

# Research Paper: Study of Households' Preparedness for Disasters and Emergencies in West Regions of Tehran Province, Iran



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## ABSTRACT

**Background:** Disasters and emergencies are always among the major challenges and problems facing societies. By proper education and preparedness promotion for households, the effects of disasters and emergencies can be reduced. This study was performed to provide disaster assessment and education guidelines in western regions of Tehran Province in 2018.

**Materials and Methods:** This was a cross-sectional study. For data collection, the "Disaster Assessment and Education Guidelines" provided by the Ministry of Health was used. The forms and checklists were compiled by experts of urban and rural health centers. Then, the level of household preparedness for disaster was evaluated.

**Results:** Based on the present study in 314 centers covered, 1726803 households were evaluated. In the northwest and west Tehran health centers, Shahryar, Malard, Qods, Robot Karim, and Baharestan and all of the regions, the levels of preparedness were estimated 34.9, 24.7, 31.3, 36.2, 21.9, 24.6, 12.3, and 26.9, respectively.

**Conclusion:** The city of Tehran is located on important faults and areas prone to floods. So Tehran is highly vulnerable to natural disasters. Because of the important role of the people and the community-based management of disasters, household readiness must be improved to reduce the burden of death, injuries, and other disastrous consequences.

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## 1. Introduction

Accidents and disasters have always been associated with human casualties and have had many adverse effects on human life, causing mortality, various diseases, and financial, psychological, and environmental damages [1]. An average number of 354 natural disasters are recorded each year in the Emergency Events Database, which causes the death of 68273 people and affects 210 million people on average annually, costing more than \$ 141 billion worth of damages [2]. Iran, because of its climatic and geographical location is vulnerable to catastrophic natural disasters in the world, and disaster risk management and reduction are among the challenges facing the country's health system. One of the most important steps in disaster risk reduction management in the field of health is the ability of the system in disaster assessment and education of the households.

Disaster risk management requires a regular process of applying executive, organizational, and other capacities to implement policies, strategies, and community adaptation capacity and increase community resilience to follow-up and reduce the adverse effects and consequences of disasters [3]. The program of "Disaster Assessment and Education" of the households is one of the most important programs of the Disaster Risk Management and Reduction Unit in the Deputy Minister of Health. According to the Ministry of Health, the average level of disaster preparedness of Iranian households is estimated to be 9.3%.

In 2016, Rakhshani et al. examined the level of preparedness, awareness, and vulnerability of households in Fars Province in case of an earthquake and showed that most households did not have sufficient preparedness and information to cope with an earthquake and had a relatively high vulnerability to potential earthquake hazards. Therefore, it seems necessary to maintain accurate information, to increase their level of awareness to deal with the dangers of earthquakes, and to reduce the damage [4].

The health system, as the main provider of maintaining and promoting the health of society, in recent years has paid special attention to prevention and preparedness against natural hazards, emphasizing the central role of the people. Evidence shows that health interventions through the capacity of the network system can increase household preparedness for disasters by up to 7 times in a few months [5]. Experience in the world shows that people have a very important role in managing disasters and accidents since the people of each neighborhood know their place of resi-

dence better than anyone else, and consequently, everyone knows their own home better than others.

Thus, people are the first to help family members and neighbors in the event of an accident if trained properly and can reduce the damage of accidents and disasters. Numerous studies around the world have emphasized the importance of preparing individuals and families to manage and reduce the consequences of disasters and accidents [6-8]. The report of the centers for disease control and prevention showed that focusing on increasing knowledge and improving household preparedness for disasters, improves and strengthens community behavior in response to disasters and reduces the effects and recovery after the accident [9].

The study of Jahangiri et al. to examine people's attitudes toward earthquake preparedness showed that the methods and tools of the local community can be very effective in managing and planning for earthquake preparedness [10].

