



Assessing Preparedness and Awareness of Hospital Managers in the Face of Natural Disasters in 2022: A Case Study in Gilan, Iran

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ABSTRACT

Background: Preparing hospitals for disasters and accidents is one of the fundamental elements of governmental planning to manage, control, or minimize consequences. This study aims to examine the level of preparedness and awareness of public hospital managers in the western region of Gilan Province in the face of natural disasters.

Methods: This applied cross-sectional study was conducted in 2022. The research population consisted of all public hospitals affiliated with Gilan University of Medical Sciences (a total of 8 hospitals and 56 managers). Data were collected using the standard checklist of the hospital preparedness in the face of natural disasters, and a questionnaire to assess managers' awareness. Data were analyzed with the SPSS version 22 and Spearman's statistical tests were used to analyze the association between managers' awareness and hospital preparedness.

Results: The score mean of managers' awareness and preparedness of hospitals to deal with disasters were 44.23 (6.69) and 61.73 (12.96), respectively. Among the various managerial groups, nursing managers demonstrated the highest level of awareness (51.62), whereas medical records managers showed the lowest level (37.50). The area focusing on managing unforeseen events had the highest mean score of preparedness 73.11 (18.03), and the area of planning to reduce construction risks had the lowest mean score of preparedness (44.64). Spearman's correlation test revealed a direct and statistically significant relationship between managers' awareness and hospital preparedness in West Gilan ($r = 0.586$) ($p < 0.001$).

Conclusion: The level of preparedness and awareness of government managers in the West Gilan hospitals, concerning natural disasters, was at an average level. Enhancing hospital preparedness in the face of natural disasters could be achieved through the standardization of hospital infrastructure, training of all unit officials, and the promotion of equipment safety.

1. Introduction

Numerous accidents and incidents occur every year in all regions of the world, some of which have serious financial, fatal, and psychological consequences (Mohebifar et al., 2008). Unexpected disasters and accidents are situations and circumstances where the normal functioning of essential means and facilities for every day is hindered due to sudden

natural or unnatural disasters. These events have a destructive and devastating effect and destroy a society's ability to meet healthcare demands (Chapman & Arbon, 2008). Nowadays, financial and life complications and damages caused by natural and unnatural disasters leave a huge and undeniable impact on people's lifestyles and health. To such an extent, their disruptive effect affects the ability of a society to satisfy basic needs and disrupt daily life,



leading to death, injury, and disability for large numbers of people around the world (Nivolianitou & Synodinou, 2011). According to the Secretary-General of the World Health Organization (WHO), accidents cause problems every day. However, individuals, as well as national and local officials, still lack sufficient motivation to develop accident prevention plans. The (WHO) declared 2009 as the Year of Health in Accidents and Disasters (Amiri et al., 2013). According to the 2018 International Federation of the Red Crescent and Red Cross's 2018 Annual Report on Global Disasters, approximately 1,107 crises occurred between 2008 and 2017, resulting in 232 million people receiving emergency assistance. These conditions led to 2.6 billion francs of the Confederation's operating budget to address these circumstances (Burton & Venton, 2009). In terms of the frequency of natural disasters, Iran is among the top ten countries in the world. Two of the five largest earthquakes in the world since 2013 and the majority of damage caused by natural disasters can be attributed to these two cases (Sztajnkrzyer, 2004; Sweileh, 2019; Liu et al., 2021). Iran faces various natural and man-made hazards. In the Disaster Risk Assessment Report published in 2009, the level of risk of natural disasters in Iran over the past four decades is estimated at 8 out of 10 based on the mortality criterion, with an estimated death toll of around 106,000 people (Unisdr, 2012). Approximately 77% of the country's 300 cities are located on earthquake fault lines, and 35% are exposed to the threat of floods, typhoons, and tidal waves (Wisner, 2020). In terms of natural disasters, Iran ranks fourth in Asia, after India, Bangladesh, and China (Shen & Hwang, 2019). Such accident-prone countries suffer an average annual economic loss of 3% of their GDP due to unexpected accidents (Duchek, 2020; Arab et al., 2009). During accidents and disasters, hospitals and medical centers are the first units where optimal and timely medical care can play a vital and crucial role in reducing deaths and rescuing the injured (Salari et al., 2013). The effective management of hospitals and health centers during a crisis also has significant implications for their optimal and desirable performance (Maleki et al., 2008). Crises usually arise unexpectedly and lead to a number of hidden and obvious consequences. Therefore, leaders must remain prepared to handle them appropriately (Mohammadi, 2018). A crisis, also called dealing with difficult and unforeseen circumstances, has different phases and types. Understanding the individual components and phases of crises requires correct and scientific management. Steps such as prevention and preparation before, during, and after a crisis, as well as the management of its various phases, require specific requirements, physical structures, and management skills. The task of a crisis manager task is to make correct and effective decisions based on the right information for damage control and crisis management. Decisions based on incomplete information increase the extent of damage, and, above all, prompt action is the first destructive factor in a crisis (Solhi et al., 2022). The healthcare and treatment system of each country, like other organizations providing services, plays a very effective and

