DETERMINANTS OF ROAD TRAFFIC ACCIDENTS AMONG MOTORCYCLE RIDERS IN KITUI COUNTY, KENYA

FAITH KANINI MUTINDA

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DECLARATION AND APPROVAL

Student declaration

I Faith Kanini Mutinda maintain that this thesis is entirely original with no submissions made for credit toward a degree at another college or university.

Faith Kanini Mutinda

MPH/2017/66723

Signature ……  **……. Date ……31 May 2024…….**

Approval By Supervisors

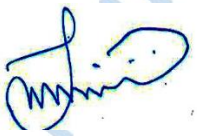
As university supervisors, we have approved this thesis and it has been submitted for examination.

Signature ……  **……. Date ……31 May 2024…….**

Dr. Joseph Juma Nyamai (Ph.D.)

School of Public Health

Mount Kenya University

Signature ……  **……. Date ……31 May 2024….**

Dr. Joseph Muchiri (Ph.D.)
School of Public Health
Mount Kenya University

DEDICATION

I dedicate this thesis to my family for their love and moral support during the period of study. I also dedicate to my mother for continued support and prayers and encouragement

Special dedication to Mr. Anthony Maina and family for walking the journey with me and giving encouragement during hard times.

May the almighty God bless them all.

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LIST OF ABBREVIATIONS AND ACRONYMS

FRSC	-	Federal Road Safety Commission
KERRA	-	Kenya Rural Roads Authority
KHIS	-	Kenya Health Information System
KRA	-	Kenya Revenue Authority
MAAK	-	Motorcycle Assembly Association of Kenya
NHTSA	-	National Highways Traffic Safety Administration.
NTSA	-	National Transport and Safety Authority
RTA	-	Road Traffic Accidents
RTI	-	Road Traffic Injuries
SDG	-	Sustainable Development Goals
SPSS	-	Statistical Package for Social Sciences
TBI	-	Traumatic Brain Injuries
WEC	-	World Economic Survey
WHO	-	World Health Organization

KEY WORDS

Road

Road Traffic Accidents

Motor cycle

Accidents

Riders

ABSTRACT

Motorcycle accidents remain one of the main global public health concern. The African region has the highest road fatality rates globally, in spite of being the least motorized region. In Kenya, motor cycles are widely used as a cheap and reliable means of transport. Kenya has an estimated road fatality rate of 20.9 per 100,000 people, higher than that of the European region. There has been an increased use of motorcycles in Kenya over the last decade, so has the number of deaths from motorcycle injury. The rise of two-wheeled automobiles as a means of transport in the majority of urban and rural settings has led to a new outlook on safety measure in Kenya as a nation. This study was aimed to establish the determinants of motorcycle accidents among riders in selected four sub counties of Kitui namely: Kitui Central, Kitui West, Kitui Rural and Kitui East in Kitui County, Kenya. The study set out to ascertain which personal traits drove motorcycle accidents in Kitui County, which environmental factors affected motorbike accidents in Kitui County, as well as which riding skills affected motorcycle accidents in Kitui County. Justification of this study was based on the KHIS reports on the road traffic accidents in the county. Theoretical, empirical and critical literature review was done by scrutinizing other related studies by scholars. The investigation used a cross-sectional design with descriptive characteristics in which the investigator collected data using both quantitative and qualitative methods. Purposive sampling was used to select the four sub counties. This was based on the geographical characteristics and also desk review on the prevalence of motorcycle accident in the sub counties as per the KHIS reports. Youth who were regarded as motorcycle riders formed the target demographic. The study's primary informant population was comprised of 424 those surveyed from each of the four sub-counties. A structured questionnaire was used for gathering quantitative data, and focus group discussions and key informant interviews with motorcycle riders were employed to obtain qualitative data. The SPSS program was used to code, enter, and analyze the collected data. A combination of charts, tables, and graphs were used to present the results. On the environmental factor, majority of those interviewed (69%) were unanimously in agreement that Kitui County has a higher rate of motorcycle accidents as a result of poor road conditions. The study also established those motorcycling abilities, individual characteristics, and environmental variable all had an influence on motorcycle accidents. Majority of the riders had not gotten any forma training and therefore they always violated traffic rules leading to the high prevalence of accidents in the four sub counties The findings of this recommends for The National Transport and Safety Authority (NTSA) to carry out regular inspection of motor cycles to reduce the risks of faults that can lead to accidents and also advise both the National and County governments on policies in regards to transport sector and road safety. The Kenya Rural Roads Authority (KERRA) should carry out regular rehabilitation and maintenance of roads to minimize the number of accidents due to poor roads and provide road signages for the precautionary measures by the motorists. The study recommends that motorists should have self-initiative for formal training to ensure compliance with the set regulations.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

This section provides an overview on what is being investigated, a statement of the research problem, and a rationale for the research objectives and questions. Giving an overview of the research was the section's the primary goal. Unseen pandemics, automobile crashes have a significant impact on the environment, society, economy, and health (Sargazi et al., 2016; WHO, 2016). Road accidents cause roughly 1.3 million deaths and 50 million disabilities around the world each year, which have an impact on the daily lives of individuals (WHO, 2010; WHO, 2013; WHO, 2015). Furthermore, at the scene of an accident, within a few minutes, about 50% of these fatalities from traffic accidents take place. In order to improve the victims' chances of survival, bystanders must act quickly (Kureckova et al., 2017; WHO, 2016; WHO, 2017).

Motorcycle injuries are a public health problem globally. The effects of motorcycle injuries in low- and middle-income countries (LMICs) are twice as high as those in high-income countries. These injuries contribute significantly to mortality and morbidity, placing a significant economic burden on individuals injured, the public health system, and governments, as shown by lost wages, unemployment, long-term medical expenses, and intangible suffering.

According to the World Report on Road Safety (2015), 68 countries have seen an increase in the total amount of mortality cases reported for 2010, with countries that are developing accounting for 84% of these deaths. Nowadays, motorcycles are the most common type of two-wheeled vehicle. Due to their effectiveness and dependability, motorcycles continue to be the most popular mode of public transport in economically advanced nations like China, Asia, Vietnam, and Indonesia. The World Economic

Survey report from 2010 states that the following countries continue to have the most significant motorcycle industries. In Iran, there was a noted increase in the number of motorcycles produced from 50,599 in 1986 to 8,334,552 in the year 1996(Janmohammadi et al, 2009).

In Taiwan, the number of two-wheeled vehicles doubles as compared to other automobiles this stands for every 10000 population (Taiwanese Government, 2007).In a report produced by nationwide research by the Australia Transportation Wellbeing Bureau (ATSB), it was identified that sales of motorcycles had tremendously increased in recent years and this cycle is projected to double in the upcoming years, this was according to Nyatundo, (2014).

In low and middle-income nations, motorcycles use is becoming the most preferred mode of transport.In a report produced by WHO,69% of the automobiles in developing nations consist of motorcycles a figure that is expected to increase as time goes by (World Health Organization, 2006). The chance of mortality cases being reported due to road traffic is higher in African countries for example it is estimated that twenty-four point two persons per one hundred thousand persons (24.2/100,000) population die due to road accidents in Africa as compared to the European countries (10.3/100,000) according to WHO report, (2015).

In Africa, driving a two-wheeled vehicle is still extremely awkward. According to a 2009 report published by the Federal Road Safety Commission (FRSC) of Nigeria, motorcycles accounted for over 52% of the country's licensed and registered number plates; this percentage increased significantly between 2004 and 2005, rising by 263,163 from 259 757. In developing countries like Tanzania, motorcycle-related accidents claimed the lives of over 181 people in the first quarterly period of 2010. Tanzania now uses 85,000 motorcycles, up from 6700 in 2007 (Figure 85,000). The

aforementioned data was disclosed in 2009. This means that for every two years, there will be a thirteen-fold increase. Nkwame (2010). Likewise in the same country, the number of motorcyclesrose by 8 percent between 2010 and 2013 while the proportion of motorcyclist deaths increased from 18 percent to 22 percent in the said period, as established by the (WHO report, 2017).

The rise in riders can be attributed to the fact that motorbikes can be purchased for comparatively less money than other types of vehicles, and the motorcycle taxi sector generated good profits, which encouraged more people—particularly young people—to enter the industry (solagberu et al, 2006).

According to a World Health Organization (WHO) report, rapid automobile adoption without concurrent funding for roadway security strategies may be partially to blame for the higher death rates observed in Kenya, Uganda, South Sudan, Rwanda, and other developing nations. WHO (2017). Ugandans invented motor process service for transportation, or "boda boda" (Howe, 2003). Originally offered on bicycles, this form of transportation has since developed in Kenya to incorporate motorcycles. In Kenya, the market for motorcycles is growing, and many people use them as their primary means of transportation in remote, undeveloped villages alongside other hard-to-reach places. Ninety percent of registered motorcycles are used for transporting passengers, corresponding to the NTSA.

In 2014, the gross national product increased by 2.2 billion shillings thanks to the motorbike sector. The following four elements have contributed to Kenya's growing popularity of two-wheeled automobiles: the state's 2008 zero-rating of boda bodas with 250 cc and smaller. The incapacity of alternative techniques of transportation to completely satisfy the demand is the second consideration.

The third driver is the high rate of price increases, which forces young people to work in

the motorcycle manufacturing sector in order to meet their routine requirements. The number of those who commute is growing daily (Nyachieo, 2012). For Kenyans, the motorcycle manufacturing has produced over 100,000 jobs. Last but not least, the motorcycle industry has less legal requirements, which means that there are fewer constraints, which increases flexibility. Moreover, less resources are required for motorcycle riders to receive training, which increases convenience. According to a 2015 MoH medical report, data from Kenya's Nationwide Transportation and Safety Authority (NTSA) shows that 3057 people lost their lives in traffic-related deaths in 2015. This number does not only include motorcyclist collisions. Over 900 injuries sustained in crashes were reported in Makueni County in 2015; these patients were was referred to Makueni level 5 hospitals for further care. The Makueni law enforcement agency reports that in Makueni HMIS, 2015 and 2016, over 74 death cases were connected with automobile accidents.

At Makueni Referral Hospital, over 550 cases of collision-related fatalities were handled in 2016. Makueni County is where all of these cases of road accident complications were documented. Based on available police and hospital records, there were 120 fatalities in 2016. (Makueni Police Reports, 2013–2016). According to Staton et al. (2016), the aforementioned trend in road accident fatalities and permanent disabilities can be avoided if appropriate policy is followed by the stakeholders and, more importantly, tackled by an effective and productive Emergency Medical Service (EMS). In Kitui County, there were 28,092 cases of road traffic accidents reported between 2016 and 2020 with the highest being 12,770 in 2016 and the lowestbeing 3,250 in 2020. This has led to the high increase in workload at the surgical ward at the Kitui County Referral Hospital, MoH 705 report (Kenya Health Information System, 2020).

1.2: Problem Statement

Traffic accidents are a growing worldwide health concern because they have a significant impact on people's health, expansion, and well-being (WHO, 2015). Globally, motorcycle fatalities account for 28% of all road traffic deaths. In the World Health Organization Africa region, between 7% and 16% of all road traffic deaths are motorcycle-related (Wilberforce Cholo et al,2023)

Over 50 million instances of serious injuries have been documented annually, while 1.2 million instances of mortality related to traffic accidents are disclosed around the world. Interestingly, developing countries account for 90% of these deaths and cases (WHO, 2015). The African continent has a disproportionate rate of road traffic accident-related passing away. This translates to 28.3 mortality cases for every 100,000 persons. The burden of Bodaboda accidents is rated at 4 per 100 persons in Nigeria where else motorcycle accidents have been linked to over half of the road traffic fate (Festus Edobor et al, 2017).

Injuries linked to Bodaboda accidents are becoming a public health concern in Kenya which is a threatto the national economic growth. Updated and recent data indicates that more than 5000 deaths are related to motorcycle accidents in Kenya. Notably, the Bodaboda industry contributes to more than 10% of road accident mortality cases. Due to the high number of mortality and disability cases being linked to motorcycle accidents, this translate to the motorcycle business being the most dangerous form of transport in Kenya, Bodaboda accidents have led to the loss of gross national product which has a significant burden on the Kenyan economy as a whole (NTSA, 2017). The National Transport Safety Authority (NTSA) published a report stating that between 2015 and 2017, over 274,865 Bodabodas had been reported in Kenya. The report also included 1399 deaths connected to motorcycles, 1956 serious wounds, and 632 superficial wounds (NTSA, 2017).

Kenya is now listed among the nations with the greatest rates of traffic fatalities. There

are 11,000 boda boda riders in Kitui County alone, according to a report from the traffic department. A significant portion of these riders are from each of the four sub-counties that were chosen. The MoH 705 report (Kenya Health Information System, 2020) states that Kitui County had 28,092 incidents involving road collisions documented by medical centers between 2016 and 2020.

Research in Kenya has mostly concentrated on motor vehicle-related road traffic accidents; nevertheless, no study has examined boda boda accidents and the factors that contribute to them. Even though boda boda accidents in Kitui County cause a great deal of financial hardship, the fundamental cause for these accidents has not been thoroughly investigated to identify the main factors that contribute to these accidents. This highlights the necessity of fully comprehending the primary reason behind these boda boda accidents.Thus, the purpose of the present investigation was to identify the risk factors for motorcycle riders' involvement in traffic accidents in four sub-counties of Kitui County, Kenya.

1.3.0 : Research Objectives.

1.3.1 : General objective.

To establish the determinants of road traffic accidents among motorcycle riders in selected fourSub-counties in Kitui County, Kenya.

1.3.2: Specific objectives

They included the following three specific objectives.

1. To determine the environmental factors influencing motorcycle accidents among Bodabodariders in selected four Sub-counties in Kitui County, Kenya.
2. To assess personal characteristics contributing to motor-cycle accidents among Bodaboda riders in selected four Sub-counties in Kitui County, Kenya.
3. To determine how riding skills influence on motorcycle accidents among Bodaboda riders inselected four Sub-counties in Kitui County, Kenya.

1.4 : Research questions

1. What are the environmental factors influencing motor-cycle accidents among Bodaboda riders in selected four Sub-counties in Kitui County, Kenya?
2. What are personal characteristics contributing to motor-cycle accidents among Bodaboda riders in selected four Sub-Counties in Kitui County, Kenya?
3. What are the riding skills influencing motorcycle accidents among Bodaboda riders in selectedfour Sub-counties in Kitui County, Kenya?

1.5. Study justification

Recently, in Kenya, there has been an increased report regarding the number of Bodabodas accordingto data released by Kenya Revenue Authority (KRA). According to this report, there has been an increase in the number of Bodabodas in the market from 3759 in 2005 to 140215 in 2011 which translates to 3730% KRA (Bachani et al., 2012)**.** The number of motorcycle-related accidents has increased in tandem with the rise in bodabodas on the market. Automobile crashes associated with the utilization of bodabodas continue to be a significant cause of morbidity and mortality cases. There have also increased the number of impairments among young people between the ages of 15 and 29(KHIS Data,2021). Between 30 and 70 percent of surgical and orthopaedical beds in Kitui County Referral Hospitals along with other health centers in the subject matter area are occupied by victims of motorcycle crashes (Muchene, 2021)**.**In addition, this investigation identified the factors that contribute to crashes involving motorcycles in Kitui County, allowing policy makers to create plans that will effectively lower the number of motorcycle-related fatalities, injuries, and disabilities.

This aligns with the seventeen Sustainable Development Goals (SDGs), which aim to reduce the number of RTA-related deaths and injuries by 2030.

1.6 : The investigation's scope.

The objectives of this investigation was restricted to defining the study's boundaries with respect to its content, location, duration, and conceptual contents as they were represented in the course of the investigation.

1.6.1. Content scope.

The present investigation concentrated on motorcycle-related traffic accidents in four specific Kenyan counties, including Kitui County...

1.6.2. Geographical scope.

This research was focused to the selected four Sub-Counties in Kitui County, Kenya.

