

**A STUDY ON EARTHQUAKE PREPAREDNESS IN SCHOOLS IN
DHAKA NORTH CITY CORPORATION**



A Dissertation for the Degree of Master in Disaster Management

By

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ABSTRACT

Bangladesh is one of the most populous and disaster prone countries in the world. Bangladesh is exposed to floods and cyclones, and the risk of other disasters such as drought, earthquakes, and tornados is increasing. The recent occurrences of earthquakes in the region have brought to stark light the need for preparedness for earthquake in various sectors in the country. Children are a dynamic and powerful force of change and form the demographic dividend and future of a country. The impact of a disaster especially like earthquake has a profound impact on the psyche of the whole generation. While children are at homes with their families, there is a familiar support and security that is available to them. It is imperative that similar is available to them while they are in school.

The research aims to explore the preparedness measures adapted by the schools in response to earthquake and to review the policy on disaster preparedness in schools in Bangladesh. The study also aims to understand the perception of stakeholders on their expectation of earthquake preparedness in schools.

An assessment of Schools, students and guardians was conducted by visiting the schools and organising completion of questionnaires by the respondents. The findings were complemented by secondary data collection and interviews with other stakeholders (government, NGOs, donors, experts etc).

While there is momentum in the sphere of earthquake preparedness in the country, there is room for improvement in awareness raising and training on preparedness for schools. A section of schools are not under the purview of Government or any other body for implementation of such measures. A streamlined coordinated preparedness and awareness raising programme for earthquake preparedness in school is the need of the hour. Parents/guardians, students should discuss proactively with school authorities to ensure preparedness measures are implemented and in place.

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ABBREVIATIONS

ADB	: Asian Development Bank
AFD	: Armed forces Division
BANBEIS	: Bangladesh Bureau of Educational Information and Statistics
BBS	: Bangladesh Bureau of Statistics
BUET	: Bangladesh University of Engineering and Technology
BURP	: Bangladesh Urban Resilience Project
CDMP	: Comprehensive Disaster Management Programme
DC	: Divisional Commissioner
DDM	: Department of Disaster Management
DDMP	: District Disaster Management Plan
DeSHARI	: Developing and Strengthening Humanitarian Assistance and Risk
DFID	: Department for International Development
DG	: Director General
DGHS	: Directorate of Health Services
DIPECHO	: Disaster Preparedness ECHO Programme
DMC	: Disaster Management Committee
DNCC	: Dhaka North City Corporation
DREE	: Disaster Response Exercise and Exchange
DRR	: Disaster Risk Reduction
DSCC	: Dhaka South City Corporation
DSHE	: Directorate of Secondary and Higher Education
DTE	: Directorate of Technical Education
ECHO	: European Commission Humanitarian Aid and Civil Protection
EIE	: Education in Emergencies
EPAC	: Earthquake Preparedness and Awareness Committee
FSCD	: Fire Service and Civil Defence
GAD3RES	: Global Alliance for DRR and Resilience in the Education Sector
GFDRR	: Global Facility for Disaster Reduction and Recovery

GSB	: Geological Survey of Bangladesh
IMDMCC	: Inter-ministerial Disaster Management Coordination Committee
IPCC	: Intergovernmental Panel on Climate Change
MoDMR	: Ministry of Disaster Management and Relief
MOE	: Ministry of Education
MOPME	: Ministry of Primary and Mass Education
NARRI	: National Alliance for Risk Reduction and Response Initiatives
NDMAC	: National Disaster Management Advisory Committee
NDMC	: National Disaster Management Council
NEOC	: National Emergency Operations Centre
NGO	: Non-Governmental Organisation
NPDRR	: National Platform for Disaster Risk Reduction
PEDP	: Primary Education Development Programme
PWD	: Public Works Department
SOP	: Standard Operating Procedure
SSP	: School Safety Plan
UDD	: Urban Development Directorate
UDMP	: Union Disaster Management plan
UGC	: University Grants Commission
UNESCO	: United Nations Educational, Scientific and Cultural Organisation
UNICEF	: United Nations Children's Emergency Fund
UNISDR	: United Nations Office for Disaster Risk Reduction
UNO	: Upazila Nirbahi Officer
USARPAC	: United States Army Pacific
UzDMP	: Upazila Disaster Management Plan
WHO	: World Health Organisation

Chapter 1 **INTRODUCTION**

1.1 Background

Bangladesh is one of the most disaster prone countries in the world. Bangladesh is exposed to floods and cyclones, and the risk of other disasters such as drought, earthquakes, and tornados is increasing. Bangladesh ranks 5th in the World Risk Index as it is frequently affected by storms and floods. The impacts are becoming more visible at the local level, with greater impacts on poor and vulnerable communities (Shaw et al., 2013). Cyclone, flood, landslides, river erosion as well as climate induced hazards are the frequent disastrous phenomena in the country. The geographical location of Bangladesh in the Bay of Bengal leaves the country susceptible to significant climate change impacts that exacerbate environmental hazards. Bangladesh ranks as the 8th most populated country in the world at 1,237.51 persons per square km growing at an estimated rate of 1.59% per year. This very high density exacerbates the impact of localised disasters. Continuing population growth and environmental degradation could further exacerbate the intensity of disasters in the future, contributing to a significant increase in humanitarian needs. (ECHO 2016).

In the urban context, disasters and hazards are posed by flood and water logging, earthquakes and fires. In the last 150 years, the country experienced damages of five earthquakes having magnitude over 7.0 Richter scale (Kamal, 2013).

According to Mitchell (1999), in developing countries, megacities often lack the most basic scientific information like risk, exposure, vulnerability and response about natural hazards that threaten them. Though mostly disasters in Bangladesh are concentrated in rural areas (flooding, river erosion and cyclones), increasingly the nature of the disasters are posing an equal if not more risk to the urban centres of Dhaka, Chittagong and Sylhet areas in the country.

During any disasters, school as a public space are mostly vulnerable as demonstrated in many calamities e.g. during the Haiti earthquake in 2010 about 4,000 schools were

damaged or destroyed and in the 2015 Nepal earthquake where more than 27,000 classrooms were fully destroyed (Paci-Green et al., 2015). More recently during the July 2016 Monsoon flooding more than 1500 schools have been affected by the floods in northern Bangladesh.

According to Dewan (2015), damages caused to public buildings such as hospitals, clinics, educational buildings, and significant cultural sites such as mosques and temples may lead to further impacts. For example, the disruption to education contributes to disruption of academic sessions and compounds the problem of low literacy rates. A 2010 study conducted by Save the Children International indicated that more than 4,666 schools in Bangladesh are affected by disasters per year (PEDP 3, 2015).

When earthquake occurs nothing is spared; may it be a dwelling house, a commercial building, a school, a temple or a mosque. If an earthquake should strike during the day, children would be the worst sufferers as they are usually at school, away from their parents and are not mature enough to look out for themselves.

1.2 Problem Statement

Over the past decades, urbanisation in Bangladesh has been rapidly taking place without proper guidance. As a result many of the urban centres have developed haphazardly. These urban centres are fast growing and influence the economic developments of the country. It is therefore essential to have a realistic understanding on the nature, severity and consequences of likely damage/loss that an earthquake could cause. A strong earthquake affecting a major urban centre like Dhaka, Chittagong, or Sylhet may result in damage and destruction of massive proportions and may have disastrous consequences for the entire nation. The next earthquake could devastate Dhaka, a potential seismic vulnerable and congested city. It is likely to become the 5th most populous city in the world by 2030. In any earthquake, it is not the tremor that kills people but the destruction of buildings and other infrastructure that are constructed by using faulty design, cheap quality materials and the negligence of the authority to implement the national building code. The increasing seismicity in this region and vulnerability to earthquake especially in Dhaka city due to high density of population, unplanned infrastructure and close proximity with India and Myanmar's active seismic area has increased the risk more than ever before (Rahman

et al., 2011). The recent 2015 Nepal earthquakes have brought to the fore the need for preparedness in the country to this disaster. Paul and Bhuiyan (2010) conducted a study on seismic risk perception in Dhaka city and it was found that a majority of the respondents were not prepared. A major recommendation of the study was awareness and preparedness among Dhaka's residents.

1.3 Justification of the Study

In Dhaka, earthquakes of a strong magnitude can have overwhelming, irreversible consequences, serious injury and disruption of building operations, catastrophic damage including structural collapse and massive loss of life.

Schools form one of the main public spaces in any community. They are important centres for imparting knowledge and education. They are not normally considered a first priority while rendering structural preparedness measures for buildings.

The authority liable for school safety must be aware of and manage risks particularly that impact the lives of students, teachers, and staff. In the Kashmir earthquake of 2005, among the 75,000 people who died, there were 19,000 children who were in schools during the time of the earthquake and died mostly due to widespread collapse of school buildings. Three years later, two earthquakes, of 9.0 and 6.1 magnitude, hit Sichuan, China, killing more than 5,000 students as thousands of classrooms collapsed. In the 2015 Nepal earthquake more than 16,000 schools and 27,000 classrooms were destroyed and as it hit on a Saturday which was a holiday, the loss of lives was less.

1.4 Objectives

1.4.1 Overall Objective

Though earthquakes affect the whole community, it is the children who are most affected. The impact is twofold: - first the physical injuries and emotional consequence of the loss of family members, friends, and dwellings etc; second the loss of protective functions of their parents, putting their basic survival at risk.

Most importantly, if the earthquake strikes when they are at school, during the day, away from their parents/family, the impact is most profound. It is thus important to ensure that there is proper structural and non-structural measures in place in schools

to ensure that the buildings are earthquake resilient, systems and procedures are in place for evacuation, proper maintenance of all important services are conducted, preparedness measures are considered and implemented.

The efforts to build disaster preparedness in schools have to be a mutually important agenda and responsibility of government, school communities and the stakeholders. School communities include people involved in teaching-learning activities: students, teachers, education practitioners and headmasters/mistresses. School stakeholders refer to communities that are interested in both school communities and community institutions surrounding the school.

1.4.2 Specific Objectives

- To review the preparedness measures adapted by the schools in response to disasters with a specific focus on earthquake;
- To review policy on disaster preparedness in schools in Bangladesh and to assess their implementation;
- To understand perception of stakeholders on their understanding and expectations of earthquake preparedness in schools.

1.5 Research Questions

The research questions that will help delve into the problem and enable analysis of the issue are:

Schools

- the preparedness measures adapted by the schools in response to disasters with a specific focus on earthquakes;
- perception of stakeholders on their understanding and expectations of earthquake preparedness in schools and
- the policy on earthquake preparedness and its implementation in schools in Bangladesh

Parents/guardians

- perception of parents and guardians on their understanding and expectations of earthquake preparedness in schools

Students

- their understanding about earthquake and
- the preparedness measures adapted by the schools in response to earthquake

1.6 Scope and Limitations

The key stakeholders for this study are school community (teachers, management), students and parents. They would be most affected if the earthquake would strike during day time and during school hours. While preparedness and awareness raising measures have been conducted in educational institutions, the study also seeks to understand the practice of these in both Bangla and English medium schools.

Some of the limitations experienced were:

- It was a challenge locating academic research available on earthquake preparedness especially focusing on preparedness in schools. There are plenty of reports, technical assessments of structure suitability and training materials but these are not in the scope of this study.
- The researcher could not get full information about schools on some issues for example security protocols, numbers of students, emergency numbers etc as they were sensitive and were not shared.
- In-depth interview at Bangla medium schools was not possible due to the examination and subsequent Ramadan and school closure. These were mostly conducted over telephone.

Chapter 2 **LITERATURE REVIEW**

This chapter is based on the review of secondary data and documents which are based on this topic. The literature review provides information on the state of disasters in Bangladesh especially earthquakes and the preparedness activities undertaken in the country. It also provides information on the educational sector of Bangladesh and linking it to earthquake preparedness whilst highlighting the international policies on safety and preparedness as well as Bangladesh's efforts towards it.

2.1 Context of Disasters in Bangladesh

The United Nations International Strategy for Disaster Reduction (UNISDR) defines Disaster as; a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.

A hazard is a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage (UNISDR, 2009). The combination of hazards, vulnerability and inability to reduce the potential negative consequences of risk results in disaster. Disasters are often classified according to their speed of onset (sudden or slow), or according to their cause (natural or man-made).

2.2 Bangladesh and Natural Hazards

Bangladesh is home to almost 160 million people; living in a land area of 147,570 square km. Natural hazards have unfortunate consequences. Being mostly low-lying and in the confluence of two large rivers (the Ganges and the Brahmaputra) much of the country is prone to widespread seasonal flooding and very vulnerable to the effects of climate change. The frequency, unpredictability and severity of these disasters is likely to be adversely affected by global warming, population growth, environmental degradation, and ill-maintained infrastructure all contributing to increased acute humanitarian needs.

The geographical location of Bangladesh in the Bay of Bengal leaves the country susceptible to significant climate change impacts that exacerbate environmental hazards. More than 80% of the population (>128 million people) can be exposed to floods, earthquakes, droughts, and more than 70% to cyclones. The Asia Pacific Disaster Report 2015 places Bangladesh at the 10th place for exposure to natural disasters and in the 5th place for risk. The Hazard Profile of Bangladesh is depicted in Figure 2.1.

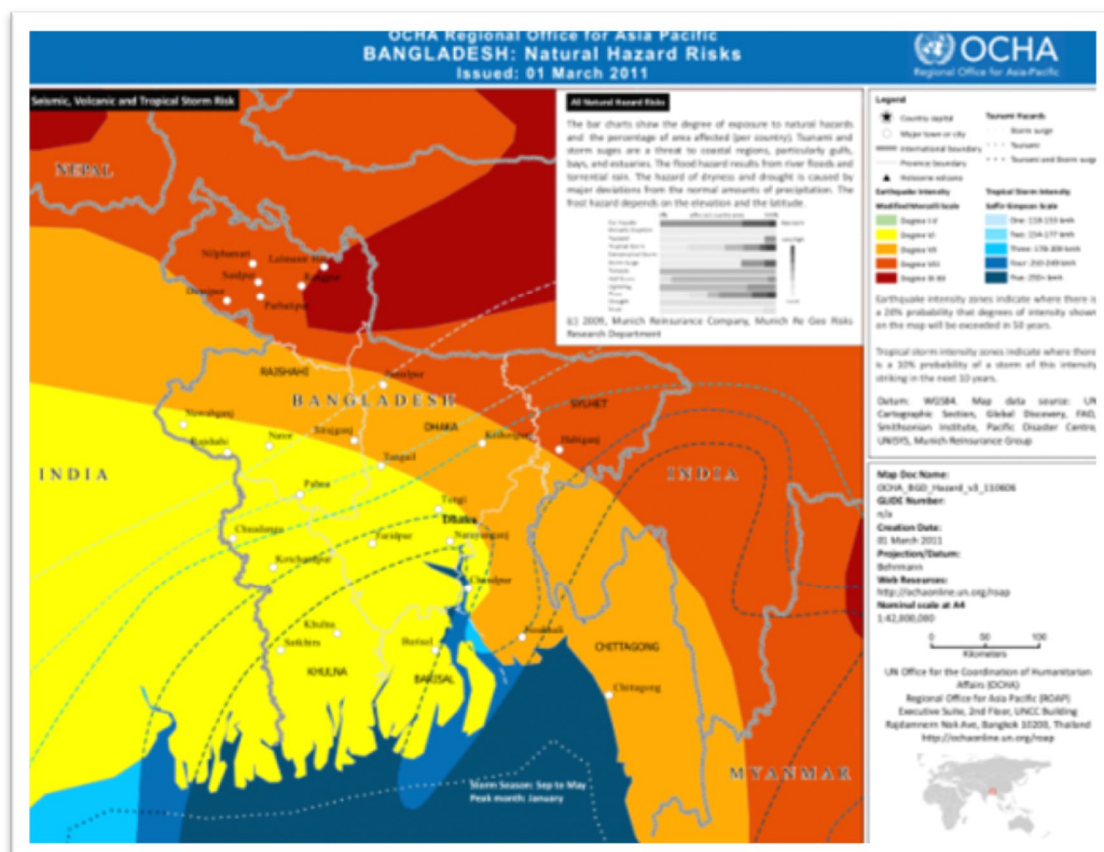


Figure 2.1: Hazard Profile of Bangladesh (source: OCHA, 2011)

Bangladesh faces extreme risks from climate change and ranks second on the Climate Change Vulnerability Index 2016.¹ In the future, the pattern of climate induced shocks and stresses will change and their frequency is likely to increase due to the impact of climate change; according to the Inter-governmental Panel on Climate Change (IPCC) peak intensity of cyclones may increase by five - ten per cent. The IPCC also considers that there are likely to be more erratic patterns in rainfall, with consequences for drought and agricultural livelihoods with knock-on humanitarian

¹ <http://climate-adapt.eea.europa.eu/metadata/tools/climate-change-vulnerability-index-ccvi>

implications. The impacts are becoming more visible at the local level, with greater impacts on poor and vulnerable communities (Shaw et al., 2013).

