

# Injury Induced Mortality in Iran from 2006 to 2010

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Received 5 September 2015; accepted 15 November 2015; published 18 November 2015

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## Abstract

**Introduction:** To adequately measure population health, a health information system is essential. The main rationale for collecting routine data on population health is to provide information and evidence for designing and assessing health programs and to ensure that their objectives are being met. Accidents are one of the most predictable issues that constitute a major social and economic burden amongst communities, particularly in developing countries such as Iran. **Methods:** Among the available data provided by health information system, data on mortality are commonly used not only as health indicators but also as socioeconomic development indices. In Iran, two organizations, the National Organization for Civil Registration (NOCR) and the Ministry of Health and Medical Education (MOH&ME) currently operate death registration systems. In this research, a cross-section of accident-cause of mortality data from the Ministry of Health and Medical Education in the year 2004 to 2010 was employed. **Results:** The highest rate of injury caused deaths was due to road traffic accidents in all these years and in both sexes. Traffic accidents were first in the ranking of unintentional accidents, the next ranking were burns, sudden intoxication with drugs and toxicants and fall in order. The proportion of deaths due to accidents in relation to the total number of deaths due to unintentional injuries was 69.9 in 2006, 66.3 in 2007, 66.3 in 2008, 68.2 in 2009 and 65.5 in 2010. **Discussion:** From 2006 to 2010, two thirds of injury-caused deaths were related to transport accidents. Although no significant changes are observable in 5 years, we can observe a gradual decrease in death. **Conclusion:** As we can see in this research, the first rank in injuries is related to road traffic accidents. This should be as a priority for various organizations and policy makers should find an appropriate and logical solution to resolve this problem.

## Keywords

Mortality, Iran, From 2006 to 2010

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## 1. Introduction

To adequately measure population health, a health information system is essential [1]. The main rationale for collecting routine data on population health is to provide information and evidence for designing and assessing health programs and to ensure that their objectives are being met [2] [3]. Such data might also be used to generate or support observations about population health transition [2]. Among the available data generated by health information systems, data on mortality are the most commonly used, not only as indicators of health development, but also as broader measures of socioeconomic development. Most, if not all countries possess legislation for vital registration systems to collect mortality data to generate various summary measures of population health.

The cause of death data have been used as a tool for monitoring health promotion in the community and for determining health priorities for several years [1]. Injuries and accidents are one of the most predictable issues that constitute a major social and economic burden amongst communities, particularly in developing countries such as Iran [2]. More specifically however to Iran, only second to cardiovascular diseases, a major cause of death is related to injuries and poisoning. A study from 1979 to 2001 demonstrated that injuries have been the second cause of death in Iran following cardiovascular diseases. Between 1979 and 1986, death due to injuries has increased from 16.9 percent to 19.9 percent. There are many factors involved which may have contributed to this sudden rise, but more outstandingly is the war between Iran and Iraq. After war the death due to injuries decreased and then increased from 1997 to 1999. The reason for this increase in this period can be attributed to industrialization and increasing cars that are a strong factor for increasing deaths due to injuries. It seems that as the cause of death due to some injuries is not registered; the estimated number of death is less than the real one [1]. It is estimated that death caused by cancer, cardiovascular diseases and accidents will be 56 percent from 67 million deaths till 2030 [3]. In this research paper, accident-caused mortality was investigated between the time periods 2006 to 2010.

## 2. Methods

Among the available data provided by health information systems, data on mortality are commonly used not only as health indicators but also as socioeconomic development indices, health workers at each health facility are responsible for identifying deaths among the population. In this research, a cross-section of accident-cause of mortality in the year 2006 to 2010 was employed. Unintentional accidents were classified in 13 groups and 95 subgroups, while age groups were then classified in 6 groups.

Based on data flow of death registration systems in Iran, two organizations are producing data on mortality. The National Organization for Civil Registration (NOCR) is responsible for registration of birth, marriage, divorce and death. Based on this institutional mandate, the organization usually reports these four vital events. However, studies shows that data on mortality have not enough quality particularly information on causes of death. Hence, ministry of health and medical education (deputy for public health) lunched a system to report the causes of death by obtaining information from various sources at district level such as: NOCR, health houses, health centers and cemetery. Based on this system data on causes of death are collected and classified in detail ICD code.

In order to record the data in duplicate, variable control data is recorded with other data, inconsistent codes of group and age in years were amended.

