Doi: 10.32592/jorar.2022.14.1.5

Challenges of Rapid Relief in Sisakht Earthquake Crisis Management in Kohgiluyeh and Boyer-Ahmad Province, Iran: A Review Study

Ramin Rostami[1], Farshad Tavakoli[2], Reza Forouzesh[2]

Date of submission: 10 Jul. 2021 *Date of acceptance: 02 Feb. 2022*

Review Article

Abstract

INTRODUCTION: Today, most developed countries have considered natural disasters a part of their urban and regional planning and believe that preventing natural disasters is the best way to deal with them. Extensive natural disasters, especially in large cities, are always associated with negative consequences and disorder. Meanwhile, the role of specialized forces becomes extremely limited in quantity to save the lives of those trapped under the rubble and provide rapid relief to the injured because the factors of time and physical extent of the disaster play key roles in the success of the rescue operation.

METHODS: This applied research was conducted based on a descriptive-correlational design. In this study, the location of the city of Sisakht city, Kohgiluyeh and Boyer-Ahmad province, Iran, at the time of the earthquake was described, and without interfering with the variables, it merely measured them and drew conclusions about the characteristics of those properties or the relationship between the variables. This method evaluates the social benefits, desirability, or effectiveness of a process, product, or program, and focuses on the application of its findings.

FINDINGS: The occurrence of widespread natural disasters, especially in major cities, is always associated with negative consequences, disorder, and confusion. In enormous disasters, such as devastating earthquakes, large amounts of rescue operations are carried out by people after the disaster. Meanwhile, the role of specialized forces becomes extremely limited in quantity to save the lives of those trapped under the rubble and provide rapid relief to the injured because the factors of time and physical extent of the disaster play key roles in the success of the rescue operation.

CONCLUSION: In modern management, rapid relief during an earthquake has an important role in reducing casualties. Factors effective in saving time and providing rapid relief include choosing an optimal route to access the affected area and using new technologies, such as a Geographic Information System and Global Positioning System. In addition to playing a decisive role in reducing casualties and material damage, practical and rapid management can minimize the problems that occur in the medium and long term after an earthquake.

Keywords: Natural Disaster; Rapid Relief; Urban Crisis Management.

How to cite this article: Rostami R, Tavakoli F, Forouzesh R. **Challenges of Rapid Relief in Sisakht Earthquake Crisis Management in Kohgiluyeh and Boyer-Ahmad Province, Iran: A Review Study.** Sci J Rescue Relief 2022; 14(1): 38-44.

Introduction

Earthquake, as the most important natural disaster, is the sudden release of enormous energy in a very short time due to the perturbation of the earth's crust. An earthquake can release tens, hundreds, or thousands of years of blocked energy in less than a minute. Iran is considered one of the 10 most important disaster-prone countries in the world due to its location in the Alpine-Himalayan orogenic belt. The Alpine belt is a young belt and active fault that enters Iran through Turkey (1).

The crisis management structure In Iran and

1- Visiting Professor at Bakhtar University Campus, Ilam, Iran
2- Master Student, Bakhtar University Campus, Ilam, Iran

Correspondence to: Farshad Tavakoli, Email: farshadt105@gmail.com

the structure of Sisakht city, Kohgiluyeh and Boyer-Ahmad Province, Iran, are planned and designed based on the principle of comprehensive crisis management. In other words, the four stages of crisis management (i.e., mitigation and prevention, preparedness, response, and recovery) in all stages of its levels must be coordinated in one center to maintain communication between them and the free flow of information and commands circulates smoothly (1). A total of 153 devastating earthquakes have hit Iran, accounting for 1.67% of the total earthquakes in the world. Iran ranks fourth in terms of the number of casualties due to earthquakes in the 20th century after China, Japan, and Italy (2).

Time is such a vital factor in reducing post-earthquake casualties that the first 24 h after an earthquake is a golden opportunity to help the affected individuals since in these hours, the victims are most likely to survive. Therefore, saving time in all stages of relief, including quick access to the affected area, is of great importance (2). With the occurrence of natural disasters from time to time around the globe, on the one hand, warns humans their structural weakness against the eternal divine power, and on the other hand, challenges human knowledge and ability to timely, rapidly, and powerfully prevent, prepare, appear in crises and their situation normalization and damages compensation (3).