The recently published report Bangladesh Disaster Related Statistics 2015: Climate Change and Natural Disaster Perspective has estimated that the impact of climate change and natural disasters has caused 43.61 lakh Bangladeshi households a loss of BDT 18,424 crore between 2009- 2014 (BBS, 2016). These disasters can be mitigated with knowledge and planning, preparedness, physical and environmental protection.

2.3 Types of Disasters

Bangladesh is exposed to threat of hazards resulting from a number of natural disasters and remains classified as one the most vulnerable countries. The major disasters that affect the country are floods, cyclones, droughts, tidal surges, tornadoes, earthquakes, river erosion, fire, infrastructure collapse, high arsenic contents of ground water, water logging, water and soil salinity, epidemic, and various forms of pollution etc. In the Bangladesh Disaster Report, 2013, these events are termed as disasters when they adversely affect the entire environment, including human beings, shelters and the resources essential for livelihoods (MoDMR, 2013). The most recent events of earthquakes that have struck the region are increasingly becoming a threat to the country.

2.4 Definition of Earthquake

Earthquake is a term used to describe both sudden slip on a fault and the resulting ground shaking and radiated seismic energy caused by the slip, or by volcanic or magmatic activity, or other sudden stress changes in the earth (USGS, 2012). In other words, earthquakes are sudden rolling or shaking events caused by movement under the earth's surface. Earthquakes happen along cracks in the earth's surface, called fault lines, and can be felt over large areas, although they usually last less than one minute.

2.5 Hazards arising from Earthquakes

The primary hazards associated with earthquakes are fault displacement and ground shaking. Secondary hazards include ground failure, liquefaction, landslides, avalanches, and tsunamis. Secondary tremors that follow the main shock of an earthquake, called aftershocks, may cause further damage. Such tremors may recur for weeks or even years after the initial event. In the 2015 Nepal Earthquake, there were

25 aftershocks of 5.0 magnitude from 25th April 2015 till 2nd July 2015. Earthquakes in India (Bhuj 2001), Pakistan (2005), China (Sichuan 2008), Haiti (2010) and Nepal (2015) implied that disasters following an earthquake are mostly human-induced due to poor constructions, noncompliance of building code and unplanned urbanisation practices. The magnitude of the force on a building due to an earthquake depends on the following things:

- quality of the soil it sits on. Poor soil will cause large amplification of the movements. Wet, silted soil is prone to liquefaction, which can cause catastrophic consequences;
- the height of the building;
- the weight of the building, and how it's distributed up the building;
- the ductility of the building. Ductile buildings will dissipate energy, resulting in lower forces on the structure and
- the natural frequency of the building – buildings of 5-15 storeys are most likely to resonate with the earthquake, resulting in much larger forces and lead to more damage.

2.6 Bangladesh and Earthquakes

Bangladesh and the neighbouring states of north eastern India have long been one of the most seismically active regions of the world. Bangladesh lies in an active seismic zone and has a history of large and damaging earthquakes.

2.6.1 Why is Bangladesh at risk?

Bangladesh is one of the most tectonically active regions in the world. It sits where three tectonic plates meet: the Indian Plate, the Eurasian Plate, and the Burmese Plate. The Indian Plate is moving northeast, slowly colliding with the Eurasian Plate (see Figure 2.2). This collision formed the Himalayan Mountains and they are still rising. There are many active faults along this boundary, such as the enormous Dauki fault that borders northern Bangladesh. Movement along this fault formed the large Shillong Plateau. To the east, the Burmese Plate pushes west against the Indian Plate. The active faults can generate huge earthquakes.

The devastating 2004 earthquake and tsunami in Sumatra occurred along the boundary between the Indian and Burmese plates. Scientists think that a major

earthquake closer to Bangladesh is due any time soon. Recently there has been research conducted by the Scientists from the University of Colombia for the BanglaPIRE project. They have discovered new evidence of increasing strain in Bangladesh, where two tectonic plates underlie the world's largest river delta.



Figure 2.2: Tectonic plates in Bangladesh (source: American Museum of Natural History, 2015).

A hidden fault which has been buried under miles of river sediment, could release an earthquake of magnitude 8.2 to 9.0 in one of the most densely populated regions of the world, the study found. Scientists estimate that at least 140 million people in the region could be affected if the boundary ruptures; the destruction could come not only from the direct results of shaking, but changes in the courses of great rivers, and in the level of land already perilously close to sea level. (Steckler et al., 2016). The study further mentions that the subduction is the main driver in the region and a locked megathrust plate boundary is representative of an “underappreciated hazard” in one of the most densely populated regions of the world.

2.6.2 History of Earthquake in Bangladesh

This section presents historical earthquake events in and around Bangladesh. As Bangladesh is located in a tectonically active region, much of the country including Chittagong, Sylhet, Dhaka, Rangpur, Bogra, Mymensingh, Comilla, Rajshahi are very much vulnerable to a major earthquake disaster. Historical earthquakes have occurred in and around Bangladesh causing significant damage, and moderate-magnitude earthquakes occur every few years causing some damage. The country's position adjacent to the very active Himalayan front and ongoing deformation in nearby parts of south-east Asia expose it to strong shaking from a variety of earthquake sources that can produce tremors of magnitude 8 or greater. Historical seismicity within Bangladesh indicates that potential for damaging moderate to strong earthquakes exist throughout much of the country (CDMP, 2009). Table 2.1 describes all the noteworthy earthquakes that have taken place in this region.

Table 2.1: History of earthquakes affecting Bangladesh

<i>Year</i>	<i>Location/Magnitude and effect</i>
1548	The first recorded earthquake. Sylhet and Chittagong were violently shaken
1762	The great Arakan earthquake of April 2, which raised the coast of Foul island by 2.74m, also caused a permanent submergence of 155.40 sq km near Chittagong.
1812	Severe earthquake in many places of Bangladesh around May 11 mostly affecting Sylhet.
1869	Known as Cachar Earthquake. Severely felt in Sylhet but no loss of life.
1885	Known as the Bengal Earthquake. Occurred on 14 July with 7.0 magnitude and the epicenter was at Manikganj. This event was generally associated with the deep-seated Jamuna Fault.
1897	Known as the Great India Earthquake with a magnitude of 8.7 and epicenter at Shillong Plateau.
1918	Known as the Srimangal Earthquake. Occurred on 18 July with a magnitude of 7.6 and epicenter at Srimangal, Maulvi Bazar. Intense damage occurred in Srimangal.
1930	Known as the Dhubri Earthquake. Occurred on 3 July with a magnitude of 7.1 and the epicenter at Dhubri, Assam. The earthquake caused major damage in the eastern parts of Rangpur district.
1950	Known as the Assam Earthquake. Occurred on 15 August with a magnitude of 8.4 with the epicenter in Assam, India. The tremor was felt throughout Bangladesh but no damage was reported.
1997	Occurred on 22 November in Chittagong with a magnitude of 6.0. It caused minor damage around Chittagong town.
1999	Occurred on 22 July at Maheshkhali Island with the epicenter in the same place, a magnitude of 5.2. Severely felt around Maheshkhali island and the adjoining sea.
2003	Occurred on 27 July at Kolabunia union of Barkal upazila, Rangamati district with magnitude 5.1.
2008	Known as Mymensingh earthquake on 27 July 2008. The epicenter was located 12 km northeast of Mymensingh city and 120 km north of Dhaka. It had a magnitude estimated 5.1 on the Richter scale.
2008	Known as Chandpur Earthquake. An earthquake with couple of aftershocks jolted Dhaka on the evening of 20 September 2008. The magnitude was 4.5 on the Richter scale.

Year	Location/Magnitude and effect
2009	Known as eastern Bhutan earthquake 21 September 2009. The epicenter was situated in eastern Bhutan, a magnitude of 6.1, but shook most of Bangladesh including Dhaka.
2009	Known as Bay of Bengal Earthquake. Occurred on 11 August. The epicenter was located at the North Andaman Islands of the Bay of Bengal and seacoast of Myanmar. The magnitude recorded was 7.5. Though no significant damage was reported throughout Bangladesh the tremor was felt strongly in Dhaka.
2010	Occurred on 10 September night at 11:30 pm local time. The tremor was felt in Dhaka and its surrounding areas with magnitude 4.8. The epicenter was 45 km southwest from Dhaka.
2011	Occurred on 6:30 pm local time with magnitude 6.8. It lasted for 2 minutes. The tremor felt was strong enough in Dhaka and the districts of northern part of Bangladesh. The epicenter was 500km north from Dhaka in Gangtok.
2015	A magnitude 7.8 earthquake struck Nepal on April 25 and was also felt in Bangladesh
2015	A magnitude 7.3 earthquake struck Nepal and 2 people were killed in Bangladesh.
2016	A magnitude 6.7 earthquake struck India in the state of Manipur on January 3. The shocks had a maximum intensity of VII (<i>Very strong</i>). At least five people were killed in Bangladesh, 200 others were injured and a large number of buildings were damaged
2016	A magnitude 6.9 earthquake struck Myanmar on April 13. The shock had a maximum intensity of VI (<i>Strong</i>). 50 people were hurt in Chittagong.

Source: Banglapedia, 2015

2.7 Earthquake Preparedness in Bangladesh

2.7.1 Overview

Bangladesh's unique geology exposes its people to a multitude of hazards. Earthquake is an emerging risk for the country, the capital Dhaka and other major cities such as Sylhet and Chittagong are extremely vulnerable. Although there hasn't been a major earthquake event in the country in the recent times, an event like the recent Nepal Earthquake could cause great havoc and loss of life especially in the north and south east parts of the country. Considering this, Government, donor agencies, research institutions, international NGOs and national NGOs have embarked on initiatives to develop comprehensive earthquake preparedness and management in the country.

2.7.2 Preparedness Activities undertaken by Various Actors

2.7.2.1 Government of Bangladesh

Ministry of Disaster Management and Relief (MoDMR) – This ministry leads on the preparedness activities for earthquake in Bangladesh. Bangladesh's regulative framework for disaster management provides for the relevant legislative, policy and best practice framework under which the activity of disaster risk reduction and emergency management in Bangladesh is implemented and managed. The framework includes:

- Disaster Management Act 2012
- National Disaster Management Policy 2015
- Disaster Management Plans
 - o National Disaster Management Plan
 - o District Disaster Management Plan (DDMP)
 - o Upazila disaster Management Plan (UzDMP)
 - o Union Disaster Management Plan (UDMP)
 - o Pourashava/City Corporation Disaster Management Plan
 - o Hazard Specific Disaster Management Plan
 - o Earthquake Management Plan
 - o Cyclone Shelter Plan
- Disaster Resilient Cluster Housing
- Tsunami Response Plan
- Standing Orders on Disaster 2010
- Guidelines for Government at all Levels (Best Practice Models)
- Bangladesh National Building Code
- Building Construction Law
- Building Construction Policy
- Bangladesh Fire Act

The following guidelines are in preparation:

- Incident Management Guidelines
- Debris Management Guidelines
- Dead Body Management Guidelines

The researcher had the opportunity to attend two key meetings on earthquake preparedness hosted by the MoDMR. The Earthquake Preparedness and Awareness Committee (EPAC) & National Disaster Management Council (NDMC) met on 30 April 2016 and confirmed the following decision points on earthquake preparedness:²

- NEOC- a National Emergency Operation Centre will be established as per the directive of the Prime Minister.
- Strict enforcement of Bangladesh National Building Code for construction of buildings to ensure that the buildings are earthquake resistant.
- All educational institutions, religious establishments, hospitals, public and private organisations should have an earthquake assessment.
- Evacuate residents from high risk buildings.
- Earthquake and fire drills conducted at least twice a year in educational

² Notes taken by the researcher

institutions, shopping malls and public offices by their own initiative.

- To identify and demolish high risk buildings in Dhaka and other cities.
- All print and electronic media to relay earthquake awareness information.
- Establish mobile hospitals as necessary.
- Annual country wide earthquake drill like the Shakeout drills in America and New Zealand.
- International consultant to be hired to provide training on earthquake preparedness for residential areas.

The researcher was also invited to a National Workshop on Earthquake Preparedness and Awareness Raising on 26 June 2016 at Hotel Abakash chaired by the Honourable Minister, MODMR. A summary of the preparedness measures taken by the Government are³:

- Bangladesh has been divided into zones and Dhaka, Sylhet and Chittagong are among the risk zones.
- Dhaka has been divided into 8 zones and under the purview of the army.
- The National Earthquake Contingency Plan has been prepared and drills for earthquake and fire safety have been conducted.
- 30,000 urban volunteers have been trained in search and rescue.
- School earthquake safety drills have been conducted.
- For safe construction, masons, bar binders have been trained in good construction practices.
- National Disaster Preparedness Day will be observed on 10 March.
- Light search and rescue equipments worth BDT 69 crore have been purchased and handed over to Fire Service and Civil Defence and Armed Forces Division.
- Under the National Curriculum, 43 textbooks for classes 3-10 have earthquake and disaster related information included.
- Higher courses on earthquake and disaster management have been introduced in 17 government and private universities.
- In government training institutions, as a part of the curriculum, earthquake and other disaster management topics have been included as compulsory reading.

³ Notes taken by the researcher

Bangladesh has disaster management mechanism at both national and sub-national levels. The Disaster Management Structure of Bangladesh (at the national level) relevant to Earthquake preparedness and response is as follows:

1. National Disaster Management Council (NDMC) headed by the Honourable Prime Minister to formulate and review the disaster management policies and issue directives to all concerns.
2. Inter-Ministerial Disaster Management Co-ordination Committee (IMDMCC) headed by the Honourable Minister in charge of the Ministry of Disaster Management and Relief (MoDMR) to implement disaster management policies and decisions of NDMC/Government.
3. National Disaster Management Advisory Committee (NDMAC) headed by an experienced person having been nominated by the Honourable Prime Minister.
4. National Platform for Disaster Risk Reduction (NPDRR) headed by Secretary, Ministry of Disaster Management and Relief (MoDMR) and DG, Department of Disaster Management (DDM) functions as the member secretary. This platform shall coordinate and provide necessary facilitation to the relevant stakeholders.
5. Earthquake Preparedness and Awareness Committee (EPAC) headed by Honourable Minister Ministry of Disaster Management and Relief (MoDMR) and DG, Department of Disaster Management (DDM) act as member secretary.

