

**INCIDENCES AND IMPLICATIONS OF ROAD TRAFFIC ACCIDENTS AMONG  
COMMERCIAL MOTORCYCLISTS IN EMBAKASI AREA, NAIROBI COUNTY**

**SAMSON MAGHANGA HAWA**

**A Research Thesis submitted to the Graduate School in partial fulfillment for the  
requirement of the Award of Master of Arts Degree in Security Management of Egerton  
University**

**Egerton University**

**MAY 2019**

## **DECLARATION AND RECOMMENDATIONS**

### **Declaration**

This thesis is my original work and to the best of my knowledge has not been presented for examination or any academic award in any institution or university.

**Signature:** ..... **Date:** .....

**Samson Maghanga Hawa**

**Reg. No: AM21/0426/13**

### **Recommendations**

This Thesis has been submitted with our/my recommendation as university supervisors.

**Signature:** ..... **Date:** .....

**Prof. Mwangi S. Wokabi**

**Department of Peace, Security and Social Studies**

**Egerton University, Kenya**

**Signature:** ..... **Date:** .....

**Mr. Panuel Mwaeke**

**Department of Peace, Security and Social Studies**

**Egerton University, Kenya**

## **COPYRIGHT**

© 2019, Samson Maghanga Hawa

All rights reserved. No part of this thesis may be transmitted, reproduced or translated in any form or by any means, electronic or mechanical, including photocopying, recording, or any information storage or retrieval system without written permission from the author or Egerton University.

## **DEDICATION**

This thesis is dedicated to my wife Regina Shali and our children Sarah Maghanga, Gang San-A Maghanga, and Gang Su Maghanga for their moral support, understanding, and encouragement throughout this study.

## **ACKNOWLEDGEMENTS**

I thank the Almighty God for His sustenance, guidance, grace and the wisdom He has bestowed upon me in the successful completion of this study. I also thank the Egerton University for the opportunity to undertake Master of Arts Degree in Security Management and for allowing me to utilize their resources.

I would like to express my sincere and utmost gratitude to my supervisors, Prof. Samson Wokabi Mwangi and Mr Paniel Mwaeke for the invaluable guidance, support, patience and tireless efforts without which I would not have completed this study. Their useful comments, remarks, assistance and dedication throughout the process made the execution of this research possible and bearable.

I also extend my gratitude to all members of the National Transport and Safety Authority (NTSA) for their understanding and support for my academic endeavour. Further, I thank my family who were always there for me even as I sacrificed their time and happiness for this academic work.

## ABSTRACT

The emergence of boda-boda motorcycles as a means of transport has brought a new dimension to road safety in Kenya. The rising trend of motorcycle accidents has raised serious security concerns among citizens in general and security agents in particular. This study examined incidences and implications of road traffic accidents among commercial motorcyclists in Embakasi area in Nairobi County. Specifically, the study examined prevalence of road traffic accidents among commercial motorcyclists, factors responsible for road traffic accidents among commercial motorcyclists, and implications of road traffic accidents among commercial motorcyclists in Embakasi area. The study was anchored on the Rational Choice Theory and System Approach Theory as explanatory frameworks. This study was descriptive in nature. Sample respondents were boda boda riders. The sample respondents were 135 members of boda boda operators. Key Informants were selected purposively. The study utilized interview schedule with both open and closed ended questions administered in a face-to-face interaction. This was used to collect quantitative information on general knowledge, perceptions, opinions and experiences from sample respondents. Key informant interview guide was used to collect qualitative information from individuals believed to hold pertinent information regarding incidences of road traffic accidents among commercial motorcyclists in Embakasi Area. Qualitative and quantitative methods of data analysis were utilized. Quantitative data was analyzed using the Statistical Package for Social Sciences and the information collected was presented in frequency and percentages. Qualitative data was analyzed by way of interpretation of responses obtained from key informants. All information from the analyzed data was presented thematically based on study objectives. Research findings revealed that, motorcycle accidents were prevalent in the study area. In addition, this study established that more than half of the motorcycle accidents were attributed to preventable human error that ranged from over speeding (93.7%), wrong overtaking (63.5%), drunkenness (26.8%) and overloading (19.0%). Implications of the motorcycle accidents included damage to property, medical costs, injury, death, crime, and loss of livelihood. The study recommendations include: mandatory registration, refresher training, testing of boda boda riders and concerted public road safety awareness.

## TABLE OF CONTENTS

<b>DECLARATION AND RECOMMENDATIONS</b> .....	i
<b>COPYRIGHT</b> .....	ii
<b>DEDICATION</b> .....	iii
<b>ACKNOWLEDGEMENTS</b> .....	iv
<b>ABSTRACT</b> .....	v
<b>TABLE OF CONTENTS</b> .....	vi
<b>LIST OF TABLES</b> .....	x
<b>LIST OF FIGURES</b> .....	xi
<b>LIST OF MAPS</b> .....	xii
<b>LIST OF ABBREVIATIONS AND ACRONYMS</b> .....	xiii
<b>CHAPTER ONE</b> .....	1
<b>INTRODUCTION</b> .....	1
1.1 Background to the Study.....	1
1.2 Statement of the Problem.....	3
1.3 Objectives of the Study.....	4
1.3.1 Broad Objective.....	4
1.3.2 Specific Objectives.....	4
1.4 Research Questions.....	4
1.5 Justification of the Study.....	5
1.6 Scope and Limitations of the Study.....	5
1.7 Definition of Terms.....	6
<b>CHAPTER TWO</b> .....	8
<b>LITERATURE REVIEW AND THEORETICAL FRAMEWORK</b> .....	8
2.1 Introduction.....	8
2.2 Global prevalence of motorcycle accidents.....	8
2.3 Regional and local Prevalence of Motorcycle Accidents.....	10
2.4 Factors responsible for road traffic accidents among Commercial Motorcyclists.....	13
2.4.1 Human factor in motorcycle accident causation.....	13
2.4.2 Mechanical related factors.....	14

2.4.3 Road infrastructure and environmental factors .....	15
2.4.4 Socio-demographic factors .....	16
2.4.5 Motorcycle training, experience and safety knowledge .....	17
2.4.6 Use of helmet by cyclists and pillions .....	18
2.4.7 Weak legal Enforcement.....	19
2.4.8 Institutional set-up, funding and capacity for road safety actions .....	20
2.5 Implications of Commercial Motorcycle Accidents .....	22
2.6 Theoretical Framework.....	24
2.6.1 Rational choice theory .....	25
2.6.2 System Approach Theory .....	26
2.7 Conceptual Framework.....	28
<b>CHAPTER THREE</b> .....	<b>30</b>
<b>METHODOLOGY</b> .....	<b>30</b>
3.1 Introduction.....	30
3.2 Research Design.....	30
3.3 Study Area .....	30
3.4 Unit of Analysis .....	31
3.5 Population and Sampling Procedure.....	32
3.6 Methods of Data Collection.....	34
3.7 Data Analysis .....	34
3.8 Ethical Considerations .....	34
3.9 Challenges encountered during the study .....	35
<b>CHAPTER FOUR</b> .....	<b>36</b>
<b>RESULTS AND DISCUSSIONS</b> .....	<b>36</b>
4.1 Introduction.....	36
4.2 Response Rate.....	36
4.3 Socio-demographic Characteristics of Respondents.....	36
4.3.1. Gender, Marital Status and Age of Respondents .....	36
4.3.2 Respondents' level of education .....	38
4.3.3 Number of dependents of boda boda operators .....	39
4.3.4 Income and expenditure of boda boda operators .....	40



4.3.5 Ownership of Motorcycle by boda boda operators .....	41
4.3.6 Motorcycles riding experience.....	42
4.3.7 Boda boda operator training levels .....	43
4.4 Prevalence of road traffic accidents among commercial motorcyclists.....	44
4.4.1 Occurrence of motorcycle accidents .....	45
4.4.2 Prevalence of motorcycle accidents.....	46
4.5 Factors responsible for road traffic accidents among commercial motorcyclists.....	47
4.5.1 Motorcycle inspection by traffic police officers .....	49
4.5.2 Incidences of police stoppage .....	50
4.5.3 Major risks that motorcycle riders were exposed to .....	51
4.6 Implications of road traffic accidents among commercial motorcyclists .....	52
4.6.1 Correlation between accident involvement and riders socio-demographic .....	53
4.7 Discussion of the Findings.....	53
<b>CHAPTER FIVE .....</b>	<b>56</b>
<b>SUMMARY CONCLUSION AND RECOMMENDATIONS .....</b>	<b>56</b>
5.1 Introduction.....	56
5.2 Summary of Findings.....	56
5.2.1 Prevalence of road traffic accidents among motorcyclists in Embakasi area .....	56
5.2.2 Factors responsible for road traffic accidents among motorcyclists in Embakasi area .....	56
5.2.3 Implications of road traffic accidents among motorcyclists in Embakasi area .....	57
5.3 Conclusions.....	57
5.3.1 Theoretical Conclusion .....	57
5.3.2 Empirical Conclusion.....	58
5.4 Recommendations.....	59
5.5 Areas for further research .....	60
<b>REFERENCES.....</b>	<b>61</b>
<b>APPENDICES .....</b>	<b>72</b>
<b>APPENDIX I: INTERVIEW GUIDE FOR BODA-BODA RIDERS .....</b>	<b>72</b>
<b>APPENDIX II: INTERVIEW GUIDE FOR TRAFFIC POLICE MANAGERS.....</b>	<b>77</b>
<b>APPENDIX III: INTERVIEW GUIDE FOR THE MEDICAL OFFICER.....</b>	<b>82</b>
<b>APPENDIX IV: INTERVIEW SCHEDULE FOR DIRECTOR NTSA.....</b>	<b>84</b>

<b>APPENDIX V: FOCUS GROUP DISCUSSION GUIDE .....</b>	<b>89</b>
<b>APPENDIX VI: CONSENT FORM.....</b>	<b>91</b>
<b>APPENDIX VII: RESEARCH PERMIT .....</b>	<b>92</b>
<b>APPENDIX VIII: RESEARCH AUTHORIZATION.....</b>	<b>93</b>
<b>APPENDIX IX: RESEARCH AUTHORIZATION .....</b>	<b>94</b>

## LIST OF TABLES

Table 3.1: Target Population.....	32
Table 3.2: Sampling Frame.....	33
Table 4.1: Distribution of respondents by gender, marital status and age.....	38
Table 4.2: Distribution of respondents by level of education.....	39
Table 4.3: Number of dependents of boda boda operators.....	39
Table 4.4 Number of dependents of boda boda operators.....	40
Table 4.5: Household approximate income from boda boda business per month.....	40
Table 4.6: Expenditure of household income.....	41
Table 4.7: Ownership of motorcycle by boda boda operators.....	42
Table 4.8: Motorcycles riding experience.....	43
Table 4.9: Boda boda operator training levels.....	44
Table 4.10: Prevalence of road traffic accidents among commercial motorcyclists.....	45
Table 4.11: Occurrence of motorcycle accidents.....	46
Table 4.12: Prevalence of motorcycle accidents.....	47
Table 4.13: Factors responsible for accidents among motorcyclists.....	48
Table 4.14: Frequency of motorcycle stoppage by police for inspections.....	49
Table 4.15: Trends in Motorcycle Fatalities in Kenya, 2005 - 2016.....	50
Table 4.16: Reasons for motorcycle stoppage by police.....	51
Table 4.17: Major risks that you are exposed to while riding your motorcycle.....	51
Table 4.18: Implications of motorcycle accidents.....	52
Table 4.19: Correlation coefficients.....	53

## LIST OF FIGURE

Figure 2.1: Conceptual Framework .....	28
--	----

## LIST OF MAP

Map 3.1: Map of the Study Area-Nairobi County .....	31
---	----

## LIST OF ABBREVIATIONS AND ACRONYMS

<b>ASEAN</b>	Association of Southeast Asian Nations
<b>ATSB</b>	Australian Transport Safety Bureau
<b>BAC</b>	Blood Alcohol Concentration
<b>DARS</b>	Decade of Action for Road Safety
<b>GDP</b>	Gross Domestic Product
<b>GNP</b>	Gross National Product
<b>GOK</b>	Government of Kenya
<b>KeNHA</b>	Kenya Highway Authorities
<b>KNBS</b>	Kenya National Bureau of Statistics
<b>KRA</b>	Kenya Revenue Authority
<b>KSI</b>	Killed and Serious Injury
<b>KURA</b>	Kenya Urban Roads Authority
<b>MAIDS</b>	Motorcycle Accidents In-depth Study
<b>MCI</b>	Motorcycles Injury
<b>MoH</b>	Ministry of Health
<b>MoT</b>	Ministry of Transport
<b>NARC</b>	National Rainbow Coalition
<b>NHTSA</b>	National Highway Traffic Safety Administration
<b>NTSA</b>	National Transport Safety Authority
<b>PSV</b>	Passenger Service Vehicle
<b>RTA</b>	Road Traffic Accident
<b>SAT</b>	System Approach Theory
<b>SPSS</b>	Statistical Package for Social Sciences
<b>TWMVs</b>	Two-wheel motorized vehicles
<b>WHO</b>	World Health Organization

# CHAPTER- ONE

## INTRODUCTION

### 1.1 Background to the Study

This study examined incidences and implications of road traffic accidents among commercial motorcyclists in Embakasi area. The study was motivated by the need for new interventions to help curb the persistent and escalating incidences of motorcycle accidents in the Nairobi County, especially in Embakasi area.

Motorcycle ownership and use is growing rapidly in many regions of the world. Currently, there are more than 200 million motorcycles in use worldwide and this number is growing at a rapid rate especially in Africa and Asia (Znajmiecka-Sikora & Sałagacka, 2018). According to WHO (2017), the global demand for motorcycles increased by 7.6 per cent annually through 2015. The high growth is spurred by the rising standards of living in developing countries which are making motorcycles an alternative to walking, bicycling and or using mass transit (Odero, 2009). However, the rapid growth in the use of motorcycles in many countries has been accompanied by increases in injuries and fatalities among the users (Clarke, Ward, Bartle & Truman, 2007).

It is estimated that over 1.2 million people die from road traffic injuries (RTIs) worldwide annually and another 20-50 million sustain a form of minor to major road traffic injury (WHO, 2015). Half of these deaths and injuries occur among vulnerable road users, namely motorcyclists (23%), pedestrians (22%) and cyclists (5%). The African region has the highest road fatality rates (24.1 deaths per 100,000 populations) well above the global average of 18.0 deaths per 100,000 persons (Znajmiecka-Sikora & Sałagacka, 2018).

In the year 2008, road traffic injuries were ranked 9<sup>th</sup> globally among the leading causes of disease burden, in terms of disability adjusted life years lost. It is projected that if this trend continues, the annual number of deaths and disabilities from road traffic injuries will rise to 60% by 2020 (Odero, 2009). Motorcycle injuries constitute a major but neglected emerging problem in developing countries (Ogunsanya, 1984). They are among the leading causes of disability and deaths with the main victims being motorcyclists, passengers and pedestrians in the young reproductive age group (Solagberu, Ofoegbu, Nasir, Ogundipe, Adekanye, & Abdur- Rahman, 2006). Since the majority

of motorcycle injuries are preventable, a clearer understanding of the incidents, contributing factors and implications is essential for the establishment of prevention strategies.

According to the U.S National Highway Traffic Safety Administration (NHTSA) an estimated 148,000 motorcyclists have died in traffic crashes since enactment of the Highway and National Traffic and Motor Vehicle Safety Act of 1966. Motorcycles made up of nearly 3 % of all registered vehicles in the United States in 2013 and accounted for only 0.4 % of all vehicles miles traveled. However, motorcycle fatalities in 2013 accounted for 14% of total traffic fatalities in the United States compared to 4.92% in 2007 (Kumar 2011). Considering per vehicle miles traveled in 2008, motorcyclists were 37 % more likely than drivers of passenger cars to die in a motor vehicle crash and nine times more likely to be injured. This high accident rates are in part attributed to consumption of alcohol. Alcohol consumption reduces the perceived negative consequences of risk taking which increases the willingness to take risks (NHTSA, 2006).

In 2004, figures from the UK Department for Transport indicated that motorcycles have 16 times the rate of serious injuries per 100 million vehicle kilometers compared to cars. Although motorcyclists make up less than 1% of vehicle traffic, riders suffer 14% of total deaths and serious injuries on Britain's roads (Clarke et al., 2004).

Nantulya (2002) established that young motorcyclists below the age of 18 years make up a significant percentage of injuries and fatalities among road users in many countries due to lack of proper training, riding while they are under age and not complying with the traffic rules. Factors such as over speeding, lack of Personal Protective Clothing (PPC), risk-taking behaviour, and drunk-driving contribute to this rising trend.

According to the national study by the Australian Transport Safety Bureau (ATS) found that, Motorcycle sales in Australia increased significantly in recent years and indications are that this trend may continue for the foreseeable future (Sinha, 2017). As motorcycling activity increase, so too is the number of serious and fatal motorcycle crashes, though this should not be observed as a simple linear relationship. Among the commonly cited risk factors for motorcycle crashes are excessive speed, alcohol and drug use, road conditions, inexperience and unlicensed riding.



A range of modifiable behaviours have also been cited to contribute to motorcycle crashes and injuries including riding speed (Lin and Kraus, 2009), traffic errors (e.g., being distracted or pre-occupied resulting in a near collision), control errors (e.g., trouble handling the bike) (Elliott et al., 2007), alcohol and/or drug use (Haworth et al., 1997; Lin and Kraus, 2009), and risk-taking (e.g., driving with too little headway) (Banstola & Mytton, 2016).

In Brazil, most of the population makes use of motorcycles to move around. Motorcycles are also used as a work vehicle for taxi motorcyclists. Moreover, this means of transport has lower cost compared to others and is accessible to low income people who use it for transport (Obara, 2009).

The national Transport and Safety Authority surveillance report of 2018 indicate that at least two motorcyclists dying out of thirty five road crashes daily. In spite of the ongoing road safety initiatives by the Nairobi County and the law enforcement officials, there has been an increase of commercial motorcycle accidents in the County (NTSA, 2018). Notwithstanding the growing burden of motorcycle accidents, the problem has received insufficient attention at both the international and national levels. Indeed, law enforcement agencies and motorcycle insurers pay more attention to motor vehicles as evidenced by the deployment of measures geared towards addressing motor vehicles related accident (Otte, 2019).

It is in this regard that this study sought to examine the prevalence and factors responsible for road traffic accidents among commercial motorcyclists in Embakasi area. It also assessed the implications of road traffic accidents among motorcyclists in area. The study findings contribute to the general understanding of the motorcycle related accidents hence assist in devising interventions geared towards addressing motorcycle accidents in the area.

## **1.2 Statement of the Problem**

Research indicates that motorcycle accidents have increased steadily over the past two years accounting for 12 percent of the total number of deaths reported in Nairobi County with about two motorcyclists dying out of thirty five road crashes that occur daily. In spite of the ongoing road safety initiatives by the Nairobi County and the law enforcement officials, there has been an increase of commercial motorcycle accidents in the County. This has significantly contributed to the overall road traffic injuries consequently leading to disability, death, loss of livelihoods, and reemergence of criminal gangs in the area due to loss of support for the household. Embakasi area

continues to experience significant rising cases of road traffic accidents among commercial motorcyclists. This has raised serious security concerns among citizens in general and security agents in particular. Notwithstanding the previous studies conducted in Kenya, none has addressed the incidences and implications of motorcycle accidents in Embakasi area. This study therefore sought to bridge the knowledge gap.

### **1.3 Objectives of the Study**

The study addressed the following objectives:

#### **1.3.1 Broad Objective**

The broad objective of the study was to examine the incidences and implications of road traffic accidents among commercial motorcyclists in Embakasi area for the purpose of generating information that would be helpful in designing strategies geared towards prevention of commercial motorcycle accidents.

#### **1.3.2 Specific Objectives**

The specific objectives of the study were:

- i. To determine the prevalence of road traffic accidents among commercial motorcyclists in Embakasi area.
- ii. To establish factors responsible for road traffic accidents among commercial motorcyclists in Embakasi area.
- iii. To assess the implications of road traffic accidents among commercial motorcyclists in Embakasi area.

### **1.4 Research Questions**

The following questions provided for a systematic study of the problem:

- i. How prevalent are road traffic accidents among commercial motorcyclists in Embakasi area?
- ii. What factors are responsible for road traffic accidents among commercial motorcyclists in Embakasi area?
- iii. What are the implications of road traffic accidents among commercial motorcyclists in Embakasi area?

