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Earthquake Preparedness Knowledge and Practice of Secondary Level Students

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Abstract

This paper attempts to analyze earthquake preparedness knowledge and practice of secondary-level students in Nepal. In this paper, earthquake preparedness knowledge and practice refer to the understanding and implementation of measures to minimize the potential damage and loss of life caused by earthquakes, including proper building design and construction, emergency planning, and regular drills and training for individuals and communities. Earthquake preparedness knowledge and practice are essential for secondary-level school students because the losses of mortalities, morbidities, and economics from earthquakes cannot be predicted in the world. In this paper, a descriptive research design and quantitative approach as well as primary sources of data were used. Primary data were collected from semi-structured questionnaires with the students of Grades 9 and 10 of the government school of Bhaktapur, Bagmati Province. Of the total 96 students were censused using the rule of thumb method. The findings show that about 91.7% reported they heard the earthquake preparedness, 16.9% prepared with a Go bag, and 2.1% practiced duck, cover, and hold methods during the shock of the earthquake. The result reveals that about 50 percent of the total students have adequate knowledge of earthquake preparedness while they have limited practice. It can conclude that adequate preparedness practices were needed for secondary-level students. In addition, they should be aware of and

understand the causes, nature, and effects of natural hazards skills to enable proactive prevention and mitigation of disasters.

Keywords: knowledge, practice, earthquake, preparedness

Introduction

Earthquake preparedness is a set of measures taken at individual, organizational, and societal levels to minimize the effect of an earthquake. Natural disasters are unforeseen and unavoidable, but their consequences may be reduced with knowledge and practice about preparedness (Cartwright, Hall, & Lee, 2017). A review summarized that natural disasters might be occurring worldwide, but their long-term impacts are much greater in developing countries. In countries, located in geologically and geographically vulnerable regions of the world, both the risks of natural hazards such as earthquakes and weak socio-political and economic systems can contribute to the adversities of the impacts (Shrestha, 2016). A study conducted in Thailand reflected that Participants showed positive attitudes and a good level of understanding about earthquake safety. However, due to their poor practice scores, especially in the high seismic zone, they were not prepared for earthquakes. The knowledge, attitude, and self-assessment score levels in earthquake circumstances revealed a statistically significant difference (Songlar et al., 2019).

The study of earthquakes i.e., seismology shows that Nepal lies in the eleventh rank of high risk from an earthquake. Recent earthquakes (7.9 and 7.2 Richter scale) in Nepal during April and May 2015 resulted in a huge number of deaths and injuries. This event killed more than 8,673 people, 21,952 people were injured and it left hundreds of thousands of people homeless with some of the villages entirely flattened to the earth (Basnet et al., 2016). Several studies have determined that Nepal's existing infrastructure, communication systems, and medical sector are inadequately prepared for an earthquake. The lack of preparation has also been proven a major threat to many human lives. According to the World Bank's 2005 Natural Disasters Hotspots Report, Nepal has ranked the 11th most vulnerable country to earthquake and 30th to flood risk. Geo-Hazards International (2011) has classified Kathmandu as one of the world's most vulnerable cities to earthquakes. Nepal has lost its lives and annual monetary loss is estimated at more than 15 million (US) dollars (Poudel et al., 2015). A review stated that as was said by many experts and persons alike, disasters do not kill people. It is a lack of preparedness for one that takes lives. Yet even after such a cataclysmic event, when it comes to disaster

preparedness, we are still woefully behind' (Devkota, 2016). Different studies conducted in Nepal showed that students have extensive knowledge of earthquakes, including how to prepare and what to do in the event of one. Nevertheless, in light of their knowledge, their preparations are insufficient (Pokharel,2022).To minimize the risk of damage to humans, property, and infrastructure during the time of disaster public awareness campaigns, regular earthquake exercises in schools, universities, public buildings, and hospitals, staff training in various fields of private and public institutions, as well as the construction industry; rigorous adherence to and application of building codes, good construction practices, updating of current building codes, and creation of new rules and standards for infrastructure design are all essential (Mallet al., 2015).

The reviewed literature related to earthquake knowledge and practice revealed that different training has been conducted for the community people, teachers, and students. However, there is a significant mismatch between knowledge and practice on earthquake preparedness among school students. Though they have knowledge practice is insufficient and preparation is inadequate. In this context, this paper aims to identify the level of knowledge on earthquake preparedness among the secondary-level students in Bhaktapur and to explore their practices at the time of the earthquake.

Methods and Materials

Research Design

A descriptive study was used to assess the knowledge and practice of earthquake preparedness among secondary-level students of a government school.

Nature and Sources of Data

The sources of data were primary sources. This study was conducted in government school ward no -2 of Bhaktapur. The sample was taken from students of classes 9 and 10 of the government school of Bhaktapur-2 by using the census method and the sample size was 96.

