



# Analysis of the livelihood and health of internally displaced persons due to riverbank erosion in Bangladesh

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## ABSTRACT

Bangladesh is particularly vulnerable to natural calamities such as flooding, cyclones, droughts, and severe riverbank erosion as a deltaic country. Riverbank erosion brings about terrible consequences such as loss of land, human displacement, social isolation, and physical and mental well-being problems. The study used a mixed-method research approach and a multi-method data collection procedure to analyse the impact of riverbank erosion on livelihood and health. Households of Internally Displaced Persons (IDPs) due to riverbank erosion in Bangladesh's Lakshmipur district were surveyed using a structured questionnaire and an unstructured interview schedule to collect quantitative and qualitative data. Thematic content analysis, and descriptive statistics were applied to identify how riverbank erosion is inextricably linked to the IDPs' socio-economic conditions and well-being vulnerability. The findings show that riverbank erosion is responsible for the IDPs' livelihood uncertainty and substantial health concerns. Uncertainty about livelihood gives rise to socio-economic instability, poverty, diseases, and medical expenses. On top of that, the displaced people faced several difficulties, including no land ownership, living in substandard housing, no access to power, use of unhygienic toilets, social isolation, and anxiety. The research also finds inadequate government or non-governmental master plans for IDPs to overcome miserable conditions. The study results will help policymakers in Bangladesh and elsewhere to better understand the needs of vulnerable riverine communities and to design and implement policies and programmes to improve those communities' capacity to withstand shocks and recover quickly.

## Introduction

Climate change has been speeding up the devastation of the past, producing new patterns of human migration, and increasing the present vulnerability (Petrova, 2021; Assaduzzaman, 2020). We all face environmental stress every day, although the frequency and severity vary from person to person. People whose livelihoods depend on natural resources are particularly sensitive to environmental changes (Juran and Trivedi, 2015; Malak et al., 2021). For example, landslides and climate change exacerbate the vulnerability of livelihoods in mountainous areas, while sea-level rise, coastal erosion, and coastal floods exacerbate the instability of life and livelihoods in coastal areas (Singha et al., 2020; Claude et al., 2020; Hoque, 2019). Therefore, academics and practitioners have recognised a fast-emerging study topic on climate change, vulnerability, and human displacement. During the previous several decades, the frequency of severe natural disasters appears to have increased globally (Thomas et al., 2014). Climate change is predicted to significantly influence land loss, agricultural production, livelihood diversification, and food security (Petrova, 2021). Seasonal migration

has always been a critical livelihood strategy and a tradition in many cultures, but climate change is expected to increase current migratory trends (Millock, 2015).

Migration is regarded as a significant factor in the overall well-being of migrants since it affects other critical factors, such as the availability of food and water security, access to education and employment opportunities, and access to healthcare (Nayna Schwerdtle et al., 2021). Several studies have been conducted on climate-induced migration, climate-driven internal displacement, environmental migration, and general human displacement (Hunter et al., 2021; Baldwin et al., 2019). People migrate to find better economic opportunities elsewhere by leaving their own country's hazards and shortcomings and the environment's threats and vulnerabilities (Khatun et al., 2021). Since the 1980s, some researchers have argued that environmental migration may result in mass relocation, resulting in conflict, socio-economic vulnerability, and the resolution of problems (Boas, 2014; Myers, 2002; Petrova, 2021). Regarding a climate-related incident causing widespread uncertainty amongst inhabitants of an affected area, internally displaced persons (IDPs) experience its effects according to the degree of their

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personal and place-specific vulnerabilities (Lutz and Mutarak, 2017; Hunter et al., 2021). The inability to meet fundamental requirements is a significant contributor to displacement. Climate change may exacerbate people's propensity to displacement (Arseneault et al., 2015). It could be worsened for people who live on riverbanks, hills and coastal areas because it is unpredictable and hard to avoid (Haque et al., 2020; Billah, 2018).

Bangladesh is one of the world's most climate-vulnerable countries. Climate change is expected to force one out of every seven Bangladeshis to leave their homes by 2050 (Khan, 2019). Around 30 million people in Bangladesh are at risk of cyclones, floods, droughts, riverbank erosion, and coastal erosion, making it the fifth most vulnerable country in the world (Chowdhury et al., 2020). Regarding vulnerability to climate change, the two most vulnerable areas of Bangladesh's territory are the country's southwest coastline and its northern-western mainland region (Haque et al., 2020; Dastagir, 2015). Bangladesh, considered the least capable of combating natural catastrophes and least equipped to adapt to climate change, is deeply concerned about the threat of future climate change. Changes in temperatures, rainfall, waterlogging, pollution, river erosion, cyclones, and the possibility of rising sea levels are all factors that contribute to climate change in nations like Bangladesh (Ali et al., 2019; Hasnat et al., 2020; Chiba et al., 2017). According to the 2011 Bangladesh census, natural catastrophes accounted for around 2% of total internal displacement (BBS, 2011). About 9.6 million individuals from 29 regions of the country will be compelled to migrate domestically and globally by 2050 (Malak et al., 2021). It is expected that between 3 and 10 million people in Bangladesh will move to other parts of the country over the next 40 years, depending on how bad the hazards are (Alam et al., 2020; Mahmooei and Parris, 2012).

Bangladesh is particularly prone to flooding and riverbank erosion (Kartiki, 2011). The long-term economic consequences of riverbank erosion are permanent, whereas the repercussions of other threats are only short-lived (Majumdar et al., 2022). Residents of the chars (river islands) are under threat from severe riverbank erosion. In the hazards scenario, riverbank erosion and human displacement are not new; such frequent uncertainties lead to riverbank erosion and rural families' shifting both externally and internally (Alam et al., 2020; Přívara and Přívarová, 2019). According to recent estimations (Islam, 2021), riverbank erosion erodes an average of 100 km<sup>2</sup>s of land every year. Nine per cent per year is predicted to be added to the pace of riverbank erosion over the next 50 years. More than half a million people are temporarily or permanently relocated each year in the Padma, Jamuna, and Meghna river basins. As a result of the devastating flooding and riverbank erosion caused by the country's major rivers, many Bangladeshi migrants have been displaced (Haque et al., 2020). It is predicted that more people will likely be displaced in the future as climate-related disasters become more common and severe.

