

## Original Article

# Risk Management in Disasters: The Case of a Private Hospital

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### Abstract

**Background:** The main purpose of disaster management in hospitals is to ensure that patients, their relatives and staff are least affected by the damages that may occur as a result of disasters and to minimize loss rates.

**Aim:** This research was carried out to determine the current situation regarding disaster preparedness in health institutions.

**Methodology:** Research data was obtained by applying a survey to 120 healthcare workers (nurses, health technicians and laboratory workers) working in a private hospital operating in Istanbul between 01.01.2024-29.02.2024. In this research, the "Hospital Disaster and Emergency Preparedness" scale and the "Hospital Employee Disaster and Emergency Preparedness" scale were used. The data were recorded and analyzed in the SPSS 21.0 program. Chi-Square test, Fisher's Exact test, and Correlation analysis, which were used to analyze the data.

**Results:** The findings revealed no significant relationship between the preparedness of healthcare workers for hospital disasters and emergencies and their genders, ages.. etc. However, a significant relationship was found between their professions and their previous training on disasters. The preparedness of healthcare workers for hospital disasters and emergencies showed no significant relationship with their genders, ages such as demographic information in the institution, professional experiences, or involvement in hospital duties during disasters. However, a significant relationship was found between their previous training on disasters. As a result of the study, it was determined that there was a low positive relationship between the preparedness of healthcare professionals for hospital disasters and emergencies and the preparedness of hospital employees for disasters and emergencies.

**Conclusions:** In order to hospitals to effectively manage disasters, they need to train their staff at regular intervals, organize emergency drills, create an emergency plan, and conduct regular risk assessments to identify potential dangers and weaknesses.

**Keywords:** Disaster, hospital, risk management

### Introduction

Disasters, which have a history as old as human history, occur in the form of natural events such as earthquakes, floods, landslides, and tsunamis, or human-caused events, causing loss of life; such extraordinary

situations negatively affect societies in many ways (Bankoff, 2012; Chaudhary & Piracha, 2021). In general, a disaster is defined as "an event that causes physical, economic and social losses for the whole or certain segments of the society, stops or interrupts normal life

and human activities, and where the affected society's coping capacity is insufficient" (Yilmaz, 2003). Being prepared for disasters in all organizations, and being able to manage the process without suffering too much damage is the goal. Disaster risk management can be considered as a holistic perspective that includes the planning that needs to be done before, during and after disasters, and requires the cooperation of many disciplines from different fields (Lamberti-Castronuovo et al., 2022). Failing to make the necessary precautions in the case of a disaster might have very serious consequences for healthcare organizations that provide 24-hour services (Gowing et al., 2017; Rodriguez-Arrastia et al., 2022). For this reason, healthcare organizations should identify disaster risks, determine the damages that will occur in the event of a disaster, and carry out the necessary work to eliminate the identified risks. In this context, preparations should be completed by coordinating with the relevant institutions and organizations (Isik et al., 2012; Sheikhi et al., 2021; Azarmi et al., 2022). It is important to take quick action to ensure the supply of necessary personnel and equipment for the treatment of injured people who apply to the healthcare organization after a possible disaster (Luke et al., 2021). The intermittent implementation of plans during extraordinary periods such as pandemics in the application of risk management plans created for the normal operating period of healthcare organizations causes complexity (Righi et al., 2021; Grondys et al., 2021). For this reason, hospital managers should change their existing plans during epidemics, floods, and other disasters periods to prevent the problems that are likely to occur. Since the healthcare service production process is dynamic, this process should be quickly reviewed according to changing conditions (Peterson et al., 2018; Yurtlu & Erkan, 2023).

The aim of this research is to emphasize the importance of the issue of disaster preparedness of healthcare institutions, and to evaluate the knowledge and awareness of the healthcare workers of a private hospital in Istanbul regarding disaster preparedness in terms of demographic characteristics, and to provide recommendations.

## **Materials and methods**

**Study design and sample:** This research is a descriptive-cross-sectional study. This study was conducted in a private hospital operating in Istanbul between 01.01.2024 and 29.02.2024. It was determined that the hospital where the research was conducted had 164 nurses, health technicians, and laboratory staff. The study employed the basic random sampling approach, and the sample size was calculated using the formula Karagoz (2014) developed. A questionnaire was provided to 120 healthcare workers in this study given that the calculations showed that the sample needed to include at least 115 participants in order to reflect the population.