1.6.3 Time of the Scope

This research dwelled on the period between the specific study period agreed on in the Gantt chart.

1.7 Limitations of the Study

High expectations of money handouts.

This was one major limitation in this study that the youths where the data was to be collected expected free money handouts due to unemployment, poverty index and corruption as the research period approached election in 2022 respectively.

Limitations

The Kitui county terrain was ruddy in some Sub-Counties due to means of transport to accessing areas masked with numerous challenges such as delays to get proper means of transport to reach the participants on time.

Valid and reliable information collected constituted a bias by the cooperation of respondents being limited thereby concealing some information expected to provide viability and reliability of the data collected during this study in Kitui County.

Reducing limitations in data collection period.

The investigator enlisted and coached investigators who were cognizant of the youth's expectations in Kenya's Kitui County. The investigator and her assistants clarified that the study had an entirely academic goal and had nothing to do with any project aimed at generating revenue or political benefit. Additionally, those who participated received snacks as motivation during the data gathering exercise.

Handling transport challenges.

Research assistants accessed certain areas on foot covering some reasonable distances while some areas were accessed by hired motorbikes to ease the data collection process and supervision of data collection for this study.

1.8 Definition of Key Terms

Road traffic accident- A road traffic accident, often referred to simply as a traffic accident or car accident, is an incident that occurs when a vehicle collides with another vehicle, pedestrian, animal, or object on a road or highway. These accidents can result in various degrees of damage to property, injuries, or even fatalities.

Road traffic injury A road traffic injury refers to harm or damage caused to a person as a result of a road traffic accident. These injuries can vary widely in terms of severity and can include physical injuries, psychological trauma, and, in some cases, fatalities. Road traffic injuries are a significant public health concern worldwide, as they contribute to a substantial number of deaths and disabilities each year**.**

Boda-Boda-Popular name for a motorcycle used for commercial purposes in Kenya

Fatal Injury- A fatal injury refers to an injury that results in death. When an injury is described as fatal, it means that the harm sustained by an individual was severe enough to lead to their death. Fatal injuries can occur in various contexts, including accidents, violence, medical conditions, or other traumatic events.

Vehicle –an object meant to ferry people or goods from one area to the next. Can refer to a two, three,and above-wheeled automobile.

Attitude- refers to the perceived reaction by a human being which can be positive or negative towardsa person, occasion, object or circumstances.

Behavior –this is how one acts or conducts oneself.

Motor cycle- refers to a two-wheeled automobile that is motorized by nature.

CHAPTER TWO

LITERATURE REVIEW

2.0. Introduction

Theoretical frameworks, empirical frameworks, critical literature reviews, conceptual frameworks, and a summary of the investigation's conceptual framework are all included in this chapter.

2.1: Overview of motorcycle accidents.

Worldwide, road traffic accidents are a major contributor to a large number of mortality cases being recorded. Road traffic accidents contribute to 12.5 deaths globally. More than 50 million get fatal injuries as a result of these accidents which in turn lead to increased hospital admission translating to30% to 70 % of the total bed occupied in the orthopedic sections in upcoming nations, this report is according to (World Health Organization, 2017).

Road traffic accidents account for the majority of fatal crashes among individuals in the 15–29 age range. The widespread utilization of boda-bodas has been linked to an increase in crashes involving vehicles recently, according to supporting data. This is burdening not only the families of those affected but also the country in its entirety because it negatively impacts the country's economy (WHO,2015).

Recent data from the Kenya Revenue Authority (KRA) indicates that the number of motorbikes in use in Kenya has dramatically increased. Between 2005 and 2015, there was a 3730% increase in the total number of motorcycles registered in the country, from 3759 to 140,215 (KRA, 2012).

Even though there were more motorbikes on the road in the country, there was a noticeable rise in the total number of accidents, which went from 451 in 2005 to 1991 in 2013. A report released by the nation of Kenya traffic police in 2010 stated that over 3055 fatal crashes involving roads were reported in Kenya. Bodabodas was linked to

7% of those instances (WHO,2013).

More than 3055 fatal incidents linked to traffic collisions were reported in 2010, according to a report issued by the Kenya Traffic Police Department. Motorcycle use was connected to 7% of these death cases (World Health Organization, 2012).

The bodaboda is the fastest and most convenient form of transportation in Kenya. Interestingly, compared to other modes of transportation, the majority of boda boda riders function in dangerous environments, which leaves travelers unsecured and increases their exposure to these accidents. Medical report from MoH, 2015. As per the National Transport Safety Authority's (NTSA) report, there has been a rise in the overall number of motorcycles registered in Kenya, with a current total of 274,865. According to NTSA data from 2017, there were 1399 death cases associated with boda boda accidents, along with 1956 fatal outcomes and only 634 injuries of minor magnitude.

More than 4 million passengers in Kenya are transported using bodabodas. However, substance abuse by motorcycle riders is a major risk factor for these accidents, (Ngari et al., 2020). This has been linked to over 60% of all surgical cases being linked to road traffic injuries.in a report released in 2010 by the police traffic section, bodabodas accidents had overtaken injuries caused by other forms of transport indicating this is an alarming public health concern. According to the police department, this accident has been linked to inadequate regulation in the bodaboda sector which can be a national disaster, (Ngari et al., 2020). In Kenya, more than 3000 up to 13000 Kenyans are at risk of road traffic accidents yearly. Motorcyclists, pedestrians, and vulnerable users are the ones at risk, this was according to (WHO, 2013).

2.2.0Theoretical framework

2.2.1The multiple causation theory

Multiple causation theory is the successor of the domino theory.

According to this theory, for each a very accident that occurs, several factors must exist

which can less or more contribute to this accidentto a particular degree. According to this theory, the major causes of these accidents can be categorized into various categories (DeCamp & Herskovitz, 2015). These categories have been highlighted below

Behavioural –These included factors affecting an individual and can include, insufficientknowledge or awareness, poor attitudes, inadequate skills, and poor physical and mental awareness.

Environmental factors- These factors include insufficient protection of workers from hazardous objects on the working premises and the use of worn-out machines and equipment which can lead to the use of unsafe protocols at the place of work. According to this theory, accidents occuras a result of multiple factors and not a result of a single factor (Heinrich et al, 1980).

2.2.2: Human factor theory

This theory contends that human error is the primary cause of workplace accidents. This theory emphasizes that mistakes made by people sets off a series of events that are most probable to result in an accident in the part that is working. According to this theory, the main causes of errors at work include overworked employees, poor worker response, and insufficient right activities (Ferrell, 2018).

When an employee is overworked, they are more likely to struggle to control and handle psychological and physical problems that come up at work. Both internal and external factors, as well as a lack of awareness of the situation have an impact on this. Employees are destined to cause incidents at work when they are unaware of potentially dangerous conditions at work and when they fail to observe safety precautions (Ferrell, 2018). Unfavorable environmental circumstances lead to human errors. Due to inadequate safety training, ignorance, and situational awareness. When all these elements come together, there's a good chance that a car accident or other type of

accident at work will occur (Infante et al., 2023).

2.3: Environmental Factors

Over 5% of traffic accidents have been connected to badly constructed roads. However, this puts riders' safety in jeopardy when combined with other factors, so this section needs to be given a lot of attention. 12.5% of boda boda incidents in developing countries, including Kenya, are caused by shoddy road design (Ashraf et al., 2019). The vast majority of boda bodas accidents in Nigeria, a developing country, have been connected to the bad condition of the roads and potholes, which raise the chance of these accidents happening (Infante et al., 2023). Environmental factors play a crucial role in road traffic accidents, influencing both the frequency and severity of incidents. These factors encompass a wide range of conditions related to the natural and built environment. Understanding the impact of environmental factors is essential for implementing effective safety measures and designing infrastructure that mitigates risks. some key environmental factors include: Weather Conditions: Rain, Snow, and Ice: Adverse weather conditions can create slippery road surfaces, reduce visibility, and increase braking distances, contributing to a higher risk of accidents. Reduced visibility in foggy conditions can lead to collisions if drivers fail to adjust their speed and maintain a safe following distance. Poorly maintained roads with potholes and uneven surfaces can pose hazards to drivers, leading to loss of vehicle control and accidents. Extreme Weather Events: The increasing frequency of extreme weather events due to climate change can lead to more challenging driving conditions and contribute to accidents. Addressing the impact of environmental factors on road traffic accidents involves: Infrastructure Planning: Designing and maintaining roads with proper drainage, signage, and lighting to enhance safety in various environmental conditions. Weather Forecasting and Warning Systems: Implementing systems that provide timely

information to drivers about adverse weather conditions and potential hazards. Wildlife Crossings and Eco-Friendly Infrastructure: Incorporating features like wildlife crossings and environmentally friendly road designs to minimize the impact on local ecosystems. Emergency Response Preparedness: Developing strategies and infrastructure to address the increased risk of accidents during extreme weather events and other environmental challenges. An integrated approach that considers the interaction of environmental factors with human behavior and vehicle characteristics is essential for creating safer road environments.

Poor roads have been linked to poor road design as a major factor leading to accidents in Africa. Due to the presence of these poorly designed roads and poor maintenance measures, bodaboda accidents have continued to increase which have been linked to the presence of potholes. The majority of roadsin Africa have very sharp corners coupled with potholes which put the life of drivers, riders, and pedestrians at risk (Odera et al, 2013). Poorly designed roads especially in hilly areas has led to breakfailure of vehicle or even some automobiles unable to use those roads completely.

2.4 : Personal characteristics

2.4.1 Study respondent's Age.

In industrialized nations, automobile crashes are the main cause fatalities for individuals between the ages of 15 and 29. For instance, in 2011 there was at least a single young driver (aged 17 to 24) involved in 22 percent of crashes on the roads in Britain. Even highly developed nations have been affected since deaths among people between the ages of 15 and 29 are largely caused by traffic accidents. For instance, in 22% of crashes on the roads in Great Britain in 2011—a developed nation, at least one of the victims was a person between the ages of 17 and 24. Road collisions are one of the main causes of being hospitalized for young riders in their teens. Youths between the ages of

18 and 24 account for 23% of documented fatalities. It is estimated that one in four young people will experience a recurrence of one of these mishaps (Ludovic, 2016).

The age of a motorcycle rider is a significant factor that can influence the risk of road traffic accidents. Different age groups may exhibit distinct patterns of behavior, experience levels, and risk factors, which can impact road safety. Here are some general trends associated with different age groups of motorcycle riders: Younger riders may have less experience on the road, which can contribute to a higher risk of accidents. Studies have suggested that younger riders may be more prone to engaging in risky behaviors such as speeding and aggressive riding. Young riders may be less likely to consistently wear protective gear, increasing the severity of injuries in accidents. Riders in this age group often have more experience, potentially leading to safer riding habits. Responsibility: Middle-aged riders may exhibit a more responsible approach to riding, considering factors like family responsibilities and career commitments (Ludovic, 2016).

Older Riders (50+ Years): Older riders may face physical limitations and health concerns that can affect their riding abilities and reaction times. While older riders may have significant riding experience, they could be less resilient to the physical impact of accidents. It's important to note that these are general trends, and individual behaviors can vary widely. Moreover, other factors such as skill level, adherence to safety practices, and the type of motorcycle ridden also play crucial roles in accident risk (Ludovic, 2016).

Efforts to improve motorcycle safety across age groups include: Training and Education Programs: Rider training programs can help enhance skills and awareness, particularly for younger riders. Encouraging all riders, regardless of age, to consistently wear protective gear such as helmets, gloves, jackets, and boots. Strict enforcement of speed

limits, helmet laws, and other traffic regulations can contribute to safer roads for motorcyclists of all ages. Informing riders about the risks associated with certain behaviors and the importance of responsible riding through awareness campaigns. Designing roads with the safety of all users in mind, including motorcyclists, can help reduce the likelihood of accidents. Understanding the demographics and behaviors associated with different age groups of motorcycle riders can inform targeted interventions aimed at improving road safety and reducing the incidence of accidents (Ludovic, 2016).

2.5: Socio-economic factors

Among the major source of employment in Kenya, the motorcycle industry has been ranked as a major source of employment among youths, this has eased the rate of employment among youths with a global problem. Despite the existence of the national youth situational analysis report of 2009, which was meant to address unemployment, there are no formal strategies to address the menace. The high rate of unemployment has majorly affected the youth aged 15 to 29 years (Ministry of Youth Affairs,2009). In Kenya, there has been a rise in motorcycle services due to their convenience and flexibilityat the place of work. Due to their cost-effectiveness in terms of maintenance, their number is likely toincrease with time, the bodaboda industry generates 22 billion Kenya shilling in Kenya in the year 2917, which is emerging as a major contributor to the overwhelmed Kenya economy (Isaac Karua, 2017).

The level of income can influence road traffic accidents in various ways, affecting both the likelihood of accidents occurring and the consequences of those accidents. Here are some key ways in which income levels can impact road traffic accidents. Individuals with higher incomes often have greater access to private vehicles. An increased number of vehicles on the road can contribute to traffic congestion and potentially raise the risk

of accidents. In some cases, lower-income individuals may rely more on public transportation or non-motorized modes of transportation, potentially leading to different types of accidents. Those with higher incomes may be able to afford newer vehicles with advanced safety features, which can reduce the severity of injuries in the event of an accident. Lower-income individuals may have older vehicles with fewer safety features, potentially leading to more severe outcomes in accidents. Higher-income individuals may be able to afford advanced driver education and training, leading to safer driving behaviors. Limited access to driver education programs and resources may contribute to riskier driving behaviors among some lower-income individuals (Isaac Karua, 2017).

Regions with higher incomes may invest more in road infrastructure, resulting in well-maintained roads and effective traffic management systems, potentially reducing the risk of accidents. Lower-income areas may have poorly maintained roads and limited traffic management resources, contributing to a higher likelihood of accidents. Individuals with higher incomes may have better access to quality healthcare services, which can impact the outcomes of accidents by ensuring timely and effective medical care. Limited access to healthcare resources in lower-income areas may result in delayed or inadequate medical assistance, potentially leading to more severe consequences for accident victims. While individuals from all income levels can engage in substance abuse, some studies suggest that higher-income individuals may have better access to resources for treatment and rehabilitation. Limited access to resources may pose challenges for lower-income individuals seeking assistance with substance abuse issues, potentially contributing to a higher risk of accidents involving impaired driving (Isaac Karua, 2017).

Efforts to address income-related disparities in road traffic accidents may involve:

Equitable Enforcement of Traffic Laws: Ensuring that traffic laws are enforced consistently and fairly across different income levels. Education and Outreach Programs: Implementing educational initiatives that target specific income groups to promote safe driving practices and awareness of road safety. Infrastructure Investments: Allocating resources for the improvement of road infrastructure in lower-income areas to enhance safety. Access to Transportation Alternatives: Improving public transportation options and promoting alternative modes of transportation in areas with lower incomes. Understanding the relationship between income levels and road traffic accidents is essential for crafting effective policies and interventions that address disparities and improve overall road safety (Isaac Karua, 2017).

According to the latest statistics on this industry, it means they made more profit as compared to othernational corporate companies such as Safaricom in East Africa in the year 2017 financial year. More than 600,000 motorcycles are estimated to be on Kenyan roads at any time, this is according to the motorcycle assembly association of Kenya. On average bodaboda riders earn an average of Ksh 1000 per day. This has led to the majority of youths investing in this area which has steered the Kenyan economy business (Dominic Omondi, 2018). Kenya is bearing the brunt of crashes on the roads because of the damage they have done to the country's economy. For example, in 1984, Kenya lost over one billion Kenya shillings, or 1.6% of its gross national product, due to property damage, medical expenses, and managerial expenses. The amount lost has gone up recently; in 1988, a total of 3.8 billion were lost, or 5% of the gross national product; Kenya also experienced this effect in 1988, losing 3.6% of the GNP, or 2.9 billion. More than 26–52 percent of the total revenue made by the boda boda industry is lost as a result of traffic accidents (Kitara & Ikoona, 2022).

