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GENDER DIFFERENCES IN TRAFFIC RISK BEHAVIOR AMONG MOTORCYCLISTS IN INDONESIAN CITY

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Several factors, such as humans, vehicles, roads, and the environment, can cause traffic accidents. However, studies have shown that the crucial problem in traffic accidents is the human factor, in particular motorcycle users, or motorcyclists. This study aimed to investigate the traffic risk behavior of motorcyclists' considering gender as a factor to reduce traffic accidents. The data was obtained through a self-administered questionnaire completed by 155 motorcyclists in Aceh Province, Indonesia, specifically in Banda Aceh City and the neighboring areas. The questionnaire included information about the characteristics of the respondents as well as their perceptions of traffic risks. The data collected were analyzed using Chi-Square test/Fisher's Exact Test, and Odds Ratio (OR). According to the findings, gender had no significant effect on motorcyclists' traffic risk behavior among the eight variables considered (overtaking, speeding, the use of cell phone, turning without signal alert, tailgating, the use of helmet, helmet strapping, and the use of protective cloth). Subsequently, it was observed that not using helmets while riding put men at greater risk than women. The odds ratio of 3.930 implies that men who frequently drive without helmets have a 3.930 times higher risk of traffic accidents than women. The study revealed that, although gender did not affect traffic risk behavior, men were more at risk than women in almost all categories except tailgating. As a result, male motorcyclists are required to be more responsible when driving, and local governments must play a key role in law enforcement to decrease traffic accidents.

Keywords: motorcyclists, traffic risk, gender, road safety

1 INTRODUCTION

Motorcycles, being the most prevalent mode of transportation in Indonesia, have been identified as the primary contributor to traffic-related fatalities [1]. The relatively high cost of cars and the limited public transport systems and facilities are possibly some of the reasons why motorcycles are overused [2]. A study conducted by [3] investigated the reasons underlying traffic violation attitudes and types of traffic violations committed on urban roads by young motorcyclists in Indonesia, taking three metropolitan cities into account, including Bandung, Surabaya, and Yogyakarta. The study observed that the substandard condition of road infrastructure, both in terms of design and maintenance, appeared to play a role in fostering a culture of non-compliance with traffic regulations among motorcyclists.

A study by [4] investigated the factors that influence fatal traffic accidents involving motorcycles in Bali. Traffic accident data over 6 years, from 2007 to 2012, was used and the logistic regression model was applied. It was found that four variables significantly affect accident fatality at a 95% confidence level, including accident location, collision type, violation type, and age. Another study by [5] explored the factors influencing traffic violation behaviors and the kinds of traffic violations committed by young motorcyclists on urban roads in Indonesia. The study showed that young motorcyclists compared to more experienced motorcyclists were affected by different aspect of influencing factors in violating traffic regulations. An investigation by [6] outlined several risk factors for road traffic accidents in Palu, Indonesia. These factors included scattered attention, lack of discipline, speeding beyond the limits, and driving without a valid license.

Based on the above literature, this study intends to address a significant gap in Indonesian road safety investigations, specifically focusing on the perspective of motorcyclists and emphasizing the role of gender in this context. In addition this study aimed to investigate motorcyclists' traffic risk behavior by considering gender differences. By integrating gender as a crucial factor, the aim is to enhance road safety measures, reduce traffic accidents and improve road safety.

2 METHODOLOGY

According to the National Police Criminal Information Center (PUSIKNAS, in Indonesian), Aceh Province showed as the eighth largest contributor to traffic accidents in Indonesia, in 2022 [7]. The selection of Banda Aceh City as the focal point of this study is driven by its status as the capital of Aceh Province, coupled with its substantial involvement in the province's elevated count of traffic accidents. According to data from The City of Banda Aceh in Figures year 2022 [8], the area of the city is only 0.1 percent of Aceh Province's total area, which is 61.36 Km^2 with a population of 255,029 people in 2021, and a population growth rate of 0.84. The GRDP per capita is the highest in the province, with non-food expenditure per capita exceeding 50%, indicating a higher level of social welfare than other cities in Aceh province. In terms of population, the sex ratio of Banda Aceh City exceeds 100 where there are more men than women. According to the National Traffic Police Corps of Indonesia, 2023 [9], based on the number of traffic accidents

which has occurred, Banda Aceh was ranked first with 59 incidents out of 315 accident cases that occurred during January 2022 in Aceh.

