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**AN ANALYSIS OF THE INCIDENCES AND
CAUSES OF ROAD TRAFFIC ACCIDENTS
IN KISII CENTRAL DISTRICT - KENYA**

BY

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*An analysis of the
incidences and causes*



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DECLARATION

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

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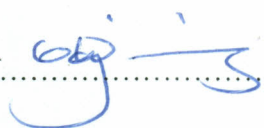
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TABLE OF CONTENTS

	<i>PAGE</i>
Declaration	(i)
Dedication	(ii)
Acknowledgement	(iii)
List of Appendices	(vii)
List of Tables	(viii)
List of Figures	(ix)
List of Abbreviations	(x)
Definition of Operational Terms	(xi)
Abstract	(xiii)
CHAPTER ONE: INTRODUCTION	1
1.1 Background Information	1
CHAPTER TWO: LITERATURE REVIEW	3
2.1 Magnitude of Road Traffic Accidents	3
2.2 Kenyan Situation	11
2.3 Susceptible Groups of Road Users	13
2.4 Substance Abuse	14
2.5 Legal Policy	14
2.6 The Impact of Road Traffic Accidents	15
2.7 Statement of the Problem	18
2.8 Justification of the Study	18
2.9 Research Questions	19
2.10 Null Hypothesis	20
2.11 Objectives of the Study	20
2.11.1 Main Objective	20
2.11.2 Specific Objectives	20
CHAPTER THREE: MATERIALS AND METHODS	21
3.1 The Study Area	21
3.2 Study Population	21
3.2.1 Inclusion Criteria	21
3.2.2 Exclusion Criteria	22
3.2.3 Assumptions	22
3.3 Ethical Considerations	22
3.4 Study Design	23
3.5 Sampling Method	23
3.6 Sample Size Determination	24
3.7 Data Collection	25
3.8 Data Analysis	25

CHAPTER FOUR: RESULTS	26
4.1 Gender and Age Distribution of Road Users	26
4.1.1 Educational Level of Road users	26
4.1.2 Religion of Road Users	27
4.1.3 Occupation of Road Users	28
4.1.4 Marital Status of Road Users	28
4.1.5 Preferred Mode of Transport	29
4.1.6 History of Previous RTAs Among Road Users	30
4.1.7 Vehicles Perceived to be Involved in RTAs	30
4.1.8 Factors Responsible for Road Traffic Accidents	31
4.1.9 Actual Vehicles Involved in RTAs as Reported by Accident Victims	32
4.1.10 Predisposing factors in Human Error	33
4.2 Predisposing Factors in the Traffic Environment	33
4.2.1 Predisposing Factors in Defective Vehicles	34
4.2.2 Characteristics of Hospitalised Accident Victims	35
4.2.3 Level of Education of RTA Victims	36
4.2.4 Characteristics of Drivers	36
4.2.5 Level of Education of Drivers	37
4.2.6 Commonly Used Vehicles by RTA Victims	37
4.2.7 Types of Vehicles, which Caused Traffic Accidents as Reported by RTA Victims	38
4.2.8 Causes of Accidents as Reported by RTA Victims	39
4.2.9 Hospitalisation and Duration of Stay in Hospital	39
4.2.10 Training of Drivers	40
4.2.11 Driving Experience of Drivers	40
4.2.12 Previous History of RTA Among Drivers	41
4.3. Type of Insurance Cover of vehicles involved in RTAs	41
4.3.1 Accident Reported or Filed to the Traffic Police	42
4.3.2 Court Cases filed for Road Traffic Offences from 2000 to 2003	43
4.3.3 Incidence of RTAs Statistics in Kisii	43
4.3.4 Persons Killed and Injured from January to May 2004	44
4.3.5 Victims of RTAs who were Hospitalised at the District Hospital (2000 – 2003)	45
4.3.6 Recommended Methods of Preventing RTAs by Road Users	45
CHAPTER FIVE: DISCUSSIONS	48
5.1 Characteristics of Study Population	48
5.2 Educational Level of Road Users	48
5.3 Vehicles Perceived to be Causing RTAs	49
5.4 Actual Vehicles Causing Accidents	49
5.5 Causes of Road Traffic Accidents	50
5.6 Contributory Factors to RTAs	50
5.7 The Incidence of RTAs before and after Enforcement of the new Traffic Act	52
5.8 The Impact of RTAs on Public Health	52
5.9 Methods of Preventing RTAs	53

CHAPTER SIX:	CONCLUSIONS, RECOMMENDATIONS AND AREAS FOR FURTHER RESEARCH	56
APPENDIX		
6.1	Conclusions	56
6.2	Recommendations	57
6.3	Areas for Further Research	58
1.1	Focus Group Discussion Questionnaire	70
1.2	Speed Limit Questionnaire	73
REFERENCES		59
3.0	Traffic Act (No. 26) & The Traffic (Amendment) Rules, 2003	77
4.0	Research Authorization Letter by MOES&I	80

LIST OF APPENDICES

APPENDIX

1.1	Study Questionnaire	64
1.2	Traffic Police Officers Questionnaire	67
1.3	Focus Group Discussion Questionnaire	70
1.4	Road Users Questionnaire	73
2.0	Map of Study Area	76
3.0	Traffic Act (Cap 403) The Traffic (Amendment) Rules, 2003	77
4.0	Research Authorization Letter by MOES&T	80
4.1	Age of Road Users Involved	84
4.2	Sex of RTA Victims	85
4.3.1	Level of Awareness of RTA Victims	86
4.3.2	Sex of RTA Victims	87
4.3.3	Age of RTA Victims	87
4.4	Commonly Used Vehicles by RTA Victims	88
4.5	Type of Vehicles causing RTAs	88
4.6	Causes of RTA as reported by accident victims	89
4.7	Number of Hospitalizations	90
4.8	Place of Training as a Driver	90
4.9	Duration of Experience of Drivers	91
4.10	Frequency of History of RTA among Drivers	91
4.11	Type of Insurance Cover in Vehicles Involved in RTAs	92
4.12	Report Filed to Traffic Police	92
4.13	Total RTA Statistics	93
4.14	Persons Killed and Injured in Kisumu through RTAs	94
4.15	Causes of RTAs Hospitalized at Health District	94
4.16	RTA Statistics (2002-2003)	95

LIST OF TABLES

TABLE

2.1	Disease burden (DALYs* lost) for 10 leading causes	6
2.2	Estimated Incidence of Injuries and Injury-related Deaths in East Africa	8
2.3	National Accident Statistics (1997-2003)	12
2.4	Distribution of Traffic Deaths and Mortality Rates by WHO region and Income Group, 1998	15
2.5	Road Crash Costs by Region (US\$ billion) 2000	17
4.1	Age of Road Users in Years	26
4.2	Sex of RTA Victims	35
4.3	Level of Education of RTA Victims	36
4.4	Sex of Drivers	37
4.5	Age of Drivers	37
4.6	Commonly used Vehicles by RTA Victims	38
4.7	Type of Vehicles causing RTAs	38
4.8	Causes of RTA as reported by accident victims	39
4.9	Duration of Hospitalization	40
4.10	Place of Training as a Driver	40
4.11	Driving Experience of Drivers	41
4.12	Previous History of RTA among Drivers	41
4.13	Type of Insurance Cover in Vehicles Involved in RTAs	42
4.14	Report Filed to Traffic Police	42
4.15	Kisii RTA Statistics	44
4.16	Persons Killed and Injured in Kisii through RTAs	44
4.17	Victims of RTAs Hospitalised at Kisii District Hospital (2000 – 2003)	45

LIST OF FIGURES

FIGURE

4.1	Education Level of Road Users	27
4.2	Religion of Road users	27
4.3	Occupation of Road users	28
4.4	Marital Status	29
4.5	Preferred Vehicles by Road Users	29
4.6	History of Previous RTA	30
4.7	Vehicles Perceived to be Involved in RTAs	31
4.8	Factors Responsible for RTAs	32
4.9	Actual Vehicles involved in RTAs	32
4.10	Factors Associated with Drivers	33
4.11	Factors in the Traffic Environment	34
4.12	Factors in Defective Vehicles	36
4.13	Court Cases Filed by Traffic Police	43
4.14	Methods of Preventing RTAs by Road Users	46

LIST OF ACRONYMS

AFR	-	African Region
AFRO	-	African Regional Office (WHO)
AMR	-	American Region
APR	-	Asian Pacific Region
BPS	-	Board of Post-Graduate Studies
CBS	-	Central Bureau of Statistics (Kenya)
CEE	-	Central and Eastern Europe
DALY	-	Disability Adjusted Life Years
ECA	-	Economic Commission of Africa
EMR	-	Eastern Mediterranean Region
EUR	-	European Region
EURO	-	European Regional Office
FGD	-	Focus Group Discussion
GNP	-	Gross National Product
GRPS	-	Global Road Safety Partnership
GFHR	-	Global Forum For Health Research
HIC	-	High Income Countries
HIV/AIDS	-	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
IFRC	-	International Federation of Red Cross & Red Crescent Societies
IRTAD	-	International Road Traffic and Accident Database
LAC	-	Latin Central America and the Caribbean
LMIC	-	Low and Middle Income Countries
OECD	-	Organization for Economic Co-operation and Development
PSVs	-	Public Service Vehicles
RTAs	-	Road Traffic Accidents
RTIs	-	Road Traffic Injuries
SEAR	-	South East Asian Region
MOH	-	Ministry of Health
NRSC	-	National Road Safety Council
TRL	-	Transport Research Laboratory
USA	-	United States of America
WHO	-	World Health Organization
WPR	-	Western Pacific Region

Crash

A vehicle collision involving two or more vehicles or another vehicle

Communication

Flow of information such as via radio, television, Internet, etc.

DEFINITION OF OPERATIONAL TERMS

Matatu

Is essentially a private motor vehicle allowed by Presidential decree (1973) to carry up to 25 fare paying passengers without all the extra rules and safety precautions needed for a public service vehicle licence. It is important in the transport of people and goods both in rural and urban areas in Kenya (Khayesi, 1998)

A Dangerous road location

It is a site that tends to frequently experience road traffic accidents.

An accident

Is a non-deliberate, unplanned event which may produce undesirable effects and is preceded by unsafe avoidable act and /or conditions (Hicks, 1990)

A road traffic accident

Refers to collision or mishap involving one or more of the means of transport using the road. It takes such forms as a head on vehicle collision; roll over by a vehicle, vehicle pedestrian collision, vehicle –cyclist collision, vehicle animal collision or passenger falling down from a moving vehicle.

Collision

Refers to an instance of colliding.

Crash

A vehicle collides violently with an obstacle or another vehicle.

Communication

Is the flow of information and ideas via radio, television, letters, telegram and satellite.

Network structure

Is the route layout and characteristics of its elements, which includes a location of nodes and edges and the relationship between them.

Traffic

Refers to vehicles moving on a public highway.

Traffic calming

This is a deliberate slowing of traffic in residential areas by building road humps or other obstructions.

Traffic conflict

This is a situation where by the action or manoeuvre of a vehicle or road user threatens another vehicle and / or road user with possibility of collision.

Transport

This is the movement of people and goods via the media of road, railway, water ways, pipelines and airways.

Transport modes

Are the means of or ways by which movement is affected.

Road

Refers to the paved and /or unpaved motorable track. It falls under various classes:

Road traffic accident casualties

Refers to injuries sustained as a result of RTA.

ABSTRACT

Road Traffic Accidents (RTAs) are an emerging public health problem worldwide with over 1.2 million deaths and 10 million injured or crippled annually. Globally, road traffic accidents are the ninth leading contributor to the burden of disease and the tenth leading cause of death by injury. Deaths from injuries are projected to rise up to 8.4 million worldwide by 2020. In developing countries, accidents are common and yet remain underreported mainly due to inaccurate statistics on road deaths. In Kenya, over 3000 lives are lost and more than 3000 are left with serious disabilities annually due to RTAs. This study was undertaken to establish the incidence and causes of RTAs and their impact on public health in Kisii Central District - Kenya, as well as assess the effect of the new traffic amendment rules of November 2003 on the state of RTAs. A total of 393 respondents comprising of fifteen traffic police officers, fifty one motor vehicle drivers, two hundred ninety seven road users and thirty accident victims who were undergoing treatment at the time of the study were used for data collection. This was a cross-sectional study, which used questionnaires, interview schedules and focus group discussions to collect data. Among the non-motorist road users, 65.7% were males, while 34.3% were females. For the drivers, 90.2% were males while 9.8% were females ($\chi^2 = 98.412$, $df = 2$, $P = 0.0005$). Seventy-four point five percent of drivers had a previous history of RTAs while 25.5% had none. Vehicles causing traffic accident included *matatus* (73.4%), buses (13.3%), saloon cars (10%) and landrovers (3.3%). Contributory factors reported by road users included human errors (59.6%), defective roads (19.5%) while twenty nine point nine percent were attributed to defective vehicles ($\chi^2 = 98.412$, $df = 2$, $P = 0.0005$). Police records showed that RTAs were caused by: human errors (66.7%) defective vehicles (13.3%), and other road users (6.7%). Over-speeding, overtaking, overloading and police leniency was significantly associated with RTAs ($\chi^2 = 42.221$, $df = 3$, $P = 0.0003$). Methods of preventing RTAs suggested by study participants included observing and enforcement of traffic rules (19.6%), avoiding over-speeding and overtaking carelessly (18.8%), avoiding overloading (17.1%), stopping drunk driving (11.2%), designing and constructing good roads (6.6%) and training and retraining of drivers (3.6%) as significant factors which can help in the prevention of RTAs. The results of this study have shown that *matatus* and buses are the leading categories of vehicles causing accidents in Kisii Central District. Factors contributing to these accidents include: human errors, defective vehicles, and bad roads. It is imperative that this information is availed to the public so that concerted effort is made by all stakeholders to curb road carnage. This study suggests that policy makers, development partners and insurance firms can use findings to formulate sound road policy, which can reduce mortality in our roads

CHAPTER ONE: INTRODUCTION

1.1 Background Information

Road Traffic Accidents (RTAs) are an emerging public health problem, both in developing and developed countries worldwide. They are the leading cause of injury, the tenth leading cause of death by injury, and the ninth leading contributor to the burden of disease worldwide (Jacob *et al.*, 2000). Deaths from injuries sustained from RTAs are projected to rise from 5.1 million in 1990 to 8.4 million worldwide in 2020 (Murray and Lopez, 1996). The forecast raises it to third position, just behind heart disease, clinical depression and ahead of respiratory infections, tuberculosis, war, diarrhoeal diseases and human immunodeficiency syndrome (WHO, 2000). In developing countries, the magnitudes of RTAs with its resultant injuries are under-reported mainly due to inaccurate statistics on road deaths. Both international and local agencies and researchers have not taken the initiative to conduct epidemiological studies. In this regard, there appears to be little awareness of their contribution to the burden of disease. Therefore they are seriously neglected in both research and policy.

