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Knowledge and Practice about Car Safety in Kingdom of Bahrain

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Abstract:
Introduction: *Each year, more than 20 million people are injured and 1.17 million are killed due to road traffic accidents. The objectives of this study were to assess knowledge and practice towards car safety among people in the kingdom of Bahrain.*
Materials and Methods: *A descriptive cross sectional study was conducted in different areas in Bahrain during July and August of 2013. Data was analyzed using SPSS, Qi-Square and T-test.*
Results: *A total number of 427 people participated in this study. Approximately 253(59.3%) of the participant had been involved in one or more than one road traffic accident. 140(32.8%) participant didn't know the exact age that requires a car seat. The study results showed that 63.2% of people believe that driving attitude is the most common cause of car accidents.*
Conclusion: *Study participants had high knowledge about car safety but moderate attitudes. Married people had decreased knowledge toward the age that requires a car seat. The age group of 18-29 years tends to use cell phones more often while driving, whichmeans that they have a low level of practice. We recommended the General Department Of Traffic to raise awareness, increase fines of violations, and increase the age by which a license is given.*

I. Introduction

Imagine our present life without cars, without means of transportation. It would be impossible for us to survive this catastrophe. Nowadays, our demand for cars is increasing and along with it, our responsibility is becoming bigger. Road traffic accidents (RTA) are now representing the 10th leading cause of death in the world, occupying 2.1% of deaths [(1)]. The burden of these accidents is not only affecting the population, it is also putting a financial burden on the government and the Ministry of Health and creating more lost time injuries. This research will be conducted to estimate the amount of knowledge about safety measures among people and how do they apply this knowledge. If we come to know what is the level of awareness that is needed to increase the application of safety measures in everyday basis, then and only then we will be able to enhance driving habits and thus avoiding as much accidents as possible.

II. Literature Review

Previous studies:

A study about road traffic accidents (RTA) in Bahrain in September 2003 showed that the incidence of RTA casualties treated at SMC was 73.59% Bahrainis, 26.38 % non-Bahrainis. Male Bahraini drivers between the age of 15 and 29 represented 13.90% of RTA casualties treated at SMC. Drivers between the ages of 15 to 17 inclusive accounted for 187 of RTA casualties between 1996 and 2001. Fractures represented 46.76% of all inpatient injuries, followed by intra-cranial injuries at 29.76% [(2)].In Oct. 2007, a study conducted by the Pediatric Department, at the University of Chicago in an urban health center showed that non-use of car restraint system (CRS) was found in accident involving 307 (17%) infants, 604 (50%) toddlers, and 593 (88%) booster seat-sized children. As a result, they recommended providing CRS checks as a promising means of promoting sustained and improved CRS use [(3)].In November 2002, according to the Department of Emergency medicine, University of California, a study was conducted to determine the level of child safety seat (CSS) and airbag safety knowledge in parents who utilize emergency care services for their children and to determine the factors that influence knowledge of safe transportation of children. Eighty-six percent of those studied reported owning a CSS or booster seat. Eighty-one percent were aware that infants in rear-facing CSSs should never be placed in front of an airbag [(4)]. Driver age is an important consideration in the design of Advanced Telemetry Linked Acquisition System (ATIS) displays, because the number of older drivers continues to increase. Studies showed that older drivers experience more attention demands (Dingus et al. 1997) and have poorer perceptual/cognitive abilities (Temple 1989) [(5)].

One of the first research findings of Partners for Child PassengerSafety (PCPS), published in 1998,

found that the majority of children ages 3 to 8 were placed in vehicle seat belts, which are designed for adults, not children. Soon after, researchers using PCPS data quantified the effect of this behavior on injury risk. The researchers found that seat-belted children ages 2 to 5 were 3.5 times as likely to be injured in crashes as those placed in child restraints and booster seats [(6)(7)]. A research study done in Yunlin in 2011 indicated that the use of hands-free cellular phones could significantly affect the safety of driving among the older drivers and presented risks, although fewer, for younger drivers [(8)].

Definition and standards of car safety [(9)]

What is the definition of car safety? A lot of people would go on the roads driving vehicles that they think are safe but what are the basic characteristics that define avehicle's safety.

1-Seat Belts: if there was a crash, they are designed to keep passengers inside the vehicle and reduce the risk that the passenger will collide with the steering wheel, dashboard, or windshield.

2-Air Bags: depending on the speed at impact and the stiffness of the object struck, front air bags prevent passengers from hitting the dashboard, steering wheel, and windshield. Side airbags reduce the risk of the passenger hitting the door or objects that crash through it.

Although they provide life-saving benefits, there are situations in which air bag deployment can have adverse effects, such as when passengers are unbelted. In fact, maximum air bag effectiveness depends upon seat belts, which keep about 10 inches or more between the breastbone and the air bag.

Children can be killed or heavily injured by an air bag, so children under 12 years should be in the rear seat. A rear-facing child seat should not be placed in the front seat of a vehicle equipped with a front passenger air bag unless the air bag is off.

3-Head Injury Protection: consists of energy absorbing material under the trim of the vehicle interior and is likely to be invisible. It is designed to help protect occupants from injuries caused when their head strikes the upper interior of a vehicle.

4-Head Restraints: extensions of the vehicle's seats, which limit head movement during a rear-impact crash, reducing the probability of neck injury.

5- The Antilock Brake System: prevents the vehicle's wheels from locking during "panic" braking, which allows the driver to maintain greater steering control in order to avoid a collision.

6-Traction ControlSystems: improve the vehicle stability by controlling the amount the drive wheels can slip when applying excess power.

7-All-Wheel Drive: distributes power to both front and rear wheels to maximize traction.

8-Electronic Stability Control: is designed to assist drivers in maintaining control of their vehicles during extreme steering maneuvers. It senses when a vehicle is starting to spin out or plow out, and it automatically applies the brake to a single wheel. It is intended to reduce the occurrence of crashes in which vehicles veer off the road and strike objects that initiate rollovers.

9-Weight:weigh crash data shows that heavy vehicles offer more protection than light vehicles including the exact same safety equipment, especially in two-vehicle crashes.

Aim of The Study:

To assess knowledge and practice towards car safety

Methodology:

Hypothesis:

Knowledge and practice towards car safety in the Kingdom of Bahrain is low.

Objectives:

1. To study the factors associated with increased use of car safety measures.
2. To study obstacles to using safety measures.

Study design:

Observational cross sectional study during the period of July 2013, 427 candidates were interviewed.

Case definition (Inclusion criteria):

- Above 18 years of age and has a valid license
- Resident

Exclusion criteria:

- Everyone who doesn't have a license and is not a resident.

Sampling technique:

We selected 5 malls, each representing a governorate, in order to cover most of Bahrain. We randomly selected every 3rd person who entered the mall and asked them to fill the questionnaire.

These are the malls we chose to represent the governorates:

City	Name of the mall	Governorate
Manama	Bahrain City center	Capital Governorate
A'ali	Ramli Mall	Central Governorate
Budaiya	Country mall	Northern Governorate
Riffa'a	Oasis mall	Southern Governorate
Muharraq	Lulu hypermarket	Muharraq Governorate

Sample size:

Our numbers and statistics were collected from WHO research, which was conducted in 2007[10]. Our concern was on deaths due to 4-wheel vehicle accidents including passengers and drivers. To calculate the prevalence of deaths among drivers and passengers in 4 wheel vehicles in the kingdom of Bahrain, the following equation was used to find out the sample size:

$$\mathbf{n= (Z_{1-\alpha/2})^2.}\ P\ (1-P)$$

$$E^2$$

{ n= sample size, p= prevalence of deaths among (drivers/passengers) in 4 wheelers, E= error}

Considering that:

- Confidence interval (CI): 95%, so Z 1-α/2 = 1.96
- Prevalence of deaths among drivers in 2007 WHO research was 39%
- Prevalence of deaths among passengers in 2007 WHO research was 20%
- E = 0.06

❖ We used 0.06 as our error chance because the increased prevalence increases the chance of error

- Sample size for drivers after calculation is 253
- Sample size for passengers after calculation is 170
- ***The total sample size will be 423.***

Procedure of data collection:

We randomly gave the questionnaire form to every 3rd person who entered the mall.

Study instruments:

The questionnaire forms. Some questions were inspired from previous studies[11].

Study variables:

The variables used in questionnaires were

- Demographic data
- Knowledge
- Practice

Ethical Issues:

This questionnaire passed through the research committee of the Arabian Gulf University, and after getting the approval; permission was taken from the management department of each mall mentioned above. When asking participants to fill the questionnaire, they were asked for consent after we informed them that this research is not sponsored by a beneficial organization.

Pilot study:

We conducted a pilot study prior to our actual research in order to test the questionnaires and make sure it does not need adjustment. We distributed it to a sample of 10 people in the city center and there were no problems. No adjustments were needed.

Data entry, validation, &analysis:

SPSS, we used Qi- Square for categorical information and T-test for nominal data. The P-value we depended on for significance was0.05.

Note: from each correlational study, we chose one question to represent the knowledge and attitude of the driver to discuss during our presentation.