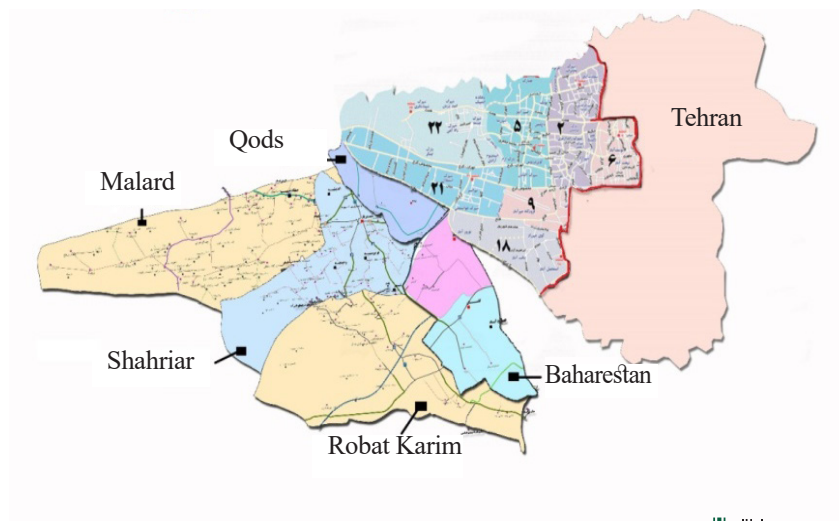
Annual disaster assessment and education of Iranian households is one of the important components of the integration program of disaster risk management in the health system. The basis of evaluation in this program is the household disaster preparedness index. The training of this program is based on three tools: drawing a participatory risk map at home, frequent questions and answers, and triple educational boards.

Iran University of Medical Sciences has the largest covered population among medical universities in the country. The special location of the covered areas on important fault lines and areas prone to floods has created a high level of vulnerability to hazards [11]. Because of the large population covered by the university, they must always be prepared for disasters. Therefore, the present study was conducted to assess the level of preparedness and education of households supported by Iran University of Medical Sciences against accidents and disasters in 2018.

## 2. Materials and Methods

The present study is a descriptive cross-sectional study in the western and northwestern regions of Tehran Province in 2018. The sampling method is random. The geographical location of the areas covered by the University of Medical Sciences is shown in Figure 1.

This research is done as a quantitative and qualitative evaluation. For data collection, the checklist in the disaster assessment and education of the households guide-



**Figure 1.** Areas covered by Iran University of Medical Sciences

lines prepared by the Risk Reduction and Disaster Management Unit of the Ministry of Health was used.

Relevant forms and checklists were completed by the experts of the Deputy of Minister of Health and sanitary and therapeutic centers. A score of 1 is given for each answer of “yes” and a score of 0 for each answer of “no,” and then the sum of the scores is calculated. Then, the amount of the coverage of the Disaster Assessment and Education of the households’ guideline in the sanitary and therapeutic centers and networks under the supervision of Iran University of Medical Sciences is calculated and evaluated by the following formulas:

Percentage of coverage of the household disaster assessment of the household readiness =  $100 \times \frac{\text{total number of households}}{\text{the number of assessed households}}$

Percentage of coverage of the household disaster assessment of the household readiness =  $100 \times \frac{\text{the number of trained households}}{\text{the number of trained households}}$

Disaster preparedness level of household =  $6.7 \times \frac{\text{total number of assessed households}}{\text{total disaster preparedness score}}$ .

Given that people usually prefer to be educated with pictures and play an active role in their learning process, three methods are used to educate the households: educational boards, frequent questions and answers (to ensure that family members have learned enough), and drawing a risk map (with the participation of all family members). This program is done annually and the education of the households is done gradually. In each household, the target group of the program is mothers and women. Assessment and training are based on the

assessment form and household education guidelines. Each year, first the assessment form is completed and then by inviting the families, the training is done in health centers. Then, the assessment form is placed in the household file. Monitoring and supervising each center and answering questions are the responsibility of the higher members of the centers. Training is provided only after evaluation. Assessment and training should be done in one session as much as possible.