The lack of scientifically based epidemiological, socio-economical and risk data factors to RTAs from the national level and most importantly from the developing countries has inhibited the response of international agencies to take appropriate action and mobilize funds for prevention and control of RTAs. It was estimated that in 1998, about 1,170,694 people died from road traffic injuries (RTIs) worldwide. The problem of RTIs was the leading cause of death and disability, accounting for 2.2% of all deaths (Krug, 1999). RTAs were the leading cause of injury-related

deaths, accounting for 20.3% of all deaths injury (Jacob *et al.*, 2000). Out of the total deaths from RTAs in 1998, 1,029,037 or 87.9% were in low and middle income countries (LMICs) and 141,656 or 12.1% were in high income countries (HICs). Deaths from RTIs per 100,000 populations were constantly higher in all LMCs in the same regions (WHO, 1999).

In Kenya, the incidence of RTAs is on the increase and is among the leading causes of mortality and disability among economically active adults. According to MOH Development Plan (1989-1993), RTAs are one of the leading causes of mortality and disability. This situation places a high demand on hospital resources and significantly exerts a huge burden on the socio-economic development of the country. The estimation is that between 45% to 60% of all admissions in surgical wards and upto 75% in the National Spinal Cord Injury Hospital are RTA related cases (NRSC, 1990).

The increase in RTA is partly because of rapidly expanding motorized transport and industrial expansion without adequate safety precautions spelt out in the road traffic act (Appendix 3). Beyond the human toll, RTAs are responsible for the tremendous loss of the Kenyan economy. In 1996, it was estimated that between 26% and 52% of Kenya's total earnings from road transport sector were lost to RTAs. This is approximately 2.5 billion Kenyan shillings a year (ECA, 1997). This cost comprises the loss in production output by the accident victims, hospital expenses, administration expenses and cost of vehicle and property damage. Road traffic accidents are a major public health issue, which requires urgent attention by stakeholders and the wider society.

CHAPTER TWO: LITERATURE REVIEW

2.1 Magnitude of Road Traffic Accidents

Road traffic accidents are increasingly becoming a public health problem in addition to communicable diseases. WHO (1990) reported that over 500,000 deaths and 10 million people are injured or crippled through RTAs. Road traffic accidents and its subsequent injuries are ranked ninth among the major causes of mortality and disability (Murray and Lopez, 1996). In 1998, 1,170,694 people died from road traffic injuries worldwide (Krug, 1999).

In developing countries, injury-patterns are poorly known due to gross underreporting and lack of population based incidence data. RTAs are rapidly emerging as a leading cause of death and disability at rates exceeding those in most developed countries (Razzack and Luby, 1998; Tercero *et al.*, 1998). In Asian Pacific Region (APR) alone over 2 million people died and approximately 1.7 million were crippled or injured in road traffic accident in 1990s (Nantulya and Muli-Musiime, 1996). During the next decade, it is expected that over 6 million people will die and over 60 million will be crippled or injured in developing countries as a result of road traffic accidents. Although developed countries have experienced marked decline in road traffic accident deaths, Africa has experienced a rapid growth in this cause of death over the last several decades (Razzack and Luby, 1998).

A study by WHO in collaboration with world Bank and Harvard University in 1996 on "Global Burden of Diseases" revealed that in 1990, approximately 5 million people worldwide, two-thirds of them males died of injuries, which accounted for

approximately 15% of the total burden of premature mortality and disability globally. By 2020, the report projected that injury-related burden will increase by 20%. Motor vehicle crashes represented the largest single cause of all injury-related deaths worldwide in 1999. Among adults of ages 15-44 years worldwide, traffic crashes were the leading cause of death for males and the fifth for females (WHO, 2000)).

Increased motorization is the leading contributor to increase in motor vehicle crash deaths. This is evident in developing countries where vehicles (cars, buses, trucks,) share the roads with pedestrians, cyclists, drivers of motorcycles and motor scooters (World Bank, 1996).

Road traffic accidents are the major cause of death in many areas of the world, (WHO, 2002). Towards the end of the 1990s, between 80,000 and 90,000 people were killed each year in road accidents in Western Europe and North America.

According to Occupational Safety and Health Association of America, 6,023 work related fatalities occurred in the United State in 1995 (Jones, 1996). Almost 33% of these accidents were caused by motor vehicle accidents. While 6.3% of USA workers on average experience an occupational injury or illness each year. In 1998, 41,471 people were killed in motor crashes in the United States; these deaths occurred as a result of 37,081 actual crashes involving 56,865 vehicles (Assum, 1998).

A survey in Britain estimated that out of the 55 million persons alive in 1995, 222,000 were expected to die through RTA in some future year that is 1 in 250 could die in a RTA. The most affected were projected to be 17-32 and 74-79 age group. Most of

the projected RTA deaths (about 65%) were men, particularly of younger ages (Department of transport, Great Britain, 1987).

There are about two million traffic accidents in the European region (EUR) every year killing 120,000 and injuring 2.5 million people. One in every three deaths involves young people under 25 years of age. Pedestrians and cyclists comprise 30-35% of deaths. Every year in the same region about 25,000 males under 25 years die in road traffic accident (WHO, 1999).

In 2002, an estimated 1.18 million people worldwide died as a result of road traffic collisions. This is more than 2.1% of global mortality. In low and middle-income countries (LMICs), where 90% of fatal road traffic crashes occur, the majority of victims are pedestrians, motorcyclists and passengers often of public transport. Most are people who would never be able to afford a private motor vehicle. With regard to the future, WHO projections suggest that by the year 2020, road traffic accidents could rank third in the order of causes contributing to ill health (Table 2.1).

Table 2:1 Disease burden (DALYs* lost) for 10 leading causes

1998 Disease or Injury		2020 Disease or Injury	
1	Lower Respiratory Infections	1	Ischaemic heart disease
2	Diarrhoeal diseases	2	Unipolar major depression
3	Perinatal conditions	3	Road traffic injuries
4	Unipolar major depression	4	Cerebravascular disease
5	Ischaemic heart disease	5	Chronic obstructive pulmonary disease
6	Cerebrovascular disease	6	Low respiratory Infections
7	Tuberculosis	7	Tuberculosis
8	Measles	8	War
9	Road traffic injuries	9	Diarrhoeal diseases
10	Congenital abnormalities	10	HIV/AIDS

Source: **Murray and Lopez, eds; 1996**

* Epidemiologist's use estimated DALYS (disability-adjusted life year) lost as the measure of the burden of disease.*

In New Zealand, with a population of just over 3,500,000 people, road traffic accidents are the second important cause of premature deaths after cancer. Motor vehicle accidents are the leading cause of death for 15-24 year olds (Jones, 1996). Road crashes, leading to casualties and disabilities have also been identified as a major public health problem in the Caribbean, striking especially young people in the age group 15-22 years (WHO, 1985).

Japan has had a highly fluctuating rate of road traffic accidents with the year 1970 identified as the worst in her history of RTAs. The peak of RTA deaths (16,765) and injuries (981,096) were reached in 1970. These figures declined in 1971, marking the

beginning of a steady downward trend, which began to level off after 1975. In 1978, injuries began to increase again and the number of deaths began to rise in 1980. Despite the implementation of comprehensive traffic safety programmes, the number of accidents per 10,000 motor vehicles and 100,000 motor vehicle kilometres of travel fell steadily until in the middle of the 1980's levelling off since then (The Japan Research Centre for Transport Policy, 1994). Currently Japan has the lowest rate of RTA per 10,000 motor vehicles.

An assessment by the London Research Centre in 1996 of RTA casualties by mode of travel in Greater London for the year 1995, established that pedestrians had the highest involvement (20.8%) and taxis had the lowest (TRL, 1997). Ministry of Labour and Social Security (2001), reported that out of 188 fatal accidents, which occurred in Britain, 43 (23%) were road deaths (WHO, 2002). Dr Lee Jong-Wook (2004) reported that "Too often, road safety is treated as a transport issue, not a public health issue, and traffic injuries are called "accidents" though most could be prevented. As a result, many countries put far less effort into understanding and preventing road traffic injuries than they do into understanding and preventing diseases that do less harm. Every day, as much as 140,000 people are injured on the world's roads. More than 3,000 die and some 15,000 are disabled for life. Each of these people has a network of family, friends, neighbours, colleagues or classmates who are also affected, emotionally and otherwise. Families struggle with poverty when they lose a breadwinner or have added expenses of caring for disabled family members. Road traffic injuries can be prevented if they are recognized as a serious

public health problem and if government and others take the necessary actions to prevent them (World Health Day, 2004).

The countries most successful in reducing RTAs have engaged many different groups—from government, civil society and industry in co-ordinated programmes of road safety research. The most heavily motorized countries in the world have the lowest rates of road traffic death per 100,000 people, with annual rates below 6.0% and falling. By contrast, many other countries have rates in excess of 28 per 100,000 people (WHO, 2004). However, in East Africa, beside RTAs, a number of causes contribute to injury-related death (Table 2.2).

Table 2:2 Estimated incidence of injuries and injury-related death in East Africa

Cause of Injury	Annual incidence Per 100,000 Population	Death per 100,000 Population
Falls	10,000	15
Road traffic accidents	5,000	25
Burns	5,000	10
Poisoning	5,000	10
Drowning, near drowning	100	5
Assault	5,000	15
Suicide attempt	1,000	10
Other	9,000	10
Total	40,100	100

Source: Nordberg, 2000

Road traffic injuries are an emerging health problem in developing countries including Africa. It is estimated that 2 million injury deaths occur in developing countries annually. The situation in Africa is deteriorating. Low-income countries suffer 80 times more traffic fatalities per vehicle than high-income countries. Pedestrians and cyclists are generally disproportionately represented among accident victims and so are poor people. The lack of institutional engineering and infrastructure, interventions are considered as more important explanations than merely the number of cars. Lack of driver training, public education and insufficient law enforcement are other reasons behind the tragic accident statistics (WHO, 2002).

An estimated 885,000 people worldwide lose their lives in RTA annually. The majority of traffic accidents (70%) occur in low and middle-income countries of the world, even though private vehicle usage is markedly lower than in wealthier nations (Assum, 1998). The differences in rise per vehicle are dramatic, in several African countries; fatality rates exceed 100 per 10,000 vehicles compared with less than four in Western European. In Kenya, 40% of road accidents occur in cities and 60% occur in rural areas (World Bank, 1996). The rate of fatalities and severe injuries is a growing public health problem in sub-Saharan Africa. For instance in South Africa RTA are so common that they lead to tow trucks competing for business. Over a typical national holiday period such as Christmas or Easter, total deaths often approach 1,000 mark (TRL, 2003). Most African countries do not produce accurate statistics on road deaths due to under-reporting and lack of baseline statistical records but with even this background, their accident rates exceed those of countries that have relatively good highways. Road safety is usually judged on the number of deaths per

100 kilometres travelled. In the 1990s the South African rate was in the 10 – 11 range whereas Kenya's was between 40 and 45. These compare with rates of just one in the United Kingdom (UK), United States of America and Scandinavia (TRL, 2003). In Zimbabwe, motor vehicle deaths have increased more than twice, while the number of vehicles increased five-fold so that deaths per 10,000 vehicles have dropped from 709 to 525 between 1965 and 1990. Alcohol or drugs were believed to be involved in three percent of the RTA (Zwi *et al.*, 1993). In Costa Rica, car accident death has increased from 1 to 17 per 100,000 population between 1940 and 1980 while other violent deaths declined from 52 to 371 / 100,000, keeping the total rate of accidental death the same (Rosero – Bixby, 1990).

In United Arab Emirate, a hospital-based study in 1997 found 810 road traffic casualties and 25 deaths per 100,000 population annually, compared to the UK figures of 625 and 12 respectively (Weddell and McDonald, 1981). Corresponding figures in Malaysia in 1975 were 1764 and 22/100,000, respectively, with the driver considered the cause of RTA in 85% of the cases (Silva, 1978).

A study of accidents involving commercial minibuses in Jordan showed that they had an average of 2.8 accidents per year, caused 625 accidents, per 10,000 vehicles in 1987 and 880, involving of child injuries. Road traffic injuries are usually recorded when police investigations take place, when injured people seek care at hospitals and when insurance companies become involved. Black spot analysis are usually based on crash reports to the police, which tend to include the most severe accidents, and advice regarding pedestrians tend to shift the black spot to another nearby site while

recommendations regarding vehicle occupants are more useful (Retchanheim and Harpham, 1989).

2.2 Kenyan Situation

In Kenya, RTAs have been on the increase as reported by the traffic police records of 2003 as shown in Table 2.3. In 1984, there were 8,229 RTAs with 14,566 people injured; 1,490 injuries were total 4856 serious and 8,220 mild. In 1988, four years later, 16,740 people were injured while 1,919 died. By 1998, about 244,000 people had been killed due to RTAs. This corresponds to 8.3 deaths / 100,000 people and 60 deaths per 10,000 vehicles (Hicks, 1990). Kenya National Development Plan 1989 – 93 gives the number of deaths per 10,000 vehicles in Japan, US and Britain a 10, 5 and 4.5 respectively. RTAs have risen in Kenya by 65% from 1987 to 1996, and in which fatality has increased by 69% (CBS, 1997). Epidemiological data showed that Kenya had 8,229 RTAs during 1996 with 14,562 individuals injured and 1490 (10.2%) killed. Out of those injured, 4,852 (33.2%) had serious, injuries while 8,220 (56.4%) had mild ones. This corresponds to 60 deaths per 10,000 vehicles (NRSC, 2000). Further RTA data is demonstrated in Table 2:3.