**Data Collection Tools:** AThe research used the Dincer (2019) questionnaire, for which permission was obtained. There are 80 questions in the three sections of the data collection tool used by the study. Nine questions in the first section are designed to ascertain the healthcare worker's sociodemographic details, including gender, age, degree of education, and working hours. Healthcare workers' preparedness for disasters is assessed using a 42-question "Hospital Disaster and Emergency Preparedness Status" scale in the second section, and healthcare workers' preparedness is examined using a 29-question "Hospital Employee Disaster and Emergency Preparedness Status" scale in the third section. The data obtained were recorded and analyzed using the SPSS 21.0 (statistical package for social sciences for Windows) program. Since the questionnaire questions in the scales used were categorical and did not follow a normal distribution, parametric tests could not be applied. Therefore, non-parametric tests such as Chi-Square test and Fisher's Exact test were used to test the hypotheses. Correlation analysis was used to look at the relationship between variables. Mean and standard deviation values were given in the analysis of the questionnaires used in the research. Cronbach's Alpha analysis was performed to determine the reliability level of the questionnaires. The Cronbach's Alpha value of the hospital disaster and emergency preparedness questionnaire was calculated as 0.942, and the Cronbach's Alpha value of the hospital employee disaster and emergency

preparedness questionnaire was calculated as 0.934. Cronbach's Alpha values indicate that the questionnaire questions have a high degree of reliability.

**Ethics:** This study was approved by University Ethics Committee (Ethical approval: 2023/11-1109, 06.11.2023). Permission for this research was acquired from the hospital's management.

## Results

The findings regarding the demographic characteristics of the participants are presented in Table 1. It is seen that 77.5% of the participants have not previously served in a hospital during a disaster, and 86.7% have previously attended a disaster-related training.

The results of the chi-square analysis on the differences in the participants' disaster preparedness levels according to their occupations are shown in Table 2. Since the number of expected cells less than 5 is more than 20%, the Fisher's Exact Test value was examined instead of the Pearson Chi-Square value. In this case, since  $p=0.021$ , it was determined that the participants' levels of evaluation of the hospital's disaster preparedness differed according to their occupations.

It was determined that the hospital disaster and emergency preparedness questionnaire ( $\bar{X}=1.0833$ ) and the employee disaster and emergency preparedness questionnaire ( $\bar{X}=1.3083$ ) had an average score. The

question "Do you have knowledge about the Emergency Color Code System?" ( $\bar{X}=1.05$ ) had the lowest average, while the question "Do you know the procedures to be applied in the event of terrorism and sabotage in the hospital (bomb threat, suspicious package/tube, attack)?" ( $\bar{X}=1.55$ ) had the highest average.

When the participants' responses to the questions regarding the evaluation of the hospital's disaster and emergency preparedness were examined, the questions "Is there an Incident Management Team for disasters and emergencies?" and "Are there emergency exit signs?" ( $\bar{X}=1.02$ ) had the lowest average, while the question "Is there an inventory (list) of emergency companies and critical suppliers (for food, water, etc.)?" ( $\bar{X}=1.65$ ) had the highest average.

The participants' levels of disaster preparedness differ significantly ( $p=0.006$ ) according to whether they have previously attended a disaster-related training. However, there is no significant difference between the other variables (Table 3).

Table 4 shows that, since the  $p$ -value is  $<0.05$ , there is a significant relationship between the participants' levels of evaluation of the hospital's disaster preparedness and the participants' levels of feeling prepared for disasters. However, since the correlation coefficient is determined to be 0.282, this relationship is not considered strong.

**Table 1. Demographic characteristics of the participants**

		n	%
Gender	Female	95	79.2
	Male	25	20.8
Age	20-26 years	69	57.5
	27-33 years	21	17.5
	34 years and above	30	25.0
Educational Status	High School	26	21.7
	Associate's Degree	76	63.3
	Bachelor's Degree	15	12.5

<b>Occupation</b>	Graduate Degree	3	2.5
	Laboratory Technician	3	2.5
	Nurse/Midwife	62	51.7
	Paramedik/Tekniker	55	45.8
<b>Duration of Work in the Instution</b>	Less than 1 year	39	32.5
	1 year to 5 years	41	34.2
	5 years to 10 years	23	19.2
	Over 10 years	17	14.2
<b>Duration of Work in the Profession</b>	Less than 1 year	19	15.8
	1 year to 5 years	32	26.7
	5 years to 10 years	33	27.5
	Over 10 years	36	30.0
<b>Serving in a Hospital During a Disaster</b>	Yes	27	22.5
	No	93	77.5
<b>Participation in Disaster-Related Training</b>	Yes	104	86.7
	No	16	13.3

