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Issues Surrounding Children as Motorcycle Pillion Rider in ASEAN Country

Noor Faradila Paiman, Aqbal Hafeez Ariffin, Azhar Hamzah, Siti Fairros Mat Husin, Zulhaidi Mohd Jawi, Mohd Syazwan Solah, Norlen Mohamed

Vehicle Safety and Biomechanics Research Centre, Malaysian Institute of Road Safety Research, Selangor, 43000, Malaysia

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ABSTRACT

Background: In ASEAN, where motorcycle is the main mode of transportation, it is worth to explore on the safety of children travelling on motorcycle. **Objective:** The objective of this paper is to highlight the main issue among child pillion rider, their safety and the suitability. **Results:** A comprehensive review of literature on child pillion riders reveal that there are a few topics related; i) Children in road traffic injury, ii) Body sizes of children, iii) Age limit, and iv) Child motorcycle helmet. **Conclusion:** The ASEAN countries road traffic authorities is encourage to review their road traffic policy and introduce safety regulation specifically on children travelling by motorcycle so that high traffic fatality can be reduced to a minimum level.

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INTRODUCTION

Motorcyclists are found to be 37 times more likely to die in a motor vehicle crash than passenger car occupants and 9 times more likely to be injured (NHTSA, 2008). Motorcyclists are categorized as one of the vulnerable road users and carry the highest risk for injury and death in a motor vehicle crash due to their lack of protection. In most ASEAN countries, motorized two- and three-wheelers account for more than 60% of registered vehicles. Motorcycles are an important, but also a risky means of transportation in low and middle income countries (LMICs), in which eight out of ten ASEAN Countries are categorized as LMICs.

In Vietnam, motorcycle injuries account for 59% of road traffic injuries (Hung *et al.*, 2006). Meanwhile, in Malaysia, motorcycle fatalities are found to be three times higher compared to passenger car fatalities, six times higher than pedestrian fatalities and nearly 50 times higher than bus passenger fatalities (Abdul Manan *et al.*, 2012). Motorcyclists contributed approximately 60% of the overall national road traffic fatality (M-Roads, 2011). In comparison, Taiwan (of Republic of China); the nearest region to ASEAN, fatality involving motorcyclist contributed 51% of the total fatality in 2001 from 1,711 deaths.

Studies in child motorcycle pillion rider, the use of helmet by child pillion and suitability of children travelling on motorcycle are apparently very limited. Many researchers had focused on the use of child restraint system (CRS) for child car occupant, nutritional issue among children and household safety. There were a few studies in this country identified in the literature search observed on helmet wearing rate. However, in ASEAN, where motorcycle is the main mode of transportation, it is worth to explore on the safety of children travelling on motorcycle. Therefore, this paper aims to highlight the main issue among child pillion rider, their safety and suitability. Extensive literature search has been conducted especially from major established research repository such as PubMed, Springer Online, etc.

Regulations With Regard To Child Safety:

Review of regulations and policies relating to motorcycle laws reveals that very few countries specify the minimum age for the children riding on motorcycle as pillion riders. Also, the description of child physical requirement that define the "fitness-to-ride" as pillion rider is very limited. Table 1 describes, among others, the motorcycle passenger regulations found from the literature search.

Fundamental Research - Issue Surrounding Child Pillion Riders:

Children and adults differ in their anthropometric attributes. The most notable characteristics are the size, shape and biomechanics. This paper reviews several issues surrounding child pillion riders as described in the

Corresponding Author: Noor Faradila Paiman, Malaysian Institute of Road Safety Research, Vehicle Safety and Biomechanics Research Center, Lot 125, Jalan TKS 1, Taman Kajang Sentral, 43000, Kajang Selangor, Malaysia.
Tel: +60126774748; E-mail: noorfaradila@miros.gov.my

following topics; i) Children in road traffic injury, ii) Body sizes of children, iii) Age limit, and iv) Child motorcycle helmet.

Table 1: Comparison of motorcycle passenger regulations (Sivasankar *et al.*, 2014; Azhar *et al.*, 2010; MAG UK, 2004; WHO, 2013).

