

Drivers Characteristics with Respect to Accident Involvement and Seat Belt Utilization

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Abstract: This paper examines the relationship between drivers' personal and social characteristics with respect to their driving time accident involvement and seat belt utilization. The studied characteristics include : years of driving experience, marital status, educational background, and monthly income. The study area covers two of the Arabian Gulf Cooperation Council (GCC) States, Qatar and the United Arab Emirates (UAE). However, due to lack of proper related data a questionnaire was randomly distributed to achieve the above goals. Random sampling technique employed here is a stratified one. The stratification was based on occupation. The questionnaire was distributed to over 4200 drivers in the two states. However, 1893 responded back (i.e. 45%). The questionnaire illustrated the necessary questions in a short answer form.

Findings indicate that drivers of different educational backgrounds and marital status do not differ significantly in being involved in accidents, of their fault or otherwise. However, one out of each three unmarried drivers' accidents was due to respondent own fault. That for married drivers was one out of each four to five accidents. As the driving experience increases, the accident rate decreases. Moreover income showed no significant influence on drivers' accident involvement and seat belt usage. Drivers who rarely use their seat belts are significantly less educated than those who always or sometimes fasten their seat belts. Drivers' experience tend to increase the tendency of seat belt utilization.

Keywords: Accident, seat belt, experience, marital, education, and income.

Introduction

The urban development of The Arabian Gulf States in general has been compatible with the socioeconomic development of the nation. Before the oil boom, both Qatar and the UAE had small settlements with undeveloped communication and transportation facilities. The discovery of oil in the region raised the standard of living to an unprecedented level in a short period of time. The car ownership ratio in Qatar

significantly increased from about one per 200 persons in the late sixties and early seventies to around one per three persons in the early nineties [1]. Due to rapid industrial development during the last three decades, the traffic increased drastically. As a result, roadway networks of high standards have come up. Although the traffic facilities are well established, as in many emerging countries, and traffic related data are almost computerized, safety related data are not up to a level sufficient enough to meet the ambitions of the planners and researchers. The rapid motorization has not been paralleled by developments in driver education, law enforcement, judiciary legislations, emergency care unit, and other safety related areas. Licensing system still requires no comprehensive writing driving tests. Accident rates, in Qatar (Table 1), are quite high compared to the developed countries. The death ratio of traffic accidents to the total number of registered vehicles is twice that of the USA (Table 1). Moreover, the ratio as per total number of accidents is six times that of the United States. The figures in the UAE are quite similar to that of Qatar [7]. However, the accident rates in the studied states might still be slightly greater than that officially published since the actual number of vehicles and that officially registered might not match. However, since all the vehicles are required to be annually inspected by the traffic authorities in the studied states, the dissension between the actual and registered vehicles are thought to be minimal. These facts certainly justify the importance of detailed investigation to answer questions as to how well drivers characteristics influence their safety? This study attempts, more specifically, to find answers to the following questions : How much driving experience, educational background, marital status, and monthly income affect drivers total accident involvement and seat belt utilization? Are married drivers less involved in accidents compared to single ones ?

Table 1. Fatality rates in road accidents

Country	Vehicle ownership (per 1000 pop.)	Fatalities (per 100,000 population)	Fatalities (per 10,000 vehicles)
UK, 1994 [2]	445	6.4	1.4
Turkey, 1993 [3]	713	10.8	1.5
USA, 1993 [3]	736	15.6	2.1
Spain, 1993 [3]	214	16.3	2.2
Germany, 1993 [3]	449	12.3	2.7
Bahrain, 1994 [4]	288	9.2	3.2
Qatar, 1993 [1]	355	15.0	4.2
Malaysia, 1994 [5]	357	26.4	7.0
Thailand, 1994 [6]	186	16.0	8.6

Objectives

Drivers' demographical characteristics are examined with respect to their life time accidents' involvement and frequency of seat belt usage. The following hypothesis are tested in this study:

