

Research Paper

Assessing the Risk Perception of Natural Disasters Among the Staff of Hospitals in Mashhad, Iran



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ABSTRACT

Background: Risk perception of natural disasters refers to the mental perception of the risk of a particular disaster and concerns about its outcomes. Decisions taken during disasters are guided based on the level of risk perception of the affected people and policymakers. The current study aims to investigate the risk perception of natural disasters among the staff of selected hospitals in Mashhad, Iran.

Materials and Methods: This cross-sectional study was conducted on 300 staff working in six hospitals affiliated to Mashhad University of Medical Sciences in Mashhad, Iran, who were selected using multi-stage cluster and stratified sampling methods. A researcher-made questionnaire was used to collect data. This questionnaire had two sections; the first section surveys the demographic characteristics of the participants. In the second section, the participants were asked to express their opinion about the probability of occurrence and their concerns regarding the outcomes of the two disasters of flood and earthquake. In order to analyze the data, descriptive and analytical methods such as t-test, Mann-Whitney U, and Kruskal-Wallis tests were used in SPSS software. The significance level of the tests was set at 0.05.

Results: The Mean±SD risk perception of floods and earthquakes was 2.74±0.79 and 3.57±0.79, respectively. The Mean±SD outcome perception of floods and earthquakes were 3.28±0.66 and 4.03±0.66, respectively. There was a statistically significant difference in the outcome perception of floods among the staff with different levels of education, types of work (organizational position), and working departments (clinical and non-clinical) ($P \leq 0.05$). There was also a statistically significant difference in risk perception of floods and earthquakes between the staff with and without a history of exposure to these disasters ($P \leq 0.05$). However, there was no significant difference in risk perception of disasters between the staff who completed and not completed the training courses related to disasters.

Conclusion: The risk perception of natural disasters in the staff of hospitals in Mashhad is at moderate to high level. It is recommended to carry out programs to increase the quality and effectiveness of training courses related to natural disasters and, hence, improve the risk perception of staff as much as possible.

Keywords:

Risk perception, Natural disasters, Staff, Hospital, Iran

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1. Introduction

The number of disasters in the world is increasing. Disasters are divided into natural and man-made disasters. Natural disasters are unavoidable and can have various negative effects on governments. On the other hand, due to the risk of new wars, the increase of technological disasters, and terrorist attacks, man-made disasters are increasing [1]. Disasters, gradually or suddenly, often have a destructive impact and lead to financial and life losses and damages [2]. In the three decades in Iran, natural disasters have killed about 2,689 people and have caused 737,058 thousand dollars economic losses. About 88% of all deaths caused by disasters are related to natural disasters, and 83% of people who died because of these disasters are in Asia [3]. Iran is the sixth country among the top ten countries in the world that are prone to disasters. Due to being located in a tectonic region, Iran has often experienced strong earthquakes and sometimes destructive floods, droughts, and other disasters [4]. According to the Global Assessment Report on Disaster Risk Reduction, Iran's natural disaster risk class is 8 out of 10 [5]. Razavi Khorasan province is one of the disaster-prone provinces of Iran. Faults exist in this province can cause earthquakes with a magnitude 6-7 Richter [6]. This issue indicates the necessity and importance of paying attention to Mashhad city's disaster preparedness in all areas, especially health.

The inevitable disasters and the changes in the environment, society, and lifestyle have made countries increasingly vulnerable. However, by adopting preventive measures, the negative outcomes of disasters can be reduced [7]. Receiving medical supply is one of the most important needs of disaster victims. Hospitals are the main source of providing medical services during disasters [8]. In case of hospitals' lack of preparation for disasters, important healthcare services cannot be provided, which somehow causes a secondary crisis [9]. The evidence shows that the hospitals with preparedness plans against accidents and disasters have a more effective and timely response to disasters [10]. This issue indicates the importance of planning and preparedness to deal with disasters in hospitals. Staff preparation is one of the main elements of hospital disaster preparedness programs [11]. Staff preparation guarantees the proper and effective performance in difficult and stressful conditions after disasters in the hospital [12]. Despite the importance of disaster preparedness and the necessity of having programs and measures in this field at the level of hospitals, less at-

