



# Analysis of Road Traffic Crashes Data of Perak State in Malaysia

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**Abstract:** Road traffic accidents are one of Malaysia's top five major causes of death and is one of the most critical public health concerns in 2023. As a result, this article offers research based on data from different Malaysian government organisations and analysing the changes in the pattern of Road Traffic Crashes (RTC) in Perak, Malaysia. From 2011 to 2018, data was analysed based on road traffic collisions and categories of casualties concerning gender, age, types of roads and vehicles, and road users. The mortality and injury rates per 100,000 people were used to calculate performance for road safety. It was found that with a 0.59% increase in Perak's population and an increase in the number of cars, there are 30,669 total crashes and 491 road deaths in 2020. Furthermore, this study discovered that motorcycles were the most common vehicle involved in road traffic deaths from 2011 to 2018, which should raise concerns since motorbikes have become an essential mode of transportation. In Perak, most road deaths were males between the ages of 16 and 20. Finally, this study discovered that the death and injury rates per 100,000 people in Perak are 19.56 and 75.82, respectively, indicating that the fatality rate is dropping, but the injury rate increased dramatically in 2020 compared to 2019. The Perak state administration must investigate why the situation has worsen after a decade. Somehow or rather, the state must address this issue, and it is advised that further research be conducted to identify mechanisms to enhance the current scenario to lower the number of RTCs, notably deaths, in the state.

**Keywords:** Road traffic crashes (RTC), road traffic injuries (RTI), road fatalities, road injuries, Malaysia

## 1. Introduction

As a developing country, Malaysia relies heavily on the road as a transportation system, and the network of roads and highways totalled 267,046 km in 2020 (DOSM, 2020). Road transportation is vital for the country for access to workplaces, educational facilities, logistics and health centres (Kamarudin et al., 2018). However, the adverse effect of the road as a transportation system is visibly seen when Road Traffic Crashes (RTC) involves many types of vehicles, especially motorcycles (Masuri et al., 2017). Road Traffic Crashes (RTC) are known as one of the causes of mortality and disability worldwide. Approximately 1.3 million people die annually, and between 20 to 50 million people bear injuries with disability or all forms of injuries (WHO, 2009; WHO, 2023). As RTC is causing Road Traffic Injuries (RTI), it also causes considerable economic losses to individuals, families, and the whole nation as it costs most countries 3% of gross domestic product (GDP) (WHO, 2023). The losses begin from the cost of treatment, loss of productivity due to injuries, disabilities pay, and time off from work for the victims. RTC statistics are crucial in

assessing road safety in a particular country. Examples of such elements are the count of fatal road crashes, the number of people who sustained injuries and the number of people who die on the road due to road crashes (Rohayu et al., 2018). In 2021, Malaysia had 370,286 RTC cases which caused 4,539 deaths cases (DOSM, 2022a). With an average of 18 deaths in road traffic crashes daily, it is becoming a public health issue for Malaysia (MOT, 2023). According to MIROS (2018), each death case due to road crashes costs about RM3.12 million per person for the nation, including the loss of efficiency and infrastructure recovery, such as medical and transportation costs (MOT, 2022).

A safe road system can be categorised by the ability of a person to travel freely without injury or death along a road. A perfectly safe transportation system would not experience crashes between various road users. This has not been the case for Malaysia, where people continue to get injured or killed on roads and highways across the country. For many years, Malaysia has worked to put in place a secure road network. The Malaysian Road Safety Plan, Malaysia’s version of the safe road system, was introduced in 2014 (JKR, 2014). By 2020, the plan sought to cut the number of traffic fatalities and severe injuries in half. The Malaysian Road Safety Plan had a thorough strategy for road safety that included strengthening education about road safety, stepping up law enforcement, and enhancing post-crash response. The plan included several activities, including creating a road safety council, automated enforcement mechanisms, and road safety audits. Malaysia’s government 2022 to unveil a new road safety strategy called the Malaysia Road Safety Plan 2021–2030 (MIROS, 2022). This new plan aims to decrease the incidence of severe injuries and fatalities caused by motor vehicle accidents. The new strategy calls for installing additional speed cameras, developing a new driving curriculum, and creating a national database for road safety. Thus, the challenge posed to the road safety field in Malaysia is to minimise the frequency of crashes resulting deaths and injuries by using all currently available tools, knowledge, and technology (FHWA-SA-18003, 2017).

## 2. Comparison of Road Safety Among Countries

Traffic accidents represent a significant problem facing many countries around the world. Traffic accidents have been reported as the ninth most common cause of death, according to the World Health Organization (WHO, 2013). The total number of annual traffic accident fatalities is approximately 1.3 million; in a later study, the WHO estimated the number of fatalities to be approximately 1.24 million (Akmal, 2016). Many cities worldwide are working to reduce the traffic fatality rate (i.e., the number of fatalities relative to the population or the number of registered vehicles). However, WHO data revealed that the estimated fatality rate in Malaysia was among the highest in the world in 2013. In addition, Malaysia has one of the highest traffic fatality rates in the region, as shown in Figure 1 (Akmal, 2016). Additionally, Figure 2 shows Malaysia’s fatality rate compared to selected developed countries, based on WHO data (Akmal, 2016).

