

# Research Paper: The Effect of Educational Intervention on Health Care Providers' Preparedness in the Natural Disasters: A Case Study of Health Care Providers in Shahreza City, Iran



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## ABSTRACT

**Background:** Every year, numerous natural disasters occur around Iran, with many casualties and financial losses. In these crises, the demand for health care suddenly and uncontrollably increases. In such circumstances, the readiness of health centers and their staff is critical in reducing injuries and mortality. This study aimed to determine the effect of disaster preparedness intervention on the attitude, knowledge, and practice of health care providers in Shahreza City, Iran.

**Materials and Methods:** This one-group quasi-experimental study was conducted on 55 health care providers in Shahreza health centers selected by the census method. The participants completed a researcher-made questionnaire in two stages before and two months after attending a disaster preparedness workshop, a top-table maneuver, and an operational maneuver. The obtained data were analyzed by SPSS V. 23 using descriptive statistics and paired t-test.

**Results:** Data analysis showed a significant difference between the mean scores of pretraining and posttraining regarding the rate of knowledge, attitude, and preparedness ( $P < 0.05$ ), but there was no significant difference between the mean scores of performance ( $P > 0.05$ ).

**Conclusion:** The intervention significantly improved awareness and developed a positive attitude about disaster preparedness. Although it slightly increased performance, it was not significant. Nonetheless, it appears that the continuation of training along with other operational methods can improve individual performance. It is recommended that disaster preparedness programs be considered as one of the topics of in-service education of health care providers and also as the subject of educational courses in different academic periods.

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## 1. Introduction

Natural disasters have always and for centuries threatened the lives of human societies [1] and have been experienced by humans. They are often uncontrollable and cause disabilities, loss of human lives and property, and severe known and unknown consequences [2, 3]. Because of the occurrence of natural disasters, all economic, political, and cultural infrastructures are affected, leading to disruption of the functioning of society and widespread human, economic, and environmental effects [4].

The number of deaths due to natural disasters varies significantly from year to year. Natural disasters may occur with very few deaths for some years until a significant disaster kills many people. On average, over the past decade, almost 60000 people died from natural disasters worldwide every year [5].

In 2019, 396 natural disasters occurred worldwide, killing 11755 people, affecting more than 95 million people, and causing total damage of about \$ 103 billion. Asia is the most vulnerable continent with about 40% of natural disasters, 45% of deaths, and 74% of all affected people [6].

Iran, which is located in this continent, is considered one of the most accident-prone areas globally due to its geographical location in the Alpine-Himalayan earthquake belt [7]. It is among the ten most vulnerable countries to natural disasters [8], and every year, it experiences many natural disasters associated with several human and substantial financial losses. Out of 40 types of natural disasters globally, 31 types occur in different parts of Iran [9, 10]. Earthquakes, floods, droughts, landslides, and storms are common dangers experienced in Iran every year [2, 11]. The consequences of these accidents cannot be avoided entirely because some of them are very complex and unpredictable [12]. Apart from the irreparable damage caused by accidents and disasters, lack of prevention and preparation for a proper and effective response can create a painful tragedy [13]. Natural disasters do not automatically lead to catastrophe. What makes disasters catastrophic is the vulnerability of a small number of communities [4]. Therefore, having the preparedness to deal with natural disasters is one of the most critical factors to reduce injuries [14].

In disasters, deaths and complications occur, so the demand for health care suddenly and uncontrollably increases, and people flock to health centers and hospitals [15]. In such circumstances, the readiness of these cen-

ters and their staff to provide fast, efficient, and timely services can reduce deaths and increase the number of survivors [9, 16]. In other words, appropriate emergency health measures can reduce the damage caused by the disaster [17]. The World Health Organization announced preparedness as a long-standing concern and emphasizes the importance of the activities needed to achieve it. One of the main concerns in determining the preparedness of medical centers in disasters is the staff's readiness [18].

Regarding the preparedness of staff, training is an essential factor [19]. Numerous studies have pointed the role of education in preparing and increasing the safety of people against disasters and emergencies [20-24]. Farajzadeh et al. recommended continuous training against accidents and disasters, creating a suitable educational environment, and giving proper motivation to nurses to improve their preparedness [25]. Ghanbari et al. showed that implementing a training program as part of the disaster preparedness process has improved people's preparedness. Also, the implementation of these programs increases personnel awareness of existing programs to deal with disasters, increases employee's participation in planning and elimination of problems, and improves the skills of personnel in performing their tasks [26].