Table 2.3: National Accident Statistics (1997 – 2003)

ANNUAL SUMMARIES	1997	1998	1999	2000	2001	2002	2003
Fatal Accidents	2189	2220	2292	2184	2081	2281	1244
Serious injuries	4394	4199	4229	4227	4462	4671	2458
Slight injuries	8266	7923	7670	7527	6864	6466	3896
Total	14849	14342	14291	13938	13407	13418	7598
VICTIMS							
Persons killed	3022	2972	2823	2819	2790	2782	1594
Seriously injured	9618	9632	10160	9659	10504	10912	5549
Slightly injured	16133	15896	17038	16539	161140	15080	9098
CLASSES OF PERSONS KILLED AND INJURED							
DRIVERS							
Killed	310	275	299	293	271	288	134
Seriously injured	990	912	910	1007	970	911	499
Slightly injured	1513	1519	1569	1533	1592	1406	742
MOTOR CYCLISTS							
Killed	54	37	35	18	38	49	22
Seriously injured	251	133	162	164	192	141	101
Slightly injured	371	262	330	271	397	237	141
PEDAL CYCLISTS							
Killed	266	285	283	266	284	317	185
Seriously injured	799	668	765	711	921	777	499
Slightly injured	1100	999	1095	1006	1055	955	632
PASSENGERS							
Killed	1096	1110	1012	1117	1031	1004	573
Seriously injured	5459	5659	6397	5825	6176	6721	3439
Slightly injured	8605	8826	10066	10014	9743	9054	5738
PEDESTRIANS							
Killed	1296	1265	1194	1125	1166	1124	680
Seriously injured	2119	2260	1926	1952	2245	2362	1011
Slightly injured	4544	4290	3978	3713	3377	3428	1842

Source: Traffic Police Records, 2004

2.3 Susceptible Groups of Road Users

Pedestrians and passengers form the majority of susceptible road users who fall victims to RTAs. In a study on RTA in Kenya, Nantulya and Muli-Musiime, (1996) observed that pedestrians, passengers, cyclists and drivers as vulnerable groups who are at the greatest risk of accidents or fatalities. The study showed that pedestrians (42%) and passengers (38%) accounted from the majority of deaths from RTAs nationwide.

Other studies have recorded that young people of up to 15 years of age are common victims. Likewise fatalities in RTAs involving pedestrians and cyclists were very common and constituted approximately 28% of those who sustained injuries, while drivers constituted a minority group. They formed 14% and 13% of those injured and killed respectively (Hicks, 1990; Gekonge, 1990). RTIs are one of the causes of mortality with the steepest social class gradient, especially for children and young people. Non-car users, pedestrians and cyclists sustained injuries (Laflamme, 1998). The evidence in developing countries is more fragmentary but points out that the most vulnerable groups on the roads are young males and pedestrians - often children, adolescents, and poorer segments of the population (Mohan and Tiwari, 1998; Ayuthaya and Bohning; 1997; Laflamme, 1998; Andrew *et al.*, 1999; Odero *et al.*, 1997). In a review of 38 studies on road traffic injuries in developing countries, it was found that pedestrian fatalities were higher than fatalities involving drivers, cyclists and other victims in 75% of the studies (Odero *et al.*, 1997).

2.4 Substance Abuse

Alcohol or drugs were believed to be involved in around 3% of road traffic accidents. Truck drivers are more prone to the use of drugs and substances for various reasons, for instance to keep alert while driving or energise them when faced with fatigue. Truck driving is characterised by long travels and often is accompanied by fatigue. This exposes the driver to miscalculations and misjudgement, which subsequently lead to traffic accidents (Odero, 1998). A study in Taiwan recorded that motor vehicle injuries found 8.5% of 449 patients had more than 0.05% alcohol in their blood (Wu *et al.*, 1991).

2.5 Legal Policy

The Legal Policy framework was formulated in Kenya between 1984-1993, which spelt out road safety programmes. At the same time a Kenyan National Road Safety Council (NRSC) was formed during the 1980s supported by the Finnish Government till 1991 based in the Ministry of Transport. Recommendations and Measures to improve safety on Kenyan roads were made. The government did not however provide adequate follow-ups for implementation and monitoring as well as strategies to evaluate the policy. They were never implemented. Improving road safety requires deliberate efforts by the government and its many development partners and stakeholders. Political will is important for successful implementation of strategies aimed at improving road safety programme.

2.6 The Impact of Road Traffic Accidents On Public Health

Road traffic accidents have significantly contributed to premature deaths and disability. In 1998, it was estimated that about 1,171,694 people died from road traffic injuries worldwide. Injury related deaths account for 20.3% of all deaths. Accidents happen to people from all economic groups but the poor and under-privileged when injured, have less chance of survival and full recovery, mainly due to financial problems which limit their health seeking behaviour (Krug, 1999).

Studies carried out in Nigeria, Zimbabwe and Botswana have attempted to explain the epidemiology of RTAs. They have shown that RTAs are the most frequent causes of injuries presented to casualty departments in hospitals (Nordberg, 1994) see Table 2.4. Fatalities from RTA account for 10% of all deaths in the 14 - 44 age group in Kenya. The costs involved in taking care of the RTA casualties have inevitably risen causing considerable strain on the human and financial resources in Kenya. This has led to overcrowding in the health facilities (NRSC, 2000).

Table 2.4: Distributions of Traffic deaths and Mortality Rates by WHO Region* and Income Group* (High, Low and Middle), 1998

COUNTRY	AFR	AMR			EMR			EUR		SEAR		WPR		WORLD
		HICs	LMCs		HICs	LMCs		HICs	LMC	HICs	LMC			
Total RT Deaths (000)	170	49	126	72	66	107	336	25	220	1171				
% of global RT Deaths	14.5	4.2	10.8	6.1	5.6	9.1	28.6	2.1	18.8	100				
RT Deaths per 100,000	28.2	16.1	25.3	15.2	16.8	22.4	22.6	12.6	15.5	19.9				
% of all Deaths due to RTIs	1.8	1.9	4	1.9	1.7	2	1.7	1.7	2.1	2.2				

Source: **Krug, 1999.**

By 2020, it is projected that RTIs will account for about 2.3 million deaths globally and this will account for a greater proportion of all injury deaths (27.4%), with over 90% of these deaths occurring in LMICs. In 1998, there were 38,848,625 disability adjusted life years lost from RTIs worldwide. Infact economic data shows that only US\$ 1 was spent for every DALY caused by road traffic collisions in 1990 despite the fact that projections indicated that road traffic collisions will be the third biggest cause of DALY by the year 2020 (Krug, 1999). The annual cost of road traffic crashes is about 1% of the GNP in developing countries, 1.5% in transitional countries and 2% in “highly motorised countries”. The global annual cost is US\$ 518 billion (TRL, 2002). An assessment study done in Kenya reported that the cost of RTAs to the global economy is about US\$ 500 billion, with approximately US\$ 100 million lost in developing countries annually. The cost of RTA to the economy is approximately 1 to 2% of a country’s GNP (Nantulya and Muli-musiime, 1996)

In 1996, between 26% and 52% of Kenya’s total earnings from road transport sector was lost due to RTAs (ECA, 1997). Table 2.5 shows the estimated cost of RTAs in six regions of the world.

Table 2.5: Road Crash Costs by Region (US\$ Billion) 2000

Region	Regional GNP		Estimated Annual Crash Cost	
	1997	GNP	GNP	Costs
Africa	370		1%	3.7
Asia	2454		1%	24.5
Latin America/Caribbean	1,890		1%	18.9
Middle East	495		1.5%	7.4
Central/Eastern Europe	659		1.5%	9.9
Sub total	5,615			64.5
Highly Motorised Countries	22,665		2%	453.3
TOTAL				517.8

Source: Jacobs *et al.*, 2000

The World Bank reported that the annual cost of road traffic accidents in developing countries is 100 billion US\$ combining all forms of foreign loans and aid totals to 60 billion US\$ (Table 2.5). It is evident that RTAs are seriously undermining socio-economic development in these countries. The accident victims are workers and bread winners in their respective families and contribute to the socio-economic status of their immediate families and the nation in general. When killed or disabled, they profoundly affect their family, community and the nation (World Bank, 1999).

RTAs cost the Kenyan economy approximately 2.5 billion shillings annually. The consequences of RTAs has far reaching economic and social implications, not only to the individual victim if he survives but also to the dependants of the victims and the government. Besides money, in form of measurable costs, the nation loses valuable resources in form of skilled and unskilled human resources (Gekonge, 1990).

2.7 Statement of the Problem

RTAs are the leading cause of premature death and disabilities worldwide. Global road fatality trends show that RTAs constitute a rapidly growing problem, with deaths from injuries projected to rise from 5.1 million in 1990 to 8.4 million in 2020. The current global record is 1.18 millions of deaths (WHO, 2000), while in Kenya, RTAs claim 2,800 people annually. In Kisii, 21 fatal road crashes are reported annually (CBS, 2003; Traffic Police Records, 2003). The progressive increase in RTAs with its increased deaths and disabilities and the socio-economic losses associated with them are a cause of concern. Policy responses have been ineffective in containing them. The public is not aware of this problem and most importantly they have been associating it with transport anomaly and yet this is a public health problem.

2.8 Justification of the Study

Records show that RTAs are rapidly emerging as a leading cause of death and disabilities worldwide. In developing countries and especially Sub-Saharan Africa, RTA rates far exceed those in developed countries (Razzack and Luby, 1998; Terrcero *et al.*, 1998). Every day 140,000 people are injured on the world's roads. More than 3,000 people die and some 15,000 are disabled for life (WHO, 2004). In most developing countries where the burden of RTA is the greatest and represents a large and neglected health problem, there has been little or no public health leadership for prevention and control of road traffic injuries and their consequences.

In developed countries the technological complexities of RTAs are understood, solutions found, and strategies have been implemented with success. Currently, the

developed countries have the lowest rate of road traffic deaths per 100,000 people with annual rates below 60 and progressively falling. By contrast, many developing countries, including Kenya has rates in excess of 280 per 200,000 people. In developed countries, the understanding of causes of RTAs have resulted in the design of safer vehicles, roads and traffic management system (Murray and Lopez, 1996). Other interventions implemented include behaviour change to reduce injury risk, educational campaigns in increasing the use of safety devices such as seatbelts, bicycle helmets, child restraints in cars, smoke alarm, pedestrian education, pedestrian walkways, traffic calming, immediate management of victims on site, training of emergency medical service system and establishment of trauma centres with adequate facilities. This study aimed to come up with findings which will assist stakeholders, policy makers and relevant authorities in formulation and implementation of cost effective and sustainable road-safety strategies which will reduce RTAs.

2.9 Research Questions

The study sought to answer the following questions:

1. Which vehicles are more prone to cause road traffic accidents within Kisii Central District Kenya?
2. What factors contribute to RTAs within Kisii Central District?
3. What measures are in place to enforce the Traffic Act in reducing Road Traffic Accidents?
4. What is the relationship between demographic factors and the cause of RTA?

2.10 Null Hypotheses

1. Matatus and buses do not cause RTAs in Kisii Central district Kenya.
2. There is no significant relationship between human errors, vehicular factors and traffic environment and incidence of RTAs.
3. There is no association between RTAs and measures taken by road users and law enforcement agencies in Kisii Central District.
4. Demographic factors have no relationship with the causes of RTAs.

2.11 Objectives of the Study

2.11.1 Main Objective

The main objective of the study was to establish the incidence and causes of RTAs and their impact on public health within Kisii Central District Kenya.

2.11.2 Specific Objectives

1. To determine the incidence of RTAs and the disease burden within Kisii District
2. To determine vehicles which cause RTAs within Kisii District
3. To determine factors which contribute to causes of RTAs and measures taken by road users to avoid them.
4. To assess the effect of RTAs before and after enforcement of the road traffic regulations.

CHAPTER THREE: MATERIALS AND METHODS

3.1 The Study Area

The study was carried out in Kisii Central District in Western Kenya. The district is situated in the greater Kisii highland. Kisii Central District is one of the twelve districts which form Nyanza Province. Kisii Central District has a population of 491,786 people, occupying an area of 648.9 square kilometres and a density of 758, with a household of 100,315 units (CBS, 2000).

The area is endowed with volcanic, rich fertile soil which favours agricultural activities. Food crops include maize, cassava, bananas, groundnuts, peas and beans, while cash crops are coffee and tea. A few farmers practice dairy farming as well as poultry keeping (CBS, 2000). The main mode of transport is through road network. Kisii town is the main administrative headquarter and the main commercial centre (Appendix 2).

3.2 Study Population

The study population included drivers of *matatus*, buses, trucks lorries and cars, traffic police officers, road traffic accident victims and road users (passengers, pedestrians, motor cyclists and pedal cyclists).

3.2.1 Inclusion Criteria

Drivers of motor vehicles and buses who were in Kisii at the specific time of the study. All road users and traffic police officers who consented to participate in the study

3.2.2 Exclusion Criteria

Drivers and traffic police officers who were not in Kisii at the specific time of the study. Drivers and traffic police officers who were unwilling to participate in the study. Those accident victims and road users who were unwilling to participate in the study.

3.2.3 Assumptions

Underlying this study were the following assumptions. That the respondents of this study had the knowledge especially of traffic rules (see Appendix 3) and insight to participate and complete the instruments of the study.

That the respondents would freely and honestly express their opinion about items in the instrument of the study.

That the stakeholders and road users had the desire to understand the multi-factorial causes of RTAs and their subsequent consequences and therefore would have the desire to offer suggestions for prevention and control of RTAs.

3.3 Ethical Considerations

Permission to carry out the research study was sought from the Kenya Traffic Police headquarters, Ministry of Education, Science and Technology and Ministry of Health (Appendix 4). Confidentiality of responses from respondents was strictly maintained. Signed permission was not required and acceptance to answer the questionnaire implied consent to participate in the study. Participation was voluntary and

participants were assured that the researchers would not reveal their identity and the information obtained would only be used for the purpose of the study.

3.4 Study Design

This was a descriptive cross-sectional survey whereby a section of motor vehicle drivers, road traffic accident victims, road users and traffic police officers were randomised to participate in the study. Qualitative and quantitative data was collected using structured questionnaires (Appendix 1.1). Focus group discussions were held with road users and traffic police officers.

3.5 Sampling Method

Simple random sampling was used to select participants for the study. Purposive sampling was used for the drivers at the bus terminus, the traffic police officers, road users and accident victims undergoing treatment at the district hospital. Kisii Central District was chosen for the study because of its dense population, topography and high rainfall of 1500mm annually, which make roads dangerous and at times impossible

3.6 Sample Size Determination

The sample size was determined by using the formula as used by Fisher *et al.* (1998).

$$n = \frac{Z^2 pqD}{d^2}$$

- where,
- n = The desired sample size (population > 10,000)
 - Z = Normal standard deviation (1.96) which corresponds to 95% Confidence Interval (C.I)
 - P = Proportion of the target population estimated to have particular characteristics
 - q = 1 – P
 - d = Degree of accuracy usually 0.05
 - D = Design effect is equal to 1 where there are no replication

Where P = 0.5, assumed D = 1

Thus $n = \frac{1.96^2 \times 0.5 \times 0.5 \times 1}{0.05^2}$

$$n = \underline{\underline{384}}$$

To allow for attrition, nine respondents were added.

