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Forced Migration as a Livelihood Adaptation in Response to Climate Change: An Empirical Study on Central South Exposed Coast of Bangladesh

Md. Shamimul Islam[*]
Md. Amzad Hossain[**]
Rafia Islam Lina[***]

Abstract

Bangladesh, a densely populated country, is threatened by the impact of climate change. Interestingly, Bangladesh seems to be the worst victim of climate change, especially, the coastal areas; even though, it had a very little noticeable role in climate change. Adaptation to climate change will be crucial for the sustainable development of Bangladesh, where migration will perform a key role in this framework. This paper attempts to focus on the overall impact of migration due to climate change, and will particularly observe the factors related with migration decision, connecting impact of Salinity, Sea-level rise, Riverbank Erosion and Disasters (Storm, Drought, and Cyclones etc.); particularly, vulnerable coastal districts of central-south regions of Bangladesh. In theory, migration decision is determined by both pull and push factors. This study is purely an empirical study that reflected the push factors due to climate change. To conduct the study, primary data has been collected from 99 households head covering all possible professions through questionnaires and Focus Group Discussion (FGD). After that, data is analyzed by SPSS, and the findings were presented through graphs and simple descriptive statistics to figure out the overall impact of migration due to climate change. Remarkably, the study identified the interconnections among migration, climate change, and terrible challenges of sector based livelihood. Moreover, it has been observed that there are severe effects of climate change on migration, and a large number of people have been migrated to have a better life and livelihood. To conclude, government should incorporate climate induced migration

[*] Associate Professor, Department of Economics, Comilla University, Cumilla, e-mail: mimul81@yahoo.com
[**] Graduate Student, Department of Economics, Comilla University, Cumilla, e-mail: hossainaz333@gmail.com
[***] Assistant Professor, Department of Economics, Comilla University, Cumilla, e-mail: rafiaislam43@gmail.com

policies in formulating national development plan, and take initiatives to mitigate the impact of natural calamities.

Keywords: Migration, Adaptation, Climate Change, Bangladesh.

Introduction

Bangladesh is most climatic vulnerable countries; with high population density. The impact of climate change on migration is gradually threatening us, though Bangladesh had no major role in causing it. The United Nations Environment Program (UNEP) termed the future migrants as 'environmental refugees'-people who have been forced to leave their traditional habitat, temporarily or permanently, because of marked environmental disruption (natural and/or triggered by people) that jeopardized their existence and/or seriously affect the quality of their life. , Forced migration refers to that type of migration, where migrants don't have intention to leave their previous habitat, but they have to change by hook or by cook. The climate change 'refugee' term is commonly used and legally defined in the 1951 Refugee Convention. The coastal area is more vulnerable than any other region of the country. Various impacts, such as sea level rise, salinity and extreme storms etc are main hazards in coastal areas. Moreover in coastal area, means of earning is very critical. As coastal area (such as islands, wetlands, deltas, and estuaries) is devastated day by day, so there people are more dependent on the natural blessing. Both developing and developed countries are vulnerable to the impacts of climate change. Especially Low-lying countries like Netherlands, Guyana, and Bangladesh are particularly at-danger. Still Most of the people in our country live below the poverty line and among them some are living in ecologically fragile areas, like river islands (chars) and the coastal zones where river bank erosion, cyclones and storm surge are great problem. Climatic vulnerable hazards including severe flood, cyclones, storm surges and droughts are threat to sustainable growth, so most of the people of that region have to migrate in another region. Moreover Adaptation in response to climate change will be crucial in Bangladesh's long-term efforts to development; that's why ultimate developmental destination can't be reach.

Literature Review

Due to rapid urbanization and industrialization, day by day there is increase in industrial zones, which eventually increment the Greenhouse gases. Because of this reason, Bangladesh has been observed various climatic stresses, including water shortage, cyclone, river bank erosion and salinity intrusion in water and soil. A combination of various factors includes disasters, environmental changes, shortages and economic haphazard's, could increase the vulnerability of local people (Piguet,

2011). In effect, climate change works as a global phenomenon that makes existing social, economic, political, and environmental challenges even more serious at a local level (Crate and Nuttall, 2009).Climate change could affect migration in various ways. As in case of Bangladesh, various natural calamities like cyclones and extreme rain could lead to destruction of habitats, livelihoods, infrastructure (Rahman et al. 2007). Yet at the same time, erratic or decreased rain could cause water shortages and reduce crop yields. Rising sea level and increased river flow could lead to more erosion or coastal flooding (Brown 2008). Myers (2001) estimated that Bangladesh alone would produce 26 million climate refugees in the future. Alam (2003) found that high population growth, climate change, and frequent disasters would cause millions to enter the neighboring country of India. But, he was not able to provide any concrete evidence on migration from Bangladesh to India.

Disaster-related migration is both long and short-term oriented and occur within short distances. For example, 88 per cent of migrant agricultural communities in Bangladesh were found within two miles of their previous residence following the erosion of land and loss of homes due to flooding (Zaman 1989). Similar trends were found on cyclone response too. Such rapid-onset disasters lead to temporary displacement to nearby areas as people lack resources to move farther, and many return and reconstruct their homes (Piguet, 2011). Often seasonal and permanent migration is an important livelihood option that helps communities gather resources from their destination while offsetting the resource pressure back home.

An estimated half a million people move to cities every year, and they come mainly from coastal and rural areas (Islam 2012). In effect, countryside has become a source of labor force catering to cities (Toufique and Turton 2002). It is often said that Bangladesh is a country ‘made for natural disasters’ (Poncelet, 2009). Record of 214 years (1795-2009) shows that 73 cyclones hit the Bangladesh coast, of them 53 cyclones hit between 1948-2009 which shows a clear trend of increasing the frequency of natural disasters in recent years (Islam, 2004; BMD, 2011). Though it has been claimed that the frequency and intensity of disasters are caused by increasing global temperature and sea surface temperature (Emanuel, 1987; Royer *et al.*, 1998; Ali, 1999), it could also be the improvement of meteorological science in tracking and recording disaster events in more recent years.