Shahreza City is located in an area with high seismicity, near the Zagros mountain range and on the edge of the fault. On the other hand, a large area of worn-out urban fabric has made the city vulnerable to floods and earthquakes [27]. Because health care providers in the health care network system are in direct contact with the public and in the health reform plan, they are responsible for assessing and educating families about disaster preparedness. In addition to improving the overall preparedness of society in the face of natural disasters, they can enhance the provision of health services and reduce injuries and casualties. In other words, these people, besides having a positive attitude, should be able to show the acquired knowledge in their practice and behavior and be a model for the covered population.

On the other hand, in recent years, health care providers have integrated into the healthcare system, and little information is available regarding their knowledge, attitude, and practice. This study aimed to determine the level of preparedness of people against natural disasters and investigate the effect of educational intervention on the attitude, knowledge, and practice of health care workers in Shahreza. The study results can be used in health-related planning and decision making.

## 2. Materials and Methods

The present study was a one-group quasi-experimental study using the pre-test/post-test design without a control group. The study population included all health care workers (n=55) working in health centers of Shahreza City, Isfahan Province, Iran. A researcher-made questionnaire was used to collect data. To prepare the questionnaire, we conducted some exploratory analysis, and research in the library, and related articles in reputable scientific databases. The questionnaires used in national and international research and a checklist for assessing family preparedness in disasters of the Ministry of Health were examined. Our questionnaire consisted of 38 questions in four sections. The first part consisted of 8 questions related to the demographic characteristics of the respondents, including age, gender, marital status, level of education, work experience, field of study, and workplace. The second part included 12 questions to examine the knowledge of health care providers about disaster preparedness, which were designed as 4-choice questions and the correct answer scored 1, and the wrong answer scored 0. Therefore, the total score of the knowledge questionnaire was 12. The third part included 8 questions to measure the participants' attitude scored on a 5-point Likert scale from "completely disagree" to "strongly agree." Therefore, the maximum score was 40. The fourth part consisted of 10 questions regarding performance assessed by "yes" and "no" and scored 0 and 1, respectively. Therefore, the maximum score was 10. Finally, the readiness scores of individuals consisted of the scores of the three sections of knowledge, attitude, and performance and scored 62 in total.

To verify the validity of the scale, the content validation method was used. Accordingly, the initial questionnaire was sent to 10 health experts in disasters and was reviewed, evaluated, and revised by these people. Then, a pilot study was performed to confirm its reliability. The questionnaire was first completed by 10 health care providers (not selected samples) and had similar conditions to the participants, and it was repeated two weeks later. Finally, its correlation coefficient was calculated to be 0.715. Besides, the Cronbach alpha of the attitude questionnaire was estimated to be 0.72.

**Table 1.** Descriptive statistics of age and work experience of the participants

Variables	No.	Range	Min.	Max.	Mean±SD	Variance
Experience	52	5.5	1.5	7	3.58±1.41	2.007
Age (y)	54	13	24	37	30.35±3.55	12.610

Regarding the performance section, the Kuder-Richardson formula was used, and the obtained score was 0.85. To collect the data, after making the necessary coordination, we referred to 12 health centers of Shahreza City. After introducing the researcher and explaining the research's purpose, the questionnaire was provided to the samples. While completing the questionnaire, the necessary oral explanations were provided to the respondents, and the researcher was present during all processes. After completing the initial questionnaire, a 2-day workshop was held, in which participants were trained based on educational texts approved by the Ministry of Health. At the end of the second day of the workshop, a top-table maneuver and an operational maneuver for disaster preparedness were held. It consisted of the determination of safe areas, Drop, Cover, and Hold On (DCHO), emergency exit, gathering in the safe area. Then a practical fire-fighting exercise was carried out with the participation of the samples and the cooperation of the experts of the city fire department. The questionnaire was completed again two months after the intervention. Data were analyzed by SPSS V. 23 using descriptive statistics and paired t-test.

## 3. Results

According to the results obtained from 55 completed questionnaires, 11 respondents (20%) were male, and 44 (80%) were female. Also, 18.2% had an associate degree, 72.7% had a bachelor's degree, and 9.1% of the respondents had a master's degree. The fields of study of participants were as follows: family health, 36.4%; disease prevention, 7.12%; midwifery, 27.3%; environmental health, 5.5%; occupational health, 5.5%; mental health, 9.1%; and laboratory, 3.6%.

It was also found that 54 cases responded to the age question, and 52 cases responded to the work experience question. The minimum age was 24, and the maximum was 37 years. The mean age of the participants was 30 years, and their average work experience was 3.58 years (Table 1).

