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ORIGINAL ARTICLE

FACTORS ASSOCIATED WITH DEATH DUE TO ROAD TRAFFIC ACCIDENT IN MUARO JAMBI REGENCY IN 2019-2021

Faktor-Faktor yang Berhubungan dengan Kematian akibat Kecelakaan Lalu Lintas di Kabupaten Muaro Jambi pada Tahun 2019-2021

Silvia Adiningsih[1], Raden Halim[2], Ummi Kalsum[3]
[1]Public Health Study Program, Faculty of Medicine and Health Sciences, Universitas Jambi, Jambi, 36122, Indonesia, silviaadiningsih09@gmail.com
[2]Public Health Study Program, Faculty of Medicine and Health Sciences, Universitas Jambi, Jambi, 36122, Indonesia, halim75@unja.ac.id
[3]Public Health Study Program, Faculty of Medicine and Health Sciences, Universitas Jambi, Jambi, 36122, Indonesia, ummi2103@unja.ac.id
Corresponding Author: Ummi Kalsum, ummi2103@unja.ac.id, Public Health Study Program, Faculty of Medicine and Health Sciences, Universitas Jambi, Jambi, 36122, Indonesia

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ABSTRACT

Background: Traffic accidents can cause morbidity and mortality so preventive action is needed to overcome them. **Purpose:** to find out the factors associated with deaths from traffic accidents in Muaro Jambi Regency in 2019 to 2021. **Methods:** the type of research was case control. Secondary data was collected from the Muaro Jambi Resort Police Traffic Unit with a total sample 483 consist of 161 cases and 322 controls (1:2). The variables studied were the victim's age, sex, victim's role, vehicle's type, direction of collision, day of accident, time of accident, weather, road surface's type, traffic flow, availability of road markings, and shape of the road to the variables of death due to traffic accidents. To analysis the data, chi-square test and multiple logistic regression were used. **Results:** The risk factors for death due to traffic accidents in Muaro Jambi Regency were age, the role of victims, traffic flow, and road shape. The dominant factor was the victim's role (OR = 3.14; 95% CI = 1.87-5.44) controlled by variables of victim's age (>30 years-old OR = 1.61; 95% CI = 0.85-3.04; 18-30 years-old OR = 1.92; 95% CI = 1.01-3.68), traffic flow (OR = 1.64; 95% CI = 1.03-2.62), and road shape (OR = 1.24; 95% CI = 0.77-2.00). **Conclusion:** Driver aged 18-30 years, moderate to busy traffic flow, and straight roads increase the risk of death from traffic accidents. Drivers should wear traffic safety equipment such as helmets, seat-belt and increase alertness and caution when driving.

ABSTRAK

Latar Belakang: *Kecelakaan lalu lintas dapat menyebabkan morbiditas dan mortalitas sehingga perlu tindakan preventif untuk mengatasinya.* ***Tujuan:*** *memperoleh faktor-faktor yang berhubungan dengan kematian akibat kecelakaan lalu lintas di Kabupaten Muaro Jambi pada tahun 2019-2021.*

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Metode: *penelitian menggunakan desain case control. Data sekunder bersumber dari Satuan Lalu Lintas Kepolisian Resor Muaro Jambi dengan total sampel 483 terdiri dari 161 kasus kematian dan 322 kontrol (1:2). Variabel yang diteliti adalah usia korban, jenis kelamin, peran korban, jenis kendaraan, arah tabrakan, hari kecelakaan, waktu kecelakaan, cuaca, jenis permukaan jalan, arus lalu lintas, ketersediaan marka jalan, dan bentuk jalan terhadap kematian akibat kecelakaan lalu lintas. Analisis data menggunakan chi-square dan regresi logistik berganda.* ***Hasil:*** *faktor risiko kematian akibat kecelakaan lalu lintas di Kabupaten Muaro Jambi adalah usia pengemudi 18-30 tahun, berperan sebagai pengemudi, arus lalu lintas sedang hingga ramai, dan bentuk jalan lurus. Faktor dominan adalah peran korban sebagai pengemudi (OR= 3,14; 95% CI= 1,87-5,44) setelah dikontrol usia (>30 tahun OR= 1,61; 95% CI= 0,85-3,04; 18-30 tahun OR= 1,92; 95% CI= 1,01-3,68), arus lalu lintas (OR= 1,64; 95% CI= 1,03-2,62), dan bentuk jalan (OR= 1,24; 95% CI= 0,77-2,00).* ***Simpulan:*** *Pengemudi berusia 18-30 tahun, arus lalu lintas sedang-ramai, dan jalan lurus meningkatkan risiko kematian akibat kecelakaan lalu lintas. Pengemudi disarankan memakai alat keselamatan lalu lintas seperti helm, sabuk pengaman, serta meningkatkan kewaspadaan dan kehati-hatian ketika berkendara.*

