Determination of the Common Risk Factors Associated with Road Traffic Accidents in Iraqi Kurdistan Region

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Article info	Abstract
	Increased traffic crashes have been one of the main issues local authorities have experienced due to the increased stability and economic development in Iraq's Kurdistan region. Any residual risk by collisions that originate from, finish with, or involve a vehicle either partially or completely on a public road is considered a road traffic accident. The present study has been conducted to assess factors associated with road traffic accidents in the Kurdistan region. An investigation was carried out among drivers in the three provinces of Kurdistan. The data collection process was conducted from February 1–March 3, 2021, and was obtained from 1,427 drivers. The questionnaires were constructed according to the study's objectives: sociodemographic data, driver's behaviors, weather effects on road traffic accidents, and effects of car lights on road traffic accidents. Data have been gathered using a contracted questionnaire, conducted independently and anonymously. The questionnaire enquires about the risk factors and the situations which might cause predisposition to road traffic accidents and driving behaviors, as well as demographic data and driving style. The majority of the data was gathered from electronic surveys. More than half (74.5%) of the study sample are male; most of them (75.11%) use a seat belt while driving, 4.2% of drivers drink alcohol while driving, and 55.8% of drivers use a mobile phone while driving. Traffic accidents have impacted 9.46% of drivers due to weather conditions, 6.3% of drivers do not have driving licenses, and there is a highly significant association between age and gender with road traffic accidents. Several risk factors that apply to the general population are especially pertinent and even increased among young drivers: drunk driving, speeding, and lack of seat belt use. The study recommends that drivers be encouraged to drive defensively and obey traffic rules and regulations in all circumstances. This can be accomplished by increased traffic awareness and the enforcement of traffic regulations. Furthermore, cities should be equipped with public transportation modes such as trams or trains.

Introduction

A road traffic accident (RTA) can be defined as any injury resulting from crashes that originate from, terminate with, or involve vehicles fully or partially on public roads *[1].* In most areas of the world, the road traffic injury epidemic continues to increase. In the last five years, the majority of countries have endorsed recommendations of the World report on the prevention of road traffic *injuries*, giving guidance on how countries could implement a comprehensive method for the improvement of road safety and decreasing death rates on roads *[2].*

Traffic accidents are predicted to be the fifth leading cause of death and the third leading cause of disabilities worldwide by 2030. Road traffic injuries result in severe disabilities in several middle- and low-

income countries. Despite their wealth and modern road systems, the traffic injury incidence in Middle Eastern countries is considerably higher than in Europe and the US *[3]*.

The *Global status report on road safety* reaffirms road traffic injuries as a worldwide health and development problem. Over 1.2 million individuals die on the world's roads each year, and as many as 50 million others have been injured. More than 90% of traffic-related deaths take place in the countries of middle- and low-income *[4]*.

On EU roads, 22,660 people died in 2019, representing a 3% reduction compared to 2018. Out of the 32 countries monitored by the European Transport Safety Council (ETSC) Road Safety Performance Index (PIN) program, 16 countries reduced road death cases in 2019. Luxembourg achieved the best results with a 39% reduction, Sweden with 32%, Estonia with 22%, and Switzerland with 20%. Road death cases increased in 12 countries, whereas the progress stagnated in four others *[5]*.

An average of 17 Saudi Arabian citizens die daily on the country's roads, according to data reported by the Kingdom's General Directorate of Traffic. The World Health Organization has found Saudi Arabia to have the world's highest number of deaths from road accidents, which now make up the nation's principal cause of death in adult males aged 16–36. First reported by the Saudi-based *Arab News*, the study found that 6,485 people died and over 36,000 were wounded in more than 485,000 traffic accidents from 2008 to 2009 *[6]*.

In Sulaimani, the Kurdistan region's general directorate of traffic said that 432 people died and 4,772 others were injured in traffic accidents in 2020. The directorate reported in a statement that the casualties were the result of 2,897 collisions. Likely due to coronavirus-related travel restrictions, deaths and injuries both decreased compared with the previous year. According to the directorate, 575 people died and 6,791 others were injured in traffic accidents in 2019. Speed and not wearing a seat belt are often cited as contributing factors in deaths and injuries. In addition, 1,386,214 traffic violations were recorded in the Kurdistan region, revealing considerable risk factors, such as overload, by analyzing the ratio of every one of the risk factors per year. This ratio refers to the number of accidents involving a specific factor in one year compared with the total accident count that year *[7]*.

