



Survey on the Causes of Road Traffic Accidents in Sulaymaniyah, Kurdistan Region, Iraq

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Abstract

Background: Due to the stability and economic development in the Kurdistan region of Iraq, increase in the number of traffic crashes has been one of the serious challenges that local authorities have faced with. The present study was conducted to investigate the prevalence of road traffic accidents (RTAs), road traffic injuries (RTIs), and their causes in Sulaimaniyah City, Kurdistan Region, Iraq.

Materials and Methods: The present descriptive study was conducted based on the data collected from the Health Directorate/ MOH and the Traffic Department/ Ministry of Interior in Sulaimaniyah. A questionnaire was also used to collect required data from RTA casualties who were admitted to Sulaimaniyah Main Emergency Hospital during a 6-month period from January first till the end of June 2014. The collected data were analyzed using SPSS software version 21.0.

Results: Based on the results obtained from Sulaimaniyah Main Emergency Hospital, there were 251 RTA victims in 2014 within the age range of 1 to 81 years. Moreover, RTAs led to the death of 270 and 280 individuals in 2012 and 2013, respectively. The main causes of RTAs were respectively over speeding (33%), the sudden appearance of a vehicle (13.9%), and vehicle slip (10.4%), speeding (48.7%), followed by drowsiness of the drivers (36.9%), and drunken driving (5.6%).

Conclusion: In order to reduce RTAs, the overall quality of roads, quality of cars, and general driving skills should be improved. Moreover, for decreasing the rate of crashes inside the city, public transport modes such as tram or train should be prepared.

Keywords: Traffic Accident, Injury, Iraq.

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Introduction

The World Health Organization (WHO) defines a road traffic accident (RTA) as a collision involving at least one vehicle in motion on a public or private road, resulting in at least one person being injured or killed. The dictionary defines accident as a happening that is not expected, foreseen, or intended. RTAs are major but neglected public health challenges (1, 2).

Road traffic injuries (RTIs) represent a leading and increasing contribution to regional and global disease burden. RTAs are amongst the leading causes of disability-adjusted life years lost. RTIs mean a fatal or non-fatal

injury incurred as a result of a road traffic crash (RTC). The WHO has defined RTC as a collision or incident that may or may not lead to injury, occurring on a public road and involving at least one moving vehicle (1, 3).

Injuries and deaths caused by RTAs are a major public health problem in the developing countries, mainly because of rapid motorization and development of the industrial products without suitable safety precautions. RTAs affect many sectors of society including individuals, families, communities, and countries. Victims of fatal road accidents die on the scene or in hospital. Survivors also suffer from different types of injuries and disabilities

which can affect their quality of life. Sufferers can be passengers, pedestrians, and drivers. They can even be the cause of the accident themselves. As these victims suffer, their families and communities will suffer too; they must sometimes carry the burden of caring for the victims (4). Based on various studies carried out for detection of the most potential epidemiologic factors associated with the occurrence of RTAs, some of the main risk factors and determinants include: human factors (i.e. age, gender, type of road user, socioeconomic status, risky behaviors, intake of alcohol and drugs, fatigue and sleepiness of driver, day or night driving, wearing seat-belts and helmets, airbag, use of mobile phone, and driver experience), vehicle factors (product design, vehicle size and type, speed of the vehicle, and age of the vehicle), and environmental factors (road conditions, traffic conditions, and weather conditions) (5, 6).

In order to achieve the most appropriate strategy for prevention and control of RTAs, it is important to provide instructions on the necessary elements of RTI control as part of existing training for several categories of professionals. This pertains to curricula for both basic education and in-service training, such as training related to injury control and road safety, working with injury data, social marketing to promote safe behaviors, promoting safety-conscious road system design, enhancing safety-related legislation and litigation, preparing effective enforcement of road safety laws, especially control of speed and driving while under the influence of alcohol, preparing trauma treatment for generalists, specialization in traumatology for locations dealing with a high volume of RTIs, and skills for planning and administration of trauma services (1, 7). However, prevention, safety, and treatment are the three primary aspects of a national plan to reduce road injuries (8).