**Table 2. Chi-Square analysis of the participants' levels of evaluation of the hospital's disaster preparedness according to their occupations**

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	10.130 <sup>a</sup>	4	.038	.062
Likelihood Ratio	13.161	4	.011	.005
<b>Fisher's Exact Test</b>	<b>11.149</b>			<b>.021</b>
Number of Cases	120			

**Table 3. Chi-Square analysis of the participants' levels of disaster preparedness and their previous participation in disaster-related training**

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	12.987 <sup>a</sup>	2	.002	.005		
Likelihood Ratio	9.288	2	.010	.005		

<b>Fisher's Exact Test</b>	<b>9.357</b>			<b>.006</b>		
Linear-by-Linear Association	6.928 <sup>b</sup>	1	.008	.013	.013	.008
Number of Cases	120					

**Table 4. Correlation analysis of the hospital's disaster preparedness level and the participants' levels of feeling prepared for disasters**

		Hospital Questionnaire	Employee Questionnaire
Hospital's disaster preparedness level	Pearson Correlation	1	<b>.282**</b>
	Sig. (2-tailed)		<b>.002</b>
	Sum of Squares and Cross-products	13.167	6.917
	Covariance	.111	.058
	N	120	120
Employee's level of readiness	Pearson Correlation	<b>.282**</b>	1
	Sig. (2-tailed)	.002	
	Sum of Squares and Cross-products	6.917	45.592
	Covariance	.058	.383
	N	120	120

## Discussion

The main purpose of disaster management in hospitals is to ensure that patients, their relatives, and staff are minimally affected by the consequences of disasters and to minimize the loss rate. During a disaster, the health services provided in the hospital must continue uninterrupted, and no one should be affected by the disaster, so effective disaster management must be implemented. Therefore, effectiveness of disaster management, it is depends on the hospital and healthcare workers be prepared for disasters (Dincer ve Kumru, 2021; Turkoglu, 2024).

In this study, there is no significant difference the participants' answers of the hospital's level of preparedness on their gender. The outcomes of our study are like with those of

the studies carried out by Dincer in 2019 and Ozkara in 2022 (Dincer, 2019; Ozkara, 2022). On the contrary, the results showed in the participants' assessments of the hospital's disaster preparedness status based on their gender have significant difference with the Ozkara and Dincer The outcomes showed no significant difference levels of disaster preparedness at gender in the study by Unal and colleagues (2017) among UMKE workers in Turkey. In this study, there are no significant difference was found in the participants' evaluation levels of the hospital's disaster preparedness status up to their age groups. Also, no significant difference was found in previous studies. (Sen & Ersoy, 2017; Aslantas & Tabuk, 2021, Sarik & Cengiz, 2022).

In our outcomes, no significant difference was found between the participants' assessments of the hospital's level of preparedness for disasters on their educational background. But, Ozkara's study, participants with an associate's degree had a significant lower level than those with a bachelor's or master's degree. (Ozkara, 2022). In Yildiz's study, participants with lower educational status demonstrated significant greater level of disaster readiness (Yildiz, 2017). In Unal and colleagues' study According to their educational background, participants' answers of the hospital's disaster preparedness status did not change significantly. (Unal et al., 2017). As a requirement of risk management, hospital governors should proactively assess and prevent possible and current hazards throughout the healthcare facility. To reduce potential dangers, professionals should provide ongoing service training (Erkan & Akbaba, 2020).

In our study, on the contrary, Hugelius and colleagues' study we found a statistically significant difference in the participants' assessments of the hospital's emergency readiness status on their occupations. (Hugelius et al., 2017). Lim and colleagues' study, apart from low differences in the participants' level of disaster awareness, revealed that few discrepancies between the participants' job titles and their level of disaster awareness (Lim et al., 2013). According to their professional experience and duration of service with the hospital, the participants' answers of its emergency preparedness status did not differ significant. For this reason, hospital managers should change their existing cantly like the study carried out by Berhanu and colleagues. (Berhanu et al., 2016). Conclusions of Tercan's study on nurses showed that those with 11–15 years of experience were more prepared and aware of disasters than those with 0–5 years of experience (Tercan, 2015).