Drivers must become the primary agents of change for better road traffic safety outcomes within the population. If drivers are insufficiently educated before driving, the public ultimately suffers. For this reason, drivers must be well educated and knowledgeable about the impact of driver behavior on road traffic safety *[8]*. The study's objective was to identify the key factors contributing to the RTAs in the Kurdistan region.

Methods

A. Study design

This study was a cross-sectional design—a quantitative survey done online from February 1–March 30, 2021.

B. Administrative arrangement

The study proposal was accepted by the nursing college council and approved by the scientific committee of the College of Nursing, University of Sulaimani.

C. Setting of study

The study was conducted in all cities of the three Kurdistan provinces (Hawler, Halabja, and Sulaimaniyah).

D. Sample of study

A total of 1,472 drivers took part in the online survey. The study was open to both males and females, and the eligibility criteria included having the ability to drive, being registered to operate a vehicle, and having completed the questionnaire. Participants received an information sheet illustrating the objective of this study and ensuring the voluntary participation and complete confidentiality of the acquired information.

E. Methods of data collection

The questionnaire was constructed by researchers according to the study's objectives, depending on many scientific studies and literature. A Google Survey (docs.google.com/forms) invitation link was sent to potential

participants via email. Written consent was included in the first section of the online survey after the reason for the research. If participants agreed, they could then progress to completing the questionnaire. It took an average of 4 minutes for participants to respond to the questionnaire by clicking answers in the checkboxes.

F. Tools and measurement

The study, including the Kurdish translation, was constructed according to the researcher's objective with some adjustments. The questionnaire consists of two parts. The first part is related to a person's sociodemographic data: age, sex, means of transportation, type of car, whether they have a driver's license, how long they have held a driver's license, type of driver's license, and how long they have been driving a car. The second part relates to risk factors, including behavior, morals, weather, and safety-related questions. Social and family problems affect the driver's ability to concentrate. We asked questions to understand the effect of a driver's mood, such as anger or depression, and similar inquiries related to the weather's impact on driving. Have you been in traffic accidents due to bad weather?

G. Testing validity of the questionnaire

The validity of the study questionnaire was established through a panel that included nine experts from the University of Sulaimani and the Ministry of Health to validate the questionnaire for content clarity, relevancy, and adequacy to achieve the present work's objectives.

H. Statistical analysis

For statistical analysis, Jeffrey's Amazing Statistics Program (JASP) version 14.1 was used after data was automatically registered in the Excel file of the survey and imported into the JASP. Frequency and percentage for descriptive analysis were used. For testing relationships between categorical variables, the Chi-squared test was used.

Results

Study revealed that most participants 74%, 79% were male and in rural areas. 19.3% of the participant were aged between (22-25) years old and 54.2% of the participants are married. 59% of the participants are post-graduated and 53% were already employed. According to present data 72.2%, their economic status indicates barely sufficient (Table 1).

Table-1: Frequency and percentage of participant collision accident information.

Demographic information		Frequency	Percent
Gender	Male	1063	74.5
	Female	364	25.5
	Total	1427	100
Age	Under 18 years old	41	2.8
	18 – 21	243	17
	22 – 25	276	19.3
	26 – 29	148	10.4
	30 – 33	207	14.5
	34 – 37	201	14.1
	38 – 41	196	13.7
	42-over 42	115	8
	Total	1427	100
Residential Area	Rural	1129	79.1
	Urban	298	20.9
	Total	1427	100
Material Status	Single	638	44.8
	Married	774	54.2
	Divorced / Widow	15	1
	Total	1427	100
Economic Status	Sufficient	316	22.1
	Barley Sufficient	1030	72.2
	Insufficient	81	5.7
	Total	1427	100
Occupation	Student	412	28.9
	Employer	756	53
	Worker	137	9.6
	Jobless	122	8.5
	Total	1427	100
Level of Education	Postgraduate	839	58.9
	University & Institute	356	24.9
	School	207	14.5
	Illiterate	25	1.7
	Total	1427	100

The most common transportation way among participants is a car with a percentage of 97.6%. Also 88.4% has a driving license 67.6% of them were special licenses. 34.55% in their first four years with a driving license (Table 2).

