



Analysis of Risk Factors for Traffic Accidents Among Online Motorcycle Taxi Drivers in Makassar City in 2024

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KEYWORDS

Traffic Accident;
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ABSTRACT:

Introduction: As the technology in transportation field develops, numerous companies utilized this chance to invent new business called online transportation. The annual high growing rate of vehicle have caused many traffic accidents caused by several factors, including the driver, environment, and vehicle. However, the most significant factor is the human error itself.

Objectives: This research aims to know the traffic accident risk factor on online transportation drivers in Makassar City.

Methods: Cross-Sectional approach was applied, utilizing 96 samples from Non-Probability of Purposive Sampling.

Results: Results found relationship between fatigue ($\rho=0.001$), sleeping quality ($\rho=0.021$), driving behaviour ($\rho=0.000$), workload ($\rho=0.012$), vehicle condition ($\rho=0.013$) with the traffic accident, and no relationship between working period ($\rho=0.486$) and road condition ($\rho=0.208$) with traffic accident on online motorcycle taxi drivers in Makassar City. Among them, driving behaviour is the most significant factor causing traffic accident with Exp(B)/OR value of 14.391.

Conclusions: This research discovered relationship between fatigue, sleeping quality, driving behavior, workload, and vehicle condition with traffic accident, yet no relationship between working period and road condition with the traffic accident. Among the variables, driving behavior is the most significant factor in causing the traffic accidents on online motorcycle taxi drivers in Makassar City.

1. Introduction

In the current modern era, people are demanded to have high mobility. It makes human cannot avoid the use of transportation in order to carry out their daily activities. Such high mobility also triggers the high traffic density level, including both human and goods throughout the world. Seeing this development, facts show that road is a killing place in modern era [1].

The increase of private transportation volume, especially motorcycle on the road which is not accompanied with sufficient road access gives negative impact to all the road users. In this case, high traffic jam and accident is the proof of the negative effect caused by the high number of vehicle on the road, especially during the time people start and carry out their daily activities [2].

The presence of online transportation is considered very helpful in supporting people's activities. The service provided is also not limited to drive the passengers, but also to deliver goods and foods, and even to go shopping. Its ordering process is also considered easy since it is only relied upon smartphone that is connected internet, of which many people currently have [3].

Data issued by Global status report on road safety from World Health Organization show that the number of mortality due to traffic accident is 1.19 million per year while million others experience serious injury and live with long-term health loss consequence [3]. Death and injury due to traffic accident on the road is a serious global issue [4]. Based on the previous research carried out by Kumar, et al., two-wheels vehicle contribute to 46.78% traffic accident from the total traffic accident victims [5].



Indonesia Statistics (BPS) accumulated data of traffic accidents and its victims from 2019 to 2021. The data collected from Indonesian Police Headquarters show that the total traffic accidents and its victims in 2019 is higher than each next two years, where there are 116,411 incidents in 2019, 100,028 incidents in 2020, and 103,645 incidents in 2021 [6].

Directorate of Traffic of the Police of South Sulawesi recorded that there were 17,797 traffic accidents in the last two years of 2020 to 2022 within the legal area of its office. Among them, the victims are 26,369 people, consisting of 3,056 deaths, 26,369 serious injuries, 22,228 minor injuries, and the highest percentage of the victim are 15 to 19 years old by 5,612 victims [7].

Based on the preliminary data collected from the Police Headquarters of Makassar, traffic accidents occurred in 2021 is 1.090 cases with death victims of 113 people, seious injuries victims of 5 people, and minor injuries victims of 1,287 people. In 2022, this incidents increased to 1,484 cases with death victims reaching 123 people, serious injuries victims are 3 people, and minor injuries victims are 1,905 people. Furthermore, this rate increased more in 2023, where there are 1,895 traffic accident cases with death victims of 112 people, seious injuries victim of 1 person, and minor injuries victims of 2,336 people. Therefore, in 2021 to 2023, there are 4,468 traffic accident cases, where two-wheeled vehicles involved. Among them, there are 1,748 online motorcycle taxi drivers involved, either as a perpetrator or victim.

Makassar City, as the biggest city in South Sulawesi, has quite high traffic activities and categorized as highway city. The traffic condition of Makassar City is heterogenic, where the vehicles spread on the road without characteristics and functions differences, causing the high rate of traffic accidents [8].

Traffic accident cannot be seen as a mere transportation issue, yet it has spread into social, economy, environmental, and health issues if it is correlated to the prevention and countermeasure efforts. The negative effect of traffic accidents is in the forms of material, injuries, and even death that can affect the public health level [9]. Therefore, countermeasure efforts are needed to minimize the traffic accidents, such as by educating the road users, traffic engineering, and road condition improvement.