Results:

		n	%
Age	18-29	179	41.9%
	30-39	135	31.6%
	40-49	69	16.2%
	50-59	34	8.0%
	60-69	10	2.3%
	Total	427	100%
Driving	Car	414	97.0%
	Bus	9	2.1%
	Truck	4	0.9%
	Total	427	100%
Education level	Illiterate	5	1.2%
	Lower education	73	17.1%
	Higher education	349	81.7%
	Total	427	100%

- For simplicity, we conjoined the age groups (50-59) and (60-69), also the heavy vehicles (truck and bus) were put together and we also joined illiterate and lower education levels

General information of all participants:

In our study, the total number of all participants was 427, 53.9% of them were males while 46.1% of them were females. Most of them are of ages between 18 and 29 years with a percentage of 41.9%, while 31.6% are of ages between 30 and 39 years, 16.2% are between 40 to 49 years, and only 10.3% are above 49 years of age. Only 17.6% of the participants are students while 60.4% and 22% are employees and non-employees respectively. Married participants showed a percentage of 39.6% while unmarried participants represent 60.4% of all 427 participants. 81.7% of the participants were highly educated, and 18.3% of them were illiterate or lower educated.

Table 1 Demographic Data of the Participants

		n	%
Sex	Male	230	53.9%
	Female	197	46.1%
	Total	427	100%
Age	18-29	179	41.9%
	30-39	135	31.6%
	40-49	69	16.2%
	>49	44	10.3%
	Total	427	100%
Job	Employee	258	60.4%
	Non employee	94	22.0%
	Student	75	17.6%
	Total	427	100%
Marital status	Married	169	39.6%
	Unmarried	258	60.4%
	Total	427	100%
Education level	Illiterate or lower education	78	18.3%
	Higher education	349	81.7%
	Total	427	100%

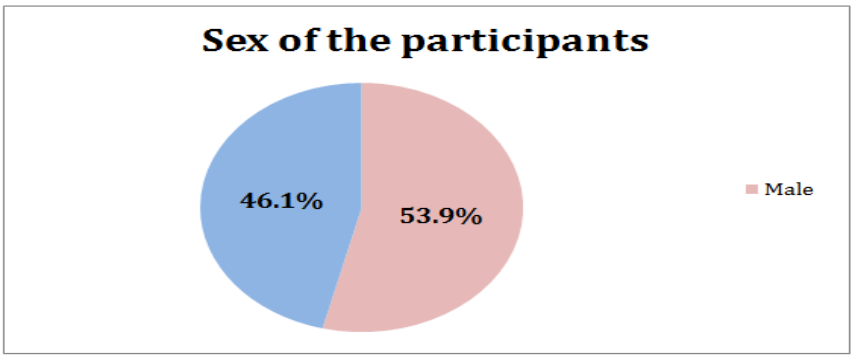
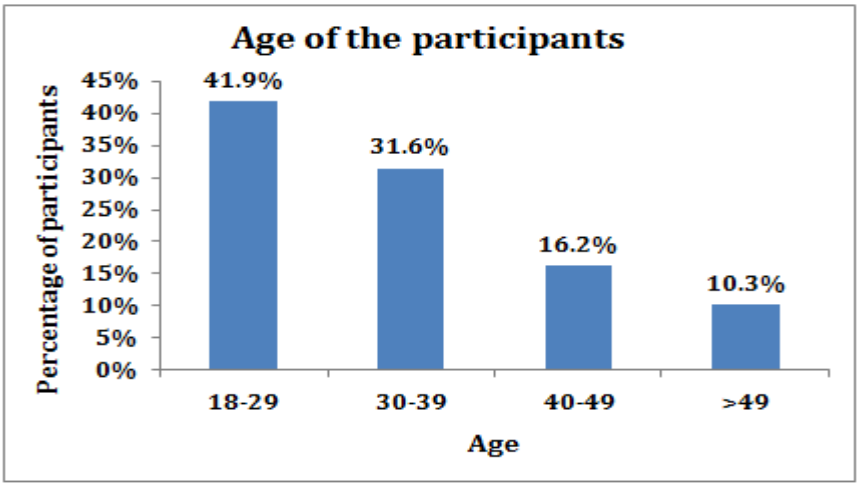


Fig.2 Age of the participants



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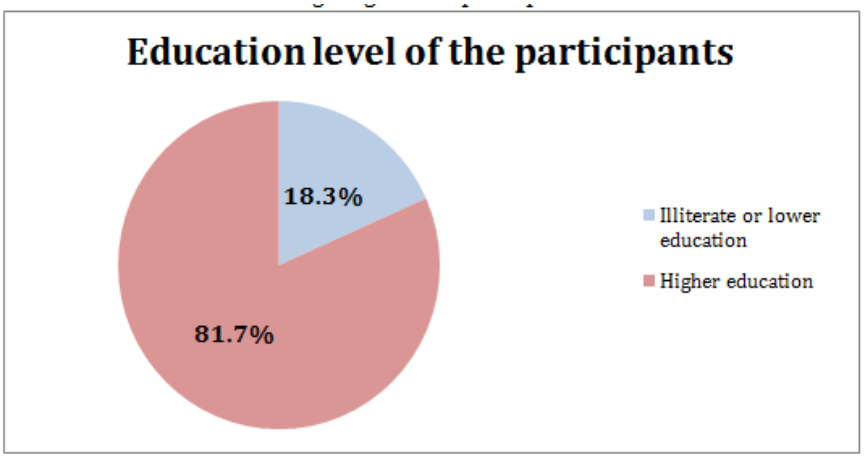

Fig.3 Educational level of the participants

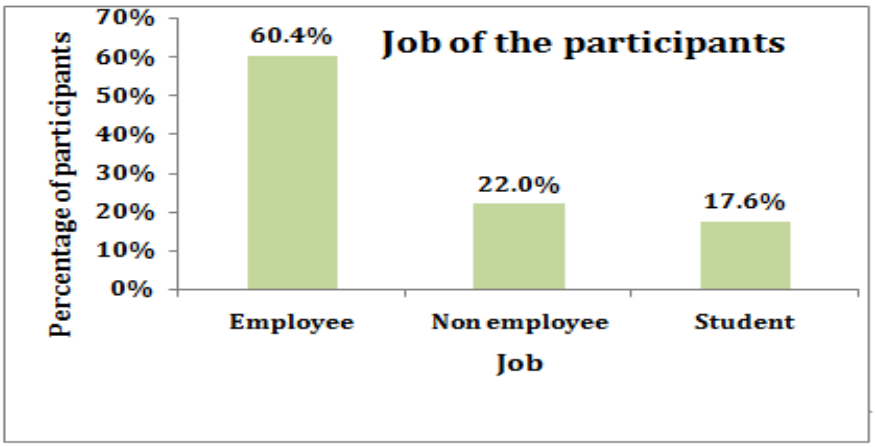

Fig.4Job of the participants

Driving Data:

The Data showed that 97% of people driving car while 3% of people driving bus or truck. Moreover, the result showed that the people with highest percentage are among the people who drive for more than 10 years and lowest percentage among the people who drive for less than year. In the other hand 86.7% of people had an accident in their life while 13.3% of people hadn't an accident. 59.3% of people had been in accident while 40.7% haven't been in an accident. 40.7 % of the people had 0 accident while 32.8% had 1-2 accident but the lowest percentage was among the people who had a 4 accidents and above which is 9.6%.

	Mean	Standard Deviation
Number of accidents	1.64	1.97

- The result showed that the mean number of accidents is 1.64.

Table 2 Driving data

		n	%
Driving	Car	414	97.0%
	Bus or truck	13	3.0%
	Total	427	100%
Driving experience in years	<1	31	7.3%
	1-5	98	23.0%
	6-10	102	23.9%
	>10	196	45.9%
	Total	427	100%
Have you ever witness an accident?	Yes	370	86.7%
	No	57	13.3%
	Total	427	100%
Have you been in any accident?	Yes	253	59.3%
	No	174	40.7%
	Total	427	100%
Number of accidents	None	174	40.7%
	1-2	140	32.8%
	3-4	72	16.9%
	>4	41	9.6%
	Total	427	100%

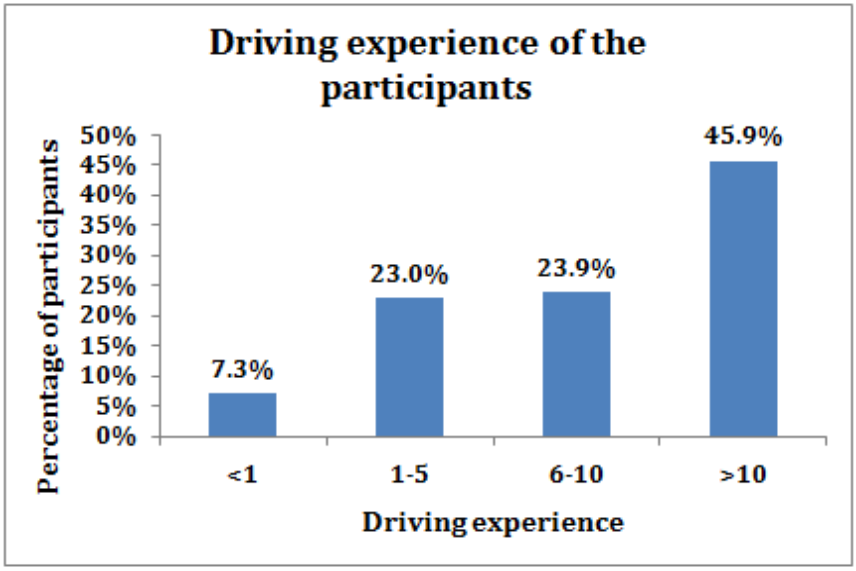

Fig.5 Driving experience of the participants

Knowledge:

When we asked if seat belts and car seats were only necessary for long distance driving or travelling at fast speed, 120 (28.1%) said yes while 307 (71.9%) said no. Also here we can see that the majority (71.9%) had knowledge. When came to the question if its important to wear the seatbelt if the car has an air bag, 78.7% said it was important while only 21.3% said it wasn't. 78.7% had knowledge.