In this study, the target population was motorcycle riders residing in the city of Banda Aceh and the surrounding areas. Considering the population of Banda Aceh City in 2021, the sample of 155 motorcyclists was acquired using purposive sampling. Only motorcyclists aged over 17 years were selected. The instrument used was a self-administered questionnaire based on a few sources in the literature [10], [11], [12], [13]. In addition to demographic data, information on traffic risk behavior was taken into consideration, including overtaking, speeding, using a phone while riding, providing a turning signal light, tailgating, wearing a helmet, strapping a helmet, and wearing protective clothes.

The researchers approached motorcycle riders in nine Banda Aceh subdistricts using purposive sampling. The questionnaire should be filled out by those who are willing to participate. Motorcyclists were assured that their participation was entirely voluntary and would not result in any negative consequences. The confidentiality and anonymity of all shared information were emphasized, with a clear understanding that the data would solely serve academic purposes. Eligibility criteria required participants to be at least 17 years old, have a minimum residency of six months in the area, possess a motorcycle, and engage in frequent motorcycle riding. The participants were asked to rate the items pertaining to traffic risks on a 4-point Likert scale (1 = always, 2 = often, 3 = rarely, and 4 = never). The answers are reversed from Never to Always with regard to questions about wearing a helmet, strapping a helmet, and wearing protective clothes. To eliminate respondents' ambiguity, a 4-point Likert scale was employed [14], [15]. On average, respondents completed the questionnaire within approximately 30 minutes.

The statistical analysis employed in this study encompassed the utilization of the chi-square test as the primary method. If the conditions for the chi-square test are not met, Fisher's test was subsequently applied. The hypothesis revolves around exploring the potential relationship between gender and traffic risk behavior, which could contribute to a heightened likelihood of being involved in traffic accidents. To assess the extent of risk attributed to men and women, the Odds Ratio was selected as the analytical tool. The 4-point Likert scale will be divided into two groups, high-risk and low-risk. For instance, when examining responses to questions like the frequency of overtaking other vehicles when safe, responses categorized as "always" or "often" were classified as high-risk, whereas the converse, "rarely" or "never," were classified as low-risk. This classification methodology aimed to simplify the analysis and enhance clarity in interpreting the results.

3 RESULTS AND DISCUSSION

3.1 Characteristics of Respondent

The following are the descriptive statistics of the respondent characteristics from 155 motorcycle riders. The majority of respondents were men (71%), while women made up the remaining 29%. On average, respondents had completed high school (67.1%) and were older than 25 years or older. Approximately 67.1% of the respondents reported having monthly incomes of less than IDR 4 million (US$ 264). In terms of occupation, the majority were entrepreneurs (34.84%), followed by students (24.52%) and private employees (22.58%), respectively. The percentage of license holders was 62.58%. Notably, respondents had to be older than 17 years old to participate. Therefore, it was surprising to learn that 37.52% of motorcyclists had no driving license. Additional information showed that about 66.45% of motorcycle riders had never been in a serious accident.

3.2 Descriptive Statistics of Traffic Risk Behavior

Figure 1 – 8 shows the descriptive statistics of traffic risk behavior among motorcyclists by males and females. Each figure describes the percentage of males and females on eight traffic risk variables at the level of high risk and low risk distributed to 110 males respondent (71%) and 45 female respondents (29%). In Figure 1, it can be observed that both males and females exhibit a propensity for taking significant risks while overtaking other vehicles, with percentages of 75% and 66.67%, respectively. However, it is noteworthy that only a relatively small proportion of individuals from both genders engage in frequent overtaking (25.55% for males and 33.33% for females) even in situations deemed safe for such maneuvers. Figure 2 illustrates that in terms of speeding, men are more likely than women to take high risks (33.64% and 22.22%). However, on average, those hardly ever exceed 50 km/h, demonstrating that they adhere to urban traffic laws, in accordance with Law No. 22 of 2009 [16] and Minister of Transportation Government Regulation No. 79 of 2013 concerning Traffic Networks and Road Transportation in Indonesia [17], in which the maximum speed set on inner-city road is 50 km/hr.

