Risk Factors of Severity of Road Accident Injury Incidence At Kut Bak district Sakon Nakhon Province, Thailand

By

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Abstract

The study aimed to investigate the situation of road accidents and then the risk factors of severity of road accident injury incidence in Kut Bak District, Sakon Nakhon Province. This retrospective research was studied from 2019 to 2021, Kut Bak Hospital treated 1,113 cases of people injured in traffic accidents. Data were collected from road accident records. All data were analyzed by descriptive statistics, and the risk factors of severity of road accident injury incidence were analyzed by Odd Ratio, 95% Confidence Interval of Odds Ratio.The study results showed that 1,113 people had an accident of males 66.2%, age group between 15 to 24 of 31.9%. The time period of the accident was 4 - 6 p.m. for 18.1%, motorcycle drivers of 85.5%, and without parties for 52.20%. They were not wearing safety helmets of 93.3%, not safety belts of 62.8%, and on the country road of 51.9%. The mind severity level of road accidents of 78.7%, and the high level of 21.3%. Furthermore, the death rate was 19.06 per 100,000 population. The comparison of the severity of road accident injury incidence was lower than the standard of Thailand (22 per 100,000 population (p<0.05). And then, the risk factors affecting the severity of road accident injury incidence were personal factors, physical, environmental, and protective factors (p<0.05). Most of injuries from road traffic accidents are mind severity level. The main reasons of them are personal factors, physical factors, and legal factors, which affect to severity of accident victims.

Keywords: accident, road traffic injury, severity of accident, risk factors

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Introduction

Road traffic accidents are a global problem in the society that uses cars for transportation and has a continuous trend. There are fatalities in road accidents, resulting in enormous economic and social losses. From the Global Situation of Road Safety Report 2019 by the World Health Organization (WHO) found that the injuries and loss of life from road accidents in the world had a mortality rate of 16.7 per 100,000 population. Thailand had the 18th highest road accident death rate in the world and is estimated to be at 32.2 deaths per 100,000 population. It is the 2nd highest-death country in Asia and the 1st highest in ASEAN, (WHO, 2021; Department of Disaster Prevention and Mitigation, 2021) road traffic accidents from Thailand World Health Organization (WHO) and the World Bank estimate that Thailand's road damage was estimated at 500 billion baht, resulting in enormous economic, and social losses. This affects the image of tourism and the credibility of foreigners' safety measures and causes tourists to life insurance before coming to Thailand. (Road Safety Administration Center, 2011; Chantith & Permpoonwiwat, 2020)

The death rate from road accidents of Sakon Nakhon Province has a tendency to increase every year. In the year 2018 and 2020, it was found that there were 303, 317 and 273 deaths from road accidents, respectively. The year 2021, the death rate from road accidents per 100,000 population was as high as 26.5 per 100,000 population. (targets no more than 18 per 100,000 population), especially during the Songkran festival in 2017, 13 deaths and in 2018, 12 deaths (Department of Disease Control, 2021; Road Safety Administration Center Sakon Nakhon Province, 2019)

Kut Bak District, Sakon Nakhon Province found that the number of injuries and deaths exceeded the standard every year, between 2018 and 2021, the death rates from road accidents were 38.91, 32.60, 33.29, and 57.69 per 100,000 population, respectively, were higher than the threshold. Therefore, it is classified as a very high-risk area. (Academic Center for Road Safety, 2017; Accident Information Center to strengthen road safety culture, 2021) from the situation of accidents and deaths from road accidents increasing trend every year, because the most important factors involved in driver injury severity. The statistical analysis reveals that factors such as lateral crosstown roads, low traffic volumes, higher percentages of heavy vehicles, wider lanes, the non-existence of road markings, and finally, infractions, increase the severity of the drivers' injuries(Casado-Sanz, N. et al., 2020). In addition, the factor within a person not wearing a helmet, drinking alcohol, and not wearing a seat belt is a risk factor for the severity of an accident (Kedthongma & Phakdeekul, 2022).

The weakness of the management system in preventing or solving the problem of road accidents was the lack of analysis of the situation. Essential factors of accidents that affect the severity of accident victims lead to systematic planning, implementation, and evaluation therefore, the aim of this study was to explore the situation of road accidents and risk factors for the severity of road traffic accidents in rural areas.