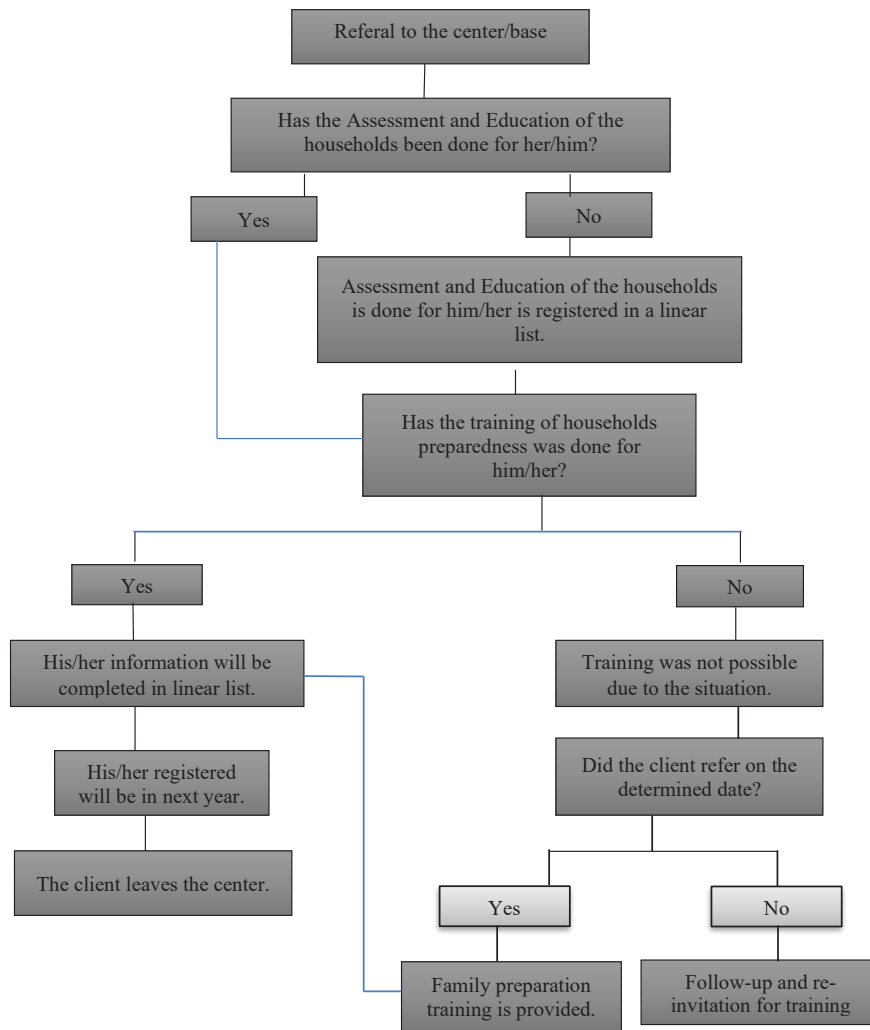
The assessment and training program is done in two ways:

1. Through the direct referral of the client to the center;
2. Following-up households by visiting home and assessing and inviting them to participate in training sessions (Figures 2 and 3). The household readiness assessment form for calculating scores is shown in Table 1.

### 3. Results

After collecting data and completing the required forms and checklists, the obtained information from all centers and in general was compared and evaluated. Sanitary and therapeutic centers under the support of Iran University of Medical Sciences include Northwest health center, Western health center, Shahriar sanitary and therapeutic network, Qods City, Robat Karim, Baharestan, and Malard. The total number of centers and bases covered is 314; the number of households is 1726803, and the covered population is 5102472 people.

