



PROMOTING COMMUNITY-BASED EARTHQUAKE RISK REDUCTION AND RESILIENCE ACTIVITIES IN IRAN

K. Amini Hosseini⁽¹⁾

⁽¹⁾ Associate Professor, International Institute of Earthquake Engineering and Seismology (IIEES), Tehran, Iran, kamini@iiees.ac.ir

Abstract

During recent years and especially after enacting the Sendai Framework for DRR, developing resilient communities to natural disasters has been considered in many countries including Iran. As results, variety of community-based activities for disaster risk management, such as promoting public awareness and participation in earthquake risk reduction programs from local to national levels have been prepared and implemented. In this paper, some of the activities carried out in Iran for this purpose is addressed and the results of pilot studies carried out in some parts of Tehran for involving local people in DRR activities is presented and the willingness of local residents to participate in such activities is discussed. In this regard, the necessary trainings have been presented to local communities and disaster maps at neighborhood levels have been prepared by the residents themselves. In addition, preparedness drills have been implemented in some places to assess the effects of trainings. The result shows that the presented trainings had different impacts on communities and the level of success is related to socio-economic and cultural characteristics of local residents. It is also found that novel ways need to be developed for changing the attitude of people to participate in such activities.

Keywords: Iran, Community, Risk Management, Drill



1. Introduction

Iran is considered as one of the most seismically active countries in the world and many destructive earthquakes occurred in the country during its history [1]. Therefore the country will undoubtedly experience large earthquakes in the future [2]. On the other hand, most of the buildings, infrastructures as well as urban fabrics in Iran are vulnerable to potential strong earthquakes. This may cause major damages and casualties in Iranian cities in case of occurrence of an earthquake, as evinced by the heavy loss of life and widespread destruction in the Manjil and Bam earthquakes of 1990 and 2003, respectively.

Considering the seismicity and vulnerability of the country and the limitations of local governments to respond to potential impacts of strong earthquakes, it is necessary to involve local residents in implementing risk reduction and disaster management activities. Mobilizing the communities and local residents in DRR plans is considered as a necessity in the last few years worldwide [3]. The local groups may play important roles in reducing seismic risks or improving the emergency response capacities, as they are the first who are affected by disasters [4]. In addition, applying buildings codes and standards, strengthening vulnerable buildings and renovating urban fabrics cannot be implemented successfully without cooperation and participation of the local residents. Furthermore, the emergency response in major disasters also cannot be implemented by governments without mobilizing the local people. For instance, after Kobe Earthquake (1995) in Japan, about 20.000 people were brought out alive among the debris, of whom, 15.000 were rescued by local people and neighbors, and only 5.000 by relief forces [5]. Similarly, in the 2003 Bam, Iran, Earthquake, the victims were mostly survived by their neighbors and relatives. However, in that case, it was ended in further injuries of survivors in some places, as the local people were not familiar with the proper methods of rescue and relief [6].

However, Involving local communities in such activities cannot be implemented easily in Iran due to top-down political structures [7], [8]. There are many socio-cultural as well as economic issues amongst local communities that may affect the public participation in earthquake risk mitigation and management and without considering these issues in DRR planning, any activities in this line may not lead to appropriate results. This shows the importance of conducting necessary researches on local conditions before planning and implementing DRR plans at community level. The results of one of these activities carried out in Tehran will be presented in the following sections.

2. Earthquake risk in Tehran

Tehran, the Capital of Iran, has been affected by many strong earthquakes throughout its history, the last one of which occurred in 1830 (Fig. 1). Despite the high seismicity, the city of Tehran has been significantly expanded during the last 50 years, especially in 1960th and 1970th. Vulnerability of urban fabrics, heavy traffic, insufficient emergency response facilities, low public awareness and preparedness, etc. are some issues in the city that may increase the potential destructive impacts of earthquakes in Tehran.

Besides physical characteristics, the social structure of Tehran Municipality is also very complex due to immigration of people with different socio-economic characteristics from other parts of the country. These days, people with various socio-cultural and economic backgrounds live together in the same districts, but in different communities. In some places, residents have modern life style and do not know their neighbors. In other places, people have strong bonds, live together for a long time and care about each other. In general, low income families and less educated people are likely to be more religious and traditional, and have relatively strong relationships within their family and groups. Mutual help can be seen in their daily life especially in the religious events and ceremonies [3]. This shows that a unique methodology cannot be recommended and implemented for risk reduction and disaster management to the whole existing communities in this city and for involving local residents in mitigating the earthquake risk and responding to its impacts, these local conditions should be taken into account.

