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Demographic Profiles and Risk Perception of Motorcycle Riders Commuting to Work in Pulau Pinang, Malaysia

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Abstract

This research aims to determine the demographic characteristics of motorcycle riders who use their motorcycles to commute to work. The survey was disseminated to 776 individuals employees who were trained at Boon Siew Honda Safety Riding Centre in Batu Kawan, in the Penang State of Malaysia, and collected from 2016 to 2023. The survey indicates a higher proportion of male employees who commute to work using motorcycles than females. Employees aged 25 to 34 preferred to commute using their motorcycles. The majority of personnel have over 20 years of riding experience. The riders commute for at least 1 to 2 hours each day for work. The demographic profile of employees is first to be examined. This analysis will provide valuable information about the demographic profiles of company employees, which can be used to improve transport planning in the future.

1. Introduction

Worldwide, vehicle accidents have resulted in nearly 1.35 million fatalities and are the primary cause of death for individuals aged 5 to 29 years (World Health Organization, 2023). The issue is a distressing public health concern that results in the loss of many valuable lives (Nanjunda, 2021). At the national level, the economic burden of road traffic injuries amounts to around 3% of the country's gross domestic product (GDP). Low- and middle-income nations, like Malaysia, face an even more dire predicament (Antić et al., 2020). According to Ling (2017), road accidents are a significant cause of death among Malaysian youth between the ages of 15 and 40. These accidents also resulted in a financial burden of about RM 9.2 billion for the country in 2016. Despite the implementation of multiple efforts and programs by various authorities, road safety for Malaysian motorcyclists has not improved, as seen by the persistently high incidence of traffic accidents and fatalities.

According to the Royal Malaysia Police (2023), motorcyclists accounted for 70% of road crash fatalities in Malaysia. Motorcycles have consistently been Malaysia's predominant and dependable means of transportation, particularly for commuting to work. By 2022, the total number of registered motorcycles is projected to reach 16.2 million, reflecting a 4.7% rise from the previous year. These motorcycles make up nearly half of all registered vehicles in Malaysia (Ministry of Transport, 2021). Nevertheless, motorcycling is considered the most dangerous kind of transportation because motorcyclists experience the highest fatality rate on the roadways (RMP, 2023). Motorcyclists are more exposed to death and are 37 times more likely to die with eight times more prone to injury in comparison to four-wheeler passenger occupants (Tan Chor Lip et al., 2019; Talving, et al., 2010).

According to Bui et al. (2020), Vietnam has revealed that 90% of motorbike road crash fatalities are attributed to dangerous riding behaviors, including speeding and reckless overtaking, which account for 60% of

these fatalities. According to Susilo et al. (2015), motorcycles were involved in 72% of road accidents in Indonesia, and many of these accidents resulted in fatalities. Specifically, risk riding behaviour has been observed to cause traffic crashes in Jakarta (Maulina et al., 2018) This is also reported among Malaysian motorcycle riders specifically for younger riders (Abdullah et al., 2018; Tan Chor Lip et al., 2021). The prevalence of motorcycle-related fatalities is not exclusive to underdeveloped nations (Yu et al., 2023). A similar pattern is observed in the fatality rate of motorcyclists in industrialized countries like Australia, the United States, and the United Kingdom. This is because motorcyclists are willing to engage in risky behavior by disregarding traffic regulations, such as exceeding the speed limit (Borhan et al., 2018; Haworth et al., 2009), lane splitting (Maulina et al., 2018) and driver or rider anger (Abdullah et al., 2018) that causes traffic collisions.

Motorcycle riders in Penang state, Malaysia, face a significant risk of commuting accidents since the number of incidents in Penang state are high (RMP, 2023). Demographic factors such as age, gender, education, distance travelled and location of stay have been studied in relation to risk riding behaviour or risk perception towards danger (Borhan et al., 2018; Chor Lip, et al., 2021). Specifically, long distance riding promotes risky riding behavior such as speeding (Yousif et al., 2020; Chumpawadee et al., 2015), red light running (Rusli et al., 2020); disregard for traffic signs (Susilo et al., 2015), and aggressive riding behavior as a result of fatigue (Yousif et al., 2020). A study conducted in Malaysia showed that employees' risk-riding behavior is affected by their quality of work life, and high pressure at work will increase the tendency to risk riding without helmets (Jaafa et al., 2020).

