

The Prevalence of Helmet Wearing Among Young Motorcyclists In Klang Valley

Nurul Hafizah MOHD AZLAND^a, Choy Peng NG^b, Mohammed Alias, YUSOF^c

^{a,b,c} *Civil Engineering Department, Faculty of Engineering, Universiti Pertahanan Nasional Malaysia, Kem Sungai Besi, 57000 Kuala Lumpur, Malaysia*

^a *E-mail: zaza_azland@yahoo.com*

^b *E-mail: cpng@upnm.edu.my*

^c *E-mail: alias@upnm.edu.my*

Abstract: In Malaysia, young motorcyclists between 16-25 years old contributed a large proportion of death and disabilities each year. Most of the deaths and disabilities amongst young motorcyclist were due to serious head injuries. This indicates that the awareness of wearing a motorcycle helmet while riding a motorcycle is still low amongst them. This pilot study was aimed to investigate the factors associated with helmet wearing among young motorcyclists in Klang Valley. The multinomial logistic regression analysis of 104 samples revealed that male young motorcyclists, married, live in the city area, with income exceeding RM 500 per month are more likely to wear helmet while riding a motorcycle. In addition, it was found that the young motorcyclists with higher value of statistical life are more likely to wear helmet. These findings suggested that road safety education and campaign should be emphasized to increase the awareness of young motorcyclists towards wearing helmet.

Keywords: motorcyclists, helmet, value of statistical life, multinomial logistic regression

1. INTRODUCTION

Motorcycles are relatively cheap and reliable mode of transportation especially in developing countries. They represent about half of the total registered vehicles in Malaysia¹ (MOT, 2012). In 2009, the total road deaths in Malaysia are 6745, of which 4010 or approximate 60% are motorcyclists (RMP, 2010). This is not much different from the figure (67.7%) reported by Yen et al., 1999 in his study.

The crash statistics in recent years also show that the fatality ratio of other road users to motorcyclists is 1:1.52 and more than 50% of the victims are under 25 years old (MIROS, 2011). The Malaysian Institute of Road Safety Research (MIROS) also reported that 58% of motorcyclist deaths were due to serious head injuries (The Star, 2010). This indicates that the awareness of wearing a motorcycle helmet while riding is still low, especially amongst the motorcyclist below 25 years old.

Previous researches have indicated that wearing a motorcycle helmet is effective to protect motorcyclists from sustaining traumatic head injuries during a crash (DeMarco *et al.*, 2010; Hill *et al.*, 2009; Mills *et al.*, 2009; Mayrose, 2008; Li *et al.*, 2008; Chiu *et.al*, 2000;

¹ Malaysia has introduced the motorcycle safety helmet standard in 1969 and enforced the motorcycle safety helmet law in 1973 (Radin Umar *et al.*, 2005). Based on the Global Status Report of the World Health Organization (WHO) on Road Safety in 2009, the compliance level for helmet wearing rates were 90% and 70% for riders and pillion riders, respectively.

Gabella *et al.*, 1995). A study conducted in Colorado showed that proper motorcycle helmet wearing could prevent head injuries 2.4 times better than those not wearing a motorcycle helmet (Gabella *et al.*, 1995). Chiu *et al.* (2000) reported that un-helmeted motorcyclists were two times more likely to sustain a head injury in the event of a crash compared to helmeted motorcyclists. Liu *et al.* (2003) demonstrated that the helmet may reduce head injuries and death by 72%.

Although increasing evidence shows that riding a motorcycle without a motorcycle helmet (as shown in Figure 1), many motorcyclists, especially the young motorcyclists still engage in this risky behaviour. Therefore, this study was aimed to investigate the factors associated with helmet wearing among young motorcyclist while riding a motorcycle. These factors include the demographic factors such as age, gender, education level, marital status, living location, personal income, motorcycle riding experience and the value of statistical life (VSL).



Figure 1: A young motorcyclist and his pillion rider go without helmets
(Source: New Straits Times, 2013)

The rest of the paper is organized as follows. Section 2 provides the study design, whilst Section 3 presents empirical results. Section 4 contains discussion of the results, followed by conclusion in Section 5.