2.6: Behavioral factors

It is well known that one of the main causes of crashes involving vehicles in Kenya is human behavior. Other factors, such as social-cultural and economic ones, have affected this. People are shaped and controlled by the social class in which they reside. Although human being behavioral factors are blamed for these accidents, formal and social norms are other factors that tend to damage the individual the sphere. When these elements come together, accidents are more likely to occur (GladysMoraa Nyachieo, 2015).

2.6.1 : Alcoholism and drug abuse

Use of motorcycles under the influence of a substance and drug abuse has led to an avoidable number of road accidents, and substance abuse impairs mental judgment (Sashoo, 2012). In developing nations, research has indicated a high number of abuse of drugs among motorcycle riders which has transformed to arise in the number of bodaboda crashes; this is according to a report by Safety Net, (Kwagala et al., 2022). Riding under the influence of drugs impairs mental judgment which can lead to controllable accidents. The rate of drunken driving is high among youth (Ngari et al., 2020). In a study done in Kenya, substance abuse was significantly linked to the occurrence of road traffic accidents (Nguyen et al., 2018). In developed nations, 20% of fatal accidents have been linked to substance and drug abuse. Young drivers are the most affected.

Alcoholism and drug abuse significantly contribute to road traffic accidents, posing serious risks to both the impaired individuals and other road users. The impact of substance abuse on road safety is a well-documented concern, and various studies and literature highlight the following aspects: Alcohol and certain drugs impair cognitive functions, leading to poor judgment, decreased concentration, and compromised coordination. This impairment can result in risky behaviors, including reckless driving

and poor decision-making on the road. Individuals under the influence of alcohol or drugs are at a significantly higher risk of being involved in road traffic accidents (Kitara & Ikoona, 2022). The impairment affects the ability to react quickly to unexpected situations, increasing the likelihood of collisions. Accidents involving alcohol or drug-impaired drivers often result in more severe injuries and fatalities. The impaired state of the driver can lead to high-speed collisions and a greater likelihood of multiple vehicle crashes. Substance abuse affects motor skills, coordination, and reaction time. Impaired motor skills can hinder a driver's ability to control the vehicle, steer accurately, and respond promptly to changing road conditions. Alcohol and drugs can influence driver behavior, leading to aggressive driving, speeding, and other dangerous actions. The altered mental state may reduce inhibitions, making the driver more prone to taking unnecessary risks (Kitara & Ikoona, 2022).

Impaired drivers are more likely to violate traffic rules, such as running red lights, failing to yield, and disregarding speed limits. These violations contribute to a higher incidence of accidents. Pedestrians, cyclists, and motorcyclists are at a greater risk when sharing the road with impaired drivers. The impaired ability of the driver to detect and respond to the presence of vulnerable road users increases the likelihood of accidents involving these individuals. Research often highlights the prevalence of substance-impaired driving in different regions and populations. Understanding the extent of the problem is crucial for developing effective prevention and intervention strategies (Kitara & Ikoona, 2022).

Efforts to address the link between alcoholism, drug abuse, and road traffic accidents include: Strict DUI (Driving Under the Influence) Laws: Legislation and enforcement of laws related to driving under the influence are essential for deterring substance-impaired driving. Education and Awareness Programs: Public awareness campaigns inform

individuals about the dangers of substance-impaired driving and emphasize the importance of responsible alcohol and drug use. Treatment and Rehabilitation Programs; Providing support and treatment options for individuals struggling with alcoholism or drug abuse can contribute to reducing the incidence of substance-impaired driving. Technological Interventions: The development and implementation of technologies such as ignition interlock devices aim to prevent individuals under the influence from starting and driving a vehicle. Addressing the complex issue of alcoholism, drug abuse, and road traffic accidents requires a multidimensional approach involving legal, educational, and public health measures (Kitara & Ikoona, 2022).

2.6.2 : Overspeeding

The primary factor causing most crashes involving vehicles on the roads is speeding. Overspeeding affects the likelihood of crashing as well as its aftermath. The way the road is actually laid out can either deter or reward riders who overspeed. Road users' underestimation of the speed of the oncoming vehicle has been related to an increase in the likelihood of crashes, particularly at sharp corners or when overtaking (Road traffic injury prevention training manual, 2016). Excessive accelerating has been associated with increasing the frequency of traffic accidents, which may exacerbate the degree of severity of injuries received in the collision. Research has shown that a 5% increase in the average required speed can result in a 20% increase in the likelihood of a fatal crash (Global Status report on road safety, 2019). Out of all the variables associated with traffic accidents, speeding has been found to be the primary cause of these incidents. This is consistent with Heinrich's observation that individual factors account for the majority of these accidents (Adejugbagbe et al., 2015). Some of these factors leading to the occurrence of this accident include individual carelessness, conducting harmful activities, the social environment, former accidents, and the presence of injuries due to

these accidents. Authors have reported the majority of accidents are caused by mistakes caused by humans and risks to human behavior. Inappropriate response to these factors remains to be a major factor for this accident occurring (Ashraf et al., 2019).

Over speeding, or driving at speeds higher than the posted speed limits or too fast for road conditions, is a major contributor to road traffic accidents. The relationship between overspeeding and accidents is well-documented in the literature, and numerous studies have highlighted the following points: Accidents that occur at higher speeds tend to result in more severe injuries and fatalities. The force of impact increases exponentially with speed, making high-speed collisions more dangerous. Higher speeds reduce the amount of time a driver has to react to unexpected events or obstacles on the road. This can lead to an increased likelihood of collisions, especially in situations where quick decisions are necessary. Vehicles traveling at higher speeds require more time and distance to come to a complete stop. This extended braking distance can be critical in situations where sudden stops are necessary, such as when encountering traffic congestion or obstacles. High speeds can make it more challenging for drivers to maintain control of their vehicles, especially in adverse weather conditions or on poorly maintained roads. Loss of control is a significant factor in accidents involving overspeeding (Adejugbagbe et al., 2015).

Pedestrians, cyclists, and motorcyclists are particularly vulnerable to accidents involving overspeeding vehicles. The high kinetic energy associated with speeding vehicles can result in severe injuries or fatalities in collisions with vulnerable road users. Overspeeding is often associated with other risky behaviors, such as impaired driving (under the influence of alcohol or drugs) and distracted driving. The combination of these factors can significantly increase the risk of accidents. Speeding is a common factor in single-vehicle crashes, where a vehicle leaves the roadway and collides with a

fixed object or rolls over. High speeds reduce the margin for error, increasing the likelihood of such incidents (Adejugbagbe et al., 2015).

Efforts to address the issue of overspeeding and reduce the associated road traffic accidents include: Enforcement of Speed Limits: Law enforcement agencies use speed limits and employ various methods (such as speed cameras and patrols) to enforce compliance. Public Awareness Campaigns: Educational campaigns inform drivers about the risks of overspeeding and emphasize the importance of adhering to posted speed limits. Use of Speed-Calming Measures: Infrastructure solutions, such as speed bumps, traffic circles, and radar-controlled signs, are implemented to slow down traffic in specific areas. Technological Interventions: Advanced driver assistance systems (ADAS) in modern vehicles may include features like adaptive cruise control and automatic emergency braking to help mitigate the consequences of overspeeding. Addressing overspeeding requires a comprehensive approach involving legislation, enforcement, education, and technology to create safer road environments(Adejugbagbe et al., 2015).

2.6.3 : Overloading

The motorcycle industry has been recognized for overlading in terms of pillion carried and the numberof passengers. For instance, in Kenya motorcycles have been observed to carry more than 2 passengers rather than one is recommended. When it comes to the number of pillions instead of loading one theycarry even more than four pillions (NTSA report, 2017).

Overloading, whether it pertains to vehicles or specific road conditions, can contribute to road traffic accidents. The term "overloading" can have different meanings depending on the context: This occurs when a vehicle carries more weight than it is designed or legally allowed to handle. Overloading can negatively impact a vehicle's stability,

braking distance, and overall handling. Some ways in which overloading can contribute to accidents include: Reduced Maneuverability: Overloaded vehicles may be more difficult to maneuver, especially in emergency situations or when quick responses are required(Nguyen et al., 2018).. Extended Braking Distances: The increased weight can lengthen the time and distance required for a vehicle to come to a complete stop, potentially leading to collisions. Tire Issues: Overloading can lead to excessive wear on tires, increasing the risk of blowouts or other tire-related issues that may result in accidents. Suspension and Mechanical Failures: Over time, constant overloading can lead to mechanical failures, affecting the vehicle's suspension, brakes, and other critical components.

2.6.4 Overloading of Infrastructure:

Overloading of road infrastructure, such as highways or bridges, can also be a factor in road traffic accidents. If a road is subjected to more traffic than it is designed to handle, it may lead to: Congestion: Overloaded roads can experience traffic congestion, increasing the likelihood of rear-end collisions and other accidents. Structural Failures: Bridges or overpasses may be at risk of structural failures if subjected to loads beyond their design capacity, potentially causing catastrophic accidents(Nguyen et al., 2018)..

To address these concerns, various measures can be implemented: Enforcement of Weight Limits: Authorities often enforce weight limits on vehicles to prevent overloading. Regular inspections and penalties for violations help deter overloading practices. Infrastructure Planning: Proper planning and maintenance of roads and bridges can help prevent overloading of infrastructure. This includes regular inspections and assessments to ensure that structures can handle the anticipated traffic loads. Educational campaigns can inform drivers about the dangers of overloading and the importance of adhering to weight limits(Nguyen et al., 2018).. Awareness can encourage responsible loading practices. Weigh stations and technologies such as

weigh-in-motion systems can be used to monitor and enforce weight limits on roads. Overall, overloading, whether it involves vehicles or infrastructure, is a significant factor that can contribute to road traffic accidents. Mitigating this risk requires a combination of regulatory measures, enforcement, infrastructure planning, and public awareness efforts.

2.6.5: Use of personal protective equipment (PPEs)

Two research studies done in Kenya among major towns including Naivasha and Thika reported that36% of patients who were admitted in emergency sections of the respective hospital were victims of road traffic accidents linked to motorcycle use whereas else 75% of the admitted patients reported not using head gears at the time of the accident thus increasing their vulnerability to severe injuries. In Kenya use of head gears is low with a staggering figure of 3% of riders reporting not using them at their place of work (WHO, 2015).

2.6.6: Riding skills

According to 14% of survey responses that indicated the kind of license a bodaboda rider held, (Mutekanga et al., 2020) detailed the necessity for experience and improved good behavior by bodaboda riders. According to their report, riders with licenses that had been possessed for less than a year were more likely to be associated with a collision. This suggests that experience in the industry is necessary, as it has been associated with a lower risk of accidents in countries such as the USA and the UK. Insufficient training and lack of proper licensing have been major causes of bodaboda accidents among riders in Nigeria (Motorcycle et al., 2021).

Riding skills are crucial for safe and enjoyable motorcycle or bicycle use on the roads. Road traffic accidents involving riders can occur for various reasons, and having good riding skills can significantly reduce the risk (Ashraf et al., 2019). Here are some key

aspects of riding skills and their relation to road traffic accidents: Riders should undergo proper training and education before hitting the road. This includes learning the rules of the road, traffic signs, and understanding the dynamics of their vehicle. Defensive riding involves being constantly aware of your surroundings and potential hazards. This includes anticipating the actions of other road users and being prepared to react appropriately. Mastering control of the motorcycle or bicycle is fundamental. This includes skills such as braking, accelerating, turning, and maintaining balance (Ashraf et al., 2019). Regular practice can enhance these skills. Riders should be aware of road conditions such as wet or slippery surfaces, potholes, and debris. Adjusting speed and riding style based on road conditions is crucial for safety. Being visible to other road users is essential. This includes using headlights, reflective gear, and wearing bright clothing. Increased visibility reduces the risk of collisions. Wearing a helmet is one of the most effective ways to reduce the severity of head injuries in the event of an accident. It is a legal requirement in many places and a key safety practice. Following traffic rules and regulations is fundamental to road safety. This includes obeying speed limits, traffic signals, and road signs (Ashraf et al., 2019).

Distractions, such as using a phone or adjusting music while riding, can lead to accidents. Focusing solely on the road and the surroundings is crucial. Riders should be able to predict the actions of other drivers, pedestrians, and cyclists. This helps in avoiding potential conflicts and accidents. Ensuring that the motorcycle or bicycle is in good condition is vital. Regular maintenance checks, including brakes, lights, tires, and other critical components, can prevent mechanical failures. Despite the best riding skills, accidents can still occur due to factors beyond the rider's control, such as the actions of other road users or unexpected environmental conditions. However, developing and maintaining strong riding skills significantly contribute to reducing the

overall risk of road traffic accidents (Ashraf et al., 2019).

In nations like Zambia, riders are prone to receiving riding license through corrupt means which exacerbated the rate of accidents as the majority of these riders are unaware of traffics rules and laws.Inexperience among riders remains a huge threat to the occurrence of road traffic accidents. Accordingto (Kwagala et al., 2022), he narrates that it cost an average of 200ksh to train riders for an hour on how to handle and observe traffic rules, this seems to be more exploitation which has been linked to inadequate training in the end and can lead to the occurrence of this accidents. The use of substance abuse increased the risk of an accident occurring by 2.5 times compared to those with enough experience. Blood alcohol concentration of 0.10g/dl is likely to lead to an accident thrice compared toa concentration of 0.05g/dl which is the least expected limit in developed nations.

2.7: Socio-economic factors

This has a significant impact on the nation's economically viable populace. Drivers make up about 23% of them, followed by people who walk (22%), cyclists, and other users (5%). Pedestrians, car occupants, and other unidentified users make up 31% and 19% of the remaining fatalities, respectively. Traffic accidents have been linked to higher rates of disability and fatalities, which have a negative impact on the vast majority of families. Due to the deaths and high medical expenses that resulted in the loss of one or more soul providers, this has caused many families to live in poverty. (WHO, 2019).

Around the world, efforts have been made to reduce the rate of traffic accidents and eliminate passing away along with the morbidities associated with them. The United States General Assembly was one of the organizations that carried out these efforts, implementing 64 of the 2551 strategies. Developed countries have a lower RTA rate

than developing ones (IRAP, 2009). Of the many RTAs that occur globally,84% of these accidents occur in developing nations. The loss experienced as a result of these accidents exceeds the number of donations and loans meant to cater for developments. Developing nations experience a loss of 1-2% of gross national product due to road traffic accidents (WHO, 2012).

Several factors dictate different sectors of the transport system, how they are used, and at what time. Economic issues such as economic development level, social demographic factors, social scarcity, use of land, and planning practices dictate which mode of transport to be used and the length of the trip (Road traffic injury prevention training manual, 2016).

2.8 Empirical literature review

2.8.0 Introduction

An empirical literature review, also known as a systematic literature review, analyzes previous empirical studies in order to provide an answer to a specific research topic. Rather than drawing information from theories or beliefs, empirical research relies on observations and measurements to arrive at conclusions. Empirical Literature review in this study was based on other related studies whose aim was to establish what other scholars had found out as the determinants of motor cycle riders in their areas of study.

Motorcycle accidents are a significant public safety concern worldwide. Understanding the environmental factors that contribute to these incidents is essential for developing effective prevention strategies. This review synthesizes empirical studies that investigate various environmental aspects influencing motorcycle accidents.

2.8.1. Road Conditions

- **Surface Quality**: Studies indicate that poor road conditions, such as potholes, gravel, and uneven surfaces, increase the likelihood of accidents (Pang et al., 2020). Motorcycles are more susceptible to instability caused by these hazards.
- **Weather Conditions**: Research shows that adverse weather, including rain, snow, and fog, substantially raises accident rates (Liu et al., 2019). Wet surfaces reduce traction, while reduced visibility can impair judgment.

2.8.2. Traffic Infrastructure

- **Road Design**: Features such as sharp curves, lack of adequate signage, and insufficient lighting are associated with higher accident rates (Kim & Kockelman, 2021). Well-designed roads with clear markings and appropriate speed limits can mitigate risks.