A study by Fitroh et al. (2015) in Bandung, Indonesia had found that young male riders tended to be more inclined towards lapses by forgetting which gear to use. In the same study, young female riders were found to have a higher tendency towards "ordinary" violations by speeding. However, Ang et al. (2019) have highlighted that older Malaysian male riders have a higher tendency towards lapses, specifically nearly hitting others at turnings. Age variation among male riders can also contribute to the different risky riding behaviors. But, most of the local studies did not investigate the relationship between motorcycle riders demographic variables and the reliable and significant measurement of risk riding behaviour. Most using a self-constructed measurement (Borhann et al., 2018; Razelan et al., 2021). Therefore, this research aims to determine the demographic characteristics such as marital status, riding hours per day, license tenure, risk perception, riding experience and start riding age of riders to assist in implementing a safety campaign at both the state and national levels and to improve awareness about road safety among riders.

2. Method

The survey was conducted among motorcycle riders who attended safety riding training at Boon Siew Honda Safety Riding Centre in Batu Kawan, Penang, Malaysia. These riders commute to work daily to Batu Kawan Industrial Park. This survey was conducted to learn of their demographic profile. This type of study is the first to be performed in Penang state, Malaysia. For this research, a survey of 776 motorcycle riders was collected over the period of 2016 to 2023. All the motorcycle riders attended the safety riding trainings at Boon Siew Honda Safety Riding Centre. Majority of the riders have had an accident before (66.0%). Since most of the riders have had an accident before we can make an assumption that the riders are at risk of commuting accident. The survey form is distributed to each rider during the safety riding training and information about their demographic profile and their experience as a rider is collected. The demographic profile of the riders is collected to know their riding hours per day, riding experience, risk perception (judgment of assessment of hazards), start riding age and license tenure in order to implement measures to improve the rider's road safety. The survey data was entered into and analysed using SPSS software.

3. Results

The survey is studied using the frequency distribution analysis. In this analysis, the frequency and percentage of the demographic profile of the respondents are known. Out of 776 total respondents, there were 709 males and 56 females. The number of respondents aged 20 years and below is 9.8%, 21 to 24 years are 14.6%, 25 to 29 years were 20.2%, 30 to 34 years around 24.9%, 35 to 39 years are 15.5%, 40 to 44 years were 7.3% also 45 and above around 7.7%.The number of employees who traveled a distance (2-ways) of 10km and below was 6.6%, whereas between 11km and 100 km was 87.3%. Around 36.0% and 64.3% of the respondents are married and single. Around 0.3% of the respondents are widowed or divorced. The respondents who started riding before the age of 16 are 44.7% whereas 55.3% of the respondents started riding after the age of 16. About 0.5% have riding experience of less than one year, and 6.4% have riding experience from 2 to 5 years. The remaining respondents (93.1%) have more than six years of riding experience. About 4.3% have a license tenure of less than one year, whereas 28.1% have a license tenure of 2 to 10 years. And the remaining (49.5%) have license tenure 11 to 20. Around 18.1% of them had more than 20 years of experience.

Around 66.0% of the employees were involved in an accident. And 34.0% were not involved in an accident. The number of employees who traveled around 1 to 2 hours daily was 39.6%. There were 24.2% who traveled for less than one hour and 21.7% who traveled for 2 to 3 hours. Some respondents traveled more than 5 hours

per day, which was around 4.8%. Around 49.5% of the employees had a below 50% risk perception, and 50.5% had an above 50% risk perception.