Research Methods

Ethical consideration

This study has also been approved by Kasetsart University Chalermphrakiat Sakon Nakhon Province Campus, Thailand for Research Ethics in Humans under ethical exemption (KUREC-CSC65-008). Participants were informed of the study's goals and expected outcomes, and each participant was assured that their information would be kept confidential and that participating posed no risk.

Study Design

This Retrospective cohort study was used the data set from Road Accident Death Investigation Form (RTI Investigation form), Health Region 8 (Health Region 8, 2022), during January 2019 to December 2021 (Road Accident Prevention Center Kut Bak District, 2021). Road accident victims of thai citizen aged 15 years and treated at Kud Bak Hospital. Sakon Nakhon Province from January 2019 to December 2021 were selected as study population.

Sample Size and Sampling Population

A total of 1,113 volunteers by Inclusion criteria were 15 years old, diagnosed by a physician with the ICD10 diagnostic code V01-V99, and treated at Kud Bak Hospital. Sakon Nakhon Province from January 2019 to December 2021 and the exclusion criteria were incomplete data. cannot be analyzed in the model. From the inclusion and exclusion criteria.

Data Collection

The tool of this study was the data collection of road traffic accidents in Kud Bak Hospital. Sakon Nakhon Province, data were collected by Road Accident Death Investigation Form (RTI Investigation form), Health Region 8 (Health Region 8, 2022), consists of 2 parts. Part 1 questions on driver (interview driver or someone closed in the event of the driver's death) contains personal information of the driver, the physical and mental condition of the driver at the time of the accident types of vehicles, road types, and risk behaviors that increase violence. Part 2 questions on passengers/pedestrians (interviews from relatives or closed ones) contains personal information of passengers/pedestrians, location of accident/death vehicle type, factors that increase the severity of an accident.

Classification of severity of injuries: Injury Severity Score

1   Mind Injury = There is a small wound, go home.
2   Moderate Injury = The injury was mild and had to be hospitalized.
3   Serious Injury = Suffered serious injuries and had to be referred.
4   Severe Injury = Injured at a very serious injury level, died at the scene, or died at the hospital, or died after an accident from an accident injury.

The questionnaire was check the accuracy of content by five qualified persons. Content validity test results of questionnaire content tools. The resulting Index of Item-Objective Congruence (IOC) value at 0.60 – 1.00

Statistical analysis

Statistics analysis was performed by descriptive statistics by Frequency, Percentage, Standard Deviation, Median, Maximum and Minimum, the risk factors of severity of road accident injury incidence analyzed by Odd Ratio, 95% Confidence Interval of Odds Ratio.

Results

1. escription of the Study Population
1.1. General characteristics of accidents

A total of 1,113 participants were involved in this study, most of the injured in road accidents were 737 men, representing 66.2%, aged 15-24 years 31.9% . (mean age 38 years [SD. = 18.00] ,Min. = 15.00, Max. = 86.00) hired workers 59.2%, time of accidents was at 4-6 p.m. 18.1%, drivers 85.5%, with motorcycles were 85.30%, area at country road 51.9% and the time of accident had a bright light 72.15%. (Figure 1)
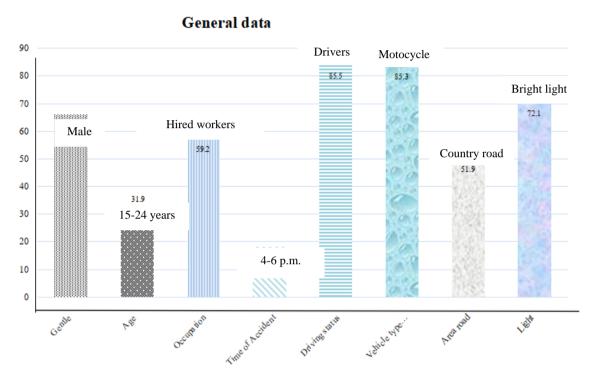

Figure 1. *Average percentage of road accident victims in Kut Bak District, Sakon Nakhon Province (N=1,113)*