## **1.5 Justification of the Study**

Motorcycle transport is one of the vibrant and growing sub-sectors in Kenya with huge economic potential. Over the last decade, the industry has registered a massive growth and offered employment opportunities to many Kenyans, particularly the youth. Nonetheless, motorcycle accidents have negatively impacted on their livelihood and wellbeing. The effect of these accidents has a strong bearing on the economy as it undermines investments in the growing motorcycle transport industry and the overall security in the country. The findings of this study therefore contribute to a better understanding of the problem and offer insights to the formulation of effective strategies for addressing motorcycle accidents in the country.

The study has also generated new knowledge to augment the current dearth of research on motorcycle accidents in the country. The findings from this study therefore provides a basis for researchers, academicians, policy makers and law enforcers in formulating effective strategies to address public safety challenges in the country.

## **1.6 Scope and Limitations of the Study**

The study examined the incidences and implications of road traffic accidents among commercial motorcyclists in Embakasi area. While there are many motorcycle incidences associated with motorcycle accidents, the study was limited to establishing the prevalence of commercial motorcycle accidents, factors contributing to these accidents, and their implications in Embakasi area. Further, the study confined itself to rider responses and did not include pillion passengers. The study respondents consisted of 135 boda boda operators and 16 driving schools officials who participated in the two Focus Group Discussions.

Key informants included four (4) National Police Service Senior Police Officers, 2 Traffic Base Commanders (Kayole and Embakasi Divisions), Medical Superintendent - Mama Lucy Hospital, and the Director of Road safety, National Transport and Safety Authority. The study employed descriptive research design where probability and non-probability sampling techniques were used to sample the respondents. The use of probability sampling procedures and the limited geographical area in which the study was undertaken limits the generalization of the findings to the entire country. Nonetheless, the study findings provide information for the understanding of the problem in other parts of the country.

## 1.7 Definition of Terms

**Accident:** An undesired event that results in physical harm or damage to human beings and vehicles.

**Boda-boda Operator:** In this study, boda-boda refers to a motorcycle used for transporting passengers and goods at a fee. The term boda-boda operator and motorcycle rider have the same meaning in the study and are therefore used interchangeably.

**Commercial Motorcycle Accident:** An event that occurs when a motorcyclist loses control of their motorcycle and causes a collision with either a motorcycle or another motorcycle.

**Incidence:** Is the number of new cases of the condition over a specified period of time including fatality, serious injury, slight injury, or property damage.

**Injury:** In this context injury is synonymous with trauma i.e. physical or emotional harm. Injury in this study is referred to as trauma inflicted by road traffic crash.

**Slight injury:** Injury with injury severity score of less than or equals to 8.

**Serious injury:** Injury with an injury severity score of 9-15.

**Motorcycle Implications:** These include the outcomes such as loss of livelihood, decreased wellbeing, increased vulnerability, and reduced quality of life, Loss of productivity, Medical costs, vehicular damage costs and Intangible costs such as pain, grief and suffering.

**Motorcycle:** A single track, two-wheeled motorized vehicle powered having a saddle or seat for use by the rider.

**Pillion:** Refers to motorcycle passengers.

**Prevalence:** Is the number of cases of the condition at a particular point in time.

**Rider characteristics:** In this study, it meant features that distinguish riders. For example age, number of years worked, education level, riding experience.

**Risk behavior:** It means the presence of the following behaviours: speeding, drunk driving, non - use of helmets, non - use of reflective jackets, dangerous overtaking. It was measured by the presence or absence of the above.

**Road safety:** It is a term that refers to all activities or methods and measures that are issued to reduce risks of injury, death and harm to all road users thereby reducing the rates and consequences of road crashes.

**Road Traffic Accident:** Is an occurrence on the road involving the collision of a vehicle with another vehicle, pedestrian, animal, road debris, or other stationary obstruction, such as a tree or utility pole

**Road Traffic Injury:** An injury occurred on the road with an involvement of at least one motorcycle or bicycle.

**Severe injury:** Injury with an injury severity score of 15-75.

**Socio-cultural factors:** Social factors are things (facts and experiences) that influence Individual's personality, attitudes and lifestyle while culture encompasses the set of beliefs, moral values, norms, traditions and rules of behaviour held in common by a defined group of people. In this study, socio-cultural factors include; formal training, motorcycle safety knowledge, drink driving, rider attitudes and practices.

## **CHAPTER TWO**

### **LITERATURE REVIEW AND THEORETICAL FRAMEWORK**

#### **2.1 Introduction**

This chapter reviews literature that is pertinent to the study. It describes the prevalence of motorcycle accidents at the global, regional and local level. It is thematically arranged as per the research objectives. Also presented is the theoretical and conceptual framework that guided the study.

#### **2.2 Global prevalence of motorcycle accidents**

Road traffic accidents is a global phenomenon. It accounts for over 1.2 million fatalities annually, with a projected increase of up to 65% over the next 20 years globally (WHO, 2017). Of the 20-50 million reported fatalities worldwide, road traffic accidents (RTA) account for an average of 13 million deaths annually; hence becoming the ninth-ranked cause of death in the world. This accounts for 23% of all injury deaths worldwide (WHO, 2017). Lin and Kraus (2009) established that half of these deaths and injuries occur among vulnerable road users, particularly motorcyclists (23%), pedestrians (22%) and cyclists (5%). This therefore provides the basis of the study to establish the prevalence road traffic accidents among motorcyclists in Embakasi area.

The WHO (2015) Global Status Report on Road Safety indicates that, the total number of road traffic deaths worldwide increased with nearly a quarter of all road traffic deaths being among motorcyclists. However, this too is disproportionately distributed across the world, with the South-East Asian Region and Western Pacific Region each accounting for 34% of the world's motorcyclist deaths compared to the African Region which accounts for 7%.

In Europe, a number of countries are equally grappling with the problem of motorcycle accidents. In Australia for instant, the rise in motorcycles is attributed to the increasing traffic congestion in most urban areas. Clarke (2014) in his study on motorcycle accident causal factors established that, risky riding behaviours are more prevalent among young motorcyclists which potentially lead to accidents. In his study, the common rider specific crash risks include speeding, rider impairment, unlicensed riding, non-use of helmets, male gender, rider age, and rider inexperience. However, his study did not consider factors outside the individual's environment. Therefore, the current study was holistic in nature focusing on both factors within and outside rider's control.

In many Low Medium Income Countries, motorcycles are an increasingly common means of transport. In India, for instance, 69% of the total numbers of motor vehicles are motorized two-wheelers (Clarke et al., 2007). In China it was estimated that more than 67 million motorcycles were registered in the country (WHO, 2017). In Nigeria, commercial motorcycles constitute one of the most common form of informal transport system (Asogwa, 2012).

Lin and Kraus (2009) established that, there were more than 8 million motorcycles registered in the United States in the year 2013. However, the rate of motorcycle accidents continued to fluctuate even though there was slight improvements in the overall trend. Still, in 2013, there were 4,668 motorcyclists killed in motor vehicle traffic crashes and there were an estimated 88,000 motorcyclists injured during the same period (NCSA, 2015).

In Thailand, motorcycle-related accidents account for the majority of road accidents. Some of the common contributing factors have been cited to include: alcohol, invalid driver's license, inexperience and age of the riders, as they were found to be common characteristics in motorcycle accidents (Nunn, 2011). In Thailand, hospital records show that 75–80% of road traffic injuries and 70–90% of road traffic deaths are among users of Motorized two-wheeled vehicles (Condro and Chang (2006). In all countries, such road users tend to sustain multiple injuries to the head, chest and legs. Head injuries contribute to most deaths and leg injuries in most cases results to long term disability (Blackman & Haworth, 2013).

In the Philippines, laxity by law enforcement agencies, lack of public awareness and the absence of comprehensive road safety action plan is believed to have led rising trends of motorcycle accident (Clarke et al., 2007). In Australia, the rise in registered motorcycles is attributed to the increasing traffic congestion in most urban areas. A study by Blackman & Haworth (2013) established that risky riding behaviors are more prevalent among younger motorcyclists, which potentially lead to accidents.

According to Condro and Chang (2006), motorcycle related accidents are influenced by traffic volume, speed, road status, the number of lanes, and environmental conditions. Indonesia government however developed a raft of measures to curb this trend. These included: safety policies, strategies, action plans and other appropriate programs to better the safety conditions of all road users.

In Australia, apparently the rise in motorcycles is attributed to the increasing traffic congestion in most urban areas. According to Blackman, Ross & Haworth, Narelle (2013) established that the common rider specific crash risks include speeding (over limit) and inappropriate speeds, rider impairment, unlicensed riding, holding a foreign license, non-use of helmets, male gender, rider age (younger or older), rider inexperience and riding for recreation. Similarly, lack of rider training and licensing were cited as the main causes of accidents involving motorcycles in Queensland Australia. Regardless of licensing requirements, rider training and education has historically been seen as important for improving rider safety and continues to be widely promoted by researchers and industry (Abdul, 2013).

### **2.3 Regional and local Prevalence of Motorcycle Accidents**

Just like other developing countries, African region has also experienced significant rise in motorcycle accidents Odero (2009). The World Health Organization (WHO, 2012) figures reveal that, 90 per cent of the road fatalities occur in low and middle income countries. According to Corazza, et al., (2016), motorcycle injuries constitute a significant cause of disability and deaths in Africa with the main victims comprising of motorcyclists and passengers in their young reproductive age group.

Many developing countries are facing the problem of rapidly increasing fatalities and disabilities due to injuries with the vulnerable groups bearing the brunt of it (Peden, 2005). In Nigeria for example, the prevalence of motorcycle accidents range from 12.8% to 60% as reported in different studies (Ekanem et al., 2016) while in Kenya it was between 39.4% and 16% (NTSA, 2018).

Many studies have been carried out on the use of public transportation in Nigeria. Ogunmodede, Adio, Ebijuwu, Oyetola, and Akinola (2012) identified factors influencing the high rate of commercial motorcycle accidents in Nigeria to include: over speeding, wrong overtaking, bad roads, mechanical defects and alcohol intake as major factors. They also established that commercial motorcycle operators do not comply with Road Safety Highway Codes. The study also established that motorcycles have a higher fatality rate per unit of distance travelled as compared to motor vehicles (Juillard et al., 2010).

According to National Council of Traffic Safety and Security Annual Report (2003), motorcycle accidents have increased significantly over the years in Tanzania. This has been due to poor road



maintenance, lack of rider education and awareness, weak law enforcement, and poor implementation of traffic rules and regulations. Ironically despite the ever rising incidents of road accidents which call for further empirical attention, few studies have undertaken on how this situation could be addressed.

In Kenya, as in other low and middle income countries, road safety challenges have been driven by rapid increases in human and vehicle populations, which have in turn led to rapid increases in traffic. The whole road traffic system in Kenya in its current state cannot cope, and very large numbers of people are being killed and seriously injured as a result (Matheka et al., 2015). An investigation of fatality data held by the Department of Civil Registration Services (DCRS) reveals twice as many road traffic injury fatalities in 2017 as reported through the current crash data systems in Police and NTSA. That is, 6037 road traffic injury fatalities were recorded by the DCRS compared to 2919 by Police/NTSA.

According to Odero et al (2003), Kenya has experienced unprecedented wave of road traffic accidents. The country has one of the highest fatality rates in Africa at 68 deaths per 10,000 registered vehicles. Nearly 3,000 people are killed on Kenyan roads annually, translating to approximately 68 deaths per 10,000 registered motorcycles. Between 45 - 60% of admissions to surgical wards are as a result of road traffic injuries, especially in public hospitals.

In recent past, there have been a number of different agencies involved in undertaking road safety awareness campaigns, including both Government and non-government organizations. However, there has been a lack of coordination between these agencies and as a result the impact of the road safety campaigns have been limited. The establishment of the NTSA has created a central organization that should take responsibility for undertaking road safety campaigns and coordinating the efforts of other agencies (WHO, 2017).

Motorcycle transport subsector has provided immense employment opportunities to many youth in Kenya, especially at a time when the world is grappling with continuing problem of unemployment. Nonetheless, Matheka et al., (2015) in his study on motorcycle road traffic accidents in Thika town established that, negligence was the most reported cause of crash at 33%, followed by slippery roads 21.0% and speeding 17.5% with majority of these accidents occurring among young aged working male motorcyclists.

Similar studies (Eze, Kipsaina, & Ozanne & Peden, 2005) indicate that, motorcycle related injuries are the leading cause of mortality among persons aged between 15 and 29 years in Kenya. The study however did not consider the prevalence and the factors responsible for these accidents. This study therefore determined the motorcycle accidents causal factors.

The colonial era 1954 Traffic Act CAP 403 underpins all road traffic safety law in Kenya. Significant law changes in the recent past has addressed drink driving, speeding and use of speed cameras, use of reflective jackets and motorcycle helmets, and rules governing vehicle passenger seating capacity, seat belts, the use of speed governors, certification of drivers and conductors among others. The Traffic Act is however outdated and increasingly difficult to amend thus impacting upon law enforcement (NTSA, 2018).

In a study by Obara (2009) on road traffic injuries in Kenya, motorcycles accounted for most of the crashes at 65 percent. In some towns, for instance, Naivasha, there were deaths reported of up to 40 people per month with some hospital setting aside emergency wards specifically for boda-boda motorcycle accident victims. The number of motorcycle registered annually has risen from as low as 6,250 in 2006 to an estimated 1.4 Million motorcycles in 2017. Apparently, Motorcycle rider fatalities in Kenya have been increasing from as low as 34 in 2006 to a recent 836 deaths in 2018 (NTSA, 2018).

The National Transport and Safety Authority (2018) reported Nairobi County as having recorded the highest number of motorcycle accidents with an average of 20 to 30 fatalities every month. According to NTSA, these cases occurred along Tom Mboya Street, CBD, Starehe Sub-County, Embakasi, Outer Ring Road and Mombasa road. This study, therefore sought to determine the prevalence of road traffic accidents among commercial motorcyclists and their implication in Embakasi area.

## **2.4 Factors responsible for road traffic accidents among Commercial Motorcyclists**

Factors responsible for road traffic accidents among commercial motorcyclists are diverse. Global Status Report on road safety (2013) indicate that motorcycle accident causation factors may be traced to human factors, mechanical related factors, institutional factors, and road condition. These variables were also considered in this study.

### **2.4.1 Human factor in motorcycle accident causation**

According to Kumar (2011), the human factor accounts for up to 90% of accidents, while the mechanical and environmental factors contribute to the other 10%. Over speeding (42.6%) and pedestrians' obstruction (11.7%) are the leading causes of road traffic accidents among commercial motorcyclists in terms of the human factor. These factors including road user behaviour are the most common factors accounting for more than 85% of all traffic crashes (Odero et al, 2003). Among them, the two key known contributing factors include speeding and drunk riding. Others include non-compliance with helmet use, increased use of hand-held devices such as cellphones while riding.

Speeding is a major perennial risk factor normally related to severe traffic injury severity levels. Motorcycle riders are typically more likely to be involved in speeding related fatal crashes than other drivers. For instance, NHTSA reports that in 2013 34% of motorcyclist were involved in fatal accidents as a result of speeding as compared to 21% for drivers of passenger cars, 18% for light truck drivers and 8% for large truck drivers (NCSA, 2015).

In Uganda for instance, the motorcyclists tend to speed and overload their machines for quick returns. It is because of this recklessness, indiscipline and lack of respect for other road users that there is a rising trend in motorcycle accidents (Nantulya & Muli-Musiime, 2011). In Kenya, 93.5% of reported accidents (NTSA, 2018) were caused by human error, 5.4% mechanical and 1.1% environmental factors.

A study by Abdul (2013) showed that speed choice is influenced by a number of factors that can be considered as rider related (age, sex, alcohol level, number of pillion); factors relating to the road and the motorcycle (road layout, surface quality, vehicle power, maximum speed); traffic-related and environment-related factors (traffic density and composition, prevailing speed, weather conditions). Other studies have shown that, the higher the speed the greater the likelihood of

serious and fatal injury (Manyara, 2016). Errors such as loss of control of the motorcycle, speeding, misjudgment and improper overtaking contributed to 44% of all police-reported crashes in Kenya. However, all these studies overlooked institutional related factors which the current study endeavored to focus.

Alcohol use is one of the most highly cited risk factors for drivers of all types of vehicles but more worse for motorcycle riders. In the United States alcohol-impaired is defined as a motor vehicle driver or motorcycle rider with blood alcohol concentration (BACs) of 0.08 grams per deciliter (g/dL) or higher (NCSA, 2015). The percentage of motorcycle riders involved in fatal crashes with BACs of at least 0.08 grams per deciliter (legally alcohol-impaired) is typically higher than any other type of motor vehicle drivers (Peek-Asa et al., 2009).

A variety of Blood Alcohol Concentration (BAC) limits are in place for some countries across the world. Kenya is one of those countries with the legal BAC limit of 0.08 g/dl (Khayesi, 2016). Despite the BAC limit for Kenya, it is one of the highest in the world. The setting of maximum allowable BAC levels is a tool for enforcement and for prevention of alcohol-related road accidents. BAC limits of 0.05 g/dl, can lead to significant reductions in alcohol-related crashes.

Oluwadiya et al., (2004) identified factors influencing the high rate of commercial motorcycle accidents in Kenya. The study identified over-speeding, wrong overtaking, bad roads, sudden mechanical defects and alcohol intake as major factors. However, the study did not consider other temporal factors such as age, experience, time of the day or week, marital status; a gap that was filled by this study.

#### **2.4.2 Mechanical related factors**

The contribution of motorcycle defects to traffic crashes is significant even if this is generally underreported in the police reports (Chang & Yeh, 2007). These factors have also been found to be among the main contributing factor to a road traffic accident, a more detailed classification shows that the issue is related to neglected maintenance, technical faults in subsystems or to conceptual shortcomings (Condro & Chang, 2006).

This has been a concern in Africa, although it accounts for a smaller percentage of crashes, between 5% and 6% of the total traffic crashes as the sole contributing factor (Odero et al, 2003). However, combined with other factors, human and roads, motorcycle are involved in more than 10% of all road traffic crashes (Ngari, 2019).

The number of road worthy motorcycles operating in developing countries is lower than those in developed countries (Peek-Asa et al., 2009). Worn out motorcycles are more likely to be involved in traffic accidents. Motorcycle without inadequate lights, faulty brakes and worn out tires as well as lacking direction indicators are associated with road traffic accident (Eustace et al., 2010). Motorcycle mechanical factors including design, lighting system, break system and its use are significant contributors to road traffic accident Nzegwu et al (2008).

According to Jorgensen and Abane (2009), motorcycle characteristics and use are frequently potentially important factors contributing to high motorcycle related fatality rates. A study done in Papua New Guinea revealed that un-roadworthy motorcycle used to transport pillions are increasingly becoming the main contributors to motorcycle accidents. Similarly open back motorcycle have also been reported to be associated with increased risk to passengers (Quine, Rutter & Arnold, 1998).

### **2.4.3 Road infrastructure and environmental factors**

The environmental factors including the design of the road, its geographic location, season, time of day weather, and visibility (Mekonnen, 2018). The road network has an effect on crash risk because it determines how road users perceive their environment, and it provides instructions for road users, through signs and traffic controls, on what they should be doing (Peden M et al., 2005).

Smith et al. (2017) established that, road hazards and driving conditions, including weather, as well as whether it is day or night, can lead to motorcycle accidents. Road hazards, which may include potholes, slippery road conditions, wet roads, loose stone or gravel, winding roads, blind spots, and even animals, can cause motorcycle accidents. Drivers of cars or trucks may not see motorcyclists; in such instances, it may be difficult to determine who may be at fault for an accident, or if anyone was at fault at all.

Roadway maintenance contributes to some motorcycle accidents, for instance, weather impacts roadway mobility by increasing travel time delay, reducing traffic volumes and speeds and decreasing roadway capacity. In the same manner, the situation of areas of residence and working whether in an urban or rural area determines the extent of traffic accident risk in an area (Mkutu, 2019).

Although bad roads account for less than 5 per cent of the causes that contribute to traffic crashes, the consequence in human and economic terms is equally devastating (Woo, 2006). According to Komba (2013), one of the biggest causes of road traffic accidents is bad weather conditions. The weather can cause bad visibility or bad traction on the road surface which can, in turn, lead to incidences of motorcycle accidents.

A study conducted by Peltzer (2011) established that road conditions, mainly lack visibility or obstructions, unclean road or lose material, poor road condition or road markings and horizontal curvature significantly contributed to around 15% of the crashes. It was therefore in the interest of this study to establish how road related factors contribute to accident causation among commercial motorcycle accidents in Embakasi area constituency.