Even though cell phone usage while riding is not very common, a slight gender difference exists, with women demonstrating a slightly higher rate than men (11.11% compared to 9.09%). A significant proportion of both male and female motorcyclists refrain from using their phones while driving, highlighting a growing awareness of the associated hazards, as shown in Figure 3. Considering the attitude of turning, men and women are about equally at high risk (17.27% and 15.56%) as shown in Figure 4. The percentage of those who consistently give the signal alert is substantially higher. This demonstrates how well the driver is aware of his or her surroundings when turning. Figure 5 depicts how males and female motorcycle riders behave when tailgating. Women are more likely than men to take high risks (22.22% versus 17.27%). In contrast to those who tailgated, more motorcyclists maintained a safe distance behind other vehicles.

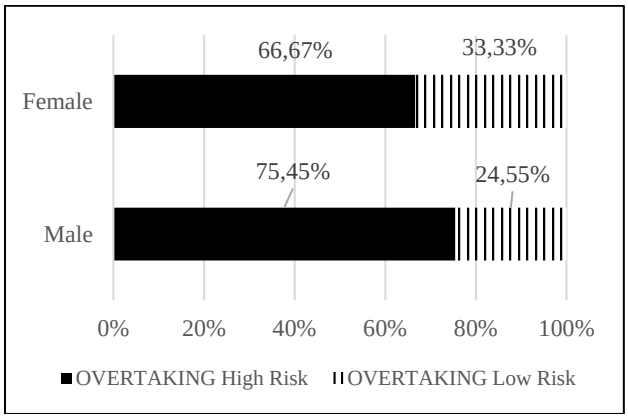

Figure 1. Percentage of Traffic Risk Behavior in Overtaking by Gender

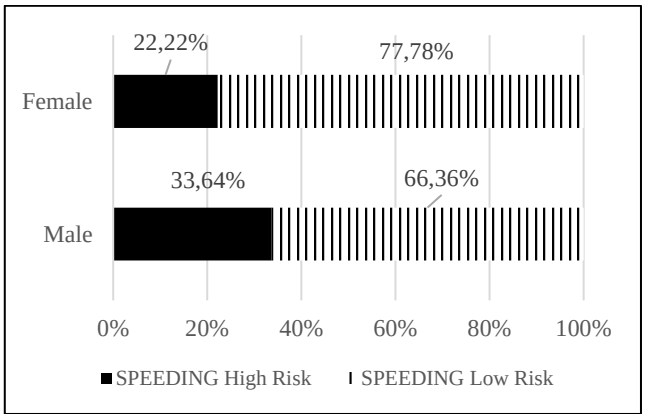

Figure 2. Percentage of Traffic Risk Behavior in Speeding by Gender

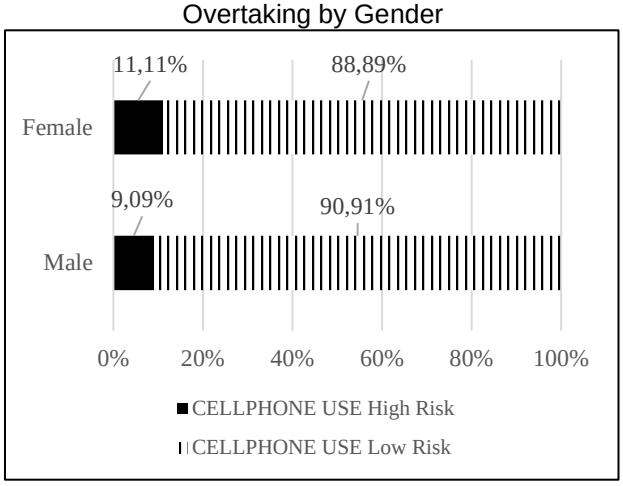

Figure 3. Percentage of Traffic Risk Behavior in Cellphone Use by Gender

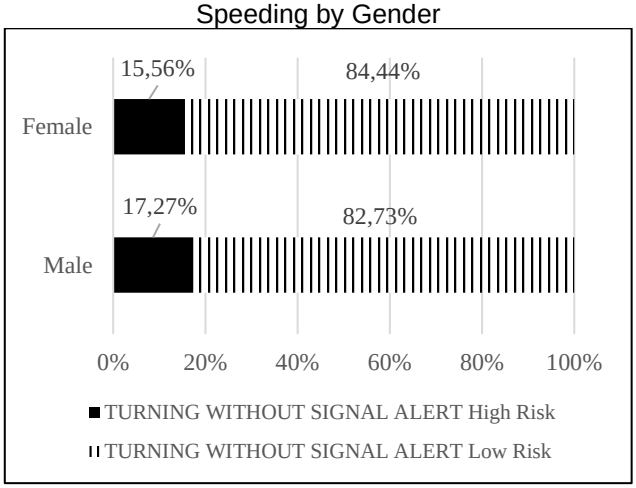

Figure 4. Percentage of Traffic Risk Behavior in Turning without Signal Alert by Gender