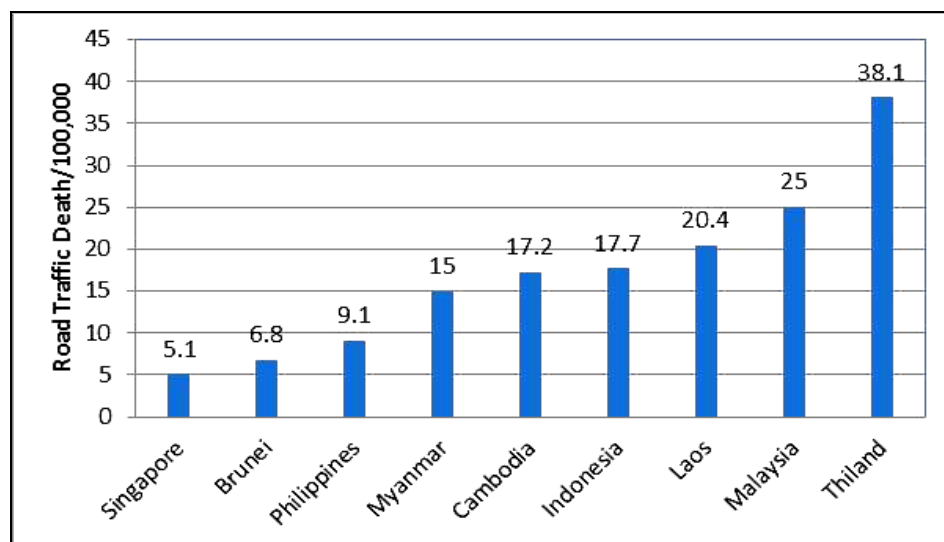


Fig. 1 - Fatality rate in Malaysia to countries in the Region [Akmal, A. 2016]

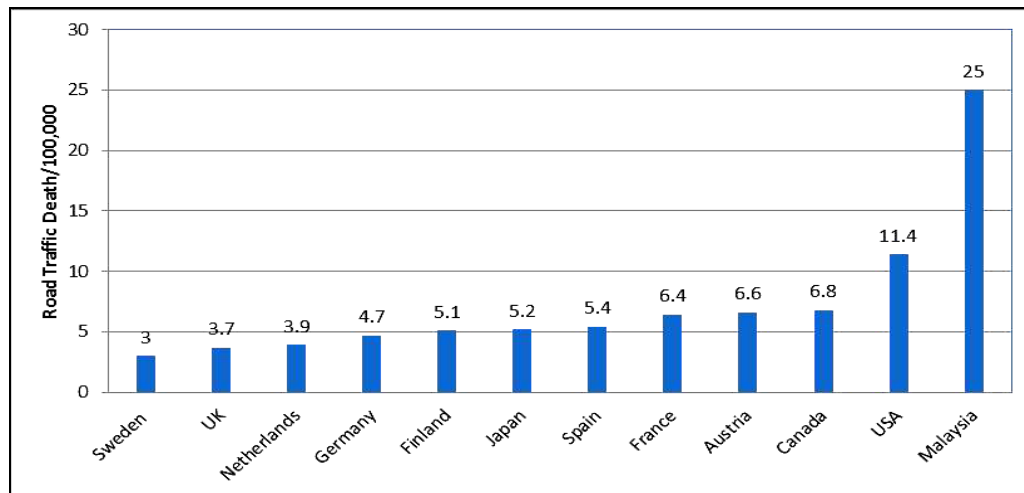


Fig. 2 - Fatality rate in Malaysia to developed countries [Akmal, A. 2016]

In 2009, the Malaysian government spent RM 9.3 billion due to traffic crashes and the fatalities in Malaysia in 2009 6,745 deaths (Musa, Hassan & Mashros, 2020). Comparing the fatality rate between countries, as shown in Figures 2.1 and 2.2, Malaysia did not do well compared with some developing and developed countries and requires urgent attention from the government.

### 3. Data of Road Traffic Crashes

The data on yearly road traffic crashes (RTC) are officially obtained from various agencies such as the Royal Malaysian Police (RMP), Malaysian Institute of Road Safety Research (MIROS), and Ministry of Transport Malaysia (MOT) through official websites and official emails. Then, the collected data were road traffic crashes concerning the numbers and types of casualties (fatalities and injuries) from 2011-2020, which includes elderly road users as well as casualties concerning age and gender from 2011 to 2018. From these data, the road fatality rates and injury rates based on per 100,000 population of Perak were calculated for each year from 2011 to 2020, in which the data for the population were obtained from the Department of Statistics, Malaysia (DOSM).