The investigation of the ongoing crises in the country and considering the statistics of the last 100 years, the bitter reality is revealed that about 3,500 earthquakes have occurred in Iran, of which 535 earthquakes had a magnitude higher than 4 Richter and every 10 years an earthquake with a magnitude of 7 or larger have occurred in Iran. Furthermore, about 200 small and large earthquakes occur in the country every year. Consequently, planning to ensure safety in cities and developing new rapid relief plans with coherent and efficient management shows their importance in the country (3). Inattention to the correct location of cities, the growth, and development of established cities, as well as the lack of necessary planning to prevent the unbridled growth of cities, has caused numerous problems for the safety of cities. This development has led to the construction of cities on major earthquake fault lines or riverbanks (4).

According to the present study and the situation of Iran regarding earthquake risk, which has always suffered from irreparable consequences, and due to the important dimensions of the impact of critical conditions in most cities of Iran (4).

The crisis management structure in Iran is very good in terms of planning and software; however, it faces weaknesses and a lack of hardware facilities, equipment, and support services for crisis management in implementing, practicing, and maneuvering the system in the country (5). According to the above, this study aimed to strengthen the understanding of risk and resilience in rural and local communities, to help improve response and response to disasters and crises by capacity building and empowerment of local communities, especially in crescent houses, the establishment of management Decentralized crisis in crescent houses is for an emergency response to crises and improving the level of safety and changing the attitude and good behavior of individuals in rural and local communities.

Methods

The present study described and interpreted the existing conditions and relations and investigated the situation of Sisakht city. In this study, the researcher described the location of the Sisakht city at the time of the earthquake and, without interfering with the variables, merely measured them, and drew conclusions about the characteristics of each variable or the type of relationship between them. In this method, it valued social benefits, desirability, or effectiveness of a process, product, or program, and paid attention to the application of its findings, which can be used as a basis for further comprehensive studies. This type of research explores cause-and-effect relationships by examining existing consequences, which is called post-occurrence research. The researcher initiated his work by observing and examining the dependent variable(s) in order to reach the independent variable(s). It actually started with the effect to search for the cause.

Findings

In February 2021, at around 10 pm, a 5.6 magnitude earthquake shook the city of Sisakht and the surrounding villages, affecting large parts of Kohgiluyeh and Boyer-Ahmad and Isfahan provinces, Iran. More than 86 villages were damaged due to this earthquake. No casualties

[DOI: Doi: 10.32592/jorar.2022.14.1.5]

were reported; nevertheless, more than 61 people were injured and taken to hospitals. Additionally, according to published reports, 14,000 people were affected by the earthquake and more than 3,000 residential units were damaged by 60-100%. One hour after the earthquake and 2 h later, the electricity and water were stabilized in Dena city, Kohgiluyeh and Boyer-Ahmad Province.

According to the reports, out of 61 injured individuals in the earthquake, 34 cases were treated on an outpatient basis and 27 were taken to Yasuj Hospital, Kohgiluyeh, and Boyer-Ahmad Province. Doctors and medical staff were also dispatched to Sisakht city, and preparations were made as there was a greater chance of injury. From the first moment of the earthquake, a state of emergency was declared in the province and emergency accommodation was immediately set up in the quake-hit areas. Despite the establishment of temporary shelters, the quake victims did not welcome emergency accommodation, mainly due to fears of coronavirus disease 2019 transfer. Another reason was that citizens tended to be next to their homes to ensure the safety of their belongings and homes. The distribution of tents and needed items was immediately put on the agenda and given to all earthquake victims. In this regard, those families who requested, a tent was set up next to their homes.

The Red Crescent Society was present with 280 staff in the form of 40 relief teams in the earthquake-stricken area of Sisakht and 30 teams from Kohgiluyeh and Boyer-Ahmad Province and 10 teams from Chaharmahal and Bakhtiari, Fars, and Isfahan provinces covered the operation. These teams distributed 4,786 tents (including 1,660 travel and 3,126 relief), 11,625 kg of nylon cover, (72-hour) 2,630 food packages, 1,080 blankets, 117 carpets, heating appliances (including 210 primus stoves and 734 electric heaters), a number of sanitary utensils and packages worth 15,132,850,000 Tomans among the victims of Kohgiluyeh and Boyer-Ahmad Province (8).

Seismicity of High Zagros Fault

Limited aftershocks were reported up to 30 h after the 5.2 magnitude earthquake, accounting for 8 small aftershocks reported in the area, with the largest and smallest being 2.7 and 1.7 magnitudes on the Richter scale, respectively. Considering the seismic events in the last decade and emphasizing that the obtained data indicate seismicity on the western side of the High Zagros Fault, while the eastern side of the High Zagros Fault in Isfahan and Fars provinces have been hit with fewer earthquakes. This fact is evident from the location of large-scale earthquakes from 2006 until now (9).