2. Methods

This research was carried out after obtaining recommendation and permit from the research ethic committee of Faculty of Public Health Universitas Hasanuddin Makassar number 1217/UN4.14.1/TP.01.02/2024. This quantitative research applied observational analytical study through cross-sectional approach. Furthermore, this research was conducted in Makassar City, South Sulawesi in May to June 2024. The respondent population in this research is all online motorcycle taxi drivers in Makassar City. In this case, the samples obtained from unknown population number were determined through Lemeshow formula of 96, that is the minimum samples used should be 96 samples. However, this research will round the samples into 100 samples. Furthermore, this study utilized questionnaire as the data collection aid, including *Industrial Fatigue Research Committee Questionnaire*, *Pittsburg Sleep Quality Index*, *Motorcycle Rider Behavior Questionnaire*, dan *NASA-TLX* as well as writing tools. The data obtained were then processed using SPSS program in several stages including editing, coding, data entry, and data cleaning. Data analysis was then continued and carried out in several forms including univariate, bivariate, and multivariate analysis.

3. Results

Table 1. Bivariate Analysis Results

Research Variables	Traffic Accident				Total		Pvalue
	Ever		Never		n	%	
	n	%	n	%			
Fatigue							
High	33	34,4	18	18,8	51	100	0,001
Low	14	14,6	31	32,3	45	100	
Sleeping Quality							
Poor	27	28,1	17	17,7	44	100	0,021
Good	20	20,8	32	33,3	52	100	



Driving Behaviour							
Poor	40	41,7	14	14,6	54	100	0,000
Good	7	7,3	35	36,5	42	100	
Workload							
Heavy	30	31,3	19	19,8	49	100	0,012
Light	17	17,7	30	31,3	47	100	
Working Period							
Does not meet the requirement	28	29,2	28	29,2	56	100	0,486
Meet the requirement	19	19,8	21	21,9	40	100	
Vehicle Condition							
Poor	8	8,3	1	1	9	100	0,013
Good	39	40,6	48	50	87	100	
Road Condition							
Poor	15	15,6	11	11,5	26	100	0,208
Good	32	33,3	38	39,6	70	100	

Source: Primary Data, 2024

Based on table 1 of bivariate analysis results above, 33 respondents with high fatigue level have ever experienced traffic accident (34.4%), while 18 respondents with high fatigue level have never experienced traffic accident (18.8%). Meanwhile, among the respondents who have low fatigue level, 14 respondents (14.6%) experienced traffic accident, while 31 (32.3%) respondents did not experience traffic accident. The data analysis carried out using statistical test of Chi-Square obtained p-value of 0.001, that is below 0.05, so H₀ is rejected and H_a is accepted, indicating that there is relationship between fatigue variable and traffic accidents on online motorcycle taxi drivers in Makassar City.

Furthermore, among respondents who have poor sleeping quality, 27 of them (28.1%) experienced traffic accidents, while 17 of them (17.7%) did not experience traffic accidents. Meanwhile, among respondents who have good sleeping quality, 20 of them (20.8%) have ever experienced traffic accidents, while 32 of them (33.3%) have never experienced traffic accidents. The data was then analyzed using statistical test of Chi-Square obtained p value of 0.021, that is below 0.05, indicating that H₀ is rejected and H_a is accepted, meaning there is relationship between sleeping quality variable and traffic accidents on online motorcycle taxi drivers in Makassar City.

Among respondents who have poor driving behaviour, 40 of them (41.7%) have ever experienced traffic accidents, while 14 of them (14.6%) have never experienced traffic accidents). Meanwhile, among respondents who have good driving behaviour, 7 of them (7.3%) have experienced traffic accidents, while 35 of them (36.5%)

have never experienced traffic accidents. In this case, statistical analysis test of Chi-Square was conducted and obtained p-value of 0.000 so it is below 0.05. Hence, H₀ is rejected, while H_a is accepted, meaning that there is relationship between driving behaviour variable and traffic on online motorcycle taxi drivers in Makassar City.

In addition, among respondents who have heavy workload, 30 of them (31.3%) have ever experienced traffic accidents, while 19 respondents (19.8%) have never experienced traffic accidents. Meanwhile, among those who have light workload, 17 respondents (17.7%) have experienced traffic accidents, while 30 respondents (31.3%) have never experienced traffic accidents. The data was then analyzed using statistical test of Chi-Square obtained p value of 0.012, that is below 0.05, indicating that H₀ is rejected and H_a is accepted, meaning there is relationship between sleeping quality variable and traffic accidents on online motorcycle taxi drivers in Makassar City.