Firstly, as the driving experience increases, the accident involvement rate decreases and the seat belt utilization increases, simply because of better driving skills [8], greater reliability, maturity and responsibilities. Secondly, married drivers are less involved in accidents and they fasten their seat belts more frequently compared to single ones. This is due to the fact that married drivers hold greater social and economic responsibilities compared to younger-less matured single drivers. Peck *et al.* [9] found that single drivers, both male and female, have higher crash rates than married ones. However, Evans [8] refers part of such difference to the difference in amount of driving, i.e. exposure rate. Thirdly, although, for obvious reason, one may fairly hypothesize that as drivers' educational background improve so do their safety records and seat belt usage, yet, Evans [8], Brown *et. al* [10] and Patvin *et. al* [11] found no convincing evidence that drivers' education or general knowledge increase their safety records. Therefore, one may hypothesize that drivers' educational background has no influence on their accident involvement. Fourthly, drivers' income has no significant influence on their accident involvement. The basis for such hypotheses is drawn from the conflicting responses resulting from behavioral aspects of the drivers and conditional aspects of their vehicles. In Saudi Arabia, for example, poorer drivers, more likely, own unsafe vehicles [12]. On the other hand, drivers with high income own safer cars in terms of both car status and the extra passive and active safety features. Nevertheless, higher speed by such drivers in such cars is highly probable.

Methodology

Due to lack of proper data, a questionnaire (appendix A) containing short answer questions was used to gather the necessary data. These questions were designed to identify driver's personal and social characteristics satisfying the above goals. The drivers were selected based on stratified choice-based random sampling technique [13, 14]. The stratification was occupation based, simply because of the accuracy of the population estimates in each strata and the cost [15]. Each characteristic was subdivided into groups (e.g. uneducated, below secondary, secondary, diploma, B.Sc. and higher degrees). Drivers in each category are then tested for their average number of accident's involvement. However, seat belt is considered differently. Here, parameters' average values are first determined for each utilization class, i.e. average years of experience, average years of education and average monthly income. Then analysis of variance, using Scheffe's technique, is employed for comparison purposes. When dichotomous variable is considered, i.e. marital status, percentage of observation in each utilization class is used. Here, t-test is employed for the validity of significant, at 0.05 level, differences between the groups. Seat belt utilization is classified into always, some times (moderate) and occasionally (very little) fastening the belts.

Accident involvements used in this study are driver's life time accumulation, that are experienced during the driving career regardless of whose fault it was. The accidents considered in this study are not classified any further, as for example, into rural and urban or day and night. However, accidents were rated as per drivers' years of experience, wherever possible. All the necessary data are drawn from drivers' own responses to the questionnaire. As in any questionnaire-based study, respondents answers might not be always reliable. They might also generate a short memory bias, of long experience drivers who might not be able to accurately remember all the accidents they were involved in during their long experience. Moreover, biases against those who did not respond, may also occur. Driver's exposure rates to accidents, as annual mileage difference, are not considered here due to measuring and accuracy difficulties. Furthermore, no literature on exposure rate for the studied states was found.

The suitability of the questionnaire was approved by language and educational experts before being distributed.

Population scope and data collection

The study covers two GCC states; Qatar and UAE. Qatar covers an area of 11,437 square kilometers. The population, in 1993, was 560 thousand [16]. UAE consists of seven emirates. The largest emirate amongst all is Abu Dhabi. Its total area is 67340 square kilometers and forms 87 % of UAE's total area. The population of Abu Dhabi is estimated as 898 thousand [17]. Majority of the population consists of males, due to the fact that bulk of labour force are expatriates who form a major part of the population, generally are not accompanied by families. These people come from different cultures and with different habits and attitudes. The wide difference in their backgrounds create safety related problems [18]. It is also to be mentioned that many of the expatriate drivers although live as singles here, they are actually married, but their families are left back home at their own countries. These are still considered to be married drivers in this study. The respondents were not required to break down their accidents' involvement into prior or after marriage since errors in such estimations will be high.

The questionnaire was distributed to over 2000 drivers in Qatar and to over 2200 drivers in Abu Dhabi, to represent the UAE. Around 1900 drivers responded back; 1032 in Qatar and 861 in the UAE. The response rate was just over 45 percent of the total distributed questionnaires. The response is thought to be sufficient, as many studies e.g. Dean [19] and Steven [20] consider samples as high as 500 to be representative for any large population if properly distributed. The data were then reduced from the questionnaires and analyzed using a statistical software known as Statistical Package and Service Solutions, SPSS [21].

Results and Discussion

Driving experience

In order to have a fair comparison between the drivers in the different driving experience groups; experience per accident ratio was employed here. This is determined

by dividing years of driving experience of each driver by his cumulative accident involvement. In other words, the ratio determines the intervals, as per years of experience, between accidents. This is an accident involvement rating for the drivers.