As water flow is higher from July to September due to rainfall in both India and Bangladesh, Which causes severe flooding in Bangladesh due to channeling excess water through dam gates towards Bangladesh by

India. This problem is also exacerbated by the drought problem in the northern districts, which hampers agricultural production (Mirza and Hossain, 2004) and causes a high risk of river erosion and flooding in the south-western coastal districts.

Current estimate suggests that the temperature of Bangladesh will increase very rapidly, one to five degrees by the year 2100. Increasing temperature will affect production of some corps negatively. The two major crop productions (Boro Rice and Wheat) will reduce to a one-third if temperature increases by a four degrees and moisture stress increases by sixty percent (World Bank, 2000). Stern Review mentioned that both sea-level rise and other climate-induced changes could submerge one-fifth of the current territory of Bangladesh (Stern, 2007). Sea level rise had caused river bank erosion, increased salinity in coastal areas, and affected biodiversity leading to reduction of food production and fisheries in Bangladesh. Current sea-level rise trend suggests that, one meter increase in sea level will submerge around eighteen percent of the country's coastal belt (Stern, 2007; Sarwar and Khan, 2007). In fact, more than one million people have already lost their homes - 70 percent of these people became landless due to river erosion. Initially, these people stayed in nearby areas. Now days, affected people have adequate knowledge that slow siltation process and high population pressure will make their condition worse and ultimately force them to move to somewhere safe especially to the urban areas (RMMRU, 2007).

Approximately twenty-six cyclones hit Bangladesh since 1970 (Akter, 2009). The two major cyclones killed 500,000 and 140,000 persons in 1970 and 1991 respectively. A very strong cyclone named SIDR struck the country in 2007 but still people managed to take refuge in shelters. Therefore, compared to previous cyclones, death toll was low (3,500 persons) yet displaced more than a half million people (650,000).

World Bank projected that another 7 million coastal people will face cyclones by 2050 because of the changing climate. With this, total number of damaged houses will increases up to 1.6 million because of cyclones induced by the climate change. The reason Bangladesh will continue to encounter climate change in rising sea level and the melting ice caps (ice mass consisting less than 50,000 square-kilometers). Moreover, Warmer Ocean will bring in more intense cyclone activity (World Bank, 2010). A vast majority people became seasonal migrants, as they feared no employment opportunities would be available for them in the surrounding areas (International Organization for Migration, 2010).

Objective of the study

The main objective is to focus on the overall impact of migration due to climate change, and the specific objectives of the study are:

- to identify the factors related with migration decision;
- to assess the impact of salinity intrusion on migration;
- to investigate the effect of sea level rise and river bank erosion on migration;
- to identify the impact of natural disasters (storm, drought, cyclones) on migration.

Research Methods

Research Area

The study area was south-east Char Chandia village under Sonagazi upazila, Feni district of Bangladesh. The location was selected on considering vulnerability of that area to climate change. Sonagazi upazila is one of the most vulnerable exposed coastal upazilas of central-south region of Bangladesh. Consulting with Upazila Nirbahi Officer (UNO); 6 No. Char Chandia union was selected as study area. Opinion from union parishad chairman as well as analyzing map, by considering high vulnerability; south-east Char Chandia village is decided to select.

The Data

The empirical study was conducted based on primary data. A sample of 99 households head was selected purposively covering all possible professions of the villagers. Interviewing the household head (or her representative in her absence) with a pre-structured questionnaire data, Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) were conducted to complement and validate the survey findings.

Analysis and presentation of the report

Data is analyzed by SPSS 16 version and represent the findings using MS Excel 2016 to represent it via graphs and simple descriptive statistics to figure out the overall impact of climate change on migration.

Findings and Analysis

A detailed overview of the findings of the study is demonstrated in this section. It describes the demographic and socioeconomic profile of the study population, and then illustrates the migration trends amongst the local population and descries the reasons of forced migration. It also provides details on the destination of the migrants, before presenting real scenario and the perceptions of the study population on the impacts of climate change. Moreover it also lay out environmental degradation on sectors and livelihoods. Then it describes how the households currently adapt to the adverse effects and also provides an overview of the climate change, environmental degradation and migration nexus about the study areas. Finally, the section provides conclusions and recommendations.

Demographic and Socioeconomic profile of the respondent

This section provides an overview of the demographic and socioeconomic characteristics of the study population. This mainly includes age, gender, social status, education and primary occupation of the respondents. The household characteristics including household size, asset, major sources of income, monthly income and expenditure, access to basic services e.g. electricity, water supply and sanitation are summarized in this section.

Age, gender, religion, marital and social status

The respondents are of various age groups. The largest group, which consists of more than 27% of the total respondents, is between 45-54 years. The smallest representation of 2% was young people in the age group 18-24 years. Most of the respondents are in the middle age group, i.e., 64% respondents are in 25-54 age groups. Of the total about 83% respondents are male whereas rest of the respondents (17%) are female. Among the total respondents 86% are married, 13% are unmarried and 1% respondent is widow. Out of 99 respondents 68% are Muslim and 32% are Hindu.

