Healthcare-Seeking Behaviours of Climate-Induced Internally Displaced People and Non-Displaced People in Bangladesh

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Declaration

I certify that the work in this thesis entitled "Healthcare-Seeking Behaviours of Climate-Induced Internally Displaced People and Non-Displaced People in Bangladesh" has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree to any other university or institution other than Macquarie University.

I also certify that the thesis is an original piece of research and it has been written by me. Any help and assistance that I have received in my research work and preparation of the thesis itself have been appropriately acknowledged.

In addition, I certify that all information sources and literature used are indicated in the thesis. The research presented in this thesis was approved by Macquarie University Human Research Ethics Committee (Ref: 5201600776 on 30/11/2016, Appendix-B) and Bangladesh Medical Research Council (Ref: BMRC/NREC2016-2019/1770 on 14/12/2016, Appendix-C).

Signature:
Md. Rabiul Haque
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Date: 9th May 2019

Abstract

Climate-related extreme events, including floods and riverbank erosion, affect the livelihoods for millions of rural Bangladeshis and force them to change their usual place of residence permanently. However, little is known about healthcare-seeking behaviors of the large and growing number of climate-induced internally displaced people. This thesis explores the displacement disadvantages and healthcare-seeking behaviors of people whose households have experienced displacement due to floods and riverbank erosion, and those whose households have not experienced such displacement.

Data for this thesis were collected using a cross-sectional survey from 1,200 randomly selected households, 600 from two displacement-prone districts and 600 from two non-displacement-prone districts, located in the north-western mainland regions of Bangladesh. It draws comparisons between the displaced and the non-displaced, between those displaced suddenly (displacement occurred at short notice due to a natural disaster) and those displaced gradually (resettlement process occurred gradually in anticipation of a natural disaster), and by the frequency of past displacement. Multiple logistic regression was used to identify the effect of displacement and other predictors on each outcome measure relating to the utilization of healthcare services.

The results show that the displaced experience multiple disadvantages compared to the non-displaced. The disadvantages of the displaced are intensified by sudden displacement and increased number of displacements. The displaced have reduced healthcare options, which, in turn, affects their healthcare-seeking behaviors. The children of climate-displaced parents are less likely to be treated by a trained provider during illness than those of non-displaced parents. Moreover, the utilization of health facilities for antenatal, delivery and postnatal care services is significantly lower among displaced mothers than among non-displaced mothers.

The findings have important implications for enhancing healthcare-seeking behavior of the climate-affected Bangladeshi people, and for the effectiveness of maternal and child healthcare related programs.

Keywords: Climate change, displacement, children's healthcare, maternal healthcare, antenatal care, delivery care, post-natal care, floods, riverbank erosion, Bangladesh

Dedicated

With love to Jesmin, Rabab, Marwa and my parents

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Sydney, 9th May 2019

Table of contents

List of abbreviations

ARI	:	Acute Respiratory Infection
ANC	:	Antenatal Care
BBS	:	Bangladesh Bureau of Statistics
CC	:	Community Clinic
CHCPs	:	Community Health Care Providers
GCRI	:	Global Climate Risk Index
DS	:	Displacement Solution
EmOC	:	Emergency Obstetric Care
FP	:	Family Planning
FWAs	:	Family Welfare Assistants
FWVs	:	Family Welfare Visitors
GBM	:	Ganges, Brahmaputra, and Meghna (River)
HAs	:	Health Assistants
HC	:	Health Centre
HDI	:	Human Development Index
IGS	:	Institute of Governance Studies
IOM	:	International Organization for Migration
IPCC	:	Intergovernmental Panel on Climate Change
JLI	:	Joint Learning Initiative
MA	:	Maternity Allowance
MCHC	:	Maternal and Child Health Care
MDGs	:	Millennium Development Goals
MoDMR	:	Ministry of Disaster Management and Relief
MoEF	:	Ministry of Environment and Forest

MoF	:	Ministry of Finance
MoHFW	:	Ministry of Health and Family Welfare
MoP	:	Ministry of Planning
MoWCA	:	Ministry of Women and Child Affairs
MW	:	Maps of the World
ND-GAIN	:	Notre Dame-Global Adaptation Index
NIPORT	:	National Institute of Population Research and Training
ORS		Oral Rehydration Saline
PHC	:	Primary Health Care
PJM	:	Padma, Jamuna, and Meghna (River)
PNC	:	Postnatal Care
PRB	:	Population Reference Bureau
PRB	:	Population Reference Bureau
SACMOs	:	Sub-Assistant Community Medical Officers
SBAs	:	Skilled Birth Attendants
SDGs	:	Sustainable Development Goals
SLR	:	Sea-Level Rise
TBAs;	:	Trained Birth Attendants
UN	:	United Nations
UNDP	:	United Nations Development Program
UNHCR	:	United Nations High Commissioner for Refugees
UNICEF	:	United Nations Children's Fund
USAID	:	United States Agency for International Development
WB	:	World Bank
WHO	:	World Health Organization

List of figures

Chapter 1

Chapter 3

List of tables

Chapter 1

Chapter 2

Chapter 3

Chapter 4

Chapter 5

List of self-contained papers and statement of authorship

This research work is completed as a 'Thesis by Publication'. The four self-contained papers[1], which have developed from this thesis, are as below:

i. Paper one: "Climate-induced displacement, impoverishment and healthcare accessibility in mainland Bangladesh".

ii. Paper two: "Parents' healthcare-seeking behaviour for their children among climate-related displaced people in rural Bangladesh".

iii. Paper three: "Climate-induced displacement and antenatal care utilization in rural Bangladesh".

iv. Paper four: "Utilization of maternal healthcare services for delivery and postnatal care in rural Bangladesh: Does climate-induced displacement matter?"

The papers related to this thesis were presented in the following conferences

i. Paper one was presented at the *Australian Population Association Conference*, 18-19 July 2018, Darwin, Australia; the *Asian Population Association Conference*, 11-15 July 2018, Shanghai, China; and the *2nd International Conference on Climate Change*, 15-16 February 2018, Colombo, Sri Lanka.

ii. Paper two was presented at the *Australian Population Association Conference*, 18-19 July 2018, Darwin, Australia.

iii. Paper three was presented at the *Asian Population Association Conference*, 11-15 July 2018, Shanghai, China.

[1] The four-self-contained papers of this thesis are presented in Chapter 2, 3, 4 and 5 respectively.

Statement of authorship

Title of paper one	:	Climate-induced displacement, impoverishment and healthcare accessibility in mainland Bangladesh (see Chapter 2).
Authors	:	Haque, M.R., Parr, N., & Muhidin, S.
Publication status	:	Under review by *Asian Population Studies*

Contributions of authors

Principal author (PhD candidate)	:	Md. Rabiul Haque
Contribution to the paper	:	Developed data collection instrument, collected data, conducted the literature review, conceptualized the scope of the paper, performed data analyses and interpretation and wrote the manuscript (80% of the work).
Name of co-author (1)	:	Nick Parr
Contribution to the paper	:	Supervised the development of manuscript, edited draft, assisted in manuscript evaluation, and provided some substantive suggestions. He has also acted as a corresponding author (15% of the work).
Name of co-author (2)	:	Salut Muhidin
Contribution to the paper	:	Advised on data analysis and assisted evaluation of the manuscripts (5% of the work).
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Name of co-author (1)	:	Nick Parr
Contribution to the paper	:	Supervised the development of manuscript, edited draft, assisted in manuscript evaluation, and provided some substantive suggestions. He has also acted as a corresponding author (15% of the work).
Name of co-author (2)	:	Salut Muhidin
Contribution to the paper	:	Advised on data analysis and assisted evaluation of the manuscripts (5% of the work).

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Authors	:	Haque, M.R., Parr, N., & Muhidin, S.
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Contributions of authors

Principal author (PhD candidate)	:	Md. Rabiul Haque
Contribution to the paper	:	Developed data collection instrument, collected data, conducted the literature review, conceptualized the scope of the paper, performed data analyses and interpretation and wrote the manuscript (80% of the work).

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Contribution to the paper	:	Advised on data analysis and assisted evaluation of the manuscript (5% of the work).

Chapter 1: Introduction

1.1 Background

Over the last three decades, life expectancy has increased for most of the developing countries (UNDP, 2018). Yet, access to standard healthcare services is out of the reach of many people in Bangladesh and some other developing countries. Despite promotional efforts, many people in resource-poor settings still do not have equitable access to health services, and therefore experience high morbidity and mortality (Ahmed et al., 2015; Hall & Taylor, 2003; O'Donnell, 2007; UNDP, 2018). Disparity in access to, and utilization of, healthcare services remains as a major concern for further progress in better health for Bangladesh and for many other developing countries. Exposure to climate-related extreme events is an additional recognized threat-multiplier for millions of Bangladeshis' health. This thesis examines the healthcare-seeking behaviours of climate-induced internally displaced people and compares them with non-displaced people in the mainland districts of Bangladesh.

The term 'climate-induced internally displaced people' refers to those who are forced to flee from their homes and homestead lands permanently in response to climate-related natural disasters and resettle in different places within their locality. 'Healthcare-seeking behaviours' are the ways people perceive illness and the initiatives of seeking appropriate remedies for healthcare. Whilst the socioeconomic vulnerabilities of internally displaced people and the adverse effects of natural disasters have been well documented in the national and international literature, the health-related disadvantages and healthcare-seeking behaviours of this large and growing section of the population have not yet gained enough attention in the health, climate change and natural disaster related literature, even though displacement leads to additional health and social burdens on the resettlement locations of the displaced people. This thesis aims to examine the extent of displacement-related disadvantages and assess healthcare-seeking behaviours of climate-induced internally displaced people and non-displaced people. These aims of this thesis are addressed in Chapters 2, 3, 4 and 5.

This chapter has five sections: 1) an introduction to the identification of the research problem and the justification of its significance; 2) a literature review to identify the relevant research gaps (comprehensive coverage of literature relevant to the topics of the papers is provided in Chapters 2-5) and to develop an appropriate conceptual framework; 3) the research questions and the study's objectives; 4) the research methods, study sites, study design, and sampling framework; and 5) an outline of the thesis structure.

1.1.1 Justification for this research

Bangladesh, as disaster-prone country, has been shaped by the effects of various climate-related extreme weather events (e.g., cyclone, flood, riverbank erosion, drought, storm surges, and landslide) since its formation (MoDMR, 2017). The frequency and intensity of these events have been increasing gradually in Bangladesh (Akhter, 2009; Saroar et al., 2015). Such climate-related events cause widespread loss of agricultural and homestead land, damage of household's assets and public infrastructure, and degrade the local ecosystem and livelihood system, with resultant massive population displacement in the disaster-prone areas of Bangladesh (Biswas et al., 2015; Das, 2014). However, the magnitude of displacement varies by region of the country and by the type of disaster. For example, the extent of floods and riverbank erosion related displacement (99%) among the inhabitants of the mainland riverine areas is almost double that for the coastal inhabitants (50%) (Kabir et al., 2016b; MoDMR, 2014). According to the Government report of Bangladesh, the highest proportion of people was displaced by riverbank erosion followed by floods, water logging, and salinity (MoDMR, 2014). Climate-induced displacement is projected to increase in the future because of high population growth and the effects of frequent exposure to extreme weather events. By 2050 one in seven Bangladeshis is expected to become displaced due to climate-related extreme weather events (MoDMR, 2014). The growth of climate-displacement is estimated to be 42% of the total population in 2020 an increase from 2% in 2011 (Akhter, 2009; BBS, 2011a).

Climate-induced displaced people face economic hardship and food insecurity because of homelessness, landlessness, marginalization, and unemployment (Biswas et al., 2015). They also suffer from health insecurity due to their higher incidence of illness and limited access to health and education infrastructure, as the effects of such disasters destroy those infrastructure in the disaster-prone areas (Das, 2014; MoDMR, 2014). Furthermore, the displaced households in many cases resettled in remote and geographically more vulnerable areas in which they face a lack of health and education facilities. Thus they have to travel longer distances from their new areas than before to reach health centre and bear extra cost for medical care (Das, 2014). Gradually, the displaced households become indebted due to the displacement-related damages and the costs associated with movement from one place to another place (MoDMR, 2014). Debt associated with recurrent and sudden displacement creates long-lasting poverty among the poor displaced that in the long run reduces their utilization of health and education services.

Climate-induced internally displaced people are disadvantaged group in Bangladesh whose healthcare-seeking and utilization behaviours and the factors associated with these behaviours have not yet been given enough attention in the literature, even though their share of the total population has grown continuously since the 1990s with rising its growth and increasing the frequency of natural disasters (BBS, 2011a; MoDMR, 2014; Mollah & Ferdaush, 2015; Poncelet et al., 2010). According to MoDMR (2014), flood-induced displacement increased from 1% of total population in 2005 to 8% in 2010. The contribution of riverbank erosion to the total population displacement was also increased from 8% in 1998 and 13% in 2010. The health-related vulnerabilities of these people may increase in the future as displacement adversely affects the livelihoods of the displaced and their relocation creates pressure on existing health and social services in their destinations (McMichael et al., 2012; Schütte et al., 2018; Schwerdtle et al., 2018; Thomas & Thomas, 2004). Thus, to reduce inequality in access and utilization of healthcare and to achieve the health-related targets of the Sustainable Development Goals (SDGs), the current urban-centric research focus needs to shift to this disadvantaged group to

understand the factors associated with their health-related disadvantages and healthcare-seeking behaviours.

The review of the literature *(Section 1.3.3)* suggests that a large number of studies in Bangladesh have been conducted in different contexts on groups other than climate-induced displaced people to assess the reasons for unequal utilization of healthcare services, perceptions about illness, and behaviours toward utilization of healthcare services. The existing literature has mainly concentrated on maternal and child healthcare services and to some extent on communicable diseases. Additionally, the climate change and health-related studies *(Section 1.3.4)* in Bangladesh have mostly focused on the health effects of climate change and weather-related events, perceptions about climate change, and adaptation strategies. Health coping strategies and sources of care for households in disaster-prone areas in general have only been partially discussed in a few studies. Displacement disadvantages have often been described based on the experiences of the climate-exposed people only without comparing such detriments with the non-displaced people. However, there is no specific research on healthcare-seeking behaviours of climate-induced internally displaced people and non-displaced people in Bangladesh. Thus, there is a dearth of information on the healthcare-seeking behaviours of climate-induced internally displaced people and on the extent to which socioeconomic and health-related disadvantages and healthcare seeking behaviours of the displaced people differ from non-displaced people.

1.1.2 Climate change and displacement

A large body of evidence confirms that climate change is one of the greatest threats to sustainable livelihoods in many parts of the world (Adger, 2010; IPCC, 2007b, 2014b; Mallick & Vogt, 2014; Renaud et al., 2007; Warner et al., 2008). Globally, the recorded number of natural disasters per year, mostly climate-related, has almost doubled over the last two decades (Islam & Shamsuddoha, 2017). Even though climate change affects all people, the poorer populations in developing countries such as Bangladesh are at greater risk of exposure to climate-related

disasters, such as cyclones, storm-surges, flooding, drought, riverbank-erosion and sea-level rise (SLR) (Adger, 2010; Baird et al., 2007; Boano et al., 2007; Faist & Schade, 2013; IPCC, 2014a; Johnson & Krishnamurthy, 2010; Kreft et al., 2016; Poncelet et al., 2010; Rahman & Ahmad, 2018; Stern, 2007; UN-ESCAP, 2015). One of the adverse outcomes of direct exposure to climate-related extreme weather events is forced displacement or migration (McLeman & Hunter, 2010; McMichael & Lindgren, 2011; McMichael et al., 2012). However, climate-induced displacement is most likely to occur in developing countries, where people depend on nature for their livelihoods and where public health resources are inadequate (IPCC, 2007a, 2014a; Schubert et al., 2008; Schütte et al., 2018).

Bangladesh, located in South Asia on the basin of three legendary rivers: Ganges, Brahmaputra and Meghna (GBM), locally known as Padma, Jamuna and Meghna (PJM), is widely recognized as one of the most climate vulnerable countries on earth (Anemüller et al., 2006; Boano et al., 2007; Dasvarma, 2014; Kreft et al., 2016; Pender, 2008; Poncelet et al., 2010; Stern, 2007). According to the Global Climate Risk Index (GCRI), Bangladesh ranked 1st between 1990 and 2010 and 6th between 1995 and 2014, based on average climate vulnerability score (Harmeling, 2009, 2011, 2012; Kreft et al., 2016). However, according to the Notre Dame Global Adaptation Index (ND-GAIN), Bangladesh is the 37th least ready country to combat climate effects, with the agriculture, dam and health systems among the most vulnerable sectors (ND-GAIN, 2014).

1.1.3 Basic demographics of Bangladesh

Bangladesh is a country of about 163 million people, with 1,103 people per square km in 2017, and a majority of its population (about 67%) live in rural areas (BBS, 2018; PRB, 2018). Around 24% of its total population in 2016 were below the national poverty line, while per day earnings were less than one US dollar in 2015 for 43% of the population (MoF, 2018; MoP, 2015c). However, out of 64 districts in Bangladesh, 32 of the districts, mostly disaster-prone regions, have experienced higher rates of poverty than the national rate (MoP, 2015a). Bangladesh is

experiencing rapid growth in its urban population, and this is expected to continue with an increasing rate of rural-urban migration and changes in agriculture and river-based livelihoods in rural settings due to climate change (Ayers et al., 2014; BBS, 2011a; Choe & Roberts, 2011; Hossain et al., 2015; IOM, 2016; Thomas et al., 2013; UN, 2014). Studies have revealed that internal migration is higher in the climate-affected areas, where migration is considered to be an adaptation strategy to climate change (Afsar, 2003; Haque et al., 2016b; Hossain et al., 2015; Kar & Hossain, 2001; Khun, 2002; Toufique & Turton, 2002). The effects of climate change on household's basic needs and subsistence activities (including financial resources, access to land, water and sanitation and social networks) increase their vulnerability and force them to move from their usual place of residence (Arsenault et al., 2015; Hutton & Haque, 2004). Most of these migrations are generally short distance, despite the high-level risk of further displacement. Recurrent displacement is prevalent among the climate-induced displaced households due to this pattern (Abrar et al., 2004; Hutton & Haque, 2003). Permanent migration, in particular to urban areas, is considered as the last option of climate-adaptation among the climate-induced displaced households (Arsenault et al., 2015; IOM, 2008).

1.1.4 Major climatic events and displacement in Bangladesh

Bangladesh has a border on three sides with the Indian states of West Bengal, Tripura, Assam, and Meghalaya (Figure 1.1). A small part of the border is shared with Myanmar. The geographical position of the Bay of Bengal and the crisscrossing network of small and medium tributaries with local rivers have formed the world's largest Delta in Bangladesh. Additionally, the tidal rivers connected to the Bay of Bengal to the south, the Himalayas to the north, and the upstream river channels create pressure in the flat Ganges Delta and these have made Bangladesh geographically unique in its annual experience of natural disasters (Ayers et al., 2014; Khatun & Islam, 2010; Pender, 2008; Warner et al., 2009). Bangladesh is also experiencing SLR along its coasts due to the global SLR and the subsidence of the Ganges Delta (Karim & Mimura, 2008). Also, 10% of its land is just one metre above the sea-level (Islam & Shamsuddoha, 2017).

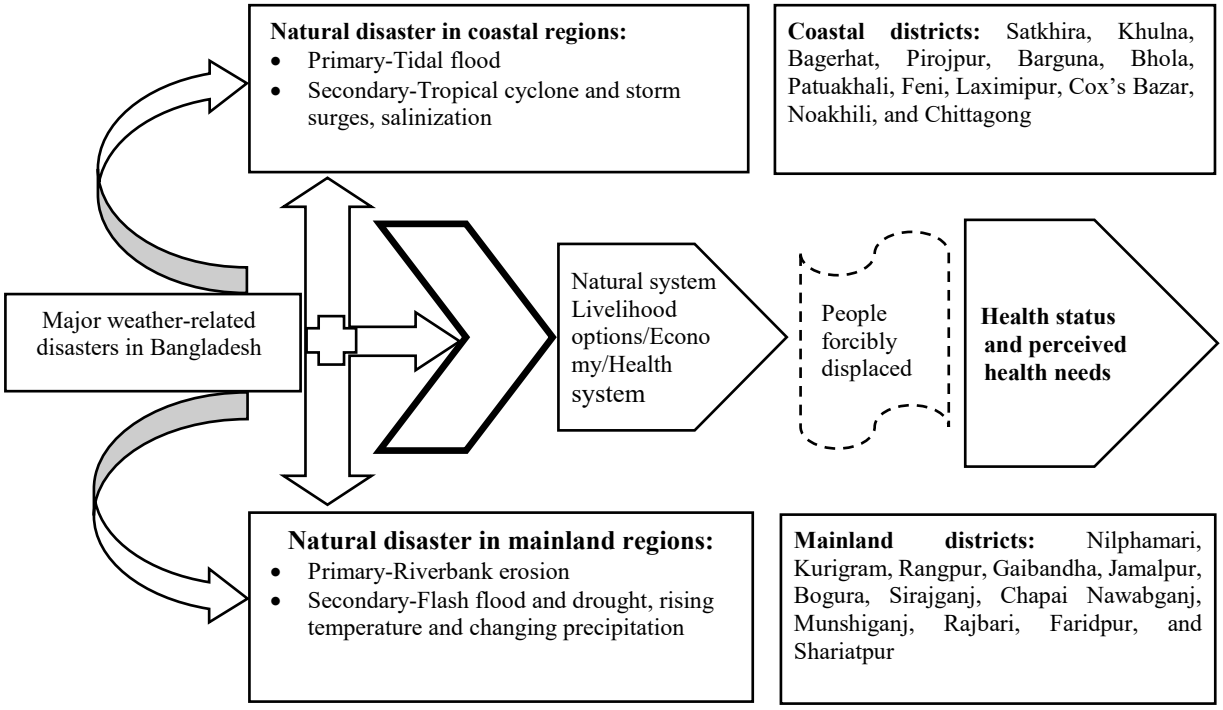
Figure 1.1: Geographical location of Bangladesh and its crisscross river channels

Source: (MW, 2016)

Natural disasters based on intensity and harshness can be classified into sudden-onset (e.g., cyclone, storm surges, and tidal/flash floods) and slow-onset (e.g., riverbank erosion, drought,

sea-level rise and salinization) events. Figure 1.2 shows the types of disaster by region, districts and their interlinks with displacement, health and well-being. Both coastal and mainland districts are being affected by rapid and slow onsets of disasters with some overlapping. These types of disasters can destroy the basic amenities of livelihood and well-being which ultimately force people to move somewhere else from their pre-disaster homestead land either temporarily or permanently. People in Bangladesh are mainly displaced from 24 districts (12 coastal and 12 mainland) out of 64 districts because of different climate-related extreme weathers-events (DS, 2012; MoDMR, 2014; Mohammad, 2015).

Figure 1.2: Major climate hazards causing displacement and affect health in Bangladesh



Source: Developed based on information (DS, 2012; Shamsuddoha et al., 2012)

Among these natural disasters, shown in Figure 1.2, the frequency and intensity of floods have increased over the last three decades in Bangladesh and other South Asian countries (Dasvarma, 2014; Islam & Shamsuddoha, 2017; Kobayashi et al., 2010; Parvin et al., 2016; UN-ESCAP, 2015). Floods and riverbank erosions are two common and frequent events that cause large-scale population displacement in Bangladesh (IOM, 2016; Rayhan, 2010; UN-ESCAP, 2015). Floods, depending on the intensity, submerge an estimated 30% to 70% of Bangladesh's

land (Agrawala et al., 2003), thus, almost 70% of its population are at risk of floods (Cash et al., 2013). The increased patterns of Bangladesh's floods and riverbank erosions are linked with the increased changes in the context of climate-related events (Ali, 2010; Khan, 2017; Parvin et al., 2016; Rahman et al., 2015). The frequency of floods and its intensity is projected to increase further for many countries in the world, in particular Bangladesh, with changes in the context of climate-related events (e.g., rising sea-level and increased precipitation, surface temperature, snow-melting, hydrological events, and massive river discharge) (Hirabayashi et al., 2008; IPCC, 2014a; Karim & Mimura, 2008; Masood & Takeuchi, 2016; Mirza, 2002; Nowreen et al., 2015; Nury et al., 2017).

Changes in the environment have exposed millions of Bangladeshis annually to climate-related sudden-onset and slow-onset of extreme events and forced them to become displaced (Mohammad, 2015; Poncelet et al., 2010; Stern, 2007; Vorosmarty et al., 2009). However, slow-onset of natural disasters and environmental changes are likely to be one of the proximate determinants of long-term migration from the pre-disaster homestead lands (IOM, 2016; McMichael et al., 2012). Between 1970 and 2009, around 48 million people have already been displaced in Bangladesh, of which 39 million were displaced by flooding, 5 million by drought, 3 million by cyclones, and the rest by riverbank erosion (Akhter, 2009). Floods and riverbanks are the leading causes of permanent displacement, mostly occurring in the mainland riverine regions of Bangladesh (Arsenault et al., 2015; IOM, 2016; MoDMR, 2014; Mollah & Ferdaush, 2015; Rahman, 2010b; Uddin & Basak, 2012). Temporary displacement generally occurs in the coastal region of Bangladesh, following a sudden-onset of natural disasters (Alam et al., 2013; Islam & Shamsuddoha, 2017; Kabir et al., 2016b). It is worth noting that displacement in the future, whether temporary or permanent and by choice or not, would be an important survival strategy for more than 30 million disaster-affected people in Bangladesh (Etzold & Mallick, 2015; McAdam & Saul, 2010; Shamsuddoha & Chowdhury, 2009; Stern, 2007).

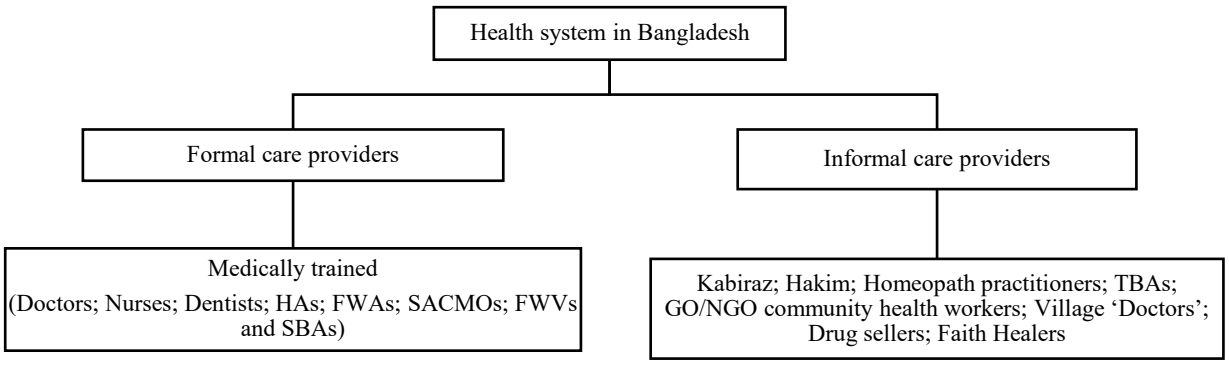
1.2 Health system of Bangladesh: Progress and challenges

1.2.1 Health system: Structure and medical pluralism

The Government of Bangladesh is constitutionally committed to improving the public health system of its large growing population and to ensuring their access to basic healthcare services regardless of social, political and legal identities (IGS, 2012; MoHFW, 2012). The health system of Bangladesh is hierarchical and pluralistic, and healthcare services are delivered via government facilities, private institutions and NGO-outlets. These actors are responsible for making healthcare services available to all. However, it is an individual's responsibility to visit service centres for healthcare services and to protect their own health (Ahmed et al., 2015). Hierarchically, the government health system places Specialized Hospitals at the top of the pyramid and Community Clinics (CCs) at the bottom (one for every 6,000 population), while District Hospitals, Upazila (sub-district) Health Complexes, and Union Health and Family Welfare Centres are in between (Ahmed et al., 2013).

Different stakeholders and agents, ranging from traditional care providers to modern private and public care systems, are involved in the pluralistic health system of Bangladesh to provide healthcare services. The health system in Bangladesh, based on the types of service providers, is broadly categorized into formal and informal care providers (Figure 1.3). The healthcare providers can also be classified as trained and untrained providers.

Figure 1.3: Provision of services in the Bangladesh health system



Source: (Ahmed et al., 2013)

1.2.2 Progress and challenges of Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) in selected health indicators

Since the 1990's, several programs[2] have been undertaken in Bangladesh to help the country to attain the Millennium Development Goals (MDGs), and over the last few decades, the country has made remarkable progress on many health indicators, in particular reducing its maternal and children under 5 mortality ratio, despite its economic hardship (Ahmed et al., 2013; Chowdhury et al., 2013; MoHFW, 2015; NIPORT et al., 2016). Table 1.1 illustrates the progress in reaching selected health-related MDGs and SDGs targets in Bangladesh.

Table 1.1: Maternal and child health-related progress towards MDGs and SDGs targets

Selected indicators related to maternal and child health	Base year 1990/2004	Progress 2014/2015	MDGs Target 2015	SDGs Target 2030
Maternal mortality ratio/100,000 live births	574	176*	144	59
% of births attended by skilled health personnel	7	42	50	98
% of births at health centre (HC)	9	37	-	98
% of antenatal care coverage (at least 4 visits)	17	31	98	98
Children <5 mortality rate/1,000 live births	144	46	48	25
Neonatal mortality rate/1,000 live births	52	28	-	12

Source: (MoHFW, 2015; NIPORT et al., 2016; NIPORT et al., 2005; UN, 2015a); *MMR in 2015**

The progress related to improved health is also noticeable in Bangladesh (Arifeen et al., 2013; NIPORT et al., 2016). For example, the contraceptive prevalence rate (CPR) has increased from 8% in the 1970's to 62.5% in 2017, while the total fertility rate (TFR) has decreased from 6.3 births per women in 1975 to 2.05 births in 2017 (BBS, 2018; NIPORT et al., 2016). Bangladesh has reduced childhood diarrhoea-related deaths (2% of all under-5 deaths in 2011) by increasing the coverage of Oral Rehydration Saline (ORS) from 50% to 77% between 1994 and 2014 for diarrhoeal treatment (NIPORT, 2016). The coverage of all basic vaccination for children by age of 12 months increased from 68% to 78% between 2004 and 2014. The rate of receiving treatment from a health centre for Acute Respiratory Infection (ARI) for children under-5 has also improved from 35% in 2011 to 42% in 2014 (NIPORT et al., 2016). Bangladesh is now pledged to reinforce the Family Planning (FP) services and to reduce its TFR to 1.7 by

[2] Key programs related to maternal and child healthcare are discussed further in Chapters 3-5.

