

Commuting Accident: Issues Related to Speeding and PPE Usage among motorcycle commuters in Peninsular Malaysia

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ABSTRACT

This study focuses on industrial workers who commute using a motorcycle to and back from work in peninsular Malaysia. This study objective is to determine the frequency of reported construct among motorcyclists, especially on speeding and usage of PPE. A self-administered questionnaire, a Malaysian version of the Motorcycle Riding Behaviour Questionnaire (MRBQ) and socio-demographic details, was collected to measure the riding behaviour of the workers. However, this paper was focus only on speeding and safety equipment construct. The data was collected during a commuting accident intervention program conducted at the respective company. As a result, it shows that Safety equipment recorded the highest percentage of non-compliance among the listed behaviour (45.8%) followed by traffic error, speeding and safety violation. In details, this analysis further compares riding behaviour in each region in peninsular Malaysia. Based on the presented findings, localised riding behaviour in the Peninsular Malaysia regional area was determined. Thus, appropriate countermeasures can be developed and translated into the existing commuting safety intervention program as a re-evaluation strategy for riding behavioural changes. This study is essential as a guide for a strategic regional commuting management plan, especially for motorcyclists.

Keywords:

Motorcyclist commuter; riding behaviour; speeding; personal protective equipment

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1. Introduction

Commuting accident is defined as an accident happening while travelling on a route between a place of residence to a place of work, travelling on a journey made for any reason which is directly connected to employment, or travelling on a trip during any authorised recess (Section 24 Employees Social Security Act 1969). At the risk of stating the obvious, this degree of traffic-related carnage affects high costs far beyond the human toll. In 2009, for example, the Malaysian government spent RM 9.3 billion because of traffic accidents [9]. The broad implication of commuting accident reflects the current need for a proactive mitigation action plan. Accordingly, comprehensive safe commuting management focusing on employee education and advocacy is urged [25]. Apart from regular-basis training and continuous commitment from both employers and employees, Sulong *et al.*, [24] has

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proposed a commuting safety and health practice guideline. SIRIM Malaysia also issues a guideline for commuting safety called SIRIM 4: 2014 Good Practices in Implementing Commuting Safety Management. Implementing the proactive initiative certainly requires a further thorough analysis of the reported commuting accidents to address this problem systematically and efficiently. Dietz *et al.*, [8] highlighted that identifying the potential risk groups is essential in determining a successful intervention.

In Malaysia, work-related accidents reported by SOCSO shows that commuting accident increased by 15.2% in 5 years period, from 24, 809 in 2011 to 28, 579 in 2015. Out of the total cases in 2015, commuting accidents contributed about 45% of the overall accidents. Besides the significant percentage, the increasing trend of commuting accidents nationwide since 2011 is alarming. Earlier, further analysis of the SOCSO Database for 2009 and 2010 revealed that almost 85% of the commuting accidents occurred among those travelling by motorcycle [4]. Given the high vulnerability of motorcyclists, a higher number of motorcyclists on the road would result in a more significant prevalence of fatal road crashes in LMICs. Indeed, two- and three-wheeler vehicles represent almost 69% of fatal crashes in LMICs (WHO, 2018). Its relatively low price and its low fuel consumption beat other passenger vehicles as road users' primary preference, not only in Malaysia but also in most ASEAN countries. Among the key factors that make motorcycle more popular is because they are cheaper in both price and maintenance costs than cars [11]. Due to its increasing usage, the number of motorcycle crashes and related fatal injuries in these countries are also increasing [16]. The rising trend of a fatal motorcycle accident in Malaysia is continuously growing since the early '90s.