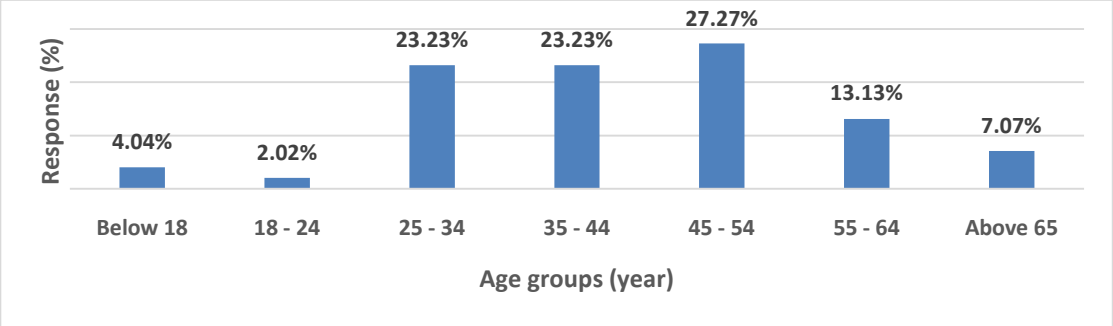

Figure 01: Percentage of respondents by age group

Educational status of the respondents

The education status of the study area is very poor. More than 44% respondents are illiterate, which is dominating group in the study findings followed by primary, 23%; High school, 21%; college, 5%; graduation, 1%; post-graduation 4% and kawmi madrasa 1%.

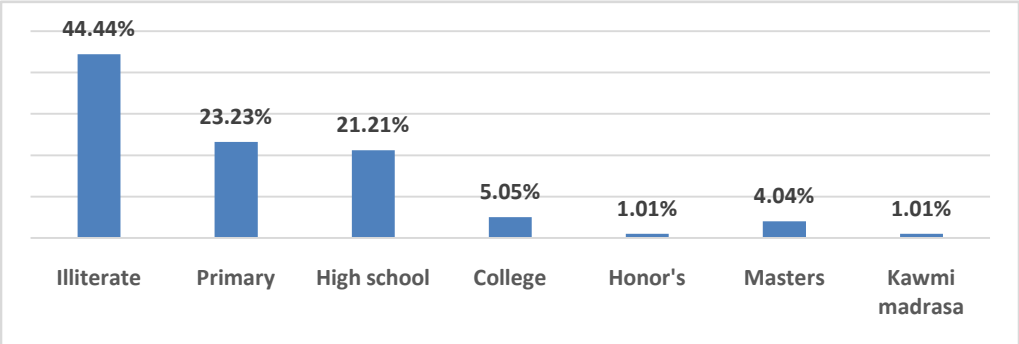

Figure 02: Education status of the respondents

Primary occupation of the respondents

The results of the household survey show that fishing was found to be the most common (25%) primary occupation among the study respondents. The second highest occupation was others (18%) with the third and fourth primary occupations being in agriculture (16%) and daily labor, for example hired farm labor, earthwork, rickshaw/van pulling and so on household work (9%), followed by household work (8%); business (8%); government service (6%); fish farming (4%); livestock rearing (3%) and private service (2%).

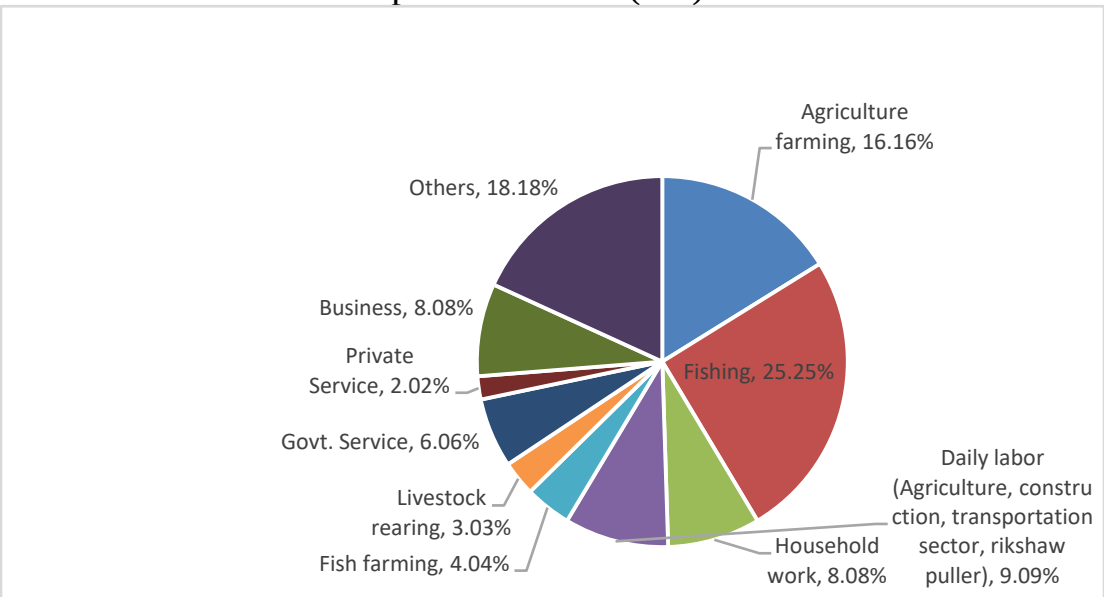

Figure 03: Percentage distribution of the primary occupation of the respondents

Household Characteristics

Each of the 99 households had an average 6.33 members. This average size of each household is larger than the national average, which is 4.5 (BBS, 2010). Each household had an average land of 60 decimals and there are 1.60 earning members in average. Monthly average income of the households is 18030 taka whereas monthly average expenditure is 17367 taka. Average monthly saving of the household is 6934 taka.

Name of the variables	**N**	**Minimum**	**Maximum**	**Mean**
Total household members	99	1	15	6.33
Total earning member(s) of the household	99	1	5	1.60
Size of land owned by the household(In decimal)	99	1	720	60.21
Monthly average expenditure of the household (in BDT)	99	1000	300000	17367.02

Monthly average income of the household (in BDT)	99	0	100000	18030.49
Monthly average saving of the household (in BDT)	99	0	50000	6934.46

Table 01: Major sources of income by the respondents

Major sources of income by the respondents

The most important source of income was found to be fishing (30%) followed by agriculture farming (17%); agriculture based daily labor (14%); small business (10%); service (8%); others (7%); international remittance (6%); non-agriculture based daily labor (6%); livestock rearing (2%).

