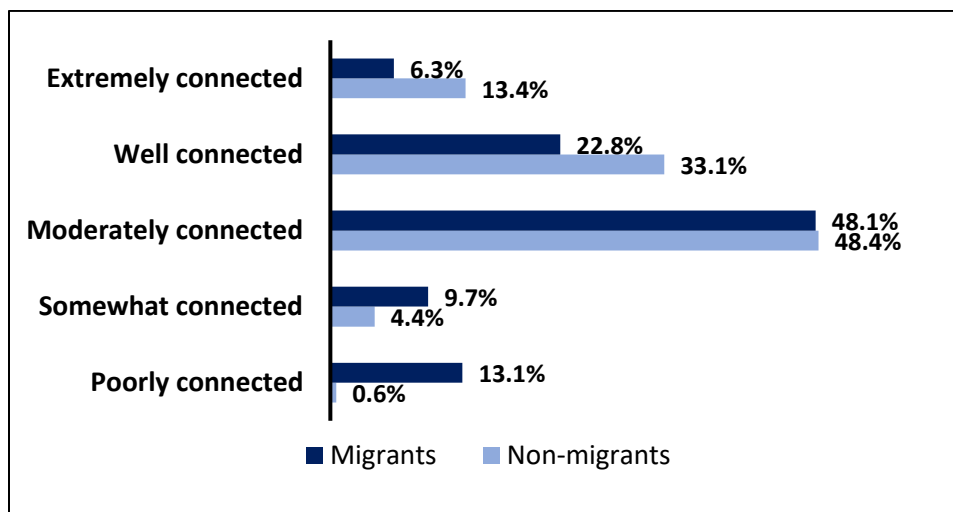
**4.4.1.5 Social Capital**

- **Connectivity with friends and family**

The non-migrants reported an overall greater level of connectedness with their friends and families. Among the migrant, about 13 percent said their connections were very poor and another 10 percent indicated that they felt somewhat connected to their kith and kin network.

**Figure 4.38**

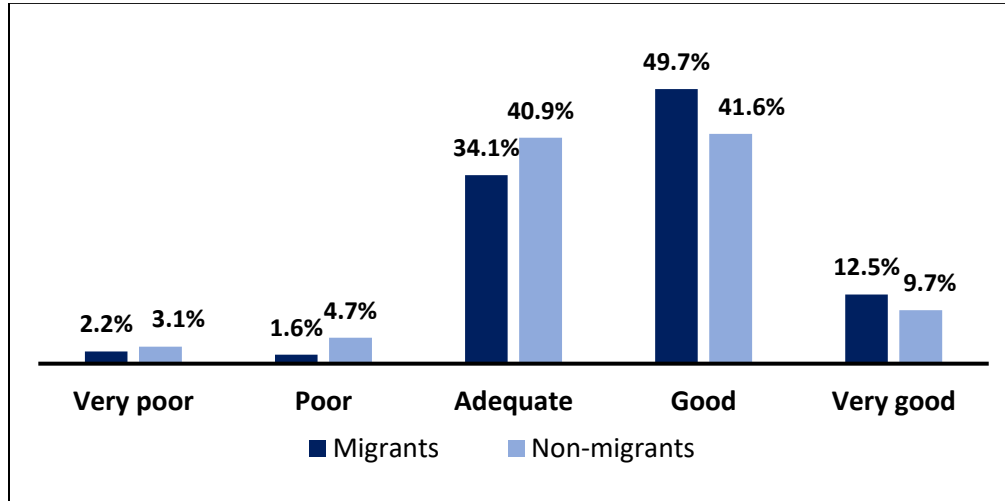
*Connectivity with friends and family*



- **Communication with neighbors**

**Figure 4.39**

*Communication with neighbor*

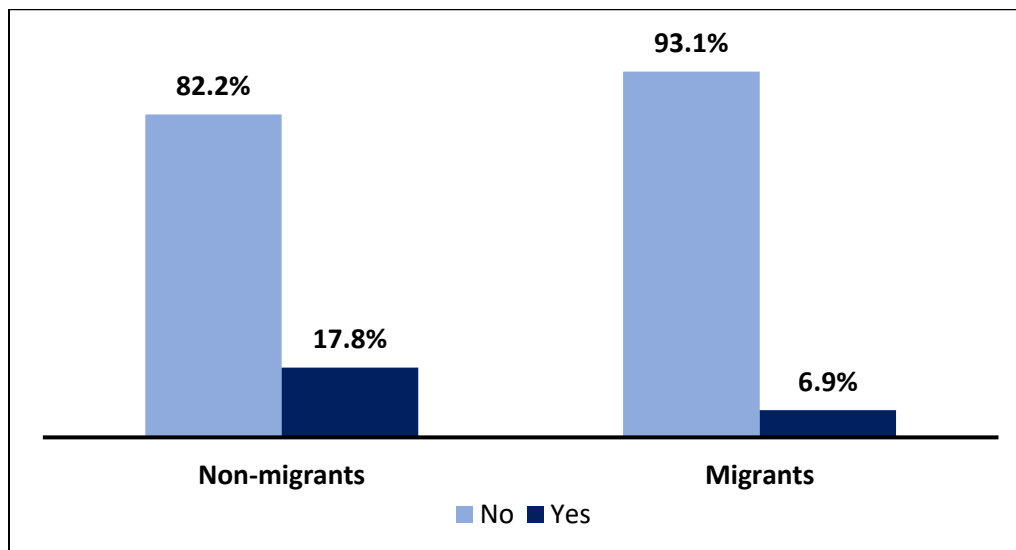


Relationships and communication with neighbors in both groups were reported to be good. A very low percentage of households among both the migrant and non-migrant respondents reported having poor or very poor communication with their neighbors.

- **Social safety nets**

**Figure 4.40**

*Social safety nets*



Few households across the groups were covered by social safety nets, even though all of them led precarious lives. Among the migrants, only about 7 percent of the households were covered by social safety nets. The rate was higher among the non-migrants as almost 18 percent of the households had safety nets such as government subsidies.

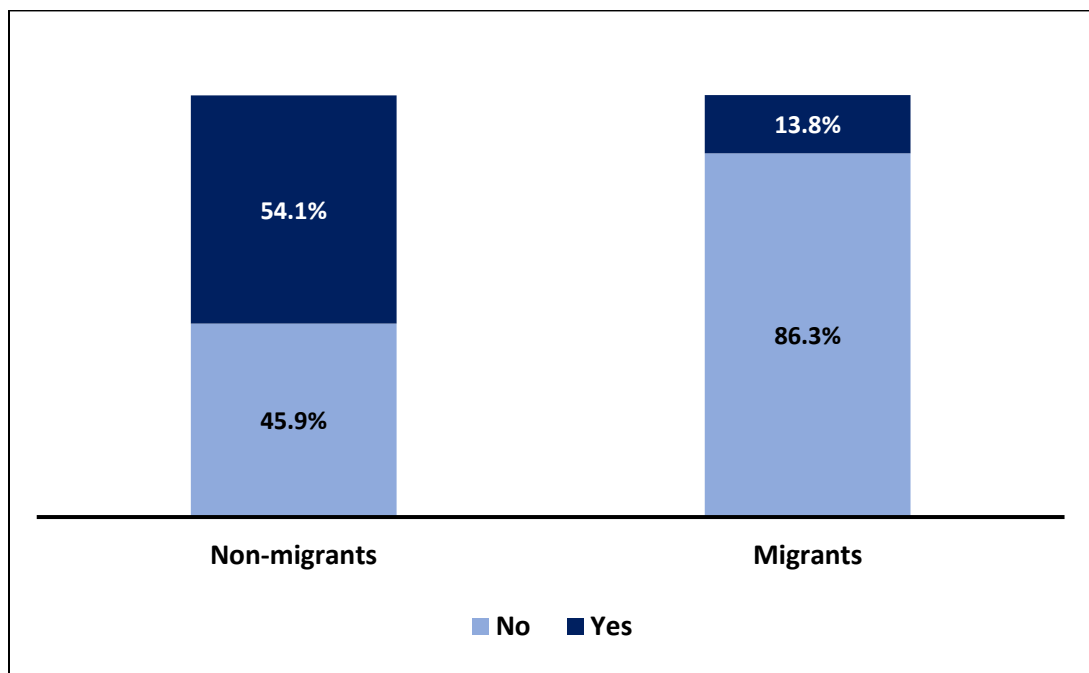
#### 4.4.2 Self-organization

- **Group memberships**

Memberships in groups and associations were more common among the non-migrants compared to the migrants. Around 54 percent of the non-migrants reported that they were part of an association whereas only about 14 percent of the migrant reported the same.

**Figure 4.41**

*Group memberships*

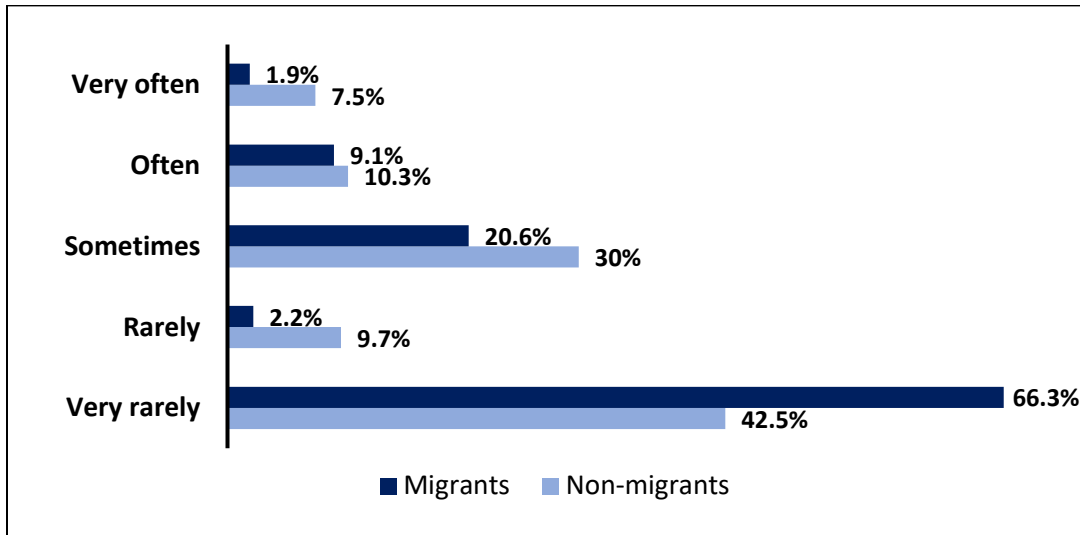


- **Participation in collective affairs**

The respondents were asked about how often they participated in activities for collective good. For more than 66 percent of the migrants and 42.5 percent of the non-migrants, it was very rare to participate in such activities. However, non-migrants did report a greater participation in group activities including repairing broken roads, bridges, houses, and so on.