Surveillance is key to the initiation and implementation of a successful injury prevention program, which could be improved with minimal expenditure. In this regard, upgrading preexisting data sources is likely to be more cost-effective than creating entirely new systems (9). Moreover, some features affect the safety of a road, including intersection design, signboards, and traffic calming measures to decrease vehicle speeds, as well as more general features of the road environment, such as whether high-speed roads pass through crowded neighborhoods (10). Since most traffic engineering practices are based on experience from high-income countries, another priority is to delineate design features that are most effective in different environments encountered in low and middle-income countries, particularly taking into account the predominance of vulnerable road users, such as pedestrians and cyclists, and different land-use patterns (11).

In relation with human behavior, there are two major driver behaviors that should be addressed: speed control and driving under the influence of alcohol; both are

best approached by a combination of legislation and law enforcement and social marketing. Speed control is one of the more readily controllable factors affecting pedestrian injury in countries with low or middle incomes (12). An entire field of traffic engineering is dedicated to speed control through laws, enforcement, education, and traffic-calming infrastructure; this field needs to be developed and applied more extensively in low or middle-income countries (11). Moreover, it should be noted that advances in trauma care have played a role in decreasing the rates of deaths from RTIs in high-income countries (13). Considering all abovementioned, the main objective of the present study was to investigate the RTAs, RTIs, and the relevant parameters and factors in Sulaimaniyah city, Iraqi Kurdistan.

Materials and Methods

Study Design and Setting

The present descriptive study was carried out with the consideration of cross-sectional approaches. The study was carried out in Health Directorate in Sulaimaniyah, MOH, Sulaimaniyah city, Road Traffic Registration Department, Ministry of Interior, Sulaimaniyah city, Main Emergency Hospital in Sulaimaniyah, and Census Directorate Ministry of Planning, from January first to the end of June, 2014.

Study Population

The study consisted of RTA victims registered in 2012 and 2013 in Sulaimaniyah at the Health Directorate/MOH Department of Statistics, and Road Traffic Registration Department/ Ministry of Interior. It also included the victims of RTAs admitted to Sulaimaniyah Main Emergency Hospital during a 6-month period from January first till the end of June, 2014.

Data Collection

Required data were collected in two phases; record review and questionnaire-based interviews. In the first phase, the Health Directorate/ MOH and the Traffic Department/ Ministry of Interior in Sulaimaniyah were referred to for collecting data on the number of RTAs, number of RTIs, accident type, age, time of accident, place of occurrence, and weather conditions at the time of accident. In the second phase, a questionnaire was used to collect data on the socio-demographic characteristics of the victims (age, sex, marital status, education level, occupation, and monthly income), pre-accident data (wearing seat belt, wearing helmet, alcohol intake, taking drugs, using cell phone, speed, and drowsiness), accident-related data (type of accident, vehicle type, vehicle model, time and place of accident, type of road, cause of accident, the organs injured, road conditions, weather conditions, and traffic conditions), and post-accident data (arrival of ambulance, time of hospital transport, provided health care, and length of stay in hospital). These data were

collected through face-to-face interviews with the victims or their companions.

Statistical Analysis

The collected data were analyzed through SPSS software version 21.0. In so doing, frequencies, mean, and standard deviations were calculated. In addition, incidence rate of RTIs, incidence rate of RTAs, injury-related death rate, mortality rate (MR), proportionate mortality rate due to RTIs, case fatality rate due to RTIs, and injury rate of RTAs were calculated.

Results

Based on the results obtained from Sulaimaniyah Main Emergency Hospital (January - June 2014), there were 251 RTA victims whose mean age was 25.96 ± 17.04 years, ranging from 1 to 81 years. The most affected age group was 20-29 years (34.7%), followed by 10-19 years (19.9%), 1-9 years (15.9%), and 30-39 years (13.5%) (see Table 1). The RTA victims' monthly income was barely sufficient in 62.5% of cases, sufficient in 28.7%, and insufficient in 8.8% (see Figure 1).