Table 1 *Demographic profile of respondents*

Item	Frequency (n)	Percentage (%)
Gender		
Male	709	92.7
Female	56	7.3
Age (years old)		
20 and below	75	9.8
21 to 24	111	14.6
25 to 29	154	20.2
30 to 34	190	24.9
35 to 39	118	15.5
40 to 44	55	7.3
45 and above	59	7.7
Distance Travel (2-ways)		
10 km and below	42	6.6
11 km to 30 km	152	23.8
31 km to 60 km	259	40.5
61 km to 100 km	147	23.0
101 km and above	40	6.1
Marital Status		
Single	202	64.3
Married	110	36.0
Widowed	1	0.3
Divorced	1	0.3
Start Riding age (years old)		
Below 16	292	44.7
16 and above	361	55.3
Riding Experience (years)		
1 and below	3	0.5
2 to 5	42	6.4
6 to 10	120	18.3
11 to 15	162	24.7
16 to 20	164	25.0
Above 20	165	25.1
License Tenure (years)		
1 and below	28	4.3
2 to 5	79	12.1

6 to 10	104	16.0
11 to 15	156	23.9
16 to 20	167	25.6
Above 20	118	18.1
Accident Involvement		
Yes	487	66.0
No	251	34.0
Riding Hours (per day)		
1 hour and below	146	24.2
1 to 2 hours	239	39.6
2 to 3 hours	131	21.7
3 to 4 hours	28	4.6
4 to 5 hours	31	5.1
above 5 hours	29	4.8
Risk Perception		
50% and below	311	49.5
Above 50%	317	50.5

Table 2 *Means and correlation matrix*

		Mean	SD[a]	1	2	3	4	5	6	7	8
1	Gender	1.07	.261	_	-017	-.087*	.051	-.132**	-.128**	-.043	.028
2	Age	3.74	1.658		_	-.017	.291**	.831**	.870**	-.159**	.048
3	Distance Travelled (2-ways)	2.99	.990			_	-.073	.048	.008	.075	-.003
4	Illegal Riding Age(years)	1.55	.498				_	.049	.292**	-.124**	.054
5	Riding Experience (years)	4.43	1.247					_	.824**	-.113**	.050
6	License Tenure (years)	4.09	1.416						_	-.142**	.081*
7	Riding Hours (per day)	2.41	1.306							_	-.004
8	Perceived Probability Accident	1.50	.500								_

*p<.05; **p<.01.

4. Discussion

The survey results provide an overview of the demographics and riding habits of the respondents, offering insights into the characteristics of the sample population.

4.1 Gender Distribution

The sample primarily comprises males, with 92.7% (709 out of 776) of the respondents being men and only 7.3% being women. The notable disparity in gender distribution implies that there exists a gender imbalance when it comes to preference for riding a motorcycle. This is in line with the findings of Zamzahuri (2019).

4.2 Age Distribution

The respondents' age distribution exhibits a wide range, with the majority falling within the 25 to 34 age brackets. More precisely, 24.5% of the participants fall within the age range of 30-34, while 19.8% are between 25 and 29. This suggests a significant presence of young adults likely to be more actively involved in riding

activities. Additionally, the respondents in the 21-24 age group and the 35-39 age group constitute substantial proportions, accounting for 14.3% and 15.2% of the total, respectively. The sample includes a smaller proportion of individuals aged 40 years and above, suggesting that riding activities may be less common among the mentioned age categories. This finding has a negative association with the conclusions of riders in developed countries where older people are active riders of higher cc motorbikes (Fitzpatrick & Neill, 2017) whereas lower cc motorbikes are used in Malaysia.

4.3 Distance Travelled

The survey indicates that a considerable proportion of participants undertake extensive journeys. Significantly, a majority of 71.9% of riders travel distances ranging from 11km to 100km, indicating that many individuals use their motorcycles for purposes beyond mere short commutes. Merely 9.7% of the respondents engage in travel distances of 10km or less, indicating a possible inclination towards long-distance travel due to work. This finding positively correlates with Shah's (2024) findings.

4.4 Marital Status

The respondents' marital status indicates that most were single (26%), and 14.2% were married. 1% were divorced or widowed. There should be a family institution where couples should be trained about safety while riding a motorcycle. Each couple can contribute by motivating their partner to follow the safety instructions and wear safety equipment while riding.

4.5 Start Riding Age

The start riding age of employees above 16 years is 46.5%, and below 16 years is 37.6%. Yuen et al. (2014) found that the second highest number of accidents among motorcycle riders happens between 0-20 years, with most occurring between 21-40 years of age. Kori (2024) found that transport consultants argued that the minimum riding age for motorcycle riders must be raised to 21 years, accounting for the increase in road accidents with motorcycle fatality alone around 60 percent to 75 percent.