Other risk factors related to motorcycle accident causation include road bends (curves) and grades which had been found to have substantial affects in the motorcyclist's fatality and incapacitating injury rates. Studies have shown that curved and graded segments have higher motorcyclist fatality rate when compared with level and straight road segments (Elliott et al., 2003). In addition, nighttime crashes and/or crashes in dark lighting conditions tend to result into a higher than average fatality rates (Eustace et al., 2010).

Although no conclusive studies appear to have been done on the extent to which the poor state of road infrastructure leads to road crashes Okebiro (2016) in his study established that poor state of roads is a major contributing factor to road accidents in the Kenya. Despite the fact that road conditions also contribute to road accidents, there is no well-established policy on the same.

#### **2.4.4 Socio-demographic factors**

Globally, road crash injury is a leading cause of death for young motorcycle operators (WHO, 2014). According to this report, both young age and inexperience contribute to the high risk of

these riders. The riders' age is known to be an important factor contributing to motorcycle accidents (Znajmiecka-Sikora & Sałagacka, 2018) as it is deemed to influence the riders' behaviour. Studies show that adolescents or young riders are frequently involved in traffic accidents than any other age groups (Levy, 1990). Quine, Rutter & Arnold (1998) in their study established that young riders are more frequently involved in accidents caused by inappropriate speed and loss of control of the vehicle compared to other age groups of riders. Young Motorcyclists hardly wear protective gear thus aggravating the risks of getting severe head injuries and being predisposed (Quine, Rutter & Arnold, 1998).

Reeder et al (2006) observed that reckless riding in adolescents has been associated with increased risk of accidents. The problem with young riders is that they like risk taking behaviour notwithstanding their lack of riding skills (Fletcher, 2014).

#### **2.4.5 Motorcycle training, experience and safety knowledge**

Motorcycle training is an important factor in reducing motorcycle related crashes. Riding a motorcycle requires additional mental and physical skills than those needed in driving motor vehicles (Mekonnen, 2018). Motorcyclists are more vulnerable road users as compared to drivers of other vehicle types due to their lack of protection when involved in a crash (Mkutu, 2019).

A study by Fagnant and Kockelman (2015) suggests that, motorcycle riders who have received motorcycle training are less likely to be involved in an accident. That is why motorcycle riders are always recommended to attend periodic training in order to increase their awareness of traffic safety, improve on their defensive motorcycle maneuvers and increase their odds of avoiding traffic crashes and severe injuries. Hurt et al., (1981) established that Ninety two per cent of the riders were self-taught or learned from family or friends. Motorcycle rider training experience reduces accident involvement and is related to the reduction of injuries in the event of accidents.

Peltzer (2011) established that, the capacity and competence of the training institutions has also been a major concern. Most of the training institutions are not properly equipped and staffed to provide effective training. At the same time, rider testing also lacks in rigor and can easily be passed even by a very weak candidate.

Lack of experience is mostly addressed formally through a range of rider licensing, training and education programs for which, as noted previously, there is a lack of rigorous evaluations. Programs generally target new riders regardless of age, tending to capture not only young riders but also older ones who comprise a large proportion of those seeking a license (Haworth & Rowden, 2010).

Nzegwu et al (2008) argued that young motorcyclists below the age of 18 years make up a significant percentage of road accidents among road users in many countries because of lack of proper training, riding while they are under age and not complying with the traffic rules. When motorcyclists ride beyond the recommended speed limit, they can lose control consequently causing an accident. High speed therefore increases the chance of one getting involved in an accident.

In Nigeria, motorcycle accident causation factors include over-speeding, wrong overtaking, bad roads, sudden mechanical defects and alcohol intake as major factors (Okebiro, 2016). According to Moraa, (2010), majority (75%) of PSV commercial motorcycle operators were not adequately trained. The study found that rider training is monopolized by commercial driving schools which are not subjected to any inspections by the government. Although their syllabuses are fairly uniform, they are not standardized.

#### **2.4.6 Use of helmet by cyclists and pillions**

Helmet use is another important factor in relation to injury severity of motorcyclists. Branas and Knudson (2001) investigated motorcycle rider fatality rates between states with mandatory motorcycle helmet laws and those without the laws. Competing influences of variables such as population density, weather conditions, alcohol consumption, maximum speed limit, urban vs. rural roads, motorcycle engine size, and age of the motorcycle riders were analyzed on the fatality rates of motorcyclists. Bivariate analyses demonstrated that states with motorcycle helmet laws have significantly higher fatality rates per 10,000 registered motorcycles compared to states without helmet laws. After simultaneously adjusting for other factors using multivariate regression models, fatality rates in states with mandatory motorcycle helmet laws were shown to be lower than those of states without helmet laws.



Peek-Asa et al. (2009) examined the prevalence of nonstandard helmet use among motorcycle riders following introduction of a mandatory helmet law in the United States and the prevalence of head injuries among a sample of nonstandard helmet users involved in motorcycle crashes. Among the injured riders examined in 2009, exactly one-third, whose crash reports indicated nonstandard helmet use, had 15.5% fatalities of non-helmeted riders compared to 13.6% of helmeted riders. Among the riders wearing nonstandard helmets, 75% sustained head injuries of any severity which was significantly greater than riders not wearing a helmet, of which 51.9% had any injuries. Average head injury severity for riders identified as wearing nonstandard helmets was 82.65, which was significantly higher than 1.56 for rider's not wearing helmets and 0.96 for riders wearing standard helmets.

Wearing of helmets and other protective gears by motorcyclists significantly reduce the risk of severe head injury or death in the event of a crash (Abegaz & Gebremedhin, 2018). Helmet use is low among Association of Southeast Asian Nations countries (ASEAN) even though there are laws making wearing of helmets compulsory across the region (Woo, 2006). A study conducted at the University of Southern California, which analyzed 3,600 traffic crash reports covering motorcycle crashes established that wearing helmets was the single most important factor in surviving motorcycle crashes. Unfortunately, in many countries the use of helmets is low.

In his study on road traffic injuries in Kenya Odero et al (2003) observed that, voluntary safety helmet use by accident involved motorcycle riders was lowest for untrained, uneducated, young motorcycle riders on hot days and short trips. Additionally, the study established that sixty per cent of the motorcyclists were not wearing safety helmets at the time of the accident. Some respondents indicated that they did not wear helmets because they were uncomfortable and inconvenient; others simply had no expectation of accident involvement. On the contrary, studies conducted Nigeria, Asia (Vietnam), and even USA, indicate that low rates of helmet use are evident despite the enactment of helmet laws (Hung et al., 2008; NHTSA, 2006).

#### **2.4.7 Weak legal Enforcement**

Enforcement and traffic laws have to do with government policy regarding road safety issues. The aim of traffic regulation systems and enforcement is to ensure adequate operations in the traffic

environment and system maintenance through enforcement of legislation and regulations (Nzegwu et al., 2008).

Regulations by traffic signaling systems, speed limits and speed controls as well as the existence of police patrols and checkpoints can lead to the reduction of accidents by influencing the road user's behaviour (Peltzer, 2011). Aetukumana et al., (2010) contends that traffic regulation schemes are not systematically implemented and the police are generally less well trained, equipped and motivated to enforce traffic rules and regulations, as are evident in many developing countries.

Mkutu (2019) established weak law enforcement for the boda boda sub-sector as a contributing factor to accidents and impunity in Kenya. The boda boda industry operates on lawlessness, not because of inadequate legal regime but more because of weaker enforcement of laws. The subsector has therefore established systems that reinforce a culture of impunity. The boda boda sub-sector in Kenya has largely operated without effective regulation and control (Odero, 2009).

The seemingly ineffective governance of the sector has occasioned increasing cases of boda boda related accidents, crimes and impunity. The informal, unregulated nature of boda bodas connotes greater risks to public safety. Strict enforcement of the National Transport and Safety Authority (NTSA) Regulations (Operation of Motorcycles) 2014, the Traffic Act CAP 403, 2009 and other regulations will help address the safety issues in a subsector that that has gained notoriety for lawlessness in Kenya.

The National Police Service and other law enforcement agencies haphazardly enforce laws and regulations meant to ensure public safety on the roads like wearing of helmets, reflector jackets; carrying only one passenger to ensure strict observance of traffic rules by boda boda riders. Security and law enforcement agencies must also uphold integrity and shift focus from the lackluster handling of boda boda sub-sector that has partly been blamed for lawlessness and impunity in the sub sector in Kenya.

#### **2.4.8 Institutional set-up, funding and capacity for road safety actions**

Management of Road Traffic Crashes necessarily involves the coordination of several sectors including infrastructure providers and managers, education, health, legislation, enforcement, rider training and licensing, finance, the mass media, rider providers and insurance among others (Otte,

2019). Recent studies have shown that coordinating the sectors to act towards a common vision and a well-defined system that ensures that outputs and targets are achieved is a prerequisite for developing a safe traffic system (Woo, 2006).

According to WHO (2015), institutional set-up entail the need for restructuring/strengthening coordination of the sectors involved in road safety management and providing sufficient and sustainable financing and capacity to carry out roads safety work. This was also the view of some researchers for example Odera et al (2003) who concluded that impediments to successful road safety work included ineffective coordination, inadequate resources and qualified personnel.

Poor implementation of motorcycle operating policy in Nigeria over years has remained to be among the causes of motorcycle accidents (Oyesiku, O. K. 2001). The constraints in the implementation of this directive are both attributed to cultural and religious. Particularly for Nigeria and many countries in West Africa, the greater significance of direct government intervention in the policy initiatives on motorcycle operation relates to the poor management of public transportation systems in both the metropolitan and intermediate cities with rapidly growing population. The weakness in the existing structure regarding the difficulty of poor co-ordination between transport and land use and between physical planning and infrastructure development. There are no structural plans or even master plans for physical development of most cities in the country. Thus, there is hardly any specific land allocation made that could be critical to the sound development of the nations' transport network (Oyesiku, O. K. 2001).

Ineffectiveness in traffic law enforcement by the police is perceived as a major motivation for aspects of careless driving in Ghana roads. The police rather seemed to be interested in extorting money from motorists who commit traffic offences and letting them go unpunished (Aetukumana et al., 2010).

In South Africa institutional factors play a larger role than road environment factors. It is established that one out of every ten motor vehicles on South African roads are considered to be un-roadworthy so is the case with motorcycles which is the likely cause of this phenomenon (Van Schoor et al. 2001). South Africa displays trends similar to those of other developing countries with rise in road accidents.

The Kenya National Highways Authority (KeNHA) is the main institution responsible for the national road infrastructure network in Kenya. Other institutions include, Kenya Urban Roads Authority (KURA), The National Transport and Safety Authority (NTSA), Traffic Police Department and Local Authorities. These institutions are fragmented across government ministries and departments. Similarly, policy, legal and institutional framework for road safety in Kenya has been very weak (Odero, 2009). Besides the legal provisions scattered in various Acts of Parliament, there has been neither a coherent policy nor a coordinated safety institutional framework. Even the existing safety legislation often faces implementation hurdles (Asingo, 2004).

## **2.5 Implications of Commercial Motorcycle Accidents**

The economic burden of road traffic injury cannot be ignored. Road traffic injuries place a heavy burden on national economies as well as on households (Nantulya & Muli-Musiime, 2011). In low and middle-income countries they particularly affect the economically active age group or those set to contribute to family, society and the workforce in general (Hyder, 2013).

The motorcycle accidents affects families in a number of ways. For instant, many families are driven deeper into poverty by the loss of a breadwinner, the expenses of prolonged medical care or by the added burden of caring for a family member who is disabled from a road traffic injury (Asongwa, 2012).

At the macro level, the outcomes of motorcycle related injuries have an impact on a country, not only on its working population but also on families where most of the riders are breadwinners. Majority of road crash adult survivors experience considerable psychological distress and disruption of lives (Peltzer, 2011). Some suffer from post-traumatic stress disorder, driving phobias and related anxiety or affective disorders. A link has been documented between surviving a serious road traffic accident and poor mental health outcomes, especially post-traumatic stress disorder and major depressive disorder (Znajmiecka-Sikora & Sałagacka, 2018).

The most productive age group, those aged between 15 and 44 years, is heavily represented in road traffic injuries; the economic impacts of injuries in this age group are therefore especially damaging (Mwiti, Abande, & Stephen, 2019). The incidence of road traffic crashes in Kenya illustrates this point with more than 75% of road traffic casualties are among economically

productive young adults. Medical costs and lost productivity do not capture the psychosocial losses associated with road traffic crashes either to those injured or to their families. Aetukumana et al (2010) argues that these costs might possibly exceed the productivity losses and medical costs associated with premature death were they accurately quantifiable.

A study conducted in Sweden established that, there was a high rate of psychosocial complications following road traffic crashes, even for minor injuries. Almost half the respondents in the study group still reported travel anxiety two years after the crash. Pain, fear and fatigue were also commonly found.

Road traffic crashes can place a heavy burden on the family and friends of the injured person, many of whom also experience adverse social, physical and psychological effects, in the short-term or long-term (Ozdol, 2019). In the European Union, more than 40, 000 people are killed and more than 150,000 disabled for life by road traffic crashes each year. As a result, nearly 200 000 families annually are newly bereaved or have family members disabled for life (Moskal, Martin, & Laumon, 2012).

In many low-income and middle-income countries and sometimes in high-income countries as well, the cost of prolonged care, the loss of the primary breadwinner, funeral costs, and the loss of income due to a disability, can push a family into poverty (WHO, 2014). The process of impoverishment especially affect children.

WHO (2015) established that, the annual losses in developing countries exceed the total annual development aid and loans received by these countries. It has been established that the cost to the economy due to RTAs is approximately 1% to 2% of a country's gross national product (GNP). In Kenya, the cost to the economy from RTAs is in excess of US\$ 50 million exclusives of the actual loss of life.

A case study conducted in Bangladesh found that poor families were more likely than those better off to lose their head of household and thus suffer immediate lose as a result of road traffic injuries (Mabunda, Swart & Seedat, 2010). The loss of earnings, together with medical bills, funeral costs and legal bills, can have a ruinous effect on a family's finances. Among the poor, 32% of the road

deaths surveyed occurred to a head of household or that heads spouse, compared with 21% among those not defined as poor.

(Mabunda, Swart & Seedat, 2010) established that over 70% of households reported that their household income, food consumption and food production had decreased after a road death. Three-quarters of all poor households affected by a road death reported a decrease in their living standard, compared with 58% of other households. In addition, 61% of poor families had to borrow money as a result of death, compared with 34% of other families (Brandt et al., 2002). In cases where there is prolonged treatment or the death of the victim, the family may end up selling most of its assets, including land, and possibly becoming trapped in long-term indebtedness, therefore, indulge in crime to meet their daily family needs.

According to WHO (2013), victims of motorcycle accidents experience psychological suffering and the added costs of caring for an impaired family member which sometimes involve one family member's full attention. The proportion of seriously injured who suffer from a permanent disability is as high as 78 per cent as reported for Kenya by Manyara, (2016) which is comparable to the experience in Tanzania. Thus the impact of road traffic crashes on the community is much more than what is indicated by the economic loss.

Okebiro (2016) argues that, at the household level when the single bread earner dies in a crash or suffers permanent disability the impact can plunge the family into poverty as very few road users has sufficient insurance, if any, to allow them to recover financially. There are psychological suffering and the added costs of caring for an impaired family member which sometimes involve one family member's full attention. It is in this context that this study endeavours to examine the incidences and implications of road traffic accidents among motorcyclists in Embakasi area.

## **2.6 Theoretical Framework**

This study was anchored on Rational Choice and System Approach theories to provide a theoretical context to the study. The theories provided insights into the factors influencing accidents rates among commercial motorcyclists in Embakasi Area.

### **2.6.1 Rational choice theory**

The theory expounded by Ronald Clarke and Derek Cornish (1986), examines crime from the viewpoint of the offender. It asserts that most criminals are normal, reasonable people who weigh the relative risks and rewards associated with a crime before deciding to commit it (Clarke & Cornish, 1994). The commission of crime therefore indicates that the benefit perceived by the offender as associated with the offence outweighs the perceived risk of being caught and the resultant punishment.

The theory examines accident from the viewpoint of the motorcycle rider. It asserts that most traffic law violators are normal, reasonable people who weigh the relative risks and rewards associated with law violation before deciding to commit it (Friendman and Hechter, 1988). The occurrence of the accident, therefore, indicates that the benefit perceived by the violator as associated with the violation outweighs the perceived risk of being caught and the resultant punishment. Possible reasons for the violation of traffic laws are described by Aberg (1997) in terms of costs and benefits, such as being in a hurry, seeking excitement, trying to prove one's skill, or being in a bad mood.

The main rational theory applied to the area of traffic law violations is Ajzen's (1985) theory of planned behaviour, which is derived from Fishbein and Ajzen's (1975) theory of reasoned action. The theory of planned behaviour, suggests that the decision to engage in a particular behaviour is the result of a rational process, that is goal-oriented and that follows a logical sequence. Behavioural options are considered, the consequences of each option are evaluated, and a decision is reached.

Many studies on the planned behavior theory were conducted by the Manchester Driver Behavior Group Research project which predicted the intention to violate traffic laws based on the original model as well as added components such as personal norms (Parker, Manstead, and Stradling, 2007) and situational factors, e.g., such as time of day and the presence of a passenger in the car.

The health beliefs model which is also based on the assumption that people behave in a rational manner was applied to road safety to predict helmet use among cyclists (Quine, Rutter & Arnold, 1998) and safe-riding behaviour among motorcyclists. Nevertheless, rational instrumental explanations seem to be insufficient in explaining driver behaviour relating to traffic laws: ample

evidence supports the effect of emotions on the violation of traffic laws. For example, Lawton, Parker, Manstead and Straddling (2007) found various positive emotions relating to speeding such as feeling exhilarated and powerful and concluded that the assessment of attitudes must include measures of effect and not purely cognitive measures.

More broadly, various personality traits unrelated to cognitive processes but related to emotional motivations were found to affect the violation of laws generally. A well-known example is the effect of sensation-seeking defined by Zuckerman (1979) as "the need for varied, novel, and complex sensations and experiences, and the willingness to take physical and social risks for the sake of such experiences".

Numerous studies have found a relationship between sensation seeking and risky driving (Zuckerman & Neeb, 1980). Yagil et al., (2001) indicated that the intention of drivers to commit traffic violations is predicted by attitudes toward this behaviour, and by sensation seeking, external locus of control, aggression and anxiety.

The theory is therefore critical in explaining the reasons why motorcycle riders engage in risky behaviour. However, it does not adequately explain why motorcycle accidents are on the increase. The study, therefore, introduces the Systems Approach Theory, which provides a comprehensive understanding of the behaviour of both motorcycle riders and why accidents occur at particular locations and time.

### **2.6.2 System Approach Theory**

The System Approach Theory was advanced by Talcott Parsons in 1973. The theory posits that Road traffic crash results from a combination of factors related to the components of the system comprising roads, the environment, vehicles and road users, and the way they interact (Carolan, 2006). Some factors contribute to the occurrence of a collision and are therefore part of crash causation. Other factors aggravate the effects of the collision and thus contribute to trauma severity (Hadden, 1997). Some factors may not appear to be directly related to road traffic injuries. Some causes are immediate, but they may be underpinned by medium-term and long-term structural causes.



According to Naghavi and Forouzanfar (2013) integrated into the systems approach theory is a system of highway codes and enforcement mechanisms designed to ensure that road users adhere to the controls and regulations of traffic flow for maintaining road traffic safety. The environment component comprises of the natural and the built environments and transport networks. Environmental conditions are important in the analysis of traffic accidents. The literature indicates that traffic accidents are common during rush hours when the volume of traffic is high, and at locations frequently travelled coupled with the condition of the roads.

Rather than looking at the environment as being full of hazards and people prone to errors, systems theory assumes that there is a steady state between individuals and the environment. For example, the theory explains how the combination of speeding and alcohol use is significantly related to the occurrence of motorcycle accidents and how such factors responsible for the accidents can be changed to serve better the community.

The means of transport component comprises of the volume and quality of vehicles on the modes of transport. The behaviour of man component comprises of the demographic characteristic of road users (age, sex, education, socio-economic status, stages in the life cycle), people's perceptions of risk and people's general behaviour on the streets. Superimposed on this theory is a system of traffic laws, regulations and mode of enforcement designed to ensure that the population adheres to the controls and regulations so as to maintain some level of road safety.