1.2 Physical and environmental factors

The time of the most accidents was at 4-6 p.m. 18.1%. In addition, most accidents occurred during the day 67.57% and at night 32.43%. It was found that the most accidents involving motorcycles were 85.30%, followed by bicycles, which accounted for 5.3%, drivers, 85.5%, passengers 13.3% and pedestrians 1.2%. Vehicle it was found that the vehicles involved in the accidents were motorcycles 52.2%, followed by the driver falling by himself, hitting the fence, wall, house, lamp post, signage, pets, dogs, buffaloes, chickens, cows, cats, representing 20.2%, accident on the country road 51.9%, followed by municipal road 36.9%. Moreover, there was a light at the time of accident 72.1%. (Figure 1)

1.3 Factors for preventive measures

Risk behaviors, it was found that 93.3 percent of the accident victims did not wear a helmet, 62 % did not wear a seatbelt, and 66.6% did not have a license to drive a car. Fasten seat belt and had a driving license of 6.7, 37.2, 70.9 and 33.4 %, respectively. Most of the road traffic injured 70.9% did not drink alcohol, and only 29.1% had a history of alcohol consumption. (Figure 2)
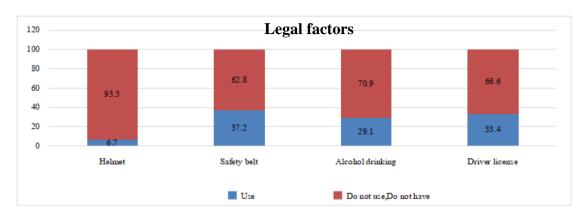
Figure 2. *Percentage of compliance with preventive measures of road accident injuries in Kut Bak District, Sakon Nakhon Province (N=1,113)*

1.4 The severity of road traffic accidents
Most of the accident victims sustained mind injury at 72.9%, followed by accidents with severe injury and severity at 19.6%, and died 1.7 %. (Figure 3)
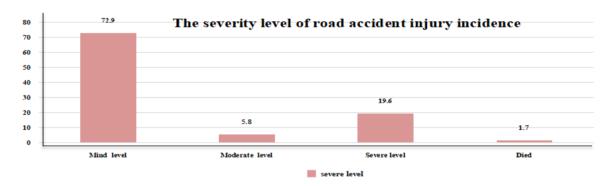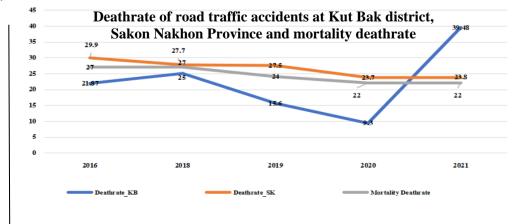

Figure 3. *Percentage of the severity of road traffic accidents of those injured in road accidents in Kut Bak District, Sakon Nakhon Province (N=1,113)*

1.5 Comparison of road accident death rates by independent accident areas
When compared the mortality rates from road accidents by independent accident areas. The mortality rate from road accidents at the area level of Kut Bak District, Sakon Nakhon Province and Thailand found that the area of Kut Bak District was mortality rate from road accidents higher than Sakon Nakhon province and Thailand. (Figure 4)

Figure 4 *Comparison of road accident death rates by independent accident areas in Kut Bak District, Sakon Nakhon Province and Thailand*

2 Multilevel Analysis

The analysis risk factors affecting the severity of road accident injury incidence. in Kut Bak District, Sakon Nakhon Province.The results showed that risk factors affecting severity of road accident injury incidence in Kut Bak District, Sakon Nakhon Province were personal characteristics, physical, environmental and protective factors. Gender was difference in severity of road accident injury incidence. Males were more likely to have a serious incidence of injuries from road accidents 12 times more than females (95%CI = 0.39 - 0.76, p < 0.0001). Road accident injuries 6 times more than the sample aged 15-44 years (95%CI = 1.09 - 1.99, p < 0. 009*).