attention is often paid to such programs and measures by the staff, managers, and officials [13]. The assessment of risk perception and disaster preparedness of hospitals in Iran have shown that the risk perception and the degree of preparedness is at a low level, and confusion and lack of proper management are the most common problems when disasters occur [5]. The evidence has shown the relationship between the negative outcomes of disasters and low risk perception among people [14]. Examining risk perception of disaster among hospital staff can help health planners to take measures to increase the preparedness of staff and hospitals against accidents and disasters [15]. Therefore, the present study aims to evaluate the risk perception of natural disasters and its related factors in selected hospitals in Mashhad, Iran.

2. Materials and Methods

This is a cross-sectional study that was conducted in 2020. The study population consists of all staff of six hospitals affiliated to Mashhad University of Medical Sciences in Mashhad, Iran. The following formula was used to determine the sample size, by considering the error probability of 0.5, $d=0.1$, and standard deviation=1 based on a previous study [16]. The result was 384; by considering a sample dropout of 5%, the sample size increased to 403.

$$n = \frac{(z1-\alpha/2)^2 \sigma^2}{d^2} = 384$$

The reason for choosing the study hospitals is that they are general and main hospitals in the city and receive a highest number of injured people in case of accidents and disasters. The sampling method was a cluster/stratified method. First, the sample size was determined according to the number of staff in each hospital. Then, sampling was done in each hospital (cluster) using a random stratified method. The classes in this step included medical staff, nursing staff, administrative staff, and paraclinical staff. From each class, the samples were randomly selected. Inclusion criterion was a willingness to participate in the study, while exclusion criterion was the return of incomplete questionnaires.

In this study, a researcher-made questionnaire was used to collect data. This questionnaire consisted of two sections. The first section included 9 items surveying the demographic characteristics of the participants. The second section with 8 items rated on a five-point Likert scale (very low, low, moderate, high, and very high) measured the flood and earthquake risk perception. In

this section, the participants were asked to give their opinions about the risk of floods and earthquakes and their concerns about their outcomes. The validity of the questionnaire was measured and confirmed according to the opinions of 10 experts and calculating the content validity ratio (CVR). The reliability of the questionnaire was examined by the test-retest method in a pilot study on 20 samples with a 2-week interval between the two tests. According to the obtained intraclass correlation coefficient (ICC) of 0.84, the reliability of the questionnaire was confirmed. The data were entered into SPSS software, version 19 for descriptive analysis using frequency and percentage and statistical analysis using t-test, ANOVA, Mann-Whitney U, and Kruskal-Wallis tests. The significance level of all tests was set at 0.05.

3. Results

The response rate was 74% (n=300). The Mean±SD age of participants was 33.30±7 years, and their work experience was 9.05±7 years. It was reported that 72.7% of participants had a history of exposure to floods and earthquakes. The largest percentage of participants had not completed the theoretical (51.7%) and practical (59.7%) courses. The highest percentage of participants were female (63.7%), nursing staff (39.0%), with a bachelor's degree (73.7%), working in clinical departments (64.7%). Table 1 shows the

mean risk perception scores of the participants. As can be seen, the mean risk perception of earthquakes was higher than the mean risk perception of floods.

Examining the relationship of the risk perception of natural disasters with age ($P \geq 0.05$) and work experience ($P \geq 0.05$) of hospital staff showed no statistically significant relationship between them (Table 2).

The mean scores of the risk perception of natural disasters based on the staff's educational level and type of work are given in Table 3. As can be seen, there was a statistically significant difference among the staff with different levels of education only in the outcome perception of floods ($P \leq 0.05$). The results of the post-hoc test for pairwise comparison of different levels of education, showed a statistically significant difference between the staff with PhD degree and diploma, between the staff with PhD degree and bachelor's degree, and between the staff with a PhD degree and specialized degree in the outcome perception of floods ($P \leq 0.05$). Furthermore, the results in Table 3 showed a statistical difference among the staff with different types of work only in the outcome perception of floods ($P \leq 0.05$). The results of post-hoc test for pairwise comparison showed a significant difference only between administrative and nursing staff ($P \leq 0.05$).

