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Factors Contributing to Crash Involvement of Unlicensed Motorcycle Riders in Malaysia

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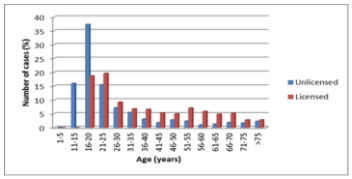
Graphical abstract



Abstract

Despite the various interventions carried out to reduce the number of road crashes and injuries involving motorcycle riders, unlicensed riding remains a growing road safety concern in Malaysia. Thus, the current study was embarked upon to identify the general trends and to assess the factors contributing to the high involvement of unlicensed motorcycle riders who were fatally injured in road crashes. The results indicated that about one-fifth of the total casualties involved were unlicensed motorcycle riders and the proportion would be higher if the statistics of the unknown cases was included. The results also revealed that, when compared with licensed motorcycle riders, relatively high proportion of unlicensed motorcycle riders were young (69%), did not wear safety helmets (33%), involved in crashes which occurred at night (39%) and in rural areas (79.1%). These findings suggested that unlicensed motorcycle riders were predominantly young which can be considered as novice and inexperienced, and were more likely to engage in risky riding behaviors. Potential intervention activities and future research are discussed as well.

Keywords: Motorcycle rider; unlicensed; crash involvement

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1.0 INTRODUCTION

Road transportation mishaps are responsible for the death of more than a million of world's populations each year and also left the other 50 million survived victims with injuries and incapacities (WHO 2009). It is also learned that, 90% of the said fatalities occurred in South East Asia which primarily consists of low-income and middle-income countries. It should also be realized that more than half of the fatalities involved were motorcyclists and thus made them the most vulnerable road users in the region (WHO 2009).

Motorcycle casualties have long been a significant concern in Malaysia with the motorcycle users representing more than half of the total traffic fatalities each year with an average of 2% increment for the last ten years (ADSA 2011). In addition to that particular note, motorcyclists have consistently outnumbered the other road users for the past two decades (ADSA 2011).

Despite the paramount efforts to improve the safety of motorcycle in terms of interventions and traffic law enforcement activities, the frequency of motorcyclist fatalities is increasing and shows no sign of declining in the near future (Abdul Manan and Várhelyi, 2012). One of the main contributions towards the higher motorcyclist fatalities is the unlicensed motorcycle users (Mohd Hafzi *et al.* 2011; Abdul Manan and Várhelyi, 2012). Unlicensed riding also remains a road safety concerns and contributes to the high crash statistics in other countries (Kraus *et al*. 1991; Watson 1997; Watson and Steinhardt 2006).

Specifically for Malaysia, driver's and rider's licensing is still in a great dilemma. This is due to socio-economic issue as well as the ease-of-use factors offered by the two wheelers. As motorcycle can be regarded as a motorized version of two-wheeler transport, it is safe to claim that motorcycle is less complex to operate as compared to cars. In addition to that, the small size of the most popular "underbone" motorcycle makes it more convenience to the young users.

Though rider licensing in the country is properly managed and attracted road users especially the young users to be legal riders, socio-economic factors still remain a challenge to the system. Zulhaidi *et al.* (2010) reported that the majority of new riders registered at Driving Institutes in the country are those below 30 years of age. Candidates of age between 16 and 20 alone made up around half of the new applicants in 2008. This indicates that young users are keen to obtain the license, however, there are still unlicensed riders spotted on the road through enforcement and road accidents especially the young users. Underprivileged, family awareness and geographical factors are among the known issues contributed to this road safety concern of unlicensed as well as underage riders.

Thus, this warrant a study to be carried out to: 1) determine the trend of motorcycle casualties based on license' status; 2) explore the crash involvement patterns of unlicensed motorcycle

riders; and 3) compare between licensed and unlicensed motorcycle riders who were fatally injured. The findings can be used for future interventions and may influence current legislation and practice particularly on the road safety enforcement system.