According to the results of the present study obtained from Sulaimaniyah Health Directorate, Ministry of Health (2012 and 2013), the total number of RTIs were 4390 in 2012 and 3429 in 2013, from which 270 (6.2%) and 280 cases (8.2%) were fatal in these years, respectively (see Table 2).

The total number of RTAs in 2012 and 2013 were respectively 1223 and 887 cases, from which 270 (7.2%) and 280 (9.0%) cases led to fatal injuries, respectively (see Table 3).

As revealed by the results, RTAs led to death of 724 and 763 individuals in 2012 and 2013, respectively. The most common causes of death in both years were respectively RTIs with 37.3% in 2012 and 36.7% in 2013, other injuries with 18.92% in 2012 and 18.5% in 2013, and burns with 16% in 2012 and 16.5% in 2013. Other most common

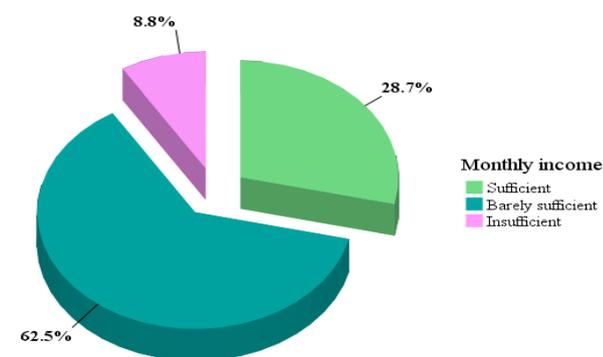


Figure 1. Distribution of RTA Victims According to Monthly Income (Source: Sulaimaniyah Main Emergency Hospital, Jan - June 2014).

Table 1. Distribution of RTA Victims According to Age and Gender

Age Group (y)	Gender				Total	
	Male		Female		No.	%
	No.	%	No.	%		
1-9	21	12.3	19	23.8	40	15.9
10-19	32	18.7	18	22.5	50	19.9
20-29	74	43.3	13	16.3	87	34.7
30-39	19	11.1	15	18.8	34	13.5
40-49	8	4.7	5	6.3	13	5.2
50-59	3	1.8	2	2.5	5	2.0
60-81	14	8.2	8	10.0	22	8.8
Total	171	100.0	80	100.0	251	100.0

Mean ± SD: 25.96±17.04 years
Source: Sulaimaniyah Main Emergency Hospital, Jan - June 2014

Table 2. Distribution of RTA Victims According to Accident Outcome

Years	Total RTIs	Outcome			
		Non-fatal RTIs		Fatal RTIs	
		No	%	No	%
2012	4390	4120	93.8	270	6.2
2013	3429	3149	91.8	280	8.2
Total	7819	7269	92.9	550	7.1

Source: Sulaimaniyah Health Directorate / MOH, 2012 and 2013

Table 3. Total RTAs and Outcome

Years	Total No. of RTAs	Accident Outcome for Total No. of RTIs	Accident Outcome			
			Non-fatal RTIs		Fatal RTIs	
			No.	%	No	%
2012	1223	3749	3479	92.8	270	7.2
2013	887	3115	2835	91.0	280	9.0
Total	2110	6864	6314	92.0	550	8.0

Source: Sulaimaniyah Traffic Department/ Ministry of Interior, 2012-2013

causes of death were gunshot, electric shock, fall from height, drowning, trauma, and scorpion bite (see Table 4).

Considering the pre-accident data, 107 RTA victims (42.6%) had not worn seat belts, 4 (1.5%) had drunk alcohol, 2 (0.8%) had used cell phones, and 1 (0.4%) had taken tranquilizers (see Table 5).