2. THE STUDY DESIGN

Previous research has shown that demographic factors (Ng *et al.*, 2013; Kulanthayan *et al.*, 2012; Abdul Sukor and Fujii, 2011; Huang *et al.*, 2011; Mohamed *et al.*, 2011; Trowbridge and Kent, 2009) have a strong influence on the behaviour of road users. In that case, we thought there is no exception for the young motorcyclists in this field. We speculated that the young motorcyclists with higher VSL are more likely to wear helmet when they ride motorcycles. The measurement of VSL in this study was obtained through a contingent valuation study using the willingness to pay (WTP) approach.

WTP is defined as the maximum amount of money that may be contributed by an individual to equalize a utility change. Net economic benefits of risk reduction, are estimated as the difference between the motorcyclists maximum WTP for risk reduction for road crash.

The VSL is concerned with valuation of changes in the level of risk exposure rather than the valuation of specific individual (de Blaeij *et al.*, 2003). The VSL should be expressed as the aggregate of the individual WTP for safety improvement for risk reduction.

We hypothesized that family plays a significant role in young motorcyclists' risky riding behaviour, with family members' impacting positive behaviour on road safety. Therefore, in this study, it is worth to take an in-depth look at the complex of familial influences (i.e. the marital status) on young motorcyclist's helmet wearing behaviour. Such influences deserve dedicated attention, rather than being regarded simply as one of many factors that may influence young motorcyclist's helmet wearing behaviour. Findings from previous researches has indicated that married road users were more unlikely to engage in risky behaviour than single road users due to a phenomenon that can be explained by of theory known as 'social integration'. The social integration theory focuses on how social interactions with family, friends, community and society creates social support, which is associated with an individual's self-esteem, physical wellbeing and sense of commitment to society (Durkheim, 1951). The literature on social integration has demonstrated that a lacking of social integration can lead to deviant and risky behaviour such as suicide (Park and Lester, 2006; Agerbo *et al.*, 2011; Poudel-Tandukar *et al.*, 2011) and increase the mortality rate (Umberson, 1987; Berkman *et al.*, 2004). In contrast, marriage indicates maturity and responsibility, and it is usually attributed to the positive effects of societal integration. According to Kposowa (2000), marriage can help to prevent suicide by providing social support and emotional stability to an individual. Riding on a motorcycle without wearing a helmet is considered to be a risky behaviour, which is very similar to suicide.

2.1 The Questionnaire Design

We designed a questionnaire to obtain information about the factors that likely to influence the helmet wearing behaviour among the young motorcyclists. The questionnaires were reviewed before administration. The random sampling method was chosen for this study. The questionnaire survey was piloted from January to March 2012 where a total of 120 respondents' staying in Klang Valley age between 16-25 years old was interviewed face-to-face. The questionnaire survey consisted of six parts and were as shown in Appendix 1:

2.1.1 Part A: Screening

Part A is an introductory section to screen the respondent profile accordingly. Only motorcyclists between 16-25 years old that ride motorcycle were recruited for the survey.

2.1.2 Part B: Motorcycle and License Detail

Part B further gathered information of the respondents regarding the type of motorcycle they ride, motorcycle riding experience and license information.

2.1.3 Part C: Motorcyclist Road Crash Experience

Part C inquires the respondents on their past experience in a road crash while riding motorcycles.

2.1.4 Part D: Motorcyclists Helmet Wearing Behaviour

Part D surveyed the respondents' helmet wearing behaviour and the reasons of wearing or not wearing a helmet.

2.1.5 Part E: Contingent Valuation Study

Part E seeks particular response of a WTP elicitation question. The respondents were informed that annually 5 in 10,000 motorcyclists were killed in road crash in Malaysia. They were asked to pay a certain amount of money to buy a new helmet for their protection. The question was framed as, "Imagine that you are going to purchase a new helmet. This helmet can reduce your risk of death in a road crash by 50%. How much money would you willing to pay for this helmet to reduce your risk by 50%?"