2.0 METHODOLOGY

The source of the road crash data is from MIROS Road Accident Database System (M-ROADS). This database is maintained by the Accident Database and Analysis Unit (ADSA) of Malaysian Institute of Road Safety Research (MIROS) which contains crash data collected by the Traffic Department - Royal Malaysian Police (RMP).

Information was obtained from all the three categories of injury severity; fatal, serious injury and slight injury. Five (5) years data (from 2006 to 2010) were retrieved from the database to ensure that the general trends were sufficiently identified. For the purpose of comparing the analyses between licensed and unlicensed motorcycle riders, data of crashes that resulted in fatality for the year 2010 only were used. Fatal cases were only included due to under-reporting issues associated with other injuries (Abdul Manan and Várhelyi, 2012).

From the database, the three types of driving license status, namely full license for not more than 5 years and more than 5 years, and learner (`L') license were categorized and renamed as "licensed". Other types of driving licenses (international, police and military) and unknown cases were excluded. After applying the exclusion criteria to the initial data set including removing missing and unreliable data, 2265 road crash cases were used for the analyses.

Chi-square test was used to determine the associations between the study groups and the independent variables (e.g. demographics, safety helmet wearing, time of day, day of week and location of crash). A confidence p-value of <0.05 was considered to indicate statistical significance level. The statistical analyses were performed using Statistical Package for Social Sciences or Statistical Product and Service Solutions (SPSS) software version 17.0.

3.0 RESULTS

3.1 Trend of driving license status among motorcycle riders involved in road crashes (2006-2010)

During the 5-year period, unlicensed motorcycle riders who were fatally injured, seriously injured and slightly injured recorded 21.5%, 20.1% and 16.4% of the total cases respectively. There were also a high proportion of licensed motorcycle riders who sustained all these injuries, particularly for those with valid license of more than 5 years. It is also to be noted that motorcycle riders with unknown license status recorded a relatively high percentage (10.8%). Table 1 lists the driving license status and injury severity of motorcycle riders involved in road crashes during the period from 2006 to 2010 in Malaysia.

Table 1 Driving license status of motorcycle riders involved in road crashes in Malaysia (2006-2010)

DRIVING LICENSE		INJURY SEVERITY						Total	
		Fatal		Serious injury		Slight injury			
Status	**Type**	**Cases**	**%**	**Cases**	**%**	**Cases**	**%**	**Cases**	**%**
Licensed	Learner	377	1.4	707	1.5	1447	1.5	2531	1.5
	<=5 years	7279	27.4	14850	32.2	32310	34.3	54439	32.6
	>5 years	10456	39.3	16993	36.9	33426	35.5	60875	36.5
Sub-total		18112	68.1	32550	70.6	67183	71.3	117845	70.6
Other Licensed	International	58	0.2	89	0.2	119	0.1	266	0.2
	Police	20	0.1	59	0.1	96	0.1	175	0.1
	Military	20	0.1	37	0.1	57	0.1	114	0.1
Sub-total		98	0.4	185	0.4	272	0.3	555	0.4
Unlicensed	Sub-total	5708	**21.5**	9254	**20.1**	15461	**16.4**	30423	18.2
Unknown	Sub-total	2651	10.0	4097	8.9	11234	12	17982	10.8
TOTAL		26569	100.0	46086	100.0	94150	100.0	166805	100.0

3.2 Comparison between licensed and unlicensed motorcycle riders for year 2010

3.2.1 Demographics and safety helmet wearing

Table 2 explores the differences between the licensed and unlicensed motorcycle riders involved in road crashes, in terms of demographics and safety helmet wearing variables. Among the variables; age, race, academic qualification and safety helmet wearing were found to be significantly associated with license status. Majority of the unlicensed motorcycle riders involved in the road crashes were young riders aged 25 years old and below. Young unlicensed riders of aged 16-20 recorded the highest involvement in the road crashes, as illustrated in

Figure 1. Surprisingly, this is followed by riders of aged 11-15 who were below the country's minimum legal age for driving license' ownership (as stipulated in the Road Transport Act 1987, Section 39 (1) "No person under sixteen years of age shall drive a motor vehicle on a road"). About one-third of the unlicensed motorcycle riders did not wear safety helmet with higher proportion of the cases involved riders aged 16 to 20 years old (39%) and 15 years old and below (22%), as shown in Figure 2.

