

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI,
GHANA
COLLEGE OF HEALTH SCIENCES
SCHOOL OF MEDICAL SCIENCES
DEPARTMENT OF COMMUNITY HEALTH**



**THE FREQUENCY AND BURDEN OF SEVERE INJURY IN RURAL AND URBAN
COMMUNITIES OF THE BOLGATANGA MUNICIPALITY, UPPER EAST REGION,
GHANA: AN EXPLORATORY STUDY**

**Dissertation submitted to the School of Graduate Studies, Kwame Nkrumah University of
Science and Technology in partial fulfilment of the requirements for the degree of
MASTER OF PUBLIC HEALTH; Health Services planning and management.**

Submitted by

**AZURE BENSON NSO
(PG1789407)**

BPharm. (Hons.)

MPH Health Services Planning and Management

SUPERVISED BY: DR HARRY TAGBOR

November, 2008

DECLARATION

I wish to state that this work has never been submitted by anyone to any university or institution for the award of a degree or other purpose. I declare that this is my own original work. References from the work of others have been duly acknowledged.

Signature:.....

Azure Benson Nso

(Student)

SUPERVISOR

Signature:.....

Name: Dr. Harry Tagbor

HEAD OF DEPARTMENT

Signature:.....

Name: Dr. Easmond Otupuri

DEDICATION

This work is dedicated to my wife; Juliana Abazes, and children; Wendy and Akanzuna for their contributions, patience and sacrifices during the period of the programme.

ACKNOWLEDGEMENT

A good number of people have contributed in various ways to enable me go through the programme and carry out my project work successfully. I express my gratitude to them. I would like to thank all my lecturers especially Dr. E.N.L Browne, Dr. Harry Tagbor, Dr. Easmon Otupri, Prof. E. Addy, Dr. Anthony K. Edusei, Dr. Ellis Owusu Dabo, Mr Emmanuel Nakua, Dr Ernest Y. Kunfa and all the staff of the department for being helpful to me in diverse ways during the period of the programme.

I am particularly grateful to my academic supervisor, Dr. Harry K. Tagbor for his guidance, time and support during the course of the project in spite of the fact that he always has a busy schedule.

I wish to express my sincere gratitude to my field supervisors, Dr Awoonor-Williams; the Regional Director of Health Services and Ms Joyce Bagina, the Bolgatanga Municipal Director of Health Services; as well as the entire staff of the Health Management Team of the Bolgatanaga municipality. The health staff at the sub-districts level was very cooperative and helpful and that made it possible for me to carry out my project work successfully; I am grateful to them. I also acknowledge the support and co-operation I enjoyed from the Deputy Director of Pharmaceutical Services at the Regional Health Directorate, Upper East.

Finally, I appreciate the hard work of all my fieldworkers in spite of all the difficulties we met as well as the valuable support of Mr Lawrence Yelfari.

GLOSSARY

Bias: Deviation of processes, results or inferences from the truth, or deviation from any trend in the collection, analysis, interpretation, publication, or review of data that can lead to conclusions that are systematically different from the truth.

Case fatality rate: The product of the number of deaths attributable to severe injury in the reference period and one hundred (100) divided by the total number of cases of severe injury in the same reference period .

Confidence level: The degree of certainty of obtaining the same results if the survey were to be repeated e.g. 95% certainty that the true value of a variable such as a mean, proportion, or rate is contained within a specified range; the confidence interval.

Cross-sectional study: A study that examines the relationship between diseases (or other health-related characteristics eg injury) and other variables of interest as they exist in a defined population at one particular time.

Crude incidence rate: The product of the total number of severe injuries recorded in the survey (including those dead or alive) and one (1) thousand divided by total number of people in all the households included in the surveyed.

DALYs: Health gap that combines in one measure the time lived with disability and time lost due to premature death.

Design effect: A bias in study findings attributable to the study design.

Disability: Any permanent restriction or lack of ability (resulting from an impairment) to perform an activity in the manner or within the range considered normal for a human being and which may be as a result of physical, intellectual or sensory impairment, medical conditions or mental illness.

Epidemiology: The study of the distribution and determinants of health-related events in a defined population and the application of this study to the control of health problems.

‘Free’: Payment for health services that excludes cash or credit sales directly to the patient.

Health facility: Any place where primary, secondary or tertiary medical care is provided (Health centre, clinic or hospital).

Injury: All types of damage to the body such as cuts, wounds, haemorrhage, fractures, burns and bites caused by external factors such as fall, drowning, fire, motor vehicle collision, self-infliction, cultural practice and violence etc.

