

Traffic Accident Traits and Driver Characteristics Implication on Road Accidents using Descriptive Analysis: A Cross Sectional Study in Sulaymaniyah, Iraq

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ABSTRACT

The current study focuses on disclosing the types and causes of traffic events in the Sulaymaniyah governorate and their association with driver implications. The study was conducted between September 2019 and August 2020 in cooperation with the General Directorate of Traffic. A total of 573 traffic accident forms were directly collected at the site of crash events. The result shows that the collision type of Road Traffic Accidents (RTAs) is the most frequent type, accounting for 64.6% of the total. Higher incidence of RTAs was recorded in pickup, taxi, and motorcycle automobiles than in private cars. The analysis showed that the driver's faults are responsible for 81.4% of RTAs followed by road issues, mechanical car faults, and environmental factors which were responsible for 15%, 2.4%, and 1.2%, respectively. The most important driver factors accountable for RTAs were overspeeding, low level of education, gender, young age, and alcohol intake. Driver age group 19-33 is highly associated with RTAs with the peak occurring at the age of 21 years.

Keywords-Road Traffic Accidents (RTAs); drivers; risk factors

I. INTRODUCTION

Sulaymaniyah is one of the biggest cities in Iraq and the occurrence of transportation accidents is frequent. Officially, the total number of wheeled motor vehicles, excluding motorbikes, registered at the General Directorate of Traffic in Sulaymaniyah Governorate is around 600000, thus approximately 1 in 10 people own a car [1]. Despite great efforts to reduce and control Road Traffic Accidents (RTAs), they are still considered a major issue, due to the increasing daily occurrences and their severity [2]. Following the African region, the Eastern Mediterranean Region was classified by the World Health Organization as having the highest number of fatalities due to road mishaps in the world. Among Eastern Mediterranean counties, Iraq is in the top two of the list of

RTA-related fatalities [3]. Alertly, the ministry of health in the Kurdistan Regional Government reported that RTAs are regarded as the most common cause of citizen deaths. Each year, traffic crashes cause approximately 850 deaths and 10,000 injuries [4]. Furthermore, the statistical data of Sulaymaniyah Medicolegal Institute showed that RTAs are the most common type and the leading cause of civilian deaths. The causative risks of RTAs can be broadly categorized as human, vehicle, and environmental factors [5, 6]. Age, sex, education, medical conditions, and driving speed are key human-related factors, while environmental causes involve defective and narrow roads, poor lighting, lack of familiarity, and bad weather [1, 7-10]. Authors in [7, 11] confirm that human errors comprise the major cause of RTAs. Driving speed is considered as a potential causative factor or RTAs

[12]. The environmental factors are the least participating risk of RTAs and are responsible for only about 5% of RTAs [1, 7, 9].

The aim of this study is to present an overview of RTAs in Sulaymaniyah governorate and analyze the role of drivers' contribution to the occurrence of RTAs.

II. METHODOLOGY

A. Study Area

Sulaymaniyah was selected as the study area for several reasons: it is the biggest touristic city of Iraq and has a very large concentration of urban population. Geographically, the city is surrounded by four mountains and has a semi-arid climate with very hot dry summers and cool wet winters. The city was visited by more than 750,000 tourists in 2021 [13].

B. Data Collection

The case study was conducted in the Sulaymaniyah Governorate from September, 2019 to August, 2020 including the period of Covid-19 lockdown from March to July. A questionnaire was developed and administered in people involved in RTAs in the Governorate. The questionnaire form used included a diagram of the accident and information about the location, the date and time, weather conditions, car type and model, the sex and age of the people involved, the cause and the type of the accident, the type and license number of the drivers, the type of road, and the number of injuries and/or deaths. A copy of the accident report was stored in nearby traffic police stations. All forms were filled by trained traffic police personnel. The completed forms were transmitted to the department of forensic medicine for analysis. The questionnaire can be seen in the Appendix.

C. Data Analysis

During the pre-processing stage, wrong and missing values in any section of the filled form were dealt with. Records with inappropriate or incomplete values were removed from the dataset. In addition, during the analysis for the cause of accidents, uninsured cases or cases not categorized in the major causative factors were excluded. SPSS program (Ver.23.0) was used to analyze the data. Descriptive analyses were achieved calculating frequency, percentage, and cross tabulations.

