

Title: A Tale of Two Groups: Focusing on the Differential Vulnerability of ‘Climate-induced’ and ‘Non-climate-induced’ Migrants in Dhaka City

Abstract

Bangladesh is one of the most vulnerable countries in the world under the context of climate change. Each year millions of migrants arrive Dhaka City-the capital of the country-mainly forced by the events like floods, cyclone and riverbank erosion. Such group of migrants has been termed as ‘climate-induced’ migrants in this research. The city also received other types of migrants who are not driven by climatic factors rather their reasons for migration are purely opportunistic. This group has been termed as non-climate-induced migrants. The paper deals with the climate-induced and non-climate-induced migrants in Korail slum of Bangladesh who had arrived in Dhaka after 2006. This research attempted to analyze whether there are any differences in the characteristics, experiences and future aspiration between these two groups in spite of living in the same slum- located in the capital of Bangladesh. Questionnaire survey, focus group discussion and key informant interview were the methods of data collection. Independent sample t-test and Chi-square test have been conducted to analyze data. Results revealed significant differences between the two groups in terms of income and savings, educational level, access to credit, contacts in the city, family structure, pattern of migration and relationship with the place of origin.

Keywords: climate change, rural-urban migration, climate-induced migration, non-climate-induced migration, vulnerability, migration experience, slum.

1. Introduction

Tracing the reasons for migration is not new rather it has been researched for ages (Moench and Gyawali, 2008; Barnum and Sabot, 1977; Hagen-Zanker, 2008; Ishtiaque and Ullah, 2013). Identifying a single reason behind people’s movement is almost impracticable because people generally migrate due to variety of reasons depending on the socio-economic, environmental and/or political context. Rural-urban migration is motivated by complex reasons and take different forms at the end such as permanent or seasonal. Urban areas and cities in the developing countries are important destinations for poor rural migrants as they offer increased employment opportunities both in formal and informal sectors (Todaro, 1976). However, limited research has been conducted investigating whether the reasons behind migration can play a role in shaping migrants’ socio-economic conditions in the city. This paper has taken two different reasons to analyze- climate-induced reasons (floods, cyclone and river bank erosion) and non-climate-induced reasons (reasons not related to climatic factors).

There is limited previous research comparing migrants and non-migrants (Butterworth, 1972; Hartog and Winkelmann, 2003) and also permanent and temporary migrants (Bell and Ward, 2000). However, this paper will compare two different groups of migrants – ‘climate-induced’ migrants and ‘non-climate-induced’ migrants, who are living in the same slum in Dhaka City of Bangladesh and this comparison has been made in terms of their characteristics, experience in the city and future aspirations. It has been claimed that Bangladesh is one of the most vulnerable countries to the impacts of climate change (Maplecroft, 2011; Penning-Rowsell *et al.*, 2013). Dhaka attracts nearly 400,000 new migrants each year (World Bank, 2007) and push factors such as unemployment due to land erosion have been main contributing factors to migration (Opel 2000; Siddiqui, Ahmed *et al* 2000; Islam 2005). That is why Dhaka has been selected as the case because of greater possibility of finding climate-induced migrants.

Before stepping into the main discussion, it is necessary to discuss the basic concepts related to migration and climate change. Migration is the movement of people from one place to another. Migration takes different forms such as permanent, temporary or oscillating; voluntary or forced; internal or international. Migration has also been categorized based on the types of driver such as economic, political or environmental. The term ‘climate-induced’ in this article refers to forced rural-urban migration which occurs both due to ‘climatic’ and ‘anthropogenic’ events; where anthropogenic means- ‘resulting from or produced by human activities’ (IPCC, 2014). However, throughout the article ‘climate change’ will actually refer to ‘anthropogenic climate change’.

Climate change is generally the change in the state of the climate which is recognized by changes in the mean and/or the variability¹ of its properties which continues for an extended period, typically decades or longer (IPCC, 2007). The IPCC (2007) also stated that it refers to any types of changes over time, where the changes may be in terms of natural variability or due to human activity. This IPCC definition differs from that in the United Nations Framework Convention on Climate Change (UNFCCC), where climate change refers to the change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods (UNFCCC, 2007).

Due to rapid industrialization, the world is facing huge greenhouse gas emissions which are contributing to the increase of global average temperature. This phenomenon has been claimed to have bitter consequences for the world and the overall human settlement in the form of untimely precipitation, more frequent and intense weather events and sea level rise (IPCC, 2014). Poor developing countries which are situated in coastal zones are mainly experiencing the worst impacts of climate change (UNFCCC, 2007) - sometimes exacerbated by human-induced events such as frequent construction of embankments and forest removal (Auerbach *et al.*, 2015; Rahman *et al.*, 2010; Adnan, 1991). Previous research showed that the poor, who mainly depend on agriculture for survival, cannot maintain their livelihoods due to more frequent and intense climatic disasters (IPCC, 1990; Ahmed, 2013). However, Brammer (1990, 2013) rejects any links of cyclone, floods and riverbank erosion with climate change. Other researchers also tried to verify such links of floods with climate change and could not come to any significant conclusion verifying the link (Hofer and Messerli, 2006; Rosenzweig *et al.*, 2007; Bates *et al.*, 2008; Warrick and Ahmad, 1996). Hence academic debates are strong in terms of verifying the links of climate change and post-disaster migration.

Others also claimed that it is not only climate change, rather the politics and failure of governance system, which have significant role in inducing people to migrate (Warner, 2010). Many researchers termed migration as an adaptive strategy (McLeman and Smit, 2006), while others considered migration as a ‘failure of adaptation’ (IOM, 2007; Renaud *et al.*, 2007; Dun and Gemenne, 2008; Stojanov and Novosak, 2008). This research attempted to conduct a critical evaluation of these different concepts and collected empirical evidences from the ‘climate-induced’ migrants in Dhaka City of Bangladesh as a case to understand their reasons for migration and whether the migration decision was worthy enough to live a life they wanted.

Recognizing that the effects of climate change are not yet fully manifested, we have termed them ‘climate-induced’ migrants in this research who have migrated due to environmental problems of the type climate change is expected to cause. For example, floods, riverbank erosion, waterlogging, drought and salinity intrusion are some cases which are likely to be exacerbated by the impacts of climate change, and therefore people induced by such events have been termed as ‘climate-induced’ migrants in this research. The research is also engaged in a critical evaluation of the concept of ‘climate-induced’ migration - where the migration has been considered as a consequence of both climatic and anthropogenic events. However, as said before, the inverted comma around the term- ‘climate-induced’ is an indication of its critical nature and the rest of the article will not use the inverted comma but will mean the same.

Tracer survey questionnaire has been used to identify the climate-induced migrants (target group). Migrants to Dhaka, who are not climate-induced but live in the same slum, have been considered as the non-climate-induced migrants (comparison group). Both the target group and the comparison group were selected as having arrived in the city after 2006.