The strengths of this theory are in its holistic approach to the road traffic problem. It is both a method and an intervention blueprint to accident management. It is also comprehensive because its tenets cover all categories of road users such as drivers, pedestrians, cyclists, and passengers (Fletcher, 2014). The essence of using a systems approach is to consider not only the underlying factors but also the role of different agencies and actors in prevention efforts. Road traffic injuries are a multi-dimensional problem that requires a comprehensive view when examining the determinants, consequences and solutions.

In this regard, the study presupposes that the survival of the system, in this case, the road transport system is dependent on the working together of the different institutions to meet the road and transport systems need for safety. Each institution is seen as performing a function that meets that need for safety.

As indicated above, in Kenya there are many institutions (For instance, NTSA, Traffic Police Department, Kenya National Highways Authority (KeNHA), Kenya Rural Roads Authority (KURA), County government, and the National Transport & safety Authority) involved in road traffic safety. These institutions may contribute to or hinder accident causation behaviour among riders depending on how they play their roles within the system.

## 2.7 Conceptual Framework

The conceptual framework below illustrates the relationship between independent variables, intervening variables as well as the dependent variable.

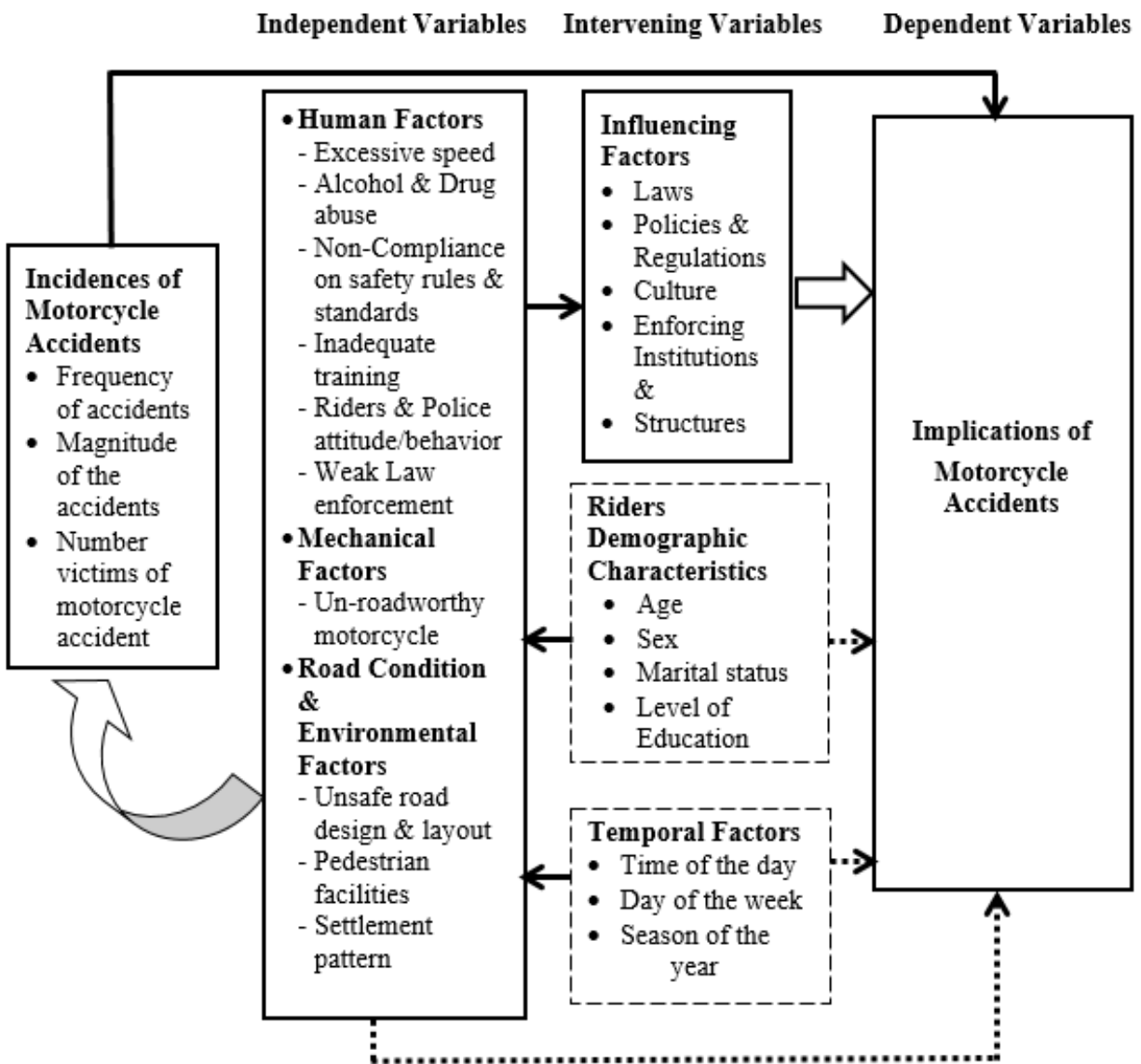


Figure 2.1: Conceptual Framework

The Conceptual framework shows the interconnections between the study variables that are important in understanding the dynamics of motorcycle accidents in this study. The dependent variable is implications of motorcycle accidents which is affected by the independent variables; accident causation factors such as human factors, mechanical factors, and environmental factors.

The researcher tested the relationship between the independent and dependent variables against the intervening or moderating variables which relate the incidences and implication of motorcycle accidents. The first Table in Figure 2.1 shows the risk factors that give rise to motorcycle incidences such as human carelessness, high speed (driver's errors), traffic officers and riders' irresponsibility and corruption, poor compliance to safety rules and riding without training. Temporal factors such as season of the year, day of the week, and time of the day also influence the occurrence of motorcycle accidents.

Further, the riders' demographic characteristics such as age, sex, marital status and level of education significantly influence the choice of riders to engage in risky behaviours. However, these independent variables may be prevented from happening by the intervening/moderating variables as depicted in the second domain in Figure 2.1 which include the level of laws, enforcement of legislation, safety culture, enforcing institutions and structures. Finally, the third domain in Figure 2.1 depicts the dependent variables, which is the implication of motorcycle accidents.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1 Introduction**

This chapter describes the study area, research design and the procedure that was used in carrying out the study. The procedures consist of the research design, target population, and the unit of analysis. It also describes the sampling design and techniques of data collection, data analysis procedures and ethical considerations.

#### **3.2 Research Design**

This study employed the descriptive research study design. The design was considered efficient as it helped obtain crucial information on the various aspects under this study. A descriptive study is concerned with establishing the what, where and how of a phenomenon. The design aims to gather data without any manipulation of the research context and deals with naturally occurring phenomena, where the researcher has no control over the variables (Hessler, 2014).

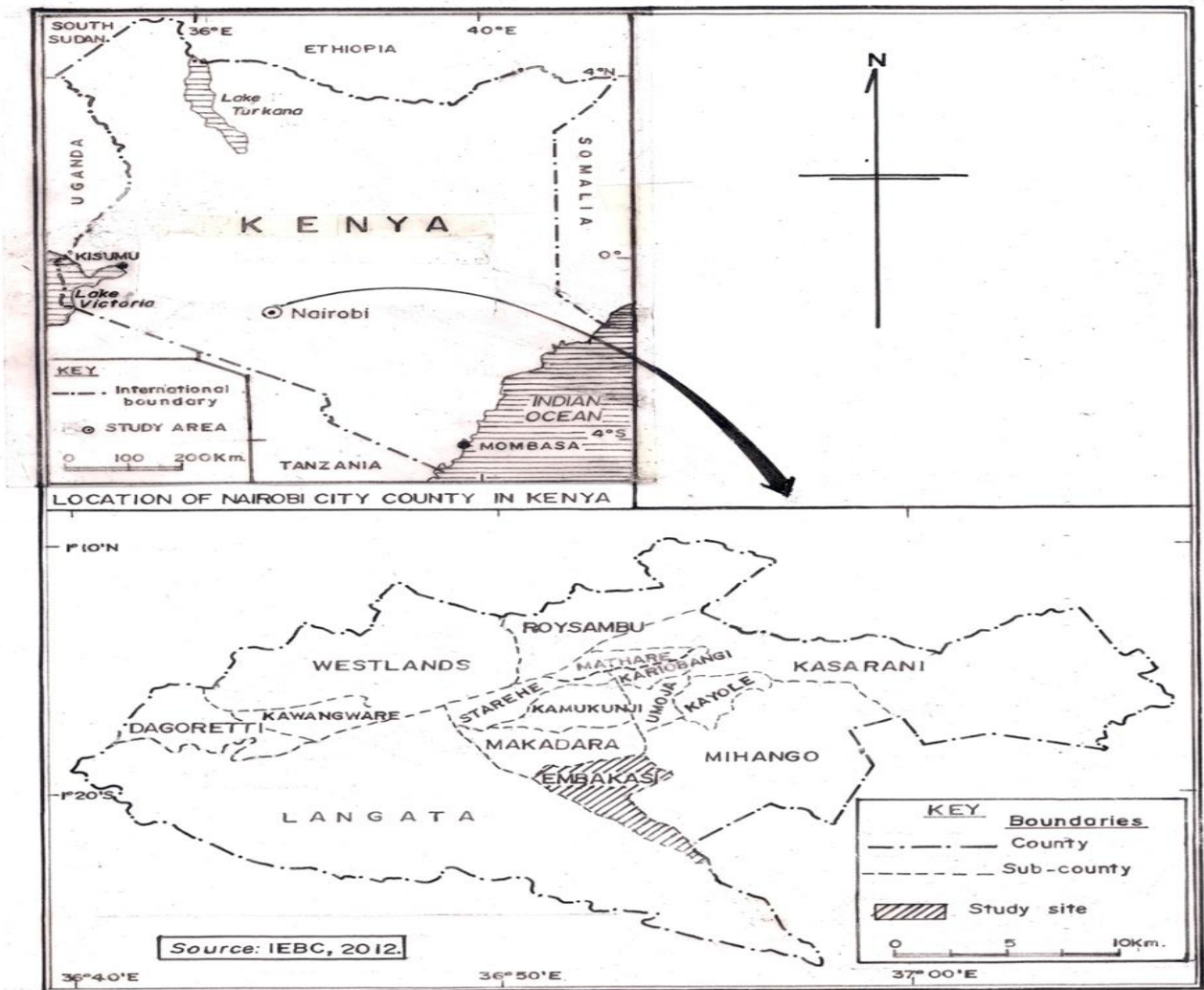
Kombo and Tromp (2010) posits that, descriptive design discovers and measures the cause and effect of relationships between variables. This study used a descriptive design because it enabled the researcher to collect crucial information on various aspects of motorcycle accidents and their implications in Embakasi area. This study utilized both probability and non-probability sampling techniques. The boda boda respondents were selected using simple random sampling while key informants used purposive sampling. Purposive sampling technique is preferred when a researcher requires a maximum degree of insight into the problem with comprehensive information from particular areas and people deemed to be rich with the required information.

#### **3.3 Study Area**

This study was carried out in Embakasi area, which comprises of 5 constituencies. It covers an area of 208 square kilometers that is the official extension of the city. The population density was estimated at 2088 persons per square kilometer (KNBS, 2014). This low-income area accounts for half of Nairobi's population, young adults from 15-44 years representing a critical 43 percent subset of the entire population of the city residents (KNBS, 2014). This area was selected because there has been increasing cases of motorcycle accidents which have resulted in high morbidity and mortality rates in the area. For example, the Traffic Department statistics show that the Embakasi area is leading in motorcycle accidents compared to other constituencies within Nairobi County.

For instance, in 2017, Embakasi area Traffic Section recorded 12 fatalities, 37 seriously injured and 13 slightly injured. These cases were 53% of the motorcycle accidents recorded in the county. The constituency has Level 5 Hospital (Mama Lucy Hospital), which receives an average of 7 motorcycle accidents victims a day. Map 3.1 shows the divisions within the Embakasi area where the study was undertaken.

**Map 3.1: Map of the Study Area-Nairobi County**



**Source:** Chief Technologist, Egerton University, 2018

### 3.4 Unit of Analysis

According to Barsky (2005), a unit of analysis is an object of study or item under study that is to be described or analyzed. Kothari (2011) further explains that a unit of analysis is “who” or the

“what” can be studied. The unit of analysis in this study was the incidences and implications of road traffic accidents among commercial motorcyclists in Embakasi Area of Nairobi County.

### 3.5 Population and Sampling Procedure

According to the Nairobi County Government-City Inspectorate Department, there are 450 registered boda-boda operators in the Embakasi area. This formed the study target population as show in Table 3.1 below.

**Table 3.1: Target Population**

<b>Strata</b>	<b>Locality</b>	<b>Target Population</b>	<b>Percentage (%)</b>
Embakasi area in Nairobi County	Savanna	28	6.22
	Embakasi area	37	8.22
	Utawala	33	7.33
	Mihang’o	29	6.44
	Umoja	35	7.78
	Mowlem	18	4.0
	Kariobangi	40	8.89
	Dandora	27	6.0
	Imara-Daima	26	5.78
	Kwa-Njenga	21	4.67
	Kwa-Reubin	24	5.33
	Pipeline	43	9.56
	Kware	22	4.89
	Kayole	30	6.67
	Njiiru	20	4.44
Chokaa	17	3.78	
<b>Total</b>		<b>450</b>	<b>100.0</b>

**Source:** Field data, 2018

The study used non probability purposive sampling method to select the 25 Key informants (who included 4 National Police Service Senior Police Officers, 2 Traffic Base Commanders, Kayole and Embakasi Divisions), Mama Lucy Hospital Medical Superintendent, Embakasi Boda-Boda Association Chairman, Director of Road safety, NTSA and 16 Driving Schools Officials) since

they were knowledgeable in the subject of the study. Therefore, it was presupposed that they provide detailed and authentic information on the dynamics of the motorcycle accidents in Embakasi Area.

The researcher used Stratified random sampling to identify potential respondents in the study. Stratified sampling was used to get the sample from the population of boda boda operators. This method involved categorizing the members of the population into mutually exclusive and collectively exhaustive groups. The population (450) was divided into 16 strata (sub-groups) based on mutually exclusive criteria. An independent simple random sample was then drawn from each stratum. Stratified sampling technique was quite appealing for this study because it provided more precise estimates of the population being studied as it is more heterogeneous than the categorized groups (Aguinis, 2007). Kothari (2011) indicate that, a third (1/3) of the population is sufficient for a sample in each subgroup when conducting stratified sampling. A third of boda boda was therefore randomly selected from each stratum to form a sample size of 135 respondents as shown in Table 3.2 below.

**Table 3.2: Sampling Frame**

<b>Strata</b>	<b>Locality</b>	<b>Target Population</b>	<b>Ratio</b>	<b>Sample size</b>
<b>Embakasi area</b>	Savanna	28	0.3	8
<b>in Nairobi</b>	Embakasi area	37	0.3	11
<b>County</b>	Utawala	33	0.3	10
	Mihang'o	29	0.3	9
	Umoja	35	0.3	11
	Mowlem	18	0.3	5
	Kariobangi	40	0.3	12
	Dandora	27	0.3	8
	Imara-Daima	26	0.3	8
	Kwa-Njenga	21	0.3	6
	Kwa-Reubin	24	0.3	7
	Pipeline	43	0.3	13
	Kware	22	0.3	7
	Kayole	31	0.3	9
	Njiiru	20	0.3	6
	Chokaa	17	0.3	5
<b>Total</b>		<b>450</b>	<b>0.3</b>	<b>135</b>

**Source:** Field data, 2018

### **3.6 Methods of Data Collection**

This study used a mixed-method approach to collect data, which included interviews and focus group discussions (FGDs). The FGD's were held with driving school officials. The use of Interview method in this study was crucial in providing in-depth and a holistic understanding of the issues under study.

Similarly, FGDs were crucial in providing more information and clarifications on issues that arose from the interviews thus helped the researcher obtain different views on motorcycle accidents and gain insights into the shared understandings of the issues among respondents. This study used key informant interviews to collect information from the sampled respondents believed to hold pertinent information on motorcycle accidents.

Secondary data was collected from Police records such as Occurrence Book (OB) and incident reports which contained reported information about the time, location, situational context, economic loss, bodily harm and personal details of the victim such as residence, name and sex. This technique is used mainly as researchers required a maximum degree of insight into the problem with comprehensive information from people deemed to be rich with the required information (Kombo and Tromp, 2010).

### **3.7 Data Analysis**

This study utilized both qualitative and quantitative data analysis methods. The filled interview guides were first coded and the Statistical Package for Social Sciences (SPSS) was used to analyze the data. Quantitative data were analyzed using descriptive statistics and the information presented in distribution frequency and percentage tables in order to give a clear picture of the findings. The qualitative data was analyzed by interpretation of responses provided by the key informants. All information from the analyzed data was presented in themes guided by the research objectives.

### **3.8 Ethical Considerations**

The research ethical clearance was sought from the National Commission for Science, Technology and Innovation (NACOSTI) and notified the following by way of a copy of the research authorization letter: the Embakasi Area Sub-County Commanders, and Medical Superintendent (Mama Lucy Hospital) before embarking on fieldwork. Approval was also obtained from the Embakasi Traffic Police Base Commander and the Embakasi boda-boda association. All



information obtained was confidential and used for the sole purpose of this study. The study protocol was explained to each of the respondents and a written consent was obtained from each prior to interview. No identifying data was collected from the participants.

### **3.9 Challenges encountered during the study**

The main challenge faced during the study was completing interviews with the respondents (riders) who were constantly required to ferry passengers. Similarly, accessing accident records at the Traffic Police Office was also a challenge. To address this problem interviews were mainly conducted during off-peak hours when riders were less busy. On the issue of records, the researcher worked closely with the Traffic Base Commander of the study area and obtained information from the police records. Finally, accessing the Traffic Police Officers was a challenge since most of them were on duty outside the station. Some had taken annual leave by the time the research was being undertaken.

## **CHAPTER FOUR**

### **RESULTS AND DISCUSSIONS**

#### **4.1 Introduction**

This chapter presents the results of data analysis and interpretations of the findings of the study. Data was collected from boda boda operators, traffic police officers and key informants comprising of medical superintendent, representatives of driving schools, and the National Transport and Safety Authority Director of Road Safety. This chapter is organized into sections according to the objectives of the study.

#### **4.2 Response Rate**

The researcher had anticipated a high response rate; however, only 132 of the respondents participated in this study thus achieving a response rate of 97.8%. According to Kothari (2011), a response rate of 70 percent and above is good and sufficient for analysis.

#### **4.3 Socio-demographic Characteristics of Respondents**

This section provides demographic information of the respondents in terms of their age distribution, gender, marital status, highest level of education, number of dependents, monthly income and expenditure.

##### **4.3.1. Gender, Marital Status and Age of Respondents**

Table 4.1 below summarizes the gender, marital status and age distribution of the respondents. In this study, it was assumed that age was a crucial feature of the respondents that would influence the experience and involvement of respondents in accidents.

The study established that, out of the 132 respondents interviewed, 97% of were males while females constituted 3 percent. This shows that boda boda sub-sector is dominated by male operators. The strenuous and demanding nature of the occupation perhaps justifies this premise. The female respondents in the study indicated that, female riders may shy away from such occupation because it exposes them to risks more than men especially at night. Moreover, family obligations and responsibilities may not allow women to engage in commercial motorcycle business.

Respondents were asked to provide data on their marital status. Findings of this study indicates that, the majority (57.6%) of the respondents were married implying that married respondents were family members with familial responsibilities such as providing basic needs especially the young dependents. Incidents of motorcycle accidents contribute to stress and misery in the affected families. A small portion (26.5%) of the respondents was single while the separated, widowed, and divorced were at 6.1%, 5.3%, and 3.8% respectively.

Nonetheless, less than 1% of the respondents declined to give their marital status. From the study findings, the married boda boda operators close business early because of family responsibilities and obligations. Therefore, this cohort of respondents relied on boda boda business as a source of livelihood.

The study established that, most (25%) of the respondents were aged between 32-38 years, those between ages 25-31 years were 20.5%, whereas the ages between 18-24 accounted for 22.7%, while those aged between ages 39-52 years were 28.1%. Only 2 % of the respondents were less than 18 years of age. These findings therefore points to a productive and reproductive segment of the population in Embakasi Area. The engagement of minors as boda boda operators has serious implications for the development trajectory and their safety.

