

Risk Factors and Road Traffic Accidents in Tanzania:  
A Case Study of Kibaha District.

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## **DEDICATION**

The thesis is dedicated to my beloved mother Theodosia Simon Ngonyani “Wamkoa” for her love, care and support

And

To my wife Lucy Pius Kyauke and son Sweetbert Deus Komba.

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## ABSTRACT

This thesis discusses the risk factors which are associated to the cause of road traffic accidents in Kibaha district in Tanzania; the study describes the composition of motor related injuries including non motorized casualties in Kibaha district. The thesis assesses different road safety measures taken by the local authorities to prevent accidents in Kibaha district.

In identifying risk factor associated to the cause of road traffic accidents, four theoretical frameworks: System theory, risk theory, political ecology and geographical approach have been used as the base of knowledge in this study. The methodology and procedure for data collection employed in the field was based on both qualitative and quantitative approaches within a framework of a case study approach. Interviews with accident victims, government officials, traffic police, focus group discussions with local government authority, observations and review of secondary data at Tumbi hospital of about 855 casualties, were done accordingly.

The study has revealed the pattern and trends of motor traffic accidents in Kibaha district from 2001 to 2004. It shows that the accident occurrence was increasing every year, passengers and pedestrians are always at highest risk of being injured or killed on the road, young males are highly prone to motor traffic accidents. Males are more involved in road accidents than females; the risk of dying in an accident during the night was significantly higher than during the day, especially when it was raining. Driving toward the end of the year in Kibaha district is more risk than others time of the year given a similar level of traffic flow (exposure), Monday, Friday and Saturday are the days when most of the motor vehicle accidents occurred. The study has also described different types of motor related injuries and the survival status of the accident victims. Age, sex, over speeding, reckless driving, being a pedestrian, or a motor cyclist were identified as risk factors to motor vehicle crashes. The distribution of injured and killed casualties residing outside Kibaha district are two times those who reside in Kibaha district, the trend of casualties in Kibaha district stands to be high, there are more casualties in the areas located in small townships with high population density. The study has also identified qualitatively (by interviews) that the technical element of the highway construction, corruption, irresponsibility, poor management, driving while using cell phone, driving without training, failure to respect and obey traffic regulations, bad condition of vehicles, age of the vehicles and poor condition of services as the important risk factors associating to the cause of traffic accidents in Kibaha district

The field work came under some constraints, the time given for the field work was limited and the bureaucratic procedures in the government institutions created some delays. The recording system of road traffic accidents at the police station and Tumbi hospital are manually maintained hence it consumed time in sorting out information and some of the information was missing especially those pertaining to referred cases. To combat these constrains, the study used multiple methods to explore information for a more comprehensive picture of risk factors and road traffic accidents.

In order to reduce traffic accidents in Kibaha district, it is recommended that the government should review legislation regarding employment of drivers; NIT should be given a statutory mandate to train the drivers. Working conditions of police force should be improved, public road safety campaigns should be conducted, and new driving license system should be imposed. The use of cell phones while driving should be restricted. The hospital and police record keeping should be strengthened, the hospital staff, traffic police and ambulance personnel should be considered for intensive training on emergency and preparedness, and regular vehicle inspection should be introduced in the country.

# TABLE OF CONTENTS

<b>DEDICATION</b> .....	<b>I</b>
<b>ACKNOWLEDGEMENT</b> .....	<b>II</b>
<b>ABSTRACT</b> .....	<b>III</b>
<b>TABLE OF CONTENTS</b> .....	<b>IV</b>
<b>ABBREVIATIONS</b> .....	<b>VIII</b>

<b>CHAPTER ONE</b> .....	<b>1</b>
<b>1. INTRODUCTION</b> .....	<b>1</b>
1.1 BACKGROUND OF THE STUDY .....	1
1.2 STATEMENT OF THE PROBLEM. ....	4
1.3 OBJECTIVES OF THE STUDY.....	6
1.3.1 Specific questions .....	7
1.4 SIGNIFICANCE OF THE STUDY.....	7
1.5 STRUCTURE OF THE THESIS .....	7

<b>CHAPTER TWO</b> .....	<b>9</b>
<b>2. THEORETICAL PERSPECTIVES AND CONCEPTS.</b> .....	<b>9</b>
2.1 INTRODUCTION .....	9
2.2 SYSTEM THEORY.....	9
2.3 A MODEL FOR TRAFFIC ACCIDENTS. ....	10
2.3.1. <i>Behaviour</i> .....	12
2.3.2 <i>Vehicle</i> .....	15
2.3.3 <i>Environment</i> .....	16
2.3.4 <i>System of traffic laws, control and regulations.</i> .....	19
2.4 RISK THEORY .....	20
2.5 POLITICAL ECOLOGY APPROACH.....	23
2.6 GEOGRAPHICAL APPROACH .....	25
2.6.1 <i>Some broader international spatial pattern</i> .....	26

<b>CHAPTER THREE</b> .....	<b>28</b>
<b>3. RESEARCH DESIGN AND METHODOLOGY</b> .....	<b>28</b>
3.1 INTRODUCTION .....	28
3.2 THE RESEARCH PROCESS .....	28
3.3 QUALITATIVE METHODOLOGIES.....	29
3.4 QUANTITATIVE METHODOLOGY .....	30
3.5 CASE STUDY APPROACH.....	31
3.6 SAMPLING METHOD AND JUSTIFICATION .....	32
3.7 SELECTION OF DATA COLLECTION SOURCES AND PARTICIPANTS .....	33
3.8. SOURCES OF DATA .....	35
3.8.1 <i>Primary data</i> .....	35
3.8.1.1 <i>Interviews</i> .....	35

3.8.1.2 Interviews with main informants: (Traffic accident victims) .....	36
3.8.1.3 Interview with officials (Key informants).....	36
3.8.1.4 Informal interview.....	37
3.8.1.5 Focus group discussion.....	38
3.8.1.6 Personal observations.....	38
3.8.2 Secondary data.....	39
3.9 WRITING AND ANALYSIS OF DATA.....	39
3.10 CHALLENGES AND LIMITATIONS .....	40
3.11 VALIDITY AND RELIABILITY OF THE STUDY .....	41
3.12 ETHICAL ISSUES.....	43
<b>CHAPTER FOUR.....</b>	<b>44</b>
<b>4. STUDY AREA.....</b>	<b>44</b>
4.1 INTRODUCTION.....	44
4.2 POPULATION .....	45
4.3 ROAD TRANSPORT.....	46
4.4 TRAFFIC ACCIDENTS IN KIBAHA DISTRICT .....	49
<b>CHAPTER FIVE.....</b>	<b>56</b>
<b>5. ROAD TRAFFIC ACCIDENT PATTERNS IN KIBAHA DISTRICT.....</b>	<b>56</b>
5.1 INTRODUCTION .....	56
5.2 TRENDS OF TRAFFIC ACCIDENTS IN KIBAHA DISTRICT .....	57
5.3 DISTRIBUTION OF CASUALTIES IN KIBAHA DISTRICT.....	59
5.4 DISTRIBUTION OF CASUALTIES BY PLACE OF RESIDENCE. ....	60
5.5 DISTRIBUTION OF CAUSALITIES BY PLACE OF RESIDENCE AND AGE GROUP.....	62
5.6 DISTRIBUTION OF CAUSALITIES BY SEX AND AGE GROUP.....	63
5.7 DISTRIBUTION OF CLASS OF INJURED PERSON BY AGE GROUP.....	64
5.8 INJURED AND KILLED CAUSALITIES BY LOCAL PLACE OF ACCIDENT.....	65
5.9 INJURED AND KILLED CAUSALITIES BY MEANS OF TRANSPORT.....	67
5.10 DISTRIBUTION OF KILLED AND INJURED CAUSALITIES BY MONTH.....	69
5.11 DISTRIBUTION OF KILLED AND INJURED CAUSALITIES BY DAY AND HOURS .....	70
5.12 DISTRIBUTION OF CAUSALITIES BY CONDITION OF THE ROAD AND HOURS .....	73
5.13 SUMMARY .....	75
<b>CHAPTER SIX.....</b>	<b>76</b>
<b>6. RISK FACTORS ASSOCIATED WITH TRAFFIC ACCIDENTS.....</b>	<b>76</b>
6.1 INTRODUCTION .....	76
6.2 TUMBI HOSPITAL SITUATION.....	77
6.3 THE POLICE VIEWS ON TRAFFIC ACCIDENTS: .....	78
6.4 IDENTIFIED RISK FACTORS.....	80
6.4.1 Environment and road network.....	80
6.4.2 Legislation and regulations enforcement.....	81
6.4.3 Human behavior elements .....	83
6.4.4 Vehicle factor elements .....	86
6.5 SUMMARY .....	89

<b>CHAPTER SEVEN .....</b>	<b>90</b>
<b>7. ROAD SAFETY MEASURES IN KIBAHA DISTRICT .....</b>	<b>90</b>
7.1 INTRODUCTION .....	90
7.2 SAFETY MEASURES UNDERTAKEN BY LOCAL GOVERNMENT AUTHORITY .....	90
7.3 SAFETY MEASURES UNDERTAKEN BY THE TRAFFIC POLICE IN KIBAHA DISTRICT .....	93
7.4 SAFETY MEASURES UNDERTAKEN BY THE TANZANIA INSTITUTE OF EDUCATION. ....	94
7.5 SAFETY MEASURES UNDERTAKEN BY THE TANZANIA NATIONAL ROADS AGENCY. ....	98
7.6 SAFETY MEASURES UNDERTAKEN BY VOCATIONAL EDUCATION TRAINING AUTHORITY. ....	100
7.7 SUMMARY .....	102
<b>CHAPTER EIGHT .....</b>	<b>103</b>
<b>8. FINAL DISCUSSION, CONCLUSION AND RECOMMENDATIONS .....</b>	<b>103</b>
8.1 INTRODUCTION .....	103
8.2 FINAL DISCUSSION AND SUMMARY .....	104
8.3 CONCLUSION. ....	106
8.4 RECOMMENDATIONS .....	108
8.4.4 <i>About traffic control, regulation and legislation</i> .....	110
8.4.5 <i>About the Hospital</i> .....	111
8.5 AREAS FOR FURTHER RESEARCH .....	111
<b>REFERENCES.....</b>	<b>113</b>
<b>APPENDICES .....</b>	<b>126</b>
<b>APPENDIX 1: OPERATIONAL DEFINITIONS AND GLOSSARY .....</b>	<b>126</b>
<b>APPENDIX 2: QUESTIONNAIRE FORM .....</b>	<b>128</b>
<b>APPENDIX 3: INTERVIEW GUIDES .....</b>	<b>130</b>
<b>APPENDIX 4: FOCUS GROUP DISCUSSION. (FGD).....</b>	<b>138</b>
<b>APPENDIX 5: MAP OF KIBAHA DISTRICT .....</b>	<b>139</b>

## **LIST OF TABLES**

Table 1.1	Disease burden for 10 leading causes of death.....	2
Table 4.1	Injuries of different groups of road users.....	51
Table 5.1	Trend of road traffic accidents in Kibaha district.....	57
Table 5.2	Distribution of casualties in Kibaha district.....	60
Table 5.3	Distribution of casualties by place of residence and year.....	61
Table 5.4	Distribution of casualties by place of residence and age group.....	62
Table 5.5	Distribution of killed and injured casualties by sex and age group.....	63
Table 5.6	Distribution of class of injured person by age group.....	64
Table 5.7	Injured and killed Casualties by local Place of accident.....	67
Table 5.8	Injured and killed casualties by means of transport.....	68
Table 5.9	Distribution of killed and injured casualties by month.....	70
Table 5.10	Distribution of killed and injured casualties by day and hours.....	72
Table 5.11	Distribution of casualties by condition of the road and hours.....	74

## **LIST OF FIGURES**

Figure 4.1	Population size for Tanzania 1948 to 2002.....	45
Figure 4.2	A map of Tanzania with regions.....	48
Figure 5.1	Map of Kibaha district.....	139

## **LIST OF PHOTOS**

Photo 4.1	An old pick-up carrying passengers in a highway road.....	53
Photo 4.2	Non- motorized mode of transport being used in the highway road.....	55

## **ABBREVIATIONS**

ARC	Annual Road Convention.
MOEVT	Ministry of Education and Vocation training
MOHA	Ministry of Home Affairs
RSE	Road Safety Education
RTA	Road Traffic Accidents
SADC	South African Development Cooperation.
TANROADS	Tanzania National Roads Agency
TIE:	Tanzania Institute of Education
TNRSC	Tanzania National Road Safety Committee
TTC	Tanzania Teaching College
URT	United Republic of Tanzania
URT	United Republic of Tanzania
VETA	Vocational Education Training Authority

## CHAPTER ONE

### 1. Introduction

#### 1.1 Background of the study

Road traffic accidents which are generally unintended and preventable are a common risk every day to life that can happen to almost every one, any where. The problem of road traffic accident is increasingly becoming a threat to public health and national development in many developing countries. Road traffic accidents contribute to poverty by causing deaths, injuries, disabilities, grief, lost of productivity and material damages. The British Medical Journal of 11<sup>th</sup> May 2002 indicated that more people die on the road traffic accident than from malaria world wide; and that traffic accident cause about 1.2 million deaths and injury 10 to 15 million people a year in the world. Many people do not know that road traffic accidents are preventable. (Krug, 2002)

Road traffic accidents are the most frequent causes of injury-related deaths world wide (Astrom, et al. 2006). According to the World Report on Road Traffic Injury Prevention (Peden et al., 2004) traffic accidents account for about 3000 daily fatalities worldwide. Statistical projections show that during the period between 2000 and 2020, fatalities related to traffic accidents will decrease with about 30% in high income countries. The opposite pattern is expected in developing countries, where traffic accidents are expected to increase at a fast rate in the years to come.

World Health Organization (WHO) strategy of 2001 reports that currently road traffic injuries are the leading cause of deaths and injuries, the 10<sup>th</sup> leading cause of all deaths and 9<sup>th</sup> leading contributor to the burden of disease worldwide based on disability adjusted life years. The numbers of deaths resulting from road traffic crashes have been projected to reach 8.4 million in the year 2020.

**Table 1.1 Disease burden for 10 leading causes of death.**

<b>1998. Disease or Injury</b>	<b>2020. Disease or Injury</b>
1. Lower respiratory infections	1. Ishaemic heart disease
2. HIV/AIDS	2. Unipolar Major depression
3. Perinatal Conditions	<b>3. Road Traffic Injuries</b>
4. Diarrhoeal diseases	4. Cerebrovascular disease
5. Unipolar Major depression	5. Chronic obstructive pulmonary disease
6. Ishaemic heart disease	6. Lower respiratory infections
7. Cerebrovascular disease	7. Tuberculosis
8. Malaria	8. War
<b>9. Road Traffic Injuries</b>	9. Diarrhoeal diseases
10. Chronic obstructive pulmonary disease	10. HIV/AIDS

Source. WHO, Evidence, Information and Policy Report 2000

In general the importance of injury as a public health problem is not well recognised in many developing countries (Lie et al 1991). Road traffic accidents are a major worldwide problem. In developing countries the trend has reached an alarming state, but very little attention is paid to the problem (Odero et al 1997).

Worldwide reports reveal the problem of accidents being equally serious. According to research carried out by Pierce and Maunder (1998), under the auspices of Road Research Laboratory in UK, they found out that, road accidents world wide are estimated to a total of 20,000,000 victims for a time period which 70% of the accidents occurred in developing countries. The number of accidents per registered vehicles was 10% to 20% higher in developing countries than in the developed world. The more general reasons advanced by these researchers for an increase of accidents in developing countries were as follows, 1. Rapidly urbanisation process in these countries, 2. High growth rates of traffic and 3. Poor road conditions, 4. Reckless driving, 5. Non-adherence to the traffic regulations by the motorist and the traffic officers (due to corruption), 6. The majority of people in developing countries were dependant on public transport for their daily

movement. In developing countries the public transport system such as minibuses has a much higher accident risk than in developed countries.

In developing countries the proportion of serious injured and killed casualties are higher than in the developed countries. An analysis of cross sectional data on road traffic related deaths has shown that the poorest countries have highest road traffic related mortality rates (Soderlund et al 1995). In this analysis, many industrialised countries appear to have introduced interventions that reduced the incidence of road traffic injuries and improve survival of those injured (Soderlund et al 1995). In developing countries there are some peculiarities regarding the accident profiles. A study done in Calcutta India, reported that there are some host (human) factors (such as the behaviour of drivers, pedestrians and cyclist behaviours) and seasonal factors (weather and time) that contribute to fatal road traffic accidents Zhang et al (1998). Overall, most traffic accidents occurred on main roads (highways) and in the majority of cases pedestrians were found to be at fault during crossing the roads (Majumder et al 1996).

Studies done world wide have shown that road traffic accidents are the leading causes of death of many adolescents and young adults (Odero et al 1997;Balogun et al 1992). There is evidence that using minimum safety standards, crash worthiness improvement in vehicles, seatbelts use laws and reduced alcohol use can substantially reduce deaths on the road (Leon 1996).

In developing countries, including Tanzania, the scenario is different to developed countries, road traffic accidents are increasing with time and mortality due to road traffic accidents is also on the rise (Asogwa 1992). When taking the population figures into account, developing countries in Sub-Saharan Africa have the highest frequency of various accidents worldwide Peden et al,(2004). Although an implication of this is that the risk environments in countries need further empirical attention, few studies have investigated how people in those societies perceive risk. This scenario calls developing countries to put more effort toward control and prevention of road traffic accident and their outcome. This can be achieved through multidisciplinary approach and research.

Such examination should be undertaken, because traffic accidents have negative impacts on social and economical improvements in developing countries. In this problem there are many agents: (1) The police who are interested in legal enforcement (2) The insurance companies and vehicle owners in the monetary cost of road accidents (3) The accident victim and their relatives in those of lives or disability and related cost of medical care (4) the health care system and medical personnel who are responsible for the emergence treatment and life savings of accident victims (Asogwa 1992).

Road transport is the basic mode of transportation for good and passengers in Tanzania; catering 90% of National freight tonnage and 95% of the transport volume. Despite the fact that the development of road systems and transport is an important factor in social-economic development, road accidents account for high death rates in the country and pose a threat to public health and developmental progress. (Down 1997)

### **1.2 Statement of the problem.**

Road traffic accidents in Tanzania have been increasing since independence in 1961. There has also been a simultaneous increase in the import of vehicles. Motor related accident occur in Dar es Salaam and concentrate in major up country highway (Morogoro road along Kibaha District) much more than many other urban centres due to high traffic volumes. In 1980's, the Government stated to take some measures to control this problem. The existing regulation were enforced, including annual road safety campaigns. For instance the busses were prohibited to travel during the night and recently the Government has introduced vehicles speed limiters installed in the engine in all public busses. Example town minibuses like daladala have a speed limit of 50km/hr.

The National road safety council of Tanzania in 2005 reported that the problem of road traffic accident was on the increase for the last ten years. In 1994 the total number of road accidents that had occurred was 10,674 while in 2004 it had increased to 17,039 accidents, an increase of 60%.

Despite of all ongoing implemented road safety initiatives, the situation is worsening. According to the study for the Development of the National Road Safety Master plan for Tanzania mainland and Zanzibar, Road Safety Management and policies executive summary Technical report November 2003 stated that, the number of casualty accidents as reported in the policy statistics has increased and reached over 16,000 in the year 2002. Of which about 2000 people were killed in over 1,600 fatal accidents or system risk. These figures of people killed in accidents related to the number of motor vehicles are higher than Kenya and Zimbabwe, and it is 30 to 40 times higher than most countries in Western Europe (Tanzania Annual Road convection Report, 2005). The most vulnerable groups are passengers and pedestrians. Based on the estimation of the study reports, the situation is alarming, if no additional safety actions are taken and traffic are continue to increase by 3 to 5% per year. The scenario by the end of 2007 will be that persons killed in accidents will increase by 30%, the number of reported injuries will increase by 35%, and the cost of reported accidents and casualties will as well increase by 30 % ( Tanzania Annual Road convection Report, 2005). According to the same study it is estimated that accidents cost per year is estimated at 190 billion Tanzania shillings which is equivalent to 0.2 billion USD.

According to “National Council of Traffic Safety and Security Annual Report 2003”, In Tanzania, the number of vehicles on the roads has greatly increased due to government liberalized policies. Unfortunately road maintenance, driver’s education, vehicle up-keeps and traffic regulations have not grown accordingly. A high accident level increases the dependency burden of the country. Working parents are killed or injured in traffic accidents leaving children who relied solely on these deceased persons for sustenance. Casualties from traffic accidents impose a heavy burden on the specialized health care facilities. In addition, the cost of repair and replacement of damaged vehicles demand resources that otherwise could be devoted to other high priority human development sectors such as education, food production and health. Thus, many countries pay dearly for the cost of the modernized transport system and increased mobility in the absence of compensatory mechanisms for ensuring safety. The total cost of road accidents have been estimated to be more than one percent of GNP in developing countries (Down 1997)

It estimated that Tanzania loosing 25 billion shillings every year as property loss, treatment expenses and road damage as a result of road traffic accidents. It is also estimated that the loss experienced by Tanzania is twenty times greater than that of England and twenty five times compared to that of Sweden the latter country has 16 times more number of vehicles than Tanzania.(TNRSC-1999).

According to National council of road traffic safety report in 2005: Kibaha district is one of the black spot areas with high rate of traffic accidents in Tanzania, it has an average of 71 reported traffic accidents per year from 2001 to 2005 and this has been increasing, the last six years 1995 to 2000 the average traffic accidents per year reported at Kibaha District was 64 accidents. 96% of these accidents occurred along the highway road, the high way from Dar es Salaam to Morogoro Region (National council of road traffic safety report 2005)

The curiosity of this study under its objective seeks to fill the gap of knowledge which exist by identifying risk factors associating to the cause of road traffic accidents so as the findings may be useful for further implementation of the road safety measures or a baseline of similar studies.

### **1.3 Objectives of the study.**

The general objective of the study is to investigate and identify risk factors contributing to high health and system risk rates of Road Traffic Accidents in Kibaha District.

More specifically, the study will be geared to attain the following objectives:

1. To describe the composition of motor vehicles related injuries including non-motorised casualties in the district in a period of 2001 to 2004
2. To identify factors associated with high way traffic accidents in Kibaha district.
3. To assess different road safety measures taken by local authorities to prevent accidents in Kibaha district.

### **1.3.1 Specific questions**

In order to achieve the purpose of the research, the following guiding questions or lines of inquiry are devised (as an alternative).

1. What kind of motor vehicle casualties and non motorised casualties occurred at Kibaha District in a period of 2001 to 2004? (Tumbi Hospital records, by reviewing the hospital information cards of accident victims admitted).
2. Which factors are assessed as associated with the causes of traffic accidents in a high way road at Kibaha District? (By interviewing in/outpatient accident victims at Tumbi Hospital, Government officials at Kibaha district, Traffic Police at Kibaha District, Responsible Officials at Tumbi Hospital and Officials from the Ministry of Health.)
3. What kind of safety measures have been taken or implemented by local authorities to prevent road traffic accidents at Kibaha district.(Interviewing Local District authorities at Kibaha District)

### **1.4 Significance of the study**

The study will add knowledge on understanding what risk factors contribute to the occurrence of road traffic accidents and related injuries in a restricted risk area in Tanzania. The data obtained in this study, can be used by the road safety authorities for planning and evaluating road safety measures. The data can also be utilised by the health authorities in Kibaha District, Coast region and possibly at the nation level for planning health care delivery at Kibaha district. The recommendations given if considered are going to benefit the public at large on prevention of road accidents. The data can also be utilised as baseline data in future related researches.

### **1.5 Structure of the thesis**

The report is organized in eight chapters that are linked to the issues in relation to the study: it also includes information from various sources relating to the study. Chapter one

gives the background of the study, problem statement and states the main objective of the study, it also highlights ways of investigating issues in relation to the study.

Chapter two reviews some of the theories and theoretical model based on the system theory as a base of knowledge of this study. Chapter three reviews the methodology used in the study, it elaborates the qualitative and quantitative methods used types of data collected and the challenges faced during data collection.

Chapter four gives the description of the study area, focusing on geographical location, socio economic and road traffic accident aspects. Chapter five presents the findings from the hospital data relating to trend and pattern of motor related traffic accident casualties in the district from 2001 to 2004.

Chapter six presents the findings on the risk factors associated to road traffic accidents in Kibaha district. Chapter seven presents the findings on safety measures undertaken by local government authority in Kibaha district and other institutions working at district level. Finally chapter eight contains the final discussion, conclusions and recommendations.

## CHAPTER TWO

### **2. Theoretical perspectives and concepts.**

#### **2.1 Introduction**

This study applies various bodies of theories in social and behavioral science, predominantly emphasizing on system theory, risk theory, political ecology approach, including literature review. The geographical approach concerning time factor, spatial variation and regional distribution are also used in the study. The decision of using these approaches is due to the understanding that, theories are vital in stating research problems and also in choosing the right methodologies that helps in carrying the empirical study. One of the major problems of road safety evaluation research presented by Rune Elvik (2002) in a paper titled “To what extent can theory account for the findings of road safety evaluation studies?” indicates that most research on road safety does not have a strong theoretical basis, which guides the design of the studies and interpretation of such findings. To him, this means the lack of a strong theoretical base for research which also means that few results of road safety evaluation studies can be ruled out on theoretical bases. In a geographical context in order to obtain adequate research results theories or used models should be accompanied by concepts of geography plus a literature review to support knowledge.

And the second reason has been based on the view of Holt-Jensen (2001 page 5), geography exist among other reasons to study evaluation in phenomenon from place to place, and its value as an academic discipline depends on the extent to which it can clarify the spatial relations and processes that might explain the features of an area or a place. Geographical curiosity starts with the questions “Why is it like this here?” To study these variations, various concepts and models are used by the geographers.

#### **2.2 System theory**

The first theoretical approach of the study is the system approach. Explanations of the systems theory are based on man-environment adjustments and maladjustments (Muhlrad et al 2005). The components of the theory are the environment, the means of transport (vehicles) and the behavior of man (Krug et al 2000). The environment component comprises of the natural and the built environments and transport networks. The means of

transport component comprises of the volume and quality of vehicles on the modes of transport. The behavior of man component comprises of demographic characteristic of road users (age, sex, education, socio-economic status, stage in life cycle), people's perceptions of risk and people's general behavior on the streets. Integrated in the systems theory is a system of highway codes and enforcement mechanisms designed to ensure that road users adhere to the controls and regulations of traffic flow for maintaining road traffic safety. Comprehensive traffic management should be sufficient to maintain road traffic safety (Haur, 1995:136; Button, 1993:80).