The 3 main causes of RTAs were respectively over speeding (33%), sudden appearance of a vehicle (13.9%), and vehicle slip (10.4%) (see Table 6).

Regarding the three main causes of the RTAs in 2012 and 2013, it was observed that the main cause was over speeding (48.7%), followed by drowsiness of the drivers (36.9%), and alcohol drinking (5.6%) (see Table 7).

Discussion

The WHO reported in 2004 that the incidence rate of fatal

Table 4. Distribution of Total Injury Deaths Based on the Causes

Cause of Death	2012		2013	
	No.	%	No.	%
RTIs	270	37.3	280	36.7
Other injuries	137	18.92	141	18.5
Burns	116	16.0	126	16.5
Gunshot	86	11.87	74	9.7
Electric shock	30	4.14	22	2.9
Fall from height	30	4.14	52	6.8
Drowning	25	3.5	25	3.3
Trauma	21	2.9	14	1.8
Scorpion bite	9	1.24	29	3.8
Total	724	100.0	763	100.0

Source: Sulaimaniyah Health Directorate/ MOH, 2012 and 2013

RTIs was 19 per 100,000 worldwide and 26.4 per 100 000 in the Eastern Mediterranean Region (EMR) (14). In Iraq, the incidence rate was reported to be 21 per 100 000 in 2009. It was estimated that in 2007, RTA injuries would account for 23% of all injury deaths worldwide. According to the recent report by WHO in 2012, on average, RTIs caused an estimated 1.24 million deaths and 20-50 million non-fatal injuries worldwide annually (15, 16). The annual road traffic fatality rate for low income and middle-income countries was 20.1 per 100 000, while it was 8.7 per 100 000 in the high-income countries in 2012 (16). According to the WHO, the average annual death rate due to RTAs in Iraq was 44.7 (standardized age death rate per 100 000 population) which ranked as number 4 in the countries with major death rates in result of RTAs. This fact draws the attention on the need for both medical and engineered research in Iraq regarding RTAs (17). Death from RTAs and in particular motor vehicle traffic accidents have been characterized worldwide as a hidden epidemic that affects all sectors of society. Motor vehicle injuries have been an important cause of morbidity and mortality in developed countries. Injury and deaths due to RTAs are major public health problems in the developing countries, mainly due to rapid motorization. In India, 11% of deaths from non-communicable diseases

occur due to injuries and 78% of injury deaths are due to RTAs (18, 19).

Based on the data obtained from the present study, it was seen that the number of RTA victims was 251 with a mean age of 25.96±17.04 years, ranging from 1 to 81 years. On the other hand, the calculated incidence rate of RTAs was 62.2 per 100 000 for 2012, which decreased to 43.8 per 100 000 in 2013. According to the data obtained from Health Directorate/MOH, RTAs were ranked as the first cause of death in Sulaimaniyah constituting 36.7% and 37.9% of the causes of injury death in 2012 and 2013, respectively. This result is in line with that of previous reports that have shown that global RTIs are the eighth leading cause of death (20). Similarly, a study conducted in Tanzania found that RTIs made up the largest proportion of injury deaths (33%) (21). The age distribution of RTA mortality in Sulaimaniyah during the years 2012 and 2013 (Health Directorate data) showed that most of the fatalities (49.4%) were in the age group of 45-64 years. In this regard, the WHO reported that global RTAs were the leading cause of death in young people aged 15-29, and almost 60% of RTA deaths (59%) were among the age group of 15-44 years, whereas the records

Table 6. Distribution of RTA Victims According to Main Causes of the Accident

Main Cause of the Accident	No.	%
Over speeding of vehicle	83	33.0
Sudden appearance of a vehicle	69	27.5
Negligence	35	13.9
Vehicle slip	26	10.4
Not known	12	4.8
Sudden turn of another vehicle without warning	10	4.0
No concentration / sleepiness	8	3.2
Traffic jam or unorganized traffic	4	1.6
Risky behavior	3	1.2
Under the influence of drugs	1	0.4
Total	251	100.0