Table 2 Demographics profiles and safety helmet wearing of motorcycle riders who were fatally injured in road crashes by license status

Variables	License Status				Significance level
	Licensed		Unlicensed		
	Cases	%	Cases	%	
Age					
≤25	556	38.3	538	**69.0**	χ^2 (df2) = 199.5, p < 0.001
26-50	477	32.9	159	20.4	
>50	418	28.8	83	10.6	
Gender					
Male	1372	93.5	727	92.0	χ^2 (df1) = 1.77, p = 0.183
Female	95	6.5	63	8.0	
Race					
Malays	912	63.6	545	**74.3**	χ^2 (df3) = 90.88, p < 0.001
Non-Malays	522	36.4	189	25.7	
Academic qualification					
Did not attend school	99	6.8	68	**8.8**	χ^2 (df3) = 28.68, p < 0.001
Primary school	231	15.8	131	**17.0**	
Secondary school	1063	72.5	566	**73.4**	
Higher education	73	5.0	6	0.8	
Safety helmet wearing					
Not wearing	159	10.8	256	**33.0**	χ^2 (df2) = 166.0, p < 0.001
Wore but not strapped	83	5.7	34	4.4	
Wore and strapped	1227	83.5	485	62.6	

Note: The number of cases for each variable does not add to totals (2265 cases) due to missing data

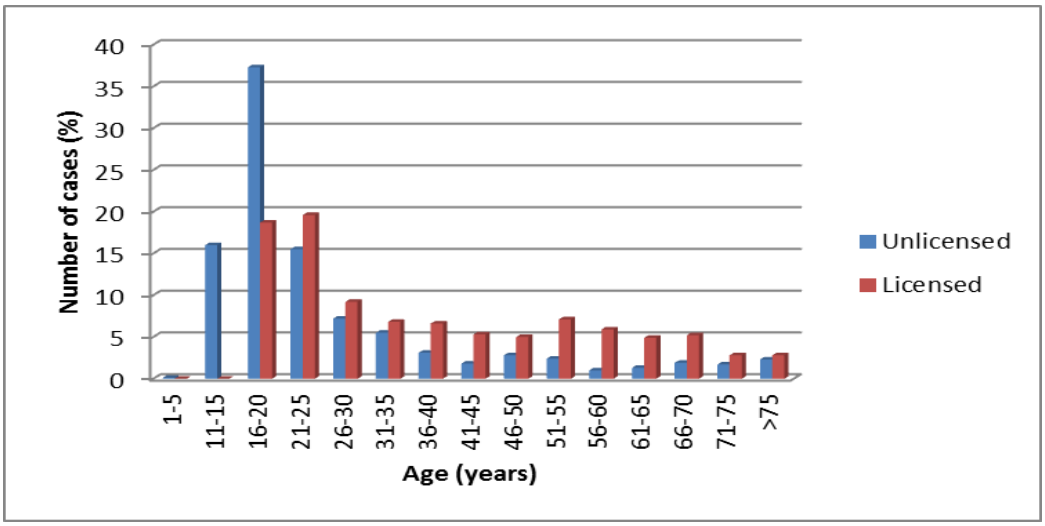

Figure 1 Motorcycle rider fatality by driving license status according to age category