According to Figure 1, out of about 1,100 earthquakes that occurred in this region, the numerical average of which shows a magnitude of 3 on the Richter scale, 4 earthquakes can be seen during the last 12 years with a magnitude of 5-5.2 on the Richter scale. Accordingly, 37 earthquakes were with a magnitude of 4-5 on the Richter scale and the rest were small earthquakes smaller than 2.5 on the Richter scale (Figure 2)

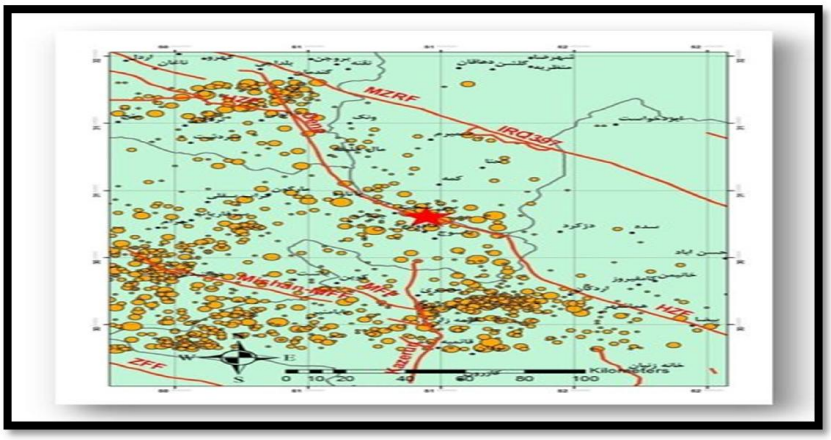

Figure 1. Main earthquake at Sisakht city and its aftershocks up to 30 h later (distribution to the east) (9)

[DOI: Doi: 10.32592/jorar.2022.14.1.5]

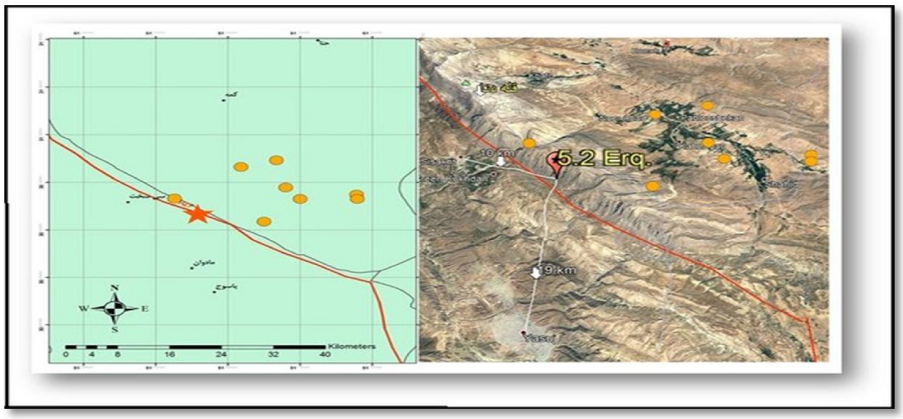

Figure 2. Distribution of recent 12-year earthquakes with the epicenter of the earthquake of Sisakht city and 100 km around it (9)

Discussion and Conclusion

Crisis is a state that occurs or appears suddenly due to natural and unnatural events and factors around humans. In such a situation, management, first of all, needs experience, skill, speed, intelligence, creativity, and timing, and according to the available information, the subject should be evaluated and acted upon as soon as possible (8). Crisis management oversees the five categories of organization, communication, decision-making, crisis factors identification, and design. Crisis management is a process of planning and performance that by systematically observing crises and analyzing them either seeks to find a tool by which can prevent crises or, if they occur, took actions to reduce their effects, prepare for them, provide quick relief, and improve the situation of the organization. A greater communication level between crisis management agencies leads to more efficient crisis management. The speed of decision-making is highly important in crisis management.

There is a direct relationship between decision-making speed and crisis control speed, in other words, the faster the decisions are made by the crisis management, the faster the crisis is controlled. The main issue in crisis management is how to measure the urgency and priority of the threat. Numerous factors are influential in measuring, classifying, and identifying the priority and urgency of the threat, including the time, location, severity, strength, and power of the threat, threat factor, the depth and scope of the threat, the type of threat, the target of the threat, and the means of threat (8,9).

The results of the Red Crescent Society's relief operations in the earthquake of East Azerbaijan Province, Iran, in 2012, showed how catastrophic crisis management can be in natural disasters without the preparedness of rescue services and the presence of trained and organized citizens (10). Experiences around the world over the past decade, especially after the Kobe earthquake in Japan, have put the local community-based crisis management executive plan at the forefront of human casualty reduction, rescue, emergency housing, temporary accommodation, and reconstruction (11).