The data are not full of information such as age and sex evaluated and the fact that these variables are important to analysis the empty cases identified and analysis by using redistribution was amended that was based on Global Burden of Disease study methods [4].

As one of the most important steps in data analysis of the injury cause of death, it is to evaluate the quality of information. For this purpose, unlikely causes of injury and also ill-defined and garbage codes were reviewed and modified. In this study, population data by age and sex were obtained from Statistical Center of Iran (SCI) to calculate cause-specific-mortality rates from accidents. Accidents were categorized in 13 main groups and mortality rates were compared by age, sex and year.

## 3. Results

As shown in **Table 1** and **Table 2**, the highest rate and number of injury caused deaths was due to vehicle and traffic accidents in all these years and in both sexes. The vehicle and traffic accidents caused death rate (number)

**Table 1.** Mortality rate (per 100,000) due to injuries by sex in all ages, Iran, 2006-2010.

Unintentional Events	2006		2007		2008		2009		2010	
	F	M	F	M	F	M	F	M	F	M
Vehicle and traffic injuries	17.992	74.352	15.317	61.899	14.777	57.861	14.915	58.533	13.913	56.365
Falls	1.215	4.121	1.270	4.286	1.253	4.228	1.193	3.993	1.146	4.408
Exposure to inanimate mechanical forces	0.798	3.515	1.037	4.366	0.996	4.643	0.917	3.825	0.920	4.102
Exposure to animate mechanical forces	0.049	0.106	0.045	0.088	0.040	0.062	0.047	0.086	0.031	0.104
Drowning	0.683	3.153	0.816	3.553	0.547	2.915	0.514	2.862	0.633	3.132
Suffocation	0.582	1.020	0.588	1.086	0.579	0.880	0.426	0.861	0.472	0.967
Exposure to electrical current or radiation	0.259	1.769	0.358	1.613	0.298	1.639	0.300	1.800	0.315	1.882
Fire/flames/hot objects	4.013	3.848	4.122	3.462	4.019	3.523	3.159	2.901	3.015	3.206
Contact with venomous snakes and lizards	0.214	0.249	0.261	0.265	0.193	0.286	0.240	0.235	0.177	0.234
Nature/environmental	0.146	0.374	0.136	0.563	0.102	0.294	0.064	0.318	0.072	0.268
Unintentional poisoning	1.533	5.535	1.662	4.599	1.446	4.322	1.278	3.896	1.427	4.346
Deprivation or overexertion	0.028	0.094	0.009	0.024	0.009	0.061	0.024	0.096	0.032	0.101
Unintentional Complications of medical and surgical care	1.830	4.673	1.476	3.635	1.255	3.335	1.482	3.719	1.803	4.123
Total	351.070	523.756	355.971	516.767	349.360	498.187	338.325	496.629	345.750	501.236

**Table 2.** Number of deaths due to injuries by sex in all ages, Iran, 2006-2010.

Unintentional Events	2006		2007		2008		2009		2010	
	F	M	F	M	F	M	F	M	F	M
Vehicle and traffic injuries	5057	21,536	4009	16,641	3916	15,728	4008	16,111	3795	15,730
Falls	341	1194	332	1152	332	1149	321	1099	313	1230
Exposure to inanimate mechanical forces	224	1018	272	1174	264	1262	246	1053	251	1145
Exposure to animate mechanical forces	14	31	12	24	11	17	13	24	8	29
Drowning	192	913	214	955	145	792	138	778	173	874
Suffocation	164	295	154	292	153	239	114	237	129	270
Exposure to electrical current or radiation	73	512	94	434	79	446	81	496	86	525
Fire/flames/hot objects	1128	1115	1079	931	1065	958	849	798	822	895
Contact with venomous snakes and lizards	60	72	68	71	51	78	64	65	48	65
Nature/environmental	41	108	36	151	27	80	17	88	20	75
Unintentional poisoning	431	1603	435	1236	383	1175	343	1072	389	1213
Deprivation or overexertion	8	27	2	6	2	17	7	27	9	28
Unintentional Complications of medical and surgical care	514	1354	386	977	333	907	398	1024	492	1151
Total	98,680	151,707	93,173	138,926	92,591	135,418	90,909	136,692	94,301	139,881

in men from 2006 to 2010 was 74.352 (21,536), 61.899 (16,641), 57.861 (15,728), 58.533 (16,111) and 56.365 (15,730) per 100,000 people respectively. Vehicle and traffic accidents caused death rate (number) in women from 2006 to 2010 was 17.992 (5057), 15.317 (4009), 14.777 (3916), 14.915 (4008) and 13.913 (3795) per 100,000 people respectively. Hence, the proportion of death due to vehicle and traffic accidents compare to other injury related causes are higher and also in men are higher than women.

