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## Do Malaysian Motorcyclists Concern to Safety Helmet Usage: A Cross-sectional Survey

<sup>1</sup>Kamarudin Ambak, <sup>2</sup>Rozmi Ismail, <sup>3</sup>Riza Atiq Ok Rahmat and <sup>3</sup>Foad Shokri

<sup>1</sup>Faculty of Civil and Environmental Engineering,

Universiti Tun Hussein Onn Malaysia, Johor, Malaysia

<sup>2</sup>Faculty of Social Science and Humanities, Univeriti Kebangsaan Malaysia, Selangor, Malaysia

<sup>3</sup>Faculty of Civil and Structural Engineering,

Universiti Kebangsaan Malaysia, Selangor, Malaysia

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**Abstract:** The study was carried out to examine percentage of compliance rate regarding helmet used and to identify their characteristics. An observational method and a questionnaire survey were conducted among a group of motorcyclists in Selangor, Malaysia. The observations of 1150 motorcyclists show that only 46.6% used helmets properly, 10.6% untied helmet and 42.8% without-helmet. A random of 300 respondents those improper wearing helmet (either untied helmet or unhelmeted) were interviewed and asked to fill-up a questionnaire. The findings were discussed on background, motorcycling experience, knowledge and attitude of the respondents in details. The percentage of improper helmet usage in the locations of study was considered high and it seem those helmet initiative programs are insufficient to overcome the problem. Also, the characteristics of motorcyclist who did not wearing helmet properly (either unfastened or not wearing helmet) were identified. Therefore, there is need to introduce a new mechanism or method that can be utilized to incorporate behavior adaptation toward safety concern among motorcycle users. Finally, the direction of this study was explained in section of future work.

**Key words:** Motorcyclist, characteristics, head injuries, helmet use, compliance rate

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### INTRODUCTION

Road safety is one of public health concern and problem in Malaysia. Annually, according to Malaysian Royal Police (PDRM) reported more than 6000 people killed in road accidents. In 2007 alone, 6282 of fatalities were recorded. Of this figure, motorcyclist considers 50% that contribute as major victims (Royal Malaysian Police, 2009). Furthermore, motorcycle has become a common and popular in many developing countries (Conrad *et al.*, 1996; Ambak *et al.*, 2009). Also, it known as vulnerable road user in term of safety-risky exposure and instability compared to other vehicles. Many researches indicate that the major cause of death involving motorcycle users due to serious head injuries (Barbara *et al.*, 1995; Kulanthayan *et al.*, 2000; Radin *et al.*, 2005; Shao, 2005; Zamani *et al.*, 2009). Also, Royal Malaysian Police (2009) has reported that the most part of body injured lead to fatality is head by 65%. Safety helmet is the best equipment that can be used to protect motorcycle users from head injuries (National Highway Traffic Safety Administration, 2009; Radin *et al.*, 2005; Shuaieib *et al.*, 2002). Many studies shown that helmet is

effective in preventing and reducing the severity of head injuries by 37 to 72% (David, 2007; Li-Ping *et al.*, 2008) or deaths by 20 to 24% (Masao *et al.*, 2003; Thomas, 2009).

Despite the safety helmet is the best protective equipment to prevent or reduce severity of head injuries, majority motorcycle user did not use or fasten it properly. There are several studies in developing countries found that the percentage of proper usage of helmet amongst motorcycle users is consider low. A study in Indonesia reported that only 55% of the riders wore helmets correctly (e.g., with chinstrap buckled). Similarly in Malaysia, 54.4% were used their helmet properly but alarmingly in Thailand only 22.6% motorcycle user used helmet since the enforcement of the helmet act in 1996 (Conrad *et al.*, 1996; Kulanthayan *et al.*, 2000). Surprisingly, several cities in Iran indicated that of the 92% of the motorcyclists, who owned a helmet, only 13% were using it. Study in some provinces of China shows that the rate of proper helmet use was low, with less than one-third of riders (32.3%) and only 15.3% of the passengers wearing a helmet correctly (Li-Ping *et al.*, 2008; Zamani *et al.*, 2009).