2021 (NIPORT, 2016). Life expectancy at birth has increased also from 54.8 years in 1981 to 72 years in 2017 (BBS, 2018).

Bangladesh in many cases, however, has failed to achieve the targets of the MDGs (Table 1.1) due to the huge disparity in access to and utilization of existing healthcare services (Anwar et al., 2015; Chowdhury et al., 2013; MoHFW, 2015). Differential progress in certain health related indicators by different characteristics (e.g., demographic, socioeconomic, residence, and culture) show the disparity in access to and utilization of healthcare services (Adams et al., 2013; Chowdhury et al., 2013; NIPORT et al., 2013; NIPORT et al., 2016; Paul & Rumsey, 2002). Inequality in utilization of health services, difficulties in poverty alleviation, and the potential negative effects of climate change are likely to remain as major challenges in achieving the specified targets of SDGs (EBD, 2017; MoP, 2015b). The scarcity of qualified providers, particularly in rural areas, also creates the disparity in seeking-healthcare (Ahmed et al., 2013; Arifeen et al., 2013; MoHFW, 2008, 2016). The public health sector of Bangladesh has a severe shortage of human resources (Table 1.2), however, over the years Bangladesh has taken initiatives to strengthen its health systems by recruiting more human resources and deploying them equitably across the country by 2030 (MoHFW, 2016; MoP, 2015a).

Table 1.2: Availability of human resources in the health sector of Bangladesh

Human resources	For Population	Per 10000 population (cut-off point)
One Physician	2,628	3.8 (WHO's cut-off point 22.8)
One Nurse	8,696	1.15 (JLI cut-off point 25.0)
One Medical Technologist	26,490	0.38
One FWA	4,000-5,000	2.0-2.5
One HA	6,000	1.67
One CSBA	10,000	1.0
One CHCP	6,000	1.67

Data source: (Ahmed et al., 2011; Arifeen et al., 2013; JLI, 2004; MoHFW, 2015; WHO, 2006)

1.3 Literature review and research gaps

1.3.1 Literature review

The purposes of reviewing the existing frameworks/models and the available literature are to: i) identify the research gaps, and ii) develop an appropriate framework to address the identified research questions of this thesis. A detailed description of models and an extensive review of literature have been undertaken for developing the research questions and survey questionnaire.

However, only a brief description of selected key healthcare-seeking behaviour-related frameworks/models (S*ection 1.3.2*) and a concise review of selected key literature related to healthcare-seeking behaviours, climate adaptation, displacement, and health in Bangladesh *(Section 1.3.3 and 1.3.4)* are presented in this introduction Chapter. More in-depth coverage of the literature relevant to the topics of the Chapters is summarised further in Chapters 2-5.

1.3.2 Conceptualization of the existing frameworks/models

A range of different models have been used to explain the diverse steps and pathways taken by the individuals during illness, and their determinants at a given time and place. A specific overview of some frameworks/models is presented below.

1.3.2.1 Health belief model (HBM)

The health belief model (HBM) was developed to explain people's responses to disease symptoms and their subsequent behaviours towards disease diagnosis and medical care (Janz & Becker, 1984; Kirscht, 1974; Montano & Kasprzyk, 2008; Rosenstock, 1974). The dimensions of this model are: perceived susceptibility, severity, benefits, barriers to action, cues to action, and self-efficacy. According to the HBM, sociodemographic and psychological conditions such as age, sex, socioeconomic status, and ethnicity are associated with an individual's preventive and curative healthcare behaviours. It considers people's 'beliefs' as the bridge between socialization and health related behaviours (Conner & Norman, 2005). However, HBM describes individuals' responses to illness and health seeking behaviours without considering the impact of social networks in the decision making process (Mackain et al., 2004).

1.3.2.2 Theory of reasoned action (TRA) and Theory of planned behaviour (TPB)

The 'theory of planned behavior' (TPB), an extension of the 'theory of reasoned action' (TRA), recognizes the importance of careful appraisal of existing information in forming peoples' attitudes (Conner & Norman, 2005; Montano & Kasprzyk, 2008). Both models (TPB and TRA) emphasize how background conditions, such as external forces, demographic variables, and personality traits, construct people's attitudes, subjective norms, and perceived control towards

behavioural intentions, and they explain variations in healthcare-seeking behaviours. Though many of the variables used in TRA and TPB are also found in HBM, they also incorporate the role of social network supports.

1.3.2.3 The 'four As' model

The 'four As' model considers different factors and categorizes these factors to explain healthcare-seeking behaviours (Hausmann-Mueala et al., 2003). The 'four As' are as follows (Ansari 2007; Hausmann-Mueala et al., 2003):

i. '**A**vailability' refers to the geographical distribution of: healthcare facilities, service providers, medicinal products, medical equipment, and transport facilities.
ii. '**A**ccessibility' refers to people's access to transport facilities, communication systems, travel and waiting time to reach health systems, including providers and medicines.
iii. '**A**ffordability' covers direct, indirect (out of pocket) and opportunity costs involved in access to available healthcare services; and
iv. '**A**cceptability' denotes availability of socially and culturally accustomed healthcare services.

1.3.2.4 Pathways model

The 'pathways model' illustrates the steps taken to utilize healthcare services after recognition of symptoms during ill health. The pathways model is qualitative in nature and describes different steps that people consider in their decision-making processes and responses to illness (Kroeger, 1983). Iindividual's behaviour during illness is guided by social and medical considerations at five different stages: decisions that something is wrong, decisions that illness is important and there is a need to seek care, decisions to seek medical diagnosis and care, decisions to accept and follow prescribed treatment, and finally, decisions to resume normal life (Suchman, 1996). However, individual's choice of care-provider is an outcome of interactions between 'illness perception' and 'therapy choice' in which 'significant others (e.g., relatives and friends)' are important in the course of an illness episode (Good, 1987).

1.3.2.5 Healthcare utilization model

The earlier models identified socio-demographic, economic, cultural, and health-infrastructural variables as the determinants of healthcare-seeking behaviours. Andersen classified these factors and proposed a three-stage *healthcare utilization model,* also known as *socio-behavioral model,* in 1968 to explain differential use of healthcare services of families, to evaluate inequality in access to healthcare services, and to frame enduring policies for equitable access to the existing healthcare services (Andersen, 1968). The three broad categories of Andersen's model are: i) predisposing factors (e.g., age and sex, education, employment, ethnicity, culture, social networks, social interactions, knowledge, attitudes, and values of health and health services), ii) enabling factors (e.g., income, insurance coverage, social capital, social network supports, service availability, affordability, acceptability, distance, travel and waiting time), and iii) needs factors (perceptions towards health status, symptoms, illness severity, disability, health needs and satisfaction).

Andersen later revised the model and shifted his focus to individuals within the family instead of the family as the unit of analysis for healthcare utilization (Andersen, 1995). He added several new factors to the original model to explain healthcare service utilization. The newly added aspects include health-system external environment, personal healthcare practices, and consumer satisfaction. The revised model further shows that the dynamic interplay of multiple factors, both directly and indirectly, influences people's use of healthcare services and, subsequently, their health status (Andersen, 1995).

1.3.2.6 Ethnographic decision-making model

Pokhrel and Sauerborn (2004) rearranged the factors that influence the healthcare-seeking decision-making process into three different levels: individual level characteristics (e.g. age and sex), household level characteristics (e.g. household income, women's education, employment, and educational status of household head), and health system level characteristics (e.g., access to healthcare service providers). Additionally, there are four steps (perception about illness, care-

seeking, provider choice, and healthcare expenditure) that influence the household-level decision-making process of whether to consult for care (Pokhrel & Sauerborn, 2004). This model focuses on the household-level decision-making process and its determinants, but it is not clearly specified how household-level decisions to consult for care emerge, why individuals choose one provider over another, and what the role of the patriarchal social system in the decision-making process is.

Summary of the models reviewed: According to these models *(discussed in Section 1.3.2.1 to Section 1.3.2.6)*, many variables placed based on the three common factors: access to care service, social networks, and cultural attribute of the individuals. The HBM, TRA and TPB, Four-As, Pathways, and Ethnographic Decision model provide an understanding of a person's decision to utilize healthcare services. However, they are generally lacking empirical support for the effects of living environment on an individual's healthcare behaviours. According Moore (1969), an individual's healthcare-seeking behaviour is a function of his/her individual characteristics, characteristics of his/her living environment, and or some interactions between these individual and societal level factors (Moore, 1969).

Overall, Andersen's multilevel model, which includes both individual and contextual aspects of healthcare service utilization, is closely aligned with the topic of this research, namely, -healthcare-seeking behaviours of the climate-induced internally people and non-displaced in Bangladesh (Babitsch et al., 2012). This model has been applied in different contexts to explain the determinants of health service utilization of displaced, non-displaced, and homeless people (Burns et al., 2018; Ruiz-Rodriguez et al., 2006; Stein et al., 2007). Given the displacement related socioeconomic disadvantages, and associated health problems (see Section 1.1.1 and 1.3.4 for details), Andersen's model is used in this research to examine the effects of displacement-related attributes on healthcare-seeking behaviours of the proposed study population and its linkages with the predisposing, enabling, health system and perceived needs related characteristics (see Section 1.3.6 for details).

1.3.3 Studies of healthcare-seeking behaviours in Bangladesh

The review of existing frameworks/models (S*ection 1.3.2*) suggests that a range of factors including demographic, socioeconomic and cultural, determine peoples' healthcare-seeking behaviours for care, though the degree and direction of association vary widely, subject to other characteristics of individuals in a given place and time (Andersen & Newman, 2005; Babitsch et al., 2012; Blackwell et al., 2009; Thode et al., 2005).

1.3.3.1 Demographic factors

Age: The healthcare-seeking studies conducted in Bangladesh in different contexts have documented that healthcare-seeking behaviors are significantly predicted by the age of the ill person. Studies conducted in Bangladesh and other developing countries reveal that the probability of seeking care from professional care providers (i.e., doctors and paramedics) reduces with increasing age of children (Alam et al., 2009; Chowdhury et al., 2015; Huq & Tasnim, 2008; Pokhrel & Sauerborn, 2004; Thorsen & Pouliot, 2016).

Differences in using maternal care by age have also been documented in a large number of studies in Bangladesh (Aktar, 2012; Amin et al., 2010; Anwar et al., 2015; Chakraborty et al., 2003; Chowdhury et al., 2007; Haider et al., 2018; Haider et al., 2017; Haque et al., 2016a; Islam & Masud, 2018; Kamal, 2009). According to these studies, the likelihood of using antenatal care, skilled birth attendants at birth, health center (HC) based delivery and postnatal care decreases with the increasing age of mothers, which is consistent with the findings of studies conducted in other developing countries (Joshi et al., 2014; Ononokpono & Odimegwu, 2014; Rani & Bonu, 2003; Sharma et al., 2014; Singh et al., 2012a; Singh et al., 2012b; Tey & Lai, 2013).

Gender: The social construction of differential roles and responsibilities by gender disadvantages women in seeking modern healthcare from costly professional doctors (Ahmed et al., 2003; Ahmed et al., 2006; Ensor et al., 2002). Women are significantly more likely to be either untreated or treated by self-medication or by drug-seller-prescribed medicine, while men are more likely to choose paraprofessional or professional doctor-prescribed medicine during

illness (Ahmed et al., 2000; Ahmed et al., 2003; Ahmed et al., 2009a; Ahmed et al., 2005; Chakrabarti, 2012; Hou & Ma, 2013; Levin et al., 2001; Pokhrel & Sauerborn, 2004; Shaikh et al., 2008a, 2008b; Tee et al., 2011; Thorsen & Pouliot, 2016; Yount & Gittelsohn, 2008). Similarly, boys are treated more by professional care providers than girls (Alam et al., 2009; Darmstadt et al., 2006; Das et al., 2013). However, non-significant variation in seeking healthcare by the sex of the children has been reported in one study (Huq & Tasnim, 2008).

Parity: A range of studies have shown that women with more previous children are less likely to use antenatal care (ANC), skilled birth attendants (SBA) at birth, HC-based delivery, and C-section delivery than women with fewer previous children, and this phenomenon is probably due to the former group's previous experience of given birth (Chakraborty et al., 2003; Chowdhury et al., 2007; Haider et al., 2018; Hossain, 2010; Kamal, 2012b; Kamal, 2009; Kamal et al., 2013). Having a higher number of previous children increases the likelihood of delivering babies at home and increases the morbidity and mortality of both mothers and children (Heller, 2013; Howlader et al., 2000; Islam et al., 2006).

1.3.3.2 Socioeconomic factors

Household poverty: Household economic status is another important factor affecting healthcare-seeking from medically trained providers in Bangladesh. The lower the household economic status, the lower the likelihood of seeking healthcare from a doctor in rural Bangladesh (Alam et al., 2009; Sultana et al., 2019). The marginalized people tend to avoid modern care and depend more on self-medication or traditional care providers because they are only charged for medicine cost and because of the more flexible payment system (Ahmed et al., 2000; Ahmed et al., 2006; Ahmed et al., 2005; Bam et al., 2014; Caldwell et al., 2014; Edgeworth & Collins, 2006; Ferdous et al., 2014; Huq & Tasnim, 2008).

Differences in economic status are one of the leading causes of inequity in seeking maternal care in Bangladesh: the higher the household wealth status, the higher the likelihood of using maternal care from a qualified care provider and delivering birth at HC (Aktar, 2012; Anwar et

al., 2008; Chakraborty et al., 2003; Darmstadt et al., 2006; Hajizadeh et al., 2014; Halder et al., 2007; Kamal et al., 2016; Kamal, 2012a, 2012b; Kamal, 2009; Mahabub-Ul-Anwar et al., 2008). Poor households are the least likely to comply with prescribed drugs and the most likely to discontinue treatment (Alamgir et al., 2010; Hossain et al., 2001). Households with less available space for living are less likely to consult formal care providers for children in rural Bangladesh (Alam et al., 2009). In line with previous studies it is expected that the households with higher monthly income will be more likely to use trained health providers for care. Household's monthly income will also be associated their displacement status and thus with healthcare-seeking behaviours.

Literacy: The literacy status of household heads plays a significant role in healthcare-seeking behaviours (Ahmed et al., 2000; Ahmed et al., 2003; Ahmed et al., 2005; Alam et al., 2009; Chowdhury et al., 2015; Darmstadt et al., 2006; Rahman et al., 2011). Households with educated heads are more likely to choose professional/paraprofessional care providers for healthcare than households with uneducated heads. Illiterate household heads are less likely to comply and continue with prescribed drugs for treatment (Hossain et al., 2001). However, the literacy status of the studied samples is likely to vary by household's displacement status and by the nature and frequency of past displacement.

Parental education: Educated mothers avoid self-treatment or drugstore prescribed medicine and prefer to visit professional care providers both for children and for themselves (Ahmed et al., 2005; Alam et al., 2009; Huq & Tasnim, 2008; Kamal, 2012a). The higher the education of women, the higher is the likelihood of using antenatal care, HC-based delivery, skilled birth attendants at birth and postnatal care (PNC) from a trained provider (Amin et al., 2010; Anwar et al., 2015; Anwar et al., 2008; Chakraborty et al., 2003; Chowdhury et al., 2007; Hajizadeh et al., 2014; Haque et al., 2016a; Islam et al., 2006; Islam & Odland, 2011; Islam et al., 2014; Kalim et al., 2009; Kamal, 2012a; Kamal, 2009; Shahabuddin et al., 2015b). Fathers' education also has

a positive effect on maternal and child healthcare (Amin et al., 2010; Anwar et al., 2015; Anwar et al., 2008; Kamal, 2009).

Occupation: The occupational status of household heads is another important factor that influences healthcare-seeking behaviours of children and mothers. Wives of agricultural workers/farmers and day laborers are less likely to use maternal care during pregnancy, both from medically trained and traditional care providers, than women whose husbands are involved in business/service or other occupations. Additionally, businessmen/ service holders are more likely to visit doctors/nurse for maternal care of their wives than farmers (Chakraborty et al., 2003; Chowdhury et al., 2007; Kamal, 2009).

Women's status: Women's socioeconomic position and prevailing patriarchal norms, which are deeply embedded in the society and social systems, often discourage them from visiting professional or paraprofessional male care providers in Bangladesh (Hossen & Westhues, 2010, 2011a; Mahmood et al., 2009; Schuler et al., 2002). Women's health seeking behaviours from professional care providers from outside the home are also related with their conservativeness; lack of independence; limited decision-making capacity; husband/other household members' permission; availability of someone to accompany them to attend healthcare centre; low social position within the household; and social distance between non-local trained providers, services recipients and their family (Hossen & Westhues, 2010, 2011a; Hossen & Westhues, 2011b; Kalim et al., 2009; Levin et al., 2001; Navaneetham & Dharmalingam, 2002; Rani & Bonu, 2003). However, household's displacement related attributes (i.e., displaced/non-displaced and frequency of past displacement) may also act on women's healthcare behaviours, particularly for displaced women, as their household's displacement may likely to reduce their familiarity with the locally available trained healthcare providers and their accessibility. Moreover, women's involvement in healthcare related decision-making process is expected to increase the utilization of quality care for treatment, particularly for children.

Women's social position in terms of domestic autonomy, control over assets, social network and prestige are all positively associated with seeking healthcare from trained care providers for mothers and children (Alam et al., 2009; Amin et al., 2010; Chowdhury et al., 2007; Darmstadt et al., 2006; Das et al., 2013; Gayen & Raeside, 2007; Ghose et al., 2017; Kalim et al., 2009; Shahabuddin et al., 2015b). Additionally, the husband's concern about their wives' health increases the likelihood of using trained providers for maternal care, which is probably associated with the value of wives' assets' (Chowdhury et al., 2007; Darmstadt et al., 2006; Pardosi et al., 2015).

Media access: Households in rural, hilly and slum areas who have access to the mass media are more likely to use trained providers for antenatal care, skilled birth attendants at birth, and HC-based delivery and postnatal care than those who have no access to media (Islam & Hasan, 2000; Islam & Odland, 2011; Kamal, 2012b; Kamal, 2009; Rabbi, 2012; Rahman et al., 2017b). Unequal access to mass media of the studied households by displacement status (i.e., displaced/ non-displaced) is likely to create inequity in utilization of health facilities for ANC, delivery and PNC services between displaced mothers and non-displaced mothers.

1.3.3.3 Nature of illness and perceptions about illness

Parental decisions to seek care and choice of providers for children depend on illness characteristics (e.g., duration, severity, and symptom of illness). Existing parental beliefs and understanding of illness are associated with accepting preventive care, delays in seeking care, and choice of care providers (Chowdhury et al., 2015; Das et al., 2013; Ferdous et al., 2014; Karim et al., 2005). Parents prefer professional providers for uncommon diseases, such as skin/eye/pain/aches and gastrointestinal and long-term illness (i.e., ≥4days) than common and short-duration illnesses, such as diarrhoea, fever and respiratory infections (Ahmed et al., 2000; Ahmed et al., 2003; Alam et al., 2009). An analysis of cognitive mapping for seeking healthcare of villagers suggests that unqualified providers tend to be their first choice unless they perceive severe health threats (Sharmin et al., 2009).

Perceived importance of maternal care and complications during pregnancy and delivery determine the needs and choices of provider for care: the probability of using a medical doctor/nurse/skilled birth attendant is higher if household heads/husbands perceive that pregnant women are in a life threating situation (Anwar et al., 2008; Chakraborty et al., 2003; Kamal et al., 2013). Culturally, special care from a qualified provider during pregnancy and delivery is not essential unless there is an emergency (Choudhury & Ahmed, 2011; Gayen & Raeside, 2007; Kamal, 2012b; Shahabuddin et al., 2015b).

1.3.3.4 Health system/infrastructural

People's choices of healthcare providers are associated with their availability, accessibility, acceptability, and familiarity with care providers in Bangladesh (Caldwell et al., 2014; Hossen & Westhues, 2011a; Huq & Tasnim, 2008). The availability of health facilities within the village/locality increases the probability of seeking healthcare, though it has no significant impact on using qualified providers for treatment (Ahmed et al., 2000; Ahmed et al., 2003; Ahmed & Hossain, 2007). The availability of trained providers and household's affordability of using such provider and household's familiarity with trained care providers in the locality increases the likelihood of using modern healthcare as opposed to traditional care (Alam et al., 2009; Darmstadt et al., 2006; Huq & Tasnim, 2008; Mahmood et al., 2009; Wahed & Mahmood, 2009). However, the availability of drug-sellers is positively associated with modern drug use but negatively with using professional care for maternal and child health (Amin et al., 2010). Healthcare providers' availability, their familiarity with local people, and local people's affordability and accessibility to such services are expected to be different by displacement related attributes.

Additionally, certain health system factors (e.g., provider and staff attitudes, abusive language, negligence, and unfamiliarity) discourage marginalized rural people from visiting modern health facilities, even when they could afford it (Choudhury & Ahmed, 2011; Edgeworth & Collins, 2006). Caldwell et al. (2014) reveal that urban slum mothers mostly prefer to use

locally available informal care providers for healthcare of children and themselves because they are:

> *—more convenient, friendlier and cheaper; and least satisfaction with hospitals and clinics, government and private, which were the opposite. …only as a last resort do they seek it from outside their social networks. (Caldwell et al. 2014, p. 120)*

Distance: Distance to health facilities, which is associated with opportunity costs, is another factor that affects healthcare utilization and choice of providers in Bangladesh (Alam et al., 2009; Anwar et al., 2008; Biswas et al., 2016; Blum et al., 2006; Darmstadt et al., 2006; Edgeworth & Collins, 2006; Ferdous et al., 2014; Hossen & Westhues, 2011a; Hossen & Westhues, 2011b; Islam et al., 2006; Kalim et al., 2009). According to these studies, preference for use of self-care/informal care providers to formal care providers for treatment among the long-distance households is associated with their opportunity costs, such as traveling time, costs and loss of working time. The displaced people may experience greater disadvantages in terms of healthcare accessibility compared to the non-displaced people, which in the long run may increase their utilization of untrained providers, as opposed to trained providers, for healthcare.

Residence: Place of residence (rural/urban) plays an important role in reporting illness and seeking healthcare (Anwar et al., 2015; Huq & Tasnim, 2008). The use of antenatal, HC-based delivery, skilled birth attendants at birth, and C-section delivery care are all higher among urban women than rural women (Angeles et al., 2018; Anwar et al., 2015; Anwar et al., 2008; Biswas et al., 2016; Chowdhury et al., 2007; Kamal, 2009). The choice of providers for care depends on where people live (e.g., slum, hilly, wetland, embankment), as their care practices are related to their living environment and endogenous understanding about healthcare (Ahmed et al., 2000; Ahmed et al., 2003; Haque et al., 2016a; Heller, 2013; Islam & Odland, 2011).

1.3.3.5 Antenatal, delivery and post-natal care

Having had antenatal care (ANC) during pregnancy increases the likelihood of using maternal healthcare from a qualified provider during and after delivery (Anwar et al., 2008; Chowdhury et al., 2007; Islam & Masud, 2018; Islam et al., 2014). Women with regular visits to doctors for

ANC are more likely to deliver at a HC, while women with irregular visits are more likely to give birth at home (Islam et al., 2006). The in-depth coverage of the literature relevant to ANC delivery and PNC service utilization is discussed further in Chapter 4 and 5.

1.3.4 Climate change and health related studies in Bangladesh

Climate change has adverse impacts on human health, particularly for those who are directly exposed to its risks (Boano et al., 2007; Costello et al., 2009; Kabir et al., 2014; McMichael & Woodruff, 2008; McMichael et al., 2006; Myers & Patz, 2009; Rahman & Ahmad, 2018; Watts et al., 2015). Several studies agree that the prevalence of climate-sensitive diseases (e.g., diarrhoea, dengue, malaria, fever, and heat stroke) has increased over the years in climate-affected countries, including Bangladesh (Haines et al., 2006; IPCC, 2007a; Kolstad & Johansson, 2011; MoDMR, 2014; MoEF, 2009; Purse et al., 2005; WHO, 2009). A large number of people in Bangladesh suffer from infectious, waterborne and vector-borne diseases (e.g., cholera, diarrhoea, malaria, dengue, hepatitis, and skin diseases) during the periods of extended natural disasters and after disasters (Beier et al., 2015; Ebi et al., 2007; Haque et al., 2012; Hashizume et al., 2007; Hasib & Chathoth, 2016; Kabir et al., 2014; Kamruzzaman et al., 2015; Khan et al., 2011a; Khan et al., 2011b; Mani & Wang, 2014; MoDMR, 2014; MoEF, 2009; Myint et al., 2011; Rahman, 2008; Shahid, 2009).

Among the climate vulnerable population , children, the elderly and women are at a higher risk of suffering from ill health (Kabir et al., 2014; Mahmood, 2012; Nesha et al., 2014). Studies based on cross-sectional data confirm that the perceived severity of health effects of climate change differs significantly by age, sex and education (Beier et al., 2015; Haque et al., 2012; Kabir et al., 2016a; Kabir et al., 2016b; Mani & Wang, 2014).

Households living in the coastal and riverine areas or being displaced are vulnerable in general due to loss of land and household positions and limited access to food, water, education, and health facilities (Alam, 2017; Biswas et al., 2015; Rahman & Ahmad, 2018; Salauddin & Ashikuzzaman, 2012; Sarker et al., 2003; Saroar et al., 2015; Torikul & Farjana, 2014; Uddin &

Basak, 2012). Displacement related studies have mostly described socioeconomic disadvantages of the displaced, causes of displacement, and their adaptation strategies (Arsenault et al., 2015; Haque & Zaman, 1989; Hutton & Haque, 2003, 2004; Mollah & Ferdaush, 2015; Rabbi et al., 2017; Rahman et al., 2015; Rahman, 2010b).

Summary of literature review: The review of the potential predictors suggests that the predisposing characteristics such as age, gender, parity, education, employment status and the existing beliefs/practices related to illness will be associated with their healthcare service utilization. These predisposing factors will vary by displacement status and displacement related other attributes. For example, mother's education, which is an important factor for maternal and child healthcare, is likely to be different by displacement status. Some of the enabling factors, such as household income and access to media, will also be associated with displacement status, as well as with reduced utilization of healthcare services of the displaced. The factors related to health systems, such as availability and type of health providers, distance to health services, transportation system, and opportunity costs, will be associated with the utilization of healthcare services. Long distance travel to reach health centre and higher costs for transportation, and higher opportunity costs of the displaced may reduce their utilization of healthcare services for treatment. Moreover, the perceived need factors such as self-reported illness, type and severity of illness, and duration of illness will vary by displacement-related characteristics and affect the utilization of healthcare services. For example, parental displacement experience will reduce their perceived severity of child's illness which in turn will reduce the likelihood of using quality care for child's illnesses.

1.3.5 Research gaps

Despite there being plenty of literature on the determinants of health and inequalities, health vulnerabilities and climate adaptation more broadly, there is a lack of information specifically on the healthcare-seeking behaviours of climate-affected people in Bangladesh. While the potential links between climate change, migration/displacement and health have been discussed in some

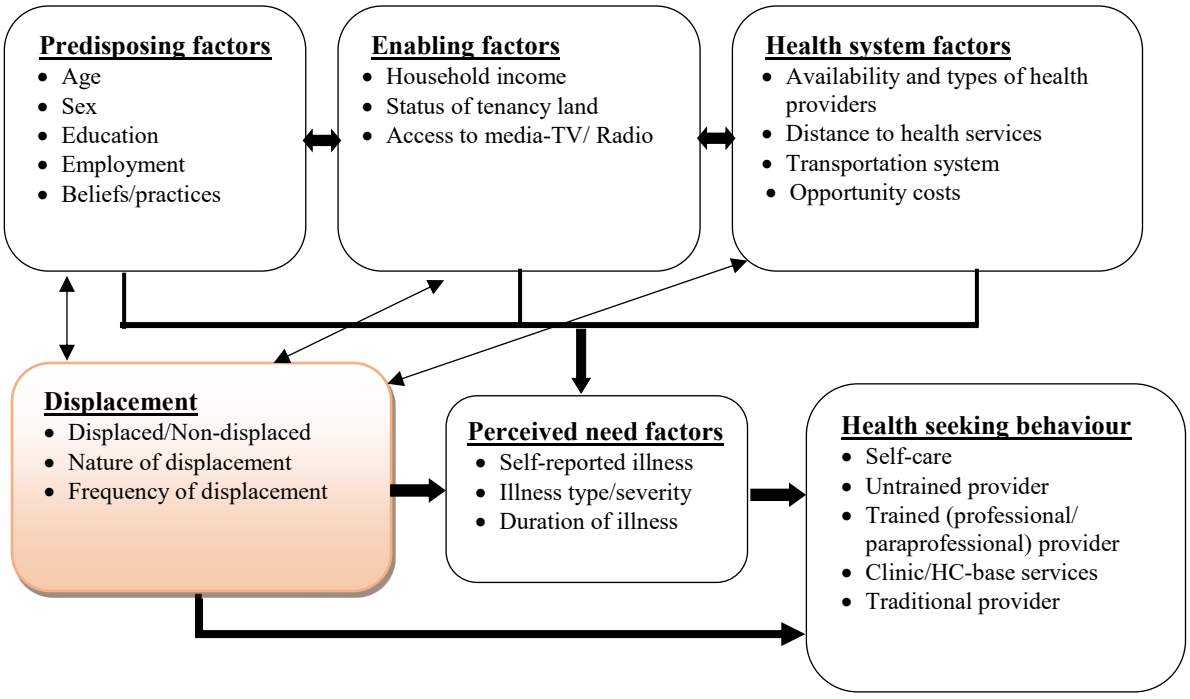
studies, there is a lack of empirical evidence that provide a foundation for indicators in this area in the global context (McMichael et al., 2012; Watts et al., 2018). The above discussion *(Section 1.3.3)* reveals that the reasons for unequal utilization of healthcare services, people's perceptions about illness, and their behaviours toward the utilization of healthcare services have received considerable attention in previous healthcare-seeking related studies. However, none of the studies discussed in Section 1.3.3 have considered healthcare-seeking behaviours of climate-related internally displaced people, while climate change and health related studies *(Section 1.3.4)* in Bangladesh have mostly concentrated on health effects of climate change, perceptions of and adaptation strategies to climate change. Only two studies with a small sample have compared displaced and non-displaced people and their focus on satisfaction related to education, health and income was quite different to the focus of this thesis (Hutton & Haque, 2003, 2004). There are only a few studies (Haque et al., 2013; Haque et al., 2014; Kabir et al., 2016a; MoDMR, 2014) in which the health coping strategies and sources of treatment of people who live in the climate-affected areas in general have been partially noted. These studies have concentrated on provider choice and the types of herbal-medicine used to cope with climate-sensitive diseases, without providing any causal explanations or examining differentials by socioeconomic, demographic, cultural, and climate-related attributes of the respondents.