key role. Among the many components of this system, hospitals are perhaps the most important manifestation of these services to society (Mehrabi et al., 2015). Since public hospitals are vulnerable to various natural, human, and technological risks, research on unexpected events holds great importance. Such research helps prevent the repetition of past mistakes and enhances responsiveness in incidents (Chong, 2004). In this regard, several studies have been conducted, including those by Bazzyar *et al.* (2020). A total of 25 articles, encompassing 181 hospitals, were examined between 2015 and 2016. The findings showed an average overall hospital readiness of 53% in Iran (Bazzyar et al., 2020). Amiri *et al.* (2009) showed that hospitals in the province generally have an average level of preparedness for disasters (Amiri et al., 2011). Another study by Amiri *et al.* (2013) indicated that the average score of managers' awareness of preparedness and disaster preparedness in all hospitals examined was average (Amiri et al., 2013). In 2015, Mohammadi *et al.* conducted a study that concluded the average level of preparedness in the hospitals studied was 75%. The highest and lowest levels of preparedness were in the areas of management and transportation, respectively (Mohammadi et al., 2017). Jahani *et al.*'s study (2019) found that the managers' awareness level and preparedness for hospital disaster management were average (Jahani et al., 2019). The results of the study showed that the hospital capacity for disaster preparedness in Nairobi city was average in 22 hospitals (88.68%), with preparedness level of 95.64% in 6 public hospitals and 64.69% in 16 private hospitals. The difference between the capacity of public and private hospitals in the city was less than 5%. The study results also showed that hospital equipment scored the highest, while hospital training and exercises scored the lowest (Simiyu et al., 2014). Ambet *et al.* (2020) conducted a study in a region of South India, which highlighted the need for hospitals to improve their preparedness to deal with emerging infectious diseases. The findings indicated that hospitals need to be prepared for the increased prevalence of such diseases (Ambat & Vyas, 2022). A review of the literature did not yield any studies specifically focusing on the level of preparedness and awareness of public hospital managers in the western region of Gilan toward natural disasters. In addition, historical documents indicate that this area is prone to natural disasters, such as the 1991 earthquakes in Roodbar and Manjil cities. Therefore, the present study aims to examine the level of preparedness and awareness of public hospital managers in the western region of Gilan toward natural disasters.

2. Materials and Methods

2.1 Study design

This cross-sectional study was conducted in the governmental hospitals of West of Gilan in 2023.

2.2 Sample size and sampling procedure

The study population included all public hospitals in West

of Gilan (8 hospitals in total) and their managers. To measure managers' awareness, a sample of 56 people was selected, which encompassed hospital officials with organizational titles such as hospital executive managers, nursing directors, supervisors, a head nurses, as well as those responsible for hospital laboratories, medical records, and pharmacy units.

