THE PROBABILITY OF THE TRAFFIC ACCIDENTS ON STUDENTS

by Rachmah Indawati

THE PROBABILITY OF THE TRAFFIC ACCIDENTS ON STUDENTS

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Abstract

The incidence of motor vehicle accidents increases sharply, especially with the students as the driver. Some causing factors of this accident are human error, problem on the vehicle, and environmental conditions. All these factors can be assumed to be the risk factor of accident occurrence on the highway either as a single or joint factor. To estimate probability of the traffic accidents on the rider. This research was an observational research conducted by cross-sectional. The samples were 242 students as motorists in Surabaya. The sampling technique used Simple Random Sampling. The data collection was done by conducting interviews using a structured questionnaire. Students as a transition age group had an average motor driving experience of 5.41 years. An average age of 20.96 years and range 18-26 years. The gender carried different risks according to all incidents. The combined factors have probably that can be fatal to the safety of the rider (individual, vehicle, and environmental conditions). If the contribution of all factors equal to 85% then the chance of a traffic accident of 0.399 (39,9%). The need for knowledge about driving management on the highway.

Keywords: Probabilities, risk factors, accidents, students

Introduction

Motor vehicle accidents are still a problem in many countries especially developing countries.[1,2] According to WHO data in August (2012)[3] it was estimated that 1.17 million deaths occur annually worldwide due to motor vehicle accidents and about 70% of deaths occur in developing countries.

In Surabaya, day by day, the number of population and motor vehicles are increased massively. The number of traffic accidents in 2011 was 1,065 cases from 711 cases while in 2010 it was increased up to 57.3%.[4] Based on the data, it showed that the percentage of cases was almost 50% in the group of students (13-17 years) and university students (18- 25 years) or dominating from the whole accident case.[18,19]

Several multidisciplinary studies have suggested that human, vehicle and environmental characteristics often interact very complex.[5-8] It was mentioned in the study that psychological variables (such as individual personalities played a significant role in the emergence of risky behavior.[9-11]

Various variables can be observed from the accident. For example, the environmental conditions that were not appropriate when it was compared with the increasing volume of vehicles. In addition, the vehicle conditions provided a different risk factor for the user, especially if the individual behavior also had a

risk factor such as operating the vehicle outside the speed limit, listening to loud music, or ignoring traffic signs that all of these actions may lead to the risk of road accidents.

In order to present the framework of thinking from more realistic assumptions through a combination of several factors, the essential element of the approach is to look at a simple relationship on data through a probability approach. The risk is a condition that may lead to danger to motorists.

The probabilities of an accident were assumed to be mutually exclusive (accidental and non-existent). If two events are mutually exclusive then the probability that one event or another will arise is the sum of each opportunity.[12,13] The accident occurrences occur randomly and each event has a probability, then it can be determined the probability of the number of incidents. The approach used a binomial probability approach.

The objectives of the study were to estimate probability of the traffic accident simultaneously. The study was expected to provide information on the estimation of accident risk factors while driving on the highway and as an indicator to determine the number of public health problems caused by accidents on the highway.

Matherials and methods

This research was an observational research conducted by crossectional. It means that the information about driving behavior, vehicle condition, and road environment was collected by single observation. the data collection was conducted by conducting interviews by using a structured questionnaire. Meanwhile, the instrument testing was done to see the validity and reliability (n = 20 students).

The sample was the student at Airlangga University Surabaya who used the motor vehicle. The sampling technique was done proportionally by Simple Random Sampling on each faculty with the sample size was 242 students.

The research variables were:

1. Individual variables included the driving habit (receiving mobile phones, listening to music, speed limits), dangerous riding actions (cutting roads, not blaming nighttime lights, non-obedient traffic signs). For every question, the respondent replied with 'no' or 'yes'.
2. Environmental variables related to individual responses to the condition of the road and its surrounding including the street lighting, signs, the traffic signs, the travel times, and the weather. For every question, the respondents answered with 'less' or 'good'.
3. The variable of vehicles included vehicle fittings (mirrors, lights) and vehicle maintenance (oil, brake, gasoline), and how old the vehicles. For every question, the respondent replied with 'no' or 'yes'

After finishing the data collection, the data then re-examined to make sure the validity and its completeness. Further data analysis was done by using a computer by building the distribution frequency and combining the distribution of several factors with the probability distribution approach. For determining the amount of the risky data, the data was calculated on the outside boundary $\bar{x} \pm 2\sigma$. Furthermore, to calculate the chance of accident risk, the Binomial probability approach was used where n = number of accident. Each event was differentiated into an accident (p) and no accident (q), p = chance of accidents (values vary by factor). P $_{(accident)}$ = p and P $_{(no\ accident)}$ = 1-p = q was fixed every time the event was repeated, and all the results appeared independently of one another. The statistical calculation was $P(X = x) = \binom{n}{x} p^x q^{n-x}$.[14]

Results
The individual conditions
The majority of the sample were female students 52.9% and men 47.1% with an average age of 20.96 years (std.deviation of 0.108 and range 18-26 years). Students have an average motor driving experience of 5.41 years

(std.deviation 0.172 and range from months to 15 years). Some of the individual characteristics can be seen in Table 1. The result shows that most male commit traffic violations and have more accidents.

Variable	Average	std. deviation	Range
Age (years) Male Female	21.2 20.8	1.70 1.65	18-26 18-25
Number of ticketed by police in 1 year (times) Male Female	1.83 0.81	2.83 1.22	0-20 0-6
Number of accident in 1 year (times) Male Female	1.87 1.78	0.66 0.55	1-4 1-3

Table 1. The differences in individual characteristics

The environmental conditions

For the condition of street lighting, 62.8% of respondents considered that street lighting was poor and 37.2% said that the street lighting was good. While for the signs and / or traffic signs, most of the respondents (63.2%) considered it as poor and 36.8% considered it as good.