Methods of Data Collection and Analysis

Data were collected using a self-administered semi-structured questionnaire. The validity of the instrument was maintained by extensive literature review & consulting with subject expertise. Before conducting the study, approval was taken from the Research Committee of the Nursing Campus, Biratnagar. Permission was taken from the concerned school authority. Written informed consent was taken from each respondent. Privacy and confidentiality of information of

all the respondents were maintained. Respondents were participating voluntarily andcan discontinue at any point during the data collection period

Collected data was checked daily for its completeness. All the data was kept in order for editing and coding. Data processing was done by using computer SPSS version 16.0. Descriptive statistics that are frequency, percentage, mean, and median were used to assess the level of knowledge and practice on earthquake preparedness among secondary-level students of the government school.

Results and Discussion

Impact of Earthquakes in Bhaktapur (A Historical Review)

The 7.8 on the Richter scale earthquake that occurred on April 25, 2015 and the accompanying aftershocks have demonstrably shown how it has affected the entire country. Over 22,000 people were injured, and about 9,000 people lost their lives. The most recent estimates indicate that more than 500,000 homes have collapsed or been destroyed. the earthquake reduced GDP growth by more than 1.5% from an estimated 4.6% GDP growth in the fiscal year 2015 ((Kunwar & Chand, 2016). The earthquake severely damaged Bhaktapur, leaving approximately 300 people dead and 2,000 injured. Significant damage has occurred to 116 monuments as well as almost 30,000 homes. Heritage reconstruction is a noticeable demand for post-earthquake recovery (Arora, 2020). The impact of earthquakes was observed in various areas. These include service provision, tourism itself, the local economy, and the cultural industries, as well as tangible and intangible heritage. However, the earthquake has also created some new opportunities (Kunwar & Chand, 2016). The world heritage site of Bhaktapur Durbar Square, which is a prime example of human creativity and possesses significant value worldwide, is vulnerable to earthquakes. Through an earthquake awareness program, community education and training, institutional and organizational enforcement of laws and regulations, financial and technical support, coordination between various authorities, invention, and research of new technology compatible with traditional architecture, integration of earthquake-resistant building bylaws, regulations is there, it requires continuous supervision and reinforcement and the people and place must be made safer against earthquakes (Phaiju, Shrestha, & Shah, 2019).

Earthquake Preparedness Knowledge and Practices

The findings show that 95.8% had experienced earthquakes during their lifetime. Among them, 95.85 had experienced in 2074 B.S. where 91.7% had heard about earthquake

preparedness which indicates that nine out of ten had heard about earthquake preparedness and 63.2% of the respondents got the information about earthquake preparedness through television which is supported by the study conducted on People's perspectives and expectations on preparedness against earthquakes: Tehran case study with sample size 1211 which shows 95.1% had heard about earthquake preparedness and 71.7% regarded TV as the most appropriate means of media communication to prepare people for an earthquake (Jahangiri et al., 2010).

This study showed that almost all of the respondents had known the importance of earthquake preparedness among them 87.5% responded to saving lives as the rationale for preparedness which is similar to the study on Knowledge, Attitude, and Practice on Disaster Risk Reduction Project with sample size 3615 in which 65% stated the importance of preparedness (British Red Cross & Nepal Red Cross Society, 2013).On opinion regarding the importance of earthquake preparedness, 87.5% stated the need for earthquake preparedness to save the life from danger. Regarding earthquake preparedness, 78.1% had mental preparedness for earthquakes. Among them, 84.4% were aware of the earthquake-resistant house and had preparations regarding home-setting whereas only 44.8% had an earthquake-resistant house. The level of knowledge on earthquake preparedness among secondary-level students is only 50% while practice was inadequate i.e., 12.5% which implies an extensive need for awareness programs for secondary-level students.

Table 1

Knowledge and Practice Related to Physical Preparedness n=96

Variables	Frequency	Percentage
Physical Preparations		
Yes	45	46.9
No	51	53.2
Knowledge on Go Bag		
Yes	88	91.7
No	8	8.3
Materials to be kept in Go Bag*		
Foods	82	85.4
Flashlight	76	79.2
First aid kit	67	69
Cell phone with chargers	61	63.5
Battery powered or hand crank radio	47	49
Extra batteries	47	49

Family and emergency contact information	44	45.8
Extra cash	44	45.8
Emergency blankets	44	45.8
Medications and medical items	43	44.8
Multipurpose tools	21	21.9
Copies of personal documents	29	30.2
Sanitation and personal hygiene items	26	27.1
Map of the area	24	25
Knowledge on Importance of Go Bag		
To prevent from scarcity after earthquake	55	57.3
To fulfill basic requirement after earthquake	41	42.7
To save the time in emergency situation	37	38.5
Prepare Go bag		
Yes	15	16.9
No	81	83.1