18.7% didn't know where the car seat should be located while 81.3 % did.

67.2% didn't know the exact age that requires a car seat while only 32.8% knew**.**

(Refer to table 3)

Table 3. Knowledge of the Participants

	Yes		No	
	n	%	n	%
You must never buckle a car seat into the front seat of a car that has an air bag	317	74.2%	110	25.8%
Seat belts and car seats are necessary only for long-distance driving or for traveling at fast speeds	120	28.1%	307	71.9%
If your car has an air bag, you don't need to wear a seat belt	91	21.3%	336	78.7%
Do you know where the car seat should be located?	347	81.3%	80	18.7%
Do you know the age that requires a car seat?	287	67.2%	140	32.8%

Most common Cause Of Car Accidents:

The study results showed that 63.2% of people believe that driving attitude is the most common cause, while 42.9% of people thought that Road conditions were the commonest cause of accidents. Theses two causes had the highest voting, so we can say that the participants chose them to be the two utmost factors causing accidents.

(Referred to table 4)

Table 4 The Most Common causes of road accidents

	Yes		No	
	n	%	n	%
Driving attitude of the drivers	270	63.2%	157	36.8%
Car's condition	149	34.9%	278	65.1%
Road conditions	183	42.9%	244	57.1%
Weather conditions	138	32.3%	289	67.7%
Numbers of cars on the road	103	24.1%	324	75.9%

Attitudes of Drivers:

The results showed that when we ask people if they wear the seat belt while driving, 34.9% said always, 37.2% they said usually. On the other hand, 21.5% said Seldom while only 6.3% said never. Here we observe highest Percentage of people who usually wear the seat belt (37.2%).When we ask people if the other passengers wear seat belts, 15.5% said always, 30.9% said usually, 36.5% said seldom and 17.1% said never. When we asked people if they use a car seat for children, 23.4% said always, 32.1% said usually, 16.2% said seldom and 28.3% said never. Here we can conclude that a high percentage (28.3%) of participants do not use car seats.When we asked people if they stop for stop signs, 60.4% said always, 27.2% said usually, 8.7% said seldom and 3.7% said they never stopped. When we ask people if they use the cell phone while driving, 17.1% said always, 41.0% said usually, 28.6% said seldom and 13.3% said never. Here we observe high percentage of people usually use their cell phones while driving.When we asked people if they check the car brakes, 37.0% said always, 36.8% said usually, 17.8% said seldom and 8.4% said they never did.

(Refer to table 5)

Table 5 Attitudes of the drivers

	Always		Usually		Seldom		Never	
	n	%	n	%	n	%	n	%
Do you wear your seat belt while driving your car?	149	34.9%	159	37.2%	92	21.5%	27	6.3%
Do other passengers in the car wear seat belts?	66	15.5%	132	30.9%	156	36.5%	73	17.1%
Do you use a car seat for children?	100	23.4%	137	32.1%	69	16.2%	121	28.3%
Do you stop for stop signs?	258	60.4%	116	27.2%	37	8.7%	16	3.7%
How often you use your cell phone while driving?	73	17.1%	175	41.0%	122	28.6%	57	13.3%
How often do you check your car break?	158	37.0%	157	36.8%	76	17.8%	36	8.4%

Correlational Study between the knowledge of the driver and his/her sex:

The results showed that when we asked about never buckling the children car seat into the front seat of a car that has an air bag, 72.6% of males said yes While 76,1% of females yes. As we can see here that the knowledge is higher in females, with a p-value 0.405.

When we asked if seat belts and car seats are necessary only for long-distance driving or for traveling at fast speeds, 69.6% of males said no, While 74.6% of female said no. So as we can see here females also have a higher Knowledge than males, with a P- value 0.247.Then when we asked if its true that you don't have to wear a seat belt if the car has an airbag, 77.4% of males said no While 80.2% of female said no. So as a result, females have a higher knowledge, with a P-value 0.479.

Also we asked if they knew where the car seat should be located, 79.6% of males said yes while 83.2% of females said yes. As we can see here, females have a higher knowledge than males, with a P- value 0.331.When we asked them if they know the age that requires a car seat, 63.5% of male said yes while 71.6% of female said yes. We can also see here, females have a higher knowledge than males, with a P-value 0.076.**(Refer to table 6.1)**

Table 6.1 Knowledge of the driver and his/her sex

		Sex				Chi-square P-value
		Male		Female		
		n	%	n	%	
You must never buckle a car seat into the front seat of a car that has an air bag	Yes	167	72.6%	150	76.1%	0.405
	No	63	27.4%	47	23.9%	
Seat belts and car seats are necessary only for long-distance driving or for traveling at fast speeds	Yes	70	30.4%	50	25.4%	0.247
	No	160	69.6%	147	74.6%	
If your car has an air bag, you don't need to wear a seat belt	Yes	52	22.6%	39	19.8%	0.479
	No	178	77.4%	158	80.2%	
Do you know where the car seat should be located?	Yes	183	79.6%	164	83.2%	0.331
	No	47	20.4%	33	16.8%	
Do you know the age that requires a car seat?	Yes	146	63.5%	141	71.6%	0.076
	No	84	36.5%	56	28.4%	

Correlational Study between knowledge of the driver and his/her Age:

When we asked about buckling the child's car seat into the front seat of a car which has an airbag, 73.2% of people between the age of (18-29) answered no. 80.7% of people between the ages of (30-39) said no. 71.0% of people between (40-49) years of age answered no. 63.6% of individuals older than 49 said no. Here we can see that the age group of 49 years and above has the higher knowledge, with P-value 0.109. When we asked if car seats and seat belts are necessary only for long distance or driving at a high speed, 31.3% between the age of (18-29) said yes while 68.7% said no. 21.5% of people between (30-39) answered yes while 78.5% said no. 34.8% of people in the age group (40-49) said yes while 65.2% said no. 25.0% of people older than 49 years said yes while 75.0% said no. We can conclude that the age group of (30-39) had the higher knowledge with P-value 0.135. When we asked if the driver shouldn't wear the seat belt if the car had airbags, 21.8% of the age group (18-29) said yes. In the age group (30-39), 17.8% said yes. 31.9% of people between (40-49) answered with yes. 13.6% of people older than 49 said yes. Here, the higher knowledge is among people who are older than 49 years with P-value 0.067.

We wanted to know if people knew where car seats should be located and the result showed that 78.8%of participants between (18-29) years said yes. Between the ages of (30-39), 85.2% said yes. 81.2% of people between (40-49) years answered with yes. 79.5% of people older than 49 said yes. Here, the age group of (30-39) had the higher knowledge about the location of the car seat with P-value 0.536. When we asked if people knew the age requires a car seat, 58.7% of the age group (18-29) said yes. Between the ages of (30-39), 74.1% said yes. 75.4% of the age group (40-49) answered with yes. 68.2% of people older than 49 said yes. We can conclude that the age group (40-49) knew better about the age of children that requires a car seat with a P-value of 0.012, which is significant.**(Refer to table 6.2)**

Table 6.2 Knowledge of the driver and its correlation with his/her Age

		Age								Chi-square P-value
		18-29		30-39		40-49		>49		
		n	%	n	%	n	%	n	%	
You must never buckle a car seat into the front seat of a car that has an air bag	Yes	131	73.2 %	109	80.7 %	49	71.0%	28	63.6%	0.109
	No	48	26.8 %	26	19.3 %	20	29.0%	16	36.4%	
Seat belts and car seats are necessary only for long-distance	Yes	56	31.3 %	29	21.5 %	24	34.8%	11	25.0%	0.135
	No	123	68.7 %	106	78.5 %	45	65.2%	33	75.0%	

driving or for traveling at fast speeds										
If your car has an air bag, you don't need to wear a seat belt	Yes	39	21.8 %	24	17.8 %	22	31.9%	6	13.6%	0.067
	No	140	78.2 %	111	82.2 %	47	68.1%	38	86.4%	
Do you know where the car seat should be located?	Yes	141	78.8 %	115	85.2 %	56	81.2%	35	79.5%	0.536
	No	38	21.2 %	20	14.8 %	13	18.8%	9	20.5%	
Do you know the age that requires a car seat?	Yes	105	58.7 %	100	74.1 %	52	75.4%	30	68.2%	**0.012***
	No	74	41.3 %	35	25.9 %	17	24.6%	14	31.8%	

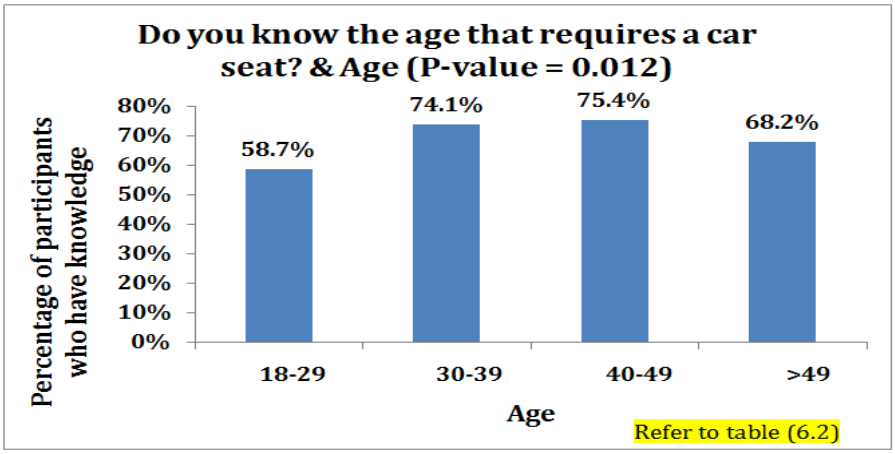

Fig.6 Correlation between Knowledge & age

Correlational Study Between the knowledge of the Driver and his/her Job status:

The data showed that the percentage of the employee participants who know that they must not buckle a car seat into the front seat of a car with air bags is 74.4% compared to 76.6% of the non-employee participants & 70.7% of the student participants who know that; with a P-value of 0.678. The same categories of these participants were asked about their knowledge of the importance of car seats and seat belts in driving for any distance and at any speed and the results were that 72.9% of the employee participants, 64.9% of the non employee participants, and 77.3% of the student participants have this knowledge with a P-value of 0.174. Another question in the questionnaire was about the importance of seat belts even though their cars have airbags; the results showed that this is well known in 77.1% of the employees, 78.9% of non-employees and 84% of the students. Here we notice that students have the highest knowledge with a P-value of 0.442.