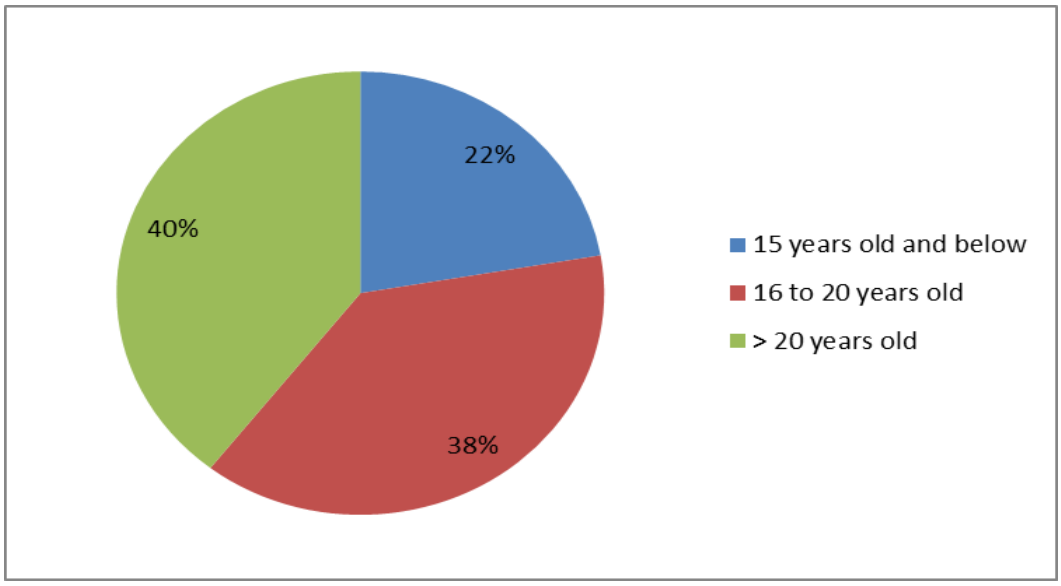

Figure 2 Unlicensed motorcycle rider who did not wear safety helmet by age

3.2.2 Crash circumstances

Table 3 compares the distribution of crash circumstance variables by driving license status. The significant factors associated with driving license status were time of day and location of crash (e.g. location and area types). In term of time of day, most unlicensed motorcycle riders were involved in road crashes during the night within 6:00–11:59pm period. From this, 8:00–10:00pm period recorded the highest proportion of road crashes involving unlicensed motorcycle riders (Figure 3). A majority of the motorcycle riders involved in road crashes were at rural location on motorways and primary roads regardless of driving license status, with slightly higher proportion for unlicensed riders.

Table 3 Driving license status by crash circumstances

Variables	License Status				Significance level
	Licensed		Unlicensed		
	Cases	%	Cases	%	
Time of day					
12:00 – 5:59am	219	14.9	128	16.1	χ^2 (df3) = 34.39, p < 0.001
6:00 – 11:59am	441	30.0	154	19.4	
12:00 – 5:59pm	368	25.0	202	25.5	
6:00 – 11:59pm	444	30.1	309	**39.0**	
Day of the week					
Weekdays (Monday to Friday)	1015	69.0	543	68.5	χ^2 (df1) = 0.055, p= 0.814
Weekends (Saturday and Sunday)	457	31.0	250	31.5	
Location type					
City/ Urban	334	22.7	110	13.9	χ^2 (df2) = 30.75, p < 0.001
Built-up area	234	15.9	111	14.0	
Rural	904	61.4	572	**72.1**	
Area type					
Residential/ Office/ Shopping	478	32.5	204	25.7	χ^2 (df3) = 13.62, p < 0.005
Industrial/ Construction/ Bridge	93	6.3	42	5.3	
School	37	2.5	21	2.7	
Others (motorways & primary roads)	864	58.7	526	**66.3**	

Note: The number of cases for each variable does not add to totals (2265 cases) due to missing data.