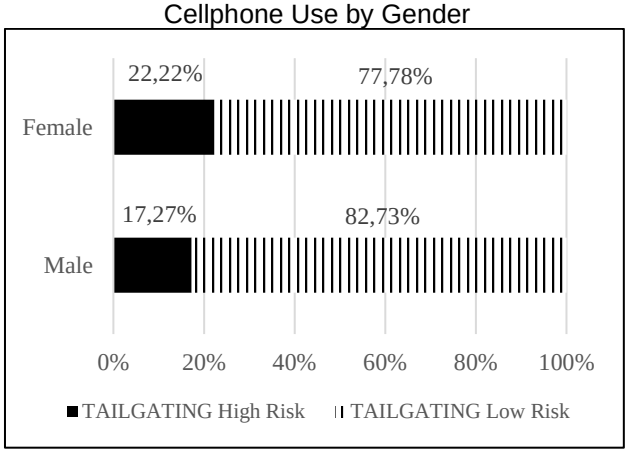

Figure 5. Percentage of Traffic Risk Behavior in Tailgating by Gender

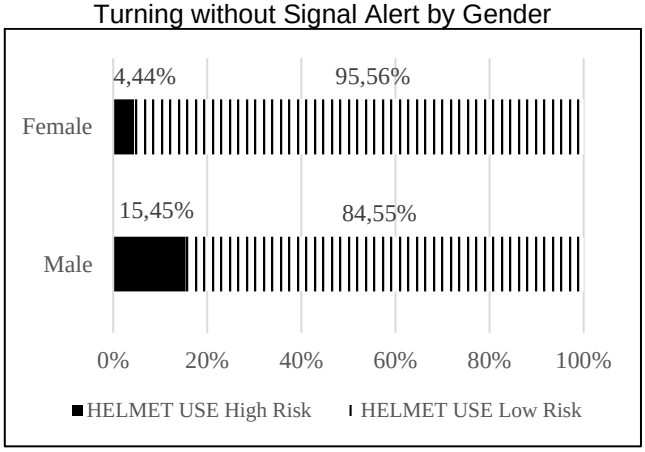

Figure 6. Percentage of Traffic Risk Behavior in Helmet Use by Gender

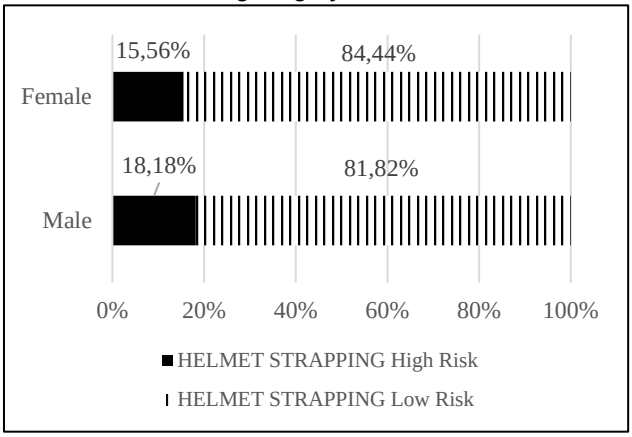

Figure 7. Percentage of Traffic Risk Behavior in Helmet Strapping by Gender

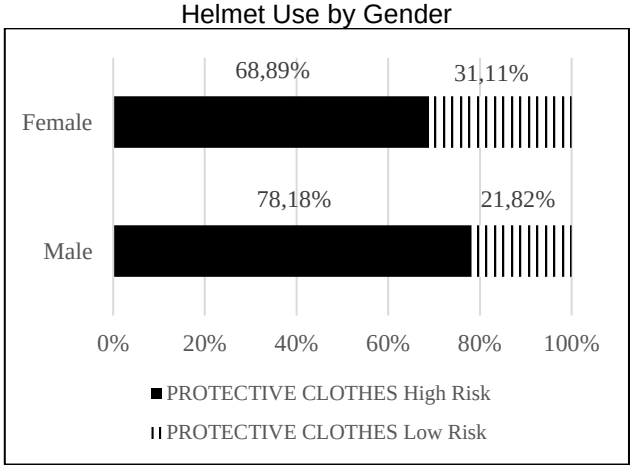

Figure 8. Percentage of Traffic Risk Behavior in Protective Clothes by Gender

In Figures 6 to 8, the answers to the last three variables (use of helmet, helmet strapping, and the use of protective cloth) are reversed in comparison to the preceding variables (1 = never, 2 = rarely, 3 = often, and 4 = always), while maintaining the high risk and low-risk assumptions. Figure 6 shows that men are more at risk for not wearing a helmet than women, although the percentage are extremely low (15.45% vs. 4.44%), in contrast to those wearing helmets all the time when riding. A similar pattern emerges in Figure 7, where both men and women exhibit a low frequency of adjusting helmet straps before riding (18.18% to 15.56%), indicating a strong tendency to securely fasten the straps when wearing helmets. Figure 8 shows substantially distinct findings from the others, except *overtaking*. Neither male nor female motorcyclists often wear protective clothes when riding. This is usually because most people, specifically women, prioritize the nature of their daily activities over dressing appropriately for motorcycle riding. However, according to this study, men are more likely than women to not wear protective clothes (78.18% vs. 68.68%).

3.3 Relationships between Gender and Traffic Risk Behavior by Odds Ratio

