

**DETERMINANTS OF THE RISING NUMBERS OF TRAFFIC ROAD
ACCIDENTS ALONG THIKA SUPER HIGHWAY IN NAIROBI -
KENYA**


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DECLARATION

This research project is my original work and has not been presented for a degree or any other award in any other university

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I dedicate my research project to my loving family: Joseph Kironji, Ronny Gathenya, Amie Wanjiku, and Ryan Ndiritu for your unconditional support and love.

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ABBREVIATIONS AND ACRONYMS

FRSC	Federal Road Safety Corps
GDP	Gross Domestic Product
GOK	Government of Kenya
GOV.UK	Government of United Kingdom
ICT	Information Communication Technology
IRF	International Road Federation
ISO	International Organization for Standards
KICD	Kenya Institute of Curriculum Development
KRA	Kenya Revenue Authority
NTSA	National Transport Safety Authority
PSV	Public Service Vehicles
RADAR	Road Accident Data Recorder
UAE	United Arab Emirates
UK	United Kingdom
UN	United Nations
USA	United States of America
WHO	World Health Organization

ABSTRACT

The construction of Thika Superhighway was aimed at addressing road safety by improving transportation and reducing traffic accidents. Despite this effort the numbers of accidents along Thika Superhighway still continue to occur claiming more lives. This study examined the determinants of the rising number of traffic road accidents along Thika Superhighway in Kenya. The study objectives were; to establish whether the kind of training that the drivers undertake to qualify as drivers contributes to rising numbers of accidents, to examine the contribution of road design on road accidents, to establish the types of vehicles that mostly causes traffic road accidents and to find out the best strategies that can enhance road safety on Thika Superhighway. Accident Cessation Theory and the Reciprocal Determinism Theory were used to guide the study. The study adopted descriptive and exploratory research designs to collect quantitative and qualitative primary data. The study targeted a population of 249 respondents drawn from traffic police officers, road safety personnel and users of Thika Superhighway. Slovin's formula was used to determine the sample size of junior traffic police officers who were selected using simple random sampling techniques. Purposive sampling technique was used to select senior officers from traffic police, National Transport Safety Authority and Ministry of Transport and Infrastructure while convenience sampling technique was applied to select drivers and pedestrians. Questionnaires, interview schedules and focus group discussions were used to collect primary data collection. Qualitative data was analysed using thematic method, while quantitative data was analysed using descriptive statistics such as frequencies, means and standard deviations. The analysed data was presented in tables and charts to represent quantitative findings while qualitative findings were presented in narratives, verbatim reporting, discussions and inferences. Results showed that driving schools produced incompetent road users. Road design, public service vehicles and private motor vehicles were found to be the major contributor of traffic road accidents. To address incompetent drivers the government and road safety stakeholders need to develop a policy to address poor training in driving schools. The study recommends use of speed guns and stationery cameras as deterrent to over speeding and reckless driving. Finally redesigning of defective road sections and construction of addition footbridges will ensure safety on the highway. These study findings are hoped to benefit all stakeholders and users of roads in an effort to ensure safety on Kenyan roads.

OPERATIONAL DEFINITION OF TERMS

Bus: A passenger vehicle with a capacity of more than 18 persons

Matatu: The term will be used to mean a Public Service Vehicle with a capacity of not more than 18 passengers.

Private Vehicles (Cars): Will be used to mean a vehicle that is not licensed to do public service business of carrying passengers to include personal cars, school buses, tractors, and government vehicles.

Public Service Vehicles: In this research project, it is any vehicle that is licensed to do public service business of carrying passengers to include large and mini buses, taxis and three-wheeled tricycles.

Traffic Road Accident: in this research, traffic road accident will mean an accident that occurs on a road involving vehicles, motorcycles, bicycles or any other moving machine along the road.

Trucks: The term will be used in referring to the Lorries designed to carry cargo.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Road accidents rank high among the major development challenges currently facing many countries of the world (Asingo & Mitullah, 2007). The frequency, magnitude, and impact of global road carnage are very worrying. Traffic road accidents are ranked ninth cause of death in the world where over 50 million people are hurt or seriously injured. An estimated 85% of the deaths occur in developing countries with 65% of the deaths are pedestrians and 35% are children (WHO, 2015). A World Bank report on road accidents in developing countries depicts worrying trends as the number continues to rise and causing more harm to the economies of these countries as compared to developed countries (Koptis & Cropper, 2003). They also noted that developed countries register few traffic road accidents as compared to developing countries though they have many vehicles. Japan, whose number of registered motor vehicles stood at 707 vehicles for every 1000 people, registered 5507 fatal accidents.

South Africa, with 165 vehicles for every 1000 people, registered 13954 fatal accidents while Kenya with 24 vehicles for every 1000 people, registered 3302 fatal accidents in 2011 (Koptis & Cropper, 2003). In an effort to address road safety, the developed countries have put elaborate measures such as speed control, helmet use, seat-belt use, use of road signs, child restraint, deterring drunk-driving and having stringent standards for acquiring driving license among others. These measures are strictly followed and whether they have resulted in reduced traffic road accidents. Tingvall (2009) observed that apart from road safety measures directed to the motorists, passengers, and pedestrians, developed counties have also developed road safety policies and enacted laws to address the traffic road accidents.

Kenya has a fairly good road network as compared to its neighbours in East Africa region. In an article published in World Bank website, Morisset (2012) argued that good road network has a direct impact on the development of a country. According to him, in comparison with the population and land size, Tanzania is superior to Kenya but it lags behind in economic development due to the inferior road network. He also argued that there is a very strong positive correlation between a country's economic development and the quality of its road network. That has been observed in disparities of economic development in Kenya and Tanzania: a case attributed to differential road networks in both countries. Road transport in Kenya is currently the most widely used mode of transport, handling to about 80 percent of both cargo and passenger transportation. Between 1998 and 2002, this mode of transport contributed to 2.9 percent of the Gross Domestic Product (GDP) in Kenya (Asingo & Mitullah, 2007).

Since 2003, the government of Kenya has embarked on a major rehabilitation of the road networks to ease transportation of goods and passengers in an effort to spur development (GoK, 2011). Many roads have been redesigned, others constructed, while others have been rehabilitated. According to Ikiara (2005), it was projected that between 2003 and 2007, the Kenyan transport sector will grow at an annual rate of 6.26 percent. It is with this in mind the government of Kenya has put in place development plans to construct adequate road network with an efficient infrastructure to realize vision 2030 objectives (GoK, 2007).

The Kenya Vision 2030 development plan aims at transforming Kenya to a middle-income country by the year 2030. To achieve this economic development, the vision 2030 blueprint has identified three pillars, economic, social and political to guide the achievement of the vision. Under the economic pillar, road improvement has been identified as one driver of the vision. The successful implementation of the vision would

need building key roads to support the proposed resort cities, revitalized tourist circuits and wholesale hubs. Thika Superhighway was designed and constructed following the international standards (APEC Consortium, 2012). The international standards adhered to comprises of having consulting engineers throughout the construction period, and construction of guardrails.

Kenya is faced with challenges of ensuring safety on the roads. It is estimated that Kenya has one of the highest road fatality rates in relation to vehicle ownership in the world, with an average of 7 deaths from the 35 road crashes that occur each day (Odero, Meleckidzedek & Heda, 2003). Kenya loses nearly 3000 person due to roads accidents annually which translates to approximately 68 deaths per 10,000 registered vehicles, which is higher (30–40 times greater) than in highly motorized countries(Mogambi & Nyakeri, 2015).

Due to rising number of road accidents, the Traffic Act was reviewed in 2012 to give the traffic law enforcement officers more teeth to deal with traffic offenses and road safety (GoK, 2013). The National Transport Safety Authority (NTSA) was created in 2012 through an Act of Parliament as a body responsible for coordinating road safety (GoK, 2012). Despite all these efforts by the government of Kenya to address road safety the number of traffic road accidents is still a concern and therefore the need to conduct a study to determine the causes. Road accidents ranks high among the major development challenges currently facing many countries of the world (Asingo & Mitullah, 2007). The frequency, magnitude and impact of global road carnage are very worrying bearing in mind traffic road accidents are ranked ninth cause of death in the world with most of them occurring in developing countries (WHO, 2015).

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Kenyan transport sector would have grown at an annual rate of 6.26%. It is with that in mind that the government of Kenya has put in place development plans to construct adequate road network with efficient infrastructure to realise vision 2030 objectives (GoK, 2007).

1.2 Statement of the Problem

Kenya has experienced high number of road accidents claiming more than three thousands lives every year. Road accidents in Kenya are the third leading cause of death after malaria and HIV/AIDS and pose major public health problem in terms of mobility, disability, and associated medical care costs (Muchene, 2012). The cause of traffic road accidents is usually blamed on the drivers, pedestrians, lack of adequate enforcement of traffic laws, quality of roads among other reasons. The government has tried to address this road carnage by coming up with road safety measures and improvement of road infrastructure. The construction of Thika Superhighway is one of the efforts of addressing road safety to reduce accidents, improve transportation and drive development. Despite this effort the numbers of accidents along Thika Superhighway still continue to occur claiming more lives.

Data from the traffic department indicates that more road accidents continue to be recorded on Kenyan roads especially on the new and improved roads. Thika Superhighway is not an exception as many traffic or road accidents have been reported since its improvement to a superhighway as compared to when it was a dual carriageway. A lot of studies (Augustus, 2012, Chitere & Kibua, 2003, Muchene, 2012) among others have been done on road traffic accidents but none has been done on the determinants of rising road accidents especially along Thika Superhighway. This study therefore aimed at establishing the determinants of road accidents on Thika Superhighway - Kenya.

1.3 Purpose of the Study

The main purpose of this study was to establish the determinants of traffic road accidents along Thika Superhighway, Kenya

1.4 Specific Objectives

The study was guided by the following specific objectives;

- i) To establish whether the kind of training that the drivers undertake to qualify as drivers contributes to rising numbers of accidents along Thika Superhighway.
- ii) To examine the contribution of road design on road accidents along Thika Superhighway.
- iii) To establish the types of vehicles that causes traffic road accidents along Thika Superhighway.
- iv) To find out the best strategies that can enhance road safety along Thika Superhighway.

1.5 Research Questions

The study was guided by the following research questions;

- i) What kind of training do drivers undergo before being given driving licence
- ii) What is the contribution of the road design on traffic road accidents along Thika Superhighway?
- iii) What categories of vehicles cause traffic road accidents along Thika Superhighway?
- iv) What are the best strategies that can be put in place to enhance road safety along Thika Superhighway?

1.6 Assumptions of the Study

The study was conducted with the following assumptions;

1. Drivers undertake a driving course to qualify as drivers

2. Only certain types of vehicles that causes traffic road accidents along Thika Superhighway.
3. There are road safety measures in place along Thika Super Highway.
4. There is available data on traffic road accidents along Thika Superhighway.

1.7 Justification of the Study

Traffic road accidents continue to raise in Kenya despite the Government's effort to improve the roads, hence the need for this research.

1.8 Significance of the Study

The study would be significant to the government of Kenya in addressing road safety especially when developing laws and formulating policies. The study findings would be useful to the traffic police and relevant stakeholders in road transport by providing an understanding of the challenges facing the road safety and how to address them. The findings of this study would be expected to contribute to the existing body of knowledge, especially to the existing literature on the causes of road accidents in developing countries. Practically the study would offer possible solutions to the challenges facing the government in an effort to address traffic road accidents in Kenya.

1.9 Scope and Limitations of the Study

The study was carried out along Thika superhighway and focused on private, public and commercial vehicles from 1st March to 30th April 2016. The respondents were traffic police officers sampled from all police stations along Thika road, public and private drivers using Thika Super Highway, engineers from the ministry of transport and infrastructure and safety officers from National Transport Safety Authority. The study sought to confine itself on the kind of training that the drivers go through to qualify as drivers, the contribution of road design on traffic road accidents and types of vehicles that causes traffic road accidents along Thika Superhighway. The study was faced with the

limitation of getting drivers to interview especially the private vehicle drivers because it was difficult to find them stationary in one place, unlike the public service vehicle drivers. The limitation was addressed by targeting drivers in police stations and any private and public institutions along Thika Superhighway. Matters involving police operations are considered confidential, thus there was reluctant to provide full information. However this limitation was addressed by seeking research authority from the Inspector General of police, Ministry of Transport and Infrastructure and National Transport Safety Authority. The respondents were assured of the confidentiality of the information they provided would be used only for academic purposes.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The literature was reviewed in an effort to inform the study on the determinants of rising numbers of road accidents in developing countries. The literature review was focused on the following sub-headings; (a) Training aspects of motor vehicle drivers, (b) road designs and traffic accidents on superhighways, (c) types of vehicles and traffic road accidents on superhighways and (d) strategies for enhancing road safety on superhighways. This section would also present a theoretical framework to address a research theory and a conceptual framework adopted for the study.

2.2 Motor Vehicle Drivers Training

All countries have different requirements for one to acquire a motor vehicle driving license. The driver training schools in most countries are under the private sector but some government agencies provide driving instructions to suit their human resource. Availability of an elaborate curriculum on driving covering theory and practice in class and on the road was established to be important in imparting adequate driving skills and attitudes and has led to a considerable reduction of road accidents (Brock, McFann, Inderbitzen & Bergoffen, 2007). This observation implies that driving school curriculum is important because it stipulates what to be trained, by who, when, duration of training and testing of the trainee. In countries where there is no driving curriculum, the numbers of road cases are usually high (Dragutinovic & Twisk, 2006).