The study population was divided into five sub-groups, on the basis of convenience but proportionately. Fifteen traffic police officers (the station had 15 officers, all were included). Fifty-one *matatu* and bus drivers sampled from approximately, 300 drivers from the *matatu/bus* terminus. Thirty victims of RTAs, who were under-going treatment at the Kisii district hospital at the time of the study and two hundred ninety seven non-motorists/road users – selected by simple random sampling. This made a total of 393 respondents.

3.7 Data Collection

The study used semi-structured, self administered questionnaires as well as interview schedule with open and closed ended questionnaires for the purpose of gathering information. The questionnaire was given to sampled respondents who filled them in the presence of the investigator. The completed questionnaire was collected the same day. Focus group discussions were used to provide valuable information and suggestions. Three FGD were held, on different settings, one with 10 motorists and another with 10 non-motorists and the other with 15 traffic police officers.

3.8 Data Analysis

The collected data was processed using Statistical Package for Social Sciences (SPSS). Degree of association was compared using Chi-Square test. The level of significance was fixed at 0.05 ($P = 0.05$).

CHAPTER FOUR: RESULTS

4.1 Gender and Age Distribution of Road Users

Out of the three hundred and ninety three road users sampled, two hundred and seventy-six (70.2%) were males, while one hundred and seventeen (29.8%) were females. Two hundred and fifty road users (63.6%) were in the age group 20-30 years, while eighty-four (21.4%) were in the age group 31-40 years. Thirty-six road users (9.2%) were between 41-50 years of age, while twenty-three (5.8%) were fifty-one years and above (table 4.1). The majority of the road users were between 20-40 years. There was a significant relationship between the age of road users and occurrence of RTAs ($\chi^2 = 273.519$, $df = 3$, $P=0.0005$).

Table 4.1: Age of Road Users in Years

AGE	FREQUENCY	%
20 - 30	250	63.6
31 - 40	84	21.4
41 - 50	36	9.2
Above 51	23	5.8
Total	393	100

4.1.1 Educational Level of Road Users (n = 393)

Out of three hundred and ninety-three road users, one hundred and forty-seven (37.4%) had attained secondary education, while one hundred and forty-four (36.6%) had post secondary education. Eighty-four road users (21.4%) had primary education, while eighteen (4.6%) had no formal education (figure 4.1). Majority of the road users were literate. There was a significant association between level of education and vulnerability to RTAs ($\chi^2 = 160.657$, $df = 3$, $P=0.0005$).

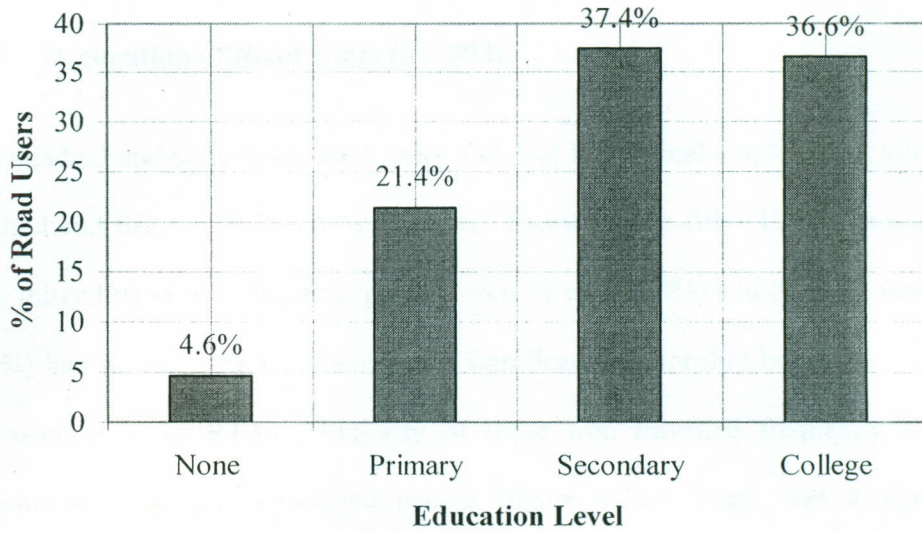


Figure 4.1: Education Level of Roads Users

4.1.2 Religion of Road Users (n = 393)

One hundred and thirty-two (33.6%) were Catholics, while one hundred and seventy-two (43.8%) were Seventy Day Adventists. Muslims were twenty-eight (7.1%), Protestants, twenty-three (5.85%), and others were thirty-eight (9.7%). Majority of the road users were Seventy Day Adventists, followed by the Catholics as compared to other religious faiths (figure 4.2).

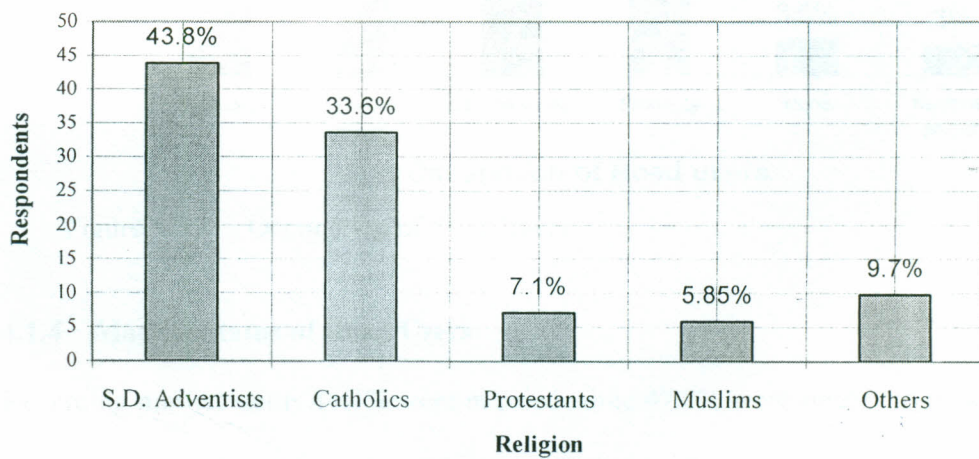


Figure 4.2: Religion of Road Users

4.1.3 Occupation of Road Users (n = 393)

One hundred and sixty-seven road users (42.4%) had formal employment, while one hundred and fifteen (29.3%) were students. Farmers were fifty (12.7%), housewives were thirty-five (8.9%), business persons were twelve (3.0%) and fourteen road users (3.6%) had no occupation. There was a significant relationship between occupation and occurrence of RTAs. Majority of those who travelled frequently included students and formally employed people (figure 4.3). There was a significant relationship between occupation and vulnerability to RTAs ($\chi^2 = 182.0655$, $df = 5$, $P=0.0005$).

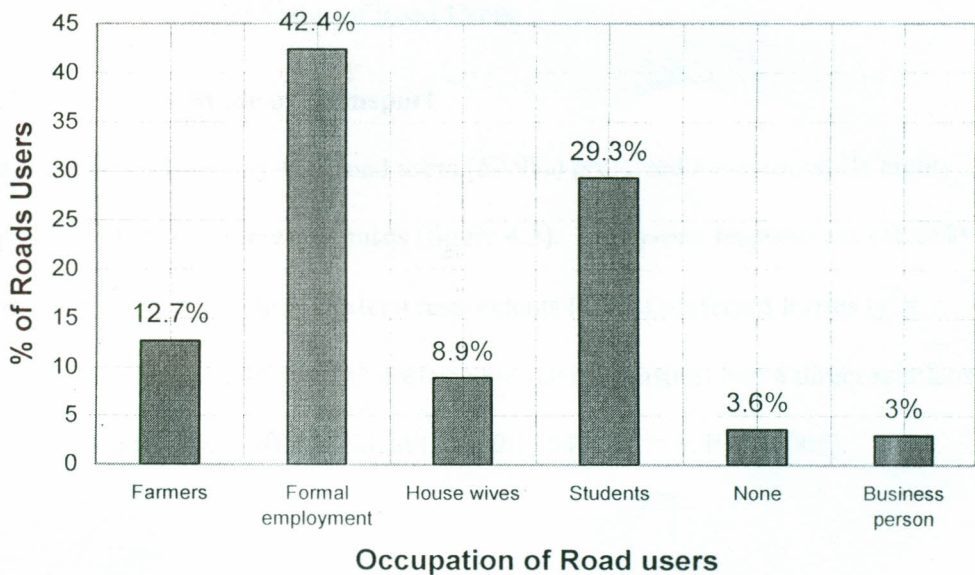


Figure 4.3: Occupation of Road Users

4.1.4 Marital Status of Road Users

Regarding marital status 44.4% were married while 47.8% were single, separated and widowed were 7.8%. Married people were affected by RTAs more compared to other

people (figure 4.4). There was a significant relationship between marital status and susceptibility to RTAs ($\chi^2 = 16.200$, $df = 2$, $P=0.0005$).

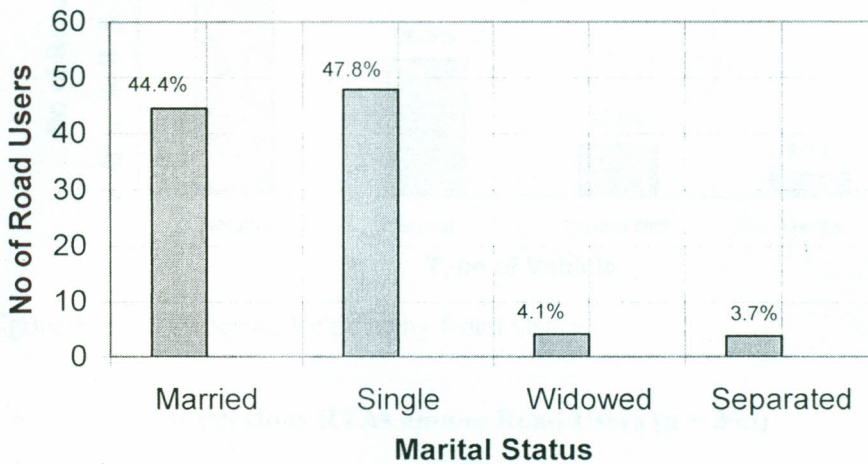


Figure 4.4: Marital Status of Road Users

4.1.5 Preferred Mode of Transport

One hundred and seventy-two road users (57.9%) preferred *matatus*, while eighty respondents (26.9%) preferred buses (figure 4.5). Thirty-one respondents (10.5%) used private vehicles, while fourteen respondents (4.7%) preferred lorries ($\chi^2 = 205.541$, $df = 3$, $P = 0.005$). The preferred mode of transport had a direct relationship to occurrence of road traffic accident ($\chi^2 = 205.541$, $df = 3$, $P = 0.005$).

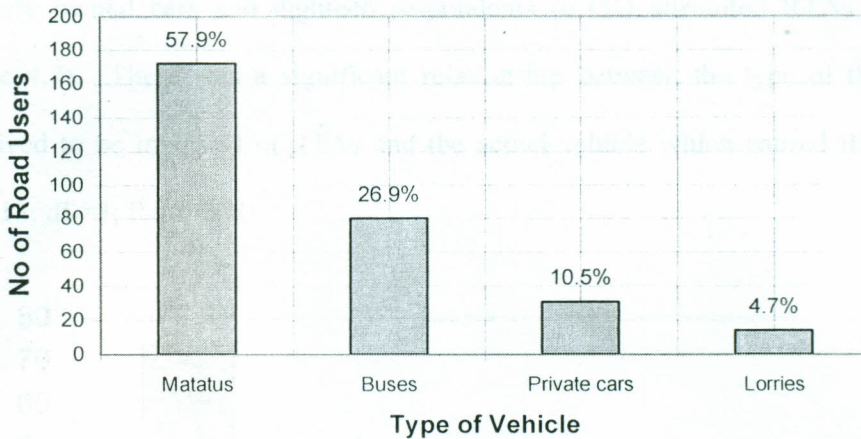


Figure 4.5: Preferred Vehicles by Road Users

4.1.6 History of Previous RTAs among Road Users (n = 393)

One hundred and twenty-four respondents (41.8%) reported to have had a previous history of RTA, while one hundred and seventy-three respondents (58.2%) had none. The study showed that nearly half of the respondents had a previous episode of RTA (figure 4.6).

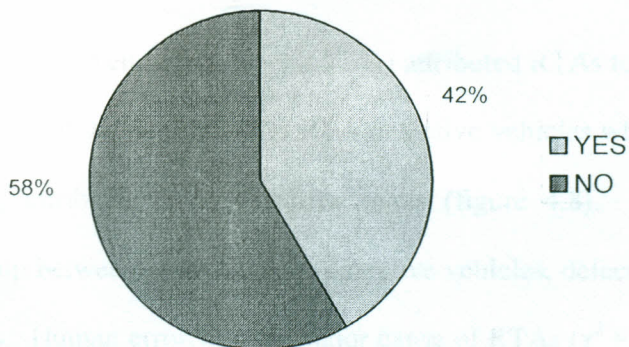


Figure 4.6: History of Previous RTAs

4.1.7 Vehicles Perceived to be Involved in RTAs (n = 393)

Two hundred and eighteen respondents (73.4%) reported matatus, while fifty-nine respondents (19.9%) reported buses. Two respondents (0.6%) attributed RTAs to

privately owned cars and eighteen respondents (6.1%) attributed RTAs to lorries (figure 4.7). There was a significant relationship between the type of the vehicle perceived to be involved in RTAs and the actual vehicle which caused RTAs ($\chi^2 = 394.118$; $df=3$; $P = 0.008$).

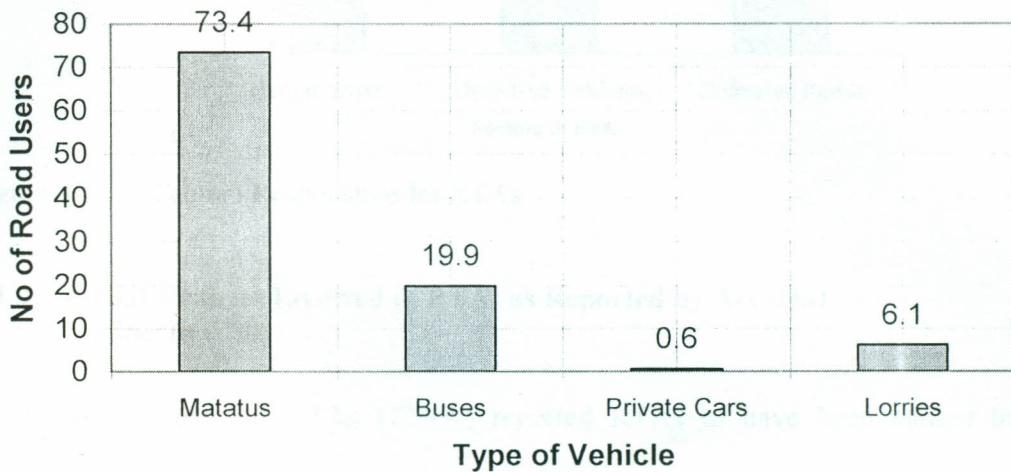


Figure 4.7: Vehicles Perceived to be involved in RTAs

4.1.8 Factors Responsible for Road Traffic Accidents

One hundred and seventy seven respondents (59.6%) attributed RTAs to human error, sixty-two respondents (20.9%) attributed to RTA defective vehicles while fifty-eight respondents (19.5%) attributed it to defective roads (figure 4.8). There was a significant relationship between human errors, defective vehicles, defective roads and road traffic accidents. Human error was the major cause of RTAs ($\chi^2 = 93.412$; $df = 2$, $P = 0.0005$).

