

Research Paper: Comparing Shiraz and Kerman High School Students' Knowledge for an Earthquake Encountering



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ABSTRACT

Background: Many cities such as Tehran, Tabriz, Rudbar, Manjil, Tabas, Lar, Qazvin, Zanjan, Hamadan, and Kermanshah are prone to damages and losses caused by the earthquake. The occurrence of an earthquake can lead to the destruction of school buildings and disruption in the function of educational systems, and the first responders will be school officials and students. This study compared Shiraz and Kerman high school students' knowledge encountering the earthquake hazard.

Materials and Methods: The research method was descriptive and the statistical population included all students of junior high schools in Shiraz and Kerman cities. Through cluster sampling method and based on Cochran's formula, 380 students in Shiraz and 376 in Kerman were randomly selected. Data collection tool was the self-administered questionnaire which was distributed among the samples after checking its validity and reliability. Data were analyzed using t test and one-way analysis of variance.

Results: Findings revealed that 54.5% of Shiraz students and 59.4% of Kerman students received scores between 0.40 and 0.60, and 23.6% of Shiraz students and 27.1% of Kerman students received scores between 0.60 and 0.80. The level of Kerman students' knowledge was higher than Shiraz students' in the emergency measures before an earthquake (0.53 Vs 0.5, $p=0.008$). However, there was no difference between the two groups in their knowledge on emergency measures during and after the earthquake.

Conclusion: The knowledge level of students regarding the serious risk of an earthquake was lower than standard. The level of the Kerman students' knowledge was evaluated higher than the Shiraz students'. Therefore, there is a need for training and education through new methods in order to improve the level of students' knowledge in the emergency measures before, during, and after the earthquake.

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1. Introduction

Disasters are serious threats for human life, and an effective risk planning often depends on the participation of the community and various groups of people. According to community-based disaster management, local people have relative knowledge in their vulnerability and capacities and also mechanisms to confront disasters [1]. However, there is a considerable difference between the perception of households and communities with proper and timely actions. As a result, crisis managers are trying to improve the level of preparedness of the communities by intervening in community knowledge to change their behavior. Education and training have long been recognized as the most effective means of intervention at the levels of knowledge and awareness of individuals. Studies indicated that the annual cost of training the managers and employees of organizations in the United States are more than \$ 40 billion [2]. Since age is an important factor in learning, many of these interventions have focused on children and adolescents.

In our country, educational measures have been taken to improve the knowledge level of students in the field of disasters. However, these educational measures have been limited only to earthquake hazards.¹ It should be considered the earthquake hazard has a special place in terms of disaster management among other hazards in Iran. Because of its unpredictable nature, the earthquake in case of unpreparedness would lead to innumerable casualties, fatalities, and damages. Eighty percent of fatalities due to earthquake have been in the 6 countries, namely China, Iran, Peru, the former Soviet Union, Guatemala, and Turkey [3]. Many cities such as Tehran, Tabriz, Rudbar, Manjil, Tabas, Lar, Qazvin, Zanjan, Hamedan, and Kermanshah have been prone to damages and losses resulting from earthquakes [4]. Statistics indicated that at least 16 major earthquakes took place in the vicinity of the city of Shiraz between 1291 AD and 1894 AD; the magnitude of which had been between 5.9 and 7.1 on the Richter scale [5]. The city of Kerman, in the southeast of Iran, also is located on one of the most active earthquake faults in Iran, where 437 earthquakes took place between 1907 and 2005 within the 300 km radius of that city and had a magnitude larger than 4 degrees on the Richter scale [6].

Since earthquake can lead to destruction of school buildings and disruption in the function of educational

1. New plans such as the National Dardas Plan (students prepared for hard days) are in the process of implementation.

systems and also because the first responders will be school officials and students [7], increasing students' knowledge of earthquake hazards students, as the major part of individuals in any school, is really important. The first step in making appropriate policies to enhance this knowledge level and subsequently to improve their functions towards the earthquake to evaluate the current level of their awareness and knowledge in this regard and to discover the weak points.