### **2.3 A model for traffic accidents.**

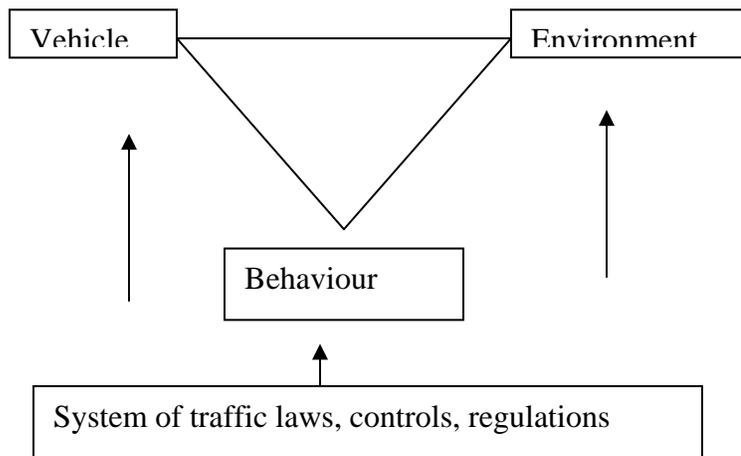
Traffic accidents bear strong elements of man-environment adjustments and maladjustment a well known approach in geography (Muhlrad et al 2005). Based on the logic of a modified human ecological model of a disease the approach can be transferred to studies of road traffic accident. A model for traffic accident as inspired by the ecological model of a disease was developed by Jørgensen and Abane (1999) who made a heuristic adjustment of this basic model to suit road traffic accident analysis. The model is characterized by three main components:

- ❖ The vehicle (corresponding to the vector in disease ecology) which describes vehicles into its composition, age, technical conditions and safety equipments like seat belts in a car.
- ❖ The environment, comprising the road system and the wider physical and built up environment. The physical environment splits further into different aspects such as; Daylight and climate (weather conditions and road conditions), Spatial conditions (arrangements and Macro structures), Settlement pattern (Urban or rural / sparse or populated area), situation of areas of residence and working areas, Principle of traffic separation, topography and road constructions qualities.
- ❖ The behavior of the population; including its characteristics such as age and sex ratio as well as attitudes and general traffic behavior. And it goes further into driving behavior, driving experience, driving style, risk compensation and risk driving ( influence of alcohol and drugs)

Superimposed on this model is a system of traffic laws, regulations and mode of enforcement designed to ensure that the population adheres to the controls and regulations so as to maintain some level of road safety i.e. traffic rules (speed restrictions, road signs), speed controls and convictions for various road traffic offences (Jørgensen and Abane, 1999).

The model as is shown below is used as a framework for understanding the multiple causes and prevention of traffic accidents that occur in developing cities. Available literature identifies traffic accidents in a place as been caused either by physical factors in the road system (environment), the vehicle or behavior factors, and how they interact with enforcement regulations in unique settings.

**Figure 2.1 A model for traffic accidents**



*Source: Jørgensen and Abane (1999).*

Thus, the relevance of Systems Theory in understanding the topic under consideration can be seen at three different levels. First, the theory helps to identify the system of traffic laws, regulations and mode of enforcement designed to ensure traffic safety in

Tanzania. Second the model help to identify the multiple causes interplay of risk factors and prevention of traffic accidents that occur in the study area. Third, the model assist in identifying/understanding the three major contributory factors of road traffic accident including human, mechanical (vehicle) and road environment factors.

### **2.3.1. Behaviour**

Behaviour is an intrinsic part of people Rundmo et al. (2004). Individuals in a unique environment like Dar es Salaam, Nairobi, or Delhi posses different population characteristics like age, sex , education and training. Shibata (1994). Likewise their risk taking behaviour differs and this may be attributed to the population characteristics as mentioned above, their cultural precepts, the economic situation they find themselves, the social norms, in the environment they live and better still their individual psychology, cultural practices, roles and their mobility Rundmo et al. (2004). The characteristics mentioned above will affect peoples perception, attitudes and driving behaviour towards traffic accident risk. The same characteristics will also affect vulnerability of an individual where the problem of traffic accident is concerned. In general, the existing literatures have revealed that the level of an individuals traffic accident risk has nothing to do with his or her genetics.

### **Human behaviour approaches**

A good control of the vehicles on the road depends very much on the behaviours (which is very complex) and skill on the driver (CSA1983). Driving is a complex system in which a large number of variables are interacting with each other but also with varying degree of dependence. Accident may be due to judgement errors, ignorance, incompetence, rule violation, lapses or carelessness, all of which are human errors (Lemming 1969). The human factor or error contributes to the majority of road traffic accidents. A study done by Odero (1995). In Kenya reported that human factors were responsible for 85% of all causes (Odero 1995).

## *Driving*

Jorgensen and Abane, (1999). Notes that, concerning road traffic behavior, one can distinguish between driving skills (Knowledge and training) and driving style which reflects attitudes and traffic risk perception.

Training of drivers increases their driver's skills. Study done by Asogwa in Nigeria has revealed that a sizeable proportion of drivers who possesses driving licenses never showed up in any driving school or went through a driving test but simply bought their licenses. Untrained drivers, not unexpectedly, often result in high accident rates (Asogwa 1992). In emergency conditions, stopping distance is also important. However this depends very much on the driver's reaction time, speed of the vehicles, quality of tyres, and the condition of the road (Lemming 1969).

Studies done on drivers after being involved in motor accidents reported that although alcohol is the most prevalent source of driver's impairment, other drugs or substance abuse can also contribute to the problem (Violent et al 1996; Kayombo 1995; Broughton 1991; Leon 1996; Shibata 1994). Driving under the influence of alcohol or other drug abuse is known to impair the driver's ability to judge and control the vehicle (CSA-1993, Orsay et al 1994).

Other studies have suggested that driver's fatigue is a factor in approximately one in four casualty crashes (NSW 1998). Further more, fatigue-related crashes occur more frequently on weekends than weekdays and they typically occur in early morning. Most of the crashes also the less experienced and non-professional drivers (Asogwa 1978). Fatigue due to long distance driving is a risk to road accidents. It is advised to plan resting points in advance before starting a long journey (NSW 1998). Fatigue also can be caused by day work (Zhang et al 1998).

Excessive speed is also mentioned as the major contributing factor on road crashes and subsequent injury rates of person injured. Similarly property damage appears to be linked to the vehicle's speed at impact (Shibata et al 1994).

Some medical conditions are also mentioned to be risk factors for driving (Hayes 1972). For example, diabetes and epilepsy have been identified as factors that are associated with increased risk if a person is allowed to drive (Odero 1997, Redelmeier et al 1997 and Lave et al 1993). Violant In 1996 reported that the frequency of road accidents involving epileptics and diabetics is double the normal and for a heart patient it is 60% higher (Kent 1991; Zhang et al 1998). However, a study done by Guibert et al (1998) failed to reveal a significant association between the above medical conditions with motor vehicle crashes (Violant et al 1996).

### *Age*

The driver's age is also known to be an important factor contributing to occurrence of accidents Available literatures shows that adolescents or young drivers are frequently involved in traffic accidents than other age groups (Bjornskau, 2000) Leon et al (1996) have also shown through their various studies that young drivers are more frequent involved in accidents caused by inappropriate speed and loss of control of the vehicle compared to other age group of drivers The study by Graham (1993) reported that motor accidents were prevalent in certain age group and they occurred at certain hours of the day and week and at certain locations. Some people there are more susceptible than others and susceptibility is increase by the traffic of alcohol and other drugs as well as other physiologic states such as fatigue (Graham 1993).

Leon et al (1996) observed that reckless driving in adolescents has been associated with increased risk of crashes (Leon 1996). The problem with young drivers is that they like risk taking behavior,also they lack driving skills (Vasconcellos 1999;Zhang et al 1998). The problem of young drivers is also mentioned as an important variable contributing to high fatalities or injuries (Hakims 1991) Massie et al in their study have also reported that old drivers (70 years and over) have the highest rate of fatal accident involvement while young drivers have highest rates of injurious involvement (Massie et al 1995).

## ***Sex***

With regards to gender, it appears that males are more involved in motor accidents than females (CSA 1993). Massie et al in their study found that males compared to females have a higher risk of experiencing fatal crashes, while women have higher rates of involvement in injury crashes (Massie et al 1995). Rivara et al (1985) have also reported that among the drivers of motor vehicles that struck victims, 69% of them were males and 31% females, controlled for gender exposure level.

It appears that males are more at risk than females for all age groups, when traffic accident is thrown in a limelight. Odero et al (1997) found out that in developing countries men are more at risk than women of being injured in crashes. The preponderance of males may be attributed due to their greater exposure to traffic and other associated factors. Concerning drivers the relevance of gender to road safety has long been recognised and it is the contribution of male drivers to accidents which has attracted much attention. (Dopson et al, 1999). This is because driving as a profession is mostly dominated by men.

### **2.3.2 Vehicle**

The technical quality of vehicles will be discussed first followed by the composition of the vehicle fleet in an area, it has been established by Dowing et al (1999) and Abane (1993) that the number of road worthy vehicles operating in developing countries is lower than those in developed countries. Worn out vehicles are more likely to be involved in traffic accidents. Vehicles with seatbelts, adequate lights, brakes, steering wheel, tyres as well as direction indicators among others and in good condition can help to reduce traffic accident.

### **Vehicle factor approaches**

Under the vehicle factors including its design, lighting system, break system and its use are significant contributors to road traffic accident (Odero 1995).

According to Jørgensen and Abane, (1999), a mixture of different type of vehicle including motorcycles and bicycles operating at different speeds is more widespread in

urban areas. This influences the system risk due to the risk of crashes or collisions between various types of vehicles (Light, heavy or overloaded) with various speed levels and non motorized road users.

Increase in income per capita is associated with increased number of vehicles purchased and in turn this may lead to increased accidents (Khair 1990; Leon 1996; Hakims et al 1991). Vehicles mile travelled (VMT) and periodic vehicle inspection are also variables appearing to affect the number of accidents (Jegade 1998). There is some evidence from motorways that accident rate per vehicle mile falls with increasing, traffic density up to a certain point and it may raise again after reaching that point.

Vehicle characteristics and vehicle use are frequently cited in the literature as being potentially important factors contributing to high motor vehicle related fatality rates.

A study done in Papua New Guinea revealed that vehicles are overloaded and improper vehicles are used to transport passengers thus increasing the risk of accidents. Similarly open back vehicles have also been reported to be associated with increased risk to passengers (Nelson et al 1991).

Among factors associated with increase of human loss, person injuries and material damage only were thought the greater size of the vehicle involved and an increasing number of heavy goods vehicles (Bener et al 1992).

Design of the vehicle, well breaking system of the vehicle, better tyres and extended visibility due to improved lighting of the vehicle reduce risk of accidents. Defects in design or manufacture of vehicle can threaten occupants' safety. Improvement of the interior of the vehicle tends to increase the safety of the occupants (Graham 1993).

### **2.3.3 Environment**

According to Bener (1992), it is impossible to understand social systems independently from their environments because society's institutional, structural and behavioural qualities are all contingent upon environmental parameters. The environment not only

provides necessary subsistence materials on which humans depend, but also restrict such things as movements and organisations complexity, it is simultaneous permissive and regulatory. The environment can be social, economic, cultural, physical or psychological setting but in this context, it is the physical, built up, and economic setting that matters Rune. (2002).

Concerning the physical environment, various climatic threats and geo hazards like heat, fog, high winds, snow, rain, ice, flooding, tomadoes hurricanes, and avalanches have effects on roads hence on traffic accidents, Moen et al (2005),. The weather (Heavy tropic rainfalls) also threatens surface transportation and impact road way safety, mobility and productivity. It affects roadway safety through increased crash risk as well as exposure to weather related hazards. Weather impacts roadway mobility by increasing travel time delay, reducing traffic volumes and speeds and decreasing roadway capacity Odero et al (1991),. Weather and road conditions in terms of road qualities therefore have a role in the causes of traffic accidents. In the same manner, the situation of areas of residence and working whether in an urban or rural area determines the extent of traffic accident risk in an area.

The build up physical and social environment with regards to road network, the types of roads, and quality of the road like black spot, road segments, lane width, junction layout, pot holes and other characteristics of the road have system also have strong effects on road safety in any place, Oluwasanmi (1993)

The area planning and land use patterns perspective has also an impact on traffic accidents, the existence of squatter buildings (Which are generally poor regulated), traffic calming schemes in residential areas, restricted driving areas as well as traffic separation in a place does matter for road safety, and this is because they have strong bearing on traffic generating activities as well as problems and solution of traffic safety efforts . Shibata et al (1994).

### **Environment Factor approaches**

The environments factors including design of road, its geographic location, season, weather, visibility, time of day and traffic regulations (Lemming 1969, CSA-1983). A clear understanding of the causal factors is of utmost importance in any attempt to design a road safety promotion or preventive program (Sarungi1981).

Well-designed roads with separate lines for pedestrians and cyclists are much safer than those without such facilities. Sometimes barriers to discourage pedestrians to motor roads reduce the rate of injuries. Modern roads are safe because they are well designed with all-important signs (Graham 1993;Bjornskau et al 2000). The road signs should be clear by themselves and should convey an unmistakable message to the driver.

The super elevation of highway roads such as tilting the road surface downward towards the inside curve has shown a positive effect in reducing motor accidents. The mechanism behind is that the slope produces a force tending to push a car inwards and this interacts with some or all of the centrifugal force, which in turn acts outwards on any object moving in a curve path (Leeming 1969).

It has also been observed that accidents mostly occur on broader roads than narrower ones (Majumder et al 1996). In Nigeria they regrettably reported that better roads have resulted in excessive speed and reckless driving resulting in an increase rather than decrease in death toll on national roads (Asogwa 1992).

There is a relationship between seasonality; weather and time factor in road traffic accident occurrence (CSA 1983,Jegede 1988,Zhang et al 1998). Fatal accidents mostly occur during winter season. A study done by Kong et al has revealed that most of the accidents occur during the night, weekends and during months of October to December (Kong et al 1996).

A study done by Barreto et al observed that exposure to high intensity noise at work place tends to be associated with occupationally acquired hearing deficits. These deficits

increase the risk of motor vehicle injury to pedestrian workers (Barreto et al 1997). Travelling long distances to obtain alcohol is associated with increased risk of pedestrian motor vehicle crashes if the pedestrian has to cross roads when going back home (Gallaher et al 1992).

Activities along the road side such as petty trading, increases exposure risk to traffic accidents Shibata et al. (1994), at the same time improved road quality may lead to behavioural adjustments in terms of more risk prone driving, Jørgensen and Abane (1999).

#### **2.3.4 System of traffic laws, control and regulations.**

Enforcement and traffic laws have to do with government policy regarding road safety issues. The aim of traffic regulation systems and enforcement is to ensure adequate operations in the traffic environment and system maintenance by legislation and controls. Regulations by traffic signaling systems, speed limits and speed controls as well as the existence of police patrols and checkpoints can lead to some reduction of accidents by influencing the road user's behavior. Jørgensen and Abane, (1999) also argued in their study in Ghana that, traffic regulation schemes are not systematically implemented and the police service is generally less well trained, equipped and motivated to enforce moving violations, as are evident in cities in developed countries.

#### **System of traffic laws, control and regulations approaches.**

Thomson et al found that riders with helmet had an 85% reduction in their risk of head injury compared with those without a helmet (Thomson et al 1989).Rivara has also reported the effectiveness of the helmets in pedal cyclists and motor cyclists (Rivara 1985).Mandatory use of helmets in Sweden showed the same good effects (Kent 1991). The effectiveness of helmet use is dependent up on the speed of the motorcyclist. It is more protective at low speed of 50km per hour but less effective at higher speeds.

Safety belt use by front seat occupants has been found to reduce motor vehicle related injuries (MMWR 1992; Leon 1996). Broughton in England observed that compulsory

seat belt wearing was beneficial (Broughton 1991). Seat belts for older, children and adults prevent approximately 50% to 60% of all fatalities resulting from motor traffic accidents (Rivara 1985).

It is well documented that the use of child restraints, specifically child safety seats, can reduce morbidity and mortality in young victims of motor vehicle crashes (CSA 1983). Approximate restraints prevent approximately 90% of fatalities in 0 to 4 year old age group (Rivara 1986).

Behavioural intervention and tighter regulations are also important measures (Jayasuria 1991; Graham 1993). However legislative and other counter measures proved effective in Nigeria (Asogwa 1992). Promotion of road safety through the use of targeted media campaigns at community level can effectively reduce motor traffic accidents (Tripop 1994).

#### **2.4 Risk theory**

A common agreed upon definition of risk is yet to be articulated. Risk can for instance be defined as subjective assessment of probability for a specific occurrence of a negative event, and how concerned individual is with the consequences of this event (Sjorberg 1983, Rundmo 2004 & Moen 2005), thus the combination of perceived probability and severity of consequences, relate to how the individual perceive risk.

According to Dejoy (1989). In the road traffic, risk is the function of four elements. The first is the exposure-the amount of movement or travel, within the system by different users or a given population density. The second is the underlying probability of crash, given a particular exposure. The third is the probability of injury, given a crash. The fourth element is the outcome of injury. Risk can be explained by human error, kinetic energy, tolerance of the human body and post-crash care Bastide (1989).

The second main theoretical approach of my study is related to risk perception and the relation between risk judgments and decision under uncertainty. A variety of factors have

been suggested to predict risk perception. Rundmo (2004) identified that poverty and poor countries exhibit a higher risk tolerance culture are the relevant approach in understanding why people neglects risk because of being influenced by other existing risks, in a high risk society people are experiencing several severe risks. Further more , risk is associated with personality traits and attitudes. Some people prefer a higher risk level, so called sensation-seekers, most likely in all types of society or cultures. Zuckerman (1979). Existing literature on traffic accidents points to the fact that while rates of accidents have fallen in industrialised countries, it is rather on the increase in developing countries. As the developing countries are characterised by poverty, majority of the people living in these countries are exposed to various risk situations every day. Risk can be assessed as an “objective” phenomenon or a social cultural or subjective “phenomenon” which could be socially construction. (Lupton 1999, Green 1995)

Several variables are thought to influence risk perceptions among the public. Information about risk from various social relations and the media are for example thought to shape how individuals and societies approach potential risks (Slovic 1987). A consequence is that the public do not always associate objectively more dangerous activities (Olterdal, Moen, Klempe & Rundmo, 2004). For instance, during a vacation in Egypt the statistical probability of being injured in traffic is larger than being struck by a terrorist attack. Still many western tourists tend to worry more about terrorism than traffic accident. during their stay in this country, this example indicates that risk should be regarded as the multidimensional concept, which is not always congruent with objective statistical calculations.

When people perceive risk several aspects have to be taken into consideration. The first is the probability of a negative event and the severity of consequences of such an event. In addition, processing theories and appraisal theories account for how affect influences such judgments. The result of several researches carried out previously on road traffic accidents have shown that greater the consequences of the negative event, the more affect will be present when thinking about the risk source, and the more precautionary action to avoid an accident is expected Rundmo, T. & Iversen, H. (2004)

According to Thompson et al (2002), risk compensation is the name given to a theory which states that an individual provided with a protective device such as automobile seatbelts will act or behave in a riskier manner because of the increase sense of protection from the seatbelt and thereby nullify the protection afforded by the seatbelt.

According to Wilde (2002) and Adams 1995, in this thermostat, individual's risk-taking decisions represent a balancing act in which perceptions of risk are weighed against propensity to take risk. The propensity to take risk is influenced by expected rewards and as a perceived threats or danger increase, people respond by being more careful. There is therefore a balancing behavior influenced by perceived danger and propensity to take the risk which in turn influences accidents and rewards. If the perceived risk of a situation exceeds our target level, we will act to reduce it and if the perceived risk is lower than the target level, we will attempt to increase our risk back to our target level (risk optimization) through more dangerous actions. Wilde's name for this process is risk compensation. In his view risk homeostasis is therefore an extreme form of behavioral adaptation, not only do we modify our behavior in response to external changes design to make us more or less safe but we seek to counteract these changes completely and return to our desired risk level.

The target level of accident risk is determined by four categories of motivating factors Dejoy (1989) and Wilde (2002). One is the expected advantages of comparatively risks behavior alternatives: for instance gaining time by speeding or over speeding when roads are good (risk compensation) Adams (1994). Two is the expected costs of comparatively risks behavior alternatives: for instance automobile repair expenses and insurance surcharges for being at fault in an accident Wilde (2002). Three is the expected benefits of comparatively safe behavior alternatives Rundmo (2004): for instance the psychology of insurance discount for accident- free driving. And fourth are the expected costs of comparatively safe behavior alternatives: for instance, using an uncomfortable seatbelt Wilde (2002).

### **2.5 Political ecology approach.**

Political ecology approach in human geography was introduced by Blaike and Brookfield (1987 cited in Zimmer, (1996)). Zimmer, (1996) explains that political ecology is the combination of ecology and political economy and observes that Piers Blaikies (the Political Ecology of Soil Erosion in Developing countries) contributed immensely to the political ecology approach in human geography. Mayer (1996) then introduced the political ecology of a disease concept which focuses on the relevance of political and economic factors at different geographical levels in the study of health and diseases in a locality, this can be extended to health and accident risk as well.

Mayer (1996) notes that although politics is not the direct concern of geography, it plays a very vital role in determining the way in which people view and utilize the recourses and opportunities available to them. The above exposition indirectly shows the importance of political ecology of disease or accident concept when one is researching into any study such how community perceive risk in relation to road traffic accident in any country at local scale. This is strongly linked to available recourses and capacity of the national and local authorities to put road safety strategies in place. The lack of resources and power to follow up on control and enforcement can result in lower motivation of police force. This is because government policy does have an influence on all the factors that cause traffic accidents, be it the quality f the road network, the associated physical environment , traffic engineering , the condition of vehicle or vehicle fleet stock or the behaviors and attitudes of road users. At international scale the political ecology approach is relevant in relation to the distribution of resources, health, risk and poverty based on international trade relations. This relationship for example, can be expressed in the import of second hand vehicles for private as well as public transport from the developed countries. Sometimes this could be Importation of vehicles nearly regarded as non road wealth in the view of the exporter in the developed country.

Political economy is concerned with issues of power, influence and authority. Thus the content of political ecology emphasizes that human-environment relationship at local, regional, and global scales can be understood only by analyzing the relationships of

patterns of resource to political economy forces Basset(1988 cited in Mayer,1996) notes that, among other characteristics which are implicit in the political ecology approach include the important of historical analysis in understanding local dynamics, and the effects of state policies and activities on the local scale

Mayer (1996) notes that the effect of state policy and action are inherent in political economy, and are therefore a major concern of political ecology. Political ecology and health are closely linked in the sense that, it provides a useful perspective for gaining an understanding of human-environment interaction to cause an increase or decrease of traffic accident at various geographical levels (central versus local) and in different areas in developing countries.

The build up environment can also influence the occurrence of traffic accidents in a locality. Planning for road construction to aid development should take into account the width of the road and the lay out of the junctions. Whether black spots will be improved or not rest on the shoulders of the state and further more regional or local authorities. In the same manner, the existence of the better roads side facilities for pedestrians and safer crossing points to reduce traffic risk accidents rest with the authorities at different level. The existence of traffic laws and effectiveness with which they are implemented is largely the sole reserve of the ruling government. The power and willingness to focus on transport and accident risk as an economic problem and poverty problem in addition to a public health problem. Moreover, the state attitudes towards traffic accidents will determine the sort of attentions the problem will receive. This is also a question of economic development and the availability of recourses, priority and the overall risk leveling the society in developing countries. The need for state policy Road Traffic Authority will increase when a high level of motorization is experienced in developing countries, hence facing a higher injury risk. Smeed (1953).

With regards to the problem of high traffic accident in Tanzania political ecology approach will help to associate and integrate human-environment factor at local level and the traffic accidents at that specific place in relation to social, economic and political

aspect and practice. How local authority's priorities the traffic safety measures interns of distribution and allocation of resources, budgeting, rules, regulations and control

## **2.6 Geographical approach**

Despite using various bodies of theories in social and behavioral science in this study, I will also use a geographical approach basing on "Geographical Matters: Place, Time, environment and Road Traffic accident" as an additional conceptual approach in understanding land use, road element, width of the road, bending road, hilly area, topography and regional distribution in occurrence of road traffic accidents in Tanzania. According to Cutter (1993), geographic scale is important in understanding technological hazards, their distribution, impacts and its reduction. The dictionary of human geography provides us with the definition of medical geography as the application of geographical perspective and methods to the study of health, disease and health care (Johnston et al, 2000:374). Accidents such as road traffic accidents are also relevant to study within this subject. According to Curtis and Taket (1996), this alerts us immediately to two components or domains of study. The first of these is the study of health and disease which can be extended to include road traffic accidents, which encompasses the analysis of special variations in human health or, more often, lack of health i.e. death/ mortality and disease/ morbidity and the search for environmental and social conditions which may be causally related to health or ill health and health behavior (risk-taking) based on cultures, activities and economic condition.

Land use pattern, types of road network, local business and activity pattern will influence the system risk in an area as well as the health risk of the population. There is also rural – urban differences, in urban there are more accidents, lower degree of injury while in rural areas there are lower accidents levels however more serious fatalities Astrom et al. (2006).

Time factor in the analysis of road accident pattern is also vital as it will be relevant to know trends in the accident patterns as well as time in a more specific way related to hours of the day, month, or season that people are more at risk of the traffic accident. In

Tanzania for instance, it has been observed that traffic accidents increase during festive occasion especially during Christmas season and it is also a rain season in that particular time. According to Odero et al (1997) there is sufficient evidence in support of high incidence of day time casualties in developing countries. In their view this can be explained by greater traffic volume during the day resulting to greater risk of traffic accidents involvement as people travel to work, children go to school and commercial enterprises are open for business. They also found out in their study on *Road traffic injuries in developing countries, a review*. That more than 50% of the weekly traffic injuries occur on Friday, Saturday and Sunday, with a high peak on Saturdays. Odero et al (1997) also revealed that in Papua new Guinea for example, studies have shown that nearly 60% of the weakly traffic injuries are reported to occur during this period and it is likely that, a greater proportion is alcohol related. These are important and interesting observations concerning traffic accidents risk in developing countries.

### **2.6.1 Some broader international spatial pattern**

In the past, road traffic accidents used to be a problem of industrialised countries but now it is becoming an epidemic in Developing Countries (Odero et al 1991; Soderlund et al 1995; Vasconcellos 1999; Oluwasanmi 1993). The trend in road traffic accidents in studies done in Nigeria, New Papua Guinea and Tanzania illustrate that road traffic accidents is a rapidly growing problem for Developing Country (Asogwa 1992; Jayasuria 1991; Kayombo 1995).

A study done in China reported that with increased motorization, leading to road congestion, has been associated with increased road trauma. China as a developing country has started to experience this problem to a massive scale, which was non-existent before, when the majority of the people were using bicycles as a major means of transport (Robert 1995).

Studies done in the U.S.A have reported a significant decline in traffic fatality rates (system risk) as a result of improved road safety measures (Graham 1993, Broughton 1991). In Great Britain has also reported a similar decline. The author noted that there

was an increasing rate in the occurrence of casualties followed by decline in recent years, a pattern that is similar to most Developed Countries (Broughton 1991).

Between 1986 and 1988 injuries were the second leading cause of death among American Indians and Alaskan natives. The injuries accounted for 22% of all deaths. Motor vehicle related injuries were threefold higher than among the total United States of America Population (MMWR 1992). Bener et al (1992) in Saudi Arabia reported that motor traffic injures are becoming the public health epidemic and yet relative to causes of morbidity and mortality, the amount of attention they have received from public health professions and scientific community is very minimal (Bener et al 1992)

## CHAPTER THREE

### 3. Research design and methodology

#### 3.1 Introduction

This chapter is about the methods that were used for collecting information in the field. This chapter is mainly explaining how this study was conducted, the applied methods and techniques in data collection and the reasons as to why they were used according to the research aims and main objectives of the study. According to Webster (1985), to research is to search or investigate exhaustively. It is a carefully or diligent search, studious inquiry or examination especially investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws. It can also be the collection of information about a particular subject. This chapter will involve a discussion of the research process, the selection of the data sites, sampling methods and justification and sources of data used in the study. There will also be a discussion on the analytical and statistical techniques used in analysing the data for the study. This chapter concludes with the discussion on the reliability and validity of the research as well as the methodological problems encountered during the data collection and analysis.