*Multiple Responses

Source: Field Survey, 2017

Table 1 shows 46.9% had physical preparation for the earthquake. Regarding knowledge of Go bag, 91.7% have knowledge of preparing Go bag in which 85.4% had an opinion to include food in Go bag, and 25% felt the need for a map. Regarding knowledge on the importance of the Go bag, 55% of respondents felt the Go bag is needed to prevent scarcity after an earthquake where only 16.9% had prepared a Go bag. Which is contradictory to the findings of the study on Knowledge, Attitude, and Practice on disaster risk reduction conducted in Kathmandu Valley which stated only fifth i.e., 19.6% had knowledge regarding Go bag. This shows that students were already known about the topic as this topic was included in the school curriculum and different training was provided by the government to school students and school teachers about earthquake preparedness. But only 16.9% had prepared a Go bag in this study which correlates with the findings of a similar study which showed that 19.5% had prepared a Go Bag (British Red Cross & Nepal Red Cross Society, 2013).

Table 2

Practice Related to Family and Mental Preparedness n=96

Variables	Frequency	Percentage
Family Preparedness		
Yes	52	54.2
No	44	45.8
Types of family preparedness*		
Identifying safe places in and outside the home	40	41.7
Turning off any flames or heat sources	29	30.2
Keeping at least one door open	17	17.7
Identifying the exit point	16	16.7
Drill	11	11.5
Mental Preparedness		
Yes	75	78.1
No	21	21.9
Mental Preparations for earthquake*		
Finding safe place	66	68.8
Stay calm	35	36.5
Not rushing out until shock stops	28	29.2
Immediately rush outside the home	17	17.7
Being panic and shout loudly	5	5.2

*Multiple Responses

Source: Field Survey, 2017

Table 2 shows 54.2% had family preparedness on an earthquake where 41.7% had found safe places in and outside homes and 30.2% would turn off any flames or heat sources that could cause a fire. There are discrepancies in the findings of the study conducted by the Earthquake Preparedness Survey project on Knowledge, Attitude, and Practice on disaster risk reduction revealed 15.1% of respondents noted that they identify pre-arranged meeting points and 66.1% said that turning gas and electricity. The reason for this might be the age difference between respondents in both studies (British Red Cross & Nepal Red Cross Society, 2013).

Similarly, 75% of students had practice related to mental preparedness in which 68.8 % had found the safe place, 36.5% had stayed calm and 29.2% did not rush out until shock stops. Likewise, 17.7% respondents rushed outside the home immediately and 5.2% respondents were panic and shouted loudly which are wrong practices.

Table 3

Preparedness Regarding Home-setting n=96

Variables	Frequency	Percentage
Preparedness regarding home-setting		
Yes	36	37.5
No	60	62.5
Types of preparedness regarding home-setting*		
Regular maintenance of home infrastructure	24	25
Storing large, heavy objects on lower shelves	21	21.9
Removing hanging pictures, and frames away from the bed	18	18.8
Keep kerosene and inflammable items away from heat sources	15	15.6
Repairing damaged electrical wiring and leaking gas connections, bolting tall furniture and appliances.	11	11.5
Limiting the sliding and rocking movements of furniture and electrical appliances by	2	2.1

*Multiple Responses

Source: Field Survey, 2017

Table 3 shows 37.5% had preparedness regarding home setting. Among them 25% had regular maintenance of home infrastructure. 18.8% kept frames away from bed followed by 15.6%, kept kerosene and flammable items away from heat sources repaired damaged electrical wiring and leaking gas connections and only 2.1% had limit the sliding and rocking movements of furniture and electrical appliances by using Velcro, straps, non-slip mats which is supported by a study of Earthquake Preparedness Survey project on Knowledge, Attitude, and Practice on disaster risk reduction, which showed 40% of respondents had secured items from falling, 24.8% noted they considered earthquake safety while repairing and 21.8% of the respondents had

actually assessed their environment for earthquake risk (British Red Cross & Nepal Red Cross Society, 2013).

Table 4

Knowledge and Practice Regarding Earthquake Resistant House n=96

Variables	Frequency	Percentage
Knowledge regarding earthquake-resistant house		
Yes	81	84.4
No	15	15.6
Criteria for earthquake-resistant house*		
Strong base and strong and light roof	71	74
Free space in and around the house	41	42.7
Soil testing: building more than 3 storied	39	40.6
Embedded steel to increase ductility	23	24
Have Earthquake –resistant house		
Yes	43	44.8
No	53	55.2
Requirements fulfilled for earthquake-resistant house*		
Reinforced Concrete Cement structured house	24	25
Has followed the engineer drawing	35	36.5
Has followed the building code	21	21.9

*Multiple Responses

Source: Field Survey, 2017

Table 4 shows knowledge and practice regarding earthquake resistant house in which, 84.4% had knowledge about earthquake resistant house where 74% had opinion to have strong base and roof should be strong and light, 42.7% had opinion to have free space in and around the house. Similarly, 44.8% had practice regarding earthquake resistant house in which 36.5% had followed engineering drawing, 25% had reinforced concrete cement structured house and 21.9% had followed the building code.