From the above findings, it is apparent that majority of respondents were aged between 18-38 years accounting for 67.7% of the respondents. This is a true representation, since most boda boda riders are in their youthful ages. As a result of lack of employment opportunities, boda boda business has become a major source of employment and livelihood among the youth in Embakasi Area. The findings are as shown in Table 4.1 below

**Table 4.1: Distribution of respondents by gender, marital status and age**

<b>Variable</b>	<b>Category</b>	<b>Frequency</b>	<b>Percent</b>
Gender	Male	128	97.0
	Female	4	3.0
	<b>Total</b>	<b>132</b>	<b>100.0</b>
Marital status	Married	76	57.6
	Divorced	5	3.8
	Widowed	7	5.3
	Single	35	26.5
	Separated	8	6.1
	No response	1	0.8
	<b>Total</b>	<b>132</b>	<b>100.0</b>
Age	<18 years	2	1.5
	18-24 years	30	22.7
	25-31 years	27	20.5
	32-38 years	33	25.0
	39-45 years	19	14.4
	46-52 years	16	12.1
	53-59 years	3	2.3
	>60 years	2	1.5
<b>Total</b>	<b>132</b>	<b>100.0</b>	

**Source:** Field Data, 2018

#### **4.3.2 Respondents' level of education**

Higher levels of education have been considered as a factor in promoting personal healthy behaviors. Generally, healthy behaviors have been associated with compliance with existing laws such as wearing motorcycle helmets, wearing seat belts, obeying traffic rules. Regarding the highest level of education attained, the findings of the study showed that majority of the respondents (44.7%) had attained post-secondary certificate, 12.1% had attained primary while 21.2% had attained form 1-4 Secondary education.

A small proportion comprising of 15.2 percent and 3.8 percent had middle level college (diploma qualifications in diverse areas of learning) and university education respectively. This indicates that boda boda business attracted largely people with relatively low level of education, while those with higher education presumably preferred career competitive jobs. Surprisingly, there was no respondent without formal education as shown in Table 4.2 below.

**Table 4.2: Distribution of respondents by level of education**

Variable	Frequency	Percent
None	0	0
Primary (1-8)	16	12.1
Primary incomplete	2	1.5
Secondary (1-4)	28	21.2
Secondary incomplete	1	0.8
Post-secondary Certificate	59	44.7
College	20	15.2
University	5	3.8
No response	1	0.8
<b>Total</b>	<b>132</b>	<b>100.0</b>

**Source:** Field Data, 2018

#### 4.3.3 Number of dependents of boda boda operators

The average number of dependents per respondent was three with a minimum of zero dependents for those who were single and living alone to a maximum of four as shown in Table 4.3 and 4.4 respectively.

**Table 4.3: Number of dependents of boda boda operators**

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Number of dependents	93	0	4	2.23	1.344

**Source:** Field Data, 2018

Dependents of respondents were categorized in to 0, 1 – 2, and 3 – 4. The findings indicate that 38.2% of the respondents had 0 dependents, 22.2% reported to have at most 2 dependents while 39.6% of the respondents had between 3 and 4 dependents. The study established that 38.2 percent of the total respondents had none dependents. This category dominated the boda- boda business whom the researcher had identified to be engaged in boda boda business.

The category with at most 2 dependants had 22.2 percent while those with 3-4 dependents were 39.6 percent. The two category with the highest number of dependants (39.6%) were pushed into

the business so as to sustain the high number of dependents. Hence, the higher the number dependents the more active the respondents were as long as boda boda business was concerned. The findings are as shown in Table 4.4 below.

**Table 4.4 Number of dependents of boda boda operators**

Category ( Dependents)	Frequency (N)	Percentage
0	62	38.2
1-2	36	22.2
3-4	64	39.6
<b>Total</b>	<b>162</b>	<b>100</b>

**Source:** Field Data, 2018

#### 4.3.4 Income and expenditure of boda boda operators

Income is usually postulated to be negatively correlated with traffic fatalities because wealthy people are generally regarded as more aware and place a higher value on safety and possess the means to enhance it. Nevertheless, in the case of motorcycle riders, in other studies income per capita and expenditure has been found to be positively correlated with higher motorcycle fatalities. This study established that majority (71%) of the respondents undertook boda boda taxi business as full time employment whereas 29% operated it as a part time mode of employment. The household approximate incomes from boda boda business per month are as shown in table 4.5 below.

**Table 4.5: Household approximate income from boda boda business per month**

Category (Kshs)	N	Percent
< 5,000	47	34.8%
5,001 - 7,500	34	25.2%
7,501 - 10,000	18	13.3%
10,001 - 15,000	21	15.6%
>15,000	15	11.1%
<b>Total</b>	<b>135</b>	<b>100.0%</b>

**Source:** Field Data, 2018

As regards to how boda boda operators spent their incomes, the study established that, incomes generated from various sources were used to meet various needs for the households. Respondents

reported more than two expenditure of their household incomes. In terms of the specific uses of the expenditure, basic needs (food, shelter and clothing) constituted more than half of the respondents' expenses at 88.0% followed by household needs/family upkeep constituting at 57.6%; this shows that income was primarily used at household level, an indicator that motorcycle riding was the main economic provider. Incomes channeled to education amounted to 16.8% of the respondents' household expenses while farming and business constituted less than two per cent (1.6% and 0.8% respectively). The results were as presented in in Table 4.6 below:

**Table 4.6: Expenditure of household income**

	Responses		Percent of Cases
	N	Percent	
Basic needs (food, shelter, clothing)	110	53.4%	88.0%
Household needs/ family upkeep	72	35.0%	57.6%
Education	21	10.2%	16.8%
Farming	2	1.0%	1.6%
Business	1	0.5%	0.8%
<b>Total</b>	<b>206</b>	<b>100.0%</b>	<b>164.8%</b>

**Source:** Field Data, 2018

#### **4.3.5 Ownership of Motorcycle by boda boda operators**

The study sought to find out how the motorcycle ownership may influence boda-boda motorcyclist accidents in Embakasi area. As regards to the ownership of motorcycles, the study established that majority of the riders were employed on a salary (47.7%), 33.1% had hired the motorcycle and 19.2% of the motorcycles were owned by the riders. The FDG found that, more boda-boda non-owners worked many hours as opposed to owners. For owners, 53.7% worked 16 – 18 hours while 74% non-owners work 16 – 18 hours. As indicated in this study (under rider characteristics) most of the respondents were unemployed or informally employed prior to becoming boda-boda operators. They, therefore, could not afford a motorcycle even after the zero-rating of all motorcycles below 250 cc. In addition, the majority could not qualify for bank loans. They, therefore, opted to be hired as riders.

The nature of ownership could have an implication on the behaviour and attitudes of a rider. The owner is more likely to be careful because it could be his only source of income and may avoid

bad riding practices, therefore, ensuring boda-boda motorcycle safety. The case could even be more serious for owners still servicing loans because they attach the motorcycle or any other asset as security in order to secure bank loan. That notwithstanding, the fact that one had to service the bank loan meant that they needed to make more money for loan repayment and upkeep. This could lead to one engaging in unsafe riding practices such as speeding and overloading in order to make more money.

The non-owners were more likely to be careless and fail to observe safety. This could be attributed to the mandatory fixed daily remittances where the hired riders, have to give between Ksh 300 and 500 to the boda-boda owner on a daily basis and also fuel the motorcycle at the end of each day. They were required to meet their daily targets failure to which they would be rendered jobless the following day. This may motivate them to disregard the rules and regulations and only focus on making money. Table 4.7 below presents data on motorcycle ownership among respondents in Embakasi area.

**Table 4.7: Ownership of motorcycle by boda boda operators**

<b>Category</b>	<b>Frequency</b>	<b>Percent</b>
Owned	25	19.2
Hired	44	33.1
Employed on salary	63	47.7
<b>Total</b>	<b>132</b>	<b>100.0</b>

**Source:** Field Data, 2018

#### **4.3.6 Motorcycles riding experience**

This study also sought to establish the length or duration of time the respondents had been riding motorcycle. A large proportion of the respondents had ridden motorcycles for more than a year least for 6.1% who had experience of less than a year. More than half the respondents had been motorcycle riders for between two and five years with 18.9% having been riders for two years; 17.4% for three years; 17.4% for four years and 22% of the respondents rode motorcycles for five years. Only 18.2% of respondents were riders for more than six years as shown in Table 4.8 below.



**Table 4.8: Motorcycles riding experience**

<b>Age distribution</b>	<b>Frequency</b>	<b>Percent</b>
<1 year	8	6.1
2 years	25	18.9
3 years	23	17.4
4 years	23	17.4
5 years	29	22.0
>6 years	24	18.2
<b>Total</b>	<b>132</b>	<b>100.0</b>

**Source:** Field Data, 2018

#### **4.3.7 Boda boda operator training levels**

The mode of training is a strong determinant of riders' knowledge on traffic rules as well as the skills and expertise required to ride. The study found that, levels of formal rider training were low. 34.8% of the riders reported having formal training while 65.2% did not undergo formal training. These results indicate that the majority of the boda-boda riders were not formally trained to ride. On answering the question of why the rider did not undertake formal training, a majority 94% reported lack of finances to pay for the training.

In this study, those riders that were not formally trained acquired their training from fellow riders (backstreet training) at a smaller fee (between 50 and 200 Kshs) compared to commercial schools that charge between 6,000 to 9,000 for two or three weeks respectively. It was further reported that, the fee for backstreet training is usually negotiable. This study findings are also supported by the study by Mbugua (2011) on motorcycle transport revolution on the economic growth in Thika, which found that majority (60%) of the boda boda riders were not formally trained on motorcycle riding whereas 40% of the respondents indicated that they had received formal motorcycle riding training. These results for the Thika study agree with the results of the current study.

This was also supported by one of the participants in FGD who stated,

*“.....We are required to pay up to Kshs 6,500 for training which was unaffordable to us. The training fee by commercial driving schools should be reduced to about Kshs 1,500 for most riders to access proper rider training. The high cost of training schools makes young*

*people prefer informal training where they pay as little as Kshs 50 to be trained for an hour”.* (Source: Interviewee, 2018).

This assertion was confirmed by boda-boda association officials who said the fee was negotiable and could be as low as Kshs 50 per session. Table 4.9 below presents data on influence of training on motorcycle operator’s involvement in accident.

**Table 4.9: Boda boda operator training levels**

		<b>Frequency</b>	<b>Percent</b>
Are you trained as a motorcycle rider?	Yes	46	34.8
	No	86	65.2
	<b>Total</b>	<b>132</b>	<b>100.0</b>
If yes, do you have a driving license?	Yes	36	78.3
	No	10	21.7
	<b>Total</b>	<b>46</b>	<b>100.0</b>

**Source:** Field Data, 2018

#### **4.4 Prevalence of road traffic accidents among commercial motorcyclists**

Looking at the prevalence of road traffic accidents among commercial motorcyclists was important in responding to the first objective in this study. Three out of ten respondents reported that they had been involved in an accident that resulted in an injury to themselves or their passenger in the last 12 months. This confirms the steady increase in motorcycle accidents in the recent past at 47% in 2017. This information was supported by data from NTSA that shows an increase in motorcycle accidents by 13% during the period between October 2017 and October 2018. Similarly, there has been a 5 fold increase in motorcycle related deaths reported by the Kenya traffic police between 2005 and 2016.

The study findings established that 40.7% of the respondents in the study were involved in only one accident and about 4% had been involved in two accidents. Fifty-five per cent were not involved in any kind of accident. It is reported that accidents involving motorcycles are on the increase. The problem has become so severe that some hospitals have special emergency wards reserved for this category of accident victims.

Moreover, 46.2% of the respondents said they did not know anyone who has been involved in a motorcycle accident that resulted in an injury in the last 12 months. The study findings show a

correlation between the findings by Kenya Police (2015) that reported a steady annual increase in motorcycle fatalities in the country. This is as shown in Table 4.10 below.

**Table 4.10: Prevalence of road traffic accidents among commercial motorcyclists**

	Response	Frequency	Percent
Have you ever been involved in an accident that resulted to an injury to yourself or your pillion passenger in the last 12 months (s)?	Yes	59	44.7
	No	73	55.3
	<b>Total</b>	<b>132</b>	<b>100.0</b>
Do you know anyone who has been involved in a motorcycle accident that resulted in an injury in the last 12 months?	Yes	70	53.0
	No	61	46.2
	No response	1	0.8
	<b>Total</b>	<b>132</b>	<b>100.0</b>

**Source:** Field Data, 2018

#### 4.4.1 Occurrence of motorcycle accidents

As regards to the occurrence of motorcycle accidents, the study established that slightly more than half of the motorcycle accidents occurred during the night at 51.4% in comparison with 48.6% that occurred during the day. Most of these accidents occurred in the town streets (68.4%) while 31.6% took place along the highway. Some of these accidents resulted in serious injuries either to the rider or the passenger (21.1%). In addition, 60.5% resulted in slight/ minor injuries whereas 18.4% bore no injuries at all.

This was also echoed by a senior police officer who stated that;

*“Many people frequent and stay late in entertainment places in this area during weekends (Friday and Saturdays) thus attracting boda boda operators to operate at dangerous hours and most accidents occur between 7 pm and 11pm.”*(Senior police officer interviewed).

While the reported accidents occurred mostly within town streets, 78.9% of them resulted in no loss while 15.8% of the accidents resulted in the loss of property. Only 5.3% of the accidents resulted in the loss of human life. These findings are represented in Table 4.11.

**Table 4.11: Occurrence of motorcycle accidents**

Category	Variable	Frequency	Percent
Time	Day	18	48.6
	Night	20	51.4
	<b>Total</b>	<b>37</b>	<b>100.0</b>
Place	Highway	12	31.6
	Town streets	26	68.4
	<b>Total</b>	<b>38</b>	<b>28.8</b>
Severity	Slight injuries	23	60.5
	Serious injuries	8	21.1
	None	7	18.4
	<b>Total</b>	<b>38</b>	<b>100.0</b>
Nature of loss	None	30	78.9
	Property	6	15.8
	Human	2	5.3
	<b>Total</b>	<b>38</b>	<b>100.0</b>

**Source:** Field Data, 2018

#### 4.4.2 Prevalence of motorcycle accidents

Asked about the frequency at which motorcycle accidents occur in their area, 52.3% of the respondents indicated that the accidents occurred regularly. In addition, 16.7% indicated that motorcycle accidents occurred all the time, while to 22.7% of the respondents indicated that accidents occurred once in a while. It was only for 8.3% of the respondents whose area of operation experienced no motorcycle accidents at all. Based on the results as presented in Table 4.12, there was a high prevalence of motorcycle accidents within the Embakasi area as reported by 49.2% of the respondents. Moreover, 26.5% had the opinion that there was a moderate prevalence in these type of accidents. Table 4.12 below presents responses on motorcycle accidents in Embakasi area.

**Table 4.12: Prevalence of motorcycle accidents**

	<b>Response</b>	<b>Frequency</b>	<b>Percent</b>
How often do such motorcycle accidents occur in your area?	Regularly	69	52.3
	Once in a while	30	22.7
	All the time	22	16.7
	Not at all	11	8.3
	<b>Total</b>	<b>132</b>	<b>100.0</b>
What is the prevalence of motorcycle accidents in your area?	High	65	49.2
	Moderate	35	26.5
	Low	21	15.9
	Very low	11	8.3
	<b>Total</b>	<b>132</b>	<b>100.0</b>

**Source:** Field Data, 2018

#### **4.5 Factors responsible for road traffic accidents among commercial motorcyclists**

The study sought to explore factors responsible for road traffic accidents among commercial motorcyclists in Embakasi Area. The respondents were required to give their perceptions on the frequency at which various factors such as riding when receiving phone calls, riding above 50Kph, riding when fatigued or when drunk, overtaking two or more vehicles at the same time, overtaking at a corner, speeding or bad weather among others.

From Table 4.13 below, among the factors that were qualified to be always responsible for motorcycle accidents were wearing a protective jacket at 51.5%, wearing of helmet as well as a bright /reflective clothing at 45.5%, use day time headlights at 34.8% and remembering to use indicators at 31.8%. However, most factors examined were found to be sometimes responsible for the accidents. These include; receiving/making phone calls while riding at 72.7%, carrying more than one passenger at 68.9%, Riding above 50 Kph at 65.9%, overtaking two or more vehicles at the same time at 64.4%, riding while fatigued at 62.1%, overtaking at a corner at 60.6%, speeding at 59.1%, overtaking from the left at 55.3%, and bribing traffic police officers at 53.8%, as well as environmental factors such as poor road conditions at 62.1%, and bad weather conditions as the cause of motorcycle accidents at 59.1%.

This was also echoed by Director Road Safety (NTSA) who stated;

*“Most (75%) of the fatal crashes are caused by human error, 4% by mechanical, 3% environmental and others (hit and run) 18%. Some of the human errors are losing control, improper overtaking, and speeding, misjudging clearance and failing to keep to proper lane among others.”* (Source: research respondent, 2018).

**Table 4.13: Factors responsible for accidents among motorcyclists**

		Not at all	Sometimes	Almost always	Always	Total
Poor visibility due to failure to wear bright /reflective clothing	n	1	30	41	60	132
	%	0.8	22.7	31.1	45.5	100
Use day time headlights	n	1	44	41	46	132
	%	0.8	33.3	31.1	34.8	100
Remember to use indicators	n	4	47	39	42	132
	%	3	35.6	29.5	31.8	100
Ride above 50 Kph/ over speeding	n	51	78	2	1	132
	%	38.6	59.1	1.5	0.8	100
Ride while feeling tired	n	24	82	18	8	132
	%	18.2	62.1	13.6	6.1	100
Ride while drunk	n	74	43	10	5	132
	%	56.1	32.6	7.6	3.8	100
Overtake two or more vehicles at the same time	n	43	85	3	1	132
	%	32.6	64.4	2.3	0.8	100
Overtake at a corner	n	49	80	3	0	132
	%	37.1	60.6	2.3	0.0	100
Overtake from the left	n	53	73	6	0	132
	%	40.2	55.3	4.5	0.0	100
Carry more than one passenger/ overloading	n	18	91	23	0	132
	%	13.6	68.9	17.4	0.0	100
Receive/make phone calls while riding	n	18	96	18	0	132
	%	13.6	72.7	13.6	0.0	100
Poor road conditions the cause of motorcycle accidents	n	14	82	30	6	132
	%	10.6	62.1	22.7	4.5	100
Bad weather conditions are the cause of motorcycle accidents	n	19	78	26	9	132
	%	14.4	59.1	19.7	6.8	100

**Source:** Field Data, 2018

#### 4.5.1 Motorcycle inspection by traffic police officers

Inspection of commercial motorcycles is one way of vetting roadworthy and un-roadworthy motorcycles. The study sought to establish whether traffic police officers in Embakasi area regularly stop motorcycle riders for inspection. The study established that while bribing police officers was cited as one cause of motorcycle accidents, actual police inspection of commercial motorcycle riders was low with 6.1% of riders indicating that they were stopped by police officers very often. Another 25% of the respondents reported that they were often stopped by police for inspection especially early in the morning or late in the evening. These stoppages were mostly to give the police their ‘dues’ for the day. Almost half of the respondents (47%) reported that police either rarely stopped them for inspection whereas 21.2% were not stopped not at all for inspection. For the few that were stopped by police, the main reason was not for inspection but to solicit for bribes from motorcyclists. The results are as shown in Table 4.14 below.

**Table 4.14: Frequency of motorcycle stoppage by police for inspections**

	Frequency	Percent
Very often	8	6.1
Often	33	25.0
Rarely	62	47.0
Not at all	28	21.2
No response	1	0.8
<b>Total</b>	<b>132</b>	<b>100.0</b>

**Source:** Field Data, 2018

Kenya traffic record accessed during this study indicated that Kenya has lately been recording high motorcycle accident rates. This is attributed to an increasing number of motorcycles ownership and use that was prompted by the zero ratings of motorcycles by the Ministry of Finance in 2008. Apparently, motorcycle rider fatalities in Kenya have been increasing from as low as 44 in 2005 to a recent 501 deaths in 2016. The table below depicts the trends in motorcycle fatalities from 2005 to 2016.