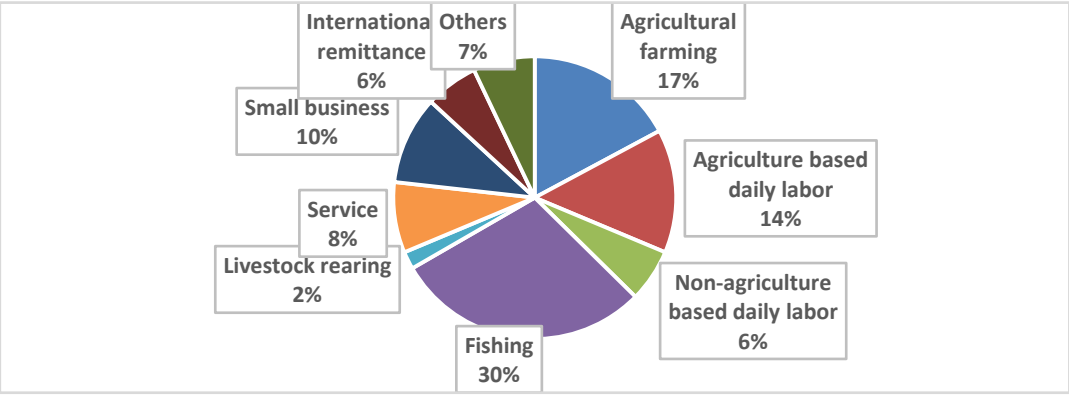

Figure 04: Major sources of income by the respondents

Monthly average income and expenditure of migrant and non-migrant households

Regarding mean income and expenditure between migrant and non-migrant households, the study indicates that both monthly mean income and expenditure of the non-migrant households is higher than that of the migrant households. It indicates that monthly mean income of the non-migrant households is about 18,574 Taka while it is 17,702 Taka for migrant households and monthly mean expenditure of the non-migrant households is about 22,000 Taka while it is 13,971 Taka for migrant households. The details are given in the following figure.

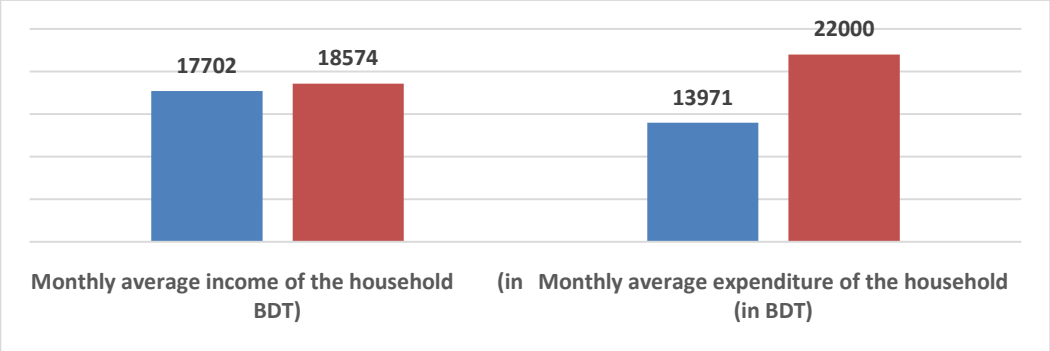

Figure 05: Monthly average income and expenditure of migrant (Blue) and non-migrant (Red) households

Property ownership

The average land size is 58 decimals for non-migrant and 55 decimals for migrant households which are presented in the following figure. From the response it is also found that 71% respondents having a house on his own land whereas 29% respondents have not a house on own land.

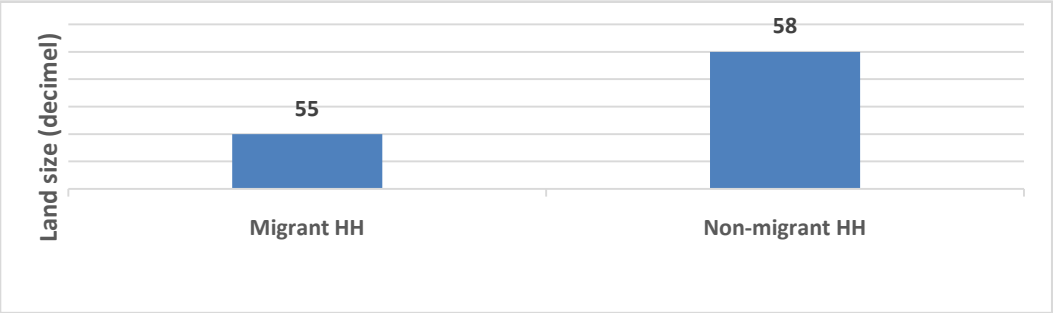

Figure 06: Average land owned by migrant and non-migrant households

Household assets

The study explored the ownership of household assets including televisions, mobile phones, bicycles, motorbikes, vehicles, refrigerators, fishing nets, boats and tractors among the study households, primarily to have a practical understanding on the socioeconomic status of the study population. Over the years, the ownership of mobile phones has increased and now, many families and rural areas of Bangladesh consider this as an important household asset. The following table indicates that 89 percent of the households surveyed for this research possessed at least one mobile phone, 39 percent of the respondents owning fishing net. The high proportion of fishing nets, with does not necessarily indicate that many of them own a boat, as only a little more than 20 percent of total respondents said that they own their own boats. 20 percent respondents owned TV with dish connection; 18 percent have a bicycle; 12% have a refrigerator; 7% have only TV; 4% have others assets; 2% have a computer and only 1% has riska/van; 1% has motorbike; 1% has tractor and 1% has a vehicle (car). The details of household assets are depicted in the following figure.