Intersections: Studies highlight that intersections are critical points for motorcycle accidents, particularly when visibility is obstructed or traffic signals are poorly timed (Shah et al., 2018). **2.8.4. Socioeconomic Factors**

- **Urban vs. Rural Areas**: Research indicates that urban environments tend to have higher motorcycle accident rates due to dense traffic and complex road networks, while rural areas face risks from high-speed roads (Johnson & Williams, 2020).
- **Socioeconomic Status**: Areas with lower socioeconomic status often have poorer road conditions and less effective law enforcement, contributing to higher accident rates (Davis et al., 2021).

2.8.5. Behavioral and Cultural Factors

- **Helmet Use**: Studies show that the presence of helmet laws can significantly reduce the severity of injuries in accidents. Regions with strict enforcement report lower fatality rates (Miller & Zador, 2021).

- **Alcohol Consumption**: The relationship between alcohol use and motorcycle accidents is well-documented. Environmental factors, such as proximity to bars and lack of public transport options, can exacerbate this risk (Freeman et al., 2020).

2.8.6. Seasonal Variations

Research indicates that accident rates fluctuate with seasons, with higher incidents reported in warmer months when more motorcycles are on the road (Baker et al., 2019).

2.9 Critical review.

Only a few investigators have concentrated on the causes of crashes on the roadways among young motorcycle operators worldwide, despite the fact that numerous researchers have conducted various studies on the subject on a global, continental, regional, and local level.

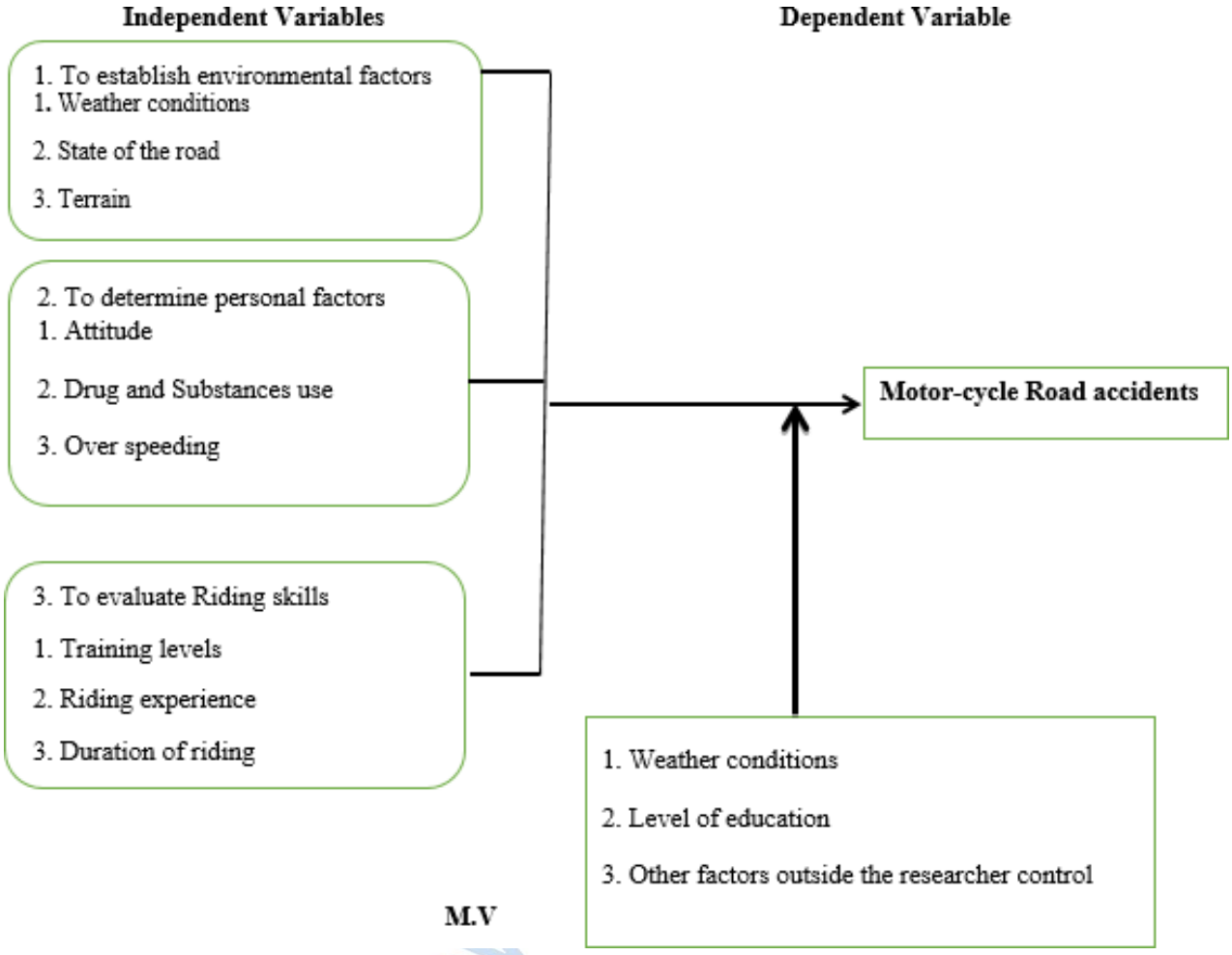
The investigation was focused on achieving the following particular goals. To identify the personal characteristics that contribute to motorcycle accidents among riders of motorcycles in chosen four Sub-counties in Kitui County, Kenya, as well as the environmental factors impacting motorcycle accidents among riders in those four Sub-counties. among motorcyclists in four specifically chosen Sub-counties within Kenya's Kitui County. The objectives of this study are to ascertain the impact of riding skills on motorcycle accidents among riders in four sub-counties of Kitui County, Kenya, and the socioeconomic factors which affect motorcycle collisions among riders in the same four Sub-counties.

This version of the study provides added advantage of the factors carousing road motor-cycle accidents in developing countries and offers a comparison on the same factors in developed countries. There exist gaps in the literature review, globally, where estimated1.3 million deaths occur annually and about 50 million remain incapacitated

during their life period as a result of road accidents WHO, 2010; WHO, 2013; WHO, 2015).

Likewise, in the African continent, there are studies by various researchers such as in Tanzania and Zimbabwe where they talk of motor-cycle accident by the youths but lives scanty information of the real causes of these road accidents, (Zhang & Witlox, 2019). According to Motorcycle et al. (2021), there is a dearth of knowledge available from regional investigators in Kenya regarding the true causes of motorcycle-related traffic accidents. The magnitude of the aforementioned gaps on a global, continental, regional, and local level is what inspired the researcher to conduct this study in Kitui County, Kenya's four Sub-Counties of choice in order to close the gaps that currently exist in this a particular topic area.

CONCEPTUAL FRAMEWORK



Source: Literature review

2.10 Summary of the conceptual framework.

2.10.1 Independent variables:

To establish environmental factors contributing to motor cycle accidents

Weather conditions- this study considered situations such as rain, fog, mist, and glaring sunlight aremajor environmental factors contributing to road accidents (Olem, 2016).

State of the roads-Road traffic accidents are higher in areas with poor state of roads. Some roads have steep/sharp corners and potholes which increase the likelihood of

motorcycle accidents occurrence. This is as per the study by (Adejugbagbe et al., 2015)

To determine personal factors

1 Overspeeding which also refers to an increase of the recommended normal speed has been shown to accelerate the rate of fatal accidents occurring and even the severity of the accident which can result in injuries and deaths. For a 1% mean increase from normal speed, there is an increase of fatal crush occurring by 4% and 3% to serious accident risk (WHO, 2021)

2 The use of drugs and substance abuse has been shown to exacerbate the risk of road crashes occurring which is likely to cause fatal injury or avoidable deaths. Engaging in substance abuse has been shown to impair mental judgment and performance which are likely to double the chances of fatal accidents occurring (Owino, 2018).

To evaluate Riding skills

1 Inexperienced drivers and riders are likely to make an unsafe move on the road that could compromise the safety of other road users (Politis, 2016)

2 Possession of a valid driving license is often associated with attending a driving school. In this regard, having a driving license is assumed to be proof that an individual has undergone formal training to become a driver or a rider (Owino, 2018)

To determine socio-economic factors.

1. Many people in low-resource countries ride motorcycles as a way of earning a livelihood as "Taxi" drivers, leading to high numbers of accidents and loss of life, (Delamou, 2020). Everyyear, the Bodaboda industry generates more than 219 billion in terms of revenue which has steered the economy of Kenya by a big margin (Karua,2017).
2. Age- concerning age, road traffic accidents have shown to affect young youths aged 15-29 years in developed nations which is a major cause of hospitalization in

adolescents among youths aged 18-24 years which contributes to 23% of the total deaths (Ludovi,2016).

3. Employment- bodaboda industry has been a major source f employment for a majority of the young generation in upcoming nations including Kenya. despite strategies stipulated by the government to tackle the problem of unemployment, unemployment remains to be a global challenge that affects many lives and their livelihoods (Ministry of Youth Affairs, 2016).

2.11 The enhanced use of the motorcycle with a rate of 250 c.c in Kenya made more people being able to access motorcycles which have tricked the number of bodabodas in the market. This has led to increased demand for bodaboda services in the nations due to their quick accessibility and availability. Depended variable.

Motorcycle Road accidents

1. Injuries: In many instances, injuries from motorbike accidents can be disastrous. In a motorcycle accident, injuries to any part of the human body are possible. The National Highways Traffic Safety Administration (NHTSA) found that when the front of the motorcycle is struck, the majority of fatal crashes and catastrophic injuries occur. Traumatic brain injuries (TBI), spinal cord injuries, lower-limb injuries, internal wounds, and broken bones are a few of the wounds that are caused (Kraft et al, 2013).
2. Disability- refers to the amputation of a limb, injury to the brain, or paralysis a condition that can be life-threatening and can affect a person's mode of living. Disability has been sown to affect the quality of life, especially when care is not sufficiently provided. People living with disability are always required to be under long-term care as they can depend on themselves fully, paralysis has been shown up because by an injury to the spine which affects the nervous condition.

Almost 10% of the people who suffer traumatic brain damage often suffer the inability to depend on themselves hence the need for constant care from their immediate familymembers.

2.5 Moderating variables.

1. Weather condition
2. Training Levels
3. Other factors outside researches control

2.11 A Theoretical Framework for Road Traffic Accidents

There are a number of main theories regarding the root cause of incidents, and each of these theories has some clarifying and forecasting values for comprehending the underlying causes of crashes on roads (RTAs). The domino hypothesis and the human element theory are the original theories of accident causes that were created by Heinrich (1932), a safety engineer as well as pioneer in the discipline of manufacturing incidents safeties.

2.11.1 The Domino Theory

Heinrich came up with one of the earliest theories of causality for accidents, the domino theory (1932). According to this theory, there are multiple variables that lead to harm, one of them being a collision itself. Heinrich's domino theory states that a mishap is one element in a chain of events that could result in a harm. In the methodical manner of According to this theory, the order of events that result in an accident can be attributed to five variables: social environment errors, individual faults or inattention, unsafe behaviors or performances, physical or physical hazards, accident, along with injury. Heinrich's domino theory's key tenet is that individuals in charge should be preoccupied with the most immediate causes of all incidents, with the variables leading up to the accident—primarily the risky behavior and physical hazard—getting the most focus.

Here, the focus is on accidents rather than harm and damage to property as the main concerns in accident scenarios. According to scientific perspectives, Heinrich's domino theory has some significance in this investigation of crashes on the resulting black spots. The domino theory of variables that influence the order of events leading to accidents that apply to this study are as follows: social environment errors in the form of roadsides activities that affect engine flows, human errors or carelessness in the form of insufficient pedestrian road usage, dangerous behaviors or shows in the create of a driver exceeding the speed limit, accidents that occur as a result of collisions between pedestrians and motor vehicles and the injuries sustained in those incidents. These perspectives are used in the present investigation's evaluation of the underlying causes of RTAs.

2.11.2 The Accident/Incident Theory

The human factor theory is expanded upon by the accident/incident theory of causality of accidents. It adds new components like ergonomic catches, which are appropriate workplaces, tools, or standards. It also encompasses the choice to make mistakes, which constitutes conscious or unconscious (personal) failure, as well as systemic shortcomings (leadership failure). These elements of accident/incident theory regarding systemic and individual shortcomings as the root causes of traffic accidents are extremely pertinent to this investigation. This theory focuses on the individual unsuccessful attempts of drivers who choose to speed and err, disregarding established rules and regulations. These decisions are what cause accidents. The system/management unsuccessful attempts mentioned in this theory occur when traffic law enforcers do not strictly enforce the traffic rules and regulations. The research carried out benefited from this hypothesis.

2.11.3 The Human Factors Theory

Heinrich presented this framework as one domino that could cause an accident. The tenet of the human component theory is that accidents are the result of human error. The human component theory is organized in a cause-and-effect manner. According to this hypothesis regarding accident causation, negligence by humans is ultimately liable for a series of events that lead to accidents. The causes of human errors can be broadly classified into three categories: overload, unsuitable worker replies, and inappropriate behaviors. When there is an overload, the work is judged to be beyond the worker's physical and psychological capabilities. The impact of external variables is present. factors that are circumstances along with within. There are risks, worker error, safety precautions, and workstation integration that are thought to be accident causes in the event of unsuitable worker replies. The causes of accidents in the case in inappropriate behaviors include a lack of training and a miscalculation of the risks. In conclusion, accidents are attributed to human error according to Heinrich's aspects of human factors theory. The ability of employees (drivers and law enforcement), the environmental factors (roads, infrastructure, and pedestrian facilities), hazards (an absence of security precautions and facilities), and the driver's lack of training or miscalculation of risks all have an impact on these human errors. Excessive speeding and ignorance of traffic safety). These pertinent perspectives on the human component theory are used in this investigation.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter covers the research's design and methodology, study location, investigation population, study criteria, sampling strategies, size of sample calculation, ethical considerations, data collection, and analysis.

3.2: Research design.

In order to generate data, both quantitative and qualitative method of data collection was utilized throughout the four Sub-Counties of Kitui County, Kenya. The investigation design was cross-sectional and descriptive.

The research strategy for this study was a descriptive cross-sectional one since it anticipated to produce fresh data and produce more precise questions to increase consistency.

3.3: Study approach.

3.3.1Quantitative

A structured questionnaire was employed to gather data from the participants for the quantitative portion of the study. Quantitative research was then utilized to quantify the issue by producing continuous data or data that could be transformed into helpful statistics and the results from a larger number of participants (Kabir, 2016; Young, 2015).

3.3.2 Qualitative

Focus groups and key informant interviews (KII) were both be conducted as part of the qualitative study. Unstructured or semi-structured techniques were used to acquire qualitative data in differentways (Corrine and Glesne, 2011).

3.3.3Mixed Qualitative and Quantitative

The mixed method made use of the research's qualitative as well as quantitative components. A recently developed methodology for research called "diverse approaches" encourages the rational integration, or "mixing," of the quantitative and qualitative data in a single study or continuous investigation (Corrine and Glesne, 2011).

3.4: Study location

The study was conducted in four sub counties of Kitui County. These include: Kitui Central. Kitui West, Kitui Rural and Kitui East.