Table 1. Mean±SD of risk and outcomes perceptions of natural disasters

| Dimensions of risk perception | Mean±SD |
|------------------------------------|-----------|
| Risk perception of floods | 2.74±0.97 |
| Risk perception of earthquakes | 3.57±0.79 |
| Outcomes perception of floods | 3.28±0.66 |
| Outcomes perception of earthquakes | 4.03±0.66 |

Table 2. Relationship of the risk perception of natural disasters with work experience

| Dimensions of Risk Perception | Work Experience (y) | | | P |
|-----------------------------------|---------------------|-----------|-----------|------|
| | <10 | 10-20 | >20 | |
| Risk perception of floods | 3(2-3) | 3(2-3) | 3(2-4) | 0.64 |
| Risk perception of earthquakes | 4(3-4) | 3(3-4) | 4(3-4) | 0.70 |
| Outcome perception of floods | 12(11-14) | 12(11-14) | 12(12-14) | 0.62 |
| Outcome perception of earthquakes | 10(8-12) | 10(9-12) | 10(7-11) | 0.63 |

Table 3. Mean±SD of the risk perception of natural disasters based on the staff's educational level and type of work

| Dimensions of Risk Perception | Educational Level | | | | | | P |
|-----------------------------------|-----------------------|-----------|-----------------|-------------------|------------------|-----------|-------|
| | Mean±SD | | | | | | |
| | Specialized and above | PhD | Master's Degree | Bachelor's Degree | Associate Degree | Diploma | |
| Risk perception of floods | 2.32±0.70 | 2.66±1 | 2.60±0.99 | 2.78±0.98 | 3.00±0.89 | 2.58±0.93 | 0.06 |
| Risk perception of earthquakes | 3.33±1 | 3.33±0.51 | 3.58±0.70 | 3.59±0.79 | 4.00±0.63 | 3.70±0.98 | 0.49 |
| Outcome perception of floods | 2.74±0.66 | 4.27±0.33 | 3.44±0.66 | 3.24±0.66 | 3.38±0.66 | 2.92±0.33 | 0.01* |
| Outcome perception of earthquakes | 3.84±0.66 | 3.72±0.66 | 4.2±0.66 | 4.01±0.66 | 3.94±0.33 | 4.23±0.33 | 0.21 |

| Dimensions of Risk Perception | Type of Work | | | | | P |
|-----------------------------------|--------------|-----------|-------------|----------------|--|-------|
| | Mean±SD | | | | | |
| | Medical | Nursing | Para Clinic | Administrative | | |
| Risk perception of floods | 2.35±0.74 | 3.03±0.98 | 2.56±0.88 | 2.56±0.97 | | 0.14 |
| Risk perception of earthquakes | 3.57±0.79 | 3.66±0.73 | 3.46±0.82 | 3.55±0.82 | | 0.47 |
| Outcome perception of floods | 3.19±0.66 | 3.43±0.66 | 3.19±0.66 | 3.16±0.66 | | 0.00* |
| Outcome perception of earthquakes | 4.03±0.66 | 4.08±0.66 | 4.05±0.66 | 3.73±0.66 | | 0.28 |

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The mean scores of the risk perception of natural disasters based on the staff's gender, department, history of exposure to disasters, and passing theoretical and practical training courses are presented in Table 4. According to results, the mean score of outcome perception of floods was significantly different between male and female staff ($P \leq 0.05$). There was also a statistically significant difference in the outcome perception of earthquake between staff working in clinical and non-clinical departments ($P \leq 0.05$). There were also significant differences in risk perception of floods and earthquakes between people with and without history of exposure to disasters ($P \leq 0.05$). However, there was no significant difference in any dimensions of risk perception among those who had passed theoretical or practical training courses related to disasters and those who had not passed them.

