



## Safety Belt Use and its Related Factors among Drivers and Occupants of Light Motor Vehicles in Southern Iran: Observation Results

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### ABSTRACT

Mortality caused by traffic collisions is considered as the leading cause of years of potential life lost and the third cause of death in Iran. Wearing a seat belt is also one of the most effective ways to reduce mortality caused by such accidents. Thus, the purpose of this study was to determine the rate of seat belt use in southern Iran. The present study was a cross-sectional analysis conducted in morning and evening rounds from October to December 2017 within nine locations of streets in the city of Jahrom (Fars Province, Iran) comprised of three groups of downtown main streets, suburban main streets, and highways as the appropriate representatives of the city roads. To this end, an observation method was used to estimate seat belt use rate and its related factors. In this study, 3456 motor vehicles were observed in which 60.9% of drivers and 37.32% of front-seat occupants had their seat belts on. Women were also wearing seat belts significantly more than men in each of the two groups ( $p < 0.05$ ). Besides, there was a significant relationship between the rate of seat belt use by drivers and that by front-seat occupants ( $p < 0.001$ ). Moreover, the use of seat belt by drivers was related to front-seat occupants' gender; ( $p < 0.001$ ). The overall average rate of using seat belts for drivers and front-seat occupants was 52.02 % which was very low according to the mandatory law of seat belt use and also much far from its ideal rate (over 90%).

**Key words:** Seatbelt, Traffic Collisions, Law, Drivers

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### INTRODUCTION

As predictable and preventive events, injuries are taken into account as one of the most important public health challenges imposing huge economic burdens on societies, especially in developing countries. In this regard, traffic collisions are the most dangerous ones that are also the first cause of death and injury every year in a way that 1.2 million people are killed in traffic accidents and 20 to 50 million individuals are injured or suffer from disabilities [1].

Because of the importance of this issue, the United Nations General Assembly has proclaimed the Decade of Action for Road Safety since 2010 through 2020, and also has urged its members to pay particular attention to traffic accidents and its known underlying risk factors [2].

Death caused by traffic collisions around the world occur for 19 individuals out of a 100000 population. This value is by 17.4 in Europe and 26.4 in the Eastern Mediterranean Region [1]. While the rate of traffic victims in Iran is 39 individuals per 100000; moreover, disabilities caused by road traffic crashes are the first cause of lost lives in Iran [2]. It should be also noted that the death toll from traffic collisions in Iran is 70

people per day and dozens of them are injured and disabled [3].

It is anticipated that if no actions are taken in order to reduce mortality caused by traffic crashes by 2020, death caused by such accidents in the world will increase by 67%. This rising trend will be also equal to 83% for low- and middle-income communities and 27% decline for high-income countries [1].

Human factors have been similarly reported as the most commonly causes of traffic collisions. The given factors can include all driving behaviors (such as exceeding speed limits and violating traffic rules) and inabilities in driving skills (such as lack of concentration, fatigue, physical disabilities, etc.) [4]. Besides, seat belt non-use is considered among behavioral factors affecting traffic accidents; therefore, seat belt use has been enumerated within the category of main risk factors of motor vehicle transport by the World Health Organization (WHO) as the leading factor influencing reduced severity of road traffic accidents [1, 2].

The use of seat belt is one of the most effective ways of decreasing mortality caused by traffic collisions which has had the greatest impacts on the safety of occupants in comparison with other interventions [5] and also has reduced the likelihood of death in drivers and front-seat occupants to 40-50% and that in rear-seat occupants to 25%. This has similarly moderated the severity of injuries caused by traffic accidents by approximately 50% [6, 7].

In vehicle-induced traffic collisions, the greatest and the most severe injuries observed among front-seat occupants is head injury. Since 87.6% of injuries in road traffic accidents in Iran are related to the head, seat belts fastened during collisions can decrease the likelihood of damage to the brain and those who do not correctly use seat belts are more likely to be injured [2] because seat belts can reduce damage caused by traffic collisions considering their principal mechanisms; for example, they can prevent the throw-out of occupants, lower the risk of colliding with the interior parts of the vehicle, and also stop smashes among occupants. In addition, they can spread the power and the energy caused by the collisions all over the body and consequently reduce the severity of injuries [8].

In 1984, New York City was the first place wherein seat belt use for drivers became mandatory and this law could increase the use of this safety device from 42% to 67% [9].

Thus, the mandatory use of seat belt has significantly contributed to reducing death, injuries, and disabilities. Following the study of mortality caused by road traffic accidents in Iran, it became evident that the main cause of collisions was seat belt non-use. After that, the use of seat belts in Iran became mandatory in 2006 and all vehicle drivers and front-seat occupants were required to wear it while driving [10].

