punjab geographer

A DOUBLE BLIND PEER REVIEWED JOURNAL OF APG AND ISPER INDIA INDEXED IN SCOPUS

VOLUME 17 ISSN- 0973–3485 OCTOBER 2021

EVALUATION OF PREPAREDNESS OF SCHOOLS IN CHITTAGONG CITY OF BANGLADESH TO FACE EARTHQUAKE EVENTUALITIES

Mst Sanjida Alam

Abstract

An earthquake is a natural disaster and can cause human casualties and severe damage to physical resources. The impact of an earthquake can be shocking in the case of schools because of a mass gathering of the young community. Studies have found that schools are inadequately prepared to face earthquake eventualities. We cannot prevent earthquakes, but we can take precautionary measures to minimize the impact. This research reports the earthquake preparedness status of selected schools in Chittagong (city area) located in one of the most earthquake-prone areas of Bangladesh. The study is based on primary data collected by surveying 45 randomly selected schools in Chittagong. The schools` responses have been collected on eleven indicators associated with the schools` earthquake preparedness levels. The indicators have been evaluated comprehensively by factor analysis. The suitability of factor analysis for the study has been confirmed by Kaiser-Meyer-Olkin (KMO) Measure, which has been found to be 0.824. The findings highlight that selected schools in the study are not well prepared to face earthquake eventualities. Sixty per cent of the schools do not have a disaster plan, whereas a disaster plan is essential for a mass gathering place such as schools to act in an emergency. Moreover, 67 per cent of the schools are least prepared in more than half of the indicators, risking 28,136 lives. However, no statistically significant results have been found to confirm that the levels of preparedness are based on previous experience of an earthquake. Similarly, strength of population does not induce the school authorities to get prepared for an earthquake. The findings highlight disparities in schools` earthquake preparedness, which may be useful for policy formulation and can contribute towards developing disaster plans in Chittagong and other cities of Bangladesh.

Keywords: Earthquake, Disaster preparedness, Schools, Risk assessment, Chittagong.

Introduction

An earthquake refers to shaking caused by breaking or displacement of rocks beneath the Earth`s surface (Panchuk and Earle, 2015). Earthquake vulnerability in Bangladesh is high due to its proximity to some active faults and socio-political factors such as non-engineered building structures, inadequate safety measures, and high population density (Alam, 2020). Historically, around 562 earthquakes trembled the Bangladesh region between 810BC and 2012AD, and over the last 150 years, five earthquakes with magnitudes of 7 or greater shook the country (Islam and Islam, 2016). The earthquakes that occurred in 1762 and 1897 trembled in south-eastern and northern parts of Bangladesh. Similarly, the earthquakes that occurred in, 1934 and 1950 have been strongly felt in the region (Alam, 2020).

The construction quality of buildings is intensifying the vulnerability. Most of the buildings (residential and commercial) are built as per the owners' instructions, which are unlikely to follow the proper building code. Without following the code for construction, the buildings become structurally vulnerable and unprepared to resist any moderate magnitude of earthquakes (Anisuzzaman, 2007). Moreover, preventive measures such as fire protection systems (Sharfuddin, 2001) and emergency evacuation (Islam and Islam, 2016) are also absent in most of the buildings. Growing population density is also escalating the vulnerability. In the past decade (2001-2011), the population of the city has increased by 15.19 per cent (Bangladesh Population and Housing Census, 2015), but sufficient accommodation has not been created (Sharfuddin, 2001).

An earthquake can seriously impact schools` education, because of the injury to schools` staff and students or the damage to schools` physical resources (Lee et al., 2008). In the Kashmir earthquake (2005), at least 17,000 school children died (Ersoy and Ali, 2016). In the Sichuan earthquake (2008), the number of students` death mounted to 19,000 (Wisner, 2006). Moreover, the Chi-Chi earthquake (1999) in Taiwan destroyed 43 schools in the Nantou and Taichung area, totaling 700 schools nationwide. Similarly, the Gujarat earthquake (2001) damaged 11,600 schools and with Kashmir earthquake (2005) 9300 schools collapsed in India (Ersoy and Ali, 2016).

