Malaysia Road Safety Performance Indicators: Experts Perspectives

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ABSTRACT – *Realizing the need to halve the number of crashes and deaths caused by road traffic crashes, every road safety expert in all countries has been working hand in hand with various related agencies to develop solutions, planning programs, and strategic planning. Malaysia is also included in this scenario. Data from various countries on performance indicators and law enforcement procedures that may directly impact the severity of the issues between Malaysia with other low and middle-income countries and between several high-income countries were scrutinized. It was found that Malaysian law and regulations standards are not far behind those low, middle, and high-income countries, proving that Malaysia has have done its best to manage road safety issues. To further conclude the underlying issues on road safety in Malaysia as a basis for the Malaysian Road Safety Performance Index framework, questionnaires were distributed to the Malaysian road safety expert network. The analysis found that Road Conditions and Drivers Characteristics were selected as the most critical pillars that need to be further scoured. These two factors hold the most basic indicators representing a bigger picture of Malaysia's road safety issues.*

KEYWORDS: Road Safety Performance Index (RSPI), road fatalities, low- and middle-income countries, high-income countries, road conditions, drivers' characteristics

1. INTRODUCTION

World Health Organization suggests that, yearly, road crashes kill 1.25 million people, with nearly 3,400 road fatalities per day and 50 million reported injuries (WHO, 2018). Year to year, road crash statistics such as fatality rate or mortality rate are among the most popular and widely used indicators to indicate the magnitude of the crash problem and compare road safety performances between countries. Being the most popular indicators, a lot of road safety programs and initiatives have relied upon these indicators heavily and even the slightest miscalculation of the data might cause a huge impact on the country's progress in road safety performance. Questions of whether the crash statistics are the correct indicator for comparing countries' road safety performance have been raised by several researchers and government agencies (Mooren et al., 2012; Egilmez & McAvoy, 2013; Aarts & Houwing, 2015; Chen et al., 2016). However, since crash statistics can directly represent countries' road safety performance, this indicator is still used until now.

2. MEASURING COUNTRIES' ROAD SAFETY PERFORMANCE

To encourage low and middle-income countries to pay extra attention to road safety issues, World Health Organization (WHO) put an effort to prepare a "how-to" road safety manual for LMIC (WHO, 2018). However, Wegman and colleagues in 2017 suggested that although there were many manuals to compare between countries, local road safety experts must be engaged to determine whether the manual meant for various countries is suitable for their local settings (Wegman, 2017; Wegman et al., 2017). This suggestion is in line with the effort made by certain countries to explore local road safety

issues hence suggesting local countermeasures since most of the time, reductions in road fatalities result from specific actions targeting specific conditions at local conditions.

When it comes to low- and middle-income countries, major steps to improve road safety issues should start by analyzing road safety problems and designing road safety strategies. Using High-Income Countries (HIC) experiences, such progress in low and middle-income countries could speed up. This is an interesting perspective because of the enormous knowledge resources accessible to the countries needing improvements. However, the key point that must uphold is that Low Middle-Income Countries (LMIC) cannot simply "copy and paste" solutions from HIC. These countries need to come up with fresh strategies and solutions adapted to local conditions and circumstances.

Those strategies should also be integrated with current laws and regulations in those LMIC countries to ensure that workable strategies could be developed. Table 1 shows comparisons between certain LMIC countries on certain road safety-related laws and regulations.

TABLE 1: Comparable country estimation of certain laws among middle-income countries by population
(Source: WHO, 2018)

Country	Malaysia	Morocco	Peru	Sudan	Venezuela	Iraq
Background	Income Group: Middle Gross national income per capita: US $9850 Population: 32 642 994	Income Group: Middle Gross national income per capita: US $2850 Population: 35 276 784	Income Group: Middle Gross national income per capita: US $2850 Population: 33 359 418	Income Group: Middle Gross national income per capita: US $2140 Population: 39 578 828	Income Group: Middle Gross national income per capita: US $11760 Population: 31 568 180	Income Group: Middle Gross national income per capita: US $5430 Population: 37 202 572
National speed limit law	Yes	Yes	Yes	Yes	No	Yes
Max urban speed limit	90 km/h	60 km/h	60 km/h	50 km/h	-	60 km/h
Max rural speed limit	90 km/h	100 km/h	60 km/h	90 km/h	-	100 km/h
Max motorway speed limit	110 km/h	120 km/h	100 km/h	No	-	120 km/h
Local authorities can modify limits	Yes	Yes	Yes	Yes	-	No
Enforcement (between 0 to 10)	6	7	1	6	-	2
Predominant type of enforcement	Manual	Manual and automated	Manual	Manual and automated	-	Manual
National drink-driving law	Yes	Yes	Yes	Yes	Yes	Yes
BAC limit – general population	≤ 0.08 g/dl	< 0.02 g/dl	< 0.05 g/dl	-	-	-
BAC limit – young or novice drivers	≤ 0.08 g/dl	< 0.02 g/dl	< 0.05 g/dl	-	-	-
Random breath testing carried out	Yes	Yes	Yes	Yes	Yes	Yes
Testing carried out in case of fatal crash	All drivers tested	No	All drivers tested	All drivers tested	All drivers tested	Some drivers tested
Enforcement (between 0 to 10)	4	5	2	7	4	2
% road traffic deaths involving alcohol	<1%	4%	9%	<1%	-	-