#### 3.2 The research process

The methodology and procedure for data collection employed in the field was based on both qualitative and quantitative methodologies within a framework of a case study approach. Interviews, focus group discussions, observations and review of secondary data, were done accordingly.

In the existing literature of the social science, a common term used to describe the use of both qualitative and quantitative methods in research is triangulation. Baker (1999) notes that, triangulation enable a researcher to gather evidence from multiple sources to address the questions at hand from different points of view. One advantage of triangulation is that it can broaden the research and at the same time strengthen the validity of the research.

Baker (1999) notes that, triangulation method is the best method to use when a researcher wants to look at the broad patterns of social life or describe widespread social reactions

for instance to social policies. Hence it is powerful means of gaining knowledge about the social world. In this study triangulation method is considered to be convenient, in analyzing the risk factors contributing to the cause of road traffic accidents at Kibaha District, for the purpose of letting the community use the information to formulate their own locally based road safety policy according to their reality and practices. For instance, implementing local physical counter measures like traffic calming schemes, reduce speed by bumps and other hindrances that reduce the speed of the vehicle in this particular area.

Burges (1984) used the term “Multiple research strategy” to connect the use of diverse methods in dealing with research problems. Kummar (1996:12) notes that: “Both qualitative and quantitative approaches have their strengths and weaknesses, neither one are markedly superior to the other in all types... In many studies you need to combine both qualitative and quantitative approaches” In this study, I considered that the traffic accident is a complex issue which involve different aspects, in order to have broader end information on my findings the use of both methodologies is good to describe and analyze the accident situation in the area.

### **3.3 Qualitative methodologies**

A qualitative research methodology covers a number of alternative techniques, including interviews, participant observation and focus group discussions. Qualitative methodology helps to understand life experiences and to reflect on the understandings and shared meaning of peoples’ everyday social life and realities (Limb 2001).

In this study qualitative approach has been used to collect the primary source of data through interviews with the accident victims who attended at the District hospital within a period of my field work, Officials from the ministry of health, officials from the Police office, Officials from the Hospital, Personal observation and a focus group discussion with Government officials in Kibaha District. The aim of collecting information from key informants was to seek the views of government officials in various organisations about what the central government has done about the road traffic accidents in Kibaha District.

This necessitated the need to interview them using the in-depth method with the help of an interview guide. Personal observation was used where I observed how pedestrians cross the main road in four different localities and how vehicles respond to the road signs especially the areas where people cross the road frequently.

Qualitative methodology is mostly based on a humanistic view, and humanistic geographers have sought to challenge the mechanistic and objectivity approach that characterizes positivism. According to Limb (2001), researcher and researched should be central to the research process, stressing the need to understand the life world of individuals and the taken for granted dimensions of experiences, the unquestioned meanings and routine of safe and risk behaviour. I have considered that participant observation interviews and focus group discussions and partly observations will enable me to participate in finding out what local people believe to be risk taking behaviour and potential courses of traffic accidents and as a team what should be done from the grassroots perspective.

Habermas (1985), quoted in Flick (1998), argues that qualitative research is of specific relevance to the study of social relations, owing to the fact of pluralization of life related to accident risk, key expressions for this pluralization of ways of living and biographical patterns. Dissolution of old social inequalities into the new diversity of milieus, substructures, lifestyles and ways of living. In this study, the focus will be based on local populations and their perception and judgement aspect of the risk of traffic accidents, including the relationship between environment, human behaviour, vehicle and the system of traffic laws, controls and regulations, hence it will be relevant to use qualitative methodology because it will then justify real situation of changes and its adaptations to social change from traditional to modernity.

### **3.4 Quantitative methodology**

Quantitative methods provide comparisons and statistical aggregations of data. Typically quantitative method are characterised by the use of close ended questions for yes or no answers or set of predefined answers like Likert scale(example strongly agree or strongly dis-agree) which can be quantified, comparable and measurable to provide numeric

results . However Flick (1998) mention that quantitative research method can amount to a quick fix involving little or no contact with people or field and also statistical correlation may be based upon variables that in the context of naturally occurring interaction are arbitrarily defined Flick (1998).

In this study quantitative source of data which was collected in the field was the review of hospital records of patients admitted to the hospital as accident victims of all accidents happened in Kibaha district from 2001 to 2004, a checklist form as questionnaire guide was developed to collect individuals information through a hospital card/form of admittance as a secondary source of information, The purpose of collecting this information is to assess the pattern and trends of motor vehicle casualties and non motorised casualties occurred at Kibaha district in a period of 2001 to 2004.

The quantitative data which was collected from the review of hospital records was analysed by using a statistical package for social sciences (SPSS).The program was extensively used to produce different statistical tables of varying kinds, and in simple statistical computations,. Furthermore, the quantitative data were frequently employed to substantiate my descriptive qualitative information obtained from interviews, informal discussions, observations and focus group discussion.

### **3.5 Case study approach.**

A case study is an empirical enquiry that investigates a contemporary phenomenon within its real life context especially when the boundaries between phenomenon and context are not clearly evident Yin (2003). A case study approach is one of the several ways of doing social science research Platt (1992). Case studies are the preferred strategy “when” “how” or “why” questions are being posed Schorr (1997), and when the investigator has little control over events, and when the focus is on a contemporary phenomenon with the same real experiences/context Silverman (2000).

Yin (1989), argues that case studies allows an investigator to retain the holistic and meaningful characteristics of real life events. It is an empirical inquiry that investigates a

contemporary phenomenon within its real life context when the boundaries between phenomenon and contexts are not clearly evident. In the process of understanding risk factors that contribute to traffic accidents in Tanzania, Kibaha district was chosen to be the unit of analysis for an in-depth understanding of life experience of accident victims in relation to safety measures undertaken by the government to improve health and system risks in the country. A case study approach seems to be relevant in my study during the retention of the holistic information of individuals with similar situation.

The most important with case studies according to Yin (2003) is to explain the causal links in real life intervention, describe the real life context in which an intervention has occurred, and evaluate the intervention itself. Given the nature of this study, it was the appropriate approach to use in understanding the real life context associating to causal link of traffic accidents (based on environment, human behavior, and vehicle and traffic regulations) and associate with the traffic safety interventions in reducing high health and system risks in the country.

### **3.6 Sampling method and justification**

The difference between non probability and probability sampling is that, non probability sampling does not involve random selection whiles probability sampling does. This implies that the usage of non probability samples cannot depend upon the rationale of probability theory. Researchers have observed that in applied social research, there may be circumstances where it is not feasible or practical to use probability samples. Flick (1998). Baker (1999) notes in her book *Doing Social Research* that there are two major goals that sampling can achieve. The first is to establish representatives of what is being studied and conversely to reduce bias , The second is to be able to make inferences from findings based on a sample to a larger population from which that sample was drawn. A study based on a sample that does not conform to the above conditions has to use non probability sampling considering the aim of the study and the respondents to be interviewed. Probability sampling is not feasible hence the use of non probability sampling was the best option available for this study.

### **3.7 Selection of data collection sources and participants**

In relation to the discussion outlined above Tumbi hospital and Kibaha police station in Kibaha district were chosen purposively for the study. The reason of choosing Tumbi Hospital is that, Tumbi hospital is in Kibaha Township and it is a designated district hospital and it is the only hospital along the highway that provides emergency services to road traffic accident victims. Tumbi Hospital is one of the hospitals affiliated to the Muhimbili University College of Health studies in Dar es Salaam, and this hospital is mainly specialised in motor related accident patients or victims and the hospital serves all traffic accidents victims whose accidents occurred within the high way from Dar es Salaam to Morogoro across Kibaha district. The hospital keeps all records of traffic accidents, type of motor involved, number of injured persons, number of killed persons and recording where the accident took place, the hospital is also responsible for the treatment and immediate support for traffic accident along the area. With the aim and objective of this study, I found choosing Tumbi hospital as the data collection point will be relevant for it is within the case study area and it has all the necessary information that the study is looking for, the hospital will also simplify the accessibility of the accident victims who are still attending to the hospital for medication, at the same time the hospital keeps all the records of individuals who got accidents within my case study area. I therefore found that it is the right point also to be chosen purposively for the review of accidents records and describing the motor related injuries including non-motorised causalities in the district in a period of 2001 to 2004.

The police station at Kibaha district is another data collection point of this study, the police in this area are the one responsible for the traffic safety, controls, ensuring traffic rules and regulation are followed, they also record and evaluate the causal factor of all traffic accidents in an area, again it was relevant for the sake of this study police station to be one of the data collection sources of the study.

In an interview study, sampling is connected to the decision of about which persons should be interviewed. It is also about which of the interviews should be transcribed and interpreted and which cases of text can best be used to demonstrate the findings (Patton,

1990). Sampling is important in reducing bias in the findings Flick (1998). The sample of respondents included in this study considered the balance between men and women though not equally but both participated representatively. The selection used purposive sampling and based on non probability sampling, stake holders were involved effectively.

The choice to interview the accident victims and government officials only and not others like pedestrians or other members of the community is due to the lack of sufficient time. According to Moen & Rundmo, (2004), in their study on risk perception described that, collecting information from a person who is directly wounded by the hazard, he or she will be in a better position to explain with a personal feeling on how dangerous is the risk of certain phenomena. The available information also from the annual report of The National Council of Road Traffic Safety in Tanzania (2005) show that, the most people who experience the effects of road traffic accidents first are the accident victims because they are injured, second is the government who is responsible for the security, the third are the owners of the vehicles who experiences the property damage.. And others follow after. It should also be noted that accident victims includes drivers, pedestrians, officials, and every kind of person regardless his or her category, therefore, accident victims stands as a sample of every person in a community at Kibaha district.

With regards to the interviews to government officials, snow balling sampling method was used to select key informants. The use of snow balling method was particularly useful because all major road safety stakeholders are associated with the government institutions. It was therefore difficult to contact and interview an official but when one stakeholder refers you to another, it is easy to schedule and conduct an interview. Considering the limited time within which the field work was done. The heads of the departments concerned were the first key informant, there after he or she directs to other key informants, snowballing method was particularly useful, even though the use of snowballing method comes with its demerit as it is susceptible to bias. For example a key informant is likely to refer me to another key informant whom they share views of the same theme under study.

### **3.8. Sources of data**

This section is about how information was collected in the field, the data collected in the field were from two sources, primary and secondary data, the primary data was qualitative and the secondary data collected were mainly quantitative.

#### **3.8.1 Primary data**

The first part of the data collection was based on a qualitative technique, the instruments used includes, interviews, direct personal observations and the focus group discussion which are discussed below:

##### **3.8.1.1 Interviews**

Interview is to listen to what people say about their lives, listen to them express their views and opinions in their own words, and learn from their view side daily life experiences. The qualitative research interview attempts to understand the world from the subjects point of view, to unfold the meaning of peoples experiences and reveal or uncover their lived world prior to scientific explanations (Kvale, 1996) In view of the above, and given nature of the study, I needed to hear from accident victims themselves and other responsible officials their views and opinions about the road traffic accidents.

During the interviews I had to introduce myself together with my research assistance explaining who we are and what the purpose of our visit is. So as to receive a warm welcome from the respondents and they should be free to air their views and share with us their life experience. Introducing ourselves helped respondents to be free in giving out their views without being skeptical.

Communication language was both English and Swahili the choice depended on to what extent a respondent is comfortable with his own language preference between these two languages, so as we can understand each other. Due to such situation our interview guide was in English and it had to be translated to Swahili because most of the accident victims understood much Swahili and they felt like using it for better understanding. Swahili is the first language in Tanzania and English is the second language officially.

During conversation with respondents we were taking notes. After conversations, we cross checked with the research assistants and review whatever they noted down to make sure that details were not omitted.

During field work I employed the following primary data collection methods;

### **3.8.1.2 Interviews with main informants: (Traffic accident victims)**

In this group a total of fourteen respondents were interviewed. This was done with the accident victims who attended the district hospital within a period of my field work which was approximately three weeks, the interviews to these accident victims were done after having their consent to participate in the study. An interview guide with a total of fifteen questions was used (See Appendix 3) Where the victims were not able to answer the questions because of his or her conditions, surrogate information was obtained from a 'helper' or anybody who brought him/her to hospital.

For the conduct of the individual interviews with accident victims, I considered the involvement of men and women, younger and older. The main intension of interviewing accident victims is to better understand of their feelings and to present a reasoned account of their everyday life experiences and to explore and explore through the commonalities and diversities in their suffering and social experience across time and space.

### **3.8.1.3 Interview with officials (Key informants)**

#### **1) Interviews with hospital staff.**

Five officials from Tumbi hospital were interviewed (District hospital), were interviewed. These were the Hospital Secretary, Matron of the hospital. Doctor in-charge of casualty, Laboratory technician in-charge of the blood transfusion unit and the Radiographer in-charge of the X-ray department. (See Appendix 3) Each key informant was interviewed separately on a different day or time following a scheduled appointment, each interview took between 30 to 45 minutes, and it was conducted by using a semi-structured interview guide. Additional probing questions were asked. The reason of

interviewing officials from Tumbi Hospital is that Tumbi hospital is a designated district hospital and it is the only hospital along the highway that provides emergency services to road traffic accident victims.

## **2) Interviews with traffic police officers.**

There was one interview with a key informant from the regional Police Office, The plan was to interview three or four respondents with the preference of Traffic Police department and licensing department.(See Appendix 3) .Unfortunately the Region Traffic Commander decided that he will be interviewed on behalf of the other police officers this is due to the fact that he was the only person authorised to serve as the spokesman of traffic police. His responses were taken as representing the opinions of the traffic police officers. The interview was done with the Regional Police Commander and he was accompanied by two professional road traffic Police, the interview took almost 45 minutes, it was conducted by using a semi-structured interview guide, additional probing questions were also asked. The guiding questions aimed at getting information on how policemen collect road accident data, problems encountered in dealing with accidents and victims, how rules and regulations are controlled. It also had a provision for them to give opinions on how motor traffic accidents can be prevented in Kibaha district.

## **3) Interview with government officers: (At the Ministry of Health),**

One Government official from the department of Health Education and traffic safety was interviewed, an interview guide used to guide the interview was similar with the one used to guide the focus group discussion with District Government officials focusing on the rules, control, regulations, Policy and safety measures which are taken to prevent road traffic accidents in the area.(See Appendix 3) The interview took approximately 45 minutes.

### **3.8.1.4 Informal interview**

Despite using the formal interviews to individuals and Officials, I also conducted informal interviews by talking to people from different places within and outside my case study area including professionals, NGOs, Religious Organizations and community based organizations (Without Interview Guide)

Patton (1990) defined informal interviews as an insight information which can verify the trend and reality of what is searched for, informal interviews can be in form of talk, friendly discussions, listening to other people discussions and narrations.

#### **3.8.1.5 Focus group discussion**

A focus group discussion is an interview with a small group of people usually six to eight people participate in the interview for about one two hours(Patton, 1990). Patton argues that focus group discussion is the highly efficient qualitative data collection technique, which provides some quality controls on data collection. Participant tends to provide checks and balances on each other and it is fairly easy to asses the extent to which there is a relatively consistent shared view among the participants.

A focus group discussion was held at the office of the District Commissioner in the meeting room, six District Government officials attended two from the department of Social welfare, two drivers from the office of the District Commissioner, one was the District Administrative secretary and one was from the department of Discipline and labour. The officials were actually very open and willingly to share ideas, the meeting took 2 hours and 36 minutes, and it was conducted by using Swahili Language. Two research assistants were also included in the meeting. (See Appendix 4)

#### **3.8.1.6 Personal observations.**

Rich information and awareness about a phenomenon can be obtained through direct personal observation. Burges(1984) Denzin(1989) and Patton(1990) note that direct personal observation gives the researcher a valued recourse and tool to relate the information obtained from the questionnaire , to crosscheck information gathered through house holds interviews and relevant institutions. It also provides necessary background information on the problem being studied.

Observation was therefore vital qualitative method used during the data collection period, it involved the process where by I visited urban villages along the main road and

observed how people make use of the main roads. I did observe that most cars are in hurry and they overtake each other unnecessarily, speed limit is not followed, at the beginning of most villages there is a sign showing a speed limit of 50km per hour or 30km per hour but it is not followed, Most sheets used to put signs are stolen by indigenous, hence there are only polls without signs hence drivers take an advantage, another interesting observation is that most of the pedestrians at Kibaha district choose to cross the road at no zebra crossing points even when zebra crossing are available. Therefore this helped me to lean people's behavior in risk taking and their attitude toward road traffics.

### **3.8.2 Secondary data**

The second part of the data collection was based on quantitative method with secondary data sources, this part comprised of a retrospective review of records of road traffic accidents at Kibaha district obtained from Tumbi hospital records. Data were obtained from the monthly and annual reports for a four-year period time from January 2001 to December 2004.

#### **3.8.2.1 Records from Tumbi hospital**

The information collected from Tumbi hospital Cards: were Place of accident, date of accident, time of accident, type of vehicle involved, direction, number of people involved, type of road users involved in accident whether a pedestrians or passengers, deaths at site of accident and at hospital, age, sex, diagnosis, and environmental condition during the accident (See Appendix 2).

A review of records was done systematically and all records were manually sorted out starting from 2001 to 2004. A questionnaire form was used to pick individual information of these accident victims from the Tumbi hospital records

### **3.9 Writing and analysis of data**

During the field work, the hospital data were entered in a computer using SPSS statistical software. The standard statistical tables were generated to examine the relationship between outcome variables of deaths, injuries and disabilities with exposure variables of

age and sex. The results are summarised to show trends and patterns of motor accidents from the year 2001 to 2004 in tables.

### **3.10 Challenges and limitations**

The field work came under some constraints. One such problem concerns the fact that the time for the data collection process was limited. A longer duration of time was needed in order to have a deeper insight into the theme under study. For instance focus group discussion with some Regional, District and Ministry of health officials could have been used in conjunction with the methods already adopted as it would have resulted in a much richer data.

Another problem encountered on the field had to do with the bureaucratic procedures in the government institutions. It was extremely difficult to come into contact with some key informants even after booking several appointments with them. I went to their offices at the schedule time of interview only to be informed that they are not available at the particular moment.

Methodological weaknesses to some extent and those which relate to the nature of the study can also be considered a bound though not so much. For instance it is argued that case studies provide very little basis for scientific generalization (Yin 1989).

Another issue was that, the recording system of road traffic accidents in Coast Region, Tumbi hospital was expected to be good, some of the information was missing especially those pertaining to referred cases. Similarly those who were not seriously injured and decided to go away without reporting at any police station or hospital their records were also missing. At the hospital some accident forms were missing information on age of the victim, time of accident, type of the vehicle and direction on which the vehicle was going. Only a few accidents occurred during the study time, therefore types of injuries for analysis were very few. One police officer on behalf of others was interviewed. This barred access to views from other police officers.

Despite all the above problems or challenges, one of the strength of this thesis is that it has used triangulation for a more comprehensive picture of road traffic accidents. Triangulation approach to this study broadly means using of multiple methods to explore information, there are four types of “triangulation”: Data triangulation using different sources of data, theory triangulation applying different perspective to the same data source, investigator triangulation using different researchers and methodological triangulation using multiple methods. Patton, M. Q. (1990).

### **3.11 Validity and reliability of the study**

According to Kirk and Miller, (1986) validity is briefly defined as the degree to which the findings are interpreted in a correct way and reliability is the degree to which the findings are independent of accidental circumstances of the research. Grbich, (1999) defined validity as the ability with which the results of a study can be verified against the stated objectives. In this section, the extent to which the validity and reliability of the study can be assessed will be presented.

Baker, (1999) explains that doing social research is not just a matter of collecting facts based on careful observation. This type of fact seeking as an end in itself could be called positivism. She also stated that the act of accumulating facts and information as if this material was the sole means of establishing an explanation is neither possible nor profitable in science. It is only by interpreting their complex meanings and relationships and understanding the way they are created in social life. It is against this background that the issue of validity will be discussed.

This study was exploratory with the aim investigating and identifying the main risk factors contributing to high Health and System risk rates of Road Traffic Accidents in a highway (Dar es salaam-Morogoro) road across Kibaha District. More specifically, to describe the composition of motor related injuries including non-motorised causalities in the district in a period of 2001 to 2004, to identify factors associated with high way traffic accidents in Kibaha district. And to assess different road safety measures taken by local authorities to prevent accidents in Kibaha district. To accomplish this objective a

comprehensive review of records associated with road traffic accidents from the hospital records from 2001 to 2004 were done in conjunction with the interviews. Purposive sampling method was used to select the data collection point. As it was stated before that, Tumbi hospital has been facilitated to be a data base centre for the traffic accidents occurring along the highway road in Kibaha district. The accident records and particulars for accident victims are recorded in well structured form which was designed purposely to obtain various information concerning road traffic accident, for instance the form consist four parts, one is the identification of a patient or accident victim name, age ,sex, tribe, residence, occupation, education, etc, second is about the accident, place, time, how many cars were involved, how many people were involved, what type of the car was involvement, the third is the Environmental condition, whether it was raining, dry, fog, wind or etc and the last part is the factor which caused accident, there is a provision of recording what spastically caused an accident. Therefore, the review of these records was relevant and they contain all information to meet the objective of the study. There is one main demerit concerning the omission of some data in the form, it happened that some forms lack information like for instance sex and religion in order to cover this information names were used to determine sex and their religion even though not all names reflect religious affiliation of a person.

Most of the police data were underreported and in addition it was very bureaucratic to get them, but the use of hospital data showed that most of the police data were also available in hospital records, the only difference is that police records the deaths on the accident point or few hours after accident within a day, while the hospital records indicates death even after 14 days of an accident. According to the interviews we had with the police , the police commander said that there is no updates of police records but hospital records can be updated because they are the once who deals with the accident victims. Therefore the use of the use of triangulation method helped to verify and covers the gape which is likely to be found in one side of the data collection point.

The data triangulation method was therefore used to reduce the bias that will be caused by choosing one method over the other. In this regard the researcher gathered evidence

from multiple sources to address the research questions from different point of view including the interviews was done.

With regards to the issue of reliability (replicability of the data and the study), it must be noted that it is not a basic aim of this research. This is because for this study to be replicable it must adhere to strict rules associated with quantitative research and this was not the case in this study. It must be therefore taken into account that making valid inferences with this study to a wider population can not be done. Apart from the fact that the study is not fully quantitative, the finding of this research may not be replicable anywhere even if the same methods (triangulation) of data collection are used. This is because the setting of the study and the period of time in which the study was carried out can and may affect the findings. (Baker 1999) notes that field work done by different people at different times might well turn up different perspectives and results.

### **3.12 Ethical issues.**

The research proposal was presented at Department of Geography at Norwegian University of Science and Technology for approval. Then the authorities of the Geography department wrote an introductory letter which enabled me as an investigator to have access to my collection of data in Tanzania, Kibaha District, and perform my field work without any doubtful and having relevant information and records. The police, Regional and District authorities, and health authorities granted permissions for this research. Accident victims are sensitive informants; therefore they were interviewed after they had given their consent. Serious injured casualties were not interviewed due to their situation. And those who were able still depended on their consent to participate (It happened that 3 accident victims rejected to be interviewed but accepted to fill out the questionnaire form). For ethical and confidentiality purposes names of accident victims and owners of the vehicles were not included in the data collection instruments.

## CHAPTER FOUR

### 4. Study area.

#### 4.1 Introduction.

Tanzania is located in East Africa and is the largest country in East Africa (943,000 sq km), comprising both the mainland and the Zanzibar Archipelago. A large central plateau makes up most of the mainland (at between 900m and 1800m) and the mountain ranges of the Eastern Arc and the Southern and Northern Highlands cut across the country to form part of the Great Rift Valley. (A land of geographical extremes, Tanzania has the highest peak – Mount Kilimanjaro, the lowest point – the lakebed of Lake Tanganyika, and the largest lake on the continent – Lake Victoria.)

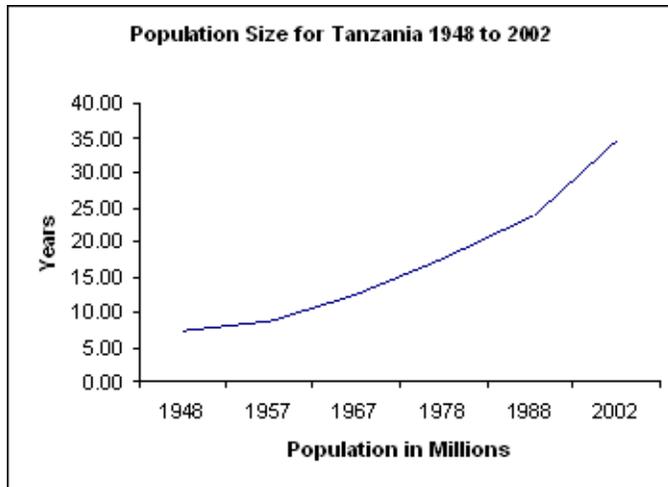
Coast Region (Pwani) is one of the 28 regions of Tanzania. Kibaha serves as the regions capital. The region is bordered to the north by the Tanga Region, to the east by Dares salaam and the Indian Ocean, to the south by Lindi Region and to the west by Morogoro Region.(Tanzania National Website). Kibaha is a town located in eastern Tanzania. It is also one of the 6 districts of the Pwani Region. The district is bordered to the North by the Bagamoyo District, to the East by Dar-es-Salaam, to the South by the Kisarawe District and to the West by the Morogoro Region.

Kibaha is the capital District of Coast Region and is geographically bordering Dar es Salaam which is the Country Commercial capital. It is about 30 kilometres form Dar es Salaam to Kibaha District. Kibaha District has close relationship with Dar es Salaam as most people live in Kibaha and work in Dar es salaam. Twenty years ago, civil servants and business men used Kibaha as the land for farming but recently as Dar es salaam expands quickly, it becomes difficult for people with average income to acquire land, hence they decide to reside in Kibaha where land is still cheap and work in Dar es Salaam.

Kibaha District has been very famous in road traffic accidents; the District has only one Main road which is the high way road from Dar es Salaam to Morogoro. The high way connect fifteen Regions and other several neighboring countries from Dar es Salaam across Kibaha District, therefore the traffic volume is very high.

## 4.2 Population

It has been observed that the population of Tanzanians nearly doubled between 1978 and 2002 in period of 14 years. Interestingly the population almost doubled in a period of 21 year, that is, 1967 and 1988. (URT 2002).. Based on the 1988-2002 intercensal growth rates, the projection for the year 2010 is around 43 million people.