Comprehensive Disaster Management Programme (CDMP) - The Government through the CDMP had undertaken various initiatives on earthquake risk assessment and planning. The Seismic Risk Assessment of Bangladesh was conducted by CDMP on earthquake hazard, vulnerability and risk assessment for the major cities in Bangladesh which included preparation of Earthquake Contingency Plans for national, city, agency and community levels, based on scenarios developed from risk assessment results, training and capacity building activities targeting groups like students and teachers, masons and bar binders, religious leaders, decision makers, and the first responding agencies in different cities in Bangladesh. CDMP with the Fire Service and Civil Defence (FSCD) undertook an initiative to train 30,000 volunteers with regard to earthquake preparedness. The authorities have completed earthquake

drills in 84 primary schools and nine secondary schools (see Annex B). The government is finalising drill guidelines to enable the programme to be rolled out across the country's nearly 66,000 primary schools and 32,000 secondary schools.

The Geological Survey of Bangladesh (GSB) under the Energy and Mineral Resources Division, Ministry of Power, Energy and Mineral Resources plays a vital role in earthquake research across the country. The main activities of the organisation are to deal with the technical and scientific aspects of earthquakes. Earthquake fault zones are also identified by Geological Survey of Bangladesh as a part of its regular activities. As a part of its earthquake preparedness activities, GSB has installed an earthquake accelerometer at 20 points with assistance from BUET across the country. The reading of these stations is useful for building code revisions in the context of different parts of the country.

Armed Forces Division (AFD) is an independent division under the direct supervision of the Honourable Prime Minister of Bangladesh and is one of the prime government agencies responsible for assisting during a disaster situation in Bangladesh. AFD developed the Earthquake Contingency Plan for Dhaka City and its surroundings areas with support from CDMP. AFD has demarcated eight zones for earthquake preparation. AFD in partnership with the U.S. Army Pacific (USARPAC) organise annual Disaster Response Exercise & Exchange (DREE) an earthquake drill in Dhaka for the participation of first responding agencies and other city stakeholders.

Ministry of Home Affairs - The Fire Service and Civil Defence, Police, Ansar, Village Defence Party, Bangladesh Rifles, Bangladesh Coast Guards all have important role to play in search and rescue, security, relief operations and disaster information management. These forces under the control of Ministry of Home Affairs are generally deployed in the affected areas and their services are placed under the control of DCs or UNOs.

The Fire Service and Civil Defence (FSCD) under the Ministry of Home Affairs of the Bangladesh Government is one of the prime first responding agencies in Bangladesh. FSCD is responsible for all emergency response including fire, landslide, and building collapse rescue. In the recent years, FSCD has undertaken several initiatives focusing on strengthening professional skill development and technical capacity for staff as well as

FSCD as an institute with regard to earthquake hazards. FSCD has developed volunteer groups in the Dhaka, Chittagong and Sylhet city corporation areas. These volunteers will perform rescue and recovery activities during an earthquake.

The Ministry of Primary and Mass Education (MoPME) supports conducting earthquake drills in schools, especially in schools in urban areas (Dhaka, Chittagong, Rajshahi, Rangpur, Sylhet and Mymensingh).

The Ministry of Health and Family Welfare, Directorate of Health Services (DGHS) and its attached agencies are responsible for providing health service to the people during disaster. The Ministry has prepared an earthquake contingency plan and updates it every year.

Urban Development Directorate (UDD) under the Ministry of Housing and Public Works is the prime organisation responsible for assisting urban and land use planning in Bangladesh. This organisation is developing land use plans for small to medium level urban centres throughout the country.

2.7.2.2 International NGOS

Concern World Wide Bangladesh worked with 6 schools on a pilot basis in the Mirpur area on earthquake preparedness and is focusing on school safety. They have developed school safety plan for each school.

Oxfam GB conducted a study in Sylhet city under the NAARI consortium funded by European Commission Humanitarian Aid and Civil Protection (ECHO) Disaster Preparedness Programme (DIPECHO) VI-Disaster Risk Reduction Programme. The main work consisted of developing and enhancing capacities of ward volunteers, developing ward disaster management committee and providing trainings to masons, engineers, and other building professionals. Oxfam GB in partnership with BUET conducted structural assessment of school and hospital buildings within the particular study area.

Islamic Relief Worldwide had an official partnership with some key stakeholders for implementing an urban project with FSCD (capacity building, trainings on search and rescue, and first aid), DGHS (for ensuring Mass Casualty Management in the hospital) and BUET (training on earthquake resilient construction).

Action AID Bangladesh was also involved in school safety programmes as well as hospital and garments factory safety programmes. Some of the earthquake preparedness initiatives taken: mass awareness on earthquake preparedness, capacity building of volunteers with FSCD on search and rescue, evacuation and first aid, equipping the FSCD for better response in the event of an earthquake, retrofitting of some important public buildings and formation and strengthening of ward disaster management committees under NARRI consortium.

Plan Bangladesh deals with earthquake preparedness focusing on schools and community by mobilising the targeted schools and communities to form disaster management committees (DMC), conduct risk and vulnerability assessments, develop risk management plans and raise awareness of the communities on disaster preparedness. School and community level simulation and mock drills are conducted at regular intervals.

2.7.2.3 International Donors

JICA Bangladesh is involved in “Capacity Development on Natural Disaster Resilient Techniques of Construction and Retrofitting for Public Buildings” which is a JICA technical cooperation project with the national Public Works Department (PWD). The project includes the training of 500 PWD engineers and about 1,200 newly graduated civil engineers. More than 150 construction companies are being trained in concepts of law and regulation.

World Bank- The Urban Earthquake Resilience Project of Bangladesh (US\$ 173 million) implemented by the World Bank through the GFDRR funding has an objective to strengthen the capacity of Government of Bangladesh agencies to respond to emergency events and to strengthen systems to reduce the vulnerability of future building construction to disasters in Dhaka and Sylhet.

ECHO- In an attempt to avoid large-scale casualties during earthquakes, DIPECHO, the disaster preparedness programme of the EU’s humanitarian aid and civil protection operations has devised a training programme on how to deal with disaster in primary and secondary schools in Bangladesh. This support focuses on increasing resilience of people, rather than buildings.

2.8 Education and Disasters

2.8.1 The Current Education Scenario in Bangladesh

The Bangladesh education system is large, catering to over 37 million students (2014), involving many stakeholders (for example there are 14 types of providers in primary education, 10 examination boards at the secondary levels, about 98.33% of secondary education are privately managed).

The education system of Bangladesh is comprised of a mix of heterogeneous providers. A variety of schools operate within the country; government run schools, privately run schools Madrasa, English medium schools, schools run by NGOs and kindergarten schools. Primary education spans grade 1-5; junior secondary grades 6-8, secondary grade 9-10, higher secondary grade 11-12 and tertiary education grades 13 and above.

Bangladesh has a centralised education system administered by the Ministry of Education (MOE) and the Ministry of Primary and Mass Education (MOPME). The MOPME and Directorate of Primary Education (DPE) are responsible for planning and management of primary, mass and pre-primary education. The Ministry of Education (MOE), Directorate of Secondary and Higher Education (DSHE) and Department for Technical Education (DTE) are responsible for post-primary education. The MOE and University Grants Commission (UGC) look after the overall management of higher education.

In Bangladesh there are 995,403 institutions offering primary and post primary education with 36 million students. Table 2.2 provides a snapshot of the education scenario in Bangladesh (BANBEIS, 2014).

2.8.2 Schools Role in the Community

School buildings often serve multiple purposes in a community. For most of the day, they house children, teachers and school staff. In addition to their role as learning centres, they may serve as gathering places for community events, meeting places for clubs and religious organisations, storage places for books and technical equipment, and public shelters in emergencies.

Table 2.2: Number of Institutions, Students in Bangladesh

Type of Education	Management	No. of Institution	No. of Student		
			Total	Girl	% Girl
Primary Education	Public	63041	14671914	7530261	51.32
	Private	45496	4881065	2383623	48.83
	Total	108,537	19,552,979	9,913,884	50.7
School Education	Public	327	280634	136122	48.51
	Private	19357	8879731	4738962	53.37
	Total	19,684	9,160,365	4,875,084	53.22
College Education	Public	297	1335291	597098	45
	Private	3688	2171092	1070741	49
	Total	3,985	3,506,383	1,667,839	48
Madrasa Education	Public	3	4992	365	7
	Private	9338	2361380	1269583	54
	Total	9,341	2,366,372	1,269,948	54

Source- BANBEIS, 2014

When a school building is vulnerable to natural hazards, the welfare of the entire community is at risk. The safety of educational institutions contributes directly to the quality of education. As vulnerable as schools are, they offer a broad range of opportunities to mitigate and respond to disaster for the whole community. As a gathering place for different members of the community, schools can disseminate information on disaster and create awareness of risks. School compounds are used for simulations of disaster scenarios.

When an extreme natural event is expected, emergency shelters, often school buildings, are opened to house the local population and keep them out of danger. In Bangladesh, schools in the coastal areas are built to be multi-purpose and to be used as emergency shelters after a disaster (e.g. cyclone or floods), to temporarily house affected people whose homes have been destroyed or are no longer safe because of damage from hazards.

In these situations, the structural soundness of the building is depended on to protect the population from the elements. Building safer school environments in urban and rural areas is part of creating safer and disaster resistant communities, and part of general disaster mitigation. Safer schools help guarantee continuity of education.

2.8.3 Disaster Preparedness in Schools

Schools play a versatile role in the communities and hence the impacts of disasters on schools are pervasive. Quality of education is affected as the learning environment gets distorted. Access to schools becomes limited due to either damage to buildings or occupancy of schools as shelters and/or bad communication channels. These impacts have cumulative and long term effects on communities. Making schools safer is important due to the following:

- School children form one-third of about 200 million disaster victims every year. Saving the lives of school children by making the school buildings safer is of paramount importance.
- Roughly one billion children aged 0-14 live in countries with high seismic and other disaster risk. Several hundred are at risk when they are attending schools. Giving disaster awareness to children will go a long way in saving their lives as well as the lives of others in the community.
- School-going children spend about 30-35% of their time in the school (in a 24-hour day-night period). Therefore, it is essential to make the school safe from disasters.
- Children are an excellent medium to reach the parents. Messages on safety, hygiene, etc., can be conveyed through the children to the parents and to the society at large.

2.8.3.1 Effects of Disasters on Schools in Bangladesh

Natural disasters have a severe and harmful impact on children's education in Bangladesh. As a result of the high frequency of natural disasters, tens of thousands of children lose precious educational hours every year. This loss translates into higher drop-out rates, lower academic achievement and denial of the basic right of education. Marginalised and excluded children especially those with disabilities, girls are at greater risk. It is predicted that both the frequency and intensity of disasters will increase in Bangladesh and those communities in the cyclone, flood and earthquake prone areas will be particularly at risk, which will only worsen the situation for children.

Past experiences and based on the available evidences in Bangladesh, it shows that education sector was hardest hit along with other sectors in the event of disaster. Starting from Cyclone of 1970, 1991, 2007 and floods of 1998, schools were

interrupted due to structural collapse. In the flood plain area, majority of schools were closed for more than three months. Disasters can have several negative impacts on schools. Not all disasters strike the schools directly and immediately. Sometimes schools are affected indirectly through students, staff and their families. Schools can be affected also in short or long term phases. An example of direct effect of a disaster event on a school is an earthquake that damages the school building. In the Nepal 2015 earthquake, 950,000 children were not able to attend school as almost 24,000 classrooms were damaged or destroyed (UNICEF 2015). Damages to the school infrastructure are directly related to reduction in school hours, and consequently, to a decrease in the quality of education. An indirect effect of disasters on schools can be seen in increased dropout rates of students in the wake of earthquakes, floods, droughts or communal riots. It is common for students to leave school after a disaster event, either because their parents need them to work for their livelihood, or because they are afraid of sending their children back to an unsafe school environment. Additionally, children may feel unable to attend classes or have problems concentrating because they are suffering from psychosocial impacts of disasters.

In Bangladesh, almost all the country's schools are already located in areas prone to regular flooding, cyclone, tidal surges and are at high risk from earthquakes. Since the devastating cyclone of 1970, an estimated average of 900 education institutions are completely damaged each year by cyclone, flood and river erosion (Alam et al., 2011).

63 million children in Bangladesh may become physically and socially vulnerable due to increased frequency and enormity of hazards like floods, cyclones and storm surges, tornadoes, riverbank erosion, drought and sea level rise. Physical vulnerability may include death, injury, diseases, physical abuse, chronic malnutrition and forced labour. Social vulnerability may include loss of parents and family, internal displacement, risk of being trafficked, loss of property and assets, and lack of educational opportunities (Das, 2010).

In a research by Shaw (2004), it was found that education coupled with self, family and community education can help a student to develop a “culture of disaster preparedness”, which, in turn, will help children to take right decisions and actions as an adult.

2.9 Global Scenario of Disaster Preparedness in Schools

2.9.1 Global Initiatives on School Disaster Preparedness

School safety has been given a major focus by the United Nations International Strategy on Disaster Reduction (UNISDR) when the 2006-2007 World Disaster Reduction Campaign was devoted to the theme ‘Disaster Reduction Begins at School’. This theme was chosen by UNISDR because (a) it is in line with the Priority 3 of the Hyogo Framework for Action 2005-2015: Use knowledge, innovation and education to build a culture of safety and resilience at all levels, and (b) schools are the best venues for forging durable collective values; therefore they are suitable for building a culture of prevention and disaster resilience.

2.9.2 Sendai Framework for Disaster Risk Reduction: 2015-2030

The Sendai Framework for Disaster Risk Reduction aims to strengthen disaster-resilient public and private investments, particularly through structural, non-structural disaster risk prevention and reduction measures in critical facilities, in particular schools and hospitals and physical infrastructures. It also emphasises on building better from the start to withstand hazards through proper design and construction, including the use of the principles of universal design and the standardisation of building materials; retrofitting and rebuilding; nurturing a culture of maintenance; and taking into account economic, social, structural, technological and environmental impact assessments.

2.9.3 One Million Safe Schools and Hospitals Initiative

The One Million Safe Schools and Hospitals Initiative started in 2013 and is a global advocacy effort to make schools and hospitals safe from disasters. The One Million Safe Schools and Hospitals Initiative encourages people, organisations, companies and governments to pledge to make a school or hospital safe and resilient to disasters. People in unsafe schools, hospitals and health facilities are at the greatest risk of losing their lives when a disaster strikes. UNISDR in collaboration with WHO, UNESCO, UNICEF, World Bank, ADB and other partners aim to raise public awareness and create a demand for safe schools, hospitals and health facilities.