About 84.5% of the employees knew where the car seat should be located, 76.6% of the non-employees and 76% of the students knew that. Here we conclude that employees had a higher knowledge with a P-value of 0.106. The question that showed a result of a significant P-value of zero was about the knowledge of the age that requires a car seat, which gave percentages of 69.4% of the employee participants, 78.7% of the non-employee participants, and 45.3% of the student participants. We can see here that non-employees held the highest amount of knowledge with a P-value of 0.000, which is significant.

(Refer to table 6.3)

Table 6.3 Knowledge of the driver and its correlation with her\his job

		Job						Chi-square P-value
		Employee		Non employee		Student		
		n	%	n	%	n	%	
You must never buckle a car seat into the front seat of a car that has an air bag	Yes	192	74.4%	72	76.6%	53	70.7%	0.678
	No	66	25.6%	22	23.4%	22	29.3%	
Seat belts and car seats are	Yes	70	27.1%	33	35.1%	17	22.7%	0.174

necessary only for long-distance driving or for traveling at fast speeds	No	188	72.9%	61	64.9%	58	77.3%	
If your car has an air bag, you don't need to wear a seat belt	Yes	59	22.9%	20	21.3%	12	16.0%	0.442
	No	199	77.1%	74	78.7%	63	84.0%	
Do you know where the car seat should be located?	Yes	218	84.5%	72	76.6%	57	76.0%	0.106
	No	40	15.5%	22	23.4%	18	24.0%	
Do you know the age that requires a car seat?	Yes	179	69.4%	74	78.7%	34	45.3%	**0.000***
	No	79	30.6%	20	21.3%	41	54.7%	

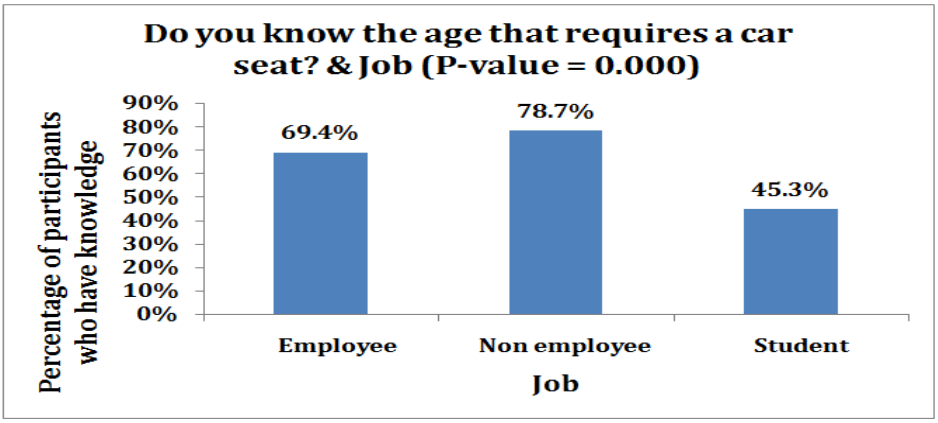

Fig.7 Correlation between Knowledge & job

Correlational Study Between the Knowledge of the Driver and his/her Marital Status:

The result showed that when asked about buckling a car seat into the front seat of a car that has an airbag, the majority (75.6%) who voted yes, were unmarried. Moreover, married people had the highest percentage of voting no (27.8%), with a P-value of 0.433. When asked if it was only necessary to wear the seat belt and use a car seat when driving a long distance or traveling. The highest percentage of saying yes was among married participants (31.4%). On the other hand, unmarried participants had the highest percentage of saying no, with a P-value of 0.225. Coming to the question of not having to wear the seat belt if there was an air bag, the results showed that married people had the highest percentage of saying yes. On the other hand unmarried people had the highest percentage of saying no (79.5%) with a P-value of 0.632.

When asked about if they knew where the car seat should be located, unmarried individuals had the highest percentage (84.5%) of saying yes, while only 76.3% of married individuals said yes, with the P-value of 0.034. When the participants were asked if they knew the required age for a car seat, the results were as the following, unmarried people had the highest percentage (73.6%) of saying yes in comparison with married people (57.4%), with a P-value of 0.000, which is significant.

Table 6.4 Knowledge of the driver and its correlation with marital status

		Marital status				Chi-square P-value
		Married		Unmarried		
		n	%	n	%	
You must never buckle a car seat into the front seat of a car that has an air bag	Yes	122	72.2%	195	75.6%	0.433
	No	47	27.8%	63	24.4%	
Seat belts and car seats are necessary only for long-distance driving or for traveling at fast speeds	Yes	53	31.4%	67	26.0%	0.225
	No	116	68.6%	191	74.0%	
If your car has an air bag, you don't need to wear a seat belt	Yes	38	22.5%	53	20.5%	0.632
	No	131	77.5%	205	79.5%	
Do you know where the car seat should be located?	Yes	129	76.3%	218	84.5%	**0.034***
	No	40	23.7%	40	15.5%	
Do you know the age that requires a car seat?	Yes	97	57.4%	190	73.6%	**0.000***
	No	72	42.6%	68	26.4%	

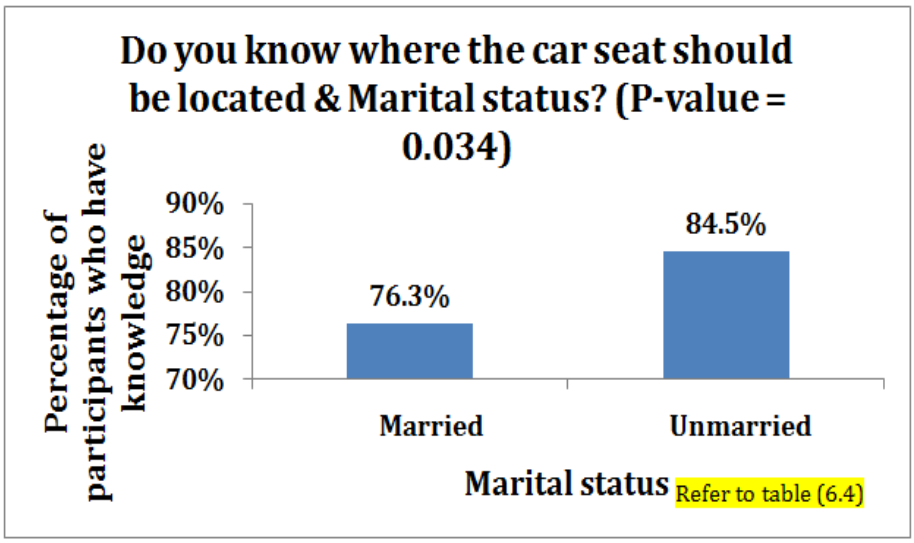

Fig.8 Correlation between Knowledge and Marital status

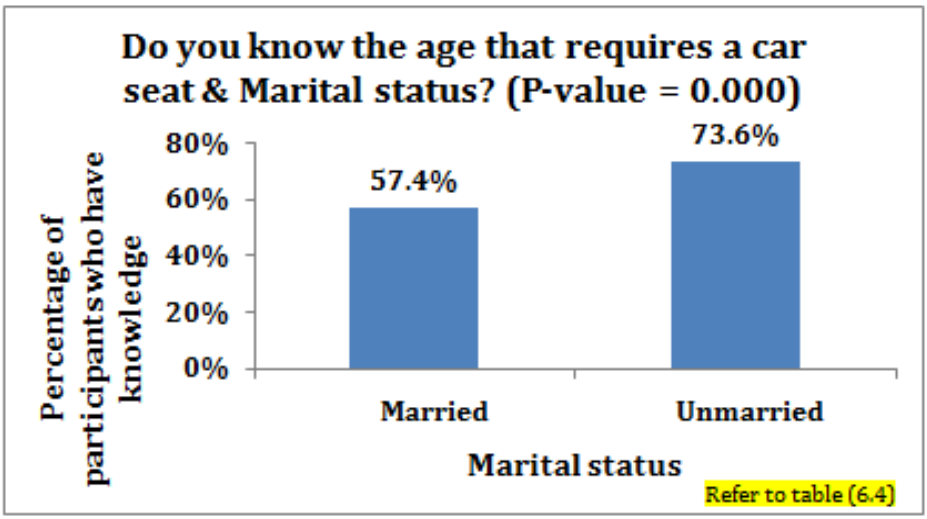

Fig.9 Correlation between Knowledge & marital status

Correlational Study between the knowledge of the drivers and their level of education:

When asked if you must never buckle a car seat into the front seat of a car that has an air bag, 62.8% of people with lower education or illiterates answered yes while 37.2% answered no, on the other hand, 76.8% of people with higher education answered yes while 23.2% answered no. The results showed that the highest percentage of who answered yes was among people with higher education and it was significant with a P-value of 0.011.