The existing literature related to displacement and health suggests that there is a lack of evidence for understanding the extended disadvantages of the displaced. Moreover, there is a dearth of comparative research between displaced and non-displaced people, relating to the effects of displacement disadvantages on seeking healthcare and utilization behaviours. This research is the first time attempt to fulfil that knowledge gap. A study which used meta-analysis also suggests that there is lack of transdisciplinary and cross-theme research in climate change, health and displacement in the context of Bangladesh (Rahman et al., 2018).

1.3.6 Proposed conceptual framework for this research

This thesis proposes a conceptual framework (Figure 1.4) for the healthcare-seeking behaviors of climate-induced internally displaced and non-displaced people, based on the review of existing frameworks and available literature. The proposed framework has been developed based on a modification of Andersen's behavioural model of seeking healthcare (*Section 1.3.2.5*). Several studies have applied this model to explain individual and contextual attributes of healthcare-seeking behaviours in the context of both developed and developing countries (Amin et al., 2010; Andersen, 2008; Babitsch et al., 2012; Chakraborty et al., 2003; Fosu, 1994; Sreeramareddy et al., 2012; Sreeramareddy et al., 2006; Subedi, 1989).

Figure 1.4 Conceptual framework proposed for healthcare-seeking behaviour



According to the proposed framework, the illness status and healthcare-seeking behaviours of the target populations are assumed to be associated with predisposing, enabling and health system factors. However, displacement-related factors also act on the perceived needs of the displaced and their healthcare-seeking behaviours. Thus, changes in healthcare-seeking behaviours are expected to be in relation to the displacement characteristics. This model is applied to assess the healthcare-seeking behaviours of the displaced people to the non-displaced

people, particularly for care of children (Chapter 3). The total respondents in this study are classified into the 'climate-induced displaced' people (those who were forced to change their residence at least once in the last 10 years due to climate change-related events) and 'non-displaced' people (those who never did so). The displaced people are further subdivided according to the nature of their last displacement (i.e., 'suddenly displaced' and 'gradually displaced') as well as the number of past displacements in the last 10 years. Moreover, permanently displaced people are those who have clear intention to stay in their current place of residence and who either have no option to return to their previous residence or have no wish to do so.

1.4 Research questions and objectives

1.4.1 Research questions

The main research question of this thesis, 'Do differences in healthcare-seeking behaviours exist between the climate-induced displaced people and the non-displaced people in Bangladesh', will be guided by the following more specific questions.

i. What is the displacement history, demographic profile, socioeconomic status, and level of healthcare access among both climate-induced people and non-displaced people, and do these vary by the nature and frequency of past displacement?
ii. What factors influence parental healthcare-seeking behaviours during the illnesses of their children, and do these factors vary by displacement status (i.e., climate-displaced/non-displaced)?
iii. What factors affect the utilization of ANC services (provider preference and practice) for pregnant mothers, and do these factors vary by displacement status (i.e., climate-displaced/non-displaced)?
iv. What factors affect the utilization of maternal healthcare seeking behaviours (e.g., use of delivery and postnatal care services), and do these factors vary by displacement status (i.e., climate-displaced/non-displaced)?

1.4.2 Research objectives

This thesis aims to compare the disadvantages of climate-induced internally displaced people and non-displaced people and evaluate the effects of displacement disadvantages on their healthcare-seeking behaviours for children's and mothers' care. The specific objectives are:

i. To explore the disadvantages by displacement status, and by nature and frequency of past displacement.

ii. To examine the factors that influence climate-induced displaced parents' and non-displaced parents' healthcare-seeking behaviours for illness of their children.

iii. To identify the determinants of ANC service utilization and differences in ANC service utilization between mothers from displaced households and mothers from non-displaced households.

iv. To evaluate the extended effects of climate-induced displacement on utilization of health facilities for HC-based delivery and PNC services (neonates) and compare health service utilization patterns between mothers from displaced households and mothers from non-displaced households.

These four research objectives derived from the four research questions are discussed in depth in the relevant Chapters 2-5 in the following order:

Research question (i) and the objective (i) are discussed in Chapter 2: *Climate-induced displacement, impoverishment and healthcare accessibility in mainland Bangladesh*. This chapter focuses on whether climate-induced displacement status, displacement nature, and displacement frequency matter for socioeconomic and health-related disadvantages for rural people in the mainland regions of Bangladesh. Comparisons are drawn between the displaced and the non-displaced, before and after displacement, between those displaced suddenly and those displaced gradually, and by the frequency of past displacement to identify socioeconomic and health-related disadvantages of the displaced people compared to the non-displaced people.

Analysing the displacement disadvantages by displacement attributes, this chapter also distinguishes which group of the displaced are more vulnerable and why.

Research question (ii) and objective (ii) are related to seeking healthcare for illness of children and they are addressed in Chapter 3: *Parents' healthcare-seeking behaviour for their children among climate-related displaced people in rural Bangladesh.* Comparisons are drawn between displaced parents and non-displaced parents to evaluates the extended negative consequences of parental displacement on their healthcare practices for their children's treatment. It also illustrates the reasons of using substandard care by prenatal displacement status (i.e., displaced parents/non-displaced parents).

Chapter 4 *Climate-induced displacement and antenatal care utilization in rural Bangladesh* of this thesis addresses research question (iii) and objective (iii). It illustrates the reasons for inadequate utilization of ANC services by mothers from displaced households and mothers from non-displaced households and the detrimental effects of recurrent displacement on their ANC service utilization.

The last research question (iv) and the objective (iv) of this thesis are discussed in Chapter 5 '*Household's displacement effects on delivery and postnatal care service utilization in rural Bangladesh'*. This chapter demonstrates the utilization of healthcare services for delivery and postnatal care services by mothers from displaced households and mothers from non-displaced households and the adverse consequences of household's recurrent displacement on HC-based delivery and PNC service utilization. It further explores the reasons for a greater tendency of home-based delivery and of not using PNC services by mothers from displaced households for their newborn babies.

1.5 Research methods and design

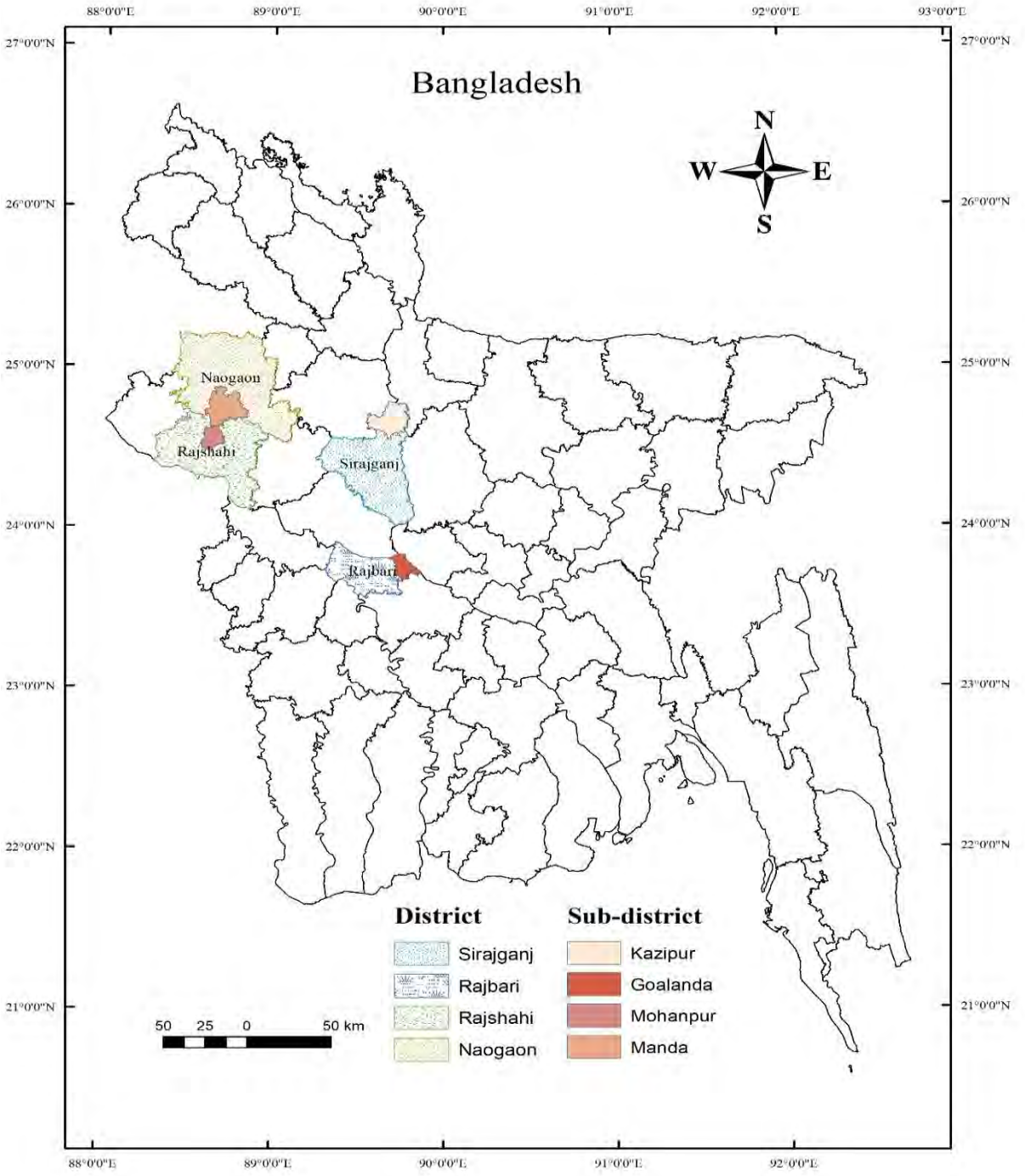
1.5.1 Research methods

This study used a 'quantitative' approach to address the identified 'what' oriented research questions. This approach is used to evaluate the cause and effect relationships between the measurable variables in order to explain the causal relations and to make the present study generalizable and replicable to other similar contexts (De Vaus, 2002; Leedy, 1993). Moreover, this approach provides options to assess the effect of one predictor by controlling others and split the study participants into groups to evaluate the differences and similarities between groups (Creswell, 2009; Johnson & Christensen, 2014). This thesis collected quantitative data about displacement history, availability and accessibility of healthcare services, incidence of illnesses, healthcare practices for treatment, and background characteristics, such as demographic, socioeconomic and cultural characteristics, to examine the determinants on healthcare-seeking behaviours and healthcare utilization practices, and to draw comparison between the displaced and the non-displaced, between suddenly displaced and gradually displaced, and to explore effects caused by the frequency of past displacement.

1.5.2 Study site and basic demographics

Climate-induced internal displacement in Bangladesh is primarily concentrated in 24 districts which lie in two climate-vulnerable 'hotspots': 12 districts are located in the central and western coastal regions and the remaining 12 are in the localities on the basin of large rivers in the north-western mainland regions, where permanent displacement mainly took place (DS, 2012; Islam & Shamsuddoha, 2017; MER, 2015; Shamsuddoha et al., 2012). However, this study was conducted in four districts: two in displacement-prone areas (Sirajganj and Rajbari) and two in non-displacement-prone areas (Rajshahi and Naogaon), which are located in the north-western mainland regions of Bangladesh (Figure 1.5).

Figure 1. 5: Geographical locations of the selected districts and sub-districts in Bangladesh

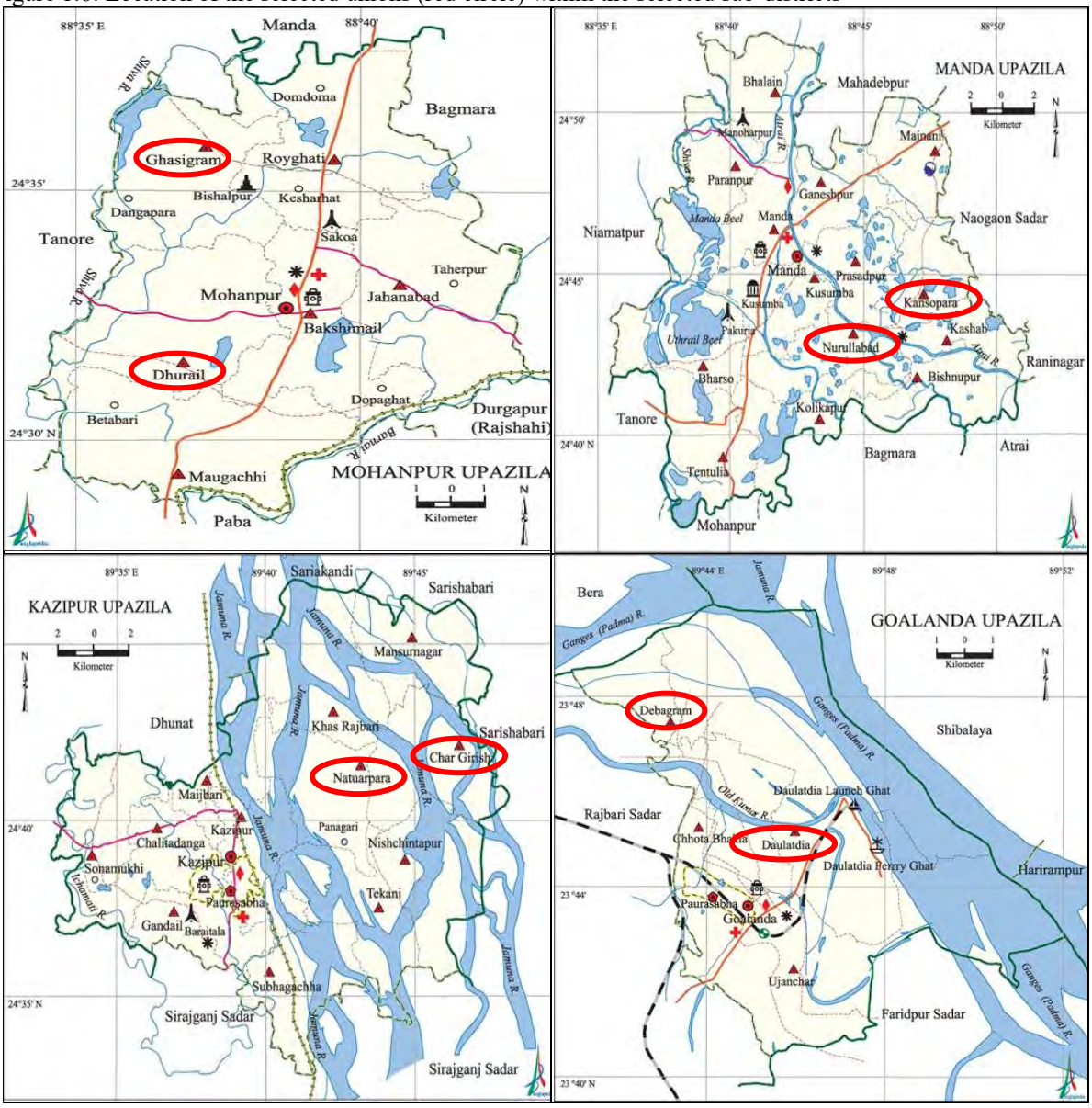


Source: (Haque, 2019)

Whilst all four districts have experienced seasonal flooding due to the crisscross networks of the small and medium rivers with the PJM rivers, only the former two have been recognized by the Bangladeshi government as displacement-prone districts, considering the intensity of flooding and riverbank erosion and the extent of displacement (MoDMR, 2014). Being located in the same region, the populations of all four districts are relatively similar in terms of

sociocultural aspects. The selected non-displacement-prone sub-districts typically experience regular floods at wetter seasons due to the crisscross networks of the local rivers (e.g., Shivai and Atrai) with the main rivers of Rajshai (Padma, Mahananda, Baral, and Barnai) and Naogaon (Atrai, Punarbhaba, Little Jamuna, Nagar, Chiri, and Tulsi Ganga) districts. While the Jamuna, Baral, Ichhamati, Karatoa and Phuljhuri are the major rivers of Sirajganj district, the Padma, Jalangi, Kumar, Gorai-Madhumati, Harai and Chandana are the main rivers of Rajbari district. Massive floods and riverbank erosion of the selected displacement-prone sub-districts are also associated with their topographical location and direct attachment with PJM rivers (Figure 1.6).

Figure 1.6: Location of the selected unions (red circle) within the selected sub-districts



Source: (Islam et al., 2015b)

The population of the displacement-prone sub-districts living in the major river basins of PJM are biophysically and socioeconomically highly vulnerable to climate-related disasters such as floods and riverbank erosion due to heavy precipitation, melting snow from the Himalayas, increased discharge of water from upstream and local rivers (Islam & Shamsuddoha, 2017; Parvin et al., 2016). In the riverine areas, the land erosion and accretion mostly occur because of floods and changes in river channels. However, the rate of land erosion due to massive rainfall, floods and river discharge often exceeds the rate of land accreditation in the riverine areas (Arsenault et al., 2015; CEGIS, 2012; Nearing et al., 2004; Rabbi et al., 2017).

Massive floods and riverbank erosion cause displacement of many people in Kajipur and Goalanda sub-districts almost every year, which is linked with the crisscross river channels of PJM (Figure 1.6). However these residents are not yet resilient enough to cope with the effects of climate-related extreme events (DS, 2010; EJF, 2012; Islam & Shamsuddoha, 2017; Islam et al., 2010; MoDMR, 2014; Mollah & Ferdaush, 2015; Parvin et al., 2016). People in these areas have mostly migrated from one sediment landmass to another permanently in a cyclic way (Arsenault et al., 2015; Islam et al., 2010). However, climate-induced forced migration are estimated to increase further in both sub-districts with upsurge floods, rising land erosion and rising total number of population (Islam & Rashid, 2011; Mollah & Ferdaush, 2015; Parvin et al., 2016). Studies have reported that the climate-induced migration rate is anticipated to be more rapid and greater in future in the riverine areas of Bangladesh with the projected increase of riverbank erosion rate from 9.4% for the period of 1984-1993 to 13.0% by 2050 and 18.0% by 2100 (Aktar, 2013; Mollah & Ferdaush, 2015).

Selected socio-demographic indicators of Bangladesh and the sub-districts being examined are presented in Table 1.3, based on the Bangladesh Population Census of 2011. Around 2.9% (4.3 million) of Bangladesh's total population live in the two displacement-prone mainland districts studied, and around 3.6% (5.4 million) in the two non-displacement-prone districts. Kajipur sub-district has 8.86% of Sirajganj district's total population, and Goalanda has 10.8%

of its district's total population. About 6.7% and 14.0% of Naogaon and Rajshahi districts' total population live in the Mohanpur and Manda sub-districts respectively. Displacement-prone sub-districts, especially in Goalanda, have lower growth rates than those of their counterparts, non-displacement-prone sub-districts. The negative growth rate in Goalanda is likely to be associated with climate-induced displacement, therefore resulting in a higher rate of rural-urban migration, particularly in the 'ferry-terminal' areas for better work opportunities. The average household sizes are larger in the displacement-prone areas than in the non-displacement-prone areas which implies that they may have higher fertility rates and a higher tendency to live in a joint family to cope with displacement-related disadvantages.

Table 1.3: Socio-demographic indicators of Bangladesh and the sub-districts studied, 2011

Indicators	Bangladesh[3]	Displacement-prone sub-districts		Non-displacement-prone sub-districts	
		Kajipur	Goalanda	Mohanpur	Manda
Area per square km	147,569.06	328.79	121.82	162.65	375.93
Total population	149,772,364	285,309	117,318	176,795	377,715
Annual growth rate (%)	1.47	0.28	(-)0.39	1.05	0.31
Population density per square km	976	835	925	1045	696
Urbanization rate	23.3	6.0	26.8	17.7	9.3
Sex ratio (males per 100 females)	98	97	95	101	98
Average household size	4.44	3.94	4.57	3.87	3.7
Literacy rate, ≥7 years aged population	51.8	37.7	40.3	51.0	46.3
School attendance rate, 5-24 years population	52.7	55.3	52.0	56.7	51.7

Source: (BBS, 2011b, 2011c, 2011d, 2011e)

1.5.3 Sample size for survey data

The sample size of this study is 1,200 (600 climate-induced internally displaced people and 600 non-displaced people). The sample size was calculated considering the prevalence of using maternal healthcare reported in the latest BDHS report-2014 to get sufficient cases for multivariate statistical analysis (NIPORT et al., 2016). According to this report, the prevalence ranges from 31% for HC-based delivery to 36% for skilled birth attendants at births in rural areas. Using the recommended highest prevalence rate (36%) and formula for random sampling, ($n=Z^2P(1-P)/d^2$, where n= sample size; Z= 1.96 (95% CI); P= 0.36 prevalence of skilled birth attendants at birth; and d= 0.05, precision) the calculated sample size was 355 for each group (Naing et al., 2006). However, it reached 587 for each group after adding the impacts of 1.5

[3] The recent data at national level have been used elsewhere in this thesis based on the availability

design effects and 10% nonresponse rate. The obtained power (84.6%, which is sufficient) for target sample size was estimated using the known nationwide (0.36 in 2014) and targeted (0.42 in 2016 estimated using annual progress shown in Demographic Survey reports between 2011 and 2014) prevalence of use of skilled birth attendants during delivery in rural Bangladesh (Chow et al., 2008; NIPORT et al., 2013; NIPORT et al., 2016). Homogenous attributes of the study populations; sampling types (i.e., purposive and random); previous experience of conducting surveys in rural Bangladesh; allocated budget and time were taken into consideration when using design effects and nonresponse rate.

1.5.4 Research design and sampling framework

Figure 1.7 briefly illustrates the survey design, sampling framework and sample inclusion criteria for this study. A cross-sectional survey (observational in design) was conducted at community level to reach the households of the climate-induced internally displaced people and the non-displaced people. This design is suitable for this thesis, as this research simply collects participants' information at one time point (over a short period) without any interventions for estimating prevalence of a specific behaviour in a population (Creswell, 2009; De Vaus, 2002; Sedgwick, 2014).

For sampling purposes, the study areas were divided into two: displaced and non-displaced. A combination of purposive and random sampling (mixed approach was used to identify displacement sub-districts and unions) procedure was applied to select study areas and study participants (Figure 1.7). The estimated sample was distributed proportionately between villages, both in the displacement-prone and non-displacement areas, on the basis of the total eligible households in each village. Households with ≤15 years old children, which had experienced displacement at least once in the ten years prior to the survey date, were considered eligible for the sampling list in the displacement-prone areas. However, the former (households with ≤15 years old children) was considered only to select eligible households in the non-displacement areas. Since displacement is a continuous process in the mainland riverine areas, all households

in the selected villages were visited by the enumerators to prepare the list of eligible households based on the selection. A similar approach was also applied for the non-displacement areas for consistency. This process has increased the probability of inclusion of all type of households, including those who were displaced recently from previous village to the current (studied) village, permanently, temporary or in rental households that may not be in the list of the last Census (2011) of Bangladesh. From each selected household anyone who is either a father or a mother (aged ≥18) was interviewed. Since not all the interviewed fathers and mothers were the head of the household, in some cases the respondent provided information for questions in Sections A-C (Appendix-A) consulting with an elderly member of the household.

Figure 1.7: Summary of the study design and sampling framework

Sampling framework for cross-sectional survey (to collect quantitative data)	
Displacement-prone districts	Displacement-prone districts
Sirajganj and Rajbari were selected randomly as climate-induced displacement-prone districts from the north-western mainland regions.	Rajshahi and Naogaon were selected randomly as non-climate-induced displacement-prone districts from the same regions.
Two sub-districts (Kazipur from Sirajganj district and Goalanda from Rajbari district) were selected purposively on the basis of displacement-related information obtained from local government offices, NGOs, and local elected personnel.	Two sub-districts (Mohanpur from Rajshahi district and Manda from Naogaon district) were selected randomly from the list of sub-districts obtained from Bangladesh's Census 2011.
Natuar Para and Char Girish unions from Kazipur, and Doulatdia and Debogram unions from Goalanda were selected purposively based on displacement-related information obtained at earlier stage.	Dhurail and Ghasigram unions from Mohanpur, and Nurullabad and Kansopara unions from Manda were selected randomly based on the list of unions obtained from Census 2011.
Thirteen villages (three from each union, except for Doulatdia) were selected randomly for listing eligible households using the list of villages of Census 2011.	Twelve villages (three from each union) were selected randomly for listing eligible households using the list of villages of Census 2011.
Households in villages were selected by using a systematic random sampling approach from the list of total eligible households (N=2,125).	Households in villages were selected by using a systematic random sampling approach from the list of total eligible households (N=2,673).
293 fathers and 307 mothers (aged ≥18) from 600 displaced households were interviewed.	300 fathers and 300 mothers (aged ≥18) from 600 non-displaced households were interviewed.
All interviews were conducted at a convenient place for the participants. In the cases of unavailability or refusal of the randomly selected household, the next available household was approached for interview. The alternative household was selected from a reserved (oversamples) sampling list of this study which was prepared before starting the fieldwork. In case of more than one eligible respondent in one household, only the father or the mother of the youngest child was selected for interview to minimize the recall bias related to healthcare service utilization.	

1.5.5 Data collection and analysis

Based on the literature review and the theoretical framework related to the research questions and study objectives, a structured questionnaire was developed to conduct the survey among the study populations to obtain the quantitative information. Before finalizing the survey schedule, it was piloted in one rural village in Bangladesh (other than the actual study areas) to understand the strengths and feasibility of this research. The rationale for using structured questions was to obtain more information from the informants by probing their responses in rural settings. The probing was used to inspire participation of the participants and to crosscheck their responses for valid and reliable information. A Bengali version of the questionnaire was used to conduct the fieldwork for this research considering the literacy level of rural Bangladeshis (see Appendix-A for English version including participant information and consent forms).

The graduate interviewers (both male and female) were recruited and trained for a week to clarify the study objectives, ethical issues, participant's consent, probing practices, and to explain the interview questions. The interviewers were responsible only for conducting interviews and to crosscheck the completed schedules of other interviewers. During the fieldwork in Bangladesh, I was involved in preparing the list of eligible households and sample selection process, and monitoring the work of the interviewers and data entry operators.

CSPro (Census and Survey Processing System) was applied to process the data for this research. In relation to this, assistance from CSPro professionals, who are typically involved in large-scale nation-wide surveys in Bangladesh, was taken. The rationale for using CSPro is to improve data quality by developing data entry forms and defining codes, and decreasing turnaround times. It also provides options to transfer data into formats readable by Excel and other statistical packages (e.g., SPSS, STATA and SAS). The statistical package SPSS (version 23) was used to analyse the data.

1.6 Thesis structure

This thesis is divided into six chapters for organizational purposes. **Chapter 1** (Introduction) provides an overview of this research and its justification. Formulating research questions by reviewing relevant literature, this chapter describes the significance of this project. It further describes how this research fits into the background statement and the knowledge gaps that it aims to fill. This chapter also provides methodology in general, and the structure for the rest of this thesis as shown below.

Chapter 2 examines the socioeconomic and healthcare-related disadvantages of climate-induced displaced households by comparing them with non-displaced households. It further examines whether the nature and frequency of past displacement make any differences in the disadvantages of the displaced. Thus, the analysis of this chapter used all household (N=1,200) information including displacement history, demographic and socioeconomic position, and availability and accessibility to the health and wellbeing facilities.

Chapter 3 investigates healthcare-seeking behaviours of parents for illnesses of their children. It evaluates the extended effects of parental climate-related displacement on their healthcare-seeking practices for care of their children. It also compares the reasons of using a particular type of provider for children's treatment by displacement status. Information related to illness of children in the last four weeks prior to the interview date (N=1,003) and parental responses to their children's last illness are analysed in this chapter.

Chapter 4 identifies the effects of a wide range of factors on antenatal care service utilization. More specifically, it illustrates the effects of household's repeated displacement on ANC service utilization either from a trained or an untrained provider, and on standard ANC practices. Information from 611 mothers (including 289 mothers from the displaced group) who gave birth in the three years prior to the date of interview are analysed in this section.

Chapter 5 examines whether a household's displacement status makes any difference in utilization of health facilities for HC-based delivery and PNC services for neonates. It

demonstrates the detrimental effects of household's displacement on HC-based delivery and PNC service utilization. Thus, 599 mothers (including 278 mothers from the displaced group) who gave birth in the three years prior to the interview date are included in the analysis.

