

CHALLENGES IN DISTRIBUTION OF EMERGENCY RELIEF SUPPLY: CASE STUDIES OF THREE EARTHQUAKES IN IRAN

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ABSTRACT

Iran is located in the Alpine-Himalayan seismic belt as one of the most active tectonic regions of the world. The country has frequently suffered large and destructive earthquakes in the past few decades. When a disaster strikes, relief services play an important role and are in a unique position to address the particular needs created by natural disasters. Based on this, emergency relief supplies need to be distributed among survived people in timely manner to protect their lives. Resources and employee support therefore are also required to be mobilized for assisting the affected communities. The aim of this paper is to briefly review the provision and distribution of necessary supplies and resources in the aftermath of three major earthquakes that occurred in Iran during the last quarter of century including Manjil–Roudbar 1990, Bam 2003, and Bushehr 2013 earthquakes. The challenges regarding these three earthquakes in the field of distribution and access to necessary relief items are discussed in this paper. Recommended strategies towards improvement of this process are presented for future disasters. The addressed recommendations are based on observations of the authors and available sources. Lack of recorded documents and confidential data were among the limitations of this study. It should be mentioned that the research on this aspect of earthquake response is very limited in Iran. It is however, addressing a relevant subject to assist people resiliency especially after major earthquakes and is worth of extended research in the future.

INTRODUCTION

Iran is one of the most active tectonic regions of the world which has frequently suffered large and destructive earthquakes and experienced several major seismic events in the past few decades. The seismic hazard map illustrating the high risk of earthquakes in Iran is shown in Figure (1). As shown in this figure, most of the cities in Iran are located in the high seismic zones.

When a natural disaster strikes, the response and relief aids play an important role in responding. Resources and employee support are mobilized to assist the affected communities. In many cases, relief aids are in a unique position to address the particular needs created by natural disasters.

In Iran, the Red Crescent Society (RCS) as one of the active organizations are responsible for search and rescue efforts and supply of relief supplies. Also other related organizations such as universities, fire fighting departments and media undertake research and assist in promotion of earthquake response in Iran. In addition, the role of some of existing NGOs cannot be denied. For example, one of the NGOs active in this field is “Earthquake Hazards Reduction Society of Iran” (Ehrs) which presents assistance to the public after

earthquakes. This organization also holds workshops, seminars and training courses and provides related disaster information to the public (Ehrsi, Acc. 2014).

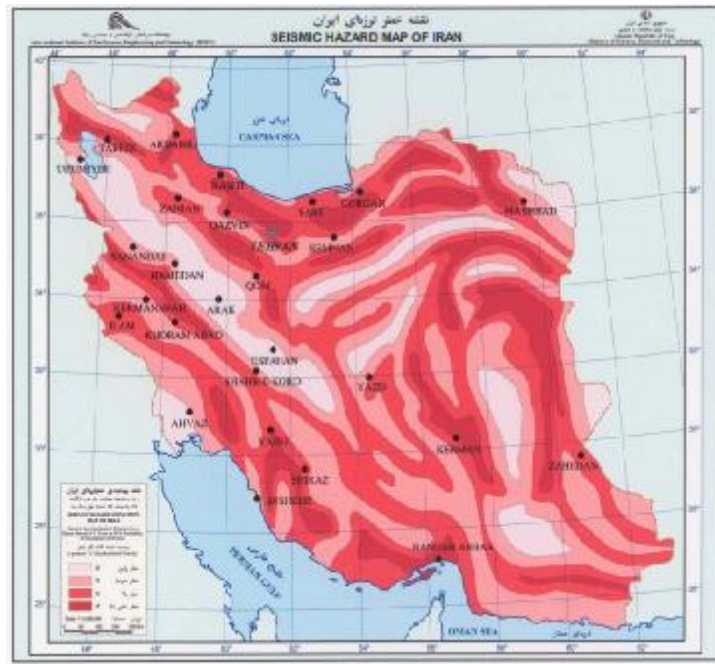


Figure 1. "Seismic Hazard Map" of Iran, Source: (IIEES Website 2008)

Thus in this paper, having a look on the issues observed in three earthquakes in Iran, some strategies towards the improvement of facilities which provide necessary supplies in developing countries after the earthquakes, will be presented. In the next section, examples of distribution of relief supplies after the three major earthquakes of Iran, Manjil-Roudbar 1990, Bam 2003, and Bushehr 2013 earthquakes is addressed briefly. At the end, some practical and applicable strategies towards the improvement of existing activities in developing countries regarding the initial aftermath of earthquake and people's emergent needs will be presented within the scope of this paper.