Furthermore, among respondents whose working period does not meet the requirement, 28 of them have experienced traffic accidents (29.2%) and other 28 (29.2%) have never experienced traffic accidents. Meanwhile, among respondents whose working period have met the requirement, 19 of them (19.8%) have experienced traffic accidents, while 21 of them (21.9%) have never experienced traffic accidents. In this case, the data obtained were then analyzed through statistical test of Chi-Square test obtaining p-value of 0.486, that is below 0.005 so H₀ is accepted, while H_a is rejected. This indicates that there is no relationship between working



period variable and traffic accidents on online motorcycle taxi drivers in Makassar City.

Among respondents who have poor vehicle condition, 8 of them (8.3%) have ever experienced traffic accidents, while 1 of them has never experienced traffic accident. Meanwhile, among the respondents who have good vehicle condition, 39 of them (19.8%) have ever experienced traffic accidents, while 48 of them have never experienced traffic accidents. The data received were further analyzed using statistical test of chi-square obtained p-value of 0.013, that is below 0.05. Therefore, H_0 is rejected, while H_a is accepted, indicating that there is a relationship between vehicle condition variable and traffic accident on online motorcycle taxi driver in Makassar City.

Additionally, among respondents who passed road with poor condition, 15 respondents (15.6%) have experienced traffic accidents, while 11 of them (11.5%) have never experienced traffic accidents. Meanwhile, among respondents who passed road with good condition, 32 of them (33.3%) have experienced traffic accidents, while 38 of them (39.6%) have never experienced traffic accidents. The data were then analyzed using Chi-Square test, obtaining p-value of 0.486 that is above 0.05. hence, H_0 is accepted, while H_a is rejected, meaning that there is no relationship between road condition variable and traffic accident on online motorcycle taxi driver in Makassar City.

Table 2. Multivariate Analysis of Variables Affecting traffic accident on online motorcycle taxi driver in Makassar City 2024

Variable	Exp(B)/OR	95% CI	P Value
Fatigue	4.353	1.394-13.591	0.011
Sleeping Quality	3.991	1.237-12.873	0.021
Driving Behavior	14.391	4.394-47.128	0.000
Workload	3.540	1.129-11.100	0.030
Vehicle Condition	11.642	0.388-349.117	0.157

Source: Primary Data, 2024

Based on table 2 of the multivariate analysis using binary logistic regression above, the variable that have p-value below 0.05, including fatigue variable with p-value of 0.11 has Exp (B) value of 4.353, sleeping quality with p-value of 0.021 has Exp(B) value of 3.991, driving behaviour with p-value of 0.000 has Exp(B) value of

14.391, and workload variable with p-value of 0.030 has Exp(B) value of 3.540. Among the four variables, it can be concluded that driving behaviour variable is the most significant factor in affecting the occurrence of traffic accident on only motorcycle taxi drivers in Makassar City 2024 with Exp(B)/OR value of 14.391.

4. Discussion

Relationship between Fatigue and Traffic Accidents on Online Motorcycle Taxi Drivers in Makassar City

Fatigue can be caused by factors related to work, factors unrelated to work, or combination of both, as well as can be accumulated as time goes by. When the body cannot recover from fatigue, fatigue will further accumulated [10]. Fatigue is related to the decrease of physiology energy, slow sensory and motor function, and damaged information processing, making drivers difficult to response emergency situation, uncommon situation, unexpected situation as well as reducing the attention and alertness reaction, and further lead to significant safety danger in transportation industry [11]. The statistical test results using *Chi-Square* test obtained p-value of $0.001 <$

0.05, indicating that in this research, fatigue has significant relationship with Traffic Accidents on Online Motorcycle Taxi Drivers in Makassar City. This is in line with the previous research conducted by Zhang, et al., that there is a significant correlation between fatigue and accident on bus driver [12].

Relationship between Sleeping Quality and Traffic Accidents on Online Motorcycle Taxi Drivers in Makassar City

Sleeping quality is very important for driver to maintain their driving safety and security. Poor sleeping quality can cause physical effect, such as sleepiness, fatigue, hypertension, and cognitive disruption, including the decrease of alertness, motivation, concentration, and intellectual, as well as increasing the traffic accident and



mental health risk. Poor sleeping quality is indicated by dark eye bags, yawning, and over sleepiness [13]. This is in accordance with the previous research carried out by Feoh, et al., showing that there is significant correlation between sleeping quality and work accident on farmers in Mata Air Village [14].