INTRODUCTION

One of the problems in the field of public health is health problems due to accidents. Based on the Decree of the Ministry of Health number 1116/MENKES/SK/VIII/2003, health problems resulting from accidents are one of the priorities for controlling non-communicable diseases (1). Traffic accidents can cause losses to the victims, either directly or indirectly. These losses can include loss of productivity due to injury, health costs, and the burden felt by the victim's family or relatives (2). Tang et al. divides the severity of injuries resulting from accidents into five levels, namely collisions without injuries, possible or invisible injury, no-capacitating injury, incapacitating injury and fatal injury (3).

Based on WHO data (2019), injuries due to traffic accidents are among the ten highest causes of death in developing countries. Traffics accidents involving motor vehicles are also listed in, International Classification of Diseases-11 (ICD-11) as an external cause of morbidity and mortality with codes PA03-PA07 (4). Every year, traffic accidents in the world cause 1.30 million deaths and 50 million people are injured. In the next decade, traffic accidents are estimated to cause up to 13 million deaths and 500 million injuries, and can hinder sustainable development, especially in low and middle income countries. The global plan target for the 2021-2030 period is to reduce by at least 50% the number of deaths and injuries due to traffic accidents (5).

Indonesia's traffic accident rate in 2019 was 44 cases per 100,000 population. Meanwhile, in 2021, there were 35 cases per 100,000 population, an increase from 2020, namely 32 cases per 100,000 population. Then, traffic accident victims in 2020 amounted to 128,041 people. Meanwhile, in 2021 the number increased 11.61% to 142,907 people (6). The traffic accident rate in Jambi Province in 2019 was 36 cases per 100,000 population. In 2020, this figure decreased to 29 cases per 100,000 population. However, in 2021, it increased again to 34 cases per 100,000 population (7).

Muaro Jambi Regency is a buffer area in Jambi Province with the second highest number of traffic accidents in 2019 to 2021 after Jambi City. In 2021, the number of traffic accidents increased by 19% (238 cases). Muaro Jambi is also the area with the highest number of deaths and material losses due to traffic accidents in Jambi Province, namely 67 deaths and losses of 1,277 billion rupiah. The traffic accident rate in 2019 was 56 cases per 100,000 population. In 2020, the traffic accident rate was 50 cases per 100,000 population. Meanwhile, the traffic accident rate in 2021 has increased to 59 cases per 100,000 population (7).

Shantajit, Kumar and Zahiruddinn (8) research results explain that road traffic accidents are the result of interactions between factors including the environment, vehicles (agents) and humans (hosts). Haddon (1980) added a time

dimension to the epidemiological triangle theory, so that host, agent and environmental factors are found in three phases of an accident, namely pre-crash phase, crash phase and post-crash phase (9).

Host factors were associated with deaths due to traffic accidents. A study by Sadeghi-Bazargani et al (10) states that motorcyclists aged 15-30 years are 3.80 times more likely to die due to traffic accident than other age groups. A meta-analysis shows that men were 1.66 times more likely to die in traffic accidents than women (11).

Vehicles as an agent factor were also related to deaths due to traffic accidents. Analysis by Cardoso et al (12) shows that there was a relationship between injuries and the vehicle used and the loss of productivity due to traffic accidents. In motorcyclists, collisions with heavy vehicles (medium and heavy trucks) increase the risk of pre-hospital death by 2.50 times (10).