The importance of the assessment role in this process is in a way that the absence or the weakness of it would cause to disregard the required information for growth, development, and improvement of preparedness activities and would create problems, which eventually leads to the breakdown and loss of resources [8]. According to studies, no specific research had been conducted in this field in Iran. Even among foreign resources, the number of such studies is limited, and there is no comparison between the earthquake-affected areas. In 2015, Ozkazanc and Yuksel conducted a study titled "Evaluation of disaster awareness and sensitivity level of higher education students." By using a questionnaire which its questions were designed based on preparedness before, during, and after a disaster, they reached these findings:

The knowledge level of those students was low. Mean score related to their knowledge level on flood, landslide, and fire was 2.21 (out of 5 points) [9]. Sinha and colleagues conducted a research in India with the objective of evaluating the knowledge level of medical students about disaster preparedness and mitigation. Their findings revealed that the students have little knowledge. The mean score was 8.77% which was slightly higher in females and maximum in age group of 26-30 years [10].

Guo and Li performed a study in Japan titled "Getting ready for mega-disasters: The role of past experiences in changing disaster consciousness" and found significant changes in Japanese people's knowledge of natural hazards and perception of mega-disaster risk. Their study indicated direct experiences, recalling past experiences, as well as indirect experiences have an effective role in increasing the knowledge of people and motivate appropriate actions [11]. Shaw and colleagues in a study proceeded to investigate the effect of experiencing the earthquake and education on awareness and preparedness of Japanese students. The results of their research indicated the combined effectiveness of past experiences and training on students. Moreover, in that study, emphasized the fundamental role of self, family, and the community education on students' awareness and preparedness [12].

Our research was conducted with the purpose of evaluating Shiraz and Kerman students' knowledge for encountering the earthquake hazards with a comparative approach. Since the province of Kerman have had the experience of earthquake at the city of Bam (not far from Kerman) in 2003, it has a suitable capacity for confronting the earthquake. The authors of this study believed the comparison of the knowledge level of students in these two cities can provide a proper feedback to the authorities of them. Figure 1 shows the model used in this research. The dimensions of the students' knowledge were divided into three categories: before the earthquake, during the possible earthquake, after the earthquake.

2. Materials and Methods

The present study was descriptive and conducted during the school year 2014-2015 in the cities of Shiraz and Kerman. The statistical population included all the students of Shiraz and Kerman high schools (Table 1).

To compute the sample size, the Cochran formula was used with the 95% confidence interval. Sample size in the cities of Shiraz and Kerman were 380 and 376 students, respectively and the questionnaire was distributed among them. A total of 369 of the students in Shiraz and 350 students in Kerman provided usable responses to the questions, and were finally participated in the study. Samples were selected through the cluster random sampling method. In the first stage of sampling, a list of schools was provided in four education districts of Shiraz and two ones of Kerman. Then a code was given to each school. Subsequently, schools were randomly selected from each district by considering their population. In the next stage, a number of students were selected as sample by considering school's population. The data collection tool was a self-administered questionnaire which its validity was assessed by 30 experts in disaster area as well as measuring and designing the tests. Internal consistency and reliability of this questionnaire were assessed by Cronbach's alpha which was equal to 0.65.