III. RESULTS AND DISCUSSION

RTAs are caused most probably by increased car ownership rate, lack of road discipline, and improper roadway features. Throughout the study period, 573 RTA cases were collected and analyzed. We can see from Figure 1 that the most common type of RTA is collision, which accounted for 64.6% of the total number of accidents and the least is road departure accounting only for 4.0%. The second most common type of RTAs is rollover, while run over (pedestrian impact) and fixed object collision have almost the same rates. Roughly, the findings of [4], which was conducted in the north Iraq (including Sulaymaniyah), are almost similar to our results except for fixed object collision that was not considered.

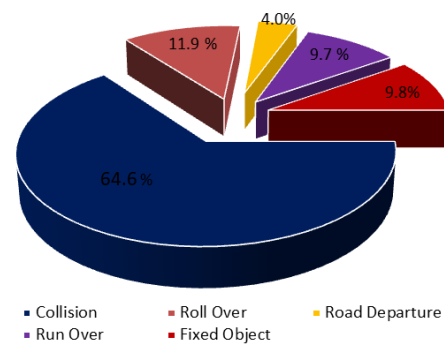


Fig. 1. The investigated types of RTAs.

TABLE I. VEHICLES TYPE INVOLVED IN RTAS

Variables	Frequency (%)
Number of vehicles	
One	225(39.5)
Two	348 (60.5)
Total	573 (100)
Vehicle type	
Private	474 (51.5)
Taxi	121 (13.1)
Pickup vehicle	129 (14.0)
Truck	79 (8.6)
Motorcycle	101 (11.0)
Government vehicle	18 (1.9)
Total	921 (100)

Table I presents the number and the type of vehicles participating in RTAs. In 474 (51.5%) of RTAs, private cars, the primary type of personal transportation, were involved, which is considered as a rationally normal percentage because the number of private cars is 12 times more than the other types of automobiles on Sulaymaniyah roads [14]. This is consistent with the findings in [7], which was conducted in the capital. Compared to other types of vehicles, accidents resulting from pickup cars are higher, account for approximately 14.0% of the total. On the other side, taxis were involved in 13.1% of the cases. This may be interpreted from the fact that taxis tend to be more time on the road than the other car types. According to police traffic data, the ratio of motorcycles in all sorts of vehicles is roughly 2% [14]. Surprisingly, the percentage of motorcycles participating in RTAs is quite bigger (11.0%) and can be regarded threatening, and may be related to the divers' age, since most of motorcyclists are under 19 years old [3]. Authors in [15, 16] pointed out that motorists have the primary contribution to road crashes during the recent years. The current investigation showed that 8.6% of RTAs happened in trucks and that governmental vehicles participated in the least accidents (1.9%), which can be explained by the fact that they spend less time on roads and take more responsibility during driving.

Figure 2 shows the percentage of accidents considering causative factors. The reasons for mishaps can be divided into drivers, roads, vehicles, and weather condition faults. The investigated data of this study depicted that the human factor is responsible for 81.3% of traffic events. This finding is very close to the ones of [4, 7, 17].

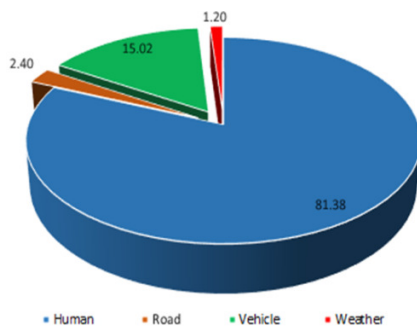


Fig. 2. Causes of RTAs.

The second most highly ranked causal factor for RTAs is vehicle faults. Absence of standard support and lack of periodic vehicle maintenance are the main possible factors for car faults that prompt unexpected malfunctions [4, 18]. Furthermore, it is revealed that weather and road mishaps account for 2.4% and 1.2% of RTAs, respectively, indicating that adequate engineering and proper roadway structure and control of roads by traffic police play a positive role in reducing the number of RTAs, although it has been reported that road status is a basic risk factor of accidents [18, 19]. Additionally, minimal causative error is caused by environmental effects (1.2%) expressing that seasonal changes of Sulaymaniyah weather did not have a great impact on RTAs in general. The present study confirmed similar findings that the drivers have the largest contribution to the occurrence of accidents [11]. Therefore, the most significant attributing risk factors related to driver errors were further investigated.

