

Seatbelt Use and Related Factors Among Drivers Involved in Road Crashes in Southeast Iran

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Background: Seatbelts are a relatively low-cost safety device that provides easy basic protection for occupants of 4-wheeled vehicles.

Objectives: This study investigates frequency of seatbelt use and its related factors among drivers involved in a vehicle crash.

Materials and Methods: In this cross-sectional study, all crash profiles recorded in a province from March 2010 to March 2011 were reviewed. Necessary information was extracted from crash reports in which at least one 4-wheeled vehicle was involved. Data were analyzed using binary and multinomial logistic regression.

Results: Of a total of 1427 motor vehicle crashes, a seatbelt was used by 58.2% of drivers. In the univariate analysis, the following were significantly associated with seatbelt use: driver age, education, and occupation along with front seat passenger's sex and seatbelt use, type and make of vehicle, speed, road surface condition, and type of road. In the multivariate model, the following remained significant: driver education, seatbelt use by front seat passenger, and type of road. Furthermore, a restraining seatbelt protected drivers from severe injury and death. Unbelted drivers were 7 and 17.4 times more likely to experience injury and death respectively than belted drivers.

Conclusions: The seatbelt wearing rate among the study participants was much lower than the 90% rate reported among Iranian drivers in 2010. Mandating seatbelt use, as in most countries, will be more effective if a combination of factors such as changes in vehicle design, road safety, and driver and passenger behavior are taken into account.

Keywords: Seat Belt; Traffic Accident; Injury Severity Score

1. Background

Road traffic fatalities occur 2.3 times more frequently in middle-income countries than high-income countries annually. Middle-income countries, with 72% of world's population and 52% of the world's registered vehicles, experience a high level of deaths (80%) compared to their level of motorization. Although about half of deaths are related to pedestrians, cyclists, and motorcyclists combined, the other half occur among vehicle occupants. In Iran, four-wheeled vehicles (cars and light vehicles, heavy trucks, and buses) were responsible for a death rate of 48% (22% drivers and 26% passengers) in 2010 (1).

A factor that strongly influences the rate of road traffic injuries and death is vehicle occupants' failure to use a seatbelt. For this reason, most of countries have made seatbelt use mandatory for front and rear seat passengers. Iran made seatbelt-wearing compulsory for front seat passengers in 2005 (2) and for rear seat occupants afterwards (1). According to a WHO report, 90% of Iranian drivers and 80% of front seat passengers used a seatbelt in

2010 (1). However, this national rate may mask significant differences in population subgroups.

Driver and passenger characteristics and their behavior play an important role in seatbelt use. Driver gender, age, educational level, income, marital status, BMI, religiosity, and race have been reported to be determinants of driver seatbelt use (3-16). Driver behaviors such as speed (17), mobile phone use while driving (18), alcohol/drug involvement (8, 12), smoking, driving errors, regular walking, and having adequate sleep (19) are also predictors of seatbelt use for drivers. Furthermore, age and sex of passengers along with their wearing of seatbelts and their seating position (5, 20) affect driver seatbelt use (3, 13, 14, 18, 19, 21-24).

Vehicle and road safety factors can also be predictors of wearing a seatbelt. Type of vehicle (10, 14) and vehicle equipment such as electronic stability control devices (25) and air conditioning (20) encourage drivers to wear a seatbelt. Moreover, use of seatbelts has been reported to significantly differ between urban/rural roads (10, 14)

and highways (20).

This study was conducted in Sistan and Baluchistan province in southeast Iran, which borders on Afghanistan and Pakistan. This province is the largest in Iran, with a hot-dry climate in the north and west and hot-humid climate in the south. The only airway connects the north to the south. Roads are the most commonly used mode of transport as this province is characterized by a scattered population across vast distances. The main roads are two-way and narrow with insufficient repairs. Side roads are mostly sandy and narrow. Therefore, the results of this study can provide valid information for this area that can be used by policy makers in the fields of health and safety.

Seatbelts are indisputably a relatively low-cost safety device that provides easy basic protection for occupants of passenger vehicles. However, law-breaking drivers are likely to resist using seatbelts and are also prone to being involved in crashes (8, 18, 19, 26).

2. Objectives

This study investigates seatbelt use and related factors among drivers involved in a motor vehicle crash (MVC) in Sistan and Baluchistan province. To our knowledge, there is no similar research published that specifically focuses on this area.