This study chooses Perak state as the case study, consisting of 12 districts and the second largest state in Peninsular Malaysia (West Malaysia) after Pahang (Perak official portal, 2022). It is also located in the north and as the central region of Peninsular Malaysia, surrounded by Thailand in the north, Kelantan and Pahang in the east, Selangor in the south, Malacca in the west, and Penang and Kedah in the northwest (DOSM, 2021). Furthermore, the roads in Perak are the longest in Peninsula Malaysia, with 40,076.133 lane-km (JKR Malaysia Road Statistics, 2021). With the longest road record, it is not astounding that Perak became one of Malaysia's highest RTC, with 30,669 cases and road fatalities 491 in 2020 (DOSM, 2022a). From 2011 to 2020, one of the states in Peninsula Malaysia that recorded the highest fatalities was Perak, as shown in Figure 3.

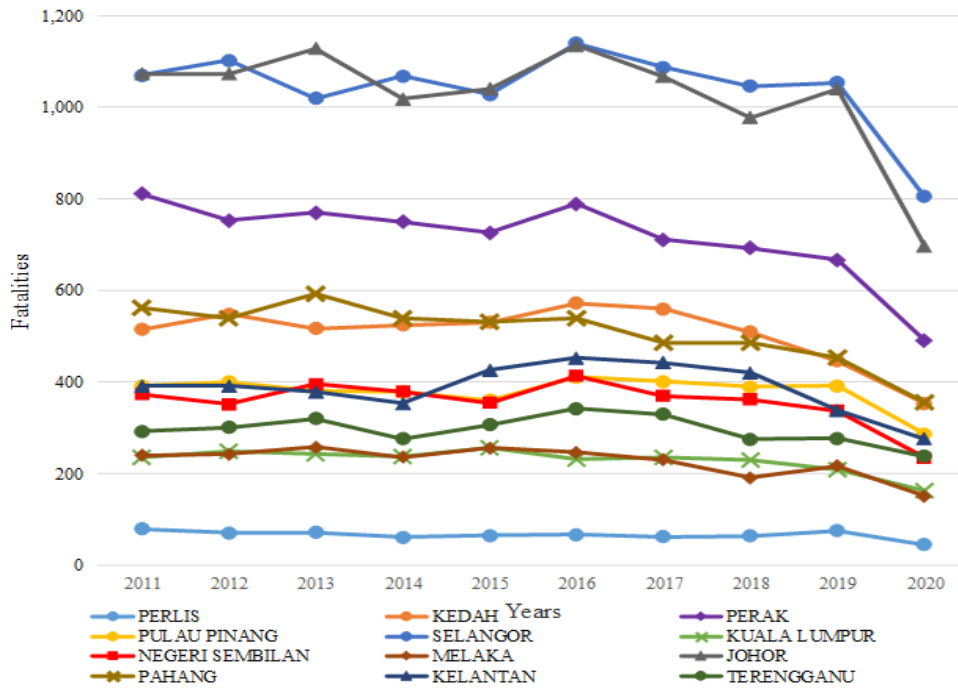


Fig. 3 - Road fatalities in States, Peninsula Malaysia, 2011-2020 [MOT, RMP]

#### 4. Road Traffic Crashes (RTC)

The term crash has various definitions; however, in this study context, WHO defined a crash as a collision involving one or more vehicles that may result in an injury or fatality (Peden, 2004). In 2016, the WHO defined a RTC as a collision involving one or more persons on the road that caused injury or death (Peden, 2004). At the same time, Road Traffic Injury (RTI) is a deadly or non-fatal injury resulting from a crash involving at least one moving vehicle (WHO, 2015). In 2020, DOSM (2022) stated that road fatalities became one of the leading causes of death in Malaysia, and is also the leading cause of death among children and young adults (MOT, 2022). Even though in 2019, road fatalities decreased by 6,167 and drastically decreased to 4,634 road fatalities in 2020, it is only due to the Movement Control Order (MCO) execution by the Malaysia government to curb the spread of COVID-19 pandemic.

The increase in RTC in developing countries such as Malaysia is associated with rapid growth in population, economy, industrialisation, old vehicles, poor road conditions, poor road maintenance, rapid motorisation, lack of vehicle maintenance and lack of police enforcement (Worley, 2006; Mustafa, 2006; Kamarudin et al., 2018). The deaths due to road traffic crashes by type of vehicles in 2010-2020 (MOT, 2022) is shown as in Figure 4, which shows that motorcycles are one of Malaysians' primary modes of transportation and one of the most dangerous groups on the road. Motorcycle-related fatalities have significantly increased in the past ten years, making up over 60% of all fatalities. With 20% and 6% of all fatalities in 2019, respectively, drivers and pedestrians are the second and third most at-risk groups.