**Table 4.45: Trends in Motorcycle Fatalities in Kenya, 2005 - 2016**

Year	Road Fatalities(Death)	Motorcyclists Fatalities(Death)	% contributed
2005	2533	44	1.74
2006	2715	34	1.25
2007	2921	35	1.20
2008	3149	111	3.52
2009	4032	263	6.52
2010	3045	200	6.57
2011	3302	315	9.54
2012	3141	306	9.74
2013	3218	328	10.19
2014	2907	391	13.45
2015	3057	434	14.20
2016	2965	501	16.90

**Source:** Kenya Police Service Traffic Department, 2017

#### **4.5.2 Incidences of police stoppage**

Table 4.16 below illustrates the reasons why motorcycle riders were stopped by traffic police officers in Embakasi area. The study findings reveal that, the main reason why police stopped motorcyclists was to solicit for bribes as was reported by 47.9% of the respondents. Police did not bother so much with the state of motorcycles or that of the rider. In addition, 16.4% of the respondents indicated that police stopped motorcycles when the riders did not have cycling gears or to check for licenses. Further, 11% of the respondents indicated that police stopped them in the event that the rider was reckless or to check the safety of the passenger.



**Table 4.16: Reasons for motorcycle stoppage by police**

	Frequency	Percent
Stop to take bribes	35	47.9
Stopped when I don't have cycling gear/check licenses	12	16.4
Careful cycling	8	11.0
To check safety of passengers	8	11.0
Regular checks at the morning and in the evening	6	8.2
For security purposes	3	4.1
Gender bias since am a woman	1	1.4
<b>Total</b>	<b>73</b>	<b>100.0</b>

This was supported by one of the respondents who stated that;

*“Police do not care about the condition of the motorcycle provided they get their portion. Once you see a police officer you prepare to give them fifty bob that will buy your freedom even if you have broken some traffic rules.”* (Source: One male respondent, 2018).

#### 4.5.3 Major risks that motorcycle riders were exposed to

The study identified the major risks that commercial motorcycle riders were exposed to while riding their motorcycles. Top on the list were collisions while overtaking other road users at 33.3%, being hit from behind by other road users at 33.3% as well as collisions with left turning vehicles at 32.6%. Meanwhile, overshooting bends in the road accounted for 0.8% of the risks. This is as shown in table 4.17 below.

**Table 4.17: Major risks that you are exposed to while riding your motorcycle**

	Frequency	Percent
Collisions while overtaking other road users	44	33.3
Being hit from behind by other road users (rear-end shunt)	44	33.3
Collisions with left-turning vehicles	43	32.6
Over-shooting bends in the road	1	0.8
<b>Total</b>	<b>132</b>	<b>100.0</b>

**Source:** Field Data, 2018

#### 4.6 Implications of road traffic accidents among commercial motorcyclists

The study sought to establish the implications of commercial motorcyclist accidents in Embakasi Area. The respondents were required to give their level of agreement with statements on implications of motorcycle accidents. Most of the respondents agreed that motorcycle accidents caused had severe implications. For instance, 79.5% of the respondents indicated that the accidents resulted in the loss of livelihoods for households, 75% reported that motorcycle accidents lead to intangible costs such as pain, grief and suffering. Moreover, majority of the respondents agreed (agree/strongly agree) that motorcycle accidents had implications like psychological distress i.e. post-traumatic stress disorder and major depressive disorder at 74.3%, physical disabilities at 73.5%, reduction of working capacity at 71.3%, burden of cost of medication at 69.6%, as well as victims resulting to crime due to their lost livelihoods at 67.4%. The findings are as shown in Table 4.18.

**Table 4.18: Implications of motorcycle accidents**

		<b>Strongly disagree</b>	<b>Disagree</b>	<b>Not sure</b>	<b>Agree</b>	<b>Strongly agree</b>	<b>Total</b>
Reduction of working capacity	n	1	12	25	53	41	132
	%	.8	9.1	18.9	40.2	31.1	100.0
Physical disabilities	n	2	7	26	60	37	132
	%	1.5	5.3	19.7	45.5	28.0	100.0
Burden of cost of medication	n	3	7	30	46	46	132
	%	2.3	5.3	22.7	34.8	34.8	100.0
Loss of livelihoods	n	0	4	23	61	44	132
	%	0	3.0	17.4	46.2	33.3	100.0
Crime	n	0	6	37	46	43	132
	%	0	4.5	28.0	34.8	32.6	100.0
Loss of parents / relatives	n	0	5	42	45	40	132
	%	0	3.8	31.8	34.1	30.3	100.0
Intangible costs (i.e., pain, grief, suffering & sorrow)	n	1	4	28	48	51	132
	%	0.8	3.0	21.2	36.4	38.6	100.0
Medical costs, funeral costs, and property damage	n	1	35	48	48	0	132
	%	0.8	26.5	36.4	36.4	0	100.0
Psychological distress i.e. Post-traumatic stress disorder and major depressive disorder	n	1	3	30	60	38	132
	%	0.8	2.3	22.7	45.5	28.8	100.0

**Source:** Field Data, 2018

To support this finding, a respondent averred;

*“Sometimes when a motorcycle has been involved in a minor incident the police take custody of it for a long time. Some of these motorbikes are on loan and owners are required to make monthly repayments to financiers. This makes people lose other possessions on the way and are forced to result to criminal activities for livelihoods”* (Source: Research respondent, 2018).

#### **4.6.1 Correlation between accident involvement and socio-demographic characteristics of riders**

Correlation analysis was carried out to establish the nature and strength of the relationship between the prevalence of motorcycle accidents and independent variables such as age, motorcycle training, ownership and inspection by traffic police. The correlation results presented in Table 4.19 show that there was a moderate positive relationship between accident involvement and motorcycle rider training,  $r(131) = -0.306$ ,  $p < 0.01$ . This correlation was significant at  $p < 0.01$ . Similarly, there was a weak negative relationship between the prevalence of motorcycle accidents and age of respondents,  $r(132) = 0.019$ ,  $p > 0.05$ . The correlation is however not significant. On the other hand, there was a weak positive correlation between accident involvement and motorcycle ownership as well as frequency in which police stop riders for inspection. These relationships are however not significant ( $p > 0.05$ ). The results are as presented in Table 4.19 below.

**Table 4.19: Correlation coefficients**

	<b>Age</b>	<b>Motorcycle ownership</b>	<b>Motorcycle rider training</b>	<b>Frequency of traffic police stoppage for inspection</b>
Accident involvement in last 12 months	-0.019	0.011	-0.306**	0.024

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

**Source:** Field Data, 2018

#### **4.7 Discussion of the Findings**

The study sought to determine the prevalence of incidences, factors responsible and implications of road traffic accidents among commercial motorcyclists in Embakasi. On the first objective, the study findings explored the causes, factors influencing motorcycle accidents, and prevalence of accidents and/or incidences commercial motorcyclists.

Generally, the industry (commercial motorcycle business) is dominated by men most of whom are in their youthful ages. This finding is in agreement with Znajmiecka-Sikora and Sałagacka, (2018) who observed that younger riders/motorcycle drivers have a higher risk of crashing than older riders. Majority of the respondents in this study reported having been trained and licensed to ride motorcycles. This notwithstanding, the Director Road Safety (NTSA) identified the quality of education/ training provided by driving schools during quality assurance checks as being ‘very poor’.

While comparatively identifying accident prevalence, less than half of this study respondents reported that they had been directly involved in an accident that resulted in injury to themselves or their passenger in the last twelve months. However, more than half of the same respondents reported knowing someone who had been involved in an accident that resulted in injury in the same period. This shows that prevalence of accidents caused by motorcycles is still high and confirmed with statistics from NTSA that motorcycle related accidents were increasing gradually with 13% increase during the past twelve months (October 2017 to October 2018).

Moreover, reports from NTSA indicated that most of these accidents and/or incidents were caused by human error, something that can be prevented. This finding is also supported by findings of a previous study by Kumar (2010) on causes of accidents showed that human factors were the major causes for a significant 90% of accidents in comparison to mechanical and environmental factors that account for 10% of the accidents. This further support finding by Clarke et al., (2014) who reported that poor road surfaces were considered a big threat to the riders. He also observed that 32.6% of the respondents in his study claimed that poorly maintained roads were one of the main causes of motorcycle accidents.

This is supported by other studies conducted by Reeder et al (2006) that indicate increased susceptibility to accidents and injuries by motorcycle riders due to human-related risk behaviour such as hardly wearing safety helmets, driving under alcohol or drug influence, or driving above the speed limits among factors. This supports finding of a study by Oluwadiya et al (2004) who stated that over-speeding, careless overtaking, bad roads, sudden mechanical defects and alcohol intake as major factors. This study does, however, show additional evidence of non-human causative environmental and mechanical factors that account for close to fifty per cent, such as

poor and slippery roads which are common in developing countries, and low lighting resulting in low visibility for the rider.

Even with annual increases in motorcycle related accidents (Kenya Police Report, 2015), this study corroborates the findings of Kumar 2011 that has seen increased accident prevention campaigns that focus on motor vehicles as compared to motorcycles. These study findings show evidence that there is insufficient focus on commercial motorcycles by law enforcers with less than 50% of respondents having been stopped by police for law enforcement, security or license related checkups. The findings from key informants further indicate that while there are policies and laws in place that provide content (curriculum, automated theory exams, trained instructors) and monitors the training of motorcycle and driving schools for certification of riders, mainstreaming the curricula across all schools to ensure quality is important yet lacking.

Based on findings in this study and concurrently with previous literature on causes of accidents, there is a need to encourage active accident prevention measures by riders such as adopting safety procedures (wearing helmets, driving within the speed limits, not driving under alcohol or substance influence, carrying one passenger and not more, overtaking correctly among others) in a bid to significantly reduce motorcycle accidents. Engaging other road users such as private vehicle owners and pedestrians in road safety is also key. This was also the finding of Nantulya and Muli-Musiime (2011), observed that in Uganda, motorcyclists tend to over-speed and overload their machines for quick returns. They further noted that this is as a result of recklessness, indiscipline and lack of respect for other road users by the boda-boda motorcyclists who are mainly youths. Additionally, there is also a need for increased lobbying for proper infrastructural development that includes roads and lighting given that a significant number of accidents occur as a result of the same.

The researcher concludes that various factors discussed under investigation influence motorcycle accidents and calls for concerted prevention efforts by all key players in reducing motorcycle related accidents in Embakasi.

## **CHAPTER FIVE**

### **SUMMARY CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter presents the summary of findings, conclusion and recommendations from the study. Further areas of research are also highlighted.

#### **5.2 Summary of Findings**

The study's broad objective was to examine the incidences and implications of road traffic accidents among commercial motorcyclists in Embakasi area.

##### **5.2.1 Prevalence of road traffic accidents among commercial motorcyclists in Embakasi area**

The study's first objective was to determine the prevalence of road traffic accidents among commercial motorcyclists in Embakasi area. The findings of the study revealed that road traffic accidents among commercial motorcyclists were moderately prevalent with more than half of the study respondents either having been involved in motorcycle accidents or knowing someone who had been involved in a motorcycle road accident in the last twelve months. Most of these accidents occurred during the night and resulted in both slight and severe injuries.

##### **5.2.2 Factors responsible for road traffic accidents among commercial motorcyclists in Embakasi area**

The study established several key factors that contributed to accidents among commercial motorcyclists in Embakasi area. These include poor safety habits/ behaviours, irresponsibility from motorcycle riders, alcohol and substance abuse, exceeding speed limits or disregarding traffic rules/flouting traffic rules and poor road conditions among others. While this study found that a majority of respondents did not feel they rode motorcycles recklessly, human-related factors such as exceeding speed limits, driving when tired or drunk, overtaking more than one vehicle or around bend resulted in a high number of accidents. The study further established that most factors responsible for road traffic accidents in Embakasi were preventable and maintains that positive safety behaviours including wearing of safety helmets and reflective clothing, maintaining speed limits and following traffic rules immensely reduce incidences of motorcycle accidents.

### **5.2.3 Implications of road traffic accidents among commercial motorcyclists in Embakasi area**

The study findings established that while traffic accidents were not majorly reported, the causes of the motorcycle accidents exposed motorcycle riders to high accident risks such as getting knocked from behind and collisions. Collisions were a key risk with secondary data indicating they could result in a serious loss of livelihoods, physical disability or even death. Integration of all motorists and road users in accident prevention programs, as well as regular traffic personnel/police checks and enforcement of road and traffic laws, will greatly reduce the number of motorcycle related accidents.

## **5.3 Conclusions**

### **5.3.1 Theoretical Conclusion**

Most motorcycle accidents are caused by human error. They are as a result of over speeding, wrong overtaking, cycling under influence of alcohol, and overloading among others. This occurs due to the daily targets the riders are required to meet in order to have something to take home. Most of the riders are in a hurry to drop the customers so that they can rush to get another. For this reason, they over speed, overtake carelessly and sometimes take alcohol to take away the fear factor. This means that most of these violations are committed with full knowledge of the rider. There was also a correlation between accident involvement and motorcycle rider training where most of those who had been involved in accidents had not gone through the formal training. This brings the need for NTSA and the Traffic Department to ensure that all riders are trained and have rider's licenses as well as fully enforce the traffic laws in order to minimize motorcycle accidents.

Theoretically, most traffic law violators are normal, reasonable people who weigh the relative risks and rewards associated with law violation before deciding to commit it. The decision to engage in a particular behaviour is the result of a rational process, that is goal-oriented and that follows a logical sequence. The intention of drivers to commit traffic violations is predicted by attitudes toward this behaviour, and by sensation seeking, external locus of control, aggression and anxiety. The possible reasons for the violation of traffic laws are in terms of costs and benefits, such as being in a hurry, seeking excitement, trying to prove one's skill, or being in a bad mood. Road traffic crash results from a combination of factors related to the components of the system comprising roads, the environment, vehicles and road users, and the way they interact. Some of

these factors contribute to the occurrence of a collision and are therefore part of crash causation while other factors aggravate the effects of the collision and thus contribute to trauma severity. The combination of illegal speed and alcohol use is significantly related to the occurrence of motorcycle accidents.

### **5.3.2 Empirical Conclusion**

#### **5.3.2.1 Prevalence of road traffic accidents among commercial motorcyclists in Embakasi area**

The study concludes that while secondary data shows an increase in prevalence of motorcycle related accidents, with motorcyclists reporting a high number of injuries, motorcycle riders interviewed were indifferent with the rate of prevalence of motorcycle accidents by riders. One reason may be that no major or serious accidents or human loss were highly reported in this study, thrill associated with speed and minor accidents among cyclists, or the risk associated with the injuries were low according to respondents perceptions. In this regard, motorcycle riders in this area need to be aware of the levels of or severity of accidents involved and feel the need to reduce them. Programs and policies that engage motorcyclists in prevention are therefore important.

#### **5.3.2.2 Factors responsible for road traffic accidents among commercial motorcyclists in Embakasi area**

As regards the second objective, this study established that preventable factors are responsible for most of the motorcycle related accidents. The study highlighted that police and traffic administration support has been lacking or inconsistent with few police checks, riding motorcycles with mechanical failures and reported cases of bribing police or avoiding roadblocks/police checks. This goes back to looking at the training content for motorcycle riders and emphasis on positive behavior modeling unlike the risk-taking behavior that is prevalent. While existing laws can be punitive, re-modeling motorcycle road interventions will support to encourage increased uptake of safety measures for accident prevention and supporting the traffic administration to consistently manage and maintain proper positive habits such as regular police checks for mechanical faults or licensing, wearing of safety helmets and reflective gear, maintaining speed limits among others.



### **5.3.2.3 Implications of road traffic accidents among commercial motorcyclists in Embakasi area**

As regards the third objective, where respondents were able to identify implications of motorcycle accidents in Embakasi area. However, there was a disconnect with most respondents disagreeing on whether the different implications had high levels of negative impact or not except for medical costs, funeral costs and property damage. While this may reflect what they see and identify with on a day to day basis, the need for increased identification of the repercussions of motorcycle accidents by motorcycle riders will increase safety behaviors among them. Consequently, this study concludes that while prevalence of motorcycle accidents is steadily increasing annually, factors responsible for the accidents are interrelated. When it comes to reducing the prevalence of accidents, one response is limiting and there is need for a multi-sectorial response that involves all players such as private and public service vehicle owners, motorcycle riders, users, pedestrians, law enforcers and policy makers.

## **5.4 Recommendations**

Based on the findings and conclusions of the study, the following recommendations were made:

1. The government should establish a Data base of all boda boda operators in Kenya through mandatory registration, refresher training and testing.
2. There is need to rewrite the Traffic Act to meet contemporary legal, safety standards and improve the quality of enforcement operations by the National Police Service and the National Transport and Safety Authority within the protections provided under Kenya's Constitution.
3. Effective implementation of the National Transport and Safety Authority (NTSA) Regulations (Operation of Motorcycles) 2014.
4. The NTSA in partnership with the National Police Service, County Governments, Boda boda Associations, SACCOs and other stakeholders should undertake concerted civic education and public awareness campaigns on road safety to boda boda operators in all counties in Kenya.
5. NTSA in conjunction with the National Police Service should carry out compliance and inspections crack downs on riders who violate traffic rules including motorcycles operating

without insurance cover, overloading, over-speeding, operating unregistered motorbikes, riders without licenses, riding under the influence of drugs and alcohol.

6. The County governments should formulate relevant by-laws and policies to govern and regulate operations of the boda boda sector in their areas of jurisdiction.
7. The County governments and other partners should also purpose through policy to offer targeted support to the boda boda transport sub-sector in formation of Savings and Credit Cooperatives Organizations (SACCOs), sponsoring rider trainings and public awareness campaigns.
8. Motorcycle dealers and sellers should also ensure buyers of new motorcycles undertake statutory registration with Kenya Revenue Authority/National Transport and Safety Authority to help curb unregistered motorcycles.
9. Boda boda motorcycle owners should undertake insurance policy cover for their motorcycles; employing professionally trained and certified riders; vetting and undertaking criminal background checks on riders they employ. This will prevent the engagement of minors to operate boda boda.

## **5.5 Areas for further research**

Based on the findings of this study, the researcher recommends the following areas for further research:

- i. The study recommends extension of this research to other counties in order to provide a complete national outlook of incidences and implications of road traffic accidents among boda boda operators in Kenya.
- ii. Considering the rising trend in human-related causal factor of motorcycle accidents, there is need to undertake further research to ascertain the quality of motorcycle training curriculum and review where appropriate.
- iii. It will be necessary to carry out studies on boda-boda motorcycle riders and passengers risk perceptions. This is in order to understand why people still more people are affected in the boda-boda accidents.

## REFERENCES

- Abegaz, T., & Gebremedhin, S. (2018). Magnitude of Road Traffic Accident Related Injuries and Fatalities in Ethiopia. Doi: 10.1101/382333.
- Aberg, L. (1997). "The Role of Perceived Risk of Detection in the Theory of Planned Behavior". Amsterdam: Elsevier.
- Adoga, A. A. (2012). The Motorcycle: A Dangerous Contraption used for Commercial Transportation in the Developing World. *Emergency Medicine: Open Access*, 02(02). doi:10.4172/2165-7548.1000e109.
- Aetukumana, I., Onumbu, L. C., John, I., & Valenti, M. (2010). Possible Causes of Motorcycle (Okada) Accidents in Karu, Nigeria. *Injury Prevention*, 16(Supplement 1). doi:10.1136/ip.2010.029215.319.
- Afukaar, F. K., Antwi, P., & Ofosu-Amaah, S. (2003). Pattern of Road Traffic Injuries in Ghana: Implications for Control. *Injury Control and Safety Promotion*, 10(1-2), 69-76. doi:10.1076/icsp.10.1.69.14107.
- Aguinis, H. (2007). Organizational Research Methods: Yearly Update. *Organizational Research Methods*, 10(1), 3-4. Doi: 10.1177/1094428106296179.
- Ajzen, I. (1985). From Intentions to Actions: A Theory of Planned Behavior. *Action Control*, 11-39. Doi: 10.1007/978-3-642-69746-3\_2.
- Asingo, P.O. (2004); The Institutional and Organizational Structure of Public Road Transport in Kenya. (IPAR) Discussion Paper No. 050 (Nairobi) Kenya
- Asogwa, S. (1992). Road Traffic Accidents in Nigeria: A Review and a Reappraisal. *Accident Analysis & Prevention*, 24(2), 149-155. Doi: 10.1016/0001-4575(92)90031-d.
- Bambach, M., & Mitchell, R. (2014). The Rising Burden of Serious Thoracic Trauma Sustained by Motorcyclists in Road Traffic Crashes. *Accident Analysis & Prevention*, 62, 248-258. doi:10.1016/j.aap.2013.10.009.

