

**PREPAREDNESS FOR EMERGENCY INJURIES IN HEALTH
FACILITIES LOCATED ALONG MBARARA-KASESE
ROAD SOUTHWESTERN UGANDA**

EKPA Julius Osee

REG. NUMBER: MPH/0007/123/DF

**BSC PUBLIC HEALTH (BSU), PGD (UNILAG),
DIP. A&EN (UNILAG), DIP. NURSING (LAGOS)**

**DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE AWARD OF MASTERS
DEGREE IN PUBLIC HEALTH OF KAMPALA
INTERNATIONAL UNIVERSITY**

DECEMBER, 2014

DECLARATION

I, **EKPA Julius Osee**, hereby declares that this dissertation report is my personal original work and has never been produced before by anybody in any institution, for any academic award.

Where the work of others have been included in this proposal, due acknowledgement is given and citation to this have been made in accordance with the text and references.


.....

Date.....

Ekpa Julius Osee

APPROVAL

I certify that this proposal has been written under my supervision, and has been approved for submission in partial fulfillment of the requirements for the award of Masters degree in Public Health of Kampala International University.



Date 12/12/2014

DR. KASULE AARON, MBChB (MUST), MPH (Mak)

(Supervisor)

DEDICATION

This work is dedicated to my beloved mother, Mrs. Ekpa Ejimi and to my late Dad, Mr. Ekpa Ikade.

I also dedicate this project to my daughter, Queen.

ACKNOWLEDGEMENT

I would like to acknowledge the effort, support, guidance and encouragement of the numerous people who have made it possible for me to undertake this study.

My profound gratitude goes to my wife, Victoria and my children Queen, Blessing, Theophilus and Victory, for their unflinching support during the course of my study.

My sincere gratitude goes to my supervisors, Dr Kasule Aaron and Mr. Mughusu Ezekiel, and the program coordinator, Mr. Emorut Simon Peter, for their priceless advice and invaluable suggestions and contributions that have made this work a great success.

I am grateful to Dr Godfrey Rukundo (PhD), for painstakingly reading through the work, editing the scripts and offering his inestimable contributions. Am also grateful to nursing and medical staff in all study sites for their support and contributions especially those who participated in the study.

I also wish to acknowledge my colleagues, Diana Mbatudde, for reading through the scripts and correcting oversights, Sarah Nabaliisa for editing the work, and Sison Mugisha and Ghali Magaji, for their contributions and continuous support. I am also grateful to all nursing students who made valuable contributions towards the success of this project.

To all of them, I owe my inestimable gratitude.

TABLE OF CONTENT

DECLARATION	ii
APPROVAL	iii
ACKNOWLEDGEMENT	v
TABLE OF CONTENT	vi
LIST OF TABLES AND FIGURES	viii
DEFINITION OF TERMS AS USED IN THE STUDY	x
LIST OF ABBREVIATIONS AND ACRONYMS	xi
CHAPTER ONE: INTRODUCTION.....	1
1.1 Background.....	1
1.1.1 Historical background.....	2
1.1.2 Theoretical background	3
1.1.3 Conceptual background	4
1.1.4 Contextual background	5
1.4 Specific Objectives	7
1.5 Research Questions.....	7
1.6 Justification of the Study	8
1.7 Scope of the Study	9
1.8 Conceptual Framework.....	9
CHAPTER TWO: LITERATURE REVIEW.....	11
2.1 Overview of Road Traffic Injuries and Hospital Preparedness	11
2.2 Prevalence of Road Traffic Injuries.....	11
2.3 Organization of Emergency Services for Mass Casualties	12
2.4 Knowledge of Health Workers Involved in Managing Road Traffic Accidents Cases	14
2.5 Availability of Resuscitation Equipment for Managing Road Traffic Accidents Caese	15
2.6 General Integration of Literature Review	15
CHAPTER THREE: METHODOLOGY	17

3.1 Study Design.....	17
3.2 Study Area	17
3.3 Study Population.....	18
3.4 Sample Size Determination	18
3.5 Sampling Procedure and Technique	19
3.5.1 Inclusion criteria	20
3.5.2 Exclusion criteria	20
3.6 Data Collection Instruments and Methods.....	20
3.7 Data Quality Control.....	21
3.8 Data Processing, Analysis and Interpretation	21
3.8.1 Quantitative data analysis	21
3.8.2 Qualitative data analysis	22
3.9 Ethical Consideration:	22
3.10 Limitations and Delimitations of the Study	23
CHAPTER FOUR:DATA PRESENTATION, ANALYSIS AND INTERPRETATION	24
CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS	31
REFERENCES	37
Appendix I: Consent form	43
Appendix II: Questionnaire for health workers (Doctors, Nurses and Clinical officers)	44
Appendix III: Observation guide	46
Appendix IV: Checklist for review of medical records in selected health facilities.....	47
Appendix V: Interview guide for Key informants.....	48
Appendix VI : Availability of equipment in six study sites.....	49
Appendix VII: Introductory letter.....	50
Appendix VIII: Approval letter	51

LIST OF TABLES

Table 1: Proportion of participants by health facilities	20
Table 2: List of health facilities selected for the study	25
Table 3: Socio-demographic information of respondents	26
Table 4: Prevalence of road traffic injuries in selected health facilities.....	27
Table 5: Proportion of road traffic accidents by age	28
Table 6: Organization of emergency services and preparedness of health facilities	30
Table 7: Self-reported knowledge of health workers	31
Table 8: Availability of resuscitation equipment.....	32

LIST OF FIGURES

Figure I: Conceptual Framework	11
Figure II: Distribution of road traffic injuries and other injuries	28
Figure III: Distribution of road traffic injuries by sex	29
Figure IV: Comparison of road traffic injuries between hospitals and health centers IV	29

DEFINITION OF TERMS AS USED IN THE STUDY

Accident - is an unfortunate incident that happens unexpectedly and unintentionally (Oxford university press, 2001).

Advanced life support systems: Is emergency care services where highly trained paramedics use protocols to deliver patients care.

Black spot - is an engineering term to denote the section of a road network where traffic accidents frequently occur.

Doc-ALS systems: Is emergency care services where physicians deliver pre-hospital care

Hospital preparedness: Ability of a healthcare facility to expand its operations to safely treat and care for an abnormally large influx of patients

Inter-hospital care: Care given to patient with road traffic injuries during transportation to hospital from scene of injury, or from one hospital to a referral facility.

Passenger – A person other than the driver travelling in or on a car, truck or bus

Pedestrian – A person who at the time of being involved in an accident, was not riding in or on any mechanically or electrically powered device.

Physician surrogates: Non-physician practitioners who are trained in basic and advanced emergency medical interventions

Pre-hospital care: Care given to patients with road traffic injuries before they are transported to hospital for definitive care.

Road traffic injury (RTI) – Injuries incurred as a result of road traffic accident. These can be fatal or non-fatal injuries.

Traffic crash - incident or collision occurring in public road, involving one or more vehicles moving that may or may not lead to injury.

Unorganized pre-hospital care: Is a system where lay people or police are involved in pre-hospital and transportation of road traffic injured patients to the hospital.

LIST OF ABBREVIATIONS AND ACRONYMS

ALS	:	Advanced Life Support
BLS	:	Basic Life Support
DALY	:	Disability Adjusted Life Years
Doc-ALS	:	Doctor – Advance Life Support systems
DRC	:	Democratic Republic of Congo
IRB	:	Institution Review Board
KIU	:	Kampala International University
LMICs	:	Low and Medium Income Countries
MOH	:	Ministry of Health of Uganda
RTA	:	Road Traffic Accident
RTI	:	Road Traffic Injuries
SPSS	:	Statistical Package for Social Sciences
UBS	:	Uganda Bureau of Statistics
WHO	:	World Health Organization

ABSTRACT

Introduction: Preparedness is ability of a health facility to expand operations and safely treat large influx of patients that could put significant strain on its operating systems. Sudden influx of patient can cause confusion and anxiety, and create inefficiency that may lead to disaster. Inadequate preparedness is a serious public health challenge. There is need for periodic assessment of health facilities' preparedness to treat mass casualties as mitigation for impact of traffic injuries. This study considered preparedness in terms of organization, staffing, equipment and supplies.

The objectives of the study were to: determine prevalence of road traffic injuries; assess the level of organization of emergency services; assess self-reported knowledge of health workers involved in managing road traffic accidents cases and to assess availability of resuscitation equipments for managing traffic accidents in health facilities located along Mbarara-Kasese road.

Methods: A descriptive cross sectional and retrospective study was conducted. 173 Doctors, Nurses and Clinicians were enrolled for the study in six purposively selected health facilities located within 5km proximity along Mbarara-Kasese road. The study was conducted between August and September 2014. Also, 760 cases of road traffic accidents were analyzed from review of medical records for one year period, from July 2013 to June 2014. Data was analyzed using descriptive statistics, correlation and linear regression.

Key findings: Prevalence of road traffic accidents was high (46.1% of total injuries received in the selected health facilities. Males and youths constituted the highest proportion of casualties. Most health facilities were not prepared for mass casualty from road traffic accidents. Some of the selected health facilities have no emergency service committee, no functional theatre and no surgical team to handle emergency surgery. Also, most selected health facilities have no provision for regular staff training in emergency care. Despite inadequacies in preparedness, general knowledge of staff on emergency procedures was good and resuscitation equipments were available in most of the facilities at the time of visit. All the study sites can manage uncomplicated road traffic injuries successfully. Three facilities can manage single cases of moderate to severe traffic injuries successfully, while severe cases are referred due to inadequate facilities and lack of expertise.

Conclusion and Recommendation: All selected health facilities shows inadequate preparedness for mass casualties from road traffic accidents. These health facilities need to be supported and adequately funded to enhance their capacity to care for mass casualties from road traffic accidents.

CHAPTER ONE

INTRODUCTION

1.1 Background

Under normal circumstances, health facilities usually determine their average daily patient load and prepare their resources and staffing according to their projection (Gnatz and Munch, 2002; Soloff, 2006; London, et al, 2002). However, road traffic accidents can result in heavy influx of casualties to a health facility. This sudden influx of patient load can cause confusion and anxiety, and create inefficiency that may lead to disaster for the affected health facility (Ramirez, 2009). Expanding the capacity of a health facility to manage a road traffic disaster goes beyond finding additional rooms to put the extra patients. Also, coping with these numerous patients drains the operating budget of the health facility and its resources and requires it to mobilize and provide additional services.

Preparedness is the ability of a healthcare facility to expand its operations to safely treat and care for an abnormally large influx of patients that could put significant strain on its operating systems (Hirsberg, et al, 2005). The critical areas of preparedness include provision of pre-hospital care, transportation to health facility and hospital based care. According to Chen (2010), emergency care of mass casualties of road traffic injuries and the outcome of their injuries is mainly determined by the level of preparedness of receiving health facilities to manage such cases.

Preparedness has three phases; pre-hospital phase targeting care at the scene of accident, inter-hospital phase providing care during transportation and health facility based care (Bazzoli, et al, 1998). Essential elements of pre-hospital emergency system include prompt communication and activation of the system, timely response of the system, correct assessment and efficient treatment, and prompt transport of casualties to a formal healthcare facility (Mohan, et al, 2006).

Addressing human health issues is a public health priority in every civil society and given the increasing incidence of road traffic injuries, it is has become an important public health concern (Bahadori, et, al, 2010). Emergency preparedness and efficiency constitute a vital aspect of a government's service to its citizens (Mullen, 2002). Improvement in hospital preparedness as an integral part of the healthcare system would play an important role in timely and proper response to road traffic injuries as well as reducing mortality and disability associated with it (Bahadori, 2011).

1.1.1 Historical background

In the past, global health policy was focused on disease specific models with interventions targeting each disease system (WHO, 2005). Although road traffic injuries are a global disaster, little attention was paid to development of a comprehensive emergency medical system. As a result, there has been great disparity among emergency medical service capacities of nations and regions around the world with consequent variations in road traffic injury mortality (Pedem, et al, 2004; Lagarde, 2007).

Mortality rates due to road traffic injury are estimated to be higher in Africa, at 28.3 per 100,000 people accounting for 10% of all disability adjusted life years (DALYs) lost annually (WHO, 2004). In a study of mortality rates for road traffic injuries in three cities, in countries at different economic levels, mortality rate (pre-hospital and in-hospital deaths) rose from 35% in a high-income setting to 55% in a middle income setting, to 63% in a low-income setting (Mock, et, al, 2004).