2.9.4 Worldwide Initiative on Safe Schools

The UN Office for Disaster Risk Reduction (UNISDR) is facilitating action with members of the Global Alliance for Disaster Risk Reduction and Resilience in the

Education Sector (GAD3RES) to promote coherent and coordinated action on school safety globally. In this spirit, the UNISDR has coordinated the development of a Worldwide Initiative for Safe Schools as a global umbrella partnership programme for school safety implementation that encompasses key safe school initiatives in support of resilient educational facilities, school disaster management and disaster risk reduction and resilience education. The WISS was endorsed by GAD3RES members and resulted in the political commitment of 21 “Safe School Leader” countries to implement school safety on the ground. The Worldwide Initiative for Safe Schools focuses on motivating and supporting Governments to develop national strategies and implement school safety. A number of Governments have so far endorsed WISS and the “Istanbul Roadmap” following the First Meeting of Safe School Leaders hosted by the Government of Turkey in October 2014, Istanbul.

2.9.5 Comprehensive School Safety Framework

The Comprehensive School Safety Framework is a global framework intended to help organise for climate-smart disaster risk reduction and to bridge development and humanitarian action in the education sector. The goals of comprehensive school safety are:

- To protect learners and education workers from death, injury and harm in schools
- To plan for educational continuity in the face of expected hazards
- To safeguard education sector investments
- To strengthen climate-smart disaster resilience through education

The Comprehensive School Safety is addressed by education sector policies and plans aligned with disaster management at national, regional, district and local school site levels. It rests on three pillars:

- Pillar 1 - Safe Learning Facilities
- Pillar 2 - School Disaster Management
- Pillar 3 - Risk Reduction and Resilience Education

2.10 Disaster Preparedness in Schools in Bangladesh

From Bangladesh's perspective, school infrastructures are most vulnerable during disasters due to poor construction and, lack of proper maintenance. Moreover, as a result of the rapid urbanisation and over population in urban areas, schools are growing in an unplanned way to accommodate students in the education system.

The Directorate of Secondary and Higher Education, Directorate of Primary Education, Department of Disaster Management in collaboration with CDMP, Education Cluster, NARRI, DeSHARI, CARITAS and ECHO prepared the Framework for Disaster Risk Reduction (DRR) in Education and Education in Emergencies (EiE). In order to break down the tasks of DRR into manageable and actionable steps, the framework is flexible enough to incorporate the widest variety of concerns for inclusive risk reduction and child protection.

The Framework aims to mainstream inclusion throughout all three pillars in order to address and take into account vulnerabilities. The objectives of the Framework for DRR in Education and Education in Emergencies have much similarity to the Global Comprehensive School Safety Framework.

The objectives are as follows:

- Integrate due actions and provisions in different phases of disaster in education system to address the issues of safe and continued education in emergencies;
- Modify policies and guidelines to develop a Standard Operating Procedure (SOP) for continued education in emergencies and
- Strengthen climate-smart disaster resilience through education.

2.11 Earthquake and Schools

Unlike cyclones and some other natural hazards, earthquakes strike suddenly and without warning. If an earthquake should strike during the day, children will be in schools and will be affected and might be injured, school property will be damaged and school functioning would be disrupted. Moderate earthquakes can cause serious damage to building contents and non-structural building systems, serious injury to students and staff members, and disruption of building operations. Major earthquakes can cause catastrophic damage, including structural collapse and massive loss of life. The causes of casualties in a school to earthquake are:

- Lack of awareness on the part of students, teachers, school authorities and guardians about earthquake disaster;
- Lack of rescue plan for school safety during earthquake disaster;
- Lack of awareness programmes at school level such as discussion or drills in class rooms;
- Possibility of more losses if earthquake hits when classes are going on;
- There is nothing done on school safety in school and
- Lack of awareness of the policy makers.

Thus, it is very important to create awareness amongst children. According to Mimura (2011), in the Japan 2011 earthquake, 3000 children in elementary and middle-high schools managed to evacuate safely as soon they felt the tremors. This was due to the deep conditioning that they had during preparedness stage that led to a response to tremors.

2.12 Work in South Asia on Earthquake Preparedness in Schools

- Nepal - The death toll among Nepali schoolchildren would have been significant if the 7.8 magnitude earthquake of 2015 had struck on a school day instead of a Saturday, the only day when schools are completely closed. The Government of Nepal conducted a post disaster assessment on safety of schools and has incorporated lessons from it for future retrofitting and reconstruction of these schools through a School Safety Project under DIPECHO VIII.
- India - India is vulnerable in varying degrees to a large number of natural as well as man-made disasters, 58.6 per cent of the landmass is prone to earthquakes of moderate to very high intensity; over 40 million hectares. India has a **National School Safety Project**; this scheme is being implemented in 8600 schools in 43 districts of 22 states. This is a demonstration project to promote a culture of safety in schools by initiating policy level changes, capacity building of officials, teachers, students and other stake holders by undertaking information, education and communication activities with special regard to earthquakes, promoting non-structural mitigation measures and demonstrating structural initiatives in schools.
- Bhutan - Bhutan is located in the Himalayas and considered to be one of most seismically active zones in the world. Considering the location and as proven by the past earthquakes, earthquake is the one of the most imminent hazards in Bhutan. The Government of Bhutan has enhanced emergency response capability of schools. In this context the government had already circulated guidelines to prepare school disaster response plans and requested that mock drills be conducted in schools. The Department of Disaster Management has started the School Safety Programme, formulated guidelines for preparing School Disaster Management Plans and practicing regular drill.

- Myanmar - Myanmar is vulnerable to a wide range of natural disasters. While the country's coastal regions are particularly exposed to cyclones, tropical storms and tsunamis, rainfall induced flooding is a recurring phenomenon across the country. Additionally, the whole country is at risk from earthquakes, droughts and fires while the country's mountainous regions are also exposed to landslide risks. The government has a specific programme for school safety in Myanmar and the Ministry of Education is responsible for disaster risk reduction in schools which includes earthquake preparedness.

2.13 Preparedness in High Seismic Risk Countries

- Peru - The capital city of Lima is subject to frequent seismic activity. More than 64% of schools are highly vulnerable to earthquakes and exposes more than 600,000 children at risk. To mitigate damage, protect students against the impact of earthquakes, the Peruvian Ministry of Education, in partnership with the World Bank and the Global Facility for Disaster Reduction and Recovery (GFDRR), is working to strengthen the structural and functional conditions of school infrastructure and reduce seismic vulnerability through a National School Infrastructure Plan and Structural Retrofitting Programme.
- Japan - Perched on the Ring of Fire, an arc of seismic activity that encircles the Pacific Basin, Japan is one of the most earthquake-prone countries in the world but it is also one of the best equipped to handle them. There are around 1,000 tremors each year. They put in a lot of effort on preparedness measures including retrofitting of buildings etc. Every schoolchild in Japan is familiar with monthly earthquake drills in which alarms sound and children retreat under their desks to shelter from falling debris. If the children are out in the playground they rush to the centre of any open space to avoid being hit by falling debris. The local fire department also takes groups of children into earthquake simulation machines to familiarise them with the sensation of being in an earthquake. Schools with two storeys or more have evacuation chutes which children can slide down to safety.
- New Zealand - Earthquakes in New Zealand are due to the country being part of the Pacific Ring of Fire. About 20,000 earthquakes, most of them minor, are recorded each year. As a result, New Zealand has very stringent building

regulations. In New Zealand, the Ministry of Civil Defence and Disaster Management is mandated to lead in the preparedness and response activities to hazards. New Zealand Shakeout is a national multi-agency exercise planned annually. The initiative is led by the Ministry of Civil Defence and Emergency Management and is supported by government departments (including the Ministry of Education), emergency services, and other agencies.

Chapter 3

METHODOLOGY

Methodology describes the procedures to be followed for carrying out a research. It also explains the tools/methods to be used and how they will be used for collection and analysis of information relevant for the research work. This chapter deals with various steps (framework of study tools, sampling design and procedure, sample size determination, data collection, processing and analysis) towards the completion of the research.

For proper interpreting, analysis and information generation on any subject, clear understanding on that subject matter is very essential. The study mainly focussed on earthquake awareness and preparedness measures in schools at institutional level, guardian level and student level.

The study has used data from primary and secondary sources. Literature review has been conducted on the issue to identify any gaps and to derive any recommendations of good practice being followed externally. Further information has been collected from different sources like books, websites, reports and studies conducted by donors, UN and NGOs etc.

3.1 Sampling Design

Purposive sampling was done for the study. This sampling method was used to make sure the representation of different category and type of schools located in the study area. Study areas (zone and wards) and schools were also purposively selected. The study is focused in two zones of Dhaka North City Corporation of Dhaka city: Zone 1-Uttara and Zone 3- Gulshan) as it has a good mix of affluent English medium schools as well as government schools. The study area falls under the following Wards:

Ward Number 1:	Uttara
Ward Number 19:	Banani and Gulshan
Ward Number 21:	Badda

Selection of study area and the schools are based on purposive sampling technique. The children have been selected by random sampling from standard 8-10. The rationale for choosing senior students was the expectation that their awareness and understanding of the situation would contribute to the study. Parents were selected by random sampling and the questionnaires were sent out by email and hard copy and interested parents responded to the queries. Students and parents for questionnaire survey were randomly selected based on their availability and willingness to take part in the study.

3.2 Data Collection Method

3.2.1 Primary Data

The schools were presented with a questionnaire and appointment sought with the Principal or Head of Administration. This was followed by observation, discussion with school representative, interviews through questionnaire on perceptions of earthquake preparedness with groups of school children and parents. The sample questionnaire is attached in Annex A. Out of the 20 schools contacted (Table 3.1), 10 schools (Table 3.2) were receptive to be interviewed. The interviews were held with the representative of the school management. Questionnaires were sent to parents and children by email and hard copy.

3.2.1.1 Questionnaire survey

In order to conduct questionnaire survey, a semi-structured questionnaire was used for each of the individual respondents identified randomly. Before going for real data collection, a field trial of the questionnaire was done to check if there is any change needed to best fit the questions in the local context and to get the desired information properly from the respondents.

3.2.1.2 Data processing, cleaning and analysis

Collected data was entered and processed in a excel data sheet for analysis. Data from every individual respondent was cleaned by thorough check up and out of 25 data sets, 20 was found with full information for relevant analysis. Primary and secondary data was analyzed both quantitatively and qualitatively according to the nature of the data. Data table, graphs and charts was produced and presented in the study findings section.

Table 3.1: List of Schools Contacted

English Medium schools	Bangla Medium schools
Aga Khan School	Gulshan Model High School
Grace International School	Kalachandpur High School
Sir John Wilson School	T & T Adarsha Uccha Balika Biddalaya
Aurora International School	Banani Bidya Niketon
Chittagong Grammar school	Badda Girls High School
American International School	Satarkul High School
Australian International School	
Canadian International School	
The City School	
International School Dhaka	
Lakehead Grammar School	
HURDCO	
Scholastica School	

Table 3.2: List of Schools Interviewed

English Medium schools	Bangla Medium schools
Aga Khan School	Gulshan Model High School
Grace International School	Kalachandpur High School (phone)
Sir John Wilson School	T & T Adarsha Uccha Balika Biddalaya (phone)
Aurora International School	Banani Bidya Niketon (phone)
Chittagong Grammar school (phone)	Badda Girls High School

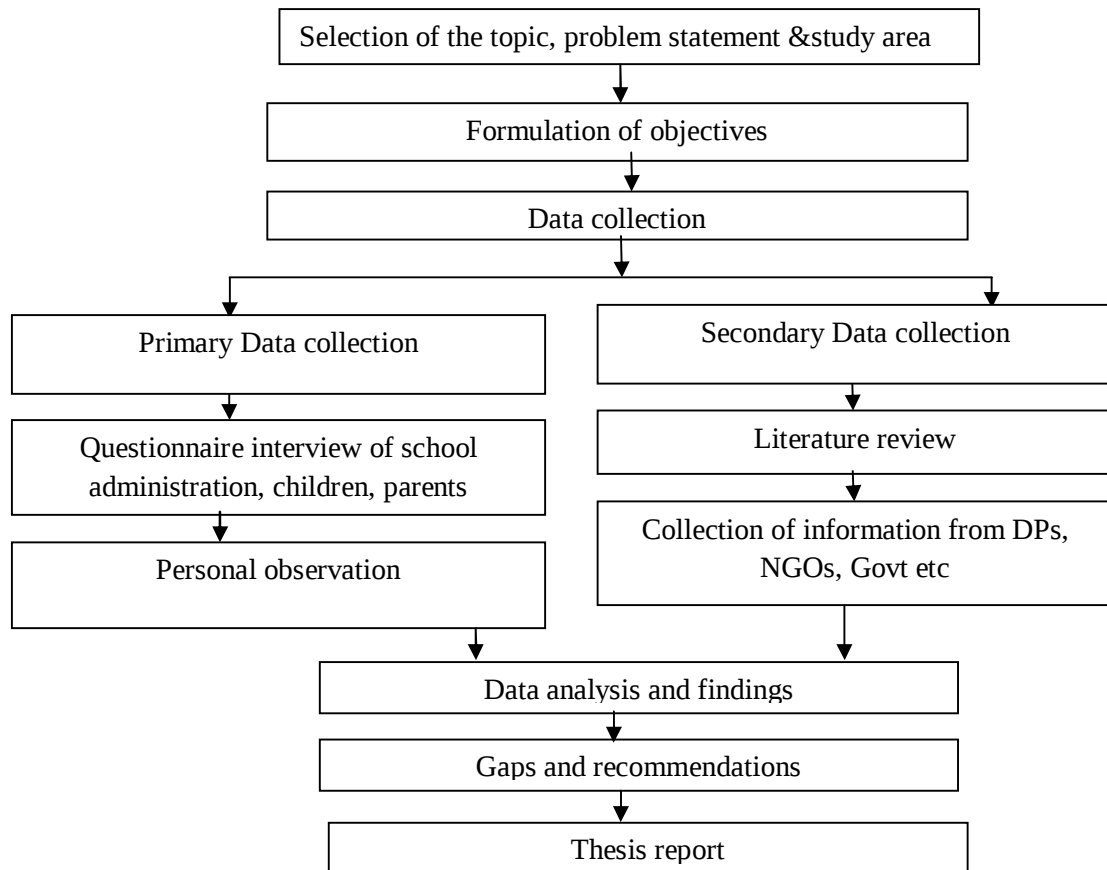
The researcher conducted interviews with professionals and experts on preparedness from international and national organisations e.g. World Bank, DFID, independent consultants, ECHO, UNICEF, Save the Children, Oxfam. The researcher also attended workshop on earthquake preparedness hosted by the Ministry of Disaster Management and Relief.

3.2.2 Secondary Data

Literature review was conducted on the earthquake preparedness measures in schools in Bangladesh, neighbouring countries as well as known high risk countries. A light touch review of the existing policy in Bangladesh on earthquake preparedness and school safety was conducted.

