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Years of Life Lost Due to Road Traffic Injuries in Kermanshah Province

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Abstract

Background: Remarkably, one of the main causes of years of life lost due to premature death (YLL) is due to road traffic injuries (RTIs), which usually occurs at an earlier age in life.
Objectives: This study aimed to determine the trend of YLL due to road traffic injuries in Kermanshah Province during the years 2009 - 2014.
Methods: This study relied on census data from forensic medicine reports. YLL related to RTIs were calculated according to the global burden of disease (GBD) 2010 guidelines, and the age and sex demographics of the population were obtained from the Governor General's Office records for 2009 - 2014. The external causes of death were determined using the international classification of diseases (ICD-10) codes. To assess the YLL trend and its significance, negative binomial regression through the use of Stata 11 was implemented.
Results: The mean age of the 3,231 subjects studied was 39.83 $\pm$ 21.27 years. A total of 78.4% of the subjects were males. The average number of fatal RTIs in the six-year period was 27.8 per 100,000 persons. The YLL rate was 149,995 (76.5 per 1000) including both sexes. The YLL rates due to premature mortality were 118,393 (119.8 per 1000) for males, and 31,602 for females (32.5 per 1000). The highest YLL rates for both sexes were in the age group of 15 - 44 years. The six-year trend of YLL due to premature mortality was therefore descending; with respect to the incremental period of one year, the YLL decreased by 7% on average (β = - 0.07; CI: - 0.09, - 0.05).
Conclusions: Despite the decrease in the mortality and YLL rates due to TRIs in recent years, these figures are higher global numbers; therefore, there needs to be more serious intervention.

Keywords: Trend, YLL, Road Traffic Injuries

1. Background

Traffic accidents and injuries are serious threats for human beings, and one the main healthcare problems of today's citizens (1). Allegedly, one of the determinants of mortality in societies affecting years of life lost (YLL) is death due to road traffic injuries, since such cases generally occur when the victims are of younger ages. In recent years, the rates of road accidents and subsequent deaths have increased tremendously, negatively impacting the socioeconomic relations of the world's countries and inflicting irreparable damages (2). Road traffic injuries (RTIs) kill 1.2 million people and injure 50 million around the world annually (3). This is the ninth most significant factor influencing the number of YLL, and one the most important reasons for global mortality and disability, leading to the loss of 5.8 million lives a year (2, 3). According to the reports of the World Health Organization (WHO), mortality due to RTIs has risen from 999,000 people in 1990 to 1.2 million in 2002, i.e. an increase of 10% (4). This organization also predicts that death due to RTIs will have become the third most important factor affecting YLL rates across the world by 2020 (4). Based on the global burden of diseases (GBD) study in 2010 (including accidents), mortality ensuing from road traffic has elevated in rank from 10 in 1990 to eight in 2010 (5). The number of deaths due to RTIs varies in different areas, but, generally speaking, it has increased by 80% in low-income countries, and decreased by 30% in industrial, high-income ones (6).

In Iran, inter-city and intra-city accidents have become major threats to health, making Iran one of the highest-ranking countries in terms of vehicular accidents and RTIs (7). In the GBD of 2003, it was reported that road traffic injuries made up 15% of the entire YLL rate due to premature mortality in Iran, with 80% of victims being males, and 57% (684,210 people) being in the age group from 15 to 29 (8). The findings of studies in Iran show that the rate of deaths due to RTIs is 30 for every 100,000, while the global rate is significantly lower at 22.6. On the other hand, 15 people in every 100 of whom are injured die in Iran, whereas the global counterpart is only two (9).

To secure and elevate the health levels of vehicular ac-

cident victims in Iran, we needed to evaluate the relevant parameters by presenting and juxtaposing the losses due to untimely deaths and disabilities resulting from such incidences, so that it would be possible to quantify the level and distribution of health within society.

2. Objectives

This study aimed to determine the trends of YLL due to RTIs in Kermanshah province.

3. Methods

In this study, data on the deaths due to RTIs reported in the Kermanshah forensic medicine center were used, representing the gold standard of accident mortality; this data covered a span of six years (2009 - 2014). The forensic medicine department (FM) covers the entire country. All fatal RTIs must be certified by FM, and, therefore, all such deaths must be reported to FM (10). The main variables recorded by FM for each death include the name, age, sex, external cause of death, underlying cause of death, vehicle type, place of accident and death, and date of accident and death.