Today, pre-hospital emergency systems that provide basic and advanced emergency medical care exist in 134 countries (WHO, 2009). Formal emergency medical service systems can be classified into two system models: Anglo-American system and Franco-German system (Pozner, et al, 2004; Dick, 2003; Tintinalli, et al, 2010). In the Anglo-American model, the underlying philosophy is to “bring the patient to the doctor.” This model is operated by physician surrogates (non-physician practitioners trained in basic and advanced emergency medical interventions) who treat patients in the field and then transport them to an emergency department for stabilization, where they are either discharged or admitted to a specialty ward within the hospital. This model is commonly found in the United States of America, the United Kingdom, Canada and Australia (Pozner, et al, 2004).

In contrast, the philosophy behind the Franco-German model is to bring the doctor to the patient. In this model, mostly physicians and nurses treat and stabilize patients in pre-hospital setting, and then either discharge or admit them directly to a specialty ward within the hospital (Dick, 2003; Tintinalli, et al, 2010). This model is commonly found in France, Germany, Portugal and Brazil.

While many variations may exist within each model type, the certainties that they both share is that advanced emergency medical systems are highly expensive to develop, implement and sustain (Davis, et al, 2004; Lerner, et al, 2007). Based on these, there is increasing evidence supporting development of Basic Life Support (BLS) pre-hospital care systems in Low and Medium Income Countries (LMICs) to help alleviate the growing burden of road traffic injuries.

In sub-Saharan African, some countries such as Nigeria and South Africa have developed a BLS pre-hospital emergency services and medical ambulance system. However, Uganda does not have a formal emergency system or public ambulance system (Mutoro, et al, 2010).

1.1.2 Theoretical background

Four theoretical models have been explored for application in this study. These include Issel's (2007) quantitative cost model, Kingdom's (1995) interactional theory, Almgren's (2007) social justice theory and Rousell's (2009) application of Maslow's hierarchy of needs to management.

Issel (2007) proposed a quantitative model that focuses on specific cost measures that show economic impact of providing services in a disaster. These measurements focus on ability of health facilities to evaluate the effectiveness of their services. The economic indicators show financial results related to cost benefit, cost effectiveness and cost utility of organized services in response to disaster. He further explored how policy and regulations that have economic impact are created and implemented.

Kingdom (1995) provided a classic model based on interaction between political agenda and health policy based on three schools of thought in the legislative process. The problem approach describes the complexity of getting policy makers to focus on the issue at hand. The policy approach describes policy goals and ideas of key stakeholders and interest groups in the political process, while political approach describes events going on in society that may impact on the policy. This theory can be used in proposed study to analyze the attitudes of the executives towards government response to hospital dilemma. It may also uncover conflicts which may exist within hospital executives that pitch their desire to provide emergency care services against economic and financial reality of resource management.

Almgren (2007) proposed the theory of social justice which governs how healthcare is delivered and explain the commitment hospital executives have to provide services. The delivery of healthcare services, whether in a crisis situation such as a road traffic disaster or as part of normal business, is governed by three mediating factors; individual and social characteristics, healthcare system and process, and aggregate needs of the populations at large (Almgren, 2007).

Similarly, Rousell's (2009) application of Maslow's hierarchy of need to the problem of quality of health care could be applied to explain hospital preparedness for care of road traffic injuries. According to Rousell, managers are mainly concerned with meeting the basic needs of health workers. Hence, issues such as security and safety of healthcare personnel come first. Therefore, hospital executives may have to meet the basic needs of workers before they can pay attention to issues of quality of patient care.

1.1.3 Conceptual background

Preparedness has four conceptual components (Kaji, et al, 2006; Barbisch, et al, 2006; Hick, et al, 2008). The first three components (space, staffing and supplies) describe resources while the fourth component describes the systems (organization, processes, policies and procedures) that govern the management of the first three components. The level of hospital preparedness based on this categorization depends on the ability to increase or conserve resources in response to influx of patients in a disaster situation (Kelen, et al, 2006).

Preparedness depends on the fundamental understanding of which hospital resources are critical to patient care in time of emergency (Hick, et al, 2009). Based on this, preparedness can be categorized into three levels of graded response; conventional, contingent and crisis management. Conventional response implies that the normal available resources in a health facility can cope with patients load and standard of care will be maintained. Contingent response requires the hospital to mobilize extra resources in addition to those routinely in place, although, standards of care will be maintained. Crisis response requires significant adjustment of operations and available resources to meet service demand posed by influx of patients and standards of care cannot be maintained (Hick, et al, 2009).

Pre-hospital care is considered the most crucial phase in hospital preparedness and can be grouped into four categories (Tintinalli, 2010). These includes basic life support (BLS) systems where emergency medical technicians provide non-invasive care and transport; advanced life support (ALS) systems where highly trained paramedics use protocols to deliver their care; Doctor-Advance Life Support (Doc-ALS) systems where physicians deliver pre-hospital care; and the fourth is "unorganized pre-hospital care" where lay people or police transport injured patients to the hospital for care. The last category is commonly seen in developing countries, where most hospitals lack emergency preparedness and surge capacity planning (Quansah, 2001).

1.1.4 Contextual background

Preparedness should be appreciated as a system of emergency patient care with interdependent components working together to make lasting impact on the outcome of critically ill patients. But due to lack of improvement in hospital preparedness, road traffic injury has become the most frequent cause of injury related deaths globally (Astrom, et al, 2006).

In developed countries, there has been significant improvement in hospital preparedness through proper planning and allocation of healthcare resources, and efficient pre-hospital care (O'Malley, et al, 2006; Pozner, et al, 2004). In these countries, emergency care is provided promptly at the scene of accident and victims are transported to hospital using advanced air and land ambulance systems, equipped with communication networks for inter-hospital and intra-hospital coordination (Verner, 2008; Black, 2005). Also, experienced staffs are readily available to provide care with consequent reduction in mortality and morbidity.

However, in developing countries the story is different. A study conducted in Iran reveals that 75% of deaths occur at the scene of accident and during transportation of casualties to hospital, due to lack of organized and coordinated pre-hospital emergency system (Nasiripour, et al, 2010). In sub-Saharan Africa, studies from urban settings shows that majority of road traffic accident victims do not reach the hospital (Mock, et al, 2007).

In Uganda, most road traffic injury patients die before they get to hospital due to lack of pre-hospital care (Mutoro, et al, 2010), and about 20,000 Ugandan die yearly from road traffic injuries (WHO, 2005). Behavioral factors such as drunken-driving, over-speeding and reckless driving are considered as major contributors to the rise in accidents, injuries and mortality.

According to Ugandan Police (2011) traffic report, factors responsible for the increase in road traffic injuries include high populations of vehicles on the roads, non-increase in number of roads and poor state of existing roads in terms of design. Others factors include poor knowledge of road use regulations, poor mechanical condition of vehicles due to permissive import of old vehicles, poor quality of maintenance and lack of spare parts. The factors also include official commercialization of issuing of driving permits without due regard to driving skills, vehicle conditions, poor enforcement of speed limits and speed governors; and corruption in policing agencies.

1.2 Problem Statement

Inadequate preparedness and response to emergency injuries is a serious public health challenge. However, from a global perspective little attention has been paid to development of comprehensive emergency system to enable health facilities respond to emergencies adequately (WHO, 2010). Hence, road traffic injuries have continued to remain a rapidly growing public health problem and represent a major global human tragedy (Nantulya, et al, 2002).

In developing countries, the situation has been described as “a worsening global disaster” (Cater and Walker, 1998). About 3,000 people die daily from road traffic injuries worldwide (Peden, 2004) and 85% of deaths occur in developing countries (Arumugam, 2007). RTAs are predicted to be the third leading contributor to global burden of disease by 2020 (Kopits and Cropper, 2003). This has enormous impact on global, national and household economies (Nantulya, et al, 2003).

In Uganda, 2000 people die annually from road traffic injuries (Peden, et al, 2004). Ugandan Police Report 2011 shows an increase from 660 deaths in 1991 to 3,343 deaths in 2011, making Uganda the highest in road fatalities rates in Africa with 10.1 per 100,000 populations. Similarly, Southwestern Uganda has one of the highest road fatality rates with annual midyear incidence of 239 deaths and 484 injuries. In 2005, Shell Uganda published 85 “accident black spots” along Ugandan highways. Most of these were identified along Kampala-Masaka highway and Mbarara-Kasese road.

Uganda has no organized pre-hospital emergency system and most deaths from road traffic injuries occur in pre-hospital phase (Mutoro, et al, 2010). Very few patients receive treatment at the scene of accident and only a few are transported to hospital promptly (Sasser, et al, 2005). Transport when available is often provided by untrained members of the public such as taxi drivers and the police who lack skills to care for injured patients (Kobusingye, et al, 2005). This increases mortality and morbidity due to poor handling of patients.

The best mitigation for the impact of road traffic injuries is to enhance the capacity and preparedness of health facilities located along major highways. However, preparedness of health facilities located along major highways in southwestern Uganda including Mbarara – Kasese road has not been studied or fully documented. Therefore, there is need to assess preparedness of health facilities (hospitals and health centers IV) located along Mbarara – Kasese road as a mitigation to reduce the mortality and morbidity associated with road traffic injuries in southwestern Uganda.

1.3 Purpose of the Study

To assess the preparedness of health facilities located along Mbarara-Kasese road for mass casualties from road traffic accidents

1.4 Specific Objectives

- i. To determine the prevalence of road traffic injuries in health facilities located along Mbarara-Kasese road.
- ii. To assess the level of organization of emergency services for mass casualties from road traffic accidents in health facilities located along Mbarara-Kasese road.
- iii. To assess self-reported knowledge of health workers involved in managing road traffic accidents cases in health facilities located along Mbarara-Kasese road.
- iv. To assess availability of resuscitation equipments for managing road traffic accidents cases in health facilities located along Mbarara-Kasese road.

1.5 Research Questions

- i. What is the prevalence of road traffic injuries in health facilities located along Mbarara-Kasese road?
- ii. What is the level of organization of emergency services for mass casualties from road traffic accidents in health facilities located along Mbarara-Kasese road?
- iii. What is the level of self-reported knowledge of health workers involved in managing road traffic accidents cases in health facilities located along Mbarara-Kasese road?
- iv. Are resuscitation equipments available for managing road traffic accidents cases in health facilities located along Mbarara-Kasese road?

1.6 Justification of the Study

i. Contribution to the body of science and academics:

The study contributed to knowledge on hospital preparedness and how it affect patients outcome, especially victims of road traffic injuries. Secondly, the study provided information that may bridge the knowledge gaps in health system research. Hospital preparedness is part of the 10/90 gaps in health system research where less than 10% of global research investment is spent on problems affecting 90% of the world's population (Global Forum for Health Research, 2002).

The study also generate useful information for planning and evaluating emergency services and surge capacity of health facilities located along major highways in south west Uganda. This may reduce mortality and morbidity associated with road traffic injuries.

ii. Benefit to the community:

Recommendations from this study are useful to hospital administrators in developing resources in areas of human capital, infrastructure and pre-hospital emergency services, as well as inter-hospital partnerships and community participation that will assist in addressing community needs brought about by heavy influx of casualties of road traffic injuries.

Also, the study presented opportunity to examine efficacy of social justice theory relating to hospital preparedness and medical practice. This may change public policy and enhance reduction in mortality and morbidity associated with road traffic injuries.

iii. Benefit to hospital administrators:

The study has added to the knowledge of hospital administration and academic endeavors, and served as a precursor for further researches. Results from this study if considered may assist hospital administrators in making decisions that could mitigate health facilities' readiness to handle clinical and financial resource management issues in event of mass casualties.

The study also revealed areas of concern that hospital administrators may have regarding their own health facility level of preparedness. This can impact on hospital policies and provides opportunity for planning on how to respond to future medical emergencies.

1.7 Scope of the Study

Content scope: The study was to assess health facilities' preparedness with emphasis on mass casualties from road traffic injuries. A checklist adopted from the Ministry of Health and World Health Organization basic trauma care requirement (Appendix VII) was used as observation guide to collect qualitative data by direct observation in selected health facilities.

Geographical scope: The study was conducted in South-western Uganda. All Hospitals and Health centers IV located within five kilometers proximity to Mbarara – Kasese road were considered due to their strategic locations. These included three Government funded health facilities (Kabwohe health center IV, Bushenyi health center IV and Rugazi health center IV); one private for profit health facility (KIU Teaching hospital) and two private not for profit health facilities (Ishaka Adventist hospital and Comboni hospital).

Time scope: The study was conducted between August and September, 2014. Available data from July 2013 to June 2014 was considered to assess the prevalence of road traffic injuries in the selected health facilities.