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**Corresponding Author:** Kamarudin Ambak, Faculty of Civil and Environmental Engineering,  
Universiti Tun Hussein Onn Malaysia (UTHM), Johor, 86400 Batu Pahat, Malaysia  
Tel: 0060192367952

Radin *et al.* (2005) highlighted that Malaysian government has taken role of safety concern regarding helmet by implementing series of helmet initiatives in early seventies. A number of helmet of initiatives have been carried-out are: (1) Introduction of Motorcycle Safety Helmet Standard MS1, (2) Implementation of Helmet Law in 1973, (3) Targeted safety helmet campaign in 1997 to date, (4) Regular helmet enforcement and checks (on-going) and (5) Newly implemented, Community Based Program in 2007 to date. The effectiveness of helmet initiatives was evaluated with a few studies. Radin *et al.* (2005) reported that since 1995, 1998 and 2000, the rate of proper usage of safety helmet was slightly increased by 33, 41 and 54%, respectively. It seems positively improve but the percentage rate was saturated at 66%. Also, this figure represent in average for both areas in urban and rural. However, the compliance rate in rural area still low as 30%, therefore extra effort is needed to increase their safety awareness (Kulanthayan *et al.*, 2001). With regards to this problem, present study was conducted to examine the compliance rate of safety helmet particularly in countryside and housing estate area and to look details on characteristic of a group of motorcyclists in Selangor state.

## **MATERIALS AND METHODS**

Based on previous studies, we found that compliance rate of proper helmet usage in rural and outside-town area was low. So, we decided data collection activities were carried out within outside-town centre including countryside and housing estates areas. Selangor state was chosen as location of study due to this state recorded highest road accidents statistical report (Royal Malaysian Police, 2009) and Bangi was represents as typical suburban in the state. There are two methods were used for data collection in this study. The first method is observational on helmet usage among motorcycle users in their daily activities such as to sundry shop, working, send children to school and to worship place. The observation activities were carried out at six zones including three areas in countryside namely Dengkil, Sg. Tangkas and Bangi Lama and three areas in housing estate namely Bangi S1, Bangi S5 and Bangi S8. A week of observation was carried out within 7.30 and 8.00 a.m. in the morning and at 5.30 and 6.00 p.m. in the evening. These two times is normal peak h that been used in the observation activity.

The second method, we employed face-to-face approached to each motorcyclist and asked them filled-up a self-administered questionnaires form. If they refuse to do so, another respondent were approached and prior to giving the questionnaire, the way they using a helmet

were noted (either unfastened properly or with-out helmet) and recorded separately. The survey activities were carried out with a period of three months (06 February to 15 May 2010). For the data collection in survey activities, we divided six zones in the location of study. Three zones consist of a group number of section in housing estate (zone 1 Bangi S1-S4, zone 2 Bangi S5-S8 and zone 3: Tmn Kajang) and, three zones in countryside (zone 4 Dengkil, zone 5 Sg. Tangkas and zone 6 Bangi Lama) respectively. The questionnaire was designed with five sections: Section A: respondents' background, Section B: motorcycling experience, Section C: knowledge and attitude, Section D: psychological model (Theory Planned Behavior, Health Belief Model and Technology Acceptance Model) and Section E: Feedback. The questionnaire was pre-tested on a target group of 20 motorcyclists at the study locations and to test the reliability and validity of the instruments. After analyzed, some modifications were made to improve the questionnaire. A sample size of 300 respondents were chosen to represent their general characteristics with response rate of 57% (out of 533 respondents were approached). This sample size is reasonably enough to analyze descriptive statistics, multivariate analysis and structural equation model. There are several studies that are using less than 300 of sample size, such as seatbelt use (N = 277) by Simsekoglu and Lajunen (2008), motorcyclists' intention speed (N = 110) by Elliott (2010), drivers' decision speed (N = 250) by Warner and Abreg (2006) and truck driver behavior (N = 232) by Poulter *et al.* (2008). Then, we used the Statistical Package for Social Sciences Software (SPSS) version 18 to coding and analyzing the data.

