YANGON UNIVERSITY OF ECONOMICS
DEPARTMENT OF APPLIED ECONOMICS
MASTER OF PUBLIC ADMINISTRATION PROGRAMME

ASSESSMENT OF ROAD SAFETY PROBLEMS AND AWARENESS OF ROAD USERS (CASE STUDY IN HLAINGTHARYAR TOWNSHIP)

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MPA 29 (20th BATCH)

MARCH, 2023

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ASSESSMENT OF TRAFFIC SAFETY PROBLEMS AND AWARENESS OF ROAD USERS (CASE STUDY IN HLAINGTHARYAR TOWNSHIP)

A thesis submitted as a partial fulfilment towards the requirements for the degree of Master of Public Administration

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This is to certify that this thesis entitled **"Economic Relations between Myanmar and Russian Federation",** submitted in partial fulfilment towards the requirements for the degree of Master of Public Administration (MPA) has been accepted by the Board of Examiners.

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ABSTRACT

This study is an assessment of traffic safety problems and road user awareness in the eastern part of Hlaing Thar Yar Township. The study aims to identify the factors associated with traffic accidents in the Yangon region and analyse the knowledge, attitude, and practice of road users in East Hlaing Thar Yar Township. A cross-sectional study was conducted among 200 road users in January 2023. The survey design explores whether people who use the road in Hlaing Thar Yar have safety knowledge, a mind-set attitude, and good driving practices. The survey questions are built into four sections. Section A consisted of profiles of road users, and sections B, C, and D asked for the respondents' knowledge, attitude, and practices. A total number of road users who are using roads in East Hlaing Thar Yar township are randomly selected for data collection in this study. The study found that most road users have safety knowledge, a moderate attitude, and good practices. Most of the respondents agreed that many accidents are caused by unskilled drivers and bad behaviour of road users including road conditions. This study reflects the behaviour of road users and can be used to formulate policies, regulations, and standard procedures to prevent road safety problems.

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LIST OF ABBREVIATIONS

ADB	Asia Development Bank
ARRSS	ASEAN Regional Road Safety Strategy
ASEAN	Association of South East Asian Nations
BAC	Blood Alcohol Limit
CBTA	Cross-border Transport Agreement
CSR	Corporate Social Responsibility
DAS	Driver Anger Scale
DBQ	Driver Behaviour Questionnaire
DOA	Decade of Action
DSI	Driving Skills Inventory
GDP	Gross Domestic Product
GMS	Greater Mekong Subregion
LMICs	Low and Middle Income Countries
MOTC	Ministry of Transport and Communications
NRSC	National Road Safety Council
RSM	Road Safety Maturity
RTA	Road Traffic Accidents
RTI	Road Traffic Injuries
SDG	Sustainable Development Goals
UN	United Nations
YRTA	Yangon Road Transportation Authority

CHAPTER I
INTRODUCTION

1.1 Rationale of the Study

Road accidents are a problem faced by most countries around the world. It has become a priority issue for the government for various concerns and impacts on health, economic, and social well-being. A road traffic accident (RTA) could be defined as an accident caused by vehicle collisions on public roads. It is one of the main causes of mortality and disability in the world. The World Health Organization (WHO) estimates that death from road traffic accidents will become the eighth leading cause of death worldwide in 2020. It is estimated that by 2030, road injuries will move into a third place among the leading causes of death around the globe (Global Status Report on Road Safety 2018). Traffic accidents kill about 1.3 million people every year, and more than half of all road traffic accident deaths are among vulnerable road users. It is estimated that more than 3,400 traffic accidents occur per day, causing 30 to 50 million non-fatal injuries each year. The majority of road traffic injuries are associated with 90% of low- and middle-income countries.

Road safety is a complex process that not only depends on technical and environments but in major part on human factors. As the world's population increases, so does the number of road users. As roads are increasingly used to facilitate transport and trade, road safety is a top priority for every country. The movement of vehicles on the roads significantly contributes to the economic development of the country and fulfils an important role in modern society. The number of road accidents in developing countries is increasing every year due to various factors that include weather conditions, location, infrastructure, vehicle technical faults, and drivers' behaviours. Most road users are well aware of the general rules and safety measures while using the road, but it is the carelessness of vehicle users that causes accidents. The main cause of accidents and crashes is mainly human error.

RTA is an accident caused by a vehicle on a public road. RTA is one of the leading causes of death, injury, and disability all over the world. This is dangerous for

global development and has high consequences for poor and vulnerable people. Road accidents not only cause huge economic losses between 1–3% of the annual gross domestic product (GDP) in most countries but also cause emotional and financial stress to millions of families. The Road Safety Annual Report, 2020, said that every year, about 1.4 million people are killed in road crashes and millions more are injured. More than half of all road traffic deaths involve vulnerable road users: pedestrians, cyclists, and motorcyclists. (Road Safety Annual Report, 2020). Without proper action and follow-up, annual road traffic deaths are expected to rise to 1.9 million by 2030, becoming the seventh leading cause of death. (WHO, 2013) Over 1,300,000 people are killed in road traffic accidents (RTAs) around the globe every year. Deaths and injuries from traffic accidents not only cause huge economic loss but also serious physical and mental harm. Road traffic injuries are burdening healthcare systems in countries around the world.

In the ASEAN region, 72,800 deaths and over 1.8 million injuries were recorded, with many resulting in permanent disablement or serious injuries. Most are the riders and passengers of motorized two- and three-wheeled vehicles, bicycle riders, and pedestrians. In recent years, the use of speeding vehicles has increased with the growing problem of accidents. As a direct result of road accidents, the annual economic losses in ASEAN countries are high. Although there are differences in the focus on reducing crashes by country, speeding, and drunk driving, Effective enforcement of laws such as wearing helmets and seat belts reduces fatalities. Therefore, traffic accidents become a global socio-economic problem, and concerned governments and NGOs have to take part in the prevention and alleviation of road traffic accidents.

Myanmar has the second-highest number of road accidents in Southeast Asia, according to a WHO study. Due to the increasing use of bicycles, motorcycles, and tricycles in Yangon, the government is working to reduce accidents by educating road users on road safety and improving road systems. This problem is now especially urgent in Asia, where deaths, injuries, and property damage are rapidly increasing. With its increasing population and crowded nature, Hlaing Thar Yar Township is also affected by RTA every year. Most of the residents are industrial workers and labourers, and it is worth studying the trend of RTA and the causes of RTA in this developing township. The purpose of this thesis is to assess the causes of traffic accidents and explore plans to improve road safety in Hlaing Thar Yar Township.

1.2 Objectives of the Study

- To identify prevalence and factors of road traffic accidents in Yangon region.
- To access the knowledge, attitude, and practices behaviour by road users in Hlaing Thar Yar Township.

1.3 Method of Study

In this study, the descriptive method was used to examine the prevalence and factors of road traffic accidents in East Hlaing Thar Yar Township. The study is based on primary and secondary data sources. The secondary data is collected form Office of Traffic Police in Hlaing Thar Yar Township.

1.4 Scope and Limitation of the Study

This study focuses on the major causes of traffic accidents and people's knowledge, attitude, and practice of road safety measures followed by road users in East Hlaing Thar Yar Township, Yangon. The primary data was collected from 200 respondents by questionnaire. Secondary data was collected from the road traffic accident records of the Traffic Police Office in Hlaing Thar Yar Township, covering the years 2021–2022.

1.5 Organization of the Study

This study is organized into five chapters. Chapter one presents the introduction. It presents the rationale of the study, the objectives of the study, the method of the study, the scope and limitations of the study, and the organization of the study. Chapter two is the literature review of the prevalence and factors of road traffic accidents. Chapter three is an overview of road safety and road traffic accident in Myanmar. Chapter four will include survey analysis. Finally, findings, conclusions, and recommendations are presented in chapter five.

CHAPTER II
LITERATURE REVIEW

2.1 Importance of Road Safety

Road safety has been identified as an essential component that should be integrated into the road management system. Road safety refers to reducing the risk of a person being involved in an accident and providing a safe environment for all road users. The government has implemented road safety programs such as driver safety programs, pedestrian safety programs, drink-driving-related safety programs, and speed management programs. Although these programs are organized to make people aware of the causes of road accidents, they do not provide awareness, modify abnormal behaviours of road users, or improve the poor enforcement of driving laws.

With the modernization in developing countries more and more road construction with an increasing number of vehicles, the incidence of the accident is expected to increase in the future, Road safety is a major challenge for all road users with that modernization and epidemiological transaction. Road safety considers factors related to the road and its environment, the road user's education, the vehicle safety standard, and emergency services. Road safety is the result of deliberate and systematic efforts by many sectors of society, like the government and non-government agencies. Policies and programs are designed to support and maintain important and valuable public interests.

According to a 2001 World Health Organization (WHO) strategic report, road traffic deaths and injuries are currently the leading cause of all deaths, the 10th leading cause of all deaths, and the 9th leading contributor to the global burden of disease based on disability. WHO predicts that road traffic injuries will rise to become the fifth-leading cause of death by 2030.

Table (2.1) Leading Causes of Death 2004 and 2030 Estimation

Total 2004			Total 2030		
No.	Leading Cause	%	No.	Leading Cause	%
1.	Ischemic Heart Disease	12.2	1.	Ischemic Heart Disease	14.2
2.	Cerebrovascular Disease	9.7	2.	Cerebrovascular Disease	12.1
3.	Lower Respiratory Infections	7.0	3.	Chronic Obstructive Pulmonary Disease	8.6
4.	Chronic Obstructive Pulmonary Disease	5.1	4.	Lower Respiratory Infections	3.8
5.	Diarrheal Disease	3.6	5.	Road Traffic Injuries	3.6
6.	HIV/AIDS	3.5	6.	Trachea/Bronchus/Lung Cancers	3.4
7.	Tuberculosis	2.5	7.	Diabetes mellitus	3.3
8.	Trachea/Bronchus/Lung Cancers	2.3	8.	Hypertensive Heart Disease	2.1
9.	Road Traffic Injuries	2.2	9.	Stomach Cancer	1.9
10.	Prematurity and low birth weight	2.0	10.	HIV/AIDS	1.8
11.	Neonatal infections and others	1.9	11.	Nephritis and nephrosis	1.6
12.	Diabetes mellitus	1.9	12.	Self-inflicted Injuries	1.5
13.	Malaria	1.7	13.	Liver Cancer	1.4
14.	Hypertensive heart disease	1.7	14.	Colon and Rectum Cancer	1.4
15.	Birth asphyxia and birth trauma	1.5	15.	Esophagus Cancer	1.3
16.	Self-inflicted injuries	1.4	16.	Violence	1.2
17.	Stomach cancer	1.4	17.	Alzheimer and other dementias	1.2
18.	Cirrhosis of the liver	1.3	18.	Cirrhosis of the liver	1.2
19.	Nephritis and nephrosis	1.3	19.	Breast Cancer	1.1
20.	Colon and rectum cancers	1.1	20.	Tuberculosis	1.0

Source: World Health Statistics 2008

2.2 Road Traffic Accident (RTA)

Road accidents are one of the phenomena in our daily lives that occur in every part of the world and are one of the major problems on economic, social, and health fronts, especially in developing countries. RTA is generally an unexpected, unplanned occurrence that may involve injury. Road accidents are one of the phenomena in our daily lives that occur in every part of the world and are one of the major problems on economic, social, and health fronts, especially in developing countries. RTA is generally an unexpected, unplanned occurrence that may involve injury. The problem of traffic accidents is becoming a threat to public health and national development in

many developing countries. Road traffic accidents cause death, injury, disabilities, loss of productivity, and damage to property that lead to poverty. This is only the tip of the iceberg in terms of the total loss of human and social resources caused by traffic accidents.

Traffic accidents are the most frequent causes of injury-related deaths worldwide (Astrom et al., 2006). A road accident is defined as a collision or crash involving one or more vehicles that takes place on either a highway or other public roads, thus causing light injury, permanent injury, vehicle breakdown, or even death (Olusina & Ajanakum, 2017). A review of the literature has shown that traffic crashes involving young drivers between the ages of 17 and 25 were significantly higher than those involving mature and older drivers in western countries (Rowe et al., 2016).

Accidents represent a major epidemic of non-communicable diseases in the present-day world. RTAs have risen in proportion to the number of vehicles they produce and have been a major cause of increased fatalities. The increasing number of vehicles and users of transportation routes is a key issue with various complex aspects. RTA is becoming one of the top ten leading causes of death around the globe and the leading cause of death for children and young adults aged 5-29 years (WHO).

A traffic accident is defined as an accident involving at least one vehicle on a road open to public traffic in which at least one person is injured or killed. The increase in the number of vehicles is the main reason for the increasing number of accidents. Developing appropriate road safety plans and implementing traffic rules are necessary for reducing the number of road accidents. It is concluded that in order to reduce the number of traffic accidents and deaths in the future, it is important to organize safety programs as required. Some factors contribute to the risk of collisions, including vehicle design, speed of operation, road design, weather, road environment, driving skills, impairment due to alcohol or drugs, and behaviour, notably aggressive driving, distracted driving, speeding, and street racing (World Report on Road Traffic Injury Prevention, 2004).