1.8 Conceptual Framework

The study adopted system model approach from World health organization (2007). The system model analyses factors contributing to road traffic injuries (such as government policy, socio-political, socio-economic and behavioral factors) and how these factors interact and influence Hospital preparedness. Government policy is considered as independent (basic contributing) factor which may influence preparedness directly or through socio-political and socio-economic factors.

From the left column, Government policy (first box) influences preparedness and socio-political and socio-economic factors. Social-political factors include enforcement of road use regulations, type and age of vehicles on road, number and size of existing roads and design. These factors may influence the prevalence, magnitude and severity of road traffic injuries which affect preparedness of health facilities to provide adequate care. Socio-economic factors influences susceptibility to road traffic injuries and determine health seeking behavior, accessibility and affordability of care.

Similarly, health systems are influenced by government policy and the country's economy. This also determines hospital funding, availability of basic equipment, capacity planning and organization of emergency services, staffing levels and staff training needs. Awareness of risks and ability to deal

with information shapes behavior and attitudes (Duperex et al, 2002). Hence, education influences road use regulations, driving behavior and vehicle maintenance culture which affect prevalence, magnitude and severity of road traffic injuries. This creates burden on health facilities' resources and affects their level of preparedness for mass casualties.

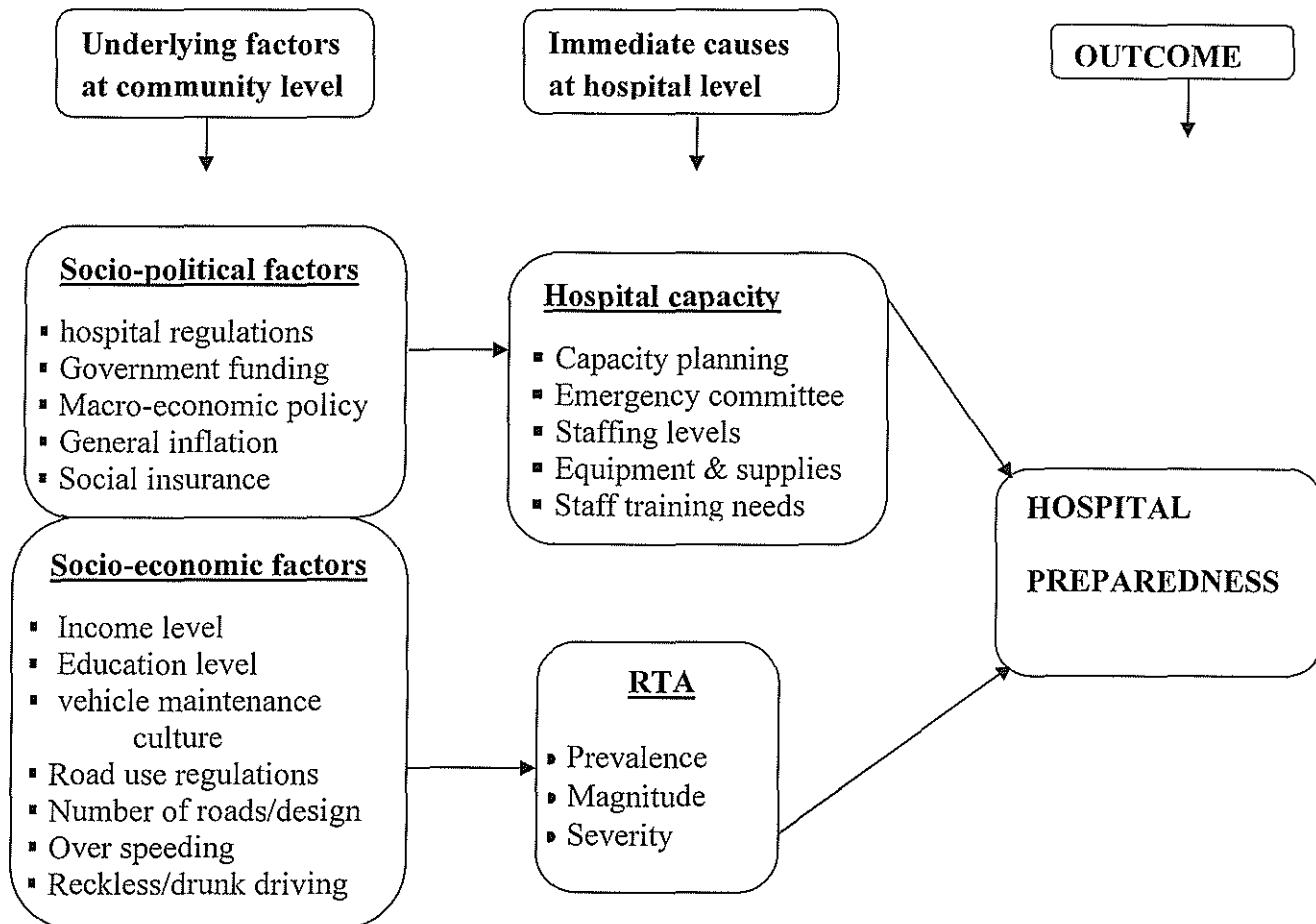


Figure 1: Conceptual framework adopted from WHO (2007)

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview of Road Traffic Injuries and Hospital Preparedness

The threat of mass casualty incidents to healthcare systems has always been present and for many emergency departments, it is part of normal day-to-day operations. Healthcare Systems generally, face multiple challenges such as increasing man-made and natural disasters, leading to overcrowding of emergency departments and health facilities' inability to respond effectively. Regardless of the threat, an effective medical surge capacity begins with strong hospital-based systems to facilitate preparedness planning for mass casualties.

Globally, decreasing the burden of road traffic injuries remain a major public health challenge especially in developing countries. Global economic cost of road traffic injuries is estimated at \$518 billion yearly (WHO, 2006). This translate to huge economic and financial losses (Krug, et al, 2000), and 12% disability adjusted life years lost (DALYS) worldwide (Mock, et al, 2002).

The youths and socio-economically disadvantaged groups tend to experiences disproportionately higher road traffic injuries fatality rates (Odero, et al, 2003). Most of these deaths and disabilities can be minimized through improvement in hospital preparedness by providing prompt and effective pre-hospital care systems (Henriksson, et al, 2001; Elvik, 2004; Coats and Davies, 2002).

2.2 Prevalence of Road Traffic Injuries

Road traffic injuries constitute a major public health problem globally, accounting for 1.2 million deaths and 15 million injuries yearly (Krug, 2002). About 3,000 people die daily from road traffic injuries worldwide (Paden, 2004), and 85% of deaths occur in developing countries (Arumugam, 2007). This amounts to 1000 youths being killed daily in developing world (WHO, 2004).

Similarly, effect of non-fatal injuries on lost productivity globally is estimated to outweigh that attributable to fatal injury (Mohan, 2002; Paden, et, al, 2000). In 2002, road traffic injuries were ranked as eleventh leading cause of death worldwide (Jacobs, et al, 2000). By 2020, deaths from road traffic injuries is projected to reach 8.4 million (WHO, 2001), and road traffic injuries would be the 9th contributor to the burden of diseases worldwide.

The aggregate rates of road traffic fatality per 100 000 population is low in high income countries compared to low and middle income countries including African regions (Ameratunga, et al, 2004; Kopits and Cropper, 2003). Similarly, estimates from developed countries suggest that 80% of total cost of road traffic injuries is attributable to non-fatal events (Jacobs, et al, 2000).

In East Africa, road traffic injuries are among the top causes of death from injuries (Odero, 1995). In Kenya, fatality rates from road traffic injuries are estimated to have increased by 578% over the last thirty years (Nantulya and Muli-Musiime, 2000).

In Uganda, the number of deaths due to road traffic accidents has been increasing every year from 660 in 1991 to 3,343 in 2011 (Ugandan Police Report, 2011). This makes Uganda to have the highest road fatalities in Africa, with fatality rate of 10.1 per 100,000 populations. In 2011 alone, there were a total of 3,343 deaths, 14,438 serious injuries and 2,181 minor injuries. Among the deaths, pedestrians were the largest casualties killed accounting for 39.2%.

According to Ugandan Police (2011), distribution of road traffic injuries by regions shows that Southwestern Uganda has one of the highest fatality rates with annual midyear incidence of 239 deaths and 484 injuries. A significant portion of the Gross Domestic Product (2.3%) is lost due to road traffic injuries in Uganda

Most accidents leading to injuries and deaths occur in urban areas and along the major highways leading in and out of the capital city, Kampala (Uganda Police Report, 2011). These highways bear continuous heavy traffic to and from other neighboring landlocked countries such as South Sudan, DR Congo, Rwanda and Burundi. In 2005, Shell Uganda (2005) published 85 “accident black spots” along Ugandan highways. Most of these accident black spots were identified along Kampala-Masaka highway, which is continuous with Mbarara-Kasese road and leads to the DR Congo.

2.3 Organization of Emergency Services for Mass Casualties

Preparedness is viewed in terms of the capacity to rapidly expand services to meet increased demand for bed space, qualified personnel and medical services in event of a disaster (Ten Eyck, 2008). The organization of emergency services is a major determinant of a health facility’s ability to expand its operations to safely treat an abnormally large influx of patients. According to Mock, et al (2004), organizational and administrative mechanisms should exist to ensure provision of adequate and

qualified staffs, quick replacement of depleted or expired stocks of supplies and medications and availability of functioning equipment. There should also be quality control mechanisms to guarantee such provision and the quality of medical care provided.

Prompt communication between emergency medical service units and receiving facility is important for trauma team activation and preparation for immediate care of severely injured patients upon arrival (Mock, et al, 2004). This takes into account availability of designated telephone numbers and assigned tasks for transfer of casualties between health facilities. Pre-existing transfer agreements can also help to streamline such processes.

In developed countries, much of the improvement in patient outcome for victims of road traffic injuries come from improvements in organization of emergency care services (Nathens, et al 2001). However, globally inadequate preparedness and poor organization of emergency services exists in most medical emergencies including road traffic injuries. Evaluation of preparedness and capacity of United States hospitals involved in providing care for mass casualties of September 11th 2001 and Hurricane Katrina in 2005 shows that gaps exist (Pillay, 2010; Akazili, et al, 2008; de Souza, 2009).

In a study conducted by Mock et al (2003), it was observed that human resources, organization and administration of emergency services are critical weak points for care of injured patients especially in low and medium income countries. Another study conducted in Iran (Modaghegh, et al, 2002), reveals shortages of professional staff which form important barriers to efficient organization of emergency services and provision of effective pre-hospital care.

In Uganda, formal organization of emergency services does not exist and shortage of Health workers remains a serious constraint to provision of quality health care in many districts (MOH, 2009). Poor attraction and retention of staff across the country remains critical, coupled with limited funding for recruitment, salaries and wages resulting in low staffing levels of health workers. These are critical issue that could hinder well-organized emergency services. Health facilities located along major high ways are supposed to be top priority institutions to be supported because of their strategic locations to care for mass casualties from road traffic accidents. However, the staffing and funding of health facilities in Uganda does not make consideration of their location.

A study of ten district Highway hospitals in Uganda conducted by Onyachi, et al (2011), shows that all the selected hospitals do not have sufficient physical and technical capacity to handle mass

casualties from road traffic accidents. They lack adequate surge capacity planning, have staffing difficulties and the biggest shortages were with nurses and senior doctors. However, they are able to manage single uncomplicated cases reasonably well. Their weaknesses stem from poor infrastructural design, poor financing, poor staffing, lack of facilities and weak management skills. Onyachi, et al (2011) also observed that hospitals which provide on-site staff accommodation are more capable of mustering and quickly organized to response to mass casualties than those whose staff stays far away.

Similarly, health facilities where most staffs do not reside on-site, have limited capacity to mobilize at short notice. This is because with mass casualties, health facilities tend to use everybody available as a coping strategy for staff shortage, although, not all staffs are trained in handling emergency cases and some may cause more harm than good.

2.4 Knowledge of Health Workers Involved in Managing Road Traffic Accidents Cases

According to Mock et al (2004), knowledge and skills needed for emergency department staffs imply that the staffs (medical, nursing and others) have the requisite training to perform diagnostic and therapeutic activities safely and successfully in the context of emergency. This implies not only the requisite training in their basic education but also continuing education to maintain these skills.

Several studies on injury care capacity in developing countries have shown that many hospitals do not have essential low-cost supplies due to poor planning and lack of knowledge of what is needed to care for road traffic injury patients (Mock, et al, 2003; Joshipura, et al, 2003; Quansah, 2001; London, et al, 2001). Hence, low utilization of several fundamental resources has been documented even when the resources are physically present.