Therefore, schools` should have adequate preparedness for an earthquake to protect the young community and schools` physical resources. However, schools are found to be inadequately prepared. Multiple studies reported this shortcoming. In his study, Ocal (2010) found that the schools` preparedness for earthquakes is inadequate. Similarly, Russell et al. (1995) have reported that people who live in hazardous areas are not adequately conscious about their safety issues, and consequently, their preparedness measures are inadequate for disasters. To ensure that schools undertake adequate earthquake preparedness measures to protect schools` staff and students from the possible devastating effects of an earthquake, schools` earthquake preparedness must be studied and reported. In the light of above, this study has been taken up to know the earthquake preparedness status of schools in the Chittagong City Corporation area of Bangladesh.

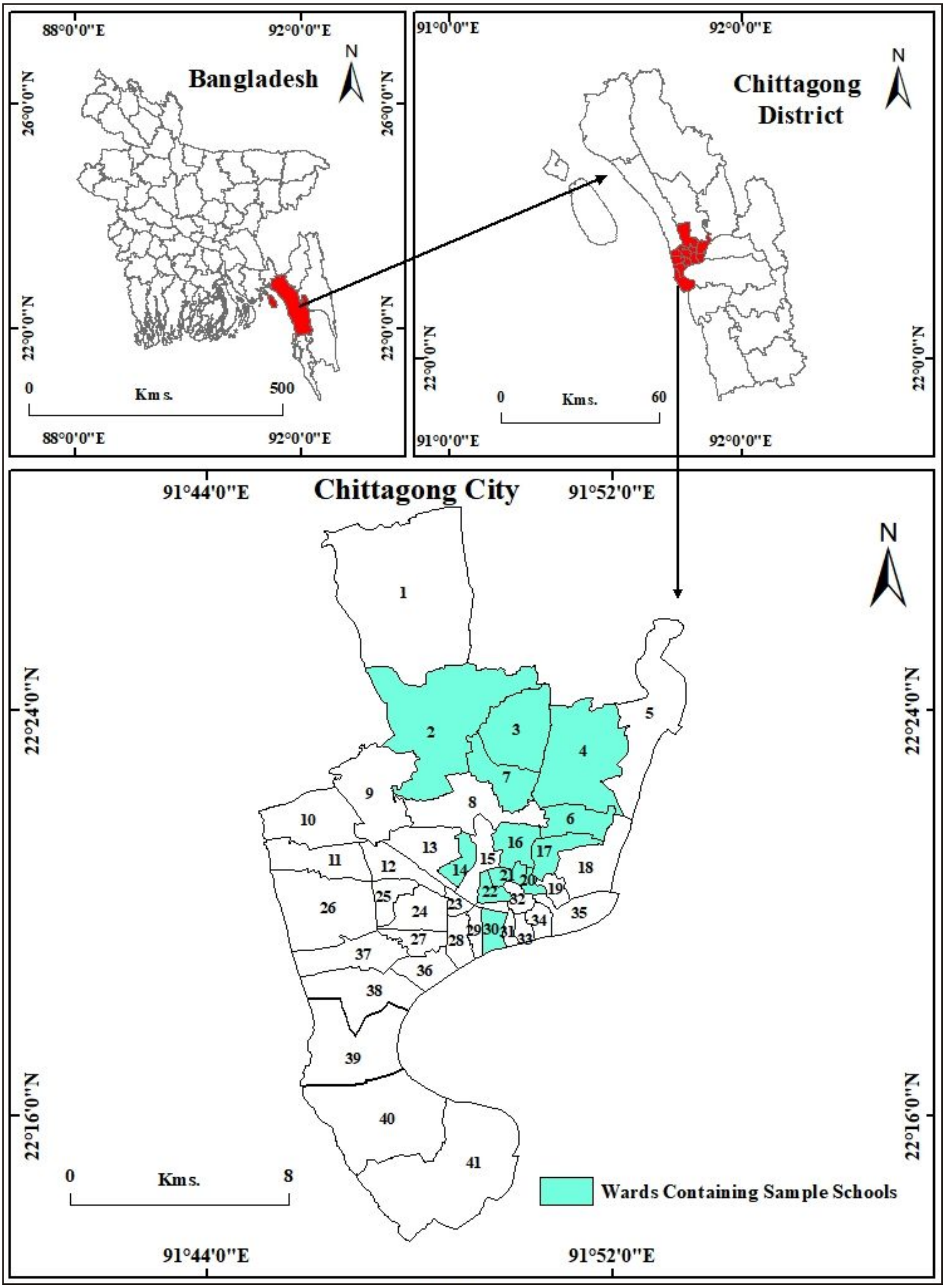
Objectives

Major objectives of the study are:

- to assess the preparedness levels of schools to face earthquake eventualities in the Chittagong City of Bangla-desh and
- to identify the significant indicators associated with levels of preparedness.

