

## Designing a Model for Community-Based Preparedness of Iranian Medical Science Universities to Provide Health Services to Earthquake Victims

Ali Azarpaykan<sup>1</sup>, Mehdi Kazemi<sup>2</sup>, Ali Mollahosseini<sup>3</sup>

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### Original Article

#### Abstract

**INTRODUCTION:** Iran, as one of the most earthquake-prone countries in the world, has been always presented with daunting challenges in providing medical services to victims. The present study aimed to achieve a model for community-based preparedness of Iranian medical science universities to provide health services to earthquake victims.

**METHODS:** This qualitative study was performed based on the grounded theory method defined by Strauss and Corbin. The statistical population of the study included university professors, senior managers of medical universities, crisis management consultants, and non-governmental organization experts in the universities. The subjects were selected via the purposive method; accordingly, the sample size was obtained at 11 cases, and the required data were collected through a semi-structured interview. In the analysis of qualitative information, open coding, axial coding, and selective coding were used manually.

**FINDINGS:** The findings were presented in the form of a paradigm model of community-based preparedness of medical universities in the face of earthquake crises. Based on the results of this research, 21 categories (variables) were identified. According to the research model, these variables were classified into six categories, including causal factors, contextual factors, central core, intervening factors, strategic factors, and consequential factors.

**CONCLUSION:** As evidenced by the obtained results, the most important achievement of this study was to prove the numerous benefits of community-based preparedness of medical universities for better management of earthquake crises. This research also included many practical strategies to achieve this.

**Keywords:** Community-based; Earthquake Crisis Management; Grounded Theory; Health Care Services.

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#### Introduction

A crisis is a sudden event or incident that leads to widespread physical or financial damage, loss of life, or injuries that require immediate measures. Such natural disasters that lead to crisis conditions in society are potentially destructive and deadly (1). Nearly one billion people across the globe, one-sixth of the world's population, have been directly or indirectly affected by disasters over the past decade (2). The incidents and disasters are responsible for more than 90% of deaths in developing and underdeveloped

countries. Iran is a developing country in Asia that is exposed to various natural and man-made disasters; therefore, it is one of the most vulnerable countries in the world. In the last 90 years, more than 180,000 people have lost their lives due to natural disasters, and many times more have suffered physical, psychological, and social damages and lost their properties (3).

Earthquake is one of the unpredictable natural hazards, imposing a toll of human and financial losses on people in the affected areas. Earthquakes are considered to be the largest potential source of

1- PhD Student in Crisis Management, Shahid Bahonar University, Kerman, Iran

2- Associate Professor, Faculty of Management and Economics, Shahid Bahonar University, Kerman, Iran

3- Professor, Faculty of Management and Economics, Shahid Bahonar University, Kerman, Iran

Correspondence to: Mehdi Kazemi, Email: [mehdykazemi@uk.ac.ir](mailto:mehdykazemi@uk.ac.ir)

damage caused by natural disasters, exerting numerous long-term socio-economic effects on governmental and non-governmental organizations. Today, the vulnerability of cities to earthquakes is regarded as a global problem for experts in various fields. In recent decades, this situation has become more acute in countries with natural structures in danger of extinction, including Iran (1).

Iran is the 4th most prosperous country in Asia and the 10th in the world which is always exposed to natural disasters. Iran is also one of the earthquake-prone regions of the world due to its geographical location. Although mountainous areas and the Zagros region are more at risk of earthquakes, no area in our country is safe from this disaster (4). Therefore, different regions of the country have suffered a lot of damage and losses in many earthquakes. This highlights the necessity of preparing and planning for this natural disaster. In the meantime, hospitals are in constant demand for services in critical situations due to their special structure and tasks; therefore, they should be prepared for critical conditions according to available situations and facilities (5).

Social participation assumes great importance for crisis management when it means a sense of belonging to active and voluntary participation in a group, leading to social activity. From this perspective, participation is an organized process in which individuals engage in voluntary activities. One of the important issues in crisis management is people's participation in crisis management. This interaction aims to improve the executive power of responsible organizations in different stages of crisis management (6). Numerous studies have been conducted worldwide on natural disaster management in the scope of medical centers and hospitals.