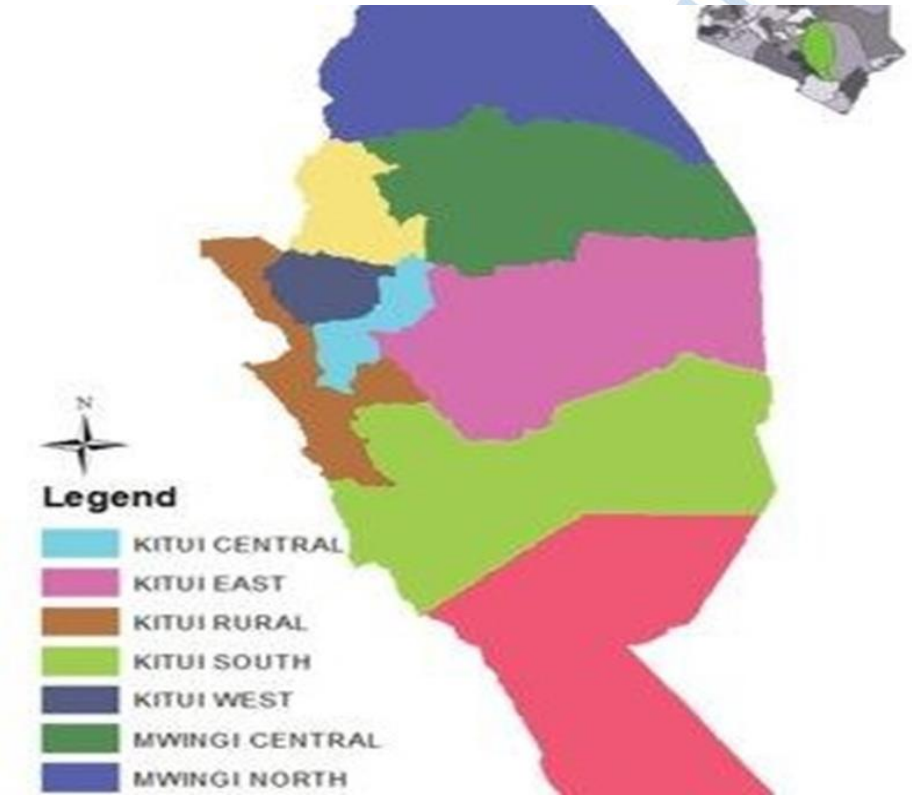


Figure 3. 1 Map of Kitui County showing the four selected Sub- Counties where the study was conducted.

3.5: Study population:

There are 1,136,187 people living in Kitui County, according to the most recent census (KNBS, 2019). The county is 30,430 square kilometers in size. The population of the four sub-counties that were chosen is 223, 171. 23% of the population is made up of young people, who were the subject of the research.

The distribution of the population is as shown below:

Table 3.2

NAME OF THE SUB COUNTY	POPULATION	PROPORTION OF YOUTH
Kitui Central	75,273	17,313
Kitui West	33,887	7,794
Kitui Rural	59,654	13,720
Kitui East	54,347	12,500
TOTAL	**223,171**	**51,329**

Source (KNBS, 2019)

3.6*:* Target Population

The young people in the 18–35 age range were the target demographic. These were Individuals engaged in the commercial motorcycling industry in Kitui for the past six months.

3.7*:* Sample size determination

The population of youths in Kitui County in Kenya according to latest Kenya Bureau of Statistic projection is 261,323 which is over ten thousand (10,000) people, and was to be used in the sample size determination using Yamane formulae of 1968. The Yamane Formula

(1967) was utilized to calculate the number of participants from this group of 51,329 young people in the research area.

$$n = \frac{N}{1 + N e^2}$$

Where n is the estimated study sample

e- is the desired precision at 0.05 level of significanceN is the number of youths in Kitui County

$$n = \frac{10,000}{(1 + 51,329 \times (0.05)^2} = 385 \text{ participants}$$

Addition of 10% of non-responses: 10% x 385 = 39

A total of Four hundred (n= 424) participants was selected from the target population.

3.8: Sampling procedure

Motor cycle riders were reached at their areas of operation, thus at the Boda boda sheds where they are stationed.in Kitui county, the county government constructed the sheds in all market centers where the riders can be found at any given time.

Using an inverse allocation, the study size for every sub county was determined based on the percentage of bodaboda riders in the target population. A basic random sampling was used in each sub county to select the required number of bodaboda riders. Odd and even integer values were assigned to the papers. The participants were chosen from the even-numbered group. This process was repeated to determine the number of samples for each Sub County. In order to compile a list of every bodaboda rider, investigators were given responsibility to the chosen sub-countries.

Participants for Key Informant Interview were conducted with participants drawn from selected transport and law enforcement sector in the Kitui County such as Police Officers. This was done using purposive sampling technique to gather qualitative data.

3.9. Testing validity and reliability of research instruments

3.9.1: Validity.

Opinion of experts in the discipline was sought and included in the structured questionnaire

3.9.1: Reliability

A sub-population with comparable age distribution and past five years of riding of motor cycle was used for the purpose of this research. A sample of 424 individuals will be chosen at random in order to test the research instrument. The gathered data was imported into SPSS version 26 and examined.

3.10 Inclusion Criteria

Youth had been riding motorcycles in the four sub counties were chosen were included in the study if they approve to do so.

3.11 Exclusion Criteria

Riders who were not youth were excluded in this study. Those riders who did not give consent were not be coerced to participate.

3.12 Data collection instruments

3.12.1 Structured Questionnaires

The structured questionnaire was administered to the youth motor cycle riders in all the selected subcounties. This was for the purpose of collecting quantitative data. The questions were in simple English that every respondent was able to read, understand and answer of fill the questionnaire.

3.12.2Focus Group Discussions

The Focus Groups discussion involved motor cycle riders those who have had an accident or witnessedanevent of an accident.

3.12.3 Key Informant Interviews

Experts in transport sector and law enforcers in Kitui County, mostly traffic police officers were interviewed.

3.13 Data analysis instruments

The collected data was tabulated, cleaned, coded and classified as appropriate. Qualitative data was classified according to themes and sub-themes.

Using SPSV25.0, quantitative data was analyzed to determine the factors that contribute to motorcycle crashes involving young riders.

3.14 Ethical consideration.

Consent of participation was sought from the respondents by use of a form which the respondents filled and signed before the start of the interview.The respondents were assured of the confidentiality of the data being collected, that it was for learning purpose and not for any other purpose.

The ethics and research committee at Mount Kenya University granted permission for the investigator to carry out this investigation. NACOSTI gave the authorization for data collection. Authorization from Kitui County's national and local authorities as well as the county health department's training committee. The postgraduate school at Mount Kenya University (MKU) was asked for permission.

CHAPTER FOUR: RESULTS AND DISCUSSIONS

2.9 Preamble

The analysis, discussion, appearance, as well as interpretation of the investigation's findings which looked into the factors that influence motorcycles riders' risk of being involved in traffic accidents were covered in the following section. The study was conducted in four Sub-counties in Kitui County, Kenya. The data for the study were processed using the Statistical Package for Social Sciences (SPSS) V25.0, cleaned up beforehand analysis, and the outcomes were then displayed graphically.

2.10 Response Rate

Systematic sampling was used to identify the 424 those surveyed that make up the sample population. 424 of the individuals who received the 424 questionnaires filled them out and got them back them. This indicated a response rate of 100.0% in comparison to the sample. For the intent of the study's analysis, Mugenda and Mugenda (2003) state that a response rate of 10% or higher is adequate and advised for research that is descriptive. As a result, the investigation's response was effective and sufficient for both reporting analytical results and making conclusions. Descriptive statistics such as frequencies and correlations were used to analyze the total replies using the Statistical Package for Social Science (SPSS V25.0).

Table 4.1: The Questionnaire Return Rate

	Issued Questionnaires	Returned Questionnaires (%)	
	424	424	100.0
Total	424	424	100.0

2.11 Demographic Data

The randomly selected population's marital status, age, gender, and educational attainment are shown in this section. This data was used to support the research's population statistics. The investigator talked about the results of demographic information.

2.11.1 Respondents' Gender

As depicted in figure (4.1), a greater percentage of those surveyed (90.3%) were male, while 9.7% were female. This indicates that men are probably the majority of those who ride motorcycles in the four Sub-counties in Kitui County that were chosen. Studies by Harrison & Klotz (2010) and Luke (2011) indicate that companies with a higher proportion of women, particularly in leadership positions, experience longer-term success. Additionally, companies with higher percentages of female employees typically have better financial results compared to those with lower percentages.

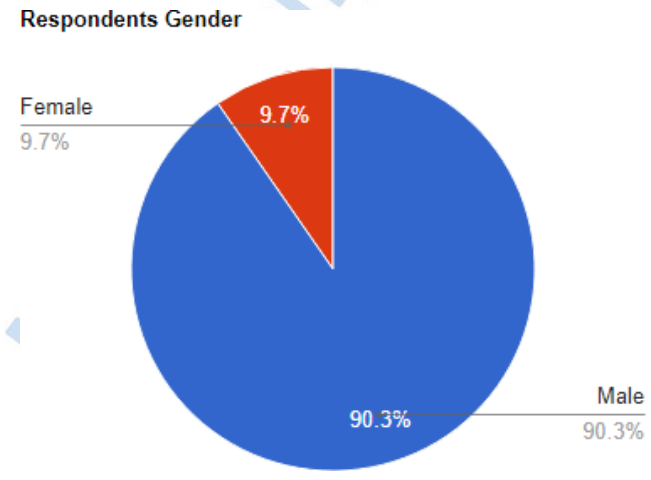


Figure 4. 1: Representation of the Respondents' Gender

2.11.2 Age of the Respondents

The findings of the investigation indicate that the age group comprising the majority of those polled (34.7%) was 39–45 years old. This was followed by those who responded in the 46–52 years old age group (29.7%), participants in the 25–31 years old age group (22.2%), and participants in the 18–24 years old age group (6.8%). The remaining portion of the sample's distribution was accounted for by participants who were under the age of 18, and those who were over 53 years old. Figure (4.2) displays these findings. This indicates that Kitui County's riders on motorcycles are probably mostly young people. (Ours & Stoeldraijer, 2010) state that the value of physical prowess or the ability to make up for skill deficiencies will probably vary depending on an individual's age and industry. The outcomes of this investigation align with a study conducted by Beier et al. (2020), which examined the effects of an aging workforce on effectiveness. Demonstrated that productivity increases up to the age of thirty-five, at which point it starts to drop until the age of fifty-five to sixty. Employees under the age of twenty and those over fifty produce significantly less than the group of reference.

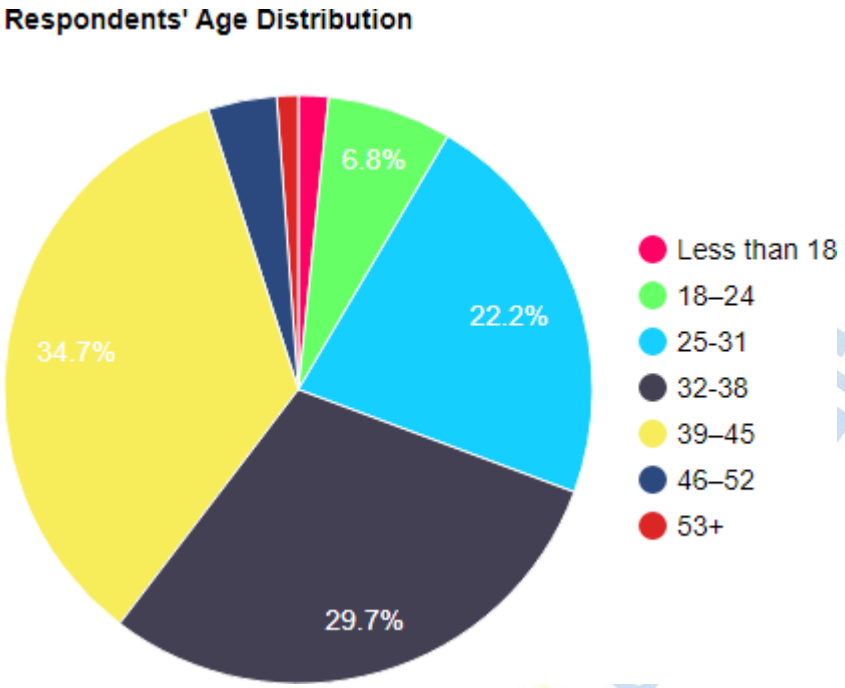


Figure 4. 2: Respondents distribution by age

4.3.4 Marital Status of the Respondents

According to the results, the majority of those surveyed (59.4%) said they were married, while 32.3% said they were single. The widowed and separated from their spouses divided the remaining 8.3%. The majority of Kitui County residents rely on their motorcycles for their livelihood, as evidenced by the high percentage of married riders in the county. This observation supports the theory that young people between the ages of 15 and 29 have been disproportionately impacted by the elevated level of unemployment (Ministry of Youth Affairs, 2019).

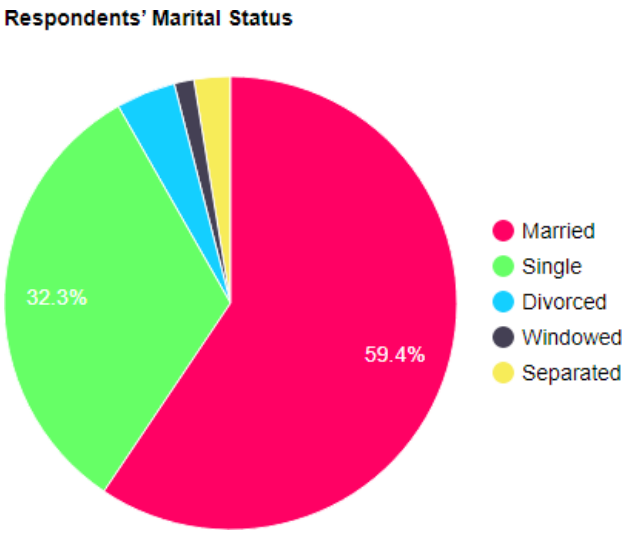


Figure 4. 3: Respondents Marital Status

4.3.5 Level of Education

The purpose of the investigation was to determine the participant educational attainment at the time of gathering information. The results are displayed in figure (4.4). The results indicate that twenty.5% of respondents had college education, twenty.8% had secondary education, twenty.1% had elementary school education, and the rest of the participants had university education at 5.0% and 2.6%, respectively.

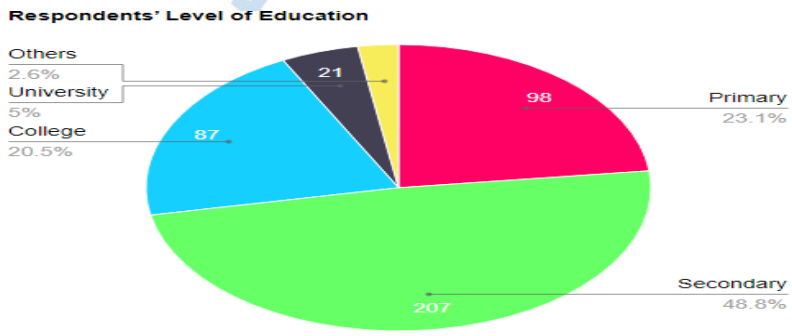


Figure 4.4.Education level

2.12 Influence of Environmental Factors on Motorcycle Accidents

This section looked at how much Kitui County's surroundings affected crashes involving motorcycles Table 4.1 contains a tabulation of the results. The people who participated were asked to rate their agreement or disagreement with the claim that county-wide driving regulations and traffic laws reduce the number of accidents. It was found that (54%) of those surveyed strongly agreed that county-wide regulations for driving and traffic laws reduce accidents. Traffic laws and county-wide driving regulations reduce accidents, according to 18% of respondents; 7% of the people surveyed were undecided about this; and 21% of participants thought strongly that traffic laws and county-wide bringing about regulations do not reduce accidents. The majority of those polled (54%) were in agreement, according to the results, that county-wide driving regulations and traffic laws reduce accidents. This may be the result from the participant ignorance of the current county-level traffic laws and regulations. This result is in line with research by Zhang and Witlox (2019), who discovered that the main governance problem in the transportation industry is that laws, rules, and policies shouldn't be created and put into effect by the government without first consulting significant stakeholders. Consequently, Zhang and Witlox (2019) discovered that the regulatory framework has minimal effect on reducing road carnage.