Table-2: Frequency and Percentage of Transportation and License information

Transportation and License information		Frequency	Percent
Type of Car?	Personal Vehicle	1135	79.53
	Public Passenger	135	9.46
	Bus	73	5.12
	Pickup	84	5.89
	Total	1427	%100
Do you have a driving license?	Yes	1262	88.4
	No	165	11.6
	Total	1427	100
How long do you have a driving license?/yes	Less than 4years	284	22.5
	4-7 years	222	17.6
	8-11 years	276	21.9
	12-15 years	237	18.8
	Above16years	199	15.5
	Total	1262	100
Types of driving licenses?/yes	Special	800	63.4
	General	462	36.6
	Total	1262	100

Data analysis illustrates that 49% of the participants had a car accident and the most common type was a hit accident by the percentage of 78.68%. 89.4% of accidents outcome were moderate injury and 93.1% of damages were vehicle damage (Table 3).

Table-3: Frequency and Percentage of partners' crash accident information.

Crash Accident Data		Frequency	Percent
Have you ever had a car accident?	Yes	699	49
	No	728	51
	Total	1427	100
If yes how many times during the past 5 year years	One	343	49.1
	Two	227	32.4
	Three	93	13.3
	Four and more	36	5.2
	Total	699	100
Kind of accident?	Overturn	36	5.15
	Overturn and Hits	31	4.46
	Going out of the way	82	11.73
	Hit	550	78.68
	Total	699	100
The outcome of an accident?	Mild injury	55	7.9
	Moderate injury	625	89.4
	Severe injury	12	1.7
	Death	7	1
	Total	699	100
Type of damage?	Personal Damage	20	2.86
	Vehicle damage	637	91.13
	Punitive Damage	6	0.85
	Personal and vehicle damage	20	2.86
	All of them	16	2.3
	Total	699	100

Regarding the behavior aspects of participants while driving, this study showed that 94.6 % were following traffic regulation rules, 23% of the participants weren't using a seat belt, 51.57% of them were using mobile while driving and 50.8% were driving while being tired (Table 4).

Table-4: Frequency and Percentage of participant behavior aspects information (No=1427).

Behavior Aspects	Yes		No	
	F	%	F	%
Do you follow traffic regulation rules?	1350	94.6	77	5.4
Do you use seat belt while you are driving?	1098	77	329	23
Do you use mobile while driving?	736	51.57	691	48.4
Do you drive while you're tired?	726	50.8	701	49.12
Do you stop in front of the traffic light till the time is end?	1381	96.77	46	3.22
Do you drive when you're drink alcohol?	44	3.1	1383	96.9
In busy cities do you apply for speed limits set by traffic rules?	1304	91.3	123	8.7
On high ways, do you apply for speed limits set by traffic rules?	1098	76.9	329	23.1
If you had passengers, will that force you to follow traffic rules more efficiently?	1290	90.4	137	9.6
Have you been the victim of car-horn abusers?	**352**	**24.6**	**1075**	**75.4**

The driving behavior of 64.8% of study participants was affected by social and familial problems while the mood changes affect negatively (74.3%) on the driving behavior (Table 5).

Table-5: Frequency and Percentage of participant social and mood effect information who done crash accident

Social and Mood Effect part		Frequency	Percent
For social and familial problems had affected your driving behavior?	Yes	925	64.8
	No	502	35.2
	Total	1427	%100
Change in mood had affected your driving behavior (anger. Depression)?	Yes	1060	74.3
	No	367	25.7
	Total	1427	100

According to the weather and lighting condition, a slight effect was recorded for the dim light of own car, the bright light of the opposite car and the weather condition (6.377%, 11.773 %, 9.46%) respectively whereas high effect was recorded of the lack of lightening on the road during dark (77.4%) (Table 6).