The proposed models overlap in some dimensions and have their own innovations in others. Nonetheless, there is a need for extensive development and exploration to localize these models since they are not specifically designed for medical hospitals in Iran and they do not have a community-based approach (given the specific social dimensions of Iran) (7). Therefore, a review of crisis management research demonstrates that multi-purpose crisis management bases, as suitable locations in times of crisis, are one of the best ways to reduce damage and casualties when crisis conditions disrupt natural conditions. Among the multi-purpose uses of crisis

management, given that mosques are civilian non-strategic places, they can be used in times of crisis as a safe base, as well as a control and command center with special design considerations (8).

Multiple problems in medical centers and hospital emergencies, such as limited facilities, lack of relief forces, and trained personnel, indicate the urgent need to provide services and benefit from the capacities of volunteer forces (9). The three main institutions of government, the private sector,

and civil society play a role in crisis management, in which several actors are involved. Nongovernmental organizations (NGOs) contribute greatly to the management of earthquake crises. Such organizations can provide significant financial, physical, and intellectual assistance to support crisis management in natural disasters (10).

Rezaei and Nouri published an article entitled "Comparative analysis of different citizens' performance in dealing with earthquake crisis with an emphasis on the importance of preparedness in the crisis management cycle (Case study: Kerman city)". The results of the stated study indicated that preparedness in the crisis management cycle is the most important step. Moreover, the findings were indicative of the lack of a culture of safety and preparedness in society. Therefore, the most important element in promoting preparedness to reduce the devastating consequences of natural disasters is education and considering the crisis management process as the dominant paradigm (10).

Amouzad Khalili et al. conducted a study entitled "Considering the role of public participation to improve urban crisis management and its effective elements based on Ragers' public participation theory". Based on the results of this research, the success of a project largely depends on the role of people and their participation in the project. Moreover, people's participation is essential to determine the needs, demands, and priorities of crisis management programs (7). In the same context, Arvin et al. performed a study entitled "Study of Social Capital Effect on Earthquake Disaster Management with Emphasis on Resiliency". The results of the referred study indicated that the status of social capital indicators and earthquake risk management is in good condition. Social capital indicators are not only significantly related to earthquake risk management indicators but also have a significant

effect on earthquake risk management in District 9 of Tehran (11).

Along the same lines, Charney et al. published an article entitled "Preparing hospital staff to work in earthquake disasters to combat infectious diseases." The referred study aimed to identify the factors affecting the willingness and preparedness of hospital staff to deal with infectious diseases in natural disasters, such as earthquakes. This study, conducted in the USA, demonstrated that such factors as not having children, full-time job, no worries about family, no fear of losing jobs, and availability of vaccines, affected the preparedness of hospital staff to deal with infectious diseases in natural disasters, such as earthquakes (12).

Tzeng et al. carried out a study entitled "Preparedness of hospital nurses for disaster responses in Taiwan: A cross-sectional study" The results of the mentioned study showed that indicators of personal preparedness, personal

protection, immediate response, and clinical management play an important role in nurses' preparedness to respond to natural crises (13). Liu et al. published an article entitled "Maintenance of hospital operations during natural disasters by the crisis communication plan". The results of the stated study illustrated that the proper functioning of hospital crisis communications is one of the effective factors in the maintenance of hospital operations during natural disasters. One of the characteristics of these indicators is paying attention to performance indicators of hospitals during a disaster. Despite the significant importance of structural and non-structural strength of the hospital, previous experiences demonstrated that the most serious effects of disasters are exerted on the ability of hospitals to respond in the performance area and disruption of their service systems (14).

Overlapping the studied models is presented in Table 1.