When analyzed the road type at the accident site, it was found that the secondary road types in the sub-district villages were statistically 4 times more likely to have a statistically significant incidence of road injury severity than highways, rural roads and other road types (95%CI = 1.01 - 1.80, p < 0.039*). When analyzed the factors in preventing injuries from road accidents, it was found that not wearing seat belts There was a greater likelihood of serious injury incidences from road accidents than those with a seatbelt 5 times (95%CI = 0.29 - 0.81, p < 0.018*) alcohol consumption the likelihood of serious injury in road accident incidence is higher than for non-alcoholic drinkers 26 times (95%CI = 0.34 - 0.62, p < 0.001**) . (Table 1)

Table 1. *Factors affecting the severity of accidents, independent variables in the experimental group and the control group (N = 1,113)*

Related Factors	The severity of the injury mild to moderate (percentage)	Serious to Severe (percentage)	OR	95%CI	(P-value)
1.Gentle -Male -Female	557 (75.60) 319 (84.80)	180 (24.40) 57 (15.20)	0.55	0.39-0.76	0.001**
2.Age group -15-44 years - 45 Years upper	572 (81.10) 304 (74.50)	133 (18.90) 104 (25.50)	1.47	1.09-1.99	0.009*
3. Area -Country road -Other road	469 (81.10) 407 (76.10)	109 (18.90) 128 (23.90)	1.35	1.01-1.80	0.039*
4. Safety belt - Not Safety belt - Safety belt	14 (51.90) 14 (87.50)	13 (48.10) 2 (12.50)	0.15	0.29-0.81	0.018*
5. Alcohol - drinking - No drinking	223 (68.80) 653 (82.80)	101 (31.20) 136 (17.20)	0.46	0.34-0.62	0.001**

P-value< 0.05
*P-value< 0.01

Discussion

This present study has described the circumstantial threads the majority of road accident victims were males 66.2%, aged between 15-24 years 31.9%. The males were risk-taking, exciting, and fast driving and the number of drivers on the road was more males or take longer to drive. Therefore, men are more likely to have accidents than women, which agreed with the WHO summary of Road Safety: fact sheet showed that the number of deaths

caused by road traffic accidents was 15-29 years old and the fourth male. Men are more prone to accidents than women because of their age, emotions, desires, and respect for friends. Therefore, teenagers are most prone to accidents (Srisawang, 2018), and the majority of road accident victims were males (Wichaiwong & Duangsong, 2018). The factors associated with severe injuries on the personal side were those aged 36 years and over. As many research results were consistent road accidents have been the result of driving system malfunctions which can be found in its components -vehicle – road infrastructure – road user and their interactions (Vlkovský et al., 2017; Bucsuházy et al., 2020; Kamrani et al., 2020; Azevedo-Sa et al., 2021; Zaidan et al., 2022).

The most accident time was 4-6 p.m. 18.1% because that time was after work causing exhaustion from working hard all day when driving to travel home, it is easy to cause accidents. In addition, most accidents occur during the day more than at night (Thasai et al., 2020), and the roadway lights are not bright, which is 16.22 times more likely to have an accident risk behavior than having a bright roadway light. The result is similar in China showing the time periods of 2:00–4:00 and 14:00–16:00 every day, which was the most prone to accidents. The driver's speeding, fatigued driving, and vehicle failure were the direct causes of most accidents (Yan et al., 2021).

Most motorcycle accidents Including the performance of the brake system of the motorcycle may be less effective. Therefore, motorcyclist accidents height consistent with the results of Thai Police 2018-2020 found that the number 1 vehicle in accidents every year is a motorcycle. And from this study, it was found that accidents Most of them occur without parties, 20.20% and 18.80% of these fall by themselves (Lam et al., 2019; Lin et al. ,2022).

The accidents did not wear helmets, 93.30% not wearing a seat belt, 62.80% don't drink alcohol, and 70% did not drink alcohol. The accident rate of 90 men exceeds 1: 2 women, which is consistent with the data of motorcycle users wearing helmets in Thailand, it was found that the helmet-wearing rate of drivers and motorcycle passengers was 43% only when drivers. In addition, factors affecting the severity of accident were drunk driving, speeding, driving a close-up front, and compliance with traffic rules (Klinjun et al., 2021; Hammad et al., 2019; Iamtrakul et al., 2022.).