In our study, there was no significant difference in the participants' answers of the hospital's preparedness for disasters based on whether they had held any positions during a crisis in the past. On the contrary to nurses with disaster experience, Tercan's outcomes revealed that nurses without such experience

felt more prepared. Tercan commented this outcome as the anguish and anxiety of inadequacy that healthcare workers who have experienced disasters experience (Tercan, 2015). Unlike our findings, Dincer (2019) and Ozkara's findings revealed a significant difference in the participants' answers of the hospital's preparedness status on if they had held any positions during a disaster (Dincer, 2019; Ozkara, 2022). Answers of the our participants' of the hospital's disaster preparedness status and their feelings of readiness for a disaster differed significantly. But, it may be stated that this association is weak because of the correlation coefficient was 0.282. Of the participants, 86.7% told never having attended any disaster-related training. Because of the lack of training, It was defined that the employees were not aware of the emergency exit signs, the emergency color-code system, or the existence of an emergency management team.

**Limitations:** The results are sample-specific, and therefore, cannot be generalized to the whole population.

**Conclusion:** As a result, disasters plans should be prepared, the duties of the disaster team should be determined and the personnel should be informed about this issue. Emergency equipment and materials should always be ready and regularly inspected. Additionally, evacuation and rescue plans should be established for the hospital building. Healthcare personnel should be given regular training on disaster situations, and newly hired personnel should be informed about disasters during orientation training. All personnel should be given disaster drills, necessary precautions should be taken in order to be affected by disasters and their consequences with minimum damage within the hospital, and the hospital building should be checked regularly and necessary security measures should be taken to ensure that health services continue during a disaster. Risk assessment should be carried out with analyses such as failure mode and effects analysis and root cause analysis at regular intervals to identify potential hazards and weaknesses related to the disaster.



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## References

- Aslantas, O., & Tabuk, M. (2021). Disaster preparedness and preparedness perception of 112 provincial ambulance service personnel: The case of Balıkesir province. *Gumushane University Journal of Health Sciences*, 10(1), 44-55. [10.37989/gumussagbil.793961](https://doi.org/10.37989/gumussagbil.793961)
- Azarmi, S., Pishgooie, A. H., Sharififar, S., Khankeh, H. R., & Hejrypour, S. Z. (2022). Challenges of hospital disaster risk management: A systematic review study. *Disaster medicine and public health preparedness*, 16(5), 2141-2148. <https://doi.org/10.1017/dmp.2021.203>
- Bankoff, G. (2012). Historical concepts of disaster and risk. In *Handbook of Hazards and Disaster Risk Reduction* (pp. 37-47). Routledge.
- Berhanu, N., Abrha, H., Ejigu, Y., & Woldemichael, K. (2016). Knowledge, experiences and training needs of health professionals about disaster preparedness and response in southwest Ethiopia: a cross sectional study. *Ethiopian Journal of Health Sciences*, 26(5), 415-426. <https://doi.org/10.4314/ejhs.v26i5.3>
- Chaudhary, M. T., & Piracha, A. (2021). Natural disasters-origins, impacts, management. *Encyclopedia*, 1(4), 1101-1131. <https://doi.org/10.3390/encyclopedia1040084>
- Dincer, S. (2019). Hospital management in extraordinary situations (Master's thesis, Istanbul Medipol University).
- Dincer, S., & Kumru, S. (2021). Preparedness of medical personnel for disasters and emergencies. *Gumushane University Journal of Health Sciences*, 10(1), 32-43. [10.37989/gumussagbil.790884](https://doi.org/10.37989/gumussagbil.790884)
- Erkan, I., & Akbaba, M. (2020). Assessment of the risks of the workplace and the awareness of healthcare professionals. *Medicine Science*, 9(4):1027-31. <https://doi.org/10.5455/medscience.2020.09.186>
- Gowing, J. R., Walker, K. N., Elmer, S. L., & Cummings, E. A. (2017). Disaster preparedness among health professionals and support staff: what is effective? An integrative literature review. *Prehospital and Disaster Medicine*, 32(3), 321-328. <https://doi.org/10.1017/S1049023X1700019X>
- Grondys, K., Ślusarczyk, O., Hussain, H. I., & Androniceanu, A. (2021). Risk assessment of the SME sector operations during the COVID-19 pandemic. *International Journal of Environmental Research and Public Health*, 18(8), 4183. <https://doi.org/10.3390/ijerph18084183>
- Isik, O., Aydinlioglu, H. M., Koc, S., Gundogdu, O., Korkmaz, G., & Ay, A. (2012). Disaster management and disaster-oriented health services. *Okmeydanı Medical Journal*, 28(2), 82-123. <https://doi.org/10.5222/otd.suppl.2012.082>
- Karagoz Y. (2014). SPSS ve AMOS Applied Quantitative-Qualitative-Mixed Scientific Research Methods and Publication Ethics. (ss.1-500). Nobel Yayınevi.
- Lamberti-Castronuovo, A., Valente, M., Barone-Adesi, F., Hubloue, I., & Ragazzoni, L. (2022). Primary health care disaster preparedness: a review of the literature and the proposal of a new framework. *International Journal of Disaster Risk Reduction*, 81, 103278. <https://doi.org/10.1016/j.ijdr.2022.103278>
- Lim, G. H., Lim, B. L., & Vasu, A. (2013). Survey of factors affecting health care workers' perception towards institutional and individual disaster preparedness. *Prehospital and Disaster Medicine*, 28(4), 353-358. <https://doi.org/10.1017/S1049023X1300349X>
- Luke, J., Franklin, R., Aitken, P., & Dyson, J. (2021). Safer hospital infrastructure assessments for socio-natural disaster—a scoping review. *Prehospital and Disaster Medicine*, 36(5), 627-635. <https://doi.org/10.1017/S1049023X21000650>
- Ozkara B. (2022). An empirical study on the assessment of preparedness levels of hospitals and healthcare workers in emergencies and disasters (Master's thesis, Istanbul Esenyurt University).
- Paterson, D. L., Wright, H., & Harris, P. N. (2018). Health risks of flood disasters. *Clinical Infectious Diseases*, 67(9), 1450-1454. <https://doi.org/10.1093/cid/ciy227>
- Righi, E., Lauriola, P., Ghinoi, A., Giovannetti, E., & Soldati, M. (2021). Disaster risk reduction and interdisciplinary education and training. *Progress in Disaster Science*, 10, 100165. <https://doi.org/10.1016/j.pdisas.2021.100165>
- Rodriguez-Arrastia, M., García-Martín, M., Villegas-Aguilar, E., Ropero-Padilla, C., Martín-Ibañez, L., & Roman, P. (2022). Emotional and psychological implications for healthcare professionals in disasters or mass casualties: a systematic review. *Journal of Nursing Management*, 30(1), 298-309. <https://doi.org/10.1111/jonm.13474>
- Sarik, M. E., & Cengiz, S. (2022). Determination of hospital disaster and emergency plan training, preparedness level and knowledge levels of employees: The case of Antalya.

