



# Challenges and Recommendations for Patient Tracking in Past Earthquakes: An Experience from Iran

Nahid Tavakoli,<sup>1</sup> Mohammad H Yarmohammadian,<sup>2,\*</sup> Reza Safdari,<sup>3</sup> and Mahmoud Keyvanara<sup>4</sup>

<sup>1</sup>PhD Student, Health Management in Disaster, Health Management and Economics Research Center, Isfahan University of Medical Sciences, Isfahan, Iran

<sup>2</sup>Professor, Health Management and Economics Research Center, Isfahan University of Medical Sciences, Isfahan, Iran

<sup>3</sup>Professor, Health Information Management, Tehran University of Medical Sciences, Tehran, Iran

<sup>4</sup>Associate Professor, Social Determinants of Health Research Center, Isfahan University of Medical Sciences, Isfahan, Iran

\*Corresponding author: Mohammad H Yarmohammadian, Health Management and Economics Research Center, Isfahan University of Medical Sciences, Isfahan, Iran. Tel: +98-3137925157, Fax: +98-3136684799, E-mail: yarmohammadian@mng.mui.ac.ir

Received 2016 October 15; Revised 2017 March 05; Accepted 2017 April 08.

## Abstract

**Objectives:** The aim of this study was to explore key informants' experiences about challenges and recommendations of patient identification and tracking in past earthquakes in Iran.

**Methods:** A qualitative survey of key informants' experiences and views was carried out on emergency physicians and nurses, first responders and managers of red crescent society, and emergency medical services (EMS) from March to September 2015. Semi-structured interviews were performed with informants who had experience of response to past earthquakes in Iran by using a purposive sampling method. Interviews were audiotaped, transcribed, and entered into MAXQDA (version 10) for coding and content analysis. A thematic analysis of interview transcripts was undertaken.

**Results:** 5 themes including the crowd's presence, lack of unified command and integrated management, deficiency of planning, shortage of managerial and information infrastructures, and human resources challenges with their subthemes were explored. Also, some solutions were explored as follows: community education, chain of command and integrated management in the disaster scene, and training the emergency medical personnel and first responders.

**Conclusions:** There are many challenges that should be solved for improving patient tracking in future disasters in Iran. Planning for proper and effective communication between agencies that have responsibility for disaster management is very important. Also, community education is a vital measure to familiarize them with disaster and teach them how to save lives.

**Keywords:** Patient Tracking, Earthquake, Challenge, Recommendation, Qualitative Research

## 1. Background

In the last few decades, it has become increasingly evident that the destructive potential of a wide range of natural disasters was growing in many countries among which, earthquakes are the most important and most destructive disasters. Also, evidence shows that the earthquake events in the world are increasing (1-5). Factors such as rapid urban growth, shortage of governmental funds to support mitigation programs, insufficient knowledge about the earthquake hazard, and inadequacy of existent building codes can definitely affect earthquake risk management in low/middle income countries (6). Iran has been exposed to natural disasters throughout history and the main sources of these natural disasters have been earthquakes and floods (3, 6-11) most of which have been occurred within the 20th century (6). The earthquake in Bam was one of the 130 major earthquakes that have

been recorded in Iran's history. These disasters which have been experienced in the past years caused many significant challenges and long-term impacts on human health and healthcare delivery systems and revealed the need for improving emergency response process (12). This process involves numerous challenges among which, the information management challenges such as tracking displaced and vulnerable populations, infrastructure and services damages, and reporting to responsible agencies are highlighted (13). Also, the other major challenge is dealing with large volume of patients and evacuees whose conditions and locations are very important for the health sector and related agencies to identify and transfer them to further care centers (14). In addition, the admission of a large number of victims in a hospital after a mass-casualty incident can easily lead to chaos and disruption of the hospital's regular organization. To ensure that this chaos