3. Materials and Methods

In this cross-sectional study, profiles of all MVCs recorded in Sistan and Baluchistan province from March 2010 to March 2011 were investigated. Those with at least one 4-wheeled vehicle involved were included in the present study. For every crash, a nationally designed standard form for road traffic crashes is completed by trained police officers at the crash scene. Generally, all forms completed across the province are collated in the central traffic police office of Zahedan, the capital city of the province. Necessary information was extracted from recorded profiles by the investigators. In regard to ethical considerations, personal information was kept confidential. All data needed were extracted from the forms and were analyzed using descriptive statistics, binary, and multinomial logistic regression with SPSS 16.

As records were used for data analysis, there were missing values in the variables. Occupation and education had the maximum percentage of missing values (42.9% and 16%). However, less than 11% of all values were missing for the other variables. Therefore, occupation was not considered in the multivariate analysis. All percentages presented in this paper are valid percent.

4. Results

A total of 1427 MVCs were recorded over the study period. Of all drivers, 1393 (99.2%) were male and 752 (55.6%) were over 30 years old. Illiterate drivers accounted for

10.3%, and 371 (34.2%) were either high school or university graduates. The front seat was not occupied in 1056 (77.5%) of all vehicles. Of all front seat passengers, 60 (19.5%) were belted and 278 (76.6%) were male. Most of MVCs ($n = 908$, 67.5%) occurred during the day and 803 (63.6%) took place when the vehicles had been driven for less than 50 km. Estimated maximum speed was under 60 km/h in 589 (46.3%) and over 90 km/h in 207 (16.3%) of the MVCs at the crash time. More than half ($n = 797$, 73%) of vehicles had been manufactured after 2000. Most vehicles were saloon cars ($n = 609$, 51.8%), followed by pickup trucks ($n = 295$, 25.1%), trucks and trailers ($n = 239$, 20.3%), and bikes ($n = 146$, 10.2%). Main and asphalt roads witnessed 695 (54.9%) and 1097 (91.6%) MVCs respectively.

When bikers were excluded, 58.2% of the drivers were wearing seatbelts at the crash time. Table 1 shows the distribution of seatbelt use by factors related to drivers, vehicles, road conditions, and time of crash. In order to provide some insight into driver seatbelt use, all potentially related factors were first examined in a univariate model. Driver's gender, day/night time, and distance driven from the starting point were not significantly associated with seatbelt use among drivers, whereas age, education and occupation of drivers as well as sex and seatbelt use by the front seat passenger were significantly related. Furthermore, seatbelt use differed by the type of vehicle, make, speed, type of road, and road surface (Table 1).

Compared to young drivers (under 20 years old), seatbelts were used 3.8 and 6 times more frequently in those aged 21 - 25 and 26 - 30 years, respectively. High school and university graduates used seatbelts much more than illiterate drivers did (4.3 and 7.5 times respectively). Full-time drivers wore seatbelts 1.6 times more frequently than others. Drivers accompanying unbelted front seat passengers wore a seatbelt 0.3 times less frequently than those with no front seat occupant. Having a male front seat passenger reduced drivers' likelihood of wearing a seatbelt by 60% (OR = 0.4). Seatbelt use was lowest among pickup truck drivers. Seatbelt use was 3.9 and 2.5 times more frequent in bus and minibus and saloon car drivers than in pickup truck drivers. Drivers' seatbelt use tended to increase with vehicle make: it was 2.1 times more for vehicles made after 2005 than for those made before 1990. Driver seatbelt use increased significantly with speed as well as with driving on asphalt and main roads (Table 1).

In the multivariate model, driver education, front seat passenger seatbelt use, and type of road played a significant role. Higher education and use of main roads increased driver seatbelt rate while a front seat passenger not wearing a seatbelt decreased this rate (Table 1).

MVCs led to 339 (24.1%) injured and 76 (5.4%) dead drivers. Non-seatbelt use was significantly related to driver injury and death. Unbelted drivers were 7 and 17.4 times more likely than belted drivers to experience injury and death, respectively (Table 2).