**Table 1.** Overlapping the studied models

Indicators	Models			
	Qaedi et al. (15)	Vahedparast et al. (16)	Hospital Safety Index (9)	Hassan and Mahmoud (17)
Manpower	*	*		
Process and instructions	*			
Equipment	*	*		
In- and out-of-hospital coordination	*			
Physical space	*	*		
Structure and organization	*	*		
Protocols		*		
Performance chart		*		
Recognizing climate hazards			*	
Recognizing the dangers of social phenomena			*	
Recognizing the dangers of biological hazards			*	
Recognizing the dangers of technological hazards			*	
Organizing the hospital crisis committee			*	
Operational plan for responding to internal and external hazards		*	*	
Possible medical operation plans			*	
Availability of an operational plan for maintaining and rebuilding critical services		*	*	
Access to medicine, equipment, and supplies in emergency conditions			*	
Electrical system safety assessment			*	
Communication system safety assessment			*	
Water supply system safety assessment			*	
Fuel storage safety assessment			*	

Medical gas safety assessment			*	
Safety assessment of heating and air conditioning systems in important areas of the hospital	*	*	*	
Safety assessment of office equipment (fixed and mobile)	*	*	*	
Safety assessment of medical and laboratory equipment and supplies for diagnosis and treatment	*	*	*	
Safety assessment of architectural components			*	
Safety assessment of previous accidents influencing hospital safety			*	
Safety assessment of structural system and type of materials used in the building			*	
Availability of personnel	*	*		*
Availability of water			*	*
Availability of transfer system				*
Availability of wastewater			*	*
Availability of power			*	*
Availability of long-range communications				*
Availability of drinking water			*	*
Availability of workspace				*
Availability of accessories	*	*	*	*

The examination of previous models (Table 1) presented in the field of crisis preparedness in the health sector revealed a gap in the field of modeling the community-based preparedness of medical universities to provide appropriate services to earthquake victims. That is to say, despite the existence of some external and general models, no internal and external research has seriously and systematically modeled this field.

Despite the undeniable role of medical universities in managing earthquake crises, preliminary studies conducted by the Ministry of Health demonstrated that there is no codified model for community-based preparation of these universities against earthquake crises, even though these universities are obliged to provide medical services to earthquake victims. Nevertheless, one of the most important measures to manage any phenomenon is to design comprehensive models in that area. Therefore, the present study sought to answer this main question to fill the theoretical gap: "What is the model of community-based preparedness of Iranian medical Science Universities in providing medical services to earthquake victims?"

### Methods

These theories and propositions are formulated systematically based on real data. The grounded

theory study is conducted to build a theory that can be examined and expanded in future research. It seems to be a wise choice to use a qualitative methodology that can reveal the hidden layers of this phenomenon with an exploratory approach. Strauss and Corbin developed this research method in 1967. In sampling (selection of participants), qualitative research is called purposeful or theoretical sampling (15).

The present qualitative study was performed based on the grounded theory method defined by Strauss and Corbin. The statistical population of the study included university professors, senior managers of medical universities, crisis management consultants, and non-governmental organization experts in the universities. The subjects were selected via the purposive method. The researcher continued sampling until reaching the theoretical saturation stage to complete and describe them more accurately. As a result, the sample size was obtained at 11 people; the required data were collected through a semi-structured interview. In the analysis of qualitative information, open coding, axial coding, and selective coding were used manually.