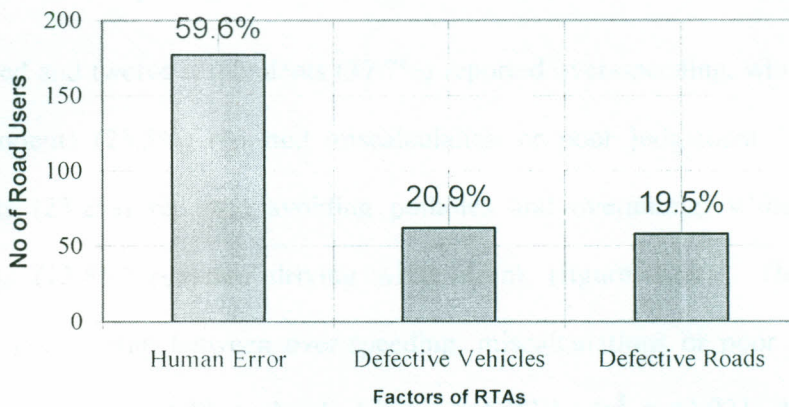


Figure 4.8: Factors Responsible for RTAs

4.1.9 Actual Vehicles Involved in RTAs as Reported by Accident Victims (n = 30)

Twenty-two victims of RTAs (73.4%) reported RTAs to have been caused by *matatus*, while three respondents (10.0%) reported saloon cars. One respondent (3.3%) reported land rover, while four respondent (13.3%) reported buses (figure 4.9). Majority of vehicles involved in actual RTAs were *matatus* ($\chi^2 = 38.00$ df = 3, P = 0.0005)

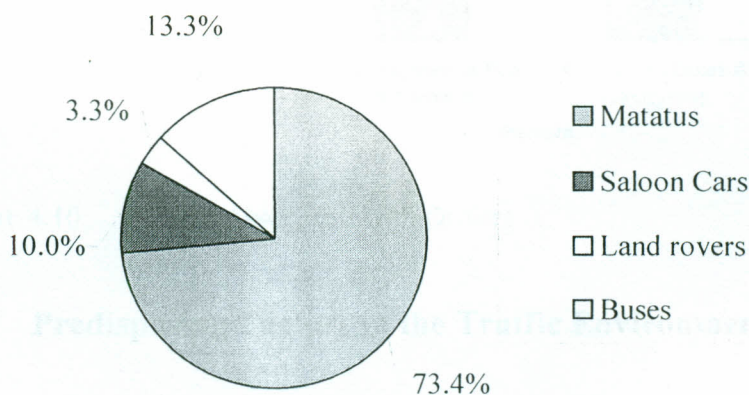


Figure 4.9: Actual Vehicles involved in RTAs

4.1.10 Predisposing Factors in Human Error

One hundred and twelve respondents (37.7%) reported over-speeding, while seventy-five respondents (25.3%) reported miscalculation or poor judgement. Sixty-nine respondents (23.2%) reported avoiding potholes and overtaking, while forty-one respondents (13.8%) reported driving while drunk (figure 4.10). There was a significant relationship between over-speeding, miscalculations or poor judgement, avoiding potholes, overtaking, drunk driving and RTAs ($\chi^2 = 42.221$; $df = 3$, $P = 0.005$).

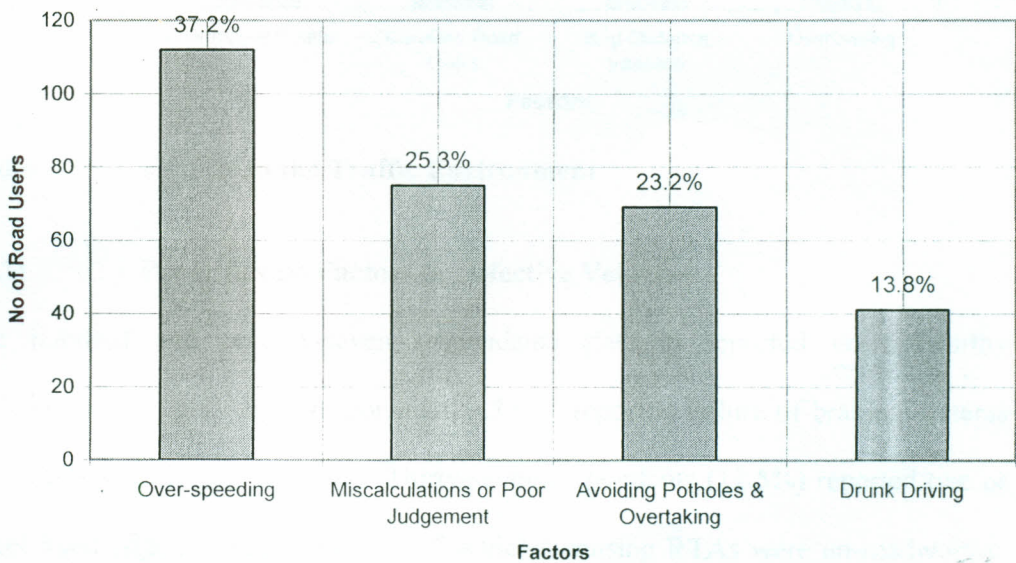


Figure 4.10: Factors Associated with Drivers

4.2 Predisposing Factors in the Traffic Environment

One hundred and twenty-two respondents (41.1%) reported defective roads, while eighty-nine respondents (30.0%) reported careless road users. Sixty-eight respondents (22.9%) reported over-loading while eighteen respondents (6%) reported

too long-distance driving causing fatigue as predisposing factors (figure 4.11). The traffic environment was a significant factor as a cause RTA ($\chi^2 = 77.714$, $df = 3$, $P = 0.005$).

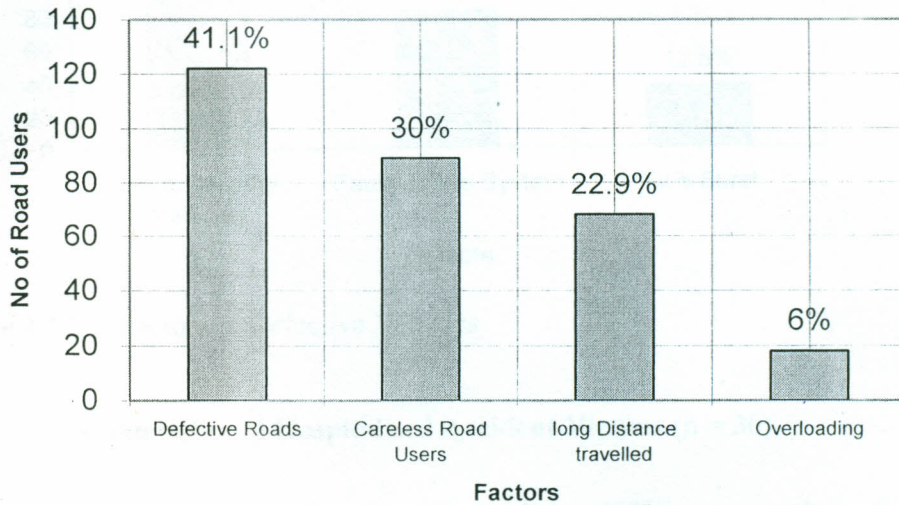


Figure 4.11: **Factors in the Traffic Environment**

4.2.1: **Predisposing Factors in Defective Vehicles**

One hundred and seventy-seven respondents (59.6%) reported un-roadworthy vehicles, while eighty-eight respondents (27.9%) reported failure of braking systems as predisposing factors to RTAs. Thirty-seven respondents (12.5%) reported tyre or wheel burst (figure 4.12). Majority of vehicles causing RTAs were un-roadworthy. The defective vehicles were significantly associated with RTAs ($\chi^2 = 238.843$, $df = 3$, $P = 0.0005$).

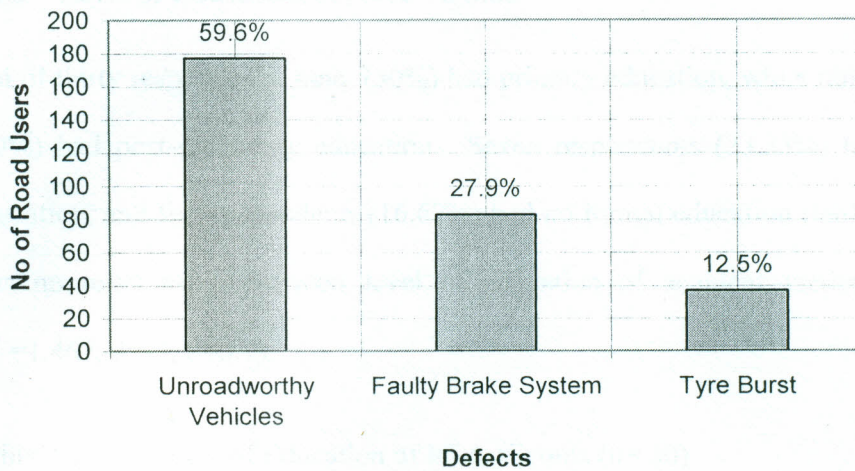


Figure 4.12: Factors in Defective Vehicles

4.2.2 Characteristics of Hospitalised Accident Victims (n = 30)

Out of thirty respondents, twenty-one respondents, (70%) were males, while nine respondents (30%) were females (table 4.2). The majority of victims (70%) of RTAs were between 20 – 40 years ($\chi^2 = 8.588$, $df = 3$, $p = 0.05$). There were significantly more males involved in RTAs than females ($\chi^2 = 32.96$, $df = 1$, $P = 0.0005$).

Table 4.2: Sex of RTA Victims

GENDER	FREQUENCY	%
Male	21	70
Female	9	30
Total	30	100

4.2.3 Level of Education of RTA Victims

Out of thirty respondents, nine (30%) had primary education, while nine respondents (30%) had post-secondary education. Seven respondents (23.33%) had secondary education, and five respondents (16.67%) had no formal education (table 4.3). There was no relationship between level of education of accident victims and RTAs ($\chi^2 = 1.467$, $df=3$, $P=0.7$).

Table 4.3: Level of Education of RTA Victims (n= 30)

	FREQUENCY	%
None	5	16.67
Primary	9	30
Secondary	7	23.33
Post-Secondary (College)	9	30
Total	30	100

4.2.4 Characteristics of Drivers (n = 51)

Out of fifty-one drivers, forty-six (90.2%) were males, while five (9.8%) were females (table 3.10). There was a significant relationship between male vulnerability to cause RTAs than females ($\chi^2 = 32.961$, $df=1$, $P=0.0005$). Most drivers (82.4%) were aged 20-40 years (table 4.4). There was a significant relationship between age and susceptibility to RTAs ($\chi^2 = 8.588$, $df=2$, $P=0.05$).

Table 4.4: Sex of Drivers

GENDER	FREQUENCY	%
MALE	46	90.2
FEMALE	5	9.8
TOTAL	51	100

4.2.5 Level of Education of Drivers (n = 51)

Nineteen drivers (37.3%) had attained secondary school education, while fourteen (27.4%) had attained post-secondary education. Thirteen respondents (25.5%) had attained primary education, while five drivers (9.8%) had no formal education (table 4.5). There was no significant relationship between education of drivers and susceptibility to RTAs ($\chi^2 = 7.902$, $df=3$, $P=0.05$).

Table 4.5: Age of Drivers (n = 51)

YEARS	FREQUENCY	%
20 -30	16	31.4
31 – 40	26	51.0
41 - 50	9	17.6
Total	51	100

4.2.6 Commonly used Vehicles by RTA Victims (n = 30)

Sixteen victims of RTAs (53.3%) used *matatus*, while eight (26.7%) used buses. Five victims of RTAs (16.7%) preferred private cars, while one RTA (3.3%) used lorries (table 4.6). There was a significant relationship between the most commonly used vehicles and occurrence of RTAs ($\chi^2 = 16.155$, $df=5$, $P=0.001$).

Table 4.6: Commonly used Vehicles by RTA Victims

VEHICLE	FREQUENCY	%
<i>Matatus</i>	16	53.3
Buses	8	26.7
Private cars	5	16.7
Lorries	1	3.3
Total	30	100

4.2.7 Types of Vehicles, which caused Traffic Accidents as, reported by RTA Victims (n = 30)

Out of thirty accident victims, twenty-two (73.4%) reported RTA to have been caused by *matatus*, while three victims (10.0%) reported saloon cars. Four victims (13.3%) reported buses, while one victim (3.3%) reported land rovers (table 4.7). Majority of accidents were caused by *matatus* and buses as compared to other vehicles ($\chi^2 = 38.00$, $df=3$, $P=0.0005$)

Table 4.7 Type of Vehicles causing RTAs

CATEGORY	FREQUENCY	%
<i>Matatus</i>	22	73.3
Saloon cars	3	10
Buses	4	13.3
Land rovers	1	3.3
Total	30	100

4.2.8 Causes of Accidents as Reported by RTA Victims (n = 30)

Thirteen RTA victims (43.3% reported driver error, while ten (33.3%) reported bad roads. Seven RTA victims reported defective vehicles as predisposing factors (table 4.8). The majority of RTAs (43.3%) were caused by driver error ($\chi^2 = 1.800$, $df=2$, $P=0.5$).

Table 4.8 Causes of RTA as reported by accident victims

	FREQUENCY	%
Driver Error	13	43.3
Bad Road	10	33.3
Defective vehicle	7	23.4
Total	30	100

4.2.9 Hospitalisation and Duration of Stay in Hospital (n = 30)

Out of thirty RTA victims, twenty-seven (90%) had serious injuries, while three (10%) did not (table 4.9). Among this group, nine RTA victims (33.9%) had a hospital stay of between 1-30 days, while thirteen (48.2%) were hospitalised for 31-180 days. Seven RTA victims (14.8%) stayed for more than 180 days, while one had stayed over a year in the hospital.