In a study on the training and testing of entry-level commercial motor vehicle drivers in different countries, it was established that in the USA there is no unified curriculum stipulating what should the drivers be trained on (Morgan, Tidwell, Medina, & Blanco, 2011). It was also established that each state in the USA has unique regulations on vehicle driving schools. It was established by this study that driving schools in different states

develop their curriculum for training drivers which is not universal in all states in the USA. Some state in the USA like Massachusetts has developed driver education programme for guiding the training of drivers (Massachusetts Registry of Motor Vehicles, 2014). The same observation was noted in Egypt where each driving school develops their curriculum to address beginners and advanced driving (Professional Truck Driver Institute, 2011). The same scenario is noted in Kenya, where there is no unified curriculum and therefore each driving school develops their own curriculum.

Each driving school in Kenya follows its training programme where Class E and BCE training takes an average of four weeks after which students are tested for competence before being issued with an interim driving license by the National Transport Safety Authority (NTSA). The NTSA, a Kenya national agency responsible for promoting safety on roads have developed a driver's training curriculum but has yet to be validated and implemented. Lack of a driving curriculum has been blamed as one of the major cause of road accidents in Kenya since the drivers are not properly trained on safety measures (Asingo & Mitullah, 2007).

The differences in the curriculum have resulted in different skills taught to drivers within the country and in different countries. In countries where there is unified curriculum like Dubai and some states in the USA, Japan, and Germany the driving curriculum is largely aimed at ensuring road safety in addition to knowing how to drive. Most of the available driving curriculum train drivers on the following; basic vehicle operation which entails vehicle orientation, vehicle control systems, vehicle inspections among others, safe operating practices for a basic operation that entail visual search, vehicle communication, speed management, space management among others. Another mandatory skill taught is Highway Code that covers areas like road signs; road markings among others are useful in ensuring safe driving. Some driving schools have incorporated other skills like

environmental knowledge, courtesy, customer care, basic vehicle maintenance, defensive driving with the overall aim of ensuring road safety. In most cases, vehicle driving instruction is over 80 percent practical oriented in class and on the road, a factor that reduces theoretical instructions (Morgan *et al.*, 2011).

Requirements for issuance of driving licenses differ from one country to another with some countries, especially where road safety measures are taken seriously being very strict (Augustus, 2012). The duration of training is not uniform in all countries and differed on practical lessons in class and on the road. According to Absal (2012) in Dubai during driving testing it's mandatory that one must drive on the highway for a minimum of two hours to obtain a driving license. In addition to the two hours of highway driving during testing in Dubai one must complete a forty-lesson curriculum. In the United Kingdom, one must undergo a motorcycle (mopeds) and motor vehicle basic training before sitting for the driving test.

In Kenya, it takes about four weeks to train on driving and obtain Class E and BCE where most of the instructions are directed on moving a vehicle from point "A" to point "B". It is not mandatory to have undergone to any driving school in Kenya to be tested and issued with a driving license but what is required is a proof you can drive and you are conversant with the Highway Code. The test in Kenya is conducted by the police traffic department. The test for acquiring a driving license is poorly conducted with no specific objective where questions are not moderated and is full of laxity and serves no purpose of ensuring safety on roads (Asingo & Mitullah, 2007).

2.3 Road Design and Traffic Road Accidents on Superhighways

Engineers designs roads with the following road safety in mind; hazard visibility measures, safe roadway surfaces, traffic control measures, road users behavioural control, traffic flow guidance, roadway signs and weather factors in an effort of ensuring road

safety. Superhighways are constructed with an aim of ensuring the smooth and fast flow of traffic between cities and countries. Their design allows exit and entry at designated junctions without greatly affecting traffic flow. There is deliberate segregation of mopeds, pedestrians, and slow-moving vehicles from using the main lanes in superhighways.

Bad road designs include narrow roads and bridges, invisible signs, lack of street lighting, lack of acceleration lanes, lack of road markings among others. Badly designed roads may lead to drivers making errors thus causing accidents. Different road classes call for different design requirements with superhighways or express motorways being constructed with the highest standards of designs to ensure highest road safety possible. International designs of super highway call for guard rails between the opposing lanes. Poor road designs have been blamed on road accidents mostly by drivers and stakeholders.

A report titled “Road Crash Problem” by World Bank in 2002 indicated that poor road designs are a major cause of traffic road accidents in developing countries since most of these countries modify road designs borrowed from developed countries (World Bank, 2002). Some countries when modifying the borrowed road designs removes the element of separating mopeds (motorcycles) and bicycle riders from the other motorists which in the end makes the roads unsafe. A report by Asian Development Bank lauded the effort of the China government for improving road network coupled with adequate road designs which have greatly reduced traffic road accidents considerably (Ono, Silcock & Teknom, 2013). The report recommended that developing countries need to learn a lesson from China to address poor road designs in an effort to address road carnage.

A study conducted in Kenya in 2011 on whether road accidents are caused by human error or poor roads established that the condition of roads contributed less road traffic accidents as compared to human error (Muchene, 2012). Although poor road designs contribute to fewer accidents in Kenya, in situations where road designs cause accidents the end results

are devastating. Tharaka Nithi Bridge near Chuka town in Tharaka-Nithi County presents a good example of poor road design where accidents have occurred (Mwithimbu, 2014). In a study conducted in Kenya on road traffic injuries, Odero, Khayesi and Heda (2003) established that 5.1% of the road accidents are caused by poor road designs.

The poor road designs can be contributed by difficult terrain like valleys, hills, lack of space for expansion, cost implication among other factors. Other factors that have contributed to poor road design are lack of stakeholder's involvement in road design and construction. The involvement of the traffic police during road design is non-existent in Kenya and they are the same people who are expected to ensure safety on the roads. Lack of pedestrians' provisions such as walkways, footbridges, designated Zebra crossing during road designs could pose risks resulting in road accidents.

2.4 Vehicle Types and Traffic Road Accidents

Vessels that use roads can be classified into mopeds (bi and tricycles) personal (private), public vehicles (Taxis and buses), light commercial and heavy commercial vehicles. Studies have shown that these types of vehicles have a potential of causing traffic road accidents at different magnitudes in different types of roads. For example in United Arab Emirates (UAE) studies on driver and vehicle type parameters' contribution to traffic safety it was established that light vehicles which consisted of private vehicles in four years from 2007 -2010 on average contributed to 80.93% of the accidents reported on all roads (Alkheder, Sabouni, & El Nagga, 2013). The same report established that light commercial vehicles contributed to 0.21% while heavy commercial vehicles contributed 7.62%.

In Japan, the major contributor to road accidents is personal vehicles at 47.9% as compared to heavy commercial at 3.8% reported on all roads (International Association of Traffic and Safety Sciences, 2007). The same report established that there are fewer road

accidents occurring on superhighways in Japan as compared to municipal roads. The same trend of personal vehicles causing accidents was noted in United Kingdom where 73% of private passenger's vehicles were largely involved in road accidents as compared to other categories of vehicles (GOV.UK, 2014). The reason why the private vehicles cause the most accidents could be attributed to large numbers as compared to other categories of vehicles. In most countries, personal vehicles on average accounts between 58 and 62% of all categories of vehicles (International Road Assessment Programme, 2006). In a study done in Kenya, it emerged that human error and over speeding other than the type of vehicles are the major causes of 85.5% of all road accidents reported in police stations (Manyara, 2013).The study also established that the public service vehicles, especially omnibuses, contribute more accidents as compared to buses.

2.5 Strategies for Enhancing Road Safety on Superhighways

These measures for ensuring road safety revolve around the improvement of road infrastructure and awareness creation among the road users. Road infrastructure improvement includes construction of new roads, improvement of existing ones, and construction of safety enhancement facilities among others. Education of road users on the safe use of roads has been established as one of the best strategies for making roads safe. A report by Canadian Government on road safety revealed that the number of road crashes reduced considerably when education programmes on road safety were rolled in all schools and in driving schools (Government of Canada, 2011). The education covered the use of safety belts and child restraint, compliance to speed limits, caution when joining the main highway, monitoring young drivers, avoiding alcohol and drugs while driving among others. Construction of new and improvement of the existing roads coupled with good designs have been established to reduce road accidents considerably.

The Peoples of Republic of China were experiencing many accidents in the 1960s and late 1980s but after the improvement of the road network through redesigning the existing one and construction of new ones has tremendously enhanced road safety in China which arguably had one of the highest fatal accidents in the world (Ono, Silcock, & Teknom, 2013). Use of technology to monitor vehicle speed has been adopted in many countries especially in developed countries. The technology includes speed cameras or guns, which control vehicle speed on the road when the vehicle is in motion, vehicle black box technology used in the UK which monitors all data regarding the vehicle movement whether stationary or on the motion. Vehicle monitoring system is an intelligent system that makes use of computer software and can monitor vehicle movement and have interactive capability with the driver, warning him or her in case of danger ahead (Chai, Abidin, Ibrahim & Ping, 2012).

Other technologies meant to change driver's behaviour include alcohol testing devices, speed monitoring devices like speed governors, computer speed monitors fitted on vehicles, GPS monitoring technology where the vehicle can be monitored in offices and handheld devices like mobile phones among others. In Kenya, the government has placed several measures to address road safety. These measures include the construction and improvement of the existing roads. New roads have been constructed all over the country and much more have been redesigned by widening, removal of sharp bends, duelling among other measures. Other measures like the fitting of speed governors to all public service vehicles to control speed use of speed monitors on major roads, use of Alco blow devise to monitor drink driving.

The government has also addressed the quality of driving by developing a unified curriculum to be used by all driving schools although it has not yet been implemented. The establishment of the National Transport Safety Authority (NTSA) is another strategy

employed by the Kenya government to ensure all issues of road safety are coordinated by one body to address the past challenges. The NTSA is charged with many responsibilities of ensuring road safety education to all road users (NTSA, 2015).

2.6 Summary of Literature Review

This section presents a summary of literature reviewed on determinants of rising numbers of road accidents with reference to Thika Superhighway. The literature reviewed identified lack of unified curriculum to train drivers in Kenya and this is one of the factors that may lead to the issuance of driving licenses to unqualified drivers. This research gap identified the need to carry out a study to investigate the training that the drivers undertake. There is lack of stringent enforcement of traffic rules mostly in developing countries as compared to developed countries. Poor road conditions like poor road designs, lack of adequate road signs among other were established to be responsible for road accidents all over the world. Human error was established to be the greatest cause of road accidents all over the world. Reviewed literature also established that different types of vehicles contribute differently to the causes of road accidents. It was revealed that personal/private passenger vehicles cause more accidents as compared to commercial vehicles. The above-identified gaps provide a rationale for conducting a study on the determinants of rising number of road accidents in developing countries a case of Thika Superhighway in Kenya.

2.7 Theoretical Framework

This study was guided by two theories, which are; the Accident Cessation Theory (ACT) and the Reciprocal Determinism Theory. The Accident Cessation Theory (ACT) was advanced by Herbert William Heinrich, a safety engineer and pioneer in the field of industrial accident safety, in 1932 (McKinnon, 2007). According to Heinrich, an "accident" is one factor in a sequence that may lead to an injury. The factors can be visualized as a series of dominoes standing on edge; when one falls, the linkage required

for a chain reaction is completed. Each of the factors is dependent on the preceding factor. This theory was developed to address the causes of accidents in industries but in this study, it will be used to inform the causes of accidents on roads. The theory was used to inform on the factors that will be investigated in order to establish the determinants of road accidents on the roads as discussed on the conceptual framework below.

Reciprocal Determinism Theory developed by Albert Bandura was also used to inform the study. The theory holds that the behaviour of a person can be changed by his or her social environment as well as personal factors (Burger, 2014). Behaviours that lead to accidents on the roads can be influenced by changes in the social environment, for instance, changes in traffic laws, and personal factors, including training aimed at enhancing personal cognitive skills and attitudes (Cacioppo, 2018). The theory holds that there is a significant probability that a person's conduct can be amended if the associated consequences are reviewed. Rosli, Mohd Rani, Mustaffa and Abdul Hanan (2017) used the theory in a study whose findings implied that changing driver license conditions may help stem traffic accidents. In the present study, the theory was developed to address how traffic accidents may be mitigated. The theory was used to inform on the factors that will be investigated in order to establish the determinants of road accidents on the roads as discussed on the conceptual framework below.

2.8 Conceptual Framework

This study was guided by the conceptual framework which depicted the relationship between the independent and dependent variables. Figure 2.1 presents the diagrammatic presentation of the conceptual framework for this study.

