

## Post-earthquake Service Provision Analysis in Sisakht, Yasuj, in 2020

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### Original Article

#### Abstract

**INTRODUCTION:** An earthquake is a major natural disaster with widespread and great effects on human life and nature. Taking care of the basic needs of earthquake victims is an essential step that should be addressed immediately. Moreover, the evaluation of various problems after disasters, especially earthquakes, is of crucial importance for the affected people. The management of humanitarian aid and public assistance among these affected people is considered one of the most important post-earthquake concerns. Therefore, the present study was conducted to evaluate the post-earthquake challenges and strengths of providing humanitarian aid services in Sisakht, Yasuj, in February 2019.

**METHODS:** This qualitative case study was conducted from March 2019 to July 2020. The studied population consisted of 20 participants including medical staff (n=10), clergy (n=2), crisis managers (n=4), and military personnel (n=4). The required data were collected through observation and semi-structured interviews, which continued until data saturation. To evaluate the reliability of the data, the strategies recommended by Guba were used. The data were analyzed by conventional content analysis based on the method proposed by Graneheim and Lundman.

**FINDINGS:** The advantages and strengths of this study included humanitarian cooperation and coordination, as well as the timely presence of relief and rescue teams and law enforcement agencies from the post-earthquake first hours, which had a great impact on reducing the suffering of people. The challenges in providing post-earthquake services included health, medical, management, geographical, and spatial concerns and issues related to the earthquake victims (relief goods distribution problem and inappropriate information dissemination as the main challenges).

**CONCLUSION:** Effective and appropriate management policies regarding the management of providing post-earthquake services and elimination of the structural and managerial obstacles can improve the operation and management of humanitarian aid.

**Keywords:** Earthquake; Disasters; Disaster management; Humanitarian aid; Management; Yasuj

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#### Introduction

Iran is one of the 10 disaster-prone countries in the world, where 90% of its population is exposed to earthquakes and floods. Statistically, Iran ranks sixth in the world and fourth in Asia in terms of natural disasters. Out of 42 disasters known in the world, 31 catastrophes occur in Iran (1, 2). Severe disasters, such as hurricanes, earthquakes, tsunamis, and volcanic eruptions often require extraordinary rescue and relief operations (3). Iran is considered one of the

most earthquake-prone countries in the world due to its special geographical location, the existence of many faults, and being on the Alpine-Himalayan belt (4). Various studies have discussed post-earthquake problems regarding healthcare efficiency (5).

After disasters, humanitarian organizations mobilize a large amount of aid to the disaster area. However, the distribution of these resources poses many challenges, such as time, cost, coverage,

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and eligibility (6). Humanitarian aid in different situations is always accompanied by many challenges. Due to the lack of political participation, the interference of government officials can lead to chaos and confusion in the interventions (7). Cooperation and coordination are the most important factors in the management of financial aid during disasters (8). Moreover, community participation and cooperation in all phases of disaster management are of crucial importance to achieving successful disaster management (9). The humanitarian aid distribution process is associated with many activities, such as access to up-to-date and appropriate information for effective communication in order to accelerate cooperation and improve integration (10). Competition among aid agencies for donor resources can be considered an obstacle to collaboration and cooperation (11).

Lack of proper instruction for humanitarian aid during disasters is one of the main challenges. People, managers, humanitarian aid workers, and donors lacked sufficient knowledge in the field of humanitarian aid. Since different organizations with different potentials, capacities, tasks, and interests participate in humanitarian aid, it is necessary to focus on improving performance, designing standards and instructions, and improving training courses by sharing their experiences (12). Sherchan et al. in a study titled "Post-disaster mental health and psychosocial support: experience from the 2015 Nepal earthquake", stated that the immediate need for basic services and security was the main concern, as in other natural disasters. The strong community and family bonding of the Nepalese society was the greatest source of psychological support and mental health, leading to strong social resilience to this traumatic event. The mental healthcare system implemented during the earthquake has emphasized the critical role of community-based care with a strong focus on community involvement; moreover, the empowering of laypersons and community caregivers to recognize cases and refer for a contextual intervention was of significance (13).