Table 4.9: Duration of Hospitalisation (n=30)

DAYS	FREQUENCY	%
1-30 days	9	33.3
31-180 days	13	48.2
180-360 days	7	14.8
Over 1 year	1	3.7
Total	30	100

4.2.10 Training of Drivers (n = 51)

Out of fifty-one drivers, forty-one (80.4%) attended a driving school for instructional training, while ten (19.6%) learnt driving on the job (table 4.10). There was no significant relationship between formal and informal driver training and occurrence of RTAs ($\chi^2 = 18.843$, $df=1$, $P=0.0005$)

Table 4.10: Place of Training as a Driver

	FREQUENCY	%
Driving school	41	80.4
Learned as a driver while a <i>matatu</i> conductor	10	19.6
Total	51	100

4.2.11 Driving Experience of Drivers (n = 51)

Thirteen drivers (25.5%) had a driving experience of less than four years while twenty-seven (52.9%) had driven for between 5 and 10 years and three (5.9%) had driving experience of above 16 years (table 4.11). There was a significant relationship between driving experience and occurrence of RTAs. Most drivers

involved in RTAs had driving experience of less than 4 years ($\chi^2=27.247$, $df=3$, $P=0.05$).

Table 4.11: Driving Experience of Drivers

EXPERIENCE IN YEARS	FREQUENCY	%
1-4 years	13	25.5
5-10 years	27	52.9
11-15 years	8	15.7
Over 16 years	3	5.9
Total	51	100

4.2.12 Previous History of RTA among Drivers (n=51)

Out of fifty-one drivers, thirty-eight (74.5%) had a previous history of RTA, while thirteen (25.5%) had no similar history (table 4.12). Most drivers involved in RTAs had experience of less than 4 years ($\chi^2=2..250$, $df=1$, $P=0.05$).

Table 4.12: Previous History of RTA among Drivers

PREVIOUS HISTORY	FREQUENCY	%
YES	38	74.5
NO	13	25.5
TOTAL	51	100

4.3. Type of Insurance Cover of Vehicles Involved in RTAs

Out of forty-nine vehicles involved in RTAs, thirty-one (63.3%) had third party insurance cover, while ten (20.4%) had comprehensive insurance cover. Eight vehicles (16.3%) did not have any insurance cover (table 4.13). There was an

association between insurance cover and occurrence of RTA. Accidents were common with vehicles, which had third party insurance cover.

Table 4.13: Type of Insurance cover involved in RTAs

TYPE OF INSURANCE	FREQUENCY	%
Comprehensive	10	20.4
Third party	31	63.3
None	8	16.3
Total	49	100

4.3.1 Accidents Reported or Filed to the Traffic Police (n = 49)

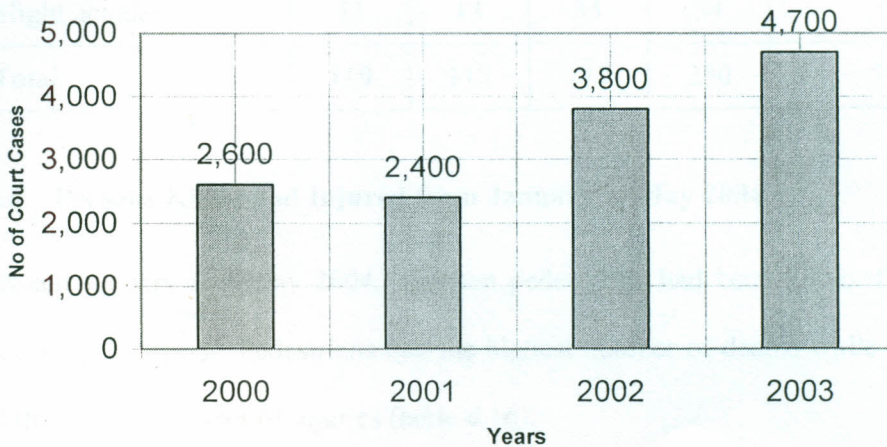
Out of forty-nine vehicles involved in RTAs, thirty-nine (79.6%) filed accident reports to traffic police, while ten (20.4%) did not report. The data showed some RTAs' were never reported to the traffic police (table 14).

Table 4.14: Report Filed to Traffic Police

REPORT FILED	FREQUENCY	%
YES	39	79.6
NO	10	20.4
TOTAL	49	100

4.3.2 Court Cases filed for Road Traffic Offences (2000 to 2003)

From the year 2000, the Kisii law courts had 2,600 traffic offences filed, 2001 had 2,400 cases, 2002 had a record of 3,800 cases, while 2003 had the highest record of 4,700 cases (figure 4.13).



Source: Kisii Court Traffic Records

Figure 4.13: Court Cases Filed by Traffic Police

4.3.3 Incidence of RTAs Statistics in Kisii Central District

Available police records in 2004 showed RTA statistics were on the increase. From 2000 to 2003 fatality increased by 7.5% while serious accidents increased by 47%. One hundred and forty-five accidents occurred annually (table 3.19). From 2004, between January and May, fatal accidents were nine (17.6%). Serious accidents were thirty-three (64.7%), while nine (17.6%) had slight accidents (table 4.15). There has been a decrease of accidents from January 2004 up till May 2004 by twenty percent.

Table 4.15: Kisii RTA statistics (from traffic police records)

SEVERITY OF RTA	2000	2001	2002	2003	2004 Jan-May
Fatal Accident	9	19	26	30	9
Serious accident	57	83	56	146	33
Slight accident	53	13	35	54	9
Total	119	115	117	230	51

4.3.4 Persons Killed and Injured from January to May 2004

Between January and May 2004, nineteen pedestrians had been killed, five drivers and four passengers. Pedestrians had the highest number of deaths while passengers had the highest number of injuries (table 4.16).

Table 4.16 Persons killed and Injured in Kisii through RTAs (from traffic police records)

Victims	Drivers	Motorcyclist	Pedal cyclists	Passengers	Pedestrians
Killed	5	1	1	4	19
Serious injury	7	-	5	161	44
Slight injury	6	2	6	66	22
Total	18	3	12	231	85

4.3.5 Victims of RTAs who were Hospitalised at the District Hospital (2000 – 2003)

Between 2000-2003, twenty-four people died while under-going treatment from injuries. Among the deaths, twenty victims (83.3%) were males while four (16.7%) were females. A total of 1432 people were injured out of which 917 (64%) were males while 515 (36%) were females (table 4.14). The data showed that an average of 364 people sustained RTIs, of twenty-four died annually.

Table 4.17 Victims of RTAs Hospitalised at Kisii District Hospital (2000 – 2003)

YEAR	2000		2001		2002		2003	
	Male	Female	Male	Female	Male	Female	Male	Female
Died	9	2	8	1	2	1	1	0
Injured	333	153	211	109	186	105	187	148
Total	342	155	219	110	188	106	188	148

4.3.6 Recommended Methods of Preventing RTAs by Road Users

- All road users had the knowledge on how RTAs should be prevented and they suggested the following ways: i.e observing and enforcement of traffic rules (19.6%), avoiding overloading (17.1%), avoiding over-speeding and overtaking carelessly (18.8%), stopping drunk driving (11.2%), building good roads (6.6%), use of safety belts and speed governors (4.3%), having well trained drivers (3.6%), banning un-roadworthy vehicles (3.1%), educating road users on road safety (2.0%) and maintaining vehicles and vehicle inspection (2.6%) and other methods (11.1%), can go along to prevent RTAs (Figure 4.14).

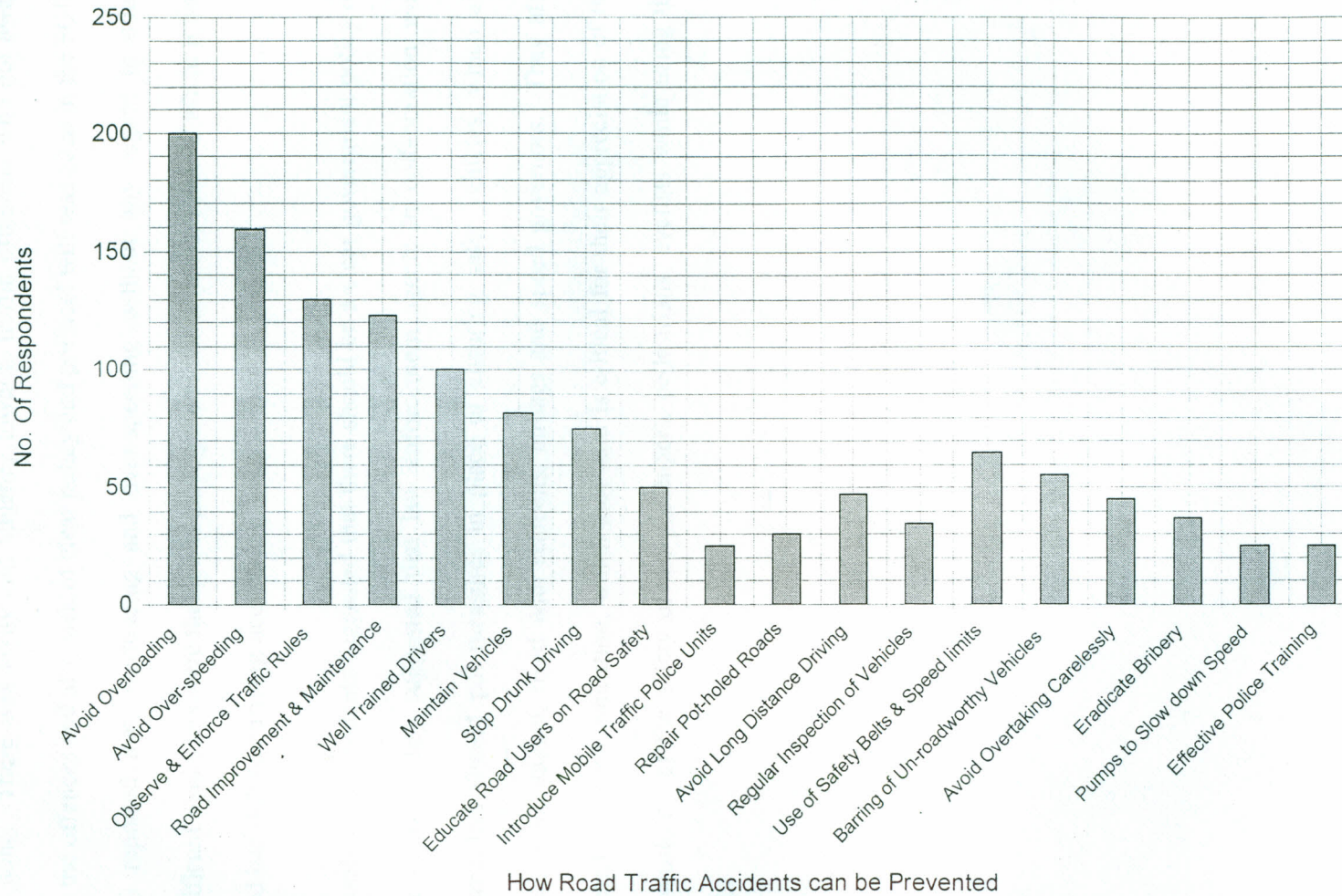


Figure 4.14: Methods of preventing RTAs by Road Users

Majority of the road users felt that observing and enforcement of traffic rules was not well done. There was laxity and leniency towards traffic offenders who got away with the offences and also lack of clear policy and political will was cited in the FGD. They reported that overloading and over-speeding without any regard to other significant road users were the norms among the *matatu* drivers, some of whom it was noted had dubious driving licenses.

Majority of respondents suggested that there should be a clear government policy on road safety. They suggested that law enforcement agents in collaboration with stakeholders should put measures in place of ensuring safer vehicles, which are properly maintained, fixed with seatbelts, airbags and speed governors. They also stressed on driver education, which they said is critical for their appreciation of the responsibility of the safety of the passengers, pedestrians, cyclists while using the roads.

CHAPTER FIVE: DISCUSSION

5.1 Characteristics of Study Population

The results of this study showed that young adults between 20-40 years of age were the majority road users. Likewise, young males (65%) were predominant road users. This suggests that young adults and most importantly men travel a lot and were susceptible to RTAs. The findings of this study are in agreement with a similar study by World Bank (1990), which showed that the majority of accident victims in the US were young males who were also workers and wage earners in their families. Similarly, WHO (1999) showed that 75.7% of road accident victims were between the ages of 25 – 45 years. Although gender dimensions of RTA have not been widely explored, studies done by Barrss *et al.* (1998) and Odera *et al.* (1997), suggested that men are at greater risk of injury and death than women due to RTAs. This also concurs with a previous study by WHO (1999), which showed that 80% of the victims of road traffic crashes are usually young and less than 45 years. Motor vehicle crashes represent the largest single cause of all injury related deaths worldwide for the young and economically active people. The results of this study showed that young people and most importantly men are at a higher risk of RTAs as compared to other road users.

5.2 Educational Level of Road Users

The study showed that the level of literacy among the study participants was high (89.7%). This is supported by the 1999 census data which showed that 89% of eligible population had formal education.

5.3 Vehicles Perceived to be Causing RTAs

The results of this study showed that majority of road users perceived that majority of road traffic accidents were caused by *matatus* (73.2%), buses (20.4%), followed by lorries (3.7%) and private cars (0.6%). The study suggests that the risk of RTA while travelling in matatu was high as compared to other categories of vehicles.

5.4 Actual Vehicles Causing Accidents

The results of this study showed that majority of RTA were caused by *matatus* (73.4%). The traffic police records showed *matatus* (72%) as the vehicles most commonly involved in RTAs followed by buses (20%). These results are in agreement with Gekonge (1990) in a study on road traffic accidents in Kenya in which he recorded *matatus*, saloon cars, buses and lorries as the leading vehicles causing RTAs. The main cause of accidents was due to over-speeding. This also concurs with a similar study by Some (1990) in which *matatus*, minibuses, pickups, followed by lorries, land-rovers, buses and land-cruisers as leading in RTAs. In a study in Costa Rica, Bixby (1990) reported cars as the major causes of RTAs.

The results of this study suggest that *matatus*, buses, cars and lorries are the vehicles that most commonly cause RTAs as compared to other vehicles plying the roads. *Matatus* ply on roads from the rural areas ferrying people and goods. They are the most common means of transport available. They are often overloaded and they over-speed which predisposes them to accidents. The results of this study suggest that an individual is twice likely to be involved in a road traffic accident and sustain injuries while boarding *matatus* than any other vehicle.