National motorcycle helmet law	Yes	Yes	Yes	Yes	Yes	Yes
Applies to drivers and passengers	Yes	Yes	Yes	Yes	Yes	No
Helmet fastening required	Yes	Yes	No	No	No	No
Helmet standard referred to and/or specified	Yes	Yes	No	No	No	No
Children passengers on motorcycles	Not restricted	Not restricted	Not restricted	Not restricted	Prohibited under 10 years	Not restricted
Enforcement (between 0 to 10)	8	7	4	3	3	5
Helmet wearing rate	91% Drivers, 87%Passengers	64% Drivers, 31% Passengers	70% Drivers, 8% Passengers	-	-	-
National seat-belt law	Yes	Yes	Yes	Yes	Yes	Yes
Applies to front and rear seat occupants	Yes	No	Yes	No	Yes	No
Enforcement (between 0 to 10)	4	8	5	5	6	5
Seat-belt wearing rate	74% Front seats, 10% Rear seats	63% Front seats, 22% Rear seats	16% Front seats, 1% Rear seats	-	-	-
National child restraint law	Yes	No	No	No	Yes	No
Children seated in front seat	Not restricted	Prohibited under 10 years	Prohibited under 12 years	Prohibited under 10 years	Prohibited under 10 years	Prohibited
Child restraint required	-	-	Up to 3 years	-	-	-
Child restraint standard referred to and/or specified	-	-	Yes	-	No	-
Enforcement	-	-	1	-	3	-
% children using child restraints	-	-	<1	-	-	-
National law on mobile phone use while driving	Yes	Yes	Yes	Yes	Yes	Yes
Ban on hand-held mobile phone use	Yes	Yes	Yes	Yes	Yes	Yes
Ban on hands-free mobile phone use	No	No	No	Yes	No	Yes
National drug-driving law	No	Yes	Yes	Yes	Yes	Yes

Morocco, Peru, Sudan, Venezuela, and Iraq were selected as their background is quite similar to Malaysia in terms of the number of populations and gross national income per capita. Venezuela recorded the highest gross national income per capita (US $1,910 more than Malaysia), and Sudan recorded the highest population (8 million people more than Malaysia) among these six LMICs.

General comparisons in law enforcement for various aspects saw Malaysia as much better than the other countries. This data implies that the Malaysian government is doing its best to cope with the current and latest road safety issues by implementing various road safety-related laws to protect its citizens. Below figures show comparisons on the 'outcomes' of the enforcement works between these six LMICs that is the trend of death itself.
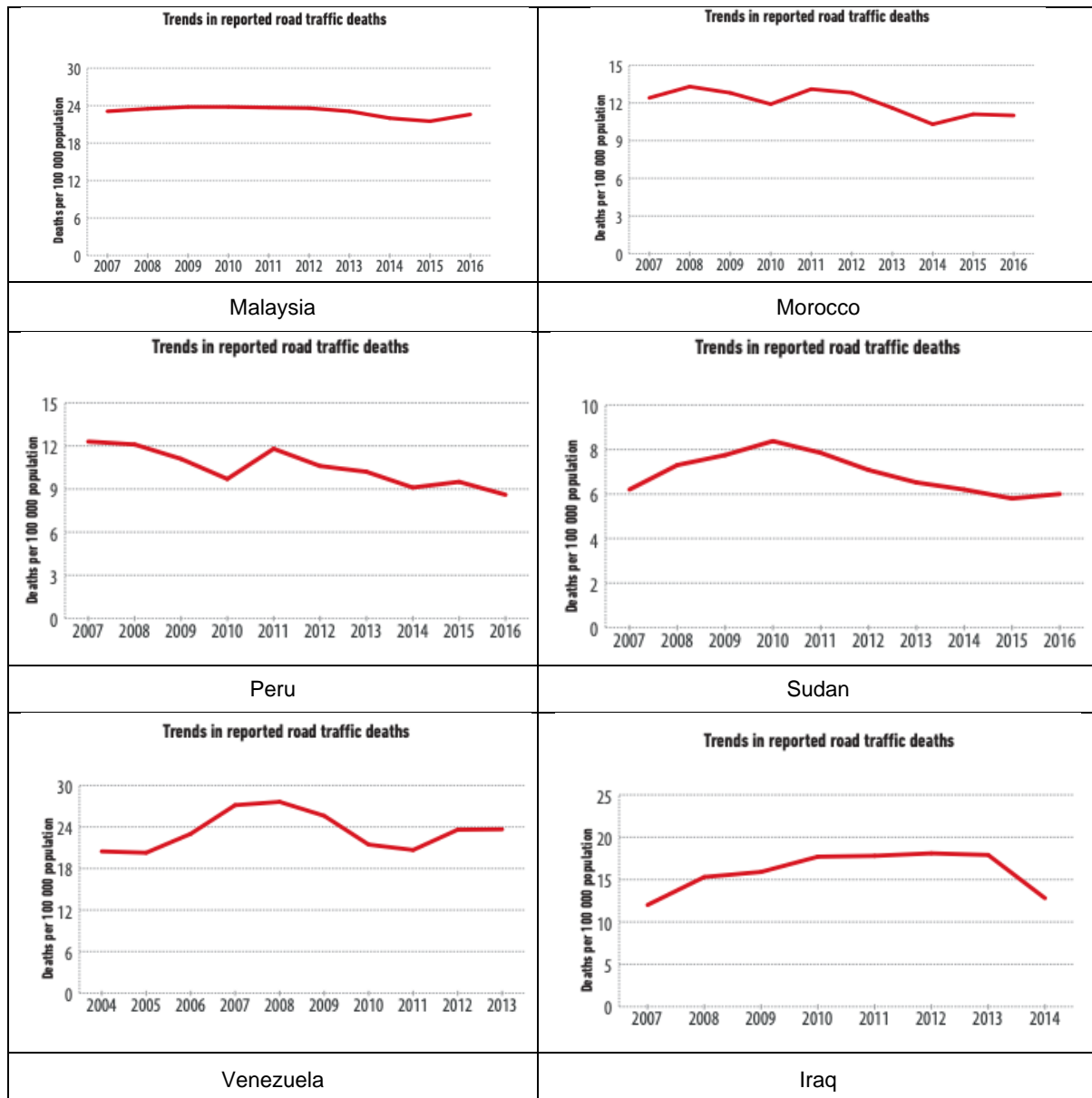
FIGURE 1: Trends in reported road traffic deaths among middle-income countries
(Source: WHO, 2018)

