

DEVELOPING A NEW MODEL FOR ESTIMATING THE NUMBER OF THE INJURED AFTER POTENTIAL EARTHQUAKES FOR IRAN

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One of the main challenges for disaster management in Iran that needs to be addressed by research institutions is estimating the potential number of the injured after an earthquake. This is important for emergency response authorities as they should provide necessary services to the victims in the aftermath of an earthquake, and delay in providing such aids may increase mortality rate. However, up to now, few studies carried out to provide a model for such assessment, specifically in Iran.

In order to develop an appropriate empirical model for estimating the number of the injured after an earthquake, the first step is preparing a database to address the information of earthquakes occurred in Iran. However, this is a challenging issue, as precise data on this subject normally are not available or not well-documented. Therefore, in this study, the available information provided by different authorities or those reflected in reliable sources have been investigated and recorded in a database. For this purpose at first, the global catalogues like UTSU, NGDC, UNISDR have been evaluated, and the information of Iran's earthquakes has been extracted from them. These catalogues cover the recorded earthquakes from 1962 to 2019 in Iran. Then, the newspapers, scientific articles, national reports prepared by official organizations, reliable news reflected in media, etc. have been reviewed and necessary data were gathered through these sources. Data collected from these various sources has been compiled in a database that includes many fields, some shown in Table 1. In this table, a sample earthquake and its impacts on different settlements have been listed to be filled based on available data.

Table 1: Bandar Abbas, Hormozgan province, earthquake on March 7, 1975.

	Name of the City/Rural	City / Rural	Latitude	Longitude	UTSU Catalog		NGDC Catalog		UNISDR Catalog		Newspapers	
					Injured	Death	Injured	Death	Injured	Death	Injured	Death
1	Bandar Abbas	City	27.183222	56.266646								
2	Sarkhun	Rural	27.396208	56.418354								
3	Khargo	Rural	27.554392	56.445393								
4	Qadhar	Rural										
5	Nang	Rural	27.350543	56.443993								
6	Ghaleh Ghazi	Rural	27.453155	56.548299								
sum												

In order to find the location of each settlement affected by earthquakes, the old and existing maps as well as Google Earth were used. However, many names of villages have been changed during the time, and it caused further burden to the research to assign collected data to specific places. This is an important task, as it was supposed that the proposed model for estimating the number of the injured should be linked to its ground motion parameters (such as PGA). This is totally dependent to the distance of each point from the earthquake source.

By compiling the collected data into the database, it was seen that there is considerable incoherency between data provided by different resources. This was worse for data about big earthquakes, where the difference was more than 50%

in some cases (such as 1990 Manjil and 2003 Bam earthquakes). However, for small earthquakes or those affecting few numbers of villages and settlements, the situation was much better. In order to address this issue, the official data provided by the relevant authorities has been taken into account.

Finally, based on the prepared database of injuries and its relevant ground motion parameters, an empirical model can be developed to be used in estimating the risk and potential number of the injured in future earthquakes. This model can also be used in quick loss estimation systems as a local model for estimation number of casualties and to assess necessary needs in medical services aftermath of an earthquake.

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