Ibrion et al. conducted a study entitled "Earthquake disaster risk reduction in Iran: Lessons and 'Lessons Learned' from Three Large Earthquake Disasters: Tabas 1978, Rudbar 1990, and Bam 2003". They concluded that there

is great potential for improving earthquake preparedness and reducing casualties, injuries, and destructions which can have a great contribution to the resilience of societies in Iran. However, a few lessons from Tabas, Rudbar, and Bam earthquake disasters have been continuously applied in earthquake disaster management methods and have helped to reduce the risk of earthquake disasters in Iran (14).

Adhikari et al. in a study aimed at examining the psychosocial and mental health problems of older people in post-earthquake Nepal, stated that the elderly who lost their property, whose family members and relatives were injured, and those who were from poor families were more vulnerable to post-earthquake psychological and mental health problems. The existence of mental health concerns and problems in providing mental health services in society became the reason that most of the elderly look for traditional treatments to treat their problems (15).

In a study aimed at reviewing the health issues one month after the earthquake in Bam, Akbari et al. stated that due to the extensive damage in hospitals and other local health centers and a large number of injured, the evacuation of survivors had created an important logistical problem in Bam. Moreover, 54% of the injured were evacuated from the earthquake site by air ambulance and directly transferred to support hospitals. Although the national and international aid was significant immediately after the earthquake, continuous and stable aid in the following weeks and months was the key to the success of relief efforts (16).

Jinichi Mori et al. conducted a study to assess "Drug Shortages after the Eastern Japan Earthquake: Experiences in a Tertiary Referral Center". They found that major disasters inevitably cause drug shortages in large areas even in developed countries; however, these shortages can be minimized by coordinated efforts of doctors and patients (17). In a study entitled "Earthquakes, Fuel Crisis, Power Outages, and Health Care in Nepal: Implications for the Future", Adhikari et al. stated that the impact of earthquakes was devastating on healthcare facilities. Many hospitals and healthcare centers lacked essential medicines, and healthcare was always affected throughout the country (18).

This study aimed at investigating the challenges and strengths of providing post-

earthquake management and health services to the people in Sisakht, Iran, in 2021, using interviews with experts and observation. The findings as valuable lessons learned can be utilized in the management of future earthquakes.

### Methods

This cross-sectional and qualitative study was conducted between March 2019 and July 2020 in the earthquake-affected city of Yasuj, Iran. The data were collected using researcher observations and interviews with experts. Since two researchers in this study were health experts in disasters, part of the data were collected by them using observation, and interviews were conducted with 18 other people. The observation was designed using the checklists of the National Emergency Response Program and was conducted by two researchers utilizing field survey and data collection methods.

### Participants

The participants' inclusion criteria were: 1) To be involved in the earthquake-affected area, 2) Work experience for at least 2 years in the field of disaster risk management, and 3) To have at least a bachelor's degree. On the other hand, those who lacked mental and psychological preparation, and the individuals who were not willing to participate in the study were excluded from the research procedure. The purposive, snowball, and convenience sampling methods were used to select the participants. Finally, after interviewing with 18 experts, the data reached saturation.

### Data collection

In-depth and semi-structured questions regarding the actions taken, challenges, weaknesses, strengths, and needs were asked from each expert in the profession they were working. Questions included: 1. "What do you think were the health-related challenges and concerns in the earthquake-affected areas?", 2. "What were the strengths of providing services to the earthquake-affected areas?", 3. "What health needs did the affected people have?". Based on the answers given by the participants, follow-up questions were also asked. The interview lasted between 30 and 90 minutes, and it was conducted in a quiet place. Upon data saturation, the interviews were terminated.

### Data Analysis

After the interviews, the interview transcription was done immediately, the strengths and challenges were extracted, and the data analysis was performed manually. The thematic analysis method was used to analyze the interviews. This kind of analysis consists of six steps: a) Getting to know the data, b) Creating primary codes, c) Searching for categories and sub-categories, d) Reviewing categories and sub-categories, e) Defining and naming categories and sub-categories, and f) Preparing report. After analyzing the interview transcripts, 260 codes were finally extracted, which were classified into six categories by removing duplicate codes and reanalyzing them.

### Rigor

Guba and Lincoln's criteria were used to ensure the accuracy of qualitative data. Moreover, trustworthiness, transformability, dependability, and confirmability were checked in this study.