2.1.6 Part F: Demographic Factors

Part F compiles social demographic factors of respondents. Respondent was asked about their age, gender, highest education level, personal income, marital status and location of living.

2.2 Estimation of the Value of Statistical Life

The estimation of VSL was computed using the following formula:

$$VSL = \frac{WTP}{\Delta Risk} \quad (1)$$

where WTP = willingness to pay
 ΔRisk = 50% reduction of 5 per 10,000 motorcyclist population

2.3 Estimation of Helmet Wearing Behaviour

The multinomial logistic regression (MLR) analysis was performed to predict the helmet wearing behaviour amongst young motorcyclists. The function used to predict the helmet wearing behaviour was proposed in accordance with Greene (2000).

$$P(y_i = j) = \frac{\exp(\beta'_j x_k)}{\sum_{j=1}^k \exp(\beta'_j x_k)} \text{ for } j = 1, 2, 3, \dots \quad (2)$$

Where I represent the classification of *pith* helmet wearing frequency, which takes the value of 1 for 'always' wearing helmet, 2 for 'sometimes' wearing helmet and 3 for 'never' wearing helmet . x_k is a factor of explanatory variables and β'_j is a factor of unknown parameter for the helmet wearing frequency j . Eq. (2), therefore, gives the probability that helmet wearing frequency is j , given the array of explanatory variables representing the VSL and socio-demographic characteristic.

The estimation of the multinomial logistic model is straightforward using the maximum likelihood estimator. In this study, the multinomial logistic regression module of the SPSS was chosen since the helmet wearing behaviour had more than two categories, always wearing a helmet, sometimes wearing helmet and never wearing helmet while riding motorcycle. The maximum likelihood ratio test was used to evaluate the fitness of the overall model. This statistic tests if the difference between the model prediction and the observed values is minimized enough for the model to fit. The significance of the regression coefficient of each predictor variable for each dependent variable was evaluated using the likelihood statistic.

3. RESULTS

After the screening exercise, a total of 104 responses was used in the data analysis. 16 responses were excluded from the data analysis based on the exclusion criteria and missing values. A summary of respondents' demographic characteristic is presented in Table 1.

Regarding the helmet wearing behaviour, 44.2% of the respondents declared that they always wear helmet, 32.7% said that they sometimes wear helmet. The rest admitted they never wear a helmet while riding a motorcycle. The respondents were also surveyed on the reasons for wearing or not wearing the helmet. 40% of the respondents said that they wear a helmet to comply with the law, 34% declared that wearing a helmet could prevent head injury. The rest of the respondents said that wearing a helmet could reduce fatality (15%) and increase the chances of survival (11%).

The mean age of respondents was 19.53 years old with a standard deviation of 3.271 years old. Amongst the 104 respondents, 65.4% were male and the others were female. 73.1% of the respondent declared that they live in the city and 59.6% of them have achieved lower education. 54.8% of them said that their income is below RM 500 and 89.4% of them are single. 23.1% of the respondents have experience riding motorcycles for less than 3 years, while 40.4% of them had a riding experience of 3-5 years; the rest has more than 5 years' experience of riding a motorcycle.

The mean VSL amongst the samples was RM 869,620 but the standard deviation was RM 1,825,100. The greatest variation is probably due to the extreme values (minimum = RM 8,000 and maximum = RM 12,000,000). The mean VSL estimated is lower than the mean VSL estimated by Md. Nor and Mohd Yusoff (2003) for the bus passengers at RM 1,200,000.

Table 1: Descriptive statistics

Variable	Description	Model
Respondents	Total number of respondents	104
HWB	Helmet wearing behaviour	
	= 1 if always	44.2%
	= 2 if sometimes	32.7%
	= 3 if never	23.1%
Age	Age of respondent	
	Mean	19.53
	Standard deviation	3.271
Sex	Gender of respondent	
	= 1 if male	65.4%
	= 2 if female	34.6%
Loc	Location of living for respondent	
	= 1 if city	73.1%
	= 2 if village	26.9%
Exp	Motorcycle riding experience of respondent	
	= 1 if less than 3 years	23.1%
	= 2 if 3-5 years	40.4%
	= 3 if more than 5 years	36.5%
Edu	Highest education level of respondent	
	= 1 if lower education	59.6%
	= 2 if higher education	40.4%
Income	Personal income of respondent	
	= 1 if below RM 500	54.8%
	= 2 if RM 500 and above	45.2%
Marital	Marital status of respondent	
	= 1 if single	89.4%
	= 2 if married	10.6%
VSL*	Value of statistical life (VSL)	
	Mean	869620
	Standard deviation	1825100
	Minimum	8000
	Maximum	12000000
ln_VSL	Natural log of VSL	
	Mean	12.96
	Standard deviation	0.954