According to the Monash University Accident Research Centre (2013), human factor contributed to 95% of the overall crash involvement factors. This main contributing factor was recognised based on a telephone survey among 1922 participants. The factor consists of driver behaviour and attitudes, including helmet wearing, overtaking on the left, riding in the emergency lane, running red lights, riding in between moving cars, trucks tailgating, speeding, smoking and using a mobile phone while riding. A study conducted in Terengganu, a state in the Eastern region of Malaysia, reported that turn signal neglect is the most dominant risky driving behaviour among the 72,377 observed motorcyclists [21]. Meanwhile, in another study conducted in Malaysia, it was noticeable that violation of traffic light by motorcycle riders had increased about threefold. Different accident patterns at areas with varying levels of urbanisation [6] may contribute to this prevalent difference.

2. Study Objective

Therefore, this prevalence study compares the difference in riding behaviour of workers between different regions in Malaysia during commuting.

3. Methodology

3.1. Sample Size and Sample Selection

The sampling method used in this study is convenience sampling. All the workers that participate in the intervention were approached. Samples in this study comprise 1,815 workers from 70 small to medium enterprise (SME) companies in Malaysia that participate in the intervention program and fulfil these inclusion criteria; Malaysian citizens commute using a motorcycle and permanent or contract workers.

3.2. Questionnaire

The motorcycle Riding Behaviour Questionnaire (MRBQ) was used to measure the workers' riding behaviour before the intervention program. However, this study uses pre-intervention data through the simplified Malaysian Version of MRBQ, which was also used in the previous survey conducted by Sakinah et al., [17]. This self-administered questionnaire is an adapted version of the original MRBQ and a Persian version of the MRBQ, back-translated and tested for its psychometric properties. The Malaysian version of the MRBQ consists of five components of riding behaviour which are Safety Violations (Cronbach Alpha = 0.902), Traffic Errors (Cronbach Alpha = 0.903), Speeding (Cronbach Alpha = 0.80), Safety Equipment (Cronbach Alpha = 0.84) and Precaution (Cronbach Alpha = 0.42). The overall reliability of the Malaysian MRBQ is 0.70. The simplified Malaysian version of MRBQ consists of four constructs: safety violations, traffic errors, speeding, and safety equipment.

However, this paper focuses on speeding and safety equipment construct and analyses each item defined within the two constructs. Table 1 lists the description of each construct that reflects the typical risky riding behaviour among motorcyclists. Comparison between the prevalence of these constructs by different region in Peninsular Malaysia was carried out to exhibit a localised motorcyclist riding behaviour.

Table 1

Description of constructs that reflects the typical risky riding behaviour among motorcyclists

Construct	Descriptions (items)
Speeding Behaviours of riding over the speed limit	1. Exceed the speed limit in the residential area. 2. Ride so fast into a corner that you scare yourself. 3. Exceed the speed limit on a country/rural road. 4. Ride so close to the vehicle in front that it would be difficult to stop in an emergency.
Safety equipment The use of safety equipment to increase safety while riding; non-wearing of personal protective equipment (PPE), including helmet, safety vest and etc.	1. Wear an unstandardised helmet. 2. Wear bright/fluorescent jacket/vest. 3. Wear a helmet in an improper way 4. Wear motorcycle riding boots

4. Results and Discussion

4.1 Distribution of Respondents

Table 2 shows the distribution of the respondents by their socio-demographic details. This study involved 1815 workers riding motorcycles to work, predominantly male workers (79.3%). Majority of the respondents, 40.7%, aged between 25 and 35 years old. Most of the respondents are Malays (88.9%) and married (68.9%). In addition, almost 96.4% of the respondents ride a motorcycle below 250 cc to commute to work.

Table 2
Socio-demographic details of respondents

Characteristics	N = 1815, n (%)
<i>Gender</i>	
Male	1440 (79.3)
Female	375 (20.7)
<i>Age (year)</i>	
< 25	196 (10.8)
25 – 35	739 (40.7)
36 – 45	652 (35.9)
46 – 55	183 (10.1)
> 55	45 (2.5)
<i>Ethnicity</i>	
Malay	1613 (88.9)
Chinese	51 (2.8)
Indian	120 (6.6)
Others	32 (1.8)
<i>Marital status</i>	
Single	534 (29.4)
Married	1250 (68.9)
Divorce	31 (1.7)
<i>Type of motorcycle</i>	
< 250 c.c	1750 (96.4)
250 – 500 c.c	43(2.4)
> 500 c.c	22 (1.2)