A study conducted Quansah (2001) in Ghana, revealed that little consideration has been given to developing organized emergency systems and training of medical and nursing staff for care of injured patients. In another report, it was observed that some hospitals in Ghana were not able to deliver immediate medical care in road traffic emergencies because the facilities did not have trained doctors and nurses to handle many of the cases arising from road traffic injuries (Sory, 2009).

Similarly, in hospitals handling large volumes of road traffic injury cases, many doctors and nurses providing care have had little training in this field. In a similar study conducted in South Africa, it

was found that many doctors were poorly prepared to deal with medical emergencies (Higgins, et, al, 2004; Dayton, et al, 2008). This is cardinal set back in efficient organization of emergency services.

2.5 Availability of Resuscitation Equipment for Managing Road Traffic Accidents Case

A study by Mock, et al (2004), suggest that major improvement in survival rates and reduced disabilities from road traffic injuries in developed countries could be partly due to the availability of infrastructures, equipment and supplies to care for victims of road traffic accidents. Availability of equipment implies that these items are accessible to all who need them without consideration of ability to pay, especially in life-threatening emergencies. This implies there are physically present in the facility and readily available 24 hours, seven days a week on an ongoing basis.

The stock of infrastructure should include ambulances, community transport system and Emergency Medical service system. They should also include intra-organizational mutual agreements and inter-hospital and supplier memorandum of understanding. These agreements should emphasize the continuity of supplies in emergencies against future payments and the availability of appropriate technological medical devices (National Road Safety Commission, 2007; Branas, et, al, 2003).

In developing countries, many hospitals lack important emergency equipment (Quansah, 2001). For example, a study conducted in Ghana found that most rural hospitals along major roads lack basic resuscitation equipment such as chest tubes and airway equipment. These items are vitally important for the treatment of life-threatening chest injuries and airway obstruction. The main reason for the absence of such vital equipment is a lack of preparedness for care of road traffic injuries.

2.6 General Integration of Literature Review

Preparedness can be achieved in almost every setting and may represent a cost effective mitigation for reducing mortality and morbidity due to road traffic injuries. The capacity of health facilities to respond and rapidly recover from mass casualty incidence is critical for protecting healthcare systems. On the other hand, a strong and resilient Healthcare system is the key to an effective response to event-driven medical emergencies. Similarly, lack of preparedness, poor organization of emergency services, lack of capacity planning as well as inadequate infrastructures can lead to poor outcomes in event of mass casualties (Hirsberg, et, al, 2005).

The results of a study conducted by Roodsari et al (2006), shows great disparity between developed and developing countries' emergency systems and call for international standard for minimum emergency patients care. Also, a study of emergency medical systems in low- and middle- income countries reveals many gaps in global knowledge (Waters, 2004). These gaps reflect the need to understand the epidemiology of conditions that may be addressed by emergency systems and to better understand which interventions may address them adequately.

Uganda situation is aggravated by lack of organized pre-hospital emergency system, where most deaths from road traffic injuries occur in pre-hospital phase of emergency care (Mutoro, et al, 2010). Most importantly, very few patients receive treatment at the scene of accident and only a few are transported to hospital promptly (Sasser, et al, 2005). Transport when available to injured patients, is often provided by untrained members of the public such as taxi drivers and the police who lack the necessary skills to care for injured patients (Kobusingye, et al, 2005). This increases mortality and morbidity due to poor handling of patients.

However, it is important to note that health facility preparedness and development of emergency care systems alone will not decrease overall morbidity and mortality rates due to road traffic injuries (Holde, et al, 2000; Nathens, et al, 2001; Mock, et al, 2006). Other initiatives, such as public education and awareness programs, community participation in injury prevention programs, better road planning and road use practices will play an important role in reversing the trends.

CHAPTER THREE

METHODOLOGY

3.1 Study Design

A descriptive cross-sectional and retrospective study was conducted. Data collection for cross-sectional study took place between August and September 2014. A retrospective study was also conducted to review medical records from July 2013 to June 2014 in six selected health facilities, to determine the prevalence of road traffic accidents cases. The study employed both qualitative and quantitative methods to assess preparedness for mass casualties from road traffic accidents.

3.2 Study Area

The study was conducted in Southwestern Uganda, located towards the boarder of Rwanda and DR Congo. The area is mountainous with undulating landscape and has sub-equatorial climate. The region has a mean annual temperatures range of 16⁰C to 30⁰C, and rainfall of 750 mm to 2100 mm annually (UBS, 2002). The main occupation is predominantly subsistence farming including animal husbandry. The major food crops include matooke, potato and beans.

This region is linked with several road networks. One of the major road networks in the region is Mbarara – Kasese road which provides direct access to five districts and bears constant heavy cargo traffic to the landlocked DR Congo. The districts linked by this road include Mbarara, Bushenyi, Sheema, Rubirizi and Kasese districts. The common mode of transport on this road is by commercial buses, taxis and motorcycles which are often poorly maintained. Most drivers on this road are noted for reckless driving and over speeding. This may be a reason for increase in road traffic incidence in the region, which has one of the highest rates in Uganda (Uganda Police Report, 2011).

Health facilities located within 5km along Mbarara-Kasese road include three Government funded health facilities, one private for profit health facility and two private not for profit health facilities. The government funded facilities includes Kabwohe health center IV, Bushenyi health center IV and Rugazi health center IV. Others include Kampala International University Teaching hospital (private for profit health facility) and Ishaka Adventist hospital plus Comboni hospital (both private not for profit health facilities). The most recent of these facilities is KIU Teaching hospital which was opened to public use in 2007.

3.3 Study Population

The study targeted health workers involved in handling casualties from road traffic accidents in all hospitals and health centers IV located within 5 kilometers proximity along Mbarara-Kasese road. These include Doctors, Nurses and Clinical officers who work in emergency departments, outpatients departments and surgical wards.

Health facilities targeted for the study are spread over three districts including Bushenyi, Sheema, and Rubirizi districts, with an estimated population of 1,209,377 people (UBS, 2011). These districts are populated by the Banyankole, the Bankozo, the Bakiga, the Baganda and the Batoro.

3.4 Sample Size Determination

The desired sample size was determined using Kish and Leslie's formula (Kish and Leslie, 1965):

$$n = \frac{z^2 p (1-p)}{d^2}$$

Where: n = desired sample size

z = Standard deviation taken as 1.96 at confidence level of 95%

P = the proportion of health workers in highway hospitals in Uganda which are assumed to have adequate capacity to manage uncomplicated cases of road traffic injuries, estimated at 87% (Onyachi, et al, 2011).

$$q = 1 - P (1 - 0.87) = 0.13$$

d = the degree of accuracy desired (using 5% precision) = 0.05

Hence,

$$n = \frac{1.96^2 \times 0.87(0.13)}{(0.05)^2} = \frac{3.8416 \times 0.1131}{0.0025} = \frac{0.43448496}{0.0025}$$

$$n = 173.793984$$

Therefore, 173 participants were selected for the study.

3.5 Sampling Procedure and Technique

The techniques for selecting participants include purposive sampling, simple random sampling and proportionate sampling. The study also reviewed medical records in selected health facilities to collect data on prevalence of road traffic injuries.

All hospitals and health centers IV along Mbarara – Kasese road were purposively selected for the study due to their strategic locations, which provide easy access to casualties of road traffic injuries. The choice of health facilities on this road was informed by personal experience of researcher, on the rate of injuries admitted in one of the selected hospitals where the researcher once served.

Simple random sampling technique was used to select individual participants in each of the selected health facility. This involved the use of simple ballot. The method comprise use of pieces of papers written ‘Yes’ and ‘No,’ which were folded and placed in a small plastic container. Participants were approached in their offices in OPD, Emergency units and surgical wards and instructed to pick only one piece of paper and read what is written on it. Participants who pick ‘Yes’ were included in the study while those who pick ‘No’ were excluded from the study. This process continued until the desired sample size was achieved.

A total of 173 participants were selected for the study, comprising of doctors, nurses and clinical officers involved in managing road traffic injuries. To ensure equal representation in the study, proportionate sampling technique was used to determine the number of participants to be selected in each of the health facilities. The table below shows staffing levels of selected health facilities and required number of participants selected from each facility. This was based on information obtained from the selected health facilities.

Health facility	Staffing level	Proportion (%)	Required Participants (n)
KIU Hospital	211	44	76
Adventist Hospital	80	17	29
Comboni Hospital.	76	16	28
Rugazi Health Center IV	45	9	16
Kabwohe Health Center IV	30	6	10
Bushenyi Health Center IV	36	8	14
Total	478	100	173

Table 1: Proportion of participants based on staffing levels

The study reviewed medical records from July 2013 to June 2014 to collect data on prevalence of road traffic injuries in selected health facilities. Also, Ministry of Health and World Health Organization basic trauma care requirement (Appendix VII) was adopted as checklist to collect qualitative data by direct observation in selected health facilities.

Interviews were conducted for key informants in selected health facilities. Respondents for key informants' interview were purposively selected and comprised of medical superintendents or their deputies, Heads of departments or nurse In-charges of emergency departments, Outpatient departments and surgical wards.

3.5.1 Inclusion criteria

The study included all health workers in emergency department, outpatient department and surgical ward in each of the selected health facilities.

3.5.2 Exclusion criteria

Health workers in emergency department, outpatient department and surgical ward, who were on leave or away from their duty stations during the period of data collection, were excluded from the study. The study also excluded all those who were too busy and could not consent to participate.

3.6 Data Collection Instruments and Methods

Data collection instruments used for the study include interview guides for key informants, checklist for review of medical records, observation guides and interviewer administered questionnaire.

Questionnaire: The study used interviewer administered questionnaires containing structured questions, printed in English language in easy to read and understand format. This was administered to participants personally by researcher and research assistant that was trained and supervised for data collection. This instrument yielded quantitative data.

Interview guide: Interview guides consisting of semi-structured and open ended questions were used for key informant interviews. Key informant interviews give a broad view on the study from a cross section of respondents. This yielded qualitative data.

Medical record review tool: The study reviewed medical records to obtain data on prevalence of road traffic injuries in selected health facilities (Appendix VI). The study also adopt Ministry of Health and World Health Organization basic trauma care requirement (Appendix VII), as checklist

to collect data by direct observation in selected health facilities. This yielded qualitative data obtained through direct observation by the research team.

3.7 Data Quality Control

To ensure reliability and accuracy, research instrument was pre-tested at Kitagata hospital outside the study area using 5% of desired sample size. The questionnaires were then edited accordingly.

Different methods were used for data collection to ensure validity and reliability of data and research findings. These included direct observation by use of observation guide, checklists for constant comparison, key informant interviews and use of interviewer administered questionnaires.

Also, data collection process was supervised to check for completeness and clarity before leaving the field. This was to ensure that incompletely filled questionnaires were completed by respondents before leaving the field. One research assistant was hired, trained and supervised for data collection to avoid bias and ensure accuracy.

3.8 Data Processing, Analysis and Interpretation

Raw data was sorted, coded and entered in the computer using SPSS data editor for data cleaning, to check for missing values, out layers and logic errors before analysis. Analyzed data was displayed in form of Charts, graphs and frequency distribution tables, which formed the basis for interpretation, discussion and conclusion. The following statistical methods were used to analyze the data:

3.8.1 Quantitative Data Analysis

The study utilizes mainly descriptive statistics to analyze variables using two levels of statistical methods (univariate and bivariate analysis) to assess the preparedness of health facilities for casualties from road traffic accidents.

Univariate analyses: This was used to analyzed and summarized socio-demographic variables into numeric and categorical data. Numerical data were further summarized using mean, median and standard deviations while categorical data were analyzed using percentages and proportions.

Univariate analysis was also used to summarize data obtained from review of medical records to determine the prevalence of road traffic accidents cases received in selected health facilities. This was estimated by using the absolute numbers of road traffic accidents cases presenting in the

selected health facilities as proportions or percentages of the number of other injuries received in these facilities within the study period.

Bivariate analysis: This was used to measure the influence of various independent variables on dependent variable. It involved analyzing two variables at a time (one independent and dependent variable). This was used to analyze the multiple variables determining organization of emergency services. Correlation test was done to determine associations between these variables and P-values ($P < 0.05$) were taken as significant to measure the associations.

3.8.2 Qualitative Data Analysis

Descriptive statistic was used mainly to describe the views of respondents to produce patterns of similarities and divergence of opinions. Data obtained from key informant interviews was decoded from tape recorder and transcribe into text using Microsoft word office 2007. This was compared with researchers notes obtained during interviews to analyzed the expressed opinion of respondents.