The results (Table 2) clearly shows that the greater the experience the greater the interval between the accidents i.e. the lower the accident involvement rate. It is quite interesting to mention that drivers with up to five years of experience will possibly be involved in an accident each two years. That for those with 5 to 10, 11 to 20, and over 20 years of experience are roughly one in 6, 11 and 18 years, respectively. These clearly match the hypotheses that accident involvement rate decreases with experience. They also match the actual accident data observed in Bahrain [22] where 61.7% of the accidents are caused by drivers with less than 5 years of experience, 17.4% by those with 5 to 10 years of experience, 13.7% by those with 11 to 20 years of experience, and 7.2% by those with over 20 years of experience, knowing that the drivers' population increases with the experience groups [23]. These, as been estimated at 10% margin of errors, are estimated to be 10.3, 13.9, 36.5, and 39.3%, respectively.

Table 2. Accident involvement rate by years of driving experience

Country	Parameter	Years of Experience				F-test (p-value)	Groups differed significantly
		1: <5 Grp. 1	2: 5-10 Grp. 2	3: 11-20 Grp. 3	4: >20 Grp. 4		
Qatar	Sample (n)	181	212	390	136		
	Inter- accident intervals (Years)	2.05	5.87	9.75	17.36	10.72 (0.000)	1 & 2, 3, 4
UAE	Sample (n)	90	123	333	203		
	Inter- accident intervals (Years)	2.43	6.08	12.15	19.57	30.49 (0.000)	1 & 2, 3, 4 2 & 4

The results (Table 3) also showed that average years of experience was increasing with the seat belt usage. However, significant differences were only observed in the UAE. This is probably because of the difference in seat belt usage law between the two countries. Seat belt usage is compulsory in the UAE but not in Qatar. Furthermore, within each experience group the average years of experience does not differ significantly with seat belt usage in both states.

Table 3. Seat belt utilization by years of driving experience

Country	Parameter	Seat belt utilization groups			F-test (p-value)	Groups differed significantly
		1. Always	2. Sometimes	3. Occasionally		
Qatar	Sample (n)	147	331	390	0.936 (0.393)	None
	Av. driving exper. (years)	13.80	13.52	12.92		
UAE	Sample (n)	267	284	152	18.953 (0.000)	1 & 2, 3 2 & 3
	Av. driving exper. (years)	18.53	16.60	13.25		

Marital status

Although married drivers may generally be expected to be less involved in accidents, because of their social and economic responsibilities and because of being more mature, which are age related factors, compared to younger single drivers, yet, the results showed single and married drivers to be statistically similar in being involved in accidents. The results (Table 4) revealed that single drivers ran into around 2.40 accidents during their whole driving life, regardless of whose fault it was, and married drivers, with no significant difference compared to single ones, ran into 2.2 to 2.45 accidents. Apparently the marriage did not influence drivers' accident involvement. This is clearly not matching the hypotheses made earlier. It was also found that only 0.65 to 0.70 of these accidents were due to unmarried respondents (single drivers) fault and 0.45 to 0.55 were due to married respondent faults. Therefore, one may generally state that one out of each three unmarried drivers' accidents is due to their own fault. That for married ones is one out of each four to five accidents.

Table 4. Accident involvement by marital status

Country	Parameter	Single	Married	t-test (p-value)
Qatar	Sample (n)	205	789	-0.230 (0.819)
	No. of accident (life time average)	2.40	2.43	
UAE	Sample (n)	82	758	0.960 (0.337)
	No. of accident (life time average)	2.37	2.23	

Drivers' marital status and seat belt utilization are presented in Table 5. The result shows that single and married drivers in Qatar appear to be very similar in frequency of using seat belts, i.e. no clear differences are observed in the different utilization groups. In the UAE, on the other hand, married drivers are found to be better than single ones. Although, percentage of expatriates in the UAE is greater than in Qatar, yet it is not

easy to cite clear reasons for such differences between two states with similar culture and social characteristics. However, differences in seat belt law, life style, drivers' characteristics and law enforcement may have some influence.