### Ethical considerations

Regarding the ethical considerations, the participants were assured of the confidentiality of their personal information, and they were informed of the research objectives and procedure. Following that, written informed consent was obtained from the participants, and all of them were acknowledged. It is worth mentioning that the study protocol was approved by the Research Ethics Committee.

### Findings

Table 1 tabulates the number and demographic characteristics of the experts who were interviewed. The mean age of the participants was 31.7 years. Out of 20 participants and researchers, 15 cases were male. Challenges and strengths were categorized into four and two categories, respectively. The four main categories of challenges included such concerns as: 1) health and treatment, 2) management, 3) geographic and location, and 4) issues related to earthquake victims. In addition, there were 19 sub-categories, the most important challenges of which were related to the inappropriate distribution of relief goods and the absence of dissemination of information. The strengths of providing services were also classified into two main categories (and 12 sub-

categories) of relief organizations, as well as humanitarian cooperation and coordination. The categories and sub-categories of challenges and strengths are shown in Table 2. One of the

important points in this regard was the timely and effective presence of the relief and police forces.

**Table 1.** Specialists participating in the study

Row	Specialization	Number	Mean age (year)	Male	Female	Bachelor's degree	Master's degree	PhD
1	Environmental Health	2	34	1	1	2	0	0
2	Psychology	4	30	2	2	3	1	0
3	Nutrition	1	28	0	1	1	0	0
4	General practitioner	1	40	1	0	0	0	1
5	General Hygiene	1	25	1	0	1	0	0
6	Crisis management	4	37	3	1	2	1	1
7	Clergy	2	45	2	0	2	0	0
8	Military personnel	4	38	4	0	4	0	0
9	Management of healthcare services	1	40	1	0	1	0	0
10	Total	20	31.7	15	5	16	2	2

**Table 2.** Categories and sub-categories of the strengths and challenges of post-earthquake provision of services in Sisakht, Iran

The main theme	Categories	Sub-categories
Challenges of post-earthquake provision of services to the earthquake victims	Health and treatment problems	People's lack of access to essential daily hygiene items. Lack of medical personnel/Improper supplies to support relief forces/Improper information dissemination/Biased treatment of relief forces/Improper storage of relief items/Improper distribution of relief goods/Wide external and internal disharmony at organizational level/Donors' lack of trust in government institutions/Emotional reactions of the media and stimulation of the people's emotions.
	Management problems	Unfavorable weather conditions in the area/Lack of familiarity of the rescue forces with the earthquake-affected area/Poor quality of the tents/Spatial dispersion of the affected villages.
	Geographical and spatial problems	Non-acceptance of emergency accommodation by earthquake victims/Insecurity in the city/Unreasonable expectations of earthquake victims/Insufficient awareness of people/Emotional blackmail by a large number of people with the aim of extortion.
	Problems related to earthquake victims	Detailed planning by relief and rescue forces/Timely distribution of relief goods/Changing strategies of disaster management improvement/High resilience of relief forces/Collaboration and empathy among relief forces/Provision of instructions to people/Presence of clergies in the role of coordinators/Improvement of mental health of people by relief and rescue forces.
Advantages and strengths	Relief organizations	The effective presence of volunteers/Solving the distribution problem with the cooperation of the military forces/Improving the security of the region by the police forces/Proper communication with organizations in charge of disaster management at the national level.
	Humanitarian cooperation and coordination	

A summary of the statements by the participants is presented below:

One of the stated challenges was management problems. A military expert (a 29-year-old man) said: "...We have a problem with relief delivery here. Suddenly there was a shock, there is no planning. We should not have allowed non-natives to enter the city from the beginning, and we should have blocked and inspected the alleys and roads leading to the city."