Figure 1 depicted the trends in reported road traffic deaths among middle-income countries after taking measurements on certain laws for developing road safety performance. Among all middle-income countries, Malaysia recorded the highest road traffic deaths trends while Sudan recorded the lowest trends of reported road traffic deaths.

Surprisingly, only Venezuela doesn't have any national speed limit law, and thus it is no surprise to see that Venezuela also recorded the highest number of deaths per 100,000 population (Fraser, 2005; Mahdian et al., 2015). However, more shocking findings to be further analyzed were that Malaysia which has a more stringent law than Venezuela is having a similar number of deaths per 100,000 population. Peru has a similar number of populations with Malaysia shockingly having less than half of the number of deaths per 100,000 population compared to Malaysia (Medina et al., 2011).

These comparisons show that although Malaysia is on the right track in terms of road safety law and enforcement, there are other issues that Malaysia's law couldn't completely curb death caused by road traffic crashes.

However, we should note that some restrictions might affect the stability of certain countries' transportation systems while making a comparison of death fatalities in the road safety field. The relationship between road fatalities and road safety among middle-income countries might also be affected by road networks, geography, transportation system quality, and political stability.

Iraq: Iraq, especially the capital Baghdad, is worn out environmentally and economically due to its minimal economic and environmental and accident problems (Chaichan et al., 2018a; Chaichan et al., 2018b). Besides, they are having an out-of-date road network and are highly congested at the same time (Mohamedmeki, 2019). *Political stability: -2.56 (weak)*

Morocco: Morocco is an active transportation system as transport is very important to deliver goods and travel among citizens. The importance of Morocco's transportation sector can be appreciated from its role in occupying an essential vector for economic competitiveness, not to mention its role in regional planning and improving people's living conditions (Akoudad & Jawab, 2018). Road transport is one of the most important human activities in Morocco; in addition to creating links between regions and between populations and the rest of the world, it employs 1 million people (Karim, 2019). *Political stability: -0.37 (weak)*

Sudan: Because of the economic conditions and increase in immigration to the capital, the population grows faster, and the capital becomes larger, and the street is extended to all its districts. The traffic jams and slow traffic motion led to a waste of time or a long way to access the desired location. Khartoum, the capital of Sudan, has almost flat geology. The study area's metrology is experiencing the same desert climate with three well-marked seasons, cold winter from November to March, hot summer from March to July, and Autumn from July to October (Ahamed & Shimmo, 2013). *Political stability: -1.67 (weak)*

Peru: Peru is a middle-income country with a sustained migration pace and an increasingly accelerated urbanization process. An integral and comprehensive planning framework has largely been absent in this modernization process, and thus urban growth has resulted in a chaotic landscape with insufficient and unfriendly road infrastructure. Peru lags in the quality of roads compared with other Latin American countries. Pedestrians have not been considered when designing the cities, and poorly regulated export of used cars has predominated for decades. Therefore, pedestrians and passengers alike have increasingly become exposed to dangerous roads and vehicles. Not surprisingly, Road Traffic Injuries (RTIs) have gained increasing visibility in Peru (Huicho et al., 2012). *Political stability: -0.14 (weak)*

Venezuela: Venezuela possessed a relatively well-integrated transportation network that far exceeded most of its South American neighbors. Roads were the primary means of transportation for both passengers and cargo, and the country had the highest percentage of paved highways in Latin America. The nation's extensive road network covered more than 76,600 kilometers in 1988, 34 percent of which was paved and 32 percent gravel. The remaining 34 percent were dirt roads. The southern part of the country lacked a road network and was generally not accessible by land. Venezuelans have been suffering through the collapse of the public transportation system over the past five years, which has been decimated by rising prices and the scarcity of spare parts, and the lack of government investment (Metzner & Verma, 2008; Mohammed Saud et al., 2019). The crisis is forcing thousands of users to either walk wherever they need to go or stand in long lines waiting for the "perreras" – cargo trucks that belong to the Caracas Mayor's Office or private citizens but without any safety measures for transporting people since there are very few public buses available (Padrón, 2020). Most of the buses are almost 50 years old, but about a third of them could return to service if the parts were available. *Political stability: -1.45 (weak)*

Malaysia: Urban cities in developing countries have several factors that create problems with sustainable transport systems. Population growth, high income, rapid growth of cities, and urbanization have led to increased travel demand. The service of the transport sector has always not been up to the mark in developing countries. Most transport facilities fail due to a lack of proper planning and design. Besides, pedestrians and non-motorized vehicle users are less considered when planning an urban transport system that creates a mixture of traffic on the roads and further complications. The Malaysian economy is developing so fast that most people afford to have private vehicles, and hence the vehicle population has also boomed (Jawi et al., 2017). Extremely congested roads with all vehicles and passengers traveling at different speeds are the present situation on Malaysian roads. This is further

worsened by the lack of public transport facilities and parking spaces (Nurdden et al., 2007; Almselati et al., 2011). ***Political stability****: 0.11 (good)*