Chapter 6 provides a summary of the main findings of the previous chapters and points out the significant contributions of this thesis to fulfil the knowledge gaps. It also illustrates the policy implications of this research, limitations of the present study, future directions for further research, and the author's self-reflections on this research experience.

Chapter 2: Climate-induced displacement, impoverishment and healthcare accessibility in mainland Bangladesh

2.1 Introduction

Almost annual natural disasters and destructive flooding and river encroachment in the densely-populated and low-lying basins and flood-plain areas of Bangladesh's major rivers have led to millions of people being displaced (Akhter, 2009; Hassani-Mahmooei & Parris, 2012; McAdam & Saul, 2010; Stern, 2007). It has been estimated that between 1970 and 2009 around 48 million people were displaced due to natural disasters in Bangladesh (Akhter, 2009). According to Stern (2007), one-fifth of Bangladesh's land could be affected by flash-floods due to sea-level rise by the end of this century, and estimates of the number of Bangladeshi people who will be displaced from their homes by 2050 range between 3 million and 30 million (Hassani-Mahmooei & Parris, 2012; McAdam & Saul, 2010). The prospect presents a major concern for what is seen as one of the countries least prepared to combat the effects of natural disasters and to adapt to climate change (Ahsan, 2014; Baird et al., 2007; ND-GAIN, 2014; Stern, 2007; UNHCR, 2009).

Displacement also affects population size and distribution in Bangladesh (BBS, 2011a; NIPORT et al., 2016). Around 2% of all internal migration in Bangladesh had occurred due to climate change (BBS, 2011a). Moreover, climate change caused scarcity of work locally and forced another 14% of the population to migrate in search for work. The intensity of sex selective involuntarily internal migration is reflected from the female dominated sex ratios of the climate-affected districts (BBS, 2011a). The higher percentages of internal migrants from the climate-affected districts in urban areas also show that climate change caused massive displacement in the climate-vulnerable areas of Bangladesh (NIPORT et al., 2016).

The two most climate-vulnerable regions of Bangladesh are the south-western coastal region and the north-western mainland region. Most of the recent displacement-related research has focused on the former (Beier et al., 2015; Biswas et al., 2015; Islam et al., 2015a; Islam & Hasan, 2016; Kabir et al., 2014; Kartiki, 2011; Mallik, 2015; Saroar et al., 2015). In the riverine

north-western mainland region of Bangladesh, riverbank erosion is one of the devastating consequences of flooding. It is estimated that annually around 20 to 30 thousand square km of riverbank is severely eroded (Islam & Islam, 1985). The annual rate of riverbank erosion has been projected to increase by 9% over the next 50 years, and by 18% over the next 100 years (MoDMR, 2014). Riverbank erosion can have devastating effects, because of its unpredictable and irresistible nature, particularly for marginalized rural people who have lost their last piece of land to the river. Recent estimates suggest that about 99% of the inhabitants of the mainland floodplain districts have experienced displacement due to riverbank erosion, and that 500,000 people are displaced annually, either temporarily or permanently, in the basin of the three major rivers, the Padma, Jamuna, and Meghna (PJM) (MoDMR, 2014). Moreover, repeated (multiple) displacement due to natural disasters and related changes to water flow and channels is common in these areas, and can impede the prospects for recovery and long-term rehabilitation of the displaced (Arsenault et al., 2015; Haque & Zaman, 1989; Hutton & Haque, 2003, 2004; MoDMR, 2014; Sarker et al., 2003).

Existing studies of riverbank erosion, displacement and survival strategies in the north-western mainland region of Bangladesh have invariably focused on a single point of time without providing comparisons by the nature and extent of displacement (Alam, 2017; Alam et al., 2017b; Arsenault et al., 2015; Etzold et al., 2014; Islam, 2007; Islam et al., 2010; Martin et al., 2014; MoDMR, 2014; Rahman et al., 2015; Rahman, 2010a; Rayhan, 2010; Sarker et al., 2003; Zaman, 1991). A few studies have drawn comparisons between socioeconomic and demographic profiles of the displaced and the non-displaced, and the adaptation of the displaced to the effects of displacement and their new community (Haque, 1988; Haque & Hossain, 1988; Haque & Zaman, 1989; Hutton & Haque, 2003, 2004). However, comparisons of healthcare accessibility between the displaced and the non-displaced, and of both socioeconomic disadvantage and healthcare accessibility between those who were displaced suddenly and those whose displacement was gradual and by the frequency of past displacement have been absent from the literature. This

research aims to fill these knowledge gaps relating to the climate-displaced population of rural mainland Bangladesh.

2.2 Methods

2.2.1 Data analysis

Data for this Chapter were derived from survey conducted in the mainland regions of Bangladesh. The in-depth information about study settings, sample selection and study design are discussed in Section 1.5. The analysis of this chapter used all households' (N=1,200) information. For analytic purposes the respondents were categorized into two groups: the 'displaced' (who had been forced to relocate at least once in the last 10 years) and the 'non-displaced' (who had never experienced displacement by natural disaster). The displaced were further subdivided according to the nature of their last displacement experience[4]: 26.0% were classified as having been displaced 'suddenly', and the remaining 74.0% as having been displaced 'gradually'. They were also subdivided according to their number of displacements in the last 10 years. The variation in selected displacement disadvantages (i.e., socioeconomic, displacement exposure and healthcare accessibility) by the nature and extent of past displacement was examined, and chi-square tests of association or analysis of variance were conducted to assess the significance of the differences (Tables 2.1-2.4). Comparisons were also drawn between the displaced and the non-displaced (Tables 2.5-2.7).

2.3 Results

2.3.1 Social and demographic profile of displaced households

For 94% of the households who experienced displacement at least once in the last 10 years, the last displacement was due to a natural disaster, mainly floods and riverbank erosion. Having been displaced multiple times is common in the riverine landmasses: the displaced households had on

[4] The 'suddenly displaced' households were forced to change their residence at short notice due to a natural disaster, while the 'gradually displaced' households resettled in anticipation of a natural disaster. The relocation of a gradually displaced household's materials and possessions often would take a several days to complete.

average experienced 4.6 times in the last ten years. Most of the households (81%) had experienced two or more displacements in this period, and 23% had been displaced six or more times. The average number of past displacements is significantly greater among those whose last displacement occurred suddenly.

The demographic, social and economic characteristics of respondents differ by the nature of displacement and the number of times displaced (Table 2.1). The proportion of people aged over 40 is significantly greater among those who were displaced suddenly than among those who were displaced gradually. Having been displacement suddenly is more common among the less educated and the illiterate than among the more educated. Unsurprisingly, the percentages of those who experienced larger numbers of displacements are higher among older age groups than among younger age groups. The percentages of those who experienced displacement multiple times are also significantly higher among the uneducated and the illiterate than among those who had some education and the literate.

Higher proportions of the suddenly displaced do agricultural work or work on a daily basis as laborers, while the proportion running a small business is higher among the gradually displaced (Table 2.1). The percentage of people working in the agricultural sector increases significantly with the number of times displaced, possibly because of increased percentages leasing land from others. The proportion of women who are homemakers decreases significantly as the number of displacements experienced increases. This may be due to women, from households who have experienced displacement multiple times, having had to undertake income-generating activities to maintain their living standards.

Table 2.1: Demographic and socioeconomic profile of respondents whose last move was due to natural disaster by nature of displacement and number of times displaced

Displacement characteristics	Total (%) N=565	Nature of displacement (%)			Number of times displaced (%)				
		Suddenly (n=149)	Gradually (n=416)	Sig.	1 time (n=107)	2 times (n=115)	3-5 times (n=214)	≥6 times (n=129)	Sig.
Gender									
Male	49.6	50.3	49.3		32.7	38.3	56.1	62.8	***
Female	50.4	49.7	50.7		67.3	61.7	43.9	37.2	
Age (years)									
<25	21.8	20.1	22.4	**	38.3	26.1	13.6	17.8	***
25-29	29.0	30.2	28.6		28.0	35.7	28.5	24.8	
30-34	20.4	14.8	22.4		18.7	25.2	22.4	14.0	
35-39	16.5	16.1	16.6		8.4	7.8	22.9	20.2	
≥40	12.4	18.8	10.1		6.5	5.2	12.6	23.3	
Schooling (years)									
No education	39.6	42.3	38.7		31.8	34.8	41.6	47.3	**
1-5	38.6	36.9	39.2		36.4	42.6	41.6	31.8	
≥6	21.8	20.8	22.1		31.8	22.6	16.8	20.9	
Literacy status									
Able to read or write	54.5	47.0	57.2	**	63.6	57.4	52.3	48.1	*
Unable to read or write	45.5	53.0	42.8		36.4	42.6	47.7	51.9	
Primary occupation									
Agricultural work	11.3	12.8	10.8		3.7	0.9	12.6	24.8	***
Daily basis labour work	22.8	24.8	22.1		16.8	20.9	27.6	21.7	
Small business	10.1	6.7	11.3		10.3	8.7	12.1	7.8	
Homemaker	50.1	49.0	50.5		66.4	61.7	42.5	38.8	
Others	5.7	6.7	5.3		2.8	7.8	5.1	7.0	

****P<.01; **P<.05; *P<.10*

2.3.2 Displacement history and disadvantages of displaced households

Table 2.2 presents selected aspects of the respondents' displacement experiences by the nature of last displacement and the frequency of past displacement. The nature of the sample selection means that people who have moved long distances from these areas, including to urban areas, are not captured in the data. Generally, the displaced households who participated in this research had moved a short distance for resettlement. Among the displaced, the average distance moved between the previous and current place of residence was 3.3km. The mean distance moved was significantly lower among the 'suddenly displaced' than among the 'gradually displaced': a higher percentage of households who were displaced suddenly relocated within the same village.

Displacement by flood or riverbank erosion can lead to homelessness. The disadvantages of the displaced are increased during the period of homelessness, as they have to depend on others for shelter, food, sanitation and other support. 72.2% of the displaced had experienced being homeless due to a natural disaster in past 10 years, with 15% having experienced homelessness more than once. The 'suddenly displaced' are significantly more likely to have experienced homelessness than their 'gradually displaced' counterparts. Those who had been displaced more than 5 times in the last 10 years are noticeably less likely to have experienced homelessness on the last occasion than those who had been displaced fewer times. The average duration of homelessness was 4.7 weeks, and is longer among the 'suddenly displaced' than among the 'gradually displaced'. The average duration of homelessness increases slightly as the number of past displacements increases.

Displacement increases participants' financial hardship by creating an additional burden of post-displacement expenditure, including resettlement costs and healthcare costs for household members. The households' average expenditure caused by participants' last displacement was 81,520 taka (US$1,010.2 at the exchange rate of 80.7 taka for 1 US$ as of June 2017). Overall, the cost of the last displacement is slightly lower among those who were displaced 'suddenly' than among those who were displaced 'gradually'. However, the difference is affected by the

higher percentage of those who were displaced suddenly and were relocated within the same village. Among those who moved between villages, the average cost of displacement was higher for those who were displaced 'suddenly' than for those who displaced 'gradually'. Irrespective of resettlement location, the monthly healthcare costs of suddenly displaced households are significantly higher than those of their gradually displaced counterparts. Household's displacement cost is highest among those who were displaced once in the last 10 years and decline as the number of past displacements increases. However, the average healthcare cost of the displaced increases as the number of past displacements increases.

The financial hardship of the displaced is also associated with post-displacement living conditions in the new location, subsequent expenditure on tenancy land, and earning opportunities. The scarcity of suitable homestead land on which to build new houses is a major issue in the riverine areas. Around 77% of the displaced live in their own house but on rented land, only 17% own both their house and their land, and the remaining 6% have a range of other living arrangements, including living on relatives' land or in rent-free public places (Table 2.2).

Table 2.2: Displacement experiences and healthcare costs of respondents by nature of displacement and number of times displaced

Displacement characteristics	Total (%) N=565	Nature of displacement (%)			Number of times displaced (%)				
		Suddenly (n=149)	Gradually (n=416)	Sig.	1 time (n=107)	2 times (n=115)	3-5 times (n=214)	≥6 times (n=129)	Sig.
Location for resettlement after last displacement									
Within same village	24.2	45.0	16.8	***	15.0	20.9	21.5	39.5	***
Between villages	28.5	24.8	29.8		27.1	31.3	28.0	27.9	
Between unions	47.3	30.2	53.4		57.9	47.8	50.5	32.6	
Ever experienced homelessness in the last 10 years									
Yes	72.2	78.5	70.0	**	71.0	77.4	76.6	61.2	***
Duration of last homelessness (weeks)									
≤2	40.5	49.6	36.8	***	43.4	36.8	35.8	51.3	**
3-4	28.8	20.9	31.9		32.9	25.3	30.2	25.6	
5-9	21.0	14.8	23.5		13.2	28.7	25.8	10.3	
≥10	9.8	14.8	7.7		10.5	9.2	8.2	12.8	
All (mean duration of homelessness)	4.7	5.0	4.5	***	4.3	4.7	4.8	4.8	***
Mean cost of last displacement by location for resettlement (taka)									
Within same village	59,332	58,201	60,414	***	68,2500	47,604	57,587	63,627	***
Between villages	107,863	114,784	105,798		100,690	114,056	117,217	91,861	
Between unions	77,019	63,789	79,700		86,855	80,418	69,606	77,107	
All	81,520	73,940	84,234		87,822	84,100	80,372	75,895	
Household's monthly healthcare cost (taka)									
≤250	32.0	20.8	36.1	***	29.9	29.6	34.1	32.6	
251-500	28.7	30.2	28.1		25.2	28.7	28.5	31.8	
501-1,000	20.0	23.5	18.8		22.4	23.5	18.7	17.1	
≥1,001	19.3	25.5	17.1		22.4	18.3	18.7	18.6	
All (mean healthcare cost)	836	1,011	774	***	651	776	769	907	***

****P<.01; **P<.05*

2.3.3 Changes in healthcare accessibility after last displacement

Displacement affects the health and healthcare of the displaced in multiple ways. The livelihoods and health of the displaced people are fragile and vulnerable, due to the recurrent and high intensity floods and riverbank erosion. The responses of the displaced indicate that their disadvantages relating to healthcare accessibility have been intensified by their displacement, and vary by the nature and frequency of displacement.

Table 2.3 compares the displaced households' estimated current times and costs of reaching the nearest available healthcare services to those of their estimation in their previous place of residence. The results show the percentages of the displaced who reported increased times for accessing healthcare facilities post displacement range between 41.8% (for doctors) and 51.2% (for healthcare centres), and in all cases exceed the percentage who reported a decreased corresponding time post displacement. Similarly, the percentages of the displaced who reported increased costs of reaching healthcare facilities post displacement range from 37.7% (for untrained providers) to 57.6% (for healthcare centres), and again in all cases exceeding the percentages for whom these costs decreased. The percentages of the gradually displaced who experienced higher times and costs of accessing healthcare services in the current location than in their previous location are generally greater than for those who displaced suddenly, especially the times and costs of accessing professional doctors, trained providers, and healthcare centres.

Table 2.3: Perceived change in time and cost to access healthcare facilities and providers between current and previous residence by nature of displacement and number of times displaced

Time/cost to reach	Total (%)	Nature of displacement (%)			Number of times displaced (%)				
		Suddenly	Gradually	Sig.	1 time	2 times	3-5 times	≥6 times	Sig.
Time to reach:									
Professional doctor (n=555)									
Decreased	29.5	41.5	25.2	***	11.3	29.2	30.5	43.7	***
Similar	28.6	30.6	27.9		29.2	33.6	28.1	24.6	
Increased	41.8	27.9	46.8		59.4	37.2	41.4	31.7	
Trained provider (n=564)									
Decreased	33.7	48.3	28.4	***	22.4	30.4	31.5	49.6	***
Similar	19.1	17.4	19.8		19.6	27.0	18.8	12.4	
Increased	47.2	34.2	51.8		57.9	42.6	49.8	38.0	
Govt./private health centre (n=562)									
Decreased	35.6	48.3	31.0	***	17.8	40.0	36.5	45.0	***
Similar	13.2	9.4	14.5		14.0	14.8	13.3	10.9	
Increased	51.2	42.3	54.5		68.2	45.2	50.2	44.2	
Untrained provider (n=561)									
Decreased	30.5	37.8	27.8	**	17.1	24.6	30.5	46.5	***
Similar	26.6	18.2	29.5		38.1	31.6	22.1	20.2	
Increased	43.0	43.9	42.6		44.8	43.9	47.4	33.3	
Cost to reach:									
Professional doctor (n=557)									
Decreased	14.7	27.4	10.2	***	12.5	16.7	14.2	15.7	***
Similar	34.3	32.9	34.8		24.0	40.4	35.4	35.4	
Increased	51.0	39.7	55.0		63.5	43.0	50.5	48.8	
Trained provider (n=562)									
Decreased	25.3	34.2	22.0	**	11.2	22.8	25.5	38.8	***
Similar	28.6	24.8	30.0		28.0	31.6	29.7	24.8	
Increased	46.1	40.9	47.9		60.7	45.6	44.8	36.4	
Govt./private health centre (n=556)									
Decreased	21.6	34.0	17.1	***	14.4	27.2	22.9	20.3	**
Similar	20.9	21.8	20.5		13.5	19.3	22.9	25.0	
Increased	57.6	44.2	62.3		72.2	53.6	54.3	54.7	
Untrained provider (n=562)									
Decreased	25.6	26.2	25.4		9.5	23.5	26.8	38.8	***
Similar	36.7	35.6	37.0		44.8	36.5	34.7	33.3	
Increased	37.7	38.3	37.5		45.7	40.0	38.5	27.9	

****P<.01; **P<.05*

The experience of an adverse post-last-displacement that has impacted on the times and costs of accessing professional doctors, trained providers and healthcare centres is most widespread among those households who had been displaced once in the last 10 years (Table 2.4). With each subsequent increase in the number of past displacements, a greater number reported an increase in the times and costs of reaching healthcare providers than reported a decrease. However, the differences between the numbers experiencing increases and the numbers experiencing decreases are smaller than following the first displacement. This may be because among those who have been displaced previously, the comparison is with a previous post-displacement (and hence often more isolated) location. It may also be that with repeated displacement, adaption to displacement becomes more effective.

Access to healthcare services varies by the nature and frequency of displacement. Almost half of the displaced reported the incidence of common illnesses was higher in the current location than in the previous location by – considerably exceeding the percentage who reported a decreased incidence of illness (Table 2.4). Post-displacement increases in costs of medicine were also reported more frequently than decreased costs. However, a slightly decreased use of professional doctor-prescribed drugs and increased use of untrained provider-prescribed drugs and self-medicated drugs is also apparent post-displacement.

Both for the ‘suddenly displaced’ and for the ‘gradually displaced’, the percentage of households who experienced a greater incidence of illness and the percentage who experienced a greater healthcare cost post displacement exceed the corresponding number who experienced a lower incidence of illness or a lower healthcare cost. Moreover, households which have experienced displacement 6 or more times are substantially more likely to have experienced a higher incidence of illness and substantially more likely to have experienced a higher cost for healthcare post relocation than those which have been displaced only once.

The differences in change of use of professional doctor-prescribed drugs and trained provider-prescribed drugs during illness between the suddenly displaced and the gradually

displaced are insignificant (Table 2.4). However, the percentages reporting increased use of untrained provider-prescribed drugs and increased use of self-medicated drugs are significantly greater for the gradually displaced than for the suddenly displaced. The percentage of households reporting reduced use in their current location compared to in their previous location is considerably lower for those who have been displaced six or more times than for those who have been displaced only once for all the various sources of drugs, and the corresponding percentage with increased use considerably higher. The higher percentages of households with a larger number of displacement experiences, which had experienced increased costs of medicine and increased use of drugs, would be linked to the increase in the incidence of illness with the number of displacement experiences.

Table 2.4: Change in household-level illness and cost and use of healthcare between current and previous residence by nature of displacement and number of times displaced

Incidence of illness, cost and use of healthcare at household	Total (%)	Nature of displacement (%)			Number of times displaced (%)				
		Suddenly	Gradually	Sig.	1 time	2 times	3-5 times	≥6 times	Sig.
Incidence of common illness (n=564)									
Decreased	35.5	39.9	33.9		43.9	40.9	38.3	18.8	***
Similar	18.4	16.9	19.0		15.0	13.9	21.0	21,1	
Increased	46.1	43.2	47.1		41.1	45.2	40.7	60.2	
Cost of medicine (n=565)									
Decreased	35.4	40.9	33.4		44.9	39.1	38.8	18.6	***
Similar	17.7	15.4	18.5		13.1	14.8	20.6	19.4	
Increased	46.9	43.6	48.1		42.1	46.1	40.7	62.0	
Professional doctor-prescribed drugs (n=549)									
Decreased	19.3	20.4	18.9		20.0	22.6	23.4	8.9	***
Similar	65.6	67.6	64.9		70.5	67.0	62.9	64.5	
Increased	15.1	12.0	16.2		9.5	10.4	13.7	26.6	
Trained provider-prescribed drugs (n=549)									
Decreased	21.3	23.1	20.7		20.6	20.9	27.8	11.4	***
Similar	57.2	55.9	57.6		65.7	57.4	51.7	59.3	
Increased	21.5	21.0	21.7		13.7	21.7	20.6	29.3	
Untrained provider-prescribed drugs (n=555)									
Decreased	23.2	25.3	22.5	*	29.4	25.0	27.7	9.4	***
Similar	45.9	51.4	44.0		53.9	37.5	41.3	54.7	
Increased	30.8	23.3	33.5		16.7	37.5	31.0	35.9	
Self-medicated drugs (n=553)									
Decreased	25.3	27.1	24.7	**	28.8	30.4	28.2	12.8	***
Similar	46.1	53.6	43.6		56.7	37.4	41.6	52.8	
Increased	28.6	19.3	31.7		14.4	32.2	30.1	34.3	
Non-allopathic medicine (n=546))									
Decreased	28.2	22.6	30.1		26.9	34.8	31.7	16.8	**
Similar	46.2	53.3	43.8		50.0	40.0	42.4	55.5	
Increased	25.6	24.1	26.2		23.1	25.2	26.0	27.7	

****P<.01; **P<.05; *P<.10*

2.3.4 Socioeconomic profiles of the displaced and the non-displaced

Table 2.5 compares the demographic, social and economic profiles of the displaced and the non-displaced. The average age of the displaced is significantly greater than that of the non-displaced. The average household size is significantly higher among the displaced than among the non-displaced, with a considerably higher percentage of displaced households having 5 or more members. The larger household sizes of the displaced could be due to higher fertility and a tendency to live jointly with parents to reduce displacement vulnerabilities. The living conditions of the displaced could be more crowded than for those who have not been displaced, in view of the significantly higher percentage of displaced households with 3 or more sharing a room for sleeping.

Table 2.5 shows that the displaced are significantly less educated than the non-displaced. The 38.7% of the displaced had no education, over three times the corresponding percentage of the non-displaced. Moreover, the 3.3% of the displaced with more than 10 years of schooling is only a quarter of the corresponding figure for the non-displaced. The percentage of people with high school level education (6-10 years) is 26% lower among displaced than the non-displaced. The literacy status of the displaced is also significantly lower than that of the non-displaced: almost 55.2% of the displaced are able to read or write, compared to 85.7% of the non-displaced.

The displaced are also disadvantaged in terms of work. The percentage who do agricultural work on their own land is significantly lower among the displaced than among the non-displaced, and the percentage who do labouring work is significantly higher. This may reflect a more limited access to agricultural land among the displaced. Household's monthly income and expenditure are also linked with displacement status. Despite their larger household sizes, the average household income of the displaced is significantly lower than that of the non-displaced. Moreover, displaced households spend less on average than non-displaced households on food and healthcare costs.

Table 2.5: Demographic, social and economic profiles of households by displacement experience

Respondent's characteristics***	% of Total (N=1,200)	% of	
		Displaced (n=600)	Non-displaced (n=600)
Age group (years) ($\bar{x}$)	*29.3*	*30.1*	*28.6*
<25	25.0	21.5	28.5
25-29	29.5	29.0	30.0
30-34	21.0	21.2	20.8
35-39	14.4	16.0	12.8
≥40	10.1	12.3	7.8
Household size ($\bar{x}$)	*4.4*	*4.7*	*4.1*
2-3 members	23.3	13.3	33.2
4 members	35.0	33.3	36.7
5-6 members	37.9	48.5	27.3
7-8 members	3.8	4.8	2.8
One room shared for sleeping by ($\bar{x}$)	*2.0*	*1.9*	*2.1*
1 member	7.1	4.0	10.2
2 members	18.9	11.7	26.2
3 members	54.8	59.3	50.3
4 members	19.2	25.0	13.3
Schooling (years) ($\bar{x}$)	*5.1*	*3.6*	*6.6*
None	24.8	38.7	11.0
1-5	35.5	39.0	32.0
6-10	32.0	19.0	45.0
>10	7.7	3.3	12.0
Literacy status			
Able to read or write	70.4	55.2	85.7
Unable to read or write	29.6	44.8	14.3
Primary occupation			
Agricultural work (own land)	19.0	11.2	26.8
Day basis labour work	15.9	22.5	9.3
Small business	10.2	11.0	9.3
Homemaker	50.2	49.3	51.0
Others	4.8	6.0	3.5
Monthly earnings (taka) ($\bar{x}$)	*9,460*	*8,786*	*10,134*
≤5,000	11.8	11.3	12.3
5,001-8,000	33.5	35.2	31.8
8,001-10,000	29.6	33.7	22.5
10,001-15,000	14.6	14.7	14.5
>15,000	10.5	5.2	15.8
Monthly food cost (taka) ($\bar{x}$)	*5,837*	*5,750*	*5,878*
≤4,000	18.0	12.7	23.3
4,001-6,000	48.9	53.8	44.0
6,001-8,000	21.1	24.5	17.7
≥8,001	12.0	9.0	15.0
Monthly healthcare cost (taka) ($\bar{x}$)	*1,074*	*876*	*1,273*
Up to 250	29.8	32.0	27.5
251-500	26.8	28.5	25.2
501 to 1,000	20.8	20.3	21.2
1,001 and above	22.7	19.2	26.2

**** Differences in all variables are statistically significant at P<.01, except monthly healthcare cost (<.05)*

2.3.5 Health and wellbeing facilities of displaced people and non-displaced people

The displaced are not only disadvantaged in relation to socioeconomic position but also in terms of access to health and wellbeing facilities. Table 2.6 shows the disadvantage of the displaced in terms ownership of household assets and availability of health and wellbeing facilities compared to their non-displaced counterparts. For example, only a small minority of the displaced have

access to electricity compared to a clear majority of the non-displaced. However, the reverse applies in relation to ownership of a solar system for electricity. In contrast to the clear majority of their non-displaced counterparts, less than a quarter of the displaced households own agricultural and homestead land.

Access to safe drinking water and sanitary toilets is critically important for health and wellbeing. That the displaced have slightly greater access to drinking water than the non-displaced is probably an artefact of their living in the riverine areas. However, the displaced are much more vulnerable to ill health in terms of lacking access to sanitary toilets than their non-displaced counterparts. Household's access to electronic media is also significantly lower among the displaced than among the non-displaced.

The differences in the availability of professional doctors are stark and concerning. Only 21% of the displaced stated that professional doctors are available within 5km of their residence, compared to 88% of the non-displaced. Almost 64% of the displaced households reported that trained providers are available within 1km from their household, compared to 85% of non-displaced households. However, similar percentages of the displaced households and the non-displaced households have non-allopathic providers (i.e., homeopath and herbal) and untrained providers available locally (Table 2.6).

Table 2.6: Household assets and availability of basic health and wellbeing facilities by displacement status

Indicator of household's assets or availability of health and wellbeing facilities***	% of Displaced (n=600)	% of Non-displaced (n=600)
Electricity at home	9	72
Solar system at home	74	16
Ownership of agricultural land	22	74
Ownership of homestead land	23	97
Ownership of cattle and poultry	85	95
Ownership of fishing materials	16	26
Access to drinking water	89	83
Access to sanitary toilet	56	80
Access to electronic media	14	54
Professional doctor within 5_{km}	21	88
Trained provider within 1_{km}	64	85
Untrained provider within 1_{km}	89	93
Non-allopathic provider within 1_{km}	86	81

*** *Differences for all variables are statistically significant at P<.01*

2.3.6 Changes in health and access to healthcare of displaced and non-displaced

The availability, accessibility and affordability of the health system are fundamentally linked with the use of healthcare services during illness. Table 2.7 summarizes the respondents' assessments of changes in household access to and use of healthcare services between the date of interview and 10 years earlier. Whereas 92.3% of the non-displaced reported their use of professional doctors had increased over this period, only 41.4% of the displaced had the same experience. The use of non-allopathic providers has increased among the displaced, but has sharply decreased among the non-displaced.

The percentages of the displaced, who stated the time it would take them to reach to the nearest healthcare providers, had increased compared to ten years earlier are significantly higher than those of the non-displaced, especially the times to reach professional doctors, trained providers and healthcare centres. Whereas 97.1% of the non-displaced reported that the time it would take them to reach a professional doctor has decreased, only 55.4% of the displaced reported so. The costs of reaching the nearest trained providers, professional doctors, and healthcare centres had increased for significantly higher percentages of the displaced than the non-displaced. For example, 87.9% of the displaced reported an increased transportation cost to see a professional doctor, compared to 35.0% of the non-displaced (Table 2.7).