Table 1 shows the relationship between gender and traffic risk behavior across eight different indicators. Considering the chi-square test, there is no statistically significant disparity at an alpha level of 0.05 between gender and all variables, such as overtaking, speeding, using a cell phone, turning without a signal alert, tailgating, wearing a helmet, strapping a helmet, and wearing protective clothes (*p-value* > 0.05). The highest Odds Ratio (3.930) was indicated by *helmet use*, which means that men who rarely or never wear helmets when riding had a 3.930 times higher probability of being involved in a traffic accident than women. This is consistent with the data showing that men are more prone to risky behavior than women, particularly in the context of riding without helmets (15.45% and 4.44%).

Several studies on the use of helmets have been conducted worldwide, particularly in Asian countries. The Indonesian traffic law mandates helmet usage for all motorcyclists and enforces penalties for non-compliance [16]. According to other investigations conducted on Thai motorcycle riders, the majority wear helmets while riding on major roads and highways during rush hours on weekdays and in the morning and afternoon to satisfy police surveillance [18]. Observations of 124,784 motorcyclists in Myanmar through camera footage revealed that 51.5% were adhering to helmet use [19]. These findings demonstrate that the use of helmets among motorcycle riders in Low– and Middle–Income Countries (LMICs) continues to be a significant behavioral challenge. In Ghana, a study by [20] reported that motorcyclists may choose not to wear helmets for short distances.

