

# Injuries Associated with Landmines and Unexploded Ordnances in Iran

AR Soroush<sup>1</sup>, F Flahati<sup>2\*</sup>, M Zargar<sup>1</sup>, MR Soroush<sup>2</sup>, H Araghizadeh<sup>3</sup>, Sh Khateri<sup>2</sup>, A Khaji<sup>1</sup>

<sup>1</sup>Trauma and Surgery Research Center, <sup>2</sup>Janbazan Medical and Engineering Research Center, <sup>3</sup>Department of Anesthesiology, Baqiatollah University of Medical Sciences, Tehran, Iran

## Abstract

**Background:** Although in the last few years there has been increasing awareness of the problem of landmines, there are still an increasing number of people especially children, killed and injured by landmine every week in the world including Iran which is estimated to have the second rank for landmine injuries. Eighteen years after cessation of Iraq-Iran war, the provinces located near the west border of Iran still suffer from the burden of vast areas highly infested with Landmines. This study aims to gather more information on the particulars of mine associated incidents and victims.

**Methods:** This is a retrospective study of people with documented deaths or injuries due to landmine and/or unexploded ordnances (UXO) explosions, as documented in their medical files between Jul 1988 (after cease-fire) and Feb 2003.

**Results:** 3713 victims from 3 main organizations in charge of providing health care services for them were included in this study. Of these, 3461 (93.2%) were male, and 252 (6.8%) were female. Most of the victims were civilians and the majority of them (40.4%) had one or more amputations. Most of the patients were injured in the period between 1994 and 1998. The majority of them were young, and 41.8% were children.

**Conclusion:** The occurrence of death and injuries due to landmine in Iran is regrettably high; this places a significant burden on the health care system, rendering increased commitment of the government a must. Collecting data on accident particulars and landmine victims can provide meaningful information on the risk factors.

**Keywords:** Landmine; Iran; Iraq; War; Epidemiology

## Introduction

Landmines have long been used in conventional warfare; they are an example of weapons that cause more injury than is necessary to disable a soldier. They are designed primarily to maim although they can also kill.<sup>1</sup> No matter if the injury or death is the intended goal-not an unintended side effect- landmine represents a somewhat unusual environmental health problem<sup>2</sup> not only because of the death and disability they cause, but also because they render large areas of land

unusable and prevent the whole communities from accessing essential commodities.<sup>2</sup> According to the International Committee of the Red Cross, 110 million mines are buried and/or stockpiled on every continent<sup>3</sup> and an estimated 26000 persons, mostly civilians, are killed or injured annually by landmines and unexploded ordnance (UXO).<sup>4</sup>

Despite an international effort to ban the production and use of Mines/ UXOs, they are a public health problem in the current and former war zone areas of the world. Two to five million more of them are placed each year, and they inflict an estimated 1200 injuries and 800 deaths each week.<sup>5</sup>

Approximately, 80 percent of these casualties are civilians.<sup>6</sup> However, the actual figures may be higher, given that many incidents occur in remote areas without

\*Correspondence: Farahnaz Falahati, MD, Janbazan Medical and Engineering Research Center, Janbazan Organization, PO Box: 19615/616, Tehran, Iran. Tel: +98-912-3025648, Fax: +98-21-23992094, e-mail: [f.falahati@gmail.com](mailto:f.falahati@gmail.com)  
Received: January 5, 2010 Accepted: May 10, 2010

medical facilities to document them. Although land mines are laid by armies, their victims generally live in rural communities.<sup>7</sup> Mines/ UXOs are endemic in many countries; yet, comprehensive information is not being collected from the health facilities where victims are present. Similarly, few community surveys have been conducted to better understand the impact of mines/UXOs on people's lives.

Three main patterns of injury were found in a study by International Committee of the Red Cross in 1991: traumatic amputation of the lower extremity, multiple fragment wounds and injury to the hand and face.<sup>8</sup>

Children are more likely to die from landmine injuries than adults, because their smaller size means that their vital organs are closer to the blast of detonating mine.<sup>8,9</sup>

Landmine injuries tend to be severe; in the early ICRC study 2.5 % of the victims died in the hospital.<sup>10</sup>

Among all survivors of landmines, massive blood loss is common, and is responsible for many outpatient deaths.<sup>11</sup> Children are also less able to survive substantial blood loss than adults. It is estimated that 50 percent of victims die within hours of the blast, many of them never reaching medical care that are just hours away.<sup>12,13</sup> Overwhelmingly, the victims of landmines and unexploded ordnance come from areas and countries where access to basic medical care is limited.<sup>13</sup>