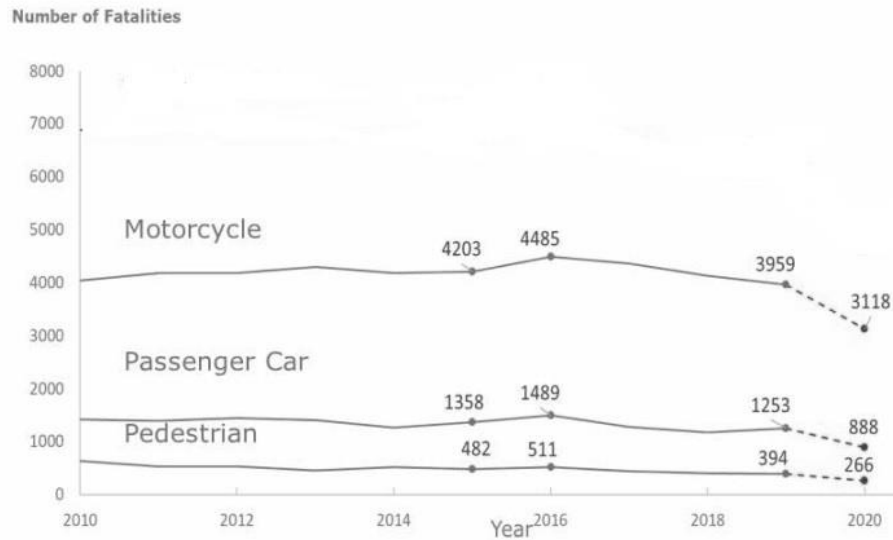


Fig. 4 - Road fatalities by type of vehicles, 2010-2020 [MOT,2022]

### 5. Demographic Profile of Road Traffic Crashes in Perak

The data was mainly gathered for Perak road traffic crashes database from MIROS, RMP, and MOT from 2011 until 2020. Then, the data analysis was carried out based on the road fatality rate (per population) and injury rate (per population) and represented graphically and discussed as follows.

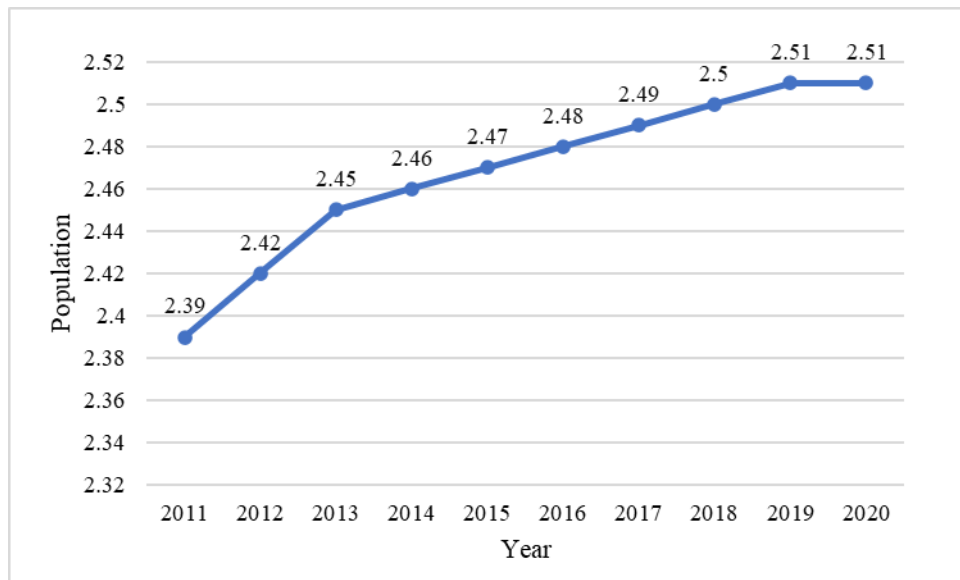
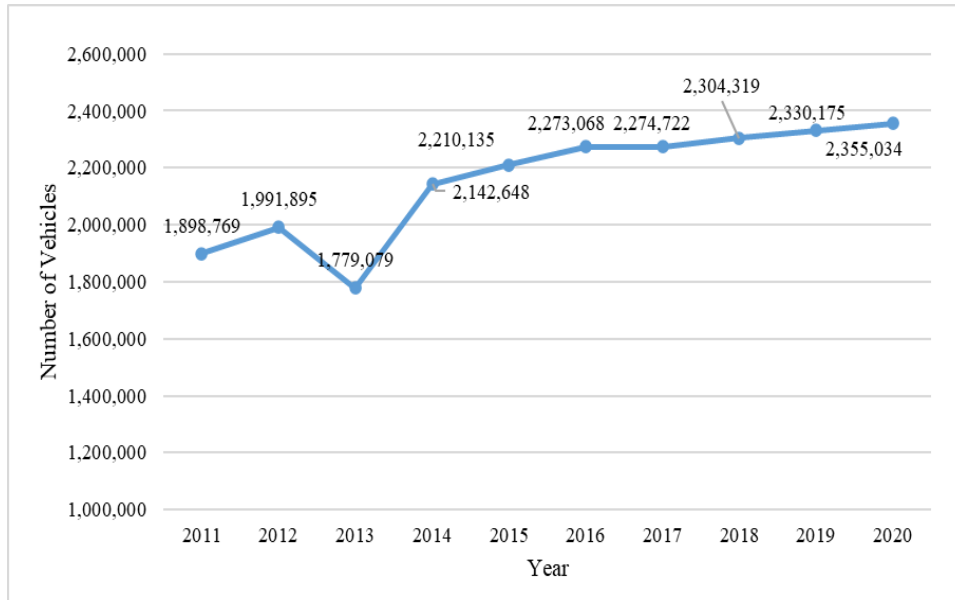
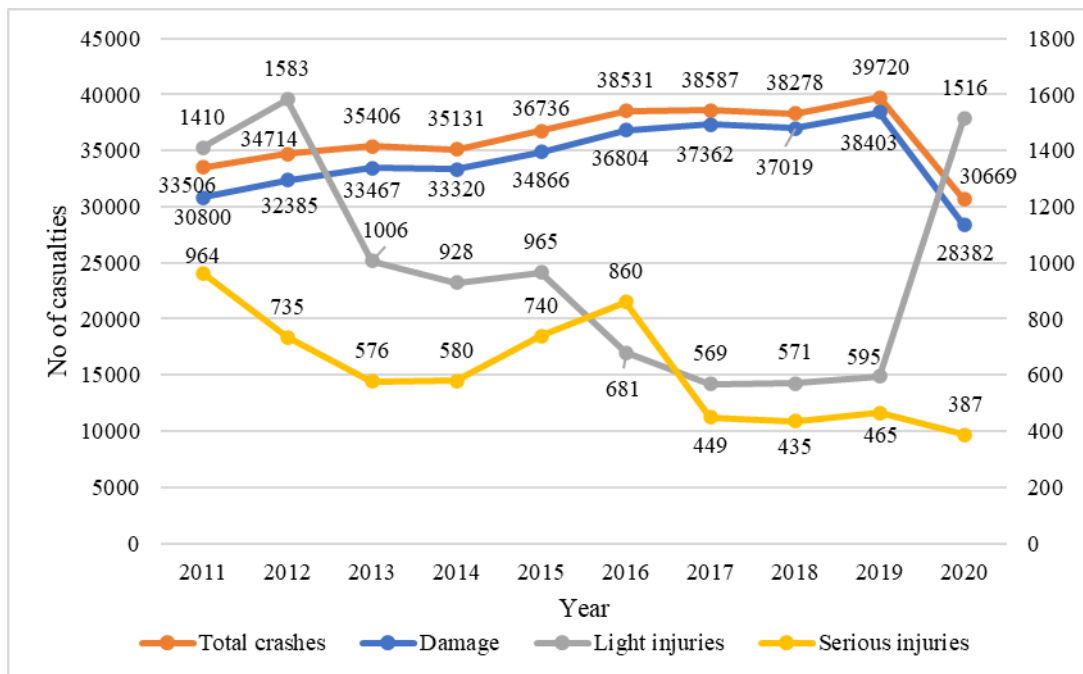