3.3 Activity Flow Chart

The activity flow chart in Figure 3.1 below describes the methodology sequencing followed in this study:



Chapter 4

PROFILE OF DHAKA CITY

4.1 Study Area

Dhaka city has been selected as the study area as Dhaka is the capital and the most developed city in the country. Dhaka as a metropolis has the largest number of schools in the city. Bangladesh is exposed to significant seismic risk due to its proximity to the seismically active tectonic plates. The city is located in the central risk zone for seismic activities. Dhaka is divided into Dhaka North City Corporation (DNCC) and Dhaka South City Corporation (DSCC). The population of Dhaka city is 6.5 million. The population of DNCC is 3.7 million and DSCC is 2.8 million. The density of population for Dhaka is 47,954 persons per square km making it one of the most densely populated cities in the world (World Bank, 2014). Dhaka North City Corporation has 5 zones with a total area of 82.638 square kilometres. The total number of schools under the study area is 721.⁴

4.2 Rationale of the Study Area

The city has the best educational institutions in the country with the availability of both public and private schooling. Many people come to Dhaka to provide quality education for their children. The services on offer are of a much higher quality and standard than other parts of the country. North Dhaka City Corporation has been chosen as the area of study see Figure 4.1. Uttara, Gulshan/Banani and Badda (Ward numbers 1 and Ward number 19 and 21) were also chosen for the presence of English medium schools registered under the Dhaka International Schools Association and CDMP trained Bangla medium schools. The schools were also chosen for the convenience of accessibility, perceived interest in the issue, anticipation of responsiveness from school management and parents. This area is also one of the most high risk areas prone to massive destruction of buildings following an earthquake.

⁴ DNCC website: <http://www.dncc.gov.bd/at-a-glance.html>

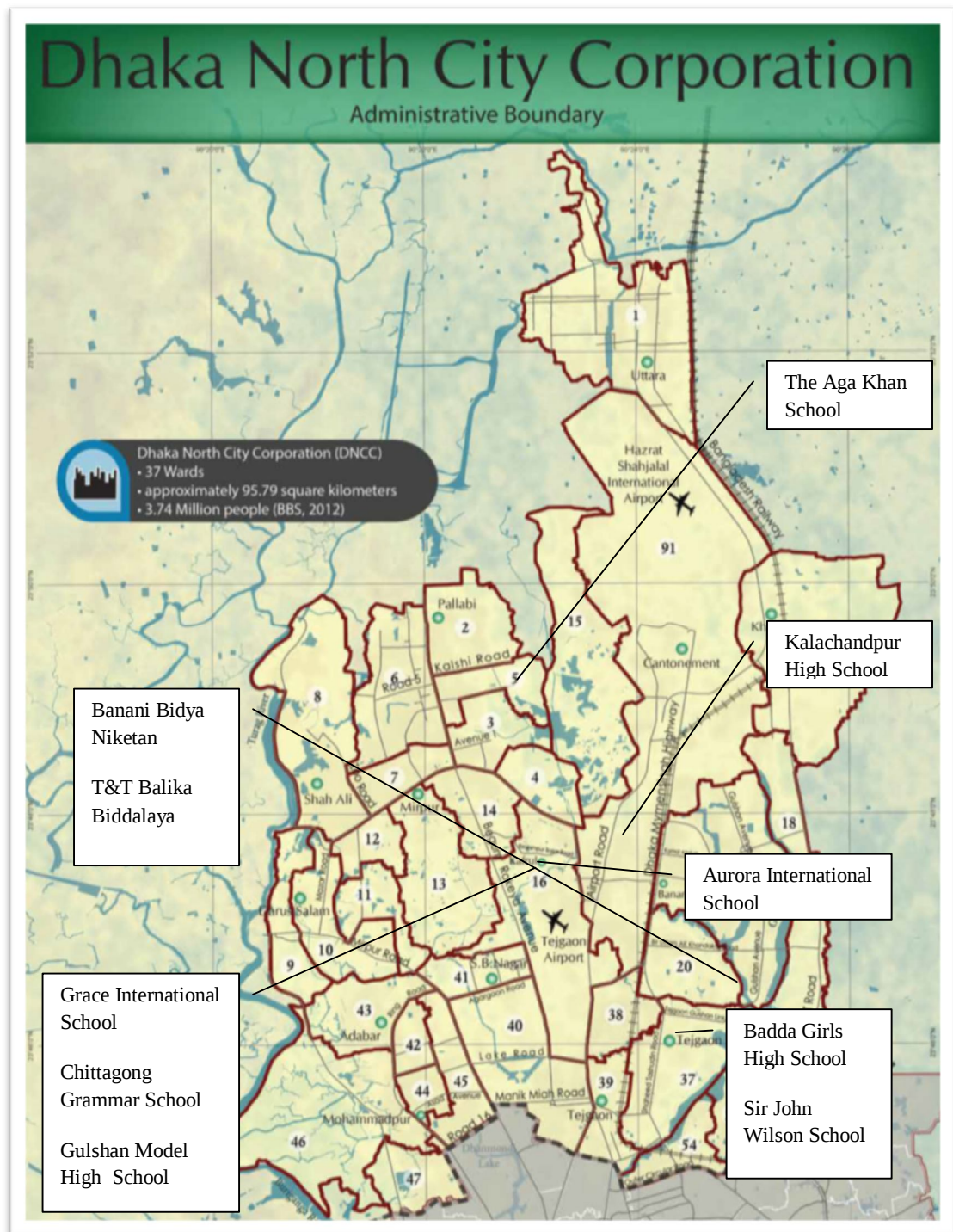


Figure 4.1: Dhaka North City Corporation (Source: World Bank, 2014) and selected schools

4.3 Geographical Setting of Dhaka

In Bangladesh, Dhaka is an important city and is the capital city in Bangladesh. Dhaka is situated between latitudes 23°42' and 23°54'N and longitudes 90°20' and 90°28'E. The city is bounded by the rivers Buriganga to the south, Turag to the west, Balu to the east and Tongi Khal to the north.

The city has three distinct seasons: winter (November-February), dry with temperature 10° to 20°C; the pre-monsoon season (March-May), some rain and hot with temperature reaching up to 40°C; and the monsoon (June-October), very wet with temperatures around 30°C. Dhaka experiences about 2,000 mm rain annually, of which about 80% falls during the monsoon. (Banglapedia, 2014).

Dhaka is situated at the southern tip of a Pleistocene terrace, the Madhupur Tract. Two characteristic geological units cover the city and surroundings, Madhupur Clay of the Pleistocene age and alluvial deposits of recent age. The Madhupur Clay is the oldest sediment exposed in and around the city area having characteristic topography and drainage. The major geomorphic units of the city are: the high land or the Dhaka terrace, the low lands or floodplains, depressions and abandoned channels. Low lying swamps and marshes located in and around the city are other major topographic features.

Dhaka has not only grown in size and volume, but also its character and characteristics have changed; it has seen its unplanned growth. Dhaka remains as an example of a city, which has grown at as speed that hardly its planners and regulators could keep pace with. In 2011, it was felt that administering the city by a single authority, the Dhaka City Corporation, was almost impossible. As a result by the Local Government (City Corporation) Amendment Bill 2011 (29 November 2011), the Dhaka City Corporation was divided in to two parts; Dhaka South City Corporation (DSCC) and Dhaka North City Corporation (DNCC). This Division came into effect on 04 December 2011.

4.4 Hazards affecting Dhaka

The increasing frequency of natural hazards as a result of increasing climate change poses significant risk to city dwellers. The most common natural hazards for Dhaka city are flooding and water logging, earthquake, tornadoes and extreme winds (Choudhury, 2007). Climate change aggravates these hazards. It increases the frequency and severity of floods. Moreover, with rural-urban migration increasing as a result of the climatic changes experienced throughout Bangladesh, hazards in urban areas are magnified. Increasing population pressures accompanied by poor infrastructure and a lack of public services heightens the risks posed (Dewan, 2013). Most of the poor people in Dhaka live in slums which are in low lying areas that have

been filled up and settlements made to accommodate a burgeoning population. Dhaka has also featured as the least 5 liveable cities in the world according to the Economist Intelligence Unit's (EIU) Global Liveability Survey.⁵

4.5 Earthquake Risk in Dhaka

Bangladesh is divided into 3 seismic zones based on the vulnerability to earthquakes and possible severity of damages. In all the classifications Dhaka city and its surroundings are shown to be situated in the seismic zone 2, the medium risk/hazard zone. The Global Urban Risk Index of World Bank 2013, places Dhaka second in region for mortality risk due to Earthquake. Recently measured plate motions measured that Dhaka is moving 30.6 mm/year in the North-East direction. Micro-seismicity data supports the existence of at least four earthquake source points in and around Dhaka (Figure 4.2). Dhaka is likely to be affected by the seismic sources mentioned in Table 4.1.

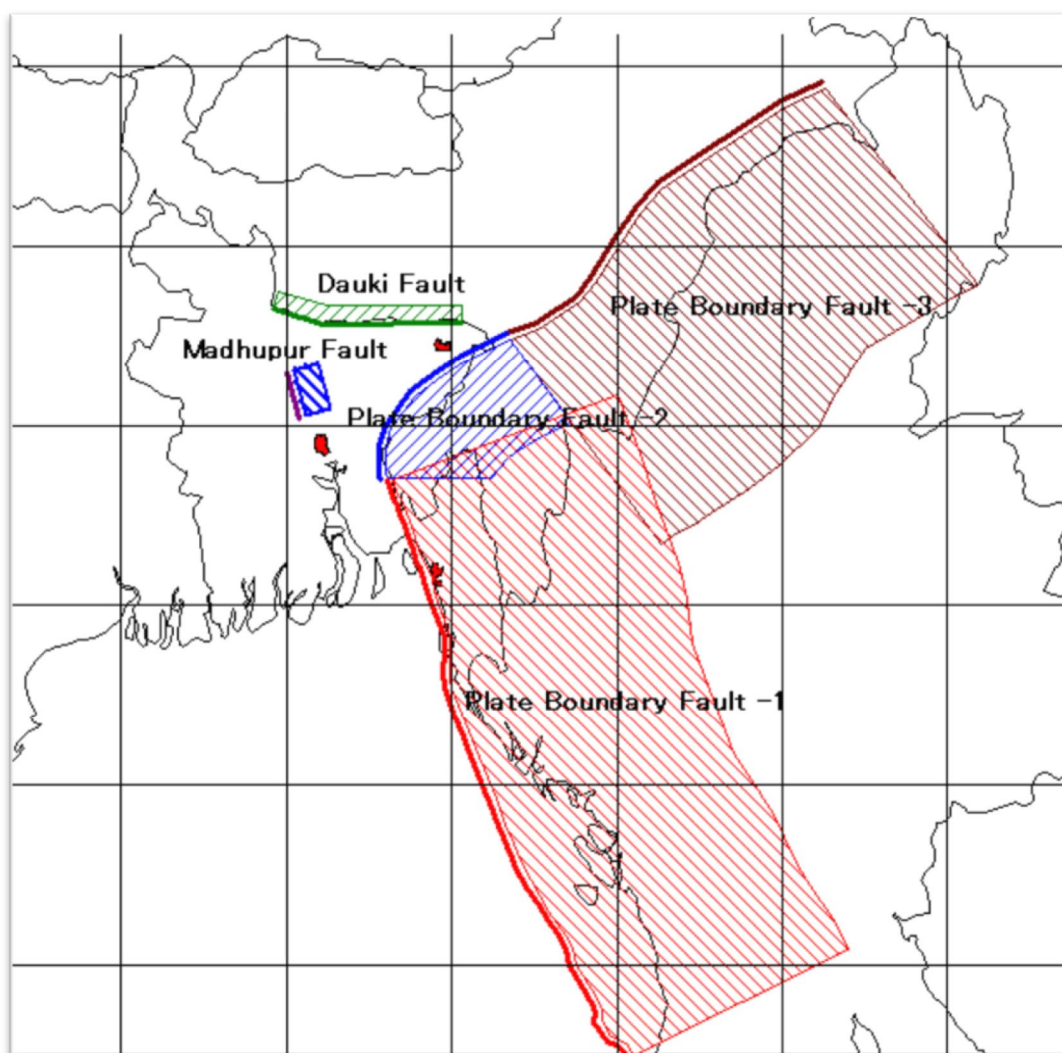
Table 4.1: Seismic Risks Affecting Dhaka

<i>Source</i>	<i>Estimated maximum magnitude</i>	<i>Last significant event</i>
Madhupur Fault (MF)	7.5	1885
Dauki Fault (DF)	8.0	1897
Plate Boundary Fault 1 (PBF1)	8.5	1762
Plate Boundary Fault 2	8.0	Before 16 th century
Plate Boundary Fault 3	8.3	Before 16 th century

Source: World Bank, 2014

Seismic zoning in Bangladesh indicates that Dhaka is under Zone II, and as such is at a real risk of an earthquake of significant magnitude. In the event of a M7.5 Madhupur Fault earthquake scenario, under current physical and social conditions, it is estimated that over US\$5.7 billion will be lost due to damages. It is also estimated that over 200,000 people will be injured and there will be over 50,000 fatalities.

⁵ <http://country.eiu.com/bangladesh>



Source : CDMP, 2009)

Figure 4.2: Faults near Dhaka

A study undertaken by the World Bank's Bangladesh Urban Resilience Project (BURP) in 2015 has produced the Dhaka Profile and Earthquake Risk Atlas. This report provides information on the physical, socioeconomic profiles, built environment, hazards, vulnerability and risks information with maps of Dhaka. These maps show the urban risk of the city and various scenarios if a M7.5 earthquake occurs in the Madhupur fault.

These projections are based on scientific modelling and predict that in the event of a 7.5 magnitude earthquake in the Madhupur Fault, there will be fatalities numbering thousands in Dhaka. The numbers of fatalities in Dhaka city will be approximately 38,000 while DNCC will have 20,057 fatalities, higher than DSCC with 18,000. In North Dhaka wards 13, 1 and 17 (Mirpur, Uttara and Khilket) will be the top three

affected areas. Wards 1, 19 and 21 are the chosen study area for this thesis. While Ward 1 (Uttara) will have considerable fatalities, Ward 19 and 21 (Gulshan/Banani and Badda) will have moderate fatalities. There are 600 hospitals, 2,737 schools, 10 fire stations, 62 police stations and 18 emergency response agency offices in Dhaka City Corporation area (CDMP, 2009). For the worst case scenario, HAZUS⁶ model estimates that out of 326,000 buildings, about 270,604 buildings will be at least moderately damaged in Dhaka City Corporation area. This is over 83% of the total number of buildings in the study area. There are an estimated 238,164 buildings that will be damaged beyond repair (CDMP, 2009).

⁶ HAZUS software of earthquake risk assessment was developed by the United States' Federal Emergency Management Agency (FEMA) and National Institute of Building Sciences (NIBS)

Chapter 5 **FINDINGS**

Following the study methodology, there was in-depth study of the secondary data gleaned from various sources like reports, journals, websites etc. A questionnaire was developed in three parts and circulated to schools, students and guardians. The following is a representation of the findings:

5.1 Schools

5.1.1 Preparedness Measures

The study questionnaire posed the crucial query to all schools on the preparedness measures adapted by the schools to earthquakes. All the schools stated that they are aware of earthquakes and the risk posed by it to the buildings and the students.

5.1.2 Awareness Creation and Policy on Earthquake Preparedness

The Bangla medium schools have had Earthquake awareness and drill training delivered through the CDMP programme starting in 2008. They have been provided small items (megaphone, first aid supplies, whistles etc). They conduct drills as per the directive of MoDMR.

The English medium schools have had no formal communication from Government to conduct drills nor any training provided to them by CDMP or any other organisation. They use their own resources to collect information and develop a preparedness plan for earthquakes. This is not verified or quality assured by any competent authority (e.g FSCD). 100% of the English medium schools reported that they are not obliged under any policy or rule by the Government to conduct any form of drills including for earthquake. They are not inspected in this aspect nor have to report on this to any authority.