TABLE II. CONTRIBUTING RISK FACTORS RELATED TO DRIVERS

Variable	Frequency (%)
Gender	
Male	880 (95.6)
Female	41 (4.4)
Education status	
Illiterate	384 (41.7)
Basic school	362 (39.3)
Preparatory school	100 (10.8)
University or higher	76 (8.2)
Speed	
Allowed speed	265 (28.8)
High speed	656 (71.2)
Alcohol drinking	
Yes	277 (30.1)
No	644 (69.9)
Driving license	
Yes	749 (81.3)
No	172 (18.7)
Driving experiences (years)	
1 to 5	386 (41.9)
6 to 10	346 (37.5)
11 to 15	98 (10.6)
16 and more	90 (9.8)

The results in Table II show that some contributing risk factors of RTAs, such as sex, level of education, speed, driving under the effect of alcohol, driving experience, and owing driving license.

The percentage of female drivers in Sulaymaniyah Governate in 2020 is 14.7% according to traffic police data registration. Accordingly, the ratio of male to female drivers is nearly 6 to 1. However, Table II shows that the percentage of male drivers participating in the investigated accidents is 95.6% with only 4.4% being female. This high percentage is in line with the findings in [20, 21]. The level of education has an important effect on RTAs as can be seen in Table II, with the illiterate, or basic educated drivers taking the lion's share with the number of accidents declining with the increasing level of education. Safety education for drivers regarding safe driving and proper vehicle maintenance should start at the student age [22, 23]

The speed of a car plays an imperative role in the occurrence of all types of RTAs [24]. The present study noted that the speed of 656 out of 921 vehicles at the time of mishaps exceeded the upper limited speed at the site of the event. Accordingly, our recorded data validated the findings of [25], where over speeding was considered as the main risk factor of RTAs. Further, it is scientifically proved that driving under the effect of drugs, particularly alcohol, is highly dangerous, especially for young drivers [25, 26]. In Iraq, the alcohol value allowed for driving is below 60gm/dl. This study found out that 30.1% of the tested drivers were under the effect of alcohol.

Driving experience was categorized in four groups as shown in Table II. The highest rate of RTAs (41.9%) was recorded for drivers with less than 5 years of driving experience, suggesting that the young drivers are usually at a higher risk. Meanwhile, the smallest number of accidents (9.8%) happened to drivers with more than 15 years of experience. Similar findings were reported in [22]. Moreover, 18.7% of drivers did not have a driving license. Authors in [23] reported that a high proportion of RTAs occurred to unlicensed drivers.

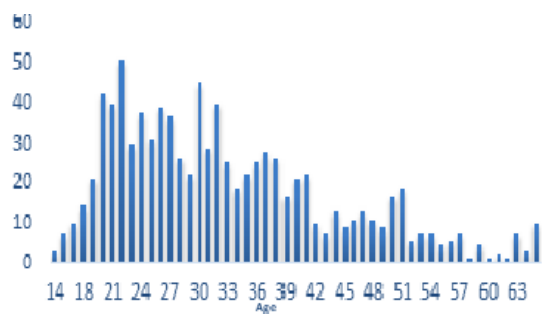


Fig. 3. Age distribution of drivers in RTAs.

In terms of age, the driver age distribution in Figure 3 shows that the bulk majority of the age of drivers participating to RTAs ranges between 19 and 33 years, with the peak being 21. Obviously, the conclusion that younger drivers are at higher risk of mishaps is evident. Young drivers have less experience, are more active, and tend more to make more car trips for educational, occupational, and social purposes. This finding is compatible with [16, 20], and with what is globally recognized [27]. Meanwhile, only a small portion of RTAs occurred in drivers under the age of 18, which is in accordance with what is

internationally found [3]. This result can be attributed to the fact that the drivers within this age group are not permitted to hold a driver’s license according to Iraqi rules stating that the minimum age for getting a driver’s license is 18. Notably, the number of RTAs obviously declines with age, mainly due to the limited number of trips that individuals in this age group make [28].