Fig. 5 - Perak's population, 2011-2020 [DOSM, 2021]



**Fig. 6 - Total vehicles in Perak, 2011-2020 [Perak State Government,2021]**

Figure 5 shows that Perak’s population substantially increased from 2011 to 2013 and began to increase gradually from 2013 to 2020. The average growth in population from 2011-2020 was about 0.59%. Based on Figure 5 and Figure 6, the population of Perak and the type of vehicles from 2011 until 2020 are increasing in tandem, which shows that population and purchasing of vehicles are interrelated. This also indicates how many road users in Perak get road traffic crashes and road fatalities, as in Figure 7 below.



**Fig. 7 - Road traffic crashes by casualties in Perak, 2011-2020**

For road traffic crashes casualties in Perak, Figure 7 illustrates the statistics. From 2011-2020, the percentage of deaths (7,161) against total road traffic crashes (360,280) was 2%, whereas, for severe injuries (6,125) and light injuries (10,065), they were 1.7% and 2.8%, respectively. For the next decade (2021-2030), Perak has targeted 5,154 road fatalities, a reduction of 2,007 fatalities from the last decade (2011-2020). In terms of percentage, it is a reduction of about 28%. Thus, collaborative action between the road safety stakeholders in the state is essential. It is under the purview and responsibility of the Road Safety Council of the Perak state to make sure this is realised for the success of managing and monitoring the performance of road safety matters in the state.

### 5.1 Number of Crash Against Number of Fatalities

Raw data of road traffic crashes from the relevant authorities are further analysed to demonstrate the relationship between the number of crashes with the number of fatalities for the state of Perak. Figure 8 below depicts the relationship.