Relationship between Driving Behavior and Traffic Accidents on Online Motorcycle Taxi Drivers in Makassar City

Human behaviour is the most dominant factor in traffic accident, since it contributes to 70% of the incidence. Risky driving behaviour that is done by a driver does not only harm himself but also other drivers and other road users around the driver [15]. Based on the data analysis conducted, the p-value obtained is 0.000, which is below significance level of 0.005. Therefore, it can be concluded that there is a significant correlation between driving behaviour and Traffic Accidents on Online Motorcycle Taxi Drivers in Makassar City 2024. This is in accordance with the research conducted previously by Santosa & Widyastuti, which found a significant correlation between driving behaviour and traffic accident. Hence, it can be summed up that driving behaviour is the main predictor of the occurrence of traffic accident [16].

Relationship between Workload and Traffic Accidents on Online Motorcycle Taxi Drivers in Makassar City

In general, work load is affected by both external and internal factor. In this case, the external factor of work load is the factors come from outside body of the worker, while internal factors come from the body of the worker himself. In addition, Sunarso and Kusdi (2010) claimed that workload is a collection of tasks that must be carried out by an organization unit or position holder in a predetermined term [17]. Based on several arguments above, it can be summed up that workload is the volume or amount of works that must be completed by a work in a certain amount of time [18]. In this case, based on the data analysis carried out using Chi-Square test, a p-value of 0.012 was obtained. Since it is below 0.05, it can be concluded that there is significant relationship between the workload and Traffic Accidents on Online Motorcycle Taxi Drivers in Makassar City in 2024. Furthermore, previous research carried out by Lyu, et al, showed that driving workload has significant effect on traffic accident [19]. When the driving workload is high, driver can loss his awareness and become less careful in driving. In such

situation, traffic accident often occurs. This is supported by research conducted by Tuasial et al. that workload has a significant relationship with traffic accident on online motorcycle taxi drivers in Ambon City [20].

Relationship between Working Period and Traffic Accidents on Online Motorcycle Taxi Drivers in Makassar City

Data analysis results from Chi-square test obtained p-value of 0.486, which is above 0.05. Hence, it can be summed up that there is no significant relationship between the working period and Traffic Accidents on Online Motorcycle Taxi Drivers in Makassar City in 2024. This is in line with the previous research conducted by Mare, et al. that no significant relationship was found between working hours of more than 8 hours or less than 8 hours per day with the increased traffic accident risk [21]. This is also encouraged by the study conducted by Shen et al., that the driving duration does not directly affect the accidents the driver experiences, yet the duration factor significantly related to the character of the driver, including the preparedness in driving [22].

Relationship between Vehicle Condition and Traffic Accidents on Online Motorcycle Taxi Drivers in Makassar City

Traffic is happened not only because of human factors but also vehicle factor. Vehicle that is not feasible will affect the occurrence of accident. Every accident used on the road must have feasible certification in accordance with the applied standard [23]. Motorcycle has completion standards that must meet technical requirement. The examination of technical requirement of the motorcycle aims to avoid sudden threat while driving the motorcycle on the road [24]. Poor vehicle condition can also cause accident. In this case, the vehicle factors that most frequently occur are flat tire, brakes does not work well, and metal fatigue that can cause the vehicle spare parts broken. Another thing that can also happen is worn spare part that is not changed and other factors [25]. Unsafe vehicle condition status causes many victims because the vehicle cannot be controlled well, causing a traffic accident. In addition, the poor vehicle condition also reflects the low awareness of the driven upon driving safety [19].

Relationship between Road Condition and Traffic Accidents on Online Motorcycle Taxi Drivers in Makassar City



Other factors that also have a role in causing accident is the poor road infrastructure, such as damaged and potholes road. Moreover, during rainy season, many damages road become the cause of traffic accident. Road factors related to speed, road planning, road geometric, safety fence in mountainous area, the presence and absence of road median, visibility and road surface area, as well as damaged or potholes road significantly endanger the motorcycle drivers [26]. Hence, the characteristics of road could cause traffic accidents. In addition, improvement on the road condition can also affect the characteristics of accident happened [27]. Data analysis results using Chi-Square test obtained p value of 0.208, that is higher than 0.05. therefore, it can be summed up that road condition does not have significant relationship with Traffic Accidents on Online Motorcycle Taxi Drivers in Makassar City in 2024. In addition, based on the research, it is also known that barriers and road signs (road markings) makes the road safer because the road users will be more orderly in driving. This claim is supported by the previous research conducted by Adnan, et al that argued that poor design and insufficient road markings can increase traffic accident potential on motorcycle drivers [28]. This is also supported by the research carried out by Batrakova & Gredasova that traffic

is caused by factors related to environment, road users, and vehicle [29].