4.2 Distribution of Riding Behaviour

This study aims to assess the riding behaviour of workers before an intervention program in their respective companies. The riding behaviour that was evaluated among the respondents comprises of four elements which are 1) traffic violation, 2) traffic error, 3) speeding and 4) riding personal protective. Figure 2 shows the overall percentage of motorcyclist risky riding behaviour in Peninsular Malaysia. Safety equipment recorded the highest percentage of non-compliance among the listed behaviour (45.8%), followed by traffic error, speeding and safety violation. Speeding recorded the third highest in the list with a percentage of 20.6%.

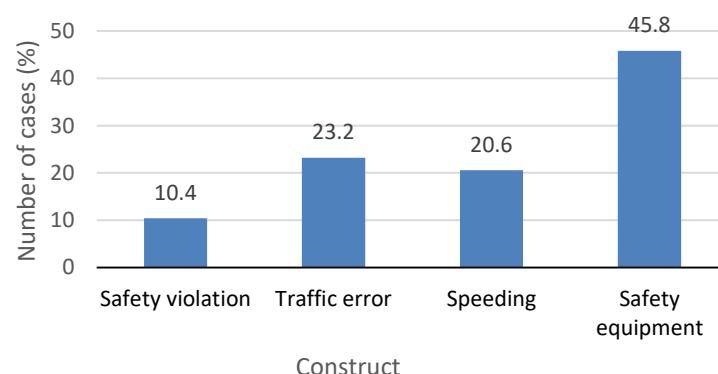


Fig. 2. Overall percentage of motorcyclist risky riding behaviour in Peninsular Malaysia

4.3 Riding Behaviour by Construct: Speeding

Frequency analysis was conducted on each item to identify precisely which item under speeding construct was the most frequently reported behaviour among the respondents, as shown in Table 3. Further analysis showed that 61.2% of the motorcyclists' most commonly reported behaviour exceeds the speed limit in a residential area and 53.4 % agree that they were above the speed limit when passing a country/rural area. As we know, the speed limit within both area is relatively low, 30km/h – 60km/h. Unsurprisingly, 55.2% of the respondents agree that they ride so close to the vehicle in front that it would be difficult to stop in an emergency.

Table 3

Percentage of the respondent by speeding behaviour

Item	Respondent percentage (%)	
	Yes	No
Speeding		
1. Exceed the speed limit in a residential area.	61.2	38.8
2. Ride so fast into a corner that you scare yourself.	46.9	53.1
3. Exceed the speed limit on a country/rural road.	53.4	46.6
4. Ride so close to the vehicle in front that it would be difficult to stop in an emergency.	55.2	44.8

Further analysis by region showed that most of the motorcyclist in Malaysia were riding above the speed limit. It shows in Figure 3, more than 50% - 70% of the respondent in each region in Peninsular Malaysia speeding at the low-speed area, particularly in a residential and rural area. Eastern region took up almost 70% of the respondents confess they exceeded the speed limit on residential areas.