Environmental factors are such as road geometry, terrain conditions or foggy weather which can interfere with the driver's vision, as well as slow-paced and fast-paced vehicles mixing in one traffic. The study by Nasiri et al (13) found that traffic accidents which occur on main roads have a 1.30 times greater risk of causing death than accidents that occur on village roads (OR 1.30; 95% CI 1.02-1.70; P= 0.04).

The incidence of traffic accidents on paved roads is higher than on sidewalks and unpaved roads (14). A study on motorcycle taxi drivers proves that there is a relationship between driving on potholes, damaged roads and slippery roads with traffic accidents (15). Tadege (16), in his study found that driving during the day increases the risk of fatal accidents in humans by 2.36 times compared to driving at night (AOR= 2.36; 95% CI 1.09-5.14; P=0.03). Research by Jecson et al (17) revealed that rainy weather was related to accidents among motorcycle taxi drivers. In continuously heavy traffic flow (average > 5,000 vehicles per 24 hours), the risk of traffic accidents is 6.27 times compared to lighter traffic flows. This study aimed to determine the factors associated with deaths due to traffic accidents in Muaro Jambi Regency in 2019-2021.

METHODS

This study design was a case control. The research used secondary data source from traffic accident case reports in the Muaro Jambi Resort Police working area in 2019-2021. The population was all traffic accidents that occurred in Muaro Jambi Regency in 2019-2022 totaling 1,224 cases. The case group was accident victims who died with the inclusion criteria being having a complete recorded police report and the exclusion criteria not using a motorized vehicle. The control group was victims who did not die, namely victims with minor injuries and serious injuries with the inclusion criteria being having a police report that was completely recorded and the exclusion criteria not using a motorized vehicle. Based on these criteria, the population that meets the criteria (eligible) was 1,064 victims.

The total sampling technique was used for the case group and simple random sampling for the control group, with a case:control ratio of 1:2. Matching control samples were carried out for cases based on the location where the traffic accident occurred, namely the sub-district. Meanwhile, to control confounding, multivariate analysis was carried out at the data analysis stage. The samples used in this study totaled 483, with 161 cases and 322 controls.

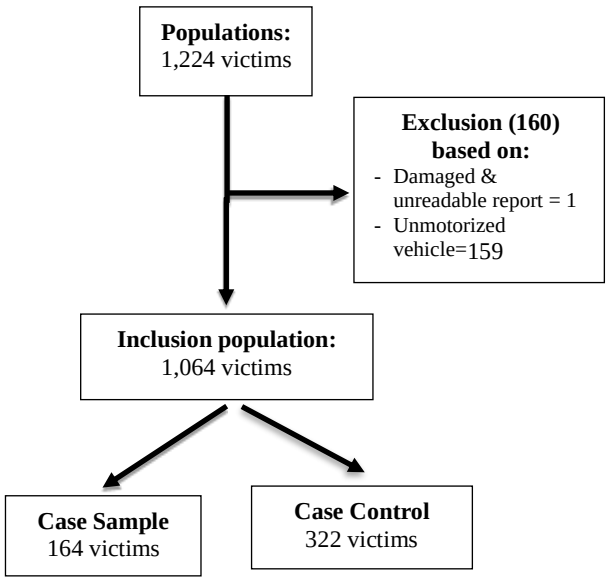

Figure 1. Population and Sample Graphs

The dependent variable was the incidence of death among traffic accident victims in Muaro Jambi Regency in 2019-2021. The independent variables studied were age (18-30 years, >30 years, and <30 years), gender (male and female), victim role (driver and passenger), vehicle type (two-wheeled, >4-wheeled, and four-wheeled), direction of collision (frontal collision and non-frontal collision), day (weekdays and holidays), time of accident (afternoon, morning, evening and early morning), weather (clear and not sunny), type of road surface (asphalt and unpaved), traffic flow

(medium-busy and slow or quiet), availability of road markings (none and present), and road shape (straight and curved). Data analysis used the Chi-square test and multiple logistic regression using SPSS software. This research was approved by the Jember University Public Health Research Ethics Committee (letter number No. 432/KEPK/FKM-UNEJ/VI/2023) on June 26 2023.