Another management problem was the biased approach of relief forces in the way that aid

workers provided more aid to certain ethnic groups and people. As one of the participants said:

"...There is no planning, and family relationships have disrupted the goods distribution; they use emotional blackmail in different ways, and if they don't need a tent, they consider it smartness to take a tent from the Red Crescent; the principles of neutrality are not respected and people are dissatisfied with this situation." (Relief and rescue specialist, a 33-year-old man):

Providing mental and psychological health

services after disasters is of significant importance. One of the mental health experts (a 35-year-old woman) said: *"...The power outage happened at the same time as the earthquake, which made people more afraid; and the gas shut off and made the air colder and people more restless. We tried to include psychological support in the agenda from the beginning, but it was too late. The instruction people had been given last year was very helpful and useful in this earthquake."*

Every rescue and relief operation has a series of weaknesses and strengths. In spite of the weaknesses, there were also strengths in the service provision in Sisakht, which helped to manage operations better and faster. A crisis management specialist (a 45-year-old man) said: *"...Coordination and cooperation among the forces was integrated with better goods distribution, but it would have been better if the tents were erected and the people were given the necessary training in this regard. The problem was the lack of coordination for the accommodation of the relief forces, and we did not know the maps leading to the city and the Red Crescent Society location in the city. The earthquake caused widespread damage to the buildings."*

### Discussion and Conclusion

One of the most basic concerns after an earthquake is the health and treatment issues, including the lack of access to essential daily hygiene items for the people which was also observed in the city under study in this research. The main reason for this is the lack of necessary coordination and the lack of task assignment among the service provider systems in the first days. Service provider systems, including hospitals, pre-hospital institutions, health and treatment centers, and other stakeholders involved, require a coordinated preparation plan to deal with new incidents and crises (19). This requirement is seriously felt in the earthquake-affected area since there are many cases of inconsistency and parallelization of emergency organizations, which leads to the lack of proper and quick response to the earthquake (20).

One of the important duties of city managers along with other city officials, especially education, is to provide the people with necessary instructions regarding dealing with natural disasters and increasing people's readiness to cope

with them considering the culture of each city. Lack of attention to this issue had caused the insufficient awareness of the people, and as a result, not acceptance of emergency accommodation, insecurity in the city, and the unreasonable expectation of the earthquake victims. Earthquake risk perception is influenced by beliefs, values, history, place, time, and other factors.

A prevalent belief that affects the acceptance of earthquake disaster risk and serves as a coping attitude is that earthquakes will not occur in the lifetime of current generations. However, the lessons become "lessons learned" as part of society and communities' efforts to live with earthquake risk and try to reduce the risk of earthquake disasters. The role of uncertainty should be considered in the application of lessons in disaster risk reduction (20, 14). Rapid health assessment needs in disaster-affected populations is an important step in directing relief efforts (21, 22). After the rapid assessment, the timely distribution of relief goods with careful planning by relief forces was among the strengths of this study. Valid information is critical to enable decision-making and resource prioritization by healthcare providers and emergency management officials during the immediate response after a disaster (23, 24). The high resilience and empathy among the relief forces, the provision of necessary training and promotion of mental health to the people, and the presence of the local clergy and trustees calmed the people in the post-earthquake first days. Since different organizations with different capabilities, capacities, responsibilities, and interests participate in humanitarian aid, it is necessary to focus on improving performance, designing standards and instructions, and improving training courses by sharing their experiences.

In the preparation stage, some studies suggest an effort to reduce unnecessary aid with low priority through general and professional education (8, 12). Proper information dissemination and communication with organizations in charge of disaster management at national levels, as well as the provision of accurate and correct information, played an effective role in calming the people in the post-earthquake first days; however, the emotional reactions of some media, and especially the virtual networks, had provoked people's emotions. The existence of various broadcasting sources, as

well as rumor making and spreading due to the lack of control, training, and regulation of the news sources was considered among the challenges of the research. Furthermore, information reliability and dealing with rumors were among the main concerns in the disaster response phase since social networks can provide unreliable information, rumors, and fake news due to the lack of control process and low quality of information. Therefore, the provision of the media with adequate instructions, which was added to the government supervision, seems very important (12, 25, 26).

In addition, the collection of accurate, valid, and effective information is considered one of the key factors in the process of distributing humanitarian aid in disasters. As a result, attention should be paid to unreal and unreliable reports that can negatively affect the process of participation in the provision and distribution of humanitarian aid (27). The mobilization of aid without need assessment leads to the accumulation of many unnecessary resources in the affected areas, which also happened in Sisakht (the distribution of some items, [e.g., tents], was more than needed in some areas, which were brought to the place without accurate need assessment). Additionally, no attention to the requirements of vulnerable groups, such as women, children, the elderly, and the disabled, is another obstacle to the management of aid and financial aid during a crisis. These groups may not be able to meet their needs due to cultural, religious, and other personal limitations (28, 29).