**Figure 4.42**

*Participation in collective affairs*

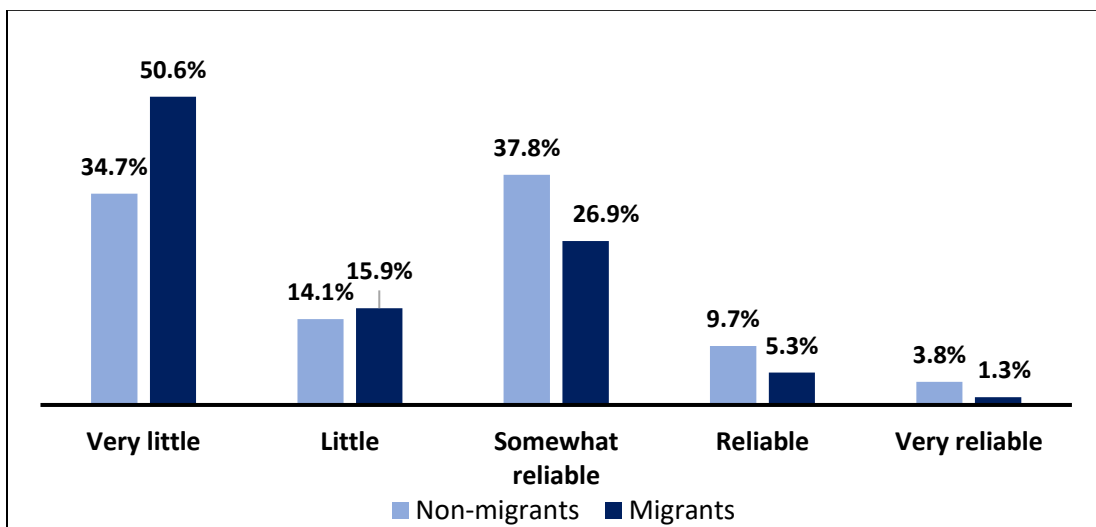


- **Trust in kith and kin network**

To determine the level of trust among the kith and kin network, the respondents were asked how reliable they found their friends, families, and neighbors in matters related to borrowing and lending money. Over 50 percent of the migrants found that they can rely on their social network very little while only around 1 percent of them found them to be very reliable. In contrast, the highest proportion of 37.8 percent of the non-migrants found their kith and kin network to be somewhat reliable.

**Figure 4.43**

*Trust in kith and kin network*

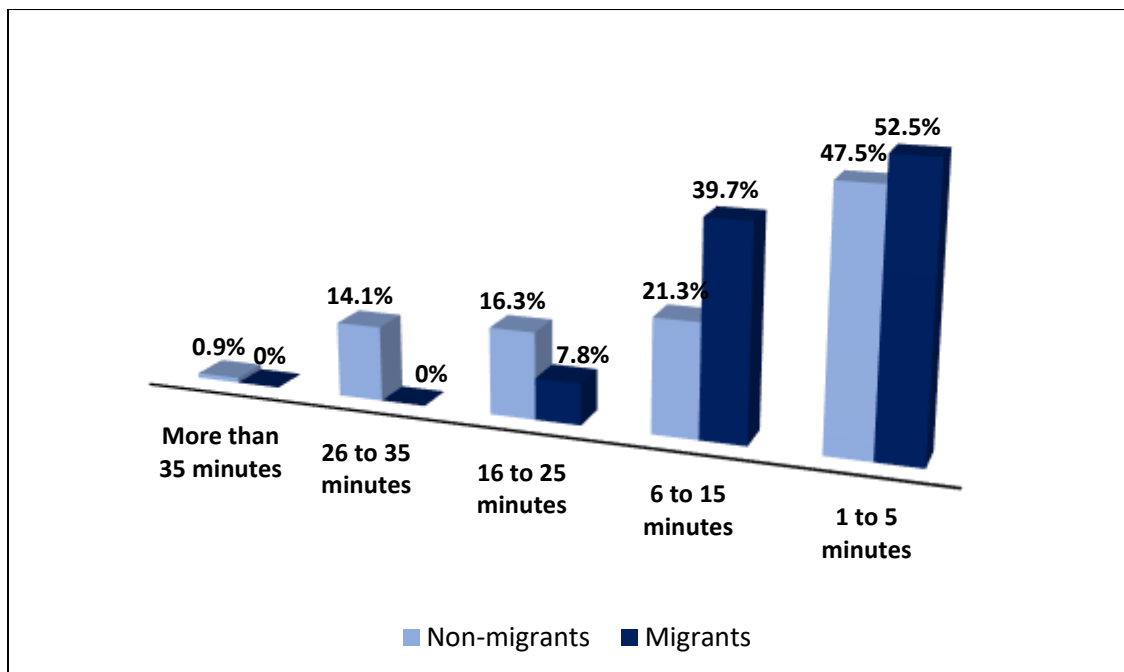


- **Distance to the nearest mode of transportation**

The average distances of the respondents' households and their preferred choice of transportation were shorter for the migrants compared to the non-migrants. Around 52.5 percent of the migrants and 47.5 percent of the non-migrants reported they only needed between 1 to 5 minutes to reach their mode of transportation. None of the migrant households said they needed over 25 minutes to reach their transport, however, around 15 percent of the non-migrants claimed they would need over 25 minutes to reach their transportation on foot.

**Figure 4.44**

*Distance to the nearest mode of transportation*

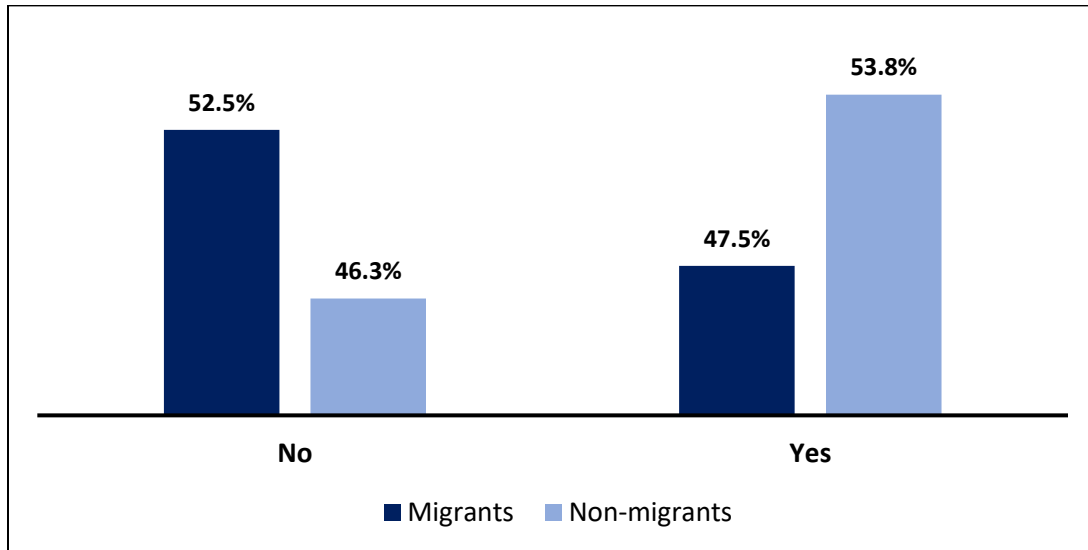


#### 4.4.3 Capacity for learning

- **4.5.3.1 Climate-risk awareness**

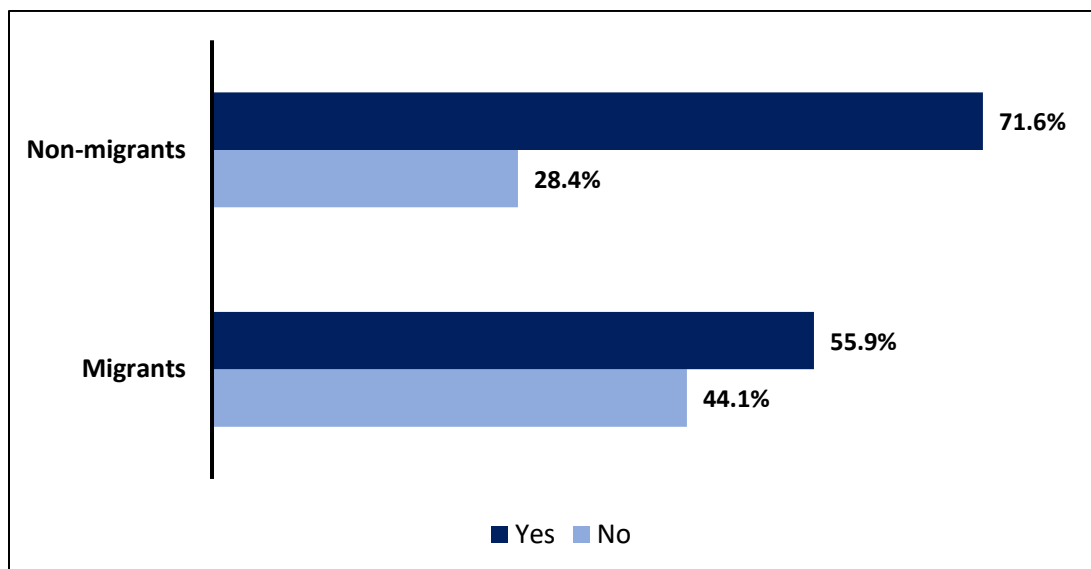
Around 54 percent of the non-migrants knew about the concept and risks associated with climate change. This knowledge was found to be less among the migrants as only 47.5 percent of them were familiar with these ideas.



**Figure 4.45***Climate-risk awareness*

- **Educational investment**

The respondents were asked whether they invested financially in the education of their children or other relatives. The practice was found higher among non-migrants as 71.6 percent of them invested in education. In comparison, around 56 percent of the migrant households made similar investments.

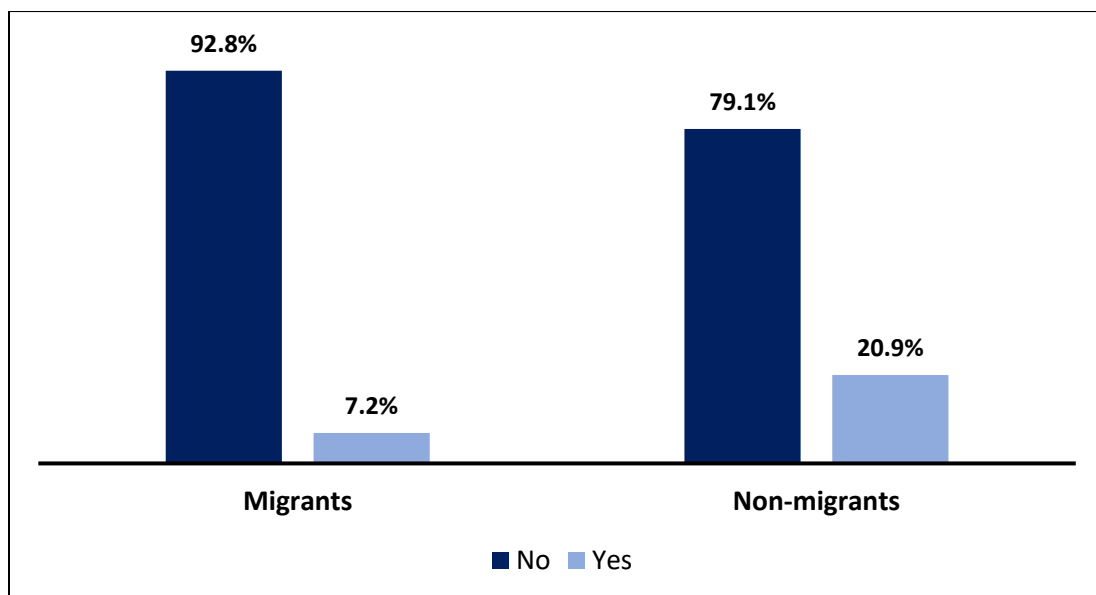
**Figure 4.46***Educational investment*

- **Participation in skill development events**

The respondents were asked about their participation in events and programs that would enhance their skills and employability. A very low number of migrant households at 7.2 percent reported they participated in such events. The rest expressed their interest in attending such programs but complained that these are not arranged in their communities. In contrast, among the non-migrants, around 21 percent have reported that they have participated in and benefitted from such programs.

**Figure 4.47**

*Participation in skill development events*



The lower participation rate among migrants is influenced by various factors. Migrants reportedly faced challenges in accessing training programs due to the limited availability of such programs. Non-migrant households contrastingly had more stable residence and employment situations, making it easier for them to enroll in skill and training programs. Non-migrant households also had greater awareness of and access to government or community-based training initiatives compared to migrants.