- Banstola, A., & Mytton, J. (2016). Cost-effectiveness of Interventions to Prevent Road Traffic Injuries in Low- and Middle-income Countries: A Literature Review. *Traffic Injury Prevention, 18*(4), 357-362. doi:10.1080/15389588.2016.1212165.
- Barsky, A. E. (2005). Book Review: Social Work Research and Evaluation: Quantitative and Qualitative Approaches. *Research on Social Work Practice, 15*(3), 223-223. Doi: 10.1177/1049731505275016.
- Blackman, Ross & Haworth, Narelle (2013) Comparison of Moped, Scooter and Motorcycle Crashes: Implications for Rider Training and Education. In 2013 International Motorcycle Safety Conference, (Orlando), Florida, U.S.A
- Branas, C. C., & Knudson, M. M., (2001). Helmet laws and Motorcycle Rider Fatality Rates. *Accident Analysis and Prevention, 33*(5), 641–648.
- Brandt, M., Ahrns, K. S., Corpron, C. A., Franklin, G. A., & Wahl, W. L. (2002). Hospital Cost Is Reduced by Motorcycle Helmet Use. *The Journal of Trauma: Injury, Infection, and Critical Care, 53*(3), 469-471. Doi: 10.1097/00005373-200209000-00012.
- Carolan, M. S. (2006). Book Review: Explorations in Classical Sociological Theory: Seeing the Social World. *34*(2), 190-190. Doi: 10.1177/0092055x0603400210.
- Chang, H., & Yeh, T. (2007). Motorcyclist Accident Involvement by Age, Gender, and Risky Behaviors in Taipei, Taiwan. *Transportation Research Part F: Traffic Psychology and Behaviour, 10*(2), 109-122. doi:10.1016/j.trf.2006.08.001.
- Clarke, D. (2014). In-depth Study of Motorcycle Accidents. *Road Safety Research Report No 54. London: Department for Transport.* doi:17.1027/bmj.24.4689.2309.
- Clarke, D. D., Ward, P., Bartle, C., & Truman, W. (2007). The Role of Motorcyclist and Other Driver Behaviour in two types of Serious Accident in the UK. *Accident Analysis & Prevention, 39*(5), 974-981. doi:10.1016/j.aap.2007.01.002.

- Corazza, M. V., Musso, A., Finikopoulos, K., & Sgarra, V. (2016). An Analysis on Health Care Costs Due to Accidents Involving Powered Two Wheelers to Increase Road Safety. *Transportation Research*, 14, 323-332. doi:10.1016/j.trpro.2016.05.026.
- Edson C. and Tandoc, N. (2007). Motorcycle Epidemic Deaths, Injuries De La Salle University, Manila, Philippines
- Ekanem, E. I., Etuk, S. J., Ekanem, A. D., & Ekabua, J. E. (2006). The Impact of Motorcycle Accidents on the Obstetric Population in Calabar, Nigeria. *Tropical Journal of Obstetrics and Gynecology*, 22(2). doi:10.4314/tjog.v22i2.14519.
- Elliott, M.A., Baughan, C. J., Broughton, J., Chinn, B., Grayson, G. B., Knowles, J., Smith, L. R., & Simpson, H. (2003). *Motorcycle safety: a scoping study*. Crowthorne, England: TRL Limited.
- Eustace, D., Indupuru, V. K., & Hovey, P. (2010). Identification of Risk Factors Associated with Motorcycle-related Fatalities in Ohio. *Journal of Transportation Engineering*, 137(7), 474-480.
- Fagnant, D.J. & Kockelman, K.M. (2015). U.S. Motorcycle Use: Crash Experiences, Safety Perspectives, and Countermeasures. *Journal of Transportation Safety & Security*, 7 (1), 20-39.
- Fletcher, J. (2014). Rapid Desk-Based Study: The Economic Impact of Road Traffic Accidents and Injuries in Developing Countries. doi:10.12774/eod\_hd.june2014.fletcher.
- Friedman, D., & Hechter, M. (1988). The Contribution of Rational Choice Theory to Macro Sociological Research. *Sociological Theory*, 6(2), 201. Doi: 10.2307/202116.
- Germeni, E., Lionis, C., Davou, B., & Petridou, E. T. (2009). Understanding Reasons for Non-Compliance in Motorcycle Helmet Use among Adolescents in Greece. *Injury Prevention*, 15(1), 19-23. doi:10.1136/ip.2008.019356.
- Hadden, R. W. (1997). *Sociological Theory: An Introduction to the Classical Tradition*. Peterborough, Ontario: Broadview Press.

- Hessler, R. M. (2014). *Social Research Methods*. St. Paul: West Pub.
- Hung, D. V., Stevenson, M. R., & Ivers, R. Q. (2006). Prevalence of Helmet Use among Motorcycle Riders in Vietnam. *Injury Prevention*, 12(6), 409-413. doi:10.1136/ip.2006.012724.
- Hyder, A. A. (2013). Injuries in Low- and Middle-income Countries: A Neglected Disease in Global Public Health. *Injury*, 44(5), 579-580. doi:10.1016/j.Injury.2013.01.028.
- Juillard, C., Labinjo, M., Kobusingye, O., & Hyder, A. A. (2010). Socioeconomic Impact of Road Traffic Injuries in West Africa: Exploratory Data from Nigeria. *Injury Prevention*, 16(6), 389-392. doi:10.1136/ip.2009.025825.
- Kannika, N., & Boonma, P. (2013). The Risk of Head Injuries in Motorcycle Traffic Accidents from Not Wearing a Helmet: A Case Study of Motorcycle Riders and Passengers in Bangkok. *The Bangkok Medical Journal*, 05(01), 104-107. doi:10.31524/bkkmedj.2013.02.022.
- Kenya National Bureau of Statistics (2012). *Kenya Population and Housing Census*. Nairobi: Government Printer.
- Kenya National Bureau of Statistics, (2014). *Kenya: County Fact Sheets, Commission of Revenue Allocation*. KNBS: USAID.
- Kenya Revenue Authority. (2012). *Road Transport Department*. Nairobi: Government printer.
- Khayesi, M. (2016). Informal Public Transport in Practice. Doi: 10.4324/9781315588490
- Kombo, K. and Tromp, L. (2010): *Proposal and Thesis Writing: An Introduction*. Nairobi: Pauline's Publications Africa.
- Kothari, C. (2011). *Research methodology: Methods and Techniques (2ed.)* New Delhi: New Age International (P) Limited.

- Kumphong, J. K. (2018). Correlations among Motorcycle-Related Deaths, Helmet Law Enforcement and Helmet Usage for Asean Countries. *International Journal of GEOMATE*, 15(49). doi:10.21660/2018.49.tr1100.
- Levy, D. T. (1990). Youth and Traffic Safety: The Effects of Driving Age, Experience, and Education. *Accident Analysis & Prevention*, 22(4), 327-334. Doi: 10.1016/0001-4575(90)90048-p.
- Lin, M., & Kraus, J. F. (2009). A Review of Risk Factors and Patterns of Motorcycle Injuries. *Accident Analysis & Prevention*, 41(4), 710-722. doi:10.1016/j.aap.2009.03.010.
- Lopez, A. (2012). Global Trends in Death and Disability from Injuries Findings from the Global Burden of Disease and Injuries Study. *Injury Prevention*, 18(Suppl 1). Doi: 10.1136/injuryprev-2012-040580h.
- Mabunda, M. M., Swart, L., & Seedat, M. (2010). Erratum to “Magnitude and Categories of Pedestrian Fatalities in South Africa” [Accidents Analysis and Prevention. 40 (2008) 586–593]. *42(6)*, 2185. doi:10.1016/j.aap.2010.02.011.
- Manyara, C. G. (2016). Combating Road Traffic Accidents in Kenya: A Challenge for an Emerging Economy. *Kenya after 50*, 101-122. Doi: 10.1057/9781137574633\_7.
- Matheka, D. M., Faraj, A. O., Kipsaina, C., & Witte, J. (2015). Road Traffic Injuries in Kenya: A Survey of Commercial Motorcycle Drivers. *Pan African Medical Journal*, 21. doi:10.11604/pamj.2015.21.17.5646.
- Mekonnen, B. (2018). Risk Factors of Road Traffic Accidents and Its Severity in North Shewa Zone, Amhara Region, Ethiopia. *American Journal of Theoretical and Applied Statistics*, 7(4), 163. doi:10.11648/j.ajtas.20180704.15.
- Mkutu, T. R. (2019). Public Health Problems Associated with “Boda Boda” Motorcycle Taxis in Kenya: The Sting of Inequality. *Aggression and Violent Behavior*. doi:10.1016/j.avb.2019.02.009.

- Moskal, A., Martin, J., & Laumon, B. (2012). Risk Factors for Injury Accidents among Moped and Motorcycle Riders. *Accident Analysis & Prevention*, 49, 5-11. doi:10.1016/j.aap.2010.08.021.
- Mwiti, J., Abande, E., & Stephen, M. (2019). Role of Intelligence Transport System in the Fight against Road Accidents in Kenya. *International Journal of Computer Applications*, 178(11), 17-22. Doi: 10.5120/ijca2019918836.
- Naghavi, M., & Forouzanfar, M. H. (2013). Burden of Non-Communicable Diseases in Sub-Saharan Africa in 1990 and 2010: Global Burden of Diseases, Injuries, and Risk Factors Study 2010. *The Lancet*, 381. Doi: 10.1016/s0140-6736(13)61349-5.
- Nantulya, V. M. (2002). The Neglected Epidemic: Road Traffic Injuries in Developing Countries. *Bmj*, 324(7346), 1139-1141. doi:10.1136/bmj.324.7346.1139.
- Nantulya, V. M., & Muli-Musiime, F. (2011). Kenya: Uncovering the Social Determinants of Road Traffic Accidents. *Challenging Inequities in Health*, 210-225. doi:10.1093/acprof:oso/9780195137408.003.0015.
- National Center for Statistics and Analysis (NCSA). (2015, May). Motorcycles: 2013 Data. (Traffic Safety Facts. Report No. DOT HS 812 148). Washington, DC: National Highway Traffic Safety Administration.
- National Highway Traffic Safety Administration. (2006). Recent Trends in Fatal Motorcycle Crashes, National Highway Traffic Safety Administration, US Department of Transportation, National Technical Information Service, Springfield, VA 22161.
- Ngari, P. M. (2019). Incidence and Correlates of Commercial Motorcycle Accidents in Embu Town, Kenya. *Texila International Journal of Public Health*, 7(1), 122-130. doi:10.21522/tijph.2013.07.01.art013.
- Nkwame M. (2018, June, 17). Motorcycle Accidents Claim 181 Lives in Four Months. Accident Daily Reports. Retrieved July 23rd, 2018 from [www.trafficreports.co.tz](http://www.trafficreports.co.tz)



- Norman, P., & Conner, M. (2006). The Theory of Planned Behaviour and Binge Drinking: Assessing the Moderating role of Past Behaviour within the Theory of Planned Behaviour. *British Journal of Health Psychology*, 11(1), 55-70. Doi: 10.1348/135910705x43741.
- NTSA (2018). Comparative Statistics Trends For 2016 and 2017 as At 14<sup>th</sup> December, 2017. The National Transport and Safety Authority: Nairobi. Available on: [http://www.ntsa.go.ke/index.php?option=com\\_content&view=article&id=213&Itemid=706](http://www.ntsa.go.ke/index.php?option=com_content&view=article&id=213&Itemid=706).
- Nunn, S. (2011). Death by Motorcycle: Background, Behavioral, and Situational Correlates of Fatal Motorcycle Collisions. *Journal of Forensic Sciences*, 56(2), 429-437. doi:10.1111/j.1556-4029.2010.01657.x.
- Nzegwu, M., Aligbe, J., Banjo, A., Akhiwui, W., & Nzegwu, C. (2008). Patterns of Morbidity and Mortality Amongst Motorcycle Riders and their Passengers in Benin-city Nigeria: One-year Review. *Annals of African Medicine*, 7(2), 82. doi:10.4103/1596-3519.55675
- Odero, W. (2009). 'Motorcycles Injuries in E. Africa: Magnitude, Risk factors and Prevention', *Proceedings of the Road Traffic Injuries Research Network (RTIRN) regional workshop, Accra, Ghana on 2<sup>nd</sup> December, 2017*.
- Odero, W., Khayesi, M., & Heda, P. M. (2003). Road Traffic Injuries in Kenya: Magnitude, Causes and Status of Intervention. *Injury Control and Safety Promotion*, 10(1-2), 53-61. doi:10.1076/icsp.10.1.53.14103.
- Ogunsanya, A. A. (1984). Improving Urban Traffic Flow by Restraint of Traffic: The Case of Lagos, Nigeria. *Transportation*, 12(2), 183-194. Doi: 10.1007/bf00167375.
- Okebiro, G. N. (2016). Motorcycle (Boda-Boda) as Emerging Business for the Poor in Transport Industry and Sustainable Development in Modern Kenya. *SSRN Electronic Journal*. doi:10.2139/ssrn.2834204.

- Oluwadiya, K., Oginni, L., Olasinde, A., & Fadiora, S. (2004). Motorcycle Limb Injuries in a Developing COUNTRY. *West African Journal of Medicine*, 23(1). doi:10.4314/wajm.v23i1.28080.
- Otte, D. (2019). Residual Injury Situation and Accident Characteristics of Severe Motorcycle Accidents. *SAE Technical Paper Series*. Doi: 10.4271/2019-01-0638.
- Oyesiku, O. K (2001). City Poverty and Emerging Mobility Crisis use of Motorcycles as Public Transport in Nigerian Cities. A Paper presented at the 9th World Conference of Transport Research (Seoul) South Korea.
- Ozdol, C. (2019). Cranial and Spinal Injuries in Motorcycle Accidents: A Hospital-Based Study. *Turkish Journal of Trauma and Emergency Surgery*. doi:10.14744/tjtes.2019.46116.
- Parker, Lawton, R., D., Manstead, A. S., & Stradling, S. G. (1997). The Role of Affect in Predicting Social Behaviors: The Case of Road Traffic Violations. *Journal of Applied Social Psychology*, 27(14), 1258-1276. doi:10.1111/j.1559-1816.1997.tb01805.x.
- Peden, M. (2005). Global Collaboration on Road Traffic Injury Prevention. *International Journal of Injury Control and Safety Promotion*, 12(2), 85-91. Doi: 10.1080/15660970500086130.
- Peek-Asa, C., McArthur, D. L. & Kraus, J. F. (2009). The Prevalence of Nonstandard Helmet Use and Head Injuries among Motorcycle Riders. *Accident Analysis & Prevention*, 31(3), 229–233.
- Peltzer, K. (2011). Road Use Behavior in Sub-Saharan Africa. *Handbook of Traffic Psychology*, 503-518. doi:10.1016/b978-0-12-381984-0.10035-9.
- Pickrell, T. M., & Stames, M. (2008). *An Analysis of Motorcycle Helmet Use in Fatal Crashes*. Pub. DOT HS 811 011. Washington, DC: National Highway Traffic Safety Administration.

- Quine, L., Rutter, D. R., & Arnold, L. (1998). Predicting and Understanding Safety Helmet use Among Schoolboy Cyclists: A comparison of the Theory of Planned Behaviour and the Health Belief Model. *Psychology & Health, 13*(2), 251-269. Doi: 10.1080/08870449808406750.
- Reeder, A. I., Chalmers, D. J., & Langley, J. D. (2006). The Risky and Protective Motorcycling Opinions and Behaviours of young On Road Motorcyclists in New Zealand. *Social Science and Medicine, 42* (9), 1297-1311.
- Republic of Kenya (2008). *Kenya Police: Annual accident Report*. Nairobi: Government Printers.
- Republic of Kenya (2014). *Kenya Police: Annual accident Report*. Nairobi: Government Printers.
- Republic of Kenya (2015). *Kenya Police: Annual accident Report*. Nairobi: Government Printers.
- Rutledge, R., & Stutts, J. (2013). The Association of Helmet use With the Outcome of Motorcycle Crash Injury when Controlling for Crash/Injury Severity. *Accident Analysis & Prevention, 25*(3), 347-353.
- Shaheed, M. S. B., Gkritza, K., & Marshall, D. (2012). Motorcycle Conspicuity: What Factors have the Greatest Impact. Ames, IA: Center for Transportation Research and Education, Iowa State University
- Shaheed, M., & Dissanayake, S. (2011). Risk Factors Associated with Motorcycle Crash Severity in Kansas. In 90<sup>th</sup> Annual Meeting of the Transportation Research Board, Washington, DC.
- Sinha, A. P. (2017). Study of Orthopedic Injuries Pattern by Road Traffic Accident Victims. *International Journal of Life-Sciences 3*(2). doi:10.21276/ijlssr.2017.3.2.14.
- Smith, A. (2017). Perceptions of Risk Factors for Road Traffic Accidents. *Advances in Social Sciences Research Journal, 4*(1). doi:10.14738/assrj.41.2616.

- Solagberu, B. A. (2006). Motorcycle Injuries in a Developing Country and the Vulnerability of Riders, Passengers, and Pedestrians. *Injury Prevention*, 12(4), 266-268. doi:10.1136/ip.2005.011221.
- Suriyawongpaisal, P., & Kanchanusut, S. (2003). Road traffic injuries in Thailand: Trends, selected Underlying Determinants and Status of Intervention. *Injury Control and Safety Promotion*, 10:95–104.
- Van Schoor, O, Van Niekerk, JL & Grobbelaar, B, (2001). “Mechanical failures as a Contributing Cause to Motor Vehicle Accidents (Limpopo) South Africa.
- Wells, S., Mullin, B., Norton, R., Langley, J., Connor, J., Jackson, R., & Lay- Yee, R. (2004). Motorcycle Rider Conspicuity and Crash Related Injury: Case Control Study. *Bmj*, 328(7444), 857.
- Wilson, D. C. (2010). The Effectiveness of Motorcycle Helmets in Preventing Fatalities. Mathematical Analysis Division, NRD-31, March 1989. *Journal of Safety Research*, 21(1), 42.
- Woo, B. M. (2006). Comparison of Helmeted and Unhelmet Motorcyclists and Evaluation of Maxillofacial Injuries. *Journal of Oral and Maxillofacial Surgery*, 64(9), 33-34. doi:10.1016/j.joms.2006.06.082.
- World Health Organization (2015). Motorcycle-Related Road Traffic Crashes in World Health Organization. (2013). Global Status Report on road safety 2013: Supporting a Decade of Action. Geneva: WHO.
- World Health Organization. (2014). Global Status report on Road Safety. [http://www.who.int/violence\\_injury\\_prevention/road\\_safety\\_status/2017/en/](http://www.who.int/violence_injury_prevention/road_safety_status/2017/en/). (n.d.).
- Yagil, D. (2001). Reasoned Action and Irrational Motives: A prediction of Drivers’ Intention to Violate Traffic Laws. *Journal of Applied Social Psychology*, 31, 720-740.
- Znajmiecka-Sikora, M., & Sałagacka, M. (2018). Determinants of Risky and Aggressive Behaviour among Motorcyclists. *Scientific Papers of Silesian University of*

*Technology, Organization and Management Series*, 2018(132), 731-748.  
doi:10.29119/1641-3466.2018.132.52.

Zuckerman, M., & Neeb, M. (1980). Demographic Influences in Sensation Seeking and Expressions of Sensation Seeking in Religion, Smoking and Driving Habits. *Personality and Individual Differences*, 1(3), 197-206. Doi: 10.1016/0191-8869(80)90051-3.

**APPENDICES**

**APPENDIX I: INTERVIEW GUIDE FOR BODA-BODA RIDERS**

Interviewer .....Date of interview .....Place.....

**A: RESEARCH SITE INFORMATION**

1. Constituency/Sub county.....

**B: BIO-DATA AND HOUSEHOLD INFORMATION**

2. Gender:

Male ( ) Female ( )

3. Age <18 ( ) 18-24 ( ) 25-31( ) 32-38 ( ) 39-45( ) 46-52( ) 53-59 ( ) 60+ ( )

4. Marital Status

Married ( ) Single ( )

Divorced ( ) Separated ( )

Widowed ( )

5. Other (Specify).....

6. Level of Education

Certificate Level [ ]

Diploma Level [ ]

Bachelor's Degree [ ]

Other (Specify).....

7. Spouse's level of education

Certificate Level [ ]

Diploma Level [ ]

Bachelor's Degree [ ]

Other Specify.....

8. Spouse's Occupation.....

1. Household information:

a) Children: Number, Gender and ages.....

b) Other members: Gender, Age.....

c) Household main source of income and approximate expenditure per month in Kshs.....

d) How do your earnings help in family upkeep.....

e) Motorcycle ownership?