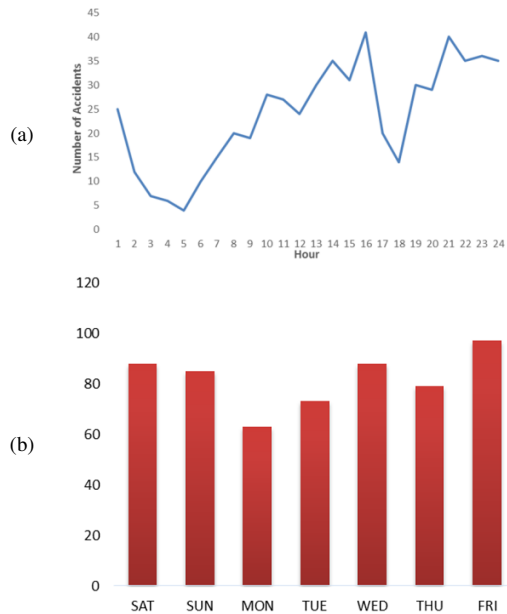


Fig. 4. Frequency plots of RTAs per (a) time (24h) and (b) day.

The trend timeline in Figure 4(a) displays a peak of RTAs in midnight. The number decreases in early morning hours to its least record and after that increases to late afternoon with a rapid drop of events during the evening. Finally the number of RTAs rises steeply before levelling off at midnight. Two peak time occurrences of maximum accidents were recognized at 16 and 21 hours with the only causative probability being that most people going back to home after work at around 16:00 and that as Sulaymaniyah is a big city with many tourists and a

good night weather, making many trips on the road during night-time is accustomed. Previous conducted studies analyzed that the larger proportion of RTAs happened during daytime [4, 7]. The contrary present study findings may be attributed to the night activities in Sulaymaniyah. On the other hand, it is clearly visible from time plot that the minimum occurrence of RTAs was recorded at the evening as this is logically the resting time of daily human activity. Figure 4(b) provides an overview of the total number of RTAs per days of the week. We can see that the frequency of RTAs in working days is nearly the same with weekend days showing a bit higher percentage. The smallest number of RTAs occurred on Mondays. This finding is in contradiction with [29, 30] in which most RTAs occurred on Thursdays, because in Sulaymaniyah region wedding tradition and funny trips are not confined in a specific weekday.

IV. CONCLUSION

In this paper, focus was given on the causes and attributing risk factors in various types of RTAs. During the study period car collision was the most common type of accident and road departure the least. Consistent with previous research, our data confirm that driver-related factors were the main cause of RTAs. Driver errors are the most common cause of RTAs, followed by defects in vehicles, poor road infrastructure, and bad weather. In particular, the focal point was to analyze the factors related to human causes of RTAs. The most RTAs occurred among illiterate drivers. Accidents were nineteen times more likely in males than in females. Moreover, less driving experience, driving under the effect of alcohol, and overspeeding are considered as the most crucial risk factors. RTAs are skewed toward involving people in younger age groups. Finally, surprisingly, the majority of crush accidents were recorded during Fridays and night periods. As a proposal, RTAs can be greatly reduced by proper education, raising awareness, and training of safety standards.

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APPENDIX

Road Traffic Accident Survey Questionnaire

This form will be fill by an allowed employee in departmental traffic bureau
Date:

Form No:

Part one: Accident Information

Information about the accident

Time: Day: Date: Location:

Type of accident a. Collision b. Roll over c. Road departure d. Run over (pedestrian) e. Run over (fixed object)

Cause of Accident a. Human b. Road c. Vehicle d. Weather

Number of vehicles involved in the accident:

Amount of speed during the accident a. Allowed speed b. High speed

The weather during the accident: a. Normal b. Rain c. Snowing d. Frizzing road e. Foggy

Number of people involved:

Number of casualties a. Injuries b. Deaths c. Safe

Reason for being safe: a. Seat belt b. Car seat c. Motor protective equipment

Part Two: Driver Information

Gender: Male Female Year of Birth:

Which one of the following is your level of education:

a. Illiterate b. Basic school c. Preparatory school d. Bachelor

* Please write down your degree (certificate) in education, if none of the above is applicable.....