The second injury cause of death in women was due to burn over these years. The second injury cause of death in men was due to sudden intoxication with drugs in 2006 and 2007 but in 2009 and 2010 was due to fall and in 2008 was due to mechanical forces. The least injury caused death in these years was due to Deprivation or overexertion in both sexes but in 2010 in women and 2009 in men the least injury caused death was due to exposure to animate mechanical forces.

The proportion of deaths due to accidents out of total number of deaths due to unintentional injuries was 69.9% in 2006, 66.3% in 2007, 66.3% in 2008, 68.2 in 2009 and 65.5% in 2010. As shown in **Table 3**, the highest proportion of deaths due to accidents was in 2006.

As shown in **Table 4**, we can see the comparison of number of deaths caused by accidents in five year age groups. The highest number is in age group 15 - 49 years with 17,421 in 2006, 13,313 in 2007, 12,608 in 2008, 12,766 in 2009 and 12,380 in 2010. The least number is in age group under 1 with 185 in 2006, 168 in 2007, 184 in 2008, 160 in 2009 and 176 in 2010. **Table 5** shows the comparison of percent of deaths caused by accidents in five year age groups. The highest rate is in age group 50 - 69 with 75.2 percent in 2006, 71.2 percent in 2007, 72.3 percent in 2008, 74.1 percent in 2009 and 70.9 percent in 2010 and least rate in age group under 1 with 33.5 percent in 2006, 35.5 percent in 2007, 39.1 in 2008, 36.9 in 2009 and 39.9 percent in 2010.

Different Causes of Unintentional death in years 2006, 2007, 2008, 2009 and 2010 respectively and vehicle and traffic accidents deaths have the highest proportion in both sexes as shown in **Figures 1-5**.

**Table 3.** Number and Percentage of deaths due to traffic accidents, Iran, 2006-2010.

Years	Number of deaths due to unintentional injuries	Number of deaths due to traffic accidents	Percentage of deaths due to traffic accidents
2006	38,027	26,593	69.9
2007	31,137	20,650	66.3
2008	29,609	19,644	66.3
2009	29,479	20,118	68.2
2010	29,764	19,525	65.5

**Table 4.** Number of deaths due to traffic accidents by age groups, Iran, 2006-2010.

Years	Under 1		1 - 4		5 - 14		15 - 49		50 - 69		Up to 70	
	Total	Traffic accidents	Total	Traffic accidents	Total	Traffic accidents	Total	Traffic accidents	Total	Traffic accidents	Total	Traffic accidents
2006	552	185	1313	676	2266	1559	24,138	17,421	5566	4189	4193	2563
2007	473	168	1240	619	1984	1248	19,388	13,313	4487	3195	3565	2006
2008	470	184	1165	567	1647	1056	18,485	12,608	4364	3156	3478	2074
2009	433	160	1119	603	1663	1077	18,118	12,766	4614	3418	3532	2094
2010	441	176	1241	635	1664	1084	18,219	12,380	4735	3357	3464	1894

**Table 5.** Percentage of deaths due to traffic accidents by age groups, Iran, 2006-2010.

Years	Under 1	1 - 4	5 - 14	15 - 49	50 - 69	Up to 70
2006	33.5	51.4	68.7	72.1	75.2	61.1
2007	35.5	49.9	62.9	69.1	71.2	56.2
2008	39.1	48.6	64.1	68.2	72.3	59.6
2009	36.9	53.8	64.7	70.4	74.1	59.3
2010	39.9	51.2	65.1	67.9	70.9	54.6