Source: Sulaimaniyah Main Emergency Hospital, Jan - June 2014

Table 5. Distribution of RTA Victims According to Some Pre-accident Related Factors

Pre-accident data	Yes		No		Not Applicable	
	No.	%	No.	%	No.	%
Wearing seat belts before the accident	53	21.1	107	42.6	91	36.3
Intake of tranquilizers prior to accident	1	0.4	161	64.1	89	35.5
Use of cell phone just before the accident	2	0.8	163	64.9	86	34.3
Alcohol intake just before accident	4	1.5	247	98.5		
Wearing crash helmets	5	2.0	19	7.6	227	90.4

Source: Sulaimaniyah Main Emergency Hospital, January - June 2014

in the present study documented 11.9% fatal RTIs for the same age group. Globally, more than three-quarters (77%) of all road traffic deaths occur among men. In the current study, males accounted for the above three quarters (77.5%) of the deaths while female deaths were 22.5%, which is almost in line with the WHO reports (7).

The case fatality rate (CFR) according to data from Sulaimaniyah Health Directorate/ MOH was 6.2% and 8.2% and from the Traffic Department/ Ministry of Interior was 7.2% and 9.0% in 2012 and 2013, respectively. A study in Alexandria in 2006 demonstrated a CFR of 7.5%, which falls within the same range (22). It should also be noted that CFR in the EMR accounts for the highest rate in the world (7). In the present study, the total number of RTA victims admitted to the Minor Operation Department during a 6-month period in Sulaimaniyah Main Emergency Hospital was 251, and most victims were aged from 20-29 years (34.7%). Among victims enrolled in the study during the six-month period, males constituted a higher percentage (68.1%) than females (31.9%), with a male-to-female ratio of 2.1:1. Data records in the Ministry of Health showed that nearly three quarters (73.9%) were males, and around 26.1% were females. There may be a possibility that married people take lower risks because of the feeling of family responsibility (23). However, Verma and Tewari in Delhi, India, found that RTAs were more common among married people (24).

The current study demonstrated the distribution of RTA victims according to their occupation. Victims who were unemployed constituted 12.7% of the victims. Ibrahim found that 10.8% of the victims were unemployed (22). Unemployment is said to be a risk factor associated with RTIs (25). In Sulaimaniyah, RTA victims were mostly of middle- and high-income families (62.5% and 28.7%, respectively). Socioeconomic status is known to be a risk factor involved in RTIs, and mortality and morbidity rates in vulnerable road users have been reported to be higher in the lower social classes (1, 26). The current study found that 66% of the victims who should have worn a seat belt did not wear one. A study in Nigeria showed that car drivers complied more with the use of seatbelts than commercial bus drivers (27), a finding which was similarly reported by Cook et al (28).

Regarding the use of a cell phone, only 2 RTA victims were using a mobile phone in the current study. A number of studies have focused on determining how many drivers use mobile phones while driving. For example, in a number of high-income countries, 60%–70% of drivers reported using a mobile phone at least sometimes while driving (29, 30). In the United States, 11% of vehicles had drivers using a mobile phone. Only four victims responded positively to alcohol intake, as religious and social barriers may have affected the victim's responses. The current study did not explore alcohol intake as a contributing factor to RTAs, although the role of alcohol in impairing driving ability has been well documented

(31).

In the present study, RTA victims resulting from car accidents constituted 32.7%, followed by vehicle rollover or car falls which constituted 29.9% and car-pedestrian and car-motorcycle accidents which constituted 27.0% and 9.6%, respectively. Regarding the type of vehicle in the current study, cars were the most common types of vehicles involved (61.4%), followed by pickup or van and motorcycle, 20.3% and 12.3%, respectively. Moreover, the current study revealed that with regard to the place of occurrence of RTAs, those outside city roads constituted 67.7% and inside city constituted 32.3%. A study by Nazari et al delineated that 75.8% of all RTAs occurred on city streets (32). Severity and mortality rates from accidents occurred on roads out of the city were higher than those on city streets. RTA victims at Sulaimaniyah Main Emergency Hospital reported that over speeding was the main cause of RTAs constituting 33.0%, followed by sudden appearance of a vehicle (27.5%). Data recorded by the Traffic Department for the years 2012 and 2013 showed the same cause for RTAs, namely, over speeding (48.7%) and drowsiness of driver which constituted 36.9%.