* Not used in MLR model

Table 2 shows the multinomial logistic regression predicting the odds of wearing helmet. All variables were entered as categorical variables except the ‘age’ and ‘ln_VSL’ variables. The VSL variable was transformed to natural log prior to the multinomial logistic regression to minimize the heteroskedasticity and allow easier interpretation of the relative elasticity value of the estimates.

Table 2: Multinomial logistic regression predicting the odds of helmet wearing among young motorcyclist

Variables	Always	Sometimes	Sometimes
	vs Never	vs Never	vs Always
Intercept	12.639	30.973**	18.334**
Exp1 × Age	-0.668*	-0.753**	-0.084
Exp2 × Age	-0.572*	-0.642**	-0.069
Exp3 × Age	-0.601*	-0.564*	0.037
Sex (ref = female)	3.446***	3.261**	-0.185
Edu (ref = higher education)	-0.876	0.111	0.988
Marital (ref = married)	-16.571***	-16.157	0.414
Loc (ref = village)	3.503**	2.183**	-1.32
Income (ref = RM 500 and above)	-4.744**	-5.529**	-0.785
ln_VSL	1.198*	-0.149	-1.347**

*, **, *** indicates statistically significant at 0.10, 0.05 and 0.01 significance level, respectively

3.1 Predicting ‘always wear a helmet’ versus ‘never wear a helmet’

As table 2 indicates, the sex variable has a positive effect on ‘always wearing a helmet’ in comparison to ‘never wearing helmet’. Thus, male young motorcyclists have a higher tendency to always wear helmet than female young motorcyclists while riding motorcycles. This may be attributed to the sample biases in this study whereby most of the motorcyclists interviewed were male. Furthermore, the location of living for the young motorcyclists also indicates that those who stay in the city were more likely to always wear helmet compared to those living in the village. The location of living is believed to be highly associated with exposure for enforcement; city area usually has higher enforcement level than a village. Thus, this may explain why young motorcyclists have been more likely always wearing a helmet in the city area.

The VSL variable is also positive and statistically significant, indicating that those with higher value of statistical life were more likely to always wear helmet than never wear a helmet. Conversely, the interaction between riding experience and age shows a negative effect on ‘always wearing a helmet’ in comparison to ‘never wearing helmet’, a finding which implies that within the same riding experience group, those who are elder were more likely to never wear helmet while riding motorcycles. This negative effect could also explain as within the same age group, when riding experience increases, the motorcyclists tend not to wear a helmet.

The marital status variable also has negative values, which indicates that single motorcyclists were more likely to never wear a helmet compared to married motorcyclists. With respect to a personal income variable, the value is negative and statistically significant. This shows that motorcyclists with lower income (below RM 500) were more likely to never wear seatbelt than those with higher income.

3.2 Predicting ‘sometimes wear a helmet’ versus ‘never wear a helmet’

With respect to ‘sometimes wearing helmet’ versus ‘never wearing helmet’, the interaction between the riding experience and age variables has a negative effect: among the young motorcyclist within the same riding experience, those elder motorcyclists were more likely never wearing helmet. Or in other words, amongst the motorcyclists within the same age, when riding experience increase, the motorcyclists were more unlikely to wear helmet.

Male young motorcyclists are more likely to engage in sometimes wear helmet than the female. In addition, those who stay in the village area are more likely to never wear a helmet. Young motorcyclists with higher personal income are more likely to wear helmet than those in the lower income group.