## **RESULTS AND DISCUSSION**

From observational study of 1150 motorcyclists, results show that only 46.9% used helmets properly, 10.8% untied helmet and 42.3% did not used helmet at all (Table 1). Housing estates area was recorded slightly higher in usage of helmet properly (54-64%) compared to in the countryside (28.5-39%). The finding in Table 2 shows that those who are riding in residential areas more likely to used helmet properly compared to those are riding in the countryside. Table 3 shows that female motorcyclists are more likely to used helmet (64%) compared to male motorcyclist (56%). This finding is statistically significant ( $p = 0.037$ ) at 95% confidence level.

However, this study found that the compliance rates of proper helmet use among motorcyclists were considered low (47% in average) and alarmingly, in some zone as low as 29%. This finding similar with

**Table 1: Helmet usage among motorcyclists at study locations**

Location	Unhelmeted	%	Untied	%	Helmeted properly	%	Total
<b>Country side</b>							
Zone 1	116	58.9	25	12.7	33	28.5	197
Zone 2	85	51.5	18	10.9	37	37.6	165
Zone 3	94	51.6	17	9.3	55	39.0	182
<b>Housing Estate</b>							
Zone 4	73	33.9	22	12.1	98	54.0	215
Zone 5	65	32.0	17	11.8	95	56.2	203
Zone 6	54	28.8	11	7.0	107	64.3	188
Total	487	42.3	124	10.8	540	46.9	1150

Note: Zone 1: Dengkil, Zone 2: Sg. Tangkas, Zone 3: Bangi Lama, Zone 4: Bangi S1, Zone 5: Bangi S5, Bangi S8

**Table 2: Helmet usage by location**

Location	Helmeted properly	Unhelmeted/improperly	Total
Countryside	189 (34.7%)	355 (65.35%)	544 (100%)
Housing estate	351 (57.9%)	255 (42.1%)	606 (100%)

( $\chi^2 = 61.831$ ,  $df = 1$ ,  $p = 0.000 < 0.05$ )

**Table 3: Helmet usage by gender**

Gender	No helmet	Used helmet	Total
Male	408 (43.8%)	523 (56.2%)	931 (100%)
Female	79 (36.1%)	140 (63.9%)	606 (100%)

( $\chi^2 = 4.363$ ,  $df = 1$ ,  $p = 0.037 < 0.05$ )

Kulanthayan *et al.* (2001) studied found that 54% of motorcyclists were used safety helmet properly. In fact, their result showed at outside-town centre was only at 33%. Other studies, in Indonesia, Conrad *et al.* (1996) reported that only 55% of the riders wore helmets correctly for urban area and compliance behavior in the villages considering lower. In China, based on observational study shows, that the rate of proper helmet use was low, with less than one-third (32.3%) of riders (Li *et al.*, 2008). In term of gender, present study shows female riders were more likely to use a helmet properly compared to male riders. This finding is in line with Kulanthayan *et al.* (2000) found that female riders used safety helmets more than male riders. Conversely, Hung *et al.* (2006) reported their studied in Vietnam, shown male drivers more likely to wear helmets than female drivers. They claimed that male riders were used more motorcycle compared with female riders.

Table 4a shows socio-demographic of the respondents and Table 4b shows respondents' motorcycling experience. Table 4c shows about respondents' general knowledge and attitude by using a likert scale (1 = strongly disagree, 2 = Disagree, 3 = Not sure, 4 = Agree and 5 = Strongly agree) of 300 respondents were observed, 90% (270) of them were not wearing helmets and 10% (30) were untied helmets. Almost half (47%) of the respondents within age of 25 y and below and majority (98%) represent as Malay ethnic. More than 60% of the respondents completed secondary education level and half (52%) of them working in private sectors. Most respondents (43%) earned monthly income less than RM1000 and 9.3% of the respondents consider as in middle income (RM 2000-3000). 54% of the respondents possessed a full

license, but alarmingly 26% of the respondents were riding motorcycle without any license (Table 4a).