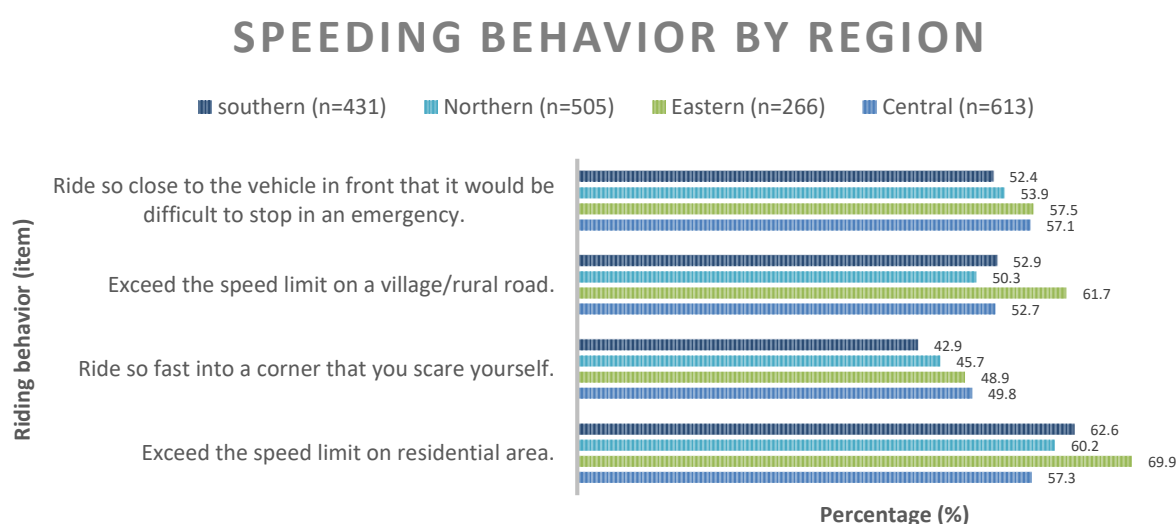


Fig. 3. Speeding behaviour by region

4.4 Riding Behaviour by Construct: Usage of Personal Protective Equipment (PPE)

Table 3 listed the respondents' riding behaviour and the distribution is depicted in Figure 4. The finding reveals that most respondents were concerned about riding personal protective for ridings, such as a helmet or reflective vest. Among the respondents, about 66.6% and 64.5% confessed they wore a standard helmet properly. Further distribution of riding behaviour shows that respondents from all participated companies self-reported that they are less concerned about vest wearing with a percentage of 31.4%, as presented in Table 3. Analysis of behaviour by region shows that a high percentage of respondents were wearing a boot during riding, ranging from 81.6 % to 85.8%. Every region shows a similar pattern for the usage of PPE. However, it was shown in Figure 4 that the eastern region has a lower percentage of vest-wearing compared to others (57.1%).

Table 3

Percentage of the respondent by the usage of PPE behaviour

Item	Respondent percentage (%)	
	Yes	No
Personal Protective Equipment / Riding Equipment		
1. Wear an unstandardised helmet.	33.4	66.6
2. Wear bright/fluorescent jacket/vest.	68.6	31.4
3. Wear a helmet in an improper way	35.5	64.5
4. Wear motorcycle riding boots	83.5	16.5