In a nutshell, the comparisons among middle-income countries show that Malaysian is the most stable country and has an appropriate road network and transportation system. However, a huge number of road fatalities might occur due to drivers' behavior (e.g., speeding) and a mixture of traffic and extremely congested roads that lead to further complications regarding road conditions and road safety (Pei et al., 2012). As compared to the other middle-income countries, the contingencies occurred from multiple angles, especially in economic and political stability, leading to the improper provision of road networks and unsatisfied transportation system that lacks road safety measurement (Law et al., 2011; Hughes et al., 2014). These factors affected how to make good comparisons among middle-income countries to develop RSPI applicable to Malaysia. Therefore, Vehicle Kilometers Travelled (VKT) is included in the discussion to perform a road safety index that can compare countries.

Nonetheless, we compared the laws implemented in high-income countries to improve certain laws suitable for Malaysia.

TABLE 2: Comparable country estimation on certain laws among high-income countries by population
(Source: WHO, 2018)

Country	Malaysia	Canada	Australia	Poland	Spain	Saudi Arabia
Background	Income Group: Middle Gross national income per capita: US $9850 Population: 32 642 994	Income Group: High Gross national income per capita: US $43660 Population: 36 289 824	Income Group: High Gross national income per capita: US $54420 Population: 24 125 848	Income Group: High Gross national income per capita: US $12680 Population: 38 224 408	Income Group: High Gross national income per capita: US $27520 Population: 46 347 576	Income Group: High Gross national income per capita: US $21750 Population: 32 275 688
National speed limit law	Yes	Yes	Yes	Yes	Yes	Yes
Max urban speed limit	90 km/h	50 km/h	50 km/h	50 km/h	50 km/h	80 km/h
Max rural speed limit	90 km/h	50-100 km/h	100-130 km/h	90 km/h	90 km/h	120 km/h
Max motorway speed limit	110 km/h	80-120 km/h	100-130 km/h	140 km/h	120 km/h	No
Local authorities can modify limits	Yes	Yes	Yes	Yes	Yes	No
Enforcement (between 0 to 10)	6	4	8	8	8	7
Predominant type of enforcement	Manual	Manual	Manual and automated	Manual	Manual and automated	Automated
National drink-driving law	Yes	Yes	Yes	Yes	Yes	Yes
BAC limit – general population	≤ 0.08 g/dl	0.04-0.08 g/dl	< 0.05 g/dl	<0.02 g/dl	≤ 0.05 g/dl	-
BAC limit – young or novice drivers	≤ 0.08 g/dl	0.00-0.08 g/dl	0.00 g/dl	<0.02 g/dl	≤ 0.03 g/dl	-
Random breath testing carried out	Yes	Yes	Yes	Yes	Yes	No

Testing carried out in case of fatal crash	All drivers tested	All drivers tested	All drivers tested	All drivers tested	Some drivers tested	Some drivers tested
Enforcement (between 0 to 10)	4	8	8	10	7	9
% road traffic deaths involving alcohol	<1%	30%	17%	13%	17% Males, 7% Females	-
National motorcycle helmet law	Yes	Yes	Yes	Yes	Yes	Yes
Applies to drivers and passengers	Yes	Yes	Yes	Yes	Yes	Yes
Helmet fastening required	Yes	Yes	Yes	No	No	Yes
Helmet standard referred to and/or specified	Yes	Yes	Yes	Yes	Yes	No
Children passengers on motorcycles	Not restricted	Not restricted	Prohibited under 8 yrs	Not restricted	Prohibited under 7/12 yrs	Prohibited under 16 yrs
Enforcement (between 0 to 10)	8	10	8	7	8	2
Helmet wearing rate	91% Drivers, 87%Passengers	98% Drivers, 98% Passengers	99% Drivers	99% Drivers, 100% Passengers	99% Drivers, 93% Passengers	-
National seat-belt law	Yes	Yes	Yes	Yes	Yes	Yes
Applies to front and rear seat occupants	Yes	Yes	Yes	Yes	Yes	Yes
Enforcement (between 0 to 10)	4	6	7	8	8	3
Seat-belt wearing rate	74% Front seats, 10% Rear seats	95% Front seats, 89% Rear seats	97% Front seats, 96% Rear seats	96% Front Seats, 76% Rear seats	99% Front Seats, 81% Rear seats	-
National child restraint law	Yes	Yes	Yes	Yes	Yes	No
Children seated in the front seat	Not restricted	Allowed in a child restraint	Prohibited under 7 yrs	Allowed in a child restraint	Prohibited under 135 cm	Prohibited under 10 yrs
Child restraint required	-	-	Up to 7 yrs	135-150 cm	Up to 135 cm	Yes
Child restraint standard referred to and/or specified	-	Yes	Yes	Yes	Yes	No
Enforcement	-	8	7	7	8	1
% children using child restraints	-	91%	-	93%	88%	-

National law on mobile phone use while driving	Yes	Yes	Yes	Yes	Yes	Yes
Ban on hand-held mobile phone use	Yes	Yes	Yes	Yes	Yes	Yes
Ban on hands-free mobile phone use	No	No	No	Yes	No	No
National drug-driving law	No	Yes	Yes	Yes	Yes	Yes

The political stability indices of these countries are as follows:

i.   Malaysia: Political stability: 0.11 (good)
ii. Canada: Political stability: 1.03 (good)
iii. Australia: Political stability: 1.09 (good)
iv. Poland: Political stability: 0.52 (good)
v.   Spain: Political stability: 0.32 (good)
vi. Saudi Arabia: Political stability: -0.43 (weak)

Saudi Arabia depicts the highest number of traffic deaths (28 deaths), followed by Malaysia (24 deaths). Meanwhile, Poland, Canada, Spain, and Australia have several traffic deaths of less than 8 per 100 000. Most high-income countries are having a low number of deaths except Saudi Arabia. Spain has the least number of deaths compared to the other high-income countries as shown in Table 2.