IRAN CASE STUDY

Several efforts have been carried out to improve the distribution of the emergency supplies and resources after the major Iranian earthquakes in recent years. However, there are still shortages that need to be looked at. A study therefore has been performed to address the challenges and seek the opportunities in this regard.

MANJIL-ROUDBAR EARTHQUAKE

Manjil-Roudbar earthquake occurred thirty minutes after midnight of June 20, 1990 in Gilan province ($M_w=7.3$), (Moinfar and Naderzadeh, 1990). According to the official reports, the earthquake claimed about 15,000 lives and more than 30,000 people were injured. The earthquake also made more than 500 thousand people homeless and affected three cities of Roudbar, Manjil and Loshan. Almost 700 villages were damaged in the populated areas of the country on northern and western parts of the Alborz Mountains.

At the time of Manjil earthquake occurrence, the location of epicenter announced with interruption. The epicenter was located firstly in Deilaman close to Lahijan. This caused 6-7 hours delay in knowing the exact place of the epicenter and dispatching the first rescue and relief teams. The less damaged areas immediately started to contact the headquarters requesting assistance in the provincial and national levels. As a result, during the initial hours, most of the attention was paid to the less damaged areas and therefore providing

necessary supplies to the affected people was not provided properly. Red Crescent Society of Iran as the organization responsible for providing humanitarian aids started collecting and distributing public aids during the initial hours after the earthquake. Besides, Islamic Republic of Iran Broadcasting (IRIB) and other media had also important roles in disseminating information with regard to requirements of the affected areas. Moreover, based on the observations of the people in the scene, the existing NGOs and cooperative organizations also participated in collecting people's donations. One of the government activities for promotion of donation was considering these aids as tax exemption costs.

In addition, the speeches of clerics had important effects in providing necessary needs of the affected areas. However, from the gathered observations, it was revealed that problems still existed in this regard, part of which is shown in Table (1):

Table 1. Part of raised issues regarding the emergency relief supplies after Manjil-Roudbar earthquake

Cause	Effect
- Proper information was not given about the facilities and assistance needed at the areas.	- Shortages of some essential items existed during the early days (such as hygiene items).
- Considerable materials and goods were transferred to the area by ordinary people or NGO's with the belief that the best way to help is to donate directly to the survivors.	- There was confusion among people as well as lack of coordination with relevant organizations.
- Status of distributing aids was so that everyone was trying to get them directly.	- Those who were unable to request directly (such as the elderly, women and patients) received less assistance.
- Aids donated by the people of each province were distributed among the coverage range of responsibility of that province.	- The variety of donation of different provinces, caused difference in distribution of goods that were not acceptable and fair for the residents in affected areas.
- Some public assistance was looted by inhabitants of the villages in route (that had suffered fewer damages) before arriving to the affected areas.	- The needed assistance reached the damaged areas after long delays.
- The distribution of international aid was not clear for the residents. While the Television was announcing the donations from different countries every day, no evidence of these aids could be observed in the affected areas.	- Spread of rumors among residents thinking that the received foreign aids have been used in other places.
- Some survivors were not happy with the distribution of relief items by relevant organizations, since the goods were distributed in an unethical way.	- In areas, this caused people to refuse in getting such aids.
- Sign cards which indicated the extent of people's received items were distributed a few days after the earthquake.	- The distribution of cards was not appropriate and although some families did not receive any cards, others had several extra.
- Some groups and organizations that had no responsibility for collecting donations, established bases in different areas.	- Unfortunately, the distribution of these aids was not clear in the affected areas.

The occurrence of earthquake caused landslides and rock-falls in many of the main and secondary roads in Gilan and Zanjan provinces which blocked the roads in several points. Main roads towards the north (Qazvin- Rasht and Karaj- Chalus) were blocked after the earthquake due to landslides and fall of blocks of stone in the days after the earthquake. In this regard, heavy machinery of the transportation ministry and other relevant organizations were dispatched to the earthquake stricken areas to open the roads, which took around 4 to 5 days especially in rural areas. Blockage of roads caused heavy traffic in most places in earthquake stricken areas and thus created a significant delay in dispatching relief teams and supply to affected areas as shown in Figure (2).

In addition to the transportation roads, most of the streets in the affected cities were also blocked due to the collapse of adjacent buildings.



Figure 2. Heavy traffic and blockage in the main roads of Gilan and Zanjan after the earthquake, Source: (IIEES)

BAM EARTHQUAKE

The 2003 Bam earthquake with a magnitude of 6.6 occurred at 5:26 local time (1:56 GMT) on December 26th, 2002 near Bam city and its surrounding villages in Kerman province, southeastern of Iran. The earthquake destroyed around 85 percent of Bam and Baravat cities and neighboring villages with a total population of approximately 143,000 people (Eshghi and Zare, 2003). It also claimed 33,000 lives, about 10,000 injured and more than 75,000 homeless.