The study reveals how riverbank erosion affects people's livelihoods, health, and overall well-being. The article analyses the phenomenon of environmental migration in one of the most prone districts in the country. The next section provides an overview of the conceptual framework of the study area and is followed by a literature review and a description of research materials and methods. This is followed by research findings highlighting the livelihood vulnerability and health crisis of IDPs due to the riverbank. Finally, the discussion and conclusion summarise the findings and provide suggestions for protecting against IDPs' vulnerability.

## Conceptual framework

### *Climate change, flood, and riverbank erosion*

Climate change influences long-term patterns in a region's temperature, humidity, atmospheric pressure, airflow, precipitation, and particle size (Stott, 2016). We are seeing the repercussions of climate change all around the world, not just in one place. The impacts of

climate change on rivers have altered their flows and water quality. River currents and wave movement cause riverbanks to droop or erode quickly. Riverbank erosion can cause channels to move, new channels to be formed during floods, bank slumping because of undercutting, and local scour because of a dam (Malak et al., 2021). Bangladesh, a land of rivers, has been produced by the build-up of sediments carried by the combined flow of the three mighty rivers: the Padma, Jamuna, and Meghna. There are around 700 rivers and tributaries in Bangladesh, and several rivers originate in the western Himalayas and flow into the Bay of Bengal (Akter et al., 2019; Islam and Rashid, 2012). These rivers are morphologically active and constantly changing; they create islands, or chars, between their braided channels and destroy these depositional features and the major riverbanks. In Bangladesh, approximately 2400 km of riverbanks (Islam and Rashid, 2012; Hasnat et al., 2020) and 30% to 40% of the country's population live in riverine areas that are vulnerable to erosion (Paul et al., 2021). In recent decades, riverbank erosion has increased by 10–20 times as a result of climate change and unforeseen human activities (Uddin and Basak, 2012). The Bangladesh Water Development Board estimates that approximately 1200 km of riverbanks annually erode (Akter et al., 2019). Moreover, riverbank erosion is severe during the monsoon season (Uddin and Basak, 2012). On the other hand, because of the slow flow of water in delta areas, riverbank erosion can happen at any time of year. So, riverbank erosion along the coast is a year-round problem. In some areas, erosion is exacerbated by high tides, strong winds, and large waves. During the rainy season, the connecting chars are submerged, exposing the banks to the effects of water flow.

### *Displacement*

Displacement is a difficult decision that is impacted by various circumstances, one of which is the changing climate. When a person decides to move to a new location, it might be seasonal, temporary, or permanent. Human migration is induced by various circumstances, including economics, social issues, political upheavals, and environmental changes (Dekaraja and Mahanta, 2021). These forces are already impacting displacement in the majority of the world's areas, and environmental change will influence displacement outcomes by altering established drivers of relocation, such as rural incomes and exposure to hazardous circumstances (Rana and Iina, 2021; Sedova and Kalkuhl, 2020). This paradigm explains relocation in terms of current environmental concerns as well as future environmental or climate change. Displaced people make decisions about moving because of their socio-economic and other circumstances (Saha, 2016).

### *Livelihood and health impact*

Riverbank erosion impacts all riverine habitats. Riverbank erosion has had varying degrees of environmental, social, and economic impacts (Majumdar et al., 2022). Periodic flooding and erosion pose a constant threat to human life and cause severe damage to land, crops, and human settlements. Natural catastrophes and the risks they bring about pose a significant threat to the coastal population, which may be forced to relocate because of rising sea levels, a lack of clean water, escalating medical expenditures, or other adverse effects on their livelihoods and quality of life (Rakib et al., 2019). Each year, the nation's residents lose an estimated one million acres of land and houses due to riverbank erosion. Nearly one million individuals each year are impacted by riverbank erosion. Riverbank erosion has a variety of negative consequences for the people who live along its banks, including decreased educational attainment, health problems, and lower economic and social standing (Alam et al., 2020). Infrastructure, livelihoods, food production, and access to safe drinking water are all at risk as a result of riverbank erosion. Land erosion has the greatest social impact since it increases the number of individuals forced to flee their homes. People who are forced to leave their homes face economic hardships, such as

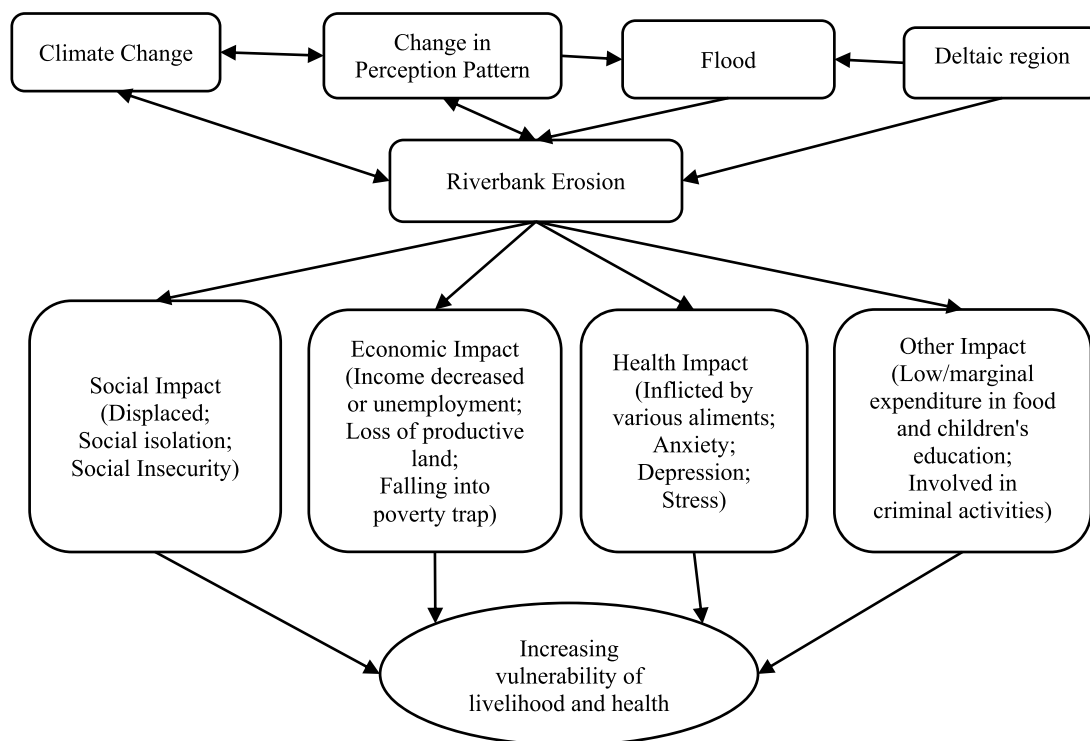
the loss of their homestead land and jobs, and they are frequently driven into poverty or become involved in criminal activity (Iqbal, 2010). Moreover, there is a long-standing problem of riverbank erosion caused by families migrating to new settlements in search of better medical care and educational opportunities for their children (Ahmad and Afzal, 2021).