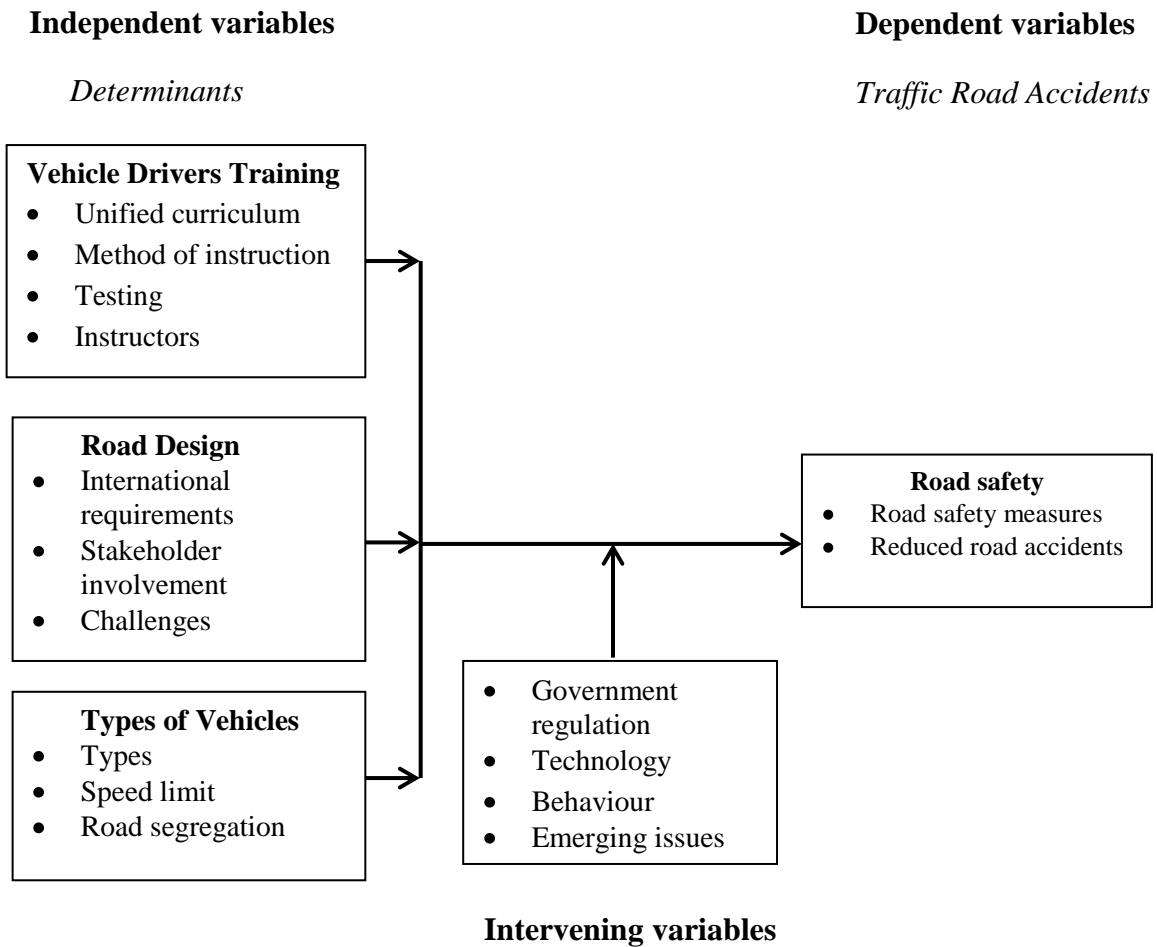


Figure 2.1: Conceptual Framework

Source: *Author (2015)*

The independent variables (Determinants) were derived from the objectives of the study and in summary comprised of vehicle drivers training, road design, types of vehicles and strategies used to enhance road safety which influences road safety on the roads (Dependent variables). The intervening variables comprised of government regulations and technologies used to improve road safety but were not explored in this study. The study collected data on the independent variable to assist in establishing the role in rising number of road accidents on roads in developing countries.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This section describes the research design, target population, sampling size and sampling procedure, and research instruments validity and reliability, data collection procedures and data analysis techniques.

3.2 Research Design

The study adopted descriptive research design which was complimented by exploratory research design to collect primary data. This design was used because it helped the researcher to understand more of an idea or provide details of the phenomenon under study. This study collected both qualitative and quantitative primary data.

3.3 Site of Study

The study was conducted along Thika Superhighway stretch from Nairobi Pangani Police station and Globe round-about to Thika Chania River. The choice of Thika Superhighway was informed by the realization it was the only Superhighway in Kenya by the time the study was conducted. The Superhighway was constructed to improve the road transport and reduce accidents. However, more accidents continue to happen despite the construction. This called for the need to carry out a study to determine the causes of rising number of traffic road accidents along the Superhighway. Figure 3.1 presents the Map of Thika Superhighway.

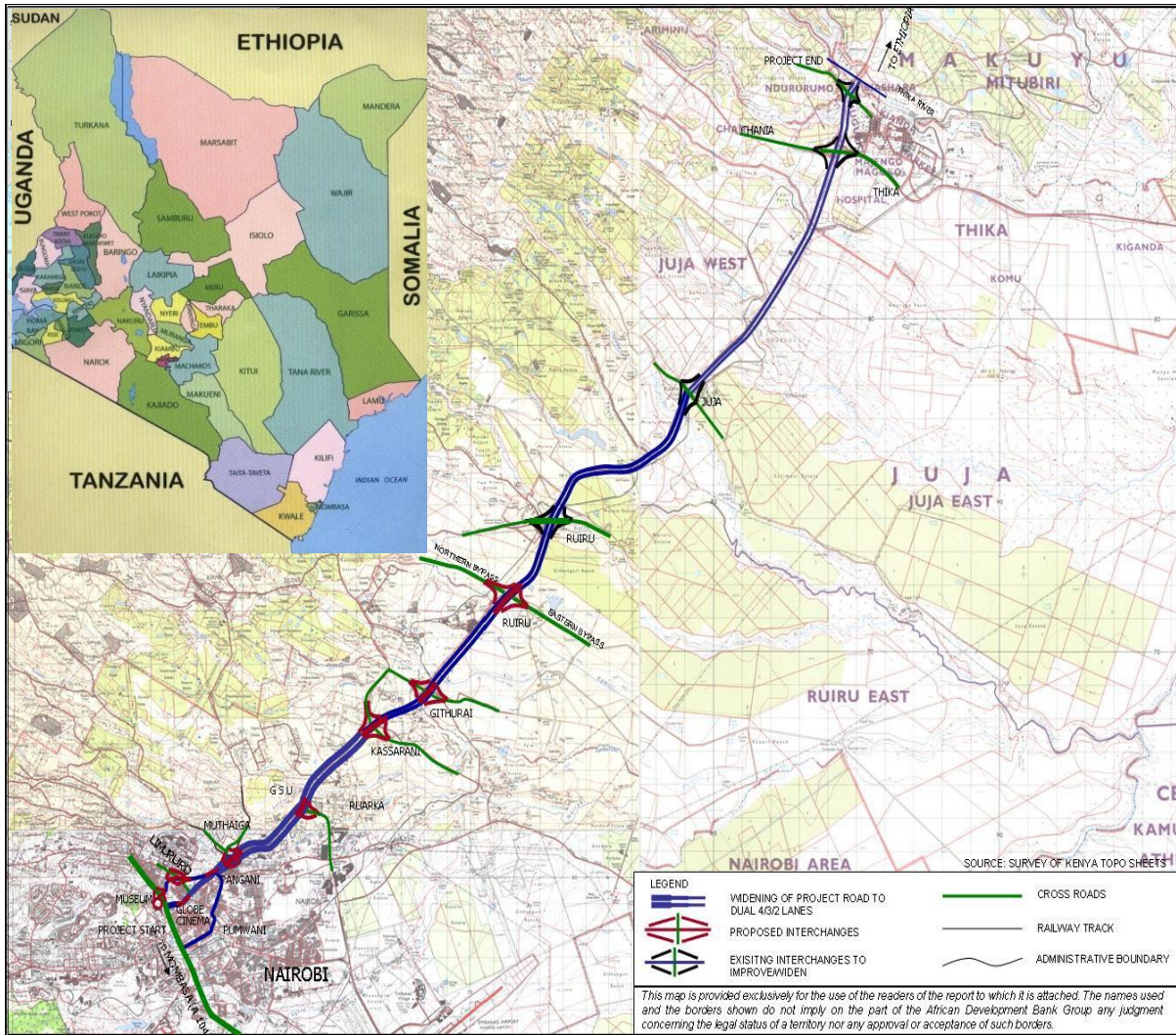


Figure 3.1: Map of Thika Superhighway

3.4 Target Population

The target population consisted of drivers of both public and private vehicles and pedestrians using Thika Superhighway. The study also targeted traffic police officers and personnel of National Road Safety Authority (NTSA) and Ministry of Transport and Infrastructure. Table 3.1 tabulates the target population.

Table 3.1: Target population

Target Population	Category of Target Population	Target Population
Kenya Police	Senior traffic police officers	7
	Junior Traffic police officers	84
National Transport Safety Authority	Senior officers	6
Ministry of Transport and Infrastructure	Senior officers	5
Drivers	Public Service Vehicles	30
	Private/Personal	45
	Motorcycle riders	20
Pedestrians	Pedestrians	52
Total		249

Source: Ministry of Transport and Infrastructure, National police service and National Transport Safety Authority (2015).

3.5 Sample Size Determination and Sampling Procedure

A purposive sampling technique was used to select senior traffic police officers along Thika Super highway. Likewise, purposive sampling technique was used to select two senior officers from the ministry of transport and NTSA. The convenient sampling method was employed to identify drivers, passengers, and pedestrians who were involved in the study. Table 3.1 tabulates the targeted population. The study used Slovin's formula $n = \frac{N}{1+N(e)^2}$, (where “ n ” is the desired sample size, “ N ” is the population size, and “ e ” is the margin of error) to determine the sample size of the traffic police officers for each police station. The computation $n = \frac{84}{1+84(0.05)^2}$ giving a sample size of 69 junior police officers who participated in the study. Table 3.2 presents the sample size of the respondents to be involved in the study. After the sample size of police officers was computed simple random sampling technique was used to select traffic police officers from Pangani, Muthaiha, Traffic Headquarters, Kasarani, Ruiru, and Juja Police Stations along Thika Superhighway.

Table 3.2: Target population and sample size

Institution	Category	Target Population	Sample Population
Kenya Police	Senior traffic police officers	7	3
	Junior Traffic police officers	84	69
National Transport Safety Authority	Senior officers	6	2
Ministry of Transport and Infrastructure	Senior officers	5	2
Drivers	Public Service Vehicles	35	35
	Private/Personal	40	40
	Motor bike	20	20
Pedestrians	Pedestrians	52	52
Total		247	223

3.6 Research Instruments

The study used questionnaires, interview schedule and focus group discussions to collect primary data.

a) Questionnaires

This type of instruments was used to collect primary data from junior traffic police officers, safety officers (NTSA), safety engineers, drivers, and pedestrians. This research instrument consisted of open and closed-ended items/questions.

b) Interview Schedule

This instrument was used to collect data from the senior officers from police traffic department, NTSA and from the Ministry of Transport and Infrastructure. The choice of this instrument was informed by the fact that it would provide an avenue for asking questions and making clarifications on the responses.

c) Focus Group Discussion

This instrument was used to collect data from motorcycle riders. Since the motorcycle riders were many, purposive sampling method was used to select one participant from six

SACCOs to form one focus group discussion (FGD) subjects. The findings of FGD was used to supplement other methods of data collection.

3.7 Validity

Validity is the degree to which results obtained from the analysis of the data collected in a study actually represents the phenomenon under study and also validity is the extent to which information collected by the researcher truly reflects the phenomenon being studied (Mugenda & Mugenda, 2003; Veal & Darcy, 2012). To ensure the validity of the instruments simple language was adopted to avoid ambiguity in an effort to promote the accurate responses by the respondents. The supervisor's expert opinion was sought regarding the validity of the research instruments.

3.8 Reliability and Piloting

The questionnaires were subjected to pilot test using the test retest method. In order to ensure their reliability, questionnaires (drivers, passengers, and pedestrians) were piloted at Kangemi – Limuru road dual carriageway. Traffic police officers research instruments were pre-tested at Kikuyu Police station along Kangemi – Limuru road dual carriageway.

3.9 Data Collection and Ethical Considerations

It was established important to adhere to the ethics during and after data collection. Permission was sought from National Commission of Science, Technology, and Innovation (NACOSTI), National Police Service and Kenyatta University. A consultation was done between traffic police department, Ministry of Infrastructure and Transport and NTSA on the methodology and the purpose of the study. A briefing on data collection was done to ensure participants were aware of what was expected of them. A self-administered questionnaire was administered to the respondents with the help of research assistant at their workplace for the respondents to fill. Face to face interviews with the senior traffic police officer, personnel of the Ministry of Transport and NTSA were conducted by the

researcher at convenient places. Confidentiality of the respondents was maintained where no names or employment numbers were recorded, in case of the traffic police officers.

3.10 Data Analysis

The study collected both quantitative and qualitative types of data. Quantitative data was analysed using descriptive statistics (Frequencies, percentages, means and standard deviations) and findings presented in tables and charts. Qualitative were analysed according to the themes and patterns formed. The data qualitative findings were presented in narrative and verbatim quotations.

CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

The main purpose of this study was to establish the determinants of traffic road accidents on Thika Superhighway, Kenya. The specific objectives were to: (a) establish whether the kind of training that the drivers undertake to qualify as drivers contribute to rising numbers of accidents on Thika Superhighway, (b) examine the contribution of road design on road accidents on Thika Superhighway, (c) establish the types of vehicles that cause traffic road accidents on Thika Superhighway and (d) establish the best strategies that can enhance road safety on Thika Superhighway.