Road accidents are classified, according to severity, into four categories: fatal, serious injury, slight injury, and property damage only. A serious injury accident is one in which there is no death but at least one person is seriously injured and requires at least an overnight stay in a hospital. A slight injury accident is one in which there are no deaths or serious injuries, but a person is slightly injured and requires medical treatment but no overnight stay in a hospital. A "damage-only accident is one in which

no one is injured but vehicles and/or property sustain damage. There are many types of accidents, such as automobiles that have collided with moving or parked automobiles and slow-moving vehicles, vehicles that hit pedestrians, passengers falling over, motor vehicles colliding with motorbikes, motor vehicles colliding with cyclists, motor vehicles colliding with trains, and motor vehicles that have capsized.

As a country becomes more developed, deaths and morbidity from traffic accidents are considered more important. The pain and suffering caused by and the tragedy of a death or permanent disability, as well as a serious economic loss to the community, arise from road traffic accidents. In Myanmar, it is generally accepted that a road accident results in damage to property or injury to road users involving at least one vehicle within the road environment. There is no specific definition for traffic accidents, but they are being followed according to the laws that have been enacted.

2.3 Concept of Road Traffic Accidents

The knowledge, attitude, and practice (KAP) model is commonly used to quantify background information about a public health issue, assess areas of potential intervention, and quantify the effectiveness of an intervention. (Gumicio et al., 2011) In theory, adequate knowledge of the dangers of using mobile phones while driving and appropriate attitudes towards not using mobile phones while driving should affect the practice of using phones while driving. The practice of not using a mobile phone while driving leads to the absence of mobile phone-related distracted driving and the consequences of distracted driving behaviours crash involvement and fatal and non-fatal crash injury. Earlier studies used the KAP model to assess mobile phone distracted driving among U.S. drivers (Nevin et al., 2017).

The main assumption of the systemic theory is that accidents happen when the factors using a road fail to fine-tune and comply with road safety measures (Larsson, Dekker, & Tingvall, 2010). The system theory was chosen then to facilitate the process of assessing knowledge, attitude, and practices on compliance with road safety measures among motorcyclists. The theory was suitable because it guided the researcher to conceptualize the knowledge, attitude, and practice of drivers and their relationship to compliance with road safety measures. In most cases, vehicle drivers fail to save road safety, resulting in road accidents.

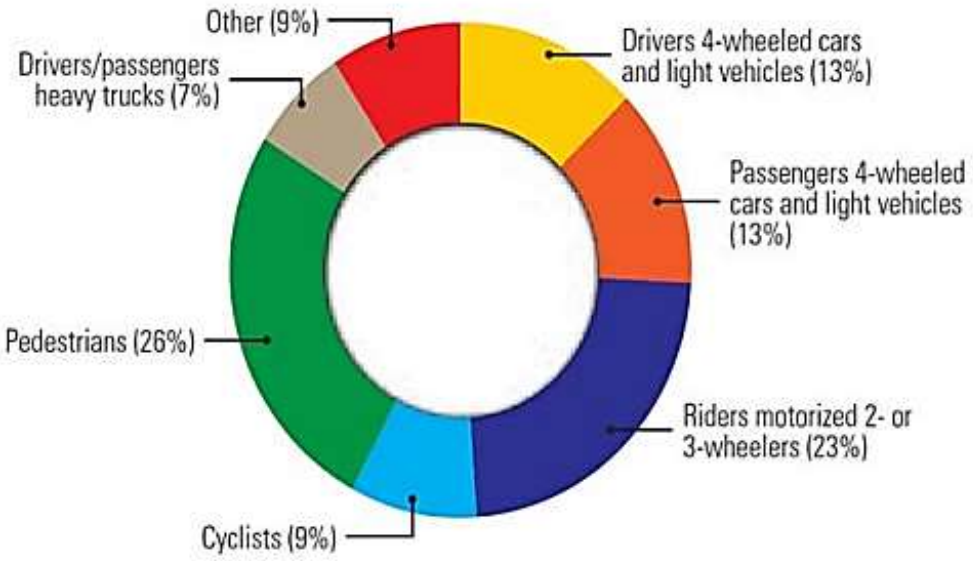
2.4 Major Causes of Road Traffic Accidents

The numerous accidents on our road network have been linked to various causes, which include over speeding, drunk driving, wrong overtaking, a poor road network, and the rickety vehicles that ply the roads. (Ayeboo, 2009) Salim and Salimah (2005) also indicated that road accidents were the ninth major cause of death in low and middle-income countries and predicted that road accidents were going to be the third major cause of deaths in these countries by 2020 if the trend of vehicular accidents was allowed to continue. Developing countries bear a large share of the burden, accounting for 85 percent of annual deaths and 90 percent of disability-adjusted life years.

There are many factors that affect road traffic accidents, including equipment failure, speed of operation, road design, road maintenance, weather, and driver behaviour. Environmental factors and stress play a vital role in causing a major road traffic accident. Other important factors, such as the age of the vehicle, safety measures, human error, and the time and place of the accident, determine the fatalities and the seriousness of the accidents. These factors may increase the severity of accidents on the road due to their negative impact on road traffic accidents.

The most common types of vehicle failure are brake failure and tire explosion. Some drivers complain about the design of the roadway in relation to accidents. For example, a bad road location or traffic flow in only one direction Roadway maintenance contributes to accidents like Debris on the roadway and faded road signs can cause accidents. Bad weather is considered one reason for road accidents. Other major causes of traffic accidents are overloading and using a cell phone while driving. Insufficiently experienced drivers who authorize improperly trained drivers and have insufficient knowledge of traffic signs tend to increase the number of road traffic accidents. Poor people cannot go to travel using safer modes, and a road crash can push a family into poverty due to the loss of income. Figure 2.1 shows the number of deaths classified by types of road users.

Figure (2.1) Number of Deaths Classified by Road Users' Types



Source: WHO Global Status Report on Road Safety (WHO, 2015)

There are many causes of road accidents, and they are usually related to traffic characteristics, road users, vehicles, roadway infrastructure, and the environment. According to the statistics, traffic accidents are increasing on the continents of the world, but the risks caused by these factors around the world have not decreased. Mode of transportation, insufficient knowledge of speed limit and road signs are influence factors of road accidents. The main causes of traffic accidents are human factors, environmental factors, and vehicle factors.

2.4.1 Human Factors in RTA

Traffic violation behaviour is one of the human factors leading to road accident causation. Human error seems to be the major cause of the majority of vehicular accidents. Drunken driving, over-speeding, failing to follow traffic rules, and reckless driving are some of the factors that contribute to road traffic accidents. Examination of the operator or human causes will be a critical component for accident analyses. Investigation into the part played by the human component in the traffic system is to be considered very important among road safety problems. The skill of the operator and traffic scenarios are the other factors involved in collisions. Some mistakes occur when a driver becomes distracted by talking on a cell phone call, sending text messages, or drinking something. The National Safety Council reports that drivers who use mobile

phones while driving are four times more likely to be involved in an accident (National Safety Council. (2021).

Human error is also caused by stress. Stress can lead to lack attention and accuracy. Such a state of mind makes them cause road accidents. About 94% of road accidents are caused by human error. Carelessness is one of the causes of road accidents, including using a mobile device while driving a vehicle, ignoring the red signal at traffic signals, and emerging from a side road into the path of another vehicle. Over speeding is one of the reasons, as injury severity increases with collision speed, and the lack of head protection accounts for the most severe but preventable injuries. Another important cause of the alarming increase in the number of road accidents is driving a vehicle in a drunken state. Under the influence of alcohol and other intoxicating substances, the driver loses self-consciousness and control over the vehicle, which ultimately forms the basis for accidents. State authorities should look at the conditions on the roads, like the malfunctioning of traffic lights, which also lead to accidents if the respect for emotions and life is not maintained properly.

Another factor in road accidents is the behaviour of drivers. Behaviour risk models include risk perception that focuses on problems experienced by road users in acknowledgment and control. Not wearing a seatbelt, speeding, jumping a red light, and not obeying road signs are some behaviours of drivers that lead to road accidents. Correct helmet use can reduce the risk of fatality by 42% and reduce the risk of head injury by 69%. Wearing a seat belt reduces the risk of death for the drivers and front seat passengers by 45–50% and the risk of death and serious injuries among rear seat occupants by 25%. The use of child restraints can reduce death by 60% (WHO). Only 38% of low-income countries and 54% of middle-income countries require seat belts to be used in cars by both front-seat and rear-seat passengers. (Global Status Report on Road Safety)

Many studies have been conducted to show that behaviors are one of the important factors that affect road accidents. 95% of accidents are caused by human behavior. Drivers' behaviors are related to age and gender. Similarly, it was indicated that human factors related to driving behavior were more emphasized. Common causes of traffic accidents include poor eyesight, overtaking, and speeding. Technical errors in vehicles such as body alignment, balancing of tires, brakes, and gear positions also play an important role in preventing vehicle accidents. The WHO reports that inadequate

driver training and licensing is a significant contributing factor to road accidents (World Health Organization. (2018).

2.4.2 Environmental Factors

These are related to the roads, like defective and narrow roads, the defective layout of crossroads, poor lighting, a lack of familiarity, poor construction, bad design, etc. Bad weather conditions are one of the major problems with road safety. Conditions such as fog, rain, sleet, snow and ice is not only hampered visibility but it can also affect the performance of the vehicle. The rain can cause roadways to become slick and slippery. The wet and slippery roads reduce tire traction and can cause cars and trucks to skid or spin out while driving. Heavy rain also reduces visibility. Snow may cover the lines on the road, but ice can block you and cause your vehicle to spin out of control. Ditches and potholes also contribute to a road accident.

Inadequate ambient lighting or even too much light which creates a glare may pose a greater risk than inadequate lighting to someone who is visually impaired. Visual and spatial distractions include inappropriate floor and step covering patterns and designs; unsafe designs; designs that have the effect of camouflaging changes in elevation such as steps and platforms while also making it visually difficult to identify whether or not there are obstacles and objects in the walkway; the absence of visual cues; and rich views that are combined with changes in views. Design standards also include requirements for materials used such as their slip resistance, fire resistance, lighting requirements, and noise levels. Finally, the design must also meet local code requirements such as height and width requirements. Pedestrian traffic includes changes in pedestrian capacities, flow rates, and route choices that occur due to factors that alter flow rates and choices. Poor traffic lights and traffic lights warning signs on government road also cause accidents.

2.4.3 Vehicle Factors

Conditions of the vehicle plying on the roads play a major role in road traffic accidents. Excessive speed, poorly maintained vehicles, a large number of vehicles, low driving standards, and overloaded buses are some of the factors associated with the vehicles.

2.5 Types of Road Traffic Accidents

There are several classifications that can affect the investigation and claim process of your injury case. Education and awareness can prove essential in reducing injuries and fatalities for all concerned. Loss of control is usually the common cause of any drivers involved in a crash.

2.5.1 Head-on Collision

A head-on collision often occurs when one driver is traveling the wrong way down a one-way road and collides with another vehicle. A head-on collision is always going to be a sudden, unavoidable, and tremendously terrifying experience that can cause serious injuries.

2.5.2 Vehicle Rollover

When a car or truck flips onto its side, lands on the road, or tumbles multiple times, it can cause the occupants to be ejected, with a high risk of fatality. When drivers and passengers wear their seatbelts, their survival rate is significantly increased.

2.5.3 T- bone Car Accident

One of the most dangerous collisions you can experience It happens when one vehicle crashes head-on into the side of another. The resulting T-shaped impact occurs most frequently on the driver's side and can cause broken bones, concussions, and fatalities.

2.5.4 Multiple Vehicle Collision

Another serious type of traffic accident is a multiple-vehicle collision, which involves three or more vehicles. These piles can range from minimal to massive and can result in severe injuries and fatalities.

2.5.5 Sideswipe Collision

Whether you're on a rural road or a freeway, driving right next to another vehicle is quite risky. Any distraction from the other drivers can cause them to drift into your lane, resulting in anything from a minor bump to something that closes down.

2.5.6 Side-Impact Collision

When one vehicle is broadsided, it is known as a side-impact collision. Most often, this type of car accident occurs at an intersection. These crashes can sometimes be avoided by slowing down when approaching a junction.

2.5.7 Single Car Accident

A single-car accident inherently involves one vehicle, but this doesn't always mean it's the driver's fault. Oftentimes, these crashes are caused by the driver reacting to another event, such as a drifting car or a darting animal, and can result in a collision with a guardrail, tree, or electrical pole.

2.6 Impact of Road Traffic Accident Injuries

Road crashes already kill as many people annually as major pandemics such as malaria or tuberculosis. They are the leading cause of mortality among men and women aged between 10 and 45, except in the countries most affected by HIV/AIDS (WHO, 2018). RTI is faced by rapidly developing nations with increasing motorization and a significant burden on the health care systems. The most commonly affected group is young males, and it is a leading cause of death for children and young adults aged 5-29 years. Pedestrians constitute a large majority of the victims, and there is high early mortality in most cases. More than 90% of road traffic deaths occur in low- and middle-income countries. RTI death rates are highest in the African region and lowest in the European region. The impact of rising injuries in the health sector is huge.

In 2006, there was a slight decrease in traffic accidents, and there was an increase in 2014. Traffic accidents are mainly affected by social and economic problems. Many road safety programs are being planned in the country to reduce injuries caused by road accidents. The state government has tackled road safety awareness programs and enacted a tough licensing law. Motor vehicles have a disproportionate impact on the poor and vulnerable in society. RTA has a serious impact on national economies, costing countries 3% of their annual gross domestic product (WHO Report, 2021). B. B. Pillai and G. D. Sing said that a safety awareness program was developed in collaboration with regional transportation offices in 2011. The main objective of this program is to educate the public about the rules of the road. Most accidents are caused by pedestrians and two-wheelers drivers. They often do not wear helmets. To reduce the severity of road accidents, the state government needs to

organize safety programs for the people. It is concluded that it is important to conduct such types of programs and safety training regularly in educational institutes.