Injury event: An incident leading to an injury

Intentional injury: Injury inflicted on the victim deliberately.

Interpersonal injury: Injury inflicted deliberately on the victim by a person to harm or as a cultural practice e.g. assault, homicide, intimate partner violence, tribal marks, genital mutilation, sexual violence etc.

Major injury: An injury that results in equal or more than thirty (30) days of restricted normal activity.

Minor injury: An injury that results in less than thirty days restriction of normal activity

Occupation: An activity that serves as one’s regular source of livelihood

Outreaches: Programmes carried out to provide health services to communities that are hard to reach and are deprived of government health services.

Prevalence: The number of injury events that occurred within a reference period in a given population; for example, instances of an injury.

Recall bias: Systematic error due to differences in accuracy or completeness of memory of past events or experiences.

Rural communities: Communities in the Bolgatanga municipality that are not in the township, have clear majority of indigenous people and with relatively less social infrastructure.

Severe injury: An injury that results in one or more days of restricted normal activity.

Surveillance: Systematic ongoing collection, collation, and analysis of data and the timely dissemination of information to those who need to know so that action can be taken.

Unintentional Injury: Injury inflicted on the victim accidentally.

Urban community: Communities in the township of the Bolgatanga municipality with considerable cosmopolitan character and relatively more social infrastructure.

ABBREVIATIONS / ACRONYMS

<i>CDC</i>	United States Center for Disease Control and Prevention
<i>CHPs</i>	Community-based Health Planning and Services
<i>DALY</i>	Disability Adjusted Life Years.
<i>DOVVSU</i>	Domestic Violence and Victim Support Unit
<i>GHS</i>	Ghana Health Service
<i>HICs</i>	High Income Countries
<i>ICC-U</i>	Injury Control Centre of Uganda
<i>ID</i>	Identity Card
<i>IPIFA</i>	Injury Prevention Initiative for Africa
<i>LMICs</i>	Low and Middle Income Countries.
<i>MDGs</i>	Millennium Development Goals
<i>MHIS</i>	Municipal Health Insurance Scheme
<i>MHMT</i>	Municipal Health Management Team
<i>NAS</i>	National Ambulance Service
<i>n.d</i>	No date
<i>NGOs</i>	Non-Governmental Organizations
<i>NHIS</i>	National Health Insurance Scheme
<i>OPD</i>	Out- Patients Department
<i>RTAs</i>	Road Traffic Accidents
<i>UNO</i>	United Nations Organisation
<i>WAJU</i>	Women and Juvenile Unit
<i>WHO</i>	World Health Organization

TABLE OF CONTENTS

<i>Declaration</i>	I
<i>Dedication</i>	II
<i>Acknowledgement</i>	III
<i>Glossary</i>	IV
<i>Abbreviation / Acronyms</i>	VII
<i>Table of contents</i>	VIII
<i>Abstract</i>	XI
1.0.0 CHAPTER ONE: INTRODUCTION	1
<i>1.1.0 Background</i>	1
<i>1.2.0 Statement of the problem</i>	3
<i>1.3.0 Rationale of the study</i>	6
<i>1.4.0 Conceptual framework</i>	7
<i>1.4.1 Explanation of the conceptual framework</i>	7
<i>1.4.2 Research questions</i>	9
<i>1.5.0 Objectives</i>	9
<i>1.6.0 Profile of study area</i>	10
2.0.0 CHAPTER TWO: LITERATURE REVIEW	14
<i>2.1.0 Epidemiology of injury</i>	14
<i>2.2.0 Definition of incidence</i>	15
<i>2.3.0 Some studies on injury frequencies and related demographic factors</i>	16
<i>2.4.0 Medical care and treatment practices of severe injury</i>	17
<i>2.5.0 Post injury outcome of severe injury</i>	19
<i>2.6.0 Global initiatives for injury control</i>	20
<i>2.7.0 Injury control initiatives for Africa</i>	22
<i>2.8.0 Economic benefits of some interventions in Ghana</i>	23
3.0.0 CHAPTER THREE: METHODOLOGY	25
<i>1.7.0 Scope of the research</i>	25
<i>1.7.1 Study population</i>	25
<i>1.7.2 Exclusion criteria</i>	25
<i>3.1.1 Study type /study design</i>	25
<i>3.1.2 Study method</i>	26
<i>3.1.3 Data collection techniques and tools</i>	27
<i>3.1.4 Sampling technique</i>	28
<i>3.1.5 Sample size calculation</i>	28
<i>3.1.6 Pre-test</i>	29
<i>3.1.7 Selection and training of research assistants</i>	30
<i>3.1.8 Ethical considerations</i>	30