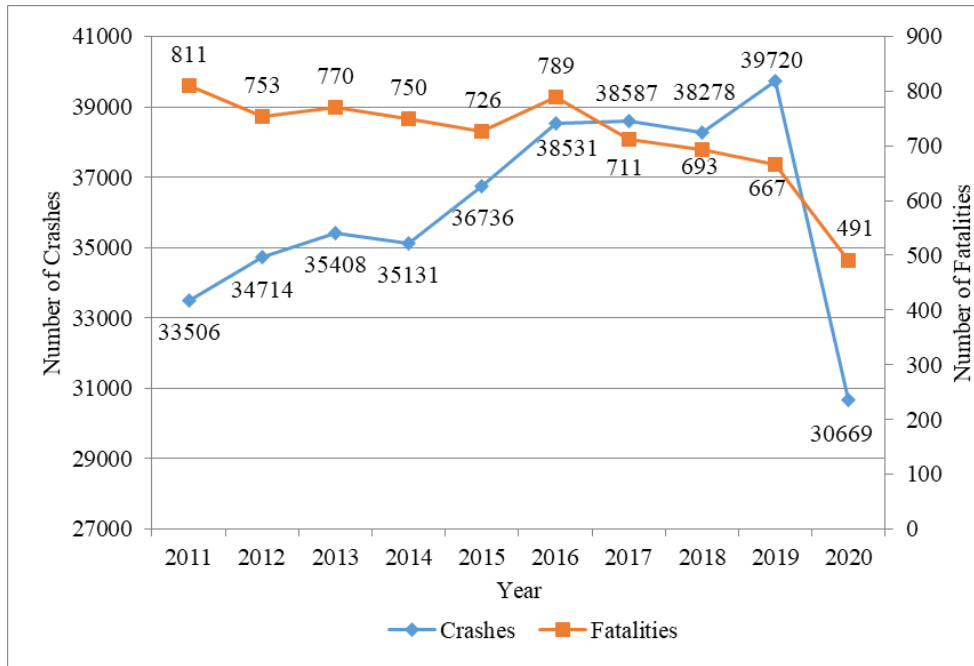


Fig. 8 - Road traffic crashes and fatalities in Perak, 2011-2020

From Figure 8, RTC are increasing yearly, but in 2014 and 2018, there was a slight reduction and a significant decrease in 2020. In 2020, RTC dropped substantially due to the impact of the Covid19 pandemic lockdowns, whereby there was less traffic on the road when the Movement Control Order (MCO) was imposed. Even with the increasing number of road crash traffic from 2011 until 2019, the number of fatalities is decreasing. Appropriate interventions need to be planned by the lead agency for road safety in the state and those involved in road safety, including the road custodians (JKR, LLM, City Councils and City Municipalities) and enforcement agencies (RMP and RTD) in the state to help to lower the number of RTC.

### 5.2 Number of Fatalities Against Types of Vehicles

Following is the relationship between the number of fatalities against the types of vehicles involved in road traffic crashes for the state of Perak, as in figure 9.

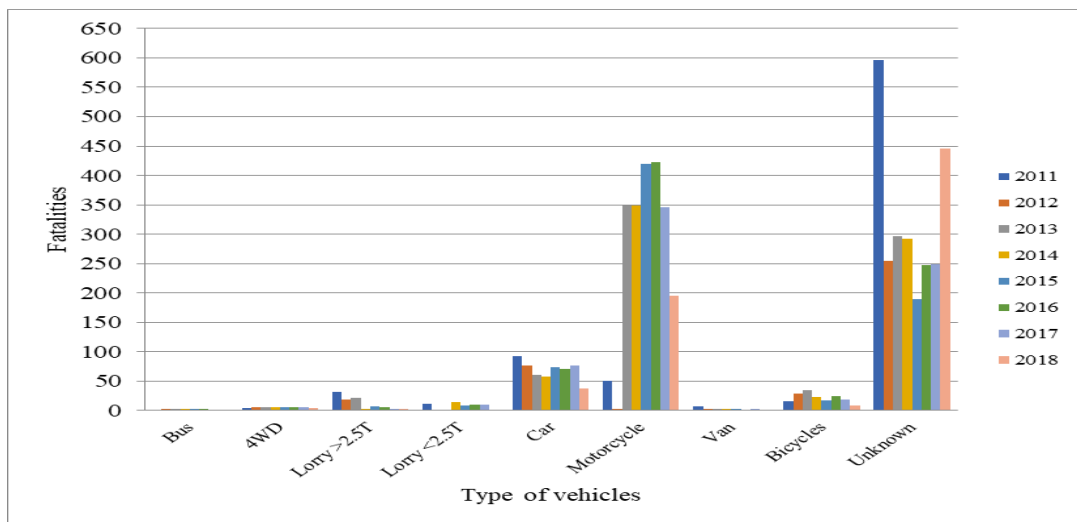


Fig. 9 - Road traffic fatalities by type of vehicles in Perak, 2011-2018

Based on Figure 9, the highest risk for fatalities for the type of vehicle is a motorcycle from 2011 until 2018. Liu et al., in 2003, stated that motorcyclists are at the highest risk in traffic crashes due to head injuries. Furthermore, RTC statistics by RMP show that motorcyclists were the most involved with significant road traffic crashes, as shown in Figure 7. This situation is common in developing countries such as Malaysia and Thailand, where motorcycles are considered a standard and necessary mode of transport (Masuri et al., 2010). Furthermore, the causative factors for road traffic crashes involving motorcycles are complex and various. One of the factors is imbalance during riding motorcycles as it only has two wheels (Masuri et al., 2010). Then, the size of motorcycles is small compared to other vehicles on the road, which causes limited visibility by other road users. In addition, most motorcyclists don't wear safety gear such as helmets and motorcycle vests, which can protect the cranium as the vital human body part and may reduce head injuries. The government needs to make an effort to improve safe routes for motorcyclists and tighten the road laws, such as the need to wear motorcycle vests, especially at night.