Table 2.7: Change in household's illness and use of and access to basic healthcare facilities during illness compared to 10 years ago by displacement status

Indicator of access to health facilities***	% of Displaced			n	% of Non-displaced			n
	Decreased	Same	Increased		Decreased	Same	Increased	
Household level incidence of illness and use of								
Common illness incidence	3.0	2.7	94.3	600	6.7	3.3	90.0	599
Professional doctors	2.6	55.9	41.4	583	3.6	4.1	92.3	586
Self-medicated drugs	9.8	36.5	53.7	589	39.9	7.5	52.6	587
Non-allopathic medicine	30.3	33.6	36.1	581	85.9	7.2	6.9	552
Time to reach nearest								
Professional doctor	55.4	22.6	22.0	592	97.1	1.3	1.5	593
Trained provider	72.7	11.8	15.5	600	73.0	25.3	1.7	588
Govt./private healthcare centre	71.7	6.9	21.4	598	81.9	16.9	1.2	597
Untrained provider	68.6	18.6	12.8	596	60.4	39.2	0.3	576
Non-allopathic provider	66.3	21.4	12.3	594	44.4	54.5	1.1	525
Cost to reach nearest								
Professional doctor	2.2	9.9	87.9	594	58.9	6.1	35.0	591
Trained providers	31.9	14.5	53.5	598	37.7	29.5	32.8	586
Govt./private healthcare centre	38.0	9.8	52.2	594	49.6	19.8	30.6	595
Untrained provider	45.0	28.1	26.9	598	33.2	39.5	27.3	572
Non-allopathic provider	47.1	30.5	22.4	594	25.8	56.1	18.1	519

*** *All variables are statistically significant at P<.01*

2.4 Conclusion

This study demonstrates that involuntary displacement is a recurrent event for most residents in the displacement-prone areas of north-western Bangladesh, and that a considerable proportion of displacements are unplanned. This study goes beyond other empirical studies of climate-related displacement by quantifying an extensive range of differences in the demographic, socioeconomic and displacement-related characteristics between the displaced people and the non-displaced people, the differences in the effects of displacement on the access to and use of healthcare of those who were displaced suddenly and those whose displacement was gradual, and the differences by the number of past displacements (Alam, 2017; Alam et al., 2017b; Arsenault et al., 2015; Haque, 1988; Haque & Hossain, 1988; Haque & Zaman, 1989; Hutton & Haque, 2003, 2004; Martin et al., 2014).

The effects of displacement are complex and multidimensional. The responses to this study show the significantly greater disadvantage and hardship of the displaced, compared to the non-displaced. Involuntary displacement due to riverbank erosion impoverishes the displaced and limits their opportunities for socioeconomic advancement. The disadvantages of the displaced include their more limited access to land, poorer sanitation, lack of education, more overcrowded living conditions, and the lack of access to electricity and electronic media, as shown by this study. Moreover, the burden of the costs that most of the displaced incurred in the process of displacement, which this study shows often exceeds annual income, coupled with the recurrent displacement experienced by the displaced, and the resultant accumulation of debts, entails a climate-poverty trap (Alam, 2017; Hutton & Haque, 2003). According to Hutton and Haque (2004), the vulnerabilities of the displaced and their adjustments to natural disasters are influenced by their poorer socioeconomic circumstances and access to development opportunities, as well as by the magnitudes of the environmental threats they face. Policy measures which generate opportunities for alternative employment in the displacement-prone localities, such as cattle and dairy farming, handloom knitting and fishing net, furniture and other

household utensils manufacturing, may increase the self-reliance of the displaced, and thus help to break this vicious circle of poverty.

This study further provides new evidence that, in addition to their socioeconomic impoverishment, the displaced are disadvantaged in relation to health and access to health and wellbeing facilities. In contrast to the substantially decreased use of such providers among the non-displaced, this study found the use of self-medicated allopathic and non-allopathic drugs has actually increased among the displaced. This would reflect a slower progress in the provision of health and wellbeing facilities in the displacement-prone areas. In view of the frequency of displacement and the lack of access to and use of healthcare services of the displaced, as shown by this study, there is a need to strengthen door-to-door healthcare service delivery systems and to relocate and increase the number of healthcare service outlets near to the areas in which the displaced have resettled.

Whilst some of the disadvantages of the displaced may have preceded their displacement, this study reveals that health vulnerabilities related to the accessibility, availability and use of healthcare services are adversely affected in multiple ways by climate-induced displacement. After displacement a greater incidence of illness, additional times and costs of reaching trained and professional healthcare providers, and additional costs of medicine are experienced. The relative importance of untrained providers of drugs is also increased post-displacement. Thus, the adversity resulting from displacement may lead to greater use of substandard treatment.

The socioeconomic impoverishment of the displaced is related to and influenced by the nature of past displacement. This study shows that those who were displaced suddenly are less educated than those who were displaced gradually, and they are more likely to have experienced long periods of homelessness post displacement, more likely to have experienced higher cost of resettlements when moving between villages, and more likely to face higher healthcare costs. The greater financial hardship and vulnerabilities related to healthcare accessibility of those who were displaced suddenly, compared to those who were displaced gradually, may be linked with

their lesser access to necessities for health and wellbeing, such as land, electricity, water, sanitation and qualified medical professionals. Improving their education may enhance their understanding and recognition of the severity of forthcoming disaster events and their assessment of the disaster-susceptibility of new locations, and thus reduce the risk of subsequent sudden displacement. Enhancing community preparedness for disasters and providing advanced warnings of the advancement and magnitude of flooding and forecasts of the trajectories of water channels, river encroachment and bank-erosion, for example by using the mobile network (ownership of mobile phones is near universal even among the climate displaced) and radio broadcasting, could reduce the risk and consequences of sudden displacement in the riverine areas (Guion et al., 2007).

Socioeconomic disadvantage related to educational attainment and occupational change is associated with the frequency of displacement. This study shows that the less educated are more likely to have been displaced more frequently. Multiple displacement may diminish the opportunity to attain education, and a lack of education may increase the risk of experiencing more frequent displacement. Post displacement, the displaced face a need to prioritize the construction of a new home and other requirements of resettlement. Changing jobs due to displacement may reduce the opportunity to develop skills and expertise in a specific job, and flooding may create a scarcity of work opportunities. Moreover, multiple displacement may reduce household financial capacity, due to the accumulation of resettlement cost with increased numbers of past displacements.

The frequent displacement experienced by many of those living in the riverine areas of Bangladesh also increases their healthcare-related disadvantages by increasing the incidence of illness and the costs of medicine, as shown in this study. Whilst the time and costs of accessing healthcare increase more often following the first move, they also increase more frequently in subsequent moves. Thus, those who have experienced larger numbers of displacements have the greatest incidence of illness and the greatest times and costs of accessing healthcare services. The

reduction in the net increase with larger number of past moves may be due to familiarization with the displacement process and the available health facilities (Arsenault et al., 2015; McMichael et al., 2012).

The disadvantage of the climate-displaced in north-western Bangladesh, thus, is a function of interactions between the extent of exposure to flooding and riverbank erosion, socioeconomic impoverishment and the availability and accessibility of support services. If realized, the projected increases in the frequency of extreme weather events, flooding and riverbank erosion and the related frequent displacement would present multiple, severe socioeconomic and health challenges in this region (Hassani-Mahmooei & Parris, 2012; McAdam & Saul, 2010; Stern, 2007).

Certain limitations to the data collected should be noted. Firstly, the data could not capture the effects of seasonal variations in illness and the estimated time and cost in accessing to the healthcare services, because in flood-affected regions fieldwork can only practically be conducted during winter, in view of the considerable difficulties which flooding, riverbank erosion and transport barriers create for reaching potential respondents during the wetter summer season. Secondly, the collection of longitudinal data for poor and often illiterate populations, who are displaced regularly by flooding and riverbank erosion, and for whom post-displacement official records are often unavailable would be problematic. Thus, our study collected cross-sectional data from a large sample of households and endeavoured to collect data on change retrospectively. In order to reduce the effects of recall bias in responses about changes in travel time and costs retrospectively, despite the response categories being very broad, the graduate enumerators were trained to cross-check answers by probing the mode of transport, approximate distance and time between the two periods, and had discussed such matters with local elderly people[5].

[5] **Contributions of authors:** Md. Rabiul Haque is the first-named author of this research paper. His contribution is 80% of the work. Nick Parr is the second-named author of this paper and his contribution is 15% of the work. Salut Muhidin is the third-named author of this paper and his contribution is 5% of the work. Details of each author's contributions are described in 'statement of authorship' section.

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Chapter 5: Household's displacement effects on delivery and postnatal care service utilization in rural Bangladesh

5.1 Introduction

In recent decades, Bangladesh has made considerable progress in relation to the improvement of maternal health outcomes. Its maternal mortality ratio (MMR) declined from 576 per 10,000 live births in 1990 to 176 in 2015 (WHO et al., 2015). Yet, many more deaths in Bangladesh and other developing countries could be prevented by increasing the numbers of mothers who deliver birth at health centre (HC), as opposed to delivery at home, as it is an important strategy for saving mothers' and infants' lives (Campbell & Graham, 2006; Rosenfield et al., 2007). Quality medically-trained-provider-guided care during pregnancy, delivery and post-delivery reduces the risks of maternal and neonatal deaths and morbidities (Neal & Matthews, 2013; WHO, 2014; WHO et al., 2015).

Despite promotional efforts, the prevalence of delivery (including HC-based delivery) assisted by trained birth attendants (TBAs) remains very low (42% as of 2014) in Bangladesh, and is far below the 98% by 2030 targeted by the Bangladesh Government (NIPORT, 2016). Most HC-based births (22% out of 37%) are delivered at private facilities, which are costly and mostly located in urban and better developed areas (NIPORT et al., 2016). Moreover, despite neonatal deaths, which account for 62% of deaths to children under five, only 30% of newborn babies receive PNC from a medically trained provider in the first two-days of life and only 33% do so in the first seven days (Singh et al., 2017). Home delivery has been found to increase the risk of maternal and neonatal mortality in many developing countries including Bangladesh (Mondal et al., 2009; Tura et al., 2013). Infant and neonatal mortality rates are particularly high in those areas of Bangladesh in which utilization of facilities for antenatal, delivery and postnatal care services is low (Nilima et al., 2018; NIPORT et al., 2016). Furthermore, there is a huge disparity by socioeconomic status and rural-urban residence in maternal and child health care (MCHC)-related service utilization, and hence the MCHC-related outcomes remain as challenges

in Bangladesh (Anwar et al., 2015; Kamal et al., 2016; Khan et al., 2013; NIPORT et al., 2016; Rahman et al., 2017a).

The key public health measures which have been adopted to reduce such disparity and improve MCHC service utilization in Bangladesh include the distribution of Family Planning (FP) methods, the distribution of supplementary vitamins and vaccination during pregnancy and after delivery, the establishment of Community Clinics (CCs) to provide basic healthcare services, upgrading peripheral health facilities for Emergency Obstetric Care (EmOC), training of skilled birth attendants (SBA) for home-based delivery, and increasing the Maternity Allowance (MA) program (Ahmed et al., 2015; Chowdhury et al., 2013; MoWCA, 2017). Poor mothers in rural Bangladesh receive 500 taka (1 US$=80.7) Maternity Allowance monthly for one year nine months, from their start of pregnancy to one year after delivery, for purchasing food and MCHC services. However, the coverage of MCHC-related services remains very low, particularly for those who live in hard-to-reach riverine landmasses and coastal regions (NIPORT, 2016). For the first time in the literature, this paper aims to investigate the factors associated with the utilization of health facilities for delivery and postnatal care (PNC) for neonates in the disaster-prone riverine areas of Bangladesh, paying particular attention to the differences between those who have experienced climate-induced displacement and those who have not experienced such displacement.

Bangladesh's ecological vulnerability exacerbates various challenges for its healthcare management programs, particularly in rural disaster-prone areas (Khan et al., 2011b; Nelson, 2003; Rahman, 2010b). The combined effects of human-induced deforestation, soil erosion and lowering river gradients, along with climate-induced rising temperature, melting glaciers of the Himalayas and chaining patterns of heavy precipitation, have contributed to abnormally high and irresistible water flows and the transportation of sediment, causing unpredictable changes to major river channels flooding, permanent riverbank erosion, and a resultant massive loss of land to rivers (Brouwer et al., 2007; Rahman, 2010b). These in turn trigger forced migration, and their

legacies influence socioeconomic and other proximate determinants of migration and health of those who actually have been displaced and those who potentially could experience climate-related displacement (Arsenault et al., 2015; IPCC, 2014a; McMichael et al., 2012; Rahman, 2010b; Schütte et al., 2018; Watts et al., 2018).

Each year, floods, changes in river channels and riverbank erosion alone are associated with an estimation of 100,000-500,000 people annually changing their usual place of residence permanently (Poncelet et al., 2010; Rahman, 2010b). These natural events cause displacement recurrently in the mainland riverine areas (Arsenault et al., 2015; Hutton & Haque, 2004). The intensity and adversity of floods are projected to increase in the future with further changes in the climate (Mollah & Ferdaush, 2015; Nowreen et al., 2015; Parvin et al., 2016). The flood-exposed poor and recurrently displaced populations face socioeconomic and health-related disadvantages in multiple ways, as shown in Chapter 2 and other studies (Alderman et al., 2012; Hutton & Haque, 2004; Kunii et al., 2002; Parvin et al., 2015; Rahman & Ahmad, 2018). However, to the authors' knowledge, none of the existing studies related to delivery care and PNC service utilization in Bangladesh, has considered the large and growing number of mothers who have been affected by climate-related displacement (Anwar et al., 2015; Biswas et al., 2016; Çalışkan et al., 2015; Kamal et al., 2016; Koblinsky et al., 2008; Nasrin et al., 2019; Rahman et al., 2018; Saha & Odjidja, 2017; Siddiquee & Ali, 2018; Yaya et al., 2017).

Greater utilization of HC for delivery and PNC services for neonates in Bangladesh has been linked with a range of factors including: residence in urban areas, mothers and their husbands having at least secondary level education, mother's age at birth, previous number of children , previous experience of HC-based delivery and household's access to mass media (Ahmed et al., 2010; Amin et al., 2010; Anwar et al., 2015; Chowdhury et al., 2006; Collin et al., 2007; Goli et al., 2017; Hajizadeh et al., 2014; Kamal et al., 2016; Kamal, 2013; Kamal, 2009; Khan et al., 2013; Shabnam et al., 2011; Shahabuddin et al., 2015a; Yaya et al., 2017; Zere et al., 2013). All of these studies found that mothers from the richest families were being more likely

to attend for HC-based delivery. Use of trained provider-guided antenatal care (ANC) is another key predictor of using health facilities for childbirth and trained provider-guided PNC services (Anwar et al., 2008; Islam et al., 2014; Kamal, 2013; Paul & Rumsey, 2002; Shah et al., 2014). Having a baby delivered at a HC further increases the likelihood of using PNC services, particularly those provided by trained providers (Anwar et al., 2008; Islam & Odland, 2011; Shahabuddin et al., 2015a; Singh et al., 2017). Long-distance travel to reach health facilities, knowledge gaps about delivery needs and complications, family traditions, refusals by other family members to accompany the mother or to allow her to go to HC for delivery, and cultural and religious beliefs related to home-based delivery have been found to be the most commonly-cited reasons for not using health facilities for MCHC services, particularly for delivery at HC (Biswas et al., 2016; Blum et al., 2006; Choudhury et al., 2012; Shahabuddin et al., 2017).

Whilst a number of studies have focused on the utilization of pregnancy, delivery, and post-delivery services in Bangladesh as a whole, and in slum areas and rural areas, to the authors' knowledge, no study has considered the utilization of health facilities for delivery care and the use of PNC services among disaster-prone rural people in Bangladesh. This paper aims to provide evidence to inform strategies for improving utilization of health facility for delivery and PNC services for neonates in the displacement-prone mainland areas of Bangladesh by investigating the extent to which HC-based delivery, PNC service utilization and the extent to which mothers' have trained provider-guided PNC differ between mothers from climate-induced displaced households and mothers from households which have not experienced such displacement and by the number of times displaced.

5.2 Methods

5.2.1 Data and statistical analysis

Data for this study were generated from a household survey conducted in 25 north western mainland villages. The in-depth of study location, sample selection and study design are discussed in Section 1.5. A total of 599 mothers who delivered their last child in the three years

preceding the survey date are included in the analysis. The eligible households were classified into two broad categories based on the displacement related responses: the 'displaced' (those who reported having been forced to change their usual place of residence permanently at least once in the past 10 years and prior to their most recent child's birth due to floods/changing river channels/riverbank erosion) and the 'non-displaced' (those who had not experienced displacement due to such events). This definition of displacement excludes those who were displaced temporarily and returned to their home following the floods. Return to the pre-disaster homestead is, in any case, unusual among the displaced, because the original home and the homestead land are often entirely destroyed and submerged with the relocated river channel (Arsenault et al., 2015; Haque & Hossain, 1988). None of the households in the 'non-displacement prone' areas reported having been displaced prior to delivery.

The results of chi-square tests of association between the predictor variables and the frequency of displacement are presented in Table 1. The chi-square tests of association between the predictor and outcome variables, and multiple logistic regression were used to identify the effect of each predictor on the utilization of HC for delivery (Table 3) and the effect on utilization of any PNC for neonates (Table 5) and the trained provider-guided PNC services (Table 6). ANC use before the birth, use of a HC for delivery, and PNC are strongly correlated. However, some of this service use may be seen in terms of a 'chain' in which ANC is followed by HC-delivery then later by PNC use, and with entry into and progress through this 'chain' being the product of demographic and socioeconomic attributes, household access to medical doctors and radio/television media coupled with direct effects on previous ANC use on subsequent HC delivery, and of both previous ANC use and HC delivery on PNC use. The modelling strategy considers both models with ANC or HC-delivery as explanatory variables and models which do include these variables to allow assessment of possible causal relationships. The selected predictors for each model are presented in Table 3 and Tables 5-6. The predictor variables were selected, if their bivariate association with any of the outcome measures was significant. The

results of multivariate regressions are presented using odds ratios (ORs) with 95% confidence intervals (CIs), level of significance, and model chi-squares. The values of variance inflation factor (VIF) and tolerance statistics indicated no unacceptable collinearity for the models. The results of cross-tabulations (multiple responses) describing the reasons of home delivery and not using any PNC services by displacement experience are also presented in Table 2 and Table 4 respectively. The 'Other' reasons recorded for 'home delivery' were mostly 'a lack of trust on medical doctor' and 'abrupt delivery'.

The first binary outcome variable, 'place of delivery' of the last child, classified mothers into those who delivered their child at home (controls) and those who delivered their child at a HC (cases). For the second outcome variable, the mothers were classified into those who did not receive any PNC for their neonates within seven days of delivery (controls) and those who received at least one PNC from any provider (cases). Finally, the mothers who received PNC were classified for the third outcome variable based on the type of provider used for PNC into two groups: mothers who used untrained provider-guided PNC (controls) and mothers who used trained provider-guided PNC (cases). Any recall bias effect on these outcome measures is likely to be minor, because only the data for the most recent delivery in the three years prior to the survey date was analysed (NIPORT et al., 2016).

The 'household's displacement status' was classified into none, 1-2, and ≥3, based on the number of displacements in past 10 years and prior to birth. The other predictors of MCHC-related service utilization used in the analysis are: utilization of ANC during pregnancy, number of previous children at the time of delivery, place of birth of the last child, mother's age at birth and level of education, household's monthly income, husband's level of education, medical doctor availability within a 5km radius, and household's access to radio/ television media. The classification of others predictor variables used is shown in Tables 3, 5 and 6.

5.3 Results

Only 39.6% of the 599 mothers in the sample delivered their last child at HC. The percentage who delivered at HC is significantly lower (16.2%) for mothers from displaced households than for mothers from non-displaced households (59.8%). As shown in Table 5.1, the percentage having HC-based delivery is lower (13.9%) among ≥3 times displaced mothers than among 1-2 times displaced (19.5%) mothers. The differences in ANC service used by displacement status are also striking. The percentage of mothers without any ANC is three-times higher for displaced mothers than for non-displaced mothers. In contrast, utilization of trained provider-guided ≥3 ANC services for displaced mothers is less than half of that for their non-displaced counterparts. The percentage of ≥3 times displaced mothers with three or more previous children was almost four-times higher than that for non-displaced mothers, and almost three-times higher than that for 1-2 times displaced mothers. This would reflect a combination of the extended exposure to the risk of displacement, larger family sizes of older mothers and higher age-specific fertility rates among the displaced (shown by the data for this but not presented here).

Both mother's age at birth and her education vary significantly by displacement status. That the average age at birth for ≥3 times displaced mothers (24.9) is higher than for non-displaced mothers (22.4), and for 1-2 times displaced mothers (22.8) could be linked with the higher parities of those with more displacements. Only 8.6% of the displaced mothers have ≥9 years schooling compared to 32.7% of the non-displaced mothers. Household's monthly income is significantly lower for the displaced than for non-displaced, with the widest difference being for the percentage with an income above 10,000 taka (123.9 US$). The husbands of the displaced mothers also have lower average years of schooling (3.7) than their non-displaced counterparts (6.4). Availability of medical doctors within 5km radius is much lower for the displaced households (20.9%) than for the non-displaced households (86.6%). The percentage of displaced (15.1%) households with media (radio/television) access is less than a third of that for non-displaced (51.4%) households (Table 5.1).

Table 5.1: Distribution of outcome and predictor variables by mothers' household's experience of displacement

Variables	% distribution of mothers' by times displaced♦♦♦ None (n=321	1-2 times (n=113)	≥3 times (n=165)	All Displaced (n=278)	All (N=599)	*Sig.*
Place of birth of last child						
Home	40.2	80.5	86.1	83.8	60.4	***
Health center	59.8	19.5	13.9	16.2	39.6	
Utilization of antenatal care (ANC)[8]						
Did not receive any ANC	9.0	18.6	33.9	27.7	17.7	***
1-2 ANC from trained provider	36.1	57.5	41.2	47.8	41.6	
≥3 ANC from trained provider	54.8	23.9	24.8	24.5	40.7	
Previous number of children						
1	49.2	38.1	31.5	34.2	42.2	***
2	40.2	34.5	29.7	31.7	36.2	
3+	10.6	27.4	38.8	34.2	21.5	
Mother's age at birth						
≤18	24.0	25.7	15.8	19.8	22.0	***
19-23	38.6	31.0	26.7	28.4	33.9	
24-28	25.9	31.9	36.4	34.5	29.9	
≥29	11.5	11.5	21.2	17.3	14.2	
Mother's education (years)						
No education	7.5	32.7	28.5	30.2	18.0	***
Junior school level (≤8)	59.8	59.3	28.5	61.2	60.4	
More than junior school level (≥9)	32.7	8.0	9.1	8.6	21.5	
Household's monthly income (taka)						
≤8,000	46.1	46.0	43.6	44.6	45.4	**
8,001-10,000	23.7	35.4	34.6	34.9	28.9	
≥10,001	30.2	18.6	21.8	20.5	25.7	
Husband's education (years)						
No education	16.8	38.9	36.4	37.4	26.4	***
Junior school level (≤8)	53.0	54.9	49.1	51.4	52.3	
More than junior school level (≥9)	30.2	6.2	14.5	11.2	21.4	
Medical doctor available within 5km						
No	13.4	84.1	75.8	79.1	43.9	***
Yes	86.6	15.9	24.2	20.9	56.1	
Access to radio/television						
No	48.6	82.3	86.7	84.9	65.4	***
Yes	51.4	17.7	13.3	15.1	34.6	
Utilization of postnatal care (PNC)						
No	34.3	44.2	57.0	51.8	42.4	***
Yes	65.7	55.8	43.0	48.2	57.6	
Sources of PNC service (n)	(211)	(63)	(71)	(134)	(345)	
Untrained provider	18.5	34.9	46.5	41.0	27.2	***
Trained provider	81.5	65.1	53.6	59.0	72.8	

♦♦♦*Refers to the strength of proportional differences of the predictor variables between 'none', '1-2 times' and '≥3 times' displacement*
*Significance level *P<0.10; **P<0.05; ***P<0.01; 1=Taka 80.7 for 1 US$ as of June 2017*

The more common reasons for having a home delivery given by the mothers are related to necessity, affordability, acceptability, accessibility and availability of the services (Table 5.2). However, wide variations in the reasons given by the mothers by displacement status are evident. Reasons for home delivery related to affordability and accessibility are more commonly given by the displaced than by the non-displaced. The greater importance of affordability among the displaced than among the non-displaced is evident from a higher percentage of the former citing

[8] Mothers who received ANC services during their last pregnancy were classified into '1-2 ANC from trained provider' and '⩾3 ANC from trained provider' as the total number of cases with 4 plus ANC from a trained provider is very low among the respondents and not yet common in rural Bangladesh (NIPORT et al., 2016).

'unaffordable costs for HC-based delivery', and may be linked to their lower household incomes (shown in Table 5.1). The greater importance of accessibility and availability for home-based delivery among the displaced is shown by the higher percentage citing 'long distance travel, transport barriers and costs to reach to the HC' and 'lack of doctors/lack of female doctors at HC', and is possibly linked with the lack of quality care in the displacement-prone areas and the opportunity costs incurred in accessing such care. 'HC-based delivery was not needed', 'family tradition of delivery at home' and 'lack of privacy in HC-based delivery' are cited slightly less frequently by the displaced than by the non-displaced, which may be a legacy of displacements of the displaced and be linked with their higher number of previous children, higher age-specific fertility rates, and more limited awareness of the importance of services (some of which may be due to less use of ANC services during pregnancy and to service availability) (Table 5.1). The greater percentage of the displaced than the non-displaced who cited 'family didn't allow HC-based delivery' may also be linked with affordability, accessibility and unavailability of services. The more commonly cited 'other' reasons include 'sudden onset of labour' and 'negative perceptions of HC delivery or providers'.

Table 5.2: Reasons for home delivery for the last child by mothers' household's experience of displacement

Reasons for home delivery for the last child *(Multiple response, n=362, mothers who had birth at home)*	% distribution of mothers' who had home delivery by displacement experience				
	None (322 responses)	1-2 times (228 responses)	≥3 times (468 responses)	All displaced (796 responses)	All (1,118 responses)
Didn't feel it necessary to hospitalize for delivery	82.2	70.4	64.1	66.5	72.0
Unaffordable costs for hospital-based delivery	42.6	82.4	79.6	80.7	67.1
Family tradition of delivery at home	62.8	52.7	56.3	54.9	57.7
Long distance travel, transport barriers and costs	9.3	64.8	48.6	54.9	38.7
Lack of doctors/lack of female doctors at HC	13.2	37.4	38.0	37.8	29.0
Family didn't allow hospitalization for delivery	13.2	27.6	21.8	24.0	20.2
Lack of privacy in hospital delivery	12.4	6.6	7.0	6.9	8.8
Religious beliefs about home delivery	7.0	9.9	3.5	6.0	6.4
Other reasons	7.1	8.8	10.5	9.9	8.9

The bivariate analysis shows that the likelihood of delivery at HC is significantly associated with household's displacement experience, utilization of ANC services during pregnancy, previous number of children, mother's age at birth and her education, household's monthly income, husband's education, medical doctor availability within 5km radius, and household's access to radio/television (Table 5.3).

The percentage who had HC-based delivery is significantly lower for mothers from the ≥3 times displaced households than for mothers from the 1-2 times displaced households, which in turn is lower than for mothers from the non-displaced households. Only 5.7% of those who did not receive any ANC during pregnancy had HC-based delivery. The likelihood of HC-based delivery increases significantly with increases in the extent of utilization of trained provider-guided ANC services. The percentage who delivered birth at a HC decreases significantly with increases in their number of previous children, and is particularly low for those with three and more children. The extent of HC-based delivery for mothers also generally decreases as the age at birth increases. The percentage of HC-based delivery increases as the mother's, and their husband's highest education increases. The prevalence of HC-based delivery is more common for mothers from households earning above 10,000-taka. HC-based delivery is more than twice as likely when a medical doctor is reported to be available in 5km radius than otherwise, and roughly twice as likely when a household have access to radio/television than otherwise.

In both multivariate regression models (Model 1 and Model 2 in Table 5.3) the odds of delivering birth at HC is significantly affected by the household's displacement experience, previous number of children, household's monthly income, husband's education, and household's access to radio/television. Model 2 shows that after controlling the effects of other variables including ANC use, the odds of delivering birth at HC of mothers from ≥3 times displaced households is only 18% and for mothers from 1-2 times displaced households is approximately a quarter of those for mothers from non-displaced households. The influence on the magnitude of this, after exclusion of ANC services from the model, is very minor (compare Model 1 and Model 2 in Table 5.3).

Table 5.3: Distribution of mothers who gave birth to their last child at a health centre (HC) by explanatory variables

Predictor variables	Mothers who gave birth at HC (%)	*Sig.*	Multivariate odds ratios (CIs) of mothers delivering last child at health center			
			Model-1	*Sig.*	*Model-2*	*Sig.*
Household's displacement status						
No displacement	59.8	***	1		1	
1-2 times	19.5		0.27(0.13-0.55)	***	0.26(0.12-0.55)	***
≥3 times	13.9		0.17(0.09-0.33)	***	0.18(0.09-0.36)	***
Utilization of antenatal care (ANC)						
Did not receive any ANC	5.7	***			1	
1-2 ANC from trained provider	30.9				5.36(2.08-13.86)	***
≥3 ANC from trained provider	63.1				15.77(5.98-41.59)	***
Previous number of children						
1	54.5	***	1		1	
2	38.7		0.46(0.26-0.81)	***	0.62(0.34-1.13)	*ns*
3+	11.6		0.09(0.03-0.22)	***	0.13(0.05-0.35)	***
Mother's age at birth						
≤18	49.2	***	1		1	
19-23	46.3		0.88(0.51-1.53)	*ns*	0.61(0.34-1.11)	*ns*
24-28	27.9		0.97(0.47-2.02)	*ns*	0.63(0.28-1.39)	*ns*
≥29	32.9		2.79(1.04-7.47)	**	1.74(0.60-5.07)	*ns*
Mother's education (years)						
No education	20.4	***	1		1	
Junior school level (≤8)	35.9		0.94(0.47-1.88)	*ns*	0.69(0.33-1.43)	*ns*
More than junior school level (≥9)	65.9		1.39(0.60-3.19)	*ns*	1.02(0.43-2.43)	*ns*
Household's monthly income (taka)						
≤8,000	34.2	***	1		1	
8,001-10,000	35.8		1.54(0.94-2.54)	*	1.67(0.98-2.82)	**
≥10,001	53.2		1.59(0.94-2.68)	*	1.83(1.05-3.19)	**
Husband's education (years)						
No education	28.5	***	1		1	
Junior school level (≤8)	34.5		0.55(0.31-0.95)	**	0.48(0.27-0.86)	***
More than junior school level (≥9)	65.5		1.18(0.58-2.37)	*ns*	1.00(0.47-2.10)	*ns*
Medical doctor available within 5km						
No	21.3	***	1		1	
Yes	53.9		1.27(0.74-2.20)	*ns*	1.05(0.58-1.91)	*ns*
Access to radio/television						
No	29.1	***	1		1	
Yes	59.4		1.75(1.13-2.71)	***	1.72(1.08-2.73)	**
Model χ^2(df) with significance level			*214.09(18), p<0.00*		*266.57(20), p<0.00*	
Overall predicted percentage			*75.3*		*79.3*	
-2Log likelihood and (Nagelkerke score)			*590.02(0.407)*		*537.52(0.486)*	

*Significance levels *P<0.10; **<0.05; ***<0.01; ns=not significant*

Model 2 shows that previous use of ANC services is strongly correlated with delivering birth at a HC. Mothers who received 1-2 ANC from a trained provider are 5.4 times more likely to deliver their birth at HC than mothers who had not received any ANC, whilst mothers who received ≥3 ANC are 15.8 times more likely to do so. Previous number of children is inversely associated with the odds of delivery at a HC. The odds of mothers having ≥3 previous children of giving birth at HC are only 13% of those for mothers having a first child. According to Model 1, mothers aged above 29 or above have a significantly higher probability of giving birth at a HC than mothers aged below 19 years. However, the effects of mother's age at birth are found significant in Model 1, but disappear after adjusting the effects of using ANC at pregnancy in

Model 2. Thus, older motherhood may affect ANC use but does not affect the likelihood of HC use of those with a particular pattern of ANC use.

