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Research Article

# Analysis of Factors Affecting Urban Road Accidents in Rasht Metropolis

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**Keywords**

Road safety,
Urban accidents,
Frequency analysis.

**Abstract**

Traffic accidents are occurred by a combination of factors that lead to casualties, injuries and property-damages. The four factors of human, vehicle, road and environment always play a key role in the occurrence of such accidents. The main purpose of this study was to investigate the effect of various factors on the severity of urban traffic accidents in Rasht metropolis in the years of March 2016 to March 2018 using frequency analysis of 7294 accident data. The results showed that various variables affected the severity of road accidents in Rasht metropolis, including accident season, accident day, accident time, road surface condition, driver gender, driver age, geometry of accident location, daylight condition and weather condition. The results of the frequency analysis of accidents for determining the most important factors indicated that a high percentage of accidents resulted in injuries and often occurred in the summer season, the start of the week, during the day, at the hours of 12 to 18, in dry road conditions, by male drivers and in the age group of 30 to 45 years, especially on straight roads and in clear weather.

## 1. Introduction

Traffic accidents are complex and unpredictable events in the occurrence and severity of which many factors such as environmental and road conditions, vehicle characteristics, mental and physical conditions of road users, personal characteristics of drivers, presence of passengers, traffic flow conditions and so on are involved [1-4]. In general, the four factors of human, vehicle, road and environment play an important role in the occurrence of traffic accidents, the impact of which should be investigated in order to take the best measures to increase road safety and reduce accidents [5-8]. Predicting the severity and probability of accidents and their characteristics is not an easy task due to the multiplicity of effective factors and their complex interaction. This prediction is more complex, especially in the case of urban roads where the influential factors are more than suburban roads [9-13]. The analysis of the severity of accidents in terms of the effective parameters provides the possibility of predicting the occurrence or non-occurrence of accidents requiring relief equipment [14-16]. In addition, using this analysis, one

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can examine the impact of each factor on the severity of accidents. Such knowledge will lead to the implementation of traffic safety plans developed by traffic engineers, and they can also have a better understanding of the factors that have a positive or negative impact on the severity of accidents. Engineers can also use the analysis to identify high-risk areas [17-20].

Increasing transportation in Iran has dramatically intensified damages caused by accidents. The road traffic fatalities reported in 2016 in Iran were 15,932, which 78% were male and the rest were female [21, 22]. Therefore, due to the high number of accidents in Iran, it is necessary to know the effective factors in accidents in order to take the best measures to reduce the occurrence of these accidents.

## 2. Materials and Methods

Data used in this research were 7294 injuries, fatal and property-damage accidents on urban roads of Rasht metropolis collected from Rasht traffic police from March 2016 to March 2018 including dependent variable of accident severity as well as independent variables of accident season, accident day, accident time, road surface condition, driver gender, driver age, geometry of accident location, daylight condition and weather condition. Also, in this study, frequency analysis was used to determine the most important factors affecting accidents on these roads.

## 3. Results and Discussion

The results of the frequency analysis of factors affecting road accidents in urban areas of Rasht metropolis are presented in Table 1. As can be seen, 57.23% of accident resulted in injuries, followed by 12.81% fatal and 29.96% property-damage accidents. According to the accident season, a high percentage of accidents occurred in summer (31.58%), after which spring (27.34%), winter (20.86%) and autumn (19.22%) seasons had the highest accident rate, respectively. The days at the start of the week had the greatest proportion in the occurrence of urban accidents (43.17%), followed by the days in the middle of the week (26.38%) and weekends (30.45%). The accident hours of 12 to 18 (46.54%) and then 18 to 24 (25.29%) also recorded the highest accident rate. Moreover, the results showed that dry surface conditions (85.17%) followed by wet surface conditions (14.83%) had a major contribution to these accidents. Male drivers (87.24%), especially in the age group of 30 to 45 years (31.48%), were involved in increasing the incidence of urban accidents. Most accidents also occurred on the straight roads (53.25%), followed by curves (31.64%) and junctions (15.11%). Accident reports in these years also indicated that clear weather (74.21%) accounted for the highest number of accidents, particularly during the daytime (69.54%).

Table 1. Effective variables in the occurrence of accidents in Rasht metropolis

| Variable | Sub-variable | Frequency (%) |
|---|---|---|
| Accident severity | Injury | 57.23 |
| | Fatal | 12.81 |
| | Property-damage | 29.96 |
| Accident season | Spring | 27.34 |
| | Summer | 31.58 |
| | Autumn | 19.22 |
| | Winter | 20.86 |
| Accident day | Start of the week | 43.17 |
| | Middle of the week | 26.38 |
| | Weekend | 30.45 |
| Accident time | 00:00 to 06:00 | 5.12 |
| | 06:00 to 12:00 | 23.05 |
| | 12:00 to 18:00 | 46.54 |
| | 18:00 to 24:00 | 25.29 |
| Road surface condition | Dry | 85.17 |
| | Wet | 14.83 |
| Driver gender | Male | 87.24 |
| | Female | 12.76 |
| Driver age | Less than 18 | 9.03 |
| | 18 to 30 | 27.96 |

| | | |
|---|---|---|
| | 30 to 45 | 31.48 |
| | 45 to 60 | 19.51 |
| | 60 and over | 12.02 |
| Geometry of accident location | Straight road | 53.25 |
| | Curve | 31.64 |
| | Junction | 15.11 |
| Daylight condition | Day | 69.54 |
| | Night | 30.46 |
| weather condition | Clear | 74.21 |
| | Cloudy | 16.95 |
| | Rainy | 8.84 |

## 4. Conclusion

In this study, the frequency analysis was used to determine the most important factors affecting the occurrence of accidents on urban roads of Rasht metropolis from March 2016 to March 2018. Data used in this research were 7294 injuries, fatal and property-damage accidents including dependent variable of accident severity as well as independent variables of accident season, accident day, accident time, road surface condition, driver gender, driver age, geometry of accident location, daylight condition and weather condition. The results of the frequency analysis of the accidents indicated that a high proportion of urban accidents resulted in injuries and often occurred in the summer season, the start of the week, during the day, at 12 to 18 hours, in dry road conditions, by male drivers and in the age group of 30 to 45 years, mainly on straight roads and in clear weather condition.

## Conflict of interest

The authors declare no conflict of interest.

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