Malaysia and Saudi Arabia have a maximum speed limit of about 90km/h and 80km/h, respectively, in urban areas. Meanwhile, other countries have a maximum limit speed of about 50km/h. It can be concluded that the high maximum limit of urban speed allowed drivers to speed on the roads and increase the chances of fatalities. Besides, Saudi Arabia has the lowest enforcement of national seatbelt law, which explains the high number of road traffic deaths.

Interestingly, although Saudi Arabia is one of the high-income countries, it has weak political stability. Meanwhile, as the effects of unstable politics, economic management is torn out and unable to properly maintain transportation and road conditions. Therefore, these factors cause an increase in road traffic fatalities in Saudi Arabia. We can conclude that political stability is an important factor in measuring the road safety index; a stable political in a country will ensure that transportation and economic development are well-managed.

In summary, Malaysia, fortunately, has stable politic that allows proper management in the economic and transportation sectors. Laws in managing road safety index should be learned from high-income countries to ensure transportation sectors' performance and users' experiences on roads. Although Malaysia is politically stable and has good road networks, the number of road fatalities is still high. Therefore, we also investigate the Vehicle Kilometer Travelled (VKT) among countries to evaluate the relationship between distance traveled and the number of road fatalities.

| Malaysia | Poland |
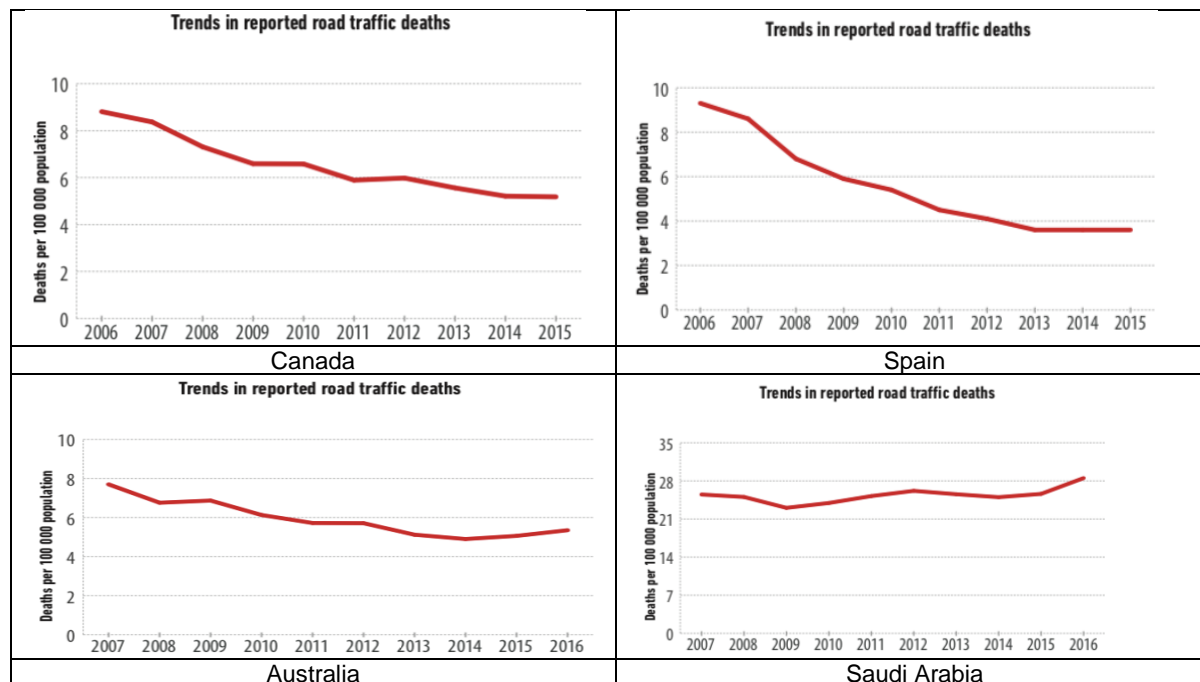
FIGURE 2: Trends in reported road traffic deaths among high-income countries
(Source: WHO, 2018)

3. VKT IMPACT ON ROAD FATALITIES

Table 3 shows a comparison between the ranking for total traffic fatalities per 100,000 population and total traffic fatalities per vehicle kilometer (Vkm).