5.1.3 Structural Assessment

6 out of the 10 schools are located in own building while the remaining are in rented premises as seen in Figure 5.1. None of the schools have had a structural risk assessment conducted on their buildings and did not mention any plans in the future

for structural mitigation measures to be taken for earthquake risk. The Bangla medium schools are mostly two storey masonry buildings and have playground which is used as assembly point. Most of the English Medium schools surveyed do not conform to any specific design standards and are either housed in residential buildings converted to schools or bespoke building. 3 out of 5 schools are double storied buildings with playground in front that can be used as assembly point. 2 schools are multi-storied buildings.

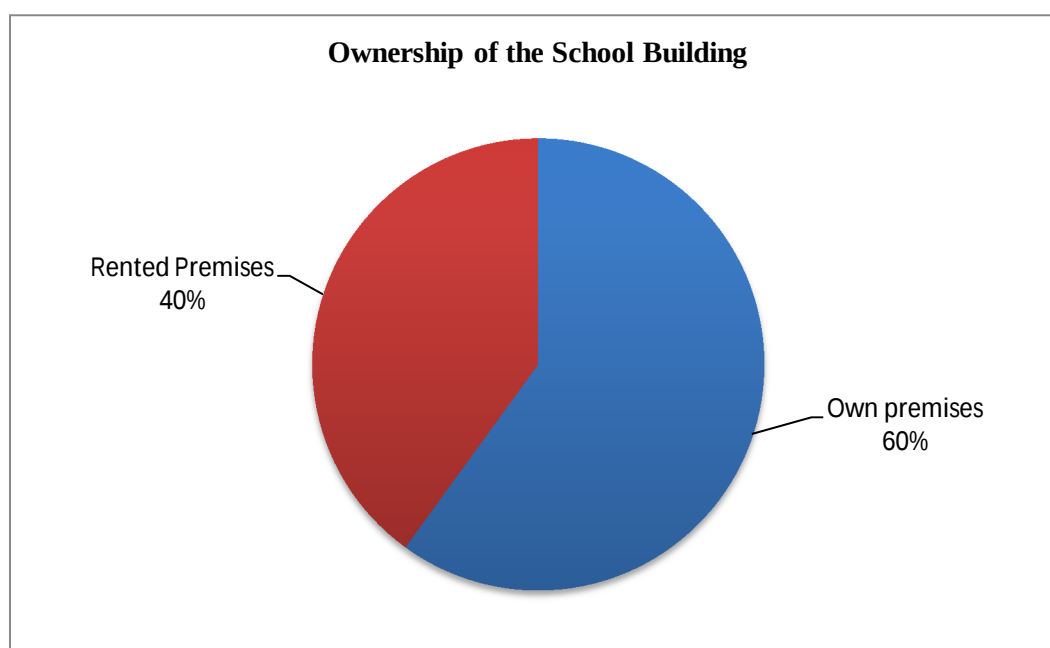


Figure 5.1: School Building – Ownership Status

5.2 Parents/Guardians

Parents of students from the schools had been contacted with a survey form to gain a perception of parents and guardians on their understanding and expectations of earthquake preparedness in schools. Most of the parents were educated and either employed professionals or homemakers.

5.2.1 Awareness of Parents about Earthquake and the Risk

As seen in Figure 5.2 there is a good understanding of earthquake and risk it poses to life and property where about 95% of parents said they were aware of it. This is definitely due to the increased instances of tremors that have jolted Bangladesh in the recent past and the coverage it received in media. Parents were able to articulate what the risk was and some of them explained it in the questionnaire.

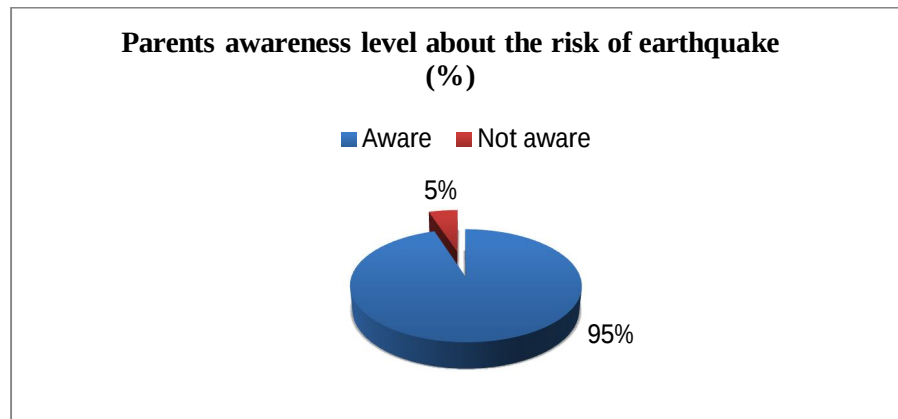


Figure 5.2: Awareness of Risk

5.2.2 Earthquake Risk Assessment of Schools

While most parents are aware of the risk of earthquake, about 85% of them were not aware whether an earthquake risk assessment had been conducted for the school that their child attended (Figure 5.3).

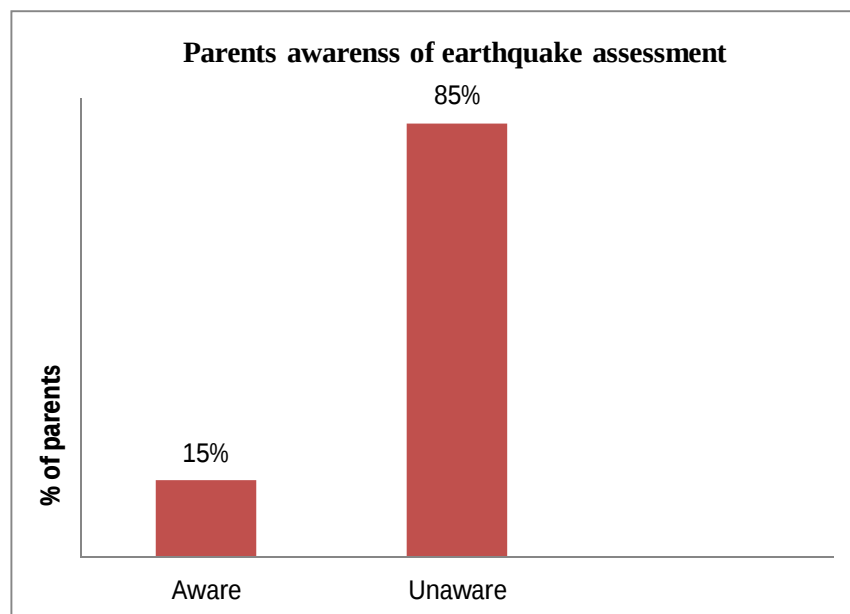


Figure 5.3: Awareness of Parents on earthquake assessment in Schools

5.2.3 Emergency Operating Procedures

It was very important that the guardians and parents were aware of the standard emergency operating procedures in place for earthquake and whether it was well communicated with parents. The study found that over 70% of the parents were not aware of the standard emergency operating procedures of their child's school and also reported that this had not communicated to them by the school. See Figure 5.4.

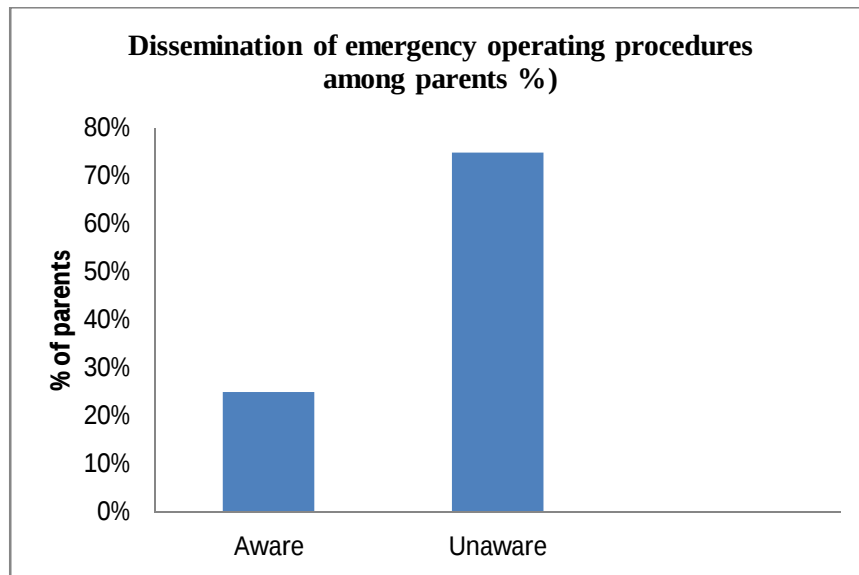


Figure 5.4: Dissemination of Emergency Operating Procedures

5.2.4 Awareness of emergency numbers

Studies have shown that the earthquake that strikes during day time can cause loss of more than 60,000 lives in Dhaka (CDMP, 2009). In case an earthquake strikes during day time and during school day, the parents should be able to communicate immediately with school authorities in order to enquire about the safety of their children. There is risk that all the communication channels in the city might collapse or the mobile phone system might get jammed due to the high spike in calls generated after the quake. It was found that only 45% of the parents were aware of the emergency contact number of the school. See Figure 5.5 for more information.

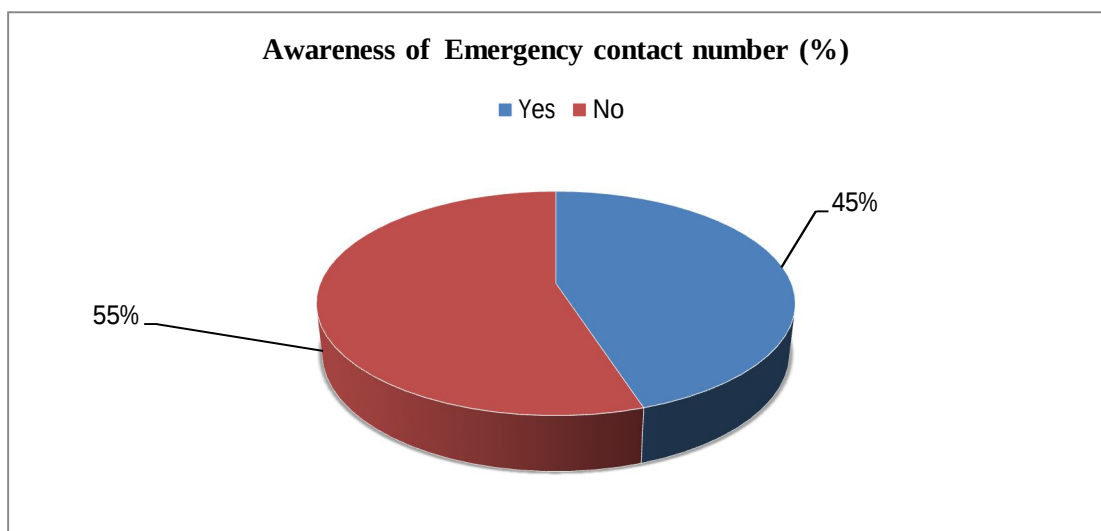


Figure 5.5: Awareness of Parents about Emergency Contact Number

5.2.5 Knowledge sharing

While most schools have confirmed that they conduct earthquake drills regularly it was not evident from the communication that the parents had from the school on the earthquake preparedness measures. Only 45% of the parents were aware about the drills that were held in schools and the safety messages that were passed on to their children. See Figure 5.6 and 5.7.

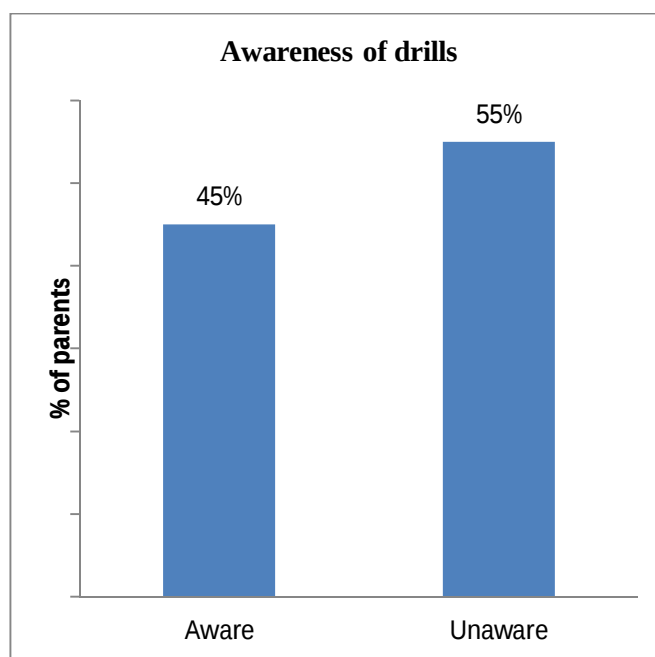


Figure 5.6 Earthquake Drill in School

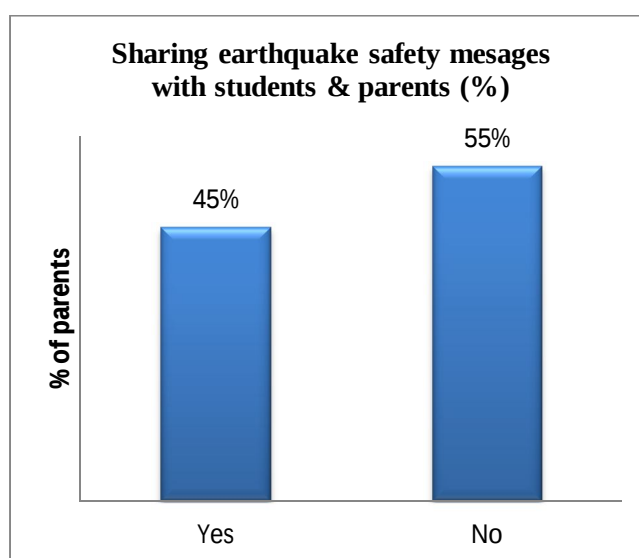


Figure 5.7: Safety messages from school shared with Parents

In a study conducted by Johnston et al (2011) in New Zealand on earthquake preparedness in schools, it was reported that schools that have well developed and regularly practiced emergency preparedness plans in place send a message to pupils and caregivers alike that in the case of an emergency, the school is prepared to protect the safety of the children. This reassures the parents on the school's ability to respond to the disaster in a more prepared manner.

5.3 Students

5.3.1 Category of Students

The study questionnaire was distributed to many school going children of higher classes (8-10). The rationale was to obtain information from school going children who could explain the procedures in their school and also form an opinion of the measures that they think the school should be taking. In Figure 5.8 we see that 73% of the children were from Class 9 and 80% were male.