3.3 Predicting ‘sometimes wear a helmet’ versus ‘always wear a helmet’

The result of predicting ‘sometimes wear a helmet’ versus ‘always wear a helmet’ were also presented in Table 2. Only the VSL variable is statistically significant. The negative effect demonstrated that when VSL increases, young motorcyclists are more likely to always wear helmet.

4. DISCUSSIONS

Young motorcyclists between 16 to 25 years old account for a great proportion involving in accidents (Chen, 2009). This study revealed that 23.1% of the young motorcyclist never wear a helmet while riding a motorcycle. This is similar to a study conducted in the United States where 42% of the young motorcyclist between 16-25 years old also rarely or never wear a helmet while riding (Reeder *et al.*, 1996).

The MLR model indicated riding experience and age are highly associated to each other. For the young motorcyclists with the same category of riding experience, when their age increases, the tendency of wearing a helmet is lower or for those within the same age, when the riding experience increases, the tendency of wearing a helmet is lower. Previous study (Lajunen and Summala, 1995) indicated that the experience was significant predictors that influence the behaviour of drivers. Most of the studies indicated that when experience gained, the tendency towards risky behaviour will decrease. However, it was not true in this study.

The analysis also indicates that male young motorcyclists are more likely to wear helmet compared to the female young motorcyclists. This shows that male motorcyclists are more alert on the helmet wearing behaviour than female motorcyclists. This result is also inconsistent with the results implied by previous studies in which female is more likely to comply with the proper usage of safety helmets compared with male (Kulanthayan *et al.*, 2001). The possible explanation on the results might be young female motorcyclists are possibly lack of riding experience and obtained least travelled distance compare to male rider as also indicated by a research conducted by Chang and Yeh (2007).

The evidence presented in this study suggested that married young motorcyclists are more likely to wear helmet while riding motorcycles compared to those singles. This finding

supports our hypothesis. Married young motorcyclists are believed to have greater social integration and social control (Ng *et al.*, 2013) that prevent them from risky riding behaviour such as not wearing a helmet. This also explains that family plays a significant role in preventing young motorcyclists' from risky riding behaviour

The analyses also revealed that motorcyclists who live in city area are more likely to wear helmet when they are riding motorcycles. This may be associated with higher law enforcement in the city area compared to the village. Besides, there are more strategic campaign media, such as television, newspaper and outdoor billboards in the city area. In addition, the motorcyclists' who ride in village area has a perception of lower enforcement. This result is consistent with a study conducted by Radin Umar *et al.* (2005) and Kulanthayan *et al.*, (2001) on helmet wearing in rural areas by younger riders.

Individual that earns more than RM 500 are more likely to wear their helmet while riding motorcycle. Typically, higher incomes place a higher value on safety and possess the means to enhance it (Houston and Richardson, 2008). It is shown that they have the awareness to reduce the chance of fatality compare to an individual with lower personal income.

We hypothesized that young motorcyclist with higher VSL are more likely to wear helmet. In this case, our results support the hypothesis. Higher VSL indicates that young motorcyclists' valley road safety more, therefore, the tendency to wear a helmet is also higher. This finding suggests that it is important to increase the awareness of road safety amongst young motorcyclists. This could be conducted through extensive road safety education and road safety campaigns.

5. CONCLUSIONS

Although this research has contributed to an understanding of helmet wearing behaviour among the young motorcyclist in Klang Valley, the results from this research raise a number of issues that could form the basis of further research. The pilot study should be carried out in a wider area to estimate the actual young motorcyclist behaviour instead of Klang Valley only. There are several ways to increase the helmet wearing among young motorcyclists. Relevant authority could take an effective countermeasure to ensure higher law enforcement at the village. Young motorcyclist also should be exposed to more road safety campaign to raise their awareness.

REFERENCES

- Agerbo, E., Stack, S., Petersen, L., (2011). Social integration and suicide: Denmark, 1996-2006. *The Social Science Journal*, 48, 630-640.
- Berkman, L.F., Melchior, M., Chastang, J., Niedhammer, I., Leclerc, A., Goldberg, M., (2004). Social integration and mortality: a prospective study of French employees of electricity of France-gas of France. *American Journal of Epidemiology*, 159(2), 167-173.
- Chang, H.L., Yeh, T.H., (2007). Motorcyclist accident involvement by age, gender and risky behaviors in Taipei, Taiwan. *Transportation Research Part F: Traffic Psychology and Behaviour*, 10(2), 109-122.

