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Letter to the Editor

Deaths Due to Fires in the Tent City Set Up After the 2011 Earthquake in Van, Turkey

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Dear the Editor,

Earthquake, flood, tsunami, landslide and avalanche falling are natural disasters causing numerous deaths. A large number of people in the world lose their lives as a result of disasters every year (Knight 1996). Human being is struggling with natural disasters through appropriate protection precautions. After the earthquake which is one of the most destructive natural disasters, until materialization of reconstruction, temporary housing environment has some risks like fire and infection when considered in scope of mortality (Igusa et al. 2012; Zhang et al. 2012). Besides, depression, postraumatic stres disorder and anxiety has been reported after earthquakes (Hyodo et al. 2010; Chan et al. 2012).

Van is a province located by Van Lake shore in Eastern Anatolia Region of Turkey, on Eastern Anatolia fault line, with a pre-earthquake population of 353,419 (Fig. 1) (http://www.haritadunyasi.com/il-haritalari/496-van-haritasi.html; http://www.haritadunyasi.com/turkiye-haritalari/214-yurdumuzdaki-fay-hatlari-haritasi.html). An earthquake, which lasted for 25 seconds, occurred in Van province of Turkey on October 23, 2011 at 13:41 with a magnitude of 7.2 on the Richter scale as measured by Kandilli Observatory and Earthquake Research Institute (KOERI). Tabanli county, which is 17 km away from Van city center, was the epicenter of the earthquake (Fig. 2) (KOERI). The human damage comprised 239 dead and 1,100 injured people, and a great number of houses and workplaces were destroyed. Financial loss is estimated to be approximately 100 billion dollars. Totally 15,351 houses were damaged to a degree

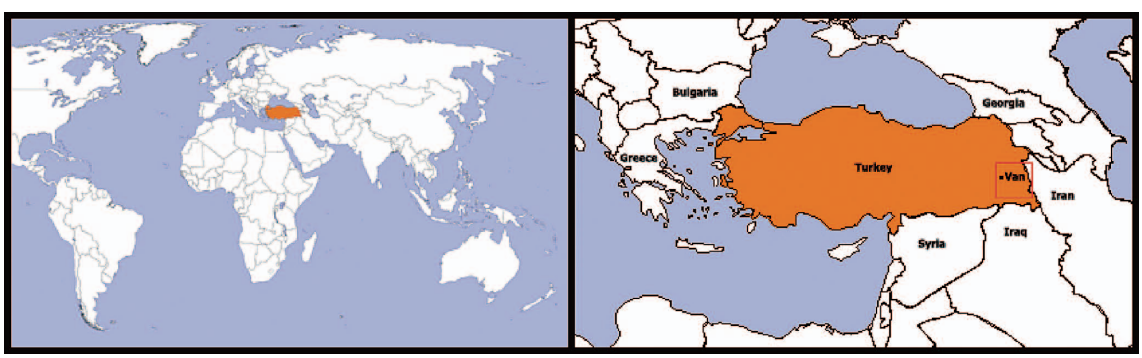

Fig. 1. The location of Van Province in Turkey.
Van Province located in eastern part of Turkey is shown in red square.

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*A part of the data (5 death cases) was presented as a poster presentation in the 22nd International Academy of Legal Medicine Congress held between the dates July 5-8, 2012.

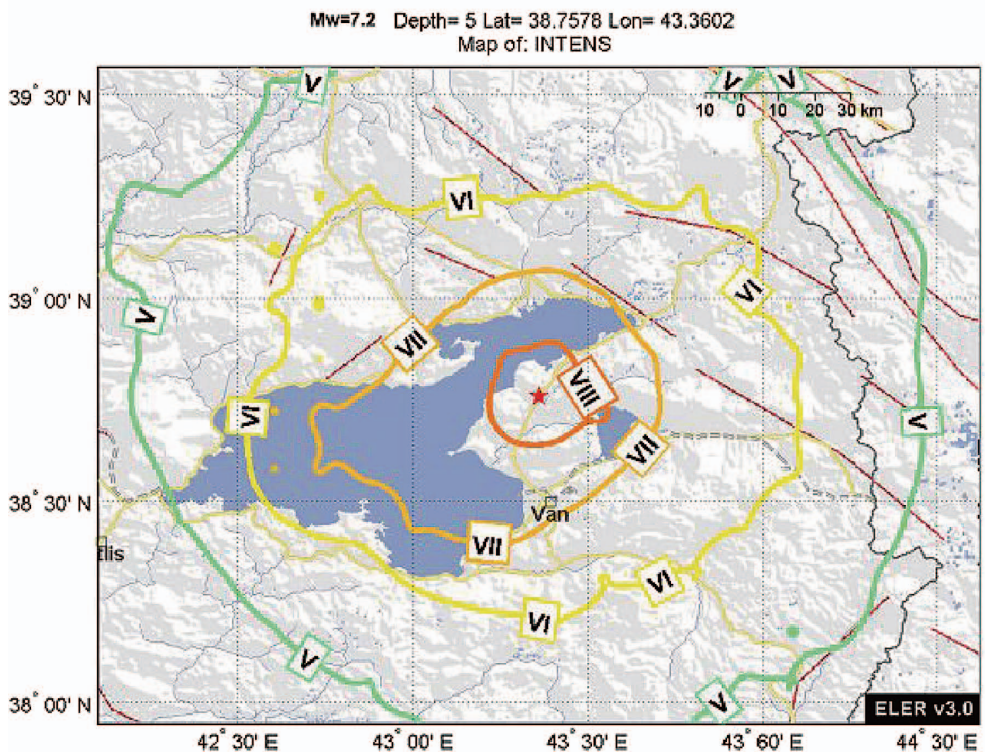

Fig. 2. The epicenter (★) and magnitudes of the Van earthquake. Roman numerals indicate magnitudes of earthquake.