TABLE 3: Comparison between total traffic fatalities per population vs. per vehicle-kilometer

	Year	No. of vehicles (v)	Length of the road network (km)	Vkm (V x km / 1,000,0 00,000)	Total traffic deaths	Total traffic deaths / Vkm	Rank (TRD / Vkm)	Total traffic deaths / 100,000 pop.	Rank (TRD / Pop.)
Malaysia	2010	20,188,565	144,403	2915	6,872	2.357	3	24.5	4
Peru	2012	4,264,114	140,672	600	3,110	5.185	4	13.9	3
Netherlands	2016	10,757,655	139,124	1497	621	0.415	1	3.8	1
Mali	2018	289,828	139,107	40	529	13.121	5	25.6	5
Austria	2018	6,384,971	137,039	875	455	0.520	2	5.4	2
Congo	2015	110,438	152,373	17	206	12.242	6	26.4	6

Vkm represents a traffic flow measurement, determined by multiplying a road network's length and vehicle number. This process compares the number of deaths from a country's road network length and its density. This study first gathered information on Malaysia's road network length and the other five nations with the nearest road network length with Malaysia to achieve that process. While this study has managed to identify a database for a country's road network length, the year varies between nations. These results suggest that a country can have a higher number of traffic accidents and fatalities than other nations with the same length due to the total number of vehicles traveling within the network. In other words, traffic density can influence traffic safety (Clark & Cushing, 2004).

TABLE 4: Comparison between total traffic fatalities per population vs. population density

Country	Year	Population density (people/km^2)	Total traffic deaths	Total traffic deaths / population density	Rank	Total traffic deaths / 100,000 population	Rank
Malaysia	2016	93.39	7,152	76.582	5	23.6	4
Spain	2016	93.05	1,810	19.452	3	4.1	1
Egypt	2016	94.88	8,211	86.541	6	9.7	2
Ethiopia	2016	91.74	4,352	47.438	4	26.7	6
Syria	2016	95.05	714	7.512	2	26.5	5
Dominica	2016	95.08	10	0.105	1	10.9	3

On the other hand, Table 4 compares the total traffic deaths per 100,000 population and total traffic deaths per population density. While this process might be like the previous comparison, it can vastly differ because a dense country might not have a dense road network due to public transportation availability in cities such as buses, trains, and trams. In line with that, high-income cities with low populations density will have more road per inhabitants that lead to low congestions level (Dingil et al., 2018), which indirectly leads to low AADT and low frequencies of crashes (Retallack & Ostendorf, 2019).

This study compares Malaysia and the other five countries with the nearest population density to Malaysia as the previous comparison. The results show that Malaysia ranks fourth among the six cities for total traffic fatalities per population. Unfortunately, Malaysia ranks fifth for total traffic deaths per population density. Other than that, there are several changes in the countries' ranking within this sample. For example, while Spain ranked first for total traffic fatalities per population, it was ranked third based on the total traffic fatalities per population density.

Also, Egypt's ranking went down from second to sixth (i.e., last within this sample) for the same comparison. Nations might have a similar number of populations, but different population densities might influence their road environment. Therefore, road safety indicators should also consider including other population properties when comparing a road network's safety.

In addition to traffic density and population density, the number of vehicles possesses by individuals might influence a country's total traffic deaths. Therefore, this study compares the total traffic fatalities per 100 population and total traffic fatalities per number of motor vehicles per population. Similarly, countries that have a similar number of motor vehicles per population were identified and compared. The result shows that Malaysia maintains the same ranking at sixth within the sample's six nations. However, there are changes in other nations' rankings. For example, while Israel ranked first for total traffic fatalities per population, nations ranked third for total traffic fatalities per the number of motor vehicles per population. Trinidad and Tobago had the biggest changes from fifth for the total traffic deaths per population to first for total motor vehicles per population. Like the other findings in this section, various properties can influence a country's road environment. Therefore, further investigation is conducted to capture the related factors that lead to Malaysia's road fatalities to develop a comprehensive Road Safety Performance Index when comparing Malaysia's road safety with other nations.

TABLE 5: Comparison between the total number of traffic fatalities per population vs. total traffic fatalities per motor vehicle per population

Country	Year	Motor vehicles / 1000 population	Total traffic deaths	Total traffic deaths / motor vehicle per 1,000 people	Rank	Total traffic deaths / 100,000 population	Rank
Malaysia	2016	361	7,152	19.812	6	23.6	6
Belarus	2016	362	588	1.624	4	8.9	3
Slovakia	2016	364	275	0.755	2	6.1	2
Trinidad and Tobago	2016	353	135	0.382	1	12.1	5
South Korea	2016	376	4,292	11.415	5	9.8	4
Israel	2016	376	335	0.891	3	4.2	1

## 4. EXPERTS' VIEWS ON COMPREHENSIVE ROAD SAFETY INDICATORS FOR MALAYSIA

A comprehensive survey on developing the Road Safety Performance Index (RSPI) for Malaysia was conducted to realize the need to have a comprehensive opinion from road safety experts in Malaysia. A survey comprised of 10 questions was handed out to several Malaysian road safety experts, including academicians and representatives from government agencies directly involved in managing road safety. 61% of respondents from government agencies, 22% from a research institute, and the rest from non-government agencies participated in the survey. Figure 3 shows years of experience for all respondents who took part in the survey.
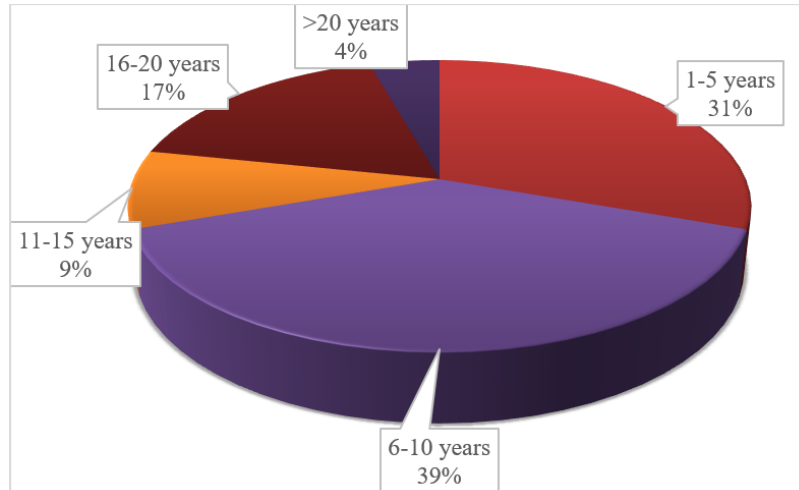
FIGURE 3: Years of experience in road safety field