3.2.0 Data collection plan	31
3.2.1 Quality control	31
3.2.2 Data analysis plan	31
3.3.0 Limitations of the study	32
3.4.0 Assumptions	33
3.5.0 Table of study variables	34
4.0.0 CHAPTER FOUR: RESULTS	38
4.1.0 Incidence rate of severe injuries	38
4.1.0 Injury Deaths	40
4.2.0 Demographic factors related to severe injury	40
4.3.0 Medical and treatment practices of severe injury	46
4.4.0 Post injury outcome of severe injury	50
5.0.0 CHAPTER FIVE: DISCUSSIONS	53
5.1.0 Incidence rate of severe injuries	53
5.2.0 Demographic factors related to severe injury	56
5.3.0 Medical and treatment practices of severe injury	57
5.4.0 Post injury outcome of severe injury	61
6.0.0 CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS	63
6.1.0 Conclusions	63
6.2.0 Recommendations	64
REFERENCES	66
APPENDICES	69
Appendix 1: Data collection form for household survey	69
Appendix 2: Data collection form for regional hospital/ other government facilities	78
Appendix 3: Data collection form for MHIS / NAS/Ghana Police Service and Municipal Assembly	79
LIST OF TABLES	
Table I : Trend of injury admissions in the Bolgatanga Regional Hospital	11
Table II : Trend of RTAs as presented by the Bolgatanga municipal police report	12
Table III : Sampled communities of Bolgatanga municipality used for the study	27
Table IV : Demographic variables used for the study	34
Table V : Variables of medical care and treatment practices of severe injury used for the survey	35
Table VI : Variables of post injury outcome used of the study	36
Table VII: Trend of severe injury in the communities of the Bolgatanga municipality	38

Table VIII:	<i>Trend of severe injury by mechanism of injury in the communities of the municipality</i>	39
Table IX:	<i>Trend of severe injury by age in the communities of the Bolgatanga municipality</i>	40
Table X:	<i>Trend of severe injury by age and mechanism in the communities of the Bolgatanga municipality</i>	41
Table XI:	<i>Trend of severe injury by religion and the facility of treatment in the communities of the municipality</i>	43
Table XII:	<i>Trend of severe injury by means of transport used to place of treatment in the communities of Bolgatanga municipality</i>	48
Table XIII:	<i>Urban and rural level of satisfaction at place of treatment in the Bolgatanga municipality</i>	50
Table XIV:	<i>Urban and rural sale of household property as a result of severe injury in the Bolgatanga municipality</i>	51
Table XV:	<i>Urban and rural borrowing of money as a result of severe injury in the Bolgatanga municipality</i>	52
<i>LIST OF FIGURES</i>		
Figure 1:	<i>Conceptual framework for frequency and burden of severe injury</i>	7
Figure 2:	<i>Trend of severe injury by age in urban and rural communities in the Bolgatanga municipality</i>	42
Figure 3:	<i>Trend of severe injury by level of education in urban and rural communities in the Bolgatanga municipality</i>	44
Figure 4:	<i>Trend of severe injury by employment in urban and rural communities in the Bolgatanga municipality</i>	45
Figure 5:	<i>Trend of severe injury by place of treatment in urban and rural communities in Bolgatanga municipality</i>	47

ABSTRACT

INTRODUCTION

The problem of injury is quite widespread and can affect anyone severely and yet has not received much public health attention. In Ghana, this is partly so because information available on injuries which makes the size of the injury problem visible to policy-makers is not adequately available to inform the deserved public health action. Information available excludes a good number of injuries in the communities as well as their socio-economic impact on victims. This makes the injury burden difficult to appreciate.

OBJECTIVES: To describe the frequency and burden of severe injury in urban and rural communities of the Bolgatanga municipality, Upper East Region, Ghana.

METHODS: Community health workers interviewed respondents in 200 households in some urban and rural communities selected by two-stage random sampling to determine those who were involved in severe injury in a one year reference period (November 2007- October 2008), using a questionnaire/ interview guide.

RESULTS: In the rural setting, 100 households, with 826 persons were surveyed whilst 100 households and 876 persons were surveyed in the urban settings. 63 and 48 injured persons were found in rural and urban communities respectively. The total incidence rate of fatal, disabling, and recovered injuries was 65.56 per 1,000 persons per year with a case fatality rate of 2.7. Leading causes of injuries were road traffic accidents in general, largely involving motor-bikes related injuries and deaths as well as occupational injuries in rural settings especially

CONCLUSION: Based on the burden of injury and deaths as demonstrated by this survey, prevention measures in both urban and rural communities in the Bolgatanga municipality should make RTAs and occupational injuries top priorities.