Table-6: Frequency and Percentage of participant weather and lighting condition information

Weather and Lighting Condition part		Frequency	Percent
Have you ever had a car accident due to the weather condition?	Yes	135	9.46
	No	1292	90.54
	Total	1427	%100
Have you ever had a car accident due to the bright lights of your opposite coming car?	Yes	168	11.773
	No	1259	88.227
	Total	1427	%100
Have you ever had a car accident due to dim light?	Yes	91	6.377
	No	1336	93.623
	Total	1427	%100
Does the lack of lightening on the road during the dark hours affect your driving?	Yes	1105	77.4
	No	322	22.6
	Total	1427	100

The participants age group (34 – 37 years) was the most applied for the traffic regulation (17.74%) while the participant's age group (22 – 25years) was the most not applying the traffic regulation (2.57%). The outcome *P*-value is 0.0001 which indicates highly significant data supporting the present result (Table 7).

Table -7: Relationship between ages group and who done crash accident, did they apply for traffic regulation rules.

Variable		Do you apply for traffic regulation rules?					
		Yes		No		Total	
		F	%	F	%	F	%
Age	Under 18 years old	18	2.57	7	1	25	3.57
	18 – 21	59	8.44	5	0.71	64	9.15
	22 – 25	95	3.59	18	2.57	113	16.2
	26 – 29	67	9.58	3	0.43	70	10.01
	30 – 33	103	14.73	7	1	110	15.73
	34 – 37	124	17.74	1	0.14	125	17.90
	38 – 41	113	16.16	6	0.86	119	17.02
	42 -over 42	73	10.44	-	0.0	73	10.44
Total		652	93.3	47	6.7	699	100
P value	0.001			X^2	46.912[a]		

This study revealed high significant relationship between the age group who done a crash accident, and they didn't have a driving license (Table 8).

Table-8: Relationship between age's group and who did crash accident, did have a driving license.

Variable		Do you have a driving license?					
		Yes		No		Total	
		F	%	F	%	F	%
Age	Under 18 years old	13	1.85	12	1.716	25	3.576
	18 – 21	49	7.01	15	2.145	64	9.156
	22 – 25	96	13.734	17	2.432	113	16.166
	26 – 29	70	10.14	-	-	70	10.014
	30 – 33	110	15.736	-	-	110	15.738
	34 – 37	125	%17.88	-	-	125	17.882
	38 – 41	119	17.024	-	-	119	17.024
	42 -over 42	73	10.443	-	-	73	10.443
Total		655	93.7	44	6.3	699	100
P value	0.001			X^2	153.658[a]		

There was a highly significant relationship between the ages group (22-25) who done a crash accident and didn't they use a seat belt while driving as shown in table (9).

Table-9: Relationship between age group and who did crash accident and have a seat belt while driving.

Variable		Do you use a seat belt while driving?					
		Yes		No		Total	
		F	%	F	%	F	%
Age	Under 18 years old	14	2.002	11	1.573	25	3.576
	18 – 21	37	5.293	27	3.862	64	9.156
	22 – 25	73	10.443	40	5.722	113	16.166
	26 – 29	59	8.440	11	1.573	70	10.014
	30 – 33	79	11.301	31	4.435	110	15.736
	34 – 37	98	14.020	27	3.862	125	17.882
	38 – 41	99	14.163	20	2.861	119	17.024
	42 -over 42	66	9.442	7	1.001	73	14.443
Total		525	75.11	174	24.89	699	100
P value	0.001					X^2 39.613[a]	

There was a highly significant relationship between a male who done a crash accident and do they drive when they drink alcohol (Table 10).

Table-10: Relationship between gender group and who done crash accident, do they drive when you drink alcohol.

Variable		Do you drive when you drink alcohol?						Total	
		Yes / F	%	No / F	%	Not a drinker / F	%	F	%
Gender	Male	26	3.719	39	5.579	491	70.24	556	79.542
	Female	3	0.429	19	2.718	121	17.31	143	20.457
Total		29	4.2	58	8.3	612	87.5	699	100
P value	0.001					X^2 7.393[a]			

There was a highly significant relationship between the male (79.542%) who done a crash accident and do they use a mobile phone while driving (Table 11)

Table-11: Relationship between gender group and who done crash accident, do they use a mobile phone while driving.

