

Risk Factors on Motorcycle Accidents in Sri Lanka

M.C.B.B. Pieris¹

Goal 03: Ensure healthy lives and promote well-being for all at all ages

1. Introduction

Road Traffic Accidents (RTA) have become the 8th leading cause of death for all ages and the 1st leading cause of death among the young generation in the world (World Health Organization-WHO,2018). Deaths and injuries resulting from road traffic crashes remain the main serious problem globally and current trends suggested that this will continue to be the case in the foreseeable future. The number of road traffic deaths continues to climb, reaching 1.3 million people. Despite the increase in absolute numbers, road traffic deaths have remained fairly constant at around 18 per 100,000 populations over the last five years (WHO, 2018). Looking at the prevalence of Road accident deaths, Motorcycle deaths have shown a significant contribution to road accidents (WHO, 2018). Globally, pedestrians and cyclists represent 26% of all deaths, while those using motorcycles and three-wheelers comprise another 28% (WHO, 2018). Because of this serious situation WHO has targeted “By 2030, to halve the number of global deaths and injuries from road traffic crashes” under the Sustainable Development Goals (SDG) (WHO, 2018). As the motorcycle is small in size, the riders tend to over speed and overload their motorcycles for a quick return. Moreover, irresponsibility, unruliness, and lack of respect for other road users cause to increase in the risk of motorcycle injuries (Naddumba, 2004). Motorcycle accident occurrence is affected or influenced by several factors including age, being male or female, education level, and maintenance of the motorcycle (Luther, 2019). Although traffic rules are enforced, Technological advancement, improvement of road infrastructure and improvement of traffic Education systems, the number of traffic deaths has not decreased significantly over the years. Further, not much extensive

¹ Department of Social Statistics, University of Kelaniya
cbingumali123@gmail.com

studies have been carried to understand the motorcycle accidents and as a result, there is a lack of overall understanding about the factors relate to motorcycle accidents and their interaction with each other. Accordingly, it is importance to acknowledge the intensifying situation involving road deaths and injuries. Therefore, this study focused on identifying the risk factors related to motorcycle accidents in Sri Lanka. This will help them vested with the mandate to overseas the nation's transportation system as the consumers of research findings and it will immensely help to reduce the occurrence of Motorcycle accidents and contribute towards saving lives that would have otherwise been lost through this accident.

2. Research Objective

Identify the risk factors on motorcycle accidents in Sri Lanka

3. Materials and Methods

This study consists with secondary data (1st of January 2020 to 31st of December 2020) of motorcycle accidents in Sri Lanka, retrieved from the Sri Lanka Police. Two- way frequency tables with Chi-square statistics and binary logistic regression analysis were utilized to obtained the required inferences. The dependent variable (y) denotes its binary category as 1 for fatal and grievous accidents and 0 for minor and damage only accidents. The explanatory variables considered are road time of the day, day of the week, road surface, weather condition, light condition, age of driver, gender, age of license, accident location, age of vehicle, validity of licenses and human factor key factors of motorcycle accidents which describe the road, human, vehicle, accident, time and environmental characteristics of motorcycle accidents.

4. Results and Discussion

4.1 Analysis of variables separately

In order to find the association of each variable on motorcycle accidents, separate two-way frequency tables with Chi-square tests were carried out initially. Results found that time of the day, age of the driver, light condition, human factor, and gender have significant influence ($p < 0.05$) on the severity of motorcycle accidents.

4.2 Analysis of Selected Variables Simultaneously

To find the combined impact from the best fitted model among the significant variables using Chi square statistics, binary logistics regression was carried out under forward stepwise method. The results of the final model are shown in table 1. The significant of the Hosmer and Lemeshow test statistic concludes that the fitted model is significant at 5% level. The overall predictive power of the model is very high as 76.7% (Table 2). The model is shown in equation (1).