Participants were additionally asked to rate their agreement or disagreement with the claim that corrupt county administrators and traffic cops are to blame for motorcycle accidents. (69%) of those surveyed firmly agree that corrupt region administrators and law enforcement officers are to blame for motorcycle accidents. Of the respondents, 4 percent agreed with the notion that motorcycle accidents are caused by corrupt county administrators and traffic cops, 14% disapproved, and 13% strongly disapproved. The majority of those polled (69%) strongly agreed, according to the results, that county-wide

restrictions on driving and traffic laws reduce accidents. This might be because those surveyed were not aware of the most recent laws and rules pertaining to drivers in the county government. These results show how a high number of accidents could result from fraudulent traffic police letting unsafe motorcycles use public roads. This result supports the assertion made by (Nagati et al., 2022) that one of the main reasons for taxi crashes involving motorcycles in nations with developing economies such as Zambia, Nigeria, Uganda, Tanzania, and Kenya, traffic police officers were involved in corruption alongside graft.

Once more, participants were asked to indicate whether they were in agreement or disagreement with the claim that Kitui County has a higher rate of motorcycle accidents as a result of poor road conditions. Of the people polled, a majority (53%) strongly agreed that Kitui County has a higher rate of motorcycle accidents as a result of poor road conditions. (2%) of those surveyed strongly disagreed that there are more motorcycle accidents in Kitui County as a result of the state of the roads, while (34% of the respondents) agreed that there are more motorcycles accidents in Kitui County as a result of the state of the roadways and 11% of the respondents were unsure. These findings suggest that inadequate road conditions, a lack of all-weather routes, potholed tarmac roads, and constrained routes can all lead to a higher risk of accidents involving vehicles. This data confirms the research results of (Gebru, 2017), who suggested that a significant contributing factor to the increasing severity of motorcycle injuries in Africa is the deteriorating state of the continent's roads.

(Buyana et al., 2022), who hypothesized that weather might have an impact on the seriousness of injuries received in motorcycle accidents in Africa.

Table 4.2: Influence of environmental factors on motorcycle accidents

Factors being taken into account	1	2	3	4	Likert mean
More accidents occur in Kitui County due to the poor terrain	21	7	18	54	3.81
More motorcycle accidents occur as a result of state of roads terrain	13	14	4	69	3.94
More motorcycle accidents occur in Kitui County due to poor visibility at night	2	11	34	53	3.79
Increased accident rates among drivers are a result of the weather	17	6	6	71	4.21
Mean Likert Mean					3.96

In Kitui County, the median response score regarding the degree to which environmental factors affected incidents involving motorcycles had been 3.96, indicating that a greater number of respondents thought that environmental factors had an impact on motorbike accidents in Kitui County.

2.13 Contribution of Personal Characteristics on Motor-Cycle Accidents among Bodaboda riders

This study investigated how personal characteristics factors influenced motorcycle accidents in KituiCounty.

2.13.1 Taking Drugs

The investigator wanted to know what those surveyed thought about the possibility that drug use affects accidents involving motorcycles. The investigator attempted to ascertain the participant's thoughts regarding drug use or not. Table 4.3 contains the tabulated results. According to the analysis, while 34.9% of those surveyed disagreed with the assertion that drug use contributed to motorcycle accidents, 65.1% of those surveyed agreed.

Table 4. 3: Influence of Taking Drugs on Motorcycle Accidents

Taking Drugs	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Yes	276	65.1	65.1	65.1
No	148	34.9	34.9	100.0
Total	**424**	**100**	**100**	

Table 4. 4: Types of Drugs Consumed

The purpose of the study was to find out what kind of medication the individuals who took drugs used. Table 4.4 contains the tabulated results.

Type of Drugs	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Alcohol	136	32.1	32.1	32.1
Bhang	23	5.4	5.4	37.5
Snuff	71	16.7	16.7	54.2
Muguka	132	31.2	31.2	85.4
Others	62	14.6	14.6	100.0
Total	**424**	**100**	**100**	

Table 4.5: Influence of Riding Speed

The investigator aimed to ascertain from every participant whether they had engaged in excessive speeding. Table 4.5 displays the responses from the respondents ratings.

Riding Speed	Frequency	Percentage	Valid Percentage	Cumulative Percentage
50 Km/h	150	35.4	35.4	35.4
70 Km/h	113	26.7	26.7	62.1
80 Km/h	88	20.7	20.7	82.8
>90 Km/h	73	17.2	17.2	100
Total	**424**	**100**	**100**	

A total of 35.4% of those surveyed said they ride at a speed limit of 50 km/h, 26.7% said they ride at an average of 70 km/h, and 20.7% said they ride at 80 km/h. Furthermore,

17.2% of respondents said they frequently ride at a speed of 90 km/h. The majority of motorcycle riders, according to the results, drive faster than 50 km/h. The results corroborate a 2016 Ministry of Transportation report that found overspeeding contributes to motorcycle accidents.

Table 4.6: Respondents Feeling on Riding Speeds

The investigator aimed to ascertain from every participant how they felt about speeding excessively. Table 4.6 displays the responses from the respondents ratings.

Riding Speed	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Feel stable	203	47.9	47.9	47.9
Feel like flying	112	26.4	26.4	74.3
Feel good	93	21.9	21.9	96.2
Others	16	3.8	3.8	100.0
Total	**424**	**100**	**100**	

47.9% of those surveyed reiterated their belief that they feel stable when they speed excessively, 26.4% said they feel like they're flying, 21.9% said they feel good when they speed excessively, and 3.8% of participants had other thoughts. The findings indicate that the majority of motorcycle riders in the research area are locals, who are responsible for the overspeeding motorcycle culture. The findings support a report from the Ministry of Transportation (MOT, 2006) that claimed that excessive speeding in a culture where road safety is not taught is the primary cause of fatal crashes involving motorcycles.

Table 4.7: Respondents View on Riding While Drunk

The researcher sought to know from the entire respondent the feeling they had about riding on motorcycles while drunk. Summary of the feelings is shown in table 4.7.

Riding Speed	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Feel high	139	32.8	32.8	32.8
Can see far	108	25.5	25.5	58.3
The motorcycle is well controlled	73	17.2	17.2	75.5
Fearful	29	6.8	6.8	82.3
Others	75	17.7	17.7	100.0
Total	**424**	**100**	**100**	

(32.8%) of the respondents reposted that they feel high on riding while drunk, (25.5%) reported that of the respondents reported that they can see far on riding while drunk, (17.2%) of the respondents reported that the motorcycle is well controlled on riding while drunk, (6.8%) of the respondents expressed fear on riding motorcycles while drunk, while (17.7%) of the respondents expressed other opinions on the issue.

2.14 Riding Skills and the Rate of Motorcycle Accidents

This section looked at how riding proficiency affects motorcycle crashes involving Bodaboda riders in four specific Kitui County Sub-counties.

2.14.1 : Level of Training of Bodaboda Riders

The person conducting the study wanted to know what everyone who responded thought about the relationship between motorcycle accidents and formal Bodaboda riders training versus none. Table 4.8 contains a tabulation of the outcomes.

Table 4. 8: Undergone formal Bodaboda riders training

The respondents were asked about having attended formal Bodaboda riders training, and the responsesare as shown in table below.

Attended Training	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Yes	226	53.3	53.3	53.3
No	198	46.7	46.7	100.0
Total	**424**	**100**	**100**	

According to the analysis, while 46.7% of the people polled did not attend the formal Bodaboda riders training, 53.3% of the participants said they had attended. According to the data, a sizable portion of Bodaboda riders (46.7%) do not have a formal education. This result is in line with the findings of (Schäffler-Thomson, 2022), who demonstrated that it is difficult for drivers to retrain for further refresher courses because some Kenyans are taking advantage of those who wish to learn how to ride in dubious training facilities where a single session of instruction costs, on average, Kshs. 200.

Table 4.9: Training Duration

The respondents were asked about the duration they attended formal Bodaboda riders training, and theresponses are as shown in table 4.9.

Riding Training	Frequency	Percentage	Valid Percentage	Cumulative Percentage
One week	19	4.5	4.5	4.5
Two weeks	78	18.4	18.4	22.9
Three weeks	126	29.7	29.7	52.6
One month	143	33.7	33.7	86.3
Others	58	13.7	13.7	100.0
Total	**424**	**100**	**100**	

The findings indicate that (4.5%) of the people who responded had gone to formal Bodaboda riders training for a week, (18.4%) had gone for two weeks, (29.7%) had gone for three weeks, (33.7%) had gone for one month, and (13.7%) had gone to other types of Bodaboda riders training. According to the data, only a minuscule percentage (33.7%) of Bodaboda for riders have completed enough formal instruction. Investigations revealed that motorcycle riders viewed formal education and training as essential to gaining the difficult skills needed to ride and control a motorcycle. Many people reportedly held the view that classroom instruction was the most effective way to acquire a high level of competence due

to the unique handling characteristics of motorcycles and riders' vulnerability to perception, aerodynamically efficient, and roadway interruptions (Buyana et al., 2022; Gebru, 2017).

4.6.1: Level of Training of Bodaboda Riders

The study's investigator aimed to investigate each respondent's experiences riding a motorcycle. Table 4.10 presents a tabulation of the results.

Table 4.10: BodaBoda Riding Experience

Riding Experience	Frequency	Percentage	Valid Percentage	Cumulative Percentage
< 1 year	56	13.2	13.2	13.2
2 yeas	112	26.4	26.4	39.6
3 years	141	33.3	33.3	72.9
4 years	71	16.7	16.7	89.6
5 years	31	7.3	7.3	96.9
> 6 years	13	3.1	3.1	100.0
Total	**424**	**100**	**100**	

The findings showed that the majority of riders (33.3%) had been riding bodabodas for three years, followed by riders with a minimum of two years' expertise (26.4%), riders with four years of work experience (16.7%), riders with three years' experience (13.2%), riders with five years' experience (7.3%), and riders with six years' experience (3.1%). The findings indicate that the respondents' total Bodaboda riding encounter is only two years. As can be seen from table 4.10 above, the vast majority of those surveyed, or 194 people, or 65%, disagreed strongly that there had been a general lack of operating knowledge in the four Kitui County sub-counties that were chosen. This result contradicts the research results of Harrison & Klotz (2010), who stated that most riders break traffic laws with little to no training, putting themselves and others in danger, and that as a result, inexperienced riding is not a significant factor in the majority of fatalities.

Table 4. 11: Ownership of Motor Cycle Rider License

Ownership of Rider License	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Yes	268	63.2	63.2	63.2
No	156	36.8	36.8	100.0
Total	**424**	**100**	**100**	

When asked if they had a motorbike rider license, the responses of the participants are displayed in table 4.11. The vast majority of riders (63.2%) did not possess a motorbike rider license, whereas 36.8% of respondents did. These findings were reported in the survey. The vast majority of those who responded, according to the results, do not have a valid driver's license. This outcome is consistent with the research of (Griskevicius, 2011).

Table 4.12: Acquisition of the Driving License

Driving License	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Got through the driving school	263	62.0	62.0	62.0
Brought by a friend	36	8.5	8.5	70.5
Brought by a relative	52	12.3	12.3	82.8
Downloaded through e-citizen	62	14.6	14.6	97.4
Others	11	2.6	2.6	100.0
Total	**424**	**100**	**100**	

When asked if they had obtained a valid motorbike rider license, the respondents' answers are displayed in table 4.12. The largest percentage of riders (62.0%) did not have a motorbike rider license from the driving school, followed by those who downloaded their license through e-citizen (14.6%), those who brought their license from a relative (12.3%), those who brought their license from a friend (8.5%), and those who obtained their license

through other sources (2.6%). A majority of those who responded, according to the results, do not have a valid driver's license. This outcome is consistent with Nagati et al.'s (2022) research.

Table 4.13: Knowledge about Traffic Rules

Traffic Rules	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Yes	203	47.9	47.9	47.9
No	221	52.1	52.1	100.0
Total	**424**	**100**	**100**	

The researcher sought to examine the riders' knowledge of traffic rules. The results are tabulated in table 4.13. According to the results, majority of the riders (47.9%) of the BodaBodas had knowledge of traffic rules, (52.1%) of the respondents had no knowledge abbot traffic rules.

Table 4.14: Frequency of Traffic Rules violation

Violation of Traffic Rules	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Once	32	7.5	7.5	7.5
Twice	171	40.3	40.3	47.8
Many times	221	52.1	52.1	100.0
Total	**424**	**100**	**100**	

The respondents were asked about often have they violated the traffic rules, and the responses are as shown in table 4.14. According to the results, majority of the riders (52.1%) had violated the traffic rules many times, (40.3%) had violated the traffic rules twice, while (7.5%) had violated the traffic rules once.

2.15 Inferential Statistical Analysis

The regression and correlation analysis with respect to the three study objectives is presented in this section. In a selection of four Sub-counties within Kitui County, Kenya, the factors that influence of motorcycles riders' involvement in traffic accidents are analyzed, presented, and explained. The descriptive statistical results are tabulated and pertain to the mean, standard deviation, and valid data items associated with the factors that influence motorcycle riders' chances of being involved in traffic accidents.

4.7 Influence of Environmental Factors on Motorcycle Accidents among Bodaboda Riders

In four Sub-counties chosen from Kitui County, Kenya, the researcher looked at the environmental factors impacting motorcycle accidents involving Bodaboda riders. Table 4.15 presents the tabulated results.

Table 4. 15: Environmental factors influencing motorcycle accidents among Bodaboda riders

	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Environmental F	424	3.41	.21	-.22	.14	1.10	.29
Accidents	424	3.31	.27	-.11	.14	.42	.29

Key: 1-Strongly disagree; 1-Disagree; 3-Moderately agree; 4-Agree; 5-Strongly agree

Table 4.15 shows the average and standard deviations for environmental variables affecting motorcycle incidents involving Bodaboda riders (M=3.41; SD=.21). Table 4.15 also includes the mean and standard deviation of motorcycle accidents (M=3.31; SD=.27). The

majority of respondents stated that environmental factors were to blame for motorcycle accidents in the four Sub-counties of Kitui County that were chosen. Additionally, Table 4.15 offers skewness and kurtosis tests to ascertain whether the study variables' error distributions are normally distributed with regard to the impact of environmental factors on motorcycle accidents among Bodaboda riders. (Thakur, 2021) state that a variable's distribution is regarded as normal if its kurtosis and skewness values fall within the range of -2.0 and +2.0. Table 4.15 demonstrate that the values of skewness and kurtosis for the variables environmental factors and motorcycle accidents were within the advised range. Therefore, the normality test was successful.

Furthermore, there is considerable disagreement as to whether there was a correlation between them because the mean for motorcycle accidents was higher than that for environmental factors. Therefore, a straight forward linear regression analysis was needed. The employed simple linear regression modelis expressed in 4.1.

$$y = \beta_0 + \beta_1 x_1 + \varepsilon \qquad (4.1)$$

The explanatory variable was environmental factors, while the response variable y was motorcycle accidents. The term ε "residual" or "error" denoted the variance between actual environmental factorsnumbers and those predicted by the model.

Initial evaluations of model 4.1 were successful. Therefore, the contribution of environmental factors in motorcycle accidents was investigated. The contribution was examined at a 5% level of significance.Table 4.16 presents the results.

Table 4.16: Contribution of environmental factors in motorcycle accidents

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.436	.172		20.004	.000
	Environmental Factors	.210	.041	.392	5.074	.000
	Best line of fit					
	R=.392[a]					
	R^2=.154					
	Adjusted R^2=.151					
F_{ratio}=32.744						
	P<.05[b]					

a. Dependent Variable: Motorcycle Accidents

b. Predictors: (Constant), Weather conditions, State of the road, Terrain

Table 4.16 demonstrates a marginally positive association between environmental factors in motorcycle accidents (R=.392; p.05). A portion of motorcycle accidents was measured with an R- square of .154, which was explained by environmental factors. It revealed that environmental factors were responsible for around 15.1% of the possible motorcycle accidents. The model's generalizability was indicated by the adjusted R-square. If not identical, it ought to have been as close to R-square as practicable.

