

ISSN 2349-4506 Impact Factor: 3.799

## Global Journal of Engineering Science and Research Management STUDYING THE TRAFFIC SAFETY LEVEL IN AL-NAJAF CITY

Hamid Athab Al-Jameel\*, Marwa Mohammed Abdullah, Bager Kamil Ahmed almosawi

\* PhD, Assistant Professor, Civil Department, University of Kufa, Iraq

Eng., Directorate of planning in Al-Najaf, Iraq

MSc The Islamic University Dep. of building and construction technical engineering, Iraq

## DOI: 10.5281/zenodo.2562022

KEYWORDS: Accident block spot, traffic operators, and vehicle safety standards.

## ABSTRACT

The high number of accidents spreading through Al-Najaf city is dangerous index for safety level. This study tries to shed light on the number of accidents and suggested suitable solutions even by previous studies for the traffic collision problems. The study includes different aspects such as making different interviewing with traffic policemen in Al-Najaf traffic directorate in order to know the causes of accidents and the system of accident recording. The study indicates that the most anticipated causes are the unlicensed drivers traffic operators in addition the locations with high frequency of accident is roundabouts and the most urgent improvement to reduce from accidents is the trained drivers; these have been observed in the questionnaires of selected people in this study.

## **INTRODUCTION**

AL-NAJAf city is from the fifth city in Iraq according to the number of population. This number is 1221248 persons in 2018 (Reference). Figure 1 indicates the location of this city in Iraq. Generally, limited studies have focused on the accidents in Iraq and in Al-Najaf city. For example, Al-Jameel [1] evaluated the level of safety in Al-Diwanyia city in south of Iraq by investigating the number of death comparing with the number of population according to data collected from traffic agencies in the city. The author indicated that the number of death is approximately twice than the world's average and 20% of total accidents are not recorded. However, this study did not introduce any practical solutions using modern technology such as adopting GIS or intelligent system for reducing and managing traffic accidents.



Figure 1. Al-Najaf city location [2].



ISSN 2349-4506 Impact Factor: 3.799

Global Journal of Engineering Science and Research Management

Recently, the number of accident increases rapidly according to reports of Al-Najaf Traffic Directorate (Reference). However, a limited number of studies tries to find out the causes of the traffic accidents and put the suitable solutions. Yahya and Al-Jameel [3] developed GIS study to number all links and nodes in Al-Najaf road network and then suggest to put referencing point for all these links and nodes in order to accurately determine the accident location. The authors recommended to use GIS in traffic offices to know the black spot (location with high accident frequency) as indicated in Figure 2. Moreover, they also recommend to change accident repot form to match the referencing point and to make such form as input for GIS system.



Figure 2. Links, nodes and referencing points in the city center of Al-Najaf city [3].

The aim of this study is to investigate the number of accidents and the available information about these accidents in Al-Najaf city and suggest the suitable countermeasures to reduce these accidents.

## TRAFFIC ACCIDENTS COST

It was found through literature that the accident is the ninth cause of death globally across the world in 1990 but it will be the third one in 2020 [4].

The cost of road crash injuries has been roughly estimated to be 1% of gross national product in countries with low-income, 1,5% for countries with moderate income and 2% for countries with high income [4]. So, these road crashes could be estimated at US\$ 518 billion from global economic costs. Hummel [5] reported that more than  $\epsilon$ 180 billion (US\$ 207 billion) the estimated annual costs of road crush injury in European countries alone. Whereas, the costs of these crashes in the US in 2000 were estimated at US\$ 230 billion [6]. Consequently, the direct and indirect cost of road accidents may exceed the current estimate of US\$ 518 billion.

- The main factors influence on safety performance are [7]:
  - The geometric design for different road facilities such as road, intersection, roundabout, etc and safe speed for these facilities.



