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Investigating the Effects of Social Determinants of Traffic Crash Mortality in Isfahan City

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ABSTRACT

Introduction Many people die as a result of road traffic crashes globally every year. Low- and middle-income countries had higher road crashes mortality compared to high-income countries and Iran is one of the countries with the high road crashes mortality in the world. Regarding the important and basic role the social components plays in health. This study aimed to investigate social determinants of traffic crash mortality in Isfahan during the 2014-2017.

Methods: This study was a cross-sectional data secondary analysis. 29909 traffic crashes were analyzed. . Social determinants were selected using the Commission on Social Determinants of Health conceptual framework. Data were extracted from the Hospital Information System (HIS) and analyzed using binary logistic regression. Data were analyzed with Stata 14 software at a significance level of less than 0.05

Results: we found that 719(2.8%) mortalities were related to traffic accident injury. The death rate due to traffic crash in the hospital was 2.4%. Multiple logistic regression showed that men (OR=1.70,p<0.001), injured transported from suburb(OR=7.09,p<0.001) and passengers of small vans/trucks (OR=2.510,p<0.001)
(p<0.001) had higher odds of mortality caused by traffic crashes.

Conclusions: Considering the importance of social factors on traffic crashes mortality, health policy-makers should develop preventive programs to reducing injury-related mortality.

Keywords: Road traffic crashes, Road traffic accidents, Social determinants of health, Social factor

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Introduction

Every year the 1.3 million people die and 20-50 million disable as a result of road traffic crashes (RTCs). RTCs are the leading cause of death for people aged 15-29 years. The cost of RTCs in most countries is about 3% of GDP (1). About 90% road crashes mortality occur in low- and middle-income countries even though these countries have about 54% of the world's vehicles (2). In addition to the differences in the rate of traffic crashes mortality in developed and developing countries, there is socioeconomic differential in mortality or injuries from RTCs within the countries (3). The lower the socioeconomic status is a risk factor for disease, injuries, and mortality. Although road traffic injuries are third leading cause of death, mortality rate caused by RCTs are higher in Iran and it is the second leading cause of death after cardiovascular disease. Furthermore, it is the first leading cause of death in the age of <40 (4).

An analytic-cross sectional study on assessing traffic accidents mortality in the Islamic Republic of Iran showed that father's job has a significant relationship with traffic accidents mortality, managers and businessmen have a 55% lower chance of mortality than the unemployed person (5). Another studies showed that mortality was higher among men, but more women died as passengers or pedestrians and people over 65 years were more at risk of death than those under 31 years (6).

Medical approach alone is no longer able to respond and solve health problems, especially in chronic diseases and accidents, the root causes, such as environmental and social factors, must be considered. Taking action on the social determinant of health is one of the most effective ways to promote public health and reduce health inequalities. Proper medical care is vital, but health will not be provided in the community unless the root social factors that endanger people's health are addressed (7).

Research shows that among the determinants of health, the share of social factors affecting health is 25% and therefore, to reduce the causes of inequality in health, the relationship between social determinants and their impact on health must be identified (8).

Given the 25 percent role of the health care system, the World Health Organization has systematically examined the issue of social determinants. The Commission for Social Determinants of Health documents shows that health inequality within and between countries is due to an unbalanced combination of social policies, development programs, economic programs, and inappropriate policies. Despite the overall improvement in global health in the twentieth century, inequality in health is evident, and the evidence suggests that in order to prevent inequality in health, special attention should be paid to the social determinants of health (9).

During the years after the Islamic Revolution, the Islamic Republic of Iran has made great efforts in understanding and identifying the social factors determining health, designing and implementing measures to reduce the negative impact of these factors on health to reduce inequalities Considering experiences in reducing inequalities in health, Iran was designated as a partner country of the World Health Organization in the field of social determinants of health in 2005(10). With the establishment of the Secretariat of Social Determinants of Health in the Iran's Ministry of Health and Medical Education and the proposal of the strategic plan of social determinants, the role of social determinants of health in health programs became more serious in Iran (11). Despite many studies (especially descriptive and epidemiological studies) have been conducted on traffic crashes in Iran, analyzing the routine and complete information about traffic crashes especially from the view social-related cause has not been explored based on a comparative study in Iran (12,13).