By definition, an RTI is considered to be an event causing injury and/or property damage, involving a vehicle in transport, and occurring on a road or while a vehicle is still in motion after running off a public highway. Any death happening no later than 30 days after the accident is categorized as being due to an RTI (1, 7). Thus, this study excludes those deaths occurring over 30 days after the incident, cases under post-mortem investigation, and cases in neighboring provinces. Codes V01-V98 were assigned for deaths due to RTIs. The classification of persons was carried out on external causes of death by means of codes ICD-10. After the data were gathered, they were keyed into Excel, and YLL rates were calculated via the mortality rates and standard life expectancies included on the Excel spreadsheet based on this formula:

Years of Life Lost (YLL) = $\Sigma N_x \times L_x$ (where x is the age and gender category)

a) The number of deaths (N): We used the data from FM.

b) Standard life expectancy (L): The GBD 2010 provided a new reference table with a life expectancy at birth of 86.02 years, the same reference standard for males and females was used (11). YLL was calculated with this new standard life expectancy for each age group.

The population of the province for different years was provided by the Kermanshah governor general's office. The estimated populations for different years was based on the census data from 2006 and 2011. Age standardized rates (ASR) determined via the world standard population were measured to allow for figure comparison. To examine the trends for different years, generalized linear models were employed. For the enumerable data, the Poisson regression was first used, and then, after investigating the model's goodness of fit and finding the Poisson regression to be inappropriate, negative binomial regression was ultimately used instead for the analysis. The base of the model was the estimated population for each year. The analysis of the trend was carried out via Strata 11 software.

4. Results

From 2009 to 2014, FM recorded 3,231 cases of fatal RTIs (78.4% among males and 21.6% among females) (sex ratio: 3.6 men/woman). The average age of the cases was 39.83 $\pm$ 21.27 years, with a range from under one to up to 99 years (39.47 $\pm$ 20.71 among men and 41.14 $\pm$ 23.14 among women). With respect to education levels, the highest number of people (41.1%) had only primary/middle school education; the lowest (1%) had an associate's degree or higher. Car occupants made up 36.7% of the death cases. Most lesions were the results of hits on the head and face (65.2%), and the least on the hands and arms (0.2%) (Table 1). The main cause of death in most cases was head concussion/blow (71.6%) (Figure 1).

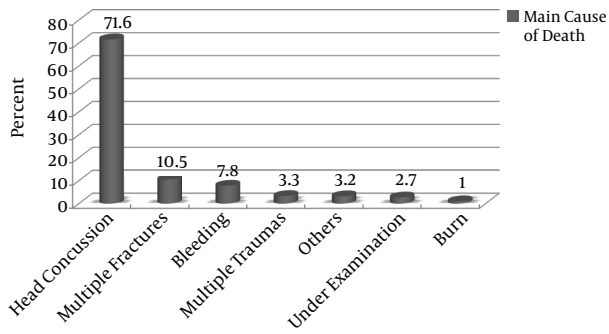

Figure 1. Main Causes of Death Due to RTIs, Kermanshah, Iran, 2009 - 2014

4.1. Fatal RTIs

The average number of fatal RTIs in Kermanshah province within the six-year period was 27.8 per 100,000 people (42.6 per 100,000 among males and 11.9 per 100,000 among females). The greatest number of fatalities among both sexes involved people aged 70 and over (Table 2). The mortality rate due to RTIs in Kermanshah province had diminished from 34.3 to 22.1 per 100,000 between the years 2009 and 2014. The highest number of external causes of death was related to car/van accidents.