CHAPTER ONE

1.0.0 INTRODUCTION

1.1.0 Background

Most injuries cause preventable loss of life and health and also have major economic implications. The association between the burden of injury, necessity of treatment, and ability to treat is not unique to the injury problem. A high incidence and burden of injury among patients is, in general associated with a greater need for injury management and willingness to commit more resources to that effect. For this reason, evidence of the burden of injury on persons is necessary to convince health policy makers that a substantial investment in injury management is worthwhile.

Using WHO data for 2000, it is estimated that up to 5.06 million people die each year as a result of some form of injury, comprising almost 9% of all deaths. This equates to almost 14,000 injury deaths per day. However, this total may be small compared to the huge numbers who suffer non-fatal and disabling injuries each day in the communities. Injury currently accounts for 10% of all disability-adjusted life years (DALYs) lost, and this is expected to increase to 20% by 2020 (Sethi D *et al* ed., 2004).

In Africa, tribal conflicts, road traffic accidents (RTAs) and occupational accidents and a host of others, are potent risk factors that can increase the frequency and burden of severe injury. The problem of alcohol and other substance-related injuries are also expected to increase the frequency and burden further considering the increase in alcohol consumption without the

appropriate public health policy implementation with regard to the use of alcohol (WHO, 2007).

According to the 1994-1998 police data, road traffic crash was the leading cause of injuries and deaths in Ghana. The other leading causes of injuries were occupational injuries involving subsistence farmers as well as tribal conflicts. The majority of road traffic fatalities (61.2%) and injuries (52.3%) occurred on roads in rural areas and pedestrians accounted for 46.2% of all road traffic fatalities. (Afukaar *et al.*, 2007).

There is also a vague knowledge about the patterns, burden of injury, and treatment-seeking behaviour of injured persons in the communities of the municipality even though injuries continue to affect people of all kinds of socio-economic background; some of whom are innocent with no direct contribution to the injury events. Indeed, the loss of productivity due to death and disability from injury represents significant causes of losses of scarce resources in all countries. (Holder *et al.*, 2001) and these losses include those met by employees, employers, the community at large and the state.

There is an opinion in the Upper East Region that provision of health care by traditional bone setters is better than hospital-based treatment whilst another is of the view that health provision by traditional healers is not credible. Neither of these opinions has been authenticated and the fact remains that neither of them can stand alone. This is just one of the things that studies on injuries in general can help to clarify.

A good understanding of the needs of patients and affordability of essential healthcare are very important for successful prevention of all diseases including injury because victims are expected to contribute the most for treatment, independent of whether they are health insured or not. In addition, expenditure on government and private health services has increased and even where services are delivered 'free', informal charges, time and transport cost incurred by patients and households can be considerable (Russell., 1996).

To develop effective prevention and support strategies for injury management, there is the need for better information on injuries. Such information will indicate how serious the injury problem is, and where prevention and support measures are possible and most urgently needed. Indeed, information on the incidence rate and burden of injury as well as the utilization of health services as considered in this study are important for cost-effective planning and decision-making.

Baker S P *et al* cited in Mock C N *et al.*, 1999 have indicated that in many high-income countries (HICs), deaths attributable to injury have decreased in rate in recent decades through the combination of prevention and better treatment. This is also possible in resource-poor countries like Ghana.

1.2.0 Statement of the problem

The problem of injuries is quite widespread, and can affect anyone severely, yet has not received much public health attention (Sethi *et al* ed., 2004). In Ghana, this is partly so because information available on injuries which makes the size of the problem visible to policy-makers is generated mainly from public sector health facilities and is not adequate. Quite a good number of

injuries are also not reported from the communities as a result of which the mortality and morbidity impact of severe injury in relation to socio-economic factors has been left inadequately dealt with in the Bolgatanaga Municipality.

Road traffic injuries alone were reported¹ as the seventh among the top ten causes of facility OPD attendance, fifth among the ten top causes of admissions and eighth among the ten top causes of death by the Bolgatanga Municipal Health Administration. Injury was also highlighted in that report as an emerging health condition that requires extra effort to control. In spite of the above, relatively few studies, to the best of my knowledge, are done on injuries especially on those of occupation and interpersonal violence in the municipality.