According to the data from the Main Emergency Hospital in Sulaimaniyah, the most common injuries were head and neck injuries, followed by lower limbs, the upper limbs, and the back and abdomen and chest regions, as further injuries. A study conducted in Alexandria in 2012 showed that the most common injuries were the orthopedic fractures, abdominal injuries, maxillofacial injuries, spine injuries, and chest injuries (33). In a study in India, head injuries were also the commonest injuries seen in victims followed by injuries to the lower limbs and face. Moreover, injuries of the chest, pelvis, upper limb, and spine were reported to be the most common ones (34). In the present study, the most common types of injuries were lacerated wounds and abrasions, and fractures. A study conducted by Singh et al indicated that a great majority of fatal RTA victims had multiple injuries, including abrasions, lacerations, fractures, dislocation, head and visceral injuries as more commonly observed injuries (35).

The results of the current study demonstrated that traffic jams were reported by 45.8% of the victims, while unorganized traffic was reported by 80.0% and 83.2% in 2012 and 2013, respectively. Similar findings were reached by Chalya et al in Tanzania, in the city during the day time (36). Moreover, in this regard, the study conducted by Ibrahim revealed that the traffic congestion was reported by 52% of the victims and unorganized traffic was reported by 55.8% (22).

In low- and middle-income countries, most victims die before admission to the hospital. Among those admitted to the hospital, 75.8% die later within the first day. Lack of medical care within one hour after injury increases the number of deaths among seriously injured by 30%. The

scarcity of medical care within three hours increases the number by 60% and within six hours by 90% (37). In terms of the method of transportation to the hospital, the current study revealed that more than half of the RTA victims (61.3%) were transferred by ambulances, while 37.5% were transferred by a private vehicle. Durak et al in Turkey showed that 80.1% of victims were transferred by ambulances to the hospital, while 18.3% were transferred by private vehicles (38).

Conclusion

RTAs represent a major public health problem in Sulaimaniyah, Kurdistan region, Iraq. Moreover, RTIs showed a high incidence with an increase in injury rate, mainly among young adults with male predominance, and the commonest injuries were head and neck injuries. An increase in the number of cars, the absence of other public transport modes (such as tram or train), quality of roads, traffic conditions, and old vehicles are all among the contributing factors. RTAs were ranked as the first cause of injury death with an increasing case fatality. The most common type of accident was car accident, accounting for around one third while car-pedestrian accident comprised more than one quarter of RTAs. Most accidents occurred during the day on urban areas outside city roads.

The main cause of RTAs was high speed, reported by one third of the victims and recorded as almost half of the causes by the Traffic Department. Another preventable human defect was not wearing a seat belt and a crash helmet. On the other hand, the lack of coordination between the various sectors involved in the problem of RTAs was another contributing factor. Data management and the link between different parties need to be improved. Finally, it should be noted that RTAs in Sulaimaniyah need prioritization.

Conflict of Interest Disclosure

The authors declare no conflict of interests.

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Ethical Statement

The researcher sought the approval of the Ethics Committee of the High Institute of Public Health for conduction of the study which was carried out according to the international ethical research guidelines. Verbal informed consent was obtained

from the participants who agreed to participate in the study after explanation of the purpose of the research, benefits, and confidentiality of information. Voluntary participation was stressed upon for all participants. Anonymity and confidentiality were guaranteed and maintained.

Authors' Contribution

All authors had contributed to the study design, data collection, writing, and preparing this article.

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