Study Area

The study area, Chittagong City, is a large port city on the south-eastern coast of Bangladesh (Fig.1). The total area of Chittagong is 5282.92 km^2, and more than 7.9 million people live in the city. The density of population in the city is 1442 persons per km^2 (Bangladesh Population and Housing Census, 2015). Historically, Chittagong is prone to earthquakes. In 1762, an earthquake trembled the southern part of Chittagong. Although the intensity could not be recorded at that time, it caused heavy damages and triggered the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Wards Containing Sample Schools

Fig. 1

earliest documented tsunami in the Bay of Bengal (Sharfuddin, 2001). Furthermore, the earthquakes originated near Sylhet (1869; magnitude: 7.5); in Bengal (1885; magnitude: 7 to 8); in Bihar-Nepal (1950; magnitude: 8.3) and in Assam (1950; magnitude: 8.5) have been strongly felt in Chittagong (Sharfuddin, 2001). Fig. 2 shows the number of earthquakes and their magnitudes in the last ten years (2011-2021) occurred in Chittagong city. It is evident from the Fig. 2 that several earthquakes of intensity ranging from 3.0 to 5.1 trembled the city in the last ten years. In 2020, multiple earthquakes occurred with magnitudes varying from 3.6 to 5.1. Chittagong is vulnerable to earthquakes and needs adequate preparedness to face earthquake eventualities (Anisuzzaman, 2007).

Database and Methodology

The study is based on primary data collected from randomly selected 45 schools in the Chittagong City. A questionnaire has been prepared to conduct the survey. The survey has been conducted from October to December 2020. Responses from school authorities' (teachers and principals) have been collected. The reason to contact the school authorities only is that they are involved in preparation of schools` policies and can influence the schools` readiness to adopt policies. One person representing the school authority from each school has participated in this survey. In total, 45 persons have filled up the questionnaire. In the study area, there are 186 registered primary/high schools (Bangladesh Bureau of Educational Information and Statistics, 2020). The list includes public and private, including missionary schools, but excludes madrasa, and technical and vocational schools. Forty-five schools (public and private) comprising 24.19 per cent of 186 schools have been selected randomly to conduct a field survey. The sample has been selected based on the convenience

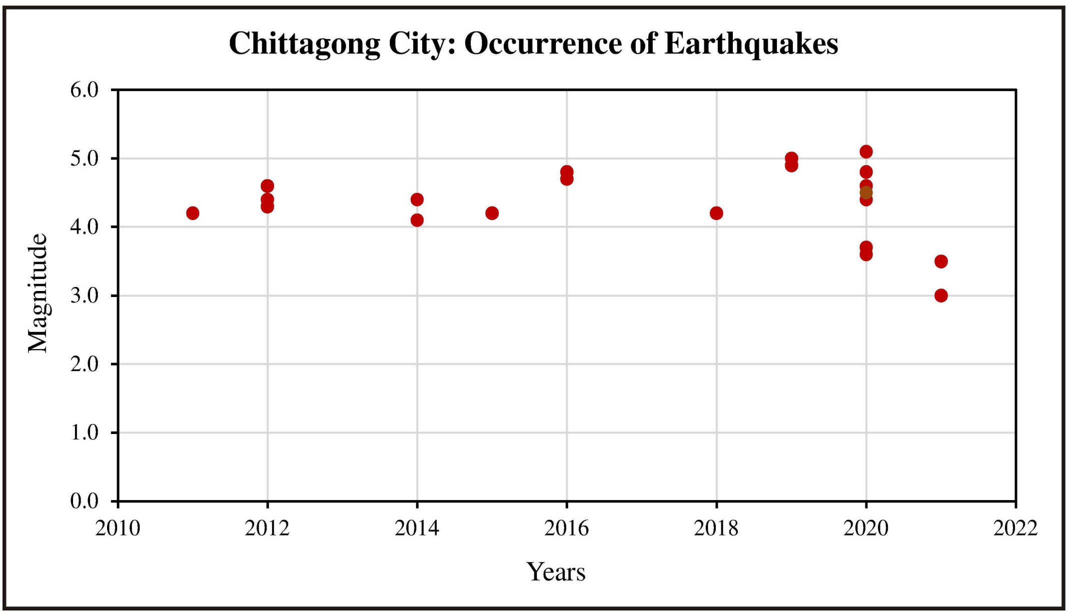

Fig. 2

sampling method. Convenience sampling or availability sampling is a non-probability sampling method that relies on data collection from population members who meet convenient criteria, such as easy accessibility, geographical proximity, or willingness to participate, etc. (Etikan et al., 2016). Descriptive research has been conducted to describe the "what" characteristics of human groups in assessing the schools` earthquake preparedness.