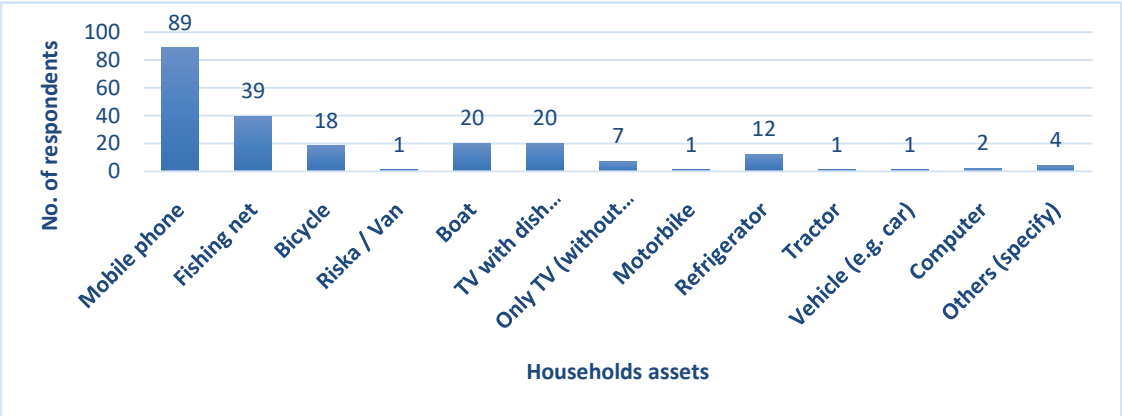

Figure 07: Household assets in the study area

Access to Utility Services by the Households

The study was also designed to understand the state of access to some key utility services of the study communities. Most of the study households have access to both safe drinking water (96%) and sanitation/latrines (89%). In terms of access to electricity (85%); followed by access to education (79%) and only 15% have access to use gas.

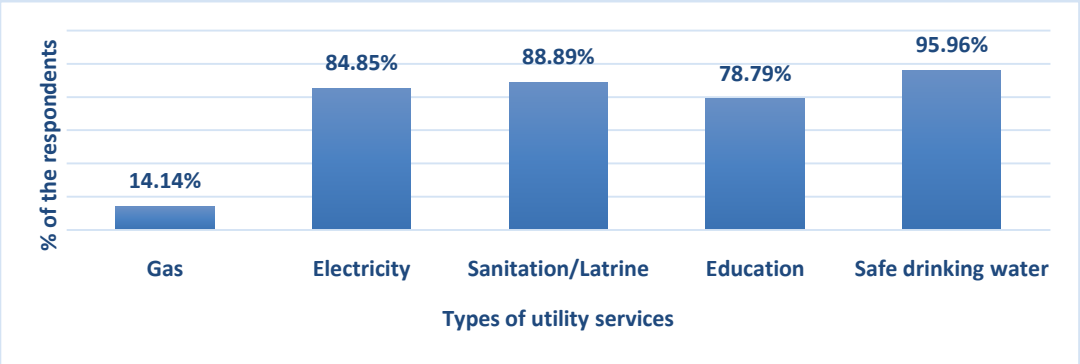

Figure 08: Percentage distribution of access to utility services by the Households

Access to Health Services

The Government of Bangladesh has established one Community Clinic for every 6000 people in rural areas to ensure basic health services at the Union Parishad level (BMRC, 2011). Of the total study households, 69 percent avail the health services regarding children immunization card; 43% getting the Community Clinic facilities; 42% avail maternity services; 22% receiving services from family welfare centre and 15% respondents mentioned they have received other services at union parishad level.

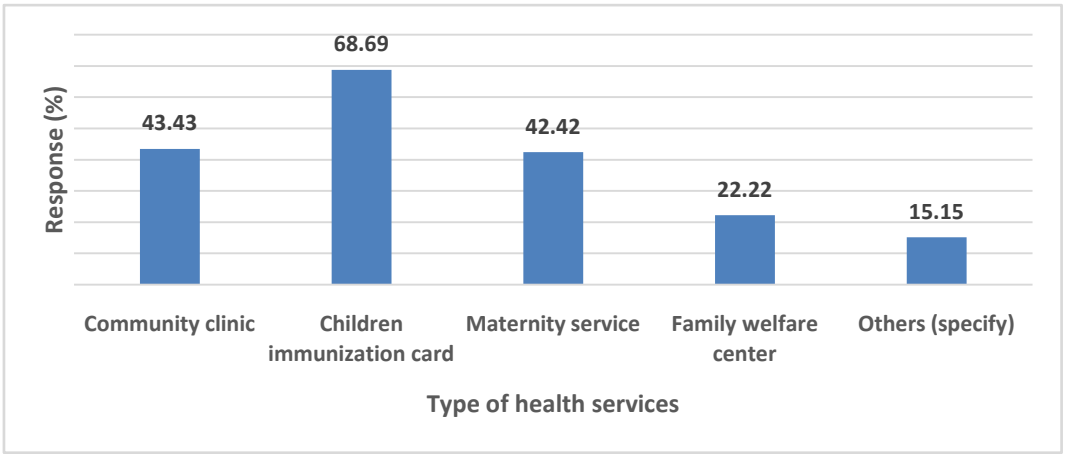

Figure 09: Percentage distribution of access to health services at union level in the study area

Migration Trends in the Study Area

Out of total respondents 52 mentioned they have migrated and rest of the respondent did not migrate from their village. It was asked to the

household heads whether any of the members of their family had migrant or not. In response it is found that 44 mentioned at least one member from their family had migrated and other 55 mentioned none of their family member had migrated. In total out of 99, 59 are migrant household and 40 are non-migrant households.