Todaro's migrants expect higher incomes and migrate mainly because of rural-urban wage differentials (Todaro, 1976). Lee's migrants also migrate mainly to achieve better employment in the city (Lee, 1966). Hope and Ruefli (1981) also identified 'expectation of social and cultural amenities' as the factors driving migration. The expectations of such migrants generally match with those of the non-climate-induced migrants. Most of such common migration theories apply to all migrants in general. However, in reality, not all migrants relocate due to the expectation of wage differentials, if we focus mainly on third world cities (Begum, 1999; Prothero, 1987). According to Akin Mabogunje (1970), this is the non-conducive structural milieu which motivates people to migrate. The target group of my research matches with Mabogunje's migrants because they are the distressed migrants and their environmental and structural situation suggests that migration is the only survival strategy (Begum, 1999).

For climate-induced migrants, migration is not a distinct choice of aspirations to higher income levels but the emergency need for safe shelter and ready cash through any forms of employment (Begum, 1999). This is the group who become the part of the unemployed population of the city. Coping during unemployment is very difficult for them because they cannot depend on the rural income and also cannot depend on their inadequate savings. In the destination urban area, migration has led to the scaling up of economic activities and optimization has been achieved through economies of scale. If that is the case, there must be a balance between the number of migrants who are productively joining the urban labour force and the availability of jobs in the labour market. However, in last few decades, climate change has altered the migration scenario (Black *et al.*, 2008). When there is an influx of climate-induced migrants, who are less committed to the way of life in urban regions but who are seeking a survival strategy, then the management of such migrants in an already overpopulated city² might be a concern for the city authorities. For example, in Dhaka, arrival of more migrants will occupy more low-lying lands and eventually create severe drainage congestion problem for the city (Alam and Rabbani, 2007). Therefore, it is necessary to identify the climate-induced migrants who are already in the city and to understand their different context of vulnerability by comparing them with other types of migrants.

2. Concept of Vulnerability

Vulnerability is the degree to which someone is susceptible to harm on being exposed to hostile factors (IPCC, 2001). It indicates a state which arises from complex interaction between three elements: exposure, sensitivity and resilience (Adger, 2006; Marshall *et al.*, 2009; USAID, 2009; Turner *et al.*, 2003). Vulnerability is also a situation when people lack the capacity to anticipate, cope with, resist and recover from the impact of a hazard (Wisner *et al.*, 2004). It involves a combination of factors that determine the degree to which people's lives, livelihoods and other assets are put at risk.

Vulnerability is used as the opposite to adaptive capacity which means the ability to adjust to the impacts of climate change. The adaptive capacity depends upon many complex factors. For instance, a household with multiple sources of income is more likely to have better adaptive capacity because they can face the food shortage and other emergency situations better than others who have to rely entirely on one income source, e.g. agriculture in rural Bangladesh, which is highly dependent on climate variability.

Social vulnerability is an important concept, highlighting how and why people's differential access to and control over resources are related with their ability to survive and recover from disasters (Enarson, 2002). Some groups are more prone to damage, loss and suffering to the impacts of hazards. This variation depends on several factors such as gender, health status, occupation, class, age, immigration status and

extent of social networks. Power relations, social exploitation, discrimination and entitlements can play a major role in determining the degree of vulnerability (Cannon *et al.*, 2003).

This particular research focuses on the vulnerability of migrants to financial, social, political and environmental hazards in Dhaka City. As both the migrants group are living in the same slum, environmental hazards affect them almost in similar way though differentiated financial ability makes some difference in their adaptation capacity. However, this paper will mainly deal with the migrants' vulnerability to city based hazards.

3. Identifying Climate Related Drivers of Migration

Identifying a single driver of migration is not simple (Khuda and Alam, 2011; Christian Aid, 2007; Wood, 2001). Migration generally occurs as a result of multiple interrelated factors and tracing the most significant one among these factors is a difficult task. Worldwide, poverty-induced migration is very common, being motivated mainly by economic considerations. Therefore, there is a general consensus that every decision of migration relates somehow to economic factors (Bachofen *et al.*, 2010; Hugo, 1996; Kolmannskog, 2008). In recent decades, research proved that poverty associated with environmental problems accelerated the process of migration (Hugo, 1996). However, many evidence-based research now also reveal that *"although economic and political factors are the dominant drivers of displacement and migration today, climate change is already having a detectable effect"* (Warner *et al.*, 2009: IV).

If any climatic event affects people's livelihood and if that livelihood loss is responsible for their migration, then that specific climatic event is generally seen as a climatic driver; but in most of the cases the scenarios are not so straight forward. For example, a recent study conducted in Bangladesh by Etzold *et al.* (2014) concluded that instead of climate change, social inequality and food insecurity as well as structural economic differences are the strongest drivers of migration inside Bangladesh. This research identified *Monga*¹ (seasonal hunger) as a major driver of migration from northern parts of the country. Research also supported that neither rainfall variability nor a single hazard can alone influence people's decision to migrate, but their immediate and mid-term effects such as crop loss, unemployment and rise of food price have significant influence on people's migration decision (Black *et al.*, 2013; Gray & Mueller, 2012; Martin *et al.*, 2013). Therefore Etzold *et al.* (2014: 19) quoted, *"In Bangladesh, climate change cannot be considered as the major cause of migration, (though) climatic risk and environmental change have certainly altered the ways in which and the places where exposed people are pursuing their livelihoods"*. Therefore, instead of a straightforward and direct relationship, climate change and migration is indirectly related and migration is always a multi-causal social process.

Food insecurity is an important driver of migration which is highly linked to climatic systems. For example, climatic events such as floods and cyclones are often proved to be destructive towards rural livelihoods (e. g. crop, shelter and other assets) (Warner and Afifi, 2014; Warner *et al.*, 2009). Such impoverished conditions lead toward food insecurity (IPCC, 2012) which often forces people to migrate and leave their ancestral homes in Bangladesh (Climate Change Cell², 2009).

During post-disaster periods, temporary migration is very common in Bangladesh. When land is destroyed completely (i.e. due to riverbank erosion), given the absence of alternative livelihood,

¹ A famine like situation where the poor suffer acute deprivation caused by their lack of purchasing power arising from seasonal scarcity of gainful employment (RDRS, 2006).

² This particular reference indicates a scientific research conducted by two research organizations of the country and funded by GoB.

permanent displacement often becomes the ultimate choice (Penning-Rowsell *et al.*, 2013; IOM, 2010; Poncelet *et al.*, 2010). Bangladesh has a long history of migration for centuries mainly for good harvest and secured livelihoods. During 1960s, population started to increase and food demand also increased dramatically. With industrialization, communication became easier during 1970s and there was a rapid increase in the urbanization rate in Dhaka due to higher rate of rural-urban migration. However, climatic disasters have now become a significant reason for rural-urban migration in Bangladesh since Cyclone *Sidr* and Cyclone *Aila* (Kartiki, 2011; Mallick and Vogt, 2012). According to Rabbani *et al.* (2013), outbreaks of diseases were severe after these two specific cyclones due to poor provision of sanitation and drinking water. The local health service providers also had poor knowledge of health protection in the rural areas of coastal Bangladesh in post-*Sidr* period (Kabir *et al.*, 2014). Therefore, the context of a post-disaster period often becomes critical due to poor governance by local authorities and becomes a major reason for migration.