Table 5

Knowledge on Safe Places during Earthquake and communication tool used n=96

Variables	Frequency	Percentage
Inside the building during the earthquake*		
Under a strong table, desk, or bed	72	75
Under the frame of a door	51	53.1
Rooftop of house	16	16.7
Outside the building during the earthquake*		
Open places away from tall buildings	71	74
Center of a broad road	61	63.5
Open places away from electric poles	53	55.2
Open places away from trees	48	50
Others	2	2
Communication Tool Used to Get Information during Earthquake Occurrence*		
Mobile message text	67	69.8
Internet	58	60.4
Radio	29	30.2
Mobile phone call	22	22.9
Others	13	13.4

*****Multiple Responses

Source: Field Survey, 2017

Table 5 shows Knowledge on Safe Places during Earthquake Occurrence where 75% felt safe under the strong desk and table or bed and 53.1% felt safe under the frame of door inside the home. Likewise, 74% felt safe at open places away from tall buildings, 63.5 % felt safe at center of road, 2% felt safe other places i.e., field and ground outside the home. Likewise, 69.8% used mobile message text as communication tool to get information during earthquake and 13.4% used other communication tools which includes television and newspaper. These findings are supported by the study done in the Auckland area of New Zealand among 440 students of age group 5-13 on School Children's Risk Perceptions and Preparedness: A Hazards Education

Survey which showed 85.8 % students found safe under a strong desk, table and stayed there during a drill performed (Ronan et al, 2001).

The present study revealed half of the respondents had adequate knowledge of earthquake preparedness whereas only 12.5% had adequate practice of earthquake preparedness which discrepancy the study findings on Knowledge, Attitude, and Practice of Tehran's Inhabitants for an Earthquake and Related Determinants of sample size 1195 which showed 90.0% and 41.0% of the participants achieved scores for the knowledge and practice on earthquake preparedness respectively. The reasons may be the difference in sample size and change in geographical reasons between the respondents of the two studies (Taghizadeh et al., 2012).

Inclusion of Earthquake Preparedness Knowledge and Practices in Curricula

Schools should play a key role in providing basic information about potential and actual disasters in the local communities. The importance of educating students about disasters has grown rapidly because children are the most sensitive group of individuals in society. As schools are recognized as centers of cultural education, the actual outcomes of the educational process are transferred to students' families and the local community (Vladimir et al., 2015).

Curriculum Development Centre mentioned they have incorporated lessons on natural disasters and preparedness in the course books from Grades I to X (KC, 2016). In Nepal, educational programs relating to disaster risk reduction are in the public school system for students 10-14 years of age group. Disaster-related topics are taught in Science, Environment, and Social Studies subjects for grade 10 (Disaster Education, 2007). Disaster risk reduction (DDR) education to school students and teachers is very important for building an understanding of the teachers and students about causes, nature, and effects of natural hazards. It also fosters a range of competencies and skills to enable teachers and students to contribute proactively to the prevention and mitigation of disasters (Tuladhar et al., 2013). A study conducted in Nepal showed that while the existing lecture-based disaster education in schools can increase risk perception, it cannot teach students the value of pre-disaster preparation and empower them to take effective disaster reduction actions. Realizing the significance of taking action can be accomplished through self-education. The community is crucial in supporting students' actual disaster reduction efforts. Students should engage in active learning throughout future disaster

education in the classroom. The most crucial element in school disaster education is continuous community involvement (Shiwaku et al., 2007).

Conclusion

This paper identified that there is inadequate knowledge as well as practice on earthquake preparedness which is the central theme of this paper. The finding of the study suggests that most of the respondents heard about disaster preparedness and they are prepared in terms of mental and family aspects whereas physical preparedness seems lacking. Therefore, it can be concluded that knowledge and practice on earthquake preparedness among secondary-level students are most to protect themselves from hazards and can save their lives during earthquakes as well as to aware the community people through a child-to-child program. The result of this study will provide baseline information to researchers to conduct a study to identify the major factors for inadequate knowledge and practice on earthquake preparedness. Based on the findings it is recommended that training and seminars can be made and conducted regarding better preparedness and practices to prevent the hazards of earthquakes by the local authorities. Better planning can also be done at the school level as well.

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