Table 1. Frequency of Death Cases Based on the Demographic Variables, Kermanshah, Iran, 2009 - 2014

Variables	Number	%
Education		
Illiterate	947	29.5
Primary/middle	1318	41.1
Secondary	653	20.3
Associate's or bachelor's	192	6
Master's or higher	19	1
Unknown	74	2.3
Total	3203	100
Lesion Location		
Head or face	2102	65.2
Multiple traumas	714	22.1
Chest & abdomen	257	8
Neck	81	2.5
Pelvis	28	0.9
Legs	22	0.7
Body posterior	13	0.4
Hand or arm	6	0.2
Total	3223	100
Deceased's State on Location		
Occupant	1184	36.7
Driver	1127	35
Pedestrian	867	26.9
Unknown	45	1.4
Total	3223	100

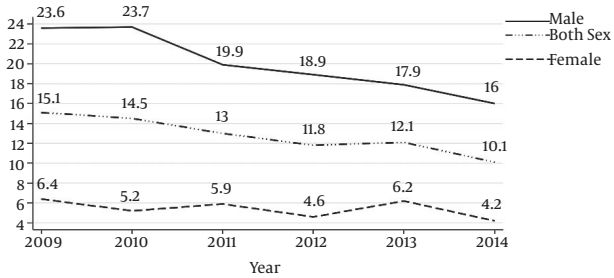

Figure 2. The Six-Year Trend of YLL Rates for RTIs, Kermanshah, Iran, 2009 - 2014

4.2. YLL of RTIs

The YLL rate due to premature mortality was 118,393 (119.8 per 1,000 people) among males, 31,602 among females (32.5 per 1,000), and 149,995 (76.5 per 1,000) among both sexes. The highest YLL rates among both sexes were in the age group from 15 to 44 (Table 3). Car occupants (36.3 per 1,000) comprised the largest YLL category of deaths via external causes, followed by pedestrians (Table 4). According to the negative binomial regression, the six-year YLL trend due to premature mortality was descending; based on an increment of one year, YLL decreased by 7% on average (β = - 0.07; CI: - 0.09, - 0.05) (Figure 2).

5. Discussion

Based upon the results of this study, the rate of mortality due to RTIs for both sexes has decreased in the period of six years: from 52.2 to 35.3 among men, and from 14 to 9.1 among women. In addition, there has been a drop in premature mortality resulting from accidents among both sexes: 6.4 reduced to 4.2 among women, and 23.6 fell down to 16 among men. This trend is tenable considering the decrease in fatal cases within the years covered in the study. The information obtained in this study conforms with the results from research conducted in Iran and other countries. For instance, Bahadorimonfared showed that mortalities due to RTIs in Iran had decreased between 2004 and 2011, dropping from 38 to 31 for every 100,000 people; however, this descending trend was only observed among men and was fixed for women (12). There have been similar descending trends observed in other parts of Iran, especially in the Fars and Khuzestan Provinces (7, 13). There was also a significant decrease of mortalities due to traffic accidents reported in China over a period of 20 years (14). These decreases show that the police have performed adequately despite population growth and increases in traffic; laws enforcing the use of safety belts have been remarkably effective in this regard. Currently, there are laws regulating the fastening of safety belts in over 25 countries, causing the percentage of safety belt fastening to rise from 20% - 25% of passengers up to 60% - 90% (a citation is needed here). The successful case of Iran Police enforcing the laws related to wearing seat belts while driving, and turning this regulation into a commonplace standard of road manners, indicate the importance of continuous planning of police in executing effective safety laws in regard to traffic, thus decreasing the injury rate by 18% in this case (15). Unfortunately, although this trend of mortality and YLL rates due to RTIs is decreasing at the global level, there is still a significant difference between the global figures and those in Iran and many other countries. According to the GBD study (2010), the age-based standardized mortality due to RTIs across the whole world was 19.5 per 100,000 people (5), and the global figure for world mortality rates due to RTIs was been reported to be 20.7 per 100,000 in the year 2013 (2).

Table 2. Fatal RTI Rate/100,000 People by Age Group and Sex, Kermanshah, Iran, 2009 - 2014