Country	No. of passenger	Passenger age limit	Helmet requirement	Other requirements
Malaysia	Only one passenger allowed	—	Yes	—
Australia	—	≥8 years, unless in a side car	Yes	—
Austria	—	12 years	—	Feet must reach footrest.
Belgium	—	3 years	Yes	Feet must reach foot pegs.
Czech Republic	—	12 years	Yes	Feet must reach foot pegs.
Denmark	—	No limit	Yes	Must reach footrest.
Finland	—	No limit	Yes	—
France	Only one passenger allowed	No limit	Yes	Child under 5 must use approved seat with handles and footrests. Child above 5 must reach footrests.
Greece	—	No limit	Yes	No age limit if one parent is on the bike.
Ireland	—	No limit	Yes	—
Italy	—	No limit	Yes	Passenger must not interfere with the rider or balancing of the bike.
Luxembourg	—	12 years	Yes	The child must reach the original footrest.
The Netherlands	—	No limit	Yes	—
Norway	—	No limit	Yes	Must sit on passenger seat. Must not be strapped to the rider. Recommended that child is tall enough to reach footrest.
Portugal	—	7 years	Yes	—
Sweden	—	No limit	Yes	—
Turkey	—	No limit	Yes	Child must ride on the back seat with feet reaching the footrests.
Vietnam	—	—	Yes	—
USA	—	Varies from >5 to >8 years	Yes	—

i) *Child pillion riders' injury profile in ASEAN:*

Children's daily lives involve various environments such as at home, at outdoor activities and travelling to school, and these expose them to many risks to get involve in road traffic injury (RTI). They may risk themselves as pedestrians while walking to school or playing on the street, as bicyclists, or being the passengers of motorized vehicle such as motorcycles and cars. According to the World Report on Child Injury Prevention, RTI is the second leading cause of fatality among children aged 5 to 14 years old (WHO, 2008; WHO, 2010). The report also noted that road fatality rates are greater in LMICs than the high income countries for children aged 14 and below.

In Malaysia, motorcycle fatalities are shown to be three times higher compared to passenger car fatalities, six times higher than pedestrian fatalities and nearly 50 times higher than bus passenger fatalities (Abdul Manan and Várhelyi, 2012). In Malaysia, motorcyclists contributed approximately 60% of the overall national road traffic fatality (M-Roads 2011). According to the data recorded by Royal Malaysian Police (PDRM) analysed using MROADS in 2009 to 2011, Malaysia recorded an average of 2000 annually casualties among children under 14 years old in motorcycle accidents. Out of this, 23% resulted in death while remaining ended up with serious and slight injuries (M-Roads 2013).

Norlen *et al.* (2011) found that in Malaysia, child pillion riders are the third leading group of traffic related deaths, in specific among children aged 1-4, 5-9 and 10-14 years old. Also, most of the road traffic fatalities among children below 14 years old happened when they were riding motorcycles (36.5%), followed by pedestrian (29.5%), being the car occupants (28.1%) and as cyclists (5.9%) (Norlen *et al.*, 2011). Despite the vulnerability of motorcyclist, it is common to see young children travelling as pillion riders on Malaysian roads. Thus, it is important to study on the safety aspect of children as pillion riders.

In Vietnam, accidents involving motorcycles are the main concern by virtue of the high number of motorcycle volume. Motorcycle accidents and the related fatalities had increased dramatically in the past two years (Boufous *et al.*, 2012). As the result, motorcycle accident has become the leading cause of RTI among children in the country. Law on helmet wearing is already in place but unfortunately it is not mandatory for children age below 14 years old (Pervin *et al.*, 2009). Meanwhile, in Philippines, from the survey conducted by Kid Safe, it was revealed that out of 26% children involved in road traffic accident in school vicinity, 14% were due to motorcycle related accidents (Alcantara *et al.*, 2012).

ii) *Children Sizes:*

Children and adults have huge difference in anthropometric qualities. Reed *et al.* (2005), Snyder *et al.* (1975) and Weber *et al.* (1985) had explained the importance of understanding the difference in child's body dimensions, proportions and biomechanical properties as compared to those of adults. In particular, children differ structurally from adult in a number of ways that are critical to the design of products that aimed to protect them in motor vehicle accidents. For instance, children are more likely to suffer from intra-abdominal injuries because their liver and spleen are yet to be fully protected by the rib cage as the adult.