Also, univariate analysis was used to summarize data obtained through direct observation and review of medical records into percentages and proportions, to determine the prevalence of road traffic accidents cases received in selected health facilities. Measurable estimate was obtained by using absolute numbers of road traffic accidents cases as a proportion of the total injuries received in selected facilities within the study period. This formed the basis of analysis, interpretations and conclusions.

3.9 Ethical Consideration:

Institutional approval was obtained from Kampala International University Institutional Review Board (IRB) for permission to conduct the study. Also, a letter of introduction was obtained from School of Allied Health Sciences to the heads of selected health facilities.

Privacy and confidentiality: Privacy was provided during data collection. Participant were assured that all data obtained will be kept confidential and their names were not needed in data collection and writing of report. They were also assured that information provided was strictly for the purpose it was collected. Results from respective Health facilities were described anonymously to mask the names of respective health facility. However, respondent may be able to identify their individual responses.

Risk and benefit: The study did not involve invasive procedures to be performed on participants so there was no risk encountered. However, participants were assured of safety and disclosure of their identity was avoided to minimize the risk of volunteering information for the study.

Informed consent: Written informed consent was obtained from all participants following detailed explanation of the purpose of the study. Participants were allowed to express their views about the study and they were informed of their rights to refuse to consent, or withdraw from the study at any time they so wish without any penalty.

Autonomy: The rights of participants were assured. Autonomy and right of participants to refuse to consent or give any information they feel uncomfortable with was also guaranteed.

Justice: Justice was ensured in selection of respondents. All emergency departments and outpatient departments' staffs (Nurses, Doctors and Clinicians) were given equal opportunity to participate.

3.10 Limitations and Delimitations of the Study

The limitations of this study include weakness of medical records on some of the aspects needed to analyze prevalence of road traffic injuries, making it impossible to study and compare all the variables in all the selected health facilities.

Another limitation was that information about level of knowledge and training of staff involved in handling road traffic accidents cases was self-reported and could be subject to bias.

Also, the study focused on preparedness of health facilities based on the experiences and perceptions of hospital administrators and medical staffs (doctors, nurses and clinicians) who attend casualties from road traffic accidents. The study did not reflect the views of personnel involved in pre-hospital care.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Demographic Description of the Sample

Data was collected from 173 respondents (doctors, clinicians and nurses). Participants were aged 18–58 years; with age group 18-28 accounting for 49.7% of the study population. A greater proportion (48%) of respondents was single and 56.1% had attained tertiary level of education (Diploma). Most respondents were nurses (62.5%), while clinical officers accounted for 24.9% and doctors 12.7%. About 59.5% of respondents had between 1-5 years of work experience (Table 3).

Parameters		Values (n = 173)	
Age (years)	18-28	86	(49.7%)
	29-38	69	(39.9%)
	39-48	11	(6.4%)
	49-58	7	(4.0%)
Sex	Male	72	(41.6%)
	Female	101	(58.4%)
Occupation	Doctor	22	(12.7%)
	Clinical officer	43	(24.9%)
	Nurse	108	(62.4%)
Work experience (in years)	1-5	103	(59.5%)
	6-10	54	(31.2%)
	11-15	11	(6.4%)
	16 and above	5	(2.9%)
Education Level	Master degree	1	(0.6%)
	Bachelor	23	(13.3%)
	Diploma	97	(56.1%)
	Certificate	52	(30.1%)
Tribe	Muyankole	87	(50.3%)
	Muganda	26	(15.0%)
	Mukonzo	18	(10.4%)
	Mushiga	18	(10.4%)
	Others	24	(13.9%)
Marital status	Married	82	(47.4%)
	Single	83	(48%)
	Widow	5	(2.9%)
	Divorce	1	(0.6%)
	Separated	2	(1.2%)
Religion	Catholic	55	(31.8%)
	Protestant	69	(39.9%)
	Muslim	16	(9.2%)
	Born again	10	(5.8%)
	Adventist	23	(13.3%)

Table 3: Social demographic information for cross sectional study

4.2 Prevalence of RTA in 6 study sites for one year (July 2013 to June 2014)

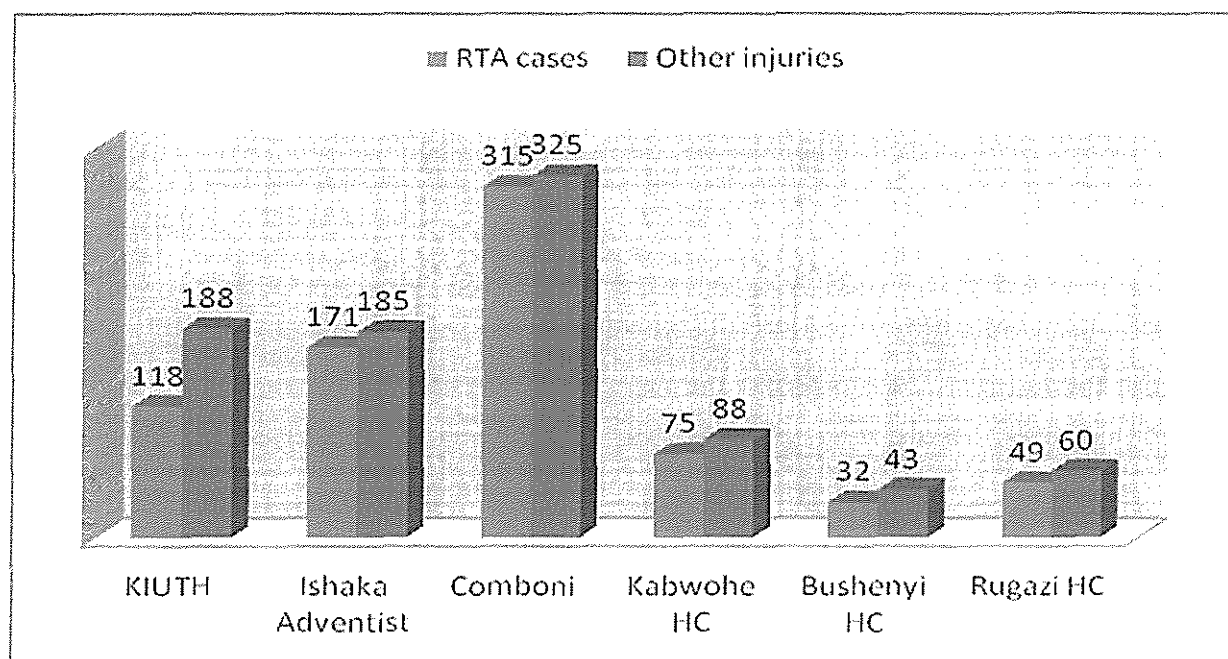
A total of 1650 cases of injuries were reported in the six selected health facilities between July 2013 and June 2014. Road traffic accidents cases were 760(46%) and other injuries were 890(54%) cases. Most cases of RTA were recorded in Comboni hospital 315(49.1%), while Ishaka Adventist hospital and KIU teaching Hospital received 171(48.0) and 118(38.6%) of RTA respectively. Among health centers IV, most cases were seen in Kabwohe HCIV (75 cases) representing 46% of injuries cases received (Table 4).

Table 4: One year prevalence of RTA in six selected health facilities (July 2013-June 2014)

Health facility	RTA cases received	Other injuries received	Total injuries received	Proportion of RTA in each facility (%)
KIU-Teaching Hospital	118	188	306	38.6
Ishaka Adventist Hospital	171	185	356	48.0
Comboni Hospital	315	325	641	49.1
Kabwohe HC IV	75	88	163	46.0
Bushenyi HCIV	32	43	75	42.6
Rugazi HCIV	49	60	109	44.9
Total	760	890	1650	

The key informants report confirmed that RTA figures were high compared to other injuries received in their respective facilities, and that RTA exerts a significant burden on health facilities.

Figure II: Distribution of RTA and other injuries in six selected health facilities



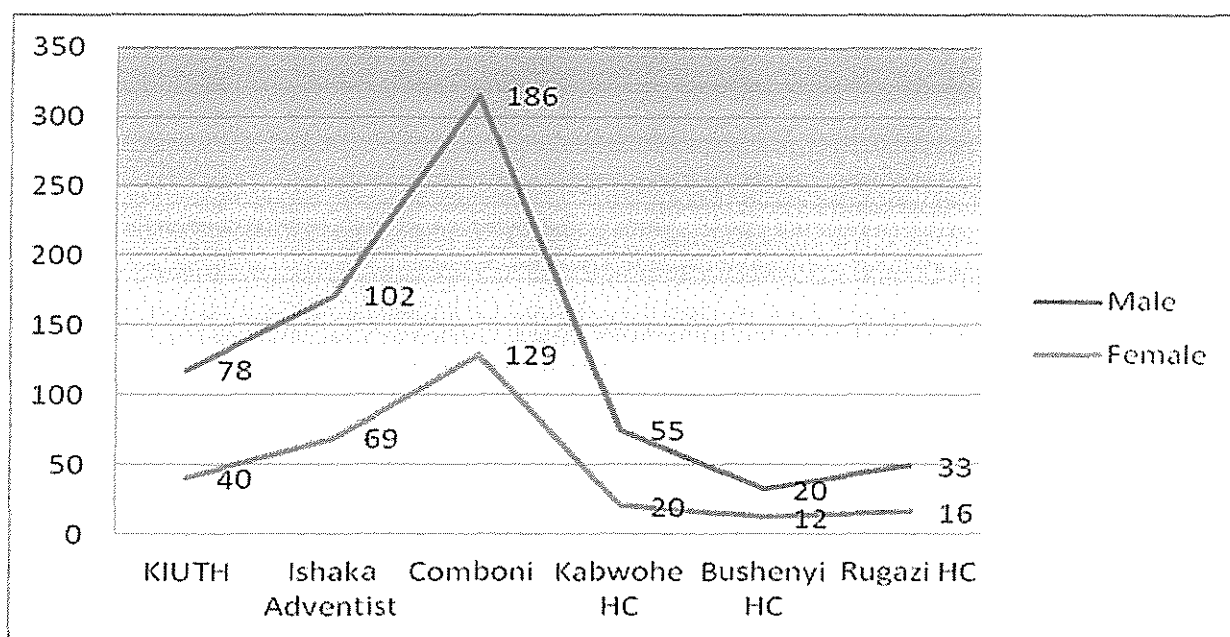
From figure II, Comboni hospital received proportionately higher cases of RTA 315(49.1%) compared to other health facilities. Ishaka Adventist hospital received 171cases of RTA representing 48% of injuries received in the health facility, while KIU teaching hospital received 118(38.6%) of injury cases received in the health facility during the study period.

Table 5: Proportion of RTA in 6 six selected health facilities by age

Parameters		Frequency	Percentage (%)
Age in years	Under 5	118	15.5
	5 – 17	209	27.5
	18 – 35	219	28.8
	36 – 49	131	17.2
	50 and above	84	11.0
	Total	760	100

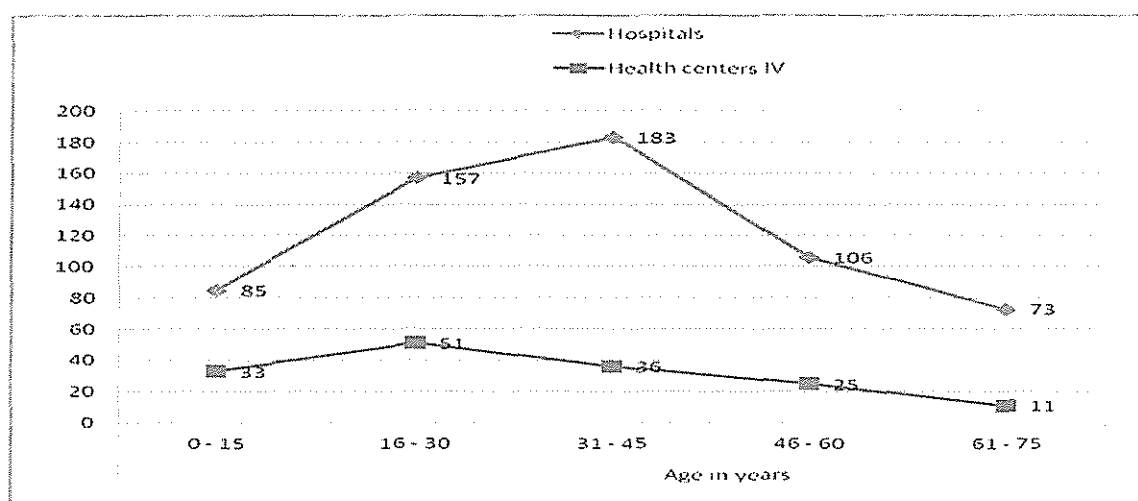
A total of 219(28.8%) cases of RTA were reported in age group 18-35 years, 209(27.5%) cases in age group 5-17 years while 131(17.2%) were reported in age 36-49 years (Table 5).