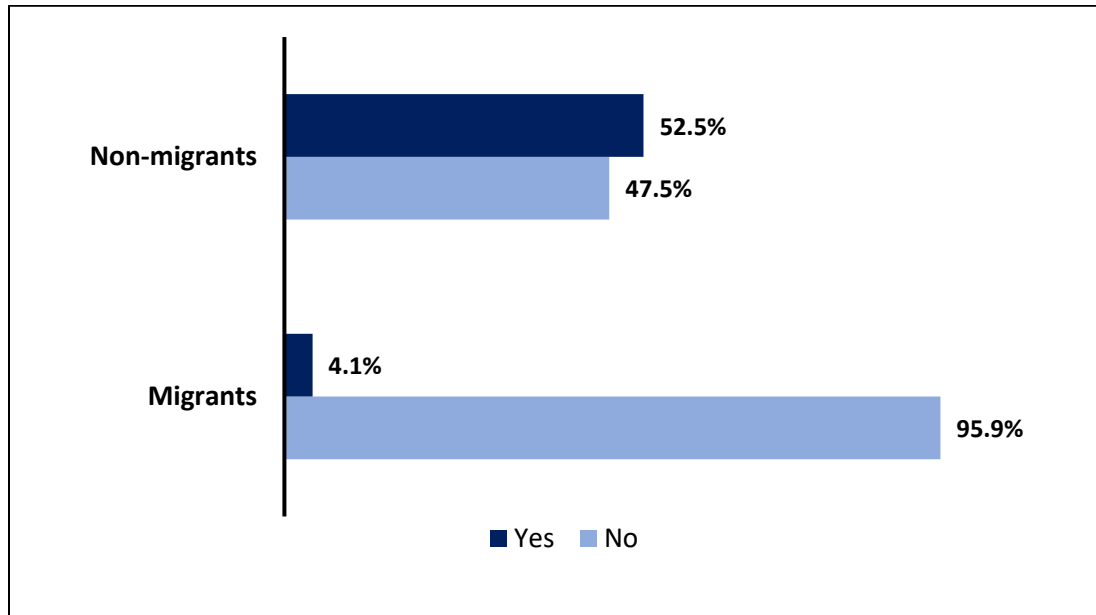
- **Information sharing practice**

The respondents were asked whether the practice of sharing knowledge and skills was prevalent within their communities. Among the migrants, such practices were incredibly low and only 4 percent of the respondents said such practices exist. Contrastingly, among the non-

migrants, the practice of information sharing was much higher as more than 50 percent of them reported the existence of this practice.

**Figure 4.48**

*Information sharing practice*



#### 4.5 Associations between migration and key variables

Chi-square tests of independence were performed to assess the association between migration status and key household characteristics. Significant associations were found between migration status and gender of household head, type of family, educational status of household head, household expenditure, and size, and the practice of educational investments, the associations were significant as the corresponding p-values were less than 0.05.

Migration was associated with several notable changes in households. Firstly, it led to an increase in female-headed households. Additionally, it resulted in a higher prevalence of nuclear families. Furthermore, migrant households tended to have lower educated household heads, accompanied by reduced household incomes and expenditures. Finally, migration was also linked to smaller family sizes and a decreased inclination to invest in educational pursuits. All of these associations were statistically significant.

**Table 4.3**

*Chi-Square Test to assess the relationship between migration status and key household characteristics*

Variables	Migrants, Mean (%)	Non-migrants, Mean (%)	Chi- square	p-value
Head of household			<b>50.63</b>	<b>&lt;.001</b>
Female	18.4	1.6		
Male	81.6	98.4		
Type of family			<b>36.85</b>	<b>&lt;.001</b>
Nuclear Family	77.8	64.7		
Joint Family	22.2	35.3		
Educational status of household head			<b>3.1</b>	<b>0.031</b>
No formal education	52.8	51.6		
Primary education	37.5	34.4		
Secondary education	9.7	14.1		
Household expenditure			<b>38.7</b>	<b>&lt;.001</b>
Less than 10000	28.7	17.5		
10000-14999	49.4	37.8		
More than 15000	21.9	44.7		
Household size			<b>36.5</b>	<b>&lt;.001</b>
1-3 members	21.9	10		
4-6 members	68.8	65.3		
7 or more members	9.4	24.7		
Child labor practice			<b>0.033</b>	<b>0.856</b>
No	90.4	90.9		
Yes	9.6	9.1		
Educational investments			<b>16.9</b>	<b>&lt;.001</b>
No	44.1	28.4		
Yes	55.9	71.6		

## 4.6 Comparison of components of livelihood resilience between migrants and non-migrants

### 4.6.1 Comparison of Buffer Capacity

#### 4.6.1.1 Comparison of Human Capital

**Table 4.4**

*Independent sample T-test to determine differences in human capital of households according to their migration status*

Migration status	N	Mean	SD	t	DF	p-value
Non-migrant	320	0.5	0.18	0.651	636.5	.52
Migrant	320	0.49	0.17			

SD: Standard Deviation; DF: degrees of freedom

Independent sample t-test was performed to evaluate whether there was a significant difference between the non-migrants and the environmental migrants in terms of human capital. The results indicated that non-migrants ( $M = 0.5$ ,  $SD = 0.18$ ) had greater human capital than the migrants ( $M = 0.49$ ,  $SD = 0.17$ ,  $t(637.33) = 1.141$ ), however, the results are not significant as the corresponding p-value (.254) is not less than 0.05.

#### 4.6.1.2 Comparison of Financial Capital

**Table 4.5**

*Independent sample T-test to determine differences in financial capital of households according to their migration status*

Migration status	N	Mean	SD	t	DF	p-value
Non-migrant	320	0.25	0.25	3.8	638	<.001
Migrant	320	0.18	0.18			

SD: Standard Deviation; DF: degrees of freedom

Independent sample t-test was performed to evaluate whether there was a significant difference between the non-migrants and the environmental migrants in terms of financial capital. The results indicated that non-migrants ( $M = 0.25$ ,  $SD = 0.25$ ) had significantly greater financial capital than the migrants ( $M = 0.18$ ,  $SD = 0.18$ ,  $t(638) = 3.8$ ), the results are significant as the corresponding p-value (<.001) is less than 0.05.

#### 4.6.1.3 Comparison of Physical Capital

**Table 4.6**

*Independent sample T-test to determine differences in physical capital of households according to their migration status*

Migration status	N	Mean	SD	t	DF	p-value
Non-migrant	320	0.5	0.15	-14.99	636.11	<.001
Migrant	320	0.68	0.15			

SD: Standard Deviation; DF: degrees of freedom

Independent sample t-test was performed to evaluate whether there was a significant difference between the non-migrants and the environmental migrants in terms of physical capital. The results indicated that non-migrants (M = 0.5, SD = 0.15) had significantly lower physical capital compared to the migrants (M = 0.68, SD = 0.145, t (636.11) = -14.99), the results are significant as the corresponding p-value (<.001) is less than 0.05.

#### 4.6.1.4 Comparison of Natural Capital

**Table 4.7**

*Independent sample T-test to determine differences in natural capital of households according to their migration status*

Migration status	N	Mean	SD	t	DF	p-value
Non-migrant	320	0.47	0.237	14.8	638	<.001
Migrant	320	0.27	0.07			

SD: Standard Deviation; DF: degrees of freedom

Independent sample t-test was performed to evaluate whether there was a significant difference between the non-migrants and the environmental migrants in terms of natural capital. The results indicated that non-migrants (M = 0.47, SD = 0.237) had significantly greater natural capital compared to the migrants (M = 0.27, SD = 0.07, t (638) = 14.8), the results are significant as the corresponding p-value (<.001) is less than 0.05.

#### 4.6.1.5 Comparison of Social Capital

**Table 4.8**

*Independent sample T-test to determine differences in natural capital of households according to their migration status*

Migration status	N	Mean	SD	t	DF	p-value
Non-migrant	320	0.5	0.18	7.64	638	<.001
Migrant	320	0.4	0.14			

SD: Standard Deviation; DF: degrees of freedom

Independent sample t-test was performed to evaluate whether there was a significant difference between the non-migrants and the environmental migrants in terms of social capital. The results indicated that non-migrants ( $M = 0.5$ ,  $SD = 0.179$ ) had significantly greater social capital compared to the migrants ( $M = 0.4$ ,  $SD = 0.144$ ,  $t(638) = 7.64$ ), the results are significant as the corresponding p-value (<.001) is less than 0.05.

#### 4.6.1.6 Comparison of Overall Buffer Capacity

**Table 4.9**

*Independent sample T-test to determine differences in buffer capacity of respondents according to their migration status*

Migration status	N	Mean	SD	t	DF	p-value
Non-migrant	320	0.44	0.12	4.14	638	<0.001
Migrant	320	0.41	0.07			

SD: Standard Deviation; DF: degrees of freedom

Independent sample t-test was performed to evaluate whether there was a significant difference between the non-migrants and the environmental migrants in terms of overall buffer capacity. The results indicated that non-migrants ( $M = 0.44$ ,  $SD = 0.12$ ) had significantly greater buffer capacity than the migrants ( $M = 0.41$ ,  $SD = 0.07$ ,  $t(638) = 4.14$ ), as the corresponding p-value (<.001) is less than 0.05.

### 4.6.2 Comparison of Self-Organization

**Table 4.10**

*Independent sample T-test to determine differences in self-organization of households according to their migration status*

Migration status	N	Mean	SD	t	DF	p-value
Non-migrant	320	0.49	0.2	9.25	638	<.001
Migrant	320	0.35	0.17			

SD: Standard Deviation; DF: degrees of freedom

Independent sample t-test was performed to evaluate whether there was a significant difference between the non-migrants and the environmental migrants in terms of self-organization. The results indicated that non-migrants ( $M = 0.49$ ,  $SD = 0.2$ ) had significantly greater self-organization capacity compared to the migrants ( $M = 0.35$ ,  $SD = 0.165$ ,  $t(638) = 9.25$ ), the results are significant as the corresponding p-value (<.001) is less than 0.05.

### 4.6.3 Comparison of Capacity for Learning

**Table 4.11**

*Independent sample T-test to determine differences in the learning capacity of households according to their migration status*

Migration status	N	Mean	SD	t	DF	p-value
Non-migrant	320	0.50	0.27	10.73	638	<.001
Migrant	320	0.29	0.22			

SD: Standard Deviation; DF: degrees of freedom

Independent sample t-test was performed to evaluate whether there was a significant difference between the non-migrants and the environmental migrants in terms of learning capacity. The results indicated that non-migrants ( $M = 0.5$ ,  $SD = 0.27$ ) had significantly greater capacity for learning compared to the migrants ( $M = 0.29$ ,  $SD = 0.22$ ,  $t(638) = 10.73$ ), the results are significant as the corresponding p-value (<.001) is less than 0.05.



#### 4.6.4 Comparison of Livelihood Resilience

**Table 4.12**

*Independent sample T-test to determine differences in Livelihood Resilience of households according to their migration status*

Migration status	N	Mean	SD	t	DF	p-value
Non-migrant	320	1.42	0.42	15.73	638	<.001
Migrant	320	1.04	0.33			

SD: Standard Deviation; DF: degrees of freedom

Independent sample t-test was performed to evaluate whether there was a significant difference between the non-migrants and the environmental migrants in terms of combined livelihood resilience. The results indicated that non-migrants ( $M = 1.42$ ,  $SD = 0.422$ ) had significantly greater livelihood resilience compared to the migrants ( $M = 1.04$ ,  $SD = 0.326$ ,  $t(638) = 15.73$ ), the results are significant as the corresponding p-value (<.001) is less than 0.05

#### 4.6.5 Summary of comparisons of individual components and overall livelihood resilience

The findings from these comparative analyses are which provide insights into the disparities in livelihood resilience components between migrant and non-migrant households are summarized in Table 4.13. Non-migrants tend to have higher financial, natural, and social capital, as well as higher levels of self-organization, capacity for learning, and overall livelihood resilience. Interestingly, migrants have higher physical capital compared to non-migrants. This might be related to their lessened exposure to environmental hazards and the resulting loss of physical assets. The dimensions where non-migrants have higher indicated that they may have more stable and resource-rich environments compared to migrants.