4.6 Riding Experience

Researchers have at their disposal a range of chi-square or Pearson's chi-square tests to assess their hypotheses, examining whether the observed frequencies align significantly with the predicted ones (Singhal and Rana, 2015). Table 2 represents the chi-square test between age and riding experience. It can be observed that there is a significant difference between them (x^2= 892.192, df = 30, p =.000). Hence, there is a dependency of age on rider's riding experience. As the age of the rider increases the riding experience increases. This is in line with the report on accident risk of motorcyclists by Sexton et al. (2004).

Table 2 *Chi-square test between age and riding experience*

Age	Riding Experience					
	1 and below	2-5	6-10	11-15	16-20	Above 20
20 and below	1	25	23	3	0	0
21-24	1	10	52	16	1	0
25-29	1	5	34	79	8	1
30-34	0	2	7	59	87	21
35-39	0	0	4	5	61	45
40-45	0	0	0	0	5	42
45 and above	0	0	0	0	2	54
X^2 =	892.192[a]					
N of Valid Cases =	654					

a 10 cells (23.8%) have expected count less than 5. The minimum expected count is .22

4.7 License Tenure and Accident Involvement

Table 3 shows the chi-square test between license tenure and early riding age. The chi-square test has shown the significant difference between the two variables (x^2 = 58.958 , df =5, p= .000). Hence, we can conclude that license tenure is dependent on accident involvement. As the license tenure increases there is a most probability of rider's involvement in accident. This has a positive association with the past finding by Bui et al. (2020).

Table 3 *Chi-square test between license tenure and early riding age*

Early Riding Age		License Tenure					
		1 and below	2-5	6-10	11-15	16-20	Above 20
Below 16		1	25	23	3	0	0
Above 16		1	10	52	16	1	0
X^2	=	58.958[a]					
N of Valid Cases	=	633					

a 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.99

4.8 Riding Hours per Day

The daily riding time varies, with 30% of responders biking for 1-2 hours daily. Notably, 29% of riders engage in rides lasting over 2 hours, suggesting a dedicated group of riders who probably depend on their motorcycle for substantial daily transportation. Conversely, 18.8% of participants say they ride for less than one hour, suggesting that very few respondents have to travel short distances for work. This research finding positively correlates with Shah's (2024) findings. Long riding hours posed a higher risk, and our data shows it leads many of these riders to report having had accidents.

4.9 Risk Perception

Risk perception is a cognitive factor that has consistently been linked to a rider's logical choice to participate in unsafe riding behavior (Falco et al., 2013). Considering our data, a greater number of respondents showed involvement in accidents. Studies (Gigerenzer 2004; Ivers et al. 2009; McCool et al. 2009) have shown that people who perceive danger as riskier are more likely to take measures to prevent accidents. These people are the ones who had accidents in the past. Table 4 shows the chi-square test between accident involvement and risk perception showed no significant influence (x^2 =.320, df= 1, p=.571). Hence, there is no important relationship between accident involvement and risk perception. This finding has a negative association with the research by Ngueutsa and Kouabenan (2017) where the people involved in accident has a lower risk perception.

Table 4 *Chi-square test between accident involvement and risk perception*

Accident Involvement		Perception Towards Danger	
		Below 50%	Above 50%
Yes		199	209
No		111	106
X^2	=	320[a]	
N of Valid Cases	=	625	

a 0 cells (0.0%) have expected count less than 5. The minimum expected count is 107.63

5. Conclusion

The data indicates that most of the studied population is male, with a notable presence of individuals in the age range of young to middle-aged adults. Most participants are riders who frequently cover significant distances to commute for work. These insights are essential for reducing the risk of motorcycle accidents in Penang, Malaysia. There should be a family institution for the training given to the couple to encourage the married couple to wear safety equipment while riding, motivated by their partners, which will help improve the safety

among riders. A more in-depth investigation might be conducted to get insight into the underlying motives for long-distance travel and the various elements contributing to the reduced involvement of women in riding activities.

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

Ambareen Khan- Conceptualization, Writing - Original draft preparation; Lilis Surienty- Data Curation, Writing- Review and Editing, Funding Acquisition; Kunitomo Asano- Data Curation, Investigation.

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