does not continue, a correct way of registration and continuous overview of registered patients can be very helpful (15). During natural disasters, identifying the victims is very important (16). Quinn in his research entitled a model for nationwide patient tracking stated that in the event of Hurricane Katrina, since the victims were transferred out of the region quickly, they often could not be located by family members or the evacuation facilities, which caused psychological and operational stress for all those involved (17). Bouman developed a computerized system using bar codes to register the patients during disaster at University Medical centre Utrecht and the central military hospital and proposed to do pilot studies for performing this system in a prehospital environment (15). Alexander designed a system for response to the pervasive patient tracking for mass casualty incident for accounting and registering patients at a disaster scene (18). In the disaster response process, the local emergency medical response systems with resources from federal government, neighboring communities, humanitarian assistance organizations, medical personnel, and volunteers from external sources are involved separately. Thus, managing an effective response requires effective collaboration, facilitated by telecommunication technologies, and updated information about conditions at the scene (14). Intersectional collaboration during disaster management as well as during the response phase is crucial. Strengthening community preparedness and resilience through awareness-raising and training and inclusion of the community as a major stakeholder in any disaster plan is necessary (19).

An important issue undefined and unknown in the literature is how the patients were tracked during past earthquakes in Iran. This is especially vital from point of views of key informant persons in this research so that they suggested solutions for dealing with patient tracking challenges in future natural disasters through involving related stakeholders and activities. The aim of this study was to review the key informants' experiences and views regarding challenges of patient identification and tracking in Iran's past earthquakes to present the guidelines to face these challenges in future disasters especially earthquakes.

## 2. Methods

### 2.1. Study Design

We performed a qualitative study using in-depth interviews with key informants in 2015. We chose a qualitative approach because it is well-suited to study processes of organizations (20, 21).

### 2.2. Selection of Participants

The study population comprised emergency physicians, nurses, and managers of hospitals, disaster and emergency management center, medical sciences universities and red crescent society. The study employed purposive sampling using snowball technique. In qualitative research, the purposive sampling strategies, particularly snowball sampling, most often present a solution to the challenge of data collection among hidden populations (22). The inclusion criteria were: having experience in response to past earthquakes in Iran, and willingness to participate in the study. First, 3 informants were selected from disaster and emergency management center, medical sciences universities, and red crescent society; then, the other informants were identified by them. We continued to recruit participants until thematic saturation was achieved, or no new ideas were extracted from subsequent interviews. A total of 24 people participated in the study. All the participants were male. Their mean age was 42 years (29 - 55 years).

### 2.3. Data Collection

In this study, semi-structured interviews with individuals who had experiences in past earthquakes emergency response were completed using an interview instrument that included two parts: a) participants demographic characteristics and, b) some open-ended questions regarding participants' experience on patient tracking challenges. The questions were framed as follows:

What challenges did you face in patient tracking in past earthquakes?

For what reasons did you face these challenges?

How these challenges affected the patient tracking process in past earthquakes?

What recommendation do you have for solving the challenges for better response in future?

In addition, some exploratory questions were asked during the interviews for getting more details about participants' experience. The interviews lasted between 30 - 45 minutes, and they were audio-recorded and transcribed verbatim.

### 2.4. Credibility and Stability

For credibility of findings, the researcher performed three pilot interviews and analyzed them under the direction of research's supervisors and advisor and then, the needed corrections were made to the interview instrument to continue the other interviews. For stability of findings, the supervisor reviewed all transcripts after establishing the final coding structure to ensure all quotes were coded consistently. Also, we conducted participant

confirmation in which, some participants reviewed a summary of the findings to ensure accurate representation of their views; there were no suggestions for refinement of the findings.

### 2.5. Ethics Statement

The study was approved by the research ethics committee of Isfahan University of Medical Sciences. Also, prior to beginning the qualitative interviews, the purpose and plan of the interview, the voluntary nature of the interview, and the confidentiality of the interview responses were reviewed with all the participants. The study steps, including the informed consent procedure, was approved by the IUMS ethics committee. All records were kept confidentially.