**Figure 4.1 Population size for Tanzania 1948 to 2002**

According to 2002, Tanzania national census, Kibaha district is having a total number of 132,045 people. The number of people per square kilometer of land area, or population density, population at Kibaha District varies considerably from Ward to Ward. People are particularly concentrated at Kibaha Ward (153 persons per square kilometers) and Mlandizi Ward (147 persons per square kilometers). The other 7 remaining wards are also relatively densely populated. The average household size, calculated by dividing the number of persons by the total number of households, at Kibaha District is 4.9 persons per household in 2002. The sex ratio is defined as the number of males per 100 females. In the 2002 Population and Housing Census the sex ratios at Kibaha District were the same for an average of the whole country, a range of 94 -99 males per 100 females. (Tanzania National Census 2002 Report)

### **4.3 Road transport.**

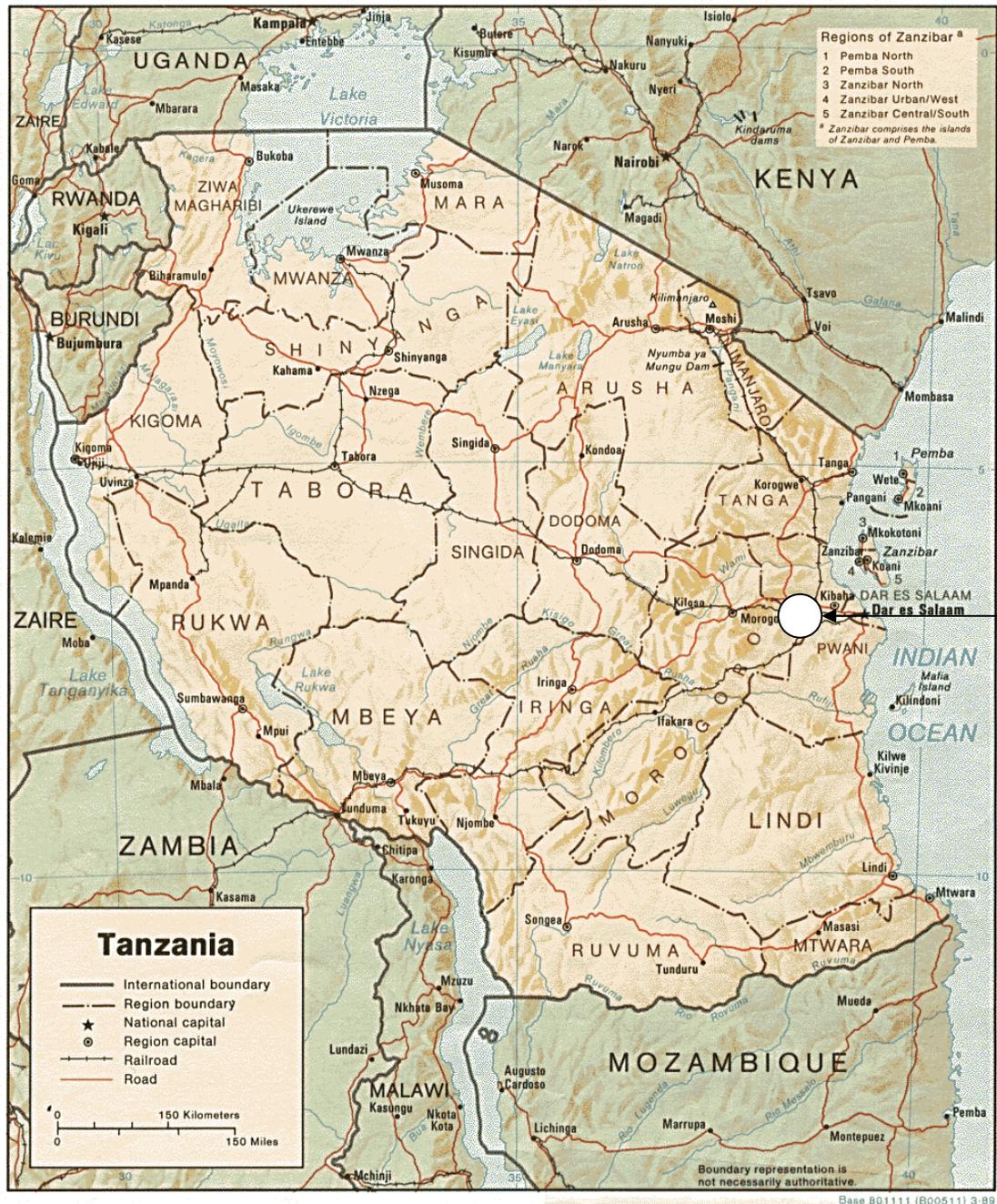
The geography of Tanzania, its size, diversity and dispersion give roads a special position in integration of the national economy'. In particular roads serve rural areas (where the majority of the people live) more effectively than any other mode of transport. National networks (under the Ministry of Works) face lack of sufficient fund for rehabilitation and upgrading due to increased traffic (e.g. the proposed Urgent Roads Rehabilitation Programme - URRP) and for routine maintenance, low capacity' of the local construction industry and low participation of the private sector. However, the Government has rationalized and streamlined the institutional framework for management of the road sector so as to enhance efficiency, effectiveness and accountability. An autonomous executive agency, the Tanzania Roads Agency (TANROADS), responsible for the management of trunk road construction, rehabilitation and maintenance has been established. A National Road Board guides its activities with representation from the private sector/road users and the Government. The Government has also established a Road Fund whose funding is ring-fenced field user charge as the main source of finance for road maintenance. The local authorities under the Ministry of Regional Administration and Local Government are responsible for the district, urban and feeder roads (the local roads network) for opening up existing and potential rural productive areas for agriculture, small-scale mining and rural tourism.

Road transport is the dominant mode of transport in Tanzania. It accounts for more than 80.0 percent of passenger traffic and over 70.0 percent of freight traffic in the country (URT, 2002). Increased economic performance and investments in roads transport infrastructures have resulted into increased levels of motorization in the country in general, and in the urban centers, in particular. But, increased motorization has also been accompanied by an unprecedented increase in road traffic accidents (URT,.2005).

Although the road traffic accidents problem is spread countrywide, three geographical zones can be singled out as the most accidents prone. These zones are the large urban centers in the country like Dar es Salaam, the regions traversed by the Tanzania Zambia motor Highway across Kibaha District (TANZAM) and the regions traversed by the road

from Chalinze- Segera –Arusha to Namanga border. These three spatial zones account for over 70.0 percent of all road traffic accidents in the country. The urban areas alone account for more than 33.0 percent of all road traffic accidents in the country (URT, 2006:7). The built environments and increased motorization have combined to make the urban centers in the country a high traffic injury level.

The Road Transport System in Tanzania could be characterized to be unsafe comparatively to Southern African Development Cooperation countries (SADC) or Western Europe countries due to the rate of accidents in each year. The fatal rate, which is 31 fatal per 10,000 registered motorized vehicles (police report (2004), is 10-22 times higher than Western Europe countries that have systematic traffic safety arrangements. Among the SADC countries Tanzania is among the five countries with high rate of fatal accidents in the region.



**KIBAHA DISTRICT**

**Figure 4.2** A map of Tanzania with regions  
 Source; Tanzania National Website.

#### **4.4 Traffic accidents in Kibaha district**

Tanzania comprises a road network totalling about 85,000km. the network consist of 10,300 km of trunk road, 24,700 km of regional roads, 20,000 km of district roads, 2,450 km of urban road, and 27,550 km of community roads. Improved roads always push motorisation on the road rapidly and that results in a rapidly increase in road traffic accidents. Road traffic accidents seem to be the major source of the death and injuries in the country especially in the cities and the highways, Kibaha being amongst. Both recorded and unrecorded statistics indicated that Kibaha district has a fairly poor road safety record regardless of the efforts being made by different institutions to combat and alleviate the situation. Malekela (2005)

Road traffic accidents constitute a major challenge in Tanzania not only in terms of health of the people but also in terms of economic loss. In 2003 the number of reported death resulting from road accidents was about 2,250 reflecting an annual growth of 9% compared to the previous year. This rate is higher than the corresponding economic growth which is about 6%, and much higher than the vehicle population growth rate. It is estimated that if the status quo prevails, the number of fatalities will reach 2,900 people by 2008. Banyikwa (2005)

It has been widely established that along Tanzania Roads the following aspects are common: inappropriate driver's behaviour, lack of law enforcement, poor traffic management, inconsistent road designs, deteriorating road conditions and inappropriate information system. All these make road safety a very serious problem in Tanzania. Economic activities are accelerating while improvement and upgrading of roads is at a slow pace and road accidents are on the increase. Kibaha District demonstrates these characteristics and radical changes are required to safe guard the investments and development processes and the error contributes about 87%, mechanical defects 14% and others is 9%.

Cast in terms of incidences of road traffic accidents per 10,000 motor vehicles, Tanzania was labeled one of the most unsafe countries in Africa. While Kenya and Zimbabwe had

fatality rates of 23 and 60 per 10,000 motor vehicles in 2004, respectively, the fatalities per 10,000 motor vehicles in Tanzania in 2004 were 66 (URT,2005). Between 2002 and 2004, the number of killed persons in road traffic accidents increased from 1,994 to 2,366 persons (URT, 2002). In 2004 alone, 17,231 people were seriously injured in road traffic accidents in the country. The statistics on road traffic accidents in the country show also that 33 percent all road traffic accident took place in the urban areas. The statistics show further that pedestrians and passengers constituted 77 percent of all fatal road traffic injuries in the country (URTm 2005). The number of fatalities and serious injures was expected to rise from 19 percent (2005) to 38 percent in 2015 (URT, 2005)

**Table 4.1 Fatalities rate by groups of road users in Tanzania**

GROUP OF ROAD USERS	YEARS						SUB TOTAL	(% )
	2000	2001	2002	2003	2004	2005		
<b>Drivers</b>	127	237	249	260	283	98	1254	12.2%
<b>Passengers</b>	658	781	875	971	1024	448	4757	47.0%
<b>Motorcyclist</b>	91	75	65	68	93	42	434	4.3%
<b>Cyclist</b>	231	143	152	174	206	73	979	9.7%
<b>Pedstrians</b>	630	630	653	682	756	386	3737	36.9%
<b>Total</b>	<b>1737</b>	<b>1866</b>	<b>1994</b>	<b>2155</b>	<b>2362</b>	<b>1047</b>	<b>10114</b>	<b>100.%</b>

Source, ARC report 2006

**Table 4.2 Injuries of different groups of road users**

<b>GROUP OF ROAD USERS</b>	<b>YEARS</b>						<b>SUB TOTAL</b>	<b>(%)</b>
	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>		
<b>Drivers</b>	942	189	205	894	1279	826	4335	5.7
<b>Passengers</b>	6298	7349	8475	9418	9482	3518	44540	58.7
<b>Motorcyclist</b>	649	149	142	628	542	99	2209	2.9
<b>Pedal Cyclist</b>	2719	248	345	1064	1037	172	5585	7.4
<b>Pedestrians</b>	3486	4632	5983	4821	4873	2494	26289	34.7
<b>Total</b>	<b>14094</b>	<b>12567</b>	<b>15150</b>	<b>16825</b>	<b>17213</b>	<b>7109</b>	<b>75849</b>	<b>100.0</b>

Source, ARC report 2006.

*The analysis of these Statistical Data indicates that passengers group is the most affected in terms of fatalities followed by pedestrians, pedal cyclists, drivers and motor cyclist.*

*Both tables 4.1 and 4.2 indicate lower number of fatalities and injuries in a year 2005 due to the fact that the statistics taken in that year was from January to June hence it was not complete for the whole year.*

The rapidly increasing number of road traffic accidents has a negative impact on the economy and society of Tanzania. Road traffic accidents cost the government about Tsh. 230 billion per year. This huge financial liability is four times the government's health budget (URT, 2015, 2005). The people who are affected by road traffic accidents are mostly in their most productive years (15-44 years). These deaths are a huge drain on the country's human resources. Also, when a head of household dies or is seriously injured in a road traffic accident, the whole family is plunged into poverty and psychological torture. Road traffic accidents are, therefore, a big problem to the government and the society of Tanzania.

Yet, road traffic accidents are made. While defective vehicles and bad roads account 26.0 percent of all road traffic accidents, the human factor (dangerous driving and excessive

speeding) accounts for 74.0 percent of all the road traffic accidents (URT, 2005). Dangerous driving and excessive speeding are sustained by the transformation of the built environment from a habitat for cars. The traffic conflicts of the motorized and the non-motorized in the urban built environment are, probably, the single most important explanation of road traffic accidents in the country. Banyikwa (1988).

In Tanzania road safety is one of the burning issues in the management of the road transport sub sector. The number of road accidents reported in the media day after another, coupled with the statistics release by the traffic department of the police force clearly lends credence to the existing problem. The statistics have all along demonstrated that the rate of accidents has kept on increasing annually and this trend is unlikely to be reversed particularly with the increase of motor vehicles on our roads. Banyikwa (1989)

Several studies regarding improvement of road safety in Tanzania were carried out in the past ten years, but implementation of the recommendations is quit minimal. Studies indicate that 16 to 20 % of all accidents in Tanzania are caused by faulty vehicles. The present influx of vehicles in the country, the laxity in the control of quality of vehicles coupled with poor maintenance has led many people to believe that the condition of the vehicle may determine whether an accident will occur given the presence of the contributing factors. Banyikwa (1989)

Most of the vehicles imported to Tanzania are used to the extent that some of them are not road worthy. This is due to the fact that the majority of the Tanzanian can not afford to buy new cars. As a result operational cost is always on the higher side. The majority of the vehicle fleet in the traffic system is therefore in poor condition of service, this problem has been attributed by the lack of systematic road worthy certification and inadequate law enforcement.

The Road Transport System in Kibaha District could be characterized to be unsafe comparatively to other Districts in Tanzania due to the rate of accidents in each year. It has been established that along Tanzania Roads the following aspects are common:

inappropriate driver's behavior, lack of law enforcement, poor traffic management, inconsistent road designs, deteriorating road conditions and inappropriate information system. All these make road safety a very serious problem in Tanzania. Economic activities are accelerating while improvement and upgrading of roads is at a slow pace and road accidents are on the increase. Kibaha District demonstrates these characteristics and radical changes are required to safe guard the investments and development processes.



**Photo 4.1 An old pick-up carrying passengers in a highway road.**

Source. IPP Media, <http://www.ippmedia.com/>. 14<sup>th</sup> December, 2005.

This photo was taken during the national road safety week to promote safety measures, the picture was shown on the daily news paper on 14<sup>th</sup> December, 2005, produced by IPP Media LTD, with the heading, Road accidents can be prevented if wishes... The photo was taken at Kibaha District along Morogoro road a high way from Dar es Salaam to Morogoro Region

According to P Banyikwa (1989), pedestrians and non motorised road users who are living at the villages located along the high ways (trunk road) specifically Morogoro road, are the main victims of the traffic accidents. The study shows that, there is a

psychological impact which influences the community specifically young generation to normalise the traffic accidents and feel like part of their life experience. Kipande M. S (2004) in his study (Road geometry and traffic accidents) described that, road traffic injuries at Kibaha district stand as a constrain to community development, there is a need of traffic safety intervention to the locals, so as to improve both motorized and non motorized safety standards, local made cyclic (wooden cycles) and other unsafe mode of non motorized transports used by the locals in trunk roads (highways) to transport their goods from one village to another or within, are below standard, they are not well equipped with road safety measures in such away that the community, passengers, and other road users are at risk of being involved in traffic accidents.

According to research done by Banyikwa (1989) indicate that, road traffic accidents in communities living along the highways in Tanzania including Kibaha district is very high, there is a gape of knowledge as to exactly what is the source and what should immediately be done, there is no specific agent (institutional wise) to be blamed, locals feels irresponsible, risk and impact accelerate poverty, The innocent passengers and, pedestrians become victims. There is a need of government and non governmental organization to intervene the calamity.



**Photo 4.2 Non- motorized mode of transport being used in the highway road.**

Source. IPP Media, <http://www.ippmedia.com/>. 15<sup>th</sup> December, 2005.

This photo was taken during the national road safety week to promote safety measures, the picture was shown on the daily news paper on 15<sup>th</sup> December, 2005, produced by IPP Media LTD, with the heading, who's Fault... The photo was taken at Kibaha District along Morogoro road a high way from Dar es Salaam to Morogoro Region

According to Banyikwa (1989) Traffic accidents in Kibaha district have been common experience to people; the existence of the high way across the district has lead to several economic and social activities in such that indigenous spent most of their time along the main road. A road has been source of their income, at the same time they are more at risk in road traffic accidents than other districts in the Coast region.

## CHAPTER FIVE

### 5. Road traffic accident patterns in Kibaha district

#### 5.1 Introduction

This chapter analyses the findings on the review of Hospital data (Tumbi hospital) in Kibaha District. Tumbi hospital is a designated district hospital and it is the only hospital along the highway that provides emergency services to road traffic accident victims, and it is one of the hospitals affiliated to the Muhimbili University College of Health studies, specialised in motor related accident patients or victims(Refer to methodology chapter).

The review is basically reflecting accident victims who were admitted at the hospital from 2001 to 2004 their information were collected from the hospital cards: A review of records was done systematically and all records were manually sorted out starting from 2001 to 2004. A guiding checklist form designed as a questionnaire was used to pick individual information of these accident victims from the hospital records

These findings represent only accident victims whose accidents were within Kibaha District and who were admitted at Tumbi hospital and does not include accident victims from Kibaha whose accidents were outside Kibaha district. (Refer to methodology chapter).

In general this Chapter demonstrates patterns and trend of motor traffic casualties (injured or killed) in Kibaha district. As it has been mentioned in other studies, prospective studies have problems in having standardised record keeping (Bener et al 1992), and also having complete records. Usually the records are kept for the purpose of use in that particular office and therefore it is not uncommon to find that they do not exactly fit the study. In this study some information was also missing because not all individuals involved in motor accidents reported or were admitted to the hospital. Accident victims who were not admitted to the hospital their information was lost. This was similar to what was reported in other studies (David 1991).

## 5.2 Trends of traffic accidents in Kibaha district

The trend of road traffic accidents in Kibaha district has been in increase for the past four years (2001 to 2004). The striking thing is that it is consistently high. The contribution of this district to the total motor accidents in the region was also very high . According to the Hospital report, in a period between 2001 to 2004 Kibaha District contributed 83% of all accidents in the Coast Region,82.5% of all injured victims and 88.8% of all deaths in the Region. The alarming high road accidents may be attributed to the heavy traffic on the highway caused by vehicles going and coming from upcountry and neighbouring countries.

Table 5.1 below shows the trend of motor traffic accidents in Kibaha District from 2001 to 2004. Overall there was a total of 276 accidents with an average of 69 accidents per year. The percentage of reported road traffic accidents in Kibaha district was increasing with an average of 9.4 accidents annually.

According to the findings of this study (Confer next chapter on risk factors), it has been identified that, the following aspects are common risk factors which acceralate the occurrence of road traffic accidents in Kibaha District: inappropriate driver's behavior, lack of law enforcement, poor traffic management, inconsistent road designs, deteriorating road conditions and inappropriate information system. All these contribute to the increase of road traffic accidents in Kibaha District

**Table 5.1 Trend of road traffic accidents in Kibaha district.**

<b>Year</b>	<b>Number of accidents</b>	<b>Percent</b>
<b>2001</b>	53	19.2%
<b>2002</b>	68	24.6%
<b>2003</b>	74	26.8%
<b>2004</b>	81	29.4%
<b>Total</b>	<b>276</b>	<b>100%</b>

Source: Police recorded registrations from regional office in Kibaha. (2001 – 2004)

These findings on table 5.1 above marches to the information obtained from the District Administrative Secretary in a focus group discussion, who mentioned that, there is a remarkable increase of road traffic accidents in Kibaha district and the acceleration of this road traffic accident in Kibaha District is mainly contributed due to inappropriate driver's behavior such as over speeding, alcoholism, drug abuse and corruption, other factors such as lack of law enforcement, poor traffic management, inconsistent road designs, deteriorating road conditions and inappropriate information system contribute less percentage than Inappropriate drivers behavior toward road safety in Kibaha district.

On the other side, it is well known in Tanzania that, the performance of the traffic police, as an agency that is supposed to enforce road traffic regulations in Kibaha District, leaves out a lot to be desired. First, the traffic police personnel are seldomly properly qualified, their level of training and knowledge of traffic regulations is too inadequate to be qualified and effective. As a result, the supply of personnel, vehicles and specialized equipment (such as radars and alcohol measuring devices) is very poor. The enforcement of traffic rules and regulations is thereby compromised. In most cases Traffic police are involved in corruption with drivers who are not willing to pay the fines.

One of the accident victims who was interviewed said that, lack of traffic separation, road signs and high traffic volume exposure on the highway contribute strongly to the frequently occurrence of road traffic accident in Kibaha district. Locals' behavior on the usage of the highway as a market place such as petty traders is also another risk factor which contributes to traffic accidents in Kibaha District. Petty traders usually intervene the traffic when selling bites, drinks and fruits to passengers this kind of behavior is also influencing other road users such as pedestrians and cyclist to normalize the usage of the highway in such that they cross the highway road without considering the road signs, locals cross the highway road in places where no zebra cross for pedestrians, they do not fear the risk of being involved in road traffic accidents. Hence then, there is an increase of number of accidents every year in Kibaha District.

According to the information received from the interview with the Regional police Commander, he mentioned that, Traffic accidents are increasing every year, and there are many accidents which are not reported, and in most cases police receive the information of these unreported accidents through insurance companies who wants to verify the occurrences of these accidents when their customers claim for the compensations. There are several reasons to take into consideration on the trend of traffic accidents in Kibaha district, the commander said, though it not true to point out just a single factor that can be identified as the catalyst facilitating the acceleration of the number of road traffic accident or accidents in Kibaha district; but the most frequently factors experienced by the Police involve a combination of reckless/dangerous driving behavior such as excessive speed and overloading, poor vehicle standard, careless pedestrians, motorcyclist and pedal cyclists. Others are driving while under influence of alcohol and bad road environment when it is dark or raining.

### **5.3 Distribution of casualties in Kibaha district.**

Table 5.2 below shows the trend of road traffic accident casualties (Injured or Killed) persons along Kibaha highway from 2001 to 2004. Overall there were 855 casualties with an average of 71% injured people and 29% deaths. The trend seem to suggests stabilizing ratio of about 3 to 7 between killed and injured persons respectively every year from 2001 to 2004.

In general there were about 855 casualties in Kibaha district from 2001 to 2004 (Refer table 5.2- about Tumbi hospital records) and 276 accidents (refer table number 5.1- Regional Police records) in 2001 to 2004 in Kibaha District. An average number of casualties per accident is calculated to be 3.1 casualties. There is a possibility of having a variation of average number of casualties due to the fact that, there are some accidents were not reported and some other accident victims didn't go to the hospital, hence their records were missing.

**Table 2.2 Distribution of casualties in Kibaha district.**

	2001		2002		2003		2004		Total	
	NO	%								
<b>Injured</b>	<b>143</b>	<b>70%</b>	<b>122</b>	<b>65%</b>	<b>168</b>	<b>76%</b>	<b>171</b>	<b>70%</b>	<b>604</b>	<b>71%</b>
<b>Killed</b>	<b>61</b>	<b>30%</b>	<b>65</b>	<b>35%</b>	<b>53</b>	<b>24%</b>	<b>72</b>	<b>30%</b>	<b>251</b>	<b>29%</b>
<b>Total</b>	<b>204</b>	<b>100%</b>	<b>187</b>	<b>100%</b>	<b>221</b>	<b>100%</b>	<b>243</b>	<b>100%</b>	<b>855</b>	<b>100%</b>

Source: Tumbi hospital in-patient and out-patient records from 2001 to 2004.  
Missing data: 0 casualties

This trend from the table 5.2 shows that, even if road transport is the dominant mode of transport in Kibaha district, it is also a source of injuries and deaths of people in the community. Traffic accidents in Kibaha district accounts for more than 200 casualties in the district every year, 29% percent of traffic accident victims are dying and 71 % remain seriously injured. Although the road traffic accidents problem is spread countrywide, Kibaha district is mentioned as one out of three geographical zones singled out as the most accidents prone. These three spatial zones account for over 70 percent of all road traffic accidents in the country. (URT, 2006:7)

During the interview with one of the hospital officials aged 52 years old, he mentioned that, traffic accident casualties in Kibaha district increases every year, the hospital experiences such kind of increase by looking into number of registered accident victims every year. The hospital budget has been always being low due to under estimation of expected accident victims, and the trend seem to be increasing every year.

#### **5.4 Distribution of casualties by place of residence.**

Table 5.3 below shows the distribution of casualties (Injured or Killed) in Kibaha district by identifying place of residence of the accident victims from 2001 to 2004. The distribution indicates that the casualties of people residing outside Kibaha district are 2 times those who reside in Kibaha district. It also shows that the trend of casualties in Kibaha District stands to be high and stable, there is only one remarkable relief on the

decrease of number of casualties in 2002, When I was interviewing the regional Police commander, he mentioned that, in 2002 the government was mainly concentrating on National Census, therefore there are many un reported traffic accidents in 2002, therefore this shows that there was a possibility of having more than existed records of casualties in 2002.

**Table 5.3 Distribution of casualties by place of residence and year**

Residence		2001		2002		2003		2004		Total 2001-2004	
		Inj	Kil	Inj	Kil	Inj	Kil	Inj	Kil	Inj	Kil
Kibaha	N	46	23	38	23	61	24	53	26	198	96
	%	32.2	37.7	31.1	35.4	38.1	50.0	31.0	36.1	33.2	39.0
Outside Kibaha	N	97	38	84	42	99	24	118	46	398	150
	%	67.8	62.3	68.9	64.6	61.9	50.0	69.0	63.9	66.8	61.0
Total	N	143	61	122	65	160	48	171	72	596	246
	%	100%	100	100	100	100	100	100	100	100	100
<b>Total Casualties</b>		<b>204</b>		<b>187</b>		<b>208</b>		<b>243</b>		<b>842</b>	

Source: Tumbi hospital in-patient and out-patient records from 2001 to 2004.  
Missing data: 13 casualties

The possible reason why the number of accident victims residing outside Kibaha district is 2 times those who reside in Kibaha district is that, Kibaha is the way through, from Dar es Salaam to up countries and neighbouring countries, therefore passengers are most affected and they are not residents of the district. Hence they are counted within the district because of the place of accident occurred.

### 5.5 Distribution of casualties by place of residence and age group.

Table 5.4 below shows the distribution number of killed and injured casualties by place of residence and age group from 2001 to 2004 in Kibaha district, the table shows that, the accident victims who are residents in Kibaha district aged between 18 to 24 are more victims compared to other age groups, 46% of this age group are injured and 64.1 % are killed, while accident victims who are not residence in Kibaha District aged between 25 to 34 and 35 to 44 are the most injured victims compared to other age groups respectively, at the same time accident victims aged above 45 years are more at risk of being killed at accident compared to other age groups, it is almost 73.5% died when involved into accidents between the year 2001 to 2004.

**Table 5.4 Distribution of casualties by place of residence and age group.**

			Age						Total
			No-	0-17	18-24	25-34	35-44	45+	
Injured	Residence	Kibaha District	No-	51	41	39	27	35	193
			%	45.1%	46.1%	22.5%	22.9%	38.5%	33.0%
	Outside Kibaha	No-	62	48	134	91	56	391	
		%	54.9%	53.9%	77.5%	77.1%	61.5%	67.0%	
	Total		No-	113	89	173	118	91	584
			%	100%	100%	100%	100%	100%	100%
Killed	Residence	Kibaha District	No-	14	25	23	22	9	93
			%	45.2%	64.1%	34.8%	30.6%	26.5%	38.4%
	Outside Kibaha	No-	17	14	43	50	25	149	
		%	54.8%	35.9%	65.2%	69.4%	73.5%	61.6%	
	Total		No-	31	39	66	72	34	242
			%	100%	100%	100%	100%	100%	100%

Source: Tumbi hospital in-patient and out-patient records from 2001 to 2004.