This chapter has organised the study findings into five sections that have captured (a) response rate (b) participants demographic characteristics, (c) Driving training that may contribute to rising numbers of accidents along Thika Superhighway, (d) Contribution of road design on road accidents on Thika Superhighway, (e) Types of vehicles that causes traffic road accidents on Thika Superhighway and (f) Best strategies that can enhance road safety on Thika Superhighway.

4.2 Response Rate

4.2.1 Response Rate of the Self-administered Questionnaires

The study earmarked to interview a total of 75 drivers, 69 junior police officers, and 52 pedestrians. Table 4.1 tabulates the response rate for each category of respondents.

Table 4.1: Response rate

	Targeted sample size	No. of respondents interviewed	% Response rate
Junior Police Officers	69	49	71.01
Drivers	75	62	82.67
Pedestrians	52	47	90.38
Total	196	158	80.61

The analysis in Table 4.1 indicates that overall the response rate is 80.61 percent of all the respondents. The highest response rate was 90.38% and the least was 71.01% within all categories of road users. According to Mugenda and Mugenda (2003) a 50% response rate is adequate, 60% good and above 70% rated very well hence based on this assertion, the response rate for this study at 80.61% was very good. About 19.39% of the respondents were established not valid for analysis. However, this number did not affect the authenticity of the data collected since no categories recorded unacceptable response rates.

4.2.2 Response Rate of the Interview Schedule.

This study targeted three senior police officers, two senior officers in the National Transport Safety Authority and Ministry of Transport and Infrastructure managers. The study was able to interview all targeted officers representing 100 percent response rate. The high response rate can be attributed to support of the management from the respective institutions.

4.3 Demographic Information

This following section presents a brief description of the background information of junior police officers, drivers, and pedestrians who participated in this study. The background information collected included the gender distribution and pedestrians' residence. The findings are discussed in sections below.

4.3.1 Gender Distribution of the Respondents

The study deemed it important to establish gender status of the respondents. This was necessary in order to establish the distribution of the sampled respondents. The distribution according to their gender is presented in Table 4.2

Table 4.2: Gender distribution of the respondents

Respondents	Male		Female		Total	
	Count	%	Count	%	Count	%
Junior Police Officers	34	69.4	15	30.6	49	100
Drivers	36	58.1	26	41.9	54	100
Pedestrians	24	51.1	23	48.9	47	100

As presented in Table 4.2, 69.4% of the junior police officers were males while 30.6% were females. This can be attributed to the fact small numbers of women are recruited during police recruitment. However the small number of traffic women police officers from sampled police stations has satisfied the 30% constitutional threshold requirement on gender employment composition in public institutions. There was near gender parity on pedestrians and drivers interviewed.

4.3.2 Pedestrians Respondents

The study sought to establish the residence of the pedestrian respondents. This was necessary in order to ensure equitable distribution of respondents along the entire stretch of Thika Superhighway. The findings are presented in Table 4.3.

Table 4.3: Pedestrians respondents

Pedestrians Residence	Frequency	Per cent
Juja	4	8.5
Ruiru	4	8.5
Kahawa	4	8.5
Githurai	4	8.5
Homeland	4	8.5
Drive inn	4	8.5
Pangani Police Station to Kamukunji market	4	8.5
Roysambu	4	8.5
Kasarani	4	8.5
Witeithie	4	8.5
Pangani footbridge area	3	6.4
Thika town	2	4.3
Muthaiga	2	4.3
Total	47	100.0

The findings in Table 4.3 indicate an even distribution of pedestrians who were interviewed. These findings largely conformed to the study designs on the number of

pedestrian respondents to be sampled for each location. This implies that there was no bias in the selection of pedestrians and therefore the study findings were valid and reliable for generalization.

4.3.3 Pedestrians Frequency of Crossing Thika Superhighway

The study sought to establish how often the pedestrians interviewed cross Thika Superhighway. This was important since the higher their frequency of crossing the road the more the respondent have experience of traffic road accidents. The research findings are presented in Figure 4.1.

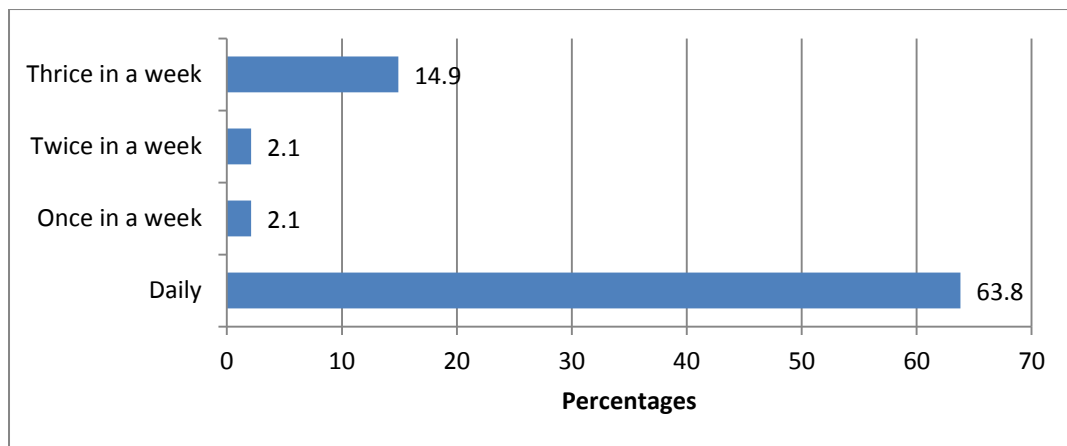


Figure 4.1: Pedestrians frequency of crossing Thika Super Highway

The findings in Figure 4.1 indicate majority (59%) of the pedestrians cross Thika Superhighway daily followed by once in a week (23%) while the least crossed it three times in a week. These findings imply that the respondents have wide experience on what happens on the highway. The high daily use of Thika Super Highway implies that there is likelihood of traffic road accidents if the users don't adhere to traffic rules.

4.3.4 Vehicle Driving Training

The study sought to establish how the respondents learned how to drive. This was necessary to establish the extent to which drivers are trained in driving schools. A cross tabulation between gender and mode of driving instructions was analysed and presented in Table 4.4.

Table 4.4: Mode of vehicle driving instruction

How the driver learnt driving	Gender		Total
	Female	Male	
a) Training school	23(37.1%)	21(33.9%)	44(71.0%)
b) Private (Friend or relative) instruction	2(3.2%)	7(11.3%)	9(14.5%)
c) Self-instruction	1(1.6%)	8(12.9%)	9(14.5%)
Total	26(41.9%)	36(58.1%)	62(100.0%)

The findings above shows that majority (71.0%) of the respondents received driving training in training school as compared to 14.5% who received driving training either privately or self-instructed. The high number of drivers having been trained in driving school is commendable. These findings were contrary to the observation of Asingo and Mitullah (2007) and Ndung'u, Bonface and Mwai (2015) who noted that majority of drivers in Kenya have not been trained in a recognized driving school. The study also established that more females (37.1%) were trained in driving schools as compared to 33.9% of males. Worth noting is the high number of men who were privatively and self-instructed drivers as compares to females. These revelations where majority of drivers are self-instructed pose a danger of lack of. The lack of standardization of the driving has the possibility of producing drivers with different orientation which is a recipe of chaos on the roads. This is mostly exhibited by public service vehicles especially the *Matatus* whose majority of the drivers are self-instructed.

4.3.5 Type of Vehicle Driven by Respondents

The study found it prudent to document the vehicles driven by the respondents. This was necessary in order to ensure equity in the distribution of the vehicles enrolled in the study. The study results are presented in Figure 4.2.

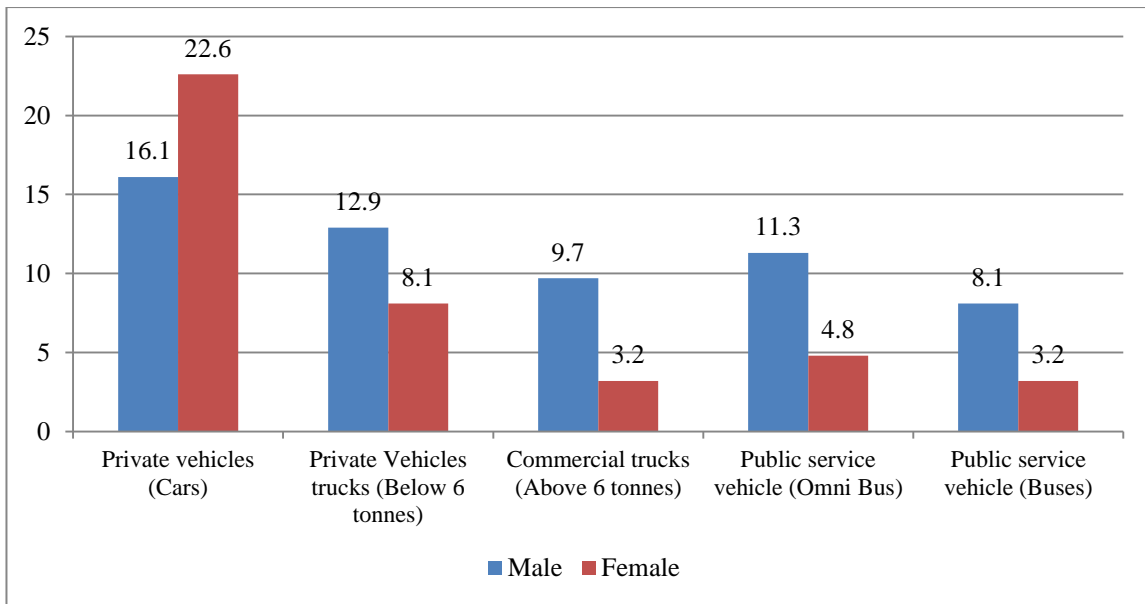


Figure 4.2: Types of vehicles involved in the study

The findings in Figure 4.2 show that the study involved different types of vehicles with the majority of the vehicles being cars. These findings were in agreement with WHO report which established that private cars are the majority of registered vehicles in Kenya (WHO, 2013). The study also established that most (22.6%) of the sampled women drive private cars as compared to 16.1% men. On the other hand most (19.4%) public service vehicles were driven by men as compared to 8% by women. The above findings show that Thika Super Highway is used by all types of vehicles. There is no policy or regulation that prevents heavy commercial vehicles from using the highway since there is no alternative roads. The heavy and slow moving vehicles were found not to follow traffic rules of driving on the left lanes. This has the possibility of slowing fast moving light vehicles which are allowed to drive over 80 Kilometres per hour. The lack adherence to the traffic rules by slow moving and heavy commercial vehicles call for a policy for ensuring they drive on the left lane which can reduce accidents. This has been implemented in South Africa The most important rule of the road in South Africa where it's a requirement is to keep slow moving vehicle as close to the left hand side of the road as possible.

4.3.6 Driving Experience

The Kenya government has provided guidelines on the driving experiences for driving different types of vehicles. The study, therefore, sought to establish the drivers' experience in order to determine if they comply with the government regulations. A cross tabulation between the type of vehicles and experience was analysed and presented in Table 4.5.

Table 4.5: Driving Experience

Type of vehicle	Driving Experience (Years)						Total
	1-2 years	2-4 years	4-6 years	6-8 years	8-10 years	Above 10 years	
Private vehicles car	10(16.1%)	6(9.7%)	4(6.5%)	2(3.2%)	0(0.0%)	2(3.2%)	24(38.7%)
Private vehicles truck (below 6 tonnes)	4(6.5%)	5(8.1%)	4(6.5%)	0(0.0%)	0(0.0%)	0(0.0%)	13(21.0%)
Commercial trucks (Above 6 tonnes)	1(1.6%)	1(1.6%)	3(4.8%)	2(3.2%)	0(0.0%)	1(1.6%)	8(12.9%)
Public service vehicle (Omni Bus)	1(1.6%)	3(4.8%)	3(4.8%)	2(3.2%)	1(1.6%)	0(0.0%)	10(16.1%)
Public service vehicle Bus	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	2(3.2%)	5(8.1%)	7(11.3%)
Total	16 (25.8%)	15(24.2%)	14(22.6%)	6(9.7%)	3(4.8%)	8(12.9%)	62(100%)

As presented in Table 4.5, the study established that overall most (25.8%) of the drivers had an experience of 1-2 years with the least (4.8%) with experience of 8 – 10 years. The analysis shows that about half (50%) of the drivers had an experience of four (4) years and above that is considered adequate for safe driving in Kenya. These findings implied that there are large (50%) numbers of the drivers with little experience (Below 4 years) who drive along Thika Superhighway. This can be attributed to improved economy in the last 10 years which has made car prices to be affordable for the middle-class to purchase and drive on the Kenyan roads. The improved economy, the reduced car prices, the increased affordability of the cars, and the large number of drivers with limited driving experience may be viewed as successive dominoes on an edge and falling in chain reaction manner in

the light of the ACT (McKinnon, 2007). This observation is supported by one of the senior police officers who had this to say;

“..... of late we have seen a lot of young Kenyan both male and female driving vehicles especially the private cars. When we stop them in our routine work we have realised majority have experience of between 6 months to 3 years. This was not common before 2002 which is an indicator of growing economy favouring the young generation with no gender discrimination” (Oral Interview (O.I) April 2016).

The above sentiments confirm that the driving age has reduced which can be attributed to the increased number of middle class due to improved economy and change of lifestyles among the young generations. This has the likelihood of drivers over speeding a common scenario with young inexperienced drivers. Over speeding has been blamed for majority of road crashes globally. This study did not explore the contribution of drivers driving experience on road accidents on Thika Superhighway but it cannot be overruled.