- Chen, C.F., (2009). Personality, safety attitudes and risky driving behaviours - evidence from young Taiwanese motorcyclists. *Accident Analysis and Prevention*, 41(5), 963-968.
- Chiu, W.T., Kuo, C.Y., Hung, C.C. and Chen, M., (2000). The Effect of the Taiwan Motorcycle Helmet Use Law on Head Injuries. *American Journal of Public Health*, 90, 793-796.
- Abdul Sukor, N.S., Fujii, S., (2011). Factors affecting motorcyclists' speeding behaviour in different types of motorcycle lanes: a study from psychological perspectives. *Proceedings of the Eastern Asia Society for Transportation Studies*, Vol. 8.
- De Blaeij, A., Florax, R.J., Rietveld, P., Verhoef, E., (2003). The value of statistical life in road safety: a meta analysis. *Accident Analysis and Prevention*, 35(6), 973-986.
- DeMarco, A.L., Chimich, D.D., Gardiner, J.C., Nightingale, R.W. and Siegmund, G.P., (2010). The Impact Response of Motorcycle Helmets at Different Impact Severities. *Accident Analysis and Prevention*, Vol. 42, 1778-1784.
- Durkheim, E., (1951). Suicide – a study in sociology. *The Free Press*, Glencoe, Illinois.
- Gabella, B., Reiner, K.L., Hiffman, R.E., Cook, M. and Stallones, L., (1995). Relationship of Helmet Use and Head Injuries among Motorcycle Crash Victims in El Paso County, Colorado, 1998-1990. *Accident Analysis and Prevention*, 27(3), 363-369.
- Hill, P.S., Ngo, A.D., Khuong, T.A., Dao, H.L., Hoang, H.T.M., Trinh, H.T., Nguyen, L.T.N. and Nguyen, P.H., (2009). Mandatory Helmet Legislation and the Print Media in Vietnam. *Accident Analysis and Prevention*, Vol. 41, 789-797.
- Houston, D.J., Richardson, L.E., (2008). Motorcyclist fatality rates and mandatory helmet-use laws. *Accident Analysis and Prevention*, 40, 200-208.
- Huang, Y., Zhang, W., Murphy, L., Shi, G., Lin, Y., (2011). Attitudes and behaviour of Chinese drivers regarding seatbelt use. *Accident Analysis and Prevention*, 43, 889-897.
- Kposowa, A.J., (2000). Marital status and suicide in the national longitudinal mortality studies. *Journal Epidemiol Community*, 54, 254-261.
- Lajunen, T., Summala, H., (1995). Driving experience, personality, and skill and safety-motive dimensions in drivers' self-assessments. *Personality and Individual Differences* 19, 307-318.
- Law, T.H., Radin Umar, R.S., Zulkarnain, S., Kulanthayan, S., (2004). Impact of the effect of economic crisis and the targeted motorcycle safety programme on motorcycle-related accidents, injured and fatalities in Malaysia. *International Journal of Injury Control and Safety Promotion*, 12(1), 9-21.
- Li, L.P., Li, G.L., Cai, Q.E., Zhang, A.L. and Lo, S.K., (2008). Improper Motorcycle Helmet Use in Provincial Areas of a Developing Country. *Accident Analysis and Prevention*, Vol. 40, 1937-1942.
- Liu, B., Ivers, R. Norton, R., Blows, S., Lo, S.K., (2004). Helmets for preventing injury in motorcycle riders. *Cochrane Database Systematic Review*, 2, CD004333.
- Khoo, S. (2010). 17 deaths recorded every day from 397,330 accidents in 2009. *The Star*, 28th July 2010.
<http://thestar.com.my/metro/story.asp?sec=southneast&file=/2010/7/28/southneast/6734694>, accessed on 20th December 2012.
- Kulanthayan, S., Radin Umar, R.S., Ahmad Hariza, H., Mohd Nasir, M.T., (2001). Modelling of compliance behaviour of motorcyclists to proper usage of safety helmets in Malaysia. *Journal of Crash Prevention and Injury Control*, 2(3), 239-246.
- Kulanthayan, S., See, L.G., Kaviyarasu, Y., Nor Afiah, M.Z., (2012). Prevalence and determinants of non-standard motorcycle safety helmets amongst food delivery