Finally, drivers of migration are complex. IASC (2008) identified four climate-related drivers of migration and displacement: sudden-onset extreme disaster (e.g. floods and storms), slow-onset extreme disaster (e.g. drought or environmental degradation), permanent loss of land due to sea-level rise, and armed conflict over shrinking natural resources. The present research has termed them climate-induced migrants who have been displaced mainly due to sudden-onset disasters such as floods and cyclones and due to permanent loss of land such as riverbank erosion. Identifying who were climate-induced and who were not, involved rounds of questionnaire surveys and FGDs. A significant question which have been asked to every respondent was whether or not they would have migrated if the specific climatic event, which affected their livelihoods, had never occurred? During this stage, the study explored other socio-economic and political problems in their places of origin which could push them anyhow towards cities irrespective of climatic problems. Here, many migrants came out to be non-climate-induced where climatic disasters were proved to be insignificant while taking migration decision.

4. Rationale of the Research

Whether the reasons behind migration can play a role in shaping migrants' current socio-economic conditions is rarely researched. By exploring the differentiated vulnerability of two different groups who were driven towards Dhaka City from two different context (affected by climate-induced events or not – see below), this paper mainly attempts to unlock the climate-induced migrants' differentiated vulnerability in their destination areas.

Previously there have been several research attempts in rural areas to investigate the impact of certain climatic events on people's migration decisions (Black *et al.*, 2013; Penning-Rowsell *et al.*, 2013). The latter's research in five villages found that most climate-related migration in Bangladesh is temporary and such migrants, at some point, actually return to their places of origin. However, it is necessary also to investigate the destination part of the equation in order to assess migrants' post-migration experiences. This paper has investigated this phenomenon in case of the climate-induced migrants in Dhaka City.

Previous research has been conducted on the vulnerability of households in climatic-affected regions who are left behind by male 'climate-induced' migrants (Kolmannskog, 2009; UNFPA, 2009; Buechler, 2009). However, research examining the vulnerability of 'climate-induced' migrants to different destination-based hazards is of recent origin. There have been research initiatives into the vulnerability of Dhaka City due to climate change (Alam and Rabbani, 2007; UN-HABITAT, 2009b), but research based on experiences of this particular group, namely 'climate-induced' migrants, is relatively a new field of study in context of Bangladesh.

Moreover, in today's urbanized world, it is necessary to initiate more research to analyze the consequences of large scale rural-urban migration. As a south Asian developing country, Bangladesh is

also facing rapid urbanization and under these consequences the current research is timely to analyze the vulnerability and aspirations of a special group during this process. Climate change, no doubt, is a serious research agenda and studying vulnerability analysis of migrants in a changing climate is likely to give practical solutions for the future. The current topic of the thesis is now a real research need in order to discover suitable livelihood options and policies necessary for the development of ‘climate-induced’ migrants.

The highest migration in human history is under way. In 1950, 309 million people used to live in cities of the developing world which will be 3.09 Billion by 2030 (Saunders, 2010). According to Saunders (2010), appropriate investment is necessary in the “arrival cities”- where migrants generally arrive in places such as the outskirts of the metropolis, in the slums, or in the suburbs. The city migrants are creating *transient urban spaces* such as different types of overlying social and material spaces which are (re)produced and *transformed* by such migrants’ daily practices and their local and *translocal* relations (Bork-Huefer *et al.* 2014). Therefore, this research is also significant in terms of exploring this translocal lives of migrants in Dhaka City where translocality and the complex social spaces span multiple locations, in which migrants’ households are “simultaneously embedded” (Glick-Schiller, 2004).

5. Methodology

Study Area

The study area, Korail, is the biggest and densest slum, situated on 90 acres of land area and with more than 120,000 inhabitants. Korail is situated in Gulshan Thana of central Dhaka which is very near to 'Mohakhali Bus Terminal' and, therefore, a great concentration of urban poor. As the slum is surrounded by wealthier community of Gulshan, the slum dwellers get the opportunity to work as service providers for that community (e. g. rickshaw puller, driver, household worker, hawker). Therefore, the inhabitants of Korail has a higher chance to be an integral part of the urban economy.

Categorization of two groups

In this study, climate-induced migrants are those who came from climatically vulnerable zone of the country and where climatic factors might not be the only reason for migration but which was the main push to cross the threshold level of already vulnerable population. The study explored other socio-economic and political problems in their places of origin which could push them somehow towards cities irrespective of climatic disasters. Here, many such migrants came out to be non-climate-induced where climatic disasters were insignificant while taking migration decisions. Therefore, the term ‘induced’ does not merely refer to reasons, rather it refers to the final push which forced them to cross the threshold limit under stressed livelihood conditions.

By contrast, the non-climate-induced migrants were mainly voluntary migrants who came to the city after some forethought and planning, and with some assets to develop new city-based livelihoods. Most importantly, their migration decision was never influenced by climatic disasters.

Fieldwork

We started our work with the hypotheses that significant numbers of climate-induced migrants will be identified through this tracer survey as, according to recent literature, Dhaka is a popular destination for the climate victims of the country (UN-HABITAT, 2009; Anwer, 2012). For this purpose, only those migrants were selected who had come to the study area after 2006 and it made the process of identifying victims easier because this period included two major national climatic disasters, namely Cyclone *Sidr*

(2007) and Cyclone *Aila* (2009) and some major floods which caused huge displacements of coastal people to all over the country (Roy, 2011). Also the newly arrived migrants' experience of migration and displacements was relatively recent and therefore prominent in their lives and memories. Hence, recently arrived migrants were selected so that they would be more likely to recall details of the key events and decisions reliably.

We initially intended to select some migrants randomly who spontaneously informed that they came from climatic hot spots of the country and reached Dhaka following a climatic disaster. After personally interviewing those migrants, we included some selected migrants in separate group discussion involving the identified migrants together and assessed any differences in their responses from the earlier personal interviews. It helped us to cross-check data regarding their actual reasons for migration and allowed us to assess our own mistakes in applying the research tools. In some cases, we rejected respondents after the group discussion who were previously identified as climate-induced migrants because of their inconsistency of information.

After completing a few rounds of tracer survey questionnaires and group discussions with the potential target group, it was easier to understand who had actually been environmentally motivated and who had not. Once a climate-induced migrant had been selected, we followed the snowballing process to identify other climate-induced migrants. Whenever we found climate-induced migrants, we used those contacts to find more similar cases. In this way, in the first few weeks we conducted an intensive search programme by means of the tracer survey questionnaire. Finally, three major categories were prominent in the slum: migrants induced by floods, cyclone and riverbank erosion.

Once the types of migrants have been specified, household questionnaire survey has been conducted among 80 climate-induced migrants (target group) and 40 non-climate-induced migrants (comparison group). The research also integrated data from the comparison group in order to differentiate the climate-induced migrants' experiences from those of the general urban poor in the city. Without a comparison group, the target group's experiences could have been considered as the general experience of slum dwellers in the city. To clarify any confusion, taking a comparison group was necessary. The same questionnaire which was used on the target group, was used to interview the non-climate-induced households, who had migrated purely due to economic reasons and without any environmental push. In this case also migrants, arriving in the city after 2006, were selected. The same time period in the city for both the target group and comparison group was necessary to compare similar types of city-based experiences of social and environmental hazards. Focus group discussions were also integral parts of the research (two FGDs with the comparison group and ten with the target group). Several personal interviews also helped to achieve data.