Marital status: a. Single b. Married d. Other
 Do you have a job? Yes No
 If your answer is Yes: a. Public sector b. Private sector
 Car type: Model year of the car:
 Did the driver have a driving license : Yes No
 If your answer is Yes, please answer the next two questions.
 Years of driving experience: Class of the driving license:
 Was the driver under the influence of alcohol during the time of the accident? Yes No
 Was alcohol test done on the driver? Yes No
 Is the driver registered in any insurance company Yes No
 Is the car registered in any insurance company Yes No

If there were other cars involved, the same information was filled and for the other drivers.

REFERENCES

- [1] E. Leidman, M. Maliniak, A.-S. S. Sultan, A. Hassan, S. J. Hussain, and O. O. Bilukha, "Road traffic fatalities in selected governorates of Iraq from 2010 to 2013: prospective surveillance," *Conflict and Health*, vol. 10, no. 1, Feb. 2016, Art. no. 2, <https://doi.org/10.1186/s13031-016-0070-0>.
- [2] S. A. R. Shah, N. Ahmad, Y. Shen, A. Pirdavani, M. A. Basheer, and T. Brijis, "Road Safety Risk Assessment: An Analysis of Transport Policy and Management for Low-, Middle-, and High-Income Asian Countries," *Sustainability*, vol. 10, no. 2, Feb. 2018, Art. no. 389, <https://doi.org/10.3390/su10020389>.
- [3] F. H. A. Asad, "Road Traffic Accidents in Iraq: A Review of Evidence-Based Literature," *International Journal for Traffic and Transport Engineering*, vol. 7, no. 2, pp. 256–275, 2017, [https://doi.org/10.7708/ijtte.2017.7\(2\).09](https://doi.org/10.7708/ijtte.2017.7(2).09).
- [4] H. Cekus, S. Albkra, and M. Musa, "Characteristic of Car Crash in North of Iraq," *International Journal of Recent Technology and Engineering*, vol. 9, pp. 15–21, May 2020, <https://doi.org/10.35940/ijrte.F9206.059120>.
- [5] D. Chisholm and H. Naci, "Road traffic injury prevention: an assessment of risk exposure and intervention cost-effectiveness in different world regions," Dec. 2008. <http://www.who.int/en/> (accessed Feb. 10, 2023).
- [6] N. K. Al-Shammari and S. M. H. Darwish, "In-depth Sampling Study of Characteristics of Vehicle Crashes in Saudi Arabia," *Engineering, Technology & Applied Science Research*, vol. 9, no. 5, pp. 4724–4728, Oct. 2019, <https://doi.org/10.48084/etasr.2939>.
- [7] A. H. Albayati and I. M. Lateef, "Characteristics of Traffic Accidents in Baghdad," *Civil Engineering Journal*, vol. 5, no. 4, pp. 940–949, Apr. 2019, <https://doi.org/10.28991/cej-2019-03091301>.
- [8] P. Dikshit, *Textbook of Forensic Medicine and Toxicology*. New Delhi, India: Peepee Publishers & Distributors Pvt. Ltd., 2008.
- [9] C. Timmermans *et al.*, "Analysis of road traffic crashes in the State of Qatar," *International Journal of Injury Control and Safety Promotion*, vol. 26, no. 3, pp. 242–250, Jul. 2019, <https://doi.org/10.1080/17457300.2019.1620289>.
- [10] M. Angin and S. I. A. Ali, "Analysis of Factors Affecting Road Traffic Accidents in North Cyprus," *Engineering, Technology & Applied Science Research*, vol. 11, no. 6, pp. 7938–7943, Dec. 2021, <https://doi.org/10.48084/etasr.4547>.
- [11] P. K. Agarwal, P. Kumar, and H. Singh, "Causes and Factors in Road Traffic Accidents at a Tertiary Care Center of Western Uttar Pradesh," *Medico-Legal Update*, vol. 20, no. 1, pp. 38–41, Mar. 2020, <https://doi.org/10.37506/v20/i1/2020/mlu/194290>.
- [12] A. Shibata and K. Fukuda, "Risk factors of fatality in motor vehicle traffic accidents," *Accident Analysis & Prevention*, vol. 26, no. 3, pp. 391–397, Jun. 1994, [https://doi.org/10.1016/0001-4575\(94\)90013-2](https://doi.org/10.1016/0001-4575(94)90013-2).