Descriptive statistics obtained from the pre-test and post-test were also examined (Table 2).

**Table 2.** Descriptive indices of variables in the pre-test and post-test stages (No. 55)

Variables	Stage	Range	Min.	Max.	Mean±SD	Variances
Knowledge	Pre-test	7	4	11	7.25±1.72	2.971
	Post-test	5	7	12	10.50±1.31	1.73
Attitude	Pre-test	22	18	40	32.78±4.55	20.76
	Post-test	11	29	40	34.76±2.93	8.62
Performance	Pre-test	10	0	10	5.49±3.15	9.95
	Post-test	10	0	10	5.83±2.98	8.91
Preparedness	Pre-test	32	27	59	45.52±6.50	42.32
	Post-test	16	43	59	51.10±4.57	20.91

**Table 3.** Non-parametric test to check the normal distribution of variables (No. 55)

Variables	Stage	The Kolmogorov-Smirnov Statistic	Approximate Sig. (Bilateral)
Knowledge	Pre-test	1.236	0.094
Attitude	Pre-test	1.097	0.180
Performance	Pre-test	1.036	0.234
Preparednesst	Pre-test	0.567	0.905
Knowledge	Post-test	1.471	0.026
Attitude	Post-test	0.872	0.432
Performance	Post-test	1.239	0.093
Preparedness	Post-test	1.082	0.192

In this section, to select the appropriate test, first, the normality of the mean scores of each variable was checked using the Kolmogorov-Smirnov test (Table 3). Because the significance level for all research variables except for the knowledge test is greater than 0.05, the assumption of normality for all variables except the post-test was valid. However, the sample size was 55. Based on the central lim-

it theorem ( the sample size is large  $\geq 30$ ), we used the parametric test [28] despite no regular distribution of the variable, to obtain more accurate results. Therefore, the paired t-test was used to compare the mean scores (Table 3).

According to the results of Table 4, the significance level was less than 0.05. Therefore, the difference between the

**Table 4.** The mean score of variables in different stages

Variables	Mean Differences				t	df	P
	Mean±SD	Mean Standard Error	95% Confidence Interval				
			Lower Limit	Upper Limit			
Difference between post-test and pre-test knowledge scores	3.25±1.96	0.26	2.72	3.78	12.28	54	0.001
The difference between post-test and pre-test attitude scores	1.98±5.16	0.69	0.58	3.37	2.84	54	0.006
Difference between post-test and pre-test performance scores	0.34±4.50	0.60	-0.87	1.56	0.56	54	0.572
Difference between post-test and pre-test preparedness scores	5.58±8.31	1.12	3.33	7.83	4.97	54	0.001

mean scores of knowledge in the pre-test and post-test was significant. The mean scores of health care providers' attitudes after training were significantly higher than before the training ( $P < 0.05$ ). Regarding the mean score of performance, the significance level ( $P = 0.572$ ) was greater than the test error (0.05). Therefore, the mean difference between the pre-test and post-test stages was not significantly different. Because the significance level was less than 0.05, the average preparedness scores in the pre-test and post-test stages were significantly different (Table 4).

#### 4. Discussion

This study aimed to investigate the effect of an educational intervention on the knowledge, attitude, and skill of health care providers. The results showed that the Mean $\pm$ SD score of knowledge, attitude, performance, and preparedness of health care providers was  $7.25 \pm 1.72$ ,  $10.50 \pm 1.31$ ,  $32.78 \pm 4.55$ , and  $34.76 \pm 2.93$  for pre-test, and  $5.49 \pm 3.15$ ,  $5.83 \pm 2.98$ ,  $45.52 \pm 6.5$ , and  $51.1 \pm 4.57$  for posttest before and after the intervention, respectively. There was a significant difference between the mean scores before and after the training in terms of knowledge, attitude, and preparedness ( $P < 0.05$ ), but no significant difference was observed between the mean scores of performance ( $P > 0.05$ ).

Accordingly, we found that the average score of knowledge after the intervention increased by 27%, which was significant. In other words, holding a training course was effective in increasing the knowledge of health care providers. The mean scores of attitude showed a substantial increase of 4.95% in the post-test.

In terms of performance, the results showed that the mean performance scores of health care providers increased by 3.45% after the training course. However, there was no significant difference between the mean performance scores in the pre-test and post-test.