		Migration by other family member(s) of the household		**Total**
		Yes	No	
Migration by the household head (respondent)	Yes	37	15	**52**
	No	7	40	**47**
Total		44	55	**99**

Table 02: Migration by the household head (respondent) * Migration by other family member(s) of the household cross table

Migration Nature

Out of migrant households 86% are internal migrant whereas only 14% are international migrant. 88% mentioned they migrate temporarily and only 12% mentioned they have migrated permanently. From the survey it is also observed that, 71% are forced migration whereas 29% migration occurs voluntarily.

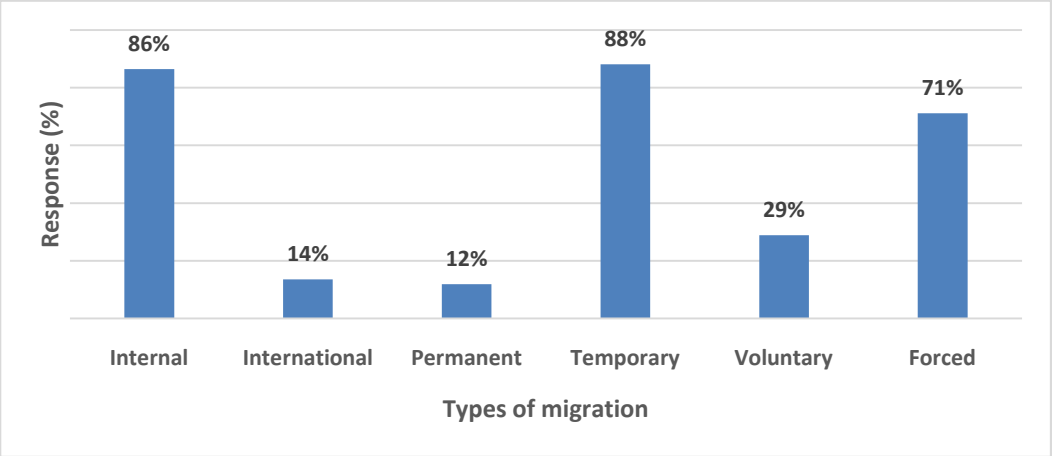

Figure 10: Migration tendency from the study households

Migration Decision

Amongst the migrant households 64% respondents claimed that, they have migrated due to climate vulnerability; they mainly migrated due to riverbank erosion, Cyclones, drought and salinity intrusion in both water and soil. 31% mentioned economic insolvency is the reason for their migration, as in the study area there is lack of job opportunity, so they

have to migrate in another location, it may the same village, same upazilla, and same zilla or may be another district town. 2% said social problem, 2% said to get better education and 2% said other purposes are the main reasons for migration decision.

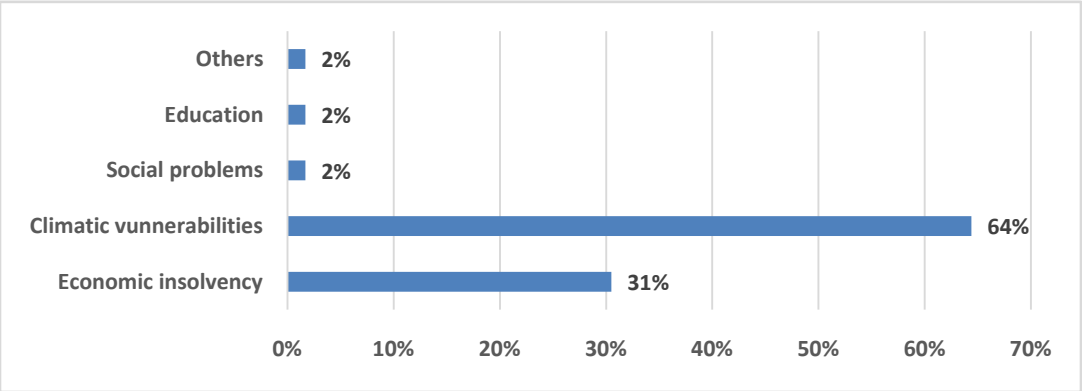

Figure 11: Reasons behind migration decision

Climate Change, Environmental Degradation and Associated Impacts on Different Sectors and Livelihood in the Study Area

Bangladesh ranked sixth on the 2016 Climate Risk Index (Kreft et al., 2016). It indicated that in the last 20 years, Bangladesh has been one of the 10 countries most affected by climate change. The country is vulnerable to a number of climate-induced hazards, including annual and seasonal variations in temperature and rainfall, cyclones and storm surges, drought, salinity intrusion both in soil and water, floods and other events such as landslides caused by excessive rainfall in a short period. Another report states that climate change would cause increase risks of floods, cyclones, drought, and sea-level rise in future (World Bank, 2013).

The household survey also explored the climate change impacts on various sectors and livelihoods of the study population. Most respondents mentioned that weather; extreme events and environmental hazards affect key sectors including agriculture, water, health, fisheries, forestry, livestock, and infrastructure. They also mentioned that sector based livelihoods are severely challenged by climate change. Many of the participants in the FGDs and community workshops said that climate change increases physical and mental pressure on both men and women. In most cases in rural Bangladesh, women are responsible for looking after the family, cooking, washing, taking care of children and other household chores. Climatic variations and the resultant impacts directly affect their lives. In cases of disasters, such as cyclones, droughts and floods, water for household use becomes a challenge to obtain. Not only is there a lack of usable and safe water, but in many cases, especially in the coastal and drought prone zones, women must travel long distances to

get water. Sometimes in some region there is no any source of pure drinking water, the people of that area have to depend upon rain water, ponds and sometimes on river water.