- Gumushane University Journal of Health Sciences, 11(1), 122-132. 10.37989/gumussagbil.1003368
- Sen, G., & Ersoy, G. (2017). Evaluation of the level of knowledge of the hospital disaster team on disaster preparedness. *Gumushane University Journal of Health Sciences*, 6(4), 122-130.
- Sheikhi, R. A., Seyedin, H., Qanizadeh, G., & Jahangiri, K. (2021). Role of religious institutions in disaster risk management: A systematic review. *Disaster medicine and public health preparedness*, 15(2), 239-254. <https://doi.org/10.1017/dmp.2019.145>
- Tercan B. (2015). Nurses' Preparedness and Preparedness Perceptions for Disasters. (Master's thesis, Gumushane University).
- Turkoglu, M. C. (2024). Evaluation of Health Services Provided in Natural Disasters from the Perspective of Health Communication. *TOGU Erbaa Journal of Health and Management*, 1(1), 53-69.
- Unal, Y., Isik, E., Sahin, S., & Yesil, S. T. (2017). Evaluation of individual preparedness levels of health disaster workers for earthquakes: The case of the National Association of Medical Rescue Teams (UMKE). *Journal of Dokuz Eylul University Faculty of Medicine*, 31(2), 71-80.
- Yildiz, M. S. (2017). Investigation of disaster preparedness levels of healthcare personnel: The case of Canakkale Province (Master's thesis, Gumushane University).
- Yilmaz, A. (2003). Disaster management as one of the problem areas of Turkish public administration. (pp.44-68). Pegem Publishing.
- Yurtlu, O., & Erkan, I. (2023). The impact of the COVID-19 pandemic on hospitals' risk management. *Journal of Medical Topics and Updates*, 2(1), 30-35 <https://doi.org/10.58651/jomtu.1138462>