Existing literature established connections between climate change, riverbank erosion, and the impact on social, economic, mental, and other matters. However, they did not take into account all these factors together to determine their relationships with riverbank erosion and livelihood and health and overall well-being. The study develops a conceptual framework in Fig. 1 that describes how riverbank erosion happens in Bangladesh as a result of climate change, flooding, and eroding deltaic soil, as well as how riverbank erosion influences climate change. The erosion of riverbanks has profound effects on people’s psychological, financial, and social well-being. These negative impacts have a detrimental effect on the livelihoods of displaced people, trapping them in a cycle of poverty and causing mental health issues. As well as discussing the effects of riverbank erosion on people’s livelihoods and quality of life, this study suggests policies that may be implemented to reduce this risk and safeguard riverine ecosystems.

**Literature review**

For this research, it is essential to review the literature on riverbank erosion and its effects on people’s livelihoods, health and well-being in Bangladesh. Consequently, the relevant literature was studied. Chowdhury et al. (2020) studied the IDPs in the Khulna district in Bangladesh. They observed that the primary reasons for migration were riverbank erosion and cyclones, and that new settlements affected social relationships. The changing climatic conditions on respondents’ health varied between previous and present locations. Islam (2021) discovered in his research Purba Khas Bandarkhola area that the char people had been displaced several times, with many homes being moved seven to eight times. Residents of the chars confront continual relocation,

instability of livelihood, and a lack of access to health care and necessities like food, safe drinking water, and shelter. Islam and Hossain (2020) analyse the losses and sufferings caused by riverbank erosion, the impact of erosion on livelihoods, and displaced people’s survival and coping mechanisms. The study was conducted near the Padma river in the Shariatpur district, Bangladesh. Displacement results in property loss and economic hardship for disadvantaged groups. Due to the river’s dynamic character and the lack of structural remedies, the people’s misery endured. According to Akter et al. (2019), a study of the migration of women from Ulania village in Bangladesh was conducted. According to the researchers, most women are socially, economically, and environmentally vulnerable after riverbank erosion. They had to adapt to a new environment and way of life in the newly migrated area. Many settlements in the Lakshimpur district have been obliterated by erosion, according to villagers of charlands and riverbanks (Islam, 2021). Crawford et al. (2020) analyse resident opinions of the new revetment and its influence on riverbank erosion danger in the lower Meghna estuary of Bangladesh. The research reveals that danger awareness is ubiquitous but may be modified by displacement and resettlement patterns, and riverbank erosion’s detrimental effects differ geographically. In their research, Majumdar et al. (2022) illustrated that agriculture is susceptible to climate change, which is the primary source of income for the vast majority of rural Indians. Rural riverine populations in India are impacted by climate change challenges as well as the recurring threat of riverbank erosion. Furthermore, natural disasters, including river erosion, saline intrusion, and rainfall patterns, are common in coastal locations. Migration to neighbouring cities is a result of all of these reasons (Hasnat et al., 2020). As a result of the eroding land, poverty, food insecurity, job loss, and perilous and unpredictable migration have all been exacerbated. As a result of these and other problems, such as the loss of social security, deteriorating physical and mental health, and others, people’s social status has declined (Akter et al., 2019). Ahmad and Afzal’s (2021) research on IDPs due to riverbank erosion in the Indus River runs through the southern Punjab area of Pakistan, a very erodible riverside zone. According to their findings,



**Fig. 1.** The conceptual framework of riverbank erosion impacts livelihood and health. Source: Modified by the author based on Rahman and Gain (2020).

riverbank erosion has a negative impact on the social, cultural, economic, and well-being of IDPs. These researches expanded our understanding of the phenomenon and added to the existing knowledge. Similarly, this research details how riverbank erosion in Bangladesh has affected the lives and mental health of IDPs due to riverbank erosion. This research also investigates the connections between riverbank erosion, climate change, and floods in Bangladesh. The article also delves into how riverbank erosion has seriously affected the health and quality of life of the southern part of Bangladesh's IDPs.

## Materials and methods

### Study area

Bangladesh, a South Asian country, is regularly brought up in discussions about the potentially catastrophic effects of climate change and natural catastrophes. Because of its location in a deltaic area prone to flooding, droughts, and cyclonic storms, it is at risk of being affected by these natural disasters. Riverbank erosion has long been a problem in Bangladesh because of its erratic rainfall, climate change, increased cyclone activity, and river run-off. As a result, Bangladesh's many rivers and streams have eroded banks, where 53 out of the 64 districts are impacted by erosion. In 17 of these 53 districts, including Lakshmipur, erosion is a severe issue. The district of Lakshmipur (Fig. 2) is severely affected by river erosion, particularly in the western and southern areas of the district. Moreover, it is situated on Bangladesh's coast and on the bank of the Meghna river, whose basin holds most of the country's water and sediments. As a result, its population is frequently displaced due to riverbank erosion. Therefore, it is an ideal area to investigate the effects

of riverbank erosion on IDPs.