Variable		Do you use a mobile phone while driving?					
		Yes / F	%	No / F	%	Total/F	%
Gender	Male	344	49.21	212	30.329	556	79.542
	Female	46	6.58	97	13.877	143	20.457
	Total	390	55.8	309	44.2	699	100
	P value		0.001			X^2	40.687[a]

Discussion

Road traffic accidents ranked seventh cause of death in low-income countries and tenth in upper- and lower-middle-income countries. These data from World Health Organization (WHO) motivated the present study on assessing the cause of RTAs in Kurdistan *[9].* Based on the presented analysis, the most common risk factors associated with RTAs in the Kurdistan region are identified as being male and between 22–25 years of age, which agrees with a study done by the WHO *[2].* The present study has 2.8% under 18 years old without a driver's license. However, 49% of drivers were involved in a car accident in the past five years and 91.3%

of the accidents caused vehicle damage and loss of money. This result is in line with previous reports by the WHO that have shown that drivers in different groups of people have various risk exposures. As the populations change over time, so does the general exposure of that population. The fluctuations in relative sizes of different groups of people will strongly affect the RTA toll. With demographic changes over the next 20–30 years, drivers over the age of 65 will become the largest group of road users in these countries *[10]*.

Concerning driver behaviors, this study shows that the proportion of subjects who have risky driving behaviors is high. The study reports that about 33% of drivers do not use seatbelts, half of the participants drive a car when tired and use their mobile phones, and safe driving was affected by mood in 65–75% of the drivers causing speeding and accidents. Risky driving behavior was associated with higher educational status, supporting behavior toward riskier driving. However, having a low monthly income has also been linked to dangerous driving. The differences in risky driving behaviors between male and female drivers were evident in this study, confirming other studies in Europe that show that males have more risky driving behaviors compared to females due to cultural and biological reasons *[11]*.

According to the present result, out of all drivers, nearly 10% have been in traffic accidents due to environmental factors such as weather conditions and street lighting. The similar study done in the United States looking at crashes, and deaths in relation to weather conditions between 2010–2014 showed that, in 2010, there were 5,419,445 traffic accidents with 443,798 due to weather conditions *[12]*. The present study shows a highly significant association between the age groups that cause the most car accidents and those that tend not to follow the traffic rules. In contrast, most adult groups not using seatbelts showed a significant incidence of accidents resulting in injury. This confirms other research in Spain on the relationship between age, gender, and seat belt use and the risk of dying young in drivers of passenger cars that have been involved in traffic accidents *[13]*. The present study demonstrates a highly significant association between the male gender and collisions occurring while using a mobile phone and drinking alcohol. This result agrees with the study half of the sample use a mobile phone while driving *[14]*. The rate of drinking alcohol while driving is higher among males than among females, similar to a study about gender differences in drunk driving prevalence rates and trends *[15]*.

Conclusion

Road traffic accidents are a severe public health issue in Iraq's Kurdistan region. RTA also occur with high frequency and increased injury rate, primarily among young adults with a male preponderance, with injuries most prevalent in these cases. A rise in the number of cars, the lack of other forms of public transportation (such as trams or trains), the quality of roads, traffic conditions, and aging vehicles are all contributing factors. The most common RTA risk factors that apply to the general population are similarly relevant to young drivers. In some circumstances, many of these are increased, such as speed, drunk driving, not wearing a seatbelt, and using a cell phone while driving. Other characteristics, such as particular aspects of driver behavior and styles, are also highly linked to car accident involvement. The study recommends that can be accomplished through various penalties, including increased traffic awareness and the enforcement of traffic laws. The findings suggest that interventions that encourage drivers to develop self-awareness regarding human variables, manage stress, and relax while driving could help minimize aggressive behavior, particularly among younger, male, and high-mileage drivers. Furthermore, public transportation modes such as trams or trains should be employed to reduce the rate of crashes in the city.

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