Table 5. Seat belt utilization by marital status

Country	Type	Parameter	Seat belt utilization groups			Sum
			1. Always	2. Sometimes	3. Occasionally	
Qatar	Single	Sample (n)	31	64	88	183
		Percentage	17.0	35.0	48.0	100
	Married	Sample (n)	129	288	331	748
		Percentage	17.2	38.5	44.3	100
UAE	Single	Sample (n)	23	19	31	73
		Percentage	31.5	26.0	42.5	100
	Married	Sample (n)	283	294	138	715
		Percentage	39.6	41.1	19.3	100

Educational background

The results for the effect of driver's educational background on his accident involvement during his driving career (Table 6) reveals the existence of no significant difference in number of accidents between any two educational background groups. In other words, better educational background of the drivers did not influence drivers total accident risks. The average number of accidents involvement was clearly fluctuating up and down with the educational background.

Table 6. Accident involvement by educational background

Country	Parameter	Educational background						F-test (p value)
		1. Uneducated	2. Below Secondary	3. Secondary	4. Diploma	5. B.Sc	6. Higher degrees	
Qatar	Sample (n)	6	124	237	136	371	129	2.55 (0.036)
	No. of accident* (life time average)	2.33	2.17	2.43	2.60	2.54	2.16	
UAE	Sample (n)	6	50	135	158	371	122	0.43 (0.827)
	No. of accident* (life time average)	2.33	2.02	2.27	2.28	2.26	2.25	

*No two groups differed significantly at 0.05 level.

Drivers of different educational background being, statistically, the same in accident involvement may reflect a serious driving behaviour since no other common reason between the various educational groups may be cited. It looks as if better education did not improve driving attitude. This requires further investigation. However, attitude and safety are highly related. Evans [8] found that driver's level of education can make a contribution mainly by influencing attitudes and by imparting knowledge that will not be acquired by direct experience.

The different educational backgrounds were also statistically tested for the significant differences between the various seat belt utilization. Here, years of education in each category were considered in order to perform the necessary tests for the seat belt usage. The results of drivers' average years of education versus seat belt utilization (Table 7) indicated no significant differences in the average number of years of education between any two seat belt utilization groups in Qatar. While no seat belt rules are enforced in Qatar; in UAE seat belt usage helps in improving seat belt usage with education. The results in the UAE showed that the average number of years of education of the drivers who occasionally use their seat belts were significantly less than the other two seat belt utilization groups. Although better education did not influence accident involvement, yet, some influence on drivers' seat belt utilization, which is a passive safety measure, was observed, in the UAE.

Table 7. Seat belt utilization by years of education

Country	Parameter	Seat belt utilization groups			F-test (p-value)	Groups differed significantly
		1. Always	2. Sometimes	3. Occasionally		
Qatar	Sample (n)	160	354	427		
	Average years of education	14.61	14.17	14.19	0.682 (0.506)	None
UAE	Sample (n)	306	314	171		
	Average years of education	15.58	15.49	14.26	9.206 (0.000)	3 & 1, 2

Monthly income

In order to examine the significant differences between the drivers' in terms of their income, driver's accident involvement and seat belt usage were tested based on their average monthly income. The results (Table 8 and 9), generally, revealed no significant difference between the drivers in the various accident involvement groups. Test on data available from Bahrain (Table 8) supported the above conclusion, as well [7].

Driver's seat belt utilization, (Table 9) showed a significant difference in average monthly income, only in Qatar, between those who occasionally use their seat belt and those who sometimes use them. The average monthly income in the former was significantly higher than that in the latter. In the UAE no significant difference was observed. One may, as well, note that those who always use their seat belts in the UAE are better in their income (wealthier) than those who less frequently use them; in Qatar,

however, those who occasionally use their seat belts are from wealthier group than those who always use them. Although this might purely be due to randomness nature of the sample since no clear significant differences were detected, yet, the difference in the seat belt laws in the two states might have some influence. However, such influence is clearly manifested when those who always fasten their seat belts in the two states are compared. While only 16 percent of the drivers in Qatar always fasten their seatbelts, those in the UAE are over 38 percent. In contrast to this, over 45 % of the drivers in Qatar and 21 % in the UAE occasionally fasten their seat belts.