RESULTS

Accident victims who died were more likely to be in the age group >30 years (48.45%), male (83.85%), and driving as a driver (84.38%). More deaths occurred when people used two-wheeled vehicles (88.82%), and those who experienced non-frontal collisions (69.35%). Then, more deaths occurred on weekdays (65.22%), during the day at 12.00-17.59 a.m (37.27%), in sunny weather (80.00%), on paved road surfaces (92.59%), when traffic flow was light (61.83%), they occurred more often in locations where there were road markings (62.22%), and on straight roads (73.58%) (Table 1).

There was a relationship between age (age > 30 years OR= 2.03; 95% CI= 1.16–3.55; age 18-30 years OR= 2.10; 95% CI=1.18–3.73), gender (OR= 1.89; 95% CI= 1.16-3.08), victim role (OR= 3.17; 95% CI= 1.95-5.13), type of vehicle (two-wheeled OR= 2.35; 95% CI= 1.14–4.82; wheels > 4 OR= 1.40; 95% CI= 0.49 –4.03), and traffic flow (OR= 1.74; 95% CI= 1.11–2.73). The results of this analysis were continued to the multivariate analysis stage. Variables that have a P-value <0.25 are included as multivariate candidates (Table 1).

There were differences in the proportion of deaths according to the age, where the victims who died were more likely young aged 18-30 years and >30 years <18 years in the case group 13.04% people, and in the control group 23.60%). There was a relationship between the age group and death due to traffic accidents. Victims aged 18-30 years were 2.1 times more likely to die than victims aged <18 years (OR= 2.10; 95% CI= 1.18–3.73; P= 0.01). Also, victims aged >30 years also had a two times greater risk of dying than victims aged < 18 years (OR= 2.03; 95% CI= 1.16–3.55; P= 0.01). Furthermore, the test results also showed that there was significance between gender and traffic accident victims with death, namely with P = 0.01. From statistical tests, it was found that male traffic accident victims had a risk two times greater than female victims (OR= 1.89; 95% CI= 1.16-3.08).

The victim role was proven to be related to traffic deaths, with P-value= 0.01. Motorists who drive were 3.17 times more likely to die than passengers when involved in a traffic accident (OR= 3.17; 95% CI= 1.95-5.13). The results of this study also found that the type of vehicle was related to death due to traffic accidents. Two-wheeled vehicles were proven to be significantly related to deaths due to traffic accidents (P= 0.02). However, there was no relationship between > 4-wheeled vehicles and the incidence of death compared to four-wheeled vehicles, although there was a tendency to increase the risk of death for accident victims. The results of the analysis show that two-wheeled drivers were 2.35 times more likely to die than four-wheeled drivers (OR= 2.35; 95% CI= 1.14–4.82 (Table 1).

The results of this study also found that the traffic flow was proven to be significant with a P-value= 0.02. Accident victims when traffic flow was moderate to busy were 1.74 times more likely to die than accident victims when traffic flow was light (OR= 1.74; 95% CI= 1.11–2.73).

However, for collision direction, accident day, accident time, weather, road surface type, road markings, and road shape, no significant relationship were found. There was a tendency to become a risk factor based on the odds ratio value, namely frontal collisions, accidents occurring during work days, during the day, not sunny weather (rain, smog, and cloudy), and straight road shapes.

Factors related to the incidence of death due to traffic accidents were age, victim's role, traffic flow, and road shape. Victims aged >30 years were 1.61 times more likely to die and victims aged 18-30 years were 1.92 times more likely to die than victims aged <18 years after controlling for the variables of victim role, traffic flow and road shape. The results also show that the victim's role as a driver was 3.14 times more likely to die than a passenger after controlling for age, traffic flow and road shape. Then, traffic accidents that occur when traffic was busy were 1.64 times more likely to cause death than when it was quiet after controlling for age, the role of the victim, and the shape of the road. Accidents on straight roads are 1.23 times more likely to cause deaths than on curves after controlling for age, victim role, and traffic flow (Table 2).