Climatic Factors Related to Migration

From the figure: 01, there was 83 percent of the respondents thought that temperature rise affected their natural resource-based. About 70 percent of the respondents thought that salinity intrusion in soil had the most intense impact; 65% mentioned sea level rise is responsible for forced migration, as most of the respondent living nearer to the embankment is threatened by storm surge, Cyclone, flood and riverbank erosion. So sea level rise is matter of concern to them. 62% said salinity intrusion in water; it should be mentioned that when there is increase in salinity in both water and soil, then is very difficult in agricultural farming. Furthermore most of the people in that area are dependent on agricultural livelihood. 53% mentioned storm surge; 47% claimed cyclone; 39% mentioned excessive rainfall; 32% claimed drought; 24% mentioned shifting of rainfall and 15% mentioned lack of rainfall can harm the natural resource base which may lead to migration.

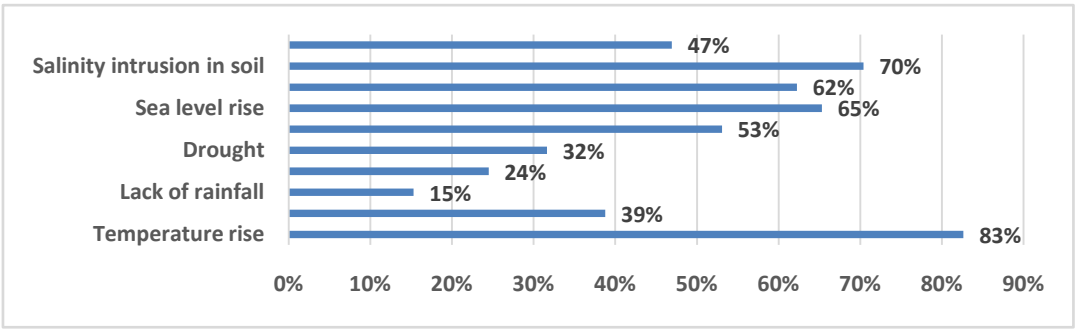

Figure: 12-A

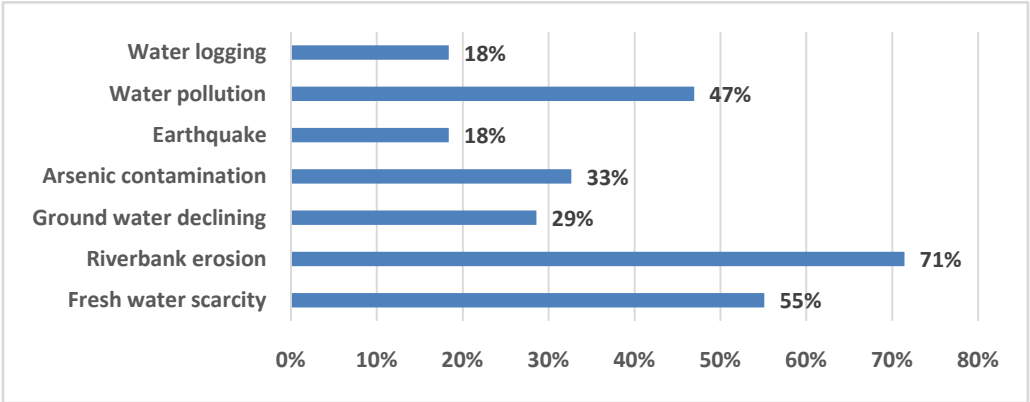

Figure: 12-B

Figure 12(A, B): Climatic factors responsible for migration decision

From the figure: B, riverbank erosion is the main reason (71%) of forced migration. Since the people living in the riverbank so they are more vulnerable to the natural calamity.

Non-Climatic Factors Related to Migration

Non climatic factors include migration due to poverty, health, education, over population and security concerns etc. Out of migrant households 56% respondents think that poverty is the key factor behind migration decisions. Most of the internal migrant prefer nearby urban area as a destination of migration. 66% respondents mentioned upazila Sadar as the destination of migration followed by nearest district town (13%). They choose urban area because they think, in that areas the livelihood opportunity is better there. 64% respondents mentioned they have migrated due to lack of livelihood opportunity in the study area. In most of the cases the migration decision is taken by the household heads (51%) alternatively 49% respondents said that, the household members together make migration decisions, following figures represent the scenario:

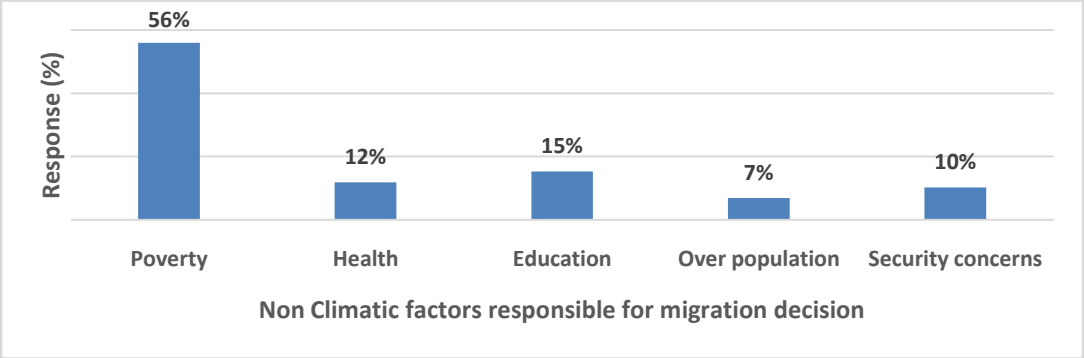

Figure 13: Non Climatic factors responsible for migration decision

Preferred Destination for Internal Migration

Normally most of the migrants migrated to the nearby upazillasadar: which was about 66%. Then the nearby migrants shifted to the nearest district town. Some respondent near about 10% forced migrated within the same village because of river bank soil erosion, intensity in salinity in both soil and water and other climatic hazards.