Both quantitative and qualitative data have been used for this research in order to balance the limitation of one type of data by the strengths of another. This has certainly ensured that the understanding had been improved by integrating different ways of knowing. For example, while exploring the actual reasons for migration, only questionnaire survey was not enough because we had to follow their eye expression, body language as well as their emotion while giving statement in order to fully understand the main reason for migration. After the tracer questionnaire survey, FGDs helped to a great extent in this regard where we had more scope of in-depth discussion.

Data Analysis

In order to assess differences between the groups of migrants, the independent samples t-test and Chi-square (χ^2) test were used. The statistical package, Statistical Package for the Social Sciences (SPSS) for Windows (versions 20.0) (SPSS Inc), was used to calculate descriptive statistics. The independent samples t-test, also called the student's t-test, is an inferential statistical test that determines whether there

is a statistically significant difference between the means in two unrelated groups. In this research, the independent samples t-test has been used to determine whether the 'climate-induced migrants' have any significantly different dimension of vulnerability than the 'non-climate-induced migrants'. This test has been conducted in the case of quantitative variables such as differences in income, savings, year of schooling, family size, number of visits to village of origin, number of meals per day and number of food items in one meal. All the variables, which have been used in the tests, have the appropriate attributes³.

The Chi-square (χ^2) test is generally used to test an unmatched case-control study, or a cross-sectional study. In this research, the Chi-square test has been applied to see whether there is any significant relationship and/or differences between two groups in terms of qualitative variables such as health-related awareness, coping strategies with unemployment, reason of village visit, or aspiration to return to places of origin.

However, there are some methodological limitations of this research. Both selecting the study area and tracing the migrants were very time consuming processes. It was also difficult to identify purely climate-induced migrants. I had to place much emphasis on the main reason for their migration and that was a sensitive task. I had to be conscious while judging the principal 'cause of migration' from their statements, body language and emotions. That is the reason behind not having large samples for this research. Finally, the study only explored one slum and could not explore the periphery of Dhaka due to resource and time constraints, though the urban periphery was another potential destination for the target group.

6. Results and Discussions

Both the target group and the comparison group were asked to respond to the same questionnaire and similar agenda were discussed in the FGDs as well. The result shows significant differences in most of the following areas:

6.1. Financial Conditions

Occupations, income, savings, asset base, transportation mode used for going to work and home ownership have been considered in case of determining differences in financial condition of the two groups - climate-induced and non-climate-induced migrants. In comparing the occupational profiles of the two groups, the Chi-square (χ^2) test could not be used because more than 73% of the cells have counts less than 5 (the minimum threshold for the test to be valid). Therefore, Table 1 compares data between two groups.

It is evident from Table 1 that a substantial proportion of the climate-induced migrants are still unemployed in the city (21.2%). Conversely, no-one among the comparison group, strikingly, was found to be unemployed at the time of the survey. The table also reveals much higher participation of climate-induced migrants in the lowest-paid menial jobs such as day labourers (20%) and maid servants (18.8%). In contrast, the comparison group has higher participation in better paid jobs such as garments factory workers (15%), shop keepers (15%), business (15%) and office peon (7.5%).

Table 2 demonstrates the differences in the financial conditions between the two groups. An independent samples t-test was conducted to examine whether there was a significant difference between the two groups in relation to their current income in the city. The test revealed a statistically significant difference between them ($t = -9.748$, $df = 45.241$, $p < 0.001$). Non-climate-induced migrants reported higher income, on the average, in the city (M, Mean = 13325, SD, Standard Deviation = 4756.305) than did climate-induced migrants (M = 5711.25, SD= 1886.86).

Monthly mean savings of the comparison group are also almost 27 times higher than those of the target group and the difference is significant at the 1% level (Table 2). The mean monthly savings of the climate-induced migrants is only 192.50 BDT (SD=797.27) which is not enough even for purchasing a return ticket to their places of origin. On the contrary, the comparison group stated about higher mean savings at the end of the month (Mean, M=5125; Standard Deviation, SD=2603.62). This mean savings of comparison group also includes remittances to their villages.

For other categorical variables such as transportation modes used every day, house ownership and asset base, Chi-square (χ^2) tests were conducted. It has been found that more climate-induced migrants (77.5%) go to work on foot than the respondents in the comparison group (37.5%). A negligible proportion (1.2%) of the climate-induced migrants catches a bus to work, while 32% of the comparison group selected this as their main mode of transport. Therefore, it can be said that there is a significant difference ($P < 0.001$) in the choice of transportation based on types of migrants, where more climate-induced migrants travel on foot as compared to the non-climate-induced migrants. In other words, these findings showed that the comparison group can afford better transportation modes for going to work, when compared with the target group. This modal choice scenario is clearly linked to their differential financial conditions. Given the significantly higher average monthly income, the non-climate-induced migrants have more flexibility in transportation choice, especially for mechanized mode of transportation, which their climate-induced counterparts can hardly avail.

A significant difference has also been found with respect to house ownership ($p = .028$) and asset base ($p < 0.001$) between the two groups (Table 2). 12.5% of the respondents in the comparison group have their own houses in the slum compared to 2.5% of the respondents from the target group. FGD sessions revealed differences in terms of what they brought with them during the process of migration. Almost all the respondents from the target group said that they could not bring anything during the migration process, except their clothes. On the other hand, non-climate-induced migrants were found to have brought more money and other assets when relocating to the city. Also, in the FGD sessions, the comparison group reported that during the process of migration they brought clothes, furniture, sewing machine and sufficient money to meet the initial needs and confront the struggle in the city. Currently 12.5% of the non-climate-induced migrants are house owners in Korail (which does not include ownership of land). As a striking instance, one FGD participant from the comparison group also revealed that he was planning to buy a piece of land on the fringe of Dhaka City. This is an indication of the differences in financial conditions, purchasing power and in priorities between the two groups.

6.2. Education and Awareness

According to previous research, the tendency to migrate increases with the level of educational qualification achieved (Byerlee, 1972, 1974; Caldwell, 1969; Rempel, 1970; Sabot, 1972; Sahota, 1968, Adepoju 1995, 2002, de Haas 2008). Therefore, it can be said that the potential migrants were previously assumed to be well educated. But recent research argued that migrants from environmentally fragile regions might come from varied educational backgrounds and levels but there are differences in their motives for migration (Tacoli, 2011). According to recent literature, those who are poorly educated generally migrate with a view to finding an alternative livelihood strategy and those who have higher education (at least up to secondary level) migrate with different objectives such as better education and better lifestyle (Van der Land and Hummel, 2013). The results of the present research (Table 3) are in agreement with these recent findings and we argue that the climate-induced migrants' motives for migration are significantly different from those of the non-climate-induced migrants.

An independent samples t-test was conducted to examine whether there was a significant difference between climate-induced and non-climate-induced migrants in relation to the years of schooling completed (Table 3). The test revealed a statistically significant difference between the two groups ($t = -$

2.121, $df = 118$, $p=.036$), where the comparison group ($M = 3.98$, $SD = 2.702$) reported significantly higher levels of education than did the target group ($M = 1.96$, $SD= 2.712$).