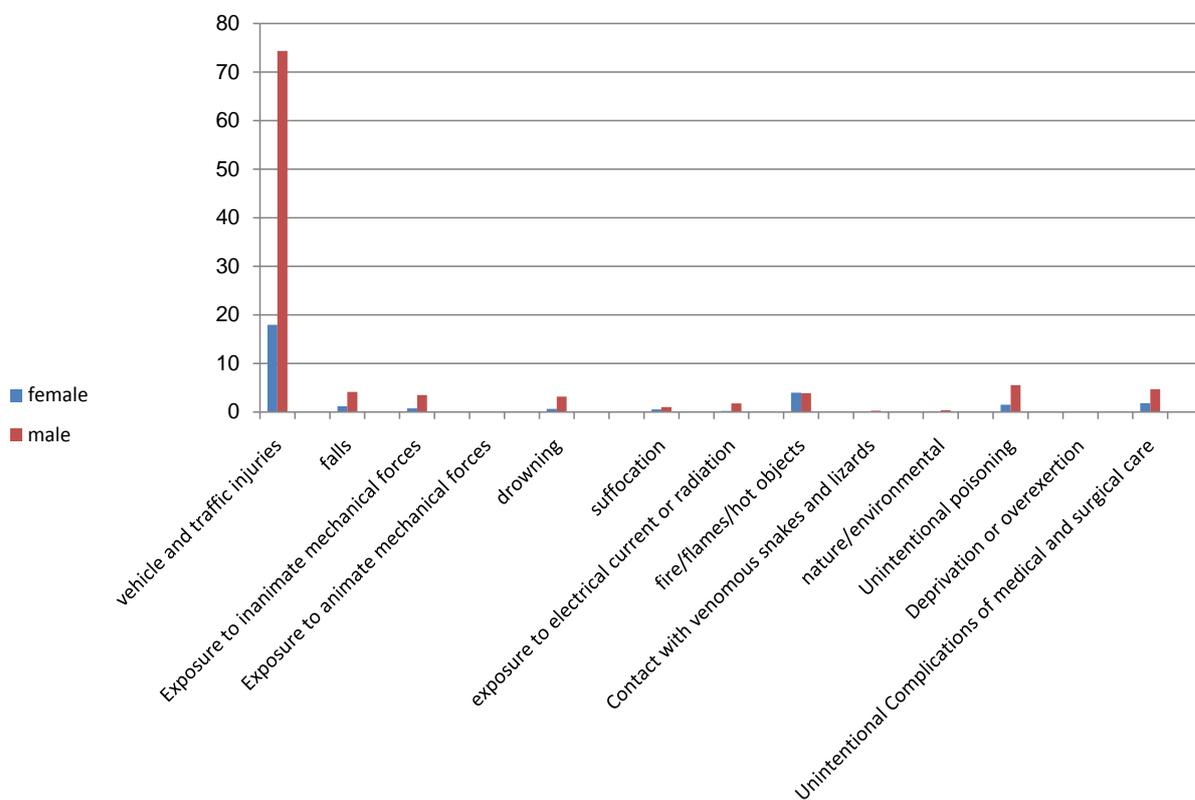


Figure 1. Mortality rate (per 100,000) due to unintentional injuries, Iran, 2006.