Some studies in several cities in Iran have also estimated the rates of seat belt use in the general population including 56% in the city of Isfahan [11], 53% in the city of Kerman [8], 77.9 % in the city of Tehran [2], and 86.4% in Golestan Province [10].

In this respect, Qin Y et al. in their study in Nanjing, China, conducted between the years 2005-2007, showed that the rates of seat belt use among drivers was 49.4% after the enforcement of the mandatory law on seat belt use [12].

In Saudi Arabia, Bend S in 2005 reported the rates of seat belt use in two suburban areas in the city of Riyadh equal to 33% and 87%. However, a significant reduction was observed in certain types of injuries resulting from traffic crashes in this country after enforcing the mandatory law of seat belt use [13].

Given the importance of the role of seat belts in preventing injuries and disabilities as well as high mortality due to traffic accidents in active groups within communities, there is a need for successive studies on seat belt use. Furthermore, investigations have demonstrated that law enforcement along with extensive training programs has been more effective in promoting the use of seat belts [14]. Therefore, this study aimed to determine the status of seat belt use and its related factors in the city of Jahrom (Fars Province) in Iran.

## MATERIALS AND METHODS

This study was a cross-sectional analysis conducted between October and December in 2017 in the city of Jahrom (Fars Province) in southern Iran. An observation method was also

used to estimate the actual rate and the factors related to seat belts use.

Similar to the methods employed in the related literature [15, 16] using the WHO's existing instructions [17] and those by the Center for Disease Control and Prevention (CDC) [18], the streets of the city were divided into three groups to carry out this study including downtown main streets, suburban main streets, and highways; then, three streets and a total of nine points from the city were selected on the map from the given streets to represent the city roads properly. After that, the observation method was implemented in these points.

The determination criteria included a 4-way street or an intersection wherein the vehicles could temporarily stop or move with low speed due to red traffic lights, stop signs, or light traffic which could also provide the possibility and the opportunity for observations. The convenience of observers, the ability to dominate the environment, and having a maximum distance of 5-6 meters with motor vehicles were similarly taken into account. To avoid Hawthorn Effect or the effect of the driver's view of the traffic police, the observations were made when the police were not present at the nearby points.

Considering sample size formula in cross-sectional studies, the sample size was calculated by 384 drivers (motor vehicles) and 384 samples were selected in two rounds of the study (morning and evening) at each selected point and finally a total of 3456 drivers (motor vehicles) were entered into the present investigation.

To further reduce the observer's errors and to consider the possible differences between the rates of seat belt use at different times each day, the study lasted for 30 minutes at two times in the morning (8.30-9 a.m.) and in the evening (4-4.30 p.m.) within each of the selected streets. Then, on a special day of the week (Monday), a group of trained observers (two individuals) observed drivers and front-seat occupants of all motor vehicles crossing through one side of the selected streets. The inclusion criteria were all light vehicles crossing the selected points during the day and the times of the study and the exclusion criteria were motor vehicles whose drivers and occupants were not visible for some reasons (such as high percentage of smoked glasses, curtains on drivers and occupants' sides, etc.).

The purpose of direct observations in this study was to determine the rate of seat belt use in drivers and front-seat occupants and to report their demographic characteristics. Within the observation checklist; vehicle types (personal cars, taxis, vans, and pickup trucks), driver's and front-seat occupant's gender, driver's and front-seat occupant's age (young: below 30 years old, middle-aged: 30-50 years old, and elderly: over 50 years old), times of day, street types, and the main variable i.e. seat belt use and non-use were recorded by the observers.

#### **Statistical Data Analysis**

To conduct the data analysis, the SPSS Software (Version 18) was used including descriptive statistics (frequency and percentage) and analytical ones (Chi-square test) considering the significance level of 0.05.

#### **Ethical Considerations**

The ethical considerations were approved by the Research Ethics Committee of Jahrom University of Medical Sciences with the ethics code of IR.YOU.REC.1396.023.

### **RESULTS**

In this study, 3456 motor vehicles were observed in which the highest frequencies were for personal cars (46.2%) and pickup trucks (31.4%). In terms of gender, 91.4% of the drivers (3160 people) were male and only 8.6% (296) were female. The middle-age group (59.1%, 2043 individuals) and young group (20.7%, 717 people) also constituted the largest age groups of drivers. Of the total number of the drivers screened out, 60.9% (2104 individuals) were using seat belts and 39.1% of them (1352 people) were not doing so. The rates of seat belt use for male and female drivers were 59.8% and 72.6 %, respectively.

Among the drivers, personal car drivers (69.9%) and taxi drivers (69.4%) had the highest and the lowest rates of seat belt use. Considering age estimates in this study, the rate of seat belt use in the elderly was equal to 64.7%, and that was 60.6% and 58% for middle-aged and young drivers, respectively.