Immediately after the earthquake it was decided to provide necessary items for the victims through local and international resources. RCS as the main responsible for collecting and distributing these items started its activities in some hours after the event (RCS, 2003). Despite to extensive efforts of RCS and excellent support of people from all over the country, there were several challenges in providing and distributing emergency needs as shown in (Table 2):

Table 2. Part of raised issues regarding the emergency relief supplies after Bam earthquake

Cause	Effect
- Lack of coordination in the distribution of items, especially in the early days after the crisis was one of the main challenges. Different taskforces had different regulations and the survivors were confused in receiving necessary items.	- Such problems somehow resulted in distributing materials improperly and those who have not affected by the event received more than those who were in need to such supports.
- In some cases, aids were distributed poorly and in public spaces such as warehouses (Figure 3).	- Most people had no access to these places and were undecided on what to choose.
- Social and cultural conditions of survivors were always neglected by the personnel in charge of distribution of assistances	- Some survivors believed that the used method was not respectful and preferred to refuse such assistance.
- Booklets for distribution of items were distributed after some days and improved the situation a bit better. But again some survivors could not receive such booklets and some received several copies.	- This caused challenges between the residents and relevant authorities.
- There were no sufficient warehouses to store the donation in proper condition.	- Therefore, many of the sent items were damaged and became unusable before distribution to the survivors.
- Difficulties to access healthy water during the first days was considerable at all affected areas.	- In the following days, some tankers were sent to the affected area to provide the necessary water supply. Moreover some mobile water storages tanks were provided by foreign agencies.
- Up to 13 days after the earthquake, only canned foods and other cold nutrition were distributed to the survivors;	- This caused problems in access to warm food for people. Cold weather increased the demand for warm food.
- Weakness of information dissemination was observable in the affected areas.	- This caused shortages of some necessary materials.
- Lack of transparency necessary to report the methods of distributing goods among the people especially for foreign aid.	- This caused expansion of rumors in the area.
- After the earthquake, several private and public organizations started to collect the donation.	- It was not clear how these organizations distributed or used these donations among people.





Figure 3. Poor distribution in the first days after the event, Source: (IIEES)

BUSHEHR EARTHQUAKE

The 2013 Bushehr earthquake, 6.3 MW, occurred on April 9, 2013, struck in Iranian province of Bushehr near the towns of Kaki and Shonbeh. At least 37 people were killed, mostly from the town of Shonbeh and villages of Shonbeh-Tasuj district and an estimated 850 people were injured. It struck at a depth of 10 Kilometres (6.2 mi), near the towns of Khvurmuj and Kaki "Dozens" of aftershocks followed, most within the first hour of the main quake. The strongest aftershock had a magnitude of 5.6. At least 37 people were killed and an estimated 850 were injured by the earthquake. 310 aftershocks have been recorded by IIEES in the first week after the earthquake.

After the earthquake, the emergency shelters were set up for people by the Red Crescent Society of Iran and Sepah (revolutionary guards). In many areas, people were unable to receive tents for the first night after the earthquake, which was resolved afterward. Most of the people set up their tents near their damaged houses in order to protect their properties.

In addition, according to data gathered from people in the area, water and warm food were among the first priorities. In the second day after the earthquake, food items such as eggs, potatoes, beans, and water were distributed with the presence of people in Red Crescent Society of Iran. Distribution of ice and warm food was observed in the third day after the earthquake as well. However, the importance issue to mention is that there should be a supervision of the responsible authorities regarding the healthiness of the distributed foods. This issue has been observed before in Ahar (2012) and Manjil-Roudbar (1990) earthquakes as well.

Security of the area was maintained properly by the responsible organizations and there was no report of any looting or robbery in the area. By the way, it was reported that few people in Shonbeh had gathered to receive more food, but this was controlled by the especial forces in the area in order to prevent chaos. There were also some fights in the area among local people for receiving further aids which was also controlled properly (Tatar et al., 2013).

The most important challenges related to emergency relief supplies after Bushehr earthquake can be classified as shown in Table (3):

Table 3. Part of raised issues regarding emergency relief supplies after Bushehr earthquake

Cause	Effect
- Communication system was poor at the beginning.	- People were unaware of what was going on.
- The distribution of goods and supplies, especially in the first days after the earthquake was not carried out properly.	- Those who were most in need received minimal aid.
- Tents were not distributed enough according to the population in the area.	- This made many people to stay without shelter for the first night after the earthquake.
- Lack of chillers, as it was warm in the area.	- People felt very uncomfortable due to the heat.
- The distribution of some out of date cans and soft drinks.	- People observed the problem and were angry about it.
- Donations sources were less in comparison to other earthquakes.	- Not many voluntary aids for food and clothes were received by people.