**Table 4.13**

*Summary of independent sample T-tests to determine differences in components of livelihood resilience of households according to their migration status<sup>1</sup>*

Dimensions	Migrants, Mean (%)	Non-migrants, Mean (%)	p-value
<i>Buffer</i>	<b>0.41</b>	<b>0.44</b>	<b>&lt;.001</b>
<i>Capacity</i>			
<b>Human capital</b>	0.49	0.5	0.52
<b>Financial Capital</b>	0.181	0.248	<.001
<b>Physical Capital</b>	0.679	0.501	<.001
<b>Natural Capital</b>	0.266	0.47	<.001
<b>Social Capital</b>	0.397	0.496	<.001
<i>Self-organization</i>	<b>0.355</b>	<b>0.488</b>	<b>&lt;.001</b>
<i>Capacity for learning</i>	<b>0.288</b>	<b>0.497</b>	<b>&lt;.001</b>
Livelihood Resilience	<b>1.045</b>	<b>1.419</b>	<b>&lt;.001</b>

<sup>1</sup> Details regarding the distribution of percentages of all sub-components can be found in the appendix

#### **4.7 Regression analysis to determine the relationship of livelihood resilience with key household characteristics**

Multiple linear regression was used to test if key household characteristics including migration status, family type, gender of household head, household setting, and religious identity significantly predicted livelihood resilience. Before running the analysis, the variables were tested to determine whether they met the assumptions of multiple linear regression. The test was only run after the assumptions of linearity, homoskedasticity, independence of error, normality, and collinearity were satisfied.

Table 4.14 presents the results of the regression analysis aimed at examining the influence of various covariates on livelihood resilience. It was found that the migration status, household head's education status, income, and household size significantly predicted livelihood resilience, as the corresponding p-values ( $<0.001$ ) are less than 0.05. Non-migrant households exhibited greater livelihood resilience in comparison to migrant households. Additionally, households with higher education heads, higher income, and larger sizes demonstrated higher levels of resilience when contrasted with households headed by individuals with lower educational status, lower income, and smaller family sizes.

Migrants, compared to non-migrants (the reference category), exhibit a coefficient of -0.34 suggesting that migration status significantly affects livelihood resilience. Contrary to expectations, the type of family structure, whether nuclear or joint, does not appear to exert a statistically significant impact on overall livelihood resilience. Both nuclear and joint families yield coefficients close to zero, with a non-significant p-value. These results imply that, within the scope of this analysis, family structure does not play a substantial role in explaining variations in the livelihood resilience variable.

The analysis indicates that household expenditure significantly influences livelihood resilience. Specifically, both mid-level (BDT 10,000 to 14,999) and high-level (more than BDT 15,000) expenditures exhibit positive effects on household livelihood resilience. Individuals from households with mid-level expenditures yield a coefficient of 0.07 and a marginally significant p-value of 0.09, suggesting a modest positive influence. In contrast, individuals from high-expenditure households display a stronger and statistically significant positive effect, with a coefficient of 0.12 and a p-value of 0.009. These results imply that higher levels of household expenditure are associated with higher scores of livelihood resilience.

**Table 4.14***Predictors of livelihood resilience*

Covariates	Coefficient		
	[95% CI]	t	p-value
<b>Migration status of the respondents</b>			
Non-migrant	Reference		
Migrant	-0.34	-10.8	<.001
<b>Type of family</b>			
Nuclear family	Reference		
Joint family	-0.07	-2.01	.841
<b>Household expenditure</b>			
Low expenditure (Less than BDT 10, 000)	Reference		
Mid-expenditure (BDT 10,000 to 14,999)	0.07	0.08	.09
High expenditure (More than BDT 15,000)	0.12	1.3	.009
<b>Household size</b>			
Small (1 to 3 members)	Reference		
Medium (4 to 6 members)	0.11	2.5	.014
Large (More than 7 members)	0.15	2.7	.008
<b>Model F</b>	30.25 df (6)		<0.001
<b>R-square</b>	0.223		
<b>Adjusted R-square</b>	0.215		

Household size is identified as another covariate significantly affecting the dependent variable. Both medium-sized (4 to 6 members) and large-sized (more than 7 members) households positively influence livelihood resilience. Individuals from medium-sized households yield a coefficient of 0.11, with a significant p-value of 0.014. Meanwhile, individuals from large-sized households exhibit an even stronger positive effect, with a coefficient of 0.15, along with a p-value of 0.008. These results suggest that larger household sizes are associated with higher scores on the dependent variable, indicating that individuals from larger households tend to be more resilient.

The statistical significance of the overall model is confirmed by the Model F-statistic (30.25) yielding a highly significant p-value of <0.001. This indicates that the combined effect of the

selected covariates significantly explains variations in the dependent variable. The R-squared (0.223) and Adjusted R-squared (0.215) values further support the model's goodness of fit, suggesting that the chosen covariates collectively account for approximately 22 percent of the variance in the dependent variable. In conclusion, this regression analysis provides valuable insights into the relationships between migration status, family structure, household expenditure, household size, and the dependent variable. Notably, migration status, household expenditure, and household size emerge as significant predictors of the outcome.

The study also aimed to assess the influence of demographic and socioeconomic factors separately on the three dimensions of livelihood resilience, namely, buffer capacity, self-organization, and capacity for learning. Table 4.15 provides coefficients with 95 percent confidence intervals (CIs) and p-values for each covariate, indicating their statistical significance and influence.

The results demonstrate that migration status significantly influences all three dependent variables. Migration is associated with a negative impact individually on buffer capacity, self-organization, and capacity for learning. The negative coefficients (-0.024, -0.14, and -0.18, respectively) indicate that migrants, compared to non-migrants, tend to exhibit lower scores in these dimensions. This suggests that migration may affect households' access to livelihood capitals, self-organization skills, and learning capacity in the context of the study area.

The type of family (nuclear vs. joint) shows no significant influence on Buffer Capacity and Capacity for Learning, as evidenced by the non-significant p-values. However, for Self-organization, the results indicate a marginally significant effect. Joint families have a slightly negative coefficient (-0.41) compared to nuclear families, suggesting that individuals from joint families may have lower self-organization scores. This finding implies that family structure might have a limited impact on certain aspects of individual capacities.

Household expenditure is statistically significant for buffer capacity and high expenditure levels (more than BDT 15,000) positively influence this dimension. This means that individuals from households with higher expenditures tend to have better buffer capacities. However, household expenditure does not significantly impact self-organization or capacity for learning, except for a marginal effect on Self-organization for mid-level expenditures.

**Table 4.15***Predictors of Buffer capacity, Self-organization, and Capacity for learning*

Covariates	Buffer Capacity		Self-organization		Capacity for Learning	
	Coeff [95% CI]	p- value	Coeff [95% CI]	p- value	Coeff [95% CI]	p- value
<b>Migration status of the respondents</b>						
Non-migrant	Reference					
Migrant	-0.024	<.001	-0.14	<.001	-0.18	<.001
<b>Type of family</b>						
Nuclear family	Reference					
Joint family	0.008	.34	0.003	.86	-0.41	.058
<b>Household expenditure</b>						
Low expenditure (Less than BDT 10,000)	Reference					
Mid expenditure (BDT 10,000 to 14,999)	0.02	.02	0.008	.69	0.03	.21
High expenditure (More than BDT 15,000)	0.06	<.001	-0.02	.36	0.07	.009
<b>Educational status of household head</b>						
No formal education	-		Reference			
Primary education	-		0.05	.002	0.05	.03
Secondary education	-		0.03	.22	0.09	.003
<b>Household size</b>						
Small (1 to 3 members)	Reference					
Medium (4 to 6 members)	-0.02	.06	0.023	.27	0.11	<.001
Large (> 6 members)	-0.03	0.057	0.023	.39	0.16	<.001
<b>Gender of the household head</b>						
Female	Reference					
Male	0.004	.736	-0.028	.26	-0.02	.46
<b>Model F</b>	7.6	<.001	11.33	<.001	19.83	<.001
	df (7)		df (9)		df (9)	
<b>R-square</b>	0.08		0.14		0.22	

Covariates	Buffer Capacity		Self-organization		Capacity for Learning	
	Coeff [95% CI]	p- value	Coeff [95% CI]	p- value	Coeff [95% CI]	p- value
<b>Adjusted R-square</b>	0.07		0.13		0.21	

The educational status of the household head demonstrates significant associations with self-organization and capacity for Learning. This variable was not included as a covariate in the regression model with buffer capacity as the dependent variable, as it did not meet the assumptions of regression analysis. Individuals residing in households where the head has primary or secondary education tend to have higher scores in self-organization and capacity for learning compared to those with no formal education. This indicates the positive role of education in enhancing self-organization and learning capacities.

Household size shows a statistically significant effect on all three dependent variables. Medium-sized households (4 to 6 members) tend to have higher scores in Buffer Capacity, self-organization, and capacity for learning compared to small households (1 to 3 members). Large households (more than 7 members) also exhibit higher scores, especially in capacity for learning. This suggests that larger households may foster greater resilience and learning capacities.

The gender of the household head does not significantly influence any of the three dependent variables in this study. Both male and female-headed households show similar scores in buffer capacity, self-organization, and capacity for learning.

The Model F-statistics indicate that the models are statistically significant for all three dependent variables, suggesting that the combined effect of covariates explains a significant portion of the variance in the outcome variables. The R-squared and Adjusted R-squared values indicate that the models have moderate goodness of fit, explaining 8 percent, 14 percent, and 22 percent of the variance in Buffer Capacity, Self-organization, and Capacity for Learning, respectively.

The regression analysis provides insights into the factors that influence individual dimensions as well as the overall livelihood resilience in the context of this study. These findings contribute to the understanding of the complex interplay between demographic and socioeconomic factors

and household resilience, which can inform targeted interventions and policies aimed at enhancing resilience and learning abilities in similar contexts.

#### 4.8 Correlations between the three dimensions of livelihood resilience

Table 5.3 presents the correlation coefficients elucidating the interrelationships among the three dimensions of livelihood resilience, used within the framework of this study. Notably, positive correlations emerged across all pairs of resilience dimensions. Particularly, a stronger correlation was discerned between self-organization and learning capacity. This finding implies that interventions aimed at enhancing households' learning capacity can concurrently strengthen their self-organizational capabilities. These findings are underpinned by a coherent rationale. The increase in household group associations and participation in collective activities is expected to facilitate greater involvement of community members in skill development programs, which in turn should lead to enhanced knowledge sharing within the community. Additionally, our analysis revealed a positive correlation between buffer capacity and both self-organization and learning capacity. This observation suggests the presence of a tripartite relationship among these three dimensions, whereby buffer capacity, self-organization, and learning capacity collectively influence and reinforce one another within the context of livelihood resilience.

**Table 4.16: Correlations between the three dimensions of livelihood resilience**

<b>Dimensions</b>	<b>Buffer Capacity</b>	<b>Self-Organization</b>	<b>Learning Capacity</b>
<b>Buffer Capacity</b>	1	0.264**	0.245**
<b>Self-Organization</b>	0.264**	1	0.359**
<b>Learning Capacity</b>	0.245**	0.359**	1

\*\*Correlation is significant at the 0.01 level (2-tailed)





CHAPTER 5:

DISCUSSION

## Chapter Five: Discussion

### 5.1 Environmental migration in the context of the Push and Pull theory

The study's findings suggest environmental migration is a multifaceted phenomenon influenced by various factors that either compel individuals to leave their current place of residence (push factors) or attract them to move to a new location (pull factors). The presented findings shed light on the interplay of such factors in the decisions of migrants and non-migrants, offering insights into the complexities of migration dynamics.