2.3 Data collection and measures

The data collection tool in this research consisted of three parts. First, demographic characteristics were assessed with 7 questions. Secondly, the managers' awareness questionnaire was used, including 33 questions about managers' awareness of hospital preparedness and disaster management. The validity and reliability of the questionnaire have been confirmed by (Amiri et al., 2013; Hekmatkhah et al., 2012; Jahani et al., 2019). Thirdly, the hospital's preparedness checklist in the face of disasters was employed, comprising 134 questions in 8 evaluation areas, as follows: Checklist for evaluation of environmental health measures (16 questions), Checklist for the evaluation of hospital emergency management (12 questions), Life Support Planning Evaluation Checklist (17 questions), Hospital Disaster Management Education Program Evaluation Checklist (18 questions), Checklist for assessing safety planning of hazardous materials and equipment against disasters (27 questions), Construction Risk Reduction Planning Assessment Checklist (8 questions), Hospital Evacuation Planning and Field Treatment Program Assessment Checklist (20 questions), and Evaluation Checklist for Planning Essential Medical and Non-Medical Equipment and Supplies (16 Questions). The preparation of this checklist was based on the national guidelines of the Ministry of Health and it has been used in previous research (Amiri et al., 2011; Jahani et al., 2019). According to the records and documents, the checklists were completed by the respondents using face-to-face interactions, observation, and interviews. The awareness questionnaire employed a Likert scale, with response options ranging from 0 (no) to 1 (to some extent) and 2 (yes). The total possible score was 66. A score below 50% indicated low awareness, a score between 51% and 75% indicated average awareness and a score above 75% indicated good awareness. Regarding the assessment checklist of hospital preparedness, a two-choice scale was used (yes = 1, no = 0). Each area was given a score between 0 and 100 and the scores were then divided into three groups. An average score of 0 to 50% indicated inadequate preparation, a score between 51% and 75% indicated average preparation and a score above 75% indicated good preparation. The minimum and maximum values for General Readiness ranged from 0 to 134. Table 1 presents the scoring system used to assess each reviewed domain and its categories (Djalali et al., 2014).

2.4 Data analysis

SPSS version 22 software was used for data analysis. According to the points given, the normality of the data was

first checked using the Kolomograph-Smirnov test, and due to the non-normality of the awareness data, the Kruskal-Wallis test was used. To determine the relationship between the managers' awareness of hospital preparation with the preparedness of the hospital in the face of disasters each of the areas was considered by Spearman's test with a significance level of $p < 0.05$.

Table 1. The scoring method used for assessing each domain of the hospital preparedness assessment checklist

Domain name	Number of questions	Score range	Classification of the readiness of hospitals		
			Weak	Medium	Good
Environmental health measures	16	0-16	0-8	9-12	13
Management of unforeseen events in the hospital	12	0-12	0-6	7-9	10-12
Critical Services Support Planning	17	0-17	0-8	9-13	14-17
Hospital training program for dealing with disasters	18	0-18	0-9	10-13	14-18
Planning for the Safety of Hazardous Materials and Equipment Against Disasters	26	0-26	0-13	14-20	21-26
Plan to reduce construction risks	8	0-8	0-4	5-6	7-8
Planning for hospital evacuation and field treatment	20	0-20	0-10	11-15	16-20
Planning for essential medical and non-medical equipment and supplies	16	0-16	0-8	9-12	13-16

3. Results and Discussion

In this section, we first examine the demographic variables, and then the objectives of the research. In terms of the participants' gender, there were 38 females (67.9%) and 18 (32.1%) males. Among those surveyed, the most common qualification was nursing, while the least common was midwifery. The mean and standard deviation of respondents' ages were 41.9 and 6.2 years, respectively. The minimum age recorded was 27 years and the maximum age was 54 years. The mean and standard deviation of respondents' work experience were 16.9 and 7 years, respectively. The minimum work experience was 3 years, and the maximum was 29 years. The majority of respondents had work experience of less than 5 years, and 61.5% of them had work experience of less than 10 years (Table 2). Findings of descriptive statistics related to awareness are presented in Table 3. The results showed that the mean score of managers' awareness regarding hospital disaster preparedness was 44.23, indicating an average level. Among the groups studied the highest and lowest levels of awareness were in the nursing manager 51.62 (7.33). and medical records 37.5 (11.79) groups.

Table 2. Frequency distribution of demographic characteristics among examined subjects

demographic characteristics		number	percent
Gender	Man	18	32.1
	Female	38	67.9
	Total	56	100
Work experience	Less than 5	24	42.9
	5-9	11	19.6
	10-14	9	16.1
	15-19	8	14.2
	20-24	3	5.4
	25 and more	1	1.8
	Total	56	100
Field of Study	Medical	4	7.1
	Nursing	25	44.6
	Midwifery	2	3.6
	Management	3	5.4
	Laboratory sciences	6	10.7
	Other	16	28.6
	Total	56	100
Level of Education	Bachelor's degree	26	46.4
	Master's degree	23	41.1
	General medicine	2	3.6
	Specialized medicine	5	8.9
	Total	56	100