The study also assessed the level of health-related awareness of the two groups. Both climate-induced and non-climate-induced migrants were asked whether they know the reasons for the incidence of diarrhoea, malaria and/or dengue. A Pearson Chi-square (χ^2) test was conducted to examine whether there were any remarkable differences in health-related awareness between the two types of migrants. The results revealed that the level of health-related awareness is significantly different between the two groups of people. A significantly larger proportion of non-climate-induced migrants (85%) reported that they were aware of the reason for at least one disease among diarrhoea, malaria and dengue compared with only 61.2% of climate-induced migrants (Table 3).

People's water purification habit is another important indicator for assessing their awareness related to health. The results showed that there was statistically significant difference between the two groups of participants in terms of water purification practice. A significantly larger proportion of non-climate-induced migrants (70%) reported that they purify water before drinking compared with only 42.5% of climate-induced migrants (Table 3).

Therefore, unlike Todaro's profit maximizing migrants (Todaro, 1976), the climate-induced migrants of this research are not very educated and not aware of the ways of urban life. For example, they are unaware of the fact that water needs to be purified in the city and also are ignorant of the causes of the likely diseases in the urban slum. In this case, however, there exist a clear difference with the comparison group who are more aware of the different types of health-related hazards and have better educational qualification that provide them a better standing in the city than that of the target group. Therefore, it can be easily said that there are differences in the educational qualifications as well as in the levels of awareness of the two groups, which also indicate differences in the goals and expectations of migrants based on their educational level (Connell *et al.*, 1976).

6.3. Family Structure and Pattern of Migration

Family size and composition are important indicators to understand a household's socio-economic condition. The family size of the target group ($M=4.20$; $SD=1.326$) in the research was found to be significantly larger ($t=3.37$; $p<0.01$) than that of the comparison group ($M=3.25$; $SD=1.515$). Nearly 79% of climate-induced migrants are living with their parents whereas less than 2% of non-climate-induced migrants brought their parents in the city with them during the process of migration. This information clearly links with the fact that climate-induced migrants were helpless during the process of migration and there was no other way than to bring the whole family with them. FGD respondents from the target group also claimed that one of the main reasons for migration was that they did not have the shelter to live in. Then how could they leave their parents in the village?

Literature suggests that migration is characterized by age, education and skill selectivity (Caldwell, 1969; Rempel, 1970; Schultz, 1971; Barnum and Sabot, 1976; Byerlee, 1972 and 1974; Chaudhury, 1978; Clark, 1986; Lipton, 1977; Todaro, 1976; Rienzo, 2013; Kaestner and Malamud, 2011). But climate-induced migration in this research is not characterized by these variables. Families came as a whole: with both economically active and inactive members. For example, Setara Begum (65) came to Dhaka after Cyclone *Sidr* in 2007 and since then she has been living in Korail with her husband, two sons and two daughters-in-law in one room with a partition wall. The room size is almost 80 square metres and 6 persons are really too many for the area. "*Sometimes I prefer to sleep under the bed of my sons*"-said Setara with tear in her eyes. Her self-dignity thus deteriorated to a great extent after coming to the city. Currently she is sick and cannot work and, according to her she is now considered to be a burden for her family. "*Why don't you go back then?*"-The answer was simple- "*no way to go back, nothing left in there!*" (Personal interview: 5; 23/08/2012).

However, Table 4 shows some different trends in the patterns of migration between the two groups. Almost 56% of non-climate-induced migrants initially migrated alone and brought family afterwards but the research found very few climate-induced migrant (1.2%) who migrated alone. Hence there is a basic difference in terms of the whole migration pattern between purely climate-induced and non-climate-induced migrants, which reflects the profoundly different circumstances under which they left. Koubi *et al.* (2013) stated that if people migrate alone from climatic-affected areas leaving their families there, then this is likely to weaken the relationship between climate change and migration and rather reflects only a form of livelihood diversification. However, as previously stated, 98.8% of the climate-induced migrants in this study moved to Dhaka with their families. Considering Koubi's findings, the pattern of migration found in my research is likely to be linked with climate change.

The FGDs also revealed that the comparison group generally had some time to plan for the migration and had scope to leave their relatives in the village. Still 17.5% of the comparison group are living alone in the city because they have the option to keep their families in villages and send money from the city, something which is not possible for the climate-induced people who actually don't have anything in their villages due to their destroyed asset base. Therefore, family size was found to be significantly different ($t=3.37$, $df=118$, $p=.001$) in case of climate and non-climate-induced migrants.

6.4. Access to Credit

Many institutions based in Korail provide micro-credit facilities to the slum dwellers. The NGOs involved in this programme are BRAC (20 groups), PROSHIKA (143 groups) and others (15 groups) (Mridha *et al.*, 2009). Attempts have been made to understand whether there are any differences between the two groups in terms of access to credit. For this, they have been asked regarding their practices of taking loans, sources of loan (whether personal or institutional), affiliation with institutions, credit facilities of those institutions and use of bank account. Table 5 is the summary of the questionnaire findings regarding access to credit of the respective groups.

Significant differences were found between the two groups in terms of use of bank account and tendency to take loans ($p<0.001$). No climate-induced migrants were found who had a bank account. In contrast, 30% of the non-climate-induced migrants said that they regularly operate a bank account in the city.

Moreover, more migrants from the target group (55%) take personal loans regularly than migrants from the comparison group (17.5%). Here personal loans refer to the loan taken at personal level (e.g. from friends and/or neighbours). Though there are 178 groups working based in Korail slum to give credit support, the target group rarely have access to this institutional source (Mridha *et al.*, 2009; Sinthia, 2013).

Only 16.3% of climate-induced migrants have institutional affiliations in the city (compared to 30% in case of comparison group) and their affiliation is mainly limited to the membership of DSK, a leading NGO working in the slum (DSK, 2010). DSK also gave cash (not loan) to very few respondents in the target group (3 out of 80) but in every case they didn't do anything productive with that money; rather they spent it to repay their previous personal loans.

"DSK gave me BDT 10,000 to construct a grocery shop; but I used that money to repay previous loans"

- Lipi Begum, a climate-induced migrant (Personal Interview: 2; 12/12/2012).

It proves that climate-induced migrants of the research cannot even utilize institutional credit support due to their already pressurized debt condition in the city. The annual progress report of Urban Partnerships

for Poverty Reduction (UPPR) mentioned this behaviour of misusing credits among some Korail slum dwellers and identified this as a major challenge for poverty reduction (UPPR, 2009).

On the other hand, the migrants from the comparison group reported a higher rate of membership (30%) in the credit giving organizations such as BRAC and PROSHIKA (leading national NGOs), co-operative organizations and formal banks in the city (Mridha *et al.*, 2009). As this group can save money at the end of the month, they don't have to seek loans regularly. This makes them free from any debt pressure and therefore, they can utilize the credit facilities in a better way unlike the climate-induced migrants.

6.5. Coping Strategies

Table 6 represents different types of coping strategies during unemployed periods. It shows that nearly 78% from the target group have the experience of being unemployed in the city at least once after joining labour force in Dhaka, where 92% from the comparison group have the same experience. The comparison group's greater experience of unemployment is probably related to their greater participation in the garment sector where they are often fired due to strict rules and regulations. FGD findings revealed that many migrants from the comparison group also take breaks from jobs in order to improve their skills through income generating training (e.g. car driving). In contrast, the migrants from the target group can rarely plan such 'break from work' situations. Their lower savings also do not allow them to explore for suitable jobs and they have to take low paid menial jobs anyway in order to survive in the city. Jaheda Begum, a climate-induced migrant, said that, "unemployment is starvation, we cannot afford it" (FGD: 2; 12/07/2012). Strikingly, the research found 21% of the climate-induced migrants to be unemployed during the fieldwork.