Moreover, the results of the study indicated that seat belt use on highways was 65.5%, and that was 60.3 % on main streets within the downtown areas. This value on the main streets in the suburban areas was 56.9%. Given the driving

**Table 1: Seat belt use rate in drivers and front-seat occupants of light vehicles in terms of the research variables**

Variables	Sub-groups	Seat belt use in drivers		Significance level	Variables	Sub-groups	Seat belt use in front-seat occupants		Significance level
		Percentage (%)	Seat belt non-use in drivers				Percentage (%)	Seat belt non-use in front-seat occupants	
Vehicle types	Personal car	69.9	30.1	<0.0001	Vehicle types	Personal car	50.3	49.7	<0.0001
	Taxi	69.4	30.6			taxi	22.2	77.8	
	Van	40.2	59.8			van	24.7	75.3	
	Pickup truck	57.5	42.5			Pickup truck	34.3	65.7	
Driver's age	Young	58	42	0.035	occupant's age	young	42.3	57.7	<0.0001
	Middle-aged	60.6	39.4			Middle-aged	30.1	69.9	
	Elderly	64.7	35.3			Elderly	43.5	56.5	
Driver's gender	Male	59.8	40.2	<0.0001	occupant's gender	Male	35.7	64.3	0.047
	Female	72.6	27.4			Female	40.1	59.9	
Street types	Downtown main streets	60.3	39.7	<0.0001	street types	Downtown main streets	22.2	77.8	<0.0001
	Suburban main streets	56.9	43.1			Suburban main streets	31.6	68.4	
	Highways	65.5	34.5			Highways	49.7	50.3	
Times of day	Morning	64.1	35.9	<0.0001	times of day	Morning	39.5	60.5	0.041
	Evening	57.6	42.4			Evening	35.2	64.8	

times, the use of seat belts in the morning was 64.1% and that was 57.6% in the evening. In terms of statistical correlations, the results of the Chi-square test also revealed a significant relationship between seat belt use and vehicle types, driver's gender, street types, and times of day ( $p < 0.05$ ) (Table 1).

In addition to observing the vehicle drivers in this study, front-seat occupants were similarly examined for the use of seat belts. Among the 3456 vehicles observed, 2071 vehicles (59.9%) had front-seat occupants, so the total of the individuals observed (drivers and front-seat occupants) were 5526 people. In terms of occupants' gender, 62.6% (1297 people) were male and 37.4% were female (774 individuals). Besides; 881 occupants were in the middle-age group (42.5%), 822 individuals were in the young group (39.7%), and 368 of them were in the elderly group (17.8%).

The rate of seat belt use in the front-seat occupants of the vehicles was 37.32% (773 people) and the rate of seat belt non-use was equal to 62.68% (1298 individuals). It should be noted that the given rate in men was 36.7% (463 individuals) and that was 40.1% in women (310 people). Considering the age group, the highest

use rate was observed among the elderly occupants (43.5%) and then the young ones (42.3%). Front-seat occupants in taxis (22.2%) and pickup trucks (24.7%) also had the lowest use of seat belts. In terms of the street types, the highest rate of wearing seat belts in front-seat occupants had occurred on highways (49.7%) and the lowest rates had been seen on downtown main streets (22.2%). Moreover, 39.5% of the front-seat occupants were using seat belts in the morning and 35.2% of them were doing so in the evening.

As a result, the overall average of seat belt use among drivers and front-seat occupants was 52.02%. Furthermore, the results of the Chi-square test showed a significant relationship between the use of seat belts in front-seat occupants and vehicle types, gender, age, street types, as well as times of day ( $p < 0.05$ ) (Table 1).

There was similarly a significant relationship between the seatbelt use rate by drivers and that by front-seat occupants ( $p < 0.001$ ). So, 51.9% of the drivers wearing seat belts were accompanied by occupants who were also doing so. Besides, seat belt use among drivers was related to front-seat occupants' gender (76.1%) in a way that drivers who were beside female front-seat

occupants were using seat belts ( $p < 0.001$ ). There was also a significant relationship between seat belt use and occupants' age. Accordingly, 76.9% of the drivers along with elderly individuals were using seat belts ( $p < 0.001$ ). Seat belt use was also linked to the drivers' gender and age ( $p < 0.001$ ).

## DISCUSSION

Securing vehicles has become of utmost importance in particular in the past several decades and also some measures have been taken to use energy-absorbing devices due to collisions such as the design of bumper materials in the interior parts of motor vehicles like airbags and seat belts [19].