Sex	Age Group	2009	2010	2011	2012	2013	2014
Male	0 - 4	9.7	23.2	14.8	19.8	12.9	14
	5 - 14	13.4	18	12.2	14.1	6.9	14.3
	15 - 29	50.3	45.6	43.4	36.6	34.8	30
	30 - 44	58.1	60.8	47.3	45.6	49.5	36
	45 - 59	61.8	51.7	47.5	19.2	44.5	44
	60 - 69	87.9	85.2	51.6	39.8	62.4	85.5
	70 - 79	143.6	130.6	92.4	107.3	143.8	72.2
	+80	210.3	180.6	132.8	129.6	90	72.1
	Total	51	49.8	41.3	39.7	39.4	34.6
	ASR[a]	52.2	50.9	40.7	39.4	39.5	35.3
Female	0 - 4	13.4	13.2	18.7	11.3	18.1	12.3
	5 - 14	7.1	6.6	6.1	4.7	12.1	1.7
	15 - 29	7.8	5.7	6.3	6	7.9	5.7
	30 - 44	12.9	9.8	12.6	5.3	9.4	7.4
	45 - 59	21	17.2	19.4	21.5	14.7	16.7
	60 - 69	46.2	40.9	23.3	27.7	27.7	24.1
	70 - 79	56.6	34.4	46.1	33.7	47.5	17.8
	+80	10.7	49.5	55	42.4	23.5	0
	Total	14	12	13	10.7	12.9	9.1
	ASR	15.8	13.6	14.2	11.6	14	9.3
Total	0 - 4	11.5	18.4	16.7	15.7	15.4	13.2
	5 - 14	10.3	12.5	9.2	9.5	9.5	8.1
	15 - 29	29.6	26.1	25.3	21.6	21.6	18.1
	30 - 44	35.5	35.2	29.9	25.3	29.3	21.6
	45 - 59	41.1	34.2	33.3	35.1	29.4	30.2
	60 - 69	65.8	61.3	36.1	33.1	42.8	50.3
	70 - 79	103.2	89.4	70.2	71.4	96	44.8
	+80	124.3	124	99.1	91.8	61.2	40.8
	Total	32.7	31.1	27.3	25.3	26.2	21.9
	ASR	34.3	32.5	27.5	25.6	26.6	22.1

[a] Adjusted mortality rate using WHO's standard population.

The highest YLL number due to premature mortality among both sexes was in the age group from 15 to 44. Rad also showed that the most significant YLL rates occur among the most active economic age group (16). A study in 2013 indicated that 65% of deaths due to accidents affected those between the ages of 15 and 59 (17). In Punjab, 43% of deaths were among those aged between 21 and 30 (18). In a study in Kashan, Farzandipour showed that most deaths happen when the victims are between 15 and 25 years of age (19). Because of their occupational and educational status, this age group commutes more often, and so they are more likely to travel and drive in dangerous conditions. Therefore, it is necessary to implement plans that focus specifically on this group in jeopardy.

In this study, in spite of the decreases in the mortality rate, fatal cases are men are still four times as common as the cases among women. In a study by Lozano, 10.7% of deaths among men aged between 15 and 49 were related

Table 3. YLL Rates (YLLs) and YLL Per 1,000 Persons (YLL) by Age Group and Sex, Kermanshah, Iran, 2009 - 2014