4.3.7 Experience Driving along Thika Superhighway

The research established it necessary to establish the respondents’ driving experiences along Thika Superhighway. The results of the findings are presented in Figure4.3.

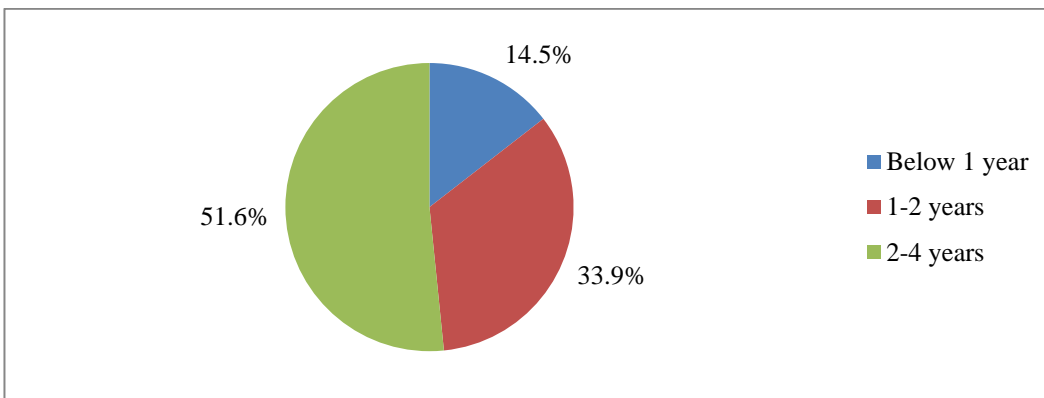


Figure 4.3: Experience driving along Thika Superhighway

The research findings in Figure 4.3 indicate that majority (51.6%) of the drivers have an experience of between 2 and 4 years of driving on Thika Superhighway as compared to the least experience of 1 year at 14.5 percent. Thika Superhighway is the first road of this nature to be constructed in Kenya. From the above findings it can be argued that majority

of the interviewed drivers had less than five years experiences of using the road. These revelations means that drivers may have not been trained on driving on a Superhighway since it's new in Kenya. This calls for the training of drivers on how to drive in Superhighways.

4.3.8 Junior Police Officers Working Experience in the Police Service

The study sought to establish how long the junior police officers have worked in the police service. This was necessary in order to establish the police officers experiences in police duties. The findings are presented in Table 4.6.

Table 4.6: Junior police officers working experience in the police service

Count	Minimum	Maximum	Mean	Mode	Medium	Std. Deviation	Range
49	2.00	15.00	7.24	5.00	8.00	3.620	13.00

NB: values in years

Findings in Table 4.6 show that the longest-serving police officer has served for 15 years while the lowest have served for two years in the police service. A mean working experience of 7.24 years and a mode of 5.00 is an indicator that the police officers sampled have wide experience on police duties. The above revelation implies that most of the police officers have worked in the police service long enough and therefore they have relevant adequate experience on traffic operations. It may also imply that the information collected during primary data collection was rich due to the long experience of the employees.

4.3.9 Junior Police Officers Working Experience along Thika Superhighway

The study sought to establish how long the junior police have worked along Thika Superhighway. This was necessary in order to establish if the police officers have experience in traffic operations along Thika Superhighway. The findings are presented in Table 4.7.

Table 4.7: Junior police officers working experience along Thika Superhighway

Count	Minimum	Maximum	Mean	Mode	Medium	Std. Deviation	Range
49	1.00	5.00	2.96	2.00	3.00	1.457	4.00

NB: values in years

Table 4.7 shows that the longest-serving police officer has served for five years while the least have served for one year along Thika Superhighway. A mean working experience of 2.96 years and a mode of 2.00 is an indicator that the police officers sampled have wide experience on traffic duties along Thika Superhighway bearing in mind it's about five years old. The above revelations imply that most of the police officers have experience on traffic operations along the Thika Superhighway.

4.4 Black Spot Sections along Thika Superhighway

The study sought to identify the black spot sections along Thika Superhighway. This was necessary in order to establish sections where vehicles and pedestrians are involved in traffic road accidents. The analysis on Table 4.8 presents the research findings.

Table 4.8: Black Sport Sections along Thika Superhighway

Black Sport Sections	Respondents					
	Driver		Pedestrians		Police officers	
	N	%	N	%	N	%
Allsops	10	3.6	4	1.6	5	2.2
Along safari park	3	1.1	3	1.2	3	1.3
Drive Inn	25	8.9	16	6.5	22	9.5
Engen (Kahawa Sukari under pass)	5	1.8	4	1.6	6	2.6
Githurai	43	15.3	32	13.1	22	9.5
Ha Kairu	34	12.1	33	13.5	25	10.8
Homeland	25	8.9	21	8.6	16	6.9
Juja near Ndarugo Motel	12	4.3	12	4.9	12	5.2
Muthaiga between the over pass bridge and food bridge	4	1.4	4	1.6	5	2.2
Ndarugo	13	4.6	12	4.9	5	2.2
Ngara stretch between Guru Nanak and KICD foot bridge	15	5.3	18	7.3	9	3.9
Pangani	8	2.8	13	5.3	11	4.8
Roysambu near foot bridge and underpass	6	2.1	12	4.9	13	5.6
Ruiru near the foot bridge	22	7.8	19	7.8	22	9.5
Survey under pass	7	2.5	4	1.6	9	3.9
Thika – Njomoko (Around the flyover)	12	4.3	12	4.9	11	4.8
Witeithie	37	13.2	26	10.6	35	15.2
Total	281	100.0	245	100.0	231	100.0

NB:Multiple responses used to analyse data from Drivers (N=54); Police Officers; (N=49) and Pedestrians (N=47).

Table 4.8 documents black sports along the entire stretch of Thika Superhighway. From the findings sections without food bridges records most responses. These sections are Githurai, Witeithie, Ha – Kairu, Homeland, and Drive Inn. These sections among others have been recorded to have had traffic road accidents involving pedestrians. These findings were confirmed by senior police and National Transport Safety Authority who confided the following;

“.....all sections that have no footbridges and experience large number of pedestrians crossing has recorded many accidents involving vehicles and pedestrians. The major sections are Witeithie, Ha-Kairu, Ndarugo, sections between Safari Park and Homeland. Other sections are Drive Inn and Kihunguro” O.I April 2016.

In the light of the ACT as explained by McKinnon (2007), the confirmation by the senior police officer and the NTSA suggests that the lack of the footbridges leads to

the accidents involving vehicles and pedestrians in the areas. The lack of the footbridges and the accidents are consecutive dominoes that fall in succession.

4.5 Drivers Training

The first objective was to establish whether the kind of training that the drivers undertake to qualify as drivers contribute to rising numbers of accidents on Thika Superhighway. The primary data for this objective was solicited information from drivers and police officers using Likert scale. The Likert scale comprised of a measurement of 1- 5 (Strongly Agree – SA [1], Agree - A [2], Neither Agree or Disagree (NAD) [3], Disagree - DA [4] and Strongly Disagree - SD [5]). Boone and Boone (2012) observe that mean and standard deviation as the appropriate analysis techniques for Likert scale. In addition, the pedestrian's information was collected using Yes or No options. The responses were analysed separately for each category of the respondents and discussed in the sections below.

4.5.1 Drivers Responses on the Contribution of the Kind of Drivers Training on Traffic Road Accidents along Thika Superhighway

The drivers were asked what factors of driving training they thought contributed to the frequent accidents along Thika Superhighway. The response findings for drivers are presented in Table 4.9.

Table 4.9: Drivers responses on the contribution of kind of driving training on traffic road accidents along Thika Superhighway

	Responses	N	Mean	Std. Deviation
a)	Driving schools lack qualified instructors to train drivers and as a result has contributes to rising traffic road accidents along Thika Superhighway	62	2.23	1.298
b)	The current vehicle driving syllabus is not sufficient to produce drivers who can drive safely along Thika Superhighway	62	2.92	1.029
c)	Having been trained in a driving school does not prevent public vehicle drivers from exhibit poor driving skills which in turn has contributed to rising traffic road accidents along Thika Superhighway	62	2.05	0.965
d)	Having been trained in a driving school does not prevent private vehicle drivers exhibit poor driving skills which in turn has contributed to rising traffic road accidents along Thika Superhighway	62	2.89	1.203

Key: Strongly Agree – **SA** [1], Agree - **A** [2], Neither Agree or Disagree (**NAD**) [3], Disagree - **DA** [4] and Strongly Disagree - **SD** [5]

The study's findings in Table 4.9 ranged from a mean of 2.05 – 2.92 which falls under “Agree” measurement in the Likert scale. These findings portrayed poor driving skills among the drivers using Thika Superhighway. The findings also established that the driving instructions are conducted by personnel who lack necessary knowledge and skills. The study also established that the current vehicle driving syllabus is not adequate to produce drivers who can drive safely along Thika Superhighway. The above findings imply that the kind of drivers produced in driving schools do not have adequate skills to drive safely on Thika Superhighway. These findings are in agreement with study findings by Absal (2012) who established that driving schools in Kenya lack a curriculum that can train drivers who can drive safely on Kenya roads. In the light of the ACT as explained by McKinnon (2007), the high number of accidents along the superhighway may be attributed to the drivers’ poor driving skills which may in turn be attributed to the unqualified driving school instructors and the inadequate vehicle driving syllabus.

4.5.2 Pedestrians Responses on the Contribution of the Kind of Drivers Training on Traffic Road Accidents along Thika Superhighway

The study sought pedestrians' responses on the kind of driving training contribution on traffic road accidents along Thika Superhighway. The responses findings for pedestrians are presented in Table 4.10.

Table 4.10: Pedestrians responses on the contribution of kind of driving training on traffic road accidents along Thika Superhighway

	Responses	Yes	No
a)	Driving schools lack qualified instructors to train drivers and as a result has contributes to rising traffic road accidents along Thika Superhighway	35(74.5%)	12(25.5%)
b)	The current vehicle driving syllabus is not sufficient to produce drivers who can drive safely along Thika Superhighway	33(70.2%)	14(29.8%)
c)	Having been trained in a driving school does not prevent public vehicle drivers from exhibit poor driving skills which in turn has contributed to rising traffic road accidents along Thika Superhighway	40(85.1%)	7(14.9%)
d)	Having been trained in a driving school does not prevent private vehicle drivers exhibit poor driving skills which in turn has contributed to rising traffic road accidents along Thika Superhighway	34(72.3%)	13(27.2%)

Table 4.10 indicates that over 70% of the pedestrian respondents agreed that driving schools lack qualified instructors and adequate syllabus to train qualified drivers. The study also established that both public service vehicle and private vehicle drivers lack skills of driving along Thika Superhighway. These findings imply that the lack of qualified instructors and inadequate driving syllabus contribute to poor drivers which in turn lead to traffic road accidents on Thika Superhighway. According to the ACT, as explained by McKinnon (2007), the high number of accidents along the superhighway may be attributed to the drivers' poor driving skills which may in turn be attributed to the unqualified driving school instructors and the inadequate vehicle driving syllabus. These revelations are supported by the findings of Chitere and Kibua (2004) on the study on

improvement of safety in Matatu industry in Kenya established that lack of qualified driving instructors and lack of a unified driving syllabus has resulted in incompetent drivers. As a result, incompetent drivers are issued with driving licenses without adequate skills of safe driving on the roads.

4.5.3 Police Officers Responses on the Contribution of the Kind of Drivers Training on Traffic Road Accidents along Thika Superhighway

It was thought prudent to seek police officers responses on the contribution of the kind of driving training on traffic road accidents along Thika Superhighway. The responses by the police officers are presented in Table 4.11.

Table 4.11: Police officers responses on the contribution of kind of driving training on traffic road accidents along Thika Superhighway

Responses	N	Mean	Std. Deviation
a) Driving schools lack qualified instructors to train drivers and as a result has contributes to rising traffic road accidents along Thika Superhighway	49	1.61	.953
b) The current vehicle driving syllabus is not sufficient to produce drivers who can drive safely along Thika Superhighway	49	1.63	.883
c) The motorcycle riders lack training on the road safety	49	1.49	1.063
d) Drivers training concentrate on moving vehicles from one point to another with no regard to road safety issues	49	1.49	.739
e) Lack of night instruction during driving training leads to poor driving	49	1.90	1.373
f) The public transport drivers are poor drivers since most of them did not attend driving schools	49	1.76	1.164
g) Lack of courtesy training among drivers of private and PSV drivers has contributed to road accidents on Thika Superhighway	49	1.55	1.062

Key: Strongly Agree – **SA** [1], Agree - **A** [2], Neither Agree nor Disagree (**NAD**) [3], Disagree - **DA** [4] and Strongly Disagree - **SD** [5]

The study findings in Table 4.11 ranged from a mean of 1.55 – 1.90 which falls under “Strongly Agree” measurement in the Likert scale. These findings depicted poor driving skills among the drivers using Thika Superhighway. The study established that lack of driving skills is attributed to lack of qualified driving instructors in driving schools, lack of driving curriculum to produce skilled drivers among others. The study also established

that drivers lack courtesy and most of the PSV drivers have not attended driving schools. The above findings imply that lack of driving skills has contributed to increased traffic road accidents on Thika Superhighway. According to the ACT, as explained by McKinnon (2007), the high number of accidents along the superhighway may be attributed to the drivers' poor driving skills which may in turn be attributed to the unqualified driving school instructors and the inadequate vehicle driving syllabus. This observation is in agreement with observations of Ikiara (2005) who noted that lack of adequate driving training and courtesy contribute largely to traffic road accidents on roads in developing countries.