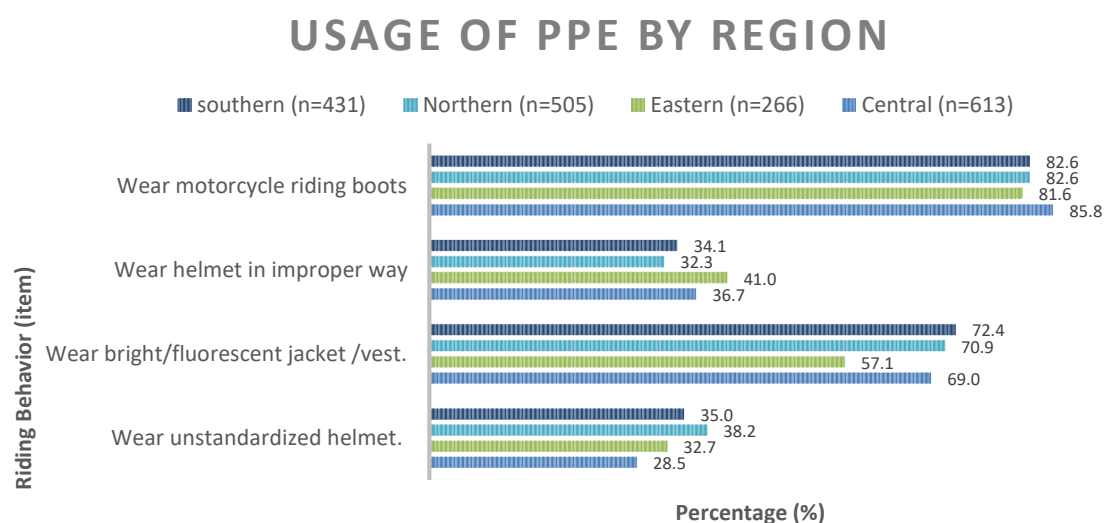


Fig.n4. Usage of PPE/riding equipment behaviour by region

4.5 Discussion

The demographic data shows that workers aged between 25-35 years are dominant, the highest motorcycle user in Malaysia while young motorcyclist (below 25 years old) takes up 10% of the working population. It is unbeatable that low cc motorcycle (below 250cc) or "kapcai" have become a favorite choice for almost 97% of the respondents.

This study aims to determine the frequency of reported construct among motorcyclists, especially on speeding and usage of PPE. The results of the study showed that usage of PPE is the most written construct among motorcyclists. Findings from the previous study by MIROS in 2016 reported that

about 98.9% of motorcyclists wear helmets while riding [14]. A higher number of motorcyclists are indeed wearing a helmet in Malaysia, especially among the working population. However, through this study, it is reported that 35.5% of respondent did not wear the helmet properly and they were using an unstandardised helmet which does not comply with the law (33.4%). This pattern might be due to rural area companies' approach in the program where workers commute short distances. A study conducted by Nimako Aidoo *et al.*, [15], in Ghana found that motorcyclists sometimes decide not to wear a helmet if the travel distance is short. The same finding was also found in Indonesia and Cambodia [5].

Meanwhile, for reflective vest-wearing, similar findings reported by the study that only 0.3% of the respondents admitted wearing a reflective vest [14]. Surprisingly, this study shows a higher number of vests wearing about 68.6%. Although this is a self-reported questionnaire, it may be due to the sample selection of the working population for this study. Furthermore, some of them are working in industrial areas and the companies mandate their workers to wear a safety vest going to work. As shown in the results, most regions have a high percentage of wearing a bright/fluorescent jacket/vest, particularly in southern and northern areas. Many other studies agreed on the importance of personal protective equipment or riding gear. A motorcyclist needs to wear riding gear such as a helmet, bright clothing, and footwear [1,23].

In Malaysia, as stipulated in Rule 4 of the Motorcycle (Safety Helmets) Rule 1973, every person who rides on a motorcycle on the road shall wear a safety helmet on his head fitted and securely fastened. Due to the importance of wearing riding personal protective, SIRIM 4: 2014 Good Practices in Implementing Commuting Safety management had outlined that training or talk on road safety for the employee. The guideline emphasises the importance of proper wearing of safety helmet and protective riding attire such as safety vest, safety shoes, and gloves. In addition, based on the Guidelines on Occupational Safety and Health in Courier Services Industry, motorbike delivery staffs should be provided with proper personal protective inclusive of helmet certified by SIRIM, covered shoes and reflective vest [7].

Speeding is the third highest in reported construct after traffic error which is 20.6%. However, after the in-depth analysis, it was found that more than half of the motorcyclists confessed they were frequently riding above the speed limit, particularly in the rural area and residential area where the posted speed limit is relatively low. During riding, excessive speeding can lead to a higher potential of losing balance and disruption. Besides, other riding behaviour such as weaving, lane splitting, and overtaking also proved to be risky, especially when the rider is young and inexperienced [10,20].

The finding is similar to a previous study conducted in 2015, which reported that the most frequently riding behaviour among young motorcyclists is speeding [17]. According to Oxley *et al.*, [19], through their telephone survey, the most significant factors contributing to motorcycle crashes were speeding and mobile phone use. Speeding is a well-established crash and injury severity risk. World Health Organization (WHO), through world report on road traffic injury prevention, stated that many studies had proven risk of crash increases as speed increases [13]. This year, United Nation Global Road Safety Week initiated #love30 campaign to call on policymakers to act for low-speed streets worldwide, limiting speeds to 30 km/h (20 mph) where people walk, live and play. The speed limit of 30 km/h (20 mph) is where people and traffic mix make for streets that are healthy, green and liveable, in other words, streets for life.