Epidemiological surveys are essential for proper quantification of the public health consequences. The results of such studies will facilitate the allocation of resources and aid in evaluating the impact of interventions.<sup>14</sup> The Iraq-Iran war of the 80s left millions landmine and also UXO in the western provinces of Iran. It is estimated that near 16 million mines infested 4000 hectares of the land in 5 provinces of Iran.<sup>15</sup>

### Materials and Methods

The study population consisted of people who were injured or died during 1988 -2003 in western and south western provinces of Iran, namely west Azerbaijan, Kerman shah, Khuzestan, Ilam, and Kurdistan. (Figure 1) A total of 3713 individuals have been injured or maimed by landmines after ceasefire in 1988. The subjects were all civilians of these provinces and had been injured by landmine their landmine accident were certified by the local authorities.



Fig. 1: Map showing area including 5 Landmine infested provinces of Iran

The hospital records of all the patients were reviewed with a focus on the following perspectives: demographic data, incidental data, pre-hospital care data, and type of injuries and outcome of hospitalization. We completed a standardized questionnaire for 3713 persons. All the questionnaires were completed by trained physicians.

From this questionnaire, we retrieved data on determinants of landmine or UXO injuries for all the victims of landmines during the period between 1988 and 2003. The retrieved data were broadly under the categories of demographic data, literacy, social background of the victims, date and time of incident, type of activity at the time of the injury and outcome of the incident. The data on all of the determinants were used as such except one relating to activity at the time of incident. The files were requested from 3 main or-

ganizations responsible for taking care of these victims as well as the provincial governor.

Only patients with true landmine or UXO injury as certified by provincial governor were included in this study. An International Classification of Disease-10(ICD-10) was used as a scaling system to characterize the scale of injury in all the victims.

SPSS Version 11 (SPSS Inc, Chicago, IL, USA) for Windows was used for the analysis of data. Pearson  $\chi^2$  test was used for categorical data, *t* test for continuous variables, and Wilcoxon nonparametric test for continuous variables with a non-normal distribution. The value of *p* <0.05 was considered as statistically significant.

**Results**

From 20th August 1988 to 20<sup>th</sup> March 2003, a total of 3713 persons in Iran were reported to be injured or killed by landmines and UXOs. The majority of the incidents (34.3%) happened in the province of Kermanshah, of the rest 23.9% (889 persons) happened in Kurdistan, 16.1% (596 persons) in Ilam, 13.3%(494 persons) in west Azerbaijan ,12/1%(451 persons) in Khuzestan and 0.3% (10 persons) in the border of Iran-Iraq. 93.2 %of the victims were male and 6.8% of them were female, which correlates with other studies.

41.8 percent of the subjects at the time of the incidence were less than 18 years old and 6.5 percent of them were over 50 years old at the time of explosion. The majority of the victims were young. (Table 1) Among 3662 persons who had documents about the reason for their presence at the site of the incident, 10.28 percent were affiliated to the army at the time of the incident (soldiers, militias and also military personnel) and 88.82 percent were civilians. Investigation of the activity at the time of exposure revealed that 28.4% of the incidents occurred while they were grazing livestock, 6.7% while farming, 1.6% during demining activity and 10.6%while smuggling. In terms of literacy, most of the subjects (38.3%) were illiterate and only 5.6 percent of them had high school diploma.

Most of the accidents (42.5%) occurred between 12 and 6 PM while only 1.3 % of them occurred between 12 to 6 AM. The duration between the onset of the accident and admission was also evaluated. (Table 1) 18% of the accidents took place in rural areas in the vicinity of the victims’ residence, roads and farms, mainly in western cities of the province. The rest of the incidents happened in deserts or mountains. Among 1427 persons who had documents about pre-hospital care, only 7.8 percent did actually receive care.

The most common outcome of the incidents was amputation with a frequency of 40.3 percent amongst all of the victims. 1.5 percent recovered without late complications, 37.7% died because of the severity of their injuries (or malpractice), and 5.7% sustained some kind of permanent disability. Traumatic amputation at the level between the knee and ankle as defined by the ICD10 classification, with a prevalence of 20.48% of all non-fatal conditions, was significantly more common than other types of injury(*p*<0.05). The prevalence of eye injury in all non-fatal injuries was 15.94 percent. The vast majority of the victims were young at the time of the study. (Table 1)

**Discussion**

This study showed the burden of landmine associated injuries in Iran as almost 80 percent of the victims either died or sustained a major permanent disability including limb amputation and/or Enucleation. Everyday, farmers, nomads and shepherds live their daily lives under the threat of landmines in mine-infested provinces of Iran.