Table 2 presents the level of household preparedness for disasters in different centers and the whole area covered. In Table 1, the total number of covered households is displayed based on sanitary and therapeutic networks



**Figure 2.** Flowchart of the program for disaster assessment and education of the households, in case of direct referral to the centers

and centers, as well as the number and percentage of trained households. According to the results, among all sanitary and therapeutic centers and networks, Mallard health center has the highest level of family preparedness for disasters.

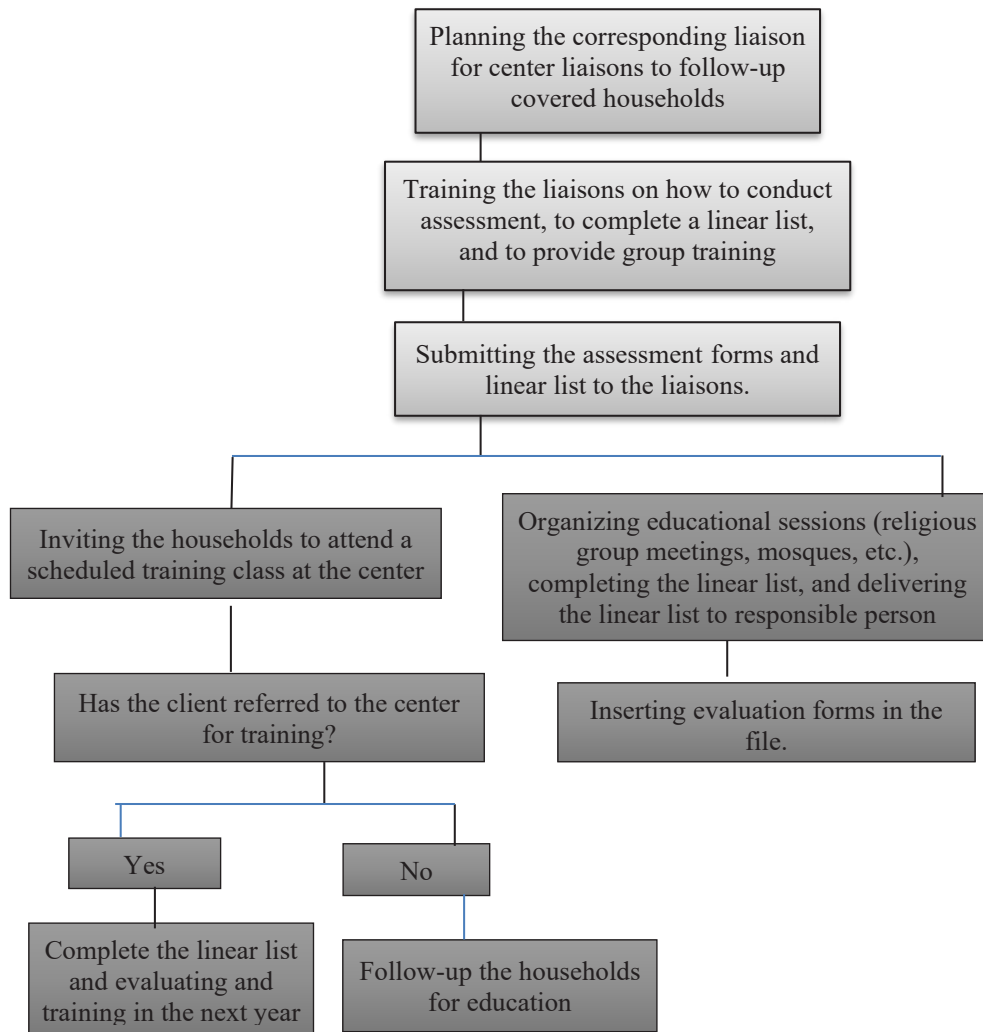
#### 4. Discussion

This study aimed to evaluate the level of preparedness of households in the West and Northwest of Tehran Province against disasters in 2018 based on the household preparedness index for disasters. People have an important role in managing and reducing the risk of disasters because they are familiar with their place of residence and home, and they can help family members and neighbors in the event of an accident earlier than others.