Inequality and injustice in distribution and the rush for distribution centers were among the challenges of aid distribution. Some people interfered in the distribution by making noise and family gatherings. If they did not need a tent, they considered it their right to get it from the Red Crescent Society. Considering the inevitability of the identification and registration of beneficiaries, it seems necessary to adopt a controlled and fair strategy for distribution (30). Humanitarian aid management during disasters is inherently difficult due to the diversity of beneficiaries. In such cases, the provision of resources needed for effective response, as well as receiving and sharing information in the infrastructure formation, seem of significant importance. Accordingly, social networks can obtain information about the number of people affected by disasters through the Internet and make it

available for a quick and effective response (31, 32). The needs of affected people are different during a disaster, and aid should be adapted to the needs of recipients rather than the preferences of donors (33). Some participants believed that donors' lack of trust in government institutions is one of the main obstacles to aid management. This causes aid to be collected through unofficial people, such as celebrities, which can also lead to misuse of the aid provided. If the aid does not match the culture of that society, the aid will not be used (34). It was also recommended to use the experiences of disaster survivors in disaster reduction strategies and disaster management plans and actions at the local, regional, and national levels (35& 36).

Another positive point was the timely and effective presence of the police force in all affected areas, which, in addition to maintaining the security of the area, calmed down the affected people. Lack of security in the affected areas is considered one of the main problems reported by the participants in the disasters (37, 38). In addition, insecurity brings challenges for humanitarian organizations and puts aid distributors and people at risk (39). Aid distribution through the adoption of coherent management of temporary tasks, such as deposit holding, qualified transfer system, and fair access to aid can be effective in managing aid and preventing theft by thieves (39). Donors' lack of trust in government institutions is one of the problems during the disaster which was also manifested in Sisakht. Accordingly, measures should be taken to prevent the presence of a large number of people with the attendance of a representative of the benefactors while gaining their trust in the place. As a result, goods can be distributed properly. Cooperation and coordination between the government and donors can increase the opportunities to respond to disasters and casualties (40).

Lack of internal and external coordination was another problem. The integrated management of processes, policies, and regulations can play a fundamental role in the management of aid among people (41). In the mentioned earthquake-affected area, there were many structural and management problems. The unpreparedness of the relief personnel and the affected people also contributed to the worsening of the situation. The presence integrated and coherent management has a great role in controlling and solving challenges.

Therefore, the elimination of structural obstacles, preparedness before an earthquake, and adaptation of an efficient management strategy with appropriate policies for humanitarian aid can improve the performance of disaster management, especially when an earthquake occurs. Moreover, the development of public education and needs assessment based on cultural and social factors, transparency of humanitarian aid, and timely information dissemination can help reduce the above challenges and obstacles. These findings can be provided as a scientific document to the managers of organizations related to disaster relief and rescue, as well as humanitarian aid in Iran, which can be used in field surveys. Furthermore, the obtained knowledge and information from this study can lead to the awareness of policy makers and managers in this country (e.g., Iran) and other countries in terms of the challenges of humanitarian aid management and help them to be better prepared against future disasters.

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### Conflict of Interests

Authors have no conflict of interests.