4.6 Contribution of Road Design on Traffic Road Accidents on Thika Superhighway

The study was partially geared towards establishing the contribution of road design on traffic road accidents on Thika Superhighway. Poor road design has been blamed on many traffic road accidents occurring in developing countries in a report titled "Road Crash Problem" and published online in 2002 by World Bank (2002). Primary data for this objective was solicited using a Likert scale from drivers and police officers respondents. The Likert scale comprised of a measurement of 1- 5 (Strongly Agree – SA [1], Agree - A [2], Neither Agree or Disagree (NAD) [3], Disagree - DA [4] and Strongly Disagree - SD [5]). The responses were analysed separately for each category of the respondents and discussed in the sections below.

4.6.1 Drivers Responses Contribution of Road Design on Traffic Road Accidents on Thika Superhighway

The study sought to establish from drivers the contribution of road design to increased traffic accidents on Thika Superhighway. This was important because the drivers are in

better position to determine if the road design causes road accidents. The research findings are as presented in Table 4.12.

Table 4.12: Drivers responses on the contribution of road design on traffic road accidents along Thika Superhighway

Drivers Responses		N	Mean	Std. Deviation
a)	Road exits from the inner lane (highway) to the service lanes contribute traffic road accidents along Thika Super Highway	62	2.03	1.008
b)	The location of some exist especially downhill are major cause of traffic road accidents along Thika Superhighway	62	1.98	.820
c)	Lack of and wrong placement of road signs is a cause of traffic road accidents along Thika Superhighway	62	2.55	1.237
d)	Inadequate foot bridges is major cause of traffic road accidents along Thika Superhighway	62	2.53	1.339
e)	Poor design on storm water drainage is one cause of traffic road accidents when it rains along Thika Superhighway	62	2.18	.859
f)	Inadequate passenger dropping points is a major cause of traffic road accidents along Thika Superhighway	62	2.53	1.411
g)	Inadequate space for parking of stalled vehicles is a one cause traffic road accidents along Thika Superhighway	62	2.48	1.238

Key: Strongly Agree – **SA** [1], Agree - **A** [2], Neither Agree nor Disagree (**NAD**) [3], Disagree - **DA** [4] and Strongly Disagree - **SD** [5]

The research findings in Table 4.12 ranged from a mean of 1.98 – 2.55 and falls under “Strongly Agree and agree” measurement in the Likert scale. This finding is an indicator of a poor highway road design. The above findings imply that poor road design may be contributing to rising number of traffic road accidents along the highway. According to the ACT, the poor road design may be viewed as being a domino whose fall causes the fall of the traffic road accidents domino (McKinnon, 2007). However, the above findings were disputed by the senior police officers who noted the following;

“... Thika Superhighway has some design challenges which mostly contribute to major traffic jams. These design challenges do not significantly contribute to rising number of traffic accidents along the Superhighway. Our reports shows that majority of traffic road accidents are caused by human error, indiscipline among the drivers and lack of skills of driving on three to four lane roads like Thika Superhighway which most drivers are not used” (O.I April 2016).

The sentiments above are supported by the findings of Amedorme and Nsoh (2014) in a study on the causes of traffic road accidents in Ghana. Amedorme and Nsoh (2014) established that indiscipline among the drivers was found to be the major contributor of accidents.

4.6.2 Pedestrians Responses Contribution of Road Design on Traffic Road Accidents on Thika Superhighway

NTSA report on the state of road safety in Kenya for 2015 indicated that majority of the victims were pedestrians. The study, therefore, found it necessary to establish from the pedestrians the contribution of road design to traffic road accidents on Thika Superhighway. The findings are presented in Figure 4.4.

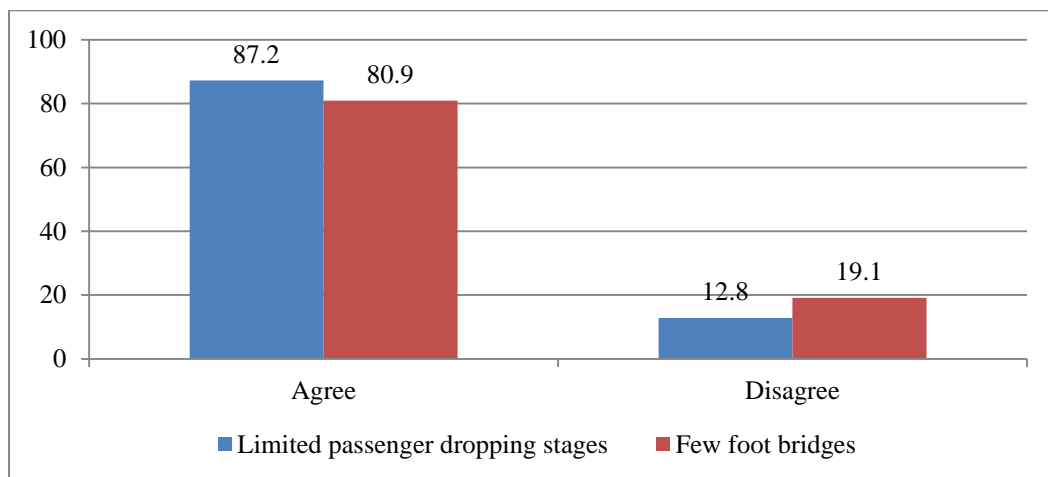


Figure 4.4: Pedestrians responses on the contribution of road design on road accidents along Thika Superhighway

The findings in Figure 4.4 established that limited passenger dropping stages (87.2%) and few footbridges (80.9%) are some of the anomalies of the road design that is contributing to the traffic road accidents on Thika Superhighway. A focus group discussion with the motorcycle riders identified Witeithie, Njomoko in Thika, Ndarugo, Homeland, Kihunguro and Drive Inn as some of the areas where the designers of the highway failed to erect footbridges. Also, lack of bus stages or passenger dropping points at already

constructed footbridges at Car Wash Food Bridge and Guru Nanak stage is another anomaly of the road design which contributes to road accidents. These observations were supported by one senior safety officer who noted the following;

“..... Though the design of exit lanes were properly designed following international standards to prevent accidents, they in turn created the problem of creating traffic jams especially at Roysambu, Muthaiga, Kimbo, Githurai among others. In order to avoid traffic jam the motorists especially PSV drop passengers on the undesignated places on the highway which has resulted in traffic accidents involving pedestrians and vehicles. The traffic road accidents cannot be therefore be entirely be blamed on the defective road design but on the indiscipline among drivers where they abide to the required regulations” (O.I, April 2016).

The above sentiments reveal that the road designer did not foresee the challenges of traffic jam and how it would change the drivers' behaviours that will lead to breaking laws and in turn lead to traffic road accidents. According to the ACT, as explained by McKinnon (2007), the high number of accidents along the superhighway may be attributed to undesirable driver behaviour which may in turn be attributed to the road designers' lack of foresight regarding the challenges of traffic jams. These findings are in agreement with the observation of Sharples (2014) in a study on motorists' habitual traffic behaviour established that motorist behaviour changes are dependent on the situation of traffic flow on the roads. Road designs should involve many stakeholders like police, association of engineers, consultants among other in order to provide diverse ideas relevant in designing safe roads.

4.6.3 Police Officers Responses Contribution of Road Design on Traffic Road Accidents on Thika Superhighway

According to Traffic Act Cap 403 (GoK, 2014), the Traffic Police department is mandated to enforce traffic laws and regulations. They have the responsibility of ensuring safety on roads by educating the road users and also to arrest and charge offenders. It was with this in mind that the study sought to establish from the traffic police department if the road

design has contributed to rising number of road accidents on Thika Superhighway. The research findings are presented in Table 4.13.

Table 4.13: Police officers responses on the contribution of road design on road accidents along Thika Superhighway

	Responses	N	Mean	Std. Deviation
a)	Road exits on the inner lane are major contributors of traffic road accidents along Thika Superhighway	49	2.51	1.210
b)	The location of some entry lanes (joining lanes to the highway) especially downhill major cause of traffic road accidents along Thika Superhighway	49	2.59	1.257
c)	Inexistence and wrong placement of road signs is a cause of traffic road accidents along Thika Superhighway	49	4.14	0.791
d)	Inadequate foot bridges is major cause of traffic road accidents along Thika Superhighway	49	2.98	1.233
e)	Poor design on storm water drainage is one cause of traffic road accidents when it rains along Thika Superhighway	49	4.08	1.256
f)	Inadequate passenger dropping points is a major cause of traffic road accidents along Thika Superhighway	49	4.27	1.095
g)	Inadequate space for parking of stalled vehicles is a one cause traffic road accidents along Thika Superhighway	49	2.82	1.318

Key: Strongly Agree – **SA** [1], Agree - **A** [2], Neither Agree or Disagree (**NAD**) [3], Disagree - **DA** [4] and Strongly Disagree - **SD** [5].

The findings in Table 4.13 show mixed responses on the contribution of road design on traffic road accidents along Thika Superhighway. This is so because the police officers agreed that the design and location entry lanes together with exit lanes have a contribution to traffic road accidents. The study also established that the police agreed that the road designers did not factor enough footbridges and adequate space for parking for stalled vehicles which in turn contribute to traffic road accidents. The above observation is supported by Machara (2014) who argued that the designers of Thika Superhighway did not adequately address the pedestrian crossing facilities. This is so because only eight footbridges were incorporated in the first design until stakeholders intervened. A senior police officer who was interviewed noted the following;

“..... the highway has areas which have poor road design especially where the exit and entry lanes joins the highway. These lanes lack acceleration or deceleration lanes. The most notable ones are lanes joining the highway at GSU downhill on the way to Thika, Juja at Thirika river on the way to Nairobi to mention a few. These areas and others have contributed to traffic road accidents” (O.I. April 2016).

Police officers disagreed that the design for passenger dropping points, road signage, and storm water contributes to traffic road accidents on the highway. However the observation of senior police officers and safety officer interviewed noted that;

“..... though there are few areas that lack passenger dropping points like Guru Nanak, Car Wash area and Ha Kairu, many of the accidents involving passengers alighting from vehicles happens when they alight from undesignated areas. Drivers have a habit of dropping passengers on these areas instead of designated areas to avoid traffic jams. This behaviour sometimes tempts the passengers to cross the highway without using the foot bridges resulting in fatal accidents” (O.I. April 2016).

The above observation confirms that the road designers did not foresee the emerging issues posed by traffic jam occasioned by unprecedented positive impacts of Thika Superhighway. The positive impact is manifested by increased economic activities like development of shopping malls and housing estates, which attract a large number of clients. According to Wairimu (2016), these economic activities have resulted to many vehicles (both public and private) using the highway thus creating heavy traffic jams. According to the ACT, as explained by McKinnon (2007), the high number of accidents along the superhighway may be attributed to undesirable driver behaviour which may in turn be attributed to the road designers' lack of foresight regarding the challenges of traffic jams. The poor road designs need to be corrected before road construction commences. This can be done by performing simulations using computer software.

4.7 Types of Vehicles that Contribute to Traffic Road Accidents on Thika Superhighway

The third objective was to establish the contribution of types of vehicle on traffic road accidents on Thika Superhighway. Primary data for this objective was solicited using

Likert scale drivers and police officers respondents. The Likert scale comprised of a measurement of 1- 5 (Strongly Agree – **SA** [1], Agree - **A** [2], Neither Agree or Disagree (**NAD**) [3], Disagree - **DA** [4] and Strongly Disagree - **SD** [5]). The responses were analysed separately for each category of the respondents and discussed in the sections below.

4.7.1 Drivers Responses on the Contribution of Types of Vehicles on Traffic Road Accidents on Thika Superhighway

The study sought the responses of the drivers on the contribution of different types of vehicles on traffic road accidents on Thika Superhighway. These were necessary because studies have shown that different types of vehicles contribute to accidents differently. The findings are presented in Table 4.14.

Table 4.14: Drivers responses on the contribution of vehicle types on road accidents along Thika Superhighway

	Responses	N	Mean	Std. Deviation
a)	Public transport vehicles are major contributor of traffic road accidents along Thika Superhighway	62	2.02	.932
b)	Private transport vehicles are major contributor of traffic road accidents along Thika Superhighway	62	2.48	1.112
c)	Private heavy transport vehicles are major contributor of traffic road accidents along Thika Superhighway	62	4.00	1.255
d)	Motor cycles are major contributors of traffic road accidents along Thika Superhighway	62	4.11	1.132
e)	Bicycles major contributors of traffic road accidents along Thika Superhighway	62	4.13	1.138

Key: Strongly Agree – **SA** [1], Agree - **A** [2], Neither Agree or Disagree (**NAD**) [3], Disagree - **DA** [4] and Strongly Disagree - **SD** [5].