### Findings

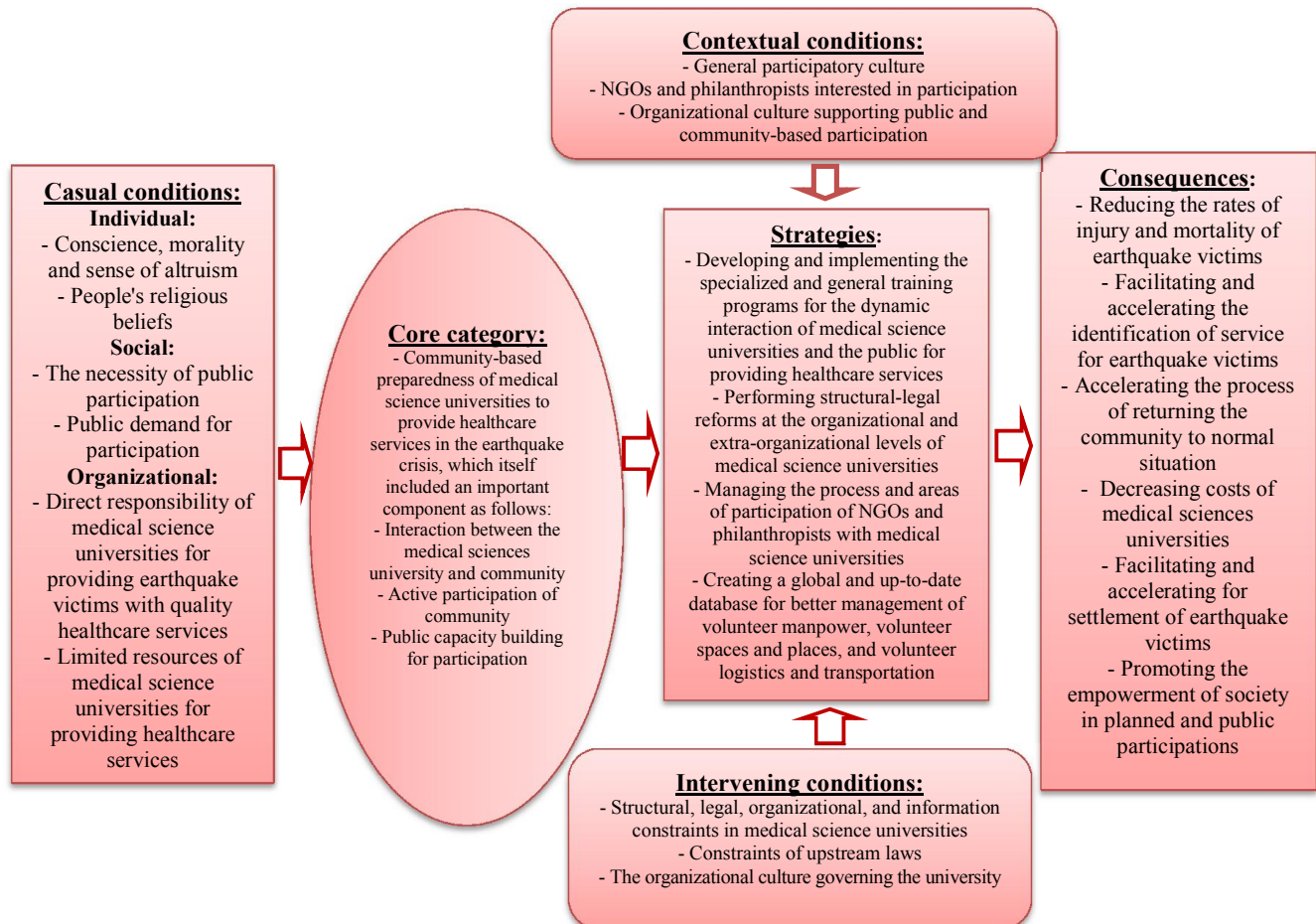
The interviewed expert (n=11) were selected from different medical science universities in Iran with master's and PhD degrees, as well as work

experience in emergency management at medical science universities (Table 2). The coding of expert interviews with the aim of presenting a community-based preparedness model of Iranian medical science universities led to the acquisition of 71 free codes, yielding 21 categories and 59 sub-categories after analysis. The main categories were divided into the general headings of “causal

conditions“, “contextual conditions“, “intervening conditions“, “strategies“, and “consequences“, which are presented in Table 3. The careful and comprehensive analysis of the title, as well as main and sub-categories extracted in different stages of coding, led to the provision of a paradigm for the community-based model of medical science universities (Figure 1).

**Table 2.** Interviewee Details

Academic degree	Position	Row
PhD	Crisis Manager at Kerman University of Medical Sciences	1
PhD	Crisis Manager at Kurdistan University of Medical Sciences	2
PhD	Crisis Manager at Mazandaran University of Medical Sciences	3
PhD	Crisis manager at Hormozgan University of Medical Sciences and community-based expert	4
PhD	Management of Emergency Department and unexpected events at Kerman University of Medical Sciences	5
PhD	General Crisis Manager of Hormozgan Governorate	6
PhD	Crisis Manager at Shiraz University of Medical Sciences	7
Master's Degree	Country Crisis Management	8
PhD	Crisis manager at Ilam University of Medical Sciences & community-based expert	9
PhD	Crisis Manager of Sarab University of Medical Sciences	10
PhD	Crisis Manager at Tehran University of Medical Sciences	11