Table 1. Odds Ratio of Seatbelt Use in Terms of Related Factors ^a

Factors	Total Values ^b	Seatbelt Users ^b	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Gender				NS
Male	1393 (99.2)	812 (58.3)	1.0	
Female	11 (0.8)	8 (72.7)	1.9 (0.5, 7.2)	
Age, y				NS
≤ 20	91 (6.7)	20 (22.0)	1.0	
21 - 25	235 (17.4)	121 (51.5)	3.8 (2.2, 6.6)	
26 - 30	275 (20.3)	173 (62.9)	6.0 (3.5, 10.5)	
> 30	752 (55.6)	477 (63.4)	6.2 (3.7, 10.3)	
Education				
Illiterate	111 (10.3)	45 (40.5)	1.0	1.0
Less than high school	600 (55.5)	358 (59.7)	2.2 (1.4, 3.3)	1.9 (1.1, 3.5)
High school	298 (27.5)	222 (74.5)	4.3 (2.7, 6.8)	3.4 (1.7, 6.5)
University graduate	73 (6.7)	61 (83.6)	7.5 (3.6, 15.4)	3.6 (1.4, 9.3)
Job				
Full-time driver	526 (64.5)	350 (66.5)	1.6 (1.2, 2.1)	NS
Others	289 (35.5)	161 (55.7)	1.0	
Using seatbelt by front seat passenger				
No passenger	1056 (77.5)	662 (62.7)	1.0	1.0
Fastened seatbelt	60 (4.4)	44 (73.3)	1.6 (0.9, 2.9)	1.1 (0.4, 2.6)
No seatbelt use	247 (18.1)	87 (35.2)	0.3 (0.2, 0.4)	0.4 (0.2, 0.6)
Sex of front seat passenger				
Not known	1064 (74.6)	665 (62.6)	1.0	
Female	85 (6.0)	53 (62.4)	0.99 (0.6, 1.6)	NS
Male	278 (19.5)	9 (33.3)	0.4 (0.3, 0.5)	
Time				
Day	908 (67.5)	530 (58.4)	1.1 (0.6, 2.2)	
Night	399 (29.7)	235 (58.9)	1.2 (0.6, 2.3)	NS
Dawn or dusk	38 (2.8)	21 (55.3)	1.0	
Distance driven, km				
≤ 50	803 (63.6)	449 (55.9)	1.0	
51 - 100	231 (18.3)	142 (61.5)	1.3 (0.9, 1.7)	NS
> 100	228 (18.1)	135 (59.2)	1.1 (0.8, 1.5)	
Type of vehicle				
Saloon	609 (51.8)	434 (71.3)	2.6 (1.9, 3.5)	
Bus and minibus	33 (2.8)	26 (78.8)	3.9 (1.6, 9.2)	NS
Truck and trailer	239 (20.3)	169 (70.7)	2.5 (1.8, 3.6)	
Pickup truck	295 (25.1)	144 (48.8)	1.0	
Make				NS
≤ 1990	145 (13.3)	71 (49.0)	1.0	
1991 - 2000	149 (13.7)	84 (56.4)	1.3 (0.8, 2.1)	
2001 - 2005	380 (34.8)	238 (62.6)	1.7 (1.2, 2.6)	
> 2005	417 (38.2)	278 (66.7)	2.1 (1.4, 3.1)	
Speed, km/h				NS
≤ 60	589 (46.3)	313 (53.1)	1.0	
61 - 80	189 (14.9)	105 (55.6)	1.1 (0.8, 1.5)	
81 - 90	287 (22.6)	173 (60.3)	1.3 (1.0, 1.8)	
> 90	207 (16.3)	149 (72.0)	2.3 (1.6, 3.2)	
Road surface condition				NS
Gravel or dirt	101 (8.4)	49 (48.5)	1.0	
Bitumen/asphalt	1097 (91.6)	642 (58.5)	1.5 (1.0, 2.3)	
Type of road				
Side road	570 (45.1)	274 (48.1)	1.0	1.0
Main road	695 (54.9)	482 (69.4)	2.4 (1.9, 3.1)	1.8 (1.2, 2.6)

^a Abbreviations: CI, confidence interval; NS: not significant; OR, odds ratio.

^b Values are presented as No. (%).