Figure III: Distribution of RTA cases in 6 selected health facilities by sex



Male casualties constituted the highest percentage (62.4%) of RTA cases received in six selected health facilities. Female casualties were 37.6% (Figure III).

Figure IV: Comparison of RTA prevalence in hospitals and Health centers IV



Majority of cases (79.5%) were received in hospitals, while 20.5% of cases were received in Health centers IV. The larger percentage received in hospitals were age 31-45 years, while 51 cases age 16-30 was the highest figure in Health centers IV.

4.3 Organization of emergency services and preparedness of health facilities

Most health facilities (69.4%) lack emergency services committee. Seventy five percent of selected health facilities have no provision for regular staff training in emergency care. Twenty five of the facilities have no phone contact to call in emergency, no functional theatre and no surgical team to handle emergency surgery (Table 6).

Table 6: Organization of emergency services and preparedness of health facilities

Parameters	Responses (n = 173)	
	YES	NO
Have emergency service committee	53 (30.6%)	120 (69.4%)
Have surgical team to handle emergencies	130 (75.0%)	43 (25.0%)
Have qualified staff for 24hrs duty coverage	145 (83.8%)	28 (16.2%)
Have a functional theatre	130 (75.0%)	43 (25.0%)
Regular training in emergency care	43 (25.0%)	130 (75.0%)
Availability of emergency drugs and supplies	135 (78%)	38 (22%)
Have emergency contact number displayed	130 (75.0%)	43 (25.0%)

Majority of the key informants admitted that their facilities were lacking in terms of organization of emergency services. However, the selected health facilities can manage single cases of moderate to severe road traffic injuries successfully, while severe case such as head injuries are referred due to lack of expertise in managing them.

"I hope someday we shall get there. For the past two years, I have pushed for the building of a trauma theatre but management is not giving it the seriousness it deserved. My first trauma was when I watch a patient die, not because I din't know what to do but because I din't have what to use. The time spent in trying to refer the patient as the only option also adds to his death because there was no ambulance to carry the patient" [Respondent, Bushenyi HCIV]

4.3 Self-reported knowledge of staff handling cases of road traffic accidents

Majority of respondents have good knowledge; in assessment of airway compromise (52.2%), airway maneuvers (50%), in the use of Bag Valve Mask to resuscitate a patient (54.9%) and in the use of oxygen equipment (63.6%). However, 74% have never performed endotracheal intubation (Table 7).

Table 7: Self-reported knowledge of staff handling cases of RTA

Parameters	Responses (n = 173)			
	Very good (%)	Good (%)	Fair (%)	Never done (%)
Asses airway compromise	34.1	52.6	13.3	0.00
Airway maneuvers	21.0	50.0	24.9	2.1
Insertion oral airway	22.5	49.1	33.1	5.2
Use suction equipment	37.0	47.4	14.5	1.2
Assisted ventilation VBM	22.0	54.9	22.5	0.6
Cardio-pulmonary resuscitation	16.8	48.0	26.0	9.2
Endotracheal intubation	2.9	5.8	16.8	74.6
Use of oxygen equipment	63.6	33.5	2.9	0.00

4.4 Availability of equipments in 6 study sites

Data was collected by direct observation, using a checklist adopted from WHO and MOH (appendix IV). All the selected health facilities have a functional laboratory services, running water and electricity. Fifty percent of the health facilities have medical ambulances (though, inadequately equipped). Most health facilities have required stock of emergency drugs and supplies as at the time of visit.

Table 8: Availability of resuscitation equipment in six selected health facilities

Parameters		values	
		Present (%)	Absent (%)
Basic Infrastructures	Functional ambulance	33.3	66.7
	Functional blood bank	50.0	0.00
	Investigation services	100.0	00.0
	Functional theatre	50.0	50.0
	Electricity or solar	100.0	0.00
	Running water	100.0	00
Resuscitation equipments	Oral or nasal airway	83.3	16.7
	Suction device	83.3	16.7
	Suction tubing/catheters	83.3	16.7
	Laryngoscope and blades	83.3	16.7
	Endotracheal tubes	83.3	16.7
	Bag valve mask	83.3	16.7
	Basic emergency pack	66.6	33.4
	Oxygen equipment	100.0	55.5
Appropriate drugs and supplies	Dexamethasone (or equivalent)	100.0	0.00
	Pethidine (or equivalent)	100.0	0.00
	Amoxicillin, (or equivalent)	100.0	0.00
	Metronidazole (or equivalent)	100.0	0.00
	Frusemide (or equivalent)	100.0	0.00
	Mannitol	50.0	50.0
	Epinephrine, Adrenaline	66.7	33.3
	Various intravenous fluids	100.0	0.00
	Adequate stock of gloves	83.3	16.7

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Prevalence of RTA in 6 Selected Health Facilities

The study finding shows that the prevalence of road traffic accidents was high in the six selected health facilities for the period under review (July 2013 to June 2014). A total of 760 cases of road traffic accidents (RTA) were received in the 6 selected health facilities representing 46.1% of all injuries received in the same period. According to the views of key informants, the prevalence of road traffic injuries was high compared to other injuries received in the respective health facilities. This exerts a significant burden on health facilities especially, in terms of drugs and hospital consumables.

It was not surprising to find that males and youths constituted the highest proportion of road traffic accident cases received in the selected health facilities. This is consistent with the study conducted by Krug (2002), which reveals that road traffic injuries constitutes a major public health burden globally, accounting for 1.2 million deaths and 15 million injuries yearly.

Another significant finding is the age disparity among the casualties received in these facilities; age groups 18-35 and 5-17 years seem to bear the heavier burden of road traffic injuries. The study revealed that these age groups bear the greater burden of disease from road traffic injuries received in the selected health facilities. This comprised of youths and economically viable and productive class (Table 4). This finding is in collaboration with the study conducted by Odero, et al (2003), which reveals that the youths and socio-economically disadvantaged groups tend to experiences disproportionately higher road traffic injuries and fatality rates.

Perhaps, males and the youths tend to experience more road traffic accidents because they are more likely to make adventures than their female counterparts. Most males are commercial bus drivers and are more likely to take more risk and more likely to drive longer distances than their female colleagues. All these can make males more prone to traffic accidents than females.

In another study conducted by Nantulya, et al (2003), it was also observed that males in their economically productive years tend to experience more road traffic injuries than their female counterparts. According to their report, this has enormous impact on global, national and household

economies. Their findings are consistent with this study where a large proportion of casualties received in six selected health facilities were male casualties.

5.2 Organization of Emergency Services and Preparedness for Mass Casualties

The study revealed that most health facilities located along Mbarara-Kasese road were not prepared for mass casualty from road traffic accidents. The selected health facilities were lacking in some basic organizational requirements for emergency services. For example, 25% of the selected health facilities have no functional theatre and no surgical team in place to handle emergency surgery.

The bane of the problem is that some hospital administrators do not take matter of traffic injuries seriously. Road traffic injuries can exert enormous impact on hospital resources in terms of infrastructure, equipment, drugs and hospital supplies, but some managers tend to pay deaf ears to planning and establishing emergency management services.

This finding collaborate the revelation made by Pillay (2010) and Akazili, et al (2008), that globally, inadequate preparedness and poor organization of emergency services exists in most medical emergencies including road traffic accidents. In evaluation of preparedness and capacity of United States hospitals involved in providing care for mass casualties of September 11th and Hurricane Katrina, they found that gaps still exist in preparedness for mass casualties.

Majority of the selected health facilities have no provision for staff training in emergency care. Only one health facility among the six study sites have emergency service committee in place and emergency plan well communicated to relevant staff. Most of the health facilities do not have phone contact to call in emergency.

Effective communication system will aid the flow of information within the health facilities staffs and between health facilities in case there is need for referral as well as enable potentials clients to get help in time in events of accident. Hence, health facilities are supposed to display their emergency help lines to the public. This is lacking in most of the selected health facilities. These findings are consistent with a study conducted by Mock et al (2003), which revealed that organization and administration of emergency services are critically weak points for care of injured patients especially in Low and Medium income countries.

However, despite inadequacies in organization of emergency services, the study found that all the six selected health facilities can manage uncomplicated road traffic injuries successfully. According to the views of key informants three of the selected health facilities (KIU hospital, Ishaka Adventist and Comboni hospital) can manage single cases of moderate to severe road traffic injuries successfully. However, severe cases such as head injuries are referred due to inadequate facilities and lack of expertise in managing them.

In a study of ten district Highway hospitals in Uganda conducted by Onyachi, et al (2011), they observed that all the selected highway hospitals did not have sufficient physical and technical capacity to handle mass casualties from road traffic accidents. However, they were able to manage single uncomplicated cases reasonably well. Their study also reveal that highway hospitals in Uganda lack adequate surge capacity planning and have staffing difficulties especially with nurses and surgeons. This is cardinal set back in efficient organization of emergency services.

This is consistent with the views of key informants in this study. They expressed the view that all the six selected health facilities have enough staff to cover 24 hour duties. However, some of the facilities lack trained staff such as surgeons to handle emergency surgery. Hence, only one of the six selected health facilities have a trauma theatre separate from the general theatre. Also, in a similar study conducted in South Africa, it was found that many lack qualified doctors, and those available were poorly prepared to deal with medical emergencies (Higgins, et, al, 2004; Dayton, et al, 2008).

5.3 Knowledge of Staff Handling Cases of Road Traffic Accidents

Majority of respondents have good knowledge in assessment of airway compromise, airway maneuvers, use of Bag Valve Mask to resuscitate patients and use of oxygen equipment. However, 9.2% of respondents lack knowledge of Cardio-Pulmonary Resuscitation and a vast majority have never performed endotracheal intubation (Table 7).

This is in contrast to a study conducted in Ghana, where it was observed that some hospitals were not able to deliver immediate medical care in road traffic emergencies because the facilities did not have trained doctors and nurses to handle cases arising from road traffic injuries (Sory, 2009).

Similarly, in another study conducted by Quansah (2001), it was also observed that in some hospitals in Ghana handling large volumes of road traffic injury cases, many doctors and nurses providing care had little or no training in this field. This is also in contrast to the finding of this study where

majority of the staff handling cases of road traffic accidents have good knowledge of most of the emergency procedures (Table 7). However, in the study by Quansah participants were subjected to a written assessment test while in this study is a self assessed knowledge by participants.

5.4 Availability of Equipments for Care of Road Traffic Injuries

Three of the six selected health facilities have medical ambulances which are inadequately equipped. Two health facilities have no functional blood bank and one health facility lacks all required resuscitation equipment. However, most health facilities have required stock of emergency drugs and supplies and three of the selected health facilities have a functional laboratory services, running water and electricity or generating set. According to some key respondent interviewed, health facilities are faced with the problem of poor funding which affect the state of infrastructures and equipments.

There is a difference between having equipment in the store and having them accessible to all staff in the unit. Most health facilities have some of the basic equipment. However, some others are in deplorable conditions especially health facility 5 which lacks most of the basic equipments.

This finding is consistent with the study by Quansah (2001), who observed that in developing countries, many hospitals lack important emergency equipment. He further revealed that in Ghana most rural hospitals along major roads lack basic resuscitation equipment such as chest tubes and airway equipment. The main reason for the absence of such vital equipment is a lack of preparedness for care of road traffic injuries.

CONCLUSION

The prevalence of road traffic accidents was high in the six selected health facilities for the period under review (July 2013 to June 2014). This translate to a year prevalence of 46.1% (760) of road traffic accidents cases among 1650 cases of injuries received in 6 selected health facilities. This exerts a significant burden on health facilities especially, in terms of drugs and supplies. Males and youths constituted the highest proportion of road traffic accident cases received in the selected health facilities.

The study also revealed that most health facilities located along Mbarara-Kasese road were not prepared for mass casualty from road traffic accidents. The selected health facilities were lacking in some basic organizational requirements for emergency services. For example, 25% of the selected health facilities have no functional theatre and no surgical team in pace to handle emergency surgery. Also, most of the selected health facilities lack emergency service committee and have no provision for staff training in emergency care.