According to the some several epidemiological studies on the root causes and deaths caused by traffic crashes, it can be said that traffic crashes and its mortality are a social phenomenon (14). Therefore, the study endeavored to examine the role that explanatory social variables play in traffic crashes mortality in Isfahan, Iran

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Methods

Participants

This study was a cross-sectional secondary analysis of data, which extracted the required data from Alzahra and Ayatollah Kashani Hospitals, as the largest with advanced trauma equipment and ward in Isfahan province Information System (HIS). All traffic crashes (29909) in Isfahan during 2014–2017 were analyzed.All traffic crashes in Isfahan during 2014–2017 were analyzed with the exception of the injured who had come for a second time or for after accident cosmetic surgery.

Data collection and Ethical consideration

Social variables of this study were selected based on the Commission on Social Determinants of Health conceptual framework (the Solar and Irwin (2010) framework). Solar and Irwin have categorized factors that can affect the distribution of health and well-being in society into three categories: socioeconomic and political context intermediary determinants. With regard to the research objectives and the availability of information, we analyzed the relationship between traffic crashes mortality and certain social structural factors such as Job status, Nationality and certain intermediary factors such as age, sex, marital status, place of residence and how transferred to hospital.

This study has an ethics code from the Research Ethics Committee (IR.SSU.SPH.REC.1398.001) of ShahidSadoughi University of Medical Sciences, Yazd.

Statistical analysis

Data after extract were prepared and entered into STATA/ SE, version 14, were analyzed using descriptive (frequency, percent) and inferential (univariate and multiplelogistic regression). Regarding that the traffic crashes mortality status as an outcome variable was a binary variable (whether or not mortality occurred) that we use binary logistic regression to calculate the odds ratio (OR) for the explanatory variables. First, univariate logistic regression was calculated between traffic crashes mortality and the explanatory variables. Significance level was also considered 5%. The Pearson chi-squared ($\chi 2$) test and the Pseudo R2 were used to measure the fitness and its prediction power of the model.

Results

Of the 29909 hospitalized injured patients in Isfahan, 719 (2.4%) of them were died in 2014-2017.

As is shown in Table1the majority of mortality were among men (82.75%) with average age of 25.61 years and were living in urban areas (83.31%) and get married (65.72%), and/or non-clerical jobs (43.13%). Most of them were transported through emergency medical services (EMS) (66.98%) to the hospital, and the vehicle of the majority of the victims was a motorcycle (36.16%).

The univariate logistic regression showed that the relationship between the traffic crashes mortality and all selected explanatory variables (structural and intermediary) was statistically significant ($p< 0.05$). So, all the variables entered in the multiple logistic regression model. In the following, Table 2shows the multiple logistic regression as final model between the traffic crashes mortality and the studied variables.

The odds of the traffic crashes mortality was 1.70 times higher in men than women and in Iranians was 1.03 times higher than non-Iranians.

Age was a protective factor against injury-related mortality; all of age groups were less likely to die from traffic crashes injury than the over 65 years of age($p<0.001$). There was no significant relationship between marital status and traffic crashes mortality($p=0.70$)and There was no significant relationship between place of residence (urban and rural place) and traffic crashes mortality ($p = 0.27$).

Non-clerical ($OR=0.606, p<0.001$) and clerical employees ($OR=0.446, p<0.001$) had the low odds of traffic crashes injury-related mortality, compared with unemployed people. There was no significant relationship between retired people and traffic crashes mortality. ($p = 0.70$)

The odds of traffic crashes mortality was 1.51times higher in injured transferred by Emergency medical services (EMS)

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(OR=1.510,p<0.001) and odds of injured transferred from suburb and town was 7.090 times higher than personal referrals(OR=7.090,p<0.001). There was no significant relationship between the type of transfer from the clinic and traffic crashes mortality(p = 0.15). Passenger of vans/small trucks increased the odds of traffic crashes injury-related mortality (OR=2.510,p<0.001), compared with pedestrians. Moreover, there was no significant relationship between the passengers of bus and heavy vehicles and traffic crashes mortality. (p = 0.94)