Hence, both groups have the experience to be unemployed in the city but the ways of coping with unemployment is different for these two groups. Taking loans during periods of unemployment is very common among the target group (41.2%) followed by eating less (19.1%). Strikingly, eating less was not mentioned as a coping strategy by anyone from the comparison group. On the contrary, spending from savings was reported as the main coping strategy of the comparison group (59.5%), where very few (7.4%) from the target group mentioned this as an option. The more capability of spending from savings reflects the more savings they have and their better socio-economic condition. This category has been shown in bold in the table due to their noticeably higher differences (Table 6).

6.6. Relationship with the Place of Origin

The research focused on the relationship of the two different groups of migrants with the places of origin. From Table 7 it is clear that the number of visits to places of origin in a year is significantly higher ($p < 0.001$) among non-climate-induced migrants than among the climate-induced migrants.

Results in Table 7 indicate that most climate-induced migrants cannot manage to visit their places of origin even once a year (mean number of visits is 0.39/year), whereas the non-climate-induced migrants are making visits 4 times a year. Though not presented in the table, the research also found that 38.7% of the climate-induced migrants visit their places of origin at least once a year, whereas the rate is 90% for the non-climate-induced migrants. The results also revealed that 3.7% of the climate-induced migrants visit their villages more than once annually, which is 70% in case of non-climate-induced migrants. Therefore, by conducting an independent samples t-test, it can be easily said that the yearly visit to the places of origin is significantly higher for the comparison group than that of the target group ($p < 0.001$).

However, reasons for visiting places of origin are also very different between the two groups. 98% of the climate-induced migrants who visit their villages every year, stated 'visiting relatives' as their main purpose of visit. On the other hand, the non-climate-induced migrants who visit their villages every year stated their reasons for visiting as taking care of village property (30.6%), buying new land (8.3%), administering income from agricultural production (13.9%) and meeting own family members (16.7%). However, no climate-induced migrants mentioned these reasons for their visit to village. Other than visiting relatives, the target group's reasons were limited to only meeting sick parents (2%) in the village (Figure 1).

Such contrasting reasons reflect the very different socio-economic conditions of the two groups. It is clearly seen from the findings that the respondents from the comparison group frequently visit their villages to administer rural-based income generating activities (mainly agriculture) and property which is not possible for the target group due to their destroyed asset base.

While exploring such relationships with villagers, it is inadequate to discuss only their frequency of travel. Cell phones provide a very easy way to communicate with their relatives in the village. The proportion using a mobile phone is 66% among the climate-induced migrants and 97% among the non-climate-induced migrants. In Bangladesh, a cell phone is a very cheap commodity and widely used by the people from almost all the classes in the society. The call rate (air time) is also very cheap and therefore it gives the climate-induced migrants a certain degree of freedom in maintaining communication with their relatives in the village. However, the use of cell phones by the target group is mainly limited to receiving phone calls as they cannot top up their phone balance regularly (FGD: 1; 12/07/12).

Finally, their level of aspiration to return to villages was discussed with both groups through FGDs, personal interviews and the questionnaire survey. It gives an idea about how they are linked with their places of origin emotionally. A significant difference has been found in the reaction of the two groups after conducting the Chi-square test ($p < 0.001$).

Translocality is an important aspect of this stage of the research where the migrant groups are living translocal lives but their changed financial and social conditions compel us to rethink about their identity (Levitt and Jaworsky, 2007). The flow of social remittances such as ideas, norms, practice and identities, are transforming the lives of the relatives of the migrants who lives in the place of origin (Levitt 2001). Therefore translocal migration is taking place within fluid social spaces that are constantly reworked through migrants' simultaneous embeddedness in more than one society (Levitt & Glick Schiller, 2004; Pries, 2005 and Smith, 2005).

Translocal social resilience can be defined as the relationship between the communities embedded in translocal networks, and human agency which refers to the choices, freedom and capacities of social actors to maintain translocal connectedness (Brogger, 2013). This connectedness has been found to be limited in climate-induced migrants of the research who are not physically well connected with their places of origins. Banks *et al.* (2011), therefore, stated that the new generations of low income urban residents might have looser links with rural areas. However the target group maintains some relationship with their rural relatives and friends at least by means of mobile phones. Thus social remittances are always being made irrespective of their differentiated status in the destination. Conversations on mobile phones allows ideas to be passed on and information and values to be exchanged quickly (Levitt, 1998, Page and Mercer, 2012). Festivals, meetings and celebrations are the events which maintain important connections among close relatives and friends and thus skills and knowledge are moved in between places (Page and Mercer, 2012; Etzold, 2014; Steinbrink, 2009 and Sterly, 2015). However, some researchers think that some sorts of exchanges still needs face-to-face contacts to build the trust needed to exchange

capitals (Levitt and Lamba-Nives, 2010). In this regard, the comparison group is always in advantageous position who can afford regular travel to their villages, unlike the target group of the research.

From Table 8 it is evident that 100% of the climate-induced migrants aspired to return permanently to their own villages. In contrast, only 40% from the comparison group have a similar aspiration. From FGDs it was clearly found that the target group perceive very strong aspirations to go back to their places of origin. Surprisingly, in every focus group with the target migrants at least one person cried out expressing his/her craving to return to their places of origin.

"Living in the city slum is like a curse on me. I strongly believe God pushed me into this city due to my previous bad conducts"

- Milton Khan, a climate-induced migrant in Korail; FGD: 2; 12/07/2012.

By contrast, the majority of the non-climate-induced migrants came to the city with the aspiration to settle permanently (60%). In the FGDs also, it was clear that they migrated with a vision and planned accordingly, unlike the climate-induced migrants.

"I cannot stay for a long time during my visit to village, because the rural atmosphere is very uncomfortable for my family members. There is no electricity connection and also there is no good school in the village"

-Fazlur Huq (45), a non-climate-induced migrant, FGD: 4; 22/07/2012.

The above-mentioned statement clearly conflicts with the target group's aspirations. The research found many families from the target group who are struggling in Dhaka only to save the money which is necessary for their return trip to villages and the repair of the broken rural houses.

6.7 Pre-migration Characteristics

This section will help readers to understand the context of their life before migration and thereby will explore whether their asset differences before migration played any role in determining current status in the city.

Map 1 represents the origins of the climate-induced migrants most of which are climatically vulnerable districts of the country. The non-climate-induced migrants were also selected from all over Bangladesh but with no intention to match the districts. However, both the target group and the comparison group were selected as having arrived in the city after 2006.

The target group's migration decision was triggered mainly by their asset destruction during cyclone/floods/riverbank erosion. Cyclone *Sidr* and Cyclone *Aila* were the two most devastating events that forced the target group towards Dhaka. Riverbank erosion and flood, on the other hand, are common features in Bangladesh where in case of the first event, people finds no other way than to leave their ancestral village.