### 2.6. Data Analysis

Considering the principles of thematic analysis, data collection and analysis were done simultaneously to provide and refine the code structure. The transcripts were entered into MAXQDA V. 10 software (VERBI Software GmbH, Berlin, Germany) to facilitate data management and analysis. All data were read line-by-line, and the main themes were identified and coded using thematic analysis. The codes were revised, added, and deleted as we progressed through the transcripts.

## 3. Results

The Iran's past earthquakes challenges and recommendations are reported under the following themes:

Table 2 provides a summary of these themes.

Details about each theme and the participants' views are available in the dissertation report at the library of Isfahan University of Medical Sciences.

## 4. Discussion

Our study identified some factors that make many problems in disaster scene which we need to face them for better response to future disaster in Iran. 8 main themes that have been known as challenges and recommendations of patient identification and tracking in past earthquakes in Iran during the interviews were explored.

### 4.1. The Crowd

The participants declared that, it was difficult to deal with the identification and tracking of the patients because of crowdedness. The ordinary people transferred some patients, while the patients had not been seen by medical responders. On the other hand, crowd's presence

made some difficulties in the delivery of proper emergency medical services. On the other hand, the crowd's presence was one of the major challenges that was noticeable in 3 aspects in the participants' point of view; first, overwhelming the help received, second, interfering with the EMS job, and third, causing sever damages to injured people during victim evacuation due to lack of first aid knowledge. It is very important to consider this challenge as a social and cultural issue.

### 4.2. Recommendation: Community Education

Based on the participants' views, the government should provide educational packages for public to teach them how to save their lives in disaster, how to help other people, and how to prevent diseases and survive.

A community-based disaster management program has been considered in Taiwan as a basic response training course and a disaster scenario in order to improve public awareness and community emergency response capability (23). Rajib Shaw conducted a research among high school students in Japan to understand the impact of earthquake experience and education on awareness. Results showed that education can provide useful information as a knowledge base for earthquake. He believed that school education, coupled with self, family, and community education can help students develop a "culture of disaster preparedness" (5). Our findings were confirmed by these research.

### 4.3. Deficiency in Chain of Command and Integrated Management

Based on experts' opinion, there was no proper coordination and chain of coordination among main responsive organizations such as ministry of health and red crescent society. The participants declared that insufficient coordination and management in past earthquakes such as the Bam earthquake was two major challenges due to no chain of command in the disaster scene so that it caused inappropriate and subjective performance evaluation in evacuating process, serious deficiencies in the management of victims triage and tracking, insufficient information regarding the areas the victims had been found and finally, it led to many parallel activities in the disaster scene which should be considered before the disaster occurrence. In the opinion of Red Crescent operational managers in the Iranian Azerbaijan earthquake, 3 scopes including operation command (such as victim's prioritization and transfer), disaster management, and information and communication were inappropriate (24). After the Bam earthquake, WHO reported that the active presence of people and authorities, organizations, military forces, and governmental and non-governmental activists caused insuf-

**Table 1.** The Participants' Characteristics

Institution Degree	Hospital	Disaster and Emergency Management Center	Red Crescent	University	Frequency	Percentage
Bachelor of nursing	4	1	3	2	10	41.7
MSC of nursing and management	0	0	5	0	5	20.8
Physician	1	1	2	1	5	20.8
PhD, M.D	2	1		1	4	16.7
<b>Total</b>	7	3	10	4	24	100

**Table 2.** Main Themes of Challenges and Recommendations of the Past Earthquakes in Iran from the Point of Views of Key Informants

Main Challenges	Recommendations
The crowd	Community education
Deficiency in chain of command and integrated management	Clear redefining roles, responsibilities and authority of related organization leaders
Human resources	Medical and first responder education
Deficiency of planning	Providing a national disaster plan
Shortage of managerial and information infrastructures	Developing infrastructures

efficient and poor management and coordination. In addition, the lack of transparency and clarity in existing laws regarding the responsibilities of service provider to the victims led to significant overlap in the activities (19). These implications confirm our findings in this research.