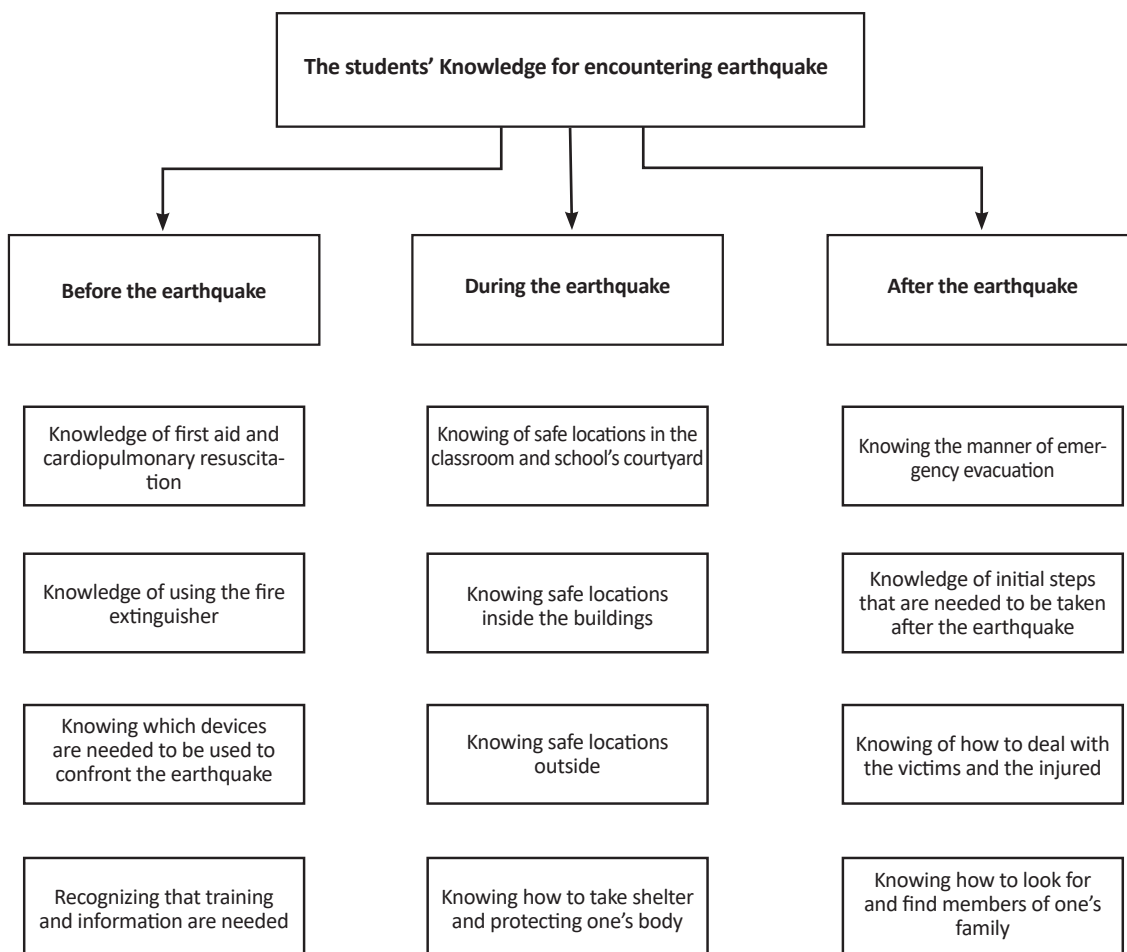


Figure 1. Dimensions of the students' knowledge and its indicators (source: www.preventionweb.net/files/11564)

Table 1. Number of students based on education department’s districts in 2014-2015 school year

City	Education Department Districts				Total
	District 1	District 2	District 3	District 4	
Shiraz	13.447	10.887	9.728	9.260	43.322
Kerman	9.701	9.359	-	-	19.060

The final questionnaire included 24 specialized questions with the following topics: knowledge of emergency measures before the earthquake, knowledge of exigent measures during the earthquake, and knowledge of emergency measures after the earthquake. Every correct response, based on the questionnaire’s key, received one point and zero point for incorrect one. The software used to analyze data was SPSS 22. The research questions were examined through unpaired t-test, and the variance analysis was used to compare the knowledge level of the students as separated by gender.

3. Results

Considering the data analysis, from among 719 students under the study, 79.3% of the students were between the ages of 13 and 14, and 42.4% were boys and 57.6% were girls. As can be observed from Table 2, the knowledge scores of 23.6% and 27.1% of Shiraz students and 30.6% and 24.6% of Kerman students on emergency measures before the occurrence of the earthquake were between 0.20 and 0.40 and between 0.40 and 0.60%, respectively. Furthermore, 12.2% of Shiraz students received scores

of 0-0.20 which was about 8.5% higher than the Kerman students. Therefore, the knowledge level of Kerman students found to be higher than the Shiraz students on emergency measures before the earthquake. The knowledge level of 40.9% and 32.5% of Shiraz students and 44.6% and 40.9% of the Kerman students regarding emergency measures during the possible earthquake was between 0.40 and 0.60 and between 0.60 and 0.80, respectively. Also, the score of the knowledge levels of 29% and 31.2% of Shiraz students and 29.7% and 26.6% of Kerman students on emergency measures after the earthquake were between 0.20 and 0.40 and between 0.40 and 0.60, respectively.