5.5 Causes of Road Traffic Accidents

The result of this study showed human error (59.6%) as the leading cause of RTAs, followed by defective vehicles (20.9%), while defective roads accounted for 19.5%. The study findings agree with a similar study by Atinga (1990) who reported that RTAs were mainly attributed to human errors followed by poor road standards and defective vehicles. This also correlates with another study by Gekonge (1990) who recorded 85% of RTAs being attributed to man, 6% to the vehicle, while 9% were attributed to traffic environment. A study by Nantulya and Muli-Musiime (1996) recorded human error as the main cause of RTAs. Predisposing factors in human error included over-speeding, overtaking and attempting to avoid potholes, all of which attributed to RTAs. A study by Asogwa (1992), on road traffic accidents in Nigeria, recorded excessive speed, improper overtaking, carelessness at junction, general reckless driving, driver inexperience and driver inattention or poor judgment as the causes of accidents in Bendel state. The results of this study highlighted human error with over-speeding as a major factor in RTA causation.

5.6 Contributory Factors to RTAs

The study has shown that the causes of RTAs included human error, defective vehicles and defective roads. These were mainly attributed to over-speeding (37.2%), miscalculation or poor judgement (25.3%), avoiding potholes and overtaking (23.2%), and drunk driving (13.8%). The traffic environment comprised defective roads (34.5%), careless road users (28%), overloading (27.5%) and fatigue (10%). In a study on RTAs in Kenya, Atinga (1990) reported that most traffic accidents were caused by a number of factors which may be a combination of human errors, poor

road standards and conditions and vehicle defects. The contributory factors included over-speeding, over-loading, drunken driving, irresponsible use of roads and the road condition which were all human factors. The London Road Peace (2004), reported that the world's first documented death by motor vehicle (1896) was due to over-speeding when Bridget Driscoll became the first person to be killed by a motor vehicle. Witnesses said the car was going "at tremendous speed" instead of 6.4 kilometres per hour (Km/hr), it was doing 12.8 Km/hr. The Christian Holy Bible, (Good News Edition 2Kings 9, V.20) documents that "the leader of the group was driving his chariots like a madman, just like Jehu", meaning that even hundred years ago, there were just as many careless drivers who were over-speeding, but the horses had more sense.

A study by Lore (1990) recorded that wet and narrow roads occasioned with potholes was a major factors to RTAs while bumps, diversion and steep slopes with poor visibility were important determinants to RTAs. A careful driver may be involved in a RTA because of the faults created by other road users. The findings of this study concur with these studies. The majority of drivers and accident victims reported defective vehicles and roads as major causes of RTAs. The traffic police records showed un-roadworthy vehicles, failure of braking system, tyre or wheel burst as defects identified at the scene of accidents. Results of this study suggest that motor vehicle accidents have been happening time and again ever since due to excessive speed, over-loading, drunken driving and irresponsible use of roads as opposed to recommended the speed limit (80 Km/hr), having normal capacity loads, being sober while driving and observing traffic rules.

5.7 The Incidence of RTAs Before and After Enforcement of the New Traffic Act

The study showed that from 2000 – 2003, RTAs fatality increased by 7.5%, while serious accidents increased by 47%. One hundred and forty-five accidents occurred annually as revealed by the data. From January 2004 to May 2004 fatal accidents were nine (17.6%), serious accidents were thirty-three (64.7%), while nine (17.6%) had slight injuries. The results of this study showed that there was a significant reduction of RTAs (70%) following the introduction of the new traffic amendment rule of November 2003. However, this may not be entirely true on the ground because few vehicles, which meet the requirements, were on the roads and during this period drivers were more careful now that speed governors had been fitted in their vehicles.

5.8 The Impact of RTAs on Public Health

The study showed that among the accident victims who were under-going treatment at the local district hospital, 33.3% were hospitalized for a period of 1 – 30 days, 48.2% between 31 – 180 days, while 14.8% were confined for ½ - 1 year and 3.7% stayed for over a year. This is in addition to twenty-one deaths, which occurred due to fatal RTAs. This study concurs with a study by the World Bank (2000) which reported that 865,000 RTA deaths occur worldwide among which 85% were in developing countries. Odero *et al.* (1997) reported that a number of developing countries including Kenya were ranked highly as regards to mortality resulting from RTAs. In a study by NRSC (2000), it recorded those fatalities from RTAs accounted from 10% of all deaths in the 14 – 44 age group. The costs involved in taking care of RTA

causalities have inevitably risen causing considerable strain on the human and financial resources. This leads to overcrowding in the health facilities. This has a significant impact on public health in terms of bed occupancy, use of overstretched and often limited health resources and loss of potential years of life to the individuals. In a similar study by NRSC (1999), it was estimated that between 45% to 60% of all hospital admissions in surgical wards and upto 75% in the National Spinal Cord Injury Hospital were RTA cases. Similarly, Krug (1999) reported that RTAs were the leading cause of injury-related deaths, accounting for 20.3% of all deaths from injury. Findings from this study suggest that RTAs are the leading causes of mortality and disability. These situations places a high demand on hospital resources and significantly exert a huge burden on the health status of the community.

5.9 Methods of Preventing RTAs

The study showed that observing and enforcement of traffic rules (19.6%), avoiding over-loading (17.1%), avoiding over-speeding and overtaking carelessly (18.8%), stopping drunk driving (11.2%), building good roads (6.6%), use of safety belts, speed governors, and having well trained drivers (7.9%) were among the leading measures in preventing RTAs. WHO (2004) reported that in developed countries, road traffic crashes have been prevented by improving road safety which involves: identifying the risk factors that contribute to crashes and injuries, identifying the interventions that reduces the risk associated with those factors: thus providing an environment conducive to safety as designing or improving roads to separate road users going at different speeds in different directions. They have also passed and

enforced laws that set maximum blood alcohol content levels for drivers. This has reduced occurrence of crashes that result in deaths by 40%.

The study findings suggest that there should be a clear government policy on road safety. The law enforcement agents in collaboration with stakeholders should put measures in place for ensuring safer vehicles, which are properly maintained, fixed with seatbelts, airbags and speed governors. Driver education was also reported to be critical since it makes them appreciate that he/she is responsible for passengers, pedestrians and cyclists safety while using the roads. Similarly, the study suggests that the Ministry of Transport, Ministry of Roads and Public Works and in collaboration with the Traffic Police should enforce the traffic rules. They should also work with other key stakeholders, establish monitoring and evaluation strategies to ensure their effectiveness. This should include driving schools, re-examination of drivers penalize drivers without valid driving license and ensure proper training of public service vehicle drivers, and enhance pedestrian and cyclists awareness of proper conduct on roads through formal and informal education.

The study findings suggest that there should be overall change in transport policy and practice in the country that gives due and balanced consideration to the needs of all road users especially the safety and mobility needs of pedestrians and cyclists. This should focus on risk reduction, road design and road construction. Education about greater road safety is essential for drivers, passengers and pedestrians when driving at night to be cautious and extremely careful. A study done by TRL (1991) in South Africa showed a direct connection between night driving and death in collision.

Designing roads that help reduce accidents involving pedestrians and cyclists can increase the cost of road construction particularly in rural areas where the planners may not be aware of how much they are likely to be used. For the local community, the cost of those killed or injured in RTA is also considerable and a balance has to be drawn. In towns, one low cost answer for improving road safety is to declare certain streets to be for pedestrians and cyclists only i.e total segregation of motorized and non-motorized traffic since it reduces traffic conflicts where vehicles cannot be separated from pedestrians and cyclists entirely. One alternative is to construct devices that slow them down i.e traffic calming. Speed reduction devices include humps, rumble strips and "jiggers bar". However, these devices can be ineffective and even dangerous in which case driver face the risk of serious damage to their vehicles. Again the result of this study suggests that any attempt by a driver to over-speed, overtake carelessly, overload, drunk driving and miscalculation are dangerous and all can contribute significantly to RTA causation.

CHAPTER SIX: CONCLUSIONS, RECOMMENDATIONS AND AREAS FOR FURTHER RESEARCH

6.1 Conclusions

1. RTAs are on the increase (20%) with 21 deaths occurring annually.
2. Vehicles commonly causing RTA included *matatus* (73.4%), followed by buses (19.7%), lorries (6.1%) and saloon cars (0.6%), respectively.
3. The main factors contributing to the causes of RTAs included human error and failings (59.6%), defective vehicles (20.9), and defective roads (19.5%).
4. The factors predisposing to RTAs were over-speeding, miscalculations or poor judgement, avoiding potholes, overtaking and use of un-roadworthy vehicles.
5. The measures of reducing RTAs existed but the political will was lacking and law enforcement agencies were lax and lenient.
6. There has been a significant reduction of RTA since the introduction of the new traffic amendment rule of November 2003, which came into force in February 2004, from 1,091 between February and June, 2003 to 327 over the same period – a reduction of 70%.
7. Road traffic injuries were a public health problem and not a transport problem.
8. Road traffic accidents affected young adults, and males were at a higher risk due to their frequent travels.
9. Road traffic accidents were the 8th contributor to the burden of disease in Kisii Central District.

6.2 Recommendations

1. There is need for the Ministries of Transport, Roads and Public Works and Traffic Police to enforce the traffic rule to curb the rate of RTAs.
2. There is need for the government to establish alternative means of transport or to make *matatu* business a state corporation which can ensure proper central management.
3. There is need for proper training of public service vehicle drivers and re-examine drivers without valid driving licences.
4. There is need for the Ministries of Transport, Roads and Public Works to work closely with local authorities to ensure that roads are properly maintained and marked with traffic signs.
5. There is need to establish rational road traffic injury prevention based on precise data on accident injuries and risks
6. There is a need for the government stakeholders and development partners to formulate sound road policy, which will reduce mortality and morbidity.

6.3 Areas for Further Research

It is recommended that further research is required in the following areas:

1. The association between accident and various underlying factors causing district, urban and rural variation in road traffic accident.
2. Factors influencing road user error including the role of alcohol, drugs and fatigue in road traffic accident causation.
3. A research on policy analysis to establish the reasons for in-effectiveness of existing road safety interventions.
4. A research to establish the linkage between driver's behaviour and identification of factors related to injuries, evaluation and adoption of cost-effective intervention of population and assessment of validity and completeness of routine traffic data.
5. Different combinations of preventive interventions need to be evaluated to determine the most cost-effective and sustainable ones.

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APPENDIX 1.1: DRIVERS QUESTIONNAIRE

Knowledge on Road Traffic Accidents to be answered by the drivers.

Instructions

You are kindly requested to give information freely as pertaining to this questionnaire. The information which you give will be treated with strict confidentiality and will only be used for the purposes of this research. You may put a tick where there are options. For questions without options, please fill in the responses in the spaces provided. Thanks for your cooperation.

Social Demographic Information

1. Your Sex: Male Female
2. Age in years
3. **Level of education**

None	<input type="checkbox"/>	Primary	<input type="checkbox"/>
Secondary	<input type="checkbox"/>	College	<input type="checkbox"/>
7. **Religion**

Catholic	<input type="checkbox"/>	Protestant	<input type="checkbox"/>
Muslim	<input type="checkbox"/>	Others	<input type="checkbox"/>
8. **Occupation**

Farmer	<input type="checkbox"/>	Formal employment	<input type="checkbox"/>
Housewife	<input type="checkbox"/>	Student	<input type="checkbox"/>
		None	<input type="checkbox"/>
9. **Marital status**

Married	<input type="checkbox"/>	Single	<input type="checkbox"/>
Separated	<input type="checkbox"/>	Widowed	<input type="checkbox"/>

Knowledge on Road Traffic Accidents:

1. **Where did you train as a driver?**

- a) Driving school
- b) Learned to drive while a *matatu* conductor
- c) Others (Please Specify).....

2. **How long have you been a vehicle driver?** Years

3. **With your current license, which classes/categories of vehicles are you authorised to drive?**

4. **Apart from the ones you are authorised, which class are you driving now?**
.....

5. a) **Have you been involved in a road traffic accident previously?**

Yes No

b) **If your answer is yes, then in what capacity?**

Driver Passenger Pedestrian

6. a) **Did you sustain serious injuries?** Yes No

b) **If your answer is Yes, were you taken to hospital?**

Yes No

c) **If you were taken to hospital, then how long was your hospital stay?**

Days. _____

7. **In the accident you were involved, how many people do you remember died?** _____ people.

8. **How many accidents have you been involved in in the last ten years?**

9. Which type or vehicle was involved in the road accident?

Matatu Saloon car

Land cruiser/land rover Bus

Other (specify please)

10. What do you attribute the accident to have been due to?

Defective vehicle Driver error

Road condition (bad) Pedestrian

Pedal cyclist Careless driver of other vehicle

11. a) Was the vehicle insured? Yes No

b) If your answer is Yes, which cover? 3rd Party cover

Comprehensive cover

12. Was the road traffic accident reported to traffic police officer?

Yes No

If No, Why? (Comment please)

.....
.....

If Yes, what action was taken? Warning

Preferred prosecution

13. Do you take alcohol? Yes No

If yes, then which type? (Please specify)

.....

14. Do you smoke? Yes No

15. Do you use any substance to assist you to be awake and alert?

Yes No

If Yes; which types? (Please specify)

.....

1.2 Traffic Police Officers, Questionnaire

To be answered by Traffic Police Officers

Instructions

You are kindly requested to give information freely as pertaining to this questionnaire. The information which you give will be treated with strict confidentiality and will only be used for purposes of this research. You may put a tick where there are options. For questions without options please fill in the responses in the space provided. Thanks for your cooperation.

Social Demographic Information

1. Your Sex Male Female

2. Age in years _____

3. **Level of education**

None	<input type="checkbox"/>	Primary	<input type="checkbox"/>
Secondary	<input type="checkbox"/>	College	<input type="checkbox"/>

4. **Religion**

Catholic	<input type="checkbox"/>	Protestant	<input type="checkbox"/>
Muslim	<input type="checkbox"/>	Others	<input type="checkbox"/>

5. **Occupation**

Farmer	<input type="checkbox"/>	Formal employment	<input type="checkbox"/>
Housewife	<input type="checkbox"/>	Student	<input type="checkbox"/>
		None	<input type="checkbox"/>

6. **Marital status**

Married	<input type="checkbox"/>	Single	<input type="checkbox"/>
Separated	<input type="checkbox"/>	Widowed	<input type="checkbox"/>

8. Which classes/categories of vehicles commonly cause accidents?

- Matatus Buses Lorries
 Mini-buses Private cars Freight trailers

9. In your experience, do age and driving experience determine accident occurrence? If yes please explain.

.....

9. In your opinion, how can RTA be prevented (you can tick more as may be appropriate)

- a) Stop over speeding
 b) Stop overloading
 c) Stop drunken driving
 d) Stop police leniency (enforcement of traffic rules)
 e) Proper vehicle maintenance
 f) Proper training and retraining of drivers
 g) Educate road users-pedestrians, pedal cyclists
 h) Legislation of driving age of public vehicles
 i) Road improvement and maintenance
 j) Punish drivers who are reckless.