1. Employed as a driver on salary [ ]

2. Rented/ Hired [ ]

3. Owned [ ]

2. What job were you doing before becoming a boda-boda motorcycle rider?.....

3. For how long have you been riding the motorcycle/boda-boda?

1. < 1yrs. [ ]

2. 2 yrs. [ ]

3. 3 yrs. [ ]

4. 4 yrs. [ ]

5. 5 yrs. [ ]

6. > 6 yrs. [ ]

4. Are you trained as a motorcycle rider? Yes [ ] No [ ]

If yes, do you have a driving licence Yes [ ] No [ ]

5. Did you start riding a motorcycle immediately you acquired your motorcycle licence?

Yes [ ] No [ ]

If no, how long did you stay without riding a motorcycle?

### SECTION C: PREVALENCE OF MOTORCYCLE ACCIDENTS

1. Have you ever been involved in an accident that resulted to an injury to yourself or your pillion passenger in the last 12 months (s)?

Yes [ ] No [ ]

If yes, how many accidents? (Please indicate in the table below)

S/No.	Cause of Accident	Time (day or night)	Place ( highway or town streets)	Severity (none, serious injuries, slight Injuries.)	Nature of Loss)- none, human, property)

2. Do you know anyone who has been involved in a motorcycle accident that resulted in an injury in the last 12 months?

Yes [ ] No [ ]

If yes, kindly explain circumstances that led to the accident (Please narrate in detail)

3. How often do such motorcycle accidents occur in your area? (Tick one)

- 1. Once in while [ ]
- 2. Regularly [ ]
- 3. All the time [ ]
- 4. Not at all [ ]

4. What is the prevalence of motorcycle accidents in your area?

- 1. Very High [ ]
- 2. High [ ]
- 3. Moderate [ ]
- 4. Low [ ]
- 5. Very low [ ]

Briefly explain your response.....

**SECTION D: FACTORS RESPONSIBLE FOR TO MOTORCYCLE ACCIDENTS**

5. When riding a boda-boda motorcycle how often do you do the following?

<b>factors</b>	<b>Not at all</b>	<b>Sometimes</b>	<b>Almost always</b>	<b>Always</b>
Wear bright /reflective clothing				
Use day time headlights				
Wear a protective jacket				
Wear a helmet				
Ride above 50 Kph				
Ride while feeling tired				
Ride while drunk				



Remember to use indicators				
Overtake two or more vehicles at the same time				
Over speeding				
Overtake at a corner				
Overtake from the left				
Reckless riding				
Carry more than one passenger				
Receive/make phone calls while riding				
Poor road conditions the cause of motorcycle accidents				
bad weather conditions are the cause of motorcycle accidents				
Bribe traffic police officers				

6. Would you please mention other factors responsible for motorcycle accidents in your area?

.....  
.....

7. How often do traffic police stop you for inspection?

- 1. Very often [ ]
- 2. Often [ ]
- 3. Rarely [ ]
- 4. Not at all [ ]

Briefly explain your response .....

8. From the list below, please identify the two major risks that you are exposed to while riding your motorcycle.

- 1. Collisions while overtaking other road users[ ]
- 2. Being hit from behind by other road users (rear-end shunt)[ ]
- 3. Collisions with right-turning vehicles[ ]
- 4. Collisions with left-turning vehicles [ ]

- 5. Poor riding technique leading to loss of control of the motorcycle[ ]
- 6. Over-shooting bends in the road[ ]

**SECTION E: IMPLICATIONS OF MOTORCYCLE ACCIDENTS**

9. Please indicate the extent to which you **Agree** or **disagree** with the following statements regarding the implications of motorcycle accidents.

**USE THE SCALE OF 1-5** where 1=strongly disagree 2=disagree, 3=not sure, 4=agree, 5=strongly agree

	Strongly Agree	Agree	Not Sure	Disagree	Strongly disagree
Reduction of working capacity					
Physical disabilities					
Burden of cost of medication, loss of livelihoods					
Loss of parents and guardians					
Intangible costs (i.e., pain, grief and suffering)					
Medical costs, funeral costs, and property damage					
Psychological distress i.e. Post-traumatic stress disorder and major depressive disorder					

10. What are other implications of motorcycle accidents in your area?

11. Is there anything else that you would like to tell or share on motorcycle accidents in your area?

**APPENDIX II: INTERVIEW GUIDE FOR TRAFFIC POLICE MANAGERS**

Interviewer.....Date of interview .....Division.....

**SECTION A: RESEARCH SITE INFORMATION**

1. Police Station/ Post.....

**SECTION B: EXPERIENCE AND TRAINING**

2. Where did you attend your initial training?

- 1. Kenya Police College, Kiganjo [ ]
- 2. General Service Unit Training School[ ]

3. What is your rank?

Rank	CPL	SGT	S/SGT	IP	C.I	SP	SSP
Tick							

4. How many years have you served in the Kenya Police service?

Years	1 - 5	6 - 10	11 – 15	16 - 20	21 - 25	26 – 30	Over 30
Tick							

5. For how long have you been working in Traffic section under the current division?

- 1. < 1yrs. [ ]
- 2. 2 yrs. [ ]
- 3. 3 yrs. [ ]
- 4. 4 yrs. [ ]
- 5. 5 yrs. [ ]
- 6. > 6 yrs. [ ]

6. To what extent are you familiar with traffic offences?

- 1. Fully [ ]
- 2. To a great extend [ ]
- 3. To some extend [ ]

- 4. Small extend [ ]
- 5. None [ ]

**SECTION C: PREVALENCE OF MOTORCYCLE ACCIDENTS**

7. Have there been motorcycle accidents in your division for the last 12 months (s)?

Yes [ ] No [ ]

If yes, what factors led to the accidents (Please narrate in detail).....

What was time, location, and description of the accidents?

Accident date	
Accident time	
Accident location	
Weather conditions at time of accident	
Road conditions at time of accident	
Brief description of the accident, including approximate speeds of all vehicles and details of the areas of vehicle damage	
Was the accident reported to the police?	Yes / No
If yes, what was the police station name	

8. How often do such motorcycle accidents occur in your division? (Tick one)

- 1. Once in while [ ]
- 2. Regularly [ ]
- 3. All the time [ ]
- 4. Not at all [ ]

9. What is the prevalence of motorcycle accidents in your division?

- 1. Very High [ ]
- 2. High [ ]
- 3. Moderate [ ]
- 4. Low [ ]
- 5. Very low [ ]

Briefly explain your response.....

**SECTION D: FACTORS RESPONSIBLE FOR TO MOTORCYCLE ACCIDENTS**

10. Indicate the extent to which you agree or disagree with the statements on the factors responsible for motorcycle accidents in your division.

**USE THE SCALE OF 1-5** where 1=strongly disagree 2=disagree, 3=not sure, 4=agree, 5=strongly agree

<b>Factor</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Not Sure</b>	<b>Disagree</b>	<b>Strongly disagree</b>
Reckless riding					
Over speeding					
Pedestrians’ obstruction					
Lack of proper training					
Overloading,					
Alcohol and Drug abuse					
Non-adherence to rules and regulation,					
Rider’s risk-taking behavior					
Mechanical factors i.e. Faulty lights and brake system failure					
Poor road and bad weather conditions					
Weak legal enforcement					
Failure to use protective gear					
Police behavior (Corruption)					
Poor government policies and regulations in transport industry					
Riders reckless culture					

Would you please mention other factors responsible for motorcycle accidents in your division?

.....

.....

.....

.....

11. To what extent do boda-boda operators comply with the existing traffic laws and regulations?

- 1. To a greater extent[ ]
- 2. To some extend[ ]
- 3. Small extend[ ]
- 4. Not at all[ ]

12. How often do you carry out motorcycle inspections in your division?

- 1. At least once a day [ ]
- 2. At least once a week [ ]
- 3. At least once a month [ ]
- 4. Never [ ]

How effective are the inspection operation .....

13. On average how many motorcycle accidents occur in your division in a month?

- 1. Less than 2 [ ]
- 2. 2 to 5 [ ]
- 3. 6 to 10 [ ]
- 4. >10 [ ]

**SECTION E: IMPLICATIONS OF MOTORCYCLE ACCIDENTS**

14. Please indicate the extent to which you **Agree** or disagree with the following statements regarding the implications of motorcycle accidents. **USE THE SCALE OF 1-5** where 1=strongly disagree 2=disagree, 3=not sure, 4=agree, 5=strongly agree

	<b>Strongly Agree</b>	<b>Agree</b>	<b>Not Sure</b>	<b>Disagree</b>	<b>Strongly disagree</b>
Reduction of working capacity					
Physical disabilities					
Burden of cost of medication,					
loss of livelihoods					
Loss of parents and guardians					

Intangible costs (i.e., pain, grief and suffering)					
Medical costs, funeral costs, and property damage					
Psychological distress i.e. Post-traumatic stress disorder and major depressive disorder					
Crime					
Reduced incomes					
School dropouts					
Medical expenses					

15. Please mention other implications of motorcycle accidents?

.....

.....

.....

.....

**APPENDIX III: INTERVIEW GUIDE FOR THE MEDICAL OFFICER**

Interviewer .....Date of interview .....Place.....

Constituency/Sub county.....

Name of the Hospital.....Level.....

1. How long have you worked as a medical officer in this facility?

- 1. < 1yrs. [ ]
- 2. 2 yrs. [ ]
- 3. 3 yrs. [ ]
- 4. 4 yrs. [ ]
- 5. 5 yrs. [ ]
- 6. > 6 yrs. [ ]

2. How many cases of motorcycle rider’s accidents do you attend to per week?

- 1.0-5 [ ]
- 2.5-10 [ ]
- 3.10-15 [ ]
- 4.15-20 [ ]
- 5.> 20 [ ]

3. How many of the above cases were fatal?

- 1. None [ ]
- 2. 0-1 [ ]
- 3. 1-2 [ ]
- 4. 3-4 [ ]

4. What type of motorcyclist’s accident injuries do you usually handle at your facility?

- 1. Head injury [ ]
- 2. Broken limb[ ]
- 3. Spinal injury[ ]
- 4. Road rash [ ]

5. How many motorcycle fatalities were recorded in the last 12

months?.....



5. What is the average cost of treating non-fatal accidents?

1. Ksh. 2,000 [ ]
2. Ksh. 5,000 [ ]
3. Ksh. 8,000 [ ]
4. Ksh. 11,000 [ ]
5. > Ksh. 13,000 [ ]

6. How many of the above cases were catered for by insurance cover?

1. None [ ]
2. Some of them [ ]
3. Half of them [ ]
4. Most of them [ ]
5. All of them [ ]

**APPENDIX IV: INTERVIEW SCHEDULE FOR THE NTSA DIRECTOR ROAD SAFETY**

Interviewer .....Date of interview .....Place.....  
Constituency/Sub county.....Designation.....

1. How long have you worked with NTSA.....
2. Is there a harmonized motorcycle inspection and certification system including inspection centers?  
Yes [ ]      No [ ]  
  
If yes, please explain.....
3. Has your organization harmonized riders training and testing system  
  
Yes [ ]      No [ ]  
If yes, how effective are the systems.....
4. Do you conduct Road safety audits?  
Yes [ ]      No [ ]  
  
If yes, how often? (Tick one)
  1. Once in while [ ]
  2. Regularly [ ]
  3. All the time [ ]
  4. Not at all [ ]How effective are the audits.....
5. Do you carry out Information campaign focused on motorcyclist’s risk factors  
Yes [ ]      No [ ]  
If yes, please mention the type of campaigns.....
6. Indicate the extent to which you agree or disagree with the statements on the factors responsible for motorcycle accidents. **USE THE SCALE OF 1-5** where 1=strongly disagree 2=disagree, 3=not sure, 4=agree, 5=strongly agree

<b>Factor</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Not Sure</b>	<b>Disagree</b>	<b>Strongly disagree</b>
Rampant violation of road safety regulations (speed limits, helmet and seat belt wearing, driving while exceeding BAC, use of mobile phones while driving, etc.).					
Lack of funding, capacity and ineffective coordination of road safety work					
Low quality and poor access of road safety data					
Lack of knowledge of the social impact of crashes and effectiveness of interventions					
Improperly trained, unlicensed drivers contributing to crashes					
Defective vehicles contributing to crashes					
Unsafe use of roads by all road users (due to poor attitude, inadequate road safety knowledge)					
High involvement of VRUs in traffic crashes					
Poor RTI victim rescue, first aid and access to emergency medical services					
Increasing use of motorcycles and involvement of riders in fatal and serious injury crashes					

Alcohol and Drug abuse					
Poor road and bad weather conditions					
Weak legal enforcement					
Police attitude and behavior (Corruption)					
There is poor coordination across agencies to achieve the desired focus on results					
Improper road layout both at links and junctions					
Inadequate street lighting in urban areas					
Lack of traffic control devices at critical locations					
Inadequate provision for pedestrians at traffic signals,					
Inadequate shoulder width for use by non-motorized and disabled vehicles					
Inappropriate and inadequate road crossing facilities for pedestrians,					
Inadequate bus stop design and inappropriate location					
Inefficient enforcing institutions					

7. Do the safety standards and rules and related compliance regimes clearly address the safety priorities of motorcyclist to achieve the desired focus on results?

Yes [ ]      No [ ]

If yes, how effective are they in addressing the motorcyclist’s safety priorities

8. Are interventions being coordinated vertically between national and county agencies to achieve the desired focus on results?

If yes, how effective is the coordination.....

9. Is road safety regularly promoted to achieve the desired focus on results?

If yes please explain how.....

10. Are systematic and regular safety inspections undertaken to quality assure adherence to the specified motorcycle safety standards and rules to achieve the desired focus on results?

Yes [ ] No [ ]

If yes, please mention the type of safety inspection undertaken.....

11. Do you conduct surveys on road user and community attitudes to road safety interventions to achieve the desired focus on results?

If yes, how often.....

12. Does the government and other relevant stakeholders effectively contribute to the funding and resource allocation safety programmes?

13. Is there a standardized road safety curriculum for motorcyclists?

Yes [ ] No [ ]

14. Do you conduct Information campaigns focused on motorcyclists, PSV operators, drivers and other road users

Yes [ ] No [ ]

If yes, how often? (Tick one)

1. Once in while [ ]

2. Regularly [ ]

3. All the time [ ]

4. Not at all [ ]

15. How often do you carry out motorcycle safety audits and enforcement of safety laws?

1. Once in while [ ]

2. Regularly [ ]

3. All the time [ ]

4. Not at all [ ]

16. What is the prevalence of road traffic accidents among motorcyclists in Embakasi area, Nairobi County?

- 1. Increasingly high [ ]
- 2. Low [ ]
- 3. High [ ]
- 4. Very low [ ]

17. Do you monitor driving schools?

Yes [ ] No [ ]

If yes, briefly explain.....

8. In your opinion, how can you rate the quality of education provided by the driving schools?

- 1. Very good [ ]
- 2. Poor [ ]
- 3. Good [ ]
- 4. Very poor [ ]

10. Does your office prepare curriculum for training of motorcycle riders?

Yes [ ] No [ ]

13. What measures have you put in place to ensure quality training is offered by the driving schools to motorcyclists?

14. What policies have the Authority put in place to ensure effectiveness of training of motorcyclists?

**APPENDIX V: FOCUS GROUP DISCUSSION GUIDE FOR DRIVING SCHOOL OFFICIALS**

Interviewer .....Date of interview .....Place.....

Constituency/Sub county.....

Name of the Driving School.....

1. Is your driving school registered

- 1. National Government [ ]
- 2. County government [ ]
- 3. NTSA [ ]
- 4. Other, specify.....

2.What type of driving classes does your school offer?

- 1. heavy commercial [ ]
- 2. Light vehicles [ ]
- 3. Motorcycle [ ]
- 4. Other, specify .....

3. Do you have well trained and certified instructors to offer driving lessons for the above classes?

Yes [ ] No [ ]

4. Do you use government training curriculum in your trainings for motorcycle driving lessons?

Yes [ ] No [ ]

5. Is the curriculum standardized?

Yes [ ] No [ ]

If yes, by who.....

6. In your opinion, is the curriculum effective?

Yes [ ] No [ ]

If no, Please explain briefly.....

7. What are the requirement one has to fulfill before he/she is issued with a riders licence?

.....  
.....

8. Do you have adequate motorcycle for the students that are currently registered in your school?

Yes [ ]      No [ ]

If yes, how many.....

9. What is the instructor to student ratio in your school?

10. To what extent are you familiar with traffic offences?

- 1. Fully [ ]
- 2. To a great extend [ ]
- 3. To some extend [ ]
- 4. Small extend [ ]
- 5. None [ ]

12. In your opinion, is the government doing enough to ensure there is quality of training of motorcycle riders?

Yes [ ]      No [ ]

If yes, please explain how.....

13. What policies do you think the government should implement to enhance quality of training of driving schools?

14. What are the main factors responsible for motorcycle accidents in the area?

15. What are the implications of motorcycle accidents in the area?



## **APPENDIX VI: CONSENT FORM**

My name is Samson Maghanga. I am a Masters of Arts student in Security Management at Egerton University. I am currently conducting a research on the incidences and implication of commercial motorcycle accidents in Embakasi area Constituency, Nairobi County. I would like to inform you that you have been selected for the survey as a respondent to provide information that I believe will be resourceful in understanding the problem of motorcycle accidents in the Constituency. Your candid and honest information will be useful to this research. I assure you that the information you provide will be treated as confidential and used only for the purpose of research.

To this extent, I will not keep a record of your name or address or any leading identification documents. You have the right to stop the interview at any time or to skip any questions that you don't want to answer. There are no right or wrong in this research. Your participation is completely voluntary. The interview will take approximately 45 minutes to complete. Do you agree to be interviewed?

Please sign here as surety of your consent Sign\_\_\_\_\_ Date \_\_\_\_\_

**Thank you for your participation.**



## APPENDIX VIII: RESEARCH AUTHORIZATION



### NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,  
2241349, 3310571, 2219420  
Fax: +254-20-318245, 318249  
Email: dg@nacosti.go.ke  
Website: www.nacosti.go.ke  
When replying please quote

NACOSTI, Upper Kabete  
Off Waiyaki Way  
P.O. Box 30623-00100  
NAIROBI-KENYA

Ref: No. **NACOSTI/P/18/53618/26066**

Date: **9<sup>th</sup> October, 2018**

Samson Maghanga Hawa  
Egerton University  
P.O. Box 536-20115  
**NJORO**

#### **RE: RESEARCH AUTHORIZATION**

Following your application for authority to carry out research on *“Incidences and implications of road traffic accidents among commercial motorcyclists in Embakasi area, Nairobi County”* I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for the period ending **9<sup>th</sup> October, 2019**.

You are advised to report to **the County Commissioner and the County Director of Education, Nairobi County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

  
**BONIFACE WANYAMA**  
**FOR: DIRECTOR-GENERAL/CEO**

Copy to:

The County Commissioner, *Approved*  
Nairobi County. *dyg 11/10/2018*

**COUNTY COMMISSIONER**  
**NAIROBI COUNTY**  
P. O. Box 30124-00100, NBI  
TEL: 341666

The County Director of Education  
Nairobi County.

# APPENDIX IX: RESEARCH AUTHORIZATION



Republic of Kenya

## MINISTRY OF EDUCATION

### STATE DEPARTMENT OF EARLY LEARNING AND BASIC EDUCATION

Telegrams: "SCHOOLING", Nairobi  
Telephone; Nairobi 020 2453699  
Email: [rcenairobi@gmail.com](mailto:rcenairobi@gmail.com)  
[cdenairobi@gmail.com](mailto:cdenairobi@gmail.com)

REGIONAL COORDINATOR OF EDUCATION  
NAIROBI REGION  
NYAYO HOUSE  
P.O. Box 74629 – 00200  
NAIROBI

When replying please quote

Ref: RCE/NRB/RESEARCH/1/64/VOL.I

Date: 11<sup>th</sup> October, 2018

Samson Maghanga Hawa  
Egerton University  
P. O. Box 536 - 20115  
NJORO

#### RE: RESEARCH AUTHORIZATION

We are in receipt of a letter from the National Commission for Science, Technology and Innovation regarding research authorization in Nairobi County on "*Incidences and implications of road traffic accidents among commercial motorcyclists in Embakasi area, Nairobi County-*".

This office has no objection and authority is hereby granted for a period ending 9<sup>th</sup> October, 2019 as indicated in the request letter.

Kindly inform the Sub County Director of Education of the Sub County you intend to visit.



DAISY IRERI  
FOR: REGIONAL COORDINATOR OF EDUCATION  
NAIROBI

Copy to: Director General/CEO  
National Commission for Science, Technology and Innovation  
NAIROBI