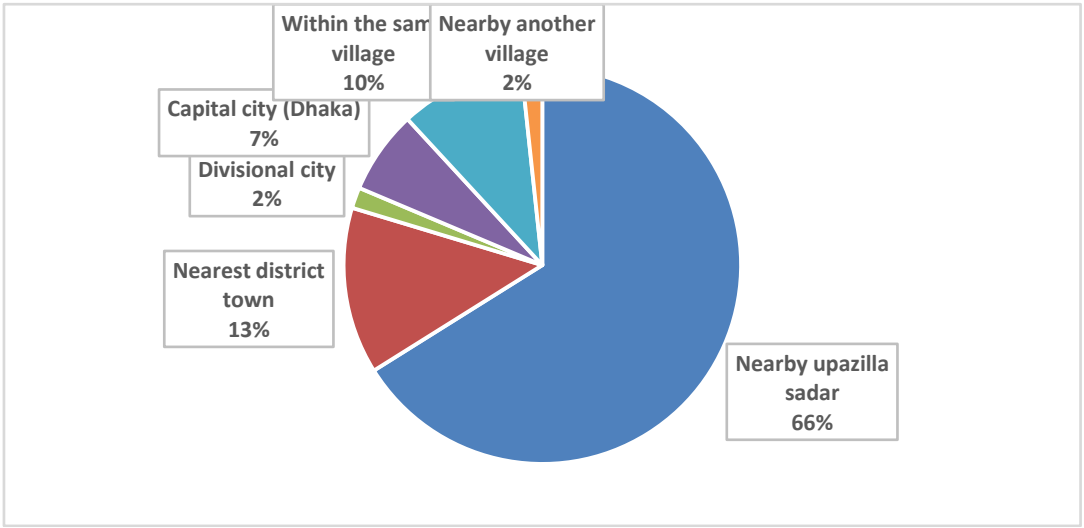

Figure 14: Preferred destination for internal migration

Determining the Destination for Migration

Most of the people inthe study area is migrated to another place, due to lack of job opportunity. Because of employment opportunity they left their living area is about 64% another 31% respondent migrated due to long distance between the working area and their living place.

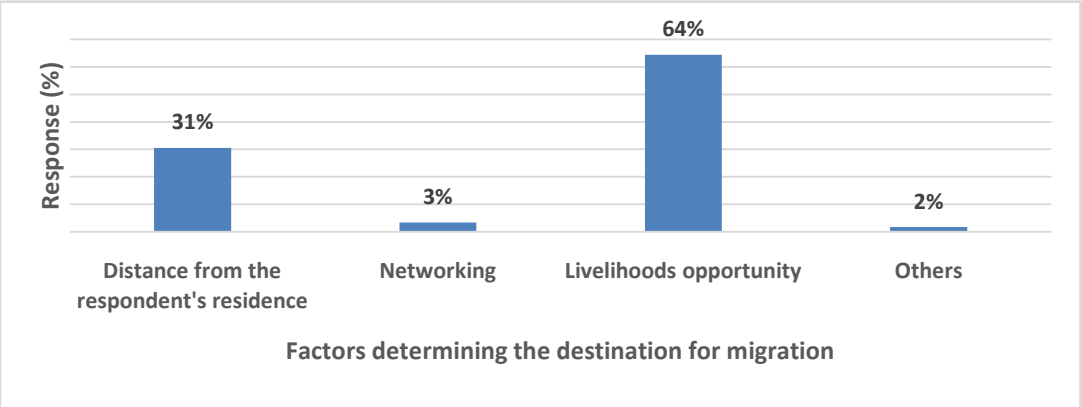

Figure 15: Factors determining the destination for migration

Recommendations

It has been observed from the field data that in most cases migration help families to improve their financial conditions. Thus, in a disaster stricken country like Bangladesh, migration can be a best possible adaptation strategy. Government should incorporate migration into policiesto adapt to climate change and mitigate the impacts of disasters. Alongside policy formulation, the Government should effectively implement and monitor the process for the betterment of the coastal people. Based on the study the following specific recommendations are given

a. Creation of alternative employment opportunities, along with skills development in climate change affected areas;
b. Training and increase literacy to assist affected communities to adapt to a changing climate;
c. Skill development for potential migrants so that they can acquire their expected jobs.
d. Provide training on financial literacy and transaction to encourage savings.

Conclusion

Bangladesh is a Central-South Asian developing country. Various types of climatic hazards are prevailing in this region. The impacts of climate change on this small sub-tropical country are intense and its impact is increasing day by day. Within the country, there are regions (e.g. coastal zone, char lands, haor and hilly areas) that are worst affected, and the rural, poverty-stricken populations of these areas are worst sufferer of climatic vulnerabilities.

Major climatic hazards include cyclones, storm surges, coastal floods, flash floods, droughts, variations in temperature and rainfall and environmental degradation such as riverbank erosion, declining ground water level, salinity intrusion in water and soil, freshwater scarcity, arsenic contamination, earthquake and water pollution. These hazards directly and indirectly affect natural resources and also affect humans, agriculture, water, health, infrastructure, fisheries, livestock, forestry, biodiversity, ecosystems. Which eventually cause livelihood difficulties to the poor and helpless peoples, furthermore communication facility is very tough in the coastal regions, and also impacts on people's domestic lives. These climatic factors have intensified role over the last 10 years. As a result of the impact of climate change on socioeconomic conditions, migration has been increasing and sometimes large numbers of people have to accept migration as a means of livelihood adaptation. Other non-climatic factors, such as higher education study opportunities and the opportunity to subsistence living. So those climatic factors push more and more people to migrate away from the climate change-affected areas.

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