When asked if seat belts and car seats are necessary only for long-distance driving or for traveling at fast speeds, 29.5% of illiterates and people with lower education answered yes while 70.5% answered no, on the other hand, 27.8% of people with higher education answered yes while 72.2% answered no. The results showed that the highest percentage of who answered no was among people with higher education with a P-value of 0.764.

When asked if your car has an air bag, you don't need to wear a seat belt, 24.4% of illiterates and people with lower education answered yes while 75.6% answered no, on the other hand, 20.6% of people with higher education answered yes while 79.4% answered no. The results showed that the highest percentage of who answered no was among people with higher education with a P-value of 0.467.

When asked if you know where the car seat should be located, 74.4% of illiterates and people with lower education answered yes, while 25.6%answered no, on the other hand, 82.8% of people with higher education answered yes while 17.2% answered no. The results showed that the highest percentage of who answered yes was among people with higher education with a P-value of 0.084.

When asked if you know the age that requires a car seat, 64.1% of illiterates and people with lower education answered yes while 35.9% answered no, on the other hand, 67.9% of people with higher education answered yes while 32.1% answered no. The results showed that the highest percentage of people who answered yes was among people with higher education with a P-value of 0.517.
(Refer to table 6.5)

Table 6.5 Knowledge of the Driver and its Relation to his/her Educational level

		Education level				Chi-square P-value
		Illiterate or lower education		Higher education		
		n	%	n	%	
You must never buckle a car seat into the front seat of a car that has an air bag	Yes	49	62.8%	268	76.8%	**0.011***
	No	29	37.2%	81	23.2%	
Seat belts and car seats are necessary only for long-distance driving or for traveling at fast speeds	Yes	23	29.5%	97	27.8%	0.764
	No	55	70.5%	252	72.2%	
If your car has an air bag, you don't need to wear a seat belt	Yes	19	24.4%	72	20.6%	0.467
	No	59	75.6%	277	79.4%	
Do you know where the car seat should be located?	Yes	58	74.4%	289	82.8%	0.084
	No	20	25.6%	60	17.2%	
Do you know the age that requires a car seat?	Yes	50	64.1%	237	67.9%	0.517
	No	28	35.9%	112	32.1%	

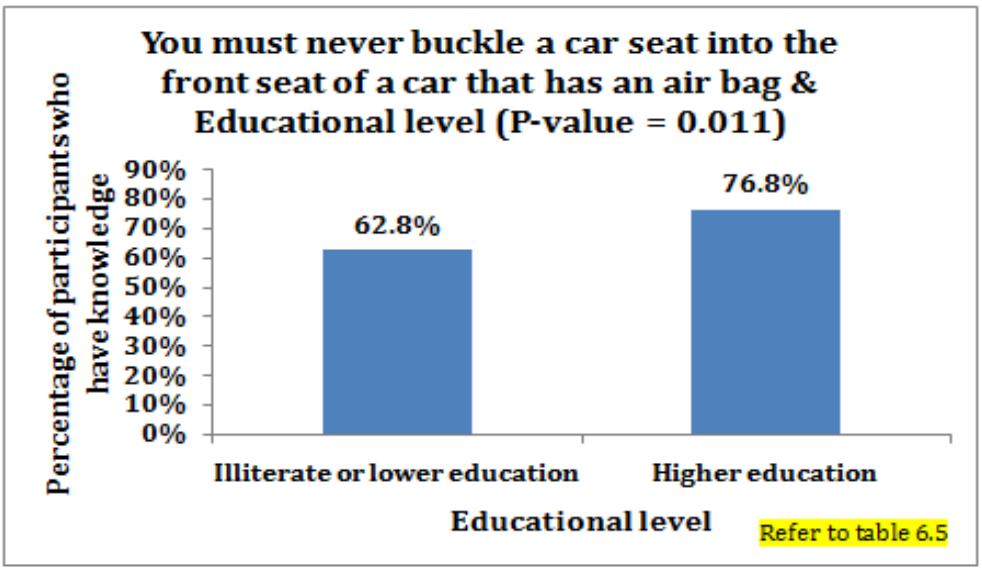

Fig.10 Correlation between Knowledge & Educational level

Correlational Study Between the Attitude of the Driver and his/her Sex:

When the participants were asked about wearing a seat belt while driving 73.5% of males said usually or always and 26.5% said seldom or never, and 70.6% of females said usually or always and 29.4% said seldom or never. We can see here that males wear the seat belts more than females, with a P-value of 0.502.

Asking about if other passengers in the car wear seat belts, 45.7% of males said usually or always while 54.3% said seldom or never. 47.2% of females said usually or always while 52.8% said seldom or never. So, the higher percentage of other passengers wearing seat belts was seen with females, with a P-value of 0.748.

The majority of males said usually or always about using car seats for children with a percentage of 55.7%, while 55.3% of females said usually or always. So, males use car seats for children more than females, with a P-value of 0.947. We wanted to know if the participants stop at stop signs, more than half of the males (87.4%) said usually or always, but a higher percentage of females said usually or always (87.8%). Here we can see that females stops in stop signs more than males do, with a P-value of 0.894. When we asked about using cell phone while driving, 60.9% of males said usually or always, while 54.8% of females said usually or always. The results show that males have higher percentage in using their phones while driving, with a P-value of 0.207.

More than half of males (72.2%) said usually or always for checking their brakes while 27.8% said seldom or never. 75.6% of females said usually or always while 24.4% said seldom or never. As we can see here that females have higher percentage of checking their brakes, with P-value of 0.418.

Table 7.1 Attitude of the driver and its correlation with her/his Sex

		Sex				Chi-square P-value
		Male		Female		
		n	%	n	%	
Do you wear your seat belt while driving your car?	Usually or always	169	73.5%	139	70.6%	0.502
	Seldom or never	61	26.5%	58	29.4%	
Do other passengers in the car wear seat belts?	Usually or always	105	45.7%	93	47.2%	0.748
	Seldom or never	125	54.3%	104	52.8%	
Do you use a car seat for children?	Usually or always	128	55.7%	109	55.3%	0.947
	Seldom or never	102	44.3%	88	44.7%	
Do you stop for stop signs?	Usually or always	201	87.4%	173	87.8%	0.894
	Seldom or never	29	12.6%	24	12.2%	
How often you use your cell phone while driving?	Usually or always	140	60.9%	108	54.8%	0.207
	Seldom or never	90	39.1%	89	45.2%	
How often do you check your car break?	Usually or always	166	72.2%	149	75.6%	0.418
	Seldom or never	64	27.8%	48	24.4%	

Correlational Study Between the Attitude of the Driver and his/her Age:

The results showed that when asked about wearing the seat belt, we can see that the highest percentage of wearing the seat belt was among age >49 which is 84.1% while the lowest percentage was among the age group (18-29) which is 65.9% with a P-value of 0.036. The data showed that the highest percentage of other passengers wearing seat belts was among people who were 49 years old and above, which was 59.1% in comparison to people within the age group (18-29) who had the lowest percentage, which is 43.6% with a P-value of 0.227.The question of using children's car seat, the highest percentage of using children's car seat was among the age group (30-39) which is 65.9%, while the lowest was among the age group (18-29) which is 47.5% with a P-value of 0.014. When asked about stop signs, the highest percentage of stopping at a stop sign was among people who were 49 years old and above, which is 95.5% while the lowest percentage was among people of ages (40-49) which is 82.6% with a P-value of 0.123.

Coming to look to the question of how often do they use their cell phones while driving, the highest percent of using the phone was among people of age (18-29), which is 68.7% while the lowest was among people of age >49 which is 40.9% with a P-value of 0.000 which is significant.A question was asked about how often do the participants check their car breaks, the highest percent of drivers checking their car breaks was among the people of age (30-39) which is 79.3% while the lowest was among those with age (18-29), which is 67.6% with a P-value of 0.101.