Table 1
Results of Bivariate Analysis of Death Victims from Traffic Accidents in Muaro Jambi Regency in 2019-2021

Variables	Traffic Accident Victims				Total		OR (95% CI)	p- value
	Cases		Control					
	n	%	n	%	n	%		
Age (n=483)								
18-30 Years	62	38.51	107	33.23	169	34.99	2.10 (1.18–3.73)	0.01
>30 Years	78	48.45	139	43.17	217	44.93	2.03 (1.16–3.55)	0.01
<18 Years	21	13.04	76	23.60	97	20.08	Ref	0.03
Sex (n=483)								
Male	135	83.85	236	73.29	371	76.81	1.89 (1.16-3.08)	0.01
Female	26	16.15	86	26.71	112	23.19	Ref	
Victim's Role (n=482)								
Driver	135	84.38	203	63.04	338	70.12	3.17 (1.95-5.13)	0.00
Passenger	25	15.63	119	36.96	144	29.88	Ref	
Vehicle's Type (n=483)								
Two-wheeled	143	88.82	256	79.50	399	82.61	2.35 (1.14–4.82)	0.02
>4-wheeled	8	4.97	24	7.45	32	6.63	1.40 (0.49–4.03)	0.53
Four-wheeled	10	6.21	42	13.04	52	10.77	Ref	0.04
Direction of Collision (n=380)								
Front Collision	38	30.65	70	27.34	108	28.42	1.17 (0.73–1.88)	0.58
Non-Front Collision	86	69.35	186	72.66	272	71.58	Ref	
Day of Accident (n=483)								
Weekdays	105	65.22	202	62.73	307	63.56	1.11 (0.75–1.65)	0.66
Weekend	56	34.78	120	37.37	176	36.44	Ref	
Time of Accident (n=483)								
Noon (12.00-17.59)	60	37.27	106	32.92	166	34.37	1.01 (0.42–2.42)	0.99
Morning (06.00-11.59)	42	26.09	105	32.61	147	30.43	0.71 (0.29–1.73)	0.45
Night (18.00-23.59)	50	31.06	95	29.50	145	30.02	0.94 (0.39–2.27)	0.88
Early (00.00-05.59)	9	5.59	16	4.97	25	5.18	Ref	0.52
Weather (n=480)								
Foggy	32	20.00	57	17.81	89	18.54	1.15 (0.71–1.87)	0.65
Clear	128	80.00	263	82.19	391	81.46	Ref	
Road Surface Type (n=423)								
Asphalt	125	92.59	267	92.71	392	92.67	0.98 (0.45–2.15)	1.00
Non-asphalt	10	7.41	21	7.29	31	7.33	Ref	
Traffic Flow (n=391)								
Moderate to Busy	50	38.17	68	26.15	118	30.18	1.74 (1.11–2.73)	0.02
Slow	81	61.83	192	73.85	273	69.82	Ref	
Road Marking (n=125)								
Not Available	17	37.78	34	42.50	51	40.80	0.82 (0.39–1.74)	0.74
Available	28	62.22	46	57.50	74	59.20	Ref	
Road Shape(n=480)								
Straight	117	73.58	215	66.98	332	69.17	1.37 (0.90 – 2.10)	0.17
Curved	42	26.42	106	33.02	148	30.83	Ref	

Table 2
Final Model of Death Victims from Traffic Accidents in Muaro Jambi Regency in 2019-2021

Variable		B	*p-value*	OR	95% CI	*p-value* (Omnibus)	Overall percentage
Age	18-30 years	0.66	0.05	1.92	1.01 - 3.68	0.00	68.12
	>30 years	0.48	0.14	1.61	0.85 - 3.04		
Victim's role as driver		1.15	0.00	3.14	1.87 - 5.44		
Moderate to busy traffic		0.49	0.04	1.64	1.03 - 2.62		
Straight road		0.21	0.39	1.24	0.77–2.00		
Constant		**-2.30**	**0.00**	**0.10**			