In developing countries, the populations are exposed to the highest risk of injury and death from road crashes. Khan, Abdul Manan, and Ansa Tehreem concluded that the main causes of road accidents are recklessness and ignorance. People need to follow traffic rules to reduce accidents. The government can play an important role in creating educational institutions, providing safety awareness training, and distributing materials among the public and drivers. Governments need to ensure that drivers are properly screened and then undergo a rigorous process of issuing driver's licenses.

In the injury field, the dominant approach to identifying injury control options is based on the Haddon matrix (see Table 1). The matrix involves the three phases of the injury control sequence: preventing potentially injurious events (the pre-event phase), minimizing the likelihood that injury will occur when the energy exchange is taking place (the event phase), and reducing the unnecessary consequences of injury (the post-event phase). For each of these phases, a countermeasure for preventing or ameliorating injuries may involve changes in human behavior, vehicles or equipment, or the physical or socio-economic environment. The Haddon matrix broadened injury reduction efforts beyond attempting to influence drivers to avoid crashes (the pre-event, human phase of the matrix). Much has since been accomplished through modifications involving the event and post-event phases of the matrix, in particular those dealing with vehicle design. A reference framework for identifying factors that have an impact on road traffic injuries is the Haddron matrix, which divides factors into human, vehicular, and environmental causes across three temporal phases: pre-crash, crash, and post-crash (Haddon, 1980).

Table (2.2) Sample Haddon Matrix Applied to Motor Vehicle Crashes

	FACTORS			
PHASES	**Host/ Driver or Passenger**	**Vehicle/Vector** (objects that transmit kinetic energy)	**Physical Environment**	**Social Environment** (Traffic Safety Culture)
Pre-Event (Before the crash occurs)	➢ Driver vision ➢ Alcohol impairment ➢ Driver experience/ ability ➢ Driver knowledge ➢ Restraint/ helmet choice ➢ Driver rested and attentive	➢ Maintenance of brakes and tires ➢ Speed of travel ➢ Load characteristics ➢ Anti-lock braking system (ABS) ➢ Electronic stability control (ESC)	➢ Adequate roadway markings ➢ Divided highways ➢ Roadway lighting ➢ Intersection configuration ➢ Road curvature ➢ Adequate shoulders and rumble strips	➢ Public / community attitudes on drinking and driving ➢ Impaired driving laws ➢ Graduated licensing laws ➢ Speed limits ➢ Enforcement and adjudication of traffic laws ➢ Support for injury prevention programs
Event (During the crash)	➢ Spread out energy in time and space with seat belt/ airbag use ➢ Child restraint use	➢ Vehicle size ➢ Crashworthiness of vehicle- crash space, crush resistance, safety rating	➢ Guard rails, median barriers ➢ Presence of fixed objects near roadway ➢ Roadside embankments	➢ Adequate seat belt and child seat laws ➢ Motorcycle helmet laws
Post-Event (After the crash)	➢ Crash victim's overall health ➢ Age of victim	➢ Gas tanks designed to minimize fires ➢ On-Star or other automated crash notification and GPS locator	➢ Availability of effective EMS systems and staffing ➢ Effective incident site management ➢ Distance to quality trauma care ➢ Rehabilitation programs available	➢ Policies and funding supporting emergency and medical response systems ➢ Public support for trauma care and rehabilitation ➢ EMS training ➢ Resources and programs for psychological recovery from trauma

Source: Haddon 1980

2.7 Global Issue of Road Traffic Accidents

Road traffic injuries remain a global public health problem at the global, regional, and national levels. The United States has the highest number of road accidents in the world. Road crashes are one of the top three causes of death for people aged between 5 and 44 years. It may become the third-leading cause of death and disability by 2020 (WHO 2000). The "Make Roads Safe" campaign is coordinated by the FIA Foundation. A report by the Global Commission on Road Safety (2011–2020), a partnership between a road safety NGO and the Public Health and Road Safety Organization, confirms that road accidents are the leading cause of youth deaths worldwide. Pedestrians, cyclists, and drivers of motorized two-wheelers and their passengers account for almost half of global road traffic deaths.

The world is facing many problems, such as poverty, natural disasters, hunger, and war. Among them, RTI is an important problem that can affect public health, sustainable development, and social equity. RTI shows strong socioeconomic variation, with those from poor backgrounds at greater risk than their more affluent counterparts. In early 2020, COVID-19 caused global health that affect the economy and society of most countries severely affected. Traffic deaths are higher in low- and middle-income countries. More than 90% of the world's road construction takes place in low- and

middle-income countries; only 48% of the world's registered vehicles are trucks (Global Status Report 2021). Global efforts on RTIs remain disproportionately high in LMICs, and progress toward global road safety indicators has been slow. Despite global efforts during the past decade, road traffic deaths remain disproportionally high in LMICs and African countries, as shown by global reports, and progress in achieving global road safety indicators is slow. Countries need to greatly accelerate the implementation of interventions proven to reduce RTIs to meet the goals of the second Decade of Action for Road Safety.

Road crashes have become a growing worldwide problem and result in around 1 million deaths, most of which occur in developing countries. When considering the rapid development of motorcycles at the same time as global population growth, this suggests that current road safety efforts could mitigate the worsening of the situation. A series of Sustainable Development Goals (SDG) were adopted, and road safety is specifically addressed under UN SDG 3 (asking for ensuring healthy lives and promoting well-being for all at all ages) and SDG 11 (to make cities and human settlements inclusive, safe, resilient, and sustainable) (UN, undated). However, progress towards achieving Sustainable Development Goal (SDG) Goal 3.6, which calls for a 50% reduction in the number of road deaths by 2020, is sufficient (WHO, 2018). As a target of halving the number of death and serious injury by 2020 was set, and by 2030 provide access for all special those in vulnerable situation, to safe, affordable, accessible and sustainable transport system.

Vinand M. Nantulya and Michael R. Reich, showed pedestrians, cyclists, moped and motorcycle riders are the most vulnerable road users as well as the heaviest users of roads in poor countries. Most people who use public transportation, bicycles, mopeds and motorcycles or who habitually walk are poor, illuminating the higher risk borne by those from less privileged. If appropriate action is not taken urgently, the burden of RTIs will continue to increase globally. Road traffic injuries can cause considerable economic losses to individuals, their families, and nations as a whole. These losses arise from the cost of treatment as well as lost productivity for those killed or disabled by their injuries and for family members who need to take time off work or school to care for the injured. Road traffic crashes cost most countries 3% of their gross domestic product (Abbasi, 2002).

Asian Development Bank (ADB) is set visions and established the Road Safety Group (RSG) to reduce road traffic accidents. Fatalities are expected to double by 2020 and reach 15,000 per year by 2025. Motorcyclist and pedestrian deaths compose the majority of annual fatalities, a common situation across Southeast Asian nations. Action to reduce the fatal crash risk for these two groups (and three-wheelers) should be of the highest priority. The annual cost of road accidents to Myanmar's economy is estimated at $800 million for 2013, or about 1.5 percent of the gross domestic product (GDP). Current road crash levels are a major hindrance to the country's economic activity. Expenditure on preventative road safety management needs to be considered not as a cost but as an investment in the country's economic development.

The main goals of road safety in ADB are to decrease the number of accidents and fatalities by 30%, increase the number of funds allocated to the road safety sector by 20%, and minimize traffic costs. To review the authorities, duties, and responsibilities of stakeholders, to raise the professional level and improve technological equipment, to provide public educational programs and informational activities, to conduct educational programs for children in schools, to enforce traffic regulations, and to protect vulnerable road users are the main strategies stated in the programs that should be followed to reach the main goal. Improving road infrastructure and public transport systems, providing black spot analysis and reconstruction, developing a long-term planning system, reviewing main standards concerning road transport, and finding additional findings to achieve key objectives are also required.

2.8 Traffic Crashes in ASEAN Countries

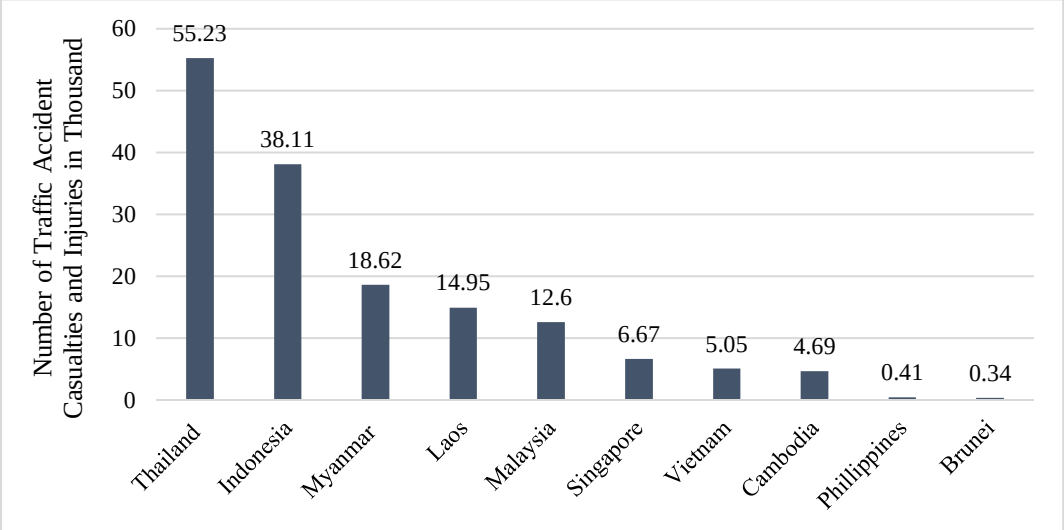
Road Traffic Accident (RTA) is one of the top five causes of morbidity and mortality in South-East Asian countries. Huge economic losses are now being incurred annually in the ASEAN countries as a direct result of road crashes, and the most recent research suggests annual losses across the region are now more than US $14 billion per year (about 2.1% of the ASEAN region's annual GDP). In the general case in the ASEAN Region, the riders and passengers of motorized two- and three-wheeled vehicles, bicycle riders, and pedestrians represent almost 60% of the road users killed on Myanmar roads (WHO, 2015). This partly reflects the popularity of these modes of transport but also highlights the vulnerability of road users to injury, particularly due to the unprotected nature of road users.

The ASEAN Regional Road Safety Strategy was officially approved at the 21st ASEAN Transport Ministers' Meeting held on November 21, 2015. The National Road Safety Action Plan 2021–2030 has been formulated by all ASEAN Member States. Reducing road fatalities by 50% in AMS by 2020 is progressing. The next target is to reduce another 25% from 2021-2030. The main strategic guidelines for the ASEAN Regional Road Safety Strategy (ARRSS) are standards, traffic rules, and legislation; capacity building; and it is proposed that research and the development of knowledge through research should focus on four aspects.

ASEAN countries are making progress in the five pillars identified in the United Nations Decade of Action (WHO, 2013). To enable this comparison, a new index for measuring the extent of road safety maturity (RSM) was constructed from a numerical weighting based on the information provided in the WHO Global Status Report for 2015. Implementation of the road safety initiative in ASEAN by following the five pillars of the UN Decade (i) Road Safety Management; (ii) Safer Roads and Mobility; (iii) Safer Vehicles; (iv) Safer Road Users; (v) Post-Crash Response.

Today, many developing countries around the world are experiencing rapid economic growth, but the number of people using the road for their economic and social needs has increased dramatically. However, there is limited access to road safety education and traffic regulations. Poor knowledge about road safety and the skills of road users leads to accidents and traffic congestion. Rapidly increasing road traffic accidents have become a major social problem. It is estimated that at least 140,000 people are injured on the world's roads every day, and 15,000 of them are disabled for life (Sharma, 2008; Al Turki, 2014). Road injury deaths are projected to reach 2.4 million deaths per year by 2030, and road traffic accidents are the third leading cause of disability loss of life worldwide by 2020 (Dickinson et al., 2000). The United Nations has recognized the importance of addressing this issue by declaring 2011–2020 the Decade for Road Safety.

Figure (2.2) Estimated Number of Traffic Accident Casualties in Southeast Asia in 2020



Source: https://www.statista.com/statistics

Figure (2.2) shows that in 2020, it was reported that there were approximately 55 thousand casualties and injuries from traffic accidents in Thailand. In comparison, Brunei recorded about 340 deaths from traffic accidents in 2020. Thailand has the highest number of traffic accidents among ASEAN countries, followed by Indonesia in second place and Myanmar in third place.

2.8.1 ASEAN and Myanmar Road Safety Strategy

Aligning with the UN Decade of Action 2011–2020, numerous strategies have been developed at regional and national levels. The Panel recommends that Myanmar could study several of these strategies and good practice manuals to identify relevant opportunities applicable to the country. This is an activity next to implementing actions that have been announced in the Road Safety Action Plan (2014). By learning from other countries, Myanmar will speed up positive developments, perform better, and make more progress in a shorter period of time than these countries did in the past. But Myanmar cannot simply copy effective strategies from elsewhere because they generally need to be tailored to the local context.

The ASEAN Regional Road Safety Strategy has detailed specific aspects that require action. They are the harmonization of standards, road rules, and legislation; capacity building; knowledge development through research and evaluation; and monitoring and reporting processes.