(Refer to table 7.2)

Table 7.2 Attitude of the driver and its relation to his/her Age

		Age								Chi-square P-value
		18-29		30-39		40-49		>49		
		n	%	n	%	n	%	n	%	
Do you wear your seat belt while driving your car?	Usually or always	118	65.9%	98	72.6%	55	79.7%	37	84.1%	**0.036***
	Seldom or never	61	34.1%	37	27.4%	14	20.3%	7	15.9%	
Do other passengers in the car wear seat belts?	Usually or always	78	43.6%	59	43.7%	35	50.7%	26	59.1%	0.227
	Seldom or never	101	56.4%	76	56.3%	34	49.3%	18	40.9%	
Do you use a car seat for children?	Usually or always	85	47.5%	89	65.9%	38	55.1%	25	56.8%	**0.014***
	Seldom or never	94	52.5%	46	34.1%	31	44.9%	19	43.2%	
Do you stop for stop signs?	Usually or always	153	85.5%	122	90.4%	57	82.6%	42	95.5%	0.123
	Seldom or never	26	14.5%	13	9.6%	12	17.4%	2	4.5%	
How often you use your cell phone while driving?	Usually or always	123	68.7%	77	57.0%	30	43.5%	18	40.9%	**0.000***
	Seldom or never	56	31.3%	58	43.0%	39	56.5%	26	59.1%	
How often do you check your car break?	Usually or always	121	67.6%	107	79.3%	53	76.8%	34	77.3%	0.101
	Seldom or never	58	32.4%	28	20.7%	16	23.2%	10	22.7%	

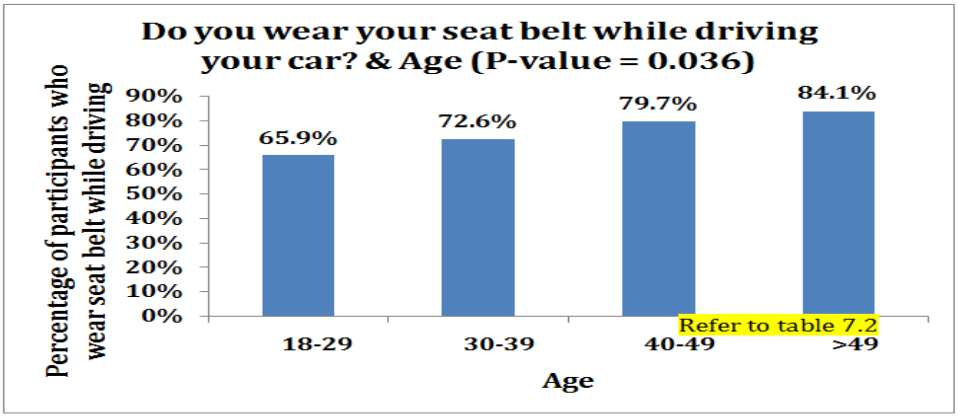

Fig.12 Correlation between Attitude & age

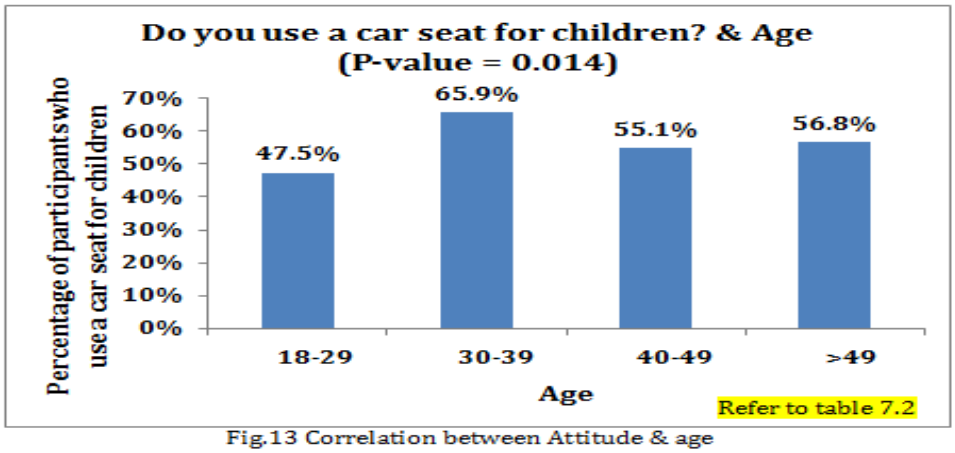

Fig.13 Correlation between Attitude & age

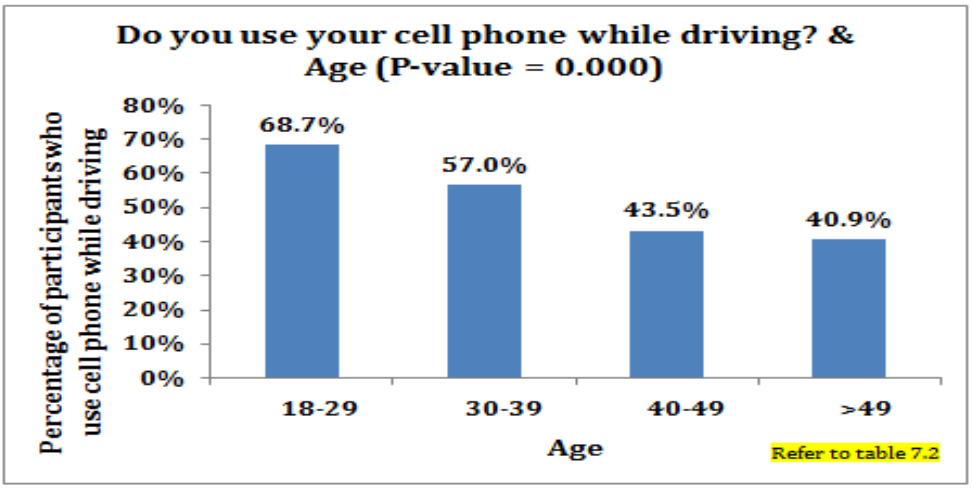

Fig.14 Correlation between Attitude & age

Correlational Study Between the Attitude of the Driver and his/her Job:

The results showed that when asked about wearing the seat belt, 76.0% of employees said always or usually while 24.0% said seldom or never. 66.7% of the student said always or usually, while 33.3% said seldom or never. 66% of non-employees said always or usually while 34% said seldom or never. Here we can see that the highest percentage of wearing the seat belt is among the employees which is 76% while on the other hand the lowest percentage is among non-employees which is 66% with a P-value of 0.091.

When asked about other passengers wearing seat belts, 50.8% of employees said always or usually while 49.2% said seldom or never. 41.5% of non-employees said always or usually while 58.5% said seldom or never. 37.3% of students said always or usually while 62.7% said seldom or never. That indicates that the highest percentage of other passengers wearing seat belts was among employees, which was 50.8% in comparison to

students who had the lowest percentage, which is 37.3% with a P-value of 0.068. Coming to the question of using children's car seat, 59.3% of employees said always or usually while 40.7% said seldom or never. 61.7% of non-employees said always or usually while 38.3% said seldom or never. 34.7% of students said always or usually while 65.3% said seldom or never. Here, we can see that the highest percentage of using children's car seat is among non-employees which is 61.7% while the lowest is among students which is 34.7% with a P-value of 0.000 which is significant.When asked about stop signs, 86% of employees said that they always or usually stop while 14% said seldom or never. 87.2% of non-employees said that they always or usually stop while 12.8% said seldom or never. 93.3%of students said they always or usually stop while 6.7% said seldom or never. We can see that the highest percentage of stopping at a stop sign is among students, which is 93.3% while the lowest percentage is among employees which is 86% with a P-value of 0.240.

When the participants were asked about how often do they use their cell phones while driving, 59.7% of employees said always or usually while 40.3% said seldom or never. 46.8% of non-employees said always or usually while 53.2% said seldom or never. 66.7% of students said always or usually while 33.3% said seldom or never. Here the highest percent of using the phone was among students, which is 66.7% while the lowest was among non-employees which is 46.8% with a P-value of 0.024 which is significant. A question was asked about how often do the participants check their car breaks. 76% of employees said always or usually while 24% said seldom or never. 72.3% of non-employees said always or usually while 27.7% said seldom or never. 68% of students said always or usually while 32% said seldom or never. The highest percent of drivers checking their car breaks was among employees which is 76% while the lowest was among students which is 68% with a P-value of 0.362.

(Refer to table 7.3)

Table 7.3 Attitude of the driver and its correlation with his/her Job

		Job						Chi-square P-value
		Employee		Non employee		Student		
		n	%	n	%	n	%	
Do you wear your seat belt while driving your car?	Usually or always	196	76.0%	62	66.0%	50	66.7%	0.091
	Seldom or never	62	24.0%	32	34.0%	25	33.3%	
Do other passengers in the car wear seat belts?	Usually or always	131	50.8%	39	41.5%	28	37.3%	0.068
	Seldom or never	127	49.2%	55	58.5%	47	62.7%	
Do you use a car seat for children?	Usually or always	153	59.3%	58	61.7%	26	34.7%	**0.000***
	Seldom or never	105	40.7%	36	38.3%	49	65.3%	
Do you stop for stop signs?	Usually or always	222	86.0%	82	87.2%	70	93.3%	0.240
	Seldom or never	36	14.0%	12	12.8%	5	6.7%	
How often you use your cell phone while driving?	Usually or always	154	59.7%	44	46.8%	50	66.7%	**0.024***
	Seldom or never	104	40.3%	50	53.2%	25	33.3%	
How often do you check your car break?	Usually or always	196	76.0%	68	72.3%	51	68.0%	0.362
	Seldom or never	62	24.0%	26	27.7%	24	32.0%	