Structure of the crisis management system and rapid relief in Iran

Crises (natural and man-made disasters) are threatening the country at any moment. Given the urban development and concentration of population and material and spiritual capital in the cities of the country, the negative consequences of the approach of a medium to large crisis in these cities are so great that it can pave the way for profound social, economic, and political changes (6). A crisis, in any form and kind, requires a rapid management and relief mechanism. The history of the formation of such mechanisms in the world goes back several decades. Until recently, different crises were managed by different organizations, and in times of severe and widespread crises, they dealt with them dependently.

Full coordination of the organizations involved in responding to the crisis and the establishment of guidelines and standards for rapid prevention and relief have led to the establishment of

[DOI: Doi: 10.32592/jorar.2022.14.1.5]

government centers for comprehensive emergency management in most countries (3). In the meantime, the significant presence of the government is necessary to guarantee the observance of citizens' rights in crisis management since the constitutions of various countries, including Iran, stipulate that the people should have security, health, and protection in times of emergency, and that governments are responsible for providing them (7).

According to the experiences gained, comprehensive crisis management centers should be established at different levels of the country's divisions in order to determine the position of policy-making and implementation by considering the powers and duties at each level. Comprehensive crisis managers at the national, provincial, and urban levels each face their own problems and risks, and practical planning strategies should also be developed and adjusted to each level. Comprehensive crisis management centers have always been formed based on comprehensive crisis management plans (6).

Application and necessity of WedGIS in integrated natural disaster management

This system is the basis of all measures that are adopted in the country to deal with natural disasters. Geographic Information Systems (GISs) can have a dynamic presence in integrated natural disaster management. The first role of GIS in disaster management is the proper organization of information. In other words, integrated natural disaster management requires spatial information (2).

To use locations for air rescue operations and to determine the optimal points according to certain distances from medical and relief centers, the GIS is a suitable tool in the design of such models. The combination of GIS and Global Positioning System (GPS) will provide us the most appropriate option in resolving these crises because these two systems are complementary and provide the precise location and growing momentum of a crisis for efficient management practices. Moreover, relief workers need the data and information available in the headquarters for quick relief (2).

Role, importance, and goals of the Iranian Crescent House project in crisis management

Iranian Red Crescent Houses have been set up in line with the motto of "every family is a relief worker" and the dissemination of public education to deal with natural disasters, which can play an important role in passive defense and crisis management. Red Crescent Houses are small branches of the Red Crescent Society and provide the most important services of this organization, including public education for risk preparedness and the development of social and philanthropic activities. These houses are used as a base for providing relief to rural inhabitants in crises. The Red Crescent Houses is a center with a volunteer structure without paid human resources run by members, donors, philanthropists and benefactors.

In fact, Red Crescent Houses have been established with the aim of empowering the community, being a place to expand relief training, influencing people, and responding in the event of disasters. The formation of rapid and ready response teams can also be considered one of the goals of establishing Red Crescent Houses. Furthermore, empowering urban and rural members in the areas of knowledge, attitude, and skills is one of the Red Crescent Society's policies accomplished in the form of a plan to establish and operate Red Crescent Houses.

Assess rapid relief and provide a standard operating process for teams

Due to the fact that Iran is a disaster-prone country and the rate of disasters is high in this country, the main purpose of this study was to determine the standard operational process for rescue teams. These teams are under the supervision of a single commanding authority, the members of which are pre-determined and are structured according to the type of accident, continuously pass the standard pieces of training, and with complete equipment appropriate to the type of disaster provide appropriate responses based on clear and specific job descriptions. Prompt and timely relief in the event of an earthquake plays an important role in reducing casualties. One of the most important factors in saving time is choosing an optimal route to reach the affected area.

Training of semi-professional forces at the local level based on the neighborhood unit causes the search and rescue activities of the injured to be performed with better organization and quality and the guidance of specialized forces be conducted more appropriately based on proper

[DOI: Doi: 10.32592/jorar.2022.14.1.5]

and timely information of the public forces. Organized acceleration of rescue and relief activities, in addition to decreasing irreparable damages to an acceptable level, accelerates recovery from a critical situation and return to normalcy (12).