Age Groups	2009		2010		2011		2012		2013		2014	
	YLLs	YLL	YLLs	YLL	YLLs	YLL	YLLs	YLL	YLLs	YLL	YLLs	YLL
Male												
0 - 4	585	8.1	1424	19.5	929	12.5	1259	16.6	839	10.8	927	11.8
5 - 14	1523	10.2	1997	13.9	1281	9.2	1478	11	688	5.3	1371	10.9
15 - 29	10586	31.5	9561	28.6	8994	27.1	7598	23	7194	21.8	6080	18.4
30 - 44	5923	28.4	6306	29.5	5090	23.1	5020	22.2	5595	24.1	4224	17.7
45 - 59	2678	21.5	2291	17.7	2238	16.6	2415	17.2	2277	15.6	2341	15.4
60 - 69	755	20.7	746	19.9	477	12.3	375	9.3	629	15.1	886	20.5
70 - 79	600	21	533	18.8	375	13.3	427	15.3	611	21.9	305	11
+80	217	71.5	187	14	159	11.1	164	10.7	118	7.1	118	6.5
Total	22867	23.6	23044	23.7	19542	19.9	18736	18.9	17951	17.9	16253	16
Female												
0 - 4	753	11.2	755	11	1089	15.7	674	9.5	1096	15.4	755	10.3
5 - 14	778	5.5	669	4.9	610	4.6	468	3.7	1147	9.3	153	1.3
15 - 29	1579	5	1120	3.5	1258	4	1178	3.7	1548	4.9	1132	3.6
30 - 44	1324	6.3	1012	4.7	1367	6.2	605	2.6	1049	4.5	890	3.7
45 - 59	920	7.1	796	5.9	943	6.8	1082	7.5	752	5	895	5.7
60 - 69	457	11.1	413	9.4	240	5.1	329	6.52	342	6.3	329	5.7
70 - 79	211	8.5	161	6.3	178	6.8	119	4.5	194	7.1	76	2.7
+80	9	1	46	4.6	47	4.3	29	2.5	24	1.8	0	0
Total	6032	6.4	4972	5.2	5733	5.9	4484	4.6	6151	6.2	4229	4.2
Total												
0 - 4	1338	9.6	2179	15.4	2019	14	1933	13.2	1935	13	1682	11.1
5 - 14	2302	7.9	2665	9.5	1891	7	1946	7.4	1835	7.2	1523	6.2
15 - 29	12165	18.5	10681	16.4	10252	15.8	8776	13.5	8742	13.5	7212	11.1
30 - 44	7247	17.4	7318	17.1	6457	14.6	5624	12.4	6644	14.2	5114	10.6
45 - 59	3598	14.2	3086	11.7	3181	11.6	3497	12.3	3029	10.2	3236	10.5
60 - 69	1212	15.6	1159	14.2	717	8.3	705	7.8	971	10.1	1216	12
70 - 79	811	15.2	694	12.9	553	10.2	546	10	805	14.6	381	6.8
+80	226	10.4	233	10	206	7.2	194	7.1	141	4.8	118	3.7
Total	28899	15.1	28016	14.5	25275	13	23221	11.8	24102	12.1	20482	10.1

Table 4. Total YLL count (YLLs) and Rate Per 1,000 Persons (YLL) Based on Sex and External Cause of Death, Kermanshah, Iran, 2009 - 2014

External Cause of Death	YLLs (Year)			YLL (Per 1,000)		
	Male	Female	Total	Male	Female	Total
Pedestrian (V01 - V04, V06 - V09)	22463	8095	30558	22.7	8.3	15.6
Bicycle (V10 - V19)	253	0	253	0.26	0	0.1
Motorized two- or three- wheeler (V20 - V39)	23527	373	23901	23.8	0.4	12.2
Car/van (V40 - V59)	52412	18702	71114	53	18.2	36.3
Truck (V60 - V69)	12721	2286	15008	12.9	2.4	7.7
Bus (V70 - V79)	2579	1213	3792	2.6	1.2	1.9
Other road User (V80 - V86)	2325	320	2635	2.3	0.3	1.3
Unknown	1425	426	1850	1.4	0.5	0.9
Total	118393	31602	149995	119.8	32.5	76.5

to RTIs, while for women, this rate was just 5% (5). In a study conducted in Kermanshah in 2012, the rate of mortality due to RTIs for men in comparison to that of women less than 15 years of age was 4.9%, and the general (all ages) rate

was 3.7% (20). In another study in Iran, it became clear that 79% of mortality was male (21). In contrast, however, studies in India show that women are more at risk for this type of mortality (17). Mortality in China is also higher among males compared to females (22), the reason of which is the higher number of male drivers than female ones. For instance, Moafian indicated that there was a ratio of 13 male drivers to each female driver in his study (23).

In this paper, the main external cause of premature deaths was car accidents for both sexes, which is the same result as Izadi's study in Kermanshah and Sadeghian's study in Shahroud (1, 24, 25). In contrast, a meta-analysis (2013) conducted in Nepal attributed most accidents and fatal cases to motorcyclists and pedestrians (26). In a similar vein, Sango showed that two-thirds of deaths in Africa happen as a result of incidences with motorized two-wheel vehicles (27). It seems that the main cause for the mortality due to RTIs involves disregarding safety tips, regardless of car type, as human factors are deemed to be the main cause in 60% of vehicle accidents and a determinant in 95% of the total number of accidents (28). Generally speaking, because most transportation in Iran is done via moving vehicles, obeying the safety regulations on drivers' and occupants' parts will remarkably curtail the rates of mortality due to road traffic injuries.