The dominant factor in the incidence of death due to traffic accidents was the role of the victim, where the role of the victim as a driver was 3.14 greater risk than that of a passenger after controlling for the age, traffic flow and road shape. The omnibus P-value in the final model was 0.01, which means that the model formed was significant in predicting the incidence of death due to traffic accidents which consists of four variables, namely driver age, driver role, traffic flow and road shape. The overall percentage value of the final model was 68.12%, which means that the model formed can estimate the variability in the incidence of deaths due to traffic accidents of 68.12%. However, the remaining 32.88% was obtained due to other variables not examined in this study.

DISCUSSION

The victim's role as driver and passenger is related to the sitting position when driving. This can have an effect if there is a collision or falls during an accident. The direction of a collision from the front or side can cause the driver to suffer more serious injuries than the passenger. This is because the driver's sitting position when driving is at the front (two-wheeled vehicles) or at the front on the right (four-wheeled vehicles or more). When a collision occurs from the front or side, the driver is the first to receive the impact of the collision. Leonavičienė et al (18) stated that frontal collisions were a risk factor for death due to traffic accidents.

Apart from that, aggressive driving includes driving in an unsafe manner and not paying attention to other road users such as breaking red lights, using the wrong road lane, not maintaining distance, or driving behind other vehicles at a very close distance (tailgating), turning in an inappropriate manner and not obeying traffic rules. Road rage or violent behavior exhibited by a driver, such as violent gestures, making physical and verbal threats, and demonstrating dangerous driving aimed at other drivers to intimidate or vent frustration are also factors (19).

Human error in two-wheeled and four-wheeled vehicle drivers is caused by recognition error and decision error factors (20). Recognition error is a driver's error when he is unable to focus his concentration due to distractions from outside or within himself. Then, decision error is a driver's mistake in deciding, namely speeding, and misestimating the behavior of other drivers. Based on the analysis of Azeze et al (21), speeding behavior has a significant relationship with deaths due to traffic accidents. Driving behavior at normal speed (not speeding) can reduce the risk of death by 85.50% compared to drivers who speed.

This research conducted a stratification analysis between the role of the victim and the death of accident victims stratified by age, traffic flow and road shape. The result is that the proportion of victims as drivers who died was greater in the 18-30 years age group (88.71%) compared to the >30 years (88.31%) and <18 years (57.14%) age groups. Furthermore, the proportion of drivers who died was higher in locations with medium-busy traffic (88.00%) than in light traffic (82.72%). Then, the proportion of drivers who died as a result of accidents occurred more often in locations with straight roads (85.34%) than on curves (80.95%).

Logistic regression analysis by Al-Aamri et al (22) estimated age and gender on the severity of injuries due to traffic accidents, controlled for risk behavior, individual characteristics, vehicles, roads, traffic, environmental conditions and geographic location. This research produced a young group and male as the dominant factor. The probability of experiencing an injury resulting in death is more likely for those aged 20-24 years. Then, the possibility of experiencing a serious paralyzing injury is more likely for those aged 25-29 years. The high rate of traffic accident fatalities is mostly caused by speeding behavior by young men aged 20-29 years.

The research results of Purnomo et al (23) showed that there is a close relationship between speed and accidents that cause death. The high number of light and heavy vehicles on one road also increases the possibility of traffic accidents considering that there are differences in speed and size between the two types of vehicles.

When on a straight road, drivers tend to travel at a faster speed than when cornering. At the time of a corner, the driver must slow down the vehicle to make the turn. The research results of Purnomo et al (23) explained that road geometry and vehicle condition are the main factors in the occurrence of accidents on toll roads. The straight shape of the toll road influences the driver in regulating the speed of his vehicle. As previously explained, speeding driving behavior is more risky for death (24).

Fatigued drivers also affect the risk of death from traffic accidents. Regression model analysis carried out in the research of Azeze et al (21), suggests that driver fatigue has a significant impact on the number of deaths per accident. For drivers who were fit (not tired), the number of deaths decreased by 85.40% compared to drivers who drove while tired (controlled for other variables).