Accordingly, it can be asserted that there were no significant differences between the knowledge levels of Kerman and Shiraz students regarding the emergency measures during and after the occurrence of earthquake. Total knowledge scores of 59.4% and 27.1% of Kerman students and 54.5% and 23.6% of Shiraz students were between 40 and 60 and between 60 and 80, respectively. Furthermore, 20.6% of Shiraz students had scores of 0.20-0.40 which was significantly higher than the Ker-

Table 2. Comparing the frequency percentage of correct responses scores provided by Shiraz and Kerman students

Range	0-0.20		0.20-0.40		0.40-0.60		0.60-0.80		0.80-1.00	
	Shiraz	Kerman	Shiraz	Kerman	Shiraz	Kerman	Shiraz	Kerman	Shiraz	Kerman
Variable	Frequency (%)									
Knowledge of emergency measures before the earthquake	12.2	3.7	35	36.3	23.6	30.6	27.1	24.6	2.2	4.9
Knowledge of emergency measures during the earthquake	2.4	0.6	13.8	7.4	40.9	44.6	23.5	40.9	10.3	6.6
Knowledge of emergency measures after the occurrence of earthquake	13.6	14.3	29	29.7	31.2	26.6	18.2	16.9	8.1	12.6
Knowledge of the students for encountering earthquake hazard	0.3	0.6	20.6	11.4	54.5	59.4	23.6	27.1	1.1	1.4

Table 3. Comparing the knowledge level of Shiraz and Kerman students for encountering the earthquake hazards

Groups	Number	Mean	Standard Deviation	t Value	df	Sig.
Shiraz	369	0.50	0.13	-2.66	717	0.008
Kerman	350	0.53	0.11			

Health in
Emergencies and Disasters Quarterly

Table 4. Comparing the knowledge level of Shiraz and Kerman students on emergency measures before the earthquake

Groups	Number	Mean	Standard Deviation	t Value	df	Sig.
Shiraz	369	0.43	0.20	-3.08	717	0.002
Kerman	350	0.48	0.18			

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man students. Therefore, the total knowledge level of the Kerman students was considered higher than Shiraz students.

There was a significant difference between the knowledge levels of Shiraz and Kerman students for encountering the earthquake hazard. In Table 3, it can be observed that the level of knowledge of the students of Kerman for facing earthquake hazard was higher than the students of Shiraz. Moreover, a significant difference was observed between the mean of students' knowledge in the two groups ($p = 0.008$).

There was a significant difference between two groups in emergency measures before the earthquake. In Table 4, it can be observed that the knowledge level of the students of Kerman on emergency measures before the earthquake was higher than Shiraz students. Also, a sig-

nificant difference was observed between the knowledge levels of the students in the two groups ($p = 0.002$).

There was no significant difference between the knowledge levels of Shiraz and Kerman students regarding the emergency measures during the earthquake. Based on Table 5, although the mean knowledge level of the students of Kerman (0.64) on emergency measures during the earthquake was higher than Shiraz students (0.61), no significant difference was observed between the knowledge levels of the two groups.

There was no significant difference between the knowledge levels of Shiraz and Kerman students on emergency measures after the earthquake. Based on Table 6, although the mean knowledge score of Kerman students (0.47) on emergency measures after the earthquake was higher than Shiraz students (0.46), no significant differ-

Table 5. Comparing the knowledge level of Shiraz and Kerman students on emergency measures during the earthquake

Groups	Number	Mean	Standard Deviation	t Value	df	Sig.
Shiraz	369	0.61	0.17	-1.83	717	0.06
Kerman	350	0.64	0.14			

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Table 6. Comparison of the knowledge level of Shiraz and Kerman students on emergency measures after the earthquake

Groups	Number	Mean	Standard Deviation	t Value	df	Sig.
Shiraz	369	0.46	0.19	-0.60	717	0.54
Kerman	350	0.47	0.20			

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Table 7. The mean and standard deviation values of knowledge level of the Shiraz and Kerman boy and girl students

City	Gender	Number	Mean	Standard Deviation
Shiraz	Boy	136	0.53	0.12
	Girl	233	0.48	0.13
	All	369	0.50	0.13
Kerman	Boy	169	0.55	0.11
	Girl	181	0.50	0.11
	All	350	0.53	0.11
Total	Boy	305	0.54	0.12
	Girl	414	0.49	0.12
	All	719	0.51	0.12

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ence was found between two groups in these measures. There was no significant difference between the knowledge levels of boy and girl students in Shiraz and Kerman for encountering the earthquake hazard. In Table 7, it can be observed that the highest level of knowledge belonged to Kerman boy students (0.55) and the lowest knowledge level belonged to Shiraz girl students (0.48). However, no significant difference existed between the knowledge level of boy and girl students in Shiraz and Kerman ($p = 0.005$) (Table 8).