Relief in a large area of the city requires the presence and participation of people, especially the locals, because smaller geographical levels and environmental formats of assistance lead to greater social cohesion and responsibility of volunteers. Moreover, through the familiarity of people with neighborhoods and places and access to open spaces of the neighborhood, relief operations are carried out in their most appropriate form in all stages of crisis management in order to provide sustainable relief.

that includes death, injured, homeless, fire, destruction of buildings and structures, thirst, hunger, cold, closure of transportation and traffic network, invaders, theft, stray animals, and insects; and needs include communications, telephone, emergency traffic network, vehicles, security, search teams, fast relief, treatment, emergency accommodation, necessities of life (water, food, health, light, and heat).

The most important role of urban planning in dealing with natural disasters is to identify high-risk areas and avoid the establishment of sensitive and dense land uses in these places. In order to provide rapid relief and crisis control, first of all, in pre-crisis management, efforts should be made to increase knowledge and obtain the necessary information and organize it. In this respect, our country can achieve a desirable result by coordinating and managing natural disasters in this regard. Among the factors that can lead to the formation and development of successful urban plans from micro to macro level is paying attention to the integration of new GISs and GPS since these two systems are complementary and provide the precise location and growing momentum of a crisis for efficient management practices and rapid relief.

Using the combination of land transportation systems, if the route is safe, and air transport (helicopter) is the best option for the rapid movement of the injured and distribution of necessary items and food through which casualties and financial losses will be reduced and injured individuals will be quickly provided relief. As mentioned above, the prominent requirements and features of the GIS system are: a) it improves the quality of work in crisis operations and disaster command, b) it creates the necessary conditions to provide better service to the victims, c) it removes redundant data, information, and tables, and d) it summarizes disturbed information (factors influencing the crisis and management) in great detail (2).

Some of the challenges ahead in times of crisis and disaster are recognized challenges and problems in the field of disaster management, disaster identification, risk assessment and evaluation, information training and management, preparedness for effective response, and disaster recovery and compensation, and when a high-magnitude earthquake hits a city, the situation generally becomes abnormal. The provision of an emergency traffic network is one of the basic needs for allowing easy access to the victims of accidents and disasters and speeding up the search, rescue and relief operations, emergency accommodation, and life basic necessities supply.

Acknowledgments

The authors would like to express their gratitude to all those who contributed to the conduction of this research project.

Conflict of Interests

Authors have no conflict of interests.

References

1. Shia E. Introduction to urban planning. Iran University of Science and Technology Publications, Sixteenth edition. 2006. (In Persian)
2. Bahraini SH. Application of crisis management in reducing earthquake damage. Revolution Housing Foundation. 1993. (In Persian)
3. Abdollahi M. Crisis management in urban areas (earthquake). Municipalities Publications. 2001. (In Persian)
4. Earthquake crisis management in Iran. First Edition, Publications of the International Institute of Seismology and Earthquake Engineering. 1995. (In Persian)
5. Hamidi M. The role of urban planning and design in risk reduction and crisis management, Proceedings of the Second International Conference on High Nature in the Urban Area. 1995. (In Persian)
6. Soheilipour, MS, Montazer Al-Hojjah, M. Resilient city an approach based on reducing the vulnerability of urban environments to hazards,

[DOI: Doi: 10.32592/jorar.2022.14.1.5]

National Conference on Crisis Management, Earthquake and Vulnerability of Vital Places and Arteries, Tehran. 2011 (In Persian)
7. Rabiee A, Ardalan A, Pourhosseini SS. Performance evaluation of function coordination of responsible organizations in natural disaster management. 2013; 16(2):107-117. (In Persian)
8. Khamer GH, Rakhshani A. The role of crisis management strategies to reduce earthquake damage (case study: Khorramabad city). Journal of Geography and Development. 2015; 41:160-147. (In Persian)
9. Samadi Miarkolaei H, Samadi Miarkolaei H, Babaei A. The Necessity and importance of the role of Red Crescent Society in natural disasters and crisis management. Scientific Journal of Rescue and Relief. 2016; 4(3):106-93. (In Persian)
10. Sarikhani N, Farsad H, Zare Tousi Z, Najafi M, Mousavi AS, Oveisi N. Studying the managers' viewpoint of East Azerbaijan province in 2012 and branches about relief operation of RCS. Scientific Journal of Rescue and Relief. 2014; 6(3):20-31. (In Persian)
11. Youneslou S. Experiences and achievements of the Kobe earthquake in Japan (narrated in real pictures). The first national conference on exploitation in the water and wastewater sector. 2006. (In Persian)
12. Nasiripour A, Reisi P, Nouri S. Providing a standard operating process for rapid health response teams in Iran. Journal of Rescue & Relief. 2010; 2(2). (In Persian)

[DOI: Doi: 10.32592/jorar.2022.14.1.5]