However, despite inadequacies in organization of emergency services, the study found that all the six selected health facilities can manage uncomplicated road traffic injuries successfully. According to the views of key informants three of the selected health facilities can manage single cases of moderate to severe road traffic injuries successfully, while severe cases such as head injuries are referred due to inadequate facilities and lack of expertise in managing them.

Generally, the knowledge of staff on emergency procedures was good. It was found that majority of respondents have good knowledge in assessment of airway compromise, airway maneuvers, use of Bag Valve Mask to resuscitate patients and use of oxygen equipment. However, some respondents lack knowledge of Cardio-Pulmonary Resuscitation and a vast majority have never performed endotracheal intubation.

Availability of resuscitation equipment in six selected health facilities was directly observed. The study found that most of the six selected health facilities have no medical ambulances and the few available were inadequately equipped. Also some of the health facilities have no functional blood bank. However, most health facilities have required stock of emergency drugs and supplies.

RECOMMENDATIONS

1. The following measures are recommended for immediate implementation:

- a. The management of affected health facilities should form emergency service committees to be headed by a surgeon and two members from each department of the hospital. Where there is no surgeon, a medical officer should head the committee.
- b. There should be regular training and re-training of health personnel in emergency patient care through continuous professional development (CPD). This will enhance their skill in managing casualties from road traffic accidents.
- c. There is need for management to enhance effective communication flow within the facility and the community or prospective clients including providing a phone directory and contact list for staffs and displaying emergency contact numbers for prospective clients to call in emergency.

2. Further measures are recommended

- a. Given the high prevalence of road traffic accidents, health facilities located along Mbarara – Kasese road should be top priority institutions to be supported by government because of their strategic locations. This will enhance their capacity and preparedness to care for mass casualties from road traffic accidents.
- b. A surgical team should put in place to handle emergency surgery. This also implies that affected health facilities should endeavor to have a functional operating theatre attach to the emergency unit. This will mitigate the burden of traffic injuries on the facility and the community at large.
- c. There is also the need for health facilities to make provision to acquire some basic equipment such as ambulances and resuscitation equipments. Resuscitative equipment should be readily available in the accident and emergency unit.
- d. Further enquiry to reflex the views of personnel involved in pre-hospital care to determine how patients are handled at the scene of accident and how they are transported to health facilities and the subsequent outcome of their care.

REFERENCES

- Akazili, J., Adjuik, M., Chatio, S., Kanyomse, E., Hodgson, A., Aikins, M., and Gyapong, J. (2008). What are the Technical and Allocative Efficiencies of Public Health Centres in Ghana? *Ghana Med J* 42(4):149-155.
- Ameratunga, S., Norton, R., Bennett, D., Jackson, R. (2004). Risk of disability due to car crashes: a review of the literature and methodological issues. *Injury* 2004; 35: 1116-1127.
- Astrom, J., Kent, M.P. and Jovin, R. D. (2006) Signatures of Four Generations of Road Safety Planning in Nairobi, Kenya: *Journal of Eastern African Research/Development*. Vol 120 pp. 186-201.
- Bahadori, M. (2011). Prioritization of Determinants influencing preparedness of Iranian Pre-hospital Emergency Services. *Iran J Crit Care Nurs*. 2011;4(2):73–8.
- Bahadori, M., Nasiripur, A., Tofighi, S., Gohari, M. (2010). Emergency medical services In Iran: An Overview. *Aust Med J*. 2010;6:335–9.
- Barbisch, D. and Koenig, K.L. (2006). Understanding surge capacity: essential elements. *Acad Emerg Med*. 2006;13:1098–1102.
- Bazzoli, G.J., Harmata, R., Chan, C (1998). Community-based trauma systems in the United States: an examination of structural development. *Social Sc and Med*. 1998;46(9):1137–49.
- Black, J. and Davies, G.D. (2005). International EMS systems: United Kingdom. *Resuscitation*. 2005;64(1):21–9. doi: 10.1016/j
- Branas, B., Gomez-Bajo, G. J., Rodriguez, L. F., et al (2003). Hypothermia and Burns: A meta-analysis. *Annals of Burns and Fire Disaster* Vol XVI Nr 2, 2003.
- Cater, N., Walker, P., eds (1998). *World Disasters Report*. Somerset: Oxford University Press, 1998.
- Coats, T.J. and Davies, G. (2002). Prehospital care for road traffic casualties. *Bmj* 2002, 324(7346).
- Davis, J., Kuhns, R., Watson, D.J. (2004). Evaluating emergency medical services: controlling the rising costs of saving lives.” *J Health Hum Serv Adm* 2004;26(4):485-513.
- Dayton, C., Ibrahim, J., Augenbraun, M. et al (2008). Integrated Plan to Augment Surge Capacity: *Journal of Pre-hospital and Disaster Medicine* 2008;23(2):113-119
- Dick, W.F (2003). Anglo-American vs. Franco-German emergency medical services system.” *Prehosp Disaster Med* 2003;18(1):29-37.
- Elvik, R. and Vaa, T (2004): *Handbook of road safety measures*. Amsterdam Elsevier; 2004.

Global Forum for Health Research (2002). 10/90 report on health research 2002. Geneva: Global Forum for Health Research; 2002.

Gnatz ,S. and Munch, I (2002). Should a Specialty Hospital Prepare for Community Disaster? 2002, *The First 72 Hours*. 2004; 6: 73-77. In: O’Leary, M, ed. www.iuniverse.com

Henriksson, E., Ostrom, M., Eriksson, A (2001). Preventability of vehiclerelated fatalities. *Accid Anal Prev* 2001, 33(4):467-75.

Hick, J.L., Barbera, J.A., Macintyre, A.G., Kelen, G.D (2009). Refining surge capacity: conventional, contingency, and crisis capacity. *Disaster Med Public Health Preparedness*. 2009; 3:S59–S67.

Hick, J.L., Koenig KL, Barbisch D, et al (2008). Surge capacity concepts for health care facilities: the CO-S-TR model for initial incident assessment. *Disaster Med Public Health Preparedness*. 2008;

Higgins, W., Wainright, C., Lu, N., Carrico, R. (2004). Assessing hospital preparedness using an instrument based on the Mass Casualty Disaster Plan Checklist: *American Journal of Infection Control*, 2004; 32(6): 327-332.

Hirsberg, A., Scott, B. G., Granchi, T., Wall, M. J.Jr., Mattox, K. L., Stein, M. (2005). How does casualty load affect trauma care in urban bombing incidents? *Journal of Trauma*.2005; 58(4).

Hofman, K., Primack, A., Keusch, G., Hrynkow, S (2005). Addressing the growing burden of trauma and injury in low- and middle income countries. *Am J Public Health* 95:13–17

Holder, Y., Peden, M., Krug, E. et al (eds) (2001). *Injury Surveillance Guidelines*. Geneva, World Health Organization, 2001.

Jacobs, G., Aaron-Thomas, A., Astrop, A (2000). Estimating global road fatalities (TRL report 445). London: Transport Research Laboratory, 2000.

Joshipura, M.K., Shah, H.S., Patel, R.P., Divatia, P.A., Desai, P.M (2003). Trauma care systems in India. *Injury* 2003;34:686-92.

Kaji, A., Koenig, K.L., Bey, T (2006). Surge capacity for healthcare systems: a conceptual framework. *Acad Emerg Med*. 2006; 13:1157–1159

Kelen, G.D., McCarthy, M.L (2006). The science of surge. *Acad Emerg Med*. 2006; 13:1089–1094.)

Kopits, E and Cropper, M (2003). Traffic fatalities and economic growth (Policy Research Working Paper No 3035). Washington, DC: The World Bank, 2003.

Krug, E., Sharma, G., Lozano, R (2000). The global burden of injuries. *Am J Public Health* 2000; 90:523-6.

Krug, E., (2002). How can road safety be improved? *The British medical journal*. 324, 1116, retrieved from <http://mjjournal.com/cgi/content/full/324/7346/1116>

Lagarde, E (2007). Road traffic injury is an escalating burden in Africa and deserves proportionate research efforts. *PLoS medicine*. 2007 Jun;4(6):e170.

Lerner, E.B., Nichol G, Spalte DW, Garrison HG, Malo RF (2007). A comprehensive framework for determining the cost of an emergency medical services system." *Ann Emerg Med* 2007;49:304-313.

London, J.A., Mock CN, Quansah RE, Abantanga FA (2001). Priorities for improving hospital-based trauma care in an African city. *Journal of Trauma* 2001;51:747-53.

London, J., Mock, C., Abantanga, F. A (2002). Using mortuary statistics in the development of an injury surveillance system in Ghana. *Bul of World Health Organization*. 2002; 80 (5): 357 – 364.

Ministry of Health of Uganda (MOH) (2009). Annual Health sector performance, 2009/2010 Report

Mock, C., Arreola-Risa, C., Quansah R (2003). Strengthening care for injured persons in less developed countries: a case study of Ghana and Mexico. *Injury Control and Safety Promotion* 2003;

Mock, C., Lormand, J.D., Goosen, J., Joshipura, M., Peden, M (2004). Guidelines for essential trauma care. Geneva, World Health Organization, 2004

Mock, C., Peden, M., Joshipura, M., Goosen, J (2002). Report on the consultation meeting to develop an Essential Trauma Care programme. World Health Organization [WHO/NMH/VIP/02.09)

Mock, C.N., Nguyen, S., Quansah, R., Arreola-Risa, C., Viradia, R., Joshipura, M (2006). Evaluation of trauma care capabilities in four countries using the WHO-IATSIC Guidelines for Essential Trauma Care." *World J Surg* 2006;30:946-956.

Mock, C.N., nii-Amon-Kotei, D., Maier, R.V. (2007). Low utilization of formal medical services by injured persons in a developing nation: health service data underestimate the importance of trauma. *J Trauma* 42:504–513

Modaghegh, M.H., Roudsari, B.S., Sajadehchi, A (2002). Prehospital trauma care in Tehran: potential areas

Mohan, D (2002). Road safety in less-motorized environments: future concerns. *Int J Epidemiol* 2002; 31: 527-532.

Mohan, D., Tiwari, G., Khayesi, M., Nafukho, F.M (2006). Road Traffic Injury Prevention: Training Manual. Geneva: World Health Organization; 2006.

Mullen, P (2002). The Role of EMS in Municipal Emergency Management. *The First 72 Hours*, 2004;18:222-240. In: O'Leary, M, ed.

Nantulya, V.M and Muli-Musiime, F (2000). Experiences from Kenya: road traffic accidents, health equity and the policy dilemma

Nantulya, V.M and Reich, M.R (2002). The neglected epidemic: road traffic injuries in developing countries. *British Medical Journal*. 2002;324:1139–1142.

Nantulya, V.M and Reich, M.R (2003). Equity dimensions of road traffic injuries in low and medium income countries. *Inj Control Saf Promot*. 2003;10:13–20.

Nasiripour, A.A., Bahadori M, Tofighi S, Gohari M (2010). Analysis of the Relationships between the Determinants Influential in performance of Pre-hospital Emergency System of Iran using the DEMATEL Approach. *Healthmed*. 2010;4(3):567–72.

Onyachi, W. Nathan, Everd, Maniple and Stefano, Santini (2011). Preparedness for mass casualties of road traffic crashes in Uganda: Assessing the surge capacity of highway general hospitals: *Health Policy and Development*, Vol. 9, No. 1, Januray-April, 2011, pp. 17-26

Nathens, A. et al (2001). Effectiveness of state trauma systems in reducing injury-related mortality: a national evaluation. *The Journal of Trauma*, 2000, 48:25–30.

National Road Safety Commission (2007). *Annual Report*. Ministry of Transportation, Republic of Ghana for improvement. *Prehosp Emerg Care* 2002;6:218-223.

O'Malley, G.F. and O'Malley, R.N (2006). EMS in Japan. *J Emerg Med*. 2006;30(4):441–2

Odero, W (1995). Road Traffic accident in Kenya: An epidemiological appraisal. *East Afr Med J*. 1995; 72:299–305

Odero, W., Khayesi, M., Heda, P.M (2003). Road traffic injuries in Kenya: Magnitude, Causes and Status of Intervention. *Inj Control Saf Promot*. 2003;10:53–61.

Pedem, M., Scurfield, R., Sleet, D., Mohan, D., Hyder, A.A., et al (Eds) (2004). World report on road traffic injury prevention Geneva: World Health Organization.

Peden, M., McGee, K., Krug, E., eds (2000). Injury: a leading cause of the global burden of disease, 2000. Geneva: World Health Organization, 2002.