### Methods of data collection

A mixed-methods strategy was used to conduct the study, including qualitative and quantitative methods (Ivankova et al., 2006). The quantitative approach is most suited to determining the factors that influence an outcome, weighing the consequences of a change, and making predictions about that outcome. Additionally, the qualitative method is optimal for comprehending a phenomenon. Data collection began with an extensive review of secondary literature, such as official policy documents and reports, laws and policies, newspaper articles, journal articles, books, and theses. Then, the IDPs' household members were surveyed through random sampling from urban and rural areas of Lakshmipur district in Bangladesh. The study used the survey method for quantitative data and developed a structured questionnaire with a series of close-ended questions. The structured questionnaire was conducted of IDP households to investigate the impact of riverbank erosion on IDPs' social, economic, and health and well-being. For qualitative data collection, this study relied primarily on unstructured interviews to elucidate the consequences and severance of IDPs, as well as to make comparisons to past and present circumstances. The abundance of information was gathered thanks to the spontaneous flow of conversation. Insights, hunches, and significant ideas were recorded during the session to assist in the exploration and clarification of developing topics. Using questions, explanations, and paraphrasing facilitated debate and verification of developing themes.

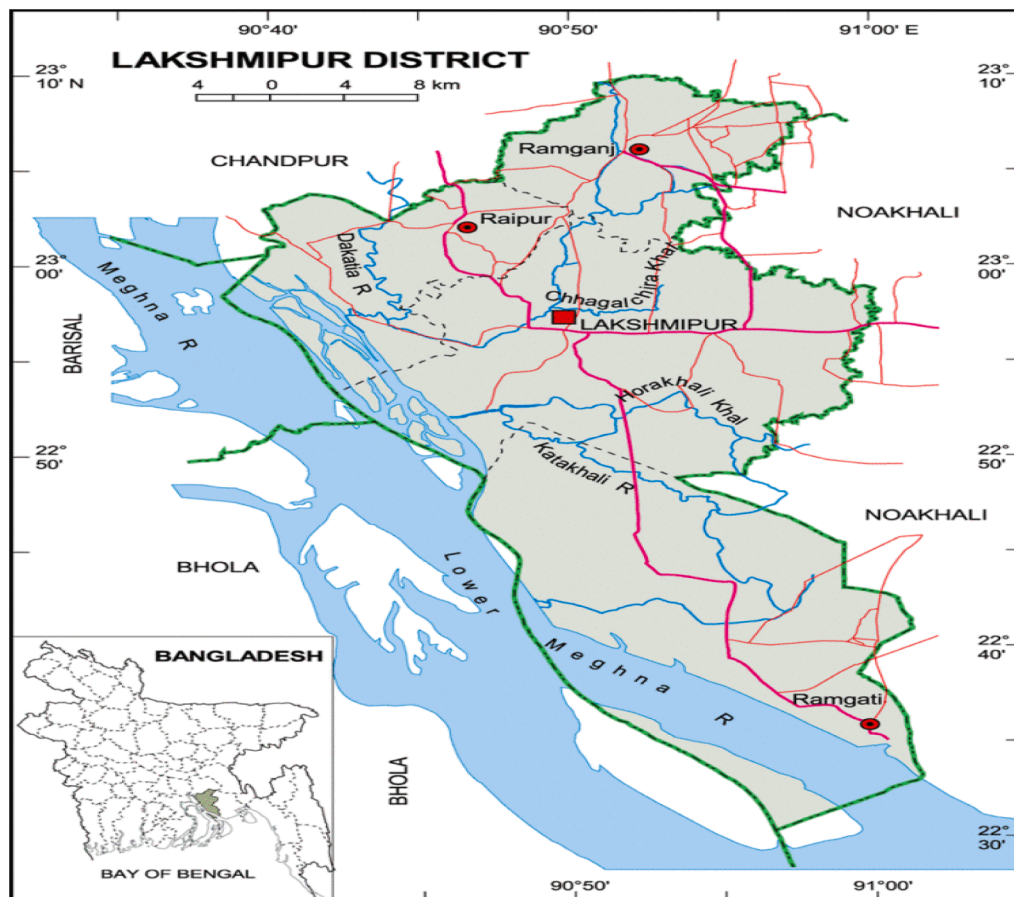


Fig. 2. Study area is the Lakshmipur district of Bangladesh on the Meghna riverbank. Source: Banglapedia. Link: ([https://en.banglapedia.org/index.php/Lakshmipur\\_District](https://en.banglapedia.org/index.php/Lakshmipur_District))



### Population and sample size

As the research focuses on the livelihood and well-being of IDPs due to riverbank erosion in Bangladesh, it considers a relevant population, including victims of riverbank erosion. Survey data and in-depth face-to-face interviews with respondents from IDP households were conducted from June to December 2021 to collect primary data on the effects of riverbank erosion on their livelihoods and health. At first, the Lakshimpur district in Bangladesh was purposively selected as it is one of the most affected riverbank districts in Bangladesh. The survey data was collected from solely 80 IDP households due to riverbank erosion. The study used a structured interview schedule. 20 in-depth interviews were conducted in addition to the survey data. An average of 20–30 min was spent on each interview, which was conducted following a unstructured interview guide. The respondents were asked about the consequences of riverbank erosion, comparing their existing and previous conditions, and suggestions for overcoming the situation.

### Social and demographic backgrounds of the survey respondents of IDPs

Table 1 provides an overview of the respondents' socio-economic and demographic backgrounds. 65% of the IDP respondents are men, whereas 35% are women. The study indicates that 73% of respondents' education levels are primary or below class one, and 6% of respondents have a college degree. Day labourers, drivers, and home servants are the most common occupations amongst respondents. In terms of professions, compared to male respondents, the majority of female respondents are homemakers and home servants. In addition, 37% of respondents are between the ages of 41 and 50, while just 7% are above the age of 60.

**Table 1**  
Demographic profile of the respondents.

Indicators	Number	Percentage
<b>Sex</b>		
Male	52	65.00
Female	28	35.00
<b>Age group</b>		
21–30 years	15	18.75
31–40 years	14	17.50
41–50 years	30	37.50
51–60 years	15	18.75
61 years above	6	7.50
<b>Level of education</b>		
Graduate and above	5	6.25
Higher Secondary	10	12.50
Secondary	13	16.25
Primary or below One	62	77.50
<b>Place of residence</b>		
Urban area	26	32.50
Rural area	54	67.50
<b>Number of children</b>		
Five or more	19	23.75
Four	26	32.50
Three	16	20.00
Two	9	11.25
One	10	12.50
<b>Occupations</b>		
Day labour	23	28.75
Housewives	13	16.25
Driving	12	15.00
Farmer	7	8.75
Government job	2	2.50
Unemployed	7	8.75
Home servant	10	12.50
Work on industry	3	3.75
Others	3	3.75
Total number=80		