Table 8. Accident involvement by average monthly income

Country	Parameter	Accidents involvement (driving time experience)					F-test (Sig. level)	Groups differed significantly
		1. None	2. One	3. Two	4. Three	5. Four +		
Bahrain	Sample (n)	104	114	98	63	43	0.717 (0.581)	None
	Av. monthly income (1000US\$)	1.13	1.17	1.23	1.28	1.19		
Qatar	Sample (n)	203	203	142	100	53	4.949 (0.001)	1 & 4, 5
	Av. monthly income (1000US\$)	1.30	1.40	1.50	1.76	1.83		
UAE	Sample (n)	182	184	119	16	26	1.025 (0.381)	None
	Av. monthly income (1000US\$)	2.27	2.32	2.41	2.33	2.77		

Table 9. Seat belt utilization by average monthly income

Country	Parameter	Seat belt utilization groups			F-test (p-value)	Groups differed significantly
		1. Always	2. Sometimes	3. Occasionally		
Qatar	Sample (n)	108	251	301	3.781 (0.023)	3 & 2
	Av. monthly income (1000US\$)	1.46	1.35	1.61		
UAE	Sample (n)	207	227	116	1.727 (0.179)	None
	Av. monthly income (1000US\$)	2.88	2.44	2.25		

Influence of both accident involvement and seat usage being insignificant with drivers' income match with the hypothesis made earlier.

Conclusions

Driving experience reduces accident involvement rate significantly. Drivers with up to five years of experience will possibly be involved in an accident each two years. That for those with 5 to 10, 11 to 20, and over 20 years of experience are roughly one in 6, 11 and 18 years, respectively. Experience stimulates seat belt usage, as well. While in the UAE, where the seat belt usage is compulsory, years of driving experience increase significantly with seat belt usage, that in Qatar, where seat belt law is not compulsory, does not influence seat belt usage. Better education does not promote lower accident involvement. Marriage has no significant influence in reducing drivers' accident involvement. However, married drivers have the tendency in being less involved in accidents due to their faults compared to single ones. It was found that one third of the unmarried drivers' accidents were due to their own faults. That for the married drivers was less than one fourth of their total number of accident involvement. In the UAE, where the seat belts are compulsory, married drivers are better than single ones in frequency of seat belts fastening. Finally, income has no significant influence on drivers' accident involvement and seat belt usage.

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خصائص السائقين بالنسبة إلى وقوعهم في الحوادث والتزامهم بأحزمة السلامة

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(قُدّم للنشر في ٢٨/٧/١٩٩٩م، وقبل للنشر في ٢٤/١٠/٢٠٠٠م)

ملخص البحث. تختبر هذه الورقة العلاقة بين الخصائص الشخصية والاجتماعية للسائقين بالنسبة إلى وقوعهم في الحوادث واستخدامهم لأحزمة الأمان. وتشمل الخصائص المختبرة في هذه الدراسة كل من عدد سنوات الخبرة في القيادة، الحالة الزوجية، الخلفية التعليمية والدخل الشهري. وتغطي الدراسة دولتان من دول مجلس التعاون الخليجي هما قطر ودولة الإمارات العربية المتحدة. وحيث إن المعلومات المطلوبة للدراسة لم تكن متوافرة فقد تم تجهيز استبانة خاصة بهذه الدراسة، وقد وزعت على أكثر من ٤٢٠٠ سائق -بشكل عشوائي طبقي- في أماكن عملهم. وتم استرجاع ١٨٩٣ استبانة (أي حوالي ٤٥٪). استخلص في هذه الدراسة إلى أن عدد مرات وقوع السائقين من مختلف الخلفيات التعليمية والحالة الزوجية في الحوادث لا يختلف نوعياً، إلا أن حاث من كل ثلاثة حوادث يقع للعزاب يكون العزاب هم أصحاب الخطأ فيه. أما المتزوجون فحادث من كل أربع إلى خمس حوادث يكون هم أصحاب الخطأ فيه. وكلما زاد عدد سنوات خبرة السائقين في القيادة قل معه وقوعهم في الحوادث ولا يوجد علاقة نوعية بين الدخل الشهري للسائقين وبين وقوعهم في الحوادث أو التزامهم بحزام الأمان. أما السائقين الذين نادراً ما يقومون باستخدام حزام الأمان فقد وجد أنهم أقل تعلماً من أولئك الذين يقومون باستخدام أحزمتهم بشكل أكبر علاوة على ذلك فإن الخبرة تزيد من استخدام السائق للحزام أيضاً.