The same finding was made in Cambodia as well [21]. In Malaysia, [22] used the Theory of Planned Behavior (TPB) to conduct a study on 288 teenagers. They ultimately determined that attitudes, subjective norms, and intentions were important predictors of helmet-wearing. Additionally, [23] carried out an observational study at seven chosen roadside locations in Klang Valley, Malaysia, and discovered that few motorcycle riders wore helmets. This discovery was caused, in part, by riders' lack of awareness of road safety and by insufficient or improper enforcement. Enhancing the comprehension of behavioral issues and the risks associated with neglecting helmet usage could serve as a foundation for devising proactive strategies. A comparative study between Malaysia and Singapore was published by [13]. It was anticipated that Malaysian respondents would indicate a higher risk of road accidents than Singaporean participants due to Malaysia's higher accident rates and more dangerous traffic environments. Surprisingly, the findings revealed that Malaysian drivers tend to take risks despite having a higher level of perceived traffic risk. In the context of Singapore, it becomes evident that risk-taking behavior diminishes in the presence of stringent law enforcement. Furthermore, [12] investigated Thai motorcyclists' attitudes and behavior related to traffic risk. In contrast to this study, they discovered that the proper fastening of the helmet strap had a relationship with the perception of traffic risk.

Table 1. Relationship between Gender and Traffic Risk Behavior of Motorcyclists (N=155)

Gender	Traffic Risk Behavior		*p-value*	Odds-Ratio
	High Risk	Low Risk		
	Overtaking			
Male	83	27	0.264	1.537 (0.721 - 3.276)
Female	30	15		
	Speeding			
Male	37	73	0.161	1.774 (0.792 - 3.974)
Female	10	35		
	Cellphone Use			
Male	10	100	0.767	0.800 (0.257 - 2.487)
Female	5	40		
	Turning without signal alert			
Male	19	91	0.795	1.133 (0.440 - 2.918)
Female	7	38		
	Tailgating			

Gender	Traffic Risk Behavior		*p-value*	Odds-Ratio	
	High Risk	Low Risk			
Male	19	91	0.473	0.731	(0.309 - 1.726)
Female	10	35			
	Helmet Use				
Male	17	93	0.058	3.930	(0.869 - 17.774)
Female	2	43			
	Helmet Strapping				
Male	20	90	0.696	1.206	(0.471 - 3.090)
Female	7	38			
	Protective Clothes				
Male	86	24	0.222	1.618	(0.744 - 3.518)
Female	31	14			

4 CONCLUSIONS

In conclusion, this study examined motorcycle riders' gender-specific related to traffic risk behavior in the Indonesian city of Banda Aceh. The results showed an expansion of references to traffic risk behavior, particularly with respect to gender. The findings showed that there was no statistically significant relationship (at a 95% confidence interval) between gender and the traffic risk behaviors examined, including *overtaking, speeding, the use of a cell phone, turning without signaling, tailgating, wearing a helmet, using a helmet strap,* and *wearing a protective cloth*. Although there was no statistically significant difference between them, men were more at risk than women in almost every aspect of traffic risk behavior, as designated by Odds Ratio (OR). Among these behaviors, the highest OR was observed for helmet use, with a value of 3.930. This finding suggested that male riders who frequently rode without wearing a helmet were at a significantly higher risk of experiencing a traffic accident, at a rate of 3.930 times greater than that of female riders. In essence, this implied that men were more inclined than women to ride motorcycles without donning helmets. Two variables that put both men and women at a higher risk are *overtaking* and *wearing protective clothing*. In terms of overtaking, both men and women were at high risk for overtaking other vehicles, often engaging in this behavior whenever the opportunity presented itself. In addition, neither men nor women who ride motorcycles frequently wear protective clothing. This pattern was often because a substantial portion of individuals, particularly women, neglected to assess whether their attire was suitable for motorcycle riding. Instead, they typically dressed for their intended activities for the day. This study found that men are more likely than women to not wear protective cloth. This study suggested that the unsafe riding behavior of male and female motorcyclists needs to be improved in order to decrease the risk of traffic accidents. The wearing of helmets in particular must be a safety and public health concern, demonstrating that people have to respect their lives rather than just following the law. Emphasizing preventive measures against motorcycle accidents not only substantially reduces fatality rates but also alleviates the societal burden, improves the overall quality of life, and stimulates economic growth by ensuring community participation. Additionally, the local governments should also play a significant role in constantly enforcing traffic laws against individuals who violated the rules, alongside promoting a culture of adherence among citizens.

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