The limitations of this study include using just one information database to calculate the indicator, defective enumeration, and the inability to measure the effects of increases in car numbers on deaths; to mitigate against the probability of defective enumeration, a gold standard, i.e. the FM database, was utilized to examine the mortality rates due to RTIs. Of the main strengths of this study is the measurement of the indicator of potential YLL due to premature mortality, the calculation of YLL based on the external cause of death, adjusting for the distorting factor of age via the standard population of WHO, and using modern standard life expectancies as reported in the GBD of 2010.

5.1. Conclusion

Despite the descending trend of mortality and YLL rates due to premature deaths caused by RTIs in recent years, some serious interventionist policies must still be implemented in this regard, and a more appropriate healthcare system ought to be established to provide protection against injuries and accidents at the provincial level and for the entire country.

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Footnotes

Authors' Contribution: Neda Izadi: contribution to the study concept and design; acquisition, analysis, and interpretation of data; drafting of the manuscript; Farid Najafi: contribution to the study concept and design; analysis and interpretation of data; drafting of the manuscript; Maliheh KhoramDad: contribution to interpretation of data; drafting of the manuscript.

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References

1. Izadi N, Najafi F, Khosravi A, Hashemi-Nazari S, Salari A, Soori H. Estimation of mortality and calculated years of lost life from road traffic injuries. *J Mazand Univ Med Sci.* 2014;**24**(112):51–8.
2. World Health Organization. . Global Status report on Road Safety 2013 [cited Feb 1]. Available from: http://www.who.int/violence_injury_prevention/road_safety_status/2013/en/.
3. Bakhtiyari M, Soori H. Epidemiology of traffic crashes outcomes and related factors in Iran 2010. *Int J Inj Contr Saf Promot.* 2013;**1**(3):150–9.
4. World Health Organization. . Injuries and Violences the Facts. Geneva,Switzerland: World Health Organization; 2010.
5. Lozano R, Naghavi M, Foreman K, Lim S, Shibuya K, Aboyans V, et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet.* 2012;**380**(9859):2095–128. doi: 10.1016/S0140-6736(12)61728-0. [PubMed: 23245604].
6. Ayatollahi M, Jafar Zadeh H, Ramezani A. Burden of traffic accidents in south khorasan province (2005). *Iran J Epidemiol.* 2008;**4**(3):51–7.
7. Hashemi Nazari S, Kazemian M, Hosseini F. Trend of five years traffic accident mortality in khuzestan province (2006-2010). *Legal Med J.* 2011;**17**(2):123–9.
8. Naghavi M, Abolhassani F, Pourmalek F, Lakeh M, Jafari N, Vaseghi S, et al. The burden of disease and injury in Iran 2003. *Popul Health Metr.* 2009;**7**:9. doi: 10.1186/1478-7954-7-9. [PubMed: 19527516].
9. Yazdani J, Ahmadi E, Ghadami M. Classification map of registered deaths due to truck accidents in the Mazandaran province (2007-2010). *J Mazand Univ Med Sci.* 2012;**22**(97):50–8.
10. Khorasani-Zavareh D, Haglund BJ, Mohammadi R, Naghavi M, Laflamme L. Traffic injury deaths in West Azarbaijan province of Iran: a cross-sectional interview-based study on victims' characteristics and pre-hospital care. *Int J Inj Contr Saf Promot.* 2009;**16**(3):119–26. doi: 10.1080/17457300903023980. [PubMed: 19941209].
11. Murray C, Ezzati M, Flaxman A, Lim S, Lozano R. (supplement to: Gbd 2010: Design, definitions and metrics) comprehensive systematic analysis of global epidemiology: Definitions, methods, simplification of dalys, and comparative results from the global burden of disease study 2010. *The Lance.* 2012;**380**:2063–6.
12. Bahadorimonfared A, Soori H, Mehrabi Y, Delpisheh A, Esmaili A, Salehi M, et al. Trends of fatal road traffic injuries in Iran (2004-2011). *PLoS One.* 2013;**8**(5):ee65198. doi: 10.1371/journal.pone.0065198. [PubMed: 23724132].
13. Hasanzadeh J, Moradinazar M, Najafi F, Ahmadi-Jouybary T. Trends of Mortality of Road Traffic Accidents in Fars Province, Southern Iran, 2004 - 2010. *Iran J Public Health.* 2014;**43**(9):1259–65. [PubMed: 26175980].