#### 4.4. Recommendation: Clear Definition of Roles, Responsibilities and Authority of Related Organization

There was vast amount of participants' views that addressed lack of unified command in the scene. Based on experts' opinion, there was not proper coordination among main organizations such as ministry of health and red crescent. Thus, the government officials would provide an essential document to clearly describe the roles and responsibilities in disaster management situation among responsible agencies especially health ministry, red crescent society, security forces, and related ministries.

WHO emphasized that Iran needs to establish the procedures for practical, organized, and defined communication channels and joint activities between the ministry of health, the medical and health department of military forces, and the red crescent society on the one hand, and the national task force for disasters in the ministry of the interior on the other hand to assure emergency preparedness (19). Also, administrative and financial supports for disaster management should be done by the government in order to develop an Iranian model for chain of command and coordination.

#### 4.5. Lack of Competency of Human Resources

The participants stated that shortage of knowledge in EMS personnel and first responders about emergency sit-

uations, no discipline for personnel distribution, and insufficient payment to them are the challenges of human resources who have responsibilities for evacuating and transferring the victims. The participants declared that we were not educated regarding patient data collection and completion of the related forms. Also, the other main problem was the EMS human resources characteristics and capabilities so that, for example, in the Rudbar and Bam earthquakes the individuals were not enough bold to face disaster and did not have efficient knowledge to do triage and victims' identification.

#### 4.6. Recommendation: Medical and first responder Education

Considering that Iran is a country with the history of earthquakes causing many financial and life losses (16, 25), we need to rely on promoting the level of knowledge in medical staff and first responders for better preparation and better response in future disasters. Therefore, it would be important to develop an educational plan for updating and promoting the level of medical responders' knowledge. The time and cost should also be taken into consideration.

WHO emphasized that there is always a need for continuous and effective training to improve organizational capacities and inter-organizational coordination among those who are involved in the task. Also, the health staff of the disease control and surveillance system should be trained and certified in disaster surveillance and have a clear terms of references (19).

#### 4.7. Deficiency of Planning

Lack of organized plans, inadequate preparedness for response, unavailability of related guidelines, and undefined duties and personalization in victim tracking were challenges as a result of deficiency of previous planning. The participants declared that due to lack of efficient measures for disaster response, everyone from ordinary people to government forces came from everywhere to help victims. In other words, there was Anarchism. Lack of integrated and common planning was a major challenge in identifying victims, coordination and transportation of victims.

#### 4.8. Recommendations: Providing a National Disaster Plan

A national protocol for all involved activists providing relief, health, and medical services during disasters is essential to avoid confusion, duplication, and parallel work. Maintaining a unified and national disaster plan is an essential principle for managing the disaster scene and hospitals in disaster situations. Planning activities should include readiness of general, public, specialized, telecommunications, and transportation facilities, as well as hospitals inside the country.

Based on the WHO report, it is highly recommended that there should be fixed members in the search and rescue team and emergency medical services team inside the country in addition to specific protocols. Also, they should be highly structured (Military like) arrangements and equipped with the communication systems in the disaster field so that the services can be delivered more effectively. In addition, operational planning and field exercises are needed to develop coordination and share information before occurrence of a disaster (19).

#### 4.9. Shortage of the Managerial and Information Infrastructure

Reviewing the participants' views showed that unfortunately, there was no defined, organized, and standard infrastructure in managerial and information level in the country to response to past earthquakes. On the other hand, information and communication services were not considered a priority in disaster management in Iran, while having access to accurate information facilitates decision-making to improve victims' evacuation and identification process at the time of disaster.