Human error and driver negligence are not the only factors that contribute to the traffic accidents. Traffic accidents must be seen as a problem that requires immediate action to reduce health, social and economic impacts or losses (25).

Based on the literature, one possible reason for the high risk of death for drivers can be seen from the severity of the injuries experienced by the victim. Sae-Tae et al. (26) stated that drivers (79.80%) experienced more serious injuries than passengers (14.90%). A cohort study by Kamabu et al (27) showed that traffic accident victims who had severe injuries were 15.63 times more likely to die within 24 hours than patients with moderate injuries.

In this study, data were analyzed on the location of injuries to body parts experienced by death victims. The majority of injuries experienced were head injuries (37.66%) and other injuries (28.57%). This result is the same as research by Shribhagwan et al (28) which stated that the most common cause of death in traffic accidents was due to head and neck injuries (57.50%). head and chest injuries (31.50%) and abdominal injuries (11%). Based on research by Kraonual et al (29), head or neck injuries are the type of injury that has the greatest risk of causing death in accident victims compared to other types of injuries (OR 1.88; 95% CI 1.31-2.70; P< 0.00).

In Mengistu et al research (30), pre-hospital care was a risk factor for death in traffic accident victims. Using a multiple logistic regression model, the study stated that accident victims who did not receive ambulance service had a three times greater risk of dying within 24 hours of the accident. This research cannot analyze the involvement of ambulances in treating accident victims. However, this study analyzes the location of the victim's death and found 47.46% of victims died on the spot. Meanwhile, the rest died in hospitals, health facilities, or were on their way to health facilities.

With the above results, it is hoped that the government or the parties involved can handle traffic accident victims in accordance with the Presidential Regulation of the Republic of Indonesia Number 1 of 2022 concerning the National General Plan for Road Traffic and Transportation Safety (RUNK LLAJ for ensuring Traffic and Road Transportation Safety (KLLAJ). The five pillars of Road Traffic and Transportation Safety (KLLAJ) are safe systems, safe roads, safe vehicles, safe road users, and handling accident victims.

The government needs to increase the provision of education about road safety using innovative and creative educational media such as social media, selecting and using road safety ambassadors, especially education given to targets aged < 30 years. The government also needs to install warnings or traffic signs, especially on straight roads to control or reduce speed when driving.

However, it is important for drivers to use traffic safety equipment when driving and always be alert and exercise increased caution to avoid traffic accidents which result in health problems, disabilities and can even take the driver's life.

Research Limitations

This research is limited in establishing a full model and there is the possibility of information bias. Variables depend on available reports, making it difficult for researchers to develop variables to form a full model. These variables include driver behavior and compliance with traffic rules, type of vehicle involved in the collision, road quality conditions, type and quality of traffic signs and road markings, severity of injury, and length of time to get help. Then, the completeness of the data analyzed depends on the role of the Muaro Jambi Resort Police Traffic Unit in carrying out investigations, concluding the causes of accidents, and recording traffic accidents. Therefore, there may be information bias, namely errors in collecting data on traffic accident reports from both

the police and researchers which cannot be controlled optimally.

CONCLUSION

There was a relationship between age, victim role, traffic flow, and road shape on deaths due to traffic accidents in Muaro Jambi Regency in 2019-2021. The dominant factor that causes victims to die as a result of traffic accidents was the victim's role as a driver. The role of a driver increases the risk of death due to a traffic accident by three times compared to the role as passenger after being controlled by age, traffic flow and road shape.

Drivers are advised to wear traffic safety equipment such as helmets for two-wheeled riders and seat belts for four- or more-wheeled riders. Motorists must always increase vigilance and caution when driving, especially when traffic is busy and when driving on a straight road.

CONFLICT OF INTEREST

There is no conflict of interest in this research.

AUTHOR CONTRIBUTIONS

All authors worked in this article and were responsible for its content. SA: conceptualization, methodology, software, writing. UK: writing-reviewing, editing, and supervision. RH: administration preparation, editing, and supervision.

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