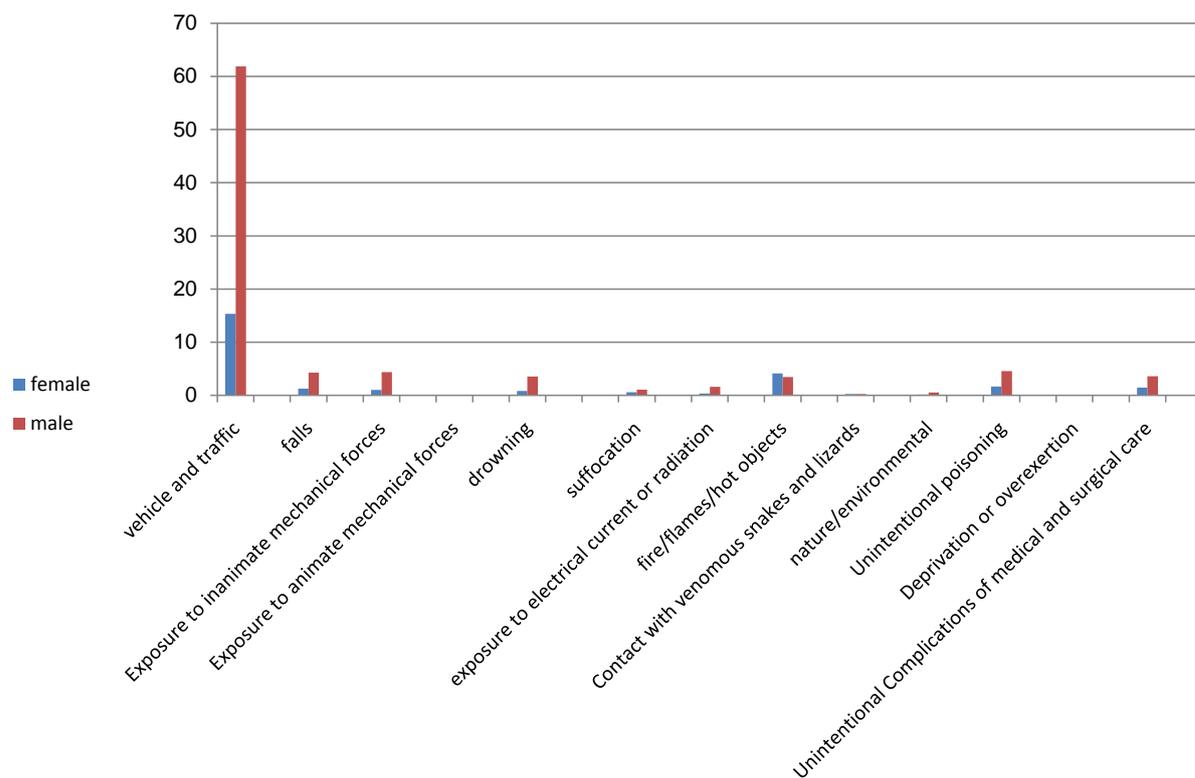
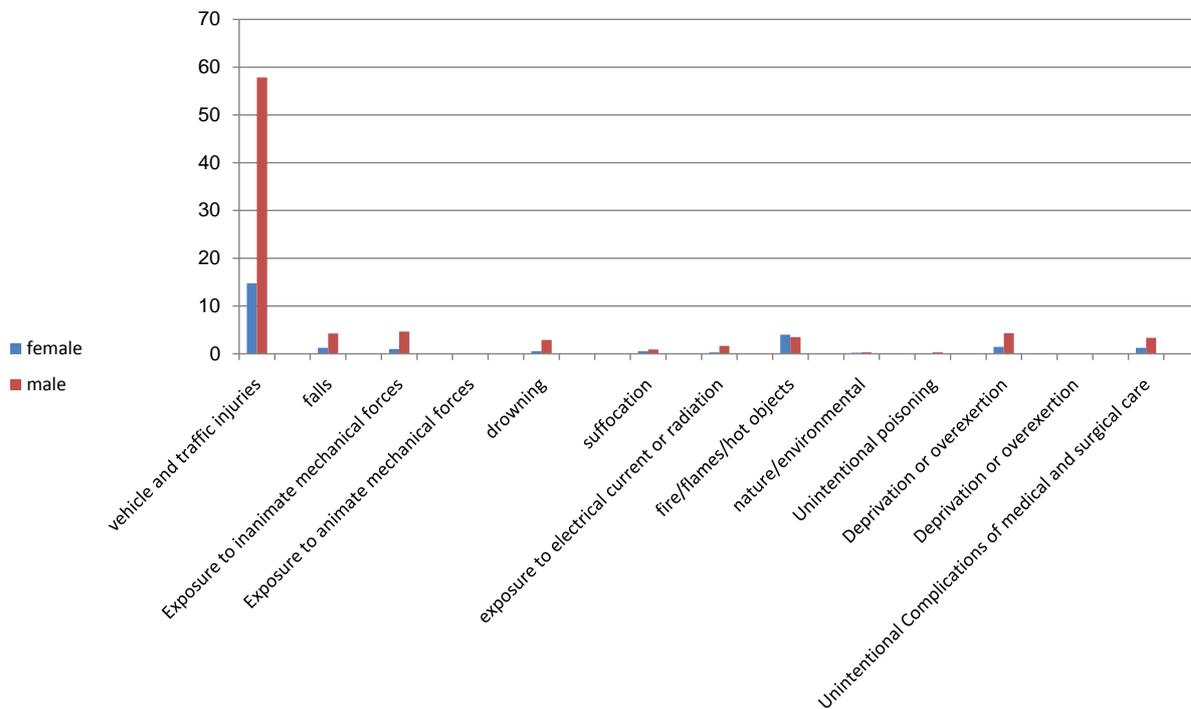
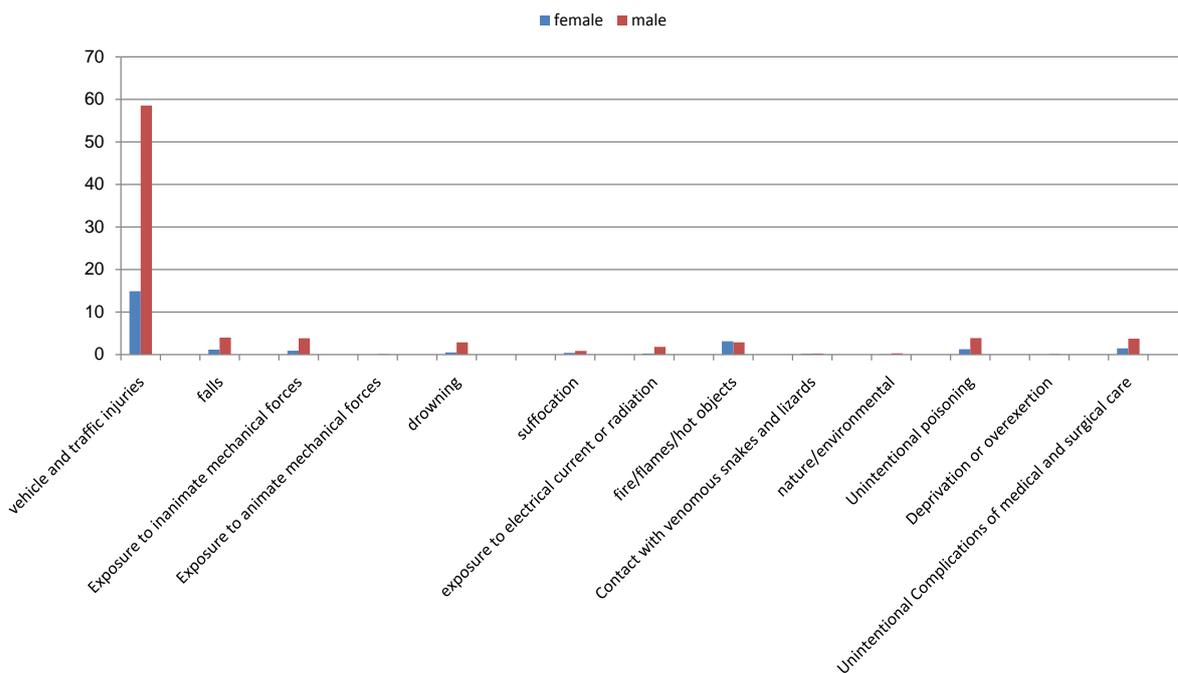