**Figure 1.** Paradigm model for community-based axial coding of medical science universities

**Table 3.** Results of open, axial, and selective coding

Source	Dimensions	Sub-categories	Main categories
A2, I4	Casual conditions	Medical science universities are directly responsible for providing earthquake victims with quality healthcare.	Responsibility of medical science universities for providing earthquake victims with quality healthcare services
A9		Services must be provided to earthquake victims promptly.	
B7		The management of diagnostic and medical affairs is critical for earthquake victims.	
C2		People's beliefs to help fellow creatures when occurring natural disasters	
F7, K5		Effect of religious beliefs on the willingness of people to help in an earthquake crisis	
H1, J3		Some people try to help their fellow creatures in terms of conscience and personal morality.	
B3		Sacrifice has been institutionalized in the culture of our society.	
C4		Public expectation and desire to engage in healthcare	
E1		Public participation is the groundbreaker of many positive social consequences in times of crisis.	
H2		Public participation is essential in community-based disaster management, such as earthquakes, and managers should try to reinforce this social variable.	
G2	Many medical science universities face the constraints of financial resources and manpower.	Limited resources of medical science universities for providing earthquake victims with healthcare services	
H3	There is not enough equipment and space in many hospitals in Iran to provide relief.		
A4	Contextual conditions	Culture building of public participation in community	General participatory culture
B5		Community must actively seek participation.	
D3		Public participation should be taught from an early age.	
B4, J4		Organizational culture should be people-centered in medical science universities.	
F2, I2		Organizational culture of universities influences public trust in public participation.	
G3		Coordination of the culture and organizational structure of universities	
E2, K4		Reinforcement of the effective role of NGOs in the community	
E4		Philanthropists can have a targeted and planned participation in relief activities.	
D2		The type of interaction between medical science universities and non-governmental organizations influences their interest in participation.	
A5		The problem must be sought in the internal processes of medical science universities.	
B6	Sometimes intra-organizational cumbersome laws prevent the community-based approach of medical science universities.		
E7	Lack of coordination of medical science universities' organizational structure with community-based practices		
F3	Lack of a mechanism for using social potential		
C4	The need for dominating the climatic conditions of the community by medical science universities		
A6, I5	Appropriate upstream laws for public participation in the healthcare section	Constraints of upstream laws	
B1, K6	The lack of instructions and upstream laws for coordinating the related organizations for relief		
D5	The lack and weakness of upstream laws (Ministry of Health, and related organizations for public participation in the healthcare section		
E3, J5	The existence of upstream laws restricting relief to public participation in the healthcare section	Organizational culture governing the university	
C3	The need for dominating the cultural and economic conditions of society by medical science universities		
E8	The lack of protocols and procedures for public participation in the earthquake crisis		
A3	Intra-organizational training to interact with the community	Development and implementation of specialized and general training programs for dynamic interaction between medical sciences universities and the public for providing healthcare services	
C1	General and public training for helping to provide healthcare services		
B2	Strategies	The structure formation and formulation of appropriate laws with community-based earthquake crisis management in medical science universities	Structural-legal reforms at organizational and extra-organizational levels
D4		Amendment of the cumbersome laws and regulations for the interaction between the university and the community to service	
E5		Providing a bed for enacting the coordinated upstream laws with the interaction between the university and the community to service	
E6		Identifying and using the potential of NGOs	
F6		Training and encouraging NOGs to participate in providing the healthcare services	
F5		Identifying, and encouraging philanthropists to participate in healthcare service	
F1		Creating appropriate communication channels between NGOs and philanthropists	
D1		Some individuals and institutions are willing to provide appropriate assistance to the healthcare system in times of crisis	
H1		Some individuals and institutions have specialized or general capabilities to participate with the university to service.	
I1		Some individuals and institutions are willing to voluntarily provide their logistics and transportation facilities to the university for providing healthcare services in the occurrence of the earthquake.	