### Data analysis

#### Interview analysis

The conversations have been recorded with the consent of each interviewee. While not all interviewees agreed to be recorded, key points from those who did not agree were noted. In-depth discussions were held in Bangla, and the data was translated into English and revised. In addition to analysing the data, field notes were edited, proofread, and simplified. The data has been interpreted in both its literal and conceptual senses to make it more accessible to the reader. The translation was done carefully to preserve metaphors and other contextual meanings. The information was transcribed into text and then organised by theme. I listened to the recordings and read the texts frequently to gain a feel for the information. The first step in preparing a transcript was highlighting the interviewer's remarks and queries. Next, a thorough analysis of the transcripts was conducted, identifying text segments, performing initial coding, and identifying results. Following the guidelines of a qualitative descriptive approach, the study did not employ any pre-existing coding techniques (Sandelowski, 2000). As an alternative, an inductive approach to content analysis was applied (Thomas, 2006). Thematic analysis was used to extract, examine, and report on common threads in the data. As a result of using thematic analysis, the study was able to understand the experiences of the study subjects and draw meaningful conclusions (Braun and Clarke, 2006). The information is offered in the form of anonymous quotations, which provide ample support for the paper's claims on the complexities of the linkages between riverbank erosion and the livelihoods and well-being of IDPs. After the first analysis of the transcripts was done, the results were compared and looked over. As a final step, responses from the interviews were added where they made sense.

#### Survey data analysis

SPSS (Statistical Package for Social Science) 25 was used to analyse and report the quantitative data. However, descriptive statistics like frequency and percentages were used most of the time to examine the survey questionnaire data.

### Findings

The study's findings focused on the impact of riverbank erosion on the livelihoods and health of IDPs. First, the section discusses the effects on IDPs' livelihoods due to riverbank erosion, such as income and displacement frequency, housing structure, basic needs, and economic activities of IDPs. Then the section discusses how riverbank erosion impacts the health of IDPs, such as physical and mental well-being and the accessibility of healthcare.

#### Impact of riverbank erosion on livelihoods of IDPs

##### State of income and displacement frequency

Table 2 illustrates that over 72% of respondents had monthly incomes below BDT 10,000, which indicates that most of the riverbank displaced are impoverished. Moreover, many individuals lose their jobs owing to the elimination of conventional employment. Nevertheless, they worked hard to fight erosion and sustain their livelihood. The study found that two-fifths of respondents were displaced from 2016 to 2020. Most (71%) had been displaced once, and the remaining respondents had been displaced twice or more. Moreover, 6% of respondents were displaced more than four times due to riverbank erosion. This frequent displacement makes their lives more vulnerable. Rural respondents stated that they experienced 10–15 km of riverbank erosion. Several displaced people stated,

"Because of our frequent displacement, our income has decreased dramatically. We lost our farmland, cultivated various vegetables and fruits, and earned additional money. Our female family members

**Table 2**  
State of income and displacement frequency of IDPs.

Average household income per month in Bangladeshi Taka (BDT)	Number	Percentage
Less than 10000	58	72.50
10001-20000	13	16.25
20001- 30000	5	6.25
30001-40000	4	5.00
40001 and above	0	0.00
<b>Displacement Tenure</b>	<b>Number</b>	<b>Percentage</b>
2015-2020	31	38.75
2010-2015	27	33.75
2005-2010	13	16.25
2000-2005	9	11.25
<b>Internally Displacement Frequency</b>	<b>Number</b>	<b>Percentage</b>
One time	57	71.25
Two time	9	11.25
Three time	8	10.00
Four time	5	6.25
Five time and Above	1	1.25
Total Number=80		

assisted us in our endeavour. In addition, when we lived on our homestead land, we bred domestic animals for extra money. However, this is neither permitted nor possible in rented dwellings, riverbanks, or roadsides."

On the other hand, an opposite statement was also found:

"Before being displaced, I was a teacher at a private school in rural areas where my salary was meagre. As a result of my migration to the city, my income has increased over the prior period. I have joined a school in the town where I currently teach, and my salary has increased."

**Basic needs**

According to the study, riverbank erosion impacts the livelihoods of IDPs on a variety of basic needs indicators such as food, children’s education, and social condition (Table 3). More than 80% of the respondents stated that the food, social conditions, and children’s education were dire. Surprisingly, over 15% of respondents said their electricity, sanitation, and water supply improved after moving to town owing to riverbank erosion. Because they live in a slum area in the city, they gain access to electricity connections, drinking water supplies, and sanitation services. These utilities were not accessible when they lived in rural regions. However, those living in rural areas face trouble getting electricity connections and drinking water supplies. Better work and income opportunities in Lakshampur town were the major pull factor for all households who migrated to the city. On the other hand, several respondents claimed that they do not want to migrate to the city because of social isolation, which compels them to abandon their customary way of life.

**Living arrangement and housing structure**

Living arrangements are one of the key indicators of living standards.

**Table 3**  
IDPs’ basic needs conditions (Multiple Responses).

Indicators	Improved		No change		Worsen	
	Number	Percentage	Number	Percentage	Number	Percentage
Food	2	2.50	9	11.25	69	86.25
Sanitation facilities	15	18.75	14	17.50	51	63.75
Electricity connection	16	20.00	11	13.75	53	66.25
Education of children	5	6.25	6	7.50	69	86.25
Clothing	4	5.00	42	52.50	34	42.50
Drinking water supply	14	17.50	4	5.00	62	77.50
Gender discrimination	9	11.25	12	15.00	59	73.75
Social condition	10	12.50	5	6.25	65	81.25
N = 80						

As seen in Table 4, just 11% of the IDPs currently own the land, while 89% are landless, although most had landed before being the victims of riverbank erosion. Only 5% of the interviewees could build their own houses where they are now residing, and 51% of the other IDPs are forced to live on river embankments, roadsides, and open areas. IDPs living atop the embankments have no access to safe drinking water, food, livelihoods, or sanitation. In addition, the residents’ long-term agony was exacerbated by embankment and road repairs, as well as the coastal area’s vulnerability to high tides. Below is a quotation explaining the situation:

"Riverbank erosion had ruined my property and my homestead land. With the loss of my job, home, and land, I went from middle-class to a beggar in a single day. I was forced to leave my home and now live in a riverside shack. Because of this, my anxiety and depression have increased, and I feel even more helpless than anytime."