Figure 2. Mortality rate (per 100,000) due to unintentional injuries, Iran, 2007.



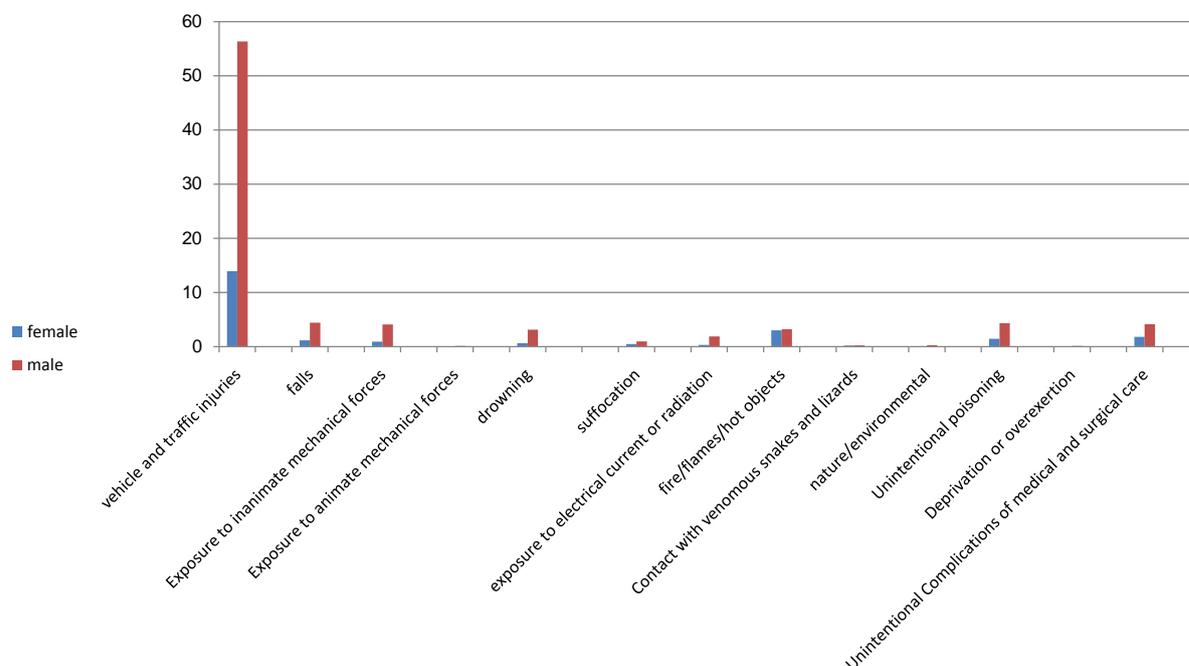
**Figure 3.** Mortality rate (per 100,000) due to unintentional injuries, Iran, 2008.