While evaluating the earthquake preparedness levels of the schools, eleven indicators such as (i) having a map showing the school and the environment; (ii) allocating the responsibility to check the laboratory and stores after an earthquake; (iii) having a shelter; (iv) identifying a safe place to store plans of the school, a map of the immediate vicinity and up to date records, in order to evaluate the situation after an earthquake; (v) educating school personnel about the location of the materials and equipment for emergency action; (vi) arranging first-aid and fire drill and damage assessment training; (vii) educating teachers when to stay in the classroom and when to evacuate the building in an earthquake emergency; (viii) listing of materials and first-aid equipment to be used in earthquake situations; (ix) educating the teachers about the basic behaviors such as ‘collapse’ and ‘hold’; (x) handing out post-earthquake evacuation procedure documents to all school personnel and (xi) undertaking the creation or maintaining of an existing shelter have been taken in to account. These indicators are useful in evaluating levels of earthquake preparedness and have been used previously by Ocal (2010) and Ocal and Yavuz (2011).

Based on the schools` responses on the selected indicators, the schools` Total School Disaster Point (TSDP) have been calculated in Likert-scale ("yes" equals 1 point, and "no" equals 0 points). The TSDP ranges from 0 to 11. The eleven indicators have been evaluated comprehensively by factor analysis. The suitability of factor analysis for the study has been confirmed by Kaiser-Meyer-Olkin (KMO) Measure. The KMO value can range from 0 to 1. A score higher than 0.5 indicates that the data set is suitable for factor analysis (Sharma, 2020). The KMO value of this study is 0.824 and thus, endorses that the factor analysis is appropriate for this study. The factor analysis has been conducted through the Principal Component Analysis (PCA) method, using Statistical Package for Social Sciences (SPSS). The indicators` uniformity in showing schools` earthquake preparedness levels and the most significant indicators influencing the schools` earthquake preparedness levels have been determined through PCA. PCA has been computed using a Correlation matrix. The rotation method has been varimax and maximum iterations for convergence have been 25. The extraction has been based on Eigenvalue. Eigenvalues above 2.0 and factor loading above 0.47 have been considered to select the component (Table 1). The study has used Cronbach's alpha to confirm the internal consistency of the data. Cronbach's alpha is a statistical technique to measure how closely a data set is related (Taber, 2018). The reliability coefficient of Cronbach's alpha can vary from 0 to 1. A coefficient of 0.70 or higher is considered acceptable. The value of Cronbach's alpha of the data set of this study is 0.893, which suggests that the collected data has relatively high internal consistency.

Three independent variables, namely (i) experiencing an earthquake, (ii) having a disaster plan, and (iii) the schools` population

Table 1
Chittagong City: Total Variance Explained with Respect to Earthquake Preparedness Indicators

Indicators	Initial Eigen-Values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Variance (per cent)	Cumulative (per cent)	Total	Variance (per cent)	Cumulative (per cent)	Total	Variance (per cent)	Cumulative (per cent)
1	5.522	50.200	50.200	5.522	50.200	50.200	2.877	26.153	26.153
2	1.336	12.146	62.346	1.336	12.146	62.346	2.838	25.796	51.949
3	1.033	9.389	71.735	1.033	9.389	71.735	2.176	19.786	71.735
4	0.748	6.804	78.540	-	-	-	-	-	-
5	0.671	6.101	84.641	-	-	-	-	-	-
6	0.565	5.139	89.780	-	-	-	-	-	-
7	0.379	3.441	93.221	-	-	-	-	-	-
8	0.265	2.409	95.630	-	-	-	-	-	-
9	0.185	1.680	97.310	-	-	-	-	-	-
10	0.158	1.438	98.747	-	-	-	-	-	-
11	0.138	1.253	100.000	-	-	-	-	-	-

Source: Compiled by Author.

have been selected and tested against TSDP to see whether the schools` preparedness level varies according to these variables. Further, T-tests have been conducted to see whether there is any statistically significant relationship between experiencing an earthquake and TSDP and between having a disaster plan and TSDP. One-way ANOVA analysis has been performed to see whether there is any statistically significant relationship between TSDP and the number of people in the school.