Table 3. Mean scores (standard deviation) of managers' awareness and ranking of public hospital managers in the west of Gilan based on organizational position

Title	Mean (standard deviation)	Minimum	Maximum	Rank
Administration Manager	41.71(10.71)	31	62	5
Supervisor	48(5.85)	41	59	2
Superintendent	50.47 (72.04)	42	57	3
Nursing manager	51.62(7.33)	42	61	1
Head of Laboratory	42.25 (10.09)	27	58	4
Responsible for medical records	37.5 (11.79)	17	58	7
Pharmacy manager	41.00 (10.28)	27	59	6

Table 4 details the descriptive statistics related to the preparedness levels of hospitals. The results showed that hospital preparedness, based on the eight domains, was as follows: 9 participants (16.1%) of hospital directors were at the low level of preparedness, 39 participants (69.6%) were at the medium level of preparedness, and 8 participants (14.3%) were at a good level of preparedness. According to Table 5, the overall preparedness score of the governmental hospitals in the west of Gilan, in dealing with disasters, was 61.73 (12.96), indicating an average level. The highest level of preparedness among the selected hospitals was observed in the management of unexpected events, with a mean score of 73.11 (18.03), indicating a good situation. The lowest preparedness score among the selected hospitals was in the area of construction risk reduction planning, with a mean score of 44.64 (21.17), indicating a poor situation. Using Pearson's correlation test, a statistically significant direct and moderate relationship ($r = 0.586$, $p < 0/001$) was observed between managers' awareness and hospital preparedness in the West of Gilan. In the study by Jahani *et al.* (2019), the overall preparedness of hospitals in the southeast of Iran to

deal with disasters was average, with a mean of 61.66 and a standard deviation of 22.95, which is close to the values of the findings of our research. Considering the similarity of assessment tools and the temporal proximity of the above study to the current study, it seems that the preparedness of hospitals in West Gilan is more appropriate than those in the southeast of the country (Jahani *et al.*, 2019). A study by Simiyu *et al.* (2014) evaluated the level of knowledge of hospital workers in Nairobi, Kenya, regarding disaster management, rating it as acceptable (Simiyu *et al.*, 2014), which is in line with the findings of this study. Additionally, Djalali *et al.* (2014) examined the level of preparedness level of hospitals in the European Union member states and found their preparedness level to be barely acceptable, contrary to the results of our study (Djalali *et al.*, 2014). In this study, 14.3% of hospitals had good preparation, 69.6% had moderate preparation, and 16.1% had poor preparation. The overall average score for hospital disaster preparedness was 61.7, with a standard deviation of 12.9. A study by Amiri *et al.* (2011) in Shahroud revealed that 30% of hospitals were poorly prepared and 70% were moderately prepared, indicating lower preparedness levels compared to our study. Further research is required to explore the reasons for this discrepancy and to assess temporal changes within this period (Amiri *et al.*, 2011). The results of this study showed that the level of preparedness was moderate, with the management of unexpected incidents and the planning of essential medical and non-medical equipment and consumables being in the best condition. However, construction risk reduction planning received the lowest rating. Similarly, Amiri *et al.*'s study (2013) in the north of the country of five universities of medical sciences showed that the management of unexpected events in hospitals received the highest score, consistent with our findings, while the lowest score was related to plans for managing the reduction of construction risks, which is also consistent with our study (Amiri *et al.*, 2013).

Table 4. Frequency distribution of preparedness levels in public hospitals in the west of Gilan

domains name	Level of preparedness, Number (%)		
	Weak	Medium	Good
Environmental health measures	13 (23.2)	32(57.1)	11(19.6)
Management of unexpected events in the hospital	4(7.1)	32(57.1)	20(35.7)
Critical service support planning	5(8.9)	40 (71.4)	11(19.6)
Hospital training program to deal with disasters	24(42.9)	23(41.1)	9(16.1)
Safety planning of hazardous materials and equipment against disasters	15(26.8)	34(60.7)	7(12.5)
Construction risk reduction planning	43 (76.4)	9(16.1)	4(7.1)
Hospital evacuation planning and field treatment	20(35.7)	33(58.9)	3(5.4)
Planning essential medical and non-medical equipment and consumables	7(12.5)	30(53.6)	19(39.9)
General preparation	9(16.1)	39 (69.6)	8(14.3)