**Figure 4.** Mortality rate (per 100,000) due to unintentional injuries, Iran, 2009.

#### 4. Discussion

This study provides comprehensive comparative estimates of injury caused deaths from 2006 to 2010 in the Islamic Republic of Iran. It showed that two thirds of injury-caused deaths are related to transport accidents. Although no significant changes are observable in 5 years, nonetheless we can observe a gradual decrease in



**Figure 5.** Mortality rate (per 100,000) due to unintentional injuries, Iran, 2010.

deaths. The most number of deaths in age groups are in age group 15 - 49 years in all of the years studied from 2006 to 2010. However, the highest per cent of injury-caused deaths are associated with the age group 50 - 69. According to a study conducted by Fanian, the highest rate of mortality was associated with the age group of 16 - 20 years [5]. Similarly, a study conducted by Sanaee-zadeh *et al.* found that in Tehran this rate was highest in the age group of 21 - 30 years [6]. A study carried out by Khademi observed that 47.2 percent of deaths involved individuals younger than 30 years of age [7]. This observation is similarly conveyed internationally such as in the US, where recent surveys suggest that young people experienced the highest mortality rate [8]. Similarly, a Nigerian study suggested that about 53 percent of traffic-injury deaths involved individuals less than 30 year of age [9]. A study in China suggests that the highest mortality rate was experienced among the 18 - 30 years age group [10]. In another survey the second highest cause of mortality in age group 15 - 60 was traffic accidents [11]. In 2005 transport accidents deaths in Iran were 30,721 cases which was the highest rate in the world. About 78 percent of total number of unintentional deaths was for men and 22 per cent for women. 19 percent of transport-injury deaths were related to women and 81 percent for men for the reason being that men in Iran are more involved in transportation affairs. Fanian's survey indicated that 81.3 per cent of deaths were related to men and only 16.9 per cent to women, thus being compatible with our country survey [5]. Khademi's survey attributed 73.4 per cent of traffic injuries deaths to men [7]. In WHO report in 2003, transport-accident deaths in men were 3 times more than women [5]. In this survey the first cause of injury-induced death was found to have been due to transportation. In US, transport accident death is the first cause of death in unintentional deaths and leads to 115 deaths daily. WHO declared that the victims of most accident deaths in America and Europe were drivers but in developing countries the highest rate were bicyclists and side walk pedestrians [12]. A 5-year survey in Iran demonstrated that the highest deaths are associated with drivers, thus demonstrating Iran's similarities to other developed countries in this respect [13]. In our study, the highest rate of transport injury deaths involved people in vehicles. In Fanian *et al.*, studies in the Isfahan province revealed that the highest rate was due to 16 - 20 age motor cyclists and the least was due to bicycle drivers [5]. In Khademi, a study revealed that 43.2 percent of deaths involved people in vehicles [7]. A study in Trinidad suggested that the highest rate of death involved pedestrians on side-walks [14].

## 5. Conclusion

As we can see in this research, the first rank in injuries is related to transport accidents. Because of high deaths

due to transport injuries and as long as young and active people are engaged in it, we should find an appropriate and logical solution to resolve this problem. It seems that car industries and other organizations should improve their quality standards and traffic problems in order to prevent deaths due to these accidents.

## 6. Ethical Considerations

Ethical issues including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. have been completely observed by the authors.

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