ISSN 2349-4506 Impact Factor: 3.799

## Global Journal of Engineering Science and Research Management

- The sufficient roads and safe vehicles are important.
- The safe conditions such as seat belts, child restraints, bicycle helmets, motorcycle helmets, and means to see and be seen.
- Fitness of drivers especially considering fatigue, distraction, alcohol and drugs.
- Safe journey planning including consideration of the need to travel, the amount and mode of travel and choice of route, vehicle and driver.
- Safe vehicles especially considering the occupant protection, protection of other road users (vulnerable as well as other vehicle occupants), road traffic crash avoidance and mitigation, road worthiness, vehicle load capacity and securing of loads in and on the vehicle.

#### Current reports of accidents in Iraq

Getting accurate accident data in Iraq is so difficult due to a lot of lack in safety system [1]. Therefore, different difficulties have been faced to obtain the accident reports from Central Statistical Organization in Minster of Planning in Iraq [8]. Based on these reports, it was found that Al-Najaf city is considered as the second city in Iraq in the number of accidents which are about 1050 accidents in 2017.

In addition, major urban roads represent the highest roads in the number of accidents. The expressway is the second among other types of roads in the number of accidents. Finally, the rural roads are the lowest class among other roads as indicated in Figure 3.



Figure 3. Number of accidents among different Iraqi cities.

#### Current traffic accident system in Al-Najaf City

According to field observations and visiting different locations and AL-Najaf Traffic Directorate, there is no accurate system to record accident types and numbers. Moreover, the accident reordering form is so simple and doesn't have specific referencing point to give the accurate system. Furthermore, some of accidents could be recorded especially the fatal accidents or accidents with high properties damage or personal injuries. Whereas, the minor accidents mostly do not documented because the reconciling between the parties involving in such accidents. On the other hand, the violated regulations, such as moving in the wrong direction and do not obey the traffic rules are the most causes of accident. Such violations are widely spreading there.



ISSN 2349-4506 Impact Factor: 3.799

# Global Journal of Engineering Science and Research Management

Regarding to the required traffic infrastructures, there is obvious lack in the pavement marking and traffic signs in most roads in the city. Moreover, a pavement condition for most of the road especially the lane number one is under acceptable level. According to accident reports from AL-Najaf Health Office, the number of fatal people involving in traffic is 350 in 2016; whereas the number of injured people is 1000 persons. The causes of fatal accident is due to motorcycles and MTR (vehicle with three tires). Figure 4 indicates that all types of accidents increase rapidly for both pedestrian and vehicle collision with another vehicles accidents. Whereas, in the number of overturn accident slightly increases. The number of injuries and property damage accidents seem to be reduced from previous years as shown in Figure 6. However, the fatal accidents increases slightly from 2015 to 2017.



Figure4. Number of accidents among different types of roads in 2017.

In the light of above, one could clearly find that the number of different accidents increases rapidly with the time as indicated in Figure 4 which is a dangerous indication of safety in the city. However, the number of property damage and injuries accidents reduces but the number of fatal accident slightly increases as demonstrates in Figure 5. As known in Iraq, there is a high number of accidents and this reduction, as indicated in Figure 6, may be attributed to inaccurate recording for accidents as mentioned by Al-Jameel [1].



ISSN 2349-4506 Impact Factor: 3.799



Figure 5. Different types of accidents in Al-Najaf city.



Figure 6. Severity of accidents in Al-Najaf city.

## CAUSES AND IMPROVEMENTS

About 300 questionnaires have been distributed among different people including engineers and engineering students in the city to investigate the cause of accidents, the locations with high accident frequencies and the



ISSN 2349-4506 Impact Factor: 3.799

Global Journal of Engineering Science and Research Management

required improvements. They asked to arrange these causes, block spots and improvements according to their opinions.

After analyzing the results of these data, it was found that they arranged the causes of accidents, the locations of high accident frequencies (Spot black) and the suggested improvements as indicated in Table 1.

Investigated item	Arranged according to opinions
Accident cause	Driver especially unlicensed one
	Traffic operators
	Vehicle safety considerations
	Traffic regulations
Black spot	Roundabout
	Intersection (cross intersection)
	U-turn
	Rural road
Suggested improvements	Driver: license
	Maintenance roads
	Imported vehicles with high safety standards
	Using intelligent traffic system

 Table 1 Opinions of selected people about accidents.