Injuries are perhaps one of the leading health conditions that can result in catastrophic health expenditure² and the economic cost of injury met by all stakeholders continues to take a lot from national health budgets (Holder., 2001). At the individual level, and in areas like Bolgatanga where the very poor may be unable to insure their health / life, it is possible that there is a large number of severe injury victims in the communities left alone to suffer, exhaust the resources they have, and die because they are unable to meet the cost of managing injuries, including treatment and rehabilitation. This can be a huge problem particularly in instances where the victim is innocent of the injury event or is a hit-and-run victim.

Injuries are most often medical emergencies and households may persist in paying for healthcare, but to mobilize resources they may sacrifice other basic needs such as food and education, with

¹ In the annual report., 2007 of the Municipal Health Administration

² Report of the Task Force on Health Systems Research. March 2005.

serious consequences for the individuals or households. Common household responses to payment difficulties are identified and range from borrowing to more serious and distressful sale of productive assets (eg land), delays to treatment and ultimate abandonment of treatment. (Russell,1996). Although these strategies may have a devastating impact on livelihood and health, few studies have investigated them in detail.

Furthermore, some negative community values including those related to socio-demographic factors (eg sex, religion, culture) can give rise to high injury frequencies and burden. Wrong perceptions of orthodox treatment for example, sometimes make people engage in risky home treatment practices of severe injuries which can lead to more injury or death. Gender is also a significant factor to inequalities in health including injury because apart from domestic violence, health systems may not deliver services appropriately to address the needs of women and children. Women and children also suffer more from the effects of poverty in many resource poor societies and may suffer the injury burden the most (WHO Task Force on Health Systems Research)³

Little information is known about the frequency and burden of injuries in most communities of the Bolgatanga municipality even though people are likely to suffer from injuries as a result of risk factors like increasing populations, ethno-political conflicts, weak enforcement of existing laws, and use of defective equipment especially on the road and at workplaces,

³ Report of the Task Force on Health Systems Research. March 2005.

1.3.0 Rationale of the study

Generally, the rationale of this study was to study the public health importance of injury (distribution, determinants and its related events) in the Bolgatanga municipality with particular regard to mortality and morbidity in relation to socio-economic aspects in order to inform public health actions if necessary.

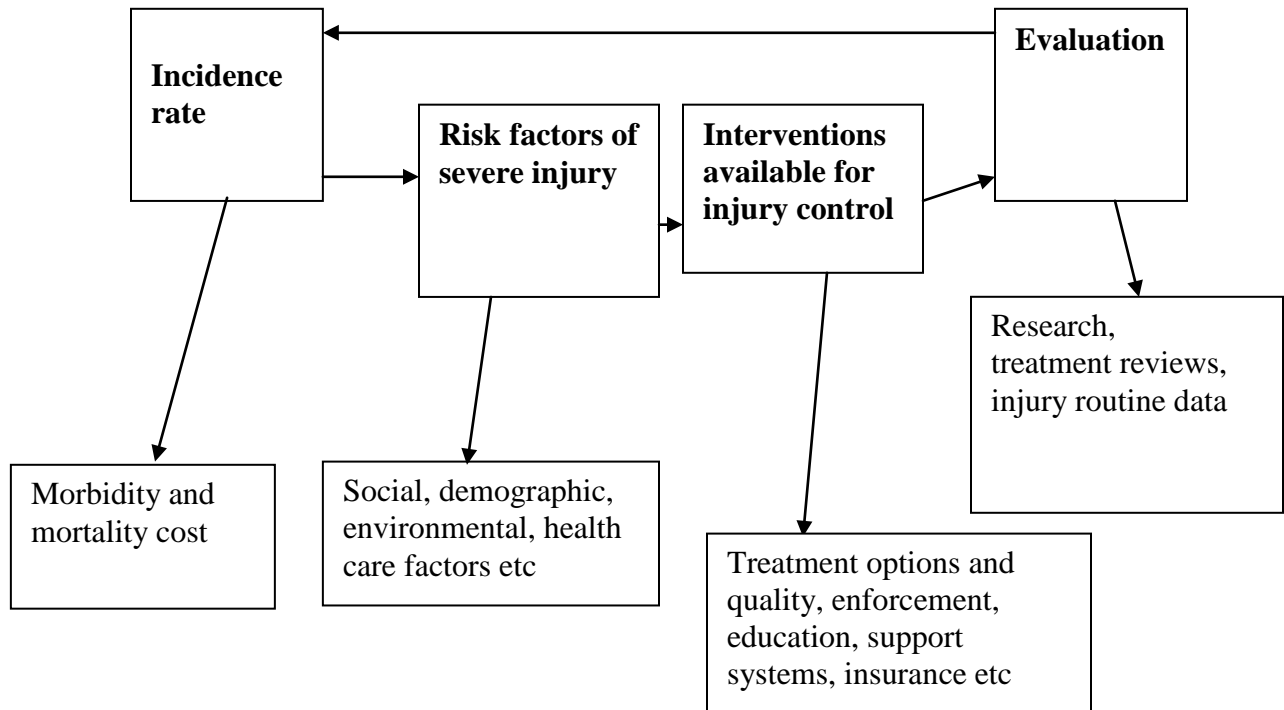
Information on injury is necessary for many reasons including the development of affordable and cost-effective preventive strategies to deal with the injury problem. Indeed, effective interventions on injury are feasible and will be accepted by politicians, NGOs and patients who will benefit directly when interventions are carried out to reduce pain and suffering.