To develop the road safety control measure, the Republic of the Union of Myanmar is actively collaborating with the regional partners mentioned below:

a) GMS Cross-Border Transport Agreement
b) ASEAN Framework Agreement on the Facilitation of Goods in Transit (AFAF)
c) ASEAN Framework Agreement on the Facilitation of Inter-State Transport (AFAFIST)
d) ASEAN Framework Agreement on the Facilitation of Cross-Border Passenger Transport by Road Vehicles (ASEAN CBTP)

2.9 Reviews of Previous Studies

Yazan Issa (2016) studied the "personality characteristics of drivers of traffic accidents in Tabuk City, Saudi Arabia," to examine the causes of road accidents and evaluate the statistical effects of certain driver behaviors on accidents. It found that young drivers under the age of 30 are involved in around 60% of vehicle crashes and more than 80% of human-related accidents. This finding showed variable important associated with an accident in the city. The findings suggest that increased efforts are needed in Tabuk City to increase public awareness of road safety issues and educate drivers on safe driving practices. He concluded that there were deficiencies in driver training in Saudi Arabia and inadequate supervision by law enforcement agents.

Yannis T. H. (2014) presented a review of climate characteristics and their impact on road safety. In this research, the weather effect is fairly certain and leads to increased accident frequency but does not seem to have a certain effect on severity. Massive losses, many temporary and permanent injuries, and extensive damages to public and private properties are the ultimate results of road traffic accidents.

Bokhari (2017), in his article titled "Maxillofacial injuries due to road traffic accidents in Saudi Arabia: A review of incidence, demographic factors, and prevention strategies," conducted his review through a literature search over a period of 25 years. He revealed that the incidence and causes of road traffic accidents vary with geographical location, socioeconomic status, religion, and era. The incidence of traffic accidents is high in Saudi Arabia. Age of the driver, education level, profession, violation record, vehicle ownership, joy riding, poor eyesight, sun haze, sand storm, long hours driving, non-observance of the speed limit, emerging and exiting from roads without signals, presence of stray animals, non-marking of the road, non-familiarity with the road, lack of regular checking of vehicles, lack of regular servicing of vehicles

and driving under medication are factors associated with a high incidence of road traffic accidents in Saudi Arabia. He had concluded that simple measures such as seat belt legislation, traffic monitoring, and the creation of awareness among youth will significantly reduce the loss of lives.

Shaban Harun Juma (2017), in his article titled "Assessment of Road User's Awareness on Strategies for Controlling Road Traffic Accidents: A Case Study of Kigoma-Ujiji Municipality," has said that road traffic accidents are on the increase in Kigoma, causing injuries, loss of lives, and damage to properties. The process of urbanization, the resultant motorization, and the recent developments in road infrastructure, more specifically the construction of tarmac roads, have all contributed to more road accidents. He had concluded that although the government has put in place the construction of the road in Kigoma until the main road and small roads in the streets which are needed to make sure that all roads had a walking way that is pavement in order to help innocent people like pedestrian to pass through without any problems.

Bhaswati Bora (2018) feels that road traffic accidents (RTAs) have become a serious problem worldwide as they incur losses of around 2% of a country's gross domestic product (GDP). RTAs are one of the major causes of death and injury in developing countries like India. To enable governments to take policy decisions on road safety, good research must be undertaken to estimate the cost of accidents. This kind of study will help governments make important decisions on investments in traffic safety and the improvement of roads and other facilities. On the other hand, evaluation and estimation of the costs of RTA will help governments ascertain the economic feasibility of policy decisions given limited economic resources. Apart from humanitarian losses, the contribution to economic losses from RTAs is alarmingly high, as most people involved in accidents are from the most economically active and productive age groups of a society.

Anup Kharde (2018) Road traffic accidents (RTAs) are a pandemic in the current era and are destined to rise in the future due to an increase in several vehicular populations in addition to an increase in several aggressive road users. Most of the RTAs are due to unawareness of road traffic rules. This could result in poor attitudes and practices while driving. The study found that people were unaware of the maximum permissible blood alcohol level while driving and the minimum distance between two vehicles. The majority of drivers followed poor driving practices such as drinking and driving, over speeding, and using mobile phones while driving.

According to Win Myint Tun's (2012) thesis, there were a total of 1317 accidents that killed 129 people in 2006, and it was the highest rate in ten years from 2002 to 2011. The highest number of accidents involving vehicles occurred on public transportation buses, and negligence by drivers was a major cause in Yangon city. It was observed that in 2010, the road accident cost of Yangon city was $31,284 million, which is 0.38% of the city's GDP. Based on his findings, negligent driving was the main cause of the most accidents in Myanmar.

According to Kaung Myat Nyi's (2011) study on road traffic accidents in Yangon City between 2005 and 2010, based on accident data summarized by the Myanmar Police Force, it reviewed the activities of road safety programs and identified the causes of road accidents in Yangon. The study could classify the traffic accidents in Yangon not only by the cause but also by gender, age, group, type of road, type of vehicle, etc.

According to Hlaing Zaw Tun's (2019) study on inter-regional passenger transportation and road safety status in Myanmar and to analyze the knowledge, attitude, and practices accepted by private sector bus drivers (PSBDs), The study finds that the majority of drivers have met with accidents during their driving lives, too. Also, the private driving schools for PSBD were not being monitored or evaluated by the government, and there was no standard curriculum for all driving schools in Myanmar. Finally, the implementation of effective and standard intervention programs suggests increasing the driver's behavior, which is a significant cause of road accidents and injuries.

According to Htin Lin's (2019) study, we should examine the factors that affect road traffic accidents and explore the drivers' behaviour and awareness based on their age, education level, and type of driving in order to reduce the rate of accidents remarkably. Also find the central government and the respective organizations and institutions should implement more to be stronger and more perfect expressways which can bring in the wellbeing and sustainable benefit of Myanmar citizens. The government should review stricter regulation regarding the drivers' behaviour and improve the conditions of police force, law enforcement of road accidents.

CHAPTER III
OVERVIEW OF ROAD SAFETY AND ROAD TRAFFIC ACCIDENT IN MYANMAR

3.1 Road Safety in Myanmar

Road safety is essential for protecting people from roadside injuries, preventing road traffic accidents, and protecting them from death, injury, and disability. In Myanmar, thousands of healthy lives are lost by road accidents compared with other ASEAN countries. As Myanmar is one of the developing countries facing the highest rate of such accidents in Southeast Asia, the government and road users should work together to ensure the safety of the growing number of vehicles. In 2011, it is estimated that more than 75,000 people died in traffic accidents in the 10 member countries of the Association of Southeast Asian Nations (WHO, 2013).

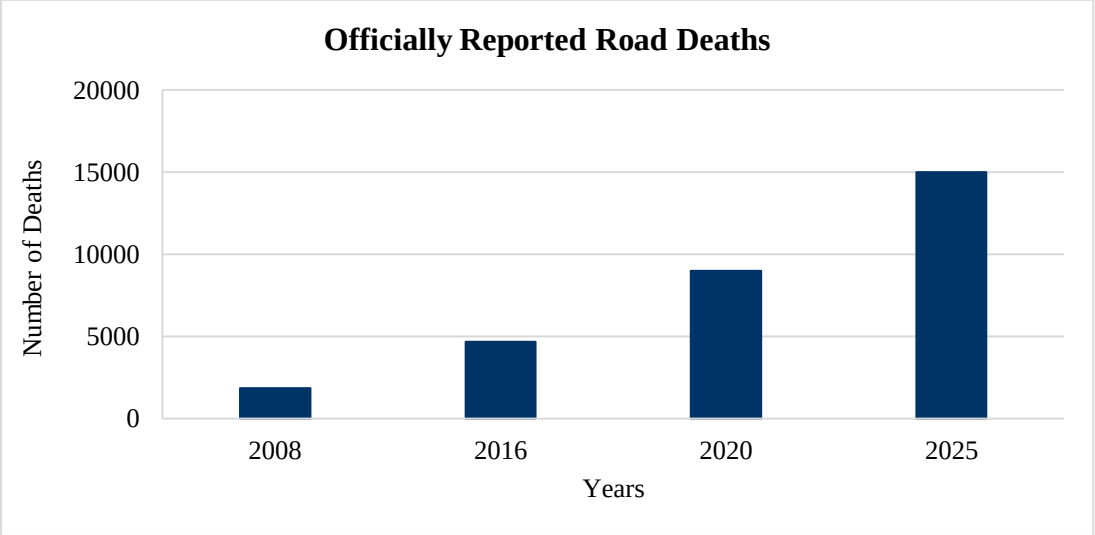
Road safety outcomes are important for the welfare and economic benefit of countries. Different countries have reached different levels of maturity in responding to road accidents. Low-income countries (such as Myanmar and Cambodia) in ASEAN generally had low motoring rates and low death rates relative to their population (although motoring rates may be excessive). Unless drastic action is taken, the economic development of those countries will be accompanied by an increase in deaths and injuries on their roads. In particular, the importance of road safety issues varies across countries. The best way to address this challenge is to recognize that a regional road safety strategy may have priority issues (e.g., not wearing helmets, drunk driving, etc.) and that the order of importance of these issues will vary from country to country. With the rapid development in some countries, the focus must be on regional traffic safety and enforcement.

The number of deaths due to traffic accidents in Myanmar has risen since the last report in 2013, now reaching 20.3 per 100,000 people. Myanmar is a low-income country designated by the World Bank. Errors on humans, roads, and vehicles can cause huge losses to life and the country's economic development. According to available

data, the annual cost of road crashes to the Myanmar economy is estimated at US$800 million, representing 1.5% of the gross domestic product (ADB, 2016). These costs highlight the major economic benefit that can be derived from reducing road crashes. Health and disability due to traffic accidents will become more important health problems worldwide that are moving from 9th to 3rd place in all counties. (WHO, 2020)

Road accident deaths have to increase in the future; this forecast was mentioned in their study of road safety in Myanmar (Wegman, 2017). This possible situation for the years 2020 through 2025 is shown in Figure (2.3), which is about the Possible Trend of Officially Reported Deaths in Myanmar.

Figure (2.3) Possible Trend of Officially Reported Deaths in Myanmar



Source: FIA Road Safety Myanmar 2017

3.1.1 Road Safety Institution Structure

As often the case in lower middle-income countries, the institutional setting for Myanmar transport is fragmented and characterized by overlaps and duplications. The main agencies are the following:

a) National Road Safety Council chaired by Vice President and highest committee to supervise the road safety of Myanmar.

b) Yangon Road Transportation Authority (YRTA), which is in charge of issuing license for inter-regional Bus Transportation Business.

c) Ministry of Transport and Communications (MOTC), which oversees the Myanmar Railways and the Road Transport Administration Department and has legal responsibilities regarding public transport licensing for bus and drivers.

d) Ministry of Construction, which is in charge of national and state highways but, in practice, does not prioritize the Yangon region; and
e) Ministry of Home Affairs, which oversees the traffic police. ADB (2016)

3.2 Transportation System in Myanmar

Transportation is a vital part of any society. Transportation is the foundation stone of the economic infrastructure and socio-economic development of one country. It helps in the development of trade, commerce, and industry. Road transportation provides benefits both to nations and to individuals by facilitating the movement of goods and people. Transportation could be divided into three main areas: land transportation, water transportation, and air transportation. Road transportation increases year by year, but the rate of road crashes also increases with it. But despite the importance of transportation, the number of road accidents around the world has increased dramatically over time.

Transportation in Myanmar is getting better and better with slow improvements in infrastructure and public transportation. A good transportation process makes it easier, safer, faster, more reliable, and more convenient to trade and communicate. Improving the transportation system is essential to national development. Myanmar is a developing country, and vehicle ownership was low in Myanmar before. But the government changed the vehicle importation policies in September 2011. So, the traffic volume rate rapidly increased, and traffic congestion became a problem in Yangon City (a commercial city in Myanmar). The rate of traffic volume increased there is needed to improve the road infrastructure for that. Insufficient road infrastructure and bad quality roads can cause a rising in the rate of road accidents. Increasing traffic volume is damaging to the environment, and reducing CO2 gas emissions from vehicles is a current issue in Myanmar.

The Ministry of Transport and Communications (MOTC) supervises the various departments, directorates, and state-owned enterprises that were founded in 1992. Integrated Transport Information System introduced in passenger transportation. Before the implementation of the new bus network, the Yangon Bus Service System (YBS) was launched on January 16, 2017, during the incumbent government's term. Among the various modes of transportation, bus routes are the easiest and most cost-effective way of using public transport. The Yangon bus network was overseen by the Yangon Motor Vehicle Supervisory Committee and provided service to the majority of

the city's 2.8 million commuters daily. And then there are two highway bus gates in Myanmar: Yangon and Mandalay High Way Bus Gate. These two main gates are currently so important to go everywhere around the country.

3.3 Myanmar National Road Safety Action Plan (MRSAP)

Achieving road safety goals requires a systematic response and long-term investment in building road safety management capacity in low and middle-income countries. Critical issues in the country are how to build capacity through institutional reforms, speed up knowledge transfer, scale up investment, increase international cooperation and development aid sustainably, and allocate increased resourcing from the government over time.