The investigation barely deviated from the final model 0.03, or.3%, in this case. This indicated that if the model had been constructed from the population instead of a sample, it might have explained roughly.3% less variance in the results (F ratio = 32.744; p.05). A statistically significant model was the linear regression model. Standardized beta coefficients showed that for every standard departure rise in environmental factors, household food security increased by roughly.392 units. Table 4.16 and Model 4.1 also provide the ideal simple linear regression equation between outside variables and motorcycle accidents.

$$y = 3.436 + .210x \qquad (4.2)$$

The linear regression model 4.2 (R =.392; p.05.) indicates a statistically significant relationship between the variation in crashes involving motorcycles and environmental factors. 15.1% of the model's variance is attributed to environmental factors. The level of motorcycle accidents was approximately 3.436 units lower without first the influence of the environment and raised by.210 units for each element of the environmental factors, corresponding to the linear regression model 4.2. This finding supports the findings of (Ayodele, 2009), who claimed that extremely poor road conditions are contributing to a higher rate of serious automobile injuries in Africa. The number of taxi and motorcycle accidents is on the rise, with wide potholes being attributed to poor road conditions and careless maintenance.

4.7.1 Thematic Analysis of qualitative findings on environmental factors influencing motorcycleaccidents among Bodaboda riders

The researcher interviewed Bodaboda riders to investigate the determine the environmental factors influencing motorcycle accidents among Bodaboda riders in selected four Sub-counties in Kitui County. The majority of the interviewees agreed that environmental factors influencing motorcycle accidents. Bodaboda riders Chairperson 1, P1, observed;

The area has all weather roads that are perennially affected by rains every season and on every onset demands for repair which is not guaranteed.

Drifts along this all-weather roads are not done and the few that are done do notallow for two way often block on rain season.

Hot temperatures which lead to blurred vision where drivers cannot see roads welleven cause accidents.

Slippery roads when driving during harsh conditions or rainy conditions mostly inthe rural areas injure the drivers, (P1, Male, 2023).

Similar sentiments were echoed by Bodaboda rider who also admitted that environmental factorsinfluencing motorcycle accidents. On further probing, Bodaboda rider, P2, noted;

Marram graveled roads which have led to dust where drivers cannot see where they are driving.

Slippery roads which are wet as lead to drivers falling and getting injured.Steep and rocky roads have led to destruction of roads where drivers fail.

Noise pollution from industries, vehicles, other machines which lead to hearing loss. Electrical hazards e.g. Power lines which strike when lightning strikes this leads to many accidents. (P2, Male, 2023).

Therefore, the environmental factors influencing motorcycle accidents among Bodaboda riders in selected four Sub-counties in Kitui County, Kenya. Bodaboda rider 3 explained that environmental factors influencing motorcycle accidents among Bodaboda riders as follows;

Hot weather conditions where the heat fills the helmets reducing division causing accidents.

Steep slopes and rocky roads most roads have not been well maintained this has led to falls of motorcycles along the roads.

Sloppy roads which occur as a result of harsh raining conditions therefore drivers for or even lose control.

Mist and fog which is seen in the morning leading to low vision among the riders therefore leading to accidents.

Noise and electrical hazards which even lead to death of motorists along the roadsand parking (P3, Female, 2023).

4.7.2 Contribution of Personal Characteristics to Motor-Cycle Accidents

The researcher examined how the personal characteristics contributing to motor-cycle accidents among Bodaboda riders in selected four Sub-counties in Kitui County, Kenya. The results are tabulated in table 4.17.

Table 4. 17: Personal characteristics and motor-cycle accidents

	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Personal Chs	424	3.32	.26	-.27	.14	1.90	.29
Accidents	424	3.21	.29	-.11	.14	.42	.29

Key: 1-Strongly disagree; 1-Disagree; 3-Moderately agree; 4-Agree; 5-Strongly agree

The means and standard deviations for personal characteristics contributing to motor-cycle accidents among Bodaboda riders are displayed in Table 4.17, (M=3.32; SD=.26). The motorcycle accidents mean and standard deviation are also included in Table 4.17 (M=3.21; SD=.29). According to the results, most respondents said that the selected four Sub-counties in Kitui County experienced motorcycle accidents associated with personal characteristics. Table 4.17 also provides skewness and kurtosis tests to determine if the influence of personal characteristics on motorcycle accidents among Bodaboda riders studies variables' error distributions are normally distributed. The research by (Thakur,2021) state that a variable's distribution is regarded as normal if its kurtosis and skewness values

fall within the range of -2.0 and +2.0. Table 4.17 demonstrates that the values of skewness and kurtosis for the variables personal characteristics and motorcycle accidents were within the advised range. Therefore, the normality test was successful. Furthermore, there is considerable disagreement as to whether there was a correlation between them because the mean for motorcycle accidents was higherthan that for personal characteristics. Therefore, a straightforward linear regression analysis was needed. The employed simple linear regression model is expressed in 4.3.

$$y = \beta_0 + \beta_1 x_1 + \varepsilon \quad (4.3)$$

The explanatory variable was personal characteristics, while the response variable y was motorcycle accidents. The term ε "residual" or "error" denoted the variance between personal characteristics numbers and those predicted by the model. Initial evaluations of model 4.3 were successful. Therefore, the contribution of personal characteristics in motorcycle accidents was investigated. The contribution was examined at a 5% level of significance. Table 4.18 presents the results.

Table 4.18: Personal characteristics and Motorcycle Accidents

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.268	.208		15.700	.000
	Personal Characteristics	.228	.072	.291	4.994	.000
	Best line of fit					
	R=.291[a]					
	R^2=.085					
	Adjusted R^2=.079					
	F_{ratio}=24.942					
	P< .05[b]					

a. Dependent Variable: Motorcycle Accidents

b. Predictors: (Constant), Attitude, Drug and Substances use, Over speeding

Table 4.18 demonstrates a marginally positive association between personal characteristics

in motorcycle accidents (R=.291; p.05). A portion of motorcycle accidents was measured with an R- square of .085, which was explained by personal characteristics. It revealed that personal characteristics were responsible for around 8.5% of the possible motorcycle accidents. The model's generalizability was indicated by the adjusted R-square. If not identical, it ought to have been as closeto R-square as practicable.

The study's deviation from the final model was minimal. i.e. .003, or.3%. This suggested that the modelmight have accounted for about .3% less variance in findings if it had been derived from the population rather than a sample (F ratio = 24.942; p .05). The linear regression model was statistically significant. According to standardized beta coefficients, household food security increased by about .392 units forevery standard deviation increase in personal characteristics. The ideal simple linear regression equation between personal characteristics and motorcycle accidents is also provided by Table 4.18 and Model 4.4. $y = 3.268 + .228x$ (4.4).

The linear regression model 4.2 (R =.291; p.05.) indicates a statistically significant relationship between variations in crashes involving motorcycles and environmental factors. 15.1% of the model's variance is attributed to natural factors. The level for motorcycle accidents was approximately 3.436 units lower with no environmental variables and increased by.228 units for each element of the individual characteristics, according to the linear regression model 4.4. The present findings are consistent with the investigation conducted by Zhang and Witlox (2019), which suggested that the primary governance issue in the transportation sector stems from the government's unilateral formulation and enforcement of laws, rules, and legal frameworks without consulting key stakeholders. As a consequence, the legal framework has little effect on reducing road carnage.

4.7.3 Thematic Analysis of qualitative findings on personal characteristics contributing to motor-cycle accidents among Bodaboda riders

The researcher interviewed Bodaboda riders on assess personal characteristics contributing to motor- cycle accidents among Bodaboda riders in selected four Sub-counties in Kitui County, Kenya. The majority of the interviewees agreed that personal characteristics contributed to motor-cycle accidents.The Bodaboda rider, P4, observed;

In areas outside the county headquarters, we have police officers along the better routes of our repaired weather roads and this have subjected our motorists to use the "panya routes" that are very poor hence costing about 30 to 40% of motorist accidents.

Lack of ownership of motorcycles which has made many drivers to drive carelessly therefore causing accidents.

Over-speeding due to use of substances like drugs which leads to confusion when drivers are on the road therefore causing accidents (P4, male, 2023).

These findings are consistent with studies by Zhang and Witlox (2019), which found that the primary issue with transportation sector governance is that regulations, laws, and policies have all been enacted by the government in a unilateral manner without consulting important parties. As a result, the legal structure has little effect on reducing road fatalities.

4.7.4 Influence of Riding Skills on Motorcycle Accidents

The investigation investigated the impact of riding abilities on motorcycle mishaps among Bodaboda riders in four specific Sub-counties located in Kitui County, Kenya. Table 4.18 presents the tabulated outcomes.

Table 4.19: Influence of riding skills on motorcycle accidents

	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Riding skills	424	3.63	.19	-.29	.14	1.78	.29
Accidents	424	3.61	.24	-.18	.14	.48	.29

Key: 1-Strongly disagree; 1-Disagree; 3-Moderately agree; 4-Agree; 5-Strongly agree

Table 4.19 (M=3.63; SD=.19) shows the means and deviations from the mean for riding skills impacting motorcycle accidents among Bodaboda riders. Table 4.19 also includes the mean and standard deviation of motorcycle accidents (M=3.61; SD=.24). The majority of responders stated that riding abilities was a contributing factor in the motorcycle accidents that occurred in Kitui County's four Sub-counties that were chosen. Table 4.19 also provides skewness and kurtosis tests to determine if the influence of riding skills on motorcycle accidents among Bodaboda riders study variables' error distributions are normally distributed. (Thakur, 2021) state that a variable's distribution is regarded as normal if itskurtosis and skewness values fall within the range of -2.0 and +2.0. Table 4.15 demonstrates that the values of skewness and kurtosis for the variables riding skills and motorcycle accidents were within the advised range. Therefore, the normality test was successful.

Furthermore, there is considerable disagreement as to whether there was a correlation between them because the mean for motorcycle accidents was higher than that for riding skills. Therefore, a straightforward linear regression analysis was needed. The employed simple linear regression model is expressed in 4.5.

$$y = \beta_0 + \beta_1 x_1 + \varepsilon \qquad (4.5)$$

The explanatory variable was riding skills, while the response variable y was motorcycle accidents. The term ε "residual" or "error" denoted the variance between actual riding skills

numbers and those predicted by the model.

Model 4.5's initial assessments were successful. Thus, it was looked into how riding abilities affected motorbike accidents. The effect of the contribution was looked at with a significance level of 5%. The outcomes are shown in Table 4.20.

Table 4.20: Contribution of riding skills on motorcycle accidents

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.436	.172		20.004	.000
	Riding skills	.310	.081	.312	7.028	.000
	Best line of fit					
	$R=.342^a$					
	$R^2=.102$					
	Adjusted $R^2=.099$					
	$F_{ratio}=35.211$					
	$P<.05^b$					

a. Dependent Variable: Motorcycle Accidents

b. Predictors: (Constant), Training levels, Riding experience, Duration of riding

Table 4.20 demonstrates a marginally positive association between riding skills in

Factors being taken into account	**1**	**2**	**3**	**4**	**Likert Mean**
Accidents are decreased by traffic laws and county-wide driving regulations.	21%	7%	18%	54%	**3.81**
More motorcycle accidents occur as a result of county administrators' and traffic cops' corruption.	13%	14%	4%	69%	**3.94**
More motorcycle accidents occur in Kitui County due to the state of the roads.	2%	11%	34%	53%	**3.79**
Increased accident rates among drivers are a result of the weather	17%	6%	6%	71%	**4.21**
Mean Likert Mean					**3.96**

motorcycleaccidents (R=.342; p.05). A portion of motorcycle accidents was measured with an R-square of .102,which was explained by riding skills. It revealed that riding skills were

responsible for around 10.2% of the possible motorcycle accidents. The model's generalizability was indicated by the adjusted R- square. If not identical, it ought to have been as close to R-square as practicable. The study's deviation from the final model was minimal. i.e .003, or.3%. This suggested that the model might have accounted for about .3% less variance in findings if it had been derived from the population rather than a sample (F ratio = 35.211; p .05). The linear regression model was statistically significant. According to standardized beta coefficients, household food security increased by about .342 units for every standard deviation increase in riding skills. The ideal simple linear regression equation between riding skills and motorcycle accidents is also provided by Table 4.20 and Model 4.5.

$$y = 3.436 + .310x \qquad (4.6)$$

The linear regression model 4.6 shows a statistically significant connection (R =.291; p.05.) between the variation in crashes involving motorcycles and riding skills. Riding skills variance makes up 15.1% of the model. The level of motorcycle crashes was approximately 3.436 units lower with no riding skills as well as raised by.310 units for each riding skill component, according to the linear regression model 4.6. These findings are consistent with investigation by Luke (2011), who found that the primary issue with governance in the transportation sector is that policies, laws, and regulations have been imposed unambiguously by the federal government without consulting important parties; as consequently, the legal framework hardly lessens traffic fatalities.

4.7.5 Thematic Analysis of qualitative findings on influence of riding skills on motorcycle accidents among Bodaboda riders

The researcher interviewed Bodaboda riders on the influence of riding skills on motorcycle accidents among Bodaboda riders in selected four Sub-counties in Kitui, Kenya. The majority of the interviewees agreed that riding skills influenced motorcycle accidents. The Bodaboda rider, P4, observed;

Incompetence due to the lack of driving license which has contributed to 20 to 30% of accidents not only outside the headquarters but inside.

High number of class 8 and from four dropouts which is the main factor in our Township area where young children like motorcycle accidents.

Failure to wear protective gears while driving accidents are inevitable therefore most drivers assume to wear this protective equipment therefore getting injured.

These findings are consistent with investigation by Luke (2011), who found that the primary issue with governance in the transportation sector is that regulations, laws, and policies have been imposed unilaterally by the government without consulting important parties; as a consequence, the legal framework hardly lessens traffic fatalities.

CHAPTER FIVE:

SUMMARY, CONCLUSIONS ANDRECOMMENDATIONS

5.1 Preamble

The present investigation examined the connection in four sub-counties of Kitui County, Kenya, between riding abilities, individual traits, and environmental factors. This chapter contains suggestions based on the study's findings as well as an explanation of the results of the research.

5.2Summary of the Study

Determining the environmental factors impacting motorcycle accidents among Bodaboda riders in four sub-counties of Kitui County, Kenya, was the study's initial goal. The primary aim of the research was to ascertain the environmental variables that contributed to motorcycle accidents involving Bodaboda riders in four sub-counties that were specifically chosen in Kitui County, Kenya. The impact of environmental variables on motorcycle crashes was posed to the respondents. Table 4.15 (M=3.41; SD=.21) shows the means and deviations from average for environmental factors impacting accidents involving motorcycles among riders of Bodaboda. Table 4.15 also includes the mean and standard deviation of motorcycle accidents (M=3.31; SD=.27). The majority of respondents stated that environmental factors were to blame for accidents involving motorcycles in the four Sub-counties in Kitui County that were chosen.

The participants were asked to rate their agreement or disagreement with the claim that the county's roads are in poor condition. The majority of respondents (69%), according to the results, unanimously agreed that the four Sub-counties that were chosen had poor road conditions Respondents were asked to rate their level of agreement on the poor terrain in some parts of the four specific Kitui County Sub-Counties. The results showed that, in the

four selected Sub-counties, 53% of those who participated strongly agreed that poor terrain in some parts of the sub counties were contributing to motorcycle accidents.

The study's main goal was to ascertain the opinions of the participants of how road conditions affected crashes involving motorcycles.. The study also evaluated the role that individual traits had in motorbike accidents involving Bodaboda riders in four specific Kitui County sub-counties. Table 4.17 shows the means and deviations from average for the unique features of Bodaboda riders that are linked to motorbike accidents (M=3.32; SD=.26). The motorcycle accidents mean and standard deviation are also included in Table 4.17 (M=3.21; SD=.29). According to the results, most respondents said that the selected four Sub-counties in Kitui County experienced motorcycle accidents associated with personalcharacteristics.