Victims with limb amputation comprise a large portion of landmine survivors in Iran, 4 out of 5 of whom are civilians, in need of rehabilitation in all respects (physical, social, mental, etc).

The scale of this problem in some provinces like Kermanshah merits robust measure for improving awareness and prevention of such accidents amongst the target population which is revealed to have a very low rate of literacy as over 1/3 of them are illiterate.

**Table 1:** Mean and Standard deviation of age of accidents and current age and admission characteristics

	Minimum	Maximum	Mean	SD
Age of accidents (years)	2.0	98.0	24.2	14.7
Age till 2003 (years)	5.0	109.0	32.3	14.5
Duration of accident and admission (hours: minutes)	0:15	24:00	3:49	3:18
Duration of admission (day)	1.0	96.0	11.5	9.8

Lack of pre hospital care in victims of landmine may be an underlying cause for the high rate of mortalities and morbidities, rendering this problem an important issue to address.

There were several limitations in this study. Firstly, the overall number of casualties may have been underestimated due to the low availability of medical files especially for smugglers, bootleggers and trespassers. Poor filing meant that in many cases the cause of death did not differentiate between UXO and landmine accidents. Furthermore, many of the victims were not normally based in the province; they include some of the military personnel, people involved in de-mining activity, or the pilgrims of the

Iraqi religious sites,

Despite all the limitation, it is believed that this study could serve as a gateway for a global plan for increasing the level of protection and awareness. This can also be a model for follow up and rehabilitation programmes of landmines survivors in Iran.

### Acknowledgements

I wish to thank Dr Amirali Salamat for his valuable work and assistance for preparing this manuscript

**Conflict of interest:** None declared.

### References

- 1 Peel M. The occupational health of de-miners of Afghanistan. *J R Soc Med* 1995;**88**:683-5. [8786589]
- 2 Newman RD, Mercer MA. Environmental health consequences of land mines. *Int J Occup Environ Health* 2000;**6**:243-8. [10926729]
- 3 Giannou C. Antipersonnel landmines: facts, fictions, and priorities. *BMJ* 1997;**315**:1453-4. [9418100]
- 4 Coupland RM. Assistance for victims of anti-personnel mines: needs constraints and strategy. Geneva: International Committee of the Red Cross; 1997: p. 1-30.
- 5 Centers for Disease Control and Prevention (CDC). Landmine-related injuries, 1993-1996. *MMWR Morb Mortal Wkly Rep* 1997;**46**:724-6. [9262073]
- 6 Meddings DR, O'Connor SM. Circumstances around weapon injury in Cambodia after departure of a peacekeeping force: prospective cohort study. *BMJ* 1999;**319**:412-5. [10445922]
- 7 Jahunlu HR, Husum H, Wisborg T. Mortality in land-mine accidents in Iran. *Prehosp Disaster Med* 2002;**17**:107-9. [12500735]
- 8 Coupland RM, Korver A. Injuries from antipersonnel mines: the experience of the International Committee of the Red Cross. *BMJ* 1991;**303**:1509-12. [1838290] [doi: 10.1136/bmj.303.6816.1509]
- 9 Cobey JC, Raymond NA. Antipersonnel land mines: a vector for human suffering. *Ann Intern Med* 2001;**134**:421-2. [11242503]
- 10 Stover E, Keller AS, Cobey J, Sopheap S. The medical and social consequences of land mines in Cambodia. *JAMA* 1994;**272**:331-6. [8028149] [doi:10.1001/jama.272.5.331]
- 11 Andersson N, da Sousa CP, Paredes S. Social cost of land mines in four countries: Afghanistan, Bosnia, Cambodia, and Mozambique. *BMJ* 1995;**311**:718-21. [7549685]
- 12 The Arm Project of Human rights Watch/Physicians for Human Rights. Landmines: A deadly Legacy. New York: human Rights Watch, 1993.
- 13 Walsh NE, Walsh WS. Rehabilitation of landmine victims--the ultimate challenge. *Bull World Health Organ* 2003;**81**:665-70. [14710508]
- 14 Cobey J, Ayotte B. Tools to measure landmine incidents and injuries. *Lancet* 2000;**355**:1549-50. [10801190]
- 15 Landmine Monitor Report 2005: Toward a Mine-Free World, by International Campaign to Ban Landmines, publ. by Mines Action Canada, Ottawa, 2005. The complete report can be found online at <http://www.icbl.org/>.