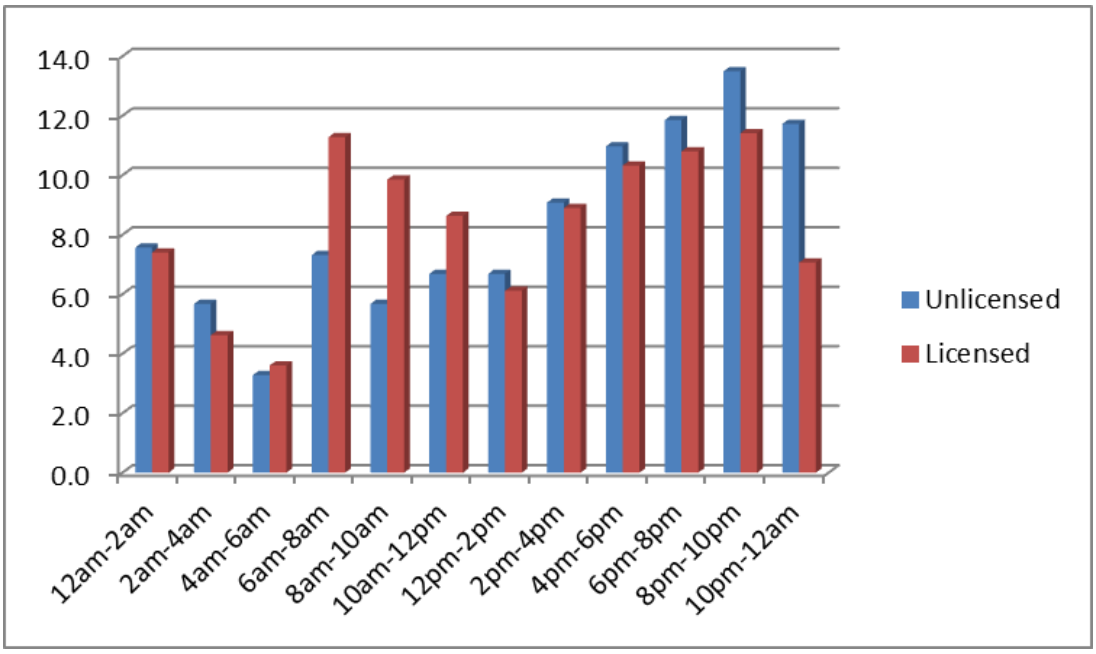

Figure 3 Motorcycle rider fatality by driving license status according to time of day

4.0 DISCUSSIONS

The proportion of unlicensed motorcycle riders who were fatal and sustained serious injuries identified in this study based on the five (5) years data (from 2006 to 2010) is relatively high (21.5% and 20.1% respectively). The proportion would be higher if unknown cases were excluded which worked out to be 23.9% and 22% respectively. The over-representation of unlicensed motorcycle riders in road crash statistics was also documented in other studies (Kraus *et al*. 1991, Watson and Steinhardt 2006).

Taking into account the value of statistical life (VOSL) of RM1.15 million per motorcyclist fatality (Mohd Faudzi *et al*. 2011), the number of fatalities involving this unlicensed group for the five year period has cost the country approximately RM6.6 billion with an average of RM1.3 billion annually. This is a conservative estimate as it does not include other costs of a crash such as hospitalization costs, disability benefits, loss of productivity and social costs. Still, this is a huge loss which has directly affected the economy of individuals, families and nation as a whole.

In term of driving license status, the over-representation of young unlicensed motorcycle riders (≤25 years old) is a concern as it constitutes approximately 69% of the total number of riders involved in road crashes in comparison with licensed riders (38.3%), with higher proportion involving riders aged between 16 to 20 years old. The situation is more alarming with the crash involvement of young unlicensed riders of aged 11-15 who were mostly high school students and below the legal age limit of 16 years old to obtain valid licenses. Riders in this age group is considered novice with poor ability in making safe decisions due to lack of experience and proper driving education (McCartt *et al*., 2009).

The results also show that a relatively high proportion of unlicensed riders were not wearing safety helmet (33%) compared to the proportion of licensed motorcycle riders (10.8%), with high proportion involving riders below the legal age limit of obtaining valid licenses (22%). This indicates that these riders not only defy the law by continuing to drive without a proper driving license, but also engage in other illegal or unsafe riding behaviors, such as not wearing safety helmets. This is further supported by previous studies whereby this group can be considered as high-risk group (young riders) who were more likely to be involved in risky behaviors e.g. alcohols, drugs, and speeding (Watson 1997; Watson and Steinhardt 2006).