Results and Discussion

Levels of Earthquake Preparedness

The levels of earthquake preparedness by the schools have been identified on the basis of the responses of the school authorities (Table 2). A positive response to a question suggests a high level of preparedness, while negative response indicates least preparedness. Sixty-seven per cent of schools have assigned someone to check the laboratory and stores after an earthquake and 64 per cent of schools have emergency shelters. About 58 per cent of schools have conducted awareness programs for their teachers about staying or evacuating the school building in case of an earthquake. Similarly, 56 per cent of schools' personnel have undertaken the creation or maintenance of an existing shelter, and 53 per cent of schools have directed personnel about the location of the materials and equipment for emergency

Table 2
Chittagong City: Schools' Responses on the Questionnaire about Earthquake Preparedness

Indicators	Questions (Descriptions of Indicators)	Responses (per cent)	
		Yes (per cent)	No (per cent)
1	Do you have a map showing the school and the environment?	24.40	75.60
2	Have you allocated the responsibility to check the laboratory and stores after an earthquake?	66.70	33.30
3	Does your school have a shelter?	64.40	35.60
4	Have you identified a safe place to store plans of the school, a map of the immediate vicinity and up to date records, in order to evaluate the situation after an earthquake?	17.80	82.20
5	After an earthquake, do school personnel know the location of the materials and equipment for emergency action?	53.30	46.70
6	Have you held first-aid and fire drill and damage assessment training?	46.70	53.30
7	After a disaster, are your teachers aware of when to stay in the classroom and when to evacuate the building?	57.80	42.20
8	Do you have a list of materials and first-aid equipment to be used in earthquake situations?	31.10	68.90
9	During an earthquake, do your teachers know the basic behaviors such as `collapse` and `hold`?	31.10	68.90
10	Have you handed out post-earthquake evacuation procedure documents to all school personnel?	31.10	68.90
11	Have school personnel undertaken the creation and/or maintenance of an existing shelter?	55.60	44.40

Source: Compiled by Author.

action. Thus, the schools have the highest level of preparedness in allocating responsibilities to check the laboratory and stores after an earthquake.

Table 2 further reveals that 82.20 per cent of the schools have not identified a safe place to store essential documents to evaluate the situation after an earthquake, and 75.60 per cent of the schools have not prepared a map showing the school and the environment. Furthermore, 68.90 per cent of the schools have not listed materials and first-aid equipment to be used in earthquake situations. A similar number of schools have not handed out post-earthquake evacuation procedure documents to all school personnel. Likewise, another 68.90 per cent of schools have not educated the teachers on the basic behaviors such as collapse and hold. Additionally, 53.30 per cent of the schools have not undertaken first-aid and fire drill and damage assessment training. Thus, the lowest level of preparedness has been found in identifying a safe place to store essential documents to evaluate the situation after an earthquake.

The schools` Total School Disaster Point (TSDP) ranges from 0 to 11 with an arithmetic average of 4.8. The more is the TSDP of a school, higher is the level of preparedness of that particular school and vice-versa. The schools with their corresponding population and TSDP have been reported (Table 3). The schools have been arranged based on population strength. It has been assumed that higher school population might induce the school authorities to be highly prepared for an earthquake. The bivariate Pearson correlation indicates a statistically significant positive linear relationship between the schools` population and TSDP. However, the magnitude of a correlation coefficient (0.48) indicates that the relationship is weak. Variables are lowly correlated if the value of a correlation coefficient is between 0.3 and 0.5, moderately correlated if the magnitude is between 0.5 to 0.7 and highly correlated if the value is higher than 0.7 (Calkins, 2005). Although some densely populated schools have higher TSDP, yet some other schools with a similar or more population level have much lower TSDP. For example, there are schools like Dr. Khastagir Government Girls High School, which with a population of 1970 persons has recorded 11, the highest TSDP, on the other hand there is Saint Mary`s School with population of 2671, which has registered only 2 TSDP. Similarly, there are schools like UCEP General School, Renaissance School and College and Presidency International School with 2200 population each have recorded 10, 4, and 6 TSDP, respectively. Therefore, it can be said that schools` population strength may not induce the school authorities to be highly prepared for an earthquake.