The study reveals that both migrants and non-migrants perceive the loss of income opportunities as a significant push factor. This observation aligns with the well-established push theory in migration studies, which emphasizes the role of economic factors, such as job scarcity or low income, as compelling drivers of migration (First et al., 2021, Adger et al., 2020, Mayunga, 2007). Economic hardships, including extreme poverty and debt, are expressed as concerns by both migrants and non-migrants. This highlights the role of financial stability in migration decisions, consistent with research emphasizing poverty as a significant driver of migration (Ahmmed et al., 2020). The burden of debt coupled with the loss of assets, in particular, can be a powerful motivator for individuals to seek improved economic opportunities elsewhere. In contrast, the availability of good employment opportunities stands out as the most influential pull factor for migrants. This again aligns with the pull theory, highlighting economic incentives, such as job prospects, as strong attractors for migration (Liu et al., 2020).

Interestingly, a higher proportion of migrants cite family obligations as a push factor compared to non-migrants. This finding underscores the complex interplay between family responsibilities and migration decisions. Additionally, having family members and friends at the destination emerges as a significant pull factor for migrants. This underscores the role of social networks in facilitating migration by providing support and a sense of belonging. These findings resonate with studies on social networks and migration (Rabbani et al., 2022, Fine & Lapavistas, 2004), emphasizing the importance of social connections in migration decisions. Both groups express concerns about declining agricultural productivity and natural resources, with a slightly higher percentage among migrants. This mirrors findings from Moniruzzaman et al. (2018) and Gautam (2017), highlighting environmental degradation and resource scarcity

as push factors contributing to migration. While less dominant than employment opportunities, the availability of good housing options and access to educational and health services is considered a pull factor.

The study also uncovers factors deterring non-migrants from considering migration which include family commitments, affordability, lack of skills, fear, community networks, security concerns, and the desire to preserve assets. The findings support previous studies from Mallick et al. (2020) and Singh et al. (2020) in unraveling complex emotional, social, and economic barriers, that dissuade trapped populations from relocating.

The study's findings align with the push-pull theory of migration, emphasizing the pivotal role of economic, social, and environmental factors in shaping migration decisions. The multifaceted nature of migration, as reflected in the interplay of various push and pull factors, underscores the complexity of migration dynamics. Understanding these dynamics is essential for policymakers and researchers seeking to address the challenges and opportunities associated with migration, especially in the context of evolving global migration trends.

## **5.2 Impacts of migration on livelihood capitals**

In this research, households were categorized into two groups based on their migration status. As depicted in Figure 4.7, the levels of five livelihood capitals between migrant and non-migrant households were compared. To achieve this, we calculated the average capital measurement for each household, considering responses from all participants. The findings revealed that non-migrant households were notably better off in terms of financial, social, and natural capital when compared to their migrant counterparts. Migrant households only surpassed non-migrant households in terms of physical capital, and, no significant difference was observed in terms of human capital. These results underscore the substantial impact of migration on livelihood capital assets.

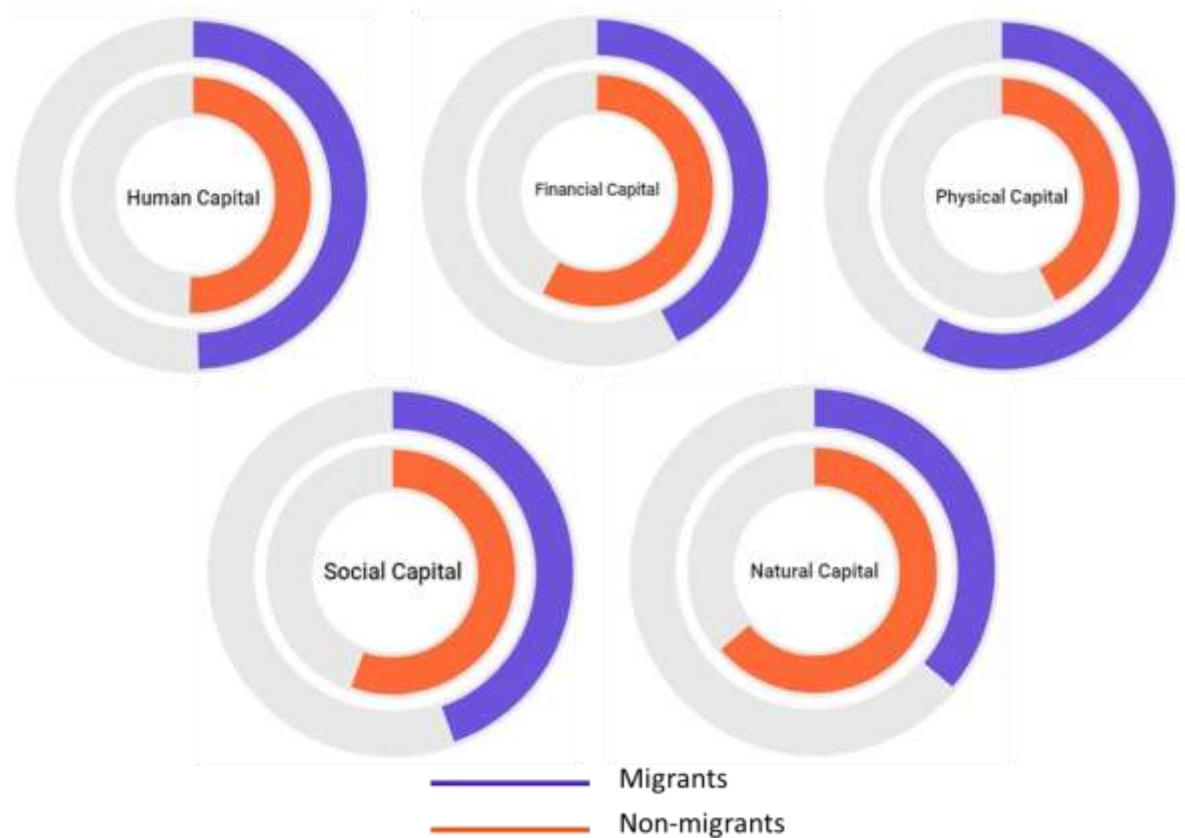
Past studies have established that migration serves as an effective adaptation strategy in mitigating the impacts of environmental hazards by reducing individuals' physical exposure to such risks (Gemenne & Blocher, 2017; Bardsley & Hugo, 2010). The findings of this study align with this notion, as they reveal that the physical capital of migrant households significantly exceeded that of non-migrant households. Indeed, the study demonstrated that environmental migration contributed to enhanced access to housing, essential utilities, sanitation, connectivity, and fundamental amenities, including hospitals and markets.

**Jahanara, a 40-year-old migrant respondent from Chandpur,** encapsulates this transformation in her statement, which illustrates how migration alleviated her daily struggles with limited resources:

*“Salinity became a huge problem for our community after Sidr and Aila. Especially, during the cropping periods, people were constantly fighting over water- everyone wanted it for themselves. People had to choose whether to use the available water for drinking or to water their crops. Here, we are free of these constraints.”*

**Figure 5.1**

*Comparison among the five livelihood capitals between migrant and non-migrant households*



No significant differences were observed in terms of human capital between migrant and non-migrant households. While there was an association noted between migration and the education status of household heads, it appeared that migration did not have a significant impact on the labor capacity or the health of household members. Conversely, migration did result in a notable decrease in the overall social capital of households, leading to reduced connections with their family and community networks. Previously, studies by Torres & Casey (2017) and

Suárez-Orozco et al. (2011) highlighted how climate-driven migration can disrupt social bonds and have adverse effects on the mental well-being of the migrants. Both migrant and non-migrant households exhibited low social safety net coverage. However, for the migrant group, a staggering 92% of households were not enrolled in any safety net programs, even though the respondents met the eligibility criteria based on factors such as age, marital status, or disabilities. The findings support the established idea that urban slum dwellers of Bangladesh face social, economic, and political marginalization, and are effectively denied access to essential societal resources (Rashid, 2009). Migrant respondents were generally wistful over their decision to migrate and their grievances are reflected in the words of **Md. Rubel, aged 44 years, and hailing from Netrokona:**

*“I never wanted to leave my village behind. People knew and respected me there. But my motherland betrayed me. After the second time I lost my home to the river, I was left with no other choice than to move.”*

Despite the challenges, some migrant households found unique adaptive strategies to cope with their new environments. Relationships between neighboring migrant households were generally positive and was a mean of strengthening their social capital. As most households in the slums were migrant households, the classic competition between host and migrant communities was not found. Here, the evidence diverges from Swain's (1996) findings which suggest environmental migration and the resulting competition for resources lead to conflicts at various societal levels. Besides, one practice of autonomous adaptation was that households from the same district or sub-districts chose to live in close vicinity of each other, to the extent that they were known and identified as individual communities. For example, under this study, we found paras or communities of migrants from Barisal, Bhola, Kishoreganj, and even households who were displaced due to riverbank erosion. The benefit of such practices is illustrated by the following quote by **Akbor, a 35-year-old migrant from Bhola:**

*“I came to Dhaka because I knew my brother-in-law was making a good living here. Back home, the debts were piling up and I wanted a better life for my family. After coming here, I saw other families from my district (Bhola) living in neighboring houses in one area of the slum. Although I missed my home, it was comforting for me to have a piece of Barisal in the middle of Dhaka.”*

Migration was also associated with a lower natural capital base, as the migrant households typically did not own any housing or farming land. Although the practice of poultry farming was prevalent in the slums, almost none of the migrant households were found to own any livestock. Moreover, the change of environment from rural to urban settings came as a shock to the migrants and many could not habituate themselves to their surroundings even after many years of living there, as expressed by **Momtaj, a 70-year-old migrant from Chandpur**:

*“Even after years of living in this slum, it is hard for me to accept it as my home. We had a spacious house with a yard where I could grow vegetables. We had a cow and a few chickens, which helped me earn some money on the side. Here, my whole life is passing within these four walls. Our houses are so close to one another that I don’t even have enough space to stretch my legs anymore.”*

The statement also highlights the problem of lack of income diversity among the migrants. More than 80% of the households only depend on one source of income. Moreover, although the migrants in this study found enhanced employment opportunities after migration, their per capita annual income (ratio of annual household income to the number of members in the household) as well as their ability to save money for emergencies was less compared to the non-migrant group. Issues of exclusion of rural migrants from high-paying jobs in urban settings were reported previously by Gautam (2017). In the words of **Selina, 30, from Barisal**:

*“Working as a fisherman didn’t always guarantee an income for my husband. On some days we would earn a lot, then for months at end, we would catch nothing. In Dhaka, as a rickshaw puller, he generally earns 300-400 taka per day. However, everything here is so expensive that we are left with no savings at the end of each month.”*

Paradoxically, even though the economic environment was the principal driver of migration for migrant households, the non-migrant group scored higher in terms of financial capital compared to the migrant group. The evidence from this study opposes assumptions and findings from studies by Adger et al. (2020), Awumbila et al. (2015), and Tacoli (2009) which suggest poverty-driven migration serves as a means of diversifying and strengthening households’ financial standing.