Based on the survey carried out on the current study, there are many damaged road spots found, such as letjen hertasning street, perintis street, urip Sumoharjo Street, and few other roads in Makassar City. In this case, the damages founds mostly are, potholes, cracked road, uneven road surface, and road patches. Such poor road condition can increase the traffic accident risk. However, such risk can be minimized by being careful while driving and obeying the existing traffic rules.

Driving on poor road surface can increase fatigue on the drivers, so drivers must be more careful in driving on the road in order to reduce the traffic accident risk that might happen due to insufficient road condition, road safety audit is very important in comparing its implementation on the road, approved by the technical standard, categorised into road geometry, pavement damage performance, and harmonization of road equipment facilities. Regular monitoring and audit on disaster-prone areas are also very important because it can help minimizing the severe effect of accident [30].

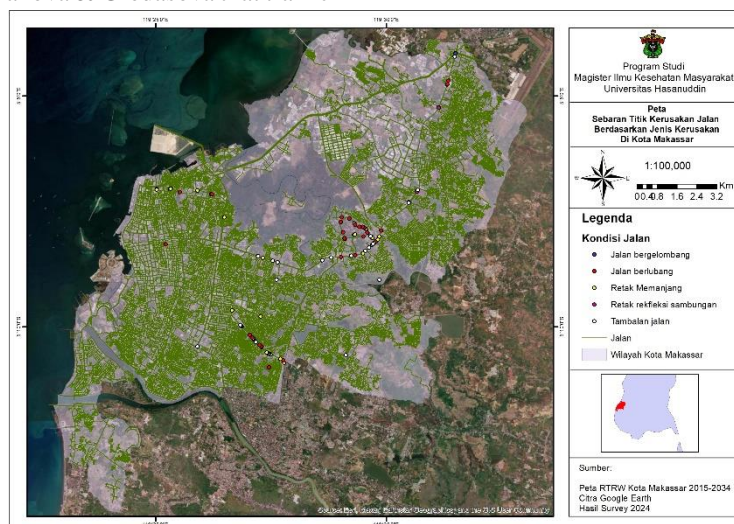


Figure 1. Damaged road condition in Makassar City

The Most Significant Factor in Affecting the Traffic Accident on Online Motorcycle Taxi Drivers in Makassar City

Human factor is the most dominant factor in traffic occurrence. Human uses road as pedestrian and driver. In this case, pedestrian can be a victim of the accident and the cause of the accident. Driver can also be the main

cause of traffic accident. Almost all accidents are started by traffic rule violation [31].

Based on the multivariate analysis using binary logistic regression above, the variable that have p-value below 0.05, including fatigue variable with p-value of 0.11 has Exp (B) value of 4.353, sleeping quality with p-value of 0.021 has Exp (B) value of 3.991, driving behaviour with



p-value of 0.000 has Exp (B) value of 14.391, and workload variable with p-value of 0.030 has Exp (B) value of 3.540. Among the four variables, it can be concluded that driving behaviour variable is the most significant factor in affecting the occurrence of traffic accident on only motorcycle taxi drivers in Makassar City 2024 with Exp(B)/OR value of 14.391. This is in accordance with the previous research conducted by Sukarto, that drivers' factors is the most significant factor in causing traffic accident [32]. In addition, Sairo, et al., also claimed that human factor is the main factor of the number of traffic accident [33].

5. Conclusion

Based on the results of the research on the Risk Factor Analysis of Traffic Accident Case on Online Motorcycle Taxi Drivers in Makassar City 2024, the following concluding can be summed up. First, there is significant relationship between fatigue and traffic accident on online motorcycle taxi drivers in Makassar City. Second, there is significant relationship between sleeping quality and traffic accident on online motorcycle taxi drivers in Makassar City. Third, there is significant relationship between driving behaviour and traffic accident on online motorcycle taxi drivers in Makassar City. Fourth, there is significant relationship between workload and traffic accident on online motorcycle taxi drivers in Makassar City. There is no significant relationship between working period and traffic accident on online motorcycle taxi drivers in Makassar City. Sixth, there is significant relationship between vehicle condition and traffic accident on online motorcycle taxi drivers in Makassar City. Seventh, there is no significant relationship between road condition and traffic accident on online motorcycle taxi drivers in Makassar City. And eighth, driving behaviour is the most significant factor in affecting the traffic accident on online motorcycle taxi drivers in Makassar City.

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