### References

1. Peyravi M, Marzaleh MA, Khorram-Manesh A. An overview of the strengths and challenges related to health on the first 10 days after the large earthquake in the west of Iran, 2017. *Iran J Public Health* 2019; 48(5): 963-70. [In Persian].
2. Ghanbari V, Maddah SS, Khankeh HR, Karimloo M. The effect of a disaster nursing education program on nurses' preparedness for responding to probable natural disasters. *Iran J Nurs* 2011; 24(73): 72-80 [In Persian].
3. Andrighetto L, Baldissarri C, Lattanzio S, Loughnan S, Volpato C. Humanitarian aid? Two forms of dehumanization and willingness to help after natural disasters. *Br J Soc Psychol* 2014; 53(3): 573-84.
4. Ranjbar M, Soleimani AA, Sedghpour BS, Mohammadi Shahboulaghi FM, Paton D, Norouzi M. The Relationship of social trust with the intention to prepare and preparedness behavior of Tehran Inhabitants against earthquake. *Refahj* 2018; 18(69): 278-49 [In Persian].
5. Cao H, McFarlane AC, Klimidis S. Prevalence of psychiatric disorder following the 1988 Yun Nan (China) earthquake. *Soc Psychiatry Psychiatr Epidemiol* 2003; 38: 204-12.
6. Ferrer JM, Martín-Campo FJ, Ortuño MT, Pedraza-Martínez AJ, Tirado G, Vitoriano B. Multi-criteria optimization for last mile distribution of disaster relief aid: test cases and applications. *Eur J Oper Res* 2018; 269(2): 501-15.
7. Patel R, Wild H. To do no harm: humanitarian aid in conflict demands political engagement. *Disaster Med Public Health Preparedness* 2018; 12(5): 567-8.
8. Varella L, Gonçalves M. Collaboration: A critical success factor in the logistics of Donations Management. 27<sup>th</sup> Conference-Production and Operations Management Society; 2016.
9. Jahangiri K, Izadkhah YO, Jamaledin TS. A comparative study on community-based disaster management in selected countries and designing a model for Iran. *Disaster Prev Manage Int J* 2011; 20(1): 82-94 [In Persian].
10. Mohd S, Fathi MS, Harun AN. Humanitarian aid distribution framework for natural disaster management. *Int Arch Photogrammetry Remote Sensing Spatial Inform Sci* 2018; 42: 343-9.
11. Kovacs G. Where next? The future of humanitarian logistics. In *Humanitarian logistics meeting the challenge of preparing for and responding to disasters*; 2014.
12. Safarpour H, Fooladlou S, Safi-Keykaleh M, Mousavipour S, Pirani D, Sahebi A, et al. Challenges and barriers of humanitarian aid management in 2017 Kermanshah earthquake: a qualitative study. *BMC Public Health* 2020; 20: 563. [In Persian].
13. Sherchan S, Samuel R, Marahatta K, Anwar N, Van Ommeren MH, Ofrin R. Post-disaster mental health and psychosocial support: experience from the 2015 Nepal earthquake. *WHO South-East Asia J Public Health* 2017; 6(1): 22-9.
14. Ibrion M, Mokhtari M, Nadim F. Earthquake disaster risk reduction in Iran: lessons and "lessons learned" from three large earthquake disasters—Tabas 1978, Rudbar 1990, and Bam 2003. *Int J Disaster Risk Sci* 2015; 6: 415-27.
15. Adhikari RP, Upadhaya N, Paudel S, Pokhrel R, Bhandari N, Cole L, et al. Psychosocial and mental health problems of older people in postearthquake Nepal. *JAH* 2018; 30(6): 945-64.
16. Akbari ME, Farshad AA, Asadi-Lari M. The devastation of Bam: an overview of health issues 1 month after the earthquake. *Public Health* 2004; 118(6): 403-8. [In Persian].
17. Mori J, Hasui K, Tanimoto T, Matsumura T, Kami