5. Conclusions

In this study, riding issues related to speeding and PPE usage among motorcycle during commuting was compared. Accordingly, it can be concluded that Safety equipment recorded the

highest percentage of non-compliance among the listed behaviour (45.8%), followed by traffic error, speeding and safety violation. Further distribution of riding behaviour by company shows that respondents from all participated companies self-reported that they are less concerned about vest-wearing with a percentage of 31.4% and more than half confessed they wore a standard helmet and in a proper way. As for speeding, the most frequently reported behaviour is exceeding the speed limit in a residential area, with 61.2% and 53.4 % agree that they were above the speed limit when passing a country/rural area. Based on the presented findings, localised riding behaviour in the Peninsular Malaysia regional area was determined. Therefore, an appropriate enforcement and advocacy approach for a particular region can be effectively constructed. This study is essential as a guide for a strategic regional commuting management plan, especially for motorcyclists.

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References

- [1] Abbas, Alaa K., Ashraf F. Hefny, and Fikri M. Abu-Zidan. "Does wearing helmets reduce motorcycle-related death? A global evaluation." *Accident Analysis & Prevention* 49 (2012): 249-252
- [2] Manan, Muhammad Marizwan Abdul, and András Várhelyi. "Motorcycle fatalities in Malaysia." *IATSS research* 36, no. 1 (2012): 30-39.
- [3] Act 4 Employees' Social Security Act 1969, Laws of Malaysia. Accessed through <https://www.perkeso.gov.my/images/aktaPeraturan/AKSP-ENGLISH.pdf>
- [4] Aziemah Azhar, Commuting Accidents: What Does Research Shows? (2014). Commuting Accidents Prevention Seminar, Monash University Malaysia, 9 – 10 December 2014
- [5] Brijs, Kris, Tom Brijs, Socheata Sann, Tú Anh Trinh, Geert Wets, and Robert AC Ruiter. "Psychological determinants of motorcycle helmet use among young adults in Cambodia." *Transportation research part F: traffic psychology and behaviour* 26 (2014): 273-290.
- [6] Cabrera-Arnau, C., R. Prieto Curiel, and S. R. Bishop. "Uncovering the behaviour of road accidents in urban areas." *Royal Society open science* 7, no. 4 (2020): 191739.
- [7] Department of Occupational Safety and Health, Ministry of Human Resources, Malaysia (2015) Guidelines on Occupational Safety and Health in Courier Services Industry
- [8] Dietz, Pavel, Jennifer L. Reichel, Antonia M. Werner, and Stephan Letzel. "Study-related work and commuting accidents among students at the University of Mainz from 12/2012 to 12/2018: identification of potential risk groups and implications for prevention." *International journal of environmental research and public health* 17, no. 10 (2020): 3676.
- [9] Hamdan, Nurhidayah, and Noorizam Daud. "Estimating cost ratio distribution between fatal and non-fatal road accidents in Malaysia." In *AIP conference proceedings*, vol. 1605, no. 1, pp. 1051-1055. American Institute of Physics, 2014.
- [10] Ibrahim, M. K. A., A. A. Ab Rashid, Z. Mohd Jawi, and H. Mohamed Jamil. "Riding hazards and crash risks facing Malaysian courier riders in the last mile delivery." *Journal of the Society of Automotive Engineers Malaysia* 2, no. 2 (2018).
- [11] Isa, Mohd Hafzi Md, Zulhaidi MOHD Jawi, Rohayu Sarani, and Shaw Voon Wong. "Injury severity analysis of accidents involving young motorcycle riders in Malaysia." *Journal of the Eastern Asia Society for Transportation Studies* 9 (2011): 1997-2010.
- [12] Laporan Tahunan Pertubuhan Keselamatan Sosial (2015).
- [13] Peden, Margie, Richard Scurfield, David Sleet, C. Mathers, Eva Jarawan, A. A. Hyder, D. Mohan, A. A. Hyder, and E. Jarawan. *World report on road traffic injury prevention*. World Health Organization, 2004.
- [14] Abdul Manan, M. M., J. S. Ho, S. T. M. Syed Tajul Arif, M. R. Abd Ghani, S. Z. Ishak, and S. V. Wong. *Speed study and behaviour observation of motorcyclists along Malaysian roads*. No. 248. MIROS Research Report, MRR, 2018.
- [15] Nimako Aidoo, Eric, Shaibu Bawa, and Carole Amoako-Yirenkyi. "Prevalence rate of helmet use among motorcycle riders in Kumasi, Ghana." *Traffic injury prevention* 19, no. 8 (2018): 856-859.
- [16] SUKOR, NUR SABAHAH ABDUL, and Satoshi Fujii. "Factors affecting motorcyclists speeding behavior in different types of motorcycle lanes. A study from psychological perspectives." In *Proceedings of the Eastern Asia Society for*