By looking at their experience in the road safety field, 30% of the respondents have experience of more than ten years in road safety fields, 39% have experience of between 6-10 years, and the rest have fewer than five years in road safety fields. Regardless of the years of experience, all respondents agreed that Malaysia is in dire need of a single road safety performance index.

Moving to more crucial questions on the survey, they had prioritized the most important category to be focused on in the development of the road safety performance index. Figure 4, Figure 5, and Figure 6 depict the experts' opinion on the most important, second, and thirdly important category, respectively, that should be considered to develop the Malaysia Road Safety Performance Indicator. Road conditions have been listed as the most important category, followed by road infrastructure conditions as the second and third choice of the important category for RSPI development.
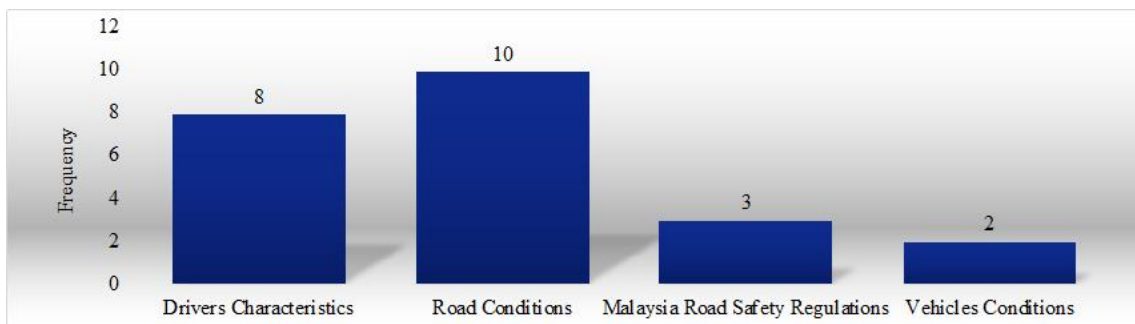
FIGURE 4: The most important category in Malaysia's RSPI
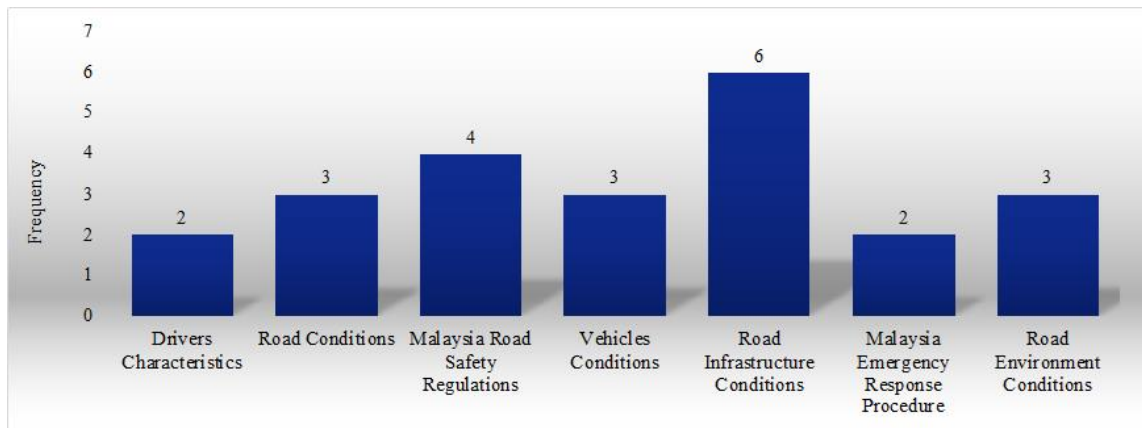
**FIGURE 5**: The second important category in Malaysia's RSPI
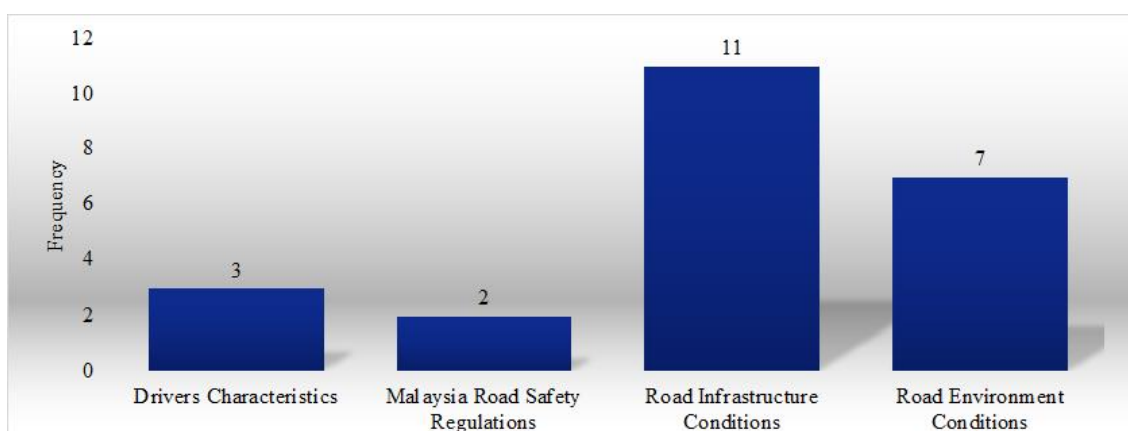
FIGURE 6: The third important category in Malaysia's RSPI

However, by comparing the importance of each category by weightage, road conditions depicted as the most important category (26%), followed by drivers' characteristics (22%), road infrastructure conditions (17%), and the least is Malaysia emergency response procedure (3%), as presented in Figure 7.

