Factors Affecting Road Traffic Accident in Batu Pahat, Johor, Malaysia

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Abstract. A road traffic accident resulted from the combination of factors related to the few components of the system involving environment, roads, road users, vehicles and the interaction between those systems. Road traffic accident (RTA) in Malaysia recorded as the highest fatality rate (per 100,000 population) among the ASEAN countries. In 2016, more than half of million cases accident recorded with more than 7,000 people were killed. Therefore, the RTA is one of the most critical issue in Malaysia even become the worldwide burden to authority. Generally, driving is a complex process which involves movement of a vehicle by either a computer or human controller. However, failure to control and coordinate will contribute to an accident. The objective of this study is to identify the pattern of accident in Johor Malaysia and to examine the relationship between the number of accident and the types of vehicles and roads. The results could help the government to recognise the different patterns, types of vehicles and roads that show major factors in the increasing of road traffic accident in Malaysia.

1. Introduction

In developing country such as Malaysia, transportation systems are vital elements and the demand for vehicles keep on increasing every year. One of the major risks that give impact to transportation system is road traffic accident. Road traffic accident is one of the most popular causes of death in Malaysia as well as other developing countries such as Iran, Thailand and United States. In fact, World Health Organization (WHO) has classified road traffic accidents as the ninth most common cause of death worldwide. Earlier research in 1983 found that the world faced a road safety problem as early as 1970s [1]. In 2017, WHO estimated around 1.3 million people may die every year due to the road traffic crashes. However, majority of the victims are cyclists, motorcyclists and pedestrians. This situation happened during the collision since there is little or may be no external protective device that would absorb energy.

Meanwhile, in 2017, Malaysia has recorded around 150,000 registered vehicles until March 2017. However, WHO estimated the trend of fatality rate in Malaysia is potentially increase year by year and Malaysia was found to be among the highest fatality rate due to road traffic accident in the world in 2013 [2]. As elsewhere in the world, the main causes of road accident are careless driving,
speeding, faulty vehicles, insufficient hours of sleep, uneven roads and many more. Many studies focused on road traffic accidents involving motorcycles [3,4,5]. They found that motorcycle tend to be the highest potential vehicle that may involve in accident. However, other transport systems either private vehicles such as cars, multi-purpose vehicles (MPV) and four-wheel drive (4WD) or public vehicles such as van and bus also need to take into consideration since all these vehicles also have their own impact on road traffic accident in Malaysia as well as other countries. On the other hand, the road-related factors also need to be highlighted in studying road traffic accident. The unexpected situation of accident also may occur along a bend, crossroad, straight road and many more due to the improper intersection design [6].

This paper is organised as follows: Section 2 presents the related data of road traffic accident in Batu Pahat, Johor from 2012-2015. Section 3 describes the research methodology in analysing the gathered data. Meanwhile, Section 4 shows the results and analysis and Section 5 concludes the study.

2. Data
Monthly number of accident cases from Batu Pahat, Johor of Malaysia for the four years from January 2012 to December 2015 were obtained from Batu Pahat District Police Office. In total 29,967 cases were reported across Batu Pahat during this time period. Figure 1 shows the total number of accidents reported in Batu Pahat from 2012-2015. The diagram shows the highest number of accidents reported was in 2015.

![Figure 1. Annual total number of accidents in Batu Pahat from 2012-2015.](image-url)
3. Research Methodology
The study started with the descriptive analysis in order to determine the overall pattern of the data set. The statistical techniques involved in this analysis are mean, median, percentage, standard deviation and variance. At the initial stage of analysis, the application of descriptive statistics is quite relevant to explore and summarise the data set [7].

4. Results and Analysis
This section discussed the results obtained from the data analysis. Discussions begins with descriptive analysis in identifying the number of accident pattern in Batu Pahat followed by the relationship between two variables. Here, Figure 2 shows that in August, the highest number of accident recorded compared to the other months. Besides, car is the major factor of road accident in Batu Pahat with 68.43 meanwhile, bus recorded the lowest percentage with 0.82% (see Figure 3). Figure 4 represents most of the accident in Batu Pahat that occurred on the straight road. This may due to the inappropriate or excessive speed by the victim along the straight road. Roundabout recorded the lowest number of accident in Batu Pahat from 2012-2015.

![Figure 2. Monthly total number of accidents in Batu Pahat, Johor from 2012-2015.](image)

In identifying the relationship between two variables, we plot the scatter plots between dependent variable, $y$ and independent variable, $x$. Figure 5 shows scatter plot between number of accident and types of vehicles. Types of vehicles consist of bus, bicycle, lorry, car, motorcycle, MPV, 4WD, pedestrian and van. From Figure 5, we could conclude that car, MPV, 4WD, van and motorcycle show positive relationship towards number of accident.
Meanwhile, bus, bicycle and pedestrian shows no relationship towards number of accident. Next, Figure 6 shows scatter plot between number of accident and types of roads. Types of roads consist of roundabout, straight, bend, multilevel junction, crossroads and T or Y junction. From Figure 6, we could conclude here that crossroads, straight and T or Y junction shows positive relationship towards the number of accident while others shows no relationship.

![Figure 3](image1.png)

**Figure 3.** Percentage number of accident according to types of vehicles.

![Figure 4](image2.png)

**Figure 4.** Percentage number of accident according to types of roads.
Figure 5. Relationship between number of accident in Batu Pahat 2012-2015 and (a) number of bus, (b) number of car, (c) number of lorry, (d) number of motorcycle, (e) number of MPV, (f) number of 4WD, (g) number of pedestrian, (h) number of van.
Figure 6. Relationship between number of accident in Batu Pahat 2012-2015 and (a) roundabout, (b) straight, (c) bend, (d) multilevel junction, (e) crossroads, (f) T or Y junction.

5. Conclusion
Types of vehicles such as car, MPV, 4WD, van and motorcycles and types of roads such as crossroads, straight and T or Y junction affected the increasing number of accident in Batu Pahat, Johor from 2012-2015. From the data analyse, the main highlight is the types of roads influenced of the increasing number of accident in Malaysia as well as other countries.

It has been the main objective for the Ministry of Works Malaysia to reduce the number of road accidents in Malaysia. Parallel with this paper in exploring the potential factors that may contribute to the increasing number of accident in Malaysia. Therefore, Malaysia government, other relevant authorities and especially all drivers in Malaysia should take in account an extra prevention steps to help in reducing the number of accident in Malaysia in future.
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