Table 3 further reveals that among the top 6 populated schools, Saint Mary`s School is least prepared, while the other schools are highly prepared to face any earthquake. On the other hand, among the 6 least populated schools, Neuron English School and Western School and College have remarkable performance in earthquake preparedness. Premier English School and Independent School and College are lowly prepared, while Little Jewels School-Senior Section and Crans-Montana International School are least prepared. There are schools like Chittagong Residential School and College, International Hope School Bangladesh, and Little Jewels School-Senior Section which have recorded zero TSDP. This status suggests that these schools are unaware

Table 3

Chittagong City: School-wise Population and Total School Disaster Points (TSDP)

School Name	Population	TSDP	School Name	Population	TSDP
Bangladesh Mohila Samity Girls High School	7116	10	Southpoint School and College	705	05
Aparna Charan City Corporation Girl's High School and College	4067	10	Gul-E-Jar Begum City Corporation Girl's High School	629	03
Rahmania High School	3452	11	Ananda Multimedia School	620	01
Chattogram Ideal High School	3366	10	Scholar School and College	535	01
Saint Mary's School	2671	02	Asian Residential School and College	518	06
UCEP General School	2200	10	Limelight Grammar School	501	02
Renaissance School and College	2200	04	Chittagong Residential School and College	473	00
Presidency International School	2200	06	Sunshine Grammar School and College	449	04
Oxford Multimedia School	2100	09	City Pilot School	441	08
Mohammadia Government Primary School	2100	05	Mohammadpur Public School and College	373	02
South West Bakalia High School	2100	01	Chottogram Laboratory School and College	369	03
C and B Colony Adorsho Uccho Bidyalay	2050	10	Sermon School and College	360	09
CDA Public School and College	2047	07	International Hope School Bangladesh	355	00
Arabian Grammar School	2040	02	Chittagong Sunshine College	329	03
Dr. Khastagir Government Girl's High School	1970	11	Pollen Grammar School	324	02
Chittagong Government High School	1950	01	Parent's Care School	324	03
Shah Waliullah Institute	1900	08	Independent School and College	192	03
Nasirabad Government Boy's High School	1890	07	Premier English School	192	03
Bon Gobeshonagar School	1529	02	Western School and College	164	11
Government National Primary School	1420	02	Neuron English School	145	10
AG Church School	1130	05	Little Jewels School-Senior Section	94	00
Kapasgola Government Primary Girl's School	972	02	Crans-Montana International School	92	01
Al-Hidaayah International School	750	01	-	-	-

Source: Compiled by Author.

Table 4
Chittagong City: Schools by Levels of Preparedness to Face Earthquake

Level of Preparedness	TSDP	Schools	
Very highly prepared	More than 8	• Rahmania High School • Dr. Khastagir Government Girls` High School • Western School and College • Bangladesh Mohila Samity Girls High School • Aparna Charan City Corporation Girl's High School and College	• Chattogram Ideal High School • UCEP General School • C and B Colony Adorsho Uccho Bidyalay • Neuron English School • Mohammadia Government Primary School • Sermon School and College
Highly prepared	7-8	• Shah Waliullah Institute • Nasirabad Government Boy's High School	• CDA Public School and College • City Pilot School
Moderately prepared	5-6	• Presidency International School • Asian Residential School and College	• Oxford Multimedia School • AG Church School • Southpoint School and College
Lowly prepared	3-4	• Sunshine Grammar School and College • Renaissance School and College • Independent School and College • Gul-E-Jar Begum City Corporation Girl’s High School	• Chattagram Laboratory School and College (Oxygen Moor Branch) • Chittagong Sunshine College • Pollen Grammar School • Premier English School Chittagong
Least prepared	2 and less	• Saint Mary’s School • Arabian Grammar School • Bon Gobeshonagar School • Government National Primary School • Kapasgola Government Primary Girl`s School • Limelight Grammar School • Mohammadpur Public School and College • Parents' Care School and College • South West Bakalia High School	• Chittagong Government High School • Al-Hidaayah International School • Ananda Multimedia School • Scholar School and College • Crans-Montana International School • Chittagong Residential School and College • International Hope School Bangladesh • Little Jewels School-Senior Section

Source: Compiled by Author.

of earthquake preparedness. On the other hand, there are schools like Rahmania High School, Dr. Khastagir Govt. Girls` High School and Western School and College which are fully prepared to face an earthquake disaster.