The special location of Tehran Province on important fault lines and areas prone to floods has created a high level of vulnerability to hazards. The western and northwestern regions of Tehran Province also are exposed to a variety of natural disasters, including floods and earthquakes.

The health system through urban and rural health centers has an important role in managing and reducing the adverse effects of disasters, with a community-based management approach. Family education and increasing the level of awareness of family members are the services that can play an effective role in reducing the effects of disasters and effective response to the accident.

According to the national estimates, the level of preparedness of Iranian households based on the index of



**Figure 3.** Flowchart of the program for disaster assessment and education of the households, in case the client does not go directly to the center

household preparedness for disasters has increased from 8 in 2013 to 9.3 in 2015. Based on the results of the present study, the level of household readiness in health centers in the northwest of Tehran Province, West of Tehran, Shahriar, Mallard, Qods City, Robat Karim, and Baharestan are respectively 34.9, 24.7, 31.3, 36.2, 21.9, 24.6, 12.3, and in total 26.9.

The highest level of household readiness belonged to Mallard and northwestern areas of Tehran Province, due to its urban context and development of these areas. The lowest level of readiness belonged to the cities around Tehran Province due to their major rural context, low literacy level, and low economic level. Despite the increase in the level of preparedness in recent years and due to the

threats and dangers in the country, especially in Tehran City, households still have a low level of readiness.

The study of Rakhshani et al. about the level of preparedness and vulnerability of families in Fars Province showed that most households, despite their very high vulnerability to earthquakes, lacked sufficient preparedness and information to deal with earthquakes [4]. Also in other countries of the world, numerous studies indicate that families are unprepared for disasters [12-14].

The study of Fung et al. in Hong Kong showed that despite the relative readiness of households with young children, the readiness of households to meet public needs in the aftermath of disasters is still insufficient [15].

**Table 1.** Disaster assessment and preparedness of the households

Center	Household Number	Date	Has Household Education Provided?	
			Yes	No
Row	Questions	Guidelines		
1	Has your family had a disaster planning session over the past year?	Disasters such as floods, earthquakes, droughts, storms, landslides, extreme cold or heat, fires, etc.		
2	Has your family drawn up a disaster risk plan?	-		
3	Has your home been assessed for earthquake resistance by an expert over the past year?	Includes walls, ceilings, columns, etc.		
4	If your home is not earthquake resistant, have you taken any action to strengthen it?	-		
5	Have you examined the vulnerability of non-structural factors in your area against earthquakes over the past year?	Including facilities (water, electricity, gas), home appliances and decoration, glass, etc.		
6	Have you taken an action to reduce the vulnerability of non-structural factors in your house over the past year?	-		
7	Is there a first aid kit in your home?	-		
8	Does your family have a communication plan for emergencies and disasters?	-		
9	Does your family have an evacuation plan for emergencies and disasters?	-		
10	Is there a special program in your family to help vulnerable groups in emergencies and disasters?	Includes women, children, the elderly, and the sick		
11	Are your family members aware of the initial warnings of important hazards in the area, such as floods, hurricanes, and so on?	-		
12	Are there any ready-made fire extinguishers in your home?	Ready means having at least one charged fire extinguisher that family members know how to use.		
13	Has at least one member of your household been trained in first aid over the past year?	-		
14	Does your family participate in disaster management programs in your neighborhood?	-		
15	Has your family practiced for emergencies and disasters in the past year?	-		

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Total points (give each “yes” answer 1 point and each “no” answer 0 points and add the points together)

Based on the results of the study of Jahangiri et al., the methods and tools of the local community can be very effective in managing and planning for earthquake preparedness. Earthquake resistance and a secure community require high-level cooperation between the broadcasting organization (IRIB), seismologists, and disaster preparedness specialists, as well as the local community [10]. To educate families, it is necessary to use the methods of educational boards, frequent questions and answers (to ensure the dominance of all family members), and drawing risk maps (with the participation of all family members).