Table 3. Continued

A7, K2		Reducing the mortality rate of earthquake victims	Reducing the mortality rate of earthquake victims
D7		Reducing the rate of earthquake injuries	Reducing the mortality rate of earthquake victims
A8		Accelerating the provision of healthcare services to earthquake victims	Facilitating and accelerating the identification of earthquake victims and provision of services
E9		Accelerating the information about damages and providing services	Facilitating and accelerating the identification of earthquake victims and provision of services
G5		Facilitating the community-based planning for providing the information-based services	Facilitating and accelerating the identification of earthquake victims and provision of services
B8		Helping to accelerate the normalization of society	Accelerating the process of returning the society to a normal situation
C5, J7	Consequences	Facilitating and accelerating the settlement of the earthquake victims	Accelerating the process of returning the society to a normal situation
D8		Improving the university's understanding of the cultural, economic, and climatic conditions of the region	Accelerating the process of returning the society to a normal situation
E10		Decreasing equipment and logistics costs of medical science university	Decreasing costs of medical sciences universities
C6, I6		Decreasing the human resource costs of medical science university	Decreasing costs of medical sciences universities
B9		Targeted and planned participation of the community in relief activities	Promoting the empowerment of society in public participation
F4		Increasing the knowledge and experience of the community for relief activities	Promoting the empowerment of society in public participation
A1	Main category	The interaction between medical science universities and the community is based on the potential of the parties for providing healthcare services	Community-based preparedness of medical science universities in the earthquake crisis
G1		Active participation of the community in providing services to the earthquake victims	Community-based preparedness of medical science universities in the earthquake crisis
H4		General capacity building to participate in relief activities	Community-based preparedness of medical science universities in the earthquake crisis

In this study, the obtained information from the interview process was carefully reviewed; thereafter, 59 concepts were extracted and recorded from the interview transcripts (open coding). In the next phase, the concepts were identified together and categorized into the following six categories (axial coding):

1- The core category phenomenon: The central phenomenon is the conceptual label that is considered in the research. After collecting and analyzing the data in the open coding phase, the community-based model of medical science universities was selected as the core category based on focusing on the interviewees and reviewing the research literature.

2- Causal conditions: These conditions result in the development of a central phenomenon. Four categories were identified based on the findings from the interviews, including the responsibility of medical science universities in providing the earthquake victims with quality medical services; religious beliefs about disasters, conscience, ethics, and altruism; the necessity of public participation in relief and public demand for participation; limited resources of medical science universities for providing earthquake victims with healthcare services.

3- Contextual conditions: These conditions include a set of specific variables and categories that influence the community-based strategies of medical sciences universities with general conditions (intervening factors). These conditions are general participatory culture, organizational culture supporting the public and community-based participation, NGOs, and philanthropists interested in participation.

4- Intervening conditions: In this study,

intervening conditions were regarded as general conditions that influence the community-based strategies of medical science universities with contextual factors. In the introduced model, these conditions include: structural, legal, organizational, and information constraints in medical science universities, constraints of upstream laws and organizational culture governing the university.

5- Strategies: Community-based strategies of medical science universities represent the interactions and activities which are adopted in response to the central phenomenon under the intervening conditions and contextual factors, including the development and implementation of specialized and general training programs for a dynamic interaction between medical sciences universities and the public for providing healthcare services, structural-legal reforms at organizational and extra-organizational levels, managing the cooperation of NGOs and philanthropists with the university, as well as identifying, recording, and creating a database for better management of volunteer manpower, volunteer spaces and places, as well as volunteer logistics and transportation.

6- Consequences: According to the collected data, the community-based model of medical science universities resulted in consequences, such as reducing the mortality rate of earthquake victims, facilitating the identification of earthquake victims, accelerating the provision of services to earthquake-stricken people, accelerating the process of returning the society to the normal situation, decreasing costs of medical sciences universities, and promoting the

empowerment of society in public participation. The results of open, axial, and selective coding are displayed in Table 3. Figure 1 depicts the paradigm model for the community-based axial coding of medical science universities.