Table 2 Odds Ratios of Driver Outcomes After a Crash in Unbelted Versus Belted Drivers ^{a,b}

Driver Outcome	Unbelted	Belted	Unbelted vs. Belted, OR (95% CI)
Non-injured	273 (46.7)	718 (87.5)	1.0
Injured	246 (42.1)	93 (11.3)	7.0 (5.3, 9.2)
Death	66 (11.3)	10 (1.2)	17.4 (8.8, 34.2)

^a Abbreviations: CI, confidence interval; OR, odds ratio.

^b Data are presented as No. (%).

5. Discussion

This study explored determinants of driver seatbelt use in 4-wheeled vehicles involved in MVCs. Although most the factors related to drivers, front seat passenger seatbelt use, vehicle make, and time of crash were significantly associated with seatbelt use in the univariate model. Driver education, seatbelt use by the front seat passenger, and type of road exerted the strongest influence on driver seatbelt use in the multivariate model. Furthermore, seatbelt use protected drivers from severe injury and fatality.

The seatbelt wearing rate was 58.2% among drivers involved in MVCs in this study. A study in Tehran (capital city of Iran) reported a seatbelt wearing rate of 70.9% among car drivers (27). However, this rate was reported to be 90% for all Iranian drivers in 2010 (1). The large difference shows that seatbelt use is much less in high-risk taking drivers than the general population.

Driver characteristics have always played an important role in seatbelt use. Many studies have reported higher compliance of seatbelt use among female drivers (3, 6, 8, 13, 14, 16, 19, 26). No significant difference was found in the current study; this may be due to the small number of female drivers. Similar to previous findings (4-8), older drivers kept their seatbelt fastened more frequently. Furthermore, driver education was the most important determinant of seatbelt use in the multivariate analysis. This finding is in line with studies that have consistently reported a positive association between seatbelt use and driver education (4, 6-8, 28). Better-educated drivers, by wearing seatbelts, showed a lower risk preference.

Drivers and passengers can influence each other to wear seatbelts (16, 18, 19). This study showed that seatbelt use by drivers was related to front seat passenger sex and behavior. In the univariate analysis, the likelihood of the driver wearing a seatbelt decreased by 60% and 70% when the front seat passenger was male and unbelted respectively. However, the latter factor was found to be the strongest predictor in the multivariate model. Generally, most previous studies have found a protective effect of passenger presence on car crash, especially when either the driver or passenger is not young (13, 15, 16, 19, 21-24). Although this effect could also be applicable in the context of seatbelt use, the final model failed to support this

result.

Vehicle characteristics may also affect driver seatbelt use. Commercial vehicles' adherence to traffic laws is more closely monitored by road traffic police as more people are affected in such vehicle crashes. Drivers of passenger-carrying vehicles (buses and coaches) are responsible for many people's safety, and heavy vehicle crashes are fatal (29, 30). Therefore, such drivers are monitored at police checkpoints and also by passengers for any traffic offences, and drastic penalties are imposed for them. As a consequence, commercial vehicle drivers are expected to observe traffic laws more than others. This was confirmed by the current results: seatbelt use was significantly higher among professional drivers than non-professional drivers, and the highest rate of seatbelt use was among bus drivers.

Make of vehicle could be a predictor for seatbelt use, as some old vehicles do not have a convenient seatbelt to use. Most vehicles made in Iran two decades ago did not provide a comfortable seatbelt and seatbelt use was not compulsory at that time. This is clear from the results of the current study as seatbelt use increased in new makes of cars. Another reason could be lower socioeconomic status of drivers of old cars. Drivers with lower socioeconomic status are more likely to exhibit multiple risk behaviors (6, 28).

Speed of vehicle was also significantly related to seatbelt use. The likelihood of seatbelt use in vehicles with speed over 90 km/h was 2.3 times more than that in those with speed under 60 km/h. This may indicate that drivers are more concerned about seatbelt use when they drive faster (17). However, this could also be related to vehicle age as older vehicles run slower and seatbelt use among drivers of such vehicles is less. High speed is also related to road condition, such as surface condition and type of road (31). In this study, drivers wore seatbelts more frequently when driving on bitumen/asphalt and main roads. This may explain the higher use of seatbelts in vehicles driven at higher speed.

The protective effect of seatbelt use in MVCs is unquestionable (15, 32-34). Therefore, mandating seatbelt use, as in most countries, could be made more effective in this region if policy makers consider a combination of chang-

es in vehicle design, road safety, and driver and passenger behavior.

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