The findings in Table 4.14 shows that public service vehicles and private vehicles are the major contributors to traffic road accidents on Thika Superhighway as compared to heavy commercial vehicles, motorcycles, and bicycles. These findings are in agreement with findings of Ndung'u *et. al.*, (2015), in a study on causes and response strategies of road traffic accidents in Kenya which established that private cars and PSV are the

major causes of traffic accidents on Kenyan roads. The motorcycles and bicycles may not be contributing much to the accidents since there are lanes set aside for them. A focus group discussion with the motorcycle riders confided the following;

“..... most of us use the reserved area outside the service lane. This is so because our clients demands so unless it’s a must we use the highway or service lanes especially to long distances. Since we started to adhere to traffic regulations of riding on far out of the lanes and reserved areas accidents involving motorcycles have considerably reduced. However we still experience many accidents on other roads since there are no dedicated lanes for motor cycles (FGD. April 2016).

The above sentiments show that with self-regulation among the road users the number of road accidents can be reduced considerably.

4.7.2 Passengers Responses Contribution of Types of Vehicles on Traffic Road

Accidents on Thika Superhighway

The study established it necessary to document the pedestrians’ responses on the type of vehicles that contribute to traffic road accidents on Thika Superhighway. The findings are presented in Table 4.15.

Table 4.15: Pedestrians responses on the contribution of vehicle types to road accidents along Thika Superhighway

Responses	N	Mean	Std. Deviation
a) Public transport vehicles are major contributor of traffic road accidents along Thika Superhighway	47	1.57	.801
b) Private transport vehicles are major contributor of traffic road accidents along Thika Superhighway	47	2.17	.963
c) Private heavy transport vehicles are major contributor of traffic road accidents along Thika Superhighway	47	4.04	1.250
d) Motor cycles are major contributors of traffic road accidents along Thika Superhighway	47	4.36	.895
e) Bicycles major contributors of traffic road accidents along Thika Superhighway	47	4.28	.926

Key: Strongly Agree – **SA** [1], Agree - **A** [2], Neither Agree or Disagree (**NAD**) [3], Disagree - **DA** [4] and Strongly Disagree - **SD** [5]

The findings in Table 4.15 indicate that private and public vehicles contribute greatly to traffic road accidents on Thika Superhighway as compared to heavy commercial vehicles,

motorcycles, and bicycles. The above results tally with the drivers' responses in section 4.7.2 above.

4.7.3 Police officers Responses Contribution of Types of Vehicles on Traffic Road Accidents on Thika Superhighway

The study sought to establish from the police which vehicles contribute to traffic road accidents on Thika Superhighway. The findings are as presented in Table 4.16.

Table 4.16: Police officers responses on the contribution of vehicle types to road accidents along Thika Superhighway

Responses	N	Mean	Std. Deviation
a) Public transport vehicles are major contributor of traffic road accidents along Thika Superhighway	49	1.82	1.236
b) Private transport vehicles are major contributor of traffic road accidents along Thika Superhighway	49	1.86	1.225
c) Private heavy transport vehicles are major contributor of traffic road accidents along Thika Superhighway	49	4.12	1.053
d) Motor cycles are major contributors of traffic road accidents along Thika Superhighway	49	2.35	1.234
e) Bicycles major contributors of traffic road accidents along Thika Superhighway	49	4.02	1.181

Key: Strongly Agree – **SA** [1], Agree - **A** [2], Neither Agree or Disagree (**NAD**) [3], Disagree - **DA** [4] and Strongly Disagree - **SD** [5].

The analysis in Table 4.16 shows a similar trend as was established in responses of pedestrians and drivers in sections discussed above. The similarity is that PSV and private cars are major contributors of accidents along the highway. These two types of vehicles are the majority, a factor that may have led them to be a major contributor to traffic road accidents. These observations are in agreement with findings of Chepchienget *al.* (2016) on a study on the road safety before, during and after the construction of Thika Superhighway established that PSV and private cars are the majority on Thika Highway and contribute the most traffic accidents.

4.8 Best Strategies for Enhancing Road Safety on Thika Superhighway

The fourth objective was to establish the contribution of types of vehicle on traffic road accidents on Thika Superhighway. The results are as presented in Table 4.17.

Table 4.17: Best Strategies for enhancing road safety on Thika Superhighway

Measures to address traffic road accidents on Thika Superhighway	Police Officers	Drivers	Pedestrians
New driving curriculum to include night instructions, road safety, road courtesy, increase duration and change the method of driver testing	51(28.7%)	25(13.3%)	28(11.0%)
Heavy penalties like hefty fines, suspension of licences	35(19.7%)	25(13.3%)	45(17.7%)
Erect speed limit sign posts and others prominently	31(17.4%)	10(5.3)	15(5.9%)
More traffic police to enforce rules and regulations on roads	26(14.6%)	21(11.2%)	28(11.0%)
Permanent speed guns, CCTV and Alcohol blow	17(9.6%)	20(10.6%)	45(17.7%)
Redesigning exit and entry lane prone to accidents and building more foot bridges	9(5.1%)	38(20.2%)	45(17.7%)
Retraining drivers on the appropriate way of driving on a Superhighway	5(2.8%)	24(12.8%)	19(7.5%)
Educating pedestrians on road safety and walking on designated paths	4(2.2%)	25(13.3%)	29(11.4%)
Total	178(100%)	188(100.0%)	254(100%)

The research finding in Table 4.17 presents a wide range of measures that can be adopted to ensure safety on Thika Superhighway. Some of the measures suggested such as heavy fines, erecting of speed limit signs and use of alcohol blow already exist. However, the respondents feel there is a need for them to be enforced on a continuous basis. The study also established that setting up Permanent speed guns, CCTV, and alcohol blow would be adequate to make the highway safe as they will record and catch offenders in real time. These measures have the potential for contributing to the improvement of drivers' behaviours while driving on the superhighway since, as noted earlier, the Reciprocal Determinism Theory developed by Albert Bandura holds that the behaviour of a person can be amended by his or her social environment as well as personal factors (Burger, 2014).

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction.

This chapter comprises of the summary, conclusion, and recommendations on the determinants of the rising numbers of traffic road accidents along Thika Superhighway. It discusses the fusion of the entire study and contains a summary of research findings, explanation of the findings, matching with specific objectives. It is also proposes recommendations and other areas for future research.

5.2 Summary of the Findings

The first objective of this study was to establish whether the kind of training that the drivers undertake to qualify as drivers contribute to rising numbers of accidents on Thika Superhighway. What emerged from the study is that the majority of drivers have been trained in driving schools as compared to self or privately instructed. The study established that though the majority of the drivers have undergone training, the training has not impacted positively or changed attitudes of drivers to drive safely on the roads. The study also established that driving schools lack qualified driving instructors. In addition, the study established that the training schools use inadequate syllabus to train drivers. The kind of drivers produced in driving schools greatly contributes to rising numbers of traffic accidents along Thika Superhighway.

Secondly, the study sought to examine the contribution of road design on road accidents on Thika Superhighway. The study found that several defective road designs have contributed to rising traffic accidents along the highway. The study established that the designers factored an inadequate number of footbridges with densely populated places like Witeithie and Homeland to mention a few not factored for construction. The study established that the exit and entry lanes are poorly designed since they don't provide adequate acceleration or deceleration opportunities to the drivers. Also, the study found

that some areas in the service lane lack designated bus stops, for example at Guru Nanak and Car Wash stage. The poor road designs have been blamed on the increase of traffic jams which in turn have lured the public service vehicles dropping passengers on the highway. The study established a great contribution to the road design to rising number of traffic road accidents.

Thirdly, the study sought to establish the types of vehicles that cause traffic road accidents on Thika Superhighway. It emerged from the study that the public service vehicles and private vehicles were major contributors of accidents on the highway. The study revealed that heavy commercial vehicles, motorcycles, and bicycles contribute little to traffic road accidents. The study established that the motorcycles riders mostly use the reserved space outside the service lane which has greatly reduced their contact with vehicles thus preventing accidents. It was also established that motorcycle passengers demand that the riders use safe areas reserved for them and to ride on the extreme end of the lanes if necessary.

Finally, the study sought to find out the best strategies that can enhance road safety on Thika Superhighway. The sustenance of enforcement of traffic rules coupled with heavy fines was established to be some of the best strategies for enhancing road safety on Thika Superhighway. The setting permanently of CCTV and speed guns was also suggested to ensure the traffic offenders can be caught in real-time where police officers are not present. Education, the introduction of a unified driving curriculum, re-testing drivers, night instructions and retraining of drivers was identified as some of the strategies that can be adopted to address road safety. Redesigning exit and entry lane prone to accidents and building more footbridges would go a long way to address road accidents.

5.3 Conclusion

The first objective of this study was to establish whether the kind of training that the drivers undertake to qualify as drivers contribute to rising numbers of accidents on Thika Superhighway. It can be concluded from the study findings that the training offered in driving school is not adequate to produce competent drivers. The drivers graduating from the schools lack skills and the right attitude to drive safely on Thika Superhighway. Secondly, the study sought to examine the contribution of road design on road accidents on Thika Superhighway. The study concludes that Thika Superhighway has several areas with defective designs which in turn contribute to traffic road accidents. Thirdly the study sought to establish the types of vehicles that cause traffic road accidents on Thika Superhighway. The study concludes that the public service vehicles and private vehicles are the major contributors to traffic road accidents along Thika Superhighway as compared to heavy commercial vehicles and motorcycles. The fourth objective sought to establish the best strategies that can enhance road safety on Thika Superhighway. The study concludes that the police and other road safety agencies must continue enforcing traffic laws to ensure safety on the highway. The study also concludes, in order to ensure road safety, the authorities need to use modern technology like the use of CCTV and speed guns.

5.4 Recommendations

The study came up with the following recommendations:

5.4.1 Drivers Training

In order to produce competent drivers, the driving schools need to employ qualified instructors. The government and the stakeholders need to formulate policies that will guide the training of the instructors and write a unified curriculum to be implemented by all

driving schools. The government should ensure that all drivers are trained in registered driving schools which follow a unified national curriculum.

5.4.2 Road Design

The engineers responsible for Thika Superhighway should design and construct new footbridges and bus stops. In addition, they should involve the stakeholders and audit the exit lanes and entry lanes and re-design them to address their anomalies.

5.4.3 Types of Vehicles

There is need of segregating the light and heavy vehicles to designated lanes. The heavy vehicles should be confined to the left lane while the light vehicles to use the inner and right lanes. Road cameras should be mounted to assist traffic police to enforce the regulations.

5.4.4 Strategies that can Enhance Road Safety on Thika Superhighway

The study recommends for implementation of new strategies such as the use of modern technology, CCTV and speed guns. This will assist traffic police to deal with errant drivers flaunting road safety requirements.

5.5 Areas of Further Research

The following areas may require further research:

1. Assess the capacity of road safety agencies to apply technology to address road safety in Kenya.
2. Explore the capacity of the traffic police officers to enforce traffic laws on Thika Superhighway.

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APPENDICES

Appendix I: Research Work Plan

ACTIVITY	January 2016	February 2016	March 2016	April 2016	May 2016	June 2016
Development of Proposal						
Defence & Corrections						
Piloting & Data Collection						
Report compiling & presentation						
Corrections						
Submission and Graduation						

Appendix II: Research Budget Estimates

	ITEMS	COST (KSH)
1.	Stationary, printing and biding	7,000.00
2.	Travelling	3,000.00
3.	Research Assistant allowances	10,000.00
4.	Telephone charges	2,000.00
5.	Internet services	3,000.00
6.	Development and printing of research instruments	5,000.00
7.	Preparation of the final report	15,000.00
Total		45,000.00

Appendix III: Consent Letter

Rachael M. Munge

F/ No 231752

P.O.Box10082-00200

Nairobi.

23rd March, 2016

The Inspector General

National Police Service

P.O. Box 30083 - 00100

Nairobi

Dear Sir,

RE: REQUESTING YOUR CONSENT TO CONDUCT ACADEMIC RESEARCH

I am a student at Kenyatta University studying a master's degree in security management and police studies. I intend to conduct a project research on "*Determinants of the rising numbers of traffic road accidents along Thika superhighway in Nairobi-Kenya.*"

I will conduct my study along Thika Superhighway from March2016.I hereby request you to kindly allow me to carry out the research. The data to be collected will be purely for academic purpose.

Yours faithfully,

Rachael Munge

Appendix IV: Questionnaire for Junior Traffic Police Officers

My name is Rachael Munge, a Master of Arts student at Kenyatta University. I have cleared my course work and am currently embarking on a research project, titled “Determinants of the rising numbers of traffic road accidents along Thika superhighway in Nairobi Kenya. This questionnaire is meant to collect data for the research project. You have been selected as one of the respondents. Kindly provide your honest information on all the items in this questionnaire. It is purely for academic pursuit and the views expressed will be treated confidentially.

SECTION A: DEMOGRAPHIC INFORMATION.

Please answer the following questions by ticking [√] your choice of answer and where applicable explain or make your suggestions.

1. Please indicate your gender

[] Female [] Male

2. Please indicate how long you have served in the traffic section since you joined Police service _____

3. Please indicate how long you have served along Thika Superhighway as a traffic officer.

4. Please identify the section (s) or black spots on Thika Superhighway where road accidents are very common

i) _____

ii) _____

iii) _____

iv) _____

SECTION B: DRIVERS TRAINING

5. Using the Likert scale in the table below please provide your opinion whether the kind of training that the drivers undertake to qualify as drivers contribute to rising numbers of accidents on Thika Superhighway. **(Tick in the appropriate box)**

Statements	Strongly agree [1]	Agree [2]	Neither agree or disagree [3]	Disagree [4]	Strongly disagree [5]
Driving schools lack qualified instructors to train drivers and as a result has contributes to rising traffic road accidents along Thika Superhighway					
Driving schools lack qualified instructors to train drivers and as a result has contributes to rising traffic road accidents along Thika Superhighway					
The current vehicle driving syllabus is not sufficient to produce drivers who can drive safely along Thika Superhighway					
The motorcycle riders lack training on the road safety					
Drivers training concentrate on moving vehicles from one point to another with no regard to road safety issues					
Lack of night instruction during driving training leads to poor driving					
The public transport drivers are poor drivers since most of them did not attend driving schools					

SECTION C: CONTRIBUTION OF ROAD DESIGN ON ROAD ACCIDENTS ON THIKA SUPERHIGHWAY.