In terms of time of day and location of crash, unlicensed motorcycle riders were over-represented in road crashes occurring during night time and in rural areas. This might be due to low frequency of traffic enforcement activities at these areas; hence, the situation might increase the likelihood of the riders riding without licenses as well as not wearing safety helmets. This is supported by a previous study whereby insufficient and inefficient traffic enforcement activities have led to low perception of being caught (POBC) by the road users with POBC for failure to use crash helmets which was reported at 37% (Noradrenalina *et al*. 2012).

Furthermore, the problem of unlicensed riding can also be partly explained by the social behavior issue typically associated with young motorcycle riders in the country which is referred to as "*mat rempits*" (`dare-devil' bikers) who are mostly unlicensed (75%), as highlighted in a study by Rozmi and Norhayati (2007). According to the study, most of them in this group are individuals who were involved in road crashes (58.3%) through their involvement in illegal racing, dangerous road stunt performances and traffic law violation, which normally took place in rural areas and during the night time; which further support the above findings.

The data used in this study only includes fatal injury and limited by the variables readily available in the POL 27 (Police Crash Report). Future study shall utilize serious and minor injury cases for better representation and explore other methods e.g. in-depth crash investigation, surveys and interviews for more detailed information, specifically on causes of accidents and social factors.

In addition, to further improve the classification used for license status in the police crash reporting form known as

POL27 and provide meaningful analyses, such as the category for "No License" can be further divided into several components, namely "revoked", "suspended", "expired", and "never licensed". Probationary ('P') license can also be included as one of the license status categories instead of classifying it under the current license type 'full license less than 5 years'.

5.0 CONCLUSIONS

Overall, these findings suggest that unlicensed riders involved in road crashes in Malaysia are a serious road safety concern and most of them were predominantly young who were more likely to engage in risky riding behaviors. Several countermeasures can be considered for reducing the number of crashes and injuries involving this group of riders. Below are the key findings obtained from this study that may have implications on road crash prevention activities and some suggestions for improvement:

a. The proportion by injury severity of unlicensed motorcycle riders identified as fatal in this study recorded for about one-fifth of the total rider fatalities each year and this results to an extraordinarily high economic lost for the country. Attempts to reduced unlicensed riding should focus on ways to increase the frequency and visibility of traffic enforcement activities and impose more stringent penalties for the unlicensed riders.
b. Unlicensed motorcycle riders aged between 16 to 20 years old (mostly secondary schools and pre-university students) account for about 37% of the total fatalities in comparison with the licensed motorcycle riders (18%). This is a great loss to the productive years among this age group and this needs further attention. Driving license tests, at least for 'L' license should be promoted and conducted in schools by the driving schools in order to encourage participation from this age group.
c. Motorcycle riders aged between 11 to 15 years old (below the legal age to obtain a valid license) account for about 15% of the total rider fatalities. Approximately 22% of this group did not wear safety helmet. This highlights the needs of targeting this young group who are in the transition to obtain driving license. Frequent awareness campaigns and intensive enforcement activities by schools and authorities towards consequences of illegal riding and safety helmet wearing could play a vital role in avoiding them from becoming fatal road crashes statistics.
d. The over-representation of unlicensed motorcycle riders involved in road crashes in rural areas during night time is also a serious concern. One of the causes for the high number of road crashes could be associated with the "*mat rempits*" or `dare-devil' bikers. More effective law enforcement by the authority and special training camps for this group are some of the possible alternatives to curb the problem of illegal racing.
e. The POL27 should be enhanced to further divide the category of "No License" into several components, namely "revoked", "suspended", "expired", and "never licensed". Probationary ('P') license should also be included. This should improve the existing database of road crashes which could be utilized to perform more efficient analysis in formulating more effective interventions.

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