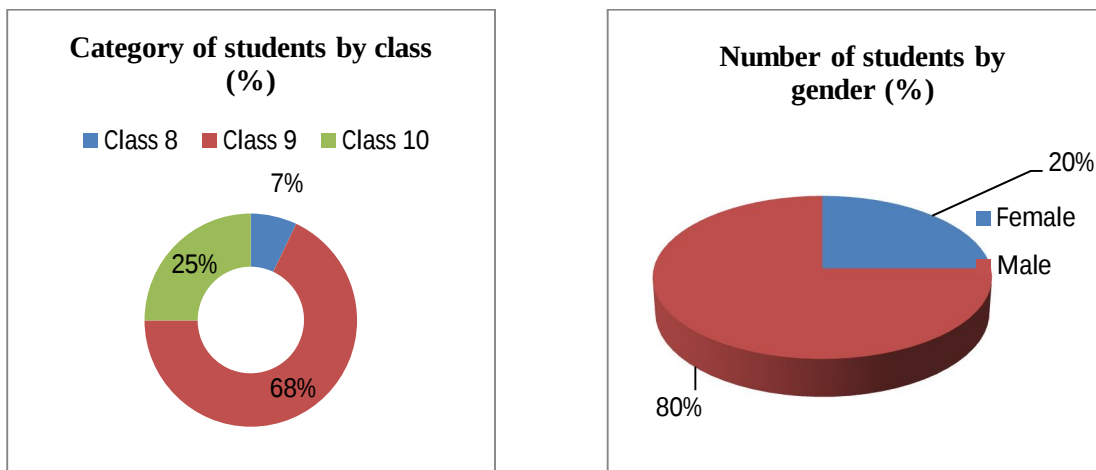


Figure 5.8: Category of Students

5.3.2 Awareness of Students about Earthquakes

The study was also interested to find out about the level of understanding about earthquakes. The dos and don'ts as well as understanding the risks of the quake to life and property. About 88% of the children surveyed had a basic understanding of what to do during an earthquake i.e. drop, cover and hold. Figure 5.9 presents this finding below.

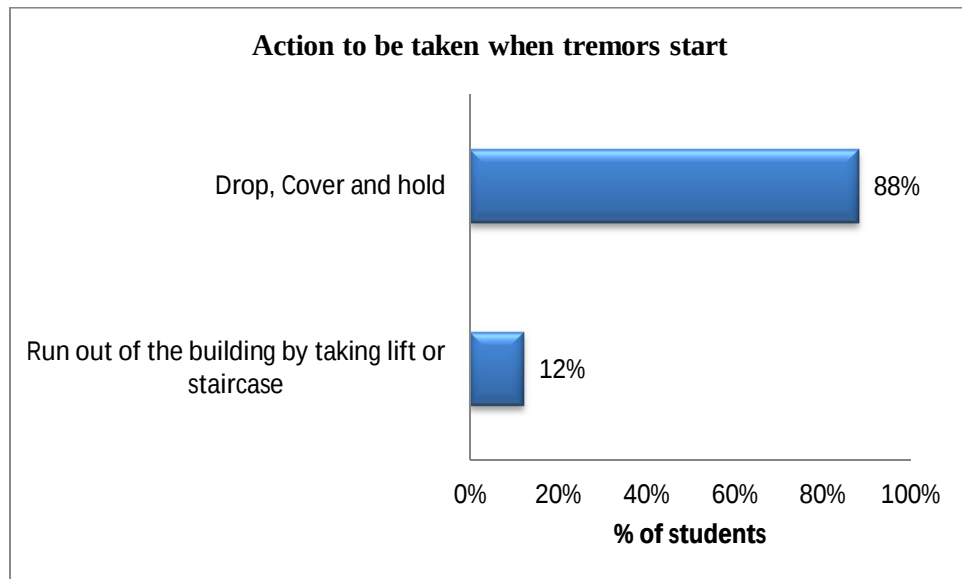


Figure 5.9: Awareness of Students of actions to do when earthquake strikes

5.3.3 Safe Areas in School

The students were further asked some questions specific to their school's approach to preparedness and their awareness of it. As seen in Figure 5.10, only 44% of the children surveyed were aware of the safe and unsafe places to be during an earthquake in their school. The ones who said they aware mentioned that it was not always marked in such a way.

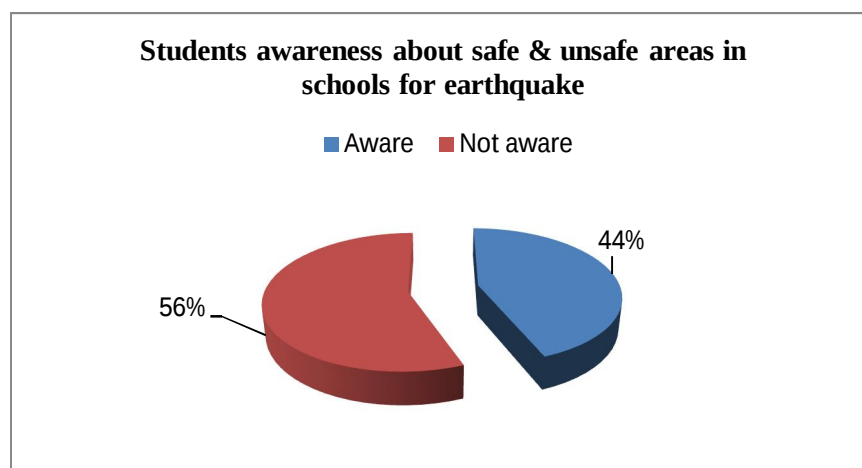


Figure 5.10: Awareness of Students of safe and unsafe places in schools

5.3.4 Alarm

As part of preparedness in any form of emergency, there should be a special alarm that should be raised in such circumstances and children, teachers should all be

conditioned to respond to it when it is rung e.g. fire alarm where a specific action is required. In Figure 5.11, 94% of the children confirmed that they were aware of the special alarm (usually the school bell is rung in a different rhythm than normal time).

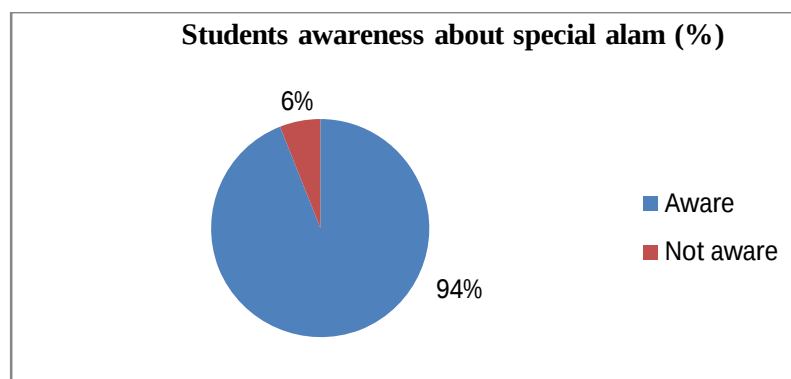


Figure 5.11: Awareness of Alarm

5.3.5 Evacuation Route

As part of emergency preparedness procedures, evacuation routes should be marked and informed. While 70% of the children were aware of the routes in their school, about 31% of the students were not aware about it. Figure 5.12 refers to the student's awareness of the evacuation routes in their schools.

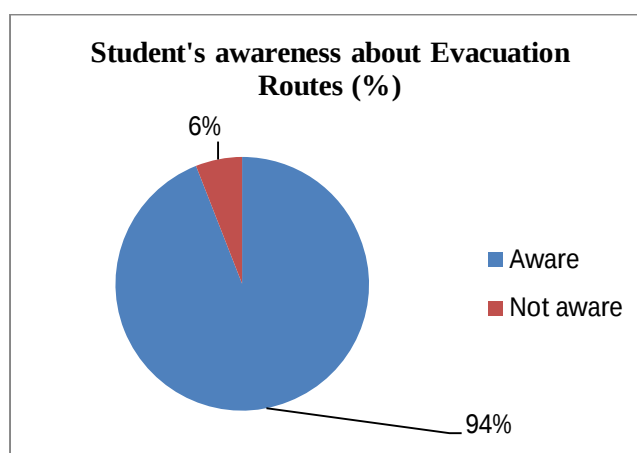


Figure 5.12: Awareness about Evacuation Routes

5.3.6 Emergency Operating Procedure

Figure 5.13 states that 81% of the children were aware of the standard operating procedures in their school and 19% did not know about it. This is especially encouraging to note that schools are trying to incorporate this into their routine preparedness.

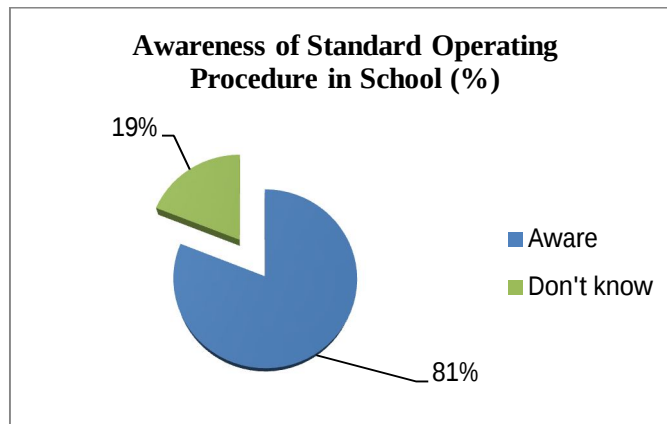


Figure 5.13 Awareness of Emergency Standard Operating Procedure in School

5.3.7 Perception of Mock Drills

100% of the children confirmed that their school conducted regular earthquake drills, it has been a recent phenomenon and in 75% of the responses it said it was conducted quarterly. In the Bangla medium schools, these started as part of the CDMP training on earthquake preparedness. The English medium schools acknowledged to its importance after the April 2015 Nepal Earthquake and later started implementing it. The perception of the students is shown in Figure 5.14 below.

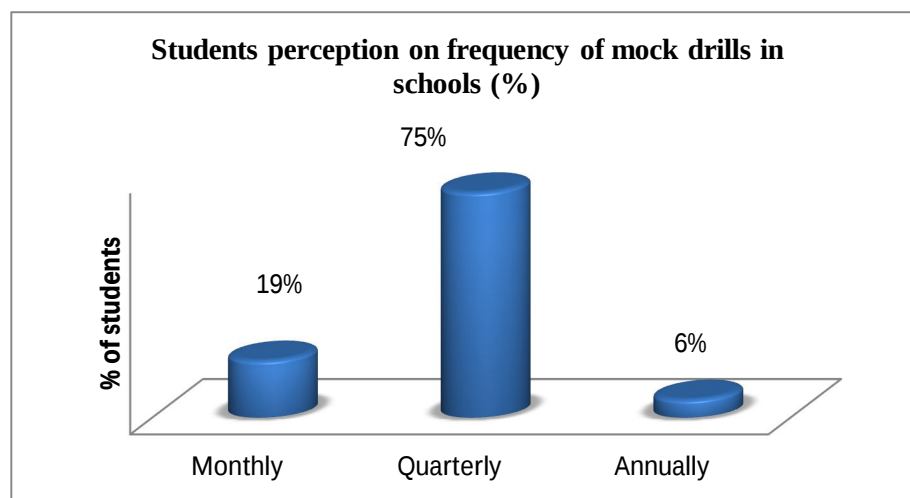


Figure 5.14: Frequency of Drills

5.3.8 Assembly Points

The students were asked about the assembly points (see Figure 5.15) and 81% were aware of the assembly point which was normally the play ground of the school. The Bangla medium schools have playgrounds that are generally used during drill practice as assembly points. The English medium schools have some open space in front of their building (not necessarily a playground) which is used as assembly point.

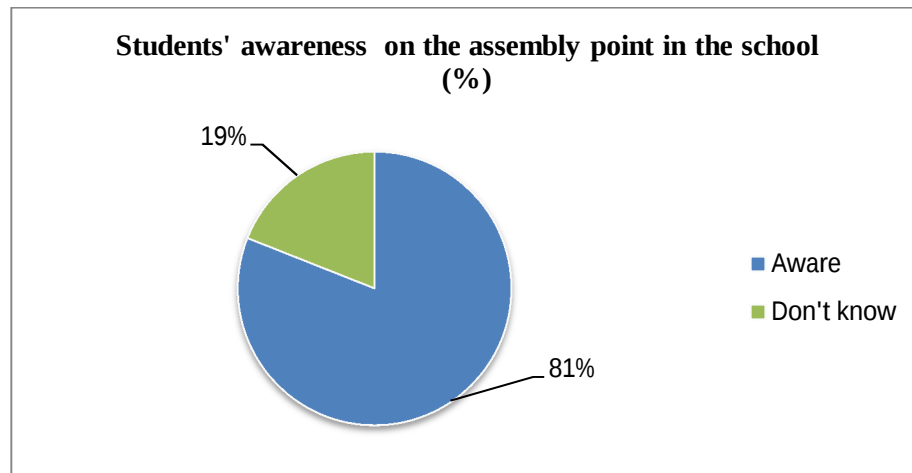


Figure 5.15: Awareness of Assembly Points

5.3.9 Scouts and Guides Programme

There is a strong Scouts and Guide presence in Bangladesh who are involved in community service, and during national disasters, such as the many floods that strike Bangladesh; Scouts are called to help with flood control, relocation of citizens and organising shelters. The Earthquake Preparedness Plan for Dhaka city mentions that these Scouts can be trained as first responders after earthquakes. It was found in the course of the study that while the Bangla medium schools have Scouts and Guides programme in their schools, trained as first responders for earthquakes, none of the English medium schools that had been surveyed had Scouts and Guides (see Figure 5.16).

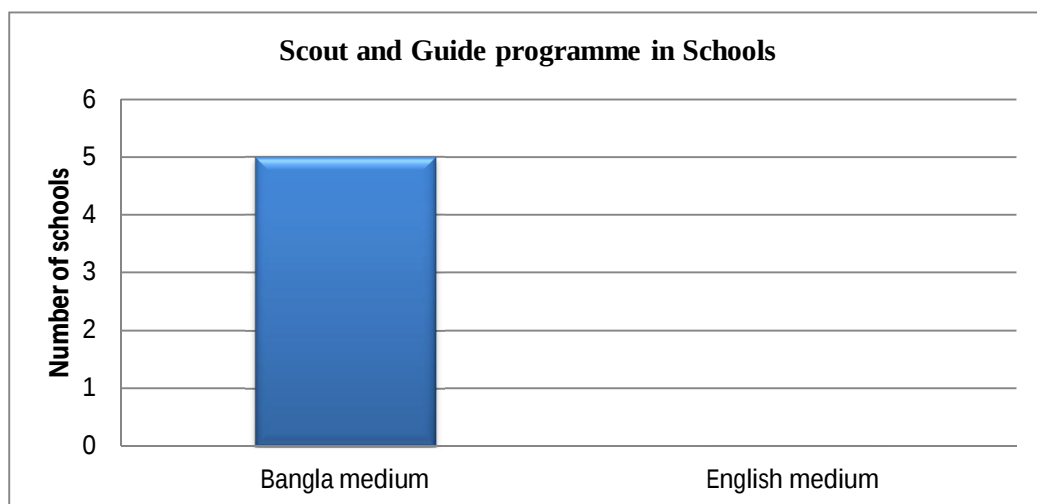


Figure 5.16: Presence of Scout and Guide Programme in Schools

5.4 Policy on Disaster Preparedness in Schools

After the 1991 Cyclone, Bangladesh was one of the first countries in the world to initiate actions for disaster preparedness. Over the years the country has moved away from the traditional reactive approach to addressing natural disasters that focused on relief and rehabilitation activities. They took a more proactive approach that included hazard identification and mitigation, community preparedness and integrated response efforts.

A paradigm shift in disaster management in Bangladesh was made through the CDMP programme which moved away the focus from relief and rehabilitation towards risk reduction, and to foster a holistic, multi-hazard approach to reducing the nation's risks and vulnerabilities to human-induced and natural hazards (Luxbacher et al., 2010).

There has been a huge input into this sector the first being the creation of a separate ministry to lead the disaster management and relief activities in the country. As mentioned in Chapter 2, there has been policy and legislature developed for disaster management.