The schools have been arranged as per their levels of preparedness in facing earthquake eventualities (Table 4). Based on the

TSDP, the schools have been divided into five categories. Only 11 schools comprising 24 per cent of the schools having a population of around 26,990 persons are very highly prepared. Similarly, only 9 per cent of the schools, whose population is 6,278 persons are highly prepared. Approx-imately 11 per cent of the schools with a population of 6,653 are moderately prepared. Approximately 21,483 people are in the rest of the schools which are at the bottom of the preparedness levels in which 18 per cent of the schools are lowly prepared, and 38 per cent of the schools are least prepared, risking 4,684 and 16,799 lives, respectively. In total, about only 33 per cent of the schools having 33,268 people on board are highly prepared, while 67 per cent are least prepared, risking 28,136 lives to face earthquake eventualities. This status is alarming considering Chittagong as an earthquake-prone area. The least prepared schools are more vulnerable and it is likely that these schools may experience large fatalities in case an earthquake strikes.

Identification of Significant Indicators

The component matrix shows the indicators and their corresponding correlations with each component (Table 5). The factor loadings of more than 0.47 have been presented in the component matrix. The extraction communalities, representing the amount of variance in each variable accounted by the components, of the eleven indicators except for the 2nd indicator are higher than 0.5. Table 5 reveals that all the indicators are highly correlated with the first component as compared to the second and the third components. According to the Extraction Sums of Squared Loadings, the first component has the highest variance (50.2 per cent), preceded by the second component (12.15 per cent) and the third component (9.39 per cent). The percentage of variance describes the extent of variability in a data set. For example, the variance in the first component is 50.2 per cent, which suggests that the first component describes 50.2 per cent variability in the data set. The uniformity of the indicators toward the first component confirms that the indicators need not to be grouped in more than one component to portray the preparedness levels. Although based on the Eigenvalue of 1, multiple components can be extracted, yet more than one component may not be explained in a meaningful way. Therefore, there is only the first component that describes 50.2 per cent variability in the data set.

Table 5 further reveals that the indicators are different in their factor loadings, suggesting that some are more dominant in influencing the preparedness level than others. Following this proposition, the 10^{th} indicator has the most dominant influence on the schools` earthquake preparedness level followed by the 8^{th}, 11^{th}, 5^{th}, 4^{th}, 7^{th}, 9^{th}, 6^{th}, 1^{st} 3^{rd} and 2^{nd} indicator. Identifying the significant indicators reveals that the majority of the schools are not adequately prepared in some of the most dominant indicators (10^{th}, 8^{th}, 4^{th}, and 9^{th}) influencing the schools` earthquake preparedness levels. Such unpreparedness highlights that these schools are more vulnerable. Their students, teachers and ancillary staff may experience severe casualties in an earthquake eventuality.

Experience of a disaster may be an essential factor in motivating people toward disaster preparedness. Johnston et al. (2005) has observed that the motivation of residents living in hazardous areas can be boosted by increasing the perceived relevance of hazard

Table 5
Chittagong City: Component Matrix of the Principal Component Analysis

Indicators	Description of Indicators	Factor Loading for Each Component		
		1	2	3
1	Do you have a map showing the school and the environment?	0.601	-	0.576
2	Have you allocated the responsibility to check the laboratory and stores after an earthquake?	0.478	-	-
3	Does your school have a shelter?	0.583	-	0.529
4	Have you identified a safe place to store plans of the school, a map of the immediate vicinity and up to date records, in order to evaluate the situation after an earthquake?	0.738	-	-
5	After an earthquake, do school personnel know the location of the materials and equipment for emergency action?	0.766	-	-
6	Have you held first-aid and fire drill and damage assessment training?	0.649	-	-
7	After a disaster, are your teachers aware of when to stay in the classroom and when to evacuate the building?	0.726	-0.512	-
8	Do you have a list of materials and first-aid equipment to be used in earthquake situations?	0.824	-	-
9	During an earthquake, do your teachers know the basic behaviors such as \`collapse\` and \`hold\`?	0.714	-	-
10	Have you handed out post-earthquake evacuation procedure documents to all school personnel?	0.852	-	-
11	Have school personnel undertaken the creation and/or maintenance of an existing shelter?	0.773	-	-

Source: Compiled by Author.

effects. The relationship between the schools` preparedness level and their experience of an earthquake might not be as obvious as pronounced in different studies. The t-test ($t=-1.47$; $p > 0.05$) result has not confirmed such relationship statistically significant. Thus, it is likely that experiencing an earthquake may not necessarily motivate people to prepare adequately for an earthquake.