The study was to identify gaps and difficulties in stakeholders' injury management, for instance, the Regional Hospital, located in the Bolgatanga Municipality is the referral centre for all health facilities in the region and information of various types of injuries in the communities could help reorganise its emergency preparedness in order to bring about general improvement in injury management. It was the hope of this study to inform stakeholders in health service provision including health insurance Scheme, NGOs, politicians, researchers and public health facilities etc about the needs of injury victims, especially with regard to equity issues.

Finally, this study sought to provide useful baseline information and hypotheses on the injury problem in the rural and urban communities of the municipality with the hope that similar and specific studies will be carried out on injuries in the light of the changing cosmopolitan and socioeconomic characteristics of the municipality.

1.4.0 Conceptual framework

Figure 1: Conceptual framework for frequency and burden of severe injury.



1.4.1 Explanation of the Conceptual Framework

From the framework above, the injury morbidity and mortality burden in the Bolgatanga Municipality is not well known and the burden on individuals could be so unbearable for injured persons and their families, probably requiring support services or reorganisation of health services.

Risk factors of severe injury including those associated with social behaviour like conflict in the community, consumption of alcohol and other substances can influence the frequency and burden of injury. Violence against women is generally regarded as private and is inadequately

addressed while tribal marks and other traditional practices are common in the study area and can have significant impact on individuals and community health.

Demographic factors such as age and sex for example, could be significant risk factors of severe injury; children are more likely to injure themselves through falls, burns and cuts etc. The aged may sustain more fractures from falls and the productive age group may suffer from occupational and road traffic injuries. Indeed, the injury burden can be related to other demographic factors like occupation, income, education and household size etc.

Environmental factors including health service organization can also increase the incidence and burden of severe injury. Quality of treatment is important in reducing the burden of injuries; good treatment can reduce prevalence and bad treatment could result in complications and death. Quality of service in terms of distance to injury treatment centres, long waiting time, availability of appropriate staff and health logistics can influence the burden of injury. Staff attitude, cost of treatment and transport to treatment places can also either increase or lower the burden of injury.

Social interventions such as health insurance schemes, national ambulance service, and support from the community, individuals and non-governmental organisation can influence the burden of injury. Good enforcement of laws and regulations and education could also reduce both the frequency and burden of injury. Finally, population-based survey such as this study can provide useful means of obtaining data on the risk factors associated with injuries and the consequences of all kinds of injuries.

1.4.2 Research Questions

From the framework above, several problem situations requiring research can be extracted including questions like:

- Are injuries of public health importance in the municipality in terms of morbidity and mortality of persons injured?
- What demographic factors pose as important risk factors for severe injuries in the municipality?
- What are the popular treatment options available for victims of severe injuries in the municipality?
- Are the necessary resources available for the management of severe injuries in the Bolgatanga municipality?
- What is the post injury outcome of severe injuries Bolgatanga municipality?

1.5.0 Objectives

1.5.1 General Objectives

To describe the frequency and burden of severe injury in urban and rural communities of the Bolgatanga municipality, Upper East Region, Ghana.

1.5.2 Specific Objectives

1. To describe the one year incidence rate of severe injury in the Bolgatanga municipality.
2. To describe the socio-demographic factors related to severe injury in the Bolgatanga municipality.
3. To describe the medical care and treatment practices of injured persons in the Bolgatanga municipality.

4. To assess post injury outcome of severe injury on victims and households in the Bolgatanga municipality.
5. Make recommendations to stakeholders for improvement of injury management at all levels of injury prevention.