### **5.3 Impacts of migration on livelihood resilience**

While the livelihood assets only described one component of livelihood resilience, this study sought to comprehensively examine all dimensions of livelihood resilience. The research

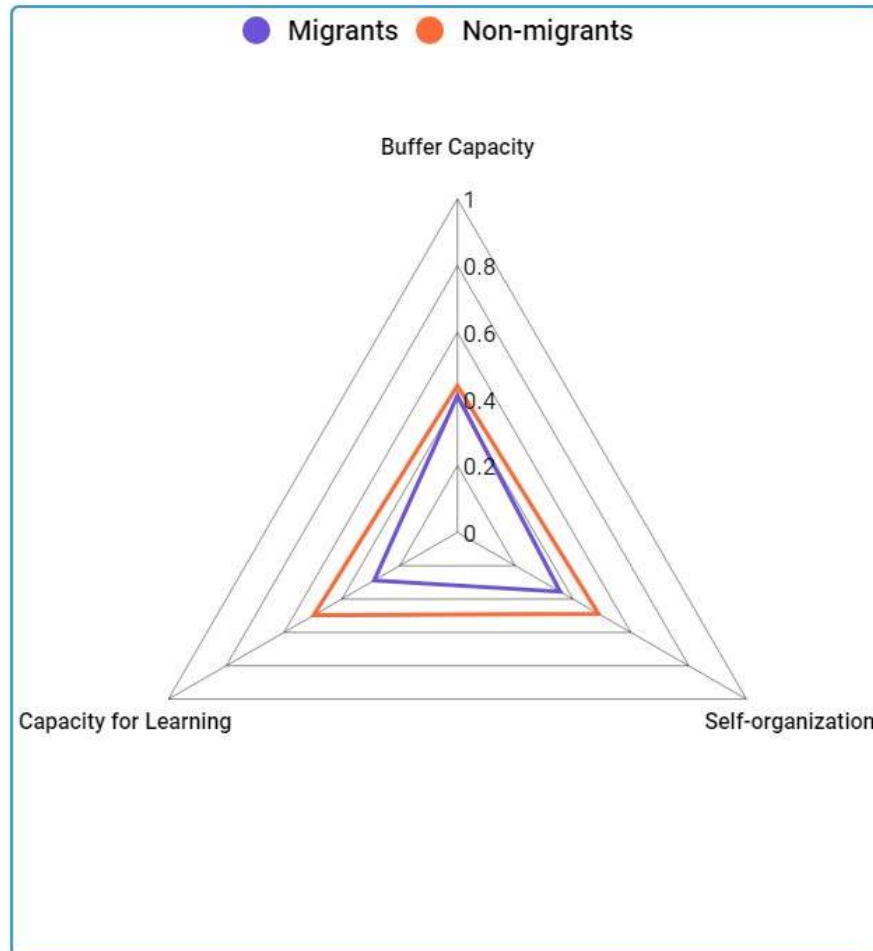
revealed variations in household livelihood resilience between migrant and non-migrant households. Specifically, environmental migration was associated with notably reduced buffer capacity, self-organization, and learning capacity, resulting in lower overall resilience scores. Among these dimensions, the smallest disparity between the two groups was observed in their buffer capacity, whereas the most significant difference was evident in their capacity for learning.

In the previous section, the variations among the sub-components within the buffer capacity were outlined. While the overall average scores of the two groups exhibited only a small difference, it is noteworthy that both in the combined buffer capacity and across the majority of the individual sub-components, the non-migrant group had higher scores compared to the migrant group significantly. The findings are consistent with the majority of prior research which indicated that post-disaster relocation and resettlement heightened the livelihood vulnerability of relocated residents (Liu et al., 2020; Sina et al., 2019; Galarza-Villamar et al., 2018).

Turning to the dimension of self-organization, the findings revealed that the non-migrant group exhibited a higher degree of involvement in political, social, and cultural group associations compared to the migrants (Torres & Casey, 2017; Rashid, 2009). Additionally, they were more inclined to engage in collective endeavors for the common good, such as repairing roads, dams, or people's houses (Sobczak-Szelc & Fekih, 2020). Conversely, migrant households generally did not participate in such activities unless there was an external organization overseeing the process. Furthermore, migrant households expressed less confidence in their immediate network of relatives and friends when it came to lending and borrowing money, often resorting to borrowing or lending at an interest rate. However, this practice was deemed acceptable as most neighboring households were themselves in need and unable to lend money to others.

**Figure 5.2**

*Spider diagram comparing the three dimensions of livelihood resilience between migrant and non-migrant households*



In this study, the capacity for learning, which revolves around the acquisition and application of knowledge, occupies a central role. The findings indicate a clear association between households' migration status and their inclination to invest in activities aimed at generating knowledge, such as funding their children's education within the household. It was found that non-migrant households exhibited a greater tendency to invest in educational pursuits in comparison to their migrant counterparts. This disparity sheds light on the lower scores observed in the learning capacity of the migrant group. Additionally, Maharjan et al. (2020) report migrant households from climate hotspots possess a more comprehensive understanding of the ramifications of climate change, and show enhanced capabilities in anticipating and mitigating the effects of climate-related extremes. In contrast, the non-migrant households



under this study displayed a higher degree of familiarity with the concept and risks associated with climate change, largely due to the presence of NGO activities in their local communities. Particularly, NGO interventions involving community-based approaches led to increased participation of non-migrant household members in skill development and training programs (Masud-All-Kamal & Nursey-Bray, 2021; Roy & Sims, 2021), which were largely absent within the migrant community. Consequently, the absence of participation in such programs among migrant households hindered the flow of new information and technology within their community.

The absence of opportunities for new skill development affected both males and females, but the consequences were particularly dire for female-headed households. Many of these women had relied on their male counterparts for economic security throughout their lives. Therefore, the sudden responsibility of earning a livelihood through their skills proved to be a daunting challenge for them. The most common profession chosen by female household heads was found to be working as housemaids, a low-paying occupation lacking long-term job security. The struggles faced by single mothers in these slum areas are encapsulated in the following quote by **Firoza, a 30-year-old migrant from Narsingdi**:

*“My husband moved to the city for better income but ended up abandoning me and my son. Seeing as we would soon lose our house to the river, I took my son and came to Dhaka. Here, I work as a maid, as all the other jobs seem to be suited for men. There’s no one to look after my son on most days. My mother sometimes comes to live with us, but it is so expensive that she has to leave soon. If I made a little more money, she could live with us all the time.”*

A significant statistical comparison between the livelihood resilience of female-headed households among migrants and non-migrants proved challenging due to the scarcity of such respondents within the non-migrant group. This disproportionate finding carries implications that can be interpreted in two possible ways: either female household heads are resorting to migration as a last-ditch effort to support their families, or migration is enabling more women to enter the workforce and assume the role of primary providers for their households. The latter assumption supports Pessar & Mahler’s (2003) argument that if given the chance to migrate, women migrants can potentially benefit more compared to males in terms of empowerment. However, regardless of the underlying reason, taking on the primary provider role created a

void in caregiving within the family, resulting in additional responsibilities for these female heads (Rao et al., 2019). As mentioned, the number of female-headed households among the non-migrants was quite limited. Nevertheless, their empowered positions within their families were often tied to external interventions, and their narratives tended to convey a more positive outlook. The story of **Jamila, a 39-year-old resident from Char Kukri Mukri**, one of the remotest study areas under this research, shows the need for such positive adaptation strategies in place of migration:

*“During the winter season, our char used to attract a fair number of visitors, but the lack of overnight accommodations posed a challenge. About six years ago, an NGO introduced an innovative project to our community. They wanted to start “home-stay” services for tourists, offering them a chance to experience our way of life. The initiative required us to provide the land as our contribution, while the NGO would cover the remaining expenses. The organization also suggested that the houses be registered in the names of the wives of the households, as they would be responsible for taking care of both the guests and the establishments. The proposal intrigued the community, but it also sparked concerns about its feasibility. Despite these reservations, I decided to take a leap of faith and volunteered the space in my backyard for this project. It turned out to be one of the most rewarding decisions of my life. Now each year, I am able to set aside a portion of the earnings from these houses for the future and the rest helps to cover any gaps in my husband's income from farming.”*

The study revealed that the household's livelihood resilience is influenced by demographic and socioeconomic factors including migration status, household size, family type, household expenditure, the education level, and gender of the household head (Bauer et al., 2022; Zhao et al., 2022; Zhou et al., 2021). Notably, migration status was found to have a significant negative impact on household livelihood resilience. This finding aligns with previous research, which has consistently indicated that relocated or migrant populations tend to exhibit high levels of livelihood vulnerability (Liu et al., 2020; Sina et al., 2019; Galarza-Villamar et al., 2018).

#### 5.4 Overall synthesis

The discussion presented so far delves into the intricate relationship between migration and livelihood resilience in a context deeply influenced by environmental hazards. The findings align with the push-pull theory of migration, highlighting the pivotal role of economic, social, and environmental factors in shaping migration decisions. Economic hardships including loss of income opportunities, extreme poverty, and debt stand out as significant push factors for both migrants and non-migrants. In contrast, the availability of good employment opportunities serves as a strong pull factor for migrants, aligning with established migration theories emphasizing the role of economic incentives.

Paradoxically, the comparative analyses of this study in livelihood resilience components between migrant and non-migrant households reveal that non-migrants possess higher levels of financial, natural, and social capital, as well as greater self-organization and capacity for learning. These findings suggest that non-migrant households have greater access to livelihood capitals compared to their migrant counterparts.

In addition to migration status, the analysis also highlights the importance of considering demographic and socioeconomic factors in understanding and strengthening livelihood resilience in the context of migration. In particular, larger household sizes and higher household expenditures positively influence all three dimensions of livelihood resilience. Finally, the three dimensions of livelihood resilience, buffer capacity, self-organization, and learning capacity also exhibit positive correlations with each other, indicating a synergistic relationship among them in enhancing overall livelihood resilience.



## CHAPTER 6:

# POLICY IMPLICATIONS AND CONCLUDING REMARKS

## Chapter Six: Policy Implications and Conclusion

### 6.1 Policy Implications

This research aimed to empirically investigate household livelihood resilience within the context of environmental migration, utilizing the framework developed by Speranza et al. (2014). The primary objective of this study was to address the demand for more comprehensive empirical evidence concerning the impacts of environmental migration on livelihood resilience. The findings derived from the two distinct study groups within this research indicated differences in livelihood resilience between migrant and non-migrant households. Further analysis of the data revealed that undergoing migration had a notable adverse impact on household livelihood resilience.

The results presented in this study emphasize the importance of transitioning from passive income assistance programs to a combination of policy interventions and community engagement approaches that necessitate collaborative efforts among individuals, communities, and institutions to foster self-sufficiency. Based on these findings, this study recommends that:

- By properly and promptly assessing the livelihood requirements in environmentally risky zones and then matching the recovery policies and decisions with the gaps found, public and humanitarian organizations are more likely to contribute to fostering resilience among the affected people.
- The improvement of migrant populations' skill sets should be a top priority for government organizations and NGOs. The skills that enable rural communities to make a livelihood do not transfer to metropolitan areas, forcing migrating people to engage in low-paying and dangerous jobs. Access to decent employment opportunities should be facilitated through vocational training, skill development, and support for job placement.
- It is essential to couple livelihood support interventions with housing recovery and programs, as home ownership correlates with increased livelihood resilience. Affordable and subsidized housing options for individuals and families should be made available for migrants with limited financial resources.
- Fostering a strong feeling of community and togetherness is of utmost importance to the migrant populations. This might involve developing relationships inside the

- community to help newcomers integrate into it and create trust and respect between the two groups. Community engagement and social interaction between migrants and local residents should be supported through cultural events, festivals, and group initiatives.
- Economic disparities within the migrant group must be addressed, with an emphasis on marginalization based on identity, using an intersectional perspective.
  - To reduce excess pressure on urban hubs, locally appropriate and environmentally sound resettlement strategies need to be planned that take into consideration the unique challenges that migrants confront. Resettlement zones need to be secure, accessible, and equipped with the necessary facilities.
  - Climate resilience must be enhanced by increasing the efficiency of social protection programs and promoting equitable access to healthcare, employment, training, and education. Especially, it must be ensured that migrant children have access to quality education by supporting their educational needs so they are able to get out of the poverty trap.
  - Low-interest loans and insurance schemes must be made available for both trapped populations and migrant communities.
  - Information centers must be established that serve as hubs for disseminating crucial information about local services, accommodation options, income prospects, legal rights, and cultural integration.
  - Allocation of funds to macro-economic processes should be amped up that allow more expenditure in increasing social security for climate change adaptation.
  - To reduce future environmental concerns, environmental sustainability practices should be encouraged in migrant hubs, such as reforestation, waste management, and clean energy initiatives.
  - Feedback channels should be created for gathering migrants' inputs on their needs and experiences, and this information should be used to design services and policies moving forward. Migrants should be integrated actively in decision-making processes that affect their community growth and resettlement.

## 6.2 Conclusion and Future Work

These findings possess broader implications and offer valuable insights for communities susceptible to migration, not only in Bangladesh but also in other regions. This study highlights that even voluntary migration, in addition to forced or involuntary migration, can diminish household livelihood resilience. Considering the current emphasis on resilience within the global development discourse, this study provides specific insights relevant to resilience-building strategies in migrant communities. However, it's essential to recognize that these results may exhibit variations in different geographical areas.