Though many studies focused on child safety in vehicles, especially on the use of child restraint system (CRS), there is few researches has been done on anthropometric studies for motorcycle design. However, it was mainly focused on adult riders using 50th percentile anthropomorphic test devices (ATD) (Robertson and

Minter, 1996; Barone and Curcio, 2004; Chou and Hsiao, 2005). Only one study found that explored on child anthropometric data for redesigning bicycle (Laios and Giannatsis, 2009). Their effort has contributed to the change of design for bicycle in Greece. Based on their finding on corresponding height subgroup among children aged 7 to 14 years old, they proposed on adjustments of the frame dimensions and saddle/handlebar height ranges.

In ASEAN countries, especially in Malaysia, motorcycles are important mode of transport and are commonly utilized as family vehicles where children tend to travel as pillion riders at early age (Sheikh *et al.*, 2006; Sivasankar *et al.*, 2014). Generally, children are seated behind the rider or alternatively in front of the rider while riding motorcycles (e.g. Noor Faradila *et al.*, 2011; Azhar *et al.*, 2009). They are exposed to an additional risk when the children did not utilize foot pegs due to their generally small size and inability to get their feet reaching the foot pegs (Azhar *et al.*, 2009; Noor Faradila *et al.*, 2013; Noor Faradila *et al.*, 2013). This mismatch situation will become hazardous to the children as pillion riders and may affect their stability and safety while riding motorcycles, especially during cornering.

Table 2: Foot peg mismatch percentage by age group (Noor Faradila *et al.*, 2013).

School children	Age	Reachability		Total by age
		Yes	No	
Standard 1	7YO	68 (68.7%)	31 (31.3%)	99
Standard 2	8YO	80 (83.3%)	16 (16.7%)	96
Standard 3	9YO	34 (89.5%)	4 (10.5%)	38
	Total	182 (78%)	51 (22%)	233

Previous study on anthropometry of child pillion rider by Noor Faradila *et al.* (2013) revealed that there is a statistically significant association between stature and age with foot peg utilization. The observation from the survey revealed that 30% of the volunteered school children sample especially among 7 years old students (entry age to elementary school) could not reach the foot peg. However, it is to be noted that there exist variations with regards to age and stature since children have different rate of growth. Table 2 shows the foot peg reachability by age breakdown. Another survey carried out on prevalence of foot peg reachability among school children riding as pillions in Malaysia showed that 35% of the samples could not reach the foot peg (Noor Faradila *et al.*, 2011).

In term of legislation, there are not many countries require children riding as pillions to have their feet reaching the foot pegs/rests (refer Table 1). As for Malaysia, the requirement does not apply since currently there are no specific minimum physical requirements for a child to ride as pillion.

iii) Age Limit:

As previously highlighted, it is common to see riders (parents/guardians) in ASEAN countries carry their child/children on motorcycles. It is also often to see them being carried on motorcycles, either in front of the rider or being "sandwiched" in between the adult rider and passenger (Figure 1). This will increase the risk of the child being injured during emergency braking or road crash. Noor Faradila *et al.* (2013) in their study reported that 7.2% and 19.2% of child pillion riders occupying front and middle seating position, respectively.



Fig. 1: Unsafe child pillion riders.

(Left: The Star, 30 August 2012; Right: www.johnbartmann.wordpress.com, Accessed 4 April 2014)

It is clear that very few countries address regulations and policies regarding minimum age definition for child pillion riders (refer Table 1). Nevertheless, there exist inconsistencies in compulsory passenger age limit between the countries. Age per se may not be so significant, but age normally proportionate with children height. Hence, setting an age limit is a more practical way to prevent unfit pillion rider (a child with small and short leg) from using motorcycles.

iv) Helmet:

In general, there is only one reference standard for motorcycle safety helmets in Malaysia and it is utilized for certification of both adult and children-size helmets (Malaysian Standard MS1-1:2011). Specific standard for child helmet and for on-road use is very limited and only available in Vietnam in the form of technical regulation (Azhar *et al.*, 2010). In 2012, Malaysia has been adopted R22 UN Regulation for protective helmet.