The investigator wanted to know what those surveyed thought about the possibility that drug use affects crashes involving motorcycles. The investigator attempted to ascertain the respondents' thoughts regarding drug use or not. The vast majority of respondents,65.1%—use drugs, according to the accomplishments. The investigator aimed to ascertain from every participant whether they had engaged in excessive speeding. Only 35.4% of the those surveyed, according to the results, worked at 50 km/h. The results indicate that most people were driving too fast.

Determining the impact of riding abilities on motorcycle crashes among Bodaboda riders in four sub-counties within Kitui County was the third goal of the research investigation. Table 4.19 (M=3.63; SD=.19) shows the means and deviations from the mean for driving skills affecting crashes on motorcycles among Bodaboda riders. Table 4.19 also includes the mean and standard deviation of motorcycle accidents (M=3.61; SD=.24). The majority of those polled stated in the results that bike accidents occurred in Kitui County's four Sub-

counties because of their riding abilities.

Determining the impact of riding abilities on motorcycle crashes among Bodaboda riders in four sub-counties within Kitui County had been the third goal of the research investigation. Table 4.19 (M=3.63; SD=.19) shows the means and deviations from the mean for driving skills affecting crashes on motorcycles among Bodaboda riders. Table 4.19 also includes the mean and the standard deviation of crashes involving motorcycles (M=3.61; SD=.24). The majority of those polled stated in their responses that bike accidents occurred in Kitui County's four Sub-counties because of their riding abilities.

5.3Conclusions

The following inferences about environmental factors and crashes involving motorcycles were drawn in light of the investigation's results and summary. Regarding environmental factors as well as crashes involving motorcycles, the main contributors are poorly maintained roads. According to individual traits, the main reasons behind motorcycle accidents are Take drugs and drive too fast. Regarding riding abilities and motorbike mishaps, the primary reasons for mishaps are a driver's license being revoked and the Bodaboda riders' insufficient training.

5.4 Recommendations

The results of the investigation suggest that motorcycles require a carefully considered plan. Regarding the reasons behind motorcycle accidents and possible future interventions, the investigator proposed the following:

1. The National Transport and Safety Authority (NTSA) should ensure regular inspection

of motor cycles to reduce the risks of faults that can lead to accidents

2. NTSA should also advise both the National and County governments on policies in regards to transport sector and road safety.

3 The Kenya Rural Roads Authority (KERRA) should carry out regular rehabilitation and maintenance of roads to minimize the number of accidents due to poor roads.

4 KERRA should also ensure that road signages are in place for the precautionary measures by the motorists

5 Motorists should have self-initiative for formal training to ensure compliance with the set regulations.

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APPENDICES

Appendices 1: Questionnaires

SECTION A: SOCIAL DEMOGRAPHIC INFORMATION

Sex Female ☐ Male ☐

1. Age in years
   (i) ☐ < 18
   (ii) 18 – 24
   (iii) ☐ 25-31
   ☐
   (iv) ☐ 32 – 38
   (v) 39 – 45
   (vi) ☐ 46 – 52
   (vii) ☐ 53 +

2. Marital status
   (i) Married ☐
   (ii) Single ☐
   (iii) Divorced ☐
   (iv) Windowed ☐
   (v) Separated ☐

3. Level of education
   i) Primary ☐
   ii) Secondary ☐
   iii) College ☐
   iv) University ☐
   v) Others ☐

4. What kind of job were you doing before starting motorcycle operations?

_____

_____

_____

SECTION B: ENVIRONMENTAL FACTORS

Please select the most acceptable option on a scale of 1 to 5.

Strongly disagree (1), disagree (2), Neither agree nor Disagree (3), agree (4), and strongly agree (5). What degree of impact do the following environmental elements have on motorcycle accidents in Kitui County

Factors being taken into account	1	2	3	4	5	
Poorly maintained roads with pot holes						
Adverse weather conditions						
Poor terrain						
Inability to see well due to inadequate lighting at						

SECTION C: PERSONAL CHARACTERISTICS

1. Do you use any kind of drug?

(a) Yes ☐

(b) No ☐

2. If yes what kind 0f drug?

(1) Alcohol ☐

(2) Bhang ☐

(3) Snuff ☐

(4) Muguka ☐

(5) Others (specify) _____

3. What is your estimated speed while riding?

(1) 50 Km/h ☐

(2) 70 Km/h ☐

(3) 80 Km/h ☐

(4) >90 Km/h ☐

4. How do you feel riding at the suggested speed?

(1) Feel stable ☐

(2) Feel like flying ☐

(3) Feel good ☐

(4) Others (specify) ☐

5. How do you feel when riding while drunk?

(1) Feel high ☐

(2) Can see far ☐

(3) The motorcycle is well controlled ☐

(4) Fearful ☐

(5) Others (specify) _____

When riding a motor cycle, how often do you do the following?

Habit of riding	Not at all	sometimes	Almost always	Always
wearing luminous or reflective attire				
Utilize daytime running lights.				
Costume a helmet				
Ride above50 km/h				
When fatigued, ride				
Dunked while riding				
Always use indications				
Simultaneous overtaking of two or more cars				
At a turn, overtake				
From the left, overtake				
Making or receiving calls while riding				

SECTION D: RIDING SKILLS

1. Did you undergo any formal training?

(a) Yes ☐

(b) No ☐

2. If yes, for how long?

(a) One week ☐

(b) Two weeks ☐

(c) Three weeks ☐

(d) One month ☐

(e) Others (specify)_____

3. If no, how did you learn to ride

(a) Learnt from a friend ☐

(b) Learnt by my own practice ☐

(c) Learnt from a relative ☐

(d) Other (specify)_____

4. For how long have you been riding?

(a) < 1 year ☐

(b) 2 yeas ☐

(c) 3 years ☐

(d) 4 years ☐

(e) 5 years ☐

(f) > 6 years ☐

5. Do you have a motor cycle rider license?

(a) Yes ☐

(b) No ☐

6. If yes, how did you acquire it?

(a) Got through the driving school ☐

(b) Brought by a friend ☐

(c) Brought by a relative ☐

(d) Downloaded through e-citizen ☐

(e) Others (specify)_____

7. Do you know of any traffic rules regarding motor cyclists?

(a) Yes ☐

(b) No ☐

8. How often have you violated the rules?

(a) Once ☐

(b) Twice ☐

(c) Many times (can't remember) ☐

9. How did you violate?

(a) Over speeding ☐

(b) Overtaking on the wrong side ☐

(c) Not using indicators ☐

(d) Not wearing reflecting jacket ☐

(e) Others (specify) _____

Please select the most acceptable response on a scale of 1 to 5.

Strongly disagree is represented by 1, strongly agree by 5, neither agree nor disagree is represented by1.

Which of the following riding techniques has the greatest impact on motorcycle accidents in KituiCounty?

Factors being taken into account	1	2	3	4	5
More accidents result from driving without a license.					
Insufficient experience leads to more accidents.					
More accidents result from greater experience.					
More accidents occur due to a lack of refresher courses.					

In your own view, how does riding skills influence motor cycle accidents in Kitui County?

APPENDICES 2: FOCUSED GROUP DISCUSSION GUIDE

The facilitator speaks to the focused group discussion

My name is Faith Kanini Mutinda. A candidate at Mount Kenya University doing a Master's of publichealth. I'm researching Determinants of Road Traffic Accidents Among Motorcycle Riders in Four Selected Sub-Counties, Kitui County, Kenya. I would like to use the next 45 minutes to 1 hour for this activity. please cooperate and give your honest opinions which will be treated with confidentiality.

Does anyone have a question before we begin?

a) Let's begin by introducing yourself
b) In your opinion, what are the environmental factors influencing motorcycle accidents among Bodaboda riders in selected four Sub-counties in Kitui County, Kenya
c) Based on your understanding, what are the personal characteristics contributing to motor-cycleaccidents among Bodaboda riders in selected four Sub-counties in Kitui County, Kenya
d) Based on your understanding, what are the factors influencing riding skills in motorcycleaccidents among Bodaboda riders in selected four Sub-counties in Kitui County, Kenya?

END OF INTERVIEW

APPENDICES 3: KEY INFORMATION

Introduction

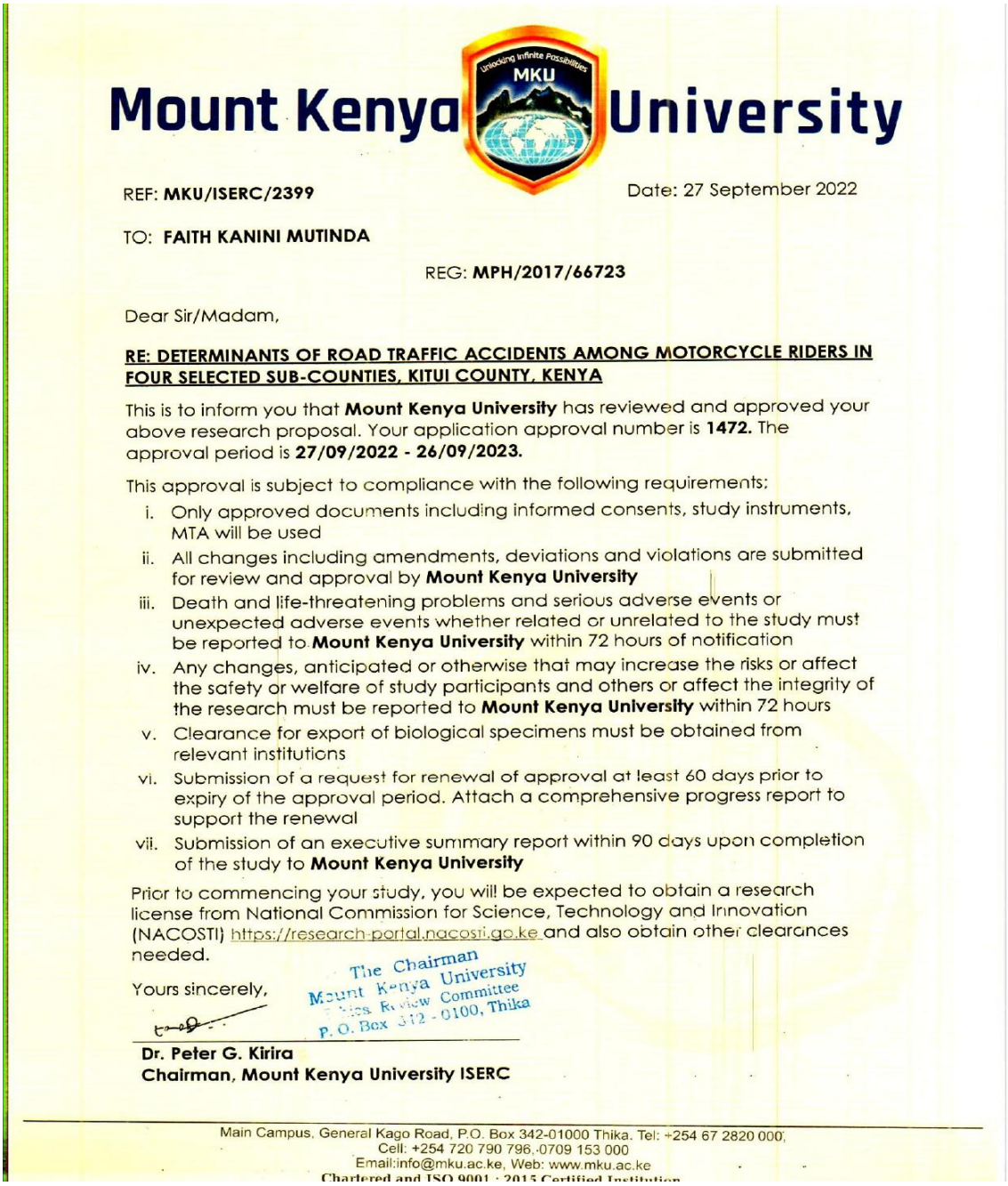
My name is Faith Kanini Mutinda candidate at Mount Kenya university pursuing a master's program in public health. As a necessity in the honor of the degree, I am anticipated to research my area of specialization. my research will give attention to Information collected is thereby planned for academic purposes, any information you deliver will be kept with extreme privacy. I will be thankful if you grunt me, your time to enable the completion of this research. This interview will consume 25 minutes of your time.

Let's begin by introducing yourself.

a) Let's begin by introducing yourself
b) In your opinion, what are the environmental factors influencing motorcycle accidents among Bodaboda riders in selected four Sub-counties in Kitui County, Kenya
c) Based on your understanding, what are the personal characteristics contributing to motor-cycle accidents among Bodaboda riders in selected four Sub-counties in Kitui County, Kenya
d) Based on your understanding, what are the factors influencing riding skills in motorcycleaccidents among Bodaboda riders in selected four Sub-counties in Kitui County, Kenya?

END OF INTERVIEW

APPENDIX 4: ERC Certificate



Mount Kenya University

REF: **MKU/ISERC/2399**

Date: 27 September 2022

TO: **FAITH KANINI MUTINDA**

REG: **MPH/2017/66723**

Dear Sir/Madam,

RE: DETERMINANTS OF ROAD TRAFFIC ACCIDENTS AMONG MOTORCYCLE RIDERS IN FOUR SELECTED SUB-COUNTIES, KITUI COUNTY, KENYA

This is to inform you that **Mount Kenya University** has reviewed and approved your above research proposal. Your application approval number is **1472.** The approval period is **27/09/2022 - 26/09/2023.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including informed consents, study instruments, MTA will be used
ii. All changes including amendments, deviations and violations are submitted for review and approval by **Mount Kenya University**
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to **Mount Kenya University** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affect the safety or welfare of study participants and others or affect the integrity of the research must be reported to **Mount Kenya University** within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal
vii. Submission of an executive summary report within 90 days upon completion of the study to **Mount Kenya University**

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://research-portal.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely,

The Chairman
Mount Kenya University
Ethics Review Committee
P. O. Box 342 - 0100, Thika

Dr. Peter G. Kirira
Chairman, Mount Kenya University ISERC

Main Campus, General Kago Road, P.O. Box 342-01000 Thika. Tel: +254 67 2820 000,
Cell: +254 720 790 796,-0709 153 000
Email:info@mku.ac.ke, Web: www.mku.ac.ke
Chartered and ISO 9001 : 2015 Certified Institution

APPENDIX 5: Introductory Letter

Mount Kenya University

DIRECTORATE OF GRADUATE STUDIES

MPH/2017/66723

4th October, 2022

The Director, Research Coordination Division
National Commission for Science, Technology & Innovation
Utalii House, 8th & 9th Floor
P.O Box 30623- 00100
NAIROBI

Dear Sir/Madam,

RE: FAITH KANINI MUTINDA– REGISTRATION NO. MPH/2017/66723

The purpose of this letter is to introduce the above named student who is pursuing **Master of Public Health** in the **Department of Epidemiology and Biostatistics** in the **School of Public Health.**

The title of her research is ***"Determinants of Road Traffic Accidents Among Motorcycle Riders in Four Selected Sub-Counties, Kitui County, Kenya."***

She has been cleared by the University's Ethics Review Committee (Certificate attached) and now has to proceed to the field to collect data for her research between **October, 2022 and January, 2023.**

Any assistance accorded to her will be highly appreciated.

Thank you.

Mount Kenya University
P. O. Box 342 - 01000, THIKA
Office of the Director
Graduate Studies

Dr. Samuel M. Kareniga, Ph. D.
Director, Graduate Studies
Enc.

APPENDIX 6: Nacosti Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **666301**

Date of Issue: **08/December/2022**

RESEARCH LICENSE

This is to Certify that Miss.. Faith Kanini Mutinda of Mount Kenya University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kitui on the topic: DETERMINANTS OF ROAD TRAFFIC ACCIDENTS AMONG MOTOR CYCLE OPERATORS IN SELECTED SUB COUNTIES OF KITUI COUNTY, KENYA for the period ending : 08/December/2023.

License No: **NACOSTI/P/22/21830**

666301

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions

APPENDIX 7: Maps of the Study Area