- M. Drug shortages after the Eastern Japan Earthquake: experiences in a tertiary referral center. *DIJ* 2012; 46: 607-10.
18. Adhikari B, Mishra SR, Marahatta SB, Kaehler N, Paudel K, Adhikari J, et al. Earthquakes, fuel crisis, power outages, and health care in Nepal: implications for the future. *Disaster Med* 2017; 11(5): 625-32.
  19. Mark J, Krajeweki R, Sztajnkrzyer M, Alejandro A. Hospital disaster preparedness in United States: New issues, new challenges. *J Disaster Med* 2005; 4(2): 22-5
  20. Kaspersen RE. Science and disaster reduction. *IJDRS* 2010; 1: 3-9.
  21. Lillibrige SR, Noji EK, Burkle Jr FM. Disaster assessment: the emergency health evaluation of a population affected by a disaster. *Ann Emerg Med* 1993; 22: 1715-20.
  22. Chen KT, Chen WJ, Malilay J, Twu SJ. The public health response to the Chi-Chi earthquake in Taiwan, 1999. *Public Health Reports*; 2016.
  23. Wagner RM, Jones NP, Smith GS. Risk factors for casualty in earthquakes: The application of epidemiologic principles to structural engineering. *Struct Saf* 1994; 13(3): 177-200.
  24. de Ville de Goyet C, del Cid Peralta E, Romero A, Jeannee E, Lechat M. Earthquake in Guatemala: epidemiologic evaluation of the relief effort. *Bull Pan Am Health Organ* 1976; 10: 95-109.
  25. Marbouti M, Maurer F. Social media use during emergency response—insights from emergency professionals. 15<sup>th</sup> Conference on e-Business, e-Services and e-Society (I3E). Swansea, United Kingdom: Springer International Publishing; 2016.
  26. Wang B. Crisis communication on social media: behaviors and patterns. New York: State University of New York at Buffalo; 2019.
  27. Mohd S, Fathi MS, Harun AN. Information management for humanitarian aid distribution system in Malaysia. In *IOP Conference Series: Materials Science and Engineering*: IOP Publishing; 2019; 513(1): 012012.
  28. Daddoust L, Khankeh H, Ebadi A, Sahaf R, Nakhaei M, Asgary A. The vulnerability of the Iranian elderly in disasters: Qualitative content analysis. *Iran J Nurs Midwifery Res* 2018; 23(5): 402–8.
  29. Sohrabizadeh S, Jahangiri K, Jazani RK, Babaie J, Moradian MJ, Rastegarfar B. Women's challenges and capabilities in disasters: a case report of the twin earthquakes of Eastern Azerbaijan, Iran. *PLOS Curr* 2017; 9.
  30. Nozhati S, Sarkale Y, Ellingwood BR, Chong EK, Mahmoud H. A modified approximate dynamic programming algorithm for community-level food security following disasters. *ArXiv preprint arXiv: 180400250*; 2018.
  31. Snook KR, Duke CH, Finch KC, Fu KW, Tse ZT, Adhikari A, et al. How social media is used during natural disasters, environmental disasters, and other environmental concerns: a scoping review. *Academy Health Annual Conference on the Science of Dissemination and Implementation in Health*; 2015.
  32. Yoo E, Rand W, Eftekhari M, Rabinovich E. Evaluating information diffusion speed and its determinants in social media networks during humanitarian crises. *J Oper Manag* 2016; 45: 123–33.
  33. Nelson T. Determinants of disaster aid: donor interest or recipient need? *Glob Chang* 2012; 24(1): 109–26.
  34. Wang Y, Tang YY, Wang J. Cultural differences in donation decision-making. *PloS One* 2015; 10(9): e0138219.
  35. Parsizadeh, F, Eskandari M. Capabilities and needs of women in disaster, case study of Bam earthquake, 26 December 2003. *Research Bulletin of IIEES* 2013; 16(1): 59–72 [In Persian].
  36. Ibrion M, Mokhtari M, Parsizadeh F, Lein H, Nadim F. Towards a culture of resilience and earthquake disaster risk reduction in Iran“ Lessons-Learned” from earthquake disasters. *Proceedings of the 7th International Conference on Seismology and Earthquake Engineering*; 2015.
  37. Roth S. Aid work as edgework—voluntary risk-taking and security in humanitarian assistance, development and human rights work. *J Risk Res* 2015; 18(2): 139–55.
  38. Ghodsi H, Khani Jazani R, Sohrabizadeh S, Kavousi A. The resiliency of humanitarian aid Workers in Disasters: a qualitative study in the Iranian context. *Iran Red Crescent Med J* 2019; 21(2): e80366.
  39. Schneiker A. *Humanitarian NGOs, (in) security and identity: Epistemic communities and security governance*. First Edition ed. London: Routledge; 2016.
  40. Pirani D, Yousefi K, Sahebi A. Disasters; the opportunity of reconstruction and development: the successful experience of the 2017 Kermanshah earthquake. *Iran Red Crescent Med J*. 2019; 21(2): e90216.
  41. Elbert R, Gerdes UT. Governance and moderating effects of environmental uncertainty: the impact on performance in horizontal logistics cooperation. *TU Darmstadt, Fachgebiet Unternehmensführung und Logistik*; 2018.