### Discussion and Conclusion

Based on the obtained model, causal conditions were identified in the following three categories. The first group was individual factors which encompass the following: conscience, morality, sense of altruism, and religious beliefs. The second group was social factors, comprising the necessity of public participation and public demand for participation. Finally, the third category was organizational factors, including the direct responsibility of medical science universities for providing earthquake victims with quality healthcare services and limited resources of medical science universities for providing healthcare services. As it is clear, the research results suggested that in the path of community-based preparedness of Iranian medical science universities for providing earthquake victims with healthcare services, many individuals, social, and organizational variables influence the process as independent variables. The results of this section are consistent with those reported by Rezaei and Nouri (10), Amouzad Khalili et al. (7), and Arvin et al. (11).

Moreover, the core of the research conceptual model was formed from the community-based preparedness of medical science universities to provide health services in earthquake crises. It included the following important component: interaction between the medical science university and community, active participation in the community, and public capacity building for participation. Given the above components, it is obvious that the way medical science universities interact with the community and build capacity for public participation in the community-centered preparation process of medical universities to provide health services in earthquake crises is of utmost importance. The results of this section are in line with the findings of the studies by Amouzad Khalili et al. (7) and Arvin et al. (11).

Another important part of the model was formed from environmental factors, including structural, legal, organizational, and information constraints of medical science universities; constraints on upstream laws; and organizational culture governing the university. These major

factors are very difficult or even impossible to control by medical science universities. However, despite the impossibility of controlling environmental factors, they may have significant effects on community-based preparedness strategies of medical science universities for providing healthcare services in the earthquake crisis. The results of this section are in accordance with the finding of the study by Qaedi et al. (15).

The other part of the model included contextual factors, namely general participatory culture, NGOs and philanthropists interested in participation, as well as organizational culture supporting public and community-based participation. Indeed, these contextual factors indicate the desired level of mental, cultural, and social contexts of community participation. These variables can be improved and controlled over time by adopting appropriate strategies. The results of this section are in line with those reported by Rezaei and Nouri (10), Amouzad Khalili et al. (7), and Arvin et al. (11).

The important and strategic part of the research model focused on community-based preparedness strategies of medical science universities for providing healthcare services in earthquake crises. They included the following: developing and implementing the specialized and general training programs for the dynamic interaction between medical science universities and the public in providing healthcare services; legal structural reforms at the organizational and extra-organizational level; managing the participation of NGOs and philanthropists with the university; identifying, recording, and creating a database for better management of volunteer manpower, volunteer spaces and places, as well as volunteer logistics and transportation. The aforementioned four strategies will be of great help to Iranian medical science universities to have much better productivity in preparedness and the community-based response to earthquake crises and provide victims with better healthcare services. The results of this section are aligned with those obtained by Amouzad Khalili et al. (7), Arvin et al. (11), and Achour et al. (16).

The consequences are presented in the final part of the model. This section indicates that the following consequences will be achieved if the community-based medical science universities are prepared to provide healthcare services in the earthquake crisis. They include the following: reducing the rates of injury and mortality of



earthquake victims; facilitating and accelerating the identification of service for earthquake victims; accelerating the process of returning the community to a normal situation; decreasing the costs of medical science universities; facilitating and accelerating the settlement of earthquake victims, and promoting the empowerment of society in planned and public participation. The results of this section are in accordance with those reported by Rezaei and Nouri (10), Amouzad Khalili et al. (7), Achour et al. (16), as well as Hassan and Mahmoud (17).

As a comprehensive conclusion of this research, it can be acknowledged that the community-based preparedness of medical universities is a great gift and advantage since in crises, such as earthquakes, the community-based preparedness of medical universities will act as a powerful lever and make up for serious shortcomings in human resources, logistics, and management. In natural crises, such as earthquakes, given that all urban factors are in crisis at once, the preparedness of the community to help the health care system will be very effective and can help to improve the urban situation more quickly and reduce the number of casualties and displaced people. Therefore, the most important achievement of this study was to prove the numerous benefits of community-based preparedness of medical universities for better management of earthquake crises. This research also included many practical strategies to achieve this.

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### Conflict of Interests

The authors declare that they have no conflict of interest.

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