Table 1. Frequency distribution of traffic crashes mortality

Variables		Number of Patients (%)	Number of Deaths (%)
Sex	Male	22770 (76.13)	595 (82.75)
	Female	7139 (23.87)	124 (17.25)
Age	14≥	2902 (9.07)	49 (6.81)
	15-24	2884 (9.64)	49 (6.81)
	25-34	7434 (24.86)	121 (16.82)
	35-44	8013 (26.86)	131 (18.21)
	45-54	4482 (14.99)	87 (12.10)
	55-64	2100 (7.02)	85 (11.82)
	65 ≤	2094 (7.00)	49 (6.81)
Marital status	Not Married	11762 (39.33)	240 (33.37)
	Married	18147 (60.67)	479 (66.63)
Nationality	Iranian	28293 (94.66)	662 (92.07)
	Non-Iranian	1597(5.34)	57 (7.93)
How transferred \ to hospital	Transfer from doctor office	1154(3.86)	4(0.55)
	Transfer from Clinics	480(1.60)	2(0.27)
	Emergency medical services (EMS)	20031(66.98)	420(58.41)
	Transfer from suburb and town	2119()	201()
	In person admission	6123(20.47)	92(12.79)
Place of residence	Urban	25942(86.74)	599(83.31)
	Rural	3967(13.26)	120(16.69)
Job status	Housewife	4074(17.66)	123(19.55)
	Non clerical jobs	9948(43.13)	205(32.59)
	Manual worker	2793(12.11)	64(10.17)
	clerical jobs	2591(11.23)	49(7.79)
	Retired	1285(5.57)	82(13.03)
	Unemployed	2373(10.29)	106 (16.85)
Vehicle type	Pedestrian	4142(13.58)	160(14.74)
	Bicycle / tricycle	658(5.54)	42(5.84)
	Motorcycle	2726(42.55)	260(36.16)
	Car	10506(35.14)	226(31.43)
	Van / small truck	182(0.61)	13(1.80)
	Heavy vehicles	154(0.51)	6(0.83)
	Bus	96(0.32)	3(0.41)
	Other	440(1.47)	9(1.25)

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Table 2. Multiple logistic regression model between traffic crashes mortality and explanatory variables

Variable	levels	OR adjusted ratio	P	95% CI
Job status	Housewife	0.413	<0.001	0.293-0.583
	Non-clerical jobs	0.606	<0.001	0.465-0.791
	Manual worker	0.723	0.05	0.519-1.00
	Clerical jobs	0.446	<0.001	0.302-0.656
	Retired	0.864	0.47	0.578-1.29
	Unemployed	1	-	-
Nationality	Iranian	0.600	<0.001	0.421-0.855
	Non- Iranian	1.00	-	-
Sex	Male	1.70	<0.001	1.336-2.176
	Female	1	-	-
Age	14 ≥	0.197	<0.001	0.134-0.292
	15-24	0.219	<0.001	0.161-0.298
	25-34	0.183	<0.001	0.134-0.249
	35-44	0.249	<0.001	0.179-0.347
	45-54	0.360	<0.001	0.257-0.504
	55-64	0.567	<0.001	0.411-0.783
	65 ≥	1	-	-
Place of residence	Urban	0.868	0.27	0.674-1.117
	Country	1	-	-
How transferred to hospital	Transfer from the office	0.348	0.04	0.125-0.964
	Transfer from the Clinic	0.236	0.15	0.325-1.712
	Emergency medical services (EMS)	1.510	<0.001	1.145-2.005
	Transfer from suburb and town	7.090	<0.001	5.192-9.701
	In person admission	1	-	0.578-1.292
Marital status	Not Married	1.038	0.70	0.855-1.262
	Married	1	-	-
Vehicle type	Pedestrian	1	-	-
	Bicycle / tricycle	0.477	<0.001	0.309-0.736
	Motorcycle	0.518	<0.001	0.400-0.671
	Car	0.634	<0.001	0.491-0.817
	Van / small truck	2.510	<0.001	1.332-4.753
	Heavy vehicles	0.638	0.40	0.223-1.853
	Bus	0.959	0.94	0.290-3.17
	Other	0.378	0.06	0.137-1.403

Discussion

As is shown in this study, certain structural and intermediary factors were risk factors for traffic crashes mortality, i.e., occupation status (unemployed), age (under 65 years of old), sex (men), transporting the injured to the hospital (transferred from suburb and town), type of vehicle (vans/small trucks), and nationality (Iranian). The findings of this study, to some extent, are consistent and inconsistent with the results of some studies.

In this study, traffic crashes mortality was found to be positively related with occupational status and the odds of injury-related mortality was higher in unemployed people than other occupational groups; conversely, studies conducted in Iran (15,16) shown that the proportion of mortality was higher in self-employed people. We considered

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that the unemployment increases the Odds of traffic crashes mortality hypothesizing by using unsafe vehicle due to lower income and socioeconomic status, having high level of unhappiness or economic stress that cause poor concentration on driving and more traffic crashes mortality, and finally having driving job to earn income.