The identification results also showed that good street lighting had a lower risk of the incidence of accidents than in poor street lighting (in women). The presence of good traffic signs/traffic signs had a tendency on decreasing the accident rate.[14] Men were more likely to be at high risk of accidents related to environmental conditions, either at good or poor street lighting. See figure 1.
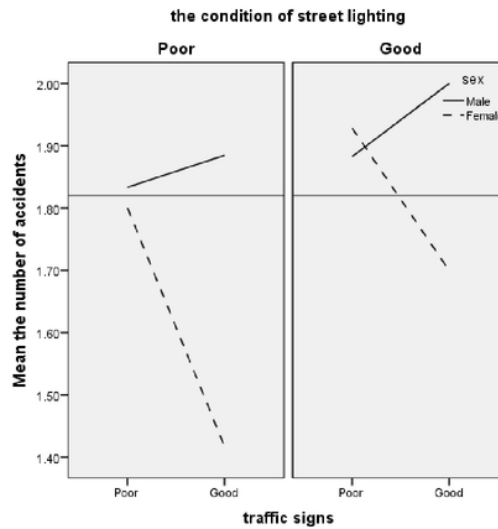

Figure 1. The Graph of environmental characteristic and condition of tranffic signs and incidence of accident based on the gender.

The condition of the vehicle

The condition of the vehicle age which was ≤5 years was mostly (80.2%) and the condition of vehicle age >5 years was 19,8%.

Vehicle Age	Male	Female	Total
Up to 5 years (new) Doing maintainance Not doing maintainance	36 (39.6%) 59 (57.3%	55 (60.4%) 44 (42.7%)	91 (100%) 103 (100%)
>5 years (Old) Doing maintainance Not doing maintainance	5 (18.5%) 14 (66.7%)	22 (81.5%) 7 (33.3%)	27 (100%) 21 (100%)

Table 2. The different vehicle condition based on the individual characteristic

Estimate of probability

Combined of probabilities were the sum of several shared risk factors. The result was a normal distribution model (mean 33.53 and std.deviation 4.245). The area outside the boundary was a combined factor that can be fatal to the safety of the rider and it was found that there are 6 (six) data showing extreme value. The combined factors suggested that

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careless individual behavior, poor vehicle conditions, and poor environmental conditions provided a high chance of traffic accidents (fatal).

The incidence of fatal accidents in developing countries amounted to 85%.[1] In the case where 6 riders drove their vehicle, the chances of having a fatal accident amounted to 0.399 (39.9%). The statistical calculation was $P(X = 1) = \binom{6}{6} 0.85^6 . 0.15^{6-6} = 0.399$. The identification result shows that men are more at risk of fatal accidents. See figure 2.
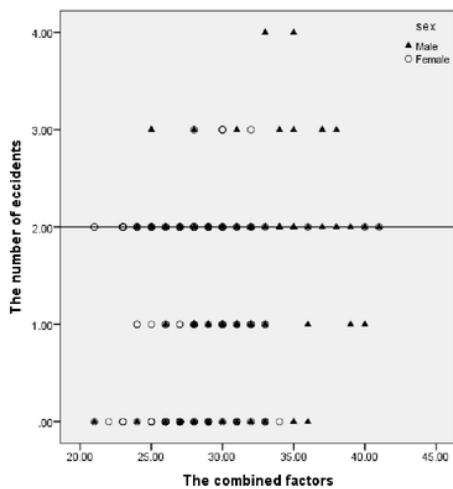

Figure 2. The graph of combined factors spreading based on gender

Discussion

Motor vehicle accidents are the result of several related risk factors. A group of factors can contribute in causing an accident. However, there was a factor that directly causes an accident and several other factors as the indirect cause of accidents. On the one hand, there was interaction with other risk factors. Recognizing risk factors are critical to reducing morbidity and mortality due to motor vehicle accidents. This is an input to the field of public health science for precautionary measures.

The approach was done by identifying on the individual factor. This is because the individual plays a very crucial role as a self-controller either for themselves, environment and, and the vehicle while on the road.[16] Individuals can harm themselves or others (either intentional or unintentional)

In addition, the awareness of traffic rules is a must when individuals are on the road. Thus, in certain areas of traffic situations, one must be able to develop its ability to reduce the danger on the road that threatens either themselves or other road users.

Some strategies need to be considered for the motorists safety. The first is the street surrounding as an important element for driving. In addition, various environmental conditions can impact the type of accident. It means that the rider must have the knowledge to reduce or increase the speed limit during driving.

The second is the individual knowledge of the vehicle conditions. All systems on the vehicle must be complete (such as mirrors, brakes, lights, wheels). Each system has its own function related to the safe driving.If one of this component does not exist or does not work properly it will disrupt the rider. Furthermore, in a sudden situation on the road, the function of the brakes must be able to work properly and the engine condition must be able to transmit when the rider's feet hit the brakes and through a series of systems then each wheel can stop. Every system on the vehicle needed to get an individual attention.[1] Special attention is 12 required for the vehicle maintenance in order to reduce the risk of accidents.

Furthermore, the behavior of driving a vehicle is about how the individual's attitude and actions when operating the vehicle on the highway. Education is a very important element because with education people can understand how to maintain the traffic regularity and safety and ultimately can reduce the risk of accidents.[10]

Conclusions

The estimation results show that the factors are combined then it can provide a high risk.

Acknowledgement

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