Table 1. Features of 19 subjects injured and died in fire incidents.

Fires	Age	Gender	Origin of Fire	Last Situation
1st fire	8	F	Wood-Coal Burning Stove	Death
	11	M		Death
	3	M		Death
	7	F		Injury
	36	M		Injury
2nd fire	3	M	Wood-Coal Burning Stove	Death
	30	F		Injury
	83	F		Injury
	1	M		Injury
	5	F		Injury
	7	M		Injury
	7	F		Injury
3rd fire	1 Month	M	Wood-Coal Burning Stove	Death
4th fire	11	F	Wood-Coal Burning Stove	Death
	17	F		Death
	30	F		Death
5th fire	2	M	Wood-Coal Burning Stove	Death
	17	F		Injury
6th fire	13	M	Electric Stove	Death

F, Female; M, Male.

that made them uninhabitable. In that region, 9 temporary suburbs were built, consisting of 3,030 tents and containers for 19,130 individuals.

Even though the earthquake occurred in autumn, the settlement for the new permanent housing conditions could not be completed before the winter. In Van province, with continental climate, winter season is very cold and snowy. The mean temperature in January is −3.6°C with the minimum temperature going to −15°C. Thus, due to extremely cold weather, predominantly (about 90%) electric and to a lesser extent (10%) wood-coal burning stoves used necessarily for heating, led to the accidental fires and deaths in tents. A total of 10 deaths were reported as a result of 19 burn cases in 19 tent fire incidents of Van and its vicinity. Deaths and injuries occurred during 6 fire incidents between November 17, 2011 and February 20, 2012 (Table 1), whereas remaining 13 fire incidents between January 3, 2012 and May 1, 2012 resulted only in financial loss. All fire incidents were due to accidents without any crime-related cases. Among the 10 cases of death, 3 (30%) were females and 7 (70%) were males, whereas 6 (66.7%) of the injured individuals were females and 3 (33.3%) were males. The youngest subject of death was a 1-month-old male infant, while the oldest subject of death was a 30-year-old female, and the mean age was 10.88 years (S.D. = 8.79). The age range of the burn sujbjects without death was between 1 and 83 years, and the mean age was calculated as 21.44 (S.D. = 26). Thirteen of the 19 burn subjects were children (between 1 month and 17 years). All deaths occured in the scene of event with carbonized burn injuries on 51% and more of the body. In all of these cases, the cause of death was determined to be 'burn and burn-related complications' while origin was accident and the scene of the incident or at the same time the place of death was tents. Normally, families were living in fair-sized tents as up to 4 individuals. In two incidents (1st and 4th fires), 3 subjects of death in each incident occurred from the same family.

Most of the deaths caused by burns occur due to accidental fires related with heaters, electrical wiring or smoking in houses and work places. In flame related burns, various degrees of burns, from first-degree to carbonization, occur depending on the extent of the flame's contact with the body. The extent of a burn is estimated by the "Rules of Nine". The appearance of the burned skin may indicate the intensity of the heat stimulus. The depth of a burn is associated with duration and intensity of heat exposure. Acute myocardial insufficiency and cardiac arrest play an essential role in the sudden death of a burn patient. Secondary shock, concurrent infections, sepsis, anemia and hypoproteinemia are some of the life-threatening circumstances in burns. As a result of flame and hot smoke inhalation, pulmonary complications occur at an early stage (Knight 1996).

The causes of death are reported after determining the burned area of the body and the inhalation of fume and smoke during the postmortem examination. The term, carbon monoxide (CO) intoxication, should only be used in deaths associated with smoke inhalation, not for burned individuals. In the scene investigation, half-burned pieces of goods should be gathered, and if the material is too large to carry, it should be swapped with an acetone-infused cotton ball (Knight 1996; Fisher 2004).

The presented subjects lost their lives in an accidental fire, while they had been trying to warm up in a small crowded tent following an earthquake. Individuals' surviving an earthquake but dying from a fire outbreak in an earthquake tent is a terribly sad situation. It is thought that tent is not a proper choice of shelter in cold weather and is risky for the human health and safety. On the other hand, it is obvious that tent is not a proper choice of shelter also in extremely hot weather.

Although the earthquake is a natural disaster, which can cause a wide range of deaths and destruction, temporary housing after an earthquake has also risks including even the possibility of death. The stoves and electrical equipment in the tents can be hazardous and children are the most vulnerable group in these incidents, since they cannot protect themselves. After natural disasters, even if tents are used for a very short period of time, housing conditions having less risk for fire, i.e. prefabricated houses, should be supplied as soon as possible until the building of permanent houses.

Conflict of Interest

The authors declare no conflict of interest.

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