4. Discussion

This study was conducted to compare the knowledge of Shiraz and Kerman high school students for encountering earthquake hazards. Moreover, in this study, it was assumed that the students were acquainted with emergency measures for encountering the earthquake hazard. Based on the questions mentioned in the questionnaire, 92.1% of Shiraz and Kerman students referred to the

effect of education and the necessity of having knowledge to encounter the earthquake hazard. Also 99.4% of students by that time had experienced the earthquake. By considering, the training and education are provided based on the three stages of before, during, and after the earthquake. In this article, in addition to comparing the knowledge level of Shiraz and Kerman students, the knowledge of all of the students in each of these dimensions was separately examined.

The knowledge levels of Shiraz and Kerman students in emergency measures before, during, and after the occurrence of earthquake, despite its serious hazards, were lower than the desired level. About 75.4% of Shiraz students and 71.1% of Kerman students had scores between 0 and 0.60. Based on the findings of most researchers, such as Sinha (2008) and Ozkazanc, it can be concluded the knowledge level of the students in the present study was not enough. The mean of students' knowledge was 58.4% and 2.21 (out of 5 points) in the study conducted

Table 8. Tests on effects between the groups

Source	Sum of Squares	df	Mean Squares	F Value	Sig.
Between gender groups	0.06	1	0.06	4.3	0.03
Between city groups	0.41	1	0.41	26.86	0.000
Between city and gender interaction groups	8.28	1	8.28	0.005	0.94
Error	11.06	715	0.01		
Total	205.55	719			

Health In Emergencies and Disasters Quarterly

by Sinha and Ozkazanc. In the research by Al-Thobaity and colleagues [13] it was equal to 4.16 (out of 6 points), whereas it was equal to 0.50 (out of 1.00 point) for Shiraz students and 0.53 for Kerman students in this research.

The students' knowledge was relatively higher in emergency measures during the earthquake. About 73.4% of Shiraz students and 85.5% of Kerman students had scores between 0.40 and 0.80. Moreover, 95.4% of the students knew how to protect head and neck when taking shelter. In the study by Ozkazanc, 39.6% of the students were aware of this protective measure. It seems because of the focus made by instructors, the students could answer these questions well.

In a comparison between the knowledge levels of Shiraz and Kerman students, the knowledge level of Kerman students was assessed to be higher than Shiraz students. Considering the dimensions of the research, this difference was in emergency measures that needed to be taken before the earthquake, while no difference was observed between the two groups in the emergency measures during and after the earthquake. Kerman is located near the city of Bam, and the tragic earthquake at Bam led to officials and people of Kerman province to be more aware than others for encountering the earthquakes and their impacts as well as to perceive more the necessity for prevention and preparedness.

Results of this research was partly consistent with the findings of Guo and Li indicating the effectiveness of direct and indirect experiences to enhance the knowledge of individuals [11]. In addition, the study by Shaw and colleagues showed this result too [12]. In fact, the direct experience of disasters provides a credible knowledge of them that can be an appropriate solution for future hazardous situations. According to the reports of Japan's cabinet office of government ministers, there were 302 earthquakes in that country with the magnitude of larger than 6 on the Richter scale from 2004 to 2013 [14]. Currently, Japan is recognized as a country with a proper culture of safety and preparedness [11]. Therefore, strengthening the memories of disasters based on past experiences can be one of the strategies to increase the knowledge level of the individuals in the society, especially the kids and adolescents. Human beings are able to learn directly and indirectly from past experiences and use them for correct behavior.

5. Conclusion

According to the results, it can be concluded that the students did not have enough knowledge level in en-

countering the earthquake hazard. In many studies including the research by Alim and his colleagues in Japan [15], the effectiveness and usefulness of education and training to improve level of knowledge had been proven. However, the important point is that we should look for the factors in order to promote these training.

Therefore, it is recommended that new educational methods with the objective of internalizing the materials, such as the game method, can be used. Furthermore, Kerman students' knowledge was higher than Shiraz students on emergency measures before the earthquake. These measures include familiarity with first aid, the use of fire extinguisher and cardiopulmonary resuscitation. By holding the workshops, the students can promote these skills and their parents, and even school officials can participate these workshops. Today, many schools throughout the world teach their students through these courses. Furthermore, the guidebooks published by UNESCO (The United Nations Educational, Scientific and Cultural Organization) and the United States' Federal Emergency Management Agency (FEMA) can be used for further enrichment of educational materials in these courses.

Ethical considerations

The questionnaire and implementation of research process took place with prior review by experts and assessors of the general office of education in Shiraz and Kerman. All students participated in this study with informed consent.

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Conflict of Interest

The authors declared no conflicts of interest.

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