Most accidents occurred on rural roads, 69.4%, with minor injuries at 72.90%, and died at 21.20%. It is now well-accepted that unsafe environments lead to a higher of unfavorable safety-related outcomes, such as injuries and accidents (Stamatiadis et al., 2020 ; Zhang et al., 2018; Lobanova & Evtiukov, 2020). The risk factors affecting the severity of road traffic accidents are gender, age, vehicle type, and dangerous behavior, road types and road traffic accidents are the severity of road accident injury incidence (Weber et al., 2018; Dingus et al., 2016). Human errors are the main cause of accidents, such as without a helmet, alcohol drinking, and predictive ability (Chang et al., 2016; Jing et al., 2020). Therefore, the study found that the impact of risk behavior is different, for example, alcohol, drugs, hard hats, seat belts, and road characteristics are not correlated with the severity of the injury. However, the factors associated with the severity of the damage are visibility and the general conditions of the vehicle (Klinjun et al., 2021; Phakdeekul et al., 2011) The main traffic accidents that cause avoidable severe injury and death were Human-error-related factors including speeding and drowsiness, passenger risks included not using a seat belt (Michaud et al., 2016; Sivasankaran et al., 2021).

The risk factors affecting the severity of road traffic accidents that consistent with Domino theory of H.W.Heinrich (Marsden, 2017) and Kedthongma & Phakdeekul (2022) describe the accident as being connected to the safety philosophy by using five dominoes

placed close to each other. When one of them falls, the next domino will also fall. The meaning of the five dominoes is 1) the environment or background of the person (Social Environment of Background) is the social environment. and behavior, 2) defects of person, mental health, and social environment cause a person is a malfunction, such as neglecting safe actions, 3) unsafe acts/unsafe conditions. Unsafe acts that may cause road accidents, such as driving. high speed not wearing a helmet no belt driving while intoxicated, etc. Unsafe environments that may cause road accidents such as bumpy/rough roads tree branches sticking out on the shoulder at night there is no light, 4) accidents are caused by all three factors above. which may result in injury, disability, or loss of life and 5) injury and damage (injury/damage), this can be done by eliminating the factors that cause accidents.

In addition, it is consistent with the Swiss Cheese Model accident theory, (Epidemiological and Intelligence Group Office of Disease Prevention and Control 8, 2019) which explains that Accidents are caused by a combination of mistakes, this concept can be seen that each of us human beings, it is like individual cheese plates with perforations on the plate. These pores are weak points, or personal mistakes if mistakes occur together and then make a red arrow is a danger that occurs and can penetrate from one sheet to another, it is cause accidents or damage. Also agreed with Haddon's Matrix, the concept of injury analysis (Haddon, 1970), shows the relationship between 3 factors people, vehicles, and the environment. It is a factor that affects accidents and injuries and is consistent with the epidemiological theory of road accidents, it is like the occurrence of a disease, that can be explained by epidemiological theory, used to analyze the situation of accidents. The distribution of accidents in terms of time, person, and place, the three epidemiological factors that cause accidents are the human being the driver, the disease-causing vehicle, and the environment, namely road conditions, environment, and law enforcement (Ruankham & Nusorn, 2019)

Conclusion

This current study revealed injuries from road traffic accidents in rural areas were at a mind level. This was mainly due to personal factors, physical thread factors, and legal factors which were important factors in accidents and affect the severity of accident victims. Motorcycles were the main cause of accidents, and it was an accident with no parties (Single Vehicle Crash), (falling himself). The accident occurred with male drivers aged 15-24 years and not wearing helmets. Most of the accidents were caused by the driving behavior of road users themselves, government agencies, local organizations, and all sectors must work together in public relations to educate a group that had high risk in preventing traffic accidents, laws and traffic regulations traffic signs It also encourages personnel in the agency and the public to have traffic discipline and have serious legal measures. Whether it is a campaign to instill a sense of safety in driving seriously and continuously establish measures to enforce helmets or use seat belts to be more effective, such as prohibiting motorcyclists from entering schools, or government offices if they do not wear a helmet by relying on the participation of adults, both the government and the private sector in setting measures and being a good role model for youth.

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