Delivering at a HC is also significantly affected by household's monthly income. Mothers from households with a monthly income above 8,000-taka are significantly more likely to deliver at a HC than those from households with an income below 8,000 taka. Mothers whose husband has junior school level education are roughly half as likely to deliver at a HC than those whose husband has no education and more than junior school level education. Mothers from households with access to radio/television have significantly higher odds of delivering at a HC (Models 1and 2). The effects of mothers' education and medical doctor availability in 5km radius are insignificant in both models (Table 5.3).

Displaced mothers in regard to not having any PNC services for neonates place greater importance to necessity, affordability, acceptability, accessibility, and availability than that of non-displaced mothers (Table 5.4). This could be related to their socioeconomic impoverishment, inadequate utilization of MCHC services for ANC and delivery care, larger numbers of previous children, and more limited knowledge about the importance and availability of such services (Table 5.1). The greater importance to 'previous experience of taking care of newborn babies' of the displaced than that of the non-displaced could also be linked with their generally larger numbers of previous children as shown in Table 5.1.

Table 5.4: Reasons of not utilizing postnatal care services for the last child by mother's household's experience of displacement

Reasons for not utilizing PNC services for the last child *(Multiple response, n=254)*	% distribution of mothers' who had not utilized PNC services by displacement experience				
	None (193 responses)	1-2 times (168 responses)	≥3 times (260 responses)	All displaced (428 responses)	All (621 responses)
Didn't feel it necessary to attend for PNC services	75.5	64.0	55.3	58.3	65.7
Unaffordable costs to visit doctors for PNC services	35.5	74.0	71.3	72.2	56.3
Family tradition of taking newborn's care at home	20.9	70.0	55.3	60.4	43.3
Long distance travel, transport barriers and costs	11.8	48.0	37.2	41.0	28.3
Previous experience of taking care of newborn babies	19.1	32.0	30.9	31.3	26.0
Lack of medical doctors and trained providers	10.0	44.0	24.5	31.3	22.0
Other reasons	2.7	4.0	2.1	2.8	2.8

As shown in Table 5.1, 57.6% of the mothers had received at least one PNC for their last child either from a trained provider or from an untrained provider. The proportion receiving any PNC is significantly lower (43.0%) for mothers of the ≥3 times displaced households than for

mothers in non-displaced households (65.7%), and is also lower than for mothers (55.8%) in the 1-2 times displaced households (Table 5.5). Utilization of PNC is nearly 32 percentage points higher for mothers who had HC-based delivery than for mothers who had home-based delivery. The likelihood of PNC service utilization for mothers who received trained provider-guided ≥3 ANC services during pregnancy is nearly double that of those who did not receive any ANC. The probability of using PNC services decreases with increases previous number of children. With higher levels of mother's educational attainment, the likelihood of using PNC services increases. Mothers who reported medical doctor availability within 5km radius are more likely to use PNC services than those who do not. Mothers whose household has access to radio/television also have an above average likelihood of using PNC services. However, mother's age at birth, household income and husband's education are not significantly related to PNC service utilization.

The results of multivariate analysis of whether any PNC services were received are shown in Table 5.5. Whilst in Model 1 mothers from displaced households, particularly those which had experienced ≥3 times displacement, have a significantly lower probability of using any PNC services for their neonates than mothers from non-displaced households (Model 1), after controlling for the effects of HC-based delivery, the effects of displacement become insignificant (Model 3). Thus, whilst displacement significantly affects HC use for delivery, it does not appear to affect whether those who delivered at a HC or at home subsequently use any PNC services (Table 5.3 and 5.5)

Use of health services for ANC and delivery also enhances the utilization of PNC services. Model 3 shows that mothers who delivered birth at HC are almost four times more likely to use PNC services than mothers who delivered their last child at home (Table 5.5). Mothers who received medically trained provider-guided 1-2 ANC and ≥3 ANC are more likely to receive PNC services for their neonates than mothers who did not receive any ANC (Model 3).

Table 5.5: Factors associated with mothers' utilization of any postnatal care (PNC) services for their last child

Predictor variables	Mothers who received PNC (%)	*Sig.*	Multivariate odds ratios (CIs) of mothers' who received PNC for last child					
			Model-1	*Sig.*	*Model-2*	*Sig.*	*Model 3*	*Sig.*
Household's displacement status								
No displacement	65.7	***	1		1		1	
1-2 times	55.8		0.72(0.41-1.27)	*ns*	0.72(0.40-1.28)	*ns*	0.97(0.53-1.78)	*ns*
≥3 times	43.0		0.45(0.27-0.75)	***	0.50(0.30-0.85)	***	0.69(0.40-1.20)	*ns*
Place of birth of last child								
Home	45.0	***					1	
Health center	76.8						4.09(2.57-6.52)	***
Utilization of antenatal care (ANC)								
Did not receive any ANC	39.5	***			1		1	
1-2 ANC from trained provider	72.2				2.44(1.49-4.01)	***	2.10(1.27-3.48)	***
≥3 ANC from trained provider	81.4				2.52(1.48-4.29)	***	1.60(0.91-2.81)	*
Previous number children								
1	77.1	***	1		1		1	
2	75.4		0.98(0.60-1.62)	*ns*	1.07(0.65-1.78)	*ns*	1.26(0.75-2.14)	*ns*
3+	56.5		0.78(0.39-1.53)	*ns*	0.92(0.46-1.84)	*ns*	1.37(0.67-2.84)	*ns*
Mother's age at birth								
≤18	65.9	*ns*	1		1		1	
19-23	56.2		0.62(0.37-1.08)	*	0.58(0.35-0.97)	**	0.59(0.34-1.01)	**
24-28	54.2		0.73(0.38-1.40)	*ns*	0.71(0.37-1.38)	*ns*	0.70(0.35-1.38)	*ns*
≥29	55.3		0.90(0.40-2.03)	*ns*	0.89(0.39-2.02)	*ns*	0.73(0.31-1.73)	*ns*
Mother's education (years)								
No education	50.0	**	1		1		1	
Junior school level (≤8)	56.6		1.07(0.65-1.80)	*ns*	1.06(0.63-1.79)	*ns*	1.15(0.67-1.95)	*ns*
More than junior school level (≥9)	66.7		1.57(0.79-3.10)	*ns*	1.50(0.75-3.00)	*ns*	1.52(0.74-3.12)	*ns*
Household's monthly income (taka)								
≤8,000	69.7	*ns*	1		1		1	
8,001-10,000	73.9		0.79(0.53-1.19)	*ns*	0.78(0.52-1.17)	*ns*	0.70(0.46-1.07)	*
≥10,001	77.3		0.76(0.49-1.17)	*ns*	0.74(0.47-1.14)	*ns*	0.63(0.40-0.99)	**
Husband's education (years)								
No education	54.4	*ns*	1		1		1	
Junior school level (≤8)	57.5		0.89(0.58-1.38)	*ns*	0.86(0.55-1.34)	*ns*	0.97(0.62-1.54)	*ns*
More than junior school level (≥9)	61.7		0.85(0.47-1.54)	*ns*	0.80(0.44-1.46)	*ns*	0.75(0.40-1.41)	*ns*
Medical doctor available within 5km								
No	69.2	*	1		1		1	
Yes	78.6		0.94(0.60-1.49)	*ns*	0.90(0.57-1.43)	*ns*	0.89(0.55-1.43)	*ns*
Access to radio/television								
No	62.5	***	1		1		1	
Yes	79.4		1.13(0.76-1.68)	*ns*	1.11(0.74-1.43)	*ns*	0.97(0.64-1.48)	*ns*
Model χ^2(df) with significance level			*32.78(15), p<0.01*		*47.22(17), p<0.00*		*85.28(18), p<0.00*	
Overall predicted percentage			*61.4*		*62.3*		*65.8*	
-2Log likelihood and (Nagelkerke score)			*783.73(0.072)*		*769.30(0.102)*		*731.24(0.178)*	

*Significance levels *P<0.10; **<0.05; ***<0.01; ns=not significant*

Mothers aged 19-23 years are significantly less likely to use PNC services for their children than those aged under 19. Model 3 of Table 5.5 shows that mothers from households with a monthly income above 8,000 taka are significantly less likely to use PNC services than mothers from households with a monthly income of 8,000 taka or below. This could be linked with the fact that women from higher income households have more negative perceptions of the need to use such services (Table 5.4). However, the effects of previous number of children, mother's education, husband's education, medical doctor availability within 5km, and household's access to radio/television on using PNC services are insignificant in all models.

Among those who received PNC, 72.8% did so from a trained provider (Table 5.1). The bivariate result shows that the percentage of mothers from ≥3 times displaced households who received trained provider-guided PNC (53.6%) is significantly lower than the percentages of mothers from 1-2 times displaced households (65.1%) and mothers from non-displaced households (81.5%) who did so (Table 5.6). The percentage who used trained providers for PNC services is 43% higher for mothers who delivered at a HC than for those who did not do so. Utilization of trained providers for PNC services is significantly higher for mothers who had trained provider-guided ANC services, particularly ≥3 times ANC. Higher number of previous children is significantly associated with lower use of trained provider for PNC services. Utilization of trained providers for PNC services is significantly higher for mothers who have more than junior level education than for those with no education. A similar pattern is found for husband's education. The percentage receiving trained provider-guided PNC is significantly higher for those mothers who reported medical doctors' availability within 5km radius than otherwise, and for those whose household has access to radio/television than for those for without such access.

The results of multivariate analysis of whether a mother uses a trained provider for PNC are shown in Table 5.6. A negative effect of household's displacement status on using PNC from a trained provider is found significant in all the models. Even after controlling the variables of ANC use and HC delivery, the odds of a mother from a ≥3 times displaced household using PNC services from a trained provider are only 37% of those for a mother from a non-displaced household (Model 3).

Table 5.6: Factors associated with mothers' utilization of postnatal care (PNC) from a trained provider for their last child

Predictor variables	Mothers who received PNC from trained provider (%)	*Sig.*	Multivariate odds ratios (CIs) of utilizing PNC services from a trained provider[9] for last child					
			Model-1	*Sig.*	*Model-2*	*Sig.*	*Model 3*	*Sig.*
Household's displacement status								
No displacement	81.5	***	1		1		1	
1-2 times	65.1		0.48(0.20-1.14)	*	0.42(0.17-1.03)	*	0.61(0.23-1.59)	*ns*
≥3 times	53.6		0.28(0.12-0.64)	***	0.26(0.11-0.60)	***	0.37(0.15-0.92)	**
Place of birth of last child								
Home	50.3	***					1	
Health center	92.9						11.70(5.43-25.20)	***
Utilization of antenatal care (ANC)								
Did not receive any ANC	35.8	***			1		1	
1-2 ANC from trained provider	60.6				4.078(1.82-9.08)	***	2.82(1.22-6.52)	**
≥3 ANC from trained provider	63.9				4.75(2.04-11.06)	***	1.98(0.78-5.00)	*ns*
Previous number of children								
1	62.1	**	1		1		1	
2	58.1		0.81(0.38-1.73)	*ns*	0.88(0.40-1.93)	*ns*	1.16(0.49-2.74)	*ns*
3+	48.1		0.35(0.12-0.99)	***	0.44(0.15-1.30)	*ns*	0.82(0.25-2.64)	*ns*
Mother's age at birth								
≤18	73.6	*ns*	1		1		1	
19-23	78.1		1.37(0.64-2.93)	*ns*	1.22(0.56-2.65)	*ns*	1.69(0.72-3.97)	*ns*
24-28	66.0		1.12(0.43-2.91)	*ns*	1.04(0.39-2.79)	*ns*	1.24(0.42-3.67)	*ns*
≥29	72.3		2.33(0.68-8.07)	*ns*	2.01(0.56-7.22)	*ns*	2.15(0.53-8.77)	*ns*
Mother's education (years)								
No education	61.1	**	1		1		1	
Junior school level (≤8)	71.4		1.00(0.45-2.22)	*	1.03(0.46-2.32)	*ns*	1.09(0.47-2.54)	*ns*
More than junior school level (≥9)	82.6		1.29(0.45-3.67)	*ns*	1.20(0.41-3.47)	*ns*	0.85(0.26-2.75)	*ns*
Household's monthly income (taka)								
≤8,000	60.7	*ns*	1		1		1	
8,001-10,000	53.2		1.74(0.93-3.26)	*	1.77(0.92-3.38)	*	1.57(0.77-3.21)	*ns*
≥10,001	57.1		1.16(0.58-2.32)	*ns*	1.23(0.61-2.48)	*ns*	0.88(0.40-1.88)	*ns*
Husband's education (years)								
No education	70.9	*	1		1		1	
Junior school level (≤8)	69.4		0.59(0.30-1.15)	*ns*	0.53(0.26-1.05)	*	0.77(0.36-1.62)	*ns*
More than junior school level (≥9)	82.3		0.94(0.36-2.43)	*ns*	0.84(0.31-2.24)	*ns*	1.07(0.35-3.28)	*ns*
Medical doctor available within 5km								
No	51.7	***	1		1		1	
Yes	62.2		1.11(0.54-2.30)	*ns*	0.93(0.49-1.72)	*ns*	1.00(0.45-2.24)	*ns*
Access to radio/television								
No	54.6	**	1		1		1	
Yes	63.3		0.93(0.51-2.30)	*ns*	0.92(0.44-1.97)	*ns*	0.69(0.35-1.38)	*ns*
Model χ^2(df) with significance level			*37.50(15), P<0.00*		*52.27(17), p<0.00*		*101.90(18), p<0.00*	
Overall predicted percentage			*75.7*		*76.2*		*77.4*	
-2Log likelihood and (Nagelkerke score)			*366.63(0.149)*		*351.86(0.204)*		*302.23(0.371)*	

*Significance levels *P<0.10; **<0.05; ***<0.01; ns=not significant*

Mothers who delivered at a HC are nearly 12 times more likely to use trained providers for PNC services than mothers who did not do so (Model 5.3, Table 5.6). The effect of ANC use on PNC service utilization is also significant, even after inclusion of HC-based delivery. Model 3 shows that mothers who received trained provider-guided 1-2 ANC are significantly more likely to go for trained provider-guided PNC services than mothers who did not receive any ANC services during pregnancy. The effect of mothers with 3+ children on use of a trained provider-

[9] Untrained providers are the predominant source of PNC service in rural Bangladesh including the study areas (NIPORT et al., 2016).

guided PNC services is significant and negative in Model 1 but becomes insignificant after controlling for ANC use and HC delivery. In Models 1 and 2, mothers from households with 8,001-10,000 taka monthly income are significantly more likely to use PNC services from a trained provider than mothers from households with a monthly income of 8,000 taka or less. However, in Model 3 the effects of previous number of children and household's monthly income become insignificant after adjusting for the effects of delivery place. The effects of mother's age at birth and their education, medical doctor availability in 5km radius and household's access to radio/television on using PNC services are insignificant in all 3 Models

5.4 Discussion

This paper, for the first time to the authors' knowledge, demonstrates the substantially lower utilization of health facilities for delivery and postnatal care for neonates among mothers in rural mainland Bangladesh whose household has experienced displacement because of floods and/or riverbank erosion in comparison to mothers residing in the same regions and sharing socio-cultural similarities but whose household has not experienced such a displacement. The extent of the decrease in use of HC-based delivery and trained provider-guided PNC services is greater for those with larger numbers of past displacement. Moreover, the reduced utilization of HC-based delivery and PNC services by mothers from displaced households persists even after controlling for a wide range of social, economic and health-related attributes. These patterns should be of major concerns, as the risks of maternal and neonatal mortality are much higher for home-based delivery attended by untrained birth attendants (Koblinsky et al., 2008; Owais et al., 2013; Pardosi et al., 2015; Partridge et al., 2012; Scarf et al., 2018; Zupan, 2005). Thus, displacement represents an additional challenge to Bangladesh's health system, increasing the coverage of quality delivery and neonatal care services, and causing issues in achieving its targets of Sustainable Development Goals (SDGs) in relation to reducing maternal and infant mortality (NIPORT et al., 2016; Owais et al., 2013).

In line with previous studies, this study finds that mothers from poorer households are less likely to delivery birth at HC and to use trained provider-guided PNC services for their neonates than mothers from richer households. This study further shows that the displaced have significantly lower incomes than the non-displaced. Thus, some of the displacement effects on using delivery and PNC services may be mediated by an effect of displacement on household income. Displacement causes multiple socioeconomic disadvantages, which in turn influences healthcare practices. Recurrent displacement damages the displaced household's home, land and possessions, disrupts their livelihood setup and social networks, results in relocation and resettlement costs, destroys local health facilities, and therefore reduces their affordability to visits private health facilities and of costly and time-consuming travel to (and hence opportunity costs of) attending fee-free care at distant public facilities, as shown in Chapter 2. The adverse health outcomes of displacement-related disadvantages are reflected in the displaced mothers' greater emphasis on affordability, accessibility and availability (of medical doctor) related reasons for delivering birth at home and for not using any PNC services, and their greater use of untrained provider-guided PNC services (Tables 5.2 and 5.4).

This study, in line with other studies, finds an increase in utilization of health facilities for delivery care among mothers whose households have access to radio/television (Islam & Odland, 2011; Rahman et al., 2017b; Sharma et al., 2007). However, it is the first study to show that the displaced have significantly lower access to radio/television than the non-displaced. The more limited access to these media of the displaced is associated with their lower household income, other wealth-related disadvantages (less access to land, damages of possessions, and lack of income generating activities, shown in Chapter 2), and more limited access to electricity, and would limit their knowledge about the importance of MCHC services and their utilization. Health-related information broadcast through radio/television increases people's day-to-day health awareness, understanding of the availability of modern healthcare options, the benefits of using such care, the issues linked with health service delivery systems, and the consequences of

marriage and pregnancy at earlier ages and of larger family sizes, and thus improves their maternal and child healthcare practices (Barber & Axinn, 2004; Islam & Hasan, 2000; Rabbi, 2012; Rahman et al., 2017b).

The differences relating to medical doctor availability by displacement status is striking, as shown in this study. The percentage of displaced mothers who do not have a medical doctor available within a 5km radius is alarmingly high, and far exceeds that for their non-displaced counterparts. The insignificant effects of medical doctor availability on using delivery and PNC services for neonates in this study could be related to their practice setup and areas of expertise. In rural Bangladesh, medical doctors in many cases perform their private practices at pharmacies, in which pregnancy and delivery care setup is generally not available. Moreover, the locally available medical doctors are mostly general practitioners. Experts on pregnancy, delivery and post-delivery care (gynaecologists) are mainly available at private and public health facilities, which are mostly located in urban and other more developed areas, despite their being the preferred source of MCHC services in Bangladesh (NIPORT et al., 2016).

The study finds a substantially lower use of ANC services among the displaced (shown in Chapter 4), which in turn reduces their probability of delivering birth at HC. The limited use of health facilities for ANC and delivery care of the displaced mothers also reduces their use of PNC services, particularly from a trained provider. Other studies in Bangladesh have found similar patterns, but none has demonstrated such effects for mothers of the displaced households (Anwar et al., 2008; Chakraborty et al., 2003; Islam et al., 2014; Shah et al., 2014; Shahabuddin et al., 2015a; Singh et al., 2017). The findings of these studies for previous number of children and age at delivery are broadly similar to the results reported in this study: HC-based delivery is significantly lower among younger and high birth-ordered mothers.

Some limitations of the data collected in this study should be noted. Firstly, our study could not collect information about the availability of HC which have facilities to delivery care and the distances to reach them, both of which may influence delivery and PNC service utilization

patterns. Secondly, findings related to delivery and postnatal care service utilization should be generalizable to other disaster-prone areas of mainland Bangladesh in which flood and riverbank cause massive permanent displacement. However, generalization of these findings in other regions of Bangladesh, particularly the coastal regions in which sudden-onset disasters cause largely temporary displacement, should be treated with caution.

5.5 Conclusion

Displacement reduces the displaced mother's utilization of health facilities for giving birth and of postnatal care services. Thus, policy makers should prioritize implementing and evaluating interventions that will benefit mothers and neonates in the climate-affected areas. Recognizing the greater inaccessibility to quality health facilities among the displaced, their unavailability and affordability-related issues, relocation of Community Clinics with basic and emergency maternal and child health care service options might be considered in order to serve the large, growing and disadvantaged population. In view of the importance of receiving trained-provider guided ANC services at pregnancy for subsequent use of health facilities for HC-based delivery and PNC services, all of which are noticeably lower among the displaced and varied by the frequency of past displacement, greater focus should be given to increasing the coverage of at least four trained-provider guided ANC visits. Training of community health workers about ANC and PNC services, and engaging them to provide such services at the client's home might increase coverage of delivery by skilled birth attendant. Counselling pregnant mothers and their husbands about the benefits of HC-based delivery, the challenges of delivery at home, and the benefits of PNC services during their ANC visits could be used to increase the use of maternal and child health care related services provided under Bangladesh's Safe Motherhood Program. In the light of displaced households' more limited access to radio/television and high rates of mobile phone ownership, social media and mobile phones text messages may be important channels for informing people in the displacement-prone areas about service availability and enhancing awareness of the negative consequences of pregnancy at earlier ages, larger numbers of children,

and the importance of using health facilities for MCHC services (Nguyen et al., 2012). In view of the socioeconomic disadvantages of the displaced, a special voucher scheme to cover costs of delivery at public facilities should be introduced under the Government's Maternity Allowance program for all pregnant mothers in the climate-affected areas as a way of increasing MCHC service utilization in these areas. Moreover, more gynaecologists should be posted at union-level health facilities, particularly in the climate-affected areas[10].

[10]**Contributions of authors:** Md. Rabiul Haque is the first-named author of this research paper. His contribution is 80% of the work. Nick Parr is the second-named author of this paper and his contribution is 15% of the work. Salut Muhidin is the third-named author of this paper and his contribution is 5% of the work. Details of each author's contributions are described in 'statement of authorship' section.

Chapter 6: Conclusion

6.1 Introduction

This thesis examines the healthcare-seeking behaviours of climate-induced internally displaced people and non-displaced people in the mainland regions of Bangladesh, a context for which there is a lack of information. This chapter summarizes the thesis findings and its contributions to the knowledge, policy implications, and future research directions. A brief summary of the main findings of this thesis, highlighting the knowledge gaps which this study aims to fill, is presented in Section 6.2. The contribution of this thesis to the knowledge is presented in Section 6.3. Policy implications and recommendations are provided in Section 6.4. Section 6.5 points out the limitations of this thesis and makes recommendations for future directions of research in the context climate change, displacement and health in Bangladesh. Reflections on this thesis are provided in Section 6.6, the final section of this thesis

6.2 Summary of the main findings

This thesis presents an extensive view of the displacement-related disadvantages of the climate-induced internally displaced people in the north-western mainland regions of Bangladesh and the adverse effects of displacement on their healthcare-seeking behaviours and healthcare service utilization. The comparative discussion highlights the disparity between the displaced and the non-displaced, between suddenly displaced and gradually displaced, and by the frequency of past displacement. This thesis provides new evidence about the direct and long-lasting health effects of displacement disadvantages. All the findings of this section are derived from the previous chapters.

Chapter 2 of this thesis presents an extensive comparison relating to demographic profiles, socioeconomic position, and accessibility of health and wellbeing facilities to identify the extent of disadvantages by displacement status, displacement nature[11] and the frequency of past displacement. Previous literature in relation to climate change, displacement and health for

[11] Chapter 2 describes details about the nature of displacement.

Bangladesh, suggests that there is limited empirical research which focuses on both the displaced and the non-displaced to measure the extent of displacement-related disadvantages.

The results of Chapter 2 demonstrate that most of the households in the mainland riverine areas of north-western Bangladesh had experienced recurrent displacement. However, this thesis, for the first time, points out that floods and riverbank erosion cause forced displacement both suddenly and gradually in these areas. The displacement effects cause socioeconomic and health related multiple disadvantages, both for the suddenly displaced and for the gradually displaced and both for those who displaced once and who displaced multiple times.

Comparative analysis between the displaced and the non-displaced indicates that the displaced have significantly less access to land, income earning opportunities, sanitary toilets, and other support services including education, electricity and electronic media. Striking differences are particularly observed in agricultural and homestead land ownership, and access to electricity and mass media. The findings also reveal that the displaced earn less and have incurred an extra burden of relocation costs, which often exceeds their annual income and extends their impoverishments even after ending the post-displacement relocation process.

The comparisons between the displaced and the non-displaced in this thesis, for the first time, demonstrate that the displaced experience health-related disadvantages in terms of the unavailability, inaccessibility and inequitable use of healthcare services. Chapter 2 reports greater incidences of illness and greater costs of accessing and using healthcare for the displaced than for the non-displaced. Significant and wide-ranging differences by displacement status were found in terms of the availability of trained healthcare providers including medical doctors. Only around one-fifth of the displaced, compared to four-fifths of the non-displaced, reported that medical doctor is available within a 5km radius of their households. Moreover, on average the displaced households spent less than non-displaced households on food and healthcare, despite their larger household sizes. An unequal use of quality providers and a greater use of substandard care for illnesses are associated with displacement disadvantages, as shown in Chapter 2.

This thesis provides new evidence that the displacement disadvantages of the displaced are intensified by sudden displacement, as shown in Chapter 2. The differences in the experiences of the displaced by displacement attributes are not considered in previous studies, as shown in Chapter 2. The results reported in Chapter 2 show that recurrent displacement is more common among those who were suddenly displaced than the gradually displaced. The suddenly displaced are shown to have less education and less access to quality health providers. Moreover, after displacement they experienced an extended period of homelessness, higher resettlement costs for movement between villages, higher costs for healthcare and occupational disadvantages.

The findings in Chapter 2 distinctively reported that the disadvantages of the displaced are intensified by an increased number of past displacements. Except for the resettlement costs, the socioeconomic and health-related disadvantages patterns of the recurrently displaced households are broadly similar with the patterns of those who had experienced sudden displacement. For example, the incidence of illness and the times and costs of accessing and using healthcare services of the displaced households increase as the number of past displacements increases.

Chapters 3, 4 and 5 of this thesis focus on exploring the effects of displacement on healthcare-seeking behaviours and the utilization of health services for care. The literature review of this thesis (see Sections 1.3.3-1.3.4 in Chapter 1 and Chapters 3-5) reveals a complete absence of research which identifies the displacement effects on healthcare service utilization. Previous studies relating to parent's healthcare practices for children's treatment found that none of the studies has considered the displacement effects on such practices and none has compared healthcare behaviours between the displaced and the non-displaced, as outlined in Chapter 3. Similarly, the displacement effects and the comparisons between displaced and non-displaced groups are not considered in the existing studies in regard to the utilization of health facilities for pregnancy (Chapter 4), delivery, and postnatal care services for neonates (Chapter 5). Thus, the distinctive findings of this thesis, as presented in Chapters 3, 4 and 5, are important to the understanding of the relationship between climate change, displacement, and health.

The displacement effects on healthcare behaviours and healthcare service utilization, as shown in this thesis, can broadly be classified into direct effects and indirect/mediating effects. The direct displacement effects which are identified for the first time in this thesis are as follows:

i. The findings of Chapter 3 reveal that, despite having a greater incidence of illness, the children of the displaced parents are significantly less likely to be treated from outside the home than children of the non-displaced parents. Moreover, in the cases of outside the home care, the displaced parents' children mostly received substandard care from an untrained provider. The persistent differences, which are identified in this thesis, in children's care by parental displacement experience are of concern for future health outcomes of the large and growing number children in the displacement-prone areas.

ii. The results of Chapter 4 reveal that mother's utilization of ANC services is adversely affected by their household's displacement status, and substantially deepened by the frequency of past displacement. Mothers from ≥3 times displaced households are less likely to receive any ANC services compared to mothers from 1-2 times displaced and non-displaced households. In particular, mothers from displaced households are incurred greater displacement-adversity in terms of using the WHO-recommended at least four ANC services from a trained provider than mothers from non-displaced households. The results of Chapter 3 further reveal a significant inverse relationship between the increased times of past displacement and the utilization of ≥4 trained provider-guided ANC services.

iii. The findings of Chapter 5 demonstrate that displacement is not only detrimental for ANC service utilization but also for delivery at HC and for utilization of PNC services for neonates. Only few of the mothers from displaced households had delivered their last child at a HC, less than a quarter the number of mothers from non-displaced households. According to the results, the adversity of displacement increases as displacement experience increases. The lowest rate of HC-based delivery is found among ≥3 displaced mothers.

iv. Displacement effects on PNC service utilization, particularly from a trained provider, are also shown in Chapter 5, which broadly demonstrates a similar pattern to the results related to HC-based delivery. Mothers from the displaced households, particularly ≥3 times displaced households, are significantly less likely to use trained provider-guided PNC services than mothers from the non-displaced households. The results also suggest that the ≥3 times displaced mothers have experienced the greatest level of displacement adversity relating to PNC service utilization for neonates.