In Bangladesh’s social and economic environment, having a sub-standard dwelling is also seen as indicative of poverty. In the countryside or town, a mug/jupri home and even a semi-pucca family count as low-income or poor. According to the data, over 79% of the respondents live in substandard housing (Table 5). In particular, the data reveals that near half (44%) of the IDPs resided in mug/jupri dwellings, with 18.75% residing in semi-pucca dwellings and 23.75% in kutcha structures. However, the research found that around 3 per cent of respondents lived in pucca houses. Consequently, the result implies that IDPs due to riverbank erosion are vulnerable in terms of housing facilities. Furthermore, kutcha and jupri dwellings are incredibly vulnerable to heavy rain, wind, and severe cold. Therefore, those IDPs who reside in this type of dwelling suffer significantly during the rainy and cold seasons.

**Impact on economic activities**

The findings indicate that riverbank erosion has a detrimental effect on economic activity, long-term poverty, financial instability, growing inequality, and failed investment. Table 6 illustrates that most migrants failed to improve their vulnerability regarding economic activities, and even the situation worsened in some cases. Findings from this study reveal that IDPs cannot lead their lives without borrowing from others. For instance, about 78% of respondents reported borrowing from non-governmental organisations (NGOs), neighbours, relatives, and local lenders after being displaced. Data shows that riverbank erosion has

**Table 4**  
Living arrangement of respondents.

Living Arrangement	Number	Percentage
Living in own house	4	5.00
Living in a rented house	41	51.25
Living on the river embankment	15	18.75
Living on the roadside	10	12.50
Living in relatives’ house	10	12.50
Total	80	100

**Table 5**  
Housing structure of respondents.

Housing Structure	Number	Percentage
<i>Pucca</i> : made of concrete roof and floor, and brick walls	2	2.50
<i>Semi Pucca</i> : made of a tin roof, brick walls, and concrete or mud floor	15	18.75
<i>Kutch</i> : made of a tin roof, bamboo walls, mud floor	19	23.75
<i>Mug/Jupri</i> : made of straw/hay/bamboo roof and walls, and mud floor	35	43.75
Others	9	11.25
<b>Total</b>	<b>80</b>	<b>100.00</b>

destroyed agricultural land and shrimp ponds, leading to a loss of income and a lack of food security. In addition, the survey reveals that most migrants' investment and household asset situation worsens as before. For instance, most respondents indicated that their investment capacity, household assets, and ability to repay loans had declined.

On the other hand, the study found that some NGOs and government aid help them recover from their current vulnerable situation. In the case of saving money, around 15% of the IDPs remain unchanged, whilst approximately three-fourths of the beneficiaries are in worse positions. However, most respondents stated that the chances of finding a job in rural areas are low, yet they still choose to remain in rural areas since they have become accustomed to rural life. The respondents also mentioned that NGOs are essential in eliminating unemployment but only have a passive role in emancipating them from their plight. Households that relied on livestock or poultry as a supplementary source of revenue saw their income drop due to the death or reduction of livestock or poultry. Some families claimed they had to sell their poultry and cattle for lack of land. Similarly, the loss of farmland to the river, the submersion of a homestead, and the inability to work as a day labourer in the village because of social status are examples of the negative impacts of riverbank erosion. Some respondents stated that,

"Most of the trouble we face is economic uncertainty. Because of riverbank erosion, we were displaced from our livelihood area and became unemployed. It is not so easy to change the livelihood, and getting a new job in an unknown area is much more difficult. Moreover, we did not get mentionable government and non-governmental support to overcome our misery."

*Impact of riverbank erosion on the health of IDPs*

*Physical well-being*

With the erosion of river banks, there has been an increase in the threats to human health. Respondents have stated that they are infected with new ailments they had not been exposed to before being displaced due to riverbank erosion. As illustrated in Table 7, several IDPs have high blood pressure, diarrhoea, malnutrition, and cardiovascular disorders that primarily originate from displacement to unhealthy places. The study found that diarrhoea was common in more than 80% of the households surveyed. The prevalence of skin diseases and malnutrition was reported by 71% and 87% of households, respectively. The majority of respondents stated that a lack of access to drinking water and a scarcity of fresh water causes an increase in skin diseases and diarrhoea.

**Table 6**  
Economic activities of IDPs (Multiple Responses).

Indicators	Improved		No change		Worsen	
	Number	Percentage	Number	Percentage	Number	Percentage
Borrowing	2	2.50	15	18.75	63	78.75
Loan repayment capacity	3	3.75	10	12.50	67	83.75
Investment	0	0.00	5	6.25	75	93.75
Household assets	3	3.75	6	7.50	71	88.75
Savings	10	12.50	12	15.00	58	72.50
Employment opportunity	1	1.25	5	5.00	74	92.50

For example, clean water is unavailable to IDPs who dwell in areas like open spaces, roadsides, or river embankments.

*Mental well-being*

Riverbanks not only have a negative impact on our socio-economic conditions and physical well-being, but they also harm our mental health. Internal displacement is a significant contributor to depression, anxiety, and stress. The devastating effects on mental health are demonstrated in this study. Due to riverbank erosion, most respondents experience anxiety, stress, and depression (Table 8). Many IDPs turn to narcotics to cope with their mental health issues. Surprisingly, 8.75% intend to commit suicide due to the uncertainty of life. Moreover, the study found that family quarrels increase significantly when 50% of the interviewees are engaged in family quarrels. According to several female respondents,

"Family quarrels were not a frequent occurrence in my family before riverbank erosion, but following the incident, we often engage in family quarrels and are occasionally beaten by our husbands. The financial crisis, loneliness, anxiety, and depression about life are the main reasons for family quarrels."