1.6.0 Profile of study area

1.6.1 Location

It is a well known fact that the Upper East Region is among the four most deprived regions in the country. Its predominantly agricultural population relies on one season of rainfall (June to September), annually. The study area (Bolgatanga municipality) is one of the nine administrative districts in the Upper East Region of Ghana

1.6.2 Population characteristics of Bolgatanga municipality⁴

The population of the Municipality is 147,729, a majority of whom are poor and illiterate. It has a population growth rate of 1.7% and a high population density of 141.2 persons per square kilometer. About 47.7% of the population fall under the age of 15 years, 50.8% fall between 15 and 64 years and 1.5 % are above 64 years. The rural population is predominantly indigenous; the Grunis.

The Bolgatanga Township has a cosmopolitan population of 49,162. There are 3,932 houses in the township with 10,091 households and an average household size of 4.5. Even though the municipality has a reputation of being the most peaceful in the region the population density and

⁴ Source of statistics with regard to Population Characteristics of Bolgatanga municipality were obtained from the annual report 2006 of the Municipal Health Administration.

displaced settlers from conflict areas can be risk factors for injury in the municipality.

1.6.3 The injury situation in the municipality

The following tables show information of the injury situation in the municipality. It is however important to note that the information presented, from my professional experience are most likely to be understatements for many reasons, including the fact that data management is a problem in this country and not all injuries are reported to the appropriate authorities. The importance of a community injury survey thus becomes very important especially for planning.

Table1: Three years trend of inpatient injury admissions in the Bolgatanga Regional Hospital.

<i>INDICATOR</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>TOTAL</i>
<i>RTAs</i>	101	116	203	420
<i>Snake bite</i>	42	34	102	178
<i>Burns</i>	13	23	21	57
<i>Tetanus cases</i>	2	2	0	4
TOTAL	158	175	326	659

Source: Regional Hospital Annual Report 2007

Table 2: Two years trend of RTAs in the Bolgatanga municipality.

INDICATOR	2006	2007
<i>Number of cases reported</i>	82	78
<i>Persons killed</i>	14	37
<i>Person severely injured</i>	48	42
<i>Vehicles involved</i>	118	45
TOTAL	262	202

Source: Municipal Police Annual Report 2007

1.6.4 Health service organisation

The Municipality is divided into nine (9) sub-districts and one hundred and ten (110) communities in order to make health services geographically accessible. The municipality has One (1) regional hospital, six (6) health centres, five (5) clinics including one quasi and one private clinic, six functional CHPs centres, and seven registered traditional healers. All the medical officers, apart from in one private clinic, work in the Regional Hospital and so public health nurses, medical assistants, prescribing nurses man the sub-districts.

Generally, inadequate deployment of health staff, as well as health logistics in the sub-districts and the region as a whole is a challenge and in spite of that, public health staff organise outreaches to provide health care to hard-to-reach communities and households. Three main languages that can easily be interpreted in the municipality at various health agencies are; English, Gruni, and Hausa and most languages in the region are generally similar.

1.6.5 Activities in the municipality to control injury

Successful control of injuries requires the collaboration of legislators, planners, district assemblies, law enforcement agencies, automobile suppliers and repairers, engineers, health professionals and communities among others. Prevention efforts include education of stakeholders to understand the scope of the problem and the prospects of using some interventions. Injury prevention indeed involves changes in knowledge, attitudes, culture or beliefs of persons or groups in the population.

In the Bolgatanga municipality, all healthcare providers, municipal assembly, police service, fire service, MHIS, NAS, WAJU, the communities are some important stakeholders available for injury control and need to collaborate and coordinate their activities. Primary injury prevention such as enforcement and education are real challenges done on a smaller scale compared with secondary and tertiary prevention like health facility injury management.

CHAPTER TWO

2.0.0 LITERATURE REVIEW

2.1.0 Epidemiology of injury

Injuries are caused by various abnormal transfer of energy including mechanical (moving objects), thermal, electric, chemical and radiation energy. The energy transfer then results in penetrative, non-penetrative or compressive damage on the victim (Songer. 2008). Injury is defined here as all types of damage to the body such as cuts, wounds, haemorrhage, fractures, burns and bites caused by many external factors such as falls, drowning, fire, motor vehicle collision, self-infliction and violence snake bites, cultural practice etc.

Injuries claim the lives of several people worldwide and it is estimated that for every person killed, around 30 times as many people are hospitalized and 300 times as many are treated in hospital emergency rooms, with traditional healers and clinics (Sethi D *et al* ed., 2004).