- workers in Selangor and Kuala Lumpur. *Injury, International Journal of Care Injured*, 43, 653-659.
- Malaysian Institute of Road Safety Research (MIROS), (2011). Motorcycle. ADSA Fact Sheet, Vol. 1.
- Mannering, F.L., Lawrence, L.G., (1994). Statistical analysis of motorcyclists perceived accident risk. *Accident Analysis and Prevention*, 27(1), 21-31.
- Mayrose, J., (2008). The Effects of a Mandatory Motorcycle Helmet Law on Helmet Use and Injury Patterns among Motorcyclist Fatalities. *Journal of Safety Research*, Vol. 39, 429-432.
- Md. Nor, N.G., Mohd Yusoff, M.F., (2003). Value of life of Malaysian motorists: estimated from a nationwide survey. *Journal of the Eastern Asia Society for Transportation Studies*, 5, 3031-3037.
- Mills, N.J., Wilkes, S., Derler, S. and Flish, A., (2009). FEA of Oblique Impact Tests on a Motorcycle Helmet. *International Journal of Impact Engineering*, Vol. 36, 913-925.
- Ministry of Transport (MOT), (2012). Total Motor Vehicles by Type and State, Malaysia, until 31st December 2012.
[http://www.mot.gov.my/my/Statistics/Land/SUKU%20IV%202012/Sektor%20DARAT%202012\(Q4\)%201.2.pdf](http://www.mot.gov.my/my/Statistics/Land/SUKU%20IV%202012/Sektor%20DARAT%202012(Q4)%201.2.pdf), accessed on 3rd March 2013.
- Mohamed, N., Yusof, M.F.M., Isah, N., Othman, I., Rahim, S.S., Paiman, N., (2011). Analysis of factors associated with seatbelt-wearing among rear-seat passengers in Malaysia. *International Journal of Injury Control and safety Promotion*, 18(1), 3-10.
- Ng, C.P., Law, T.H., Wong, S.V., Kulanthayan, S., (2013). Factors related to seatbelt-wearing among rear-seat passengers in Malaysia. *Accident Analysis and Prevention*, 50, 351-160.
- Park, B.C.B., Lester, D. (2006). Short report: social integration and suicide in South Korea. *Crisis*, 27(1), 48-50.
- Poudel-Tandukar, K., Nanri, A., Mizoue, T., Matshushita, Y., Takahashi, Y., Noda, M., Inoue, M., Tsugane, S., (2011). Social support and suicide in Japanese man and women – The Japan Public Health Centre (JPHC)-based prospective study. *Journal of Psychiatric Research*, 45, 1545-1550.
- Radin Umar, R.S., Kulanthayan, S., Law, T.H., Ahmad, H., Musa, A.H., Mohd, N.M.T., (2005). Helmet initiative programs in Malaysia. *Pertanika Journal of Science and Technology*, 13(1), 29-40.
- Reeder, A.I., Chalmers, D.J., Langley, J.D., (1996). The risky and protective motorcycling opinions and behaviours of young on-road motorcyclists in New Zealand. *Social Science Medicine*, 42(9), 1297-1311.
- Royal Malaysia Police (RMP), (2009). Statistik Kemalangan Jalan Raya (In Malay). <http://www.rmp.gov.my/base.cfm?path=statistics/statistics.cfm>, accessed on 20th December 2010.
- Shahar, F.M., Suganya, L. (2013). Reckless youth headed for danger. *New Straits Times*, 29th January 2013. <http://www.nst.com.my/streets/central/reckless-youth-headed-for-danger-1.209242>, accessed on 9th July 2013.
- Trowbridge, M.J., Kent, R., (2009). Rear-seat motor vehicle travel in the U.S. *American Journal of Preventive Medicine*, 37 (4), 321–323.
- Umberson, D., (1987). Family status and health behaviors: social control as a dimension of social integration. *Journal of Health and Social Behavior*, 28, 306-319.
- World Health Organization, 2009. Global status report on road safety – time for action. Geneva. http://www.who.int/violence_injury_prevention/roadsafety/status/2009 (accessed on 01.11.11).