Moreover, over 62% of the respondents have insomnia caused by frustration with their livelihood, houses, property, and uncertainty about the future. IDPs are forced to shift to new locations following riverbank erosion, where they (75%) experience severe social isolation and loneliness. Because these IDPs migrated long distances from their prior location, they reported considerable social isolation and loneliness. Rural IDPs face a greater degree of social isolation than urban IDPs. According to one of the respondents,

**Table 7**  
Physical well-being of IDPs (Multiple Responses).

Diseases	Yes	Percentage
Skin diseases	57	71.25
Diarrhoea	69	86.25
Malnutrition	70	87.50
Chronic diseases	38	47.50
Water-related diseases	65	81.25
Neonatal and child health problems	63	78.75
High blood pressure	30	37.50

**Table 8**  
Mental health and well-being of IDPs (Multiple Response).

Diseases	Yes	Percentage
Anxiety and stress	75	93.75
Depression	60	75.00
Family quarrel	40	50.00
Intention to suicide	07	08.75
Insomnia	50	62.50
Addiction	10	12.50
Social isolation or loneliness	60	75.00
Social insecurity	63	78.75

"When we first relocate, the community is not welcoming us. We face several obstacles as we seek to adjust to our new surroundings. Due to their unfamiliarity with us, they are wary of us. Additionally, we continue to face various societal challenges and insecurity due to our displacement."

**Healthcare accessibility**

The study shows how riverbank erosion has impacted the ability of displaced people to get medical treatment and medicine. The majority of respondents stated that they had difficulty accessing health care information and treatment. According to the displaced, access to healthcare has become more difficult since their relocation (Table 9). Accessing healthcare services takes longer and costs more in their present location than in their former location. Interviewees mentioned that although they went to doctors and government facilities, they could not afford the required medicines (73.75%). The study found that in certain remote Char communities, no medical services are provided by the government or non-profits. Most IDPs (88.75%) bought medicine without a doctor's prescription from pharmacies in their immediate area. In addition, rural IDPs in coastal areas suffered from a severe scarcity of physicians, with over 87% of respondents saying they could not gain access to doctors for medical treatment. Thus, 71% of the population does not obtain appropriate healthcare due to high treatment expenses and a lack of non-government and government medical help at the community level. One of the respondents shared,

"I do not have the money to afford treatment for myself and my family. Currently, we are confronting a terrible circumstance. Before relocation, we were able to handle our treatment expenses since we did not pay for house rent and had work. However, we lost our land, employment, and house following relocation. As we are in a new area, nobody provides us with a loan to purchase medicine or other stuff."

**Discussion**

The study uncovered clear connections between riverbank erosion and livelihood uncertainty, food shortages, and health issues. Many families in south-eastern Bangladesh have been displaced because of the erosion of river banks. In addition to the loss of homes, lands, employment, shrimp ponds, and crops, riverbank erosion has impoverished affluent households. The loss of income due to the destruction of homesteads and agricultural land was the primary reason all middle and upper-middle-class households were displaced and became poor. Similar results were found in Saha's (2016) research in a different area of Bangladesh. It is almost common in all IDPs that houses were destroyed, food and water shortages arose, and landlessness caused people to be displaced. Moreover, coastal environmental threats, water pollution, riverbank erosion, salinity, sea-level rise, and health issues are key factors that force population displacement (Rakib et al., 2019). Furthermore, IDPs in rural areas are more vulnerable to the socio-economic impacts of natural disasters such as cyclones, salt risks, and water shortages. People in the southern districts face more

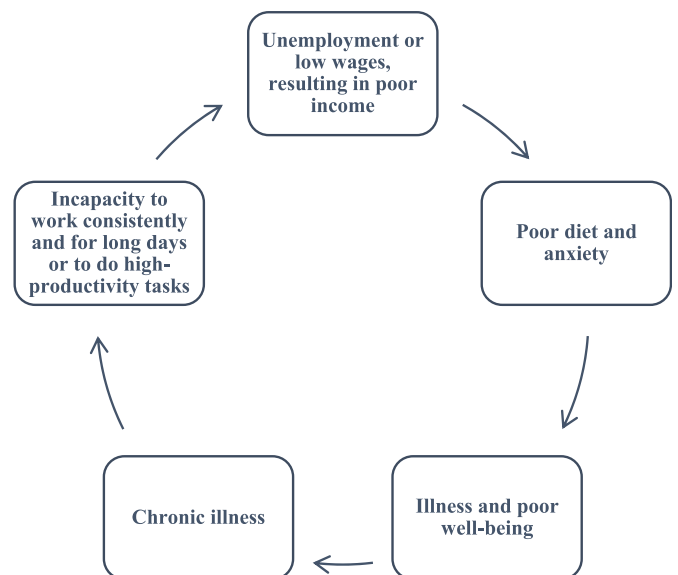
**Table 9**  
Access to medical facilities of IDPs.

Indicators	Number	Percentage
Inability to pay for treatment	57	71.25
Lack of access to healthcare information	60	75.00
Doctors shortage near resettlements	70	87.50
Unable to purchase medicine	59	73.75
Unable to get medical aid (Government and non-government)	45	56.25
Buy medicine without a doctor's prescription	71	88.75
Taking family planning	25	31.25

significant climate-related concerns, waterlogging issues during high tide, and the possibility of being inundated due to rising sea levels than their counterparts in other regions. This displacement causes urban unemployment, homelessness, poverty, and health crises.

The research reveals that most IDPs do not own houses since their houses were washed away by the river, and they now live in poor housing. Many IDPs seek refuge in river embankments and along roadsides in the Lakshmipur district. Some IDPs rent open land for living, where they build very poor temporary houses. No one could build a pucca house after river erosion destroyed their homes. Respondents often relocated their dwellings to the property of relatives, neighbours, or the government's khas land or leased land. IDPs who live on the riverbank or the roadway are at high risk of natural disasters, accidents, and social isolation. The research shows that riverbank erosion has a major impact on the economy and the physical environment, making them vulnerable to chronic poverty, lack of electricity access, poor sanitary facilities, catastrophe loss and damage, and excessive food consumption expenses. Ahmad and Afzal's (2021) also found a similar result about the riverbank erosion affecting the cultural, psychological, economic, and social well-being of the inhabited people in Pakistan. Every flooding season, riverbank erosion displaces many individuals. Riverbank residents lose their houses, farms, cattle, and other natural resources. Due to riverbank erosion, displaced inhabitants build new villages in remote places or isolated chars and live struggling with depression, poverty, and starvation. Flooding and erosion have far-reaching repercussions, including the displacement of people as well as the loss of their primary source of income. The poverty trap (Fig. 3) is prevalent amongst migrants. After losing everything to the river, most victims fall into a poverty trap where they are unable to find work and, consequently, cannot afford healthy food. A poor diet and health problems are major barriers to finding and keeping a job, and again become unemployed, falling into the poverty trap. The erosion and displacement of the char settlements might be regarded as the primary causes of their ongoing poverty. This situation creates a high level of social and environmental vulnerability.