The preparedness score consisted of the total scores of knowledge, attitude, and the performance had a significant increase of 9% compared with that before the intervention. The results of various studies have confirmed the effect of the training course on the level of disaster preparedness. Ebrahimi et al. assessed the impact of implementing interventions on improving safety and health at the workplace in an oil company in Iran (2010-2015). Their results indicated the training course's effectiveness in increasing the readiness and safety of employees in the workplace and reducing work-related accidents and damages. Therefore, training is useful in preventing many accidents and crises or minimizing injuries [29]. Wiesner et al. evaluated the effect of education on medical students'

knowledge and showed that educational intervention significantly affects students' preparedness [30]. Also, Nakhai et al. showed that holding a training course effectively increases nurses' preparedness for disasters [20].

Parra Cotanda et al. investigated the effect of disaster preparedness training programs on staff in the emergency department of Barcelona Hospital. They showed that a training course significantly increased the knowledge of the staff. Still, their performance showed no significant change 6 months after the intervention [23], which is in line with the present study. This observation indicated that to improve the people's performance, more training, long-term planning, other incentives, and changes in the type of intervention are needed.

Khankeh et al. also studied the effect of earthquake coping training on male students on household readiness in Eshtehard City, Iran. Their results indicated the impact of educational intervention on improving and promoting people's attitudes [31]. Habte et al. conducted a study entitled "Assessment of knowledge, attitude, and practice of disaster preparedness among Tikur Anbessa Specialized Hospital health care workers, Addis Ababa, Ethiopia." They reported that the general attitude of about 64% of the respondents was optimistic about the subject [32]. The results of the present study, like the results of the above studies, emphasize the effect of education on creating a positive attitude.

A few studies have been conducted on the inconsistent attitude with the present study results, which may be due to differences in the statistical population or the method of intervention. For example, Ahmadzadeh et al. investigated the effect of earthquake preparedness training on 10-year-old male students and their families' awareness in Gorgan City, Iran. Their results showed a significant difference in their knowledge and skills while facing accidents and disasters before and after the intervention. However, there was no significant difference in attitude, which is inconsistent with the present study results. There was also a significant difference between the components of awareness of safe places in the earthquake, understanding of dangerous places in the earthquake, and necessary measures during the earthquake before and after the intervention. They concluded that educating students can increase the awareness and preparedness of the students and their families [7]. Mirzaei et al. in a study conducted on nurses at Shahid Rahnamoon Hospital in Yazd City, Iran, showed that holding a disaster management training course has a significant effect on increasing the knowledge and attitude of the subjects. However, in terms of performance, it was inconsistent

with the results of the present study [33]. This discrepancy may be due to differences in the intervention method.

Najafi et al. also conducted a study on 60 nurses to examine disaster preparedness training through cyberspace on the knowledge and attitudes of individuals. A significant increase in the intervention group's knowledge score compared with the control group indicated the effectiveness of the educational intervention on the knowledge of individuals [34].

In general, various studies have been conducted worldwide to examine the preparedness of individuals and organizations against disasters from different aspects. Their statistical population and the target group were different, and there are few studies similar in the study method and the target group. However, most studies emphasize the effect of educational intervention on people's preparedness.

## 5. Conclusion

Our findings showed that the intervention had the greatest impact on knowledge and an improved attitude. The level of knowledge and attitude of individuals after the educational intervention increased significantly, and regarding performance, the mean scores of the respondents were at a low level. Although the increase in mean performance scores after the intervention was not significant, considering the descriptive results, it was found that by continuing the training, the people's performance can also be improved.

Overall, the findings showed that education increases the preparedness of health care providers against disasters because health care providers are responsible for educating the affected families. Increasing their preparedness can improve the preparedness of the covered households and thus reduce the vulnerability of people in the community against natural disasters.

The literature review showed that few programs had been used to train this group and the available programs are mostly short-term skills training programs, and long-term disaster management issues have received less attention. Therefore, it is recommended that disaster preparedness programs be part of one of the main topics of in-service training for health care providers and as one of the obligatory topics of education courses. In this regard, paying attention to educational programs is not sufficient, and maneuvers and exercises are also recommended.

## Ethical Considerations

### Compliance with ethical guidelines

This article was approved by the Ethics Committee of Isfahan University of Medical Sciences (IR.MULRESEARCH.REC.397256 on,1397.058 on 07/22/2018). After explaining the research process and obtaining their consent, the goals, importance, and necessity of conducting the research were described. A written consent was obtained from the participants, and the samples were assured that the information was confidential.

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### Authors' contributions

All authors were involved in the preparation of this article.

### Conflict of interest

The authors had no conflict of interest.

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