Appendix 1: Questionnaire Survey (Page 1 of 2)



Department of Civil Engineering
Faculty of Engineering
Universiti Pertahanan Nasional Malaysia
Questionnaire Survey On The Willingness To Pay For The Risk Reduction Amongst
Young Motorcyclist

A. Screening

1. Do you ride a motorcycle?

- | | |
|---|-----|
| 1 | Yes |
| 2 | No |

2. How often do you ride a motorcycle?

- | | |
|---|-----------|
| 1 | Always |
| 2 | Sometimes |
| 3 | Seldom |

3. How old are you?

years old

B. Motorcycle and License Detail

4. What type of B license do you have?

- | | |
|---|----|
| 1 | B |
| 2 | B1 |
| 3 | B2 |

5. How many years you have obtained your B license?

years

6. How many years you have ridden your motorcycle?

years

7. Do you own a motorcycle?

- | | |
|---|-----|
| 1 | Yes |
| 2 | No |

8. What is your motorcycle engine capacity?

- | | |
|---|--------------|
| 1 | Below 250 CC |
| 2 | 251-500 CC |

C. Motorcycle Road Crash Experience

9. Have you ever involve in a motorcycle accident?

- | | |
|---|-----|
| 1 | Yes |
| 2 | No |

10. How many times you involve in a motorcycle accident?

Time(s)

11. How bad is the most serious motorcycle accident that you involve?

- | | |
|---|----------------|
| 1 | Damage only |
| 2 | Slight injury |
| 3 | Serious injury |
| 4 | Fatal |

D. Helmet Wearing Behaviour

12. Do you wear a helmet when you ride a motorcycle?

- | | |
|---|-----|
| 1 | Yes |
| 2 | No |

Appendix 1: Questionnaire Survey (Page 2 of 2)



**Department of Civil Engineering
Faculty of Engineering
Universiti Pertahanan Nasional Malaysia
Questionnaire Survey On The Willingness To Pay For The Risk Reduction Amongst
Young Motorcyclist**

- | | |
|---|-----------|
| 1 | Always |
| 2 | Sometimes |
| 3 | Seldom |
| 4 | Never |

14. Why do you/ do you not wear a helmet?

E. Contingent Valuation Study

15. Do you agree that helmet with better quality will give better protection to you?

- | | |
|---|-----|
| 1 | Yes |
| 2 | No |

16. How much is your current helmet price?

17. In Malaysia, 5 in 10,000 motorcyclists died every year in motorcycle related accidents. Imagine that you are going to purchase a new helmet. This helmet can reduce your risk of death in a road crash by 50%. How much money would you willing to pay for this helmet to reduce your risk by 50%?"

F. Demographic Factors

18. What is your gender?

- | | |
|---|--------|
| 1 | Male |
| 2 | Female |

19. Where do you live?

- | | |
|---|---------|
| 1 | City |
| 2 | Village |

20. What is your occupation?

21. How much is your personal income?

- | | |
|---|----------------|
| 1 | Below RM 500 |
| 2 | RM 501 – 1000 |
| 3 | RM 1001 – 3000 |
| 4 | Above RM 3000 |

22. What is the highest education level that you attained?

- | | |
|---|------------------|
| 1 | No schooling |
| 2 | Primary school |
| 3 | Secondary school |
| 4 | Tertiary school |

23. What is your marital status?

- | | |
|---|---------|
| 1 | Single |
| 2 | Married |

24. Do you have any child?

- | | |
|---|-----|
| 1 | Yes |
| 2 | No |

~ END OF QUESTIONNAIRE ~