### 5.3 Number of Fatalities Against Gender

Further analysis of the acquired data shows a relationship between the number of fatalities and the gender of the people involved in the road crashes, as in Figure 10.

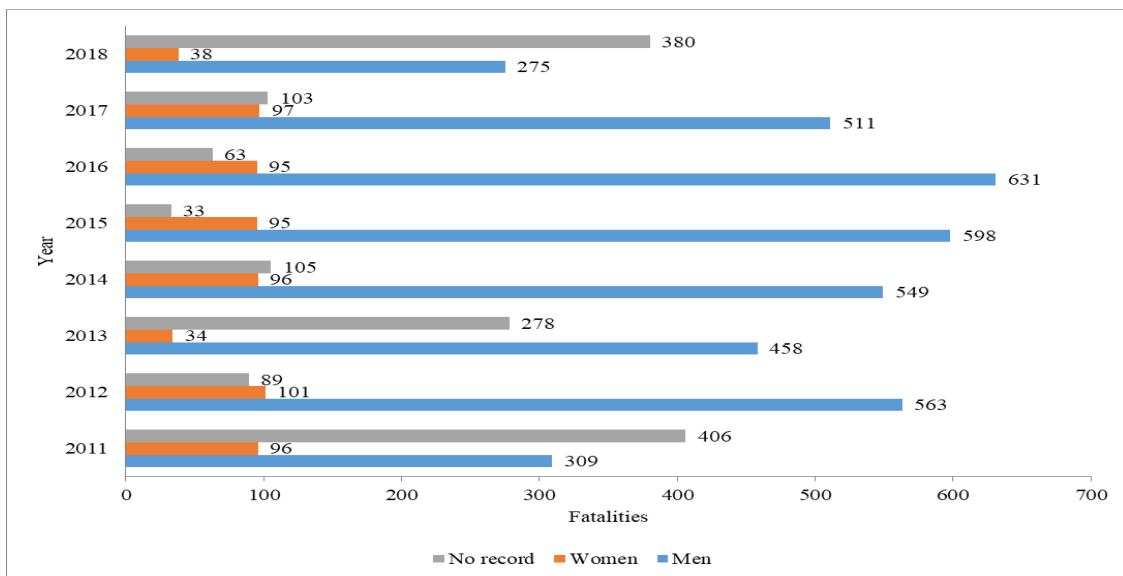


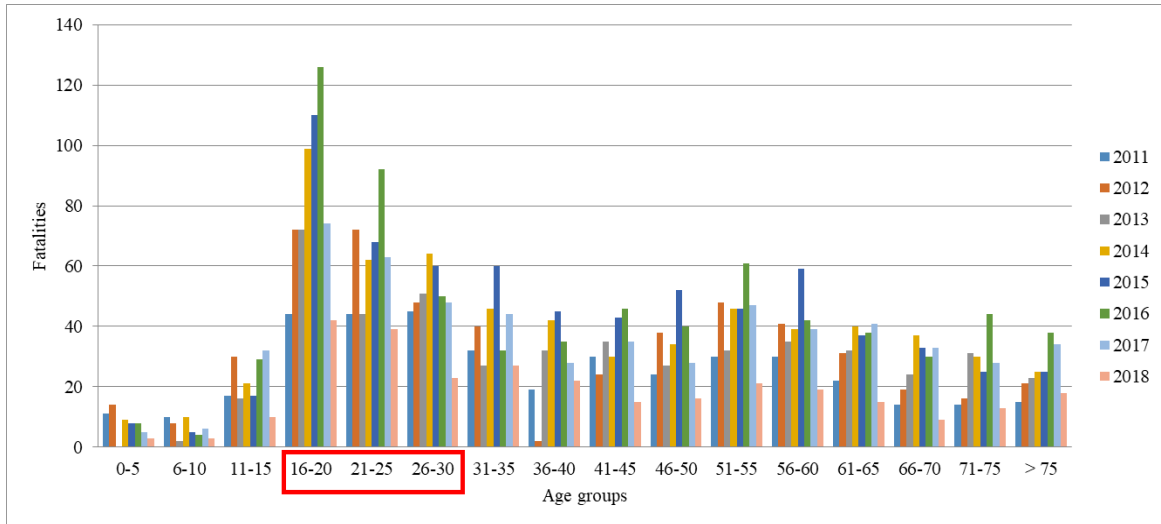
Fig. 10 - Road fatalities by gender in Perak, 2011-2018

The road fatalities by gender are illustrated in Figure 10, which shows that more men died than women due to RTC. Excluding the unknown record, the percentage of men who died compared to women was 21.83% men to 3.66% women from 2011-2018. This pattern is related to various issues such as limited public transport, limited access and opportunity, and labour force participation. In Malaysia, the men's labour force participation rate was 80.9% compared to the women's participation rate of 19.1% (DOSM, 2022b). This finding shows that men are much more on the road as road users than women as they must commute to work and travel longer distances, which exposes them to road safety risks. Furthermore, men are more likely to participate in dangerous actions, such as speeding, road violations driven by lack of patience or concentration, and driving while intoxicated (Al-Balbissi, 2003; Kelly-Baker & Romano, 2010; Tsai et al., 2010; Cullen et al., 2021). The government must increase public awareness regarding driver or rider behaviour regardless of gender.