Missing data: 29 casualties.

The possible reason why youth aged between 18 to 24 residing in Kibaha district are more affected in road traffic accidents is that, this is the age involved mostly in petty trade along Kibaha highway. Most of them have just finished primary school and they haven't succeeded for further studies and they are jobless, Most drivers of these age are not well experienced and their behaviours toward road safety is improper.

### 5.6 Distribution of casualties by sex and age group.

Table 5.5 below shows the distribution number of Killed and Injured casualties by sex and age group from 2001 to 2004 in Kibaha district, The age and sex distribution of victims, have the same pattern for injury and death victims. In all the five age groups, more males were injured compared to females. The age group of 25 to 34 years was mostly affected by injuries for both sexes. In 2001 to 2004 the results revealed that almost the highest percentage of those who died were male aged above 45 years, 79.4% of those who were involved in traffic accident in Kibaha district were died. The general observation was that males were more involved in road accidents because they travel more in their daily duties compared with females who usually stay at home doing domestic duties. These findings were consistent with other studies (Bener et al1992) that the majority of victims were males under the age of 35 years.

**Table 5.5 Distribution of killed and injured casualties by sex and age group.**

			Age					Total	
				0-17	18-24	25-34	35-44		45+
Injuries	Sex	Male	No-	80	59	118	77	57	391
			%	70.2%	65.6%	67.0%	64.2%	62.6%	66.2%
	Sex	Female	No-	34	31	58	43	34	200
			%	29.8%	34.4%	33.0%	35.8%	37.4%	33.8%
	Total		No-	114	90	176	120	91	591
	Total		%	100%	100%	100%	100%	100%	100%
Killed	Sex	Male	No-	14	27	50	43	27	161
			%	45.2%	65.9%	73.5%	59.7%	79.4%	65.4%
	Sex	Female	No-	17	14	18	29	7	85
			%	54.8%	34.1%	26.5%	40.3%	20.6%	34.6%
	Total		No-	31	41	68	72	34	246
	Total		%	100%	100%	100%	100%	100%	100%

Source: Tumbi hospital in-patient and out-patient records from 2001 to 2004.

Missing data: 18 casualties.

### 5.7 Distribution of class of injured person by age group.

Table 5.6 below shows the distribution of class of injured person by age group. The findings show that passengers are more vulnerable on traffic accident in Kibaha District, followed by pedestrians. Passengers aged below 18, 25-34 and 35-44 age groups occupy the highest percentages of being injured in the accident than those who are aged between 18-24 and above 45 years age groups,

**Table 5.6 Distribution of class of injured person by age group.**

			Age					Total	
			0- 17	18-24	25-34	35-44	45+		
Class of injured person	Driver	No-	0	0	25	12	9	46	
		%	0%	0%	11.2%	7.1%	7.8%	6.0%	
	Passenger	No-	113	61	164	119	78	535	
		%	77.9%	54.0%	73.2%	70.4%	67.2%	69.8%	
	Pedestrian	No-	32	46	25	33	25	161	
		%	22.1%	40.7%	11.2%	19.5%	21.6%	21.0%	
	Motorcyclist	No-	0	6	1	2	4	13	
		%	0%	5.3%	4%	1.2%	3.4%	1.7%	
	Cyclist	No-	0	0	9	3	0	12	
		%	0%	0%	4.0%	1.8%	0%	1.6%	
	Total		No-	145	113	224	169	116	767
			%	100%	100%	100%	100%	100%	100%

Source: Tumbi hospital in-patient and out-patient records from 2001 to 2004.

Missing data: 88 casualties.

According to an interview done with an official from the Ministry of Health, she said that, road users are human beings, therefore human characteristics will in most cases constitutes to the risk of accidents to occur or accident severity. The challenge is “are these human beings aware on how to behave and perform to whatever level to safeguard their own lives?” Are they aware that at a certain moment they are road users as a pedestrian or passenger or driver and that their lives are at what risk level? Unguided pedestrians not following traffic regulations and principles increase the risk of accidents to occur by causing confusion and misleading other road users, their movement remains inconsistent while they are unprotected. Pedestrians behavior is widely variant quite inconsistent, difficult to control and is linked to many other related and unrelated factors.

Unconcern passengers have their demands driven only by human desire and wants thereby risking their lives from the service they are demanding for. Passengers increase the severity of accidents by struggling for overloading, pressurizing for high speed and not being aware on how to travel and arrive safe. Drivers have a strong influence and responsibility over all other road users as they perform their duty which is to control, guide and navigate the vehicle. The driver's performance is limited to the available capability and limitations. The drivers' behavior is what can be improved through guidance, training and experience according to the type of the vehicle being driven. However it should be realized that drivers' performance is subjected to appropriate provision of road, traffic and environment factors.

According to the findings from the table 5.6, shows that the highest percentage of drivers who are involved in accidents are aged between 25-34 years old, This trend shows that aged drivers are more careful on traffic safety than youth below 35 years old, it is possible that aged drivers have more experience and probably much more responsible than youth. It is possible that youth behaviors towards traffic safety are more violent due to peer group suggestion influence driving style encourage taking risks within such age. However young drivers could be more exposed for instance driving larger distances than elderly drivers.

### **5.8 Injured and killed casualties by local place of accident.**

Table 5.7 below shows the site (locations) with high frequencies of injured and killed casualties by local place of accident in Kibaha district from 2001 to 2004. The combined report of four years revealed the following areas as more prone to injured and killed casualties in Kibaha district. Maili moja, and Tumbi seem to have high percentages of injured casualties than any other places in Kibaha district while Kwa mathias and Tumbi seem to have high percentage rate of killed persons between the year 2001 to 2004. The possible explanation as to why these areas had high frequency of Injured or killed casualties is that these areas are located in small townships with high population density where vehicles stop for refuelling or passengers recreations. Therefore many accidents occur when careless drivers enter the highway from these towns or pedestrians doing

petty businesses cross the road carelessly. Also intoxicated drivers and pedestrians might influence this.

A map showing most of the affected locations is attached as appendix 5. All areas which appear on the table 5.7 are considered to be prone to traffic accidents. These areas, which had high number of accidents, were not necessarily having high number of accident victims. For example at Maili moja and Tumbi the table shows that there are high percentages of injured accident victims compared to other places. These differences are usually contributed by cause of the accident and the number of passengers in the vehicle involved. This phenomenon is also explained in other studies (Graham 1993). Injury rate also depends on the size of the vehicle. Accidents involving smaller vehicles than larger ones were more likely to result in a higher proportion of injured victims (Leon 1996). Proneness of a locality to accidents is also reported in other studies (Graham 1993).

**Table 5.7 Injured and killed Casualties by local Place of accident.**

		Casualties		Total
		Injured	Killed	
Location of Accident	Not mentioned	3	30	33
		0.5%	12.0%	3.9%
	Kibamba	46	15	61
		7.6%	6.0%	7.1%
	Kiluvya	9	9	18
		1.5%	3.6%	2.1%
	Kongowe	45	23	68
		7.5%	9.2%	8.0%
	Kwa Mathias	63	28	91
		10.4%	11.2%	10.6%
	Kwa Mfipa	43	27	70
		7.1%	10.8%	8.2%
	Maili moja	95	36	131
		17.7%	14.3%	15.3%
	Mlandizi	23	11	34
		3.8%	4.4%	4.0%
	Picha ya Ndege	92	18	108
		15.2%	6.4%	12.6%
	Tumbi	105	30	135
		17.4%	12.0%	15.8%
Visiga	80	26	106	
	13.2%	10.4%	12.4%	
Total		<b>604</b>	<b>251</b>	<b>855</b>
		<b>100%</b>	<b>100%</b>	<b>100%</b>

Source: Tumbi hospital in-patient and out-patient records from 2001 to 2004.

Missing data: 0 casualties.

### **5.9 Injured and killed casualties by means of transport.**

Table 5.8 below shows, the Injured and killed casualties in relation to motorised and non motorised means of transport in Kibaha district, it shows that 51.1% of motorized and non motorized related casualties are caused by buses followed by Minibuses (Daladala) which are operated by private companies which occupies 28.6% of the casualties. The trucks and Saloon cars proportion are around 7.3% and 7.8% respectively.. Non-motorized vehicles such as bicycles in Kibaha constitute a great deal of the movements on the roads in both urban and rural areas, hence their role in increasing the risk of accidents occurrence and severity need not be neglected even though they occupy less

percentage on the findings. The buses have a large share of the transport of the passengers from one region to another, Kibaha highway is the road through and many buses from Dar es Salaam to regions and neighboring countries pass through the district. Logically the possibility of bus passengers having more causalities than other means of road transport is high, and one accident may result into many causalities. Bus transport is also unsafe in general.

**Table 5.8 Injured and killed causalities by means of transport.**

	<b>Saloon car</b>	<b>Bus</b>	<b>Trucks</b>	<b>Motorcycle</b>	<b>Bicycle</b>	<b>Minibus</b>	<b>Total</b>
<b>Causalities</b>	63	414	59	18	22	231	807
<b>%</b>	7.8%	51.1%	7.3%	2.2%	2.7%	28.6%	100%

Source: Tumbi hospital in-patient and out-patient records from 2001 to 2004.

Missing data: 48 causalities.

Motorized vehicle are the main objects fully considered and designed to be found on roads. Their characteristics are key factors for road design and their performance is a key component in achieving the intended use of the roads. Poor performing vehicles are not considered. In addition to risk taking behavior and inexperience by drivers, poor performing vehicles are considered to be a main subject when discussing road accidents causalities. Vehicles with worn out and non-functional components, misuse of intended purposes, non-compliance with roadworthiness contributes to increasing risks of accidents occurrence and severity of accidents.

When interviewing one of the bus accident victims, he mentioned that, it is more risk to use a bus than other means of transport, because the buses are based on profit making rather than service providing, therefore the drivers tend to speed up to utilize time effectively and they tend to overload passengers to maximize profit. This accident victim mentioned that in his accident day he remembered that the bus was overloaded, it was so speed, they were stopped by the police two times but police didn't say anything about the bus rather than talking to the driver and the bus conductor. Passengers were quite and didn't recommend anything. At last when the accident occurred we who survived felt that

it could have been prevented if we would also take measures as passengers to advise the driver either to reduce speed or reduce some passengers exceeded, he stated.

During the focus group discussion one government official asked a question “are the vehicles in Tanzania made to reduce the risk of accidents occurrences and severity?” Are these vehicles made and controlled accordingly to improve the performance of the user? Are the controllers aware of the gravity related to their potential errors? The District Administrative secretary said that, safety measures are one of the criteria to be taken into consideration when traffic police investigate the vehicle, but this has often been neglected by the police. They normally tend to observe driving licenses rather than safety measures. Most buses are overloaded but it is not their concern, there is a need of introducing control sheet provision of what to be checked as to remind them, and increase amount of penalties (fine levels) especially on the passenger related means of transport.

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#### **5.10 Distribution of killed and injured casualties by month.**

Table 5.9 below shows distribution number of killed and injured casualties by month. The findings show that 12.5% of all casualties in Kibaha district from 2001 to 2004 happened in December followed by September 12.3%. November 9.4% and October 9.2%. There is lower percentage of casualties in other months and this shows that Driving toward the end of the year in Kibaha district is more risk than at the beginning and at the middle month of the year. The findings can also be interpreted as during the months of rain season, it is more risks to drive than in other months. The possible reasons for that may be during the end of the year like month of November and December, it is a festival time therefore so many people travels for X-mass holiday. Schools are closed around November also students travels a lot, at the same time September and October is a peak time of most farmers harvesting their crops (tea, coffee, tobacco and fruits like oranges) therefore such time is also considered a business time for most farmers, hence traffic also is very high and more accidents are happening during the time. On the other side one may take into consideration that exposure level may be higher, so the system risk (Casualties per km driven) may not be that different between months.

**Table 5.9 Distribution of killed and injured casualties by month.**

		Causalities			Total
		Injured	Killed		
Month	January	No-	61	14	75
		%	10.1%	5.6%	8.8%
	February	No-	18	16	34
		%	3.0%	6.4%	4.0%
	March	No-	30	23	53
		%	5.0%	9.2%	6.2%
	April	No-	55	20	75
		%	9.1%	8.0%	8.8%
	May	No-	42	16	58
		%	.0%	.8%	.2%
	June	No-	73	22	95
		%	12.1%	8.8%	11.1%
	July	No-	37	17	54
		%	6.1%	6.8%	6.3%
	August	No-	22	16	38
		%	3.6%	6.4%	4.4%
	September	No-	75	30	105
		%	12.4%	12.0%	12.3%
	October	No-	57	22	79
		%	9.4%	8.8%	9.2%
	November	No-	57	23	80
		%	9.4%	9.2%	9.4%
	December	No-	77	30	107
		%	12.7%	12.0%	12.5%
Total		No-	<b>604</b>	<b>251</b>	<b>855</b>
		%	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

Source: Tumbi hospital in-patient and out-patient records from 2001 to 2004.

Missing data: 0 casualties.

### 5.11 Distribution of killed and injured casualties by day and hours

Table 5.10 below shows that there are more casualties in a day time than in the night time in Kibaha district. This may be possible because it is a law in Tanzania that vehicles carrying passengers and goods should not operate more than 22:00hrs. The table also suggest that in a day time, Monday, Friday and Saturday are the days when most of the motor accident occurred. It also suggests that there are more injured casualties on

Mondays and Fridays during a day time in Kibaha district with 24.3% and 23.9% than any other days of a week. On the other side there are more killed casualties during the night/dark time on Sundays, the percentage risk of dying when involved in an accident on Sunday night is 42.9% it may be possible to explain that probably on the weekend most drivers and passengers are either still drunk or over speeding back from their weekend holidays and do not follow properly the road safety measures than other time.

**Table 5.10 Distribution of killed and injured casualties by day and hours.**

Time Period			Causalities		Total		
			Injured	Death			
Day 06:01-17:59	Monday	No-	119	25	144		
		%	24.3%	16.7%	22.5%		
	Tuesday	No-	27	12	39		
		%	5.5%	8.0%	6.1%		
	Wednesday	No-	53	18	71		
		%	10.8%	12.0%	11.1%		
	Thursday	No-	55	30	85		
		%	11.2%	20.0%	13.3%		
	Friday	No-	117	18	135		
		%	23.9%	12.0%	21.1%		
	Saturday	No-	84	40	124		
		%	17.1%	26.7%	19.4%		
	Sunday	No-	35	7	42		
		%	7.1%	4.7%	6.6%		
	Total			No-	490	150	640
				%	100.0%	100.0%	100.0%
	Dark/Night 18:00-22:00	Monday	No-	7	5	12	
			%	6.5%	8.9%	7.3%	
Tuesday		No-	12	2	14		
		%	11.1%	3.6%	8.5%		
Wednesday		No-	7	3	10		
		%	6.5%	5.4%	6.1%		
Thursday		No-	1	0	1		
		%	.9%	.0%	.6%		
Friday		No-	28	15	43		
		%	25.9%	26.8%	26.2%		
Saturday		No-	3	6	9		
		%	2.8%	10.7%	5.5%		
Sunday		No-	50	24	74		
		%	46.3%	42.9%	45.1%		
Total			No-	108	56	164	
			%	100.0%	100.0%	100.0%	

Source: Tumbi hospital in-patient and out-patient records from 2001 to 2004.

Missing data: 51 causalities

### **5.12 Distribution of causalities by condition of the road and hours**

Table 5.11 above shows the distribution number of killed and injured causalities by Condition of the road and hours, Basically in Tanzania there are two main seasons in a year, Rain season and Dry season, Rain season is around September, October, November, December, January and February, the rest months of a year are dry season

Table 5.11 suggests that most of the accidents occurred when the road was dry (63.8%) than when the road was wet (22.6). The study also revealed that most casualties of road traffic accidents occurred during the day than during the night. The results do not support the finding of previous study (Ayuthya et al 1998) which reported that about 90% of all traffic accidents occurred during rainy season and mainly at night. May be in the other study there were different environmental factors operating during rainy season like fog which reduces visibility and probably the roads were slippery. The high number of motor accidents in Kibaha during the day may be explained by the fact that buses are not allowed to travel during the night and therefore there is congestion of vehicles during the day, which leads to increased chance of road accidents occurrence.

Victims were likely to die from motor vehicle accidents occurring at night-time than those occurring at day-time. The study also revealed that victims were more likely to die from road accidents occurring at night-time when the road was dry than at day-time when the road was also dry. The possible explanation of increased risk of dying during the night following motor traffic accidents is that it takes longer time for the victims to be transported to hospital due to low traffic flow, and therefore delayed rescue and first aid. Due to visibility problems also it may take time to locate all injured victims in time. Another reason might be that defective vehicle and incompetent drivers operate during the night to avoid traffic police who usually do not operate at night.

**Table 5.11 Distribution of causalities by condition of the road and hours.**

Time period			Causality		Total	
			Injured	Death		
Day	Condition of road	Dry	Count	222	46	268
			% within Causality	67.1%	51.7%	63.8%
		Wet	Count	70	25	95
			% within Causality	21.1%	28.1%	22.6%
		No Information	Count	39	18	57
			% within Causality	11.8%	20.2%	13.6%
	Total		Count	331	89	420
			% within Causality	100.0%	100.0%	100.0%
Night	Condition of road	Dry	Count	14	8	22
			% within Causality	24.6%	22.2%	23.7%
		Wet	Count	37	20	57
			% within Causality	64.9%	55.6%	61.3%
		No Information	Count	6	8	14
			% within Causality	10.5%	22.2%	15.1%
	Total		Count	57	36	93
			% within Causality	100.0%	100.0%	100.0%

Source: Tumbi hospital in-patient and out-patient records from 2001 to 2004.

Missing data: 342 causalities

We can conclude by recalling to the interview done with an official from the ministry of Health, he mentioned that. The road is a facility designed to accommodate the characteristics and behavior of road users, vehicles, traffic and environment. In Kibaha district the highway road was designed without appropriate consideration of some of these factors especially environmental factors, hence increases the risk of road accidents occurrence. The Official mentioned that there is no speed limits, poor visual guidance, poorly controlled and uncontrolled intersections and access, narrow road, poor alignment standards, and many other similar aspects have contributed significantly on the increasing risk of accidents occurrence and severity he concluded that it is more risk to drive in

Kibaha high way at night when the road is wet than dry because it is more slippery than a day time when the Sun is shining it helps to dry the roads.

It was also noted from the Regional Police Commander when he was interviewed, he made statement that, the road condition and information system provided on the road has a great input on the increased or reduced risk of road accident occurrence and severity. Poor and non-effective information system along Kibaha highway leads to poor guidance and control of vehicle performance regardless what time of a day and in which condition is the road at that particular time. As outlined earlier, road factors are fully linked with other aspect such as road factors are controlled by human beings and their desire and wants; any error in design, maintenance and provision of information system is carried over to other aspects resulting into mistakes and eventually turns into blunders causing disasters.

### **5.13 Summary**

To sum up, this chapter has shown the pattern and trend of motor traffic accidents in Kibaha district from 2001 to 2004. It shows that the trend of accident occurrence was increasing every year, passengers and pedestrians are always at highest risk of being injured or killed on the road, young males are highly prone to motor traffic accidents. Males are more involved in road accidents than females; the risk of dying in an accident during the night was significantly higher than during the day especially when it was raining. Driving toward the end of the year in Kibaha district is more risk than others time of the year given a similar level of traffic flow (exposure), Monday, Friday and Saturday are the days when most of the motor vehicle accidents occurred. The study has also described different types of motor related injuries and the survival status of the accident victims. Age, sex, over speeding, reckless driving, being a pedestrian, or a motor cyclist were identified as risk factors to motor accidents. The distribution of injured and killed casualties of people residing outside Kibaha district are two times those who reside in Kibaha district, the trend of casualties in Kibaha district stands to be high, there are more casualties in the areas located in small townships with high population density.

## CHAPTER SIX

### 6. Risk factors associated with traffic accidents.

#### 6.1 Introduction

This chapter represents the findings on risk factors associated with road traffic accident in Kibaha district. The findings are based on interviews with Accident victims, Government officials from the Ministry of Health, District authorities, Police office, and Tumbi Hospital which is the District Hospital responsible for traffic accident victims in Kibaha district. It seeks to identify what are the road accident contributing factors or risk increasing factors on determining why and how the accident took place in Kibaha district.

In identifying the risk factors the findings are based on the logic of four theories, the first is the System theory which is based on man-environment adjustments and maladjustments. The components of the theory are the environment, the means of transport (vehicles) and the behavior of man. Integrated in the systems theory is a system of highway codes and enforcement mechanisms designed to ensure that road users adhere to the controls and regulations of traffic flow for maintaining road traffic safety. The second is Risk theory focusing on individual's risk-taking decisions which represent a balancing act in which perceptions of risk are weighed against propensity to take risk. The third approach is the Political ecology of a disease which plays a very vital role in determining the way in which people view and utilize the recourses and opportunities available to them. it is strongly linked to available recourses and capacity of the national and local authorities to put road safety strategies in place. The lack of resources and power to follow up on control and enforcement can result in lower motivation of police force or poor national and local policy on traffic issues, and the last fourth approach is the geographical approach basing on "Geographical Matters: Place, Time and Road Traffic accident" as an additional conceptual approach in understanding regional distribution in occurrence of road traffic accidents in Tanzania in relation to Kibaha district.

With this theoretical base of knowledge, several factors have been identified qualitatively with the best knowledge of the informants who are well familiar with the environment and being victims of the traffic accidents;

### **6.2 Tumbi hospital situation.**

Tumbi hospital as it was explained in the methodological chapter, provides service to the accident victims in Kibaha district, this hospital is considered to be very important unity to serve the life of accident victims, its efficiency reduces a probability risk of an accident victim to die without first aid or medical service in an accident within Kibaha district. In order to have real situation of the hospital in relation to the treatment of the accident victims, the interview was conducted among five people including Hospital Health secretary, matron of the hospital, doctor in-charge of the casualty, Blood bank in-charge and X-ray dept in-charge. All of them indicated that motor traffic accidents were a serious public health problem in Kibaha requiring attention. The hospital was not designed to handle many accident victims at a time. It did not have enough supplies and equipment e.g. Suction machines etc. Orthopaedic specialists were required.

In the X-ray department there was a shortage of cassettes, films and chemicals. When shortage was acute, all accident victims requiring radiographs had to be referred to Muhimbili Medical Centre in Dar es Salaam. The X-ray staff felt that the department was located far away from the casualty department therefore causing problems in delaying victims on the way.

Regarding laboratory services, there was low capacity of blood storage facilities, therefore due to these problems accident victims sometimes were to be referred for just blood transfusion. Sometimes the laboratory ran short of HIV checking reagents. This lead to stoppage of blood transfusion services. The blood transfused was checked for HIV and VDRL only, other infectious diseases like hepatitis and malaria were not checked.

It was also mentioned that the room for blood transfusion services is too small; this small room is used for screening, cross matching, and donation, as office and storage of blood.

The in-charge of this section felt that at least 3 rooms were needed for an office, blood donation and blood storage. The section had only one staff, therefore more staff was needed. Also the in-charge felt that in that section there was a need to have staff who knew how to persuade people to donate blood and also who have had training HIV counselling so as to counsel donors found to be HIV positive or those who need to know their sero-status.

All the interviewed individuals felt that there was no problem with data collection and keeping of accident records. Co-operation with traffic police in handling motor accident victims was mentioned to be generally good and that it should be sustained.

Opinions on how to improve services to accidents victims, they mentioned that the emergency unit should be improved. All-important equipment, instructions and supplies should be made available. They also stated that emergency training for all hospital staff should be considered to minimise unnecessary referral of accident victims, they also suggested that an Orthopaedic unit should be established.

### **6.3 The police views on traffic accidents:**

According to the Tanzania Police Regulation, only authorised personnel is allowed to give information concerning police matters outside the police circles. Due to this bureaucratic situation the Region Traffic Commander was interviewed on behalf of all traffic police in Kibaha office. And the following are the responses,

The police force felt that the number of motor traffic accident in Kibaha district is increasing and alarming. The problem was considered to be not similar to other districts in Tanzania, the Commander declared that, Kibaha highway accounts for 90% of all traffic accidents in the district and this is because almost 70% of major towns of the district are located along the highway. At the same time Kibaha district stands as an entrance and exit gate from Dar es salaam city to other upcountry regions, therefore this facilitates the district to have many accidents compared to other district in the country.

Information on occurred accidents to traffic police is normally sent by people involved in accident through telephone by calling number 111 which is very simple to remember, in some cases other road users also help in reporting. Usually the police get information on accident promptly. The police normally provide first aid; the only first aid given to accident victims by police was reported to be lying them down properly for transportation. Accident victims are sent by police vehicle to hospital. All victims who die at the site are sent to hospital first before the bodies are released to relatives. In handling accident victims, police protect themselves with gloves.

The commander emphasised that road traffic accidents records are reliable and well kept. And he made a recommendation that in order to reduce road accident casualties: Passengers should be motivated not to board a vehicle, which has exceeded its passengers carrying capacity (to avoid overloading).-passenger should report over speeding drivers to police immediately (advice to passengers).

The police commander said that, there are common risk factors which they normally arrest the drivers in Kibaha district, among with are, overloading the passengers, driving while drunk, over speeding, Driving without using the seatbelt, Driving without driving license, driving cars without lights, driving cars without insurance, driving cars with worn-out tires, driving cars without site mirrors and overloading the cargo to the trucks. At the same time he also mentioned that, there is a need to expand the highway and repair it accordingly, traffic separation in the highway is urgently needed, the road is narrow and it accommodates only two lines, this situation can not allow overtaking, the landscape is another factor facilitating traffic accidents, there are so many sharp corners and hills. The provision of road signs is not enough. He concluded by saying that, the budget for traffic safety measures in the district is very minimal in such that it doesn't full fill the needs in minimizing the prolonging accidents.

#### **6.4 Identified risk factors.**

According to interviews done with the Accident victims, Regional traffic commander, Focus group discussion with District officials and the official from the ministry of health, the following issues were identified as factors facilitating the occurrence of road traffic accident in Kibaha district:

##### **6.4.1 Environment and road network**

It was identified in the focus group discussion with Local district authorities that One of the main risk factors associated to the course of traffic accidents in Kibaha district is the technical element of the highway construction in Kibaha district, the highway road is below standard and it accommodates high traffic volume without being equipped with traffic safety measures such as traffic separation and appropriate road signs along side the road. The regional police commander also mentioned that Kibaha highway road was not designed with the facilities to accommodate the characteristics and behavior of road users, vehicles, traffic and environment. Interviews with accident victims identifies that lack of traffic separation, poor visual guidance, poor alignment standards and poorly controlled and uncontrolled intersections and access to the road are the main risk factors relating to traffic accidents in Kibaha district.