- Transportation Studies Vol. 8 (The 9th International Conference of Eastern Asia Society for Transportation Studies, 2011)*, pp. 390-390. Eastern Asia Society for Transportation Studies, 2011.
- [17] Nuur Sakinah Azman, Nuura Addina Mohamad, Ahmad Azad Ab Rashid, Sharifah Osman@Liew Shyuan Yei, Low Suet Fin, Wong Shaw Voon (2017) Safety Violations, Traffic Errors and Speeding as Contributing Factors in Road Crashes among Young Motorcyclists in Klang Valley, MRR No.216, Malaysian Institute of Road Safety Research (MIROS), Kuala Lumpur
- [18] Nuur Sakinah, A., Rabihah, I., Noradrenalina, I., & Mohd Khairul Alhapiz, I. (in press). Self-reported riding behaviour among motorcyclists in Klang Valley. Kuala Lumpur: Malaysian Institute of Road Safety Research
- [19] Oxley, Jennifer, Jeremy Yuen, Mano Deepa Ravi, Effie Hoareau, Mohammed Azman Aziz Mohammed, Harun Bakar, Saraswathy Venkataraman, and Prame Kumar Nair. "Commuter motorcycle crashes in Malaysia: An understanding of contributing factors." *Annals of advances in automotive medicine* 57 (2013): 45.
- [20] Perez-Fuster, Patricia, Maria F. Rodrigo, Maria Luisa Ballestar, and Jaime Sanmartin. "Modeling offenses among motorcyclists involved in crashes in Spain." *Accident Analysis & Prevention* 56 (2013): 95-102.
- [21] Rusli, Rusdi, Oscar Oviedo-Trespalacios, and Suhaila Azura Abd Salam. "Risky riding behaviours among motorcyclists in Malaysia: A roadside survey." *Transportation research part F: traffic psychology and behaviour* 74 (2020): 446-457.
- [22] SIRIM 4:2014 Good practices in implementing commuting safety management, SIRIM Berhad.
- [23] Solah, M. S., A. Hamzah, Z. Mohd Jawi, A. H. Ariffin, N. F. Paiman, MH Md Isa, and M. S. Khalid. "The requisite for motorcycle personal protective clothing: Malaysia's perspective." *Journal of the Society of Automotive Engineers Malaysia* 3, no. 1 (2019).
- [24] Sulong, A. W., Hassan, A., Mohamed, T. & Raja, A. 2019. Guidelines on Safe Work Practice when Commuting in Oil Palm Plantations (2), 222–228.
- [25] Yaacob, Siti Sara, Khairil Idham Ismail, Syazmin Zuwairy Mohd Shaarial, Norhafizah Mohd Noor, Rathiruba Selvaraju, and Hafiz Ab Ghani. "Commuting Accidents among Health Care Workers Working in Malaysia Government Hospitals." *KnE Life Sciences* (2018): 79-87.
- [26] World Health Organization. *Global status report on road safety 2015*. World Health Organization, 2015.