The Odds of traffic crashes mortality in men was1.70 higher than in women. Studies conducted in Iran (15, 16, 17) and Tanzania (18), India (19) and Thailand (20) have also shown that the proportion of traffic crashes mortality was higher in men. It may due to more participation of men in labor market and more dangerous behavior of males in driving and also because of cultural and religious background in Iran, men can more ride Bicycle, Motorcycle and Heavy vehicles. In this study, traffic crashes mortality was found to be positively related with age and the Odds of injury-related mortality was higher in over 65 years of age than other age groups; Studies conducted in the Islamic Republic of Iran (21,4) has also shown that mortality rate was higher in old elderly (over 65 years of age) people.

In our study, people who were taken to the hospital by EMS 1.5 times and the injured who were transferred from suburbs were 7.09 times have higher Oddss ofmortality; conversely, studies conducted in Iran (22) India (23) and Tanzania (18) and Washington (24) shown the majority of victims were transported without an ambulance and trained personnel. We hypothesize this could be due to that factors such as lack of trauma intensive medical equipment and high distance and less access to EMS and deteriorating condition of the injured people and lower road safety and higher RTI risk in suburb.

The type of vehicle is a factor that can directly affect traffic crashes mortality. Pedestrians and occupants of vans and small trucks had the highest Odds ratio for death in traffic crashes. Studies conducted in Iran (20,4), Tanzania (18), India (23) and Barcelona (25) were consistent with this study, and in other studies, motorcyclists were the majority of victims of traffic accidents. It might be due to work-related driving and increased exposure to hazardous traffic environment for increased traveling or because of shape of vehicle and oversize load.

The OR for Traffic crashes mortality in Iranian people was higher than Foreign. Study conducted in the Islamic Republic of Iran (26), showed that traffic crashes mortality was higher in Iranian people. These results might be due to high ratio of Iranian to Foreign population in Isfahan.

Conclusions

Based on the findings of this study, it seems that due to the ability to prevent deaths due to traffic accidents, to reduce the deaths from traffic accidents, more focus should be placed on the following social determinants gender, age, methods of transporting the injured to the hospital, and vehicle safety., overlooking of each variable would lead to increase in traffic crashes mortality. Equipping the highway and main roads and EMS with full essential Trauma treatment facilities, Accurate locate EMS stations with a minimum distance of accident-prone areas of roads affecting deaths in traffic accidents mortality in the field of health is suggested.

Authors' contribution

H.J, M.R and A.H.H Conceived and designed the analysis: Data collection: M.A.R and A.H.H .Data analysis: H.J, M.A.R, M.S and A.H.H .Drafting of the manuscript: M.R, H.J and A.H.H .All authors contributed to and reviewed the final version of the manuscript. All the authors met the criteria of authorship based on the recommendations of the international committee of medical journal editors.

Conflict of Interests

The authors have no conflict of interest to declare.