1.3 Focus Group Discussion Questionnaire

Instructions

You are kindly requested to give information freely as pertaining to this questionnaire. The information which you give will be treated with strict confidentiality and will only be used for purposes of this research. You may put a tick where there are options. For questions without options please fill in the responses in the space provided. Thanks for your cooperation.

Social Demographic Information of Participants

1. **Your Sex:** Male Female

2. **Age in years** _____

3. **Level of education**

None	<input type="checkbox"/>	Primary	<input type="checkbox"/>
Secondary	<input type="checkbox"/>	College	<input type="checkbox"/>

4. **Religion**

Catholic	<input type="checkbox"/>	Protestant	<input type="checkbox"/>
Muslim	<input type="checkbox"/>	Others	<input type="checkbox"/>

5. **Occupation**

Farmer	<input type="checkbox"/>	Formal employment	<input type="checkbox"/>		
Housewife	<input type="checkbox"/>	Student	<input type="checkbox"/>	None	<input type="checkbox"/>

6. **Marital status**

Married	<input type="checkbox"/>	Single	<input type="checkbox"/>
Separated	<input type="checkbox"/>	Widowed	<input type="checkbox"/>

To be discussed by the Focus Group (FGD)

1. Are your communities considering Road Traffic Accidents (RTAs) as a public health concern?

.....
.....
.....

2. Has anyone of you been involved In a RTA?

.....
.....
.....
.....

3. How many RTAs have occurred in your area for the last 12 months?

.....

4. What are the major contributory factors to road traffic accidents?

.....
.....
.....
.....

5. What in your opinion are the causes of road traffic accidents in order of priority?

.....
.....
.....
.....

6. Who are the people likely to suffer from road traffic accidents? (Driver, passenger, pedestrians) _____

7. Which particular vehicles are commonly involved in road traffic accidents?

.....
.....
.....
.....

8. Are there any association between the behaviour, age, experience of the driver, and accident causation?

.....
.....
.....
.....

9. Does individuals and the community have a role to play in road traffic accidents?

.....
.....
.....
.....

10. How can RTAs be prevented or controlled?

- i. Role of the individual or the community
- ii. Role of the government
- iii. Role of the other stakeholders

11. What is your opinion about the government's efforts to streamline the matatu industry? (Please explain)

.....
.....
.....

1.4 Road Users Questionnaire

To be answered by Road Users

Instructions

You are kindly requested to give information freely as pertaining to this questionnaire. The information which you give will be treated with strict confidentiality and will only be used for purposes of this research. You may put a tick where there are options. For questions without options please fill in the responses in the space provided. Thanks for your cooperation.

Social Demographic Information

1. **Your Sex** Male Female

2. **Age in years**

3. **Level of education**

None Primary

Secondary College

4. **Religion**

Catholic Protestant

Muslim Others

5. **Occupation**

a) Farmer Formal employment

b) Housewife Student None

6. **Marital status**

a) Married Single

b) Separated Widowed

Knowledge on Road Traffic Accidents

1. Does your work involve travelling? Yes No

2. Which vehicles do you prefer when travelling?

a) *Matatus* Buses

b) Private cars Lorries

3. a) Have you ever been involved in a road traffic accident before?

Yes No

b) If yes, were you seriously injured? Yes No

c) If yes, were you hospitalised? Yes No

If yes, for how long?

.....

4. What do you think caused the accident?

Road users Driver error

Bad road Defective vehicle

5. Which vehicles commonly cause road traffic accidents?

Matatus Buses

Privately owned cars Lorries

6. What are the causes of road traffic accidents?

a) Human errors

b) Mechanic condition of the vehicle-defective vehicles

c) Defective (potholed) roads

7. If human errors what may predispose to it?

- a) Miscalculation or poor judgement
- b) Avoiding potholes(overtaking)
- c) Over speeding
- d) Drunk driving

8. In defective vehicles, what may predispose to it?

- a) Un-road worthy vehicle
- b) Failure of braking system
- c) Tyre or wheel burst

9. For traffic environment, what may predispose to it?

- a) Defective road
- b) Careless road users
- c) Too long distances travelled
- d) Overloading

10. Give suggestions on how road traffic accidents can be prevented?

.....

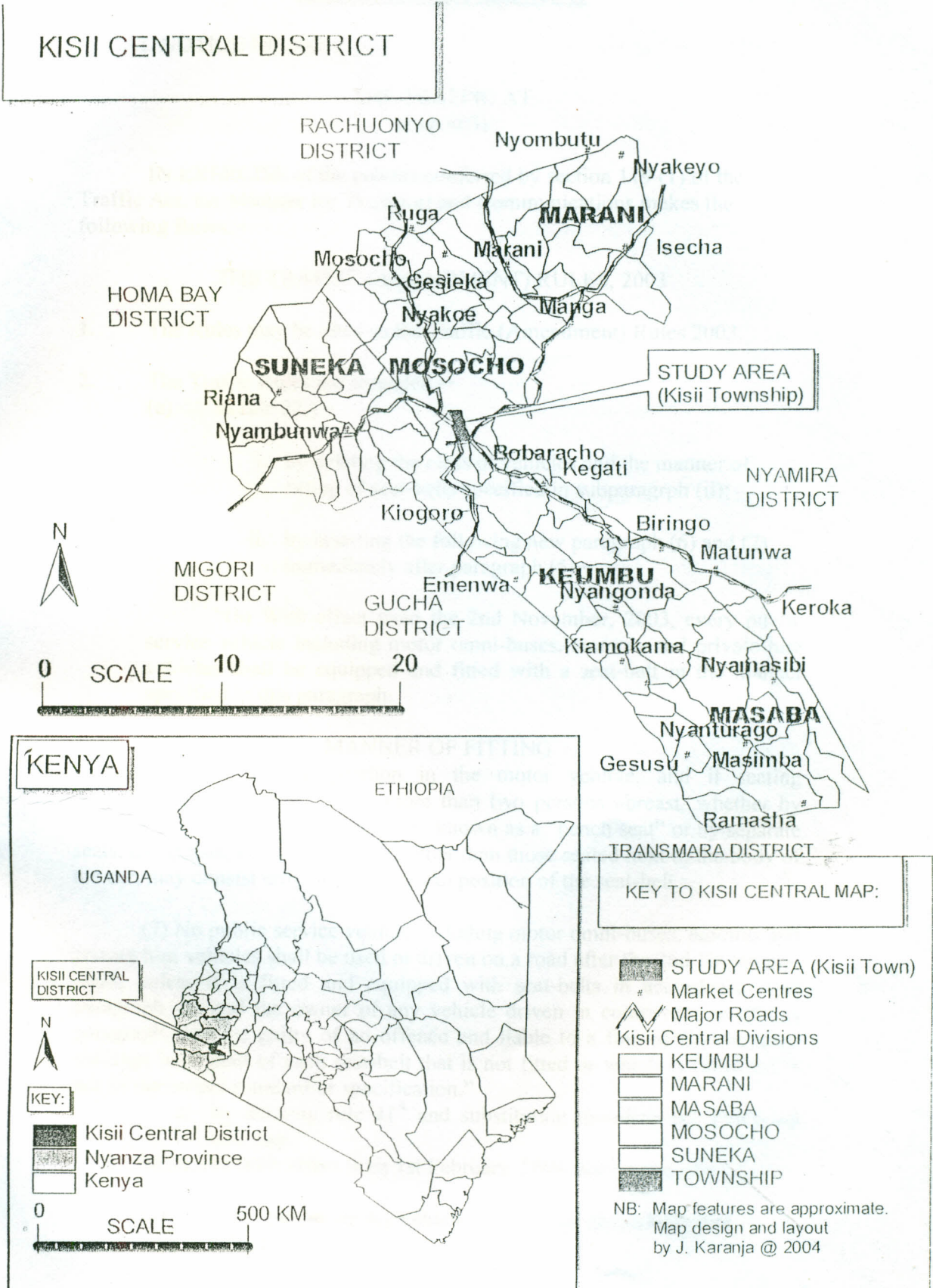
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APPENDIX 2: Map of Study Area (Township: Kisii Central District)



APPENDIX 3: The New Traffic (Amendment) Rules, 2003Kenya Gazette Supplement No. 793rd October, 2003(Legislative Supplement No.50)

LEGAL NOTICE NO.162

THE TRAFFIC ACT
(Cap.403)

IN EXERCISE of the powers conferred by section 119 (1) of the Traffic Act, the Minister for Transport and Communications makes the following Rules: -

THE TRAFFIC (AMENDMENT) RULES, 2003

1. The Rules may be cited as the Traffic (Amendment) Rules 2003.
2. The Traffic Rules are amended —
 - (a) in rule 22A—
 - i. by deleting the class of vehicles and the manner of fitting of seat-belts specified in subparagraph (ii);
 - ii. by inserting the following new paragraph (6) and (7) immediately after paragraph (5)—

“(6) With effect from the 2nd November, 2003, every public service vehicle including motor omni-buses, *matatus* and private hire vehicles shall be equipped and fitted with a seat-belt in the manner specified in this paragraph.

MANNER OF FITTING

A seat-belt per seating position in the motor vehicle, and if seating accommodation is provided for more than two persons abreast, whether by means of a continuous seat commonly known as a “bench seat” or by separate seats, the seat-belts, for the persons other than those seated next to the body of the car, may consist only of the cap-strap position of the seat-belt.

(7) No public service vehicle including motor omni-buses, *matatus* and private hire vehicles shall be used or driven on a road after the 2nd November, 2003, unless it is fitted and equipped with seat-belts in accordance with paragraph (6) and the owner of any vehicle driven in contravention of this paragraph shall be guilty of an offence and liable to a fine of five hundred shillings in respect of each seat-belt that is not fitted or which is fitted but is not of the proper standard or specification.”

- a. by deleting rule 41^A and substituting therefore the following new rule

“41A. (1) With effect from 1st February, 2004, the engine of—

 - (a) every public service vehicle except taxis and private hire vehicles

- (b) every commercial vehicle whose tare weight exceeds 3,048 kg, shall be fitted with a speed governor which—
- (i) is of a type approved in writing by the Minister; and
 - (ii) is adjusted so that at all times and in any load condition the vehicle cannot exceed 80 kph.

(2) In this rule “governor” means a device to control the speed of the engine by any method

(3) Every public service vehicle purchased after 31st December, 2003, shall be fitted with a speed governor before it can be licensed to operate,”

- (c) in rule 55 by renumbering the existing paragraphs (b) and (c) as paragraph (c) and (d) and inserting the following new paragraph (b)—

“(b) the route number the vehicle operates on;”

- (d) by inserting the following new rule 65A immediately after rule 65—

“65A (1) With effect from 31st December, 2003, every driver and every conductor of a public service vehicle shall wear a special badge and uniform.

- (2) The badges will be provided by the registrar of Motor Vehicles upon payment of a prescribed fee.
- (3) With effect from 1st February, 2004, every driver of a public service vehicle shall undergo compulsory testing after every two years to ascertain his or her competence
- (4) Every owner of a public service vehicle shall employ one driver and one conductor who shall be security vetted.
- (5) Every conductor or driver of a public service vehicle shall only take up employment as such upon being vetted pursuant to paragraph (4) and shall be paid a permanent salary by the owner of the public service vehicle.
- (6) (e) in Part VII by deleting Part VII and substituting therefore the following new Part VII—

“PART VII—SPECIAL PROVISIONS RELATING TO TAXICABS
AND MATATUS

Yellow bands

70. (1) With effect from 1st January, 2004, every taxicab or matatu shall have painted on both sides and on the rear a continuous horizontal yellow band having a width of 150 millimetres and of a consistency sufficient to enable such band to be clearly visible by day at a distance of not less than 275 metres

(2) If the main body-work of a taxi-cab or matatu is so coloured that the yellow band required under this rule does not contrast prominently therewith so as to be clearly visible at a distance of at least 275 metres, then the main body-work, or so much of it as runs parallel to and at a distance of not less than 75 millimetres on either side of and contiguous to the aforesaid yellow band, shall be painted a dark colour of sufficient consistency to enable the yellow band to be clearly visible at the distance aforesaid.

71. There shall be prominently exhibited in every taxicab or matatu a recent photograph of the head and shoulders of the driver who for the time being has charge of the taxicab or matatu and the photograph shall be taken full face without hat, of postcard size and such photograph shall be—

Photographs

- a. of such nature and so displayed as to enable any person riding in the back of the taxicab or matatu clearly to identify the driver thereof with the photograph; and
- b. approved by a police officer of or above the rank of Assistance Superintendent and having endorsed on the reverse of the photograph the particulars of the driver's identity card, public service vehicle licence and taxi driver's or matatu driver's licence, and the signature of such police officer signifying such approval as aforesaid

72. Any person who—

**Penalties under
this Part**

- (a) contravenes or otherwise fails to comply with the provisions of this Part; or
- (b) owners, drivers, causes to be driven or has charge of a taxi-cab or matatu other than in accordance with the provisions of this Part, shall be guilty of an offence and liable to a fine not exceeding six hundred shillings or, in default of payment, to imprisonment for a term not exceeding two months or to both."

3. Legal Notice No.351 of 1987, is repealed.

Dated the 24th September, 2003

JOHN MICHUKI
Minister for Transport and Communications

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

Telegrams: "EDUCATION", Nairobi

Telephone: Nairobi 334411

When replying please quote

Ref. No. MOEST 13/001/34C 64/2
and date



JOGOO HOUSE "B"
HARAMBEE AVENUE
P.O. Box 30040
NAIROBI

10th March 20.04.

Alfred Ameyia Osoro
Kenyatta University
P.O. BOX 43844
NAIROBI

Dear Sir

RE: RESEARCH AUTHORISATION

Please refer to your application for authority to conduct research on 'A study on the incidence and contributory factors of Road Traffic accidents in Kisii District, I am pleased to inform you that you have been authorised to conduct research in Kisii District for a period ending 30th August, 2004.

You are advised to report to the District Commissioner, the District Education Officer, the District Medical Officer of Health and the Officer commanding Police Division, Kisii District before embarking on your study.

It is noted that the research is a requirement in part fulfilment for the award of M.P.H.E. Degree by Kenyatta University.

Upon completion of your research project you are advised to deposit two copies of your research report to this Office.

Yours faithfully

for 
T. MOTURI
FOR: PERMANENT SECRETARY/EDUCATION

CC

The District Commissioner
Kisii

The District Education Officer
Kisii

The District Medical Officer of Health
Kisii District

The Officer Commanding Police Division
Kisii District

Traffic Headquarters (Police)
Nairobi