In Myanmar, the National Road Safety Council (NRSC) will continue its efforts to implement the vision and action plans of the Myanmar National Road Safety Action Plan (2021–2030). Article 3.6 of the Sustainable Development Goals (SDG) was drawn to reduce 50 percent of death by road accident as road safety measure becomes a global problem. Myanmar is implementing the National Road Safety Action Plan (2014–2020) to implement road safety measures. The implementation of the Road Safety Decade Action will include road safety management, safer roads and mobility, safe vehicles, safer road users, and post-crash response. NRSC will continue to strive to implement the vision and action plans of the Myanmar National Road Safety Action Plan (2021-2030), and it is intended to support the implementation of the National Road Safety Strategy (2021-2030). The National Road Safety Action Plan is implemented by aligning with the UN resolution on road safety and the road safety guidelines of the Asia Development Bank (ADB).

The objective of the Myanmar National Road Safety Action Plan (2014–2020) was to reduce the loss of lives and socio-economic impact caused by traffic accidents, environmental impact, and traffic congestion. It is necessary to consider the 5E systems: education, engineering, enforcement, emergency medical care, and evaluation. Myanmar's national road safety action plan sets the target to save many lives by reducing the annual fatalities of road accidents to halve the current death rate, reducing the death rate by 50%, making 90% of motorcycle helmets worn all over the country and 70% of seat belts worn all over the country, and eliminating illegal driving without a driver's license.

There are 12 sectors of the National Road Safety Action Plan (2014-2020) as follows:

(i) Coordination and Management for Vehicle and Road Safety
(ii) Traffic Legislation
(iii) Vehicle Safety Standards
(iv) Driver Training and Testing
(v) Safe Planning and Testing
(vi) Improvement of Hazardous Locations
(vii) Publicity, Campaigns and Road Safety Education for Children
(viii) Police and Law Enforcement
(ix) Accident Data Systems, Road Safety Research and Road Accident Costing
(x) Emergency Assistance to Road Accident Victims
(xi) Funding and Role of Insurance
(xii) Cooperation and Collaboration

3.4 Current Development and Implication for Road Safety in Myanmar

Myanmar is experiencing rapid growth, which is typically associated with economic growth and population growth. Myanmar's population is growing, and the country's economic growth is expected to increase significantly over the years. As a result, as the number of kilometres travelled on roads increases, traffic volumes increase, requiring the expansion of road networks and the need to promote the use of safer modes of transport (e.g., railway, buses). Road Traffic Accidents Deaths in Myanmar reached 3.05% of total deaths. (WHO,2020) The development of road networks stimulates economic development by reducing the costs of transportation, and the expansion of road networks and the improvement of roads are expected to be good for the welfare and well-being of the population.

However, the negative effects of increased traffic congestion and increased road networks can also be observed (air pollution, noise pollution, road closures, crashes, etc.), and these effects have negative health and economic effects. Effective policies for land, transportation, environment, infrastructure, and subsidies for public transport are needed to reduce traffic accidents. Regulations (passing vehicles, speed limits, driver education, etc.) can mitigate the potential negative effects of growing traffic congestion. The development of modern technology is an essential part of creating a safe environment. From this, it is clear that government policies to make Myanmar's roads

safer (and to reduce fatality rates) need to understand that the increase in traffic (vehicles) will increase risk exposure.

3.5 Legal Framework of Road Safety and Traffic Accident in Myanmar

Myanmar is deeply concerned about the growth in the number of road accidents, injuries, and fatalities in recent years. So the government needs to promote preventive and corrective measures for road safety. Road accident has become a major public health problem and the victims are mainly poor and vulnerable road users. So needs to raise awareness about various aspects of road safety and the social economic implications of a road accident. Since 1988, Myanmar has been taking steps to improve its physical and social infrastructure in compliance with its market-oriented economic policy. One of its economic objectives is to ensure ease of transportation within the country. Myanmar, thus, has taken measures to increase investments in infrastructure, which include encouraging the private sector's participation, joint ventures between public and private agencies, and build–operate–transfer (B-O-T) systems. Many different modes of transport exist in Myanmar, including roads, railways, inland waterways, ports, and civil aviation. Road transport is the nation's dominant mode of transportation (ADB, 2016), helping connect rural areas and support regional and international trade.

Myanmar has updated its legislative measure toward Road Safety in line with the democratic movement. In 2015, The Motor Vehicle Law has been stated as Pyidaungsu Hluttaw Law No. 55/2015. It is providing to attain the objectives: (a) for the safe driving of motor vehicles in public areas through registration according to official rules and regulations. (b) To provide driving licenses for driving particular types of motorized vehicles after qualification checks. (c) For the easy flow of road users and the protection against road users and the protection against road risk and vehicle perils. To avoid traffic congestion and to use high technology transportation systems efficiently to implement protection against road risk and vehicle perils. (e) To reduce environmental pollution caused by motor vehicles (Pyidaungsu Hlutaw,2015).

1989 Motor Vehicle Rules: The Ministry of Transport and Communications made this rule by Notification (No.1/89). The rule is exercised under the practice of Motor Vehicle Law (2015) (RTAD, 2019).

The Multimodal Transport Law was provided as Pyidaungsu Hluttaw Law No.3 in 2014 to regulate both of all modes of private and public sector transportation. The panel Code 1861 governed those who committed offenses in actions of breaching the laws.

The Multimodal Transport Law was provided as Pyidaungsu Hluttaw Law No.3 in 2014 to regulate all modes of private and public sector transportation. The panel Code 1861 governed those who committed offenses in actions of breaching the laws.

Legislative measures for road transport in Myanmar are enacted since 1915. Before 1964, The Burma Motor Vehicle Rules (1915), The Motor Vehicle International Circulation Rules (1933), and Burma Hired Motor Vehicle Rules (1935) are empowered for road transport and traffic operations. In 1964, Motor Vehicle Law was formulated and in 1989, it comprises seven scopes such as registration of motor vehicles, effecting third party insurance, issuing a license to drivers, supervision on vehicles, offenses, and punishment, and miscellaneous. 1989 Motor Vehicle Rules has 10 chapters as title and definition, registration of motor vehicles, condition of motor vehicles, issue of license to drivers and conductor license, driving training school, terms and conditions of tired motor vehicles, motor vehicle traffic, pedestrian rules, cyclists' rules, and road signs, marking of road and signals.

Road signs are classified into four groups: danger warning, prohibition and restrictive, mandatory, and direction. Road marking includes two items and signals include 5 groups involving lights and band signals. This directive is enacted in Myanmar in line with the Vienna convention on road signs and signals of 1968. Nowadays the motor vehicle law 1964, 1989 Rules and Directives are empowered and then there also exits Penal Code for the enforcement of disobedience to existing traffic laws.

In Penal Code, there include four sections for faulty driving. To be mentioned–

8-279 Rush driving or riding in a public place.

8-337 Causing hurt by doing any act so rashly or negligently as to endanger human life or personal safety of others

8-338 Causing serious hurt by doing any act so rashly or negligently as to endanger human life or personal safety of others

8-304(A) Causing the death of any person by doing any rush or negligent act

Punishment can be the withdrawal of a driving license for a certain period or whole life as the minimum level and can extend to imprisonment or fine or both. The

trials are prosecuted from township courts to supreme or high courts of justice as cases are concerned.

3.5.1 Department Involved in Law Enforcement of Traffic Rules and Regulations

Myanmar has a long history of government departments working together for road safety. These days, more departments are involved to achieve the ultimate goal of better road safety. Road safety is a multi-disciplinary problem requiring action from all sectors. There is no special department for road safety. Departments regarded as responsible bodies for road safety in Positions in Myanmar's ranking are: Road Transport Administration Department (RTAD), Myanmar Police Force (Traffic Control), Department of Health, Department of Education Planning and Training, Myanmar Insurance, Naypyitaw City Development Committee (NCDC), Yangon City Development Committee (YCDC), Mandalay City Development Committee (MCDC), Department of Development Affairs (Township Municipals), and Public Works Department. These all organizations take responsibility in different areas.

The main goal of RTAD is national road safety. The department's objective is to be responsible for road safety measures and regulations. It implements its objectives through vehicle inspection and registration, inspecting motor vehicle drivers and issuing driver’s licenses by law, publishing the rules to be followed by road users in coordination with relevant departments, traffic hazard management for road safety, reducing traffic congestion by using high-tech transportation systems effectively in traffic safety, and collecting related taxes that should be received from the state. The Department of Health plays an important role in national road safety. Prevention activities and awareness programs can reduce road accidents. The accident prevention project is jointly organized by the Ministry of Health and WHO. Red Cross activity participants are encouraged to promote first aid knowledge, including the traffic police.

3.5.2 Road Traffic Safety Institution Structure

As is often the case in lower-middle-income countries, the institutional setting for Myanmar transport is fragmented and characterized by overlaps and duplications. The main agencies are the following:

National Road Safety Council is chaired by Vice President and the highest committee to supervise the road safety of Myanmar.

a) Yangon Road Transportation Authority (YRTA), is in charge of issuing a license for inter-regional Bus Transportation Business.
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c) Ministry of Construction, which is in charge of national and state highways but, in practice, does not prioritize the Yangon region; and
d) Ministry of Home Affairs, which oversees the traffic police. (ADB 2016)

3.6 Status of Road Accident in Yangon City

The Yangon region had the most traffic accidents in 2021, followed by the Bago region. A total of 3,158 people were killed and 8,311 were injured in the same year. According to the Road Transport Directorate, the Yangon Region has the highest number of traffic accident victims, followed by the Mandalay Region. (Global New Light of Myanmar) A total of 333 car accidents happened in the Yangon region in the first four months of 2021, killing about 160 people, according to the Yangon Region Traffic Police Force. Although motorbikes have been banned and prohibited in 33 townships administered by the Yangon City Development Committee, people do not comply with the traffic rules. Therefore, the No. 2 traffic police force (Yangon) has taken legal action against disobedient motorcyclists under the Vehicle Safety and Motor Vehicle Management Law 2020 to encourage them to follow traffic rules and regulations and to reduce road accidents. From January to April 2021, a total of 6,366 vehicles and 3,048 motorbikes were seized, according to the Yangon Region Traffic Police Force (Global News Light of Myanmar 2021).

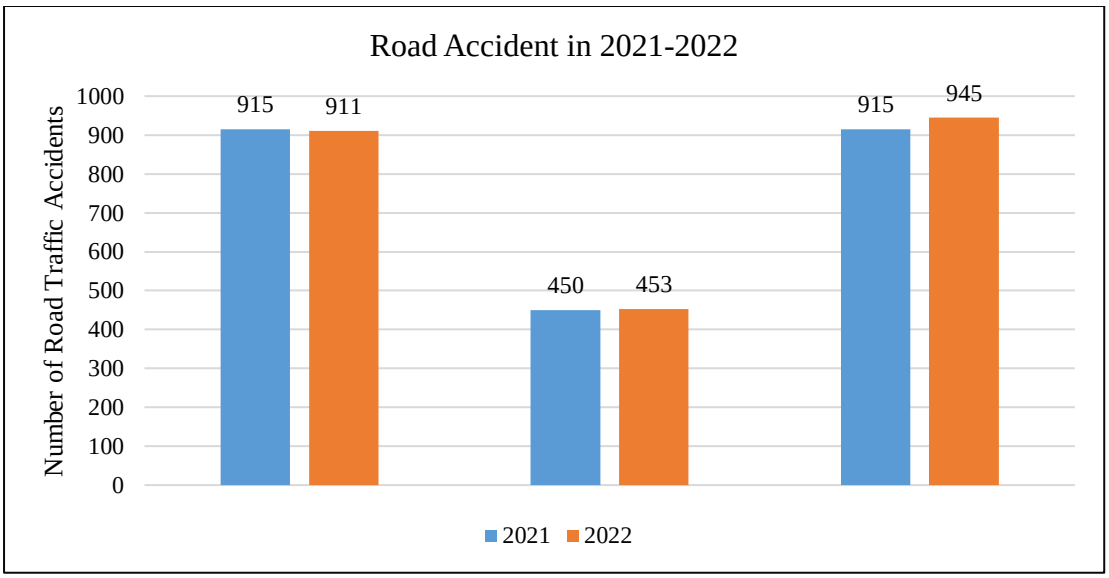
As of today, road accidents in Yangon are a major problem in Myanmar because the number of motor vehicles there is higher than in other cities. Naturally, the number of injured, deaths, and motor vehicle accident cases are highest in Yangon and Mandalay. Since there are quite a number of motor vehicles in these cities, and these cities are the most densely populated areas, the most frequent townships in Yangon for motor vehicle accidents were Hlaing Thar Yar, Insein, Mayangone, and Mingalardone

during 2014 and 2018. This is because of the unskilful and speedy driving of motor vehicles.

Poor driving skills and education about road safety are the important causes of road traffic accidents. In recent years, the number of deaths and injuries caused by traffic accidents in Myanmar has increased significantly. The number of deaths is expected to double again by 2020 and triple by 2025 (ADB, 2016). In 2021, more than 3,000 people died and 8,000 were injured in traffic accidents in Nay Pyi Taw and other regions and states, and from January to July of this year, there were 3,533 traffic accidents and more than 1,700 people died in the country, according to the Road Transport and Administration Department.

According to the No (2) Traffic Police Yangon, two years of traffic accidents in Yangon are shown in Figure (3.1) which shows the number of road accidents from 2021 and 2022. The number of accidents, deaths and injured are increasing yearly. In 2021, there were 915 accidents, 450 deaths and 915 injured persons. In 2022, there were 911 accidents, 453 deaths and 945 injured persons.

Figure (3.1) Number of Road Accidents in Yangon 2021-2022



Source: Office of Traffic Police Yangon

3.7 Critical Factors Affecting of Road Traffic Accident in Yangon

As is often the case in middle-income countries, Myanmar's transport institutional setting is characterized by fragmentation and overlap. There are many affecting factors of road traffic accidents in Yangon city. There are few places to cross the streets safely in the city, so many pedestrians cross the streets in disorderly manners.