#### 4.10. Recommendation: Develop the Infrastructure

Considering that earthquakes like all other disasters have common medical and public health consequences

that disturb the normal medical/non-medical infrastructures (26) and regarding that information and communication services are not considered a priority, having access to accurate information facilitates planning to simplify victims' evacuation and identification process in the disaster; therefore, it is highly recommended to develop a coordinated and integrated system to collect accurate data to plan for a proper patients transfer. In a disaster in Thailand, systematic and ongoing efforts were made to identify human survivors and compile descriptions and fingerprint and DNA data in a centralized government database. The data were matched with lists of people who had been reported missing (27). In several natural disasters such as the Bam earthquake, Katrina Hurricane and Haiti in the USA and Tsunami in India, insufficient resources management and poor communication caused delay in victims' evacuation and weak emergency response (28). Therefore, developing systems that enable the information to be shared and analyzed to related officials is fundamental to have better response capacity. In this regard, the electronic health records supported continuity of care for evacuated veterans after Katrina Hurricane (13). In disaster management planning, information and communication networks may not appear to be as important as having access to clean water, food, and shelter; however, having access to the relevant and timely information and communication helps promote more efficient disaster response systemically (29). The international committee of the red crescent's contribution highly recommends that "identification represents the fulfilment of the right of human beings not to lose their identities after death and, overall, the right of families to know what has happened to their relatives in all circumstances" (16). Thus, providing an electronic database for standardized and systematic data collection and interchange between medical and managerial staff is very important. In order to improve the quality of international disaster databases, systematic collation and standardized collection of local disaster data are urgently needed. Technological progress will also be needed in this area. Planning and preparation for using information technology should be undertaken (19). Disaster databases are becoming increasingly useful, as their data are being fed into analytical tools to help prioritize international actions to reduce disaster risk (30). Although information and communication technologies cannot solve the entire problem in disaster response, this issue should not obstacle to use these technologies. Available technologies such as electronic health record (EHR) and decision support system and mobile health have an important role in response to and recovery from disasters (31); this can help in victims' patient tracking and monitoring (32). Information is a vital form of aid on its own; but this is not sufficiently rec-

ognized among humanitarian organizations. Information and communication technology is needed as a critical infrastructure for enhanced disaster management (29).

To sum up, main themes presented in this paper highlight the challenges of patient's identification and tracking in Iran's past earthquakes that we were faced with along with recommendations to address them and improve patient safety during natural disasters in Iran in the future. Also, the results of the study provide an overview of the lessons learned including necessity of developing a national patient tracking system. From a business point of participants' views, it is important to make some efforts at the national level for considering the patient safety and humanitarian issues as discussed above. This requires that the ministry of health and the Iranian red crescent society (IRCS) work together in a coordinated manner of tasks to promote natural disaster response and prevention. This is widely recommended that lessons learned from past disasters be integrated and used in future preparedness policy; in addition, governmental planning can help emergency responses be more effective in future. These findings provide numerous implications for better identification and tracking of victims in future disasters including community education, chain of command, and integrated management in the disaster scene and training the emergency medical personnel and first responders to implement proper triage and identification of the victims. Although EMS and health sector officials learn about the importance of the patients' data collection and transfer in the disaster response phase, they did not accomplish this job during past earthquakes in Iran; this is because we suffer from inadequate unified management, deficiency of planning for disaster preparedness, and a community with no knowledge in regard to proper participation in victims' evacuating and tracking process. One of the important goals of this study was to offer some solutions to be acknowledged by responsible officials in disaster management to consider a humanitarian act for patient tracking in future natural disasters in Iran.

#### 4.11. Conclusion

Our findings suggest that for better response in future disasters, developing a defined information management system for sharing among officials in charge of disasters in the first hours of the disaster is essential to facilitate decision making and issuance of orders for necessary operations which this issue should be considered before the occurrence of disaster. In conclusion, as our country is earthquake-prone, increasing awareness, readiness and promoting disaster management are considerable points in public health. It is also highly recommended

that health sector in Iran needs to take measures for effective response to disasters. In addition, as there is a critical need for effective information management and communication system in generating coordinated actions to prevent and treat diseases, we should develop a software system involving both fixed and mobile equipment to facilitate effective tracking of patients from a natural disaster scene and transferring to the further care center until disposition at the treatment facility.