According to these results as indicated in Table 1, one could find that among the most causes of accident is the unlicensed drivers who spread widely in the city without actual accountant by traffic operators (traffic police) which is similar to what was mentioned by Al-Jameel [9]. Then, the traffic operators who need to be more restricted in applying the law against the violated drivers. The third cause is the vehicles without safety standards which are widely found in our city especially Iranian vehicles. Finally, poor traffic regulations such as traffic signs, signals and variable messages.

On the other hand, the black spots have been distributed among the most highest locations of accident occurrence are roundabouts, cross intersection, U-turn and rural roads, respectively. So, there is a need to put these sections in priority to improve or reduce the severity of the accidents.

Finally, the suggested improvements are so important because they put the improving the driver behavior in the first by training the driver and preventing those drivers without driving licenses and ending with asking to apply intelligent traffic system there.

## SUGGESTED SOLUTIONS FOR ACCIDENT PROBLEMS

The suggested solution to mitigate the level of safety could be categorized into three types:

- 1. Operation level: this level is about operational traffic which is managed directly by traffic police office. The current system is so poor in terms of using developed means to control and monitor the traffic.
- 2. Road and network conditions: the current road condition is so bad in terms of road surface conditions where a lot of distress found in most roads in the city. Unsuitable geometric design for most facilities as reported by Al-Jameel and Al-Hamami (2018); and Al-Jameel(2017).
- 3. Using developed system: the current system does not have any feature of the developed system such as traffic camera, GIS system, and means of recording system for accidents.
- 4. Adopting new technology which is available in this regard to accurately record the number of accidents.
- 5. The quality of imported vehicles needs to be checked in terms of safety considerations especially the Iranian vehicles.

## CONCLUSIONS AND RECOMMENDATIONS

The main conclusions have been obtained from this study are:

1. There is a serious safety problem in Iraq generally and specially in Al-Najaf city.



ISSN 2349-4506 Impact Factor: 3.799



- 2. The major urban roads such as major arterials represent the high location of accidents.
- 3. The traffic recording system needs actual reform in order to find out the accurate of number of accidents and the actual location of accident occurrence
- 4. The referenced GIS system used by previous study should be implemented to make the first step of building adequate traffic system.
- 5. The type of imported vehicles should be complied with safety considerations and standards.

## ACKNOWLEDGEMENT

The authors would like to thank the Directorate of Traffic in Al-Najaf city for their supports in information.

## REFERENCES

- 1. Al-Jameel, Hamid A. (2016). Reducing the Number of Accidents in Iraq by Using Expert System. Journal of Babylon, Vol. 24 (4), Iraq, pp. 1099-1112.
- 2. Wikipedia. (2018). https://en.wikipedia.org/wiki/Najaf [accessed by 2-8-2018).
- 3. Yahya, A. and Al-Jameel, Hamid A. (2017). Using GIS to Control and Record Traffic Accidents in Al-Najaf City. Journal of Thi Qar, Iraq.
- 4. World Health Organization Geneva. (2004). World Report on Road Traffic Injury Prevention.
- 5. Hummel T. (2001). Land use planning in safer transportation network planning. Leidschendam, Institute for Road Safety Research, (SWOV Report D-2001-12).
- 6. PROMISING. (2001). Promotion of mobility and safety of vulnerable road users. Leidschendam, Institute for Road Safety Research, 2001.
- 7. Lie, A. (2012). Managing traffic safety an approach to the evaluation of new vehicle safety systems. From the Department of Clinical Neuroscience Karolinska Institutet, Stockholm, Sweden.
- 8. Report No.1. (2018). Central Statistical Organization. Data for 2011.
- 9. Al-Jameel, Hamid A. (2017). Evaluation of Al-Zahara Roundabout in Al-Najaf City Using Simulation Model and Selecting the Optimum Alternatives. Journal of Kerbala, Vol15(3). pp. 28-39.