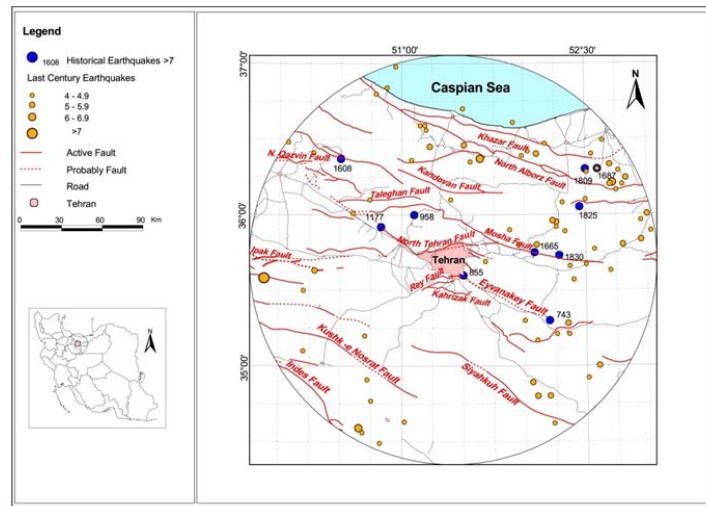


Fig. 1 – Active faults and epicenters of some historical earthquakes around Tehran [4]

One of the programs that is implemented in Tehran for developing public awareness and participation in earthquake risk mitigation and management according to the local conditions is the "Safe School- Resilient Communities" program. This program was implemented for the first time in 2015 in two districts of Tehran, along with the annual common national school “Earthquake and Safety” drill and will be extended to other districts and cities during the coming ten years. For the first time in the drill program, the communities living alongside the schools were also involved in the program. The aim was to raise awareness towards resilience in local communities to implement necessary activities in DRR at their living environment in cooperation with local authorities. In this plan, schools have been considered as DRR nodes for raising awareness of the local residents and involving communities in disaster risk reduction and management.

3. Community Preparedness Program

The program was implemented in Pasdaran-e-EngheLab High School and its surrounding neighborhood in South of Tehran into several steps. The first step was training people and local authorities about the details of the program. The concept of earthquakes and necessary measures to improve preparedness to confront the impacts of potential earthquakes were amongst the most important trainings provided to the local residents. In addition the necessary trainings about protecting themselves at the time of earthquake and providing necessary assistances to their community people were other trainings that were provided to the local citizens as well. The trainings were presented by relevant experts in assistance of school manager and other local CBO's including school societies, local religious groups, local councils, etc. (Fig. 2).



Fig. 2 – Training of local residents and authorities for organizing the community preparedness program

The next step was providing a series of instructions for measuring risk assessment index for each neighborhood based on local socio-cultural and economic conditions. The instructions were prepared to be used by local residents for survey and risk analysis of their own neighborhoods and vulnerability of the built environment at the community level. Then, these criteria have been applied for vulnerability check and identifying each neighborhood’s weaknesses and strengths from risk point of view. This step carried out by local residents, conducted by assigned specialists and risk managers (Fig. 3).



Fig. 3 – Site visit by local residents to evaluate the vulnerability of their neighborhoods and compiling the gathered information into diagnosis map

Risk maps were then prepared for each zone and have been printed and given to local residents as well (Fig. 4). Then some meetings were organized to share the information and discuss about the existing risks at the local environment to improve public awareness.

According to the program, safe schools are considered as centers for implementing local activities for earthquake risk reduction before occurrence of an earthquake and evacuation and emergency response aftermath and may act as local bases for storages of basic needs of residents for the first three days after the disaster. Therefore, it is necessary that the structure of the school has minimum requirements for resisting against strong ground motions and its non-structural elements should be retrofitted as well to not cause damages to local evacuees. In addition, it is essential to prepare and keep the necessary equipment for emergency response in such bases to be used at the time of crisis and after that. These procedures have been carried out based on the available technical and financial resources, some shown in Fig. 5 and 6.



Fig. 4 – Prepared risk map based on the local information



Fig. 5 – Using glass tapes on all windows to protect people from potential injuries



Fig. 6 – Procurement of container for storage of necessary emergency supply

In the next step, the local residents as well as school volunteers were trained for how to set camps in the school yard to be used for emergency shelters and conduct emergency activities, such as providing first aids, extinguishing fire, help each other, etc. (Fig. 7).



Fig. 7 – Practice for installation of tents in school yard

4. Preparedness Drill

After providing necessary trainings to the local residents and preparing necessary facilities for responding to potential earthquake, the procedure were practiced in National Day for Earthquake and Safety. For this purpose and at the time of the drill, the following steps were carried out:

- a) Earthquake Siren was broadcasted by national radio as well as school loudspeaker. This siren is normally used in Iranian earthquake drills as the sign for earthquake occurrence. This is the start of the drill and all students and local residents will start to protect themselves at the time of hearing the siren according to the trained procedure (Fig. 8).



Fig. 8 – Applying DCH method for self-protection during broadcasting earthquake siren

- b) After about 60 seconds, the students are evacuated to the school yard and stay in the previous indicated place. In addition the local residents are walking toward the school to be sheltered based on previous practiced plans.
- c) The volunteer groups amongst the students and local residents start to install the tents and provide necessary assistance to the injured people (Fig. 9). The relevant trainings have been presented to these groups in advance and each person knows their duties at the time of drill/crisis. For this purpose, volunteers have been classified into three groups of Green (for reconnaissance and preparing risk maps), Red (for providing rescue and relief as well as fire fighting) and White (for preparing evacuation site and providing necessary assistances to evacuees and potential injured persons).