#### Acknowledgments

We would like to thank Isfahan University of Medical Sciences for supporting this research. Also, the authors would like to appreciate the participants from red crescent society, EMS in Isfahan, hospitals, Isfahan and Shiraz Universities of Medical Sciences, social welfare university and the managers of disaster and emergencies management centers in Isfahan and Shiraz.

#### Footnotes

**Authors' Contribution:** Study concept and design: Nahid Tavakoli and Mohammad H Yarmohammadian; acquisition of data: Nahid Tavakoli; analysis and interpretation of data: Nahid Tavakoli, Mohammad H Yarmohammadian, Reza Safdari and Mahmoud Keyvanara; drafting of the manuscript: Nahid Tavakoli and Mohammad H Yarmohammadian; critical revision of the manuscript for important intellectual content: Nahid Tavakoli, Mohammad H Yarmohammadian, Reza Safdari and Mahmoud Keyvanara; statistical analysis: Nahid Tavakoli, Mohammad H Yarmohammadian and Mahmoud Keyvanara; administrative, technical, and material support: Nahid Tavakoli and Mohammad H Yarmohammadian; study supervision: Mohammad H Yarmohammadian and Reza Safdari.

**Funding/Support:** This research was funded by Isfahan University of Medical Sciences and the Ministry of Health.

#### References

1. Amin S, Goldstein MP. *Data against natural disasters: establishing effective systems for relief, recovery, and reconstruction*. World Bank Publications; 2008.
2. Dobson I, Doan Q, Hung G. A systematic review of patient tracking systems for use in the pediatric emergency department. *J Emerg Med*. 2013;44(1):242-8. doi: 10.1016/j.jemermed.2012.02.017. [PubMed: 22504083].
3. Khanke H. *Hospital readiness in disasters: National program*. Tehran: University of Social Welfare and Rehabilitation Sciences; 2012.
4. Cruz AM. *Natech disasters: a review of practices, lessons learned and future research needs*. 5th ed. Annual IIASA-DPRI; 2005.