6. Using the Likert scale in the table below please provide your opinion the contribution of road design to rising numbers of accidents on Thika Superhighway. **(Tick in the appropriate box)**

Statements	Strongly agree [1]	Agree [2]	Neither agree or disagree [3]	Disagree [4]	Strongly disagree [5]
Road exits on the inner lane are major contributors of traffic road accidents along Thika Superhighway					
The location of some entry lanes (joining lanes to the					

Statements	Strongly agree [1]	Agree [2]	Neither agree or disagree [3]	Disagree [4]	Strongly disagree [5]
highway) especially downhill major cause of traffic road accidents along Thika Superhighway					
Inexistence and wrong placement of road signs is a cause of traffic road accidents along Thika Superhighway					
Inadequate foot bridges is major cause of traffic road accidents along Thika Superhighway					
Poor design on storm water drainage is one cause of traffic road accidents when it rains along Thika Superhighway					
Inadequate passenger dropping points is a major cause of traffic road accidents along Thika Superhighway					
Inadequate space for parking of stalled vehicles is a one cause traffic road accidents along Thika Superhighway					

7. Please identify other road designs and particular place where road design may be contributing to road accidents on Thika Superhighway.

Road designs

- i) _____
- ii) _____
- iii) _____
- iv) _____

Particular place/section

- i) _____
- ii) _____
- iii) _____
- iv) _____

SECTION D: TYPES OF VEHICLES WHICH CAUSE TRAFFIC ROAD ACCIDENTS ON THIKA SUPERHIGHWAY.

8. Using the Likert scale in the table below please provide your opinion the types of vehicles that cause road accidents on Thika Superhighway. (Tick in the appropriate box)

Statements	Strongly agree [1]	Agree [2]	Neither agree or disagree [3]	Disagree [4]	Strongly disagree [5]
Public transport vehicles are major contributor of traffic road accidents along Thika Superhighway					
Private transport vehicles are major contributor of traffic road accidents along Thika Superhighway					
Private heavy transport vehicles are major contributor of traffic road accidents along Thika Superhighway					
Motor cycles are major contributors of traffic road accidents along Thika Superhighway					
Bicycles major contributors of traffic road accidents along Thika Superhighway					

SECTION E: BEST STRATEGIES THAT CAN ENHANCE ROAD SAFETY ON THIKA SUPERHIGHWAY.

9. The government and stakeholders have the duty of ensuring traffic road accidents are addressed on Thika Superhighway. As a stakeholder suggest what can be done to enhance road safety Thika Superhighway

- i) _____
- ii) _____
- iii) _____
- iv) _____

Thank you for your time

Appendix V: Questionnaires for Vehicle Drivers

My name is Rachael Munge, a Master of Arts student at Kenyatta University. I have cleared my course work and therefore am currently embarking on a research project, titled “Determinants of the rising numbers of road accidents in developing countries: case of Thika Superhighway, Kenya.” This questionnaire is meant to collect data for the research project. You have been selected as one of the respondents. Kindly provide your honest information on all the items in this questionnaire. It is purely for academic pursuit and the views expressed will be treated confidentially.

SECTION A: DEMOGRAPHIC INFORMATION.

Please answer the following questions by ticking [√] your choice of answer and where applicable explain or make your suggestions.

1. Please indicate your gender
 Female Male
2. How did learn how to drive/ride vehicles/motorcycles
 Training school Private (Friend, relative) instruction Self-Instruction
3. Please tick the type of vehicle you drive (**Tick more than one option**)
 Private vehicle cars
 Private vehicle trucks (Below 6 tonnes)
 Commercial trucks (Above 6 tonnes)
 Public Service Vehicle (Omni Bus)
 Public Service Vehicle (Buses)
 Others please specify _____
4. Please indicate how long you have been a driving
 Below 1 year
 1 – 2 years
 2 – 4 years
 4 – 6 years
 6 – 8 years
 8 – 10 years
 Above 10 years
5. Please indicate how long you have driven along Thika Superhighway.
 Below 1 year
 1 – 2 years
 2 – 4 years

6. Please identify the section (s) or black spots on Thika Superhighway where road accidents are very common

- i) _____
- ii) _____
- iii) _____
- iv) _____

SECTION B: DRIVERS TRAINING

7. Using the Likert scale in the table below please provide your opinion whether the kind of training the drivers undertake to qualify as drivers contribute to rising numbers of accidents on Thika Superhighway. **(Tick in the appropriate box)**

Statements	Strongly agree [1]	Agree [2]	Neither agree or disagree [3]	Disagree [4]	Strongly disagree [5]
Driving schools lack qualified instructors to train drivers and as a result has contributes to rising traffic road accidents along Thika Superhighway					
The current vehicle driving syllabus is not sufficient to produce drivers who can drive safely along Thika Superhighway					
Having been trained in a driving school does not prevent public vehicle drivers from exhibit poor driving skills which in turn has contributed to rising traffic road accidents along Thika Superhighway					
Having been trained in a driving school does not prevent private vehicle drivers exhibit poor driving skills which in turn has contributed to rising traffic road accidents along Thika Superhighway					

SECTION C: CONTRIBUTION OF ROAD DESIGN ON ROAD ACCIDENTS ON THIKA SUPERHIGHWAY.

8. Using the Likert scale in the table below please provide your opinion the contribution of road design to rising numbers of accidents on Thika Superhighway. **(Tick in the appropriate box)**

Statements	Strongly agree [1]	Agree [2]	Neither agree or disagree [3]	Disagree [4]	Strongly disagree [5]
Road exits from the inner lane (highway) to the service lanes contributes to traffic road accidents along Thika Superhighway					
The location of some exist especially downhill are major cause of traffic road accidents along Thika Superhighway					
Lack of and wrong placement of road signs is a cause of traffic road accidents along Thika Superhighway					
Inadequate foot bridges is major cause of traffic road accidents along Thika Superhighway					
Poor design on storm water drainage is one cause of traffic road accidents when it rains along Thika Superhighway					
Inadequate passenger dropping points is a major cause of traffic road accidents along Thika Superhighway					
Inadequate space for parking of stalled vehicles is a one cause traffic road accidents along Thika Superhighway					

SECTION D: TYPES OF VEHICLES THOSE CAUSES TRAFFIC ROAD ACCIDENTS ON THIKA SUPERHIGHWAY.

9. Using the Likert scale in the table below please provide your opinion the types of vehicles that cause road accidents on Thika Superhighway. (Tick in the appropriate box)

Statements	Strongly agree [1]	Agree [2]	Neither agree or disagree [3]	Disagree [4]	Strongly disagree [5]
Public transport vehicles are major contributor of traffic road accidents along Thika Superhighway					
Private transport vehicles are major contributor of traffic road accidents along Thika Superhighway					
Private heavy transport vehicles are major contributor of traffic road accidents along Thika Superhighway					
Motor cycles are major contributors of traffic road accidents along Thika Superhighway					
Bicycles major contributors of traffic road accidents along Thika Superhighway					

SECTION E: BEST STRATEGIES THAT CAN ENHANCE ROAD SAFETY ON THIKA SUPERHIGHWAY.

10. The government and stakeholders have the duty of ensuring traffic road accidents are addressed on Thika Superhighway. As a stakeholder suggest what can be done to enhance road safety Thika Superhighway

- i) _____
- ii) _____
- iii) _____
- iv) _____

Thank you for your time

Appendix VI: Questionnaire for Pedestrians

My name is RachaelMunge, a Master of Arts student at Kenyatta University. I have cleared my course work and therefore am currently embarking on a research project, titled “Determinants of the rising numbers of road accidents in developing countries: case of Thika Superhighway,Kenya.” This questionnaire is meant to collect data for the research project. You have been selected as one of the respondents. Kindly provide your honest information on all the items in this questionnaire. It is purely for academic pursuit and the views expressed will be treated confidentially.

SECTION A: DEMOGRAPHIC INFORMATION.

Please answer the following questions by ticking [√] your choice of answer and where applicable explain or make your suggestions.

1. Please indicate your gender
 Female Male
2. Which part/areas along Thika Superhighway do you come from
 Thika Juja Ruiru Kahawa Githurai Homeland
 Drive Inn Muthaiga Pangani foot bridge area
 Pangani police station to Kamukunji market
Others please specify_____
3. Please indicate how often do you cross or walk along the Thika Superhighway.
 Daily
 Once in a week
 Twice in a week
 Thrice in a week
 Four times in a week
4. Please identify the section (s) or black spots on Thika Superhighway where pedestrians are hit while closing Thika Superhighway.
 - i) _____
 - ii) _____
 - iii) _____
 - iv) _____

SECTION B: DRIVERS TRAINING

5. Please fill the table below to air your views on the driver training and their contribution to road accidents on Thika Superhighway. **(Tick in the appropriate box)**

Statements	Yes	No
Driving schools in Kenya lack qualified instructors to train drivers and as a result this has contributed to road accidents on Thika Superhighway		
The available syllabus for training drivers in Kenya is not adequate to produce driver who can drive safely on asuperhighway		
The public transport drivers are poor drivers and has contributed to road accidents on Thika Superhighway		
The private vehicle drivers are poor drivers and has contributed to road accidents on Thika Superhighway		

SECTION C: CONTRIBUTION OF ROAD DESIGN ON ROAD ACCIDENTS ON THIKA SUPERHIGHWAY.

6. Using the Likert scale in the table below please provide your opinion the contribution of road design to rising numbers of accidents on Thika Superhighway. **(Tick in the appropriate box)**

Statements	Strongly agree [1]	Agree [2]	Neither agree or disagree [3]	Disagree [4]	Strongly disagree [5]
In adequate/lack of passenger dropping points is a major causes of pedestrians accidents on Thika Superhighway					
The lack of adequate number of food bridges is a major causes of pedestrians accidents on Thika Superhighway					

SECTION D: TYPES OF VEHICLES THOSE CAUSES TRAFFIC ROAD ACCIDENTS ON THIKA SUPERHIGHWAY.

7. Using the Likert scale in the table below please provide your opinion the types of vehicles that cause road accidents on Thika Superhighway. **(Tick in the appropriate box)**

Statements	Strongly agree [1]	Agree [2]	Neither agree or disagree [3]	Disagree [4]	Strongly disagree [5]
Public transport vehicles are major contributor of traffic road accidents along Thika Superhighway					
Private transport vehicles are major contributor of traffic road accidents along Thika Superhighway					
Private heavy transport vehicles are major contributor of traffic road accidents along Thika Superhighway					
Motor cycles are major contributors of traffic road accidents along Thika Superhighway					
Bicycles major contributors of traffic road accidents along Thika Superhighway					

SECTION E: BEST STRATEGIES THAT CAN ENHANCE ROAD SAFETY ON THIKA SUPERHIGHWAY.

8. The government and stakeholders have the duty of ensuring traffic road accidents are addressed on Thika Superhighway. As a stakeholder suggest what can be done to enhance road safety Thika Superhighway

- i) _____
- ii) _____
- iii) _____
- iv) _____

Thank you for your time

Appendix VII: Interview Schedule for Senior Police, NTSA and Officers in Ministry of Transport and Infrastructure

1. What is your designation?
2. How long have you worked in the road safety?
3. How is the vehicle driving training conducted in Kenya? (Probe on the content of curriculum, qualification of instructors, duration of training etc.)
4. Comment on the quality of drivers coming out of driving schools and those who are privately instructed. (Probe on the way drivers behaves on roads, courtesy, use of load signs etc.)
5. What do you have to say on the contribution of road designs on the rise of road accidents on Thika Superhighway (Probe on the exit and entry sections, position/location of exit, number of exit, underpasses, load shoulders and width of road lanes etc.?)
6. In your opinion which types of vehicles causes more accidents on Thika Superhighway. (Probe on the reasons, behaviour, speed etc.)
7. Have you embraced technologies in your security duties? (Probe the types, how often, do the operations staff operate/use them, cost implication etc.)
8. What are the challenges/ hindrances in ensuring road safety in Kenya?
9. Suggest on ways of enhancing road safety on Thika Superhighway.

Thank you for your time

Appendix VIII: Focus Group Discussion Interview Questions for Motorcycle Riders

1. How often do you ride on the inner lane of Thika Superhighway
2. Are you trained to ride motorcycle and if yes where were you trained
3. Do you think the training was adequate to assist you ride safely in the highway
4. Which location of Thika Superhighway where more accidents occurs
5. What causes those accidents
6. Do the motor cycle riders causes accidents along Thika Superhighway and if Yes what could be the reasons
7. Which type of vehicles causes accidents along Thika Superhighway
8. Which part of Thika Superhighway was not constructed well and may be source of cause of accidents?
9. Suggest on ways of ensuring safety on roads to prevent road accidents

Thank you for your time