Fig. 9 – Installation of tents and taking care of injured people

- d) The Residents from the local community arrive gradually to the school, being registered at the entrance. Necessary services to them will be provided thereafter including emergency food pack, water, etc.
- e) At the end of the drill, the results are evaluated and used to organize next drill more appropriately.



5. Conclusion

In this paper, some applicable methods to promote community based activities in reducing damages and casualties of earthquakes has been introduced and the results of implementing the proposed method in one neighborhood in Tehran, has been presented to evaluate the possibility of involving community members in earthquake risk reduction and disaster management activities. The results of this study showed that those participatory activities in which the plans are made by the local residents after training can be considered as a good measure for improving public preparedness.

Although at the first stage of the program, there was a belief that the local people could not change the current conditions, if the government is unable to do it as well, but after providing the relevant training and preparing disaster maps, the community found novel ways to improve their capabilities for reducing the impacts of potential earthquakes and responding to them properly. All participants, especially the younger generation, have had various ideas and flexible attitudes toward changing the present conditions and facing the challenge for disaster management. The findings also revealed that if there is a leader from the community and local government, the activities for disaster risk reduction can be possibly implemented successfully. The school teachers/managers can play this important role as they have very close relationship with community members and local authorities.

In case they are trained appropriately, teachers can supply the necessary information for local people and manage the activities for disaster management. However, implementation of risk reduction measures needs financial resources, more or less. If the economic condition of the community is stable, the activities can be accomplished well. Meanwhile, it is difficult for communities to allocate necessary funds by themselves and therefore, the government support is essential.

It was difficult to provide images of earthquakes to those children in pilot groups who had never experienced an earthquake. However, after providing the necessary explanations, many of them started to consider the disaster seriously and became worried especially about what will happen to their families and friends after the earthquake. Most of the children knew from learning in schools that they should go under the desks, chairs and other safe places in the time of an earthquake. They have learned about what to do in an earthquake and aftermath, but the disaster preparedness has not been taught to them before. Since students are eager to help the injured and other in need during an emergency, they might be able to assist effectively in immediate response, if they get trained and be organized in special groups.

After providing the necessary trainings and preparing required items for response, the drill was implemented successfully and the results show that this program can be implemented in a broader range in Iran and also other countries having similar conditions. It is also expected that after the performance of the program, the process of neighborhood preparedness and vulnerability reduction will be continued by the people and specialists with the help of the local people and neighborhood managers.

6. Acknowledgements

The main participants in the program were International Institute of Seismology and Earthquake Engineering (IIEES), Ministry of Education, National Disaster Management Organization (Ministry of Interior), Iran's Red Crescent Society and Islamic Republic of Iran Broadcasting (IRIB) and Tehran Disaster Mitigation and Management Organization (TDMMO) that their contributions in implementing the program are highly appreciated. In addition the supports of UNESCO and UNDP Tehran Offices in implementing the drill are acknowledged.

5. References

- [1] Hessami K, Jamali F, Tabasi H (2003): Major active faults of Iran and location of historical and recent earthquakes. International Institute of Earthquake Engineering and Seismology, Tehran, Iran.



- [2] Amini Hosseini K, Tasnimi AA, Ghayamghamian MR, Mohammadi M, Mansouri B (2009): Local disaster management assessment and implementation strategy. World Bank Project, 4697-IRN, International Institute of Earthquake Engineering and Seismology, Tehran, Iran.
- [3] Amini Hosseini K, Hosseini M, Izadkhah YO, Mansouri B, Shaw T (2014): Main challenges on community-based approaches in earthquake risk reduction: Case study of Tehran, Iran. *International Journal of Disaster Risk Reduction*, **8**, 114–124.
- [4] Amini Hosseini K, Jafari MK (2007): Development guidelines for disaster risk management in Tehran. *Proceedings of 5th International Conference of Seismology and Earthquake Engineering*, Tehran, Iran.
- [5] Hisada Y (2007): Community based activities. Presentation at Tehran Disaster Mitigation and Management Organization, Tehran, Iran.
- [6] Mirhashemi S, Ghanjal A, Moharamzad Y (2007): The 2003 Bam Earthquake: Overview of first aid and transport of victims. *Prehosp Disaster Med*, 22 (6) 513-516.
- [7] Pearce L (2003): Disaster Management and Community Planning, and Public Participation: How to Achieve Sustainable Hazard Mitigation. *Natural Hazards*, **28** (2-3), pp 211-228.
- [8] Allen KM (2006): Community-based disaster preparedness and climate adaptation: local capacity-building in the Philippines. *Disasters, Special Issue: Climate change and disasters*, **30** (1) 81–101.