Most informants mentioned that lack of traffic separation accounts for highest possibility of being at accident risk all the time in Kibaha district, The co-existence of high-speed motor traffic and low-speed pedestrian traffic make accidents unavoidable especially in areas of intense pedestrian traffic like commercial areas in Maili moja, Tumbi, Picha ya ndege and Mlandizi are in high system risk.

According to the interviews done with the Local Government Officials in Kibaha district, they mentioned that, the construction of Kibaha highway didn't involve local's participation specifically on safety measures; the road designers and construction engineers have no legal and formal obligation to be responsible for the road traffic safety consequences of their acts as infrastructure providers, unlike structural engineers who can be legally brought to account for the faults in their work, transport planners and construction engineers, who create accident black-spots in the built environments like

Kibaha district, are not in principle, prosecuted for road traffic accidents occurring as a result of their negligence. Instead, the built environment is technically assumed to be good and, any accidents that occur are blamed either on faults by humans or the vehicles. Safety considerations to pedestrians in Kibaha district were not part of their contractual terms of reference. Consequently, road traffic accidents remain constantly on rise in the district and the area continues to be a black-spot in traffic accidents.

#### **6.4.2 Legislation and regulations enforcement.**

According to interviews done with the accident victims, all mentioned some weaknesses in traffic regulation enforcement in Kibaha district by the traffic police. To be specific, corruption, irresponsibility and poor management of traffic police force as an authorized body to govern, control and implement traffic safety measures as per required country's regulations, were identified as a problem and among the risk factors associated to the prolonging traffic accidents in Kibaha district, it was mentioned that, the performance of the traffic police, as an agency that is supposed to enforce road traffic regulations in Kibaha district, is not so much efficient and sufficient.. It was mentioned that, the traffic police give priority to corruption and tips other than following the traffic laws and regulations, One of the accident victims (a female aged between 40 to45) emphasized that, "It is clearly observed, the police in most cases tend to negotiate openly with the drivers an alternative means to avoid paying the penalty or fine or being prosecuted by demanding drivers to pay some amount of money to them which is less compared to the penalty or fine required"

During an interview with accident victim who is also a driver mentioned that "Kibaha highway is identified as one of the most hot-cake and strategic areas of traffic police to earn illegal income through corruption from drivers due to existing high volume of vehicles from Dar es Salaam (the country commercial capital city) to other up-country regions and neighboring countries. With this loop-hole, overloaded vehicles, defect vehicles and misbehaved drivers toward road safety operate in the district without any restriction, this create more opportunities of being at risk in traffic accidents all the time."

During an interview with the Regional police commander in Kibaha district, he mentioned that, the police are efficient but the judicial process in Tanzania is extremely complicated and slow moving, the traffic laws in the country are archaic and non-effective as deterrent instruments of road traffic accidents. The transport section of the passengers and the cargo knows this mockery of the law and they don't care about being caught in the act.

One official from the ministry of health who was interviewed in this study mentioned that, "Some people in Tanzania appear to be more equal than others before the law. A peculiar form of citizenship, based on personal relationships or corruption per excellence, has introduced a large bias in favor of those who "have" against those who "don't have" to avoid punishment, as a result, a socialization of a feeling of impunity reinforces poor road traffic behavior in the urban and highways areas like Kibaha district. Therefore within these judicial elements, formal road traffic laws are often disregarded by road users in Kibaha district and to some extent facilitate most of the occurring accidents"

Almost all accident victims mentioned that the law of using seatbelts has some weaknesses, seat-belt is only compulsory for the driver and passengers in a front seat while others is not, this makes other passengers to be at risk "Children under the age of 7 are not given seats, they just share with parents or stand aside, hence they are not provided with safety measures as full passengers no matter how far is the journey, the law demands children to pay half fare but it does not state the necessity of allowing children to have the same facilities like adults, this makes children to be at risk all the time"

It was also identified by the accident victims that: the essence of allowing open cars like pick-up and min- lorries to carry passengers even-though they don't have safety utilities even seats is another risk factor associating to traffic accidents in Kibaha district.

Another mentioned risk factor was about the fine and penalties are outdated and appear to be cheaply affordable, this facilitates careless drivers to take risk in violating the traffic rules and regulations.

### **6.4.3 Human behavior elements**

It was highly discussed and identified by the local district authorities in the focus group discussion that, the behavior of road users in Kibaha district (pedestrians, passengers and drivers), require a guidance and control for appropriate interaction with other components of the road such as vehicle and built environment. Similar to other researchers in Tanzania who concluded that, the obvious fact is that human error constitutes over 80% of all road accidents and only small proportion of accidents can be directly attributed to: vehicle performance including defects or faults, and roads themselves including their design or maintenance. The district Administrative Secretary declared that, It is true to say that accident doesn't just happen, that are made to happen. Or they are allowed to happen or in some cases are encouraged to happen. "Accidents never occur they are caused. Human behavior towards road traffic accident in Kibaha district weighs significantly to prolonged accidents in the district".

Most informants mentioned that, driving while using cell phone is one of the human behaviour factors contributing to the cause of road traffic accidents in Kibaha district. During the focus group discussion, it was presented by the social security officer that, "A hand –held cellular phone is used in a variety of circumstances by road users in Kibaha district, while walking down the street (pedestrians) or operating motor vehicle. The various tasks entailed in using a cellular phone each require a different amount of time, mental energy, and coordination, leading to potentially different complications of the driving task and resulting risk of collision. The use of cellular phone while driving is a common application of this technology in Kibaha district. Kibaha district in transportation sector is a strategic location of communication, it is first a door out from Dar es salaam to other regions and neighboring countries and it is secondly a door in to Dar es salaam from different regions and neighboring countries, therefore it has been observed to be a tendency of drivers to say bye-bye by using mobile phones when reaching Kibaha district from Dar es salaam and also make an arrival call when reaching Kibaha district from other regions. In this sense there is a high risk associated of being

involved in traffic accidents due to the tendency of drivers using mobile phone while driving in Kibaha district.”

According to the interviews with accident victims, some mentioned that, their accidents were caused by the drivers when using the mobile phone just before the accident, When driver was concentrating to the cellular phones, passengers (accident victims) detected unstable movement of the vehicle and immediately the collision to another vehicle happened.

In general it was identified in the interviews with accident victims that, the tendency of most drivers to use mobile phone in Kibaha district increases more chances of being involved in traffic accidents in the area, most collisions according to accident victims are associated with the use of mobile phones while driving, they actually emphasized that motor vehicle collisions are harmful in many ways, for motorists these collisions can result in minor, serious, crippling and even fatal injuries. Collisions result in property damage to vehicles that are often expensive to repair. There are also related health care costs, litigation expenses, insurance administration, lost work time and other adverse ramifications of collisions.

Driving without training is another risk factor which was identified by the Regional police commander. He mentioned that, “driving is a complex activity that involves factors associated with the driver, vehicle, road and traffic environment. Traffic accident survey in different places tends to show that human factors specifically driver error are the most prevalent contributory factors in traffic accidents”. Similar to this, the commander mentioned that “most drivers who are involved in traffic accidents possess a valid driving license but they can not locate where they were trained”. One of the accident victims who was also a driver and was interviewed in this study, he also mentioned that, their assistants possess driving license before knowing how to drive, and Kibaha highway is mostly used to learn driving informally for it is out of the city, therefore there is an existing risk of being involved to the traffic accident in Kibaha district due to the existing situation of driving without being trained in Kibaha highway.

In actual sense driver education/training is a sensible alternative to trail and error learning, especially given that errors can have such profound negative consequences. Driver instruction whose principal goal is to produce safer drivers, defined in terms of collision involvement. Simply put, it is assumed that drivers exposed to formal instruction should have lower crash rates than those who learn to drive informally.

The Information received form the traffic police and local government officials in Kibaha district they mentioned that, large numbers of drivers employed in the private sector in Kibaha district and possible even in other places are not well trained and at the same time employers in the private sector don't see the necessity to train their drivers because already they have valid driving licenses. Thus in Kibaha district, driving without training is considered to be one of the risk factors contributing to the increasing number of traffic accidents in the area because driving in today's demanding roadway environment requires considerable knowledge and skills that take many years to develop, other than taking risk to untrained drivers.

According to the hospital findings passengers and pedestrians are the most vulnerable road users in Kibaha district. It has also been identified by the traffic police that unguided pedestrians in Kibaha district increase the risk of accidents to occur by causing confusion and misleading other road users, their movement towards the use of the road remains inconsistent while they are unprotected. Pedestrians behavior is widely variant quite inconsistent, difficult to control and is linked to many other related and unrelated factors. Lack of traffic safety education, poverty, illiteracy, unemployment and existence of dangerous diseases like HIV/AIDS, are some of the associated factors affecting the behavior of pedestrians in risk taking behavior towards road traffic accidents in Kibaha District. It is very common to pedestrians crossing the road without paying proper attention to the vehicular traffic in Kibaha, and this shows that their behaviors in using the road is also one of the risk factors contributing to traffic accidents.

The accident victims also emphasized that passengers have their demands driven only by human desire and wants thereby risking their lives from the service they are demanding

for. It was specifically mentioned by one of the accident victims that Passengers have been seen/observed in several occasion increasing the severity of accidents by struggling for overloading, pressurizing for high speed and not being aware on how to travel and arrive safe.

It was generally accepted by every one in the focus group discussion that drivers have influence over all other road users as they perform their duty which is to control, guide and navigate the vehicle. The driver's performance is limited to the available capability and limitations. The drivers' behavior is what can be improved through guidance, training and experience according to the type of the vehicle being driven. However it should be realized that drivers' performance is subjected to appropriate provision of road, traffic and environment factors. According to the interview with the traffic police and the accident victims they all mentioned that Driving profession seem to be possessed by less educated people in Kibaha district. This means that the quality of drivers in Kibaha district is one of the risk contributing factors to traffic accidents. It has been identified and observed by the police that, most drivers in Kibaha district are driving at a speed higher than appropriate for a given road and traffic conditions, Drivers do not pay attention to the needs of non-motorized traffic and other road users, Drivers are exposing one self to traffic while under the influence of alcohol and drugs. These all behaviors contribute to the course of traffic accidents in Kibaha district. While interviewing Officials from the hospital they all emphasized that, Drivers in Kibaha district do not have a tendency to undergo regular check up for the purpose of ascertaining proper functioning of their sensitive organs such as eyes, ears, heart etc and this can also be one of the risk factors associated to cause of traffic accident, a visual or hearing impaired driver is not allowed to drive.

#### **6.4.4 Vehicle factor elements**

It was noted in the interview with the official from the ministry of health that, "In the recent years, vehicle population has grown considerably in Kibaha highway while the road infrastructure remains the same. However, most of the vehicles traversing on the roads are in bad condition of service; since most of them are imported to the country as used vehicles with ages varying from 3 years to 20 years. Most of vehicles imported to

Tanzania are used to the extent that some of them are not road worthily. This is due to the fact that the majority of Tanzanians cannot afford to buy new cars. As a result, operational cost is always on the higher side, leading to mishandling of maintenance of most vehicles on our roads. The majority of the vehicle fleet is therefore in the traffic system is in poor condition of service. This problem has been attributed by the lack of systematic Road worthy certification and in adequate law enforcement”.

Although it is believed that 80% of all accidents in Tanzania are caused by human error, it is internationally believed that human error coupled with a faulty vehicle results in disaster when there is any accident causation factor. The increase in the number of vehicles has therefore resulted into a corresponding increase in road accidents leading to loss of life and property in Kibaha district.

According to interviews done with the traffic police, they declared that, the current vehicle inspection carried by police is primarily a visual examination which is inadequate to arrest the present situation. It is therefore, imperative that systematic road worthy certification should be introduced in the country to eliminate the faulty vehicle factor and hence reducing road accidents. According to police statement, the major areas of fitness factors, which must be inspected thoroughly, include, smooth worn tires or fitting the wrong types of tires, poor brakes, faulty steering system, poor lightning system and lack of general maintenance of vehicle including the replacement of worn out parts.

The above stated condition is quite alarming taking into consideration that, even though there are many factors responsible for accident causation in Kibaha district, most accident are caused by a combination of several factors. As stated above the condition of the vehicle may tell whether an accident will likely occur give the presence of other factors. i.e. it is therefore imperative that if the vehicle on the road had faulty brakes, in the event of other accident causation factor the vehicle will not stop on the application of brakes and the accident will likely occur.

According to district executive secretary, the current traffic Act no 30 of 1973 and its Regulation 114, provide measures to be taken towards inspection of vehicles on the road. The custodian of the Traffic Act is the Ministry of Home Affairs (MOHA) is therefore responsible for both Execution of technical works and law enforcement. In the focus group discussion with the local district authorities they discussed that, the MOHA through the Police traffic division has been carrying out some inspection prior to registration and during the National Road Safety Week which is assumed to constitute to road worthiness test, however, the current system in most cases is composed of visual inspection and is therefore subjective. It has no technical backing and lacks all sorts of transparency. Moreover, it is only a small margin of the vehicles that is subjected to inspection during the National Road Safety Week, and the inspection does not serve the intended purpose of guaranteeing safety to motorists and pedestrians. Generally the system is not adequate for the following reasons: Only visual examination is done on the vehicle and the system is therefore very subjective, There are no standards for approving vehicle roadworthiness, or rather some references on what is to be checked and when a vehicle shall be declared unfit for use, The same institution carried out inspections and monitoring, responsible for law enforcement. In this context the system cannot safeguard the interest of road user and thus fails to comply with good governance procedures and at the same time., Technical motor vehicle inspection is rather a complicated task which can only be simplified by carrying it out in an adequately equipped inspection centers.

It was eventually concluded in the focus group discussion that “Vehicle inspection is a professional work that needs to be done by trained vehicle inspectors; with intention of making sure that only vehicles, which are road worthy, are allowed in the traffic system. This includes, Detailed station inspection, Insurance of road worthy certificate, Impounding of junks, Road side vehicle Inspection and Prosecution of the offenders” but the current inspection is not professional and it is considered to be one of the risk factors contributing to prolonging traffic accidents in Kibaha district.

## **6.5 Summary**

This chapter has highlighted the risk factors as identified by the respondents above; the findings have identified numerous factors that contribute towards the occurrence of road traffic accidents in Kibaha district. The approach of the findings used the concept of “accident contributing factors or risk increasing factors” when determining why and how the accident took place, The chapter has identified qualitatively that the technical element of the highway construction, corruption, irresponsibility, poor management, driving while using cell phone, driving without training, failure to respect and obey traffic regulations, bad condition of vehicles, age of the vehicles and poor condition of service as the major risk factors associating to the cause of traffic accidents in Kibaha district. To sum up, it has been identified by the respondents that road traffic accidents is a result of critical combination of several factors, there is no single factor that is identified as a cause of an accident or accidents.

## **CHAPTER SEVEN**

### **7. Road safety measures in Kibaha district**

#### **7.1 Introduction**

This chapter represents the findings on road safety measures implemented and adopted by local Government district authorities in Kibaha district. The findings are based on interviews with the Government officials from the Ministry of Health, Focus group discussion with Local District Authorities and Traffic Police in Kibaha district. It seeks to identify what are the safety measures undertaken to prevent the prolonging road traffic accidents in Kibaha district.

In Kibaha District, road safety is one of the burning issues in the management of the road transport sub-sector. The number of road accidents reported in the media day after another, coupled with the statistics released by the Traffic Department of the Police Force clearly lends credence to this submission. The statistics have all along demonstrated that the rate of accidents has kept on increasing annually and this trend is unlikely to be reversed particularly with the increase of motor vehicles on Kibaha highway road. This is, of course, does not take into account on the increase in the use of non-motorized transport on the highway road especially in urban and peri-urban areas in the district.

In identifying the safety measures, the findings are based on the logic of the risk theory(refer to theoretical chapter) and Political ecology of a disease school of thought which plays a very vital role in determining the way in which people view and utilize the available recourses and opportunities to minimize traffic accident in Kibaha district.

#### **7.2 Safety measures undertaken by local government authority**

Based on the focus group discussion with the local government authority in Kibaha district, The district executive secretary made an introduction note on behalf of the district commissioner that, “Kibaha district like other districts in Tanzania has a special Road Safety Committee dealing with traffic safety activities in coordinating and organizing different activities relating to control and prevention of road traffic accidents in the district, the Committee create and provide Conducive environment for other

Organizations or Government institutions to participate in implementing road safety measures in the district. The Committee is basically guided by the provision of The Road Traffic Act 1973(Amended in 1996) which is one of the principal legislation dedicated to road safety in Tanzania. Thus, apart from establishing the National Road Safety Council and the regional and district road safety committees, the Act provides a regulatory framework for all types of transport, motorized and non-motorized objects of transport. In regard with this provision, the Road Safety Committee in Kibaha district is mandated responsible to implement and initiate road traffic safety measures and reduce traffic accident in Kibaha district” According to this statement, it means that at the district level there is a special committee which is legally mandated to deal with traffic safety measures to reduce and control traffic accidents within the district”.

Basing on the interviews done with the Local Government Authority who are also part of the Road Safety Committee in the district the following are the safety measures undertaken by the Local district authorities in Kibaha district.

*Budgeting*, it was mentioned in the focus group discussion that: The local government authority has increased the size of the budget relating to road traffic safety in the district from 3% to 3.8% of the total budget of the district, and this was effective since 2004, even though this budget percentage is not sufficient but efforts have been made to at least make road safety activities one of the priorities in the budget allocation and distribution, this has enabled the district to implement more activities than other previous years,

*Construction of bumps*, According to the interview with District executive secretary in the focus group discussion, he mentioned that, the local government authority has managed to construct 213 pumps on a highway road in the district to control vehicle speed in areas where children cross the road to schools, the construction was done in collaboration with the community. The community identified all places where there is high frequency number of people crossing the road especially in areas where there are schools or market and the Local district authority funded the construction of the bumps.

*Repair and replacement of the road signs.* According to district executive secretary in the focus group discussion, “the local government authority have repaired 97 poll signs, 23 zebra cross mark and replaced 71 road signs including the distance poll mark in a period between 2002 to 2006, it was also mentioned that, plate polls are very expensive to repair and the budget allocated is low. In his comments, the district executive secretary said, the construction and maintenance of the high way road is basically the responsibility of the central government and not local government authority, the decision to repair and replace road signs is just a step and decision within local district authority towards road safety in the district.”

*Organizing road safety week campaign.* Based on the focus group discussion with local government authority, it was mentioned that: the local government authority in collaboration with traffic police department and TANROADS, prepares and conduct road safety week campaign carried out every year to emphasize road safety awareness among the public. The preparation of activities to be done and addressed on the Road Safety Weak campaign in Kibaha district involve community participation on identifying and deciding what should be addressed and what should be the target activities to be met on the coming year. Community groups like youth, women and students are involved effectively on creating theatre for development relating to road safety, by evaluating and debate different issues on traffic safety.

*Education dissemination* According to Social security officer in the focus group discussion, he mentioned that: “the local government authority in Kibaha district in collaboration with TANROADS organize and broad cast the information and knowledge about road safety measures. This project is funded by TANROADS, the broadcast period is 30 minutes and it covers 40% examples from Kibaha district, the radio covers all places in Tanzania. The content of the broadcast includes roads, the meaning types and their importance, proper use of roads, responsibility and rights of road users, riding bicycle and tricycle, road accidents, first aid in road accident situation, reinforcement of road safety rules and regulations, learning to drive and licensing requirements”. It was also mentioned that TANROADS used to broadcast such knowledge before, but

recently(in 2005) the local government authority in agreement with TANROADS as one of the step towards road safety approach in Kibaha district, requested to have 40% share of all drawn examples from the road safety discussion period in the radio to be taken from Kibaha district.

### **7.3 Safety measures undertaken by the traffic police in Kibaha district**

According the interview with the Regional police commander he said that “The police fatigue in road safety activities associate much with the local government plans and decisions, most activities are done in respect of decision from the local district authority, he mentioned that, conducting frequent inspection of motor vehicles to ascertain their roadworthiness in the district and those passing through Kibaha highway, is one of the local measures initiated by the Local district authority to restrict defective vehicles being in use without proper service, some of the vehicles plying Kibaha high way road are not road worthy”. This was also mentioned in the focus group discussion that, there is no mandatory vehicle inspection in Tanzania and the motor vehicle owners lack the culture of repairing their vehicles, hence, this cause such vehicles to be part of the main causes of road traffic accidents in Kibaha district. The current vehicle inspection carried by police is primarily a visual examination due to lack of vehicle inspection equipments, due to that the police only check, tires, brakes, steering system, lightning system, driving license, and the availability of safe equipment like seatbelt at least in front seats and restricting open cars like pick-up to carry passengers in the district. In general this is considered part of the road safety measures taken in the district.

Another safety measure taken by traffic police, was mentioned to be “Prosecuting in courts or penalizing without prosecution (notification) those who contravene road traffic rules and other related legislation in the district Constant patrols by traffic police officers is done in urban areas and on highway to safe guide the pedestrians and children crossing the highway.

According to local government authority, “To check and maintain regular inspection of mandatory fitting of speed limiters to all public service vehicles is another safety measure

taken by traffic police department in the district”. The Local District Authority is very strictly on vehicles which temper with the speed limiters, and any public transport without speed limiter is not allowed to provide service at the district. To ensure all public vehicles adhere to the demand, Vocational Education and Training Authority is the only institution authorized to install speed limiters to public vehicles and certifying a certificate of attendance to all vehicles installed.

In emphasizing the activities done to combat the road traffic accident in the district, the regional traffic commander declared that road safety is a human right and also an interdisciplinary process that need institutional cooperation in the country. It is through such cooperation road safety can be improved particularly among black spotted areas, it is a big role to play to remedy the situation for relief, community has to take responsibility and accountability and participate on road safety matters so as to combat road traffic accidents.

There are several organizations which are also implementing road safety activities in Kibaha district, and these organizations are working hand in hand with local government authorities, the following are some of the intuitions identified in the focus group discussion when interviewing the local district authorities:

#### **7.4 Safety measures undertaken by the Tanzania Institute of Education.**

The Tanzania Institute of Education (TIE) is a parastatal organization under the Ministry of Education and Vocational Training (MOEVT) charged with the responsibility of designing, developing, disseminating, monitoring, evaluating and ensuring quality educational programmes and curricula at the pre-primary, primary, secondary, special and teacher education levels with the objective of getting high quality products at all levels of educational pyramid.

The Tanzania Institute of Education (TIE) has been implementing a road safety education in Kibaha district since 1999. The main aim of the Project of is to reduce and eventually control the number and frequency of road accidents with the objective of providing Road

Safety Education to pupils and students in primary and secondary schools to educate school communities (i.e. community leaders, teachers, parents etc.) on the importance of Road Safety Education, to pre-test a Road Safety Education Curriculum during the project's pilot phases. And To enable primary and secondary school teachers and college tutors to teach Road Safety Education Curriculum including;- The use of variety of appropriate innovative and participatory methods and strategies in teaching RSE. Identification, preparation, improvising and use of relevant teaching aids and which are appropriate for RSE. Preparation of effective RSE schemes of work, lesson plans and lesson notes. Teaching Road Safety Education Lessons in the form of modules and units. Measurement of pupils' progress and achievement including continuous assessment. Efficient and effective classroom interaction as well as management of the RSE practical based activities.

Tanzania institute of Education (TIE) is currently implementing the Road Safety Education (RSE) project in primary and secondary schools which are allocated in urban areas or towns along the highway in Kibaha district, according to explanations received from the district authority, they said that the community agreed and accepted to start the pilot stage and first phase of the project in those areas because they are much more affected than other rural areas in the district, RSE project focused to primary and secondary schools children as their target group, because children are more vulnerable than adults, and the reasons why children being more vulnerable to road accidents than adults are: They lack the skill and experience of safe road use. Their observation and listening powers are less fully developed to be keen when using roads. Their small bodies make them less likely to be seen by vehicle drivers. Their low level of judgment exposed them to great danger of accidents. They often lack supervision or poorly supervised by parents or guardians. They are often impulsive and unpredictable.

Therefore by targeting school children, Road safety education will lead better knowledge and understanding which automatically will save lives and reduce the number of injuries in future, children will also educate their parents, and children will be out future drivers who shall be safe road users.

The RSE project is now implemented in 16 primary schools and 2 secondary schools in Kibaha district, in this regard TIE, between 1999 and 2002, developed teaching and learning materials on road safety education for primary, secondary and teacher education levels and the following materials were developed, first is Road safety education syllabi for Primary schools –class-I-VII, and Secondary Schools – Forms I-IV, second is Road safety education modules for: Primary school teachers and Secondary school teachers.

The materials were piloted in all 16 primary schools, and 2 secondary schools in Kibaha district. The course content include;- Roads, the meaning types and their importance, Proper use of roads, Responsibility and rights of road users, Riding bicycle and tricycle, Road accidents, First Aid in road safety rules and regulations, Learning to drive (Physical and mental health)

Road Safety Education is taught by teachers in schools, the trained teachers teach other teachers in their schools. Teaching and Learning Methodologies are highly participatory. Students centered techniques are well elaborated in all syllabi including teachers and tutors modules. Such techniques among others include: excursions, role plays, songs, poems, group discussions, question and answer, brainstorming, demonstrations, tabletop exercises, drama, and project work.. These techniques are executed using various resources indicated by the syllabi of different levels like: Actual roads, charts, pictures, leaflets, photographs, guiding questions, video tapes, TV, Road models, drawings, posters, Tanzania high way code, actual bus/taxi stop.

During the piloting stage 1999 to 2002 in Kibaha district, the teachers and tutors used monitoring instruments developed by TIE of which they were oriented in December, 2001. In 2002 a study was conducted by TIE intending to come up with findings and recommendations obtained as a result of using monitoring instruments by teachers and tutors during the whole period from 1999 to 2002. generally it was noted that in most of the project schools the progress of RSE was good and showed fruitful result as the number of pupils involved the road accidents reduced to a great deal.

Most pupils in project schools are well informed on how to use roads safety. They can follow road safety rules well and they are not as commonly involved in road accidents as it used to be in the past before the project. Pupils and teachers felt the need to road safety education and were highly motivated by the subject. Due to the RSE impact in Road Traffic Accidents (RTA) to students and this motivation the Kibaha Education office enrolled other 10 primary schools to be included in the RSE project. The Coast Regional Road Safety committee decided to increase the number of schools teaching RSE in Bagamoyo district after observing a high road accident rate occurring between Chalinze and Segera..

Therefore the success of RSE project as one of the road safety measures in Kibaha District is that, Road safety education curriculum and curriculum materials in Primary Schools are in place. The subject has been piloted and showed to have a very big impact in reducing road traffic accidents both for students in schools, School community and the Community in general. According to information received from the police records and Hospital records it is true that, the traffic accidents in Kibaha district affect much more Passengers and other people outside Kibaha than residents in the district.

As the forward TIE intends to do the following in the near future: 1) Prepare RSE teachers guides, tutor guides, pre school and high school syllabi (Form V and VI), 2) Prepare of RSE students books and pamphlets for high school and pre-schools, 3) Prepare of RSE charts, pictures, posters, leaflets and other teaching aids for both secondary, primary and TTCs., 4) Integrate the subject in teacher education curriculum at diploma and certificate levels., 5) Prepare preschool and high teachers modules, 6) Formation, strengthening and operationalizing RSE clusters through the country, 7) Train teachers, tutors, school inspectors ward and district educational administrators throughout the country on road safety education.