Table 5. Descriptive Statistics of Public Hospitals' Preparedness in the West of Gilan by Area

Field name	Preparedness	
	Mean	Standard deviation
Environmental health measures	65.40	16.89
Management of unexpected events in the hospital	73.11	18.03
Critical service support planning	65.13	14.79
Hospital training program to deal with disasters	94.57	89.21
Safety planning of hazardous materials and equipment against disasters	60.17	14.84
Construction risk reduction planning	44.64	21.17
Hospital evacuation planning and field treatment	55.71	16.74
Planning essential medical and non-medical equipment and consumables	70.76	20.58
General preparation	61.73	12.96

In Arab *et al.*'s study (2009), the emergency planning management area scored the highest (72.78%), in line with our study. However, the earthquake management education program received the lowest score (37.41%), which differs from our study. Nevertheless, the preparation area score related to construction risk reduction planning (45%) was very close to our study (Arab et al., 2009). Luo *et al.* (2021) conducted a study titled "Assessing the Management and Response Competence of Nursing Population in Disasters in China." Their findings indicated that a group of Chinese nurses was at a weak level in disaster management and response skills, which contradicts the findings of our study (Luo et al., 2021). This discrepancy may be attributed to different economic, social, and planning approaches between the two communities, as well as the combination of participants in this study is to a certain extent different (Yu et al., 2013). In Heidaranlu *et al.*'s study (2020), one hospital had the lowest level of preparedness in the areas of disaster recovery, the continuity of critical services, the management of support and care, the continuity of critical services, and human resources. According to the results, the overall preparedness level of the hospitals examined was low, which contradicts our research findings (Heidaranlu et al., 2020). Moreover, Ingrassia *et al.*'s study (2016) in Italian hospitals concluded that staff did not have sufficient information about their responsibilities and tasks during crises and disasters and did not provide correct and acceptable performance during crises and disasters (Ingrassia et al., 2016). This finding is contrary to the results of this study. Our study confirmed a direct and moderate relationship between managers' awareness and hospital preparedness in West Gilan, which was statistically significant. This finding aligns with Jahani *et al.*'s research (2019), which reported a positive and significant correlation between hospital managers' awareness and the preparedness of southeastern university hospitals for disasters ($p < 0.004$) (Jahani et al., 2019). In Amiri *et al.*'s study (2013) in hospitals in the north of the country, a significant relationship was observed between managerial awareness and hospital disaster preparedness. They emphasized that while awareness alone is not the sole determinant of hospital readiness and performance, it plays a crucial role in identifying strengths and weaknesses,

allocating resources, and improving overall performance. These results are consistent with our study (Amiri et al., 2013).

4. Conclusion

The results of the present study showed that the preparedness of governmental hospitals in the West of Gilan in dealing with disasters was at an average level. Moreover, there was a direct and moderate relationship between managers' awareness and hospital preparedness. However, only 25% of hospital managers had good awareness. Despite improvements in hospital preparedness since previous reports, the current conditions are still far from ideal. Considering Iran's vulnerability to natural disasters, ranking among the top 10 countries in the world, it is essential to regard hospital preparedness against such events as a requirement rather than an optional endeavor. This necessitates adopting a comprehensive, long-term approach that incorporates codified criteria and standards to evaluate the preparedness of public hospitals and the awareness of their managers regarding natural disasters.

4.1 Research limitations

This study has limitations that must be acknowledged. The first limitation was the reluctance of managers and officials of hospital units to participate in the study, who were persuaded to cooperate by talking about the importance of natural disasters and obtaining permission from the university. The second limitation was the non-attendance of managers in the hospital due to participating in a mission abroad for more than a few months, which was resolved in coordination with the hospital officials.

Authors' Contributions

Ali Mohammadi: Methodology; Advisor. Hasan Sojodi Ziabri: Performing the experiment; Collecting data and filling in checklists; Data analysis; Writing-original draft. Mehran Mohammadian Fazli: Conceptualization; Methodology; Reviewing the manuscript.

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Conflicts of Interest

The authors declare no Conflict of interest.

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Ethical considerations

This article is the result of an approved master's thesis, with a code of ethics (IR.ZUMS.REC.1401.293) in the Department

of Health, Safety and Environment Management (HSE), Faculty of Health, Zanjan University of Medical Sciences.

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