In term of motorcycling experience, half of them (53%) who rode motorcycle with over 6 years. Most respondents (60%) were riding within below 2 km and only 5.3% of them ride over 16 km to reach their destination. More than one-third (43% or 131) of the respondents involved in road accidents and 13% (17 out of 131) respondents had head injured. Majority respondents (81%) have a full shell type of helmet, 15% full face helmet and only 4% half-shell helmet. Majority respondents (93%) claimed that their helmets certified with SIRIM standard and only 7% did not. Almost 90% of the respondents did not experiencing stopped by police due to violate with helmet law.

Respondents were asked about their knowledge and attitude regarding proper helmet usage. Most respondents (44%) agreed that the lower enforcement make motorcycle users not comply with proper helmet usage and only one-third (36%) of the respondents agreed that RM100 (USD33) compound is still low. Fifty-six percents of the respondent strongly agreed that proper usage of helmet might prevent head from injuries. One-third (33%) of the respondents disagreed that proper usage of helmet only suitable for a long distance travels (more than 5 km). More than half (55%) of the respondents agreed that the helmet campaign program to create awareness were not succeeded. But, one-third (35%) of the respondents agreed that free-gift helmet program will improve compliance of safety helmet positively. However, the statement cultivating program on compliance of safety helmet is not covering in all community areas (such as school, worship place, community centre, etc.) was agreed by 55% of the respondents. Majority respondents (72%) disagreed with the statement a family is not playing important role in order to educate motorcyclist in complying proper helmet usage. Overall, finding show that the respondents have good enough knowledge and attitude regarding the importance of safety helmet. However, when it translated into their practice seems the other way around.

Based on self-reported helmet use, 36.3% (109) of the respondents were admitted they often wearing

Table 4a: Socio-demographic of respondents

Description	N	%
<b>Sect. A: Background</b>		
<b>Improper helmet usage by observed</b>		
No-helmet	270	90
Untied	30	10
Total	300	100
<b>Age (y)</b>		
20 and below	70	23.3
21-25	72	24.00
26-30	36	12.00
31-35	31	10.3
36-40	21	7.00
Above 40	70	23.3
Total	300	100
<b>Race</b>		
Malay	295	98.3
Indian	4	1.3
Other	1	0.1
Total	300	100
<b>Gender</b>		
Male	161	53.7
Female	139	46.3
Total	300	100
<b>Marital status</b>		
Married	152	50.7
Single	148	49.3
Total	300	100
<b>Education level</b>		
Never school	3	1.00
Primary school	21	7.00
Secondary school	207	69.00
Tertiary level	69	23.00
Total	300	100
<b>Working sector</b>		
Government	37	12.3
Private	158	52.7
Self-employed	45	15
Housewife	18	6
Student	23	7.7
Total	281*	93.7*
*Exclude jobless and retirees		
<b>Monthly income</b>		
RM1000 and below	130	43.3
RM 1001-RM 2000	74	24.7
RM 2001-RM 3000	28	9.3
Above RM 3001	9	3
Not relevant	59	19.7
Total	300	100
<b>Type of license</b>		
Full license	164	54.7
Probation license	33	11
Learning license	24	8
None	79	26.3
Total	300	100
<b>License possessing (y)</b>		
1 and below	49	16.3
1-5	63	21
6-10	28	12.7
Above 10	71	23.7
Total	221*	73.7*

\*Exclude non-license

a helmet, 62.0% (186) were part time helmet user and only 1.7% (5) of them never used helmet. Table 5 presents the bivariate correlation analysis between self-reported helmet used and respondents' knowledge and attitude.