### 5.4 Number of Fatalities Against Age Group

It can also develop the pattern or relationship between the number of fatalities and the age group of people involved in the road accident crashes, as shown in Figure 11.



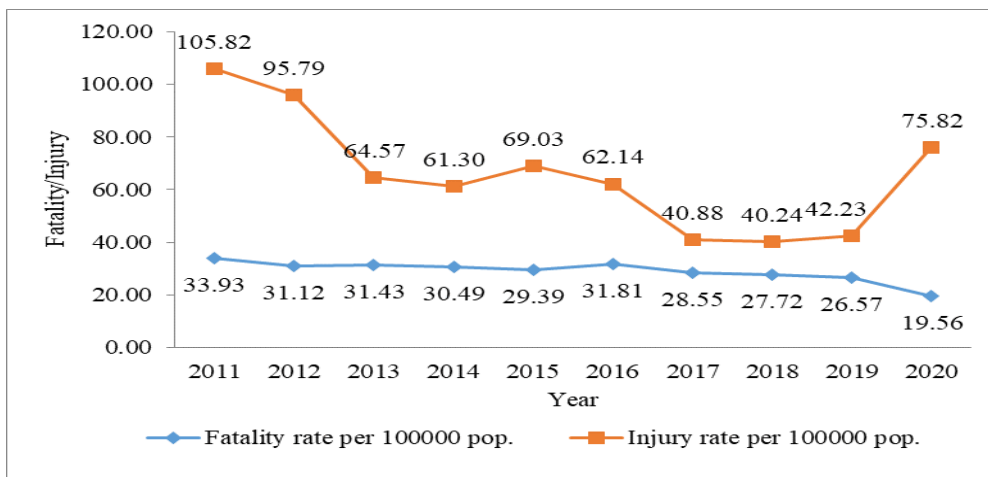


**Fig. 11 - Road fatalities against age group in Perak, 2011-2018**

Figure 11 shows the road fatalities against the age group in Perak from 2011 until 2018, indicating that the group aged 16 to 30 was recorded as the three highest age group that faced fatalities. However, ages 16 to 30 are recorded as having the highest fatalities due to recklessness, whether for cars or motorcycles or both. The group aged 16 to 20 are considered immature drivers and lack experience as drivers and riders, which also tend to violate the road’s law, such as speeding, riding in the opposite direction, and reckless driving, as mentioned by MIROS in 2020. Furthermore, under the Malaysian Road Transport Act 1987, section 26 (1) specifies that an individual must possess a valid driving license before being permitted to drive or ride on the road, which for a motorcycle license can be obtained from the age of 16 years old and onwards. In contrast, a driving license is from 17 years old. Stricter rules should be set in acquiring these licenses in the future, including occasionally increasing enforcement activities.

**5.5 Fatalities Rate Against Injury Rate**

Finally, the road crash data analysis presented a relationship or pattern between the fatalities rate and the injury rate, as presented in Figure 12.



**Fig. 12 - Road fatalities and injury rates in Perak, 2011-2020**

Lastly, Figure 12 shows the road traffic fatality and injury rates from 2011 to 2020. From the figure, the Road Fatality Rates (RFR) showed a descending trend of 33.93 in 2011 to 19.56 in 2020, although the state’s population and the number of RTCs showed an ascending trend. On average, the RFR was 29.06 throughout the ten years. On the other hand, the trend was not consistent for injury rates throughout the period. During the early part of the period, i.e. from 2011 to 2014, the rate went down steadily but began to rise in 2015 and then it began to reduce till 2018 and increased till 2020. Although the rates were inconsistent during the period, the rate has reduced in 2020 compared to 2011. In 2011, it was 105.82 compared to 75.82 in 2020, with a reduction of about 28.4%.

## 6. Conclusion

Malaysia has the second highest rate of road fatalities in 2016, with a substantial difference from industrialised countries which could impede Malaysia's progress towards being a developed country as fatalities from road crashes are huge losses to families and the nation. This study aimed to investigate the mortality rate in Perak state, which has one of the worst rates of road deaths in Malaysia, as a minor step towards assisting the government in reducing road fatalities. With a 0.59% increase in Perak's population and an increase in the number of cars, there will be 30,669 total crashes and 491 road deaths in 2020. Furthermore, this study discovered that motorcycles were the most common vehicle involved in road traffic deaths from 2011 to 2018, which should raise concerns because motorbikes have become an essential mode of transportation in Malaysia. Subsequently, in Perak, most road deaths were males between 16 and 20, considered young. Finally, this study discovered that the death and injury rates per 100,000 people in Perak are 19.56 and 75.82, respectively, indicating that the fatality rate is dropping. Still, the injury rate increased dramatically in 2020 compared to 2019. The Perak state administration must investigate why the situation has stayed unchanged for a decade. Somehow or rather, the state must address this issue. Further research should be conducted to identify mechanisms to enhance the current scenario to lower the number of RTCs, notably deaths, in the state.

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