Riverbank erosion exposes impacted regions' impoverished and disadvantaged populations to socio-economic vulnerability and erodes their assets. This study found that people who lived near the river had better access to river-based economic activities, such as dry-season agriculture in riverbeds and fishing and boating, as well as more assistance from government and non-government organisations, compared



**Fig. 3.** Unemployment and the low-wage poverty trap. Source: Modified by the author based on Devine et al. (2018).



to urban IDPs. In terms of investment and household assets, most IDPs' positions worsened. Investment and household assets declined, and IDPs' loan repayment capabilities declined. On the other hand, the data also shows that some NGOs and government institutions help them recover from their current vulnerable situation. In addition, this study found significant displacement expenses and more significant household healthcare expenditures after displacement. The article found that anxiety, stress, and depression rely on various indicators such as land ownership, children's number, education, living area, income, and the coping strategy of the respondents. Many parents with several children or other family chores suffer from despair because they cannot meet their fundamental needs. On the other hand, fewer children's parents and more educated and affluent families suffered less from the riverbank erosion because they had more alternatives to deal with the shock. The most depressed were homemakers, whereas the most stressed were day labourers. Compared to younger IDPs, the older IDPs reported higher anxiety and depression. Landless people have greater financial and health concerns than landowners. However, educated displaced individuals can deal with their predicament, whether they are landless or not. Research in Khulna found that uneducated people had more anxiety and depression than educated people. On the other hand, Hossain et al. (2021) found that IDPs' mental health is not linked to their children's education.

The study found that nearly one-third of the IDPs were displaced more than twice. Some of the respondents were displaced more than five times. In particular, char dwellers are displaced more frequently compared to urban people. Some respondents share that, first they moved to town, but after living there for many days, they failed to adjust to the town's sociocultural environment and returned to a rural area near where they previously lived. Poor riverine people rely heavily on livestock for survival and economic growth. Cattle losses due to river erosion caused three times the sadness and stress. There was a large income gap between rural and urban respondents. Even though urban IDPs have more job prospects than rural IDPs, urban IDPs are more depressed and stressed. The study found that Bangladesh's riverine communities rely on farming and fishing for their livelihoods. Nevertheless, riverbank erosion uprooted or forced them to leave their homes, losing their possessions, threatening their food security and way of life and forcing them to find new ones. Moreover, their children's education is hindered, and they lack access to clean water and sanitation. Surprisingly, despite the terrible effects of erosion, many erosion victims prefer to remain in their communities, although fewer economic prospects exist. The study found that displaced people do not have access to institutional help and are not involved in any rehabilitation programme. Riverbank erosion is a driving force for migration; consequently, the government and NGOs should work together to develop appropriate and sustainable rehabilitation programmes for migrants. Rehabilitation is needed in both rural and urban locations.

## Conclusion and the policy implications

This article explains how riverbank erosion negatively impacts IDPs in Lakshmipur, using notions of vulnerability and health issues. The research conducted on IDPs in the Lakshmipur area shows that migrants face physical and psychological risks due to displacement. They had virtually nothing left when the water took everything, and they had to start again in a new place, where they faced new challenges, including finding work, dealing with family issues, becoming ill, feeling neglected by society, and dealing with a constant sense of unease. Consequently, they experience poverty in all senses of the word, physical and mental illness, and social stigma. Riverbank erosion damages the riverine villages in the study region. Every year, the Meghna river erodes a significant area of land. The agricultural area has become barren due to significant riverbank erosion. The study shows that the residents of Lakshmipur are used to riverbank erosion because they use newly produced char land for agricultural purposes. In addition, in the absence of

government or institutional help, they began exploiting their assets and rights to manage food, housing, and money in their new locales, amongst new people and sociocultural constraints. The respondent household used many techniques to meet their fundamental requirements. The displaced families' main concerns were lack of access to adequate drinking water, sanitation, and education for their children.

The following recommendations might mitigate the difficulties that riverbank erosion poses to IDPs. Two types of measures may be adopted concerning before and after riverbank erosion. Some steps can be taken before riverbank erosion occurs, such as governments should build embankments, piling the riverside, and dropping blocks and stones on the riverside to prevent erosion. Furthermore, regular excavation of river beds increases navigability to maintain river flow and pass flood water to the Bay of Bengal during the rainy season to protect the banks from erosion. However, as a developing nation, Bangladesh cannot afford to excavate its long river basin, build embankment, and protect the country from the destructive consequences of floods. Therefore, the river's navigability may be maintained and erosion prevented if the developed world contributes money and logistical support to combat climate change and natural catastrophes in the country. In 2015, during the Paris Agreement on Climate Change, wealthy nations committed to spending USD 100 billion a year to assist developing nations in mitigating and adapting to the effects of climate change. Since Bangladesh ranks amongst the world's most climate-vulnerable nations, it deserves financial assistance from more advanced nations to lessen the impact of inevitable natural disasters. In this study region, there is no informal or formal training in disaster education. Local NGOs and governments must arrange riverbank erosion seminars and training to educate the public on coping with riverbank erosion-related problems. Development workers may advise and support people to make the correct choice at the appropriate time by raising awareness, which will help them take the appropriate steps. Some steps can be taken after riverbank erosion. Riverbank erosion is a long-term problem that requires societal and institutional changes. The best way to deal with a disaster like this is to ensure that the government *khas* land on river islands that can be redistributed with the administrative procedure and media involvement, making a database of those impacted by riverbank erosion. The government must respond quickly to protect people's lives and property. Improving socio-economic circumstances and providing alternate sources of drinkable water and healthcare facilities are urgently necessary to combat the potential theatre of health and well-being risk. The study's strength is its use of in-depth interviews and structured questionnaires, which aid in revealing the outcomes and phenomena of the study's intended objectives. The research was conducted solely in the Lakshmipur district, a study limitation. This research suggests that there is room for more comparative analysis in other areas or countries.

## Declaration of Competing Interest

The author declares that I have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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