4. Discussion

This study was conducted to evaluate the risk perception of natural disasters in the staff of hospitals in Mashhad, Iran. The findings showed that the staff's risk perception of earthquakes was higher than their risk perception of floods, which is probably due to their previous experience of earthquakes in Mashhad city. The results showed a statistically significant difference

in the risk perception of floods and earthquakes between the staff with and without previous exposure to disasters. The mean risk perception of disasters in the group with a history of exposure was 2.83 and in the group without a history of exposure was 2.50, which indicates a higher risk perception in the staff with a history of exposure to disasters. It seems that this is because of the higher work experience of these staff. A study by Raska on assessing the flood risk perception in the countries of European Union members showed that one of the preventive factors for the flood disaster was the previous experience of the flood which can be important and effective in reducing the adverse outcomes of the disaster [17].

The study by Johar Khan et al., on the flood disaster risk perception in the flood-prone areas of Pakistan, showed a positive relationship between flood risk perception and previous exposure [18], which is consistent with the present study. A study by Gaillard on the alternative paradigms of Volcano risk perception in Pinatubo, Philippines, also stated that exposure to disaster (history of exposure and different experiences) and the power and prominence of personal experience determine the time frames in which people can recall past experiences and creates the motivation for appropriate actions [19]. The study by Stewart et al. on the risk per-

Table 4. Mean±SD of the risk perception of natural disasters based on the staff's gender, department, history of exposure to disasters, and passing theoretical and practical training courses

| Dimensions of Risk Perception | Mean±SD | | | | | |
|-----------------------------------|-----------|-----------|-------|------------|--------------|-------|
| | Gender | | | Department | | |
| | Male | Female | P | Clinical | Non-clinical | P |
| Risk perception of floods | 2.89±0.91 | 2.64±1 | 0.26 | 2.58±0.99 | 2.82±0.96 | 0.06 |
| Risk perception of earthquakes | 3.54±0.78 | 3.59±0.79 | 0.20 | 3.59±0.83 | 3.56±0.76 | 0.49 |
| Outcome perception of floods | 3.21±0.66 | 4.03±0.66 | 0.03* | 4.01±0.66 | 4.04±0.66 | 0.64 |
| Outcome perception of earthquakes | 4.08±0.66 | 4.00±0.66 | 0.77 | 3.15±0.66 | 3.35±0.66 | 0.04* |

| Dimensions of Risk Perception | Mean±SD | | | | | | | | |
|-----------------------------------|----------------------------------|-----------|-------|-----------------------------|-----------|------|---------------------------|-----------|------|
| | History of Exposure to Disasters | | | Passing Theoretical Courses | | | Passing Practical Courses | | |
| | Yes | No | P | Yes | No | P | Yes | No | P |
| Risk perception of floods | 2.83±0.96 | 2.50±0.97 | 0.00* | 2.71±0.99 | 2.76±0.96 | 0.85 | 2.64±2 | 2.80±0.94 | 0.27 |
| Risk perception of earthquakes | 3.66±0.75 | 3.32±0.84 | 0.00* | 3.55±0.81 | 3.59±0.73 | 0.81 | 2.56±0.81 | 3.57±0.79 | 0.93 |
| Outcome perception of floods | 3.25±0.66 | 3.36±0.66 | 0.11 | 4.04±0.66 | 4.03±0.66 | 0.97 | 3.33±0.66 | 3.28±0.66 | 0.34 |
| Outcome perception of earthquakes | 4.05±0.66 | 3.99±0.66 | 0.65 | 3.35±0.66 | 3.12±0.66 | 0.20 | 3.96±0.66 | 4.03±0.66 | 0.18 |

ception of rural communities from disasters and their preparedness in Peru, also showed that those participants who had a history of exposure to disasters had a higher risk perception in terms of the probability of occurrence and the consequences of disasters [16], which is consistent with our results.

The findings of the present study showed a statistically significant relationship between the working department of hospital staff and their perception of flood outcomes, where those working in clinical departments had a moderate to low perception of flood outcomes. The reason maybe their frequent exposure to floods and that the human consequences of such disasters have become normal to them. Rufat et al. in a study on flood risk perception and behaviors showed that the people in the flood-prone areas had a moderate risk perception [20].