Displacement may also affect healthcare-seeking behaviours of the displaced by affecting the values of other variables, as found in this thesis. Examples of such findings are as below:

i. Household's higher income has a positive effect on healthcare-seeking behaviours and healthcare service utilization. The distinctly lower income of the displaced households, which are linked with their displacement-related multiple disadvantages as shown in Chapter 2, has reduced healthcare options for displaced parents and adversely affected their healthcare-seeking behaviours, particularly from a trained-provider for children's illness, as outlined in Chapter 3. Such pattern of income of the displaced households has also substantially reduced the likelihoods of HC-based delivery for mothers of those households, as revealed in Chapter-5. Thus, displacement effects create inequality in access to and utilization of standard care for child's illnesses and of using health facilities for delivery care.

ii. Unavailability of quality healthcare services and higher opportunity costs to reach those services have a negative influence on using such healthcare services. The lesser availability of quality providers (trained providers and medical doctors) in the displacement-prone areas (Chapter 2), therefore, contributes to the displaced parents' lower use of care from such provider for children's treatment, as shown in Chapter 3. The indirect costs associated with transport-related barriers and the opportunity costs of accessing to the quality providers, that most of the displaced incurred, also contribute to

their use of substandard care for child's illnesses (as opposed to care from a trained-provider). The results of Chapter 5 show that the greater tendency to have home-based delivery of displaced household's mothers and their lower PNC service utilization, particularly from a trained provider, is associated with the greater unavailability of quality providers and the greater opportunity costs in the areas they live in.

iii. The findings of Chapter 4 uniquely identify that mothers of the displaced households have higher fertility than mothers of the non-displaced households, and this phenomenon can explain some of their reduced likelihoods of using ANC services. In line with Chapter 4, Chapter 5 outlines that higher fertility of displaced mothers significantly reduced their HC-based delivery rate and their utilization of PNC services for neonates.

iv. Chapter 5 shows that households' greater access to radio/television media has a positive influence on mothers' delivery at HC. However, Chapter 2 reported that the displaced households have remarkably lower access to radio/television, as well as lower income and lower access to electricity, which are both important for purchasing and running such media. Chapter 5 further shows that lower access to radio/television increases the differences in PNC service utilization between the displaced and the non-displaced.

v. The results of Chapter 5 further reveal that utilization of trained-provider guided ANC services at pregnancy has a positive effect on HC-based delivery and PNC service utilization. The positive effects of HC-based delivery on PNC service utilization are also found in Chapter 5. However, household's displacement has a negative effect on mother's utilization of trained provider-guided ANC services, as shown in Chapter 4. Thus, use of quality health services for ANC, delivery and PNC services are strongly correlated with displacement and the adversity of displacement is long lasting and does not end at a single point.

6.3 Contribution to knowledge

This thesis explores displacement disadvantages extensively and evaluates the healthcare-seeking behaviours of the climate-induced internally displaced people compared to the non-displaced people of Bangladesh. The most important contributions to knowledge of the thesis are:

i. This thesis is based on statistically representative, large-scale, cross-sectional survey data, and it identifies a range of disadvantages of the climate-induced internally displaced population and their unequal access to and utilization of healthcare services as compared with the non-displaced population. Moreover, this evidence-based empirical research provides new evidence related to the direct and mediated adverse effects of displacement-related disadvantages on healthcare-seeking behaviours and utilization of healthcare services, increasing the understanding of the relationships between climate change, displacement, and health.

ii. In particular, Chapter 2 of this thesis identifies the extensive disadvantages of the displaced people compared with the non-displaced people. Previous studies have invariably tried to infer the effects of climate change based solely on the experience of those who live in the disaster-prone areas as outlined in Chapter 1 (Section 1.3.4) and in Chapter 2. Chapter 2 contributes to the filling of knowledge gaps by identifying the displacement nature (suddenly and gradually) and the frequency of past displacement, and by illustrating some of the adverse effects of sudden and recurrent displacement.

iii. The findings of Chapter 2 also contribute to filling a knowledge gap on post-displacement socioeconomic and health-related disadvantages, including their large number of past displacements, long periods of homelessness, low levels of education, high costs for resettlement and healthcare, high incidence of illnesses, the unavailability of quality healthcare providers, including medical doctors, and the unaffordability and inaccessibility of using such providers for treatment. Previous studies have focused

invariably on the socioeconomic disadvantages of the displaced people without making substantial comparison with the non-displaced people. The findings of Chapter 2 provide new evidence about health-related vulnerabilities as well socioeconomic disadvantages of the displaced and draw comparisons to the non-displaced. This chapter also contributes to existing knowledge by identifying greater socioeconomic and health-related disadvantages among suddenly and recurrently displaced households in particular. Such displacement-related disadvantages have not been covered in the previous literature.

iv. Chapter 3 of this thesis fills the gaps in knowledge by revealing higher incidences of illness for children of the displaced parents and their lower use of healthcare services for children's illnesses. Specifically, the findings of this chapter demonstrate new evidence of unequal utilization of healthcare services, particularly from a trained provider, for children's illnesses by parental displacement status in the mainland disaster-prone areas of Bangladesh. As outlined in Chapters 1 (literature review Section 1.3.3.2) and 3, previous child healthcare-related studies for Bangladesh are mostly disease-specific and have not specifically considered the disaster-prone regions or the effects of displacement on parents' healthcare practices for their children's illnesses.

v. The findings of Chapters 4 and 5 contribute to knowledge by demonstrating the adverse effects of household displacement on healthcare service utilization for mothers and neonates care. Specifically, this thesis provides new evidence of unequal receipt of ANC services by displacement status (Chapter 4), and delivery at HC and use of PNC services for neonates by displacement status (Chapter 5). None of the existing maternal and child health-related studies for Bangladesh reviewed in Section 1.3.3.2 of Chapter 1 has paid attention to the patterns for climate-related displaced mothers. This research also distinctively identifies the adverse effects of recurrent displacement on ANC, HC-based delivery, and PNC service utilization.

vi. The findings reported in Chapters 3, 4 and 5 also contribute to the understanding of healthcare effects of climate-induced displacement by illustrating the connections between specific displacement-induced disadvantages (e.g., lower income, long distance and time consuming travel to reach quality healthcare providers, greater opportunity costs for losing working day and food due to long and distant traveling, lower use of health facilities for previous children, and lack of access to electricity and radio/television media) and the utilization of health facilities for children's care and for mothers' ANC, delivery and PNC. Specifically, the lower income of the displaced, which has a negative influence on perceived health needs, substantially reduced their utilization of health facilities for children's care (Chapter 3) and mothers' delivery care (Chapter 5). Moreover, higher parity of displaced mothers and lower access to media have reduced their utilization of health facilities for ANC service (Chapter 4) and HC-based delivery care (Chapter 5). Chapters 4 and 5 also contribute to knowledge by explaining the interlinkages between climate-induced displacement, ANC, delivery and PNC service utilization. No previous studies on climate-induced displacement and healthcare service utilization on children's care and ANC, delivery and PNC care for neonates in Bangladesh has demonstrates such effects of displacement-related disadvantages (literature reviewed in Section 1.3.3 of Chapter 1).

vii. The results demonstrate a range of reasons for the greater dependency of the displaced parents on using substandard care for illnesses of their children (Chapter 3), inadequate pregnancy care of the displaced mothers (Chapter 4), and greater tendency of the displaced mothers to deliver birth at home and not to use post-natal care for their neonates (Chapter 5). The major types of reasons of these patterns are related to the unaffordability of using quality care, the unavailability of such care providers and the inaccessibility to reach such facilities. Information about the scarcity of trained providers for people in displacement-prone areas and their difficulties in accessing to reach such providers was

unexplored before this research. Moreover, none of the previous studies discussed in Sections 1.3.3 and 1.3.4 of Chapter 1 and in Chapters 3, 4 and 5 have explained the effects of displacement disadvantages on healthcare-seeking behaviours for care of mothers and children.

viii. Overall, the findings of this thesis demonstrate that despite living in the same region of the same country and sharing sociocultural similarity, the displaced people are more disadvantaged than non-displaced people in socioeconomic and health-related terms, and the people who experienced sudden and recurrent displacement are the most disadvantaged of all. The unique findings of this thesis, which are not covered in previous studies are the differences in socioeconomic and health-related disadvantages of the displaced people by nature of displacement (i.e., sudden/gradual) and frequency of past displacement. The quantifications of the direct and mediating effects of displacement disadvantages on parent's healthcare-seeking behaviours during child's illnesses and on utilization of health facilities during pregnancy, delivery and postnatal care services also demonstrate new evidence for indicators in climate change, displacement and health for which there was previously a lack of empirical evidence, both for Bangladesh and globally.

6.4 Policy implications

This thesis generates a range of recommendations for policy to reduce displacement-related disadvantages and improve access to and utilization of health facilities for climate-induced displaced people, particularly those who live in the north-western mainland riverine regions of Bangladesh.

In view of the findings of this thesis, there is a need for collaboration between the ministries, including the Ministry of Disaster Management and Relief (MoDMR), Ministry of Health and Family Welfare (MoHFW) and Ministry of Women and Child Affairs (MoWCA), to address the multiple disadvantages of the climate-induced displaced people. The findings of

Chapter 2 relating to the socioeconomic disadvantages of the displaced households indicate a need to generate alternative employment opportunities in the displacement-prone areas and to introduce a post-displacement climate-resilient fund for reducing their displacement-related impoverishment and to break the vicious circle of poverty. This study demonstrates post-displacement impoverishment for most of the displaced and its connection with displacement attributes. The cumulative effects of such displacement may, in the long run, contribute to the growth of urban population, if measures are not taken to minimize the displacement disadvantages (Ahsan et al., 2016; Martin et al., 2013; Walter, 2015).

In view of the recurrent displacement of the displaced households, and their greater post-displacement disadvantages in access to and use of health facilities, there is a need to relocate health facilities (particularly the Community Clinics) near to the areas in which the displaced have resettled, and to increase the number of such facilities in the displacement-prone areas. Collaboration between local government officials (particularly local health officials) and the locally elected bodies is recommended in the selection of sites for relocated health facilities, as the local elected bodies might have better understanding of the number of displaced households and their resettlement areas. A lack of trained providers, especially medical doctors, and its negative effects on utilization of such care providers for the displaced parents' healthcare-practices for their children's illnesses, as shown in Chapter 3, demonstrate a clear need for increasing the number of trained providers and medical doctors in the local union level health facilities in the displacement-prone areas.

In view of the socioeconomic disadvantages of the displaced households and their long-lasting detrimental effects on receiving standard care for their children's illnesses and in utilization of health facilities for mothers' ANC, delivery and PNC services (shown in Chapter 3 and 4), the Bangladesh Government's MA[12] program should cover all pregnant mothers in the displacement-prone areas. Under the MA program, a special voucher program should be

[12] Chapter 4 illustrates the benefits of Bangladesh Government's Maternal Allowance (MA) program

introduced to cover ANC, delivery and PNC service associated costs at public facilities for the displaced households' mothers.

In light of the negative effects of higher fertility, early age motherhood and transport barriers to women's movement, which often encountered by the displaced in reaching and using health facilities for standard care especially for ANC services and HC-based delivery (shown in Chapter 4 and 5), the reintroduction of the home-delivery of basic healthcare and family planning services under the Government's Family Planning programs is recommended as a measure to manage family sizes and to increase the rate of ANC service utilization as well as the rate of HC-based delivery. Counselling mothers about the benefits of delivery at HC and the risks of home-delivery in absence of trained care providers during home visits of the local health providers is recommended for increasing the HC-based delivery rates.

The greater tendency to have home delivery among the displaced mothers, and its connection with their greater inaccessibility and greater opportunity costs of reaching generally more distant health facilities suggest a need to introduce the provision of basic and emergency obstetric care services at local health facilities in the displacement-prone areas and increasing the number trained (skilled) birth attendants in these areas to attend home-delivery. In view of the insignificant effects of medical doctor's availability within 5km radius on using health facilities for ANC, delivery and PNC services (Chapter 5), more gynaecologists, nurses, midwives and trained health personnel who have expertise on maternal healthcare services, should be posted at union level health facilities, particularly in the displacement-prone areas. In view of the limited number of gynaecologists, particularly in rural Bangladesh, increasing the availability of nurses, midwives and trained health personnel would be a cost-effective measure for providing ANC and PNC services, particularly for pregnant women with no complications.

The findings of this study confirm the limited access to radio/television and electricity, a predominant source of power for television in Bangladesh of the displaced (see Chapter 2), and its significant positive influence in increasing the HC-based delivery rate (see Chapter 5). These

findings indicate a potential value of extending the coverage of the rural electrification program in the displacement-prone areas. Greater access to electricity and to electronic media among the displaced should help improve their understanding about the options of maternal healthcare services (ANC, delivery and PNC services) and the benefits of using standard health services for mothers' and neonates' care (see Chapter 5).

In view of high rates of mobile phone ownership (and a greater lack of access to radio/television) in the displacement-prone areas, as shown in Chapter 2, use of mobile phone text messages to inform the availability of public health services and create awareness of the negative consequences of pregnancy at earlier ages both for mothers and children is recommended. Mobile messages highlighting the benefits of using standard health facilities for ANC, delivery and PNC services, and the risks of home-delivery may be helpful to achieve the national targets of maternal and child health related indicators. Broadcasting advanced warnings relating to the magnitude of precipitation, flooding and the trajectories of water channels using mobile phone could reduce the risk and consequences of sudden and recurrent displacement in the riverine areas.

Recognizing the benefits of making health-related decisions jointly by the father and mother, as shown in Chapters 3 and 4, is important to involve fathers in the health promotion programs and campaigns for enhancing their understanding of Primary Health Care provision and Safe Motherhood program. Information about the healthcare programs would enhance fathers' knowledge and awareness of the importance of using quality services for care of children, mothers and newborn babies. Such awareness and concern of fathers will allow mothers to be more involved in healthcare-related decision-making process which in turn would contribute to the increased use of standard health services.

6.5 Limitations and future directions

This thesis compares the disadvantages of displaced people with non-displaced people, and identifies the effects of displacement-related disadvantages on their utilization of health services in regard to maternal and child healthcare.

However, this study has some potential limitations that should be noted. Firstly, inferences from this thesis findings to weather effects should be interpreted with caution. This thesis collected cross-sectional survey data (in absence of post-displacement official tracking record) in the winter season, due to considerations relating to the availability of the potential participants in the displacement-prone areas and the feasibility of accessing interviewees in these areas. Moreover, the prospective respondents in the displacement-prone areas may be less interested in participating in the survey in wetter season when floods, riverbank erosion and displacement mostly occur, in view of their involvement in protecting or relocating household's possessions from the actual or potential threats associated with displacement process. Secondly, the findings of this thesis are likely to be generalizable to elsewhere in the mainland riverine areas of Bangladesh, since this study collected data from the north-western mainland regions in which floods, changing river channels and riverbank erosion often cause permanent displacement. However, generalizing of this thesis findings to other regions of Bangladesh with different disaster-related attributes, particularly to coastal regions would require caution. The coastal regions of Bangladesh are prone to experiencing sudden-onset weather events, such as cyclones, storm surges and flash floods, which often create temporary displacement. In light of this, replication of this research is needed in the coastal regions. Thirdly, this study did not capture the views and experiences of local healthcare providers. The initial aim of this thesis was to provide extensive perspectives from the demand side rather than from the perspectives of the supply side. Thus, future research could incorporate the views and experiences of local healthcare providers to offer another dimension to the explanation of the health-related disadvantages of the displaced and its causes. Fourthly, this study did not include questions on the availability of

private health facilities (clinics/hospitals) in the local areas. However, the responses relating to the availability of different types of care providers and the accessibility to those providers from a larger of number of participants were used in this thesis as an alternative to explain health-related disadvantages of the displaced compared to the non-displaced. Finally, recall bias issues relating to displacement history, illness episodes, and the selection of care providers are expected to be minor in this study, as the graduate enumerators were trained to cross-check the responses by probing other linking questions. Yet, recall bias could potentially affect the responses about retrospective changes in travel time and costs. Some other precautionary measures have also been taken during data entry, analysis and interpretations as outlined in the previous chapters. Despite these measures, some potential misclassification of responses may have also occurred, if some respondents provided socially desirable responses (use of trained provider) about provider selection for care.

All the findings of this study have been derived based on the statistically representative large sample size, estimated using a random sampling formula with an obtained power to address its aims and research questions. However, future research using qualitative data could explore the strategies to overcome the displacement disadvantage, such as loss of land and household's possessions, costs associated with displacement process, coping strategies with displacement difficulties (cooking, sanitation and freshwater scarcity) encountered during and after displacement. Moreover, the displacement experiences of the elderly people and their health consequences, which have not been addressed previously, are important areas for future research.

6.6 Evaluation and reflections

The quantitative approach that I used in this research was useful to assess the experiences of the displaced, to compare their experiences to the non-displaced, and to evaluate the effects of displacement on healthcare-seeking behaviours for maternal care and childcare. This approach has generated striking facts and figures about displacement experiences and their effects on healthcare service utilization in the north-western mainland regions of Bangladesh. The

quantitative approach, which is a widely used approach to generate reliable and objective data, has assisted me in addressing the pre-designed 'what' type of research questions of this thesis and to examine the causal relationships between a wide range of variables.

The survey questionnaire was developed by reviewing a range of literature in line with the broader and specific research questions of this thesis. Based on my previous empirical research experience, I have incorporated some linking questions in the data collection instruments to cross-check the response of one question with another, and to monitor the quality of data. The process of developing the survey questionnaire from the beginning of my PhD program was helpful to address the research questions, incorporate the pre-test feedback, and validate the responses. Thus, I would highly recommend any doctoral students to take a similar approach for their PhD programs by taking notes about possible questions from the beginning of the program and adding some linking questions. I would also recommend preparing a data analysis plan, including identification of the predictor and outcome variables before finalizing the survey questionnaire. I have found this approach fruitful for completing this study smoothly.

I found the one-week training program for graduate interviewers was enough to prepare them for the fieldwork. This program was helpful to explain the survey questions and the ways to cross-check responses with linking questions to the interviewers, to clarify the research objectives and ethical issues of the survey, and to conduct mock interview sessions. I spent around six months in the research areas to select appropriate districts and random samples for my study, and to monitor the work of the enumerators, such as listing eligible households and collecting data. During the fieldwork, the completed questionnaires of one enumerator were cross checked by one randomly assigned enumerator and by me at the end of each day, and enumerators shared day-to-day work experiences with each other. This process helped me to know the details of the fieldwork, to enrich the quality of survey data, and to complete the survey of 1,200 households smoothly in the challenging rural and geographically remote areas of Bangladesh.

Two major concerns relating to my fieldwork included the identification of the villages in which the displaced households resettled and the preparation of the list of eligible households for the selected villages. Some of the villages, which were in the list of the census, were found to have completely disappeared due to floods/changes in river channels/riverbank erosion from their original place (information from local elected personals and elderly people), and the number of households differed from the census lists, as many of the households had been resettled in different villages. Another problem that I encountered was a lack of rent-based accommodation arrangements in the displacement-prone areas, long-distance walking and infrequently-available boat-based travel to reach the randomly selected displaced households. However, it may be noted that the communication system is better during the winter season than the wetter season. The sampling strategy (both purposive and random) and the assistance from local government officials and local elected bodies obtained through communication prior to the fieldwork period have helped me to overcome these barriers.

In view of the findings of this thesis, I must say that multiple outcomes have surprised me. Firstly, the striking scarcity of medical doctors within a 5km radius for the displaced households, 67 percentage points lower as reported in Chapter 2 compared to the non-displaced. Secondly; the extent to which utilization of quality care providers for their child's illnesses was lower among the displaced parents (as opposed to non-displaced parents), as shown in Chapter 3. Finally; the alarmingly lower (almost 44 percentage points) utilization of health facilities by displaced mothers for delivering their last birth, as reported in Chapter 5. Out of the three, the last outcome is the most surprising to me considering the magnitude of displacement effects and its subsequent consequences for maternal and child health-related morbidity and mortality.

If someone asked me whether, in hindsight, I would have involved any other informants in this study, my answer would be affirmative. I would certainly involve local healthcare providers, both trained and untrained, as key informants with a short questionnaire. By doing so it would have been beneficial for mapping out the availability of health facilities (both private and public),

for understanding the effects of floods and riverbank erosion on their availability for basic and emergency obstetric service provisions for maternal and child healthcare.

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Pages 165-166 removed from Open Access version as they may contain sensitive/confidential content.

Survey Questionnaire

(Use pencil to write or circle the appropriate answer)				
HOUSEHOLD ID				
Location	Division:---------- District:----------			
	Upazila: ---------- Union:----------			
	Post:---------- Village:----------			
Location	Rural=	**1**	Urban=	**2**
Name of informant	----------			
Name of the Interviewer	----------			
Interwiew date	----------/----------/20----------		Signature: ----------	
Name of household head	----------			
Sex of household head	Male=	**1**	Female=	**2**

Section A: Socioeconomic and family information

1. For family information, complete the table with using necessary codes

	Age in years	Sex	Interviewee's relation with HH members (Code)	Schooling (year/s)	Literacy (Code)	Marital status (Code)	Religion (Code)	Involved in Household earnings	Occupation (Code)	
									Primary	Secondary
1.1			Informant---							
1.2										
1.3										
1.4										
1.5										
1.6										
1.7										

CODE FOR HOUSEHOLD INFORMATION

Code for sex: 1= Male and 2 Female

Earning code: 1=Yes and 2=No

Relationship Code:
1. Informant
2. Wife
3. Husband
4. Daughter
5. Son
6. Father
7. Mother
8. Brother
9. Sister
10. Brother of husband
11. Sister of husband
12. Son-in-law
13. Daughter-in-law
14. Brother of wife
15. Sister of wife
16. Father-in-law
17. Mother-in-law
18. Elder brother (husband)
19. Wife of elder brother (‘’)
20. Nephew
21. Niece
22. Grandson
23. Grand-daughter
24. Grand-father
25. Grandmother
26. Others (Please specify--------)

Literacy code:
1. Can read only
2. Can read and write
3. Can't read nor write

Marital status code:
1. Married
2. Never married
3. Widowed
4. Divorced
5. Separated

Religion code:
1. Muslim
2. Hindu
3. Christian
4. Buddhist
5. Other (please specify---------)

Occupation code:
1. Agricultural work on own land
2. Agriculture labour
3. Non-agricultural/industrial labour
4. Fisherman
5. Rickshaw/Van puller
6. Auto rickshaw/CNG/Taxi Driver
7. Petty/small business
8. Government Job
9. Non-governmental job
10. Homemaker
11. Work as a maid servant
12. Student
13. Unemployed
14. Other income generating works
15. No work/unable/disable
16. Foreign wage earner
17. Child (Under 15 years)
18. Retired govt. employee
19. Retired non-govt. employee
20. Other (please specify---------)

2.	What is the average monthly income of your household (based on the last 3 months' earnings in Bangladeshi taka)? **Income code** 1= ≤3000 | 2= 3001-50004 | 3=5001-8000 | 4= 8001-10000 5=10001-15000 | 6=15001-20000 | 7=20001-25000 | 8=25001-30000 9=30001-35000 | 10=35001-40000 | 11=40001-45000 | 12=≥45001	
3.	What is the average monthly expenditure for food of your household (based on the last 3 months' earnings in Bangladeshi taka)? **Expenditure code** 1= ≤2000 | 2= 2501-4000 | 3=4001-6000 | 4= 6001-8000 5=8001-10000 | 6=10001-12000 | 7=12001-15000 | 8=15001-20000 9=20001-25000 | 10=25001-35000 | 11=35001-40000 | 12=≥40001	
4.	If the expenditure is higher than income, then how do you cope with that differentiation? 1. Selling household's properties (cattle/boat/ornaments/land) 2. Loan from bank/NGOs 3. Loan from relatives/friends 4. Government allowances 5. Financial support for local elites 6. Others (please specify) ---------	
5.	How much does your household spend on health per month (based on last 3 months)?	
6.	Has your household faced any scarcity of food for any household members (based on the last 3 months) **Code:** 1=Yes and 2=No	
7.	How many rooms in your home are available for sleeping?	

Section B: Displacement and vulnerability

1.	For how long, have you been living in this locality? (to the nearest year/s)	
2.	Are you living here by birth or by marriage? **Code:** 1=By birth, 2=By marriage and 3= None of these	
3.	If the **answer is No to Q-2**, then have you ever been experienced displacement from your usual residence (place of birth) due to natural disasters? **Code:** 1=Yes and 2=No (if the answer 'No' then ask →Q26)	
4.	If **experienced displacement**, then how many times have you been displaced due to natural disasters?	
5.	If **displaced more than once,** then how many months ago were you last displaced?	
6.	If **experienced displacement more than once**, then for each displacement were you displaced alone or with family members? **Start with latest incidence as 1st (1st time refers to last time displacement)** **Code:** 1=Alone; and 2=With family	1st time:---- 2nd time:---- 3rd time:---- 4th time:---- 5th time:---- 6th time:----
7.	**If experienced displacement more than once within the last 10 years,** then complete the matrix about recent 6 movements (from which area were you displaced).	

Displacement times	Displacement Year	Movement		Distance in km (previous & current residence)	Duration in each place (months)	Displaced with whom					
		From	To								
Last time											
2nd time											
3rd time											
4th time											
5th time											
6th time											

	Locality code 1. Different area/s within the locality 2. Village 3. Local Union 4. Local Upazila 5. Local District 6. Local Division 7. Other District 8. Other Division 9. Capital city	**Family members code:** 1. Alone 2. Wife 3. Husband 4. Daughter/Son 5. Father/Mother 6. Brother/sister 7. Son-in-law 8. Daughter-in-law 9. Husband's brother/Sister(in-law) 10. Wife's brother/sister (in-law 11. Nephew/Niece 12. Grandson/Granddaughter 13. Grandfather/Grandmother 14. Father/Mother-in-law 15. Others (Please specify)

8.	If **experienced displacement**, then how much money you have spent for the last time displacement?	
9.	If **experienced displacement**, then for each displacement were you displaced suddenly, gradually or in a planned way? **Start with latest incidence as 1st (1st time refers to last time displacement)** **Code:** 1=Suddenly; 2=Gradually; and 3=Planned	1st time:---- 2nd time:----- 3rd time:----- 4th time:----- 5th time:----- 6th time:-----
10.	If the **answer is (code-1 suddenly) to Q-9,** then have you ever been homeless due to any natural disaster? **Code:** 1=Yes and 2=No (if the answer 'No' then ask →Q13)	
11.	If **answer is yes to Q-10,** then how many times have you been homeless due to natural disasters over the last 10 years?	

12. If the **answer is yes to Q-10,** then complete the following matrix on homelessness of the displaced people for the last 3 events.

Homeless	Homeless Year	Disaster (Code)	Homeless		Frequency			Homeless (duration)		
			Alone	With Family	1st	2nd	3rd	1st	2nd	3rd
Before disaster										
During disaster										
After disaster										

Disaster code: 1= River erosion; 2=Flood; 3=Coastal erosion; 4=Cyclone or storm surges; 5=Water logging; 6=Salinity and 7=Other (please specify)

Homeless status code: 1=Alone; and 2=With family

Frequency code: 1= 1st time; 2= 2nd time and 3= 3rd time **Note: Homeless Duration in week/s**

13.	Have you ever been experienced homelessness after you settled in the current locality? **Code:** 1=Yes, due to natural disaster, 2=Yes, due to evacuation, 3=No	
14.	If the **answer to Q-9 is code 2/3** (gradual/planned movement), then who made decision to change the residence for each time? **Start with latest incidence as 1st (1st time refers to last time displacement)** **Decision code:** Household head alone; 2=Household joint decision; 3=Others (please specify) ---.	1st time:---- 2nd time:---- 3rd time:---- 4th time:---- 5th time:---- 6th time:----
15.	If **experienced displacement**, then which type of disaster displaced you? **Start with latest incidence as 1st (1st time refers to last time displacement)** **Code:** 1= River erosion; 2=Flood; 3=Coastal erosion; 4=Cyclone or storm surges; 5=Water logging; 6=Salinity and 7=Other (please specify)	1st time:---- 2nd time:---- 3rd time:---- 4th time:---- 5th time:---- 6th time:----

16. If **experienced displacement**, then why were you displaced from your previous place (if displaced once then completed only 1st time)? **Start with latest incidence as 1st (1st time refers to last time displacement)**

Displacement event	Reasons of displaced by order												
1st time													
2nd time													
3rd time													
4th time													
5th time													
6th time													

Reasons to displace

1. To avoid inundation
9. Have no fixed property there

	2. To avoid erosion 3. To avoid waterlogging 4. To avoid salinity 5. To avoid cyclones/storms 6. Scarcity of job /works 7. Loss of homesteads 8. For better lifestyle	10. Have nothing to lose any more there 11. Previous landowner won't extend time 12. Occupation change 13. Marriage 14. Moved again for better work 15. Lack of work opportunity in previous place 16. Other (please specify) ----------

17.	If **experienced displacement**, then what were the main reasons of choosing this current locality for living?	**Follow reasons chronologically**

Reasons' to choose locality	
1. Easy to migrate/shift	11. Facilities for children's school
2. Govt. land, no need to pay	12. Women's work opportunity
3. Low price of land	13. Better water and sanitation facilities
4. Away from river erosion	14. Marriage
5. Enough space for cattle	15. Moved again for better work
6. Above from flood-water level	16. Had own land here
7. Relatives/friends reside here	17. Relatives provided land for home
8. No alternative place to reside	18. Depositional land returned
9. Near to the usual residence	19. Better work opportunity
10. Many people can reside as like a village	20. Other (please specify) ----------

18.	What is the type of your current tenancy? **Code:** 1=Rent free govt./non govt. shelter, 2=Rent free public places (embankment or high land), 3=Govt. free land but need pay bribe; 4=Relatives' house/land, 5=Rented house, 6=Own house in own land, 7= Own house in rented land, 8= Shelter in other's house; and 9=Others (please specify)----------	
19.	If the current residence is rented or on rented land, then how much rent do you pay for it per month?	
20.	How do you compare your current tenancy with your immediate previous tenancy? **Code:** 1= Current is much poorer, 2= Current is poorer, 3=Similar, 4= Current is better and 5= Current is much better	
21.	How do you compare your current tenancy with the tenancy you had before you experience any displacement? **Code:** 1= Current is much poorer, 2= Current is poorer, 3=Similar, 4= Current is better and 5= Current is much better	
22.	Did you get any support/s from anybody other than your family members to cope with disaster effects? **Code:** 1=Yes; 2=No	
23.	If **the answer is Yes to Q-22**, then complete the following matrix to note what type of supports and from where?	