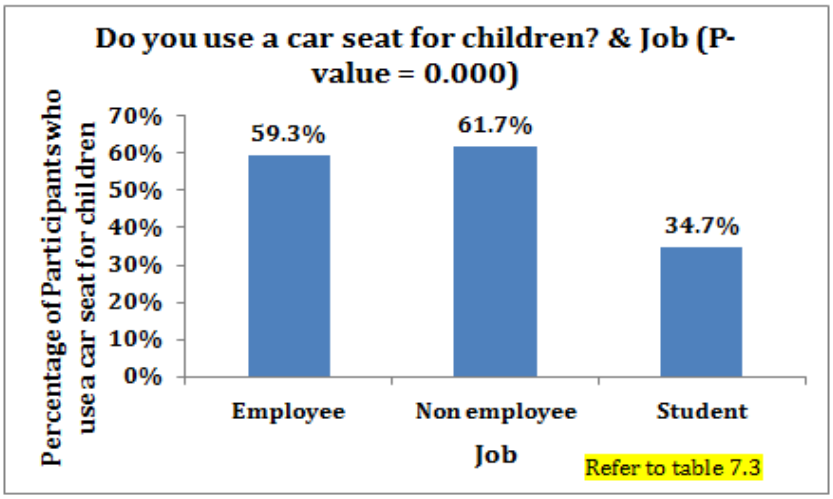

Fig.15 Correlation between attitude & job

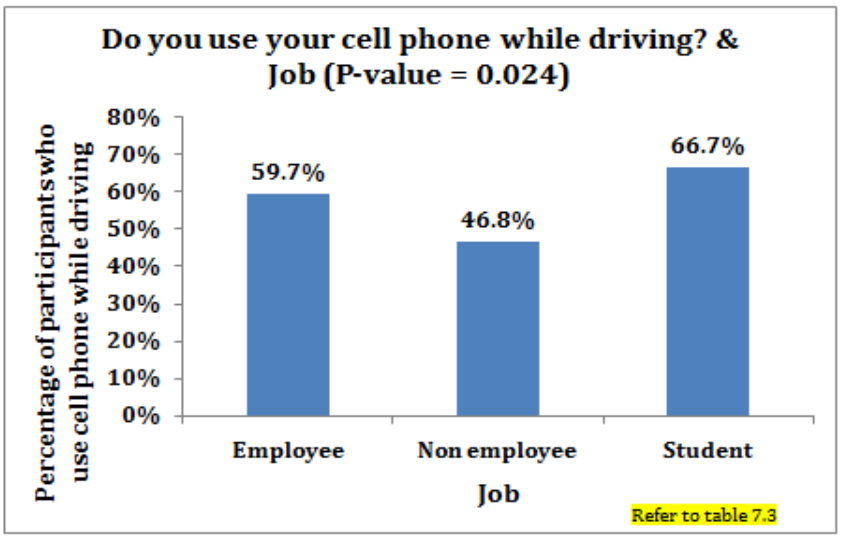

Fig.16 Correlation between attitude & job

Cross tabulation Between the Attitude of the Driver and his/her Marital Status:

Our study's results showed that when we asked about wearing the seat belt while driving, 66.3% of married individuals said usually or always and 33.7% of them said seldom or never, while 76.0% of unmarried individuals said usually or always and 24.0% of them said seldom or never. We see here that the percentage of wearing seat belts among unmarried individuals is higher than the married individuals with a P-value of 0.029, which is significant.

When we asked about the other passengers wearing seat belt. 43.8% of married individuals said usually or always while 56.2% of them said seldom or never, on the other hand 48.1% of unmarried individuals said usually or always while 51.9% of them said seldom or never. We can see higher percentage of other passengers wearing seat belts with unmarried individuals with a P-value of 0.386.

When we asked about using car seats for children, 43.2% of married individuals said usually or always while 56.8% of them said seldom or never. 63.3% of unmarried individuals said usually or always while 36.4% of them said seldom or never. We see here that unmarried individuals have higher percentage of using car seats for children with a P-value of 0.000, which is significant.

When we asked about stopping for the stop sign, 84.6% of married individuals said usually or always while 15.4% said seldom or never, on the other hand 89.5% of unmarried individuals said usually or always while 10.5% said seldom or never. If we compare, we see that unmarried individuals had a higher percentage in stopping for a stop sign with a P-value of 0.132.

When we asked about using cell phone while driving, 66.9% of married individuals said usually or always while 33.1% said seldom or never. 52.3% of unmarried individuals said usually or always while 47.7% said seldom or never. So we can see that married individuals had higher percentage of using their phones while driving with a P-value of 0.003, which is significant.

When we asked the participants if they check their car brakes, 68.0% of married individuals said usually or always while 32.0% said seldom or never, on the other hand 77.5% of unmarried individuals said usually or always while 22.5% said seldom or never. Here, we see that unmarried individuals check their car brakes more with a P-value of 0.030, which is significant.

(Refer to table 7.4)

Table 7.4 Attitude of The driver and its correlation with his/her Marital Status

		Marital status				Chi-square P-value
		Married		Unmarried		
		n	%	n	%	
Do you wear your seat belt while driving your car?	Usually or always	112	66.3%	196	76.0%	**0.029***
	Seldom or never	57	33.7%	62	24.0%	
Do other passengers in the car wear seat belts?	Usually or always	74	43.8%	124	48.1%	0.386
	Seldom or never	95	56.2%	134	51.9%	
Do you use a car seat for children?	Usually or always	73	43.2%	164	63.6%	**0.000***
	Seldom or never	96	56.8%	94	36.4%	
Do you stop for stop signs?	Usually or always	143	84.6%	231	89.5%	0.132
	Seldom or never	26	15.4%	27	10.5%	
How often you use your cell phone while	Usually or always	113	66.9%	135	52.3%	**0.003***
	Seldom or never	56	33.1%	123	47.7%	

driving?						
How often do you check your car break?	Usually or always	115	68.0%	200	77.5%	**0.030***
	Seldom or never	54	32.0%	58	22.5%	

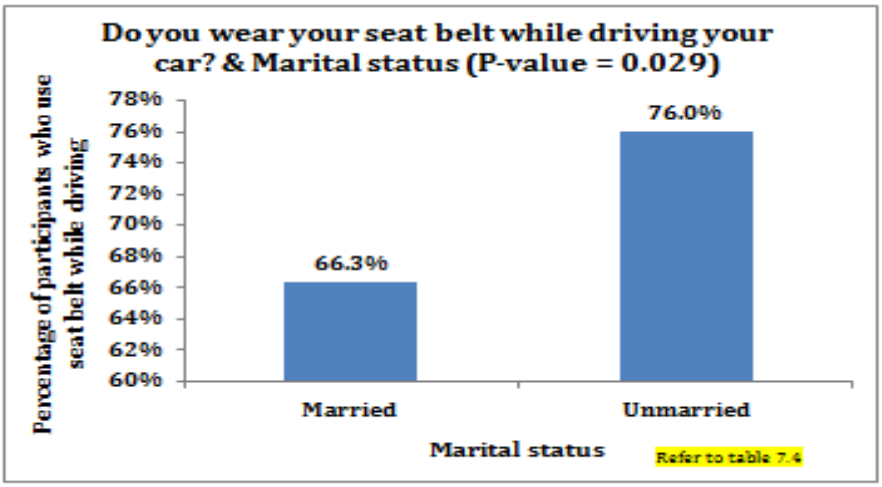

Fig.17 Correlation between Attitude and marital status

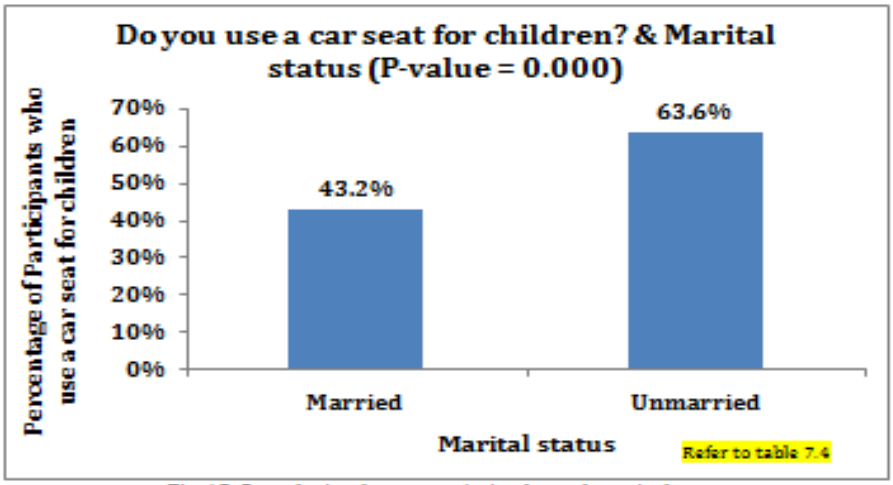

Fig.18 Correlation between Attitude and marital status

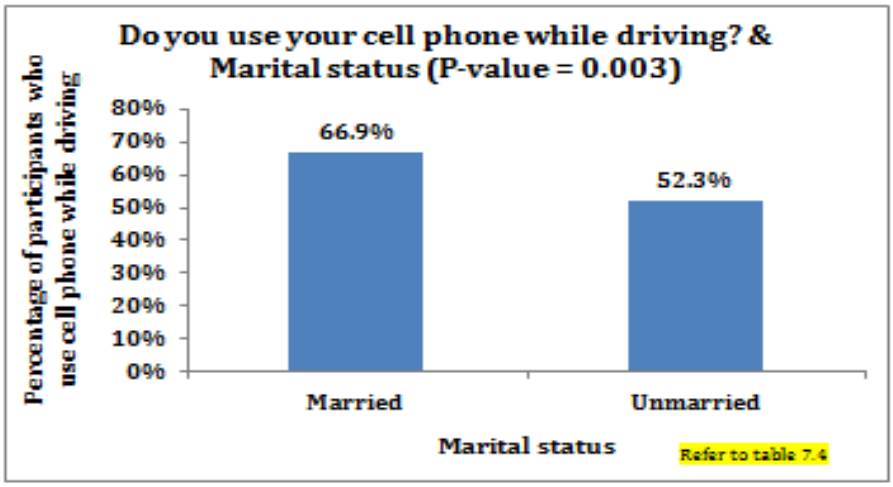

Fig.19 Correlation between Attitude and marital status

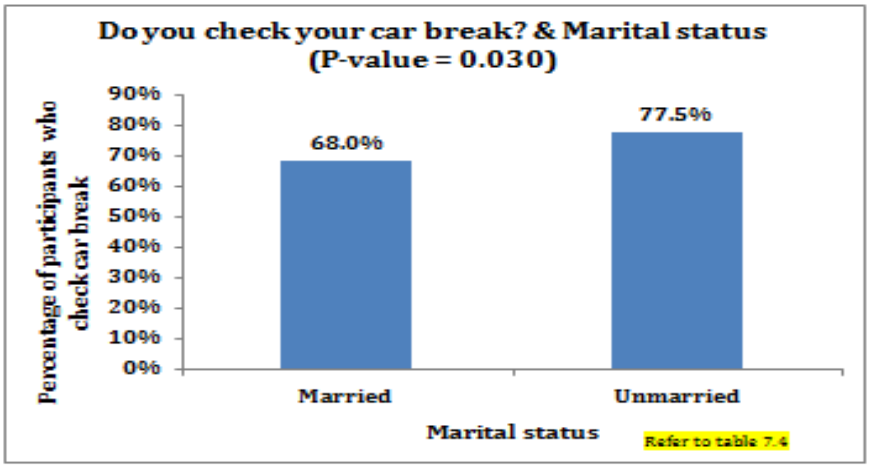

Fig.20 Correlation between Attitude and Marital status

Correlational Study Between The Attitude Of The Driver And His/Her Education Level:

Asking the participants about wearing seat belts while driving, 67.9% of illiterate or lower educated people said usually or always, while 73.1% of higher educated people said usually or always. So, we can see that higher educated people have a higher percentage of wearing seat belts, with a P-value of 0.362.