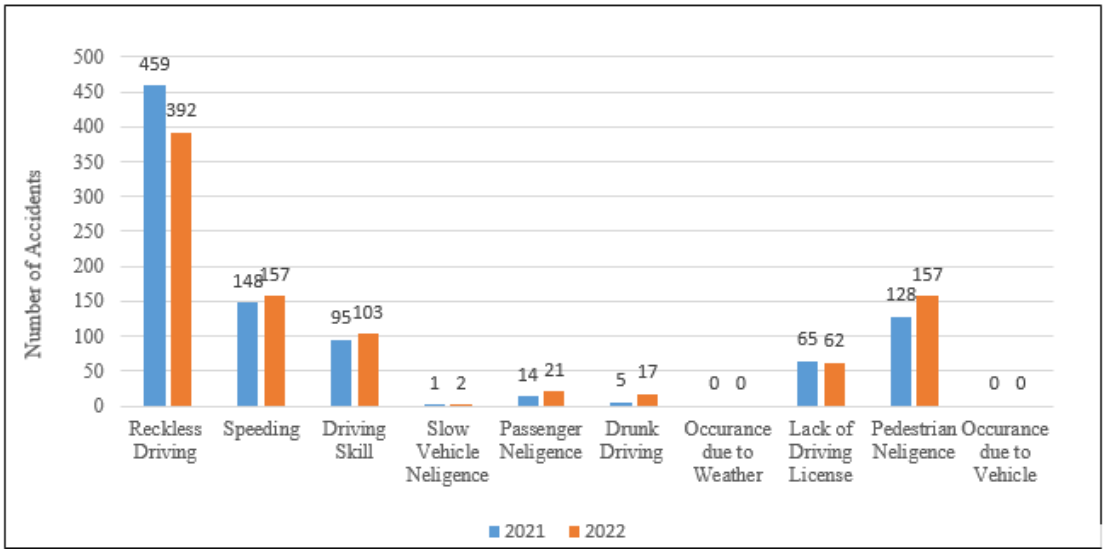
Pedestrians who cannot reach the opposite side of the road are often standing in the middle of the road, which is very dangerous. The street next to the walking path is often occupied by parked vehicles or buses. Accidents happen when trying to avoid parked vehicles. Many buses stop regardless of the location of the bus stop, which is a common cause of danger.

The number of road accidents in Yangon is disturbing. There are several major factors that affect traffic accidents. Deaths and injuries related to traffic accidents remain a significant concern in Yangon. They were mainly caused by human error, including over speeding, negligent driving, incompetence in driving skill, driver's judgment errors, violations of traffic rules, and carelessness in driving. Another set of contributing factors include pedestrians crossing roads at random and illegal parking on narrow roads, which makes them more difficult to negotiate. One of the reasons for road accidents in Myanmar is that most vehicles are designed for driving on the other side of the road. About 90 percent of the cars on the country's roads are second-hand imports from Japan that have right-hand drive.

According to statistics from the traffic police force office, over 75% of total accidents are caused by human error. Another cause of accidents is mechanical failure of vehicles, poor road quality, and bad weather. Another important cause of alarming increase in number of road accident is driving of vehicle in drunken state. Under the influence of alcohol and other intoxicating substances, the drivers lose self-consciousness and control over the vehicle, which ultimately forms the basis for accidents. Increased import of more vehicle in recent is one of the source of road traffics. Not wearing helmets or using seatbelts is the main factor in accidents. More than 80% of road accident deaths are due to head injuries.

Figure 3.2 shows that the most common cause of traffic accidents in Yangon in 2021-2022 is due to reckless driving. Accidents are also caused by speeding and negligence of pedestrians. It was found that the skills of the drivers are also a reason for the accidents.

Figure (3.2) Factors Affecting of Road Traffic Accidents in Yangon 2021-2022



Source: Office of Traffic Police Yangon

3.8 Inter-Regional Transport System of Yangon City

Yangon's road network is 4,456 kilometres (2,769 mi) long; most are asphalt, concrete, and dirt roads. The city has a high population density, with a population of over 5 million. Most people use cars, buses, railways, and waterbuses for transportation. There are many transportation systems, but the bus transportation system is the most popular. The conditions and structure of roads for the increasing number of cars are still demanding. Public transport is important for residents, and most people are relying on an extensive bus network. More than 300 public and private bus lines operate around 6,300 crowded buses in the city, carrying more than 4.4 million passengers a day. 80% of buses and taxis in Yangon run on compressed natural gas (CNG), following a 2005 government decree to save money on imported oil. There are two highway bus terminals; one is known as the Dagon Ayeyar Highway Bus Terminal in Hlaing Thar Yar Township, which is mainly for the buses going to the Ayeyarwaddy Division. (Wikipedia)

Motorcycles, bicycles, and trishaws are banned in the Yangon city limits, which is unusual in Southeast Asia. Until 2012, the importation of cars was limited, so buses were the only alternative (ADB, 2016). The Yangon Road Transport Authority (YRTA) was founded in 2016 to manage not only the city bus transport but also the Yangon-based inter-regional passenger transportation by neglecting the Yangon Region Private

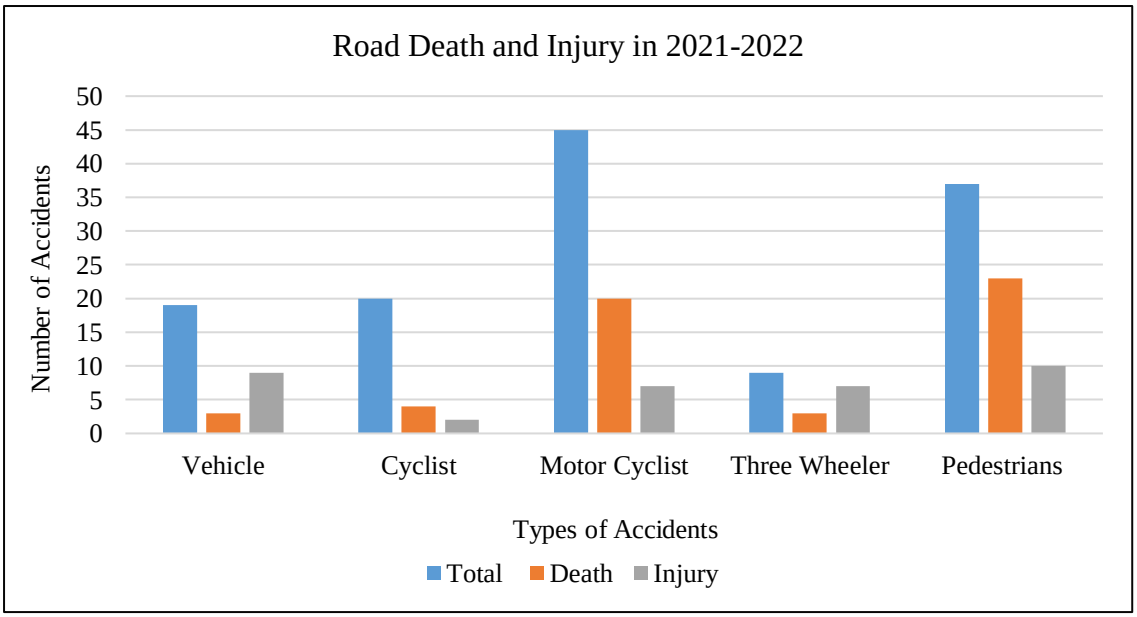
Vehicle Ownership (Private Transportation) Law (2014). Under YRTA, a branch, YRTA (Highway), was set up to control inter-regional passenger transportation.

3.9 Background Information of Hlaing Thar Yar Township

Hlaing Thar Yar Township is located in the northern district of the Yangon Region and covers an area of 22.64 square miles. It is located on Yangon-Pathein Road. As a township with moderate economic development, most of them are factory workers. It was one of the largest townships in the country and the most populous. Hlaing Thar Yar Township is bordered by Insein Township to the east, Htantabin Township to the west, Ton Tay Township to the south, and Shwe Pyitha Township to the south. Hlaing Tha Yar Township is located between the Pun Hlaing River and the Hlaing River, so it has a green environment and is a densely populated city where most of the grassroots live.

Hlaing Thar Yar Township and other cities are connected by the Aung Zeya Bridge, Bayint Naung Bridge, and Shwe Pyitha Bridge. Among the more than 400,000 people, most of them earn their living as basic laborers and factory workers. Most of the road users are pedestrians, cyclists, and tri-cyclists. Most of vulnerable road user that does not follow traffic rules also causes many accidents. Hlaing Thar Yar Township has a large number of pedestrians, cyclists, motorcyclists, and tricycle riders and is one of the townships with the highest number of traffic accidents in Yangon.

Figure (3.3) Road Traffic Deaths and Injuries in 2021-2022



Source: Office of Traffic Police East Hlaing Thar Yar Township

Figure 3.3 show the conditions of road traffic accidents in East Hlaing Thar Yar Township and that shows the number of persons killed and injured by each accident's types over the period from 2021 to 2022. There are five types of accidents including vehicles (car, bus, tuck), cyclist, motor cyclist, three wheelers and pedestrians. In Hlaing Thar Yar Township there are many motor cyclists so total accident rate of road accidents is highest in motorcyclist but pedestrians were recorded as the highest number of deaths and injuries. Because of the pedestrians are crossing the road without using cross line and narrow roads.

CHAPTER IV
SURVEY ANALYSIS

4.1 Survey Profile

The East Hlaing Thar Yar Township of Yangon city is a bustling and dynamic part of the Yangon Region. With an area of 22.64 square miles, it is one of the largest townships in the country and home to a diverse range of communities. Located on the Yangon-Pathein Road, this township is a key thoroughfare that connects people from different parts of the city and beyond.

The survey conducted in this township provides valuable insights into the attitudes and behaviors of road users in this area. With moderate economic development, most of the residents of this township are factory workers, company employees, and laborers. The township is densely populated, with a significant proportion of grassroots populations living in the area.

The East Hlaing Thar Yar Township is bordered by several other townships, including Insein Township to the east, Htantabin Township to the west, Twantay Township to the south, and Shwe Pyitha Township to the south. These bordering townships have their own unique characteristics and contribute to the overall diversity of the Yangon Region.

One of the defining features of this township is its location between the Pan Hlaing River and the Hlaing River. These rivers are significant waterways that provide essential resources for the people living in the surrounding areas. Despite these challenges, the township is a green and pleasant environment, with numerous parks and open spaces that provide recreational opportunities for residents. In recent years, there has been a concerted effort to increase the green spaces in the township, which has contributed to its attractiveness and liveability.

The survey conducted in East Hlaing Thar Yar Township focused on the attitudes and behaviours of different road users. The respondents included company employees, government employees, personal business owners, students, and retirees. The results showed that the majority of respondents were personal business owners,

while the smallest group was retirees. In terms of types of vehicles used by respondents, motorcyclists were the most common, followed by cars, bicycles, and other types of vehicles. This reflects the fact that motorbikes and cars are the primary modes of transport in the township, with bicycles and other vehicles used less frequently.

The survey also identified the most common types of road users in the township. The majority of respondents identified pedestrians as the most common road users, followed by drivers, motorcyclists, cyclists, and three-wheeler users. This reflects the fact that the township has a significant population of pedestrians who rely on footpaths and sidewalks to navigate the busy roads. This study provides valuable insights into the attitudes and behaviours of road users in this bustling part of Yangon city. The findings of this survey will be valuable for policymakers and road safety advocates who are committed to improving the safety and liveability of the Hlaing Thar Yar Township, part of Yangon Region.

4.2 Survey Design

The objective of this study is to identify the factors associated with traffic accidents and to analyse the knowledge, attitude, and practices behaviour of road users in Hlaing Thar Yar Township. To achieve these objectives, a descriptive study design was used to examine the prevalence and factors of road traffic accidents in East Hlaing Thar Yar Township. The study utilized both primary and secondary data sources. The primary data was collected from 200 respondents with questionnaire, such as drivers, pedestrians, and other road users in the township. A structured questionnaire was used to collect data on their knowledge, attitude, and practices behaviour of road safety measures. The questionnaire was designed to collect information on various factors such as driving habits, road conditions, weather conditions, and other factors that may contribute to road accidents. The secondary data was collected from the Office of Traffic Police in Hlaing Thar Yar Township. The records of road traffic accidents covering the years 2021-2022 were analysed to determine the frequency and severity of the accidents in the township.

The scope of the study was focused on the major causes of traffic accidents and the knowledge, attitude, and practice of road safety measures followed by road users in East Hlaing Thar Yar Township, Yangon. The primary data was collected from sample of 200 respondents through a structured questionnaire, while the secondary data was collected from the records of the Traffic Police Office in Hlaing Thar Yar Township.

To calculate the sample size required to achieve a specific margin of error with a given level of confidence, we can use the following formula for the sample size:

n = (Z^2 * p * q * N) / [(N-1) * e^2 + Z^2 * p * q]

where:

- n is the required sample size
- Z is the critical value from the standard normal distribution for the desired level of confidence
- p is the proportion in the population that has the characteristic of interest (this value is not known, so we use 0.5 to get the most conservative estimate of sample size)
- q is 1 - p
- N is the size of the population
- e is the desired margin of error (as a decimal)

Using your example with a population size of 800,000, a margin of error of 0.7%, and a desired confidence level of 90%, we can calculate the required sample size using the formula:

n = (1.645^2 * 0.5 * 0.5 * 800,000) / [(800,000-1) * (0.007^2) + 1.645^2 * 0.5 * 0.5]

Simplifying the equation:

n = 189.62

Therefore, we would need a sample size of approximately 190 to achieve a margin of error of 0.7% with 90% confidence for a population size of 800,000. Altogether 200 sample were collected to avoid missing value and unqualified sample.