Among the measures that should be taken by the households include holding a household planning ses-

sion against disasters to analyze the risks and necessary measures, drawing a house risk map, structural and non-structural hazard assessment, family emergency kit, a house evacuation program in an emergency, assistance program for vulnerable family members, components of a successful early warning system, fire extinguishing, first medical aid, and planning family maneuver.

Rakhshani et al. also emphasized the need for accurate information to the public, increasing the level of awareness to deal with the dangers of earthquakes and reducing the damages caused by them [4]. Saghafinia et al. showed that educational booklets could play an effective role against disasters for all people [8].



**Table 2.** The level of preparedness of households in the west and northwest of Tehran against accidents and disasters in 2018

Network / Center	Total Number of Households	Number of Trained Households	Households Trained (%)	Points Earned for Family Preparedness for Disasters	Degree of Household Preparedness for Disasters
North West	729860	51319	7	247288	34.9
West	304492	60115	19.7	221707	24.7
Shahriar	247302	51656	20.9	241500	31.3
Mallard	110247	15672	14.2	84784	36.2
Qods City	96195	26206	27.2	85667	21.9
Robat Karim	87499	23683	27.1	87026	24.6
Baharestan	151494	32384	21.4	59231	12.3
Sum of Total Areas Covered	1726803	261035	15.1	1047203	26.9

Ranan reported that the existence of a program to educate and increase the level of preparedness of women and children in the family can greatly impact on reducing the risk of disasters and appropriate response to accidents [16].

The study conducted by Muttarak et al. also reported that disaster-related education could play a key role in increasing preparedness and decreasing vulnerability against disasters [7].

A study by Pasca showed that educating and promoting the health of people in the community could be considered in the disaster risk reduction program and it could be presented in the form of modules, short courses, maneuvers, and written and visual media [17].

Considering the location of the western and northwestern regions of Tehran Province on the fault and the possibility of earthquake risk and on the other hand, considering that the most important cause of mortality in natural disasters in Iran is the destruction of non-resistant buildings, the health system must cope with it. A possible strategy in this regard is to increase the knowledge of households. The most important limitations of home remodeling are its high cost and insufficient engineering capacity in the region.

However, as households become more aware and their demands increase, this will become a necessity and the needed capacity building will gradually occur. In addition to the destruction of non-resistant buildings, non-structural factors are the causes of death and injury due to natural disasters in Iran [5]. Non-structural factors in a house include every component except the roof, wall, and columns. In other words, all household appliances,

decorative objects, glasses, doors, water, electricity, and gas facilities, etc. are components of non-structural factors. Any non-structural factor can result in death or injury in case of displacement, throwing, breaking, or blocking exit routes. Therefore, each household must identify and try to remove such obstacles of non-structural factors that may be displaced, broken, or block the exit route by an earthquake, for instance.

Solutions to reduce non-structural vulnerabilities include removing or displacing it, tightening to its place, reshaping the object, installing early warning systems, and repairing the facility [18, 19].

## 5. Conclusion

According to the study results, the level of readiness of households in the west and northwest of Tehran Province is not in a good condition, and despite all the efforts of sanitary and therapeutic centers and significant achievements and their undeniable potential, they need serious attention to education and increase community preparedness for disasters. Improving the level of household preparedness leads to increase resilience and adaptation of society to disasters. Measures of health centers and networks in household education, evaluation of training conducted from the level of awareness of individuals, attracting public participation to implement disaster risk-based health programs, and implementation of disaster risk reduction programs with a community-based approach play an important role in managing and reducing the risk of disasters.

Therefore, the need to improve this index at the national level, reduce the burden of death, injuries, and

other negative consequences of disasters for families, becomes more and more urgent.

## Ethical Considerations

### Compliance with ethical guidelines

All ethical principles were considered in this article.

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### Authors' contributions

All authors contributed equally in preparing all parts of the research.

### Conflict of interest

The authors declared no conflict of interest.

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