Table 1: Properties of the parameters for the best fitted binary logistic model

Variable Coding	Beta value	Sig.	Exp (B)
Time of the Day		.003	
(TD-1) 12pm-6pm	1.633	.013	5.119
(TD-2) 6am-12pm	1.272	.050	3.568
(TD-3) 12pm-6am	1.634	.014	5.127
Age of license		.016	
(AL-1) Below 5 years	.994	.021	.370
(AL-2) 5-10 years	.245	.007	.783
(AL-3) 11-20 years	.657	.012	.518
Human factor		.001	
(HF-1) Aggressive	-2.276	.011	.103
(HF-2) Speed	.556	.010	.573
(HF-3) Error Judgment	20.183	.000	8.667
Gender		.004	
(G) Male	20.056	.008	21.886
Constant	19.677	.008	.000

Source: Survey data, 2022

Hosmer and Lemeshow Test Statistic: $\chi^2_8 = 14.166$ ($p = .778$)

Table 2: Classification table

Observed		Predicted		Percentage correct
		Type of accidents		
		Non-Fatal	Fatal	
Type of accidents	Non-Fatal	326	8	97.6%
	Fatal	96	17	15%
Overall percentage 76.6%				

Source: Survey data, 2022

4.3 Impact of Levels within Variables on Fatal Accidents

The results in table 1 indicate that the variables; time of the day, age of license, human factor and gender of motorcycle accidents to predict the outcome variable are significantly associated with severity of accidents when all the variables are taken into consideration simultaneously.

Based on the results of Table 1 model for odd ratio for the occurrence of fatal accident is given in equation (1).

$$\left(\frac{p}{1-p}\right) = 19.677 + 5.1198*(TD-1) + 3.568*(TD-2) + 5.127*(TD-3) + 0.370*(AL-1) + 0.783*(AL-2) + 0.518*(AL-3) + 0.103*(HF-1) + 0.573*(HF-2) + 8.667*(HF-3) + 21.866*Male$$

The odds of happening fatal accidents from in 12 pm to 6 pm are 5.119 times higher than that it's occurring from 12 am to 6 am when all other variables on the model are fixed. The odds of happening fatal accidents from 6 am to 12 pm are 3.56 times higher than that it's occurring from 12 am to 6 am when all other variables on the model are fixed. The odds of happening fatal accidents from 6 pm to 12 am are 5.127 times higher than that it's occurring from 12 am to 6 am when all other variables on the model are fixed. The odds of happening fatal accidents in males 21.886 times higher than that it's occurs in female riders when all other variables on the model are fixed. The odds of happening fatal accidents due to aggression are 0.103 times less than that it occurs due to other reasons (Influenced by alcohol, Distracted/In attentiveness) when all other variables on the model are fixed. The odds of happening fatal accidents due to Speed are 0.573 times higher than that it occurs due to other reasons (Influenced by alcohol, Distracted/In attentiveness) when all other variables on the model are fixed. The odds of happening fatal accidents due to Error-Judgment 8.667 times higher than that it occurs due to other reasons (Influenced by alcohol, Distracted/In attentiveness) when all other variables on the model are fixed. The odds of happening fatal accidents in license age below 5 years is 0.370 times higher than that it occurs in license age more than 20 years. The odds of happening fatal accidents in license age between 5-10 years is 0.7830 times higher than that it occurs in license age more

than 20 years. The odds of happening fatal accidents in license age between 11-20 years is 0.518 times higher than that it occurs in license age more than 20 years.

5. Conclusion

When the variables were considered separately, that time of the day, age of the driver, light condition, human factor, and gender have significant association with accident severity of motorcycle accidents. But fitted binary model revealed that, license age, gender of rider, Human factor, weather condition, and time of the day are the major risk factors influencing fatal accidents. These findings will help to launch a new educational program for motorcyclists and other riders. Because it will be useful to improve the public awareness of accident risks and reduce the frequency of accidents.

References

- Kodithuwakku, D., Peiris T. (2021). Risk factors of road traffic accidents in Sri Lanka Retrieved on 12th January, 2022, from https://www.researchgate.net/publication/354727719_Risk_Factors_of_Road_Traffic_Accidents_in_Sri_Lanka
- Luther, VAF. (2019). Prevalence of motorcycle accident and associated factors in Accra, Master's Thesis, University of Ghana
- Madhumali, NWM., Bandaranayaka, HMT., Harshi, GC., Ayesha HKB., Rathnayaka, RMKP., Withana, IUM. (2021). Identification of risk factors for road traffic accident using injured drivers: a cross sectional study conducted in Sri Lanka. *International journal of community medicine and public health*, 8(9)
- Naddumba, E. (2004). A cross sectional retrospective study of boda boda injuries at mulgao Hospital in Kampala, Uganda. *East and Central African Journal of Surgery*, 9, 44 – 47

WHO. (2018a). *Global Status Report on Road Safety: Summary*. Geneva, Switzerland. Retrieved on 23rd September, 2021, from https://www.who.int/violence_injury_prevention/road_safety_status/2018/English-Summary-GSRRS2018.pdf