There were some limitations to the study. Firstly, the study was limited to only one township in Yangon region, which may not be representative of the entire region. Secondly, the study relied on self-reported data from the respondents, which may not be entirely accurate. Finally, the study was conducted over a relatively short period, and thus the findings may not be applicable to other periods.

The study used a purposive sampling method to select the respondents for the survey. The sampling frame comprised of residents in the East Hlaing Thar Yar Township who were 18 years or older and have a driving license or regularly use the roads in the township as pedestrians or cyclists.

Approached potential participants in person and explained the purpose of the study. Those who agreed to participate were asked to complete a self-administered questionnaire. The questionnaire was distributed evenly across the five major wards in

the township, and the number of respondents from each ward was proportionate to the population size of the ward. A total of 200 respondents were surveyed, with 40 respondents from each of the five wards in the township. The researchers ensured that the respondents came from different socio-economic backgrounds and were of different age groups and genders. The researchers also ensured that the respondents had a mix of driving experiences, including new drivers and experienced drivers.

4.3 Survey Results

The survey findings are analysed and shown as profile of respondents, knowledge, attitude and practices of the respondents as following-

4.3.1 Profile of Respondents

The questionnaire used for this survey can be seen in Appendix (a) and total respondents 200 were involved in this study. The findings of the respondent's profile were presented in Table (4.1).

Table (4.1) Profile of Respondents

No.	Particular	Number of Respondents	Percentage
		200	**100%**
Age			
1	Less than or equal to 20	6	3%
2	21-40 years	140	70%
3	41-60 years	45	22.5%
4	61 years and above	9	4.5%
Total		200	100%
Gender			
1	Male	105	52.5%
2	Female	95	47.5%
Total		200	100%
Marital Status			
1	Single	95	47.5%
2	Married	105	52.5%
Total		200	100%

Table (4.1) Profile of Respondents (Continued)

No.	Particular	Number of Respondents	Percentage
		200	**100%**
Educational Level			
1	Bachelor/Graduate	101	50.5%
2	High School passed	78	39%
3	Primary passed	21	10.5%
Total		200	100%
Type of Job			
1	Company Employee	54	27%
2	Dependent	15	7.5%
3	Government Employee	40	20%
4	Personal Business	76	38%
5	Student	11	5.5%
6	Retired	4	2%
Total		200	100%
Types of Road Users			
1	Cyclist	18	9%
2	Driver	26	13%
3	Motorcyclist	30	15%
4	Pedestrians	106	53%
5	Three Wheeler	20	10%
Total		200	100%

Source: Survey Data 2023

In their age analysis, Table (4.1), 70% of road users are age group between 21-40 years are the highest accident expect unspecified age group. The second highest proportion in accident cases are between 41-60 years. Among the respondents, a higher percentage of male 52.5%. It is also seen that there are more married people than single people. Male drivers are still at higher risk of fatal car crash. Many more men than women die each year in motor vehicle crashes.

The above data set shows the distribution of respondents based on their job types and road user types. Among the respondents, 38% were personal business owners, while 27% were company employees, and 20% were government employees. As for the road users, pedestrians were the highest percentage of respondents (53%), followed by drivers (13%), motorcyclists (15%), cyclists (9%), and three-wheelers (10%).

The data set reveals some significant insights into the different types of road users and their behavior. For instance, the majority of respondents were pedestrians, which is a clear indication of the high percentage of people who walk on the roads. Moreover, the data set shows that motorcyclists constituted the second-highest percentage of respondents, indicating the popularity of motorcycles as a mode of transportation. However, research indicates that motorcyclists are among the most vulnerable road users, with a higher risk of injuries and fatalities than other vehicle users.

The data set highlights the importance of understanding the distribution of different types of road users and their behavior to develop effective road safety policies. Policymakers should take into account the different road users' needs and vulnerabilities when developing road safety measures to ensure their effectiveness in reducing road accidents and fatalities.

4.3.2 Knowledge of Road Safety

This section tests their knowledge of road safety of road users. In this survey, the questions about knowledge of road safety include which are the most dangerous road safety hazards, meaning of road signs and traffic rules. It was analysed to find out knowledge about road safety to road users.

Table (4.2) Risk Factors of Road Safety

Which one is most risky to occur road accidents?			
No.	**Risk Factors**	**Frequency**	**Percent**
1	Bad Behaviors	87	43.5%
2	Failure of Vehicle	65	32.5%
3	Road Conditions	48	24%
4	Weather Conditions	28	14%

Source: Survey data, 2022

According to the data provided, bad behaviors are the most frequent risk factors associated with road accidents, accounting for 43.5% of the total. Failure of vehicle is the second most common risk factor, accounting for 32.5% of the total. This can include mechanical failure, tire blowouts, and other issues related to vehicle maintenance. It is important for drivers to ensure their vehicles are properly maintained and in good working order to reduce the risk of accidents.

Road conditions account for 24% of the total risk factors, which can include poor road design, inadequate signage, and potholes or other hazards on the road. The importance of road infrastructure and design cannot be overstated in reducing the risk of accidents, as it can greatly impact driver behavior and ability to react to hazards.

Weather conditions account for 14% of the total risk factors, including factors such as rain, snow, ice, fog, and other adverse weather conditions that can impact visibility and road conditions.

Overall, it is clear that bad behaviors are the most significant risk factor for road accidents, with failure of vehicle, road conditions, and weather conditions also playing a role. Addressing these risk factors through better driver education, vehicle maintenance, road infrastructure and design, and improved weather forecasting and warning systems can all contribute to reducing the incidence and severity of road accidents.

Table (4.3) Perceptions of Respondents Regarding Road Safety

(SA: Strongly Agree, A: Agree, N: Neutral, SD: Strongly Disagree, D: Disagree)

No.	Knowledge Regarding Road Safety Measure	SA	A	N	D	SD	Mean Score
		%	%	%	%	%	
1	Over speed driving can increase the traffic accidents.	43	52.5	4	-	0.5	4.35
2	Using mobile phone while driving is dangerous	31.5	57.5	7.5	3	0.5	4.17
3	Hazard lights are effect on accidents	7	57	11	25	-	3.47
4	Wearing seat belt is good habit	29	59.5	11.5	-	-	4.18
5	Weather conditions can be cause traffic accident	12.5	52.5	29.5	5.5	-	3.72

Table (4.3) Perceptions of Respondents Regarding Road Safety (Continued)

No.	Knowledge Regarding Road Safety Measure	SA	A	N	D	SD	Mean Score
		%	%	%	%	%	
6	Careless of road users can cause serious accidents	25	63	7	5	-	4.08
7	Listing to music with headphone on while driving is dangerous.	26.5	51	7	15.5	-	3.90
8	Unskilled drivers can be feeling annoyed to other road users.	19	71.5	7.5	2	-	4.08
9	Bad driving behavior and attitude is the common cause of accidents.	27.5	68.5	2.5	1.5	-	4.23
10	Deaths, injuries and property damage are the direct consequences of road accidents.	34	56.5	7.5	2	-	4.24
11	Pedestrians should use cross line.	21	57	20	2	-	3.76
Overall Mean							**4.01**

Source: Survey Data, 2022

Road safety is a critical issue worldwide, with traffic accidents being one of the leading causes of death and injury. It is therefore essential for all road users to have a good understanding of road safety measures to minimize the risk of accidents. The survey found that most road users had a good understanding of road safety measures, but there were some knowledge gaps in specific areas.

One of the most significant findings of the survey was that over speeding is a significant factor in traffic accidents, with 52.5% of respondents acknowledging that it increases the risk of accidents with a higher mean value of 4.35. This finding is consistent with global data that shows that speeding is a leading cause of road accidents. This finding emphasizes the need for strict enforcement of speed limits and education programs to raise awareness among drivers about the dangers of over speeding.

Using mobile phones while driving is another risky behavior that was highlighted by the survey. The survey found that 57.5% of respondents believe that using mobile phones while driving is dangerous. This finding is consistent with global data, which shows that using mobile phones while driving increases the risk of accidents. To reduce the risk of accidents, it is essential to raise awareness among road

users about the dangers of using mobile phones while driving and enforce strict penalties for violators.

Another finding of the survey was that most road users believe that unskilled drivers can be a source of annoyance on the road. This finding is consistent with global data, which shows that unskilled drivers are a significant cause of accidents. Governments must implement stricter licensing procedures and driver training programs to ensure that drivers have the necessary skills and knowledge to drive safely.

The survey also found that road users had good knowledge of the direct consequences of road accidents, with 56.5% of respondents acknowledging that road accidents can result in death, injuries, and property damage. This finding emphasizes the need for governments to invest in road safety measures to minimize the economic and social costs of road accidents.

One area where there was a knowledge gap was the importance of hazard lights in preventing accidents. The survey found that only 57% of respondents believed that hazard lights could prevent accidents. It is, therefore, essential to raise awareness among road users about the importance of hazard lights in preventing accidents.

The survey also found that some road users did not have a good understanding of the importance of using pedestrian crossings. Only 57% of respondents believed that pedestrians should use designated crossing areas. To reduce the risk of accidents involving pedestrians, it is essential to raise awareness among road users about the importance of using designated crossing areas. Survey findings indicate that road users have a good understanding of road safety measures. As the total mean was 3.47, there were some knowledge gaps such as the importance of hazard lights and the use of designated crossings.

Table (4.4) Attitude of Study Participants Regarding Road Safety

(SA: Strongly Agree, A: Agree, N: Neutral, SD: Strongly Disagree, D: Disagree)

No.	Attitude Regarding Road Safety Measure	SA	A	N	D	SD	Mean Score
		%	%	%	%	%	
1	I always maintain speed limit and never exceed the speed limit.	16	67.5	14.5	2	-	3.98
2	Road users should follow road safety rules.	20.5	69	10	0.5	-	4.10
3	All road users have the responsibilities for road safety.	27.5	51	18	3.5	-	4.02
4	Wearing seatbelt or helmet on vehicle is good habits.	20	66	14	-	-	4.06
5	I drive carefully during bad weather.	18	65	17	-	-	4.01
6	Failure of understand road signs can cause accidents.	15	75	9.5	0.5	-	4.05
7	I think driving under the influence of alcohol can cause accidents.	41	56	2.5	0.5	-	4.38
8	Feel annoyed due to unskilled drivers on road.	17	74	8	1	-	4.07
9	Poor awareness of traffic rules can cause road accident	20.5	69	10	0.5	-	4.17
10	Pedestrians should cross the road only at zebra crossing.	41	56	2.5	0.5	-	4.10
Overall Mean							4.09

Source: Survey Data, 2023

According to the survey data provided, there were several attitudes regarding road safety measures among the respondents. Firstly, failure to understand road signs was considered a contributing factor to accidents by 75% of the respondents with total mean score 4.05. Secondly, the survey found that unskilled drivers on the road can cause annoyance, with 74% of respondents agreeing with this statement. It is well established that all road users have a role to play in ensuring safety on the roads.

Regarding specific safety measures, 66% of respondents considered wearing a seatbelt or helmet while in a vehicle to be a good habit, which is also supported by global data showing that seatbelt use reduces the risk of death or serious injury in road crashes.

Similarly, 56% of respondents believed that pedestrians should only cross at zebra crossings, which is a common safety measure around the world.

Another attitude towards road safety that emerged from the survey was the recognition that driving under the influence of alcohol is dangerous. 56% of respondents agreed with this statement with total mean score 4.38, and this is consistent with global data showing that alcohol-impaired driving is a significant risk factor for road accidents.

Out of 200 participants, 97 respondents (48.5 %) had sufficient knowledge and 103 respondents (51.5 %) had insufficient knowledge of road safety rules and regulations. According to the percentage of 108 respondents (54%), the attitude of road users is weak, while 92 respondents (46%) have a positive attitude according to the total average score.

Overall, the attitudes towards road safety measures among the respondents were generally aligned with global data. However, there were some variations in the specific attitudes towards certain measures, which could be attributed to cultural and regional differences. Nonetheless, the survey provides valuable insights into the perceptions of road safety among the population and highlights areas for further improvement.

Table (4.5) Practice of Study Participants on Road Safety

No.	Characteristics	Frequency	Percent
1	Usually drive faster than speed limit.	52	26
2	Drinking alcohol before driving.	43	21.5
3	Wearing seatbelt or helmets.	167	83.5
4	Using phone while driving.	100	50
5	Using cross line of pedestrians.	120	60
6	Drive carefully in bad weather.	169	84.5
7	Using signal lights.	94	47
8	Parking on the side of road.	181	90.5
9	Getting on and off in a safe place.	187	93.5
10	Need to more traffic sign on roads.	192	96
11	Road conditions are still needed to upgrade.	194	97

Source: Survey Data, 2022

The characteristics of road users, as depicted in the data, provide insight into the driving practices of individuals and suggest areas where improvements can be made to promote safer driving practices. For instance, the fact that 26% of road users tend to over speed while driving is a major cause of concern, as speeding can significantly increase the risk of accidents and the severity of injuries. 21.5% of road users in the given data drive under the influence of alcohol highlights the need for stricter enforcement of drunk driving laws and greater awareness campaigns to promote responsible drinking and driving practices.