Secondly, in a vulnerable situation such as an earthquake, a disaster plan may minimize casualties and help people to act in an emergency. A large number of the young community, teachers, and ancillary staff are regularly present in the schools` buildings, and for these people, to act in an emergency requires detailed planning. The schools with a disaster plan are likely to be more prepared to face earthquake risks and vice-versa. The study has confirmed this assumption. T-test results indicate significant differences between having a disaster plan and the schools` preparedness score (TSDP). The majority (more than fifty per cent) of the schools did not have an earthquake disaster plan. The result of the t-test has been shown in Table 6. The schools with a disaster plan have a higher mean than those without a plan (X =8.56 and X=2.30). Thus, the t-value has been statistically significant ($p < 0.05$) and favored schools with a plan.

Thirdly, the schools with a higher population should be more prepared to face an earthquake eventuality than those with a lower population. The reason is that in the case of the former, more lives are at risk. One-way ANOVA analysis has been conducted to determine this relationship. The result of one-way ANOVA has been shown in Table 7. The total number of people in the schools falls into two different groups. This grouping is arbitrary. The aim is to reveal whether a higher school population induces the school authority to be more prepared for an earthquake. A statistically significant result has not been found to confirm this relationship ($p > 0.05$). Therefore, a higher school population may not result in more earthquake preparedness. Thus, the study reveals that not all the extracted indicators have a similar influence on the preparedness level; some are more dominant to influence the preparedness level than others.

Limitations of the study

Major limitation of this study is that it is based only on the information generated from the schools' authorities. School authorities have been taken into account due to their involvement in schools` policy formulation and readiness to adopt policies. In-depth interviews or observations of other stakeholders such as students, school administrative staff, and parents would have been more useful to assess what type of behavior predominates during an earthquake and accordingly modify the measures for preparedness.

Table 6
Chittagong City: Results of t-test Analysis Performed between Schools having a Disaster Plan and the Schools` Preparedness Score (TSDP)

Having Disaster Plan	N	X	S. D.	T	P
Have	18	8.56	4.23	58.92	0.03
Don’t have	27	2.30	3.32	-	-

Source: Compiled by Author.

Table 7
Chittagong City: Results of ANOVA Analysis Performed between Population of the School and the Schools' Preparedness Score (TSDP)

Number of People in the School	n	TSDP
<2000	31	119.00
>2000	14	97.00
Total	45	216.00
P		1.69

Source: Compiled by Author

Conclusions

The study highlights that the schools in Chittagong city are not well prepared to face earthquake eventualities. About 55 per cent of schools` preparedness levels are not satisfactory as these schools are not adequately prepared in more than half of the indicators taken for this study. In total, about 67 per cent schools are least prepared, risking 28,136 lives to face earthquake eventualities. The unprepared schools are more vulnerable in case an earthquake strikes. Such unpreparedness may result in serious casualties to the students, teachers, and ancillary staff and damages to the physical properties. The study has found that the schools with a disaster plan are more prepared for an earthquake eventuality than those without a disaster plan. Although some highly populated schools are well prepared to face earthquakes, yet some other schools with a similar threshold of population are least prepared to face earthquake eventualities. Thus, the schools with more population may not have higher levels of earthquake preparedness than those with less population. Thus, the analysis has revealed that neither the more population of the schools nor their previous experiences of facing an earthquake induce the school authorities to be more prepared for an earthquake eventuality. The findings can be helpful in redesigning the earthquake preparedness motivational programs designed for schools in disaster-prone areas. However, elsewhere in Bangladesh, schools may be exposed to other disasters such as floods, landslides, etc. Similar studies can be beneficial in evaluating how far the schools are prepared in facing such hazards.

Acknowledgements

I acknowledge the support given by all research assistants who worked hard to collect the primary data.

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Mst Sanjida Alam, Major,
Email: sanjidaaec@gmail.com
Artillery Centre and School,
Halishahar Chattrogram,
Bangladesh Army, Bangladesh.

punjab geographer