CHALLENGES

In addition to what was mentioned in Tables (1-3), the challenges regarding Manjil–Roudbar, Bam, and Bushehr earthquakes in the field of providing and distributing of foods are summarized and compared in Table (4):

As it can be seen in Table 4, there is a gradual change in recent earthquake in Bushehr with regard to the social condition of people and the security in distribution. It is presumed that some lessons might have been learnt in between the elapse of time, but challenges still exist. However, other common issues emerged in these earthquakes, part of which included:

- Inappropriate information dissemination;
- Weak coordination among relevant relief forces active at scene;
- Key shortages in required personnel, capacity and equipment;
- Improper use of specialized volunteers;
- Improper collection and distribution of goods in the area;
- Insufficient vehicles for transferring goods;
- Lack of good enough security after distribution of goods.

Also, improper information about the shortages at sites caused problems in sending goods to the affected areas. The difference in type and methodology of provision for the victims among different provinces caused extra difficulties and problems in providing security for donations which caused difficulties for distribution of such goods.

Table 4. A general comparison between Manjil-Roudbar, Bam, and Bushehr earthquakes in supply and distribution of resources

Subject		Manjil-Roudbar EQ (1990)	Bam EQ (2003)	Bushehr EQ (2013)	Notes
Providing and distribution of goods and materials	Collecting donation	Moderate	Moderate	Weak	Importance of information dissemination for collecting donations
	Total distribution	Weak	Moderate	Moderate	
	Estimation of people requirements	Weak	Weak	Moderate	Necessity of proper and quick estimation of requirements
	Sharing equipment among task forces	Weak	Weak	Weak	Necessity for developing cooperation plans
	Attention to social condition	Weak	Weak	Moderate	Necessity for social studies
	Clear picture of distribution	Weak	Weak	Weak	Importance of providing required data
	Security in distribution process	Weak	Weak	Moderate	Necessity of using equipped and trained security forces

Additionally, access to the stricken regions were not easily possible due to the damage of roads resulted from geological instabilities. Other most important issue was that providing aid for survivors was not in accordance with their social conditions and sometimes against ethical considerations.

RECOMMENDED STRATEGIES AND CONCLUSIONS

This study provides a brief background into resource challenges and factors that affected resource availability in a post-disaster situation in three moderate to major earthquakes in Iran during 1990 to 2013. This paper provides insights into issues the relief interventions could contribute in arriving at resource availability for a successful disaster relief recovery. Challenges are observed and addressed and recommended strategies towards improvement of this process are presented for future disasters. By comparing lessons learnt from these three earthquakes, it can be observed that there is a gradual change and improvement in recent earthquake in Bushehr (2013) with regard to considering the social condition of



people and maintaining the security in distribution.

The study also shows vulnerable issues that would commonly face the assistance after these earthquakes. In order to reach the affected area in time and to distribute the needs of survived people in the aftermath of an earthquake, few issues can be recommended based on observations of the authors and available sources. First of all, the establishment of relief centers can be useful in order to locate a place to coordinate the resources. This will use these centers as a place where all aid agencies and relief operators can cooperate together in order to avoid overlap in responsibilities and double aid assistance. Additionally, a reliable system should be in place to estimate the approximate number of deaths, injured and survivors. This will help the government and local aid agencies to have an overall estimation of the needs for the affected area. The governments should estimate the extent of people's emergency needs in a more systematic way to see if the situation can be handled or there is a need for assistance from other countries. Groups of selected people in the community should be trained in advance to deal with security issues in order to avoid chaos in the time of distribution of emergency goods and relief items. In addition, there should be covered storage room for storing the goods that are sent from either local assistance or foreign aids. Some foods needs to be kept in dry places, otherwise they will become unusable. In case of reaching the blocked roads, the use of light vehicles such as bikes or in cases animals such as camels and donkeys which can travel in bad conditions and remote areas, are suggested specially in rural areas.

As mentioned, the research on this aspect of earthquake response is very limited in Iran. The reason can be due to the lack of extensive documents and the allowable extent of using the available confidential data. It is however, addressing a relevant subject to assist people resiliency especially after major earthquakes, and therefore has a great value for further detailed exploration. At the end, it is suggested that some lessons learnt from Iran as well as other countries with similar experiences should be emphasized further in future disasters including issues related to collecting donation, estimation of people requirements, timely distribution, sharing equipment among task forces, total distribution, safe access to the outside emergency and evacuation routes, paying attention to people's social conditions, and last but not the least, considering security issues in the process of emergency supply distribution.

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