The big challenge which is now facing the implementation of the project is the availability of enough funds to train the teachers. A lot of funds are required for the effective training of teachers and tutors on RSE. Again, materials for the preparation of

teaching and learning aids are also very expensive. Therefore this remains the question on Government priority in distribution and allocation of resources according to the annual budget for the road safety mitigations in Kibaha district and other parts of the Country.

#### **7.5 Safety measures undertaken by the Tanzania National Roads Agency.**

The Tanzania National Roads Agency (TANROADS) was established on 1<sup>st</sup> July, 2000, under the Executive Agencies Act, No.30 of 1997. TANROADS is a semi-autonomous Government Executive Agency under the Ministry of Infrastructure Development. TANROADS is responsible for the day to day management of trunk and regional roads network. Its primary function includes the maintenance and development of the primary road network to support the economic and social-development of Tanzania

TANROADS is responsible for the Road Transport System which includes three main physical components: the Road Users which is the public covering pedestrians, passengers and drivers; the Vehicles including motorized and non-motorized, and the Roads which include their immediate environment. For the improvement of road safety in trunk roads, TANROADS is focused on these components and their interaction through the movement and behavior of the road users in which their influence have an effect upon a variety of social, economic, and technological factors.

TANROADS is one of the government agencies which are doing some road safety activities in Kibaha highway road for the improvement of road safety through public awareness campaigns. It is assumed that road safety campaigns reduce the extent of human errors and hence accident. TANROADS believes that, road users are the critical element in the transport system; their behavior has to be addressed if significant gains in safety are to be obtained. Key factors are a basic understanding of the traffic system, and ability to recognize and avoid danger, and exercise safe behavior. Knowledge on the traffic system and how to behave in traffic can primarily be improved through better education and publicity campaigns, and through better screening, training and testing of drivers. However, experiences has shown time and again that knowledge and guidance

alone is not enough; effective and visible traffic surveillance and enforcement are essential for compliance with laws and regulations.

TANROADS uses Safety publicity campaigns in Kibaha district in order to achieve various aims and objectives. In general, the aims of such publicity are to change the road user behavior, attitude or knowledge in order to increase road safety in the district. According to TANROADS, mass media campaigns in Kibaha district is expected to achieve the following:

- ☞ Increased awareness of a traffic accident as a problems which can be prevented and avoided,
- ☞ Raised level of information to the community about traffic safety,
- ☞ Traffic safety topic to be more salient and sensitize the audience to the other forms of communications,
- ☞ Road users to change behaviors and respect traffic rules and regulations.
- ☞ To integrate Local government authority and community in planning and implementation of road traffic measures in the district.

TANROADS Strategies and initiatives on the Road Safety Awareness and Educational Program in Kibaha district includes a. Road users awareness raising campaigns through various National Occasions (Exhibitions) such as, The National Road Safety Week, National Transport week, National Public Service Week and Engineers day, etc.

During these occasions, TANROADS like other transport service provider use these opportunity to educate the public on various road safety issues. A number of exhibitions through posters, road models, and video show, leaflets, stickers etc. In addition, focus group discussions are conducted during these occasions in order to collect and obtain feedback form the public. Various Radio programmes are also prepared and aired to sensitize road users on safe way of using roads. Visiting of local village leaders and discuss on the issue of safety along the route in their village. In some cases a meeting with village and strategies are put to combat safety in the village.

TANROADS has been successfully addressing the traffic accident as a problem that should not be undermined, and one of the problems in using publicity measures is that, on the whole, road users are resistant to change, especially when there is no apparent personal gain for them to do so. A driver who has operated a vehicle after drinking alcohol on many occasions without accident does not perceive the reasons why he/she should not drink as urged by posters or TV commercials. An additional difficulty to overcome is that, there is not usually the opportunity for face-to-face interaction

#### **7.6 Safety measures undertaken by Vocational Education Training Authority.**

The Vocational Education Training Authority (VETA) is one of the Government Academic institutions established to create graduates who are competent in technical, business entrepreneurial and interpersonal as well as life skills so as to create a sustainable competitive labor force. And to contribute towards the overall national goal of reducing and controlling road traffic accidents and the spread of HIV/AIDS among the labor force.

VETA is one of the very important stakeholders who implement road safety measures and strategies in Kibaha district and the country in general; it is among the major trainers of drivers, motor vehicle inspectors, and bus conductors. VETA is even more concerned with this issue because not only does it provide the basic driving lessons, leading to Class C license, it also offers training leading to licenses Class D and E, and also provides special courses for those who obtained training elsewhere, and how must now come into the fold, in terms of Traffic Act No. 30/1973 as amended by Act No. 1996. The Centre in Kibaha District offers courses which are geared to equip drivers, law enforcers, regulators and others, with skills to master driving and traffic rules as well as the attendant discipline. A range of courses are available and include: Vehicle Inspection (long and short courses), Basic Driving, Class D license, VIP Driving, Bus and Motor Cycle Driving, Class C license, Drivers Upgrading course, Conductorship course (Commuter buses), Conductorship course (Upcountry buses), Truck Driving, Class E license, Motor vehicle mechanics, Motor vehicle maintenance, and General Basic Skill in Motor Vehicle Mechanics

The overall objective that ought to be perceived is that VETA feels it has the duty to produce the best trained drivers who can professionally adhere to traffic laws and regulation hence reduces traffic accidents in different places by having human resources which contribute towards the efficient and safe use of roads. By doing so VETA formulate the relevant courses in combating traffic accidents that have been identified as the major causes of road accidents, namely, the condition of the driver, the condition of the vehicle, awareness of traffic rules, personal discipline, and the environment related to the usage of roads.

During the discussion with the Local government authority, the District Executive Secretary emphasized that, in Kibaha district, VETA, is a key player in the effort to reduce and suppress road accidents in the district and the country in general, for it has a very definite part to play. It trains drivers, conductors, motor vehicle mechanics, traffic control staff, etc. who all have a direct impact on the way the roads are safe. At the same time the Local government authority suggested to VETA to try to see how it can expand to accommodate more trainees; both drivers and instructors and other players, and how to modernize the training so as to keep up with advancing technology. VETA should also see how it can reduce the pressure at the Traffic Police of people queing up to obtain the driving licenses. When the waiting lists are long, the temptation is always there to seek short cuts, and this can result in the incompetent people also managing to obtain licenses. Apart from being trainers, VETA is also tendered by the Government to install all public vehicles a speed limiter and do regular inspection on the use and efficiency of the device, as one of the road safety measures in the district and the country in general.

To conclude this chapter we can say that Road safety is an interdisciplinary process that needs institutional cooperation in the country. It is through such cooperation road safety can be improved particularly among black spotted areas, The government can play a big role to remedy the situation for relief if road safety is considered to be one of the priorities in its distribution and allocation of resources in terms of budget, supply of resources, updating the laws and rules, implementing the road safety policy and empower

people(Community involvement) to be responsible, accountable and participate on road safety matters so as to combat road traffic accidents.

### **7.7 Summary**

According to the interviews done with the local authority in Kibaha district, it appears that there are excellent safety measures undertaken in the district to control and prevent road traffic accidents, but in actual fact, these measures appear to be more theoretical than practical. Most accident victims when interviewed criticized and mentioned that, vehicle inspection by police is done only once a year and it is just one week, the inspection is not technical but visual, VETA trainings are very expensive hence majority do not attend and it is not compulsory to attend VETA training before getting a driving license. TANROADS has lost focus, they mainly concentrating on road toll collections than road traffic safety activities in Kibaha district. It was also mentioned by the hospital respondents that, there are very good road traffic safety plans mentioned to be implemented in the district but they are not implemented, Institutions involved are working hardly but they are mainly concentrating to students who are not drivers. With these recommendations from different respondents it appears that, these safety measures are not effective that's why the trend of traffic accidents is increasing.

## CHAPTER EIGHT

### 8. Final discussion, conclusion and recommendations

#### 8.1 Introduction

This chapter highlights the summary of findings of the study.. The general objective of the study was to investigate and identify the main risk factors contributing to high health and system risk rates of road traffic accidents in Kibaha district. In attaining this objective the findings of the study have specifically described the composition of motor related injuries including non-motorised casualties in the district in a period of 2001 to 2004 which are discussed below. It has identified factors associated with high way traffic accidents in Kibaha district and eventually assessed different road safety measures undertaken by local authorities to prevent road traffic accidents in Kibaha district.

The purpose of this research has been achieved by using guiding questions or lines of inquiry (as an alternative) by inquiring what kind of motor vehicle casualties and non motorised casualties occurred at Kibaha District in a period of 2001 to 2004?, which factors are associated with the causes of traffic accidents in a high way road at Kibaha District?, what kind of safety measures have been taken or implemented by local authorities to prevent road traffic accidents at Kibaha district, and by investigating some aspect of the level of risk perceptions, risk attitudes and risk behaviours among people in relation to traffic accidents.

In identifying the risk factors contributing to the cause of traffic accidents in Kibaha district, the findings are based on the logic of four theories. The first is the system theory which is based on man-environment adjustments and maladjustments. The components of the theory are the environment, the means of transport (vehicles) and the behavior of man. Integrated in the systems theory is a system of highway codes and enforcement mechanisms designed to ensure that road users adhere to the controls and regulations of traffic flow for maintaining road traffic safety. The second is risk theory focusing on individual's risk-taking decisions which represent a balancing act in which perceptions of risk are weighed against propensity to take risk. The third approach is the political ecology of diseases which plays a very vital role in determining the way in which people

at different levels in the society view and utilizes the recourses and opportunities available to them. it is strongly linked to available recourses and capacity of the national and local authorities to put road safety strategies in place. The lack of resources and power to follow up on control and enforcement can result in lower motivation of police force or poor national and local policy on traffic safety issues, and the last fourth approach is the geographical approach basing on “Geographical Matters: Place, Time and Road Traffic accident” as an additional conceptual approach in understanding regional distribution in occurrence of road traffic accidents in Tanzania in relation to Kibaha district.

## **8.2 Final discussion and summary.**

The study has revealed the pattern and trend of motor traffic accidents in Kibaha district from 2001 to 2004. It has also revealed that young males aged between 25 and 34 years that are economically active are highly prone to motor traffic accidents. The road users who are always at risk of dying on the road were found to be Passengers and pedestrians. The trend of accident occurrence was almost increasing for almost every year in a period from 2001 to 2004 studied.

The study also revealed that the risk of dying if one is involved in an accident during the night was significantly higher than during the day, especially when it was raining. The study has also described different types of motor related injuries and the survival status of the accident victims.

Age, sex, over speeding, reckless driving, being a pedestrian, or a motor cyclist were identified as risk factors to motor accidents. The accident victims who are residents in Kibaha district aged between 18 to 24 are more frequent victims compared to other age groups, 46% of this age group are injured and 64 % are killed in accidents between 2001 to 2004, while accident victims who are not residence in Kibaha District aged between 25 to 34 and 35 to 44 are the most injured victims compared to other age groups respectively. However there was no association between severity of injuries and the age groups. The age and sex distribution of victims, have the same pattern for injury and

death victims. In all the five age groups categorised, more males were injured compared to females; The study also reveal that the distribution of injured and killed casualties of people residing outside Kibaha district are 2 times those who reside in Kibaha district. It also shows that the trend of causalities in Kibaha District seems to be high and stable.

According to the interviews done with the officials from the hospital they declared that road traffic accidents victims accounted for almost 20% of admission at Tumbi hospital. This is a big burden to the hospital resources because the national policy on accident victims is that they are exempted from paying. A suggestion for the Ministry of Health is to give subsidies to this hospital so as to reduce the financial burden.

The study also revealed that, there are more injured and killed casualties in the areas located in small townships with high population density where vehicles stop for refuelling or passengers recreations such as Tumbi, Maili moja, Picha ya ndege, Kwa mathias, Kwa mfipa, Kiluvya, Kibamba, Mlandizi, and Kongowe, therefore many accidents occur when careless drivers enter the highway from these towns or pedestrians doing petty businesses cross the road carelessly. Also intoxicated drivers and pedestrians might influence this.

The study also shows that, buses followed by minibuses (daladala) which are operated by private companies contribute the highest percentages of injured and killed causalities in Kibaha district. Figures show that 51% of motorized and non motorized related casualties are caused by buses while minibuses (daladala) occupy 28% of the causalities. The trucks and saloon cars proportion are around 7.3% and 7.8% respectively. Non-motorized vehicles such as bicycles in Kibaha constitute a lower percentage even though their role in increasing the risk of accidents occurrence and severity need not be neglected. The buses have a large share of the transport of the passengers from one region to another. The possibility of bus passengers having more causality if an accident occurs than other means of road transport is high and one accident may result into much causality. Bus transport is also unsafe in general.

The findings show that 12% of all casualties in Kibaha district from 2001 to 2004 happened in December followed by September 12%. November 9% and October 9%. This pattern shows that driving toward the end of the year in Kibaha district is more risky than at the beginning and at the middle months of the year given a similar level of traffic flow (exposure). The findings also suggest that in the day time, Monday, Friday and Saturday are the days when most of the motor vehicle accidents occurred. It also suggests that there are more injured casualties on Mondays and Fridays during a day time in Kibaha district with 24% and 23% than any other days of a week. On the other side there are more killed casualties during the night/dark time on Sundays. The percentage risk of dying when involved in an accident on Sunday night is 42%. The study also revealed that victims were more likely to die from road accidents occurring at night-time when the road was dry than at day-time when the also road was dry. The possible explanation of increased risk of dying during the night following motor traffic accidents is that it takes longer time for the victims to be transported to hospital due to low traffic flow, and therefore delayed rescue and first aid. Due to visibility problems also it may take time to locate all injured victims in time. Another reason might be that defective vehicle and risk-taking (incompetent) or aggressive drivers operate more frequently during the night to avoid traffic police who usually do not operate at night.

### **8.3 Conclusion.**

Accidents are result of critical combination of several factors and it is usually difficult to single out one main cause. It may be better and more appropriate to approach the issue using the concept of “accident contributing factors or risk increasing factor” when determining why and how the accident took place. In this study, risk factors contributing to the cause of road traffic accidents have been identified into the following categories:

#### **Environmental risk factors.**

One of the main risk factors associated to the course of traffic accidents in Kibaha district is the technical element of the highway construction in the area. The highway road is below standard and it accommodates high traffic volume without being equipped with traffic safety measures such as traffic separation and appropriate road signs along side the

road or Zebra crossings. Kibaha highway road was not designed with the facilities to accommodate the characteristics and behavior of various types of road users, vehicles, traffic and or environment. There is no traffic separation such as pedestrian lanes, the road is narrow without shoulders, bumps are only means to control speed, poor visual guidance, poor alignment standards and poorly controlled and uncontrolled intersections and access to the road. In actual fact the road seems to be designed without appropriate consideration of any of these mentioned factors, and all these aspects contributes significantly on the increasing risk of accidents occurrence and severity in Kibaha district.

### **Human behavior elements**

The behavior of road users in Kibaha district ( pedestrians, drivers and passengers), require a guidance and control for appropriate interaction with other components of the road traffic system such as the vehicle and the built environment. Similar to other researchers in Tanzania who concluded that, the obvious fact is that human error constitutes over 80% of all road accidents and only small proportion of accidents can be directly attributed to: vehicle performance including defects or faults, and roads themselves including their design or maintenance. It is true to say that accident doesn't just happen, they are made to happen. Or they are allowed to happen or in some cases are encouraged to happen. "Accidents never occur they are caused" Human behavior towards road traffic accident in Kibaha district weighs significantly to prolonged accidents in the district. The following are the specific risk factors associated with human behaviors which contribute to high number of traffic accidents in Kibaha district: Driving while using cell phone, Driving without training, and failure to respect and obey Traffic regulations.

### **Vehicle factor elements**

In the recent years, vehicle fleet has grown considerably in Kibaha highway while the road infrastructure remains the same. However, most of the vehicles traversing on the roads are in bad condition; since most of them are imported to the country as used vehicles with ages varying from 3 years to 20 years. Most of vehicles imported to

Tanzania are used to the extent that some of them are not road worthy. This is due to the fact that the majority of Tanzanians cannot afford to buy new cars. As a result, operational cost is always on the higher side, leading to mishandling of maintenance of most vehicles on our roads. The majority of the vehicles is therefore in the traffic system is in poor condition of service. This problem has been attributed by the lack of systematic Road worthy certification and in adequate law enforcement.

Although it is believed that 80% of all accidents in Tanzania are caused by human error, it is internationally believed that human error coupled with a faulty vehicle results in disaster when there is any accident causation factor. The increase in the number of vehicles has therefore resulted into a corresponding increase in road accidents leading to loss of life and property in Kibaha district.

#### **The traffic regulations enforcement.**

One of the risk factors associated to the prolonging traffic accidents in Kibaha district, is considered to be weaknesses in traffic regulation enforcement in Kibaha district by the traffic police. To be specific, corruption, irresponsibility and poor management of traffic police force as an authorized body to govern, control and implement traffic safety measures as per required country's regulations. This is identified as a crucial issue to be sorted out. On the other hand, the judicial process in Tanzania is extremely complicated and slow moving. Moreover, the traffic laws in the country are archaic and non-effective as deterrent instruments of road traffic accidents. The transport section of the passengers and the cargo knows this loophole of the law and they care little about being caught in the act.

#### **8.4 Recommendations**

In order to reduce traffic accidents in Kibaha district I will recommend based on my studies the following measures to rectify the problem:

### **About human behavior**

There is a need of government to improve the living standards of people. High living standards will affect the public and government view on risk and safety culture and also reduce bribery and corruption

All drivers of heavy goods vehicles and public service vehicles, should participate in refresher driver training courses so that the inevitable bad habits acquired can be reduced at a relatively early state,

Public Education on safe road crossing procedures should be conducted by the Road Safety Unit and the National Road Safety Council in terms of information and campaign using the radio and television. As far as students are concerned, the campaign should be conducted in schools,

The Drivers tendency of using cell phones while driving should be stopped and face misdemeanor fines ranging from TZ50, 000 up TZS 100,000.this should be similar to other factors equally potential for crash risk such as smoking, eating, drinking, shaving, disciplining children and pets searching for lost articles while driving. The Government should develop a comprehensive educational effort aimed at drivers to promote the responsible use of cellular phone while driving.

### **About environment and road network.**

The Government under responsible ministries should make sure road signs are repaired and replaced every time when needed especially in small towns and in high population areas..

Traffic rights and round about are important features to be considered in improving highways.

The construction of new roads especially highways must consider traffic separation to harmonise all road users and facilitate traffic safety.

### **About vehicles**

There is a need of establishing a permanent control unit (Vehicle examination unit) for regular vehicle inspection of all vehicles at least once a year and certificate of approval should be provided to the qualified vehicles. All vehicles to be used in the country, should meet safety standards such as proper brakes, lights, seat belts, indicators and good tires.

The National Bureau of Standards should inspect all imported used vehicles if they are road worth according to the national standards before they are accepted to be used in the country.

#### **8.4.4 About traffic control, regulation and legislation**

The government should review legislation regarding employment of drivers both in government, parastatal and private companies. Drivers employed must be well trained or those already employed should be trained at relevant institutions like the National Institute of Transport and Vocation Training Authority (VETA),

The National Institute of Transport should be given a statutory mandate to train the aspirants of instructorship, and accordingly, the relevant provisions in the act should be amended to incorporate a mandatory pre-registration training as a condition before one applies for driver instructorship.

The government should improve the conditions of police force, instituting better working conditions and pay them well (to deter corruption), they should also be provided and maintained modern equipment such as breathalyzers, video and speed camera.

A new driving license system should be implemented, and priority should be given to international harmonization. A driving license database should be developed and implemented. It should be noted that properly educated drivers will have a positive impact on traffic safety. Efforts must focus on the young future driving license holders.

Any person seeking to acquire a driving license should sit for a written test prior to issuance of learner's license and upon completion of training each individual has to apply for practical testing on his/her own without any assistance from the driving schools.

In order to rack down cell phone-related road accidents, police should be required to record among other factors, whether or not a cellular phone was present at the time of the accident. And laws should be imposed to restrict the use of cell phones when driving.

The traffic police should strengthen surveillance and enforcement to net drivers who drink alcohol beverages and then drive their vehicles to reduce those accidents which occur during weekends and at night.

#### **8.4.5 About the Hospital**

The hospital staff should be considered for intensive training on emergency, preparedness. They should be also motivated to care for the accident victims. The hospital should establish a full equipped and staffed orthopaedic section.

The ambulance personnel and hospital staff especially those in casualty section should be trained on how to give first aid to injured people and how to handle different types of injuries while transporting them to hospital.

The hospital and police data collection and record keeping should be strengthened

#### **8.5 Areas for further research**

Road traffic accidents in Tanzania are part of a wider debate on the built environment, motorization and human behaviors. There is a need to expose the poverty in the received explanations and research further on appropriate means of combating traffic accidents in relation to the improvement of the economy of the country.

A comparative study of road traffic accidents between Tanzania and other countries either developed or developing countries is an important area to be focused. This will

facilitate the Government authority to have an opportunity to compare the burden of traffic accidents locally and in international perspective.

## REFERENCES

Adams, J.G.U. (1994). Seat belt legislation: the evidence revisited. *Safety Science*: 18: 135-52.

Adams, J.G.U. (1995). *Risk*. London: UCL Press.

Asogwa, S.E. (1992). Road traffic accidents in Nigeria a review and reappraisal. *Accid Anal Prev*; 24 (2):149-55.

Asogwa, S.E. (1978). Road traffic accidents: The doctor's point of view. *Afr J Med Sci*; (7):29-35.

Asongwa, S.E. (1992). Road traffic accidents in Nigeria: A review and a reappraisal, *Accident Analysis and Prevention*: 23 (5), 343-35.

Astrom, J. S, Kent, M.P. and Jovin, R. D. (2006) Signatures of Four Generations of Road Safety Planning in Nairobi City, Kenya In: *Journal of Eastern African Research and Development*. Vo. 120, pp. 186-201.

Ayuthya, R.S. Bohning D. (1997). Risk factors for traffic accidents in Bangkok Metropolis. A case reference study. *Southern Asian J Trop Med Public Health*; 28 (4):881-5.

Baker, T. L. (1999). *Doing Social Research*. (3<sup>rd</sup> Ed.). McGrawhill Companies Inc.

Balogun, J.A., Abereoje, O.K. (1992). Pattern of road traffic accident cases in a Nigeria University teaching hospital between 1987 and 1990. *J.Trop Med Hyg*; 95(1):23-9.

Banyikwa, W.F. (2005). The Catchments Areas of Municipal Markets in Mbeya Municipality, Tanzania. In: UTAFITI – Journal of the Faculty of Arts and Social Sciences, University of Dar es Salaam. Vol:6, No. 1,pp 1-35.

Banyikwa, W.F. (1989), Effects of Insensitivity in Planning Land for Urban Development in Tanzania: The Case of Dar es Salaam City. In: Journal of Eastern African Research and Development. Vol. pp 83-94.

Banyikwa, W.F. (1988), Urban Passenger Transport Problems in Dar es Salaam, Tanzania. In: African Urban Quartely. Vol.19, pp. 83-94.'

Barreto,S.M.,Swerdlow,A.J., Smith,P.G.,Higgins,C.D.(1997).Risk of death from motor vehicle injury in Brazilian Steelworkers: Nested case control study. Int J Epidemiol; 26(4):814-21.

Bastide, S., Moatti, J.P., Pages, J.P., & Fagan, F. (1989). Risk perception and social acceptability of technologies of technologies: The French case, Risk analysis, 9, 215-223.

Bener, A., Absood G.H., Achan N.V., Sankaran K.M. (1992).Road traffic injuries in Al-Ain City, United Arab Emirates R Soc Health; 112(6):173-6.

Bener, A. and Jadaan, K.S. (1992).A perspective on road fatalities in Jeddah, Saudi Arabia. Accid Anal Prev; 24(2):142-148.

Bjornskau, M., Gafni, D. (2000).Globalization in road safety. Explaining the downward trend in road accident rates in a single country (Israel).Accid Anal Prev; 32(1):71-4.

Broughton, J. (1991).Forecasting road accident casualties in Great Britain.Accid Anal Prev; 23(5):353-362.

Burgess, R. G. (1984). *In the Field: An Introduction to Field Research*. London: George Allen and Unwin.

Button, K.J. (1993), *Transport, the Environment and Economic Policy*. Edward Elgar, London.

Council of Scientific affairs (1983). Automobile related injury components, trends and prevention. *JAMA* 249(20): 3216-3222.

Curtis, S. and Taket, A. (1996). *Health and Societies: Changing Perspectives*. London: Arnold.

Cutter, S. L. (1993). *Living with Risks: Geography of Technological Hards*. Great Britain: Edward Arnold.

David A.(1991). Population and registered vehicle data Vs Road Deaths.*Accid Anal Prev*; 23(5):343-351.

Dejoy, D. M. (1989). The optimism bias and traffic accident risk perception. *Accident analysis and prevention*, 21, 333-340.

Denzin, N. (1989). *The Research Act: a Theoretical Introduction to Sociological Methods*. Prentice Hall, New Jersey.

Dopson, A. J., Baguley, C.J. & Hills, B. (1999). *Road safety in Developing Countries; An overview*. Overseas Centre. Transport and Road research Laboratory, Crowthorne, and Berkshire, United Kingdom.

Down, J. (1997), *Ideology and Town Planning in Tanzania*. In: *Journal of the Geographical Association of Tanzania*. Vol. 15,pp. 20-39.

Dowing, A. J., Baguley, C. J. & Hills, B. (1999). Road Safety in Developing Countries: An overview. Overseas Centre. Transport and Road Research Laboratory, Crowthorne, Berkshire, United Kingdom.

Flick, U. (1998). An Introduction to Qualitative Research: Sage Publications Ltd, London

Gallaher, M.M., Flemming, D.W., Berger, L.R., Sewell, C.M (1992). Pedestrian and Hypothermia deaths among Native Americans in New Mexico: between bar and home. JAMA; 267(10):1345-8.

Gatrell, A. C. (2002). Geographies of Health. An Introduction. United Kingdom: Blackwell Publishers.

Graham, J.D. (1993) Injuries from traffic crashes: meeting the challenge. Ann Rev Public Health; 14:515-43.

Grbich, C. (1999). Qualitative Research in Health: An introduction. London: Sage Publications.

Green, J. (1995) Accidents and the Risk Society. In Bunton, R., Nettleton, S. & H. Burrows (Eds.). The Sociology of Health Promotion. Routledge : London.

Guibert, R., Duorte, F.E., Gampi, A., Potrin L., Loisselle, J., Philibert, L. (1998). Medical Conditions and the risk of motor vehicle crashes in men. Arch Fam Med; 7(6):554-8.

Hakims, S., Shefer, D., Hakkert, A.S., Hocherman, I. (1991). A critical review of macro models for road accidents. Accid Anal Prev; 23(5):379-400.

Harbermas, (1985): In Flick, U. (1998) An Introduction to Qualitative Research: Sage Publications Ltd, London

Hauer, E. (1995), On Exposure and Accident Rate. In Traffic Engineering and Control. Vol. 36, pp. 134-138.

Hayes, M.M.M.(1972).Road accidents:Their cause and prevention,with particular reference to Rhodesia.Cent Afr J Med;23(4):71-74.

Holt-Jensen, A. (2001). Geography: History and Concepts. (3<sup>rd</sup> Edition). London: Sage Publications.