Gaining insights into the factors that render livelihoods susceptible to extreme climatic conditions would enable policymakers to formulate effective measures aimed at strengthening the resilience of migrant households' livelihoods and mitigating their vulnerability. This research has provided comprehensive insights into the manner in which various household variables including household size and type, household head's education, income, and gender influence overall livelihood resilience. The findings also emphasize the significant impact of social networks on low-income households with limited financial resources, as they provide mutual support and contribute to increased resilience. As an illustration, migrant single mothers relied on informal networks within their neighborhoods to provide childcare services. The legal frameworks and policies on climate change have placed significant emphasis on risk reduction of the communities in disaster-prone zones, while also being closely linked to the management of natural hazards and extreme climatic events. However, there is currently a lack of established mechanisms aimed at enhancing the resilience and adaptive skills of communities that have migrated due to the impacts of climate change on their livelihood strategies.

While this study provides important insights into the relationship between environmental migration and livelihood resilience, it is important to acknowledge its limitations, which open avenues for further research. This study used a cross-sectional quantitative survey to assess livelihood resilience between the two research groups. To better understand the dynamics of resilience over time, future research should consider conducting a longitudinal study. This approach would offer a more accurate comparison of resilience levels and shed light on how these evolve in response to changing environmental conditions, especially contributing to understanding the efficacy of different interventions. Additionally, more sophisticated data

analysis techniques can be employed to delve deeper into the relationships between migration and livelihood resilience. One promising avenue is the use of the entropy method to weight all indicators. This method could provide a more nuanced understanding of the relative importance of various factors in shaping livelihood resilience outcomes. Furthermore, our study has highlighted the importance of considering the local context in understanding the phenomena under investigation. Future research should explore how different contextual factors, such as household agency, cultural norms, economic conditions, and political landscapes, influence the observed outcomes. One important scope might be comparing the experiences of forced and voluntary migrants. The geographical dimension also plays a significant role in shaping the dynamics we have explored. In this study, non-migrants were selected from only one particular coastal zone. Further research can focus on examining how different geographical regions contribute to variations in the observed outcomes. Finally, the indicators used to measure livelihood resilience in this study may have limitations in capturing the full spectrum of resilience dimensions within the context of environmental migration. Future research should consider refining the livelihood resilience index, tailoring it specifically to the unique challenges and dynamics of environmental migration.





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# APPENDICES

**Appendices**

**Appendix A1 : Survey Questionnaire (Migrant Group)**

Interviewer ID	Site ID	Questionnaire ID

<b>Consent and Confidentiality Agreement</b>		
<p>I am working on a research project titled “Impacts of environmental migration on livelihood resilience: A comparative assessment between urban labor migrants and rural non-migrants” with the help of the Institute of Disaster Management &amp; Vulnerability Studies, University of Dhaka and German Red Cross. The main objective of this project is to investigate the impacts of environmental migration on livelihood resilience of the migrant households. For this purpose, I want to carry out a short survey, where I will be asking questions about you and your household members. The survey is expected to take approximately 15-20 minutes to complete. If you agree to participate, the information you provide will be used for research purposes only. Your responses to these questions will remain strictly confidential and your name will not appear in any data that is made publicly available. You may withdraw from the study at any time and if there are questions that you would prefer not to answer then we respect your right not to answer them. We would like to write down your contact information in case we need to follow up with you for more information or clarification.</p>		
Do you consent to participate in and provide information for this study?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (If no, please conclude the interview and move to the next household)
Has your household migrated to Dhaka from any other district of Bangladesh?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (If no, please conclude the interview and move to the next household)
Did you migrate to Dhaka due to adverse environmental changes at your place of origin?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (If no, please conclude the interview and move to the next household)

**Section 1: Details of the Respondent**

Sl No.	Questions	Responses	Skip
1	Name		
2	Age		
3	Gender	1= Female 2= Male 3= Third Gender	
4	Religion	1= Muslim 2= Hindu 3= Christian 4= Buddhism 5= Others _____	
5	What is your current marital status?	1= Unmarried 2= Married 3= Separated 4= Divorced 5= Abandoned	
6	What is your occupation?	1= Government/ Non-government service 2= Small Business 3= Day labor 4= Driver 5= Handicrafts/ Tailoring 6= Hawker	

		<p>7= Livestock rearing              8= House help              9= House-wife              10= Unemployed              11= Others _____</p>	
7	What is the occupation of your household head?	<p>1= Government/ Non-government service              2= Small Business              3= Day labour              4= Driver              5= Handicrafts/ Tailoring              6= Hawker              7= Livestock rearing              8= House help              9= House-wife              10= Unemployed              11= Others _____</p>	If the respondent is the head of the household, skip to the next question
8	Which district do you come from?		
9	Which upazilla do you come from?		
10	Which village do you come from?		
11	Which disasters have you experienced in the past? (Multiple Responses)	<p>1= Flood              2= Cyclone              3= River Erosion              4= Drought</p>	

		5= Thunderstorm 6= Cold wave 7= Heat wave 8= Salinity 9= Others (Specify) _____	
12	How significant was the role of disasters behind your decision to migrate to Dhaka?	0= Not significant 0.25= Scarcely significant 0.5= Somewhat significant 0.75= Significant 1= Extremely significant	

**Section 2: Measure of Livelihood Resilience**

<b>C1: Buffer Capacity</b>			
Human Capital			
Sl No.	Questions	Response Options	Skip
13	How many members are there in your household?	Count	
14	How many of your household members are working?	Count	
15	What is the educational status of the head of your household?	0= No formal education 0.25= Primary education (Class 1-8) 0.5= SSC/Equivalent 0.75= HSC/Equivalent 1= University degree or above	
16	How many members of your household have a physical/ mental disability or an issue?	Count	



Financial Capital			
Sl No.	Questions	Response Options	Skip
17	What is your household's average monthly income?	BDT	
18	What is your household's average monthly expenditure?	BDT	
19	Does your family have any savings?	0= No 1= Yes	
20	Are your income sources diversified?	0= No 1= Yes	
Physical Capital			
Sl No.	Questions	Response Options	Skip
21	What is the material of the roof of your house?	0= Thatch 0.5= Iron 1= Concrete	
22	Does your household have electricity and gas connections?	0= No 0.5= Either one of the two 1= Yes	
23	How often during a year do you have access to safe sanitation facilities?	0= Almost never 0.25= Rarely 0.5= From time to time 0.75= Most of the time 1= Almost always	
24	What is the condition of the roads surrounding your house?	0= Very poor 0.25= Poor	

		0.5= Adequate 0.75= Good 1= Very good	
25	Do you face any barriers reaching the facilities (e.g.- hospital, markets etc) around your house?	0= Yes 1= No	
Natural Capital			
Sl No.	Questions	Response Options	Skip
26	Do you own any agricultural land?	0= No 1= Yes	
27	Do you own any housing land?	0= No 1= Yes	
28	Do you own any livestock?	0= No 1= Yes	
29	How often during a year do you have access to clean water?	0= Almost never 0.25= Rarely 0.5= From time to time 0.75= Most of the time 1= Almost always	
Social Capital			
Sl No.	Questions	Response Options	Skip
30	After migrating to Dhaka, how connected are you to your network of friends and relatives?	0= Poorly connected 0.25= Somewhat Connected 0.5= Moderately Connected 0.75= Well connected 1= Extremely connected	

31	How well do you communicate with your neighbors?	0= Very poor 0.25= Poor 0.5= Adequate 0.75= Good 1= Very good	
32	Is your household covered by any social safety nets (insurance/ subsidies etc.)?	0= No 1= Yes	
<b>C2: Self-organization</b>			
Sl No.	Questions	Response Options	Skip
33	Are the members of your household parts of any group/ associations?	0= No 1= Yes	→ Skip to 32
34	If yes, how many?	Count	
35	Do the members of your household participate in collective community affairs?	0= No 1= Yes	→ Skip to 34
36	If yes, then how often do they participate in collective community affairs?	0= Very rarely 0.25= Rarely 0.5= Sometimes 0.75= Often 1= Very often	
37	If necessary, can you rely on your kith and kin for borrowing money and vice versa?	0= No 1= Yes	→ Skip to 36
38	If yes, how much can you rely on your kith and kin for borrowing money and vice versa?	0= Very little 0.25= Little 0.5= Somewhat reliable	

		0.75= Reliable 1= Very reliable	
39	How long does it take to reach the nearest mode of transportation from your home on foot?	(In minutes)	
<b>C3: Capacity for learning</b>			
Sl No.	Questions	Response Options	Skip
40	Do you know about climate change?	0= No 1= Yes	→ Skip to 39
41	Do you believe your health, food security, livelihood services etc. are at risk due to climate change?	0= Yes 1= No	
42	How many members of your household are between 5 to 18 years of age?	(Count)	
43	How many members below the age of 18 are working to earn a living in your household?	(Count)	
44	Does your household bear any educational expenses (of children/ relatives)?	0= No 1= Yes	→ Skip to 41
45	If yes, how much is your expenditure for education per month?	(BDT)	

46	How many times have you attended any information/skill development event in the last 12 months?	(Count)	
47	Do you practice sharing new information or skills learnt with the members of your community?	0= No 1= Yes	

**Appendix A2 : Survey Questionnaire (Non-migrant group)**

Interviewer ID	Site ID	Questionnaire ID

**Consent and Confidentiality Agreement**

I am working on a research project titled “Impacts of environmental migration on livelihood resilience: A comparative assessment between urban labor migrants and rural non-migrants” with the help of the Institute of Disaster Management & Vulnerability Studies, University of Dhaka and German Red Cross. The main objective of this project is to investigate the impacts of environmental migration on livelihood resilience of the migrant households. For this purpose, I want to carry out a short survey, where I will be asking questions about you and your household members. The survey is expected to take approximately 15-20 minutes to complete. If you agree to participate, the information you provide will be used for research purposes only. Your responses to these questions will remain strictly confidential and your name will not appear in any data that is made publicly available. You may withdraw from the study at any time and if there are questions that you would prefer not to answer then we respect your right not to answer them. We would like to write down your contact information in case we need to follow up with you for more information or clarification.