5. Shaw R, Shiwaku Hirohide Kobayashi K, Kobayashi M. Linking experience, education, perception and earthquake preparedness. *Inter J.* 2004;**13**(1):39-49.
6. Group IS. *Earthquake Management in Iran A compilation of literature on earthquake management iranian studies group at MIT USA.* Massachusetts Institute of Technology; 2004.
7. Ardalan A, Mowafi H, Malekafzali Ardakani H, Abolhasanai F, Zanganeh AM, Safizadeh H, et al. Effectiveness of a primary health care program on urban and rural community disaster preparedness, Islamic Republic of Iran: a community intervention trial. *Disaster Med Public Health Prep.* 2013;**7**(5):481-90. doi: [10.1017/dmp.2013.93](https://doi.org/10.1017/dmp.2013.93). [PubMed: [24274128](https://pubmed.ncbi.nlm.nih.gov/24274128/)].
8. *Disaster Statistics.* Iran; 2014, [cited 22 November]. Available from: <http://www.preventionweb.net/english/countries/statistics>.
9. Ardalan A. *Roadmap of and disaster risk reduction and management in Islamic Republic of Iran (In Persian).* Ministry of Health: Tehran; 2013.
10. Emergency operation center. *Ministry of Health.* Tehran: Ministry of Health; 2010.
11. Fakoorziba MR, Baseri A, Eghbal F, Rezaee S, Azizi K, Moemenbellah-Fard MD. Post-earthquake outbreak of cutaneous leishmaniasis in a rural region of southern Iran. *Ann Trop Med Parasitol.* 2011;**105**(3):217-24. doi: [10.1179/136485911X12899838683449](https://doi.org/10.1179/136485911X12899838683449). [PubMed: [21801500](https://pubmed.ncbi.nlm.nih.gov/21801500/)].
12. Fazaeli A, Fouladi B, Sharifi I. Emergence of cutaneous leishmaniasis in a border area at south-east of Iran: an epidemiological survey. *J Vector Borne Dis.* 2009;**46**(1):36-42. [PubMed: [19326706](https://pubmed.ncbi.nlm.nih.gov/19326706/)].
13. Brown SH, Fischetti LF, Graham G, Bates J, Lancaster AE, McDaniel D, et al. Use of electronic health records in disaster response: the experience of Department of Veterans Affairs after Hurricane Katrina. *Am J Public Health.* 2007;**97** Suppl 1:S136-41. doi: [10.2105/AJPH.2006.104943](https://doi.org/10.2105/AJPH.2006.104943). [PubMed: [17413082](https://pubmed.ncbi.nlm.nih.gov/17413082/)].
14. Turnock M, Mastouri N, Jivraj A. Pre-hospital application of telemedicine in acute-onset disaster situations. *McMaster University.* 2008.
15. Bouman JH, Schouwerwou RJ, Van der Eijk KJ, van Leusden AJ, Savellkoul TJ. Computerization of patient tracking and tracing during mass casualty incidents. *Eur J Emerg Med.* 2000;**7**(3):211-6. [PubMed: [11142274](https://pubmed.ncbi.nlm.nih.gov/11142274/)].
16. Sidler M, Jackowski C, Dirnhofer R, Vock P, Thali M. Use of multislice computed tomography in disaster victim identification—advantages and limitations. *Forensic Sci Int.* 2007;**169**(2-3):118-28. doi: [10.1016/j.forsciint.2006.08.004](https://doi.org/10.1016/j.forsciint.2006.08.004). [PubMed: [16997522](https://pubmed.ncbi.nlm.nih.gov/16997522/)].
17. Quinn NM. *A model for nationwide patient tracking: Monterey, California.* Naval Postgraduate School; 2009.
18. Alm AM, Gao T, White D. Pervasive patient tracking for mass casualty incident response. AMIA Annual Symposium Proceedings. *American Medical Informatics Association.* 2006.
19. Organization WH. *Health sector response to the Bam earthquake. lessons learnt;* 2005.
20. Adib Hajbagheri M, Parvizi S, Salsali M. *Qualitative Reserch Methods.* Tehran: Boshra; 2013.
21. Silverman D. *Interpreting qualitative data; methods for analysing talks, text and interaction.* Second ed. London: SAGE; 2004.
22. Tongco MDC. *Purposive sampling as a tool for informant selection.* 2007.
23. Chen LC, Liu YC, Chan KC. Integrated community-based disaster management program in Taiwan: a case study of Shang-An village. *Natural Hazards.* 2006;**37**(1-2):209-23.
24. Oñe A. Managers' point of views about rescue operation of red cross in azarbayejan earthquake. *Quarterly Sci J Rescue Relief.* 2014;**6**(3):21-31.
25. Ciottone GR. *Disaster medicine.* Elsevier Health Sci; 2006.
26. Ashtari Jafari M. Lessons learned from the Bam Urban earthquake. *14th World Conference on Earthquake Engineering.* Beijing, China. 2008. p. 12-7.
27. Asadzadeh M, Aryankhesal A, Seyedin H, Babaei J. *The Relationship between Knowledge and Attitude of Managers with Preparedness of Health-care Centers in Rey Health Network against Earthquake Risk-2013.* 2013.
28. Althwab A, Norris A. *The Scope and Development of Disaster E-Health.* 2017.
29. *Economic and Social Council, Committee on Information and Communications Technology 2014.* 2014.
30. Vaux T. Data or dialogue?The role of information in disasters. *World Disasters Report.* 2005.
31. Aronsky D, Jones I, Raines B, Hemphill R, Mayberry SR, Luther MA, editors. An integrated computerized triage system in the emergency department. *AMIA Annual Symposium Proceedings.* 2008. American Medical Informatics Association; 2008.
32. Bharosa N, Lee J, Janssen M. Challenges and obstacles in sharing and coordinating information during multi-agency disaster response: Propositions from field exercises. *Information Systems Frontiers.* 2010;**12**(1):49-65.