Using mobile phone while driving is dangerous all of the passengers on board. Although traffic police prohibit the use of the phone on board, half of road users use their mobile phones. Another concerning trend is the use of phones while driving, which is becoming increasingly prevalent worldwide. In this surveys, 50% of road users in the given data use their phones while driving is a major cause of concern, as it can distract drivers and increase the risk of accidents.

In this survey, 83.5% of the respondents were aware of wearing seat belt or helmets and practiced it. Among 200 respondents, 84.5% accepted that especially in the rain and fog in tropical country like Myanmar. The western countries and countries with very cold weather with falling snow, the people could face more difficult with weather conditions driving.

Parking on the side of the road is also necessary rule to follow the road users and in this study, 90.5% of participant park on the side of road which is 181 out of 200, Parking on the side of road is a must not only for road safety but also for the traffic jam. About the question of arranging the passengers to get on and off in safe place, 93.5% do it. Finally, the overwhelming demand for more traffic signs and better road conditions, as expressed by 96% and 97% of road users respectively in the given data, highlights the need for infrastructure improvements to promote safer driving practices. Similarly, poorly designed roads and intersections can contribute to accidents and fatalities.

The characteristics of road users provide important insights into driving practices and their implications for road safety. While there are some concerning trends, such as over speeding, drunk driving, and phone usage, there are also positive trends, such as the use of seatbelts and helmets and adherence to basic safety guidelines. However, there is still work to be done in promoting safe driving practices and improving road infrastructure to reduce the incidence of accidents and fatalities.

Table (4.6) Characteristics of Road Users

No.	Characteristics	Cyclist		Driver		Motorcyclist		Pedestrians		Three Wheeler	
		f	%	f	%	f	%	f	%	f	%
1	Usually drive faster than speed limit.	3	16.7	11	42.3	8	26.7	24	22.6	6	30
2	Drinking alcohol before driving.	3	16.7	7	26.9	12	40.0	13	12.3	8	40
3	Wearing seatbelt or helmets	13	72.2	23	88.5	22	73.3	93	87.7	16	80
4	Using phone while driving	8	44.4	14	53.8	16	53.3	52	49.1	10	50
5	Using cross line of pedestrians	9	50	13	50.0	20	66.7	68	64.2	10	50
6	Drive carefully in bad weather	14	77.8	22	84.6	28	93.3	88	83.0	17	85
7	Using signal lights	5	27.8	10	38.5	16	53.3	50	47.2	13	65
8	Parking on the side of road	16	88.9	26	100	27	90	95	89.6	17	85
9	Getting on and off in a safe place	17	94.4	25	96.2	28	93.3	102	96.2	15	75
10	Need to more traffic sign on roads	18	100	26	100	26	86.7	103	97.2	19	95
11	Road conditions are still needed to upgrade	18	100	26	100	29	96.7	103	97.2	18	90

Source: Survey Data, 2022

Table (4.6) show that drivers among 200 road users have good road safety practices. It is seen that the drivers have good practice in wearing seatbelt and helmets with 88.5 percent, but sometimes use mobile phones while driving with 53.8%. Of the respondents, 42.3% of road users were found to be driving faster than the speed limit.

It was found that motorcyclists tend to drive carefully in bad weather, and 73.3 percent wear a helmet when riding a motorcycle. There is also practice on getting up and down safely and stopping on the side of the road. Cyclists also follow the rules of the road, but in some areas the practice is still lacking.

Pedestrians need to use the crosswalk and are at a disadvantage when crossing the street. It was found that crossing the road at a random place, not a designated place, also caused traffic accidents. Road users already know the rules of the road, but there are still weaknesses in practice. Respondents include cyclists; All road users are advised that need to more traffic sign on roads and suggest the need to upgrade the road conditions.

Table (4.7) Knowledge and Attitude Mean Score of Road Users

Types of Road Users	Total Knowledge Score	Total Attitude Score
	Mean ± SD	Mean ± SD
Cyclist(n=18)	44.8 ± 4.1	33.7 ± 2.49
Driver(n=26)	45.3 ± 4.48	33.2 ± 3.01
Motorcyclist(n=30)	44 ± 5.06	32.06 ± 2.9
Pedestrians(n=106)	43.6 ± 4.74	32.6 ± 2.48
Three Wheeler(n=20)	44.8 ± 3.83	32.4 ± 2.16
Total (n=200)	44.16 ± 4.62	32.7± 2.6

Source: Survey Data, 2022

Table (4.7) show that, among all respondents who have good status of knowledge, attitude and correct practice on road safety with the high average mean score of 44.16. Most of the respondents are pedestrians and second most are motorcyclists. But motorcyclist including respondents have weak status of knowledge, attitude and correct practice on road safety with low average mean score of 44. Among the respondents, cyclists, pedestrians and tricycle riders have good knowledge of traffic rules, but there are still weaknesses in attitude with 32.7. Motorcyclists and tricycle riders have shown poor compliance to road safety in this research. Most of the respondents have safety knowledge, the moderate attitude and some good practice in this study.

CHAPTER V
CONCLUSION

5.1 Findings

This study shows that most of the road users have sufficient knowledge but don't have enough practices of traffic rules and regulations. According to secondary data from the office of traffic police in East Hlaing Thar Yar township which are already presented in chapter 3, most of the accidents are caused in motor cyclists and second most in pedestrians. These two types of road users are most cases of injuries and death. The causes include human errors, road conditions, vehicle errors and weather conditions.

This study also found that the common source of road injuries and fatalities are the way of people drive, cycle and walk on the road. The main causes of RTA are speeding, pedestrians' errors, insufficient skill of drivers. Fatigue and psychological stress are the key determinants of accidents and fatality risk. Unskilled drivers who are disturb on other road users and cause accidents. This study also found that few of the peoples are still having over speed but they have good practice on wearing seat belt. But most of the riders are don't have the behaviour of wearing helmets. Most of the road users know driving under the influence of alcohol is the worst habits on accidents but some are having frequently.

The study shows that most of the road users have knowledge on using phone while driving but they are frequently use mobile phone and listening music. Most of the road users have unclear knowledge on hazard light and cross line. They are also crossing by the random areas. Weather conditions and road conditions are also effect on accidents. During the bad weather the vision of drivers are impaired. Poor road infrastructure and lack of road signs are can contribute to both frequency and severity of accidents. Failure to understanding and obeying road signs are the one of the dangerous causes of road accidents.

Regarding the driving practices from this knowledge and attitudes, further survey is made to understand whether good practice or not. Wearing seat belt is

recognized as a strong behaviour but having weakness in wearing helmets. Hlaing Thar Yar township has the largest population of people in Yangon and low and middle social class mostly live there. They use motorcycles more than any other way to go to their work. Careless motorcyclists use phone during riding and drive over speed limit, carry more than 1 passenger and not drive on the outermost lane. Regarding their belief on knowledge and practices which are concerning to happen road accidents, the study found that more than half of the road users have good driving practices but some respondents are the weak on practice of road rules. So the road users believe that most of the accidents are cause by bad behaviours of drivers and all of the road users.

The survey question was prepared to be able to give opinions, suggestion on situation needed in Hlaing Thar Yar Township. This study found out that most of the respondents think of that road signs are still needed and road conditions are need to improve in Hlaing Thar Yar Township. Epically road signs, lamps and road reflections are needed. As for road users, it is found that compliance with some rules is still weak.

In general, young male drivers were involved in more collisions and had higher RTIs because of their risk-taking behaviour while driving. The higher occurrence of RTIs was among adults 25-34 years. Male drivers were more at risk than females of being injured in crashes. It showed that human behavioural factors represent one of the leading causes of RTIs. The causes of RTIs have been reported as excessive speed, and failure to use protective measures like seatbelts. Head and neck injuries were reported more among drivers. Severe injuries were more prevalent among heavy vehicle crashes.

5.2 Recommendations

Based on the findings and survey results of the thesis the main vulnerable road users in traffic accidents are pedestrians, educational training is conducted in various sectors, improving infrastructure. It is recommended to keep pedestrians safe by preparing speed limit and traffic education at school as a course, and law enforcement in traffic rules and regulations. The central government and relevant organizations should implement strong road rules for road users will achieve well-being and sustainable benefits. Improving the knowledge of road safety though media sources and educational films. Traffic rules should be strictly implemented and penalties for road traffic violating traffic rules should be increased. Roads and road environment conditions should be improved to provide safer environments for pedestrians. Poor road

conditions can lead to accidents. Most of these accidents are caused by heavy rain and snow. All road users need to follow the traffic rules and understand the road signs well. In this survey, it was found that there are obvious road signs on the road that need to be repaired. This study reflects the behaviour of road users and can be a part of helping to formulate policies, regulations and standard procedures to prevent road safety problems.

RTIs showed a high incidence with an increase in injury rate, mainly among young adults and motorcyclists. Speeding was the leading cause of RTAs, accounting for more than a third of fatalities. Another preventable human error is not wearing seat belt and helmet. Road safety is very important to ensure safety for all age groups as well as to reduce the number of accidents and injuries. Therefore, it is expected to reduce the loss of working age people due to road hazards that can cause socio-economic problems. Prevention and control with emphasis on behavioural changes, education, and law enforcement may reduce the number of RTIs from crashes in the future.

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Appendix-I (A)

Survey for The Thesis of Master of Public Administration

Assessment of Traffic Safety Problems and Awareness of Road Users

(Case Study in Hlaing Thar Yar Township)

Road User Survey

This survey is asked for information about traffic safety problems and awareness of road users. Your participation is completely voluntary and the research team is not collecting your personal information. Information collected will be used for research purposes only. If you do not wish to answer a question, or if a question does not apply to you, you may leave answer blank.

SECTION A: PERSONAL PROFILE

1. Age ( )
2. Gender Male Female
3. Marital Status Single Married
4. Education Level
    - Under Primary
    - Primary Passed
    - High Passed
    - Bachelor
5. Type of job
    - dependent
    - student
    - government employee
    - company employees
    - personal business
    - Retired
6. Are you a
    - Driver
    - Cyclist
    - Motorcyclist
    - Pedestrian
    - three wheeler
7. Have you ever had a road traffic accident? Yes No

8. What type of vehicle do you usually use?
    - Car
    - Bus
    - motorbike
    - bicycle
    - other

Appendix-I (B)

SECTION B; KNOWLEDGE

1. Which one is most risky to occur road accidents?
   - Bad behaviors -Weather conditions
   - Road conditions -Failure of vehicle

		Strongly disagree	Disagree	Natural	Agree	Strongly Agree
1	Over speed driving can increase the traffic accident					
2	Using mobile phone while driving is dangerous					
3	Using hazards lights are effect on accident					
4	Right way of using the horn is useful					
5	Wearing seatbelt is a good habit					
6	Both the driver and the person in front need to wear seat belt					
7	Driving after alcohol consumption is dangerous					
8	It should give attention on traffic sign along road while driving					
9	Pedestrians should use zebra crossing					
10	Wearing helmet is necessary while riding motorbike					
11	Weather conditions can be caused traffic accident					
12	Road safety rules and regulations must know all road users					
13	Careless of road users can cause serious accident					
14	Listening to music with headphones on while driving is dangerous.					
15	Road sign should be followed strictly					
16	Acknowledge dangerous behaviours can cause accident					
17	We must careful while opening the door of vehicle					
18	Unskilled drivers can be feel annoyed to other road users					
19	Every road user must understand the traffic signs					
20	Bad driving behavior and attitude towards road safety is the common cause of an accident					
21	Deaths, Injuries and property damage are the direct consequences of road accidents.					

Appendix-I(C)

SECTION C; ATTITUDE

		Strongly Disagree	Disagree	Natural	Agree	Strongly Agree
1	Road conditions are important for road users.					
2	All road users have the responsibilities for road safety					
3	Wearing seatbelt or helmet on vehicle is good habit					
4	I had to stop and wait until the traffic light turned green.					
5	Pedestrians can cross the road only at Zebra crossing.					
6	I always check mirror before changing lines.					
7	I always maintain speed limit and never exceed the speed limit.					
8	I think driving under the influence of alcohol can cause accidents.					
9	Failure of understand road signs can cause accidents.					
10	I drive carefully during bad weather.					
11	Need to check your vehicle before driving.					
12	Morning hours are the time when distractions and accidents are most likely to occur.					
13	I feel annoyed if there are slow vehicles such as bicycles and motorbikes which do not have no reflection or front and back light.					
14	Feel annoyed due to unskilful drivers on road.					
15	Poor awareness of traffic rules can cause road accident					
16	Road users should follow road safety rules.					

Appendix-I (D)

SECTION D; PRACTICES

		Yes	No
1	Usually drive faster than the speed limit.		
2	Sometime I drink little alcohol before driving.		
3	Do you follow the rules when using the vehicle? (eg. Seatbelt or Helmets)		
4	Always use crossline to cross the line		
5	Do you usually use mobile phone while using road?		
6	Usually cross the red light while driving.		
7	Usually drive slowly when the weather is bad.		
8	Usually make sudden lane changes without using signal light.		
9	When I park for some reason, I usually park on the side of the road.		
10	Always arrange for passengers to get on and off in a safe place.		
11	Always use horn to notify others drivers		
12	Distracting a driver of a car or bus can cause a collision		
13	Do you usually care while opening the door of vehicle?		
14	Do you think that need to more traffic signs on road?		
15	Road constructions are still needed to upgrade?		