The relationship between years of expertise in the road safety field and their choices on the most important category for the development of RSPI. Table 6 summarizes the important category chosen by experts regarding their years of experience in the road safety field.

As presented in Table 6, we can conclude that both Road Conditions and Drivers Characteristics were voted as the most important categories in developing the Road Safety Performance Index (RSPI) in Malaysia. This is because experts who are having 20 years and above of experience in the road safety field agreed that road conditions and driver characteristics are the most important criteria that affected the safety performance of roads in Malaysia. Also, those who have less than 20 years of expertise in the road safety field happened to have the same opinion in deciding the most important criteria for RSPI development: road conditions and driver characteristics (Siskind et al., 2011; Sullman et al., 2012; Musa et al., 2020).

This study's findings are believed that it will be beneficial for the government and policymakers in tackling the right issues that are causing a huge number of deaths among Malaysians due to road fatalities. As we are trying to compare the trends of death among middle-income countries based on law enforcement in the previous section (refer to Table 1), Malaysia still recorded the highest number of deaths. Therefore, we could suggest that enforcing laws specifically on road conditions and drivers' characteristics would answer the issues that we are supposed to tackle, aside from the other laws that have been practically enforced.
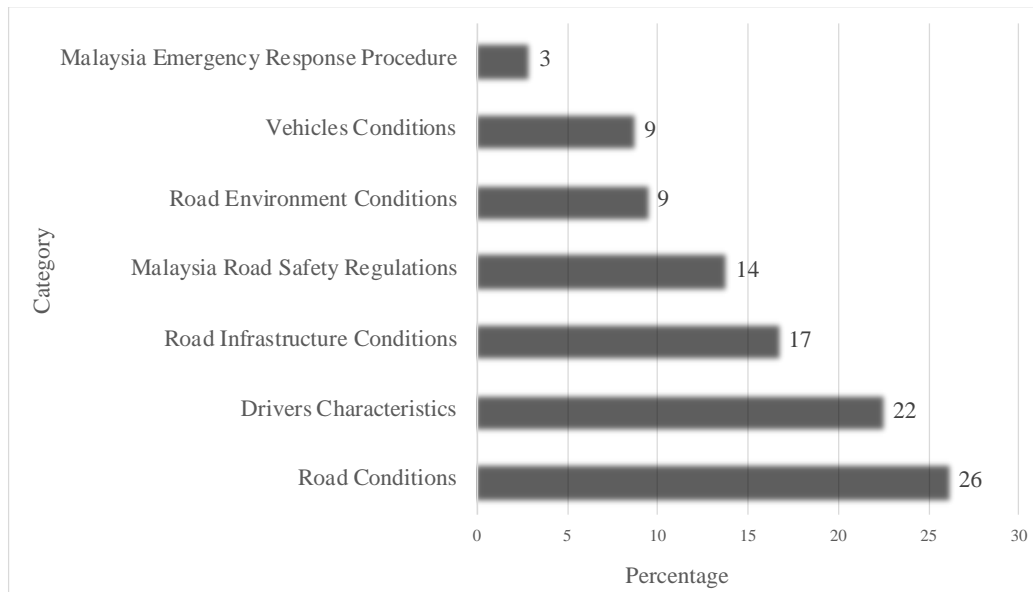
FIGURE 7: The rank of importance category based on experts' opinion

TABLE 6: Summary of an important category of safety indexes performance versus years of experiences in the road safety field

Experiences	1st importance	2nd Importance	3rd Importance
1-5 years	Road Conditions	Malaysia Road Safety Regulations	Road Infrastructure Conditions
6-10 years	Drivers Characteristics	Road Infrastructure Conditions	Road Conditions/ Road Environment Conditions
11-15 years	Drivers Characteristics	Road Conditions	Malaysia Road Safety Regulations
16-20 years	Road Conditions	Road Infrastructure Conditions	Vehicles Conditions
>20 years	Drivers Characteristics	Road Conditions	Road Infrastructure Conditions

Further studies are suggested to investigate these two categories, road conditions and drivers' characteristics. These important categories might be affected in such cases due to other factors such as geographical factors, cultures, and many more. Thus, by having a deeper understanding of the most important categories that lead to road fatalities, we will manage and reduce the number of road fatalities in Malaysia. Besides, we could develop RSPI suitable for our country to compare road safety performance between states specifically as a benchmark before developing a road safety index to compare Malaysia with other countries.

5. CONCLUSION

The Road Safety Performance Index is important to monitor and control death due to road fatalities. The current indicator that has been widely used to compare road safety performance between countries, including Malaysia, is the fatality rate or mortality rate to indicate the magnitude of the crash problem. Arguments on the effectiveness of such indicators lead many road safety programs to figure out suitable indicators for a country. A survey of experts' opinions revealed that road conditions and drivers' behaviors are the most significant indicators that should be considered in developing the Road Safety Performance Index in Malaysia.

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