The climate-induced migrants mainly came from the coastal districts of Bangladesh, such as Barguna, Patuakhali, Maheshkhali, Noakhali, Bhola, Satkhira and Jessore, which are vulnerable to the impacts of climatic disasters. 45% of migrants came from cyclone-affected districts and pushed by the two major recent cyclones, *Sidr and Aila*.

This paper is mainly based on the differences in the current conditions of both the climate-induced and non-climate-induced migrants. However, the study also attempted to understand whether their pre-migration characteristics were a factor in shaping their current socio-economic conditions. Previously their differences in educational status were discussed in Section 6.2 and the comparison group were found to be more educated than the target group. Therefore, pre migration income and assets were identified as other important categories at this stage of research.

In their places of origin, it was not easy to calculate the incomes of the farmers. Apart from possible inaccuracies in their recollections, the income was estimated based on the total amount of crop they used to produce each year. Also some livestock assets used to give them a monetary return. All those factors were taken into account while calculating their rural income. The average household income was found to be 4000 BDT (US\$1351.50) per month, which is less than their current income but expenditure in the village was negligible by comparison because they did not have to pay for house rent and utility services. In their places of origin (before the particular event which induced their migration decision), the average household income of the climate-induced migrants were found to be 4000 BDT (US\$ 51.50) per month which is less than their current income but expenditure in the village was negligible by comparison because they did not have to pay for house rent and utility services. The average household income of the non-climate-induced migrants were found to be 5000 BDT (US\$ 63.75) per month.

This difference in pre-migration income was not found to be statistically significant, which indicates that in the pre-migration period (before the extreme event inducing migration), both the target and comparison group had similar financial ability. However, this paper already revealed the differences in their financial ability in the city. This is easily understandable that the differences were shaped during the devastating floods, cyclones and riverbank erosions which made the target group more vulnerable than the migrants from the other group.

Before migration, only 20% from the comparison group were found to be farmers where the figure was nearly 49% for the target group. Others from the comparison group had some monetary income from shopkeeping (25%), truck driving (15%), rural business (18%), rickshaw/van pulling (10%) and day labour (12%) before migration. See Table 9 for the types of major occupations before migration. It is understandable from this statistics that 80% of the non-climate-induced migrants were not farmers in their villages and therefore their livelihood was not very much under threat of extreme weather events. These differences in pre-occupational characteristics might be due to their differences in educational status or vice-versa.

Figure 2 is a demonstration of their pre-migration asset status. It is evident that their asset levels were fairly similar at that time. The target group used to hold more livestock and agricultural equipment than the other group. This indicates the target group's dependency on agricultural livelihoods. Some categories, such as shops, trucks and business, were dominated by the comparison group. These assets were less sensitive to extreme weather and therefore most of those assets are still working as their sources of rural income. The comparison group still consider these shops, vehicles, businesses, land and houses as their rural property and 30.6% of them regularly visit their villages to take care of these properties (see Section 6.6).

During the pre-migration period, access to institutions was greater for non-climate-induced migrants (30%), where almost no institutional membership was found among the climate-induced migrants. This is probably due to their poor educational status which clearly made differences in their past and present conditions.

However, from relatively similar socio-economic backgrounds, these two groups now have differentiated vulnerabilities in the slum, and the study found two main reasons behind this differentiated conditions. The principal reason is probably the asset destruction during the floods, cyclone and/or riverbank erosion

which made them destitute within hours. Another reason was lack of education and institutional access which did not allow them to develop the confidence necessary to build their adaptive capacity.

6.8. Urban Politics and Governance and their Differential Impacts on Climate-induced Migrants

The research found that urban environmental governance has a strange informality in which many informal but active actors are involved (Hackenbroch, 2010). Corruption was found to be a root level problem of this system.

Now it is valid to ask how the impacts of urban governance structures and procedures differ between climate-induced and non-climate-induced migrants? The answer is simple in a way that it affects all the slum dwellers in general. Exceptions are the *Mastaans*, homeowners and influential political leaders who hold power in the society (Hossain, 2012; Bank *et al.*, 2011). But in the research these actors were mostly found to be non-climate-induced migrants. The new climate-induced migrants, due to their shorter stay in the city, were not found to be aware about these informal actors. Also lack of education and assets made them more vulnerable to the social challenges posed by local *Mastaans*. Climate-induced migrants in Korail are found to be worried about the safety of their young daughters. As they are the least educated group in the slum, it is very easy to exploit them in the nasty political games with exchange of money. Due to lack of contacts in the city, they are always insecure and try to avoid any conflicts with the local *Mastaans*.

During the final stage of the fieldwork, the research found a climate-induced migrant, Marjina Khatun, a divorced mother with three children, who was previously present in the FGDs of this study but at the very last stage of fieldwork the team found that the lady has left the slum with her children. Investigation and information from her neighbours revealed that she did not feel safe in the slum because of *Mastaans'* threats over repayment of previous loans. This pressure of loan repayment is a common story among the climate-induced migrants in Korail but Marjina's was an extreme case where *Mastaans* had direct involvement and it reflects the deteriorated law and order conditions in the slum. Marjina had no other relatives in the city and it forced her to go back to her village. Therefore, urban governance in Bangladesh does not favour the poorest, who include the climate-induced migrants in this study. These governance issues will be discussed in detail in a separate paper.

7. Conclusion

This paper has focused mainly on the relationships and the differences between the climate-induced and non-climate-induced migrants in the same slum based on different indicators. It has helped to understand the differential vulnerability of the climate-induced group to the various city based hazards such as unemployment, illiteracy, lack of credit facilities and contacts in the city.

The research revealed better income, savings, educational levels, access to credit and contacts among the non-climate-induced migrants compared with the climate-induced migrants. The research also revealed their contacts and connections with places of origin and much better connections were found in the comparison group. Reasons for visiting their places of origin are also very different in case of the two different groups. Finally, aspirations to return permanently to their places of origin are an important factor which was found to be very much higher among climate-induced migrants than in the other group.

The research also found bigger family sizes of the target group with both economically active and inactive members, where the comparison group mainly migrated with the active persons and now live with small families. The experience related to the process of migration was totally different for the climate-induced migrants: sudden and unplanned. They had no other way than to bring all the family members to the city because of their destroyed asset base in rural areas. By contrast, the non-climate-induced migrants migrated due to other types of reasons but had more time to plan their migration process than had the target group. And most importantly, the non-climate-induced migrants had the option to settle initially in the city themselves, leaving their families back home and bringing them afterwards, which was not possible for any of the climate-induced migrants of the research. This made the actual difference between the two groups – differences in types of occupations, income level and contacts; and the consequent differential coping capacity to various city based hazards.

This research also investigated whether the urban politics and governance have any differential impacts on the socio-economic conditions of the both groups. It was found that the informal actors such as *Mastaans*, homeowners and influential local leaders, who are mainly non-climate-induced migrants, generally hold the power in every aspect in the slum. Due to the target group's poor educational background, they are often exploited and deceived from their basic rights. The comparatively educated comparison group can at least protest against any discrimination in distributing common resources such as gas and water services. The comparison group's better awareness placed them in a comparatively stronger position than the target group in terms of negotiating with the informal local actors.