- [13] N. Corporation, "More than 750,000 tourists visited Sulaimani since 2021: official," *nrtv.com*. <http://www.nrtv.com/en/detail6/841> (accessed Feb. 10, 2023).
- [14] *Traffic police statistics 2020, Sulaymaniyah province*.
- [15] J. T. S. Al-Obaedi, "Evaluation of Traffic Accidents Rates in Al-Diwaniya City," *Journal of University of Babylon*, vol. 23, no. 3, pp. 571–578, 2015.
- [16] M. D. S. Hassan and M. M. K. K. Mahmood, "Statistical study of traffic accidents In Iraq," *Journal of Administration and Economics*, no. 96, pp. 213–221, 2013.
- [17] A. Al-Hucheimy, "Traffic Accidents in Thiqr Governorate during (2006-2012): A Study in Transport Geography," M.S. thesis, University of Thiqr, Iraq, 2014.
- [18] S. N. Dhahad, "Traffic Accidents in Thi Kar Government Causes and Solutions," *Basic Education College Magazine For Educational and Humanities Sciences*, no. 20, pp. 639–655, 2015.
- [19] B. Jrew, M. Abojaradeh, and S. K. AL-Kakaie, "Management of Traffic Accidents for Principle Urban Streets in Arbil City in Iraq," in *Seventh Traffic Safety Conference*, Amman, Jordan, May 2015.
- [20] S. A. Ismail and M. T. Hasan, "Epidemiology of Road Traffic Accidents in Emergency Hospital in Erbil City," *The Medical Journal of Tikrit University*, vol. 18, no. 182, pp. 296–305, 2012.
- [21] S. F. F. M. Aljoborae and A. K. A. Humairi, "A Study of Road Traffic Accidents in Babylon Province," *Medical Journal of Babylon*, vol. 11, no. 4, pp. 912–922, 2014.
- [22] M. Ghasem, R. A. Mohammad, T. H. Seyed, H. Amin, B. L. Kamran, and S. Yaser, "An epidemiologic survey of road traffic accidents in Iran: analysis of driver-related factors," *Chinese Journal of Traumatology*, vol. 16, no. 3, pp. 140–144, Jun. 2013, <https://doi.org/10.3760/cma.j.issn.1008-1275.2013.03.003>.
- [23] M. Touahmia, "Identification of Risk Factors Influencing Road Traffic Accidents," *Engineering, Technology & Applied Science Research*, vol. 8, no. 1, pp. 2417–2421, Feb. 2018, <https://doi.org/10.48084/etasr.1615>.
- [24] L. Aarts and I. van Schagen, "Driving speed and the risk of road crashes: A review," *Accident Analysis & Prevention*, vol. 38, no. 2, pp. 215–224, Mar. 2006, <https://doi.org/10.1016/j.aap.2005.07.004>.
- [25] O. A. Adeyemi and D. A. Adewole, "Risk Factors of Road Traffic Accidents (RTAs) among Commercial Inter-State Drivers in Lagos State, Nigeria," *Global Journal of Medical Research*, vol. 17, no. 5, pp. 20–26, Sep. 2021.
- [26] J. J. Rolison, S. Regev, S. Moutari, and A. Feeney, "What are the factors that contribute to road accidents? An assessment of law enforcement views, ordinary drivers' opinions, and road accident records," *Accident Analysis & Prevention*, vol. 115, pp. 11–24, Jun. 2018, <https://doi.org/10.1016/j.aap.2018.02.025>.
- [27] WHO, *Global status report on road safety 2015*. World Health Organization, 2015.
- [28] E. M. Choueiri, G. M. Choueiri, and B. M. Choueiri, "Analysis of Accident Patterns in Lebanon," in *4th International Symposium on Highway Geometric Design*, Valencia, Spain, Jun. 2010, pp. 1–24.
- [29] W. Meteeb, "Traffic accidents in the province of Diyala to the years 2009 and 2010," *Diyala Journal of Human Research*, no. 50, pp. 511–536, 2011.
- [30] H. Mohammed, A. Ahmed, and H. Ahmed, "Statistical Analysis of Traffic Accidents Locations Using Geographic Information System in Darbandikhan Town- Kurdistan Region of Iraq," *International Journal of Scientific & Engineering Research*, vol. 6, no. 5, pp. 1831–1843, May 2015.