IPP Media, <http://www.ippmedia.com/>. 15<sup>th</sup> December, 2005.

Jayasuria, R. (1991).Trends in epidemiology in injuries due to road traffic accidents in Papua New Guinea. Asia Pac J Public Health; 5(1):41-8.

Jegede,F.J.(1998).Spatial temporal analysis of road traffic accidents in Oyo State, Nigeria.  
Accid Ana Prev; 20(3):227-43.

Johnston, R et al. (2000) The Dictionary of Human Geography: oxford, Blackwell

Jorgensen, D.L. (1989) Participant Observation: A Methodology for Human Studies: Sage Publications Ltd, London

Jørgensen, S. H., and Abane, A. M. (1999). A comparative study of urban traffic accidents in developing and developed countries: Empirical observations and problems from Trondheim (Norway) and Accra (Ghana). Bulletin of Ghana Geographical Association. No. 21, 113-128.

Kayombo, E.J. (1995).Motor traffic accidents in Dar es Salaam.Trop Geogr Med; 47(1): 37-9.

Kent, S.L.(1991).Epidemiology of Traffic accidents in A Swedish Municipality.Accid Anal Prev;23(6):509-519.

Khair S.J,(1990).Traffic accidents in Kuwait:An economic dimension.Accid Anal Prev; 22(4):399-401.

Kirk, J. & Miller, M. L. (1986). Reliability and Validity in Qualitative Research: Qualitative Research Methods. Volume 1. Beverly Hills: Sage Publications

Kong,L.B.,Lekawa,M.,Navarro,R.A.,McGrath,M.,Margulies,HichJ.R.(1996).Pedestrian Motor vehicle trauma an analysis of injury profiles by age. Am Coll Surg;182(1):17-23.

Krug, E. G, Sharma, G. K, Lozano, R. The global burden of injuries. American Journal of public health, 2000, 90:523-526.

Krug, E. (1999). a leading cause of the Global Burden of Disease. Retrieved from [http://www.who.int/voilence\\_injury\\_prevention/injury/gbi/gbi8/en/index3.html](http://www.who.int/voilence_injury_prevention/injury/gbi/gbi8/en/index3.html)

Krug, E. (2002). How can road safety be improved? The BMJ asked four experts for their views. British medical journal. 324, 1116, retrieved January march 10 2006 from <http://bmjjournal.com/cgi/content/full/324/7346/1116>

Kumar, R. (1996). Research Methodology: A Step-by-Step Guide for Beginners. London: Sage publishers.

Kvale, X. J. (1996). An Introduction to Sociology; University printing press, Nairobi

Lave, L.B., Songer, T.J., La Porte, R.E. (1993).Should person with diabetes be licensed to drive trucks: Risk management. Risk Anal; 13(3):327-34.

Leeming J.J. (1969).Road accidents, Prevent or punish? Definitions, facts and figures. London, Cassell.Chapter 3:17-41.

Leon, S.R. (1996).Reducing death on the Road.The effects of minimum safety standards,

Unpublicised crash test, seat belts and alcohol. *Am J Public Health*; 86(1):31-3.

Lie, G.H., Baker, S.P. (1991).A comparison of injury death rates in China and United States 1986; *Am J Public Health*; 81(5):605-9.

Limb, N. and Dawyer, C. (2001) *Qualitative Methodologies for Geographers: Issues and Debate*: Oxford University Press Inc

Lupton, D. (1999). *Risk and Sociocultural theory: New directions and perspectives*. Cambridge University Press.

Majumder,B.,Karmakar,R.,Bose,T.,Dasgupta,S.,Basu,R.(1996).Some host factors and Seasonal variations in fatal road traffic accidents occurring in Eastern Sub urban Calcutta.*Indian J Public Health*;40(2):46-9.

Malekela, F.R. (2005), *Improvement of Hazardous Locations (Black Spot Areas)*. In: *Proceedings of Tanzania Roads Association – Annual Roads Convention, November 24-25*, pp 42-55.

Massie, D.C., Campbell, K.L., Williams.A.F.(1995).Traffic accident involvement rates by drivers age and gender.*Accid Anal Prev*;27(1):73-87.

Mayer, J. D. (1996). The political ecology of disease as one new focus for medical Geography. *Progress in human Geography*. 20 (4), 441-456

Moen, B.E. and T. Rundmo (2005), *Worrying about Transport Risks* In: Rundmo, T. and B.E. Moen (eds). *Risk Judgement and Safety in Transport*. Rotunde Publication Number 87, Trondheim.

*Morbidity and Mortality Weekly Report-Nowajo Nation*.(1992).Safety belt use and motor Vehicle related injuries Nowajo Nation 1988-1991:41(38):705-8.

Muhlrad N, Lassarre S. (2005) Systems approach to injury control. New Delhi, Macmillan India Ltd.

National Annual Road Convention (ARC), 2005. Tanzania

National Annual Road Convention (ARC), 2006. Tanzania

National Council of Traffic Safety and Security report, 2003. Tanzania

National Council of Road Safety and security report, 2005. Tanzania

Nelson, D.C.and Strucber, J.V.(1991).The effect of open back vehicles on casualty rates the case of Papua New Guinea.Accid Anal Prev;23(2-3):109-17.

New South Wales (NSW) Road and Traffic Authority Statistical report “Road Traffic Accidents in NSW-1997”.[Motor Accidents Authorities of NSW 1998].

Odero, W., Garner, P. and Zwi, A. (1997). Road traffic injuries in the developing countries: a comprehensive review of epidemiological studies. Journal of Tropical Medicine and International Health. 2(5), 445-460.

Odero, W. &. Garner, P. (1991).The problem of trauma in Nigerian pattern as seen in mult centre study.Trop.Geogr Med; 43(1-2):80-4.

Odero, W. (1995).Road Traffic Accidents in Kenya: An epidemiological appraisal. East Afr Med J; 72(5):295-305.

Odero, W., Garner, P., Zwi, A. (1997).Road Traffic Injuries in Developing Countries: A Comprehensive review of epidemiological studies.Trop Med Int Health; 2(5):445-60.

Oltedal, S., Moen, B. E., Klempe, H., & Rundmo, T. (2004). Explaining risk perception. An evaluation of cultural theory. Trondheim: Rotunde Publikasjoner.

Oluwasanmi, A.J. (1993). Road accident trend in Nideria. *Accid Anal Prev*; 25(4):485-7.

Orsay, E.M., Dowan, W.L., Lewis, R., Rama, K. V. (1994). The impaired driver: Hospital and Police detection of alcohol and other drugs of abuse in motor vehicle crashes. *Ann Emerg Med*; 24(1):51-5.

Patton, M. Q. (1990). *Qualitative Evaluationa and Research Methods*. California: Sage Publications.

Patton, M.Q. (1990) *Qualitative Evaluation and Research Methods* (2<sup>nd</sup> edition), Newbury Park, CA: Sage publications Ltd, London

Peden, M. (Ed), (2004), *World Report on Road Traffic Injury Prevention*. World Health Organisation, Geneva.

Pierce, Q and Maunder, P (1998) Road and Traffic Authority Statistical report "Road Traffic Accidents in NSW-1997". [Motor Accidents Authorities of NSW 1998].

Platt, J. (1992a). "Case study" in American methodological thought. *Current Sociology*, 40, 17-48.

Redelmeier, D.A., and Tibshirani, R.J. (1997). Association between cellular telephone calls  
And motor vehicle collisions. *N Engl J Med*; 336(7):453-8.

Rivara, F.P. and Barber, M. (1985). Demographic analysis of childhood pedestrian injuries. *Pediatrics*; 76(3):375-381.

Rivara, F.P. (1986). Traumatic deaths of children in the United States. Current available

Prevention strategies. *Pediatrics*; 75(3):456-462.

Robert, I. (1995). China takes to the roads. *BMJ*; 310:1311-3.

Rundmo, T. & Iversen, H. (2004) Risk perception and driving behaviour among adolescents in two Norwegian countries before and after traffic safety campaign. *Safety science*, 42, 1-21.

Rune, E. (2002). *Human Ecology: A New Social Science*. *Teachers College Record* 39, 488-493.

Sarungi, P.M. Review of 179 deaths due to chest injuries resulting from motor traffic Accidents during a four years period-1997-1980 at Muhimbili Medical Centre. Paper presented at road traffic accident conference in Mexico City 1981.

Schorr, L. B. (1997). *Common purpose: strengthening families and neighbourhoods to rebuilds America*. New York: Anchor.

Shibata, A. Fukuda, K. (1994). Risk factors of fatality in motor vehicle traffic accidents. *Accid Anal Prev*; 26(3):391-7.

Silverman, D. (2000). *Doing qualitative research: A practical handbook*. Thousand Oaks, CA: Sage.

Sjoberg, L. and A. Biel (1983), Mood and Belief- Value Correlations In: *Acta Psychologica*. Vol. 53 pp.253-270.

Slovic, P (1987). Perception of risk. *Science*. 236, 280-285.

Smeed, R. J. (1953). The international comparison of accident rates. *International road traffic safety review*, 1, 16-19.

Søderlund, N. and Zwi, A. B. (1995). Traffic-related mortality in industrialized and less developed countries. *Bulletin of the World Health Organisation* 73 (2), 175-182.

Tanzania Annual road convention report, 2005

Tanzania National Road Safety Council Report (TNRSC)-1999.

Tanzania National Website 2006. <http://www.tanzania.go.tz/>. "Website of the United Republic of Tanzania"

Thomson, R.S., Rivara, F.P., Thomson, D.C. (1989). A case control study of the effectiveness

Of safety helmets. *N Engl J Med*; 320:1361-1366.

Thompson, D.C., Thompson, R.S. & Rivara, F.P. (2002). Risk compensation theory should be subject to systematic reviews of the scientific evidence. *Injury Prevention*. 8, 12-15.

Tripod, R.M. and G.J.S. Wilde (eds) (1994), *Challenges for Accident Prevention – The issue of risk compensation behaviour*, Amsterdam.

United Republic of Tanzania, (2006), *National Road Safety Strategy*. Ministry of Infrastructure Development, Dar es Salaam.

United Republic of Tanzania, (2005), *National Road Safety Policy*. Ministry of Works, Dar es Salaam.

United Republic of Tanzania, (1958), *National Report*

United Republic of Tanzania, (2002), *National report*.

United Republic of Tanzania, (2005), National report.

United Republic of Tanzania, (2006:7), National report.

United Republic of Tanzania, (2002), National Census.

Unwin, T. (1992). *The Place of Geography*. Longman. London.

Vasconcellos, E.A.(1999).Urban development and traffic accidents in Brazil.*Accid Anal Prev*; 31(4):319-328.

Vasconcellos, E. A. (2001), *Urban Transport, Environment and Equity: The case for developing countries*. Earthscan Publications Ltd, London.

Violant, J.M., and Marshall, J.R. (1996).Cellular phones and traffic accidents:an Epidemiological Approach. *Accid Anal Prev*; 28(2):265-275.

Wang, S., Y., Wang S., F., Chi G.B. (1997).Epidemiological features and determinants of Road injury in China.*Chung Hua Liu Hsing Ping Hsuen Tsa Chih*; 18(3):134-7.

Webster, M. (1985). *Webster's ninth new college dictionary*. Merian Webster Inc.

Wilde, G.J.S. (2002). Does risk homeostasis theory have implications for road safety? *British Medical journal*. 324, 1149-1152.

World Health Organization (2001). *A 5-year Health Organisation Strategy for Road Traffic Injury Prevention*. Geneva Switzerland. Retrieved October 3, 2002 from Norwegian University of Science and Technology Library Database.

World Health Organization (2000). Evidence, Information and Policy report. Geneva, Switzerland.

Yin, R.K. (1989) Case Study Research: Design and Method: Applied Social Research Methods, Vol.5: Sage Publications Ltd.

Zhang,J., Fraser,S.,Lindsay,J.,Clarke,K,Mao,Y.(1998).Age specific pattern of factors Related to fatal motor vehicle traffic crashes: Focus on young and elderly drivers.Public Health; 112(5): 289-95.

Zimmer, K.S. "Ecology as a Corner stone and Chimera in Human Geography". In Earlen, C., Mathewsen, K. & Kenzer, M.S. (Eds.). (1996). Concepts in Human Geography. Rowman and Littlefield Publishers Inc.

Zuckerman, M. Sensation seeking: beyond the optimal level of arousal. Hillsdale, NJ, Erlsbaum, 1979

## APPENDICES

### Appendix 1: Operational definitions and glossary

#### 1, Operational definitions

1. *Perception*; Thought in mind in understanding the existing situation, event or phenomenon by an individual or groups of people influenced by knowledge of thinking or an awareness of ones surroundings that is produced by the operation of the senses.(Slovic, 1987) In this study perception will be regarded as opinion or views of an individual on road traffic accidents.
2. *Risk*; Can be defined as the subjective assessment of probability for specific occurrence of a negative event , and how concerned individual is with the consequences of this event (Sjoberg, Moen & Rundmo 2004)
3. *Risk Mitigation*; Is defined as safety measures put in place to curb or decrease the probability of a traffic accident occurrence.
4. *Risk perception*; Is the combination of perceived probability and severity of consequences, relate to how an individual perceives risk. (Sjoberg, Moen & Rundmo 2004)
5. *Road Traffic Accident*; Unexpected and undesirable crash involving two or more vehicles in which at least one is in motion or crash involving a vehicle and other road users; e.g. A pedestrian. In either case, there is casualty where by people get injured or killed or it results in a material damage.
6. *Traffic risk*; It is used to denote the likelihood or probability of an individual being involved in a traffic accident times the consequences of this unwanted event.

## 2, Glossary

1. *Black spots*; is an engineering term to denote the section of a road network where traffic accidents usually occur.
2. *Disability adjusted life years*; The years lost by an individual because he or she is disabled as a result of being involved in a traffic accident.
3. *Health risk*; A term that express the relationship between accidents and population. It is measured as the number of persons killed or injured in a geographical area in a year divided by 100,000 populations in that geographical area.
4. *Injuries*; Number of persons who sustain tissue damage which may be slight or serious in a motor vehicle crash.
5. *Interview guide*; A written list of topics and guide questions to be covered during the process of a semi structured interviews.
6. *Check list form*; A written list of questions as a guide, to be answered when reviewing the Police or Hospital records
7. *Daladala*; Is a Swahili terminology, a name given to minibuses which are used as public transport within a town? The name has a history associated with the charges that amount per trip in Dar es Salaam, Dala means 5 Tanzanian shillings, and therefore Daladala means just five only.
8. *System risk*; A term that express the relationship between accidents and motor vehicles. It is measured as the number of persons killed or injured in a geographical area a year divided by 100,000 vehicles in that geographical area in the year.

## Appendix 2: Questionnaire form

### QUESTIONNAIRE FORM FOR REVIEWING INDIVIDUAL PARTICULARS OF MOTOR TRAFFIC ACCIDENT VICTIMS FROM THE HOSPITAL RECORDS.

#### *SECTION ONE Individuals background*

1. Age in years

(a) Below 18

(b) 18 – 24.....

(c) 25 – 34.....

(d) 35 – 44.....

(e) 45+.....

2. Sex: (1) Male.  
(2) Female

3. Occupation: (1) Peasant  
(2) Civil servant  
(3) Businessman/woman  
(4) Others (specify).....

4. Residence: (1) Kibaha district  
(2) Outside Kibaha district

#### *SECTION TWO About the accident*

5. When did accident happen?

(a) Month.....

(b) Day of a week.....

(c) Time period, Day or night.....

6. How many vehicles were involved in accident.....

7. Type of vehicle involved (used by the victim):

(1) Saloon car

(2) Bus

(3) Truck

(4) Motorcycle

(5) Bicycle

(6) Minibus (Daladala)

8. Ownership of the vehicle:

(1) Private

(2) Government

9. Causality

(a) Injured ..... or (b) Death.....

10. If Injured what is the outcome of the diagnosis

- (1) Fully recovered
- (2) Permanently disabled
- (3) Temporarily disabled

11. Class of the injured person:

- (1) Driver
- (2) Passenger
- (3) Pedestrian
- (4) Motorcyclist
- (5) Cyclist

12. Where did the accident occur?

(Location).....

13. What was the condition of the road?

- (1) Dry
- (2) Wet
- (3) No information.....

14. Special conditions at the site just before accident?

- (1) Pedestrian on the way
- (2) Object on the way
- (3) Vehicle on the way
- (4) Overtaking
- (5) Animal astray
- (6) Heavy rainfall
- (6) Heavy Wind
- (5) Others (specify).....

**Appendix 3: Interview guides**

**INTERVIEW GUIDE QUESTIONS WITH HOSPITAL INFORMANTS**

Date of an interview-----

Personal particulars:

Age----- Sex----- Rank-----

Profession----- Working experience in Kibaha-----

Q.1.Do you think motor traffic accident injuries are important problem in Tumbi Hospital? -----  
-----  
-----

Q.2.What problems do you get in receiving motor accident victims?  
-----  
-----  
-----

Q.3.Do you have enough treatment rooms to accommodate all injured people?  
-----  
-----  
-----

Q.4.According to your experiences do you think people fear traffic accidents in Kibaha?  
-----  
-----  
-----

Q.5.What factors do you think facilitate the occurrence of road traffic accident in Kibaha?  
1. In terms of Vehicles -----  
2. In terms of (environment) road net work-----  
3. In terms of Peoples behaviour-----  
4. In terms of legislation and regulations-----

Q.6.What kind of measures should be taken to reduce traffic accidents in Kibaha district?  
-----  
-----  
-----

Q.7.Who do you think should be responsible for traffic accident?  
-----  
-----  
-----

Q.8. What are your recommendations/opinions on how to improve medical service to Motor traffic accident victims in Tumbi hospital?

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## INTERVIEW GUIDE QUESTIONS WITH ACCIDENT VICTIMS

- Date of an interview.....
1. Age.....
  2. Sex.....
  3. Occupation.....
  4. Residence.....
  5. What do you think was the main cause of your accident in Kibaha District?.....
  6. Was there any possibility to escape the accident?  
.....
  7. Can you tell us the real situation of the following parts just before your accident?
    1. What was the condition of the car.....
    2. What was the condition of a day? Rain, Wet, Dry, Wind or Fog.....
    3. Speed of the car.....
    4. Was a driver alcoholic or Drunk?
    5. Did passengers applied seatbelt?
    6. Was the car overloaded?
    7. Did the driver follow the road signs when driving?
    8. Was the driver stopping when pedestrians wanted to cross the road at zebra cross?
    9. Did you meet any traffic Police officer on the road before accident?
    10. How was the situation of the road in that day?
  8. Just one day before accident day, did you think if there is a possibility of getting an accident when you are travelling?
  9. Just when you started your journey, did you feel a possibility of getting an accident on journey?
  10. What kind of safety measures did you take just before you started travelling?
  11. What is your recommendation to other people concerning road traffic accident in Kibaha District.....

12. What factors do you think facilitate the occurrence of road traffic accident in Kibaha?

1. In terms of Vehicles-----
2. In terms of (environment) road net work-----
3. In terms of Peoples behaviour-----
4. In terms of legislation and regulations-----

13. What kind of measures should be taken to reduce traffic accidents in Kibaha district?

-----  
-----  
-----

14. Who do you think should be responsible for traffic accident?

-----  
-----  
-----

15. What are your recommendations/opinions on how to improve medical service to Motor traffic accident victims in Tumbi hospital?

-----  
-----  
-----

**INTERVIEW GUIDE QUESTIONS WITH POLICE TRAFFIC OFFICERS**

Personal particulars

Date----- Age----- Sex-----

Rank----- Working experience-----

Q.1.Do you think motor traffic accidents are important problem in Kibaha?

-----

Q.2.How do you compare the magnitude of motor traffic accidents in Kibaha to those of other Districts in the country?

-----

Q.3.How do you normally get information after the motor accident has occurred?

-----

Q.4.Are there any problems in getting immediate information after the motor accident has Occurred? What are the problems?

-----

Q.5.How do you transport injured people from the site of accident to hospital?

- (1) By police vehicle.
- (2) By ambulance.
- (3) By requesting other motorists to help.
- (4) Accident victims hire vehicles themselves.
- (5) Others (specify)-----

Q.6.Where do you send dead bodies of persons who die at the site of accidents?

Q.7.Is there any problem of getting accurate report/information on motor accidents Occurring in Kibaha?

-----

Q.8.Do you face any problem in keeping motor traffic accident reports in your office?

-----

Q.9.What are your recommendations and opinions on strategies of reducing the motor accident in Kibaha? -----

Q.10. What measures do you take to reduce traffic accidents in Kibaha district?

-----

Q.11. Are there any problems on implementing traffic safety measures in Kibaha?

-----

Q.12. Who do you think should be responsible for traffic accident?

-----

Q.13. Do you think the available traffic rules and regulations can reduce accidents?

-----

Q.14. what factors do you think facilitate the occurrence of road traffic accident in Kibaha?

1. In terms of Vehicles -----
2. In terms of (environment) road net work-----
3. In terms of Peoples behaviour-----
4. In terms of legislation and regulations-----

**INTERVIEW GUIDE QUESTIONS WITH OFFICIALS FROM THE MINISTRY  
OF HEALTH**

Personal particulars

Date----- Age----- Sex-----

Rank----- Working experience-----

Q.1. Do you think motor traffic accidents are important problem in Kibaha?  
-----

Q.2. How do you compare the magnitude of motor traffic accidents in Kibaha to those  
of other Districts in the country?  
-----

Q.4. Are there any road safety policies used in traffic safety mitigations?  
-----

Q.7. Is there any problem of getting accurate report/information on motor accidents?  
-----

Q.8. Do you face any problem in keeping motor traffic accident reports in your office?  
-----

Q.9. What is your recommendations and opinions on strategies of reducing the motor  
accident in Kibaha? -----

Q.10. What measures do government take to reduce traffic accidents in Kibaha district?  
-----

Q.11. Are there any problems on implementing traffic safety measures in Kibaha?  
-----

Q.12. Who do you think should be responsible for traffic accident?  
-----

Q.13. Do you think the available traffic rules and regulations can reduce accidents?  
-----

Q.14. What factors do you think facilitate the occurrence of road traffic accident in  
Kibaha?

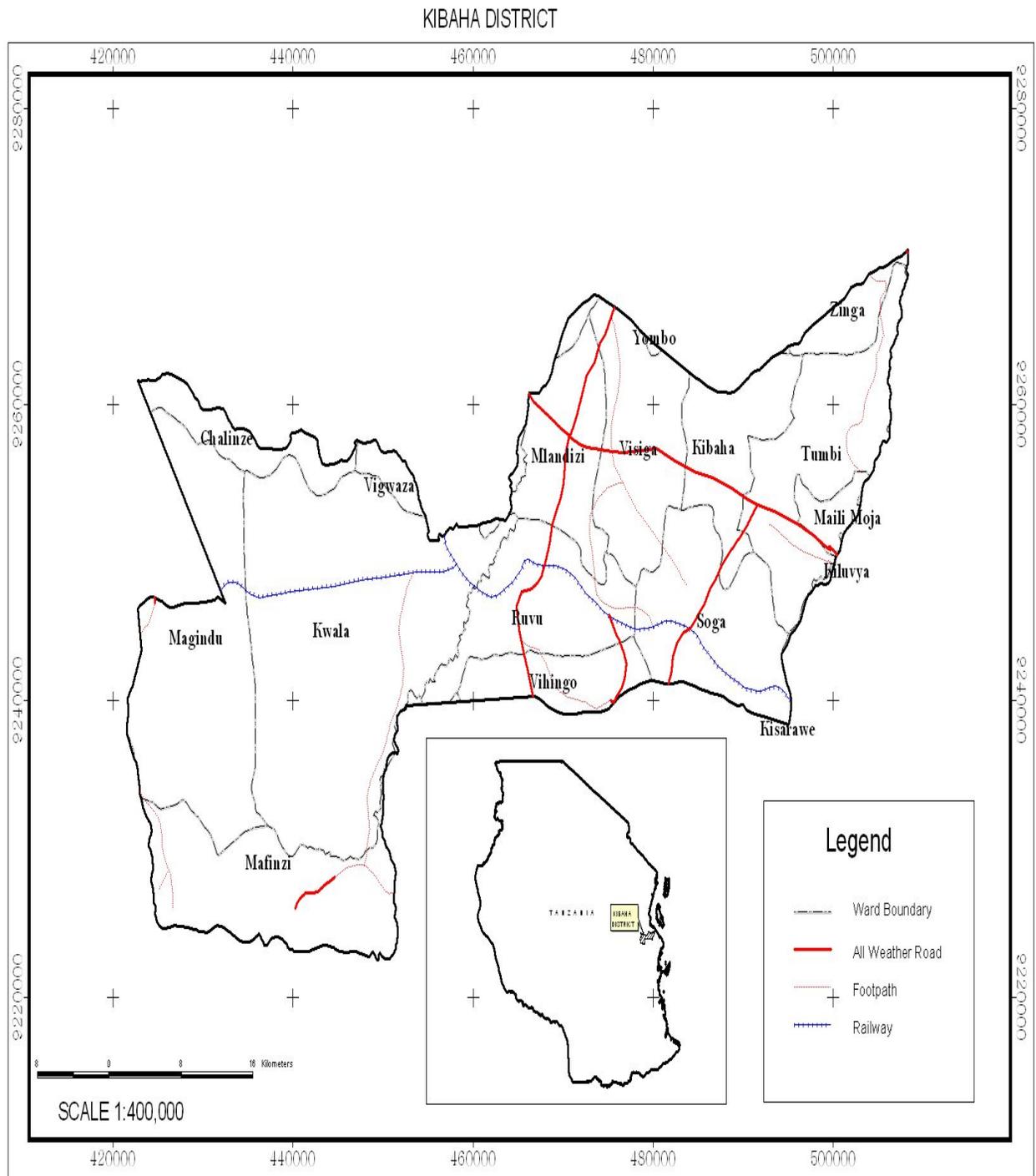
1. In terms of Vehicles -----
2. In terms of (environment) road net work-----
3. In terms of Peoples behaviour-----
4. In terms of legislation and regulations-----

#### **Appendix 4: Focus group discussion. (FGD)**

##### **INTERVIEW GUIDE QUESTIONS FOR A FOCUS GROUP DISCUSSION**

1. Is road traffic accident a serious problem in Kibaha District?
2. What are the main factors which are associated to the cause of road traffic accidents in Kibaha district?
3. Who are the main victims of road traffic accidents in Kibaha District?
4. What kinds of safety measures have been taken by the local authority to prevent road traffic accident in Kibaha district?
5. Do available safety measures reduce the traffic accidents in Kibaha District?
6. Do available traffic rules and regulations reduce road traffic accidents in Kibaha District?
7. Who is mostly responsible for the road traffic accidents in Kibaha District?
8. Are there any agents like NGOs or CBOs dealing with road traffic accidents in Kibaha District? What are they doing?
9. What has been done by the Central government to reduce traffic accidents in Kibaha District?
10. What is the reaction of people (community) in relation to frequently occurrences of traffic accident in their area?
11. Does Community in Kibaha District associate road traffic accidents with their traditional beliefs or superstitions?
12. What are the main problems facing the local authorities in implementing the road safety measures in Kibaha District?

## Appendix 5: MAP OF KIBAHA DISTRICT



Source; Tanzania National Website.

**Figure 5.1** Map of Kibaha district