The findings also showed a statistically significant relationship between the organizational position of hospital staff (type of work) and their perception of flood outcomes, where nursing staff had a higher outcome perception, which may be due to their more contact with patients, observation of their conditions, and having more knowledge about them. In the study by Wu et al. on exposure, risk perception, and altruistic

acceptance of risk of the SARS epidemic in hospital workers in China, the results showed that those who work in high-risk places such as SARS wards or had close friends or relatives with SARS were two or three times more likely to have a high level of posttraumatic stress symptoms than those who had not exposure [21], which is consistent with our results.

The present study showed a statistically significant relationship between the hospital staff's educational level and their perception of flood outcomes, where those with a PhD degree had a higher perception, maybe because they had more knowledge about the flood outcomes. The study by Pan on the risk perception of geological hazards in China, showed a significant statistical relationship between risk perception and socio-economic variables, including the level of education [22]. Raska argued that the level of awareness is one of the public participation plans in reducing flood risk [17]. these are consistent with the results of the current study.

The findings showed a statistically significant relationship between the hospital staff's gender and their perception of flood outcomes, where the perception level of female staff was lower, which may be due to their psychological characteristics. Wachinger et al. in

a study on the risk perception paradox/implications for governance and communication of natural hazards, stated that personal experience of a natural disaster and trust or lack of trust in authorities and experts have the greatest impact on risk perception [23]. Cultural and individual factors such as media coverage, age, gender, education, income, and financial status do not play an important role but act as mediators or enhancers [23], which is not consistent with our results.

Considering the increase in the occurrence of natural disasters in the world and the emphasis of the Sendai framework on the reduction of vulnerability to disasters, the perception of risk is an important step in increasing preparedness. Evidence shows that healthcare systems are not ready to face disasters. According to the Sendai framework for disaster risk reduction, disaster risk management policies and procedures must be based on knowledge and disaster risk perception in all aspects of vulnerability, capacity, exposure, and hazards' characteristics. Such knowledge can be used for risk assessment before the occurrence of disasters, prevention and reduction of the impacts of disasters, and the development and implementation of effective disaster preparedness programs [24].

Health service providers have realized a gap between their perception of disaster risk and the public perceptions of disaster risk. Increased risk perception, although increases stress, anxiety, and fear in people, can lead to more participation of people and stimulate preventive behaviors. Therefore, it is necessary to take preventive measures for hospital staff preparedness based on their perception of disaster risk to give effective response to disasters. The evidence shows that in all countries, the exposure of people to disasters has happened much faster than reducing vulnerability; as a result, new risks have arisen, and the damages caused by disasters have continuously increased in such a way that it has made severe economic, social, health, cultural and environmental impacts in the short-, medium- and long-term [17]. Therefore, it is important to identify and diagnose all possible risks and outcomes to reach the desired preparedness level and reduce vulnerability. Managers and staff at all levels should properly perceive their organizational risks. If the staff does not properly perceive the risks, it is unlikely to achieve disaster preparedness even with increased resources.

5. Conclusion

The risk perception level of two natural disasters, flood and earthquake, among the staff of hospitals in

Mashhad city is above average. It seems that factors such as history of exposure, working department, organizational position, educational level, and gender are effective in the risk perception of hospital staff, while factors such as passing theoretical and practical training courses in the field disasters and work experience have no effect on their disaster risk perception. There is a need to plan and take appropriate measures for the pathology of disaster risk management programs and to improve the disaster risk perception and increase the preparedness of hospitals in case of disasters. One of the limitations of the current study was the impossibility of explaining and identifying the root causes and main factors related to the risk perception among staff, which indicates the need to conduct more detailed studies in this field, preferably with qualitative approach, to explain the dimensions and factors affecting the risk perception of managers.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by ethics committee of Mashhad University of Medical Sciences (Code: IR.MUMS.REC.1398.164). All ethical principles such as obtaining informed consent from the participants and keeping the personal information of the participants confidential were observed.

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Authors' contributions

All authors equally contributed to preparing this article.

Conflict of interest

The authors declared no conflict of interest.

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