Table 4b: Respondents' experience of motorcycling

Description	N	%
<b>Sect. B: Motorcycling experience</b>		
<b>Riding experience (y)</b>		
Below 2	67	22.3
2-5	74	24.7
6-10	45	15.00
Above 10	114	38.00
Total	300	100
<b>Riding distance (km)</b>		
2 and below	182	60.7
3-9	77	25.7
10-16	25	8.3
Above 16	16	5.3
Total	300	100
<b>Accident involvement</b>		
Yes	131	43.7
No	169	56.3
Total	300	100
<b>Head injury</b>		
Yes	17	13.00
No	114	87.00
Total	131	100
<b>Type of helmet</b>		
Full face	45	15.3
Full shell	239	81.00
Half shell	11	3.7
Total	295	100
<b>SIRIM standard</b>		
Yes	276	93.6
No	19	6.4
Total	295	100
<b>Stopped by police</b>		
Yes	38	12.7
No	262	87.3
Total	300	100

Table 4c: Descriptive statistical analysis on knowledge and attitude

Section C: Knowledge and attitude	N	Mean	SD
Low enforcement regarding helmet law	300	3.71	1.065
*RM100 compound still low	300	3.52	1.169
Strictly impose penalty to violator helmet law	300	4.24	0.858
Proper helmet usage prevent head injury	300	4.42	0.816
MS helmet is expensive	300	3.48	1.074
Complying helmet use only for long distance	300	2.56	1.269
Helmet campaign program not successful	300	3.91	0.870
Free helmet distribution achieve target	300	3.50	0.997
Cultivating program not throughout in community	300	4.02	0.780
Family not playing important role	300	2.19	1.243

\*RM 100 compound is refer to normal rate that will be imposed to those who violating helmet law and maximum compound is up to RM 300 that issued by Royal Malaysian Police

Six of out ten items were asked and found statistical significance with self-reported of helmet use. There is a strong relationship ( $r = 0.366, p < 0.000$ ) between the item associated with low compound and self-reported helmet use. This factor might influence motorcyclists' behavior on compliance of helmet usage and they preferred to pay the compound. Unless, increase to a maximum compound (RM300) and strictly impose a penalty if they continuous violating the helmet law. Kulanthayan *et al.* (2001) found that the ability to predict enforcement activity is an influencing factor on

**Table 5: Bivariate correlation analysis on self-reported helmet use**

Items	Pearson correlation (r)	95% Significance(p)
Strictly impose penalty to violator helmet law	0.134	0.021
RM100 compound still low	0.366	0.0000
Proper helmet usage prevent head injury	0.176	0.002
Helmet campaign program not successful	0.173	0.003
Cultivating program not throughout in community	0.194	0.001
Family not playing important role	0.152	0.008

compliance of safety helmet usage among motorcyclist. Similarly, Hung *et al.* (2006) stated that the absence of legislation and enforcement made motorcyclists in Vietnam will not wear a helmet. Also, they claimed that large variations in helmet use on roads with compulsory helmet use suggest that law enforcement of helmet legislation is not consistent.

**FUTURE WORK**

This study presents part of result for on going research to develop a behavioral intention model toward proper helmet usage among motorcyclist. In future works, the behavioral sciences theories namely Theory Planned Behavior (TPB), Health Belief Model (HBM) and Technology Acceptance Model (TAM) will be used in understanding and identify the influencing factor in predicting proper usage of helmet. In TAM analysis, a prototype system (Safety Helmet Reminder) will be used in order to predict that such system could affect motorcyclists' behavior and their acceptance. Ambak *et al.* (2009) suggested possibility to adapt and apply a seat belt reminder system into motorcycle as helmet reminder system. Similarly, Li *et al.* (2008) suggest that there is a need to implement new interventions to increase helmet use. Hopefully, this research may contribute a significant finding and method that be able to mitigate current problem in the country regarding motorcycle safety program.

**CONCLUSION**

This study was conducted to examine the compliance rate of helmet usage among motorcyclists in rural and outside town centre areas. The characteristics of motorcyclist who did not wearing helmet properly (either unfastened or not wearing helmet) were identified. Alarmingly, the percentage of improper helmet usage in the locations of study was considered high (52.8%) and it seem those helmet initiative programs namely helmet law enforcement, safety helmet campaign and Community Based Program are insufficient to overcome the problem.

There is need to introduce a new mechanism or method that can be utilized to incorporate behavior adaptation toward safety concern among motorcycle users. In future work, a psychological model namely TPB, HBM and TAM is to be used analyzed with Structural Equation Modeling technique. An integrated model is expected to be developed for predicting motorcyclists' behavioral intention toward proper helmet usage.

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