From the above discussion it is evident that in many aspects there are clear differences between the climate-induced and non-climate-induced migrants in Dhaka. The research findings showed that, in most of the areas, the climate-induced group is comparatively in a more disadvantageous position than the non-climate-induced group. May be the definitions are somehow arbitrary but the difference between the two groups is robust and not entirely dependent on the definition as we used in this paper.

With the accelerated process of climate change and the higher rate of urbanization, Bangladeshi cities are expected to receive more climate-induced migrants in the future and therefore it is high time to identify them and bring them under separate national and international plans because of their differential vulnerability to social and environmental hazards.

Notes

1. The way climate fluctuates yearly above or below a long-term average value (Dinse, 2011).
2. With an urban growth rate of 5.6% annually and with a population of 14.6 million, Dhaka is one of the fastest growing cities in South Asia. Dhaka City is also the major destination of the target group of the research and is also one of the most vulnerable cities in the world to the impacts of climate change (UN-HABITAT, 2010). According to the literature, Dhaka City is highly vulnerable to flooding, waterlogging and heat stress (Alam and Rabbani, 2007, UN-HABITAT, 2009).
3. The 't-test' is basically a small-sample test, but can be used for large sample size and approaches a normal distribution for $n > 30$. In our case, the minimum sample size is 40 for the group – non-climate-induced migrants, whereas n is 80 for the other group (climate-induced migrants). This justifies the use of the 't-test' in the case of quantitative variables for the two groups in our study.
4. Statistical results are provided from the independent samples t- test and Chi-square test.

5. In this study, the variable 'access to credit', for example, is a nominal variable, for which the response was 'qualitative response' (i.e. yes or no) for various categories of the variable. Chi-square test is the appropriate test in such a case.

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Table 1: Major occupations of climate-induced and non-climate-induced migrants

Types of occupation	Percentage of climate-induced migrants (n=80)	Percentage of non-climate-induced migrants (n=40)
Unemployed*	21.2	0
Rickshaw puller	23.8	22.5
Day labourer	20	5
Garment worker	2.5	15
Shopkeeper	2.5	15
Driver	0	2.5
Hawker	1.2	0
Housewife	5	2.5
Maid servant	18.8	2.5
Scavenger	1.2	0
Office peon	1.2	7.5
Businessman	1.2	15
Security guard	1.2	2.5
Construction worker	0	2.5
Carpenter	0	2.5

Contractor	0	2.5
House caretaker	0	2.5

**Bold sections indicate areas of major difference. Source: Questionnaire Survey*

Table 2: Differences in the financial conditions of the climate-induced and non-climate-induced migrants in Korail slum of Dhaka City

Variables	Climate-induced migrants (n=80)	Non-climate-induced migrants (n=40)	Test statistic ** (P-value)
Financial conditions ⁴ :			
Average monthly household income (BDT)	5711.25 (US\$ 73.50)	13325 (US\$ 172)	t= -9.748; (p<0.001)
Average monthly household expenditure (BDT)	5518.75 (US\$ 71)	8200 (US\$ 106)	t= -5.044; (p<0.001)
Average monthly household savings (BDT)	192.50 (US\$ 2.5)	5125 (US\$ 66)	t= -11.710; (p<0.001)
Transportation mode used every day:			
-On foot	77.5%	37.5%	$\chi^2 = 18.556$; (p<0.001)
-Not on foot	22.5%	62.5%	
House ownership in the slum:			
-Rented	97.5%	87.5%	$\chi^2 = 4.855$; (p=0.040)
-Own house	2.5%	12.5%	
Asset:			

-Own shop/business	3.75%	40%	$\chi^2= 26.295$; (p<0.001)
-Rickshaw	5%	20%	$\chi^2= 6.667$; (p=0.020)
-Jewellery	6.2%	37.5%	$\chi^2= 18.75$; (p<0.001)
-Furniture	36.2%	82.5%	$\chi^2= 22.842$; (p<0.001)
-Cell phone	66.2%	92.5%	$\chi^2= 9.800$; (p<0.001)
-TV	15%	50%	$\chi^2= 16.705$; (P<0.001)

Source: Questionnaire Survey

Table 3: Education and health-related awareness of climate-induced and non-climate-induced migrants

Variables	Climate-induced migrants (n=80)	Non-climate-induced migrants (n=40)	Test statistic ** (P-value)
Years of schooling (mean value)	1.96	3.98	t=-2.121; p=0.036
Awareness about reason for diarrhoea, malaria and/or dengue	61.2%	85%	$\chi^2= 7.053$; p=.008
Habit of water purification	42.5%	70%	$\chi^2= 8.076$; p=.004

*Statistical results are provided from the independent samples t- test and Chi-square test. Source: Questionnaire Survey.

Table 4: Differences in migration pattern between the target group and comparison group

Category	Climate-induced migrants (%) (n = 80)	Non-climate-induced migrants (%) (n = 40)
Migrated with the whole family	98.8	26.5
Initially migrated alone and brought family afterwards	0	56
Living alone in the city	1.2	17.5

Source: Questionnaire Survey

Table 5: Differences in access to credit between target group and comparison group.

Access to Credit ⁵	Climate-induced migrants (n=80) (%)		Non-climate-induced migrants (%) (n=40)		Test statistic* χ^2 ; p-value
	Yes	No	Yes	No	
<i>Loan taken since came to the city</i>	55	45	17.5	82.5	$\chi^2=15.345$; p<0.001
<i>Having any bank account</i>	0	100	30	70	$\chi^2=26.667$; p<0.001
<i>Having any institutional affiliation?</i>	16.2	83.8	30	70	$\chi^2=3.057$; p=.080

Source: Questionnaire Survey

Table 6: Coping strategies in situations under unemployment

Coping strategies	Target group (n) (n=62)	Comparison group (n) (n=37)
Taking Loan	41.2%	27%
Selling Asset	8.8%	5.4%
Taking help from govt/NGO	-	2.7%
Begging	2.94%	-
Shopping in local shop and paying later	11.76%	-
Getting help from relatives or friends	8.8%	5.4%
Spending from savings	7.4%	59.5%
Eating less	19.1%	-

Source: Questionnaire Survey

Table 7: Number of visits to the places of origin in a year

Type of migrant	N	Mean no. of visits/year	Standard deviation	Test statistic*; p-value
Climate-induced migrant	80	0.39	0.562	t= -5.212; df= 118; p < 0.001;
Non-climate-induced migrant	40	4.00	5.505	

*Statistical results are provided from the independent samples t- test. Source: Questionnaire Survey.

Table 8: Aspiration to return permanently to the place of origin

Types of migrants	<i>Having aspiration to permanently return to village</i>		Total
	No	Yes	
Climate-induced migrants (n=80)	0%	100%	80
Non-climate-induced migrants (n=40)	60%	40%	40

Source: Questionnaire Survey

Table 9: Types of major occupations before migration

Types of occupation	Percentage from target group	Percentage from comparison group
Rickshaw puller	2.5	10
Unemployed	0	0
Day labourer	12.5	12
Maid servant	3.75	0
Housewife	20	0
Shop keeper	0	25%
Businessman	1.25	18%
Farmer	48.75	20%
Fisherman	10	0
Student	1.25	0

Truck driving	0	15
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Source: Questionnaire Survey