Peden, M. (Ed), (2004), World Report on Road Traffic Injury Prevention.

Pillay, R (2010). The skills gap in hospital management: a comparative analysis of hospital managers in the public and private sectors in South Africa. *Health Services Management Research, Royal Society of Medicine*. 2010; 23: 30-36

Pozner, C.N., Zane, R., Nelson, S.J., Levine, M (2004). International EMS Systems: The United States: past, present, and future. *Resuscitation*. 2004;60(3):239–44.

Quansah, R (2001). Availability of emergency medical services along major highways. *Ghana Medical Journal*, 2001, 35:8–10.

Roudsari, B.S., Nathens, A.B., Arreola-Risa, C., Cameron, P., Civil, I., Grigoriou, G, et al (2007). Emergency medical service (EMS) systems in developed and developing countries.

Sasser, S., Varghese, M., Kellermann, A., Lormand, J.D (2005). Prehospital trauma care systems. Geneva: World Health Organization; 2005.

Shell Uganda (2005). Financial Times Ltd. (From New Vision (Uganda) - AAGM).

Soloff, L (2006). New York City Bioterrorism Preparedness Program. New York City Department of Health and Mental Hygiene. 2006; pp 1-15.

Sory, E (2009). Indicted Doctors. *The Ghanaian Times*. No. 156,776, July 25, 2009: 1-4.

Souza, D (2009). Evidence-based Approach to decision making: The Inclusion of GIS as part of Ghana's Health Information System. *Ghana Med J* 2009;43(1): 1-6.

Ten, Eyck, R.P. (2008). Ability of Regional Hospitals to Meet Projected Avian Flu Pandemic Surge Capacity Requirement. *Pre-hospital and Disaster Medicine*. 2008; 23 (2): 103-112.

Tintinalli, J.E., Cameron, P., Holliman, C.J. EMS (2010). A Practical Global Guidebook. Shelton, Connecticut: People's Medical Publishing House; 2010.

Uganda Bureau of Statistics (UBS) (2002). Uganda Population and Housing Census, Population Dynamics, October 2006, Kampala, Uganda

Uganda Bureau of Statistics (UBS) (2011). Population Projection of 2010, GeoHive, 2000-2012. Retrieved from: www.geohive.com/cntry/Uganda

Ugandan Police Report (2011). Annual Crime and Traffic/Road Safety Report 2011; retrieved from: <http://www.upf.go.ug>

Verner, R (2008). Fifty emergency medical service in the Czech Republic. *Annals Emerg Med*. 2008;51(4):486.

Waters, H, Hyder, A.A., Phillips, T (2004). Economic evaluation of interventions for road traffic injuries – application to LMI countries. *Asia Pacific Journal of Public Health* 2004;16:23-31

World Head Organization (2005). Global initiative for emergency and essential surgical care

World Head Organization (2006). World Health Statistics 2006. Health system fact sheet, Uganda. Available at: <http://www.who.int/whosis/en>

World Head Organization (2006b). World report on road traffic injury prevention"

World Head Organization (2007). Mass casualty management systems: strategies and guidelines for building health sector capacity.

World Head Organization (WHO) (2004). Guidelines for Essential trauma care. Retrieved from: www.who.int/violence_injury_prevention

World Health Organization (2001). A 5-year Health Organisation Strategy for Road Traffic Injury Prevention. Geneva Switzerland.

World Health Organization (2005b), "Prehospital Trauma Care Systems,"2005, http://www.who.int/violence_injury_prevention/publications/services/39162 oms new.pdf.

World Health Organization (2007b). Field Manual for Capacity Assessment of Health Facilities in Responding to Emergencies: The Western Pacific Region, 2007.

World Health Organization (2009). *Global status report on road safety. Time for action*. World Health Organization, Geneva.

World Health Organization (2010). *Road safety in 10 countries*. Available from: http://www.who.int/violence_injury_prevention/road_traffic/countrywork/rs_overview.pdf.

APPENDIX I

CONSENT FORM

I am Ekpa Julius, Masters degree student conducting research on “**Preparedness of health facilities for mass casualties from road traffic accidents.**” I am requesting you to participate in the study.

The purpose of the study is to assess the preparedness of health facilities for mass casualties from road traffic accidents. This may assist hospital administrators in planning and evaluating the capacity of their facilities to treat casualties from road traffic injuries and to reduce mortality and morbidity.

You are required to give your views on the study by answering some questions. It may take 20-25 minutes to answer all the questions. The study will not involve any invasive procedure and there is no anticipated risk for participating. Any information you will provide shall be treated with utmost confidentiality. Your participation in the study is voluntary. You may choose to opt out of the study if you wish, and there is no penalty if you decide not to participate.

If you need any further information regarding this study, I shall be happy to provide it. You are free to ask any questions and to contact me later on the number indicated below.

Thank you for your cooperation.

..... date.....

Ekpa Julius (0703370209)

Participant's consent

This study has been explained to me and I have agreed to participate. I understand that participation is voluntary and that if I change my mind and withdraw from the study, there is no penalty.

Please, sign your signature below to indicate your willingness to participate in the study. Your name is not required.

Signature/finger print Date

Thank you for your consent.

APPENDIX II

QUESTIONNAIRE FOR HEALTH WORKERS (DOCTORS, NURSES AND CLINICAL OFFICERS)

Instruction: Tick the correct option in the box provided and give short explanation where required.

Section A: Demographic information

1. Your age in years.....
2. Your sex: Male ☐ Female ☐
3. How many years of work experience do you have?
4. Occupation: ☐ Doctor ☐ Clinical Officer ☐ Nurse ☐ Emergency Practitioner
5. Education level: ☐ PhD ☐ Masters degree ☐ Bachelors ☐ Diploma ☐ Certificate
6. Your Tribe: ☐ Munyankole ☐ Muganda ☐ Mukonzo ☐ Mukiiga ☐ Others
7. Marital status: ☐ Married ☐ Single ☐ widowed ☐ Divorce ☐ Separated
8. Religion: ☐ Catholic ☐ Protestant ☐ Muslim ☐ Born-again ☐ SDA

Section B: Prevalence of road traffic injuries

9. Have you attended to a patient with road traffic injury in past 6 months? ☐ Yes ☐ No
10. How often do you receive patients with road traffic injuries?

Section D: Organization of emergency services

11. Do you have an emergency service committee in your hospital? ☐ Yes ☐ No
12. Is the hospital prepared to handle mass casualties from road traffic accident? ☐ Yes ☐ No
13. Do you have a surgical team to handle emergency operations? ☐ Yes ☐ No
14. Do you have qualified medical staff to cover 24hour shift duty? ☐ Yes ☐ No
15. Is there provision for you to have regular training on emergency patient care? ☐ Yes ☐ No
16. Is there contact phone number to call in case of emergency? ☐ Yes ☐ No

17. Do you receive regular supply of gloves and drugs for emergency use? ☐ Yes ☐ No

Section C: The level of knowledge of health workers

18. Have you ever receive any formal training on emergency patient care? ☐ Yes ☐ No

19. Please, tick the option that best describe your skills in performing the following procedures.

Procedure	Very good	Good	Fair	Never done
Assessment of airway compromise				
Airway maneuvers (chin lift, jaw thrust, etc.)				
Insertion of oral or nasal airway				
Use of suction equipment				
Assisted ventilation using bag valve mask				
Cardio-pulmonary resuscitation (CPR)				
Endotracheal intubation				
Use of oxygen equipment				

Section E: Availability of resuscitation equipment and supplies

Observation guide (Appendix VII) will be used to obtain data to determine the availability of resuscitation equipment in selected health facilities.

Thank you for participating!

APPENDIX III

OBSERVATION GUIDE

N/B: a. F1 = health facility 1, F2 = health facility 2, F3 = health facility 3, F4 = health facility 4, F5 = health facility 5 and F6 = health facility 6.

b. 1 = present, 2 = absent.

Parameters		F 1		F 2		F 3		F 4		F 5		F 6	
A	Infrastructures required	1	2	1	2	1	2	1	2	1	2	1	2
	Functional blood bank												
	Functional investigation services												
	Functional trauma theatre												
	Electricity or solar generating set												
	Running water												
B	Resuscitation equipment:												
	Oral or nasal airway												
	Suction device (electrical or manual)												
	Suction tubing/catheters												
	Laryngoscope and various blades												
	Endotracheal tubes												
	Bag valve mask												
	Basic emergency pack												
	Oxygen equipment												
C	Appropriate emergency drugs:												
	Dexamethasone, hydrocortisone (or equivalent)												
	Pethidine, Diaclofenac (or equivalent)												
	Amoxicillin, Ciprofloxacin (or equivalent)												
	Metronidazole (or equivalent)												
	Frusemide (or equivalent)												
	Mannitol												
	Epinephrine, Adrenaline												
	Various intravenous fluids												
	Adequate stock of gloves (sterile/disposables)												

APPENDIX IV

CHECKLIST FOR REVIEW OF MEDICAL RECORDS IN SELECTED HEALTH FACILITIES

N/B: HF1 = Health facility 1; HF2 = Health facility 2; HF3 = Health facility 3

F 4 = Health facility 4; HF 5 = Health facility 5; HF6 = Health facility 6

Parameters		HF 1	HF 2	HF 3	HF 4	HF 5	HF 6	TOTAL
Age of patients in years	1-15							
	16 - 30							
	31- 45							
	46 - 60							
	61 - 70							
	71 – 75							
	Total							
Sex	Male							
	Female							
	Total							

APPENDIX V

INTERVIEW GUIDE FOR KEY INFORMANTS

1. Do you think road traffic injuries are a significant health problem? Please, explain.
2. How often do you receive patients with road traffic injuries compare to other patients?
3. Is your hospital prepared to handle mass casualties from road traffic accidents?
4. Do you have contact phone numbers to call in case of emergency, to mobilize staffs and for patients to call for help?
5. Do you have enough staff to cover 24hour duties? Are your staffs trained to handle medical emergencies and do you have provision for regular staff training in emergency patients care?
6. Does the hospital have resuscitation equipment to care for road traffic injuries?
7. Can you please share your experience in managing mass casualties of road traffic injuries?

Thanks for participating!!

APPENDIX IV

HEALTH FACILITIES LOCATED WITHIN 5KM DISTANCE ALONG MBARARA-KASESE ROAD

Name of facility	Level of care provided	Ownership of facility
KIU Teaching Hospital	District general hospital	Private For Profit
Ishaka Adventist Hospital	District general hospital	Faith Based Private – Not – For profit
Comboni Hospital	District general hospital	Faith Based Private – Not – For profit
Kabwohe HC IV	Health sub-district	Government owned
Bushenyi HC IV	Health sub-district	Government owned
Rugazi HC IV	Health sub-district	Government owned

APPENDIX VII

INTRODUCTORY LETTER



KAMPALA
INTERNATIONAL
UNIVERSITY
WESTERN CAMPUS

School of Allied Health Sciences (SAHS) Ishaka,
P.O. BOX 71 Bushenyi, Uganda: Tel: +256 (0782101486)
E-mail: agwuezera@valiso.com; Website: <http://www.kiu.ac.ug>

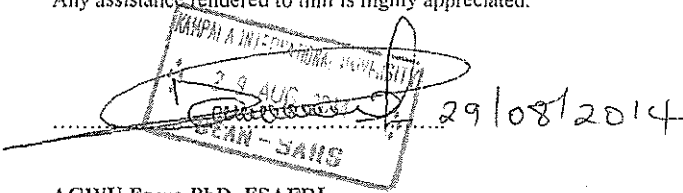
"OFFICE OF THE DEAN "

29/08/2014

RE: EKPA JULIUS OSEE

This is to introduce to you Mr. Ekpa Julius Osee with registration MPH/0007/123/DF, who is a student of Kampala International University Western Campus. He is conducting research in your Health Facility titled "Preparedness of health facilities for mass casualties from road traffic accidents along Mbarara- Kasese Road South western Uganda."

Any assistance rendered to him is highly appreciated.

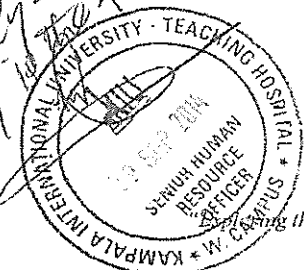
 29/08/2014

AGWU Ezera PhD, FSAFRI
Dean (SAHS)

Recommended and the student can conduct the study since the gate is open to the hospital.

Forwarded for action
An Cecilia Atop

04 SEP 2014



"Exploring the Heights"

MAP OF UGANDA SHOWING STUDY AREA