Do you consent to participate in and provide information for this study?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (If no, please conclude the interview and move to the next household)
Are your lives and livelihoods affected by disasters and recurrent climatic events?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (If no, please conclude the interview and move to the next household)
Has any member of your household migrated to any other area of Bangladesh?	<input type="checkbox"/> No (Please start the interview)	<input type="checkbox"/> Yes (If yes, please conclude the interview and move to the next household)

**Section 1: Details of the Respondent**

Sl No.	Questions	Responses	Skip
1	Name		
2	Age		
3	Gender	1= Female 2= Male 3= Third Gender	
4	Religion	1= Muslim 2= Hindu 3= Christian 4= Buddhism 5= Others _____	
5	What is your current marital status?	1= Unmarried 2= Married 3= Separated 4= Divorced 5= Abandoned	
6	Type of family	1= Nuclear 2= Joint 3= Extended 4= Single-parent 5= Childless 6= Step	

7	What is your occupation?	1= Government/ Non-government service 2= Small Business 3= Day labour 4= Driver 5= Handicrafts/ Tailoring 6= Hawker 7= Livestock rearing 8= House help 9= House-wife 10= Unemployed 11= Others	
8	What is the occupation of your household head?	1= Government/ Non-government service 2= Small Business 3= Day labor 4= Driver 5= Handicrafts/ Tailoring 6= Hawker 7= Livestock rearing 8= House help 9= House-wife 10= Unemployed 11= Others	If the respondent is the head of the household, skip to the next question
9	Contact Number		



**Section 2: Disaster and Migration Experience**

Sl No.	Questions	Responses	Skip
10	Which disasters have you experienced in the past? (Multiple Responses)	1= Flood 2= Cyclone 3= River Erosion 4= Drought 5= Thunderstorm 6= Cold wave 7= Heat wave 8= Salinity 9= Others (Specify)	
11	What are your reasons behind not migrating to a different area?	1= Family commitments 2= Can not afford moving 3= Lacks skills to secure employment elsewhere 4= Lack of necessary knowledge/ resources 5= Fear of the unknown 6= Fear of losing community networks 7= Lack of security in destination 8= Fear of leaving behind assets 9= Others (Specify)	

12	Do you believe migration can improve your socio-economic security?	0= No 1= Yes 2= Not sure	
13	How significantly do environmental shocks and stresses negatively affect your lives and livelihoods?	0= Not significant 0.25= Scarcely significant 0.5= Somewhat significant 0.75= Significant 1= Extremely significant	
14	Do you plan to migrate in the near future?	0= No 1= Yes	
15	If yes, which of the following would be push factors behind your decision to migrate? (Multiple Responses)	1= Loss of income opportunities 2= Loss of housing/ assets 3= Extreme poverty/ debt 4= Increasing weather extremes 5= Declining agricultural productivity/ natural resource base 6= Family obligations 7= Others (Specify)	

16	Which of the following has helped to you to adapt to the changing climate? (Multiple Responses)	1= Loans/ microfinance schemes 2= Remodeling homestead 3= Relocating homestead 4= Crop diversification 5= Using climate resilient farming techniques 5= Switching jobs 6= Infrastructure (Barrages/ Dams/ Sluice gates) 7= Training and Skill Development 8= Government interventions (Specify)_____	9= NGO interventions (Specify)_____
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**Section 3: Measure of Livelihood Resilience**

<b>C1: Buffer Capacity</b>			
Human Capital			
Sl No.	Questions	Response Options	Skip
17	How many members are there in your household?	(Count)	
18	How many of your household members are working?	(Count)	
19	What is the educational status of the head of your household?	0= No formal education	

		0.25= Primary education (Class 1-8) 0.5= SSC/Equivalent 0.75= HSC/Equivalent 1= University degree or above	
20	How many members of your household have a physical/ mental disability or an issue?	(Count)	
<b>Financial Capital</b>			
Sl No.	Questions	Response Options	Skip
21	What is your household's average monthly income?	BDT	
22	What is your household's average monthly expenditure?	BDT	
23	Does your family have any savings?	0= No 1= Yes	
24	Are your income sources diversified?	0= No 1= Yes	
<b>Physical Capital</b>			
Sl No.	Questions	Response Options	Skip
25	What is the material of the roof of your house?	0= Thatch 0.5= Iron 1= Concrete	

26	Does your household have electricity and gas connections?	0= No 0.5= Either one of the two 1= Yes	
27	How often during a year do you have access to safe sanitation facilities?	0= Almost never 0.25= Rarely 0.5= From time to time 0.75= Most of the time 1= Almost always	
28	What is the condition of the roads surrounding your house?	0= Very poor 0.25= Poor 0.5= Adequate 0.75= Good 1= Very good	
29	Do you face any barriers reaching the facilities (e.g.- hospital, markets etc) around your house?	0= Yes 1= No	
<b>Natural Capital</b>			
Sl No.	Questions	Response Options	Skip
30	Do you own any agricultural land?	0= No 1= Yes	
31	Do you own any housing land?	0= No 1= Yes	
32	Do you own any livestock?	0= No 1= Yes	
33	How often during a year do you have access to clean water?	0= Almost never 0.25= Rarely 0.5= From time to time 0.75= Most of the time 1= Almost always	

<b>Social Capital</b>			
Sl No.	Questions	Response Options	Skip
34	How connected are you to your network of friends and relatives?	0= Poorly connected 0.25= Somewhat Connected 0.5= Moderately Connected 0.75= Well connected 1= Extremely connected	
35	How well do you communicate with your neighbors?	0= Very poor 0.25= Poor 0.5= Adequate 0.75= Good 1= Very good	
<b>36</b>	Is your household covered by any social safety nets (insurance/ subsidies etc.)?	0= No 1= Yes	
<b>C2: Self-organization</b>			
Sl No.	Questions	Response Options	Skip
37	Are the members of your household parts of any group/ associations?	0= No 1= Yes	Skip to 32
38	If yes, how many?	Count	
39	Do the members of your household participate in collective community affairs?	0= No 1= Yes	Skip to 34

40	If yes, then how often do they participate in collective community affairs?	0= Very rarely 0.25= Rarely 0.5= Sometimes 0.75= Often 1= Very often	
41	If necessary, can you rely on your kith and kin for borrowing money and vice versa?	0= No → 1= Yes	Skip to 36
42	If yes, how much can you rely on your kith and kin for borrowing money and vice versa?	0= Very little 0.25= Little 0.5= Somewhat reliable 0.75= Reliable 1= Very reliable	
43	How long does it take to reach the nearest mode of transportation from your home on foot?	(In minutes)	
<b>C3: Capacity for learning</b>			
Sl No.	Questions	Response Options	Skip
44	Do you know about climate change?	0= No → 1= Yes	Skip to 39
45	Do you believe your health, food security, livelihood services etc. are at risk due to climate change?	0= Yes 1= No	
46	How many members of your household are between 5 to 18 years of age?	(Count)	

47	How many members below the age of 18 are working to earn a living in your household?	(Count)	
48	Does your household bear any educational expenses (of children/relatives)?	0= No 1= Yes	→Skip to 41
49	If yes, how much is your expenditure for education per month?	(BDT)	
50	How many times have you attended any information/skill development event in the last 12 months?	(Count)	
51	Do you practice sharing new information or skills learnt with the members of your community?	0= No 1= Yes	



**Appendix A3: List of IDI Participants**

SL No.	Name	Residence	Contact	Age	Marital Status	Occupation
1	Lipi Begum	Bhasantek	01927073873	20	Married	House-help
2	Ruma Akhter	Bhasantek	01992798546	25	Married	Housewife
3	MD Harun	Bhasantek	01980380800	35	Married	Service
4	Jahanara Begum	Korail	01910775846	40	Married	Business
5	Rubina Akhter	Korail	01964229784	27	Married	House-help
6	Akhi Khatun	Korail	01646910189	26	Married	Housewife
7	MD Idris	Korail	01742444202	70	Married	Service
8	Shefali Begum	Korail	01932237034	45	Married	Housewife
9	MD Shojol	Bhasantek	01311458940	28	Married	Driver
10	Firoza Begum	Bhasantek	01316974513	30	Married	House-help
11	Selina Akhter	Korail	01988541454	30	Married	Housewife
12	Momtaj Begum	Bhasantek	01980235872	70	Widowed	Labour
13	MD Rubel Mia	Bhasantek	01754912957	44	Married	Driver
14	Akbor Islam	Korail	01727306020	35	Married	Driver
15	MD Ibrahim	Korail	01792113704	37	Married	Driver

**Appendix B: Table detailing the comparisons among components of livelihood resilience of households according to their migration status**

Dimensions	Migrants, Mean (%)	Non-migrants, Mean (%)	p-value
Buffer Capacity	0.41	0.44	<.001
Human capital	0.49	0.5	0.52
Education status of head of household	0.142	0.182	
No formal education	52.8	51.6	
Primary education	37.5	34.4	
SSC/ Equivalent	9.7	14.1	
Household members with physical/ mental impairments	0.87	0.91	
No	87.2	90.6	
Yes	12.8	9.4	
Labor capacity	0.309	0.273	
Financial Capital	0.181	0.248	<.001
Per capita annual income	0.235	0.242	
Household savings	0.11	0.23	
No	88.8	76.6	
Yes	11.3	23.4	
Income diversity	0.2	0.27	
No	80	73.1	
Yes	20	26.9	
Physical Capital	0.679	0.501	<.001
Roof material	0.498	0.498	
Thatch	0.3	0.9	
Iron	99.7	98.4	

Dimensions	Migrants, Mean (%)	Non-migrants, Mean (%)	p-value
Concrete	0	0.6	
Utilities	1	0.469	
Has neither electricity or gas connection	0	15.3	
Has either electricity or gas connection	0	75.6	
Has both electricity and gas connection	100	9.1	
Access to safe sanitation facilities	1	0.611	
Almost never	0	1.3	
Rarely	0	17.8	
From time to time	0	28.1	
Most of the time	0	40.9	
Almost always	100	11.9	
Condition of roads	0.435	0.438	
Very poor	18.8	13.8	
Poor	19.4	24.7	
Adequate	33.1	36.9	
Good	26.6	22.2	
Very good	2.2	2.5	
Barriers in accessing basic facilities	0.46	0.49	
No	45.94	49.1	
Yes	54.06	50.9	
Natural Capital	0.266	0.47	<.001
Ownership of agricultural land	0.016	0.197	
No	98.4	80.3	

Dimensions	Migrants, Mean (%)	Non-migrants, Mean (%)	p-value
Yes	1.6	19.7	
Ownership of housing land	0.041	0.403	
No	95.9	59.7	
Yes	4.1	40.3	
Livestock	0.006	0.425	
No	99.4	57.5	
Yes	0.6	42.5	
Access to clean water	1	0.856	
Almost never	0	2.2	
Rarely	0	0.3	
From time to time	0	6.6	
Most of the time	0	34.7	
Almost always	100	56.3	
Social Capital	0.397	0.496	<.001
Network of friends and relatives	0.498	0.636	
Poorly connected	13.1	0.6	
Somewhat Connected	9.7	4.4	
Moderately Connected	48.1	48.4	
Well connected	22.8	33.1	
Extremely connected	6.3	13.4	
Communication with neighbors	0.625	0.672	
Very poor	3.1	2.2	
Poor	4.7	1.6	
Adequate	40.9	34.1	
Good	41.6	49.7	
Very good	9.7	12.5	

Dimensions	Migrants, Mean (%)	Non-migrants, Mean (%)	p-value
Social safety nets	0.069	0.179	
No	93.1	82.2	
Yes	6.9	17.8	
Self-organization	0.355	0.488	<.001
Group associations	0.14	0.54	
No	86.3	45.9	
Yes	13.8	54.1	
Participation in collective affairs	0.195	0.327	
Very rarely	66.3	42.5	
Rarely	2.2	9.7	
Sometimes	20.6	30	
Often	9.1	10.3	
Very often	1.9	7.5	
Supportability from kith and kin network	0.227	0.334	
Very little	50.6	34.7	
Little	15.9	14.1	
Somewhat reliable	26.9	37.8	
Reliable	5.3	9.7	
Very reliable	1.3	3.8	
Time needed to reach the nearest mode of transportation	0.862	0.751	
Less than 5 minutes	52.5	47.5	
Between 6 to 15 minutes	39.7	21.3	
Between 16 to 25 minutes	7.8	16.3	
Between 26 to 35 minutes	0	14.1	

Dimensions	Migrants, Mean (%)	Non-migrants, Mean (%)	p-value
More than 35 minutes	0	0.9	
Capacity for learning	0.288	0.497	<.001
Familiarity with risks associated with climate change	0.475	0.536	
No	52.5	46.3	
Yes	47.5	53.8	
Investment in knowledge building	0.559	0.716	
No	44.1	28.4	
Yes	55.9	71.6	
Participation in skill and training programs	0.078	0.209	
No	92.8	79.1	
Yes	7.2	20.9	
Practice of knowledge sharing	0.04	0.525	
No	95.9	47.5	
Yes	4.1	52.5	
Livelihood Resilience	1.05	1.43	<.001

Appendix C: Pictures from the field-work



*Image 1: Survey with migrants in Bhasantek slum, Dhaka*



*Image 2: Survey with migrants in Korail slum, Dhaka*





*Image 3: IDI with a migrant in Korail slum, Dhaka*



*Image 4: Survey with non-migrants in Char Modonpur, Bhola*





*Image 5: Survey with a non-migrant in Elisha ghat, Bhola*



*Image 6: IDI with a non-migrant in Char Kukri Mukri, Bhola*