Supports by time	**Type of support/s**						**Support/s provider/s**					
Before disaster												
During disaster												
During displacement												
During resettlement												
After displacement												
Currently												

Type of support/s code: 1=Yes, financial support, 2= Yes, physical support, 3= Yes, physical work support, 4=Yes, mental support, 5=Yes, food and water, 6= Medicine, 7=Employment support, 8=Social safety net, 9=Provided land for living, 10=Other supports (please specify) ----.

Support providers' code: 1= Relatives, 2=Neighbours, 3=Friends, 4=Local elites, 5=NGOs, 6=Government, 7= Other (please specify) ----.

24.	Do you have any plan to change your current location? **Code:** 1=Yes, 2=No, 3=No way to change, and 4=Don't know	
25.	Do you have any intention to go back to your origin (from where first time displaced) of residence? **Code:** 1=Yes, 2=No, 3=No way to change, and 4=Don't know	

Section C: Assets and Vulnerability Indicators

26. Ask about the following indicators to measure household assets and availability of selected services (complete the matrix for all households)

Code: 1= Yes, 2=No, 3=Don't know for Q26.1 to 26. 23 *Immediate previous place	**Non-displaced**		**Displaced**		
	Current	**10yrs back**	**Current**	**10yrs back**	**Previous place***
26.1 Have mobile phone at household					

	26.2 Have electricity at household					
	26.3 Have solar system at household					
	26.4 Listened to radio during last one week					
	26.5 Watched television during last one week					
	26.6 Membership of NGOs					
	26.7 Ownership of agricultural land					
	26.8 Ownership of homestead land					
	26.9 Household owns cattle					
	26.10 Household owns poultry					
	26.11 Ownership of fishing materials					
	26.12 Ownership of fishing boat					
	26.13 Access to safe drinking water					
	26.14 Access to sanitary toilet					
	26.15 Traditional care providers available within 1km					
	26.16 Trained allopathic care provider available within 1km					
	26.17 Drug store available within 1km					
	26.18 Non-trained allopathic care provider available within					
	26.19 Non-trained but experienced traditional birth attendants available within 1km					
	26.20 Trained birth attendants available within 1km					
	26.21 MBBS doctor available within 5km					
	26.22 Can communicate with trained allopathic care provider over phone					
	26.23 Can communicate with MBBS doctor over phone					
27.	Ask about the following indicators to measure household's social networks and access to health facilities (complete the matrix for all households)					
	CODE: 0=Decreased, 1=Same, 2=Increased, 3=Don't know for Q27.1 to 27.31 *Immediate previous place	**Non-displaced**		**Displaced**		
		Current	**10yrs back**	**Current**	**10yrs back**	**Previous place***
	27.1 Social networks with relatives					
	27.2 Social networks with friends					
	27.3 Time to reach to the nearest market					
	27.4 Time to reach to nearest traditional health provider					
	27.5 Time to reach to nearest non-trained allopathic providers					
	27.6 Time to reach to nearest trained allopathic care provider					
	27.7 Time to reach to nearest non-trained birth attendants					
	27.8 Time to reach to nearest trained birth attendants					
	27.9 Time to reach to the nearest MBBS doctor					
	27.10 Time to reach to nearest govt./private health centre					
	27.11 Time to reach to the nearest NGO's health centre					
	27.12 Transport cost to the nearest traditional care provider					
	27.13 Transport cost to the nearest non-trained allopathic care					
	27.14 Transport cost to nearest trained allopathic care providers					
	27.15 Transport cost to nearest non-trained birth attendants					
	27.16 Transport cost to nearest trained birth attendants					
	27.17 Transport cost to nearest MBBS doctor					
	27.18 Transport cost to nearest govt./private health centre					
	27.19 Transport cost to the nearest NGO's health centre					
	27.20 Household level use of traditional medicine					
	27.21 Household level use of self-medicated modern drug					
	27.22 Household level use of non-trained modern providers					
	27.23 Household level use of trained modern care providers					
	27.24 Household level use of MBBS doctor					
	27.25 Household level use of mobile phone prescribed drugs (non-trained modern care providers)					

	27.26 Household level use of mobile phone prescribed drugs (trained modern care providers)					
	27.27 Household level use of mobile phone prescribed drugs (MBBS doctors)					
	27.28 Household cost for medicine					
	27.29 Household incidence of common diseases					
	27.30 Household level use of non-trained birth attendants					
	27.31 Household level use of trained birth attendants					

Section D: Healthcare-seeking behaviour information for children

28. How would you rate your overall current family health status (based on last 3 months)?
Code: 1=Poor; 2=Fair; 3=Good; 4=Very good; 5=Excellent

29. Have any children ≤14 years of your family been ill in the past 3 months?
Code: 1=Yes and 2=No

30. If the answer is **Yes to Q-29**, then complete the following table to note the disease/s for each child in the past 3 months?

Diseases Strat with last disease	Disease code chronologically (up to 3 diseases)			Severity			Age (Years)	Sex	Sickness week prior to survey		
	1	2	3								
30.1 Children-1											
30.2 Children-2											
30.3 Children-3											
30.4 Children-4											
30.5 Children-5											

Disease Code: 1= Normal headache, flu, cold and fever, coughing, 2= Diarrhoea, 3= Dysentery, 4= Cholera, 5=Dengue, 6=Malaria, 7=Skin diseases, 8=ARI/Asthma, 9=Typhoid, 10=Jaundice, 11=Pneumonia, 12= Pox/Measles, 13=Diabetes, 14=Rheumatic, 15=Injury, 16=Arthritis/Joint pain, 17=Gastro-intestinal diseases, 18= Poor vision, 19=Cataract, 20=High blood pressure, 21=Stroke, 22=Tuberculosis, 23=Meningitis, 24= Others (please specify) ----------

Code: 1=Mild, 2=Moderate, 3=High, 4=Severe **Code:** 1=Male and 2=Female

31. If the answer is **Yes to Q-30.1 to 30.5 (for children aged ≤14),** then, what did you do to seek care for each illness?

Child No. from Q-30.1 to 30.5	Disease specific chronological action/s											
	Disease-1				Disease-2				Disease-3			
30.1 Children-1												
30.2 Children-2												
30.3 Children-3												
30.4 Children-4												
30.5 Children-5												

Action Code:
1. Wait for natural recovery without ever giving treatment
2. Start treatment outside home immediately after illness perceived
3. Start preventive treatment at home after illness perceived
4. Start treatment outside home after 3 days' latter
5. Waited for natural recovery for one week but later started treatment outside home
6. Others (please specify) ----------

32. If the answer is **Code-1 to any of the diseases of Q-31**, then what were the main reasons of not seeking health care for the illness? *Check Q30 for disease code)*

Child No. from Q-30.1 to 30.5	Disease specific chronological action/s											
	Disease-1				Disease-2				Disease-3			
30.1 Children-1												
30.2 Children-2												
30.3 Children-3												
30.4 Children-4												
30.5 Children-5												

Reasons Code:
1. Naturally recovered with self-curative measures
2. Illness was very mild and self-curative measure was enough

3. Wanted to treat but could not afford
4. Could not treat due to remoteness and lack of service providers
5. Others (please specify) ----------

33. If the answer is **Code 2-6 to any of the diseases of Q-31**, then complete the matrix to note health care episodes for the last illness of each child.

Diseases Code and child No. from Q-30.1 to 30.5		**Disease specific episodes by their order of actions**									
Child No	Disease code	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
30.1 Children-1											
30.2 Children-2											
30.3 Children-3											
30.4 Children-4											
30.5 Children-5											

Episode Codes:
1. Illness was very mild and self-curative measure was enough
2. Self-medication with herbal/other traditional medicine based on previous experience
3. Self-medication with modern drugs based on previous experience
4. Herbal/folk medicine based on others' advice who have similar experience
5. Consulted with traditional healers for folk medicine/homeopath/spiritual treatment
6. Used modern drugs based on advice from others who have similar experience
7. Consulted with drug sellers/village doctor for modern medicine
8. Consulted with FWA/FWV/MA/SACMO at home for modern medicine
9. Consulted with FWA/FWV/MA/Nurse at health centre for modern medicine
10. Consulted with MBBS doctor at pharmacy for modern medicine
11. Consulted with MBBS doctor at service centre for modern medicine
12. Consulted with MBBS doctor at private clinic for modern medicine
13. Consulted through mobile phone with drug sellers/village doctor for allopathic drugs
14. Consulted through mobile phone with FWA/FWV/MA/SACMO for allopathic drugs
15. Consulted through mobile phone with MBBS for allopathic drugs
16. Others (please specify) ----------

34. If the there is **any answer in Q-33**, then complete the matrix to note how much cost was involved with each episode against for the last illness of each child *(if the answer is code 1 for Q33 then cost=0)*

Child No.	**Costs involved for each episode**					
	1st Episode	2nd Episode	3rd Episode	4th Episode	5th Episode	Total cost
*30.1*Children-1						
*30.2*Children-2						
*30.3*Children-3						
*30.4*Children-4						
*30.5*Children-5						

35. If the there is **any answer in Q-33,** then complete the matrix to note what were the main reasons for using a particular type of providers/steps for seeking health care for the last illness of each child?

Child No.	**Up to four main reasons for each provider against each episode**																			
	1st Episode				2nd Episode				3rd Episode				4th Episode				5th Episode			
30.1																				
30.2																				
30.3																				
30.4																				
30.5																				

Reasons code: *(if the answer is code 1 for Q33 then check code 17-19)*

1. No side effects
2. Walking distance
3. Family tradition/custom
4. Familiarity with the provider
5. Convenient access and availability
6. No visiting fees, only medicine cost
7. Treatment cost is affordable
8. Flexible payment system
9. The illness was not severe
10. The illness was severe
11. Same sex of the providers
12. No opportunity costs (transport/food/working day loss) involved
13. Satisfied with previous experience
14. Experienced service provider
15. Previous treatment of another provider failed
16. Community people suggests
17. To see community people also uses same services
18. Providers came at home if necessary
19. General/common illness
20. Similar with previous experience
21. Others (please specify) ----------

36. If age of the ill child is **≥10 years (Q30.1 to Q 30.5)**, then was that child involved in any income generating activities before illness? **CODE:** 1=Yes and 2=No

Child 1----
Child 2----

Child:3----

37. Who decided to visit providers for medical care for each of the ill children aged ≤14 *for* the last illness of each child?

Child No.	Decided by whom			
	1st time	2nd time	3rd time	4th time
*30.1*Children-1				
*30.2*Children-2				
*30.3*Children-3				
*30.4*Children-4				
*30.5*Children-5				

Code: 1=Husband, 2=Wife, 3=Husband-wife Jointly, 4=Other family members, 5=Others (please specify) ---.

38. What was the choice of providers for seeking health care for last time illness of each child aged ≤14?

Child No.	Choice of provider			
	1st choice	2nd choice	3rd choice	4th choice
*30.1*Children-1				
*30.2*Children-2				
*30.3*Children-3				
*30.4*Children-4				
*30.5*Children-5				

Choice code: 1= Home remedies, 2=Village doctors/Drug sellers/self-medication, 3= Traditional healer and medicine, 4= FWA/FWV/MA/SACMO/Nurse, 5= MBBS doctor, 6= Didn't seek care, 7=Others (please specify) ---.

39 Which type of provider did you use for the last illness of each of your children aged ≤14 years?

Child No.	Provider actually used by order			
	1st time	2nd time	3rd time	4th time
*30.1*Children-1				
*30.2*Children-2				
*30.3*Children-3				
*30.4*Children-4				
*30.5*Children-5				

Provider code: 1= Home remedies, 2=Village doctors/Drug sellers/self-medication, 3= Traditional healer and medicine, 4= FWA/FWV/MA/SACMO/Nurse, 5= MBBS doctor, 6= Didn't seek care, 7=Others (please specify) ---.

Section E: Healthcare-seeking behaviour information for household member aged ≥15

40. Have any member of your family aged ≥15 years been ill in the past 3 months? _____
Code: 1=Yes and 2=No

41. If the answer is **Yes to Q-40**, then complete the following table to note the disease/s for each adult in the past 3 months *(use 99 for chronic illness)*

Diseases	Disease code chronologically (up to 3 diseases)			Severity			Age (Years)	Sex	Sickness week prior to survey		
	1	2	3								
*39.1*Adult-1											
39.2 Adult-2											
39.3 Adult-3											
39.4 Adult-4											
39.5 Adult-5											
39.6 Adult-6											
39.7 Adult-7											

Disease Code: 1= Normal headache, flu, cold and fever, coughing, 2= Diarrhoea, 3= Dysentery, 4= Cholera, 5=Dengue, 6=Malaria, 7=Skin diseases, 8=ARI/Asthma, 9=Typhoid, 10=Jaundice, 11=Pneumonia, 12= Pox/Measles, 13=Diabetes, 14=Rheumatic, 15=Injury, 16=Arthritis/Joint pain, 17=Gastro-intestinal diseases, 18= Poor vision, 19=Cataract, 20=High blood pressure, 21=Stroke, 22=Tuberculosis, 23=Meningitis, 24= Others (please specify) ----------
Code: 1=Mild, 2=Moderate, 3=High, 4=Severe **Code:** 1=Male and 2=Female

42. If the answer is **Yes to Q-41.1 to 41.7 (for adult aged ≥15),** then, what did you do to seek care for each illness? *(see Q41 for disease code)*

	Disease specific chronological action/s

Adult member from Q41.1-41.5	Disease 1				Disease 2				Disease 3			
41.1Adult-1												
41.2 Adult-2												
41.3 Adult-3												
41.4 Adult-4												
41.5 Adult-5												
41.6 Adult-6												
41.7 Adult-7												

Action Code:
1. Wait for natural recovery without ever giving treatment
2. Start treatment outside home immediately after illness perceived
3. Start preventive treatment at home after illness perceived
4. Start treatment outside home after 3 days' latter
5. Waited for natural recovery for one week but later started treatment outside home
6. Others (please specify) ----------

43. If the answer is **Code-1 to any of the diseases of Q-42**, then what were the main reasons of not seeking health care for the illness?

Adult member from Q41.1-41.5	Disease specific chronological reasons											
	Disease 1				Disease 2				Disease 3			
41.1Adult-1												
41.2 Adult-2												
41.3 Adult-3												
41.4 Adult-4												
41.5 Adult-5												
41.6 Adult-6												
41.7 Adult-7												

Reasons Code:
1. Naturally recovered with self-curative measures
2. Illness was very mild and self-curative measure was enough
3. Wanted to treat but could not afford
4. Could not treat due to remoteness and lack of service providers
5. Others (please specify) ----------

44. If the answer is **code 2-6 to any of the diseases of Q-42**, then complete the matrix to note health care episodes for the last illness of each adult member.

Diseases Code and Adult member from Q-41.1 to 41.5		Disease specific episodes by their order of actions									
Adult member	**Disease Code**	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
41.1Adult-1											
41.2 Adult-2											
41.3 Adult-3											
41.4 Adult-4											
41.5 Adult-5											
41.6 Adult-6											
41.7 Adult-7											

Episode Codes:
1. Illness was very mild and self-curative measure was enough
2. Self-medication with herbal/other traditional medicine based on previous experience
3. Self-medication with modern drugs based on previous experience
4. Herbal/folk medicine based on others' advice who have similar experience
5. Consulted with traditional healers for folk medicine/homeopath/spiritual treatment
6. Used modern drugs based on advice from others who have similar experience
7. Consulted with drug sellers/village doctor for modern medicine
8. Consulted with FWA/FWV/MA/SACMO at home for modern medicine
9. Consulted with FWA/FWV/MA/Nurse at health centre for modern medicine
10. Consulted with MBBS doctor at pharmacy for modern medicine
11. Consulted with MBBS doctor at service centre for modern medicine
12. Consulted with MBBS doctor at private clinic for modern medicine
13. Consulted through mobile phone with drug sellers/village doctor for allopathic drugs
14. Consulted through mobile phone with FWA/FWV/MA/SACMO for allopathic drugs
15. Consulted through mobile phone with MBBS for allopathic drugs
16. Others (please specify) ----------

45. If the there is **any answer in Q-44**, then complete the matrix to note how much cost was involved with each episode against for the last illness of each adult member *(if the answer is code1 for Q44, then cost=0)*

Adult member No.	Costs involved for each episode					
	1st Episode	2nd Episode	3rd Episode	4th Episode	5th Episode	Total costs
41.1 Adult-1						
41.2 Adult-2						
41.3 Adult-3						
41.4 Adult-4						
41.5 Adult-5						
41.6 Adult-6						
41.7 Adult-7						

46. If there is **answer in Q-44 (2-16),** then complete the matrix to note what were the main reasons for using a particular type of providers/steps for seeking health care for the last illness of each adult member.

Adult member	Four main reasons for each provider against each episode																			
	1st Episode				2nd Episode				3rd Episode				4th Episode				5th Episode			
Adult 1																				
Adult 2																				
Adult 3																				
Adult 4																				
Adult 5																				
Adult-6																				
Adult-7																				

Reasons code: *(if the answer is code 1 for Q44 then check code 17-19)*

1. No side effects
2. Walking distance
3. Family tradition/custom
4. Familiarity with the provider
5. Convenient access and availability
6. No visiting fees, only medicine cost
7. Treatment cost is affordable
8. Flexible payment system
9. The illness was not severe
10. The illness was severe
11. Same sex of the providers
12. No opportunity costs (transport/food/working day loss) involved
13. Satisfied with previous experience
14. Experienced service provider
15. Previous treatment of another provider failed
16. Community people suggests
17. To see community people also uses same services
18. Providers came at home if necessary
19. General/common illness
20. Similar with previous experience
21. Others (please specify)----------

47. Was that ill adult member involved in any income generating activities during their last illness?
Code: 1=Yes and 2=No

Adult-1:-----
Adult-2:-----
Adult-3:-----
Adult-4:-----
Adult-5:-----
Adult-6:-----
Adult-7:-----

48. Who decided to visit providers for medical care for each of the ill (last) adult member aged ≥15?

Adult member No.	Decided by whom			
	1st time	2nd time	3rd time	4th time
Adult-1				
Adult-2				
Adult-3				
Adult-4				
Adult-5				
Adult-6				
Adult-7				

Code: 1= Male-self, 2=Female-self, 3=Husband-wife jointly, 4=Household head, 5=Father, 6=Mother, 7= Parents-jointly, 8=Son, 9=Daughter, 10= Others (please specify) ---.

49. What was the choice of providers for seeking care for the last time illness of each adult member aged ≥15?

Adult member No.	Choice of provider			
	1st choice	2nd choice	3rd choice	4th choice
Adult-1				
Adult-2				
Adult-3				
Adult-4				
Adult-5				

Adult-6					
Adult-7					

Choice code: 1= Home remedies, 2=Village doctors/Drug sellers/self-medication, 3= Traditional healer and medicine, 4= FWA/FWV/MA/SACMO/Nurse, 5= MBBS doctor, 6= Didn't seek care, 7=Others (please specify) ---

50. Which type of provider did you use for the last illness of each adult members aged member aged ≥15?

Adult member No.	Provider actually used by order			
	1st time	2nd time	3rd time	4th time
Adult-1				
Adult-2				
Adult-3				
Adult-4				
Adult-5				
Adult-6				
Adult-7				

Provider code: 1= Home remedies, 2=Village doctors/Drug sellers/self-medication, 3= Traditional healer and medicine, 4= FWA/FWV/MA/SACMO/Nurse, 5= MBBS doctor, 6= Didn't seek care, 7=Others (please specify) ---

51. What is your preference of provider selection of seeking health care for any of your household member?

Household member	Provider Preference				Sex of the HH member	Age of the HH member	Severity of the diseases
	1st	2nd	3rd	4th			
51.1 Children ≤14							
51.2 Children ≤14							
51.3 Adult 15-59							
51.4 Adult 15-59							
51.5 Elderly ≥60							
51.6 Elderly ≥60							

Provider code: 1= Home remedies, 2=Village doctors'/Drug sellers/self-medication, 3= Traditional healer and medicine, 4=FWA/FWV/MA/SACMO/Nurse, 5= MBBS doctor; 6=Others (please specify)--
Sex: 1=Male and 2=Female **Severity code:** 1=Mild, 2=Moderate, 3=High, 4=Severe

52. If the **first preference is not option-5 (MBBS doctor) in Q-51**, then what are the main reasons?

Household member	Reason code							
52.1 Children ≤14								
52.2 Children ≤14								
52.3 Adult 15-59								
52.4 Adult 15-59								
52.5 Elderly ≥60								
52.6 Elderly ≥60								

Reason code

1. Non familiarity with providers	8. High opportunity costs (transport/food/day loss)
2. Not available/easy accessible/poor transport	9. Not satisfied with services (behave/quality/time)
3. No visiting fee, only medicine cost	10. To see others /advice of other community people
4. Not affordable (visiting fees/tests/ medicine)	11. Common illness and was not severe
5. Treatment cost need to pay at a time	12. Similar with previous experience
6. Hidden costs (out-off-pocket payment)	13. Others (please specify) -------
7. Provider and patient are not in same sex	

Section F: Maternal healthcare-seeking behaviour for ever married women

53.	How many times have you been pregnant?	
54.	How many of your children are alive?	
55.	What is the age of your last/youngest living child?	
56.	Do you have any child aged under 5? **Code:** 1=Yes and 2=No *(If the answer is 'No' then ask Q76)*	

57. In your opinion, to what extent is maternal care from a medically trained professional (MBBS Doctor) important?

Code: 1= Very Important, 2= Important, 3=Moderately important; 4=Less important and 5= Not important at all

For ANC | **For Delivery** | **For PNC**

58. Did you get basic vaccination of your last child? **Code:** 1=Yes and 2=No

59. If the answer is **Yes to Q-56, then** did you/the mother of this child (under 5) receive any antenatal care services? **Code:** 1=Yes and 2=No

60. If the answer is **Yes to Q-59**, then how many times?

61. If the answer is **Yes to Q-59,** then from where did she receive antenatal care? **Follow episode chronologically**

Code: 1= Discussed with local aged women and followed their advice
2=Consulted with local trained (FWA/FWV/MA/SACMO/Nurse) and followed instruction
3= Consulted with traditional health providers and followed instructions
4= Consulted with MBBS doctors and followed instructions
5= Other (please specify) ----------

62. What were your main reasons for using a particular type of provider/s for antenatal care? **Provider-1** | **Provider-2** | **Provider-3**

Reasons code:	
1. No side effects	12. Same sex of the providers
2. Walking distance	13. Satisfied with previous experience
3. Family tradition/custom	14. Experienced service provider
4. Familiarity with the provider	15. Previous treatment of another provider failed
5. Convenient access and availability	16. Community people suggests
6. No visiting fees, only medicine cost	17. To see community people also uses same services
7. Treatment cost is affordable	18. Providers came at home if necessary
8. Flexible payment system	19. General antenatal problem
9. The antenatal problem was not severe	20. Similar with previous experience
10. The antenatal problem was severe	21. Others (please specify) ----------
11. No opportunity costs (transport/ food/ working day loss) involved	

63. If the answer is **Code other than 4 to Q-59,** then what were the reasons for not receiving antenatal care from MBBS doctors? **Follow reasons chronologically**

Reasons Code:	
1. Not necessary	7. No female service providers
2. Family tradition	8. Privacy problems
3. Religious barriers	9. Didn't trust them
4. Family didn't allow it.	10. Too far/no transport
5. Unaffordable costs	11. Others (please specify) ------
6. Unavailability of service providers	

64. Where did you/your wife have her last birth?
Code: 1=Home; and 2=Healthcare centre

65. If the answer is **code-1 to Q-64**, then who assisted with delivery care? **Provider**

Code: 1= Relatives/local aged women
2= Local trained (FWA/FWV/MA/SACMO/Nurse) provider
3= Traditional birth attendants
4= Others (please specify) ----------

66. What were main reasons for using a particular type of provider for delivery care? **If multiple providers, then 4 most important causes for each.**

Provider-1 | **Provider-2** | **Provider-3**

Reasons code:	
1. No side effects	12. No opportunity costs (transport/ food/ working day loss) involved
2. Walking distance	13. Satisfied with previous experience
3. Family tradition/custom	14. Experienced service provider
4. Familiarity with the provider	15. Previous provider's treatment failed
5. Convenient access and availability	16. Community people suggests
6. No visiting fees, only medicine cost	17. Community people also uses same services
7. Treatment cost is affordable	18. Providers came at home if necessary
8. Flexible payment system	19. General delivery problem
9. The delivery problem was not severe	20. Similar with previous experience
10. The delivery problem was severe	21. Others (please specify) ----------
11. Same sex of the providers	

67. If the answer is **1 to Q-64,** then what were the main reasons for delivering/giving birth at home?

Follow reasons chronologically

Reasons Code:	
1. Not necessary	8. No female service providers
2. Family tradition/customs	9. Abrupt delivery
3. Religious barriers	10. Privacy problems
4. Previous experience	11. Didn't trust on MBBS doctors
5. Family didn't allow hospital delivery	12. Too far/no transport
6. Unaffordable costs	13. Others (specify)------
7. Lack of MBBS doctors	

68. Did you/your wife receive any post-natal care (PNC) for your last child within seven days of delivery? **Code**: 1=Yes and 2=No

69. If the answer is **Yes to Q-68**, then from whom did she receive postnatal care?
Code: 1= Discussed with relatives/local aged women
2= Consulted with local trained (FWA/FWV/MA/SACMO/Nurse)
3= Consulted with non-trained traditional birth attendants
4= Consulted with MBBS doctors
5= Others (please specify) ----------

70. What were the main reasons of using a particular type of provider for post-natal care? **If multiple providers, then 4 most important causes for each.**

Provider-1 | **Provider-2** | **Provider-3**

Reasons code:	
1. No side effects	12. No opportunity costs (transport/ food/ working day loss) involved
2. Walking distance	13. Satisfied with previous experience
3. Family tradition/custom	14. Experienced service provider
4. Familiarity with the provider	15. Previous provider's treatment failed
5. Convenient access and availability	16. Community people suggests
6. No visiting fees, only medicine cost	17. Community people also uses same servic
7. Treatment cost is affordable	18. Providers came at home if necessary
8. Flexible payment system	19. General post-natal care problems
9. The post-natal problem was not severe	20. Similar with previous experience
10. The post-natal problem was severe	21. Others (please specify) ----------
11. Same sex of the providers	

71. If the answer is **No to Q-68**, then what were the main reasons of not receiving PNC?

Follow reasons chronologically

Reasons Code:	
1. Not necessary	8. No female service providers
2. Family tradition/customs	9. Abrupt delivery
3. Religious barriers	10. Privacy problems
4. Previous experience	11. Didn't trust on MBBS doctors
5. Family didn't allow hospital delivery	12. Too far/no transport
6. Unaffordable costs	13. Others (specify)------
7. Lack of MBBS doctors	

72. Was the mother of the child involved in any income generating activities before/during pregnancy? **Code**: 1=Yes and 2=No

73. Who made the decision on the maternal care for the last birth?
Code: 1=Husband, 2=Wife, 3=Jointly, and 4=Other household members

For ANC

For Delivery

		For PNC
74.	What type of provider you prefer for maternal care for you/your wife? **Code:** 1= Relatives/local aged women 2= Local trained (FWA/FWV/MA/SACMO/Nurse) 3= Traditional birth attendants 4= MBBS doctors 5= Others (please specify) ----------	**For ANC** **For Delivery** **For PNC**

75. Which type of provider did you/your wife use for other than the last child (if they have more than 1 children)?

Number of Child	Provider used for maternal care			
	ANC Care	Delivery Assistant	Delivery Place	PNC Care

Code

1. Relatives/local aged women	5. Medical centre
2. Local trained (FWA/FWV/MA/SACMO /Nurse)	6. MBBS doctors
3. Traditional health provider/birth attendant	7. Others (please specify) ----------
4. Home	

76.	Could you/your wife in your household make decisions to visit doctors for herself? **Code**: 1=Yes and 2=No	
77.	Could you/your wife in your household make decisions to visit doctors for her children? **Code**: 1=Yes and 2=No	
78.	Could you/your wife in your household make decisions to spend money on medicine for herself? **Code**: 1=Yes and 2=No	
79.	Could you/your wife in your household make decisions to spend money on medicine for child? **Code**: 1=Yes and 2=No	
80.	Could you/your wife in your household make decisions to go outside for other family needs? **Code**: 1=Yes and 2=No	

Conclude interview with giving thanks

Appendix B (pages 181-182) removed from Open Access version as they may contain sensitive/confidential content.

Appendix C (pages 183-184) removed from Open Access version as they may contain sensitive/confidential content.