Malaysia Standards specifies eight sizes of helmets in the document, which is from the size of 50 cm to 62 cm. However, based on certification records, the children-size certificated helmets are only 54 cm (Figure 1) and 57cm sizes and nothing beyond (Tashriff S., 2014). It is not clear whether economies of scale play a factor in the size availability in the market.



Fig. 1: Standard-compliant helmets for children.

A brief survey on the child helmet availability was conducted near the authors' work premise and shows that standard and non-standard helmets are commonly available. Standard-compliant helmets are usually marketed at motorcycle dealers and accessories outlets while non-standard helmets are promoted typically in the cycle and toys stores. The prices of the non-standard products were approximately 20 to 28 percent lower.

With respect to usage, the standard and non-standard helmets could be easily spotted due to their substantial presence in traffic. The previous work by Azhar *et al.* (2010) at schools vicinities indicated that the use of non-standard helmets were about 10 to 15% in suburban and urban schools, respectively. Correspondingly, non-use of helmets when riding pillion were exceeding 60 and 70% among the school-going children (Azhar *et al.*, 2010).

Way Forward:

The discussion above shows that RTI among children travelling by motorcycle remain a critical public health concern in ASEAN. Half of all road traffic deaths occur among motorcyclist, and yet less than one third of all countries have put in place countermeasures to promote this road user safety (WHO, 2013). Reduction on the number of child death in RTI will only be occurred when political will is translated into concerted and coordinated multi-sectoral actions that are based on evidence. UN Decade of Action 2011-2020: Road safety plan has calls for a multi-sectoral approach that includes academia, the private sector, civil society, the media with the Governments take the lead on the implementation of activities. This Multi-sectoral group may take action particularly in the following countermeasure categories: (1) Regulation, (2) Advocacy and education, (3) Enforcement and (4) Design improvement, as discussed below:

(1) Regulation:

Majority of ASEAN countries have not established related traffic rules with regard to child pillion rider. It is obvious that the rules are highly needed to protect children from traffic injuries and death. For example, it is recommended for every country in ASEAN to spell out the age of children that are allowed to be pillion riders with a proper/safe seating requirement. Regulation could be adopted from the other developed countries. However, the law and regulation must be followed by proper monitoring and enforcement systems. All legal measures should, however, be included in a long-term strategic road safety plan to ensure a consistent implementation.

(2) Advocacy and education:

UN Decade of Action for Road Safety 2011-2020 has aligned the 4th pillar to sustained or increased enforcement of laws and standards, combined with public awareness/education to increase helmet wearing rates among children. The community-based program (CBP), which the concept has been introduced in Malaysia by Malaysian Institute of Road Safety Research (MIROS), is one of the examples that could be adopted by the ASEAN community. CBP can be the agent for reducing injuries by changing community norms and behaviors. It is hoped that by having this program regularly, it can nurture the parents/guardians behavior towards the

safety of their children.

(3) *Enforcement:*

It is believed that legislation is arguably the most powerful tool in the prevention of injury (Peden *et al.*, 2009). Thus the authority should increase the enforcement activity to ensure that all the motorcyclist (in this case, parent/guardian) obey the traffic regulation. The enforcement activities must be consistent and sustainable to ensure the motorcycle rider (in this case parents/guardians) is aware on the regulations.

(4) *Design improvement:*

It is recommended that motorcycle manufacturers put an effort on developing innovative safety measures for children such as adjustable foot peg. As explained above, the current design of foot peg may not suit the need of children. Additionally, the safety helmet design also can be improved according to the size and age of the child.

Conclusion:

Reducing the total number of ASEAN road traffic deaths requires that increased attention be paid to improving the safety of motorcyclists. The risks of road crash are high for child motorcycle pillion riders. The citizens are heavily dependent on motorcycle. Much need to be done in order to reduce the number of child pillion riders killed and injured in motor traffic accident. The responsible parties, e.g the Department for Transportation in every ASEAN countries is suggested to introduce safety regulation specifically on children travelling by motorcycle in their road traffic policy so that high traffic fatality can be reduced at a minimum level.

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