14. Xie SH, Wu YS, Liu XJ, Fu YB, Li SS, Ma HW, et al. Mortality from road traffic accidents in a rapidly urbanizing Chinese city: A 20-year analysis in Shenzhen, 1994-2013. *Traffic Inj Prev.* 2016;**17**(1):39–43. doi: 10.1080/15389588.2015.1035370. [PubMed: 25837500].
15. Pakgohar AR, Esmaili AR. The study of the effect of safety belt on fatalities and physical injuries in road accident. *Traffic Management Studies.* 2009;**4**(14):55–70.
16. Rad M, Martiniuk AL, Ansari-Moghaddam A, Mohammadi M, Rashedi F, Ghasemi A. The Pattern of Road Traffic Crashes in South East Iran. *Glob J Health Sci.* 2016;**8**(9):51677. doi: 10.5539/gjhs.v8n9p149. [PubMed: 27157159].
17. Hsiao M, Malhotra A, Thakur JS, Sheth JK, Nathens AB, Dhingra N, et al. Road traffic injury mortality and its mechanisms in India: nationally representative mortality survey of 1.1 million homes. *BMJ Open.* 2013;**3**(8):e002621. doi: 10.1136/bmjopen-2013-002621. [PubMed: 23959748].
18. Monga S, Gupta S, Paul R, Dhingra R, Arora H, Kaur H. A study of morbidity and mortality profile of 500 road traffic accident cases in Malwa region of Punjab. *IAIM.* 2015;**2**(1):44–9.
19. Farzandipour M, Ghattan H, Mazrouei L, Nejati M, Aghabagheri T. Epidemiological study of traumatic patients referred to neghavi hospital of kashan. *J Kermanshah Univ Med Sci.* 2007;**11**(1):58–68.
20. Malekifar A, Hashemi Nazari S, Ghadirzadeh M. Epidemiology of deaths due to traffic accidents in Kermanshah province (2012). *J Kermanshah Univ Med Sci.* 2016;**19**(9):327–33.
21. Montazeri A. Road-traffic-related mortality in Iran: a descriptive study. *Public Health.* 2004;**118**(2):110–3. doi: 10.1016/S0033-3506(03)00173-2. [PubMed: 15037040].
22. Ye P, Deng X, Gao X, Wang Y, Er Y, Ji C. Trend and current characteristics of road traffic injury in children based on data from the national injury surveillance system in china from 2006 to 2013. *Zhonghua liu xing bing xue za zhi= Zhonghua liuxingbingxue zazhi.* 2013;**2015**(36):1.
23. Moafian G, Aghabeigi MR, Heydari ST, Hoseinzadeh A, Lankarani KB, Sarikhani Y. An epidemiologic survey of road traffic accidents in Iran: analysis of driver-related factors. *Chin J Traumatol.* 2013;**16**(3):140–4. [PubMed: 23735547].
24. Sadeghian F, Khosravi A, Emamian M, Yonesyan R. Pattern of traffic accidents and injuries related factors in Shahrood. *Payesh.* 2008;**7**(3):225–33.
25. Izadi N, Soori H, Najafi F, Hashemi Nazari S, Khosravi A, Salari A. Epidemiological Pattern of Road Traffic Injuries in Kermanshah District in 2010. *Hakim Health Sys Res.* 2014;**17**(3):177–83.
26. Karkee R, Lee AH. Epidemiology of road traffic injuries in Nepal, 2001-2013: systematic review and secondary data analysis. *BMJ Open.* 2016;**6**(4):e010757. doi: 10.1136/bmjopen-2015-010757. [PubMed: 27084283].
27. Sango HA, Testa J, Meda N, Contrand B, Traore MS, Staccini P, et al. Mortality and Morbidity of Urban Road Traffic Crashes in Africa: Capture-Recapture Estimates in Bamako, Mali, 2012. *PLoS One.* 2016;**11**(2):e0149070. doi: 10.1371/journal.pone.0149070. [PubMed: 26871569].
28. Rezazadeh J, Jabbari S, Kavyani A, Ganji R, Arzmani K, Alavinia S. Factors contributing to driver's condition after fatal and injury vehicle accidents in North Khorasan province- New Year 1391. *Int J Inj Contr Saf Promot.* 2013;**1**(1):19–25.