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References

1. 2018.http://www.who.int/violence injury prevention/ road safety status/2018/en
2. HeyderA A. Injuries in low-and middle-income countries: a neglected disease in global public health. Injury.2013;44(5):579-80
3. Kh. Rahmani, S.S HashemiNazari, M.R Ghadirzadeh .Trend Analysis of Traffic Accidents Deaths in Iran During 2006 – 2012: Hospital or Pre-Hospital Occurred Deaths Volume 15, Issue 2 (5-2016) . JRUMS 2016, 15(2): 115-128
4. Khorami Z, HashemiNazari S, Ghadirzadeh MR. [An epidemiology study of deaths from road traffic accidents (Persian)]. J SafPromotInj Prev. 2017; 4(4):217-24.
5. Khorasani-Zavareh D. Bo J.A. HaglundMohammadi R. Traffic injury deaths in West Azarbaijan province of Iran: a cross-sectional interview-based study on victims' characteristics and pre-hospital care. Pages 119-126. 07 Aug 2009
6. Wilson O, MeleckidzedeckKh, PM Heda. Road traffic injuries in Kenya: magnitude, causes and status of intervention. Inj Control SafPromot. Mar-Jun 2003;10(1-2):53-61
7. World Health Organization. The world health report 2000: health systems: improving performance. World Health Organization; 2000
8. Khanjani N, Ahmadzadeh A, Bakhtiari B, Madadizadeh F. The role of season and climate in the incidence of congenital hypothyroidism in Kerman province, Southeastern Iran. Journal of Pediatric Endocrinology and Metabolism. 2017 Feb 1;30(2):149-57.
9. Azerbaijan. Vahidi R., Kousha A., Kalantari H., TabriziJ.S.Social Determinants of Health and Their Related Organizations In East Azerbaijan. Journal Of Health And Hygiene Winter 2013, Volume 3, Number 4; Page(s) 20 To 28.
10. Zaboli R, Malmoon Z, Seyedjavadi M, Seyedin H. Developing a conceptual model of social determinants of health inequalities: A qualitative study. Journal of Health Promotion Management. 2014;3(4):74-88
11. Vahidi R, Kousha A, Kalantari H, Tabrizi J. Social Determinants of Health and Their Related Organizations in East Azerbaijan journal of health. 2013; 3(4):20-28.
12. Moradi, A, K. Rahmani, Trend of Traffic Accidents and Fatalities in Iran over 20 Years (1993-2013). J Mazandaran Univ Med Sci 2014. 24(118): 186-97.
13. Hatamabadi H. Epidemiologic study of road traffic injuries by road user type characteristics and road environment in Irán: A community-based approach. Traffic Injury Prevention 2012. 13(1): 61-4.
14. erfanpoor, S and HashemiNazari, S S , Ghadirzadeh, .An epidemiology study of fatal road traffic accidents in khorasanrazavi province in 2011. MedicalJournal of Mashhad University of Medical Sciences, 59 (4). pp. 261-268.
15. Khorrami Z, HashemiNazari SS, Ghadirzadeh MR. An Epidemiology study of deaths from road traffic accidents. J SafPromotInj Prev. 2016; 4(4): 217-24 .
16. Rakhshani T, Kashfi S M, Idani F, Ebrahimi M R, HashemiNazari S S. An Epidemiology Study of Deaths From Road Traffic Accidents, Iran, Ahvaz Journal Of Health Sciences and Surveillance System January 2018, Volume 6, Number 1; Page(s) 46 To 51.
17. Ataey A, Moradi-Asl E, Mirzaei E, Darsaraei F. Epidemiology of Death and Years of Life Lost (YLL) Due to Accidents in Ardabil Province. Journal of Health.
18. Chalya P.L., Mabula J.B., Dass R.M., Mbelenge N., Ngayomela I.H., Chandika A.B., Gilyoma J.M. Injury characteristics and outcome of road traffic crash victims at Bugando Medical Centre in Northwestern Tanzania. J. Trauma Manag. Outcomes. 2012; 6:1–8. doi: 10.1186/1752-2897-6-1
19. Ananthnarayan Chandrasekharan,1 Aditya J Nanavati,1,* Sandhya Prabhakar,1 and Subramaniam Prabhakar1. Factors Impacting Mortality in the Pre-Hospital Period after Road Traffic Accidents in Urban India. Trauma Mon. 2016 Jul; 21(3): e22456
20. Suriyawongpaisal P, Kanchanasut S. Road traffic injuries in Thailand: Trends, selected underlying determinants and status of intervention. Injury Control and Safety Promotion. 2003;10: 95-104.
21. H Etehad 1, ShYousefzadeh-Chabok 1, A Davoudi-Kiakalaye 1, A MoghadamDehnadi 1, H Hemati 1, Z Mohtasham-Amiri 2. Impact of road traffic accidents on the elderly. Arch GerontolGeriatr. Nov-Dec 2015;61(3):489-93. doi: 10.1016/j.archger.2015.08.008. Epub 2015 Aug 5.
22. Yousefzadehchabok, Shahrokh, Ahmadi Dafchahi, Masomeh, MohammadiMaleksari, Haniyeh,

[DOI: 10.18502/jchr.v11i2.9997]

DehnadiMoghadam, Anosh, Hemati, Hossein, Shabani, Somayeh, Epidemiology of Injuries and their Causes among Traumatic Patients Admitted into Poursina Hospital Rasht, " Journal of Kermanshah University of Medical Sciences (J Kermanshah Univ Med Sci, 2007

23. Kumar N, Ghormade PS, Tingne CV, Keoliya AN. Trends of fatal road traffic accidents in central India. J Forensic Med, Sci Law. 2013; 22(2):8-11.
24. D C Grossman 1, L G Hart, F P Rivara, R V Maier, R Rosenblatt. From roadside to bedside: the regionalization of trauma care in a remote rural county. J Trauma 1995 Jan; 38(1):14-21. doi: 10.1097/00005373-199501000-00006.
25. Santamarina-Rubio E. Injury profiles of road traffic deaths. Accident Analysis Prevention 2007. 39(1): 1-5.
26. Souri H, Rouyanian M., Zali A.R., Movahedinezhad A.A. Study Of Changes On Road Traffic Injury Rates, Before And After Of Four Interventions By Iran Traffic Police. Researcher Bulletin of Medical Sciences (PEJOUHANDEH) APRIL-MAY 2009 , Volume 14 , Number 1 (67); Page(s) 15 To 20

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