More than half (57.7%) of illiterate or lower educated people said usually or always when asked if other passengers wear seat belts. On the other hand, 43.8% of higher educated people said usually or always. We noticed that passengers with illiterates or people with lower education wear their seat belts more than the other group, with a P-value of 0.027, which is significant.

To know if the participants are using car seats for children, 60.3% of illiterate or lower educated people said usually or always, while 54.4% of higher educated people said usually or always. As we can see here, illiterates or lower educated people tend to use car seats for children more than higher educated people, with a P-value of 0.350.

The majority (85.9%) of illiterate or lower educated people said that they usually or always stop for stop signs, while 88.0% of higher educated people usually or always stop for a stop sign. What we concluded from this question is that higher educated people stop for stop signs more than illiterate or with lower educated people do, with a P-value of 0.616.

We came across the fact that 65.4% of illiterate or lower educated people usually or always use their cell phones while driving, while only 56.4% of higher educated people said usually or always. The results show that illiterate or lower educated people use their phones while driving more than higher educated ones, with a P-value of 0.148.

The results showed that 71.8% of illiterate or lower educated individuals usually or always checks their brakes while 74.2% of higher educated individuals did. What we concluded in this question is that individuals with higher education tend to check their brakes more often than illiterate or lower educated individuals, with a P-value of 0.661. (Refer to table 7.5)

Table 7.5 Attitude of the driver and its correlation with his/her Education level

		Education level				Chi-square P-value
		Illiterate or lower education		Higher education		
		n	%	n	%	
Do you wear your seat belt while driving your car?	Usually or always	53	67.9%	255	73.1%	0.362
	Seldom or never	25	32.1%	94	26.9%	
Do other passengers in the car wear seat belts?	Usually or always	45	57.7%	153	43.8%	**0.027***
	Seldom or never	33	42.3%	196	56.2%	
Do you use a car seat for children?	Usually or always	47	60.3%	190	54.4%	0.350
	Seldom or never	31	39.7%	159	45.6%	
Do you stop for stop signs?	Usually or always	67	85.9%	307	88.0%	0.616
	Seldom or never	11	14.1%	42	12.0%	
How often you use your cell phone while driving?	Usually or always	51	65.4%	197	56.4%	0.148
	Seldom or never	27	34.6%	152	43.6%	
How often do you check your car break?	Usually or always	56	71.8%	259	74.2%	0.661
	Seldom or never	22	28.2%	90	25.8%	

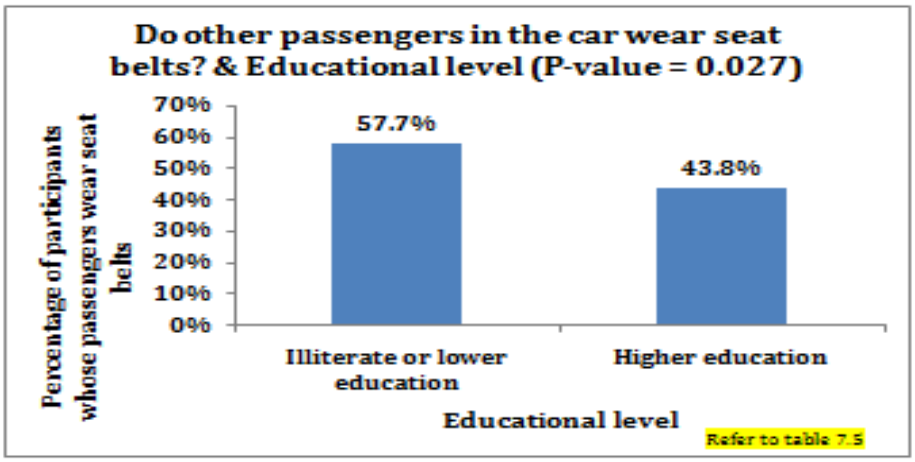

Fig.21 Correlation between Attitude and Educational level

III. Discussion

The study was established to determine the awareness and practice of safety measures among people in Bahrain. We know that car accidents cannot be prevented completely, but at least we minimize the injuries or severity by using simple protective ways. It is very important to identify the risk factors if they are related to car conditions, driver attitude, weather conditions and road conditions. Though some of these factors contribute to some extent, driver attitude and errors remain the most significant factor. As far as knowledge and sex are concerned, female participants have more knowledge about driving attitude and safety measures in this study and also in a previous study done by professor Kulkarni V in south Indian state. The same research, done by professor Kulkarni V, as will as this research, showed higher percentage of females' knowledge regarding seat belts. These results may be due to the fact that females are aware and give more attention to such measures. Nearly 86% of participants admitted using mobile phones while driving, whether they always, usually or seldom use them, While in the research done by professor Kulkarni V in south Indian state, showed that only $1/5^{th}$(20%) of the participants use mobile phones while driving. This may be attributed to the fact that the participants, of the later research, are medical students hence they are more educated and are more aware of the injuries that results from RTAs. In this study, the percentage among student participants who use seat belts is about 66.7, while in a study done by doctor AlKhaldi Y in Aseer, KSA, showed a result of 79%. This may be attributed to the change in some legislation by KSA government toward the attitude of drivers.A research done in Southern California, USA, child safety seat knowledge among parents utilizing emergency services in a level 1 trauma center conducted that 81% of participants were aware that child seat should never be buckled in front of an airbag, however, this study showed a percentage of 74.2 nearly similar to the former study result. This might be attributed to the fact that the knowledge about safety measures, including the placing of child seat in its proper place, is well known world widely. [(4)]

A research established at king Saud university, KSA, about traffic safety research chair concluded that the major cause of car accidents is the drivers' attitude related to aggressive driving, speed and failure to obey traffic rules and although alcohol is forbidden in Saudi Arabia, the rate of car accidents is increasing with time. The same cause, which is the driving attitude of drivers, was observed as a high percentage in this study, and this may be related to the similarity in the culture of both Bahrain and Saudi Arabia, and also to the proximity to each another. Overall, the knowledge of participants regarding some car safety measurements in this research was very good. In a research held in Malaysia about the knowledge, attitude and practice towards road traffic regulations among university students, the majority of participants, 87%, mentioned that they have moderate knowledge about road traffic regulations. A similar finding, reported by Al-Khaldi in a similar research, stated that most of the participants considered themselves of well knowledge about road traffic regulations. These findings were also similar to the results of this study and some other studies. The participants consider themselves knowledgeable but this is their opinion, so this might be or might be not a true fact regarding legal rules. [(14)]

This study found a strong positive relationship between road traffic accidents and attitude of drivers, this result was also concluded by many other studies including the one made in Malaysia by Redhwan A, studying the knowledge, attitude and practice towards road traffic regulations among university students, thus, drivers' behaviors, attitudes, contribute to 76.1% of all the causes of road accidents. The research done by Redhwan.A also showed a high percentage, 64.2 %, of participants who had not involved in a road accident compared to that in this study, which showed only 40.7%. The reason of this high value shown in the Malaysian research may be due to the fact that not every Malaysian participant in that research has a car; so, many of them

do not drive. And that was proven in that research with the result that tells that only 20.2% of the participants own a car. The limitation of this study is that it lacks an important aspect, the knowledge of traffic signs. Nonetheless, this study throws light on important issues with regards to knowledge and practice about car safety.

IV. Conclusion

The study participants had moderate knowledge and practice towards car safety measures. However knowledge was somewhat higher in level than the attitude observed. It showed that most people have witnessed an accident in their life while more than a half of them had been in an accident. Driving attitude is believed to be the most common cause of accidents. Females, employees and highly educated people have higher knowledge. More than half of the participants wear their seat belt while driving.

Recommendations:

We recommend The General Department of Traffic to:

1) Raise awareness of driving practice
2) Increase the fines of traffic Contraventions
3) Add more cameras on the road and traffic lights
4) Involve the community to notify the Department Of Traffic of any people who may violate the law
5) Take away the driving licenses if the person makes more than three contraventions
6) Increase the age by which the license is given

Obstacles:

- The data was basically collected in malls, and these do not represent the financially poor people and those who are less aware and less educated.
- We collected the data in the summer time and it was difficult to find this big number of people due to the fact that a lot of people usually travel in the summer.

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