Seat belts were firstly designed in the form of two-point safety belts (similar to safety belts in passenger aircrafts) in the 1940s by some American companies and they were then installed in brokerage manufacturing automobiles. Subsequently, in the 1950s, some two-point seat belts were designed which were not worn on the pelvis like the previous ones, rather they could be skewed by the occupants' chest, but this new design was set aside after initial testing due to the high risk of injuries to the internal parts of the body. In 1958, use of three V-shaped reliance points crossing the pelvis and the chest of the occupants and inserted in a lock beside the occupant's seat led to a big revolution in the design and manufacture of seat belts [20].

Seat belt non-use has been also one of the main reasons for mortality caused by road traffic crashes which prompted the adoption of a law enforcing seat belt use in the world. The mandatory wearing of a seat belt in Iran was firstly approved in 1998 by the Parliament and its implementing regulations were authorized in 2005 by the Cabinet. Since November 2005, the law on seat belt use was enforced for all motor vehicle drivers and occupants in all inter-city and intra-city streets and roads [21].

In this study, the rate of seatbelt use among drivers and occupants of light vehicles in the city of Jahrom was 60.9% and 37.32%, respectively. In this respect, Sadeghnejad *et al.* reported, in a study in the city of Tehran in 2012, that seat belt use rate was equal to 77.9% for drivers and that was 43.7% for front-seat occupants [2]. The low rate of seat belt use by front-seat occupants could be partly due to the lack of strict law enforcement by

traffic police for such individuals on the main streets of the city.

A number of other studies conducted within the cities of Iran also estimated the rate of seat belt use in drivers including the rate of 56% in the city of Isfahan [11], as well as the values of 53% in the city of Kerman [8], 84.6% in Golestan Province [10], 58.2% in Sistan and Baluchistan Province [22], and 68.1% in the city of Kashan [23].

The seat belt use rate among drivers in the United States in 2000 was also reported by 71% [24], and such a value was 75% a day in 2002 and 80% per day in 2004 [25]. In Australia, 85% [26] of motor vehicle drivers had also used seat belts in 1994.

In most investigations, due to limitations of vision, the researchers estimated the use of seat belts similar to that in the current study during the day; however, in a study in the United States, the seat belt use rate at night was determined via infrared cameras, and it was found that wearing seat belts at night was about 4.6% less than that during the day [26].

It seems that the higher rates of seat belt use in developed countries than that in Iran is largely due to the enforcement of more severe penalties as well as culture-building.

As well, the results of the present study suggested that vehicle types were one of the factors influencing the use of seat belts in drivers and occupants, and pickup truck and taxi drivers and occupants had the lowest rate of seat belt use. The given findings had been also mentioned and confirmed in other studies [2, 27]. In this case, there is a need for educational and research activities as well as strict law enforcement.

In this study, female drivers and front-seat occupants were more likely to have seat belts on than men, which could be attributed to the fact that women more than men tend to behave more cautiously and respect laws. The results of other investigations were in line with the findings of this study [2, 28].

Other results of this study demonstrated that seat belt use rates in the elderly drivers and occupants were higher. Given that young age groups suffer from most of death caused by traffic collisions in Iran and seat belt non-use is probably one of the underlying factors, it is required to take effective

measures in the field of education and law enforcement on the youth.

In the present study, the highest rates of seat belt use for drivers and front-seat occupants in terms of street types and times of day were related respectively to highways and in the morning which could be influenced by the potential of more presence of traffic police in those locations or in those certain times of the day.

There was also a significant relationship between the use of seat belts in drivers and front-seat occupants. It can be inferred that if a driver uses a seat belt, the possibility of wearing seat belts in front-seat occupants also increases. This issue can be used for education and culture-building purposes, and it is hoped that promoting seat belt use in drivers can enhance the rate of seat belt use by front-seat occupants.

Among the limitations of the present study was the determination of age groups based on the observers' speculations. Considering women and their hijab (veils) in Iran, there was to some extent a degree of difficulty in terms of age estimation.

### CONCLUSION

According to the results of this study, the overall average use of seat belts among drivers and front-seat occupants was 52.02% (60.9% in drivers and 37.32% in occupants). According to mandatory law of wearing seat belts, the given rate was very low and much far from its ideal value (over 90%). Moreover; it should be noted that vehicle owners have been increasing day by day given the economic booming in recent years in Iran, so improved use of seat belts requires a widespread combination of much stronger law enforcement as well as educational activities based on scientific theories and evidence, especially from an early age in schools along with showing images of injuries caused by seat belt non-use in road traffic accidents on television and other media in collaboration with health education and traffic police professionals. The traffic police are also recommended to intensify seat belt use by front-seat occupants through making more efforts to enforce this law on the main streets of the city.

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### Conflict of Interest

The authors of this study declared no conflict of interest.

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