If we consider from Earthquake preparedness policy especially targeting on schools, this has not been finalised. The Standard Operating Procedures (SOP) for schools during earthquakes that has been prepared by the Education Cluster has not been approved. During interview with the schools, it was found that the English medium schools are not bound by any policy to provide for either preparedness or awareness services to their children. There is no inspection of the schools for this purpose.

The Government has conducted drills and trainings in Bangla medium schools and has now mandated the Education Ministry to take this forward. During interviews with key personnel, they mentioned that there was nothing specifically planned for English medium schools. The trainings and earthquake drills are mostly conducted by the GoB and the NGOs for public schools. The English medium schools are widely ignored or not considered for any such programmes. The initiatives of the NGOs have also been largely limited to Bangla medium schools and there is no evidence to suggest that this has been taken forward in other schools.

While the English medium schools have mentioned that they have plans in place, this is not consulted with or quality controlled by any established professional institution.

Chapter 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The role of schools in the community is very important and it would be befitting to call schools as cradles of the society. Children are a dynamic and powerful force of change and are supporters in creating awareness in the community. They can contribute in a unique manner with energy and vision to find local solutions.

It is very important that the preparedness measures are strengthened and enhanced especially in schools. The Government of Bangladesh has been implementing school upgradation programme to reduce the physical risk to school infrastructures but this has been principally concentrated in the rural and coastal areas of Bangladesh to combat effects of floods and cyclones. Earthquake has been realised as a major risk recently.

The focus of the preparedness has been mostly on awareness and training of teachers and urban volunteers. While the students are informed about the earthquake preparedness measures taken in the schools, there is no evidence of this being cascaded to parents and guardians and this could lead to confusion in the event of an earthquake. There is no proper emergency management procedure in practice. The communication channels between parents and school is tenuous.

There is no legal umbrella under whose purview the schools are required to conduct these measures to a pre-defined quality and standard. This leads to misunderstanding and misrepresentation of facts as schools follow their own understanding of the actions to be taken and this could give wrong impression to the children.

There is no structural assessment and retrofitting measures planned by the Government for the public schools or for English medium schools. The buildings stand on risky land which has soft soil or sits on marshy land which has been filled up and is susceptible to liquefaction post earthquake.

Unlike countries like India and Nepal, who have a specific department to work on earthquake preparedness for schools, there is no specific authority to take forward earthquake preparedness for schools in the national context.

While there is a large emphasis placed on education in emergencies focusing on flood prone and cyclone prone areas which are mostly in the rural areas, there is little knowledge and impetus of any form of preparedness and risk assessment for schools in urban areas.

The long term sustainability of earthquake preparedness initiatives that have already taken place is questionable. There is no ownership building or dissemination strategy or capacity building programme in place.

A lot of studies have been conducted on earthquakes and plans prepared but due to the slow uptake of these by the responsible authorities, these have all become outdated. The slowness of the actions can spell doom for the country.

6.2 Recommendations

The recommendations can be divided by the key stakeholders and the actions that can be taken by them to improve and strengthen earthquake preparedness in schools. The main objectives should be to increase the awareness among students, teachers and other related authorities. This should be complemented with resource mobilisation for schools preparedness and participation of community as well as civil society in the school safety programme for reducing the risk. The following recommendations for each stakeholder might be useful for a better preparedness measure to be put in place.

6.2.1 Government

- i. The Government of Bangladesh should place more emphasis on earthquake specific school safety programme to be specially implemented in risky areas. Schools should lobby the Government for more inputs and support for the preparedness activities including access to proper training and other facilities. The earthquake drills should be made compulsory in all schools on a monthly basis so that it is ingrained into every student and staff of actions to be taken in case the tremor strikes.

- ii. Develop guidance for education authorities on policies and practices of school-based disaster risk reduction and preparedness, including standard operating procedures, simulation drills, contingency and educational continuity plans. The Comprehensive Disaster Management Programme (CDMP) had prepared a Earthquake and Tsunami preparedness training manual for teachers on school safety and evacuation. This could be adapted as the basic guideline. The Education Cluster has been preparing a draft SOP but this has not been approved. Time is of the essence to all this as an earthquake will come with no warning.
- iii. Government should design a bespoke National Action Plan for School Earthquake Safety and entrust a competent authority to ensure that it has an action plan which should include projects to undertake in the short, medium and long term to ensure that all schools, both public and private are safe from the impacts of future earthquakes. Countries like Nepal, Bhutan and India already have these plans in place and it could be useful reference.
- iv. While some NGOs have implemented earthquake preparedness programmes especially targeting schools for example Plan International's School Safety Planning (SSP) (Plan), these have been completed in pilot stage and have not been taken forward in a large scale and the lessons learnt have not fed into any large school safety programme. This should be taken up by Government.

6.2.2 School

- i. A risk assessment of the school should be carried out by a competent authority and disseminated to school authorities while identifying risk mitigating actions and timeline for completion.
- ii. Safe and unsafe areas should be marked all over the buildings for easy reference especially for smaller children.
- iii. Schools should have adequate stocks of emergency supplies in case the earthquake strikes during the day and they need to wait for rescue services to arrive.

- iv. A communications plan should be developed in consultation with parents to ensure that the flow of communication is resumed as soon as possible.
- v. Each school should invest in first aid training and fire management for key staff so that the first responders can be from the school itself and can help provide relief till the emergency services arrive.
- vi. Schools should have compulsory sensitisation sessions for children with trained teachers/facilitators to discuss:
 - a. why earthquake safety is important, basics of the hazard to Dhaka city and how it can affect their school/area
 - b. To understand what might happen to school building and to its furnishings, equipment, and systems if a strong earthquake occurred.
 - c. Understand how to reduce the damage and consequences caused by an earthquake, Recognise and understand, conceptually, how to anchor or relocate items than can fall, slide, or topple and cause injury or block exits
 - d. Understand why the school will need to develop a school emergency preparedness plan
 - e. Practice it with drills
 - f. Know what to do before, during, and after an earthquake and encourage them to discuss with their families to make a similar risk assessment at home and develop a family preparedness plan.
- vii. All English medium schools should undertake Scouts and Guide programme or any other form of recognised volunteer programme in schools which will help with the earthquake preparedness as they will act as first responders.
- viii. Budgets should be set aside in schools to acquire and stock up necessary relief and preparedness items e.g. earthquake kits, emergency light, water, food and medicines.
- ix. Trainings on evacuation, search and rescue, fire fighting, first aid should be mandatory for school authorities.

6.2.3 Parents/Guardians

Parents and guardians will have equal if not more interest to ensure that proper preparedness measures are put in place for schools where their children spend most of their time during the day. They should try to ensure the following:

- i. Meet the school authorities either by themselves or as part of a larger group and try to understand what preparedness measures school has in place for events such as these. If the school does not have an emergency plan in place, they should demand that such a system is put in place at the earliest.
- ii. Parents could advocate their elected representatives to place importance on this very crucial agenda of school safety and endeavour to form a policy/regulation to be implemented and monitored.
- iii. Parents could also understand earthquake preparedness steps and work as a family to develop a family preparedness plan and impart the teachings to their children, who can put it to use if an event arose while they were in school.

School Safety planning is the process of assessment and planning, physical protection and response capacity development designed to protect students and the staff from physical harm; minimise disruption and ensure the continuity of education for all children and develop and maintain a culture of safety. This should be enshrined in the ethos of all educational institutions as a minimum standard.

As the instances of earthquakes are increasing in trend e.g. in the month of August alone, there were about 3 noticeable shakes in the region, we should be prepared for the big one when it hits us directly. The culture of responding after a disaster has struck should be changed to a more pro-active responsive mindset. This is the only way that the loss and damage from the potential quake can be minimised and managed for a better outcome.

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ANNEXES

Annex A - Questionnaire

Earthquake Preparedness in Schools in Dhaka

Introduction

Bangladesh is one of the most disaster prone countries in the world. Bangladesh is prone to floods and cyclones, and the risk of other disasters such as drought, earthquakes, and tornados is increasing. During any disasters, school as a public space are mostly vulnerable as demonstrated in many calamities e.g. during the Haiti earthquake in 2010 and the 2015 Nepal earthquake where more than 8000 schools were completely destroyed.

When earthquake occurs nothing is spared; may it be a dwelling house, a commercial building, a school or a religious establishment. If an earthquake should strike during the day, children would be the worst sufferers as they are usually at school, away from their parents and are not mature enough to look out for themselves.

Therefore it is imperative that efforts to build earthquake preparedness in schools should be a mutually important agenda and responsibility of government, school communities⁷ and stakeholders.⁸

The researcher is keen to hear from school and school management committee on:

- the preparedness measures adapted by the schools in response to disasters with a specific focus on earthquakes;
- perception of stakeholders on their understanding and expectations of earthquake preparedness in schools and
- the policy on earthquake preparedness and its implementation in schools in Bangladesh

Thank you!

Nafisa Ziauddin
April 2016

⁷ School communities include people involved in teaching-learning activities: students, teachers, education practitioners and headmasters/mistresses.

⁸ School stakeholders refer to communities that are interested in both school communities and community institutions surrounding the school.

Earthquake Preparedness in Schools in Dhaka (Questionnaire for Schools)

Name of respondent:

Position:

Please draw on your own personal experience or observations. The questions will take no more than 10 minutes of your time to complete.

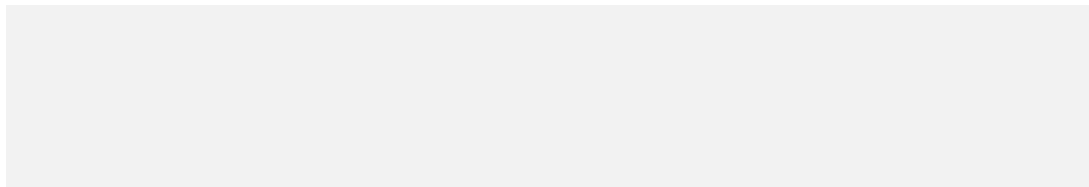
1. Name of the school:
2. Address:
3. Ward:
4. Thana:
5. Year of establishment:
6. Year of construction:
7. Medium of instruction:
8. Affiliation: Govt of Bangladesh/Cambridge/Edexcel/Others.....
9. Number of students: Male Female
10. Number of teachers:
11. Number of administrative staff:
12. Operating hours:
13. Operational days:
14. Area of the premises:
15. Area of the playground:
16. Area of the building:
17. Type of building i.e. single storied or multi storied:
18. Own building or rented premises:
19. Number of floors:
20. Total number of class rooms:
21. Total number of class rooms per floor:
22. Number of exits:
23. Number of lifts:
24. Number of staircases:
25. Alternative fire escape/exits:
26. Designated assembly point:
27. Public Address systems:
28. First aid room:
29. Disabled access:
30. What is the level of security during school hours i.e. are gates closed?

Earthquake Specific questions

1. Has there been a risk assessment of the school to earthquake? When was it conducted? By whom?
2. What actions are taken after assessment?
3. What mitigation actions taken for earthquake? Are they structural in nature
4. What preparedness actions taken for earthquake? Does the school have Standard operating procedures for earthquake?
5. Are safety drills held especially for earthquakes? How often and by whom?
6. Have safe places in the school been identified and marked?
7. How is earthquake safety messages communicated to children? How regularly?
8. What is the communication system protocol with guardians following an earthquake?
9. In your opinion, what is the first thing one should do when the earthquake tremors start?
10. Does your school have Boy Scouts/Girls guide?
11. Are the Boy scouts/Girl guides trained for the following? Circle the ones that apply.
 - o Search and rescue
 - o Fire fighting
 - o First aid
 - o Others please specify.....

12. Is there any government of Bangladesh guideline/policy/rules with respect to earthquake preparedness in schools? If so, please explain what they are?
13. Is the school evaluated on the above and by whom? What happens for non-compliance?
15. Have you ever experienced an earthquake or tremor? **Yes or No.** If yes, can you write in few lines what you did at that time?

Do you have any other comments to make which have not been captured above? Please feel free to add them in the box below:



Thank you for taking the time to complete this survey.

Earthquake Preparedness in Schools in Dhaka (Questionnaire for students)

Please draw on your own personal experience or observations. The questions will take no more than 10 minutes of your time to complete.

Name of Student:

Male/female:

Class/Grade:

Name of school:

Please circle your choice

Question 1

In your opinion, what is the first thing one should do when the earthquake tremors start?

- ☐ Run out of the building by taking lift or staircase
- ☐ Drop, Cover and hold
- ☐ Don't know

Comments-

Question 2

Are you aware of the safe and unsafe places in your school for an earthquake? Are they marked clearly?

- ☐ Aware
- ☐ Unaware

Comments-

Question 3

Are you aware of the special alarm that is raised in case of an emergency?

- ☐ Aware
- ☐ Unaware

Comments-

Question 4

Are you aware of the evacuation routes in your school? What are they? Note them in the comments box.

- ☐ Aware
- ☐ Unaware

Comments

Question 5

Does your school have standard operating procedures for earthquakes?

- ☐ Yes
- ☐ No
- ☐ Don't know

Comments

Question 6

Does your school conduct earthquake drills?

- ☐ Yes. [If yes, go to Question 7.]
- ☐ No. [If no, go to Question 8.]
- ☐ Don't know

Comments

Question 7

How often does your school conduct the drills?

- ☐ Monthly
- ☐ Quarterly
- ☐ Annually

Comments

Question 8

Are you aware of the assembly point of your school where you would go after the tremor subsides?

- ☐ Aware
- ☐ Unaware
- ☐ Don't know

Comments

Question 9

Does your school have Boy Scouts/Girls guide?

- ☐ Yes
- ☐ No
- ☐ Don't know

Comments

Question 10

Have you ever experienced an earthquake or tremor? **Yes or No.** If yes, can you write in few lines what you did at that time?

Do you have any other comments to make which have not been captured above? Please feel free to add them in the box below:

Thank you for taking the time to complete this survey.

Earthquake Preparedness in Schools in Dhaka (Questionnaire for Parents)

Name of respondent (optional):

Name of school that your child/children attend:

Please draw on your own personal experience or observations. The questions will take no more than 10 minutes of your time to complete.

Earthquake Specific questions

1. What are risks to school buildings from earthquakes?
2. Has an earthquake risk assessment been conducted for the school that your child attends?
3. Is there an earthquake preparedness plan for the school that your children attend
4. Are earthquake drill held in schools
5. Does the school have standard emergency operating procedures in place for earthquake? Is it well communicated with parents?
6. Do you know who to contact in the school if the quake strikes during school hours?
7. Does the school share earthquake safety messages with children and parents?
8. What is the Govt's role in ensuring safety in school from earthquakes
9. In your opinion, what is the first thing one should do when the earthquake tremors start?
10. Do you have any other comments to make which have not been captured above? Please feel free to add them in the box below:

Name of school that your child attends:

Your contact details, optional

Thank you for taking the time to complete this survey.

Annex B

Earthquake Drill held at Gulshan Model School and College, Gulshan (2015)



Photo 1: Earthquake Drill: Children taking cover under their tables following the alarm



Photo 2: Earthquake Drill: Children taking cover under their tables following the alarm



Photo 3: Children coming down to the Assembly Area with their bags on their heads to protect from falling debris



Photo 4: Children in the Assembly Area for roll-call



Photo 5: Guide volunteers helping with search and rescue



Photo 6: Guide volunteers administering first aid