In the study area, only scanty published literature is available on RTAs leaving most other mechanisms of injury unnoticed by relevant authorities and yet injuries could account for a good proportion of health problems that deserve more attention than it receives now. In Ghana, injuries associated with occupation alone, were reported among the top ten causes of OPD attendance in 2007 (Yayemain., 2007). This means that the total of injuries caused by all mechanisms of injuries could be significant.

As the population and volume of socio-economic activities increase in the municipality, high injury burden can especially pose as setbacks and worsen poverty rates and hunger, because

millions of people have already sunk deep into poverty in sub-Saharan Africa, and the poor are getting poorer (UNO., 2005). This could make the objective of eradicating poverty and hunger extremely difficult achieve.

2.1.1 Injury Prevention

This involves:

- Reducing the incidence of injury using good control measures so that only few unpreventable ones (eg natural disasters) are experienced in the communities .
- Reducing the prevalence of injury through good control and management of cases to reduce pain and suffering as well as undesirable outcomes including loss of scarce resources.

2.2.0 Definition of incidence rate

2.2.1 Incidence rate

The term "crude incidence" refers to the number of newly determined cases of a disease (injury) occurring in a specific population during a specific time period (one year), usually per 100,000 persons. Such an incidence rate is "crude", because it is not age adjusted and therefore cannot be used to compare different populations, (QueryCAT.,2007-2008).

2.2.2 Age-specific incidence rate

Age-specific incidence rate is the number of newly determined cases of disease / injury in a specific age group in a particular population over a specified time (one year) period usually per

100,000 persons in that age group. Typically, five-years age groups (0-4, 5-9, 10-14, etc.) are used, (QuerryCAT.,2007-2008).

2.2.3 Age-adjusted

Age-adjusted rate is different from crude and age-specific rates in that the incidence rate is modified to take into account how the age distribution of the population of interest varies from a conventionally-used "standard population". It is important that the same standard population be used so that age-adjusted rates can be compared to each other, (QuerryCAT.,2007-2008).

2.3.0 Some studies on injury frequency and related demographic factors

In the Bolgatanga municipality, RTAs relatively receives more attention in terms of routine data gathering than other mechanisms of injury and this could lead to the neglect of other important causes of injuries since there are varying causes of injuries from place to place. In South Africa, injury rates for traffic, violence or other injuries showed considerable inter-provincial variation. Violence accounted for more than half of the annual trauma injuries, (Matzopoulos *et al* n.d.). Another study in Tanzania showed that the overall incidence of injury was higher in the rural than urban areas and the incidence of major injuries (≥ 30 disability days) was similar in both areas. Poverty levels were also not significantly associated with experiencing a non-fatal injury (Moshiro C *et al.*, 2005).

In a study carried out to measure the incidence and outcome of various mechanisms of injury in the Ashanti and Brong Ahafo regions in Ghana, 21105 persons living in 431 urban and rural sites were surveyed and 1609 injuries resulting in one or more days of loss of normal activity were reported. Based on incidence rates and disability days, the major types of injury in the urban area

were transport and fall-related (Mock C N., 1999). The overall injury situation in the Upper East Region is however not well known.

There is evidence to support that as a nation industrializes, RTAs become the most frequent cause of injury deaths; up to 89% of which are due to head injuries and up to 63% occurring in people under the age of 40 (Ghani *et al.*,2003). This indicates that premature death is a major issue as far as injuries are concerned. In the Bolgatanga municipality, where the majority of people, especially women may be unemployed, a situation like this can be unbearable to households.

Some demographic factors have been shown to be important risk factors for injury. In two separate studies, males were found to be at a higher risk of having an injury than females in Tanzania and Pakistan (Ghani *et al.*,2003; Moshiro C *et al.*, 2005). Age was also found to be an important risk factor for certain types of injuries (Moshiro C *et al.*, 2005).

Few studies have been done on the patterns and impact of injuries in the Bolgatanga municipality. According to Afukaar F.K *et al.*, (2002), the Upper East Region recorded RTAs related injury crash rate and fatal injury rate as 1.7 and 1.9 respectively per 100 000 during 1994-1998. A lot of variables and risk factors associated with injury have changed significantly after this study in the municipality.

2.4.0 Medical care and treatment practices of severe injury

Medical care and treatment depends on the type of health services available (hospital bed, medicine, X-ray, other diagnostic test, physiotherapy and surgery). Inappropriate treatment of

injury can among others, worsen the injury and give rise to high cost of treatment. Whether the injury burden on households is more than the burden for other diseases and whether the burden differs between rural and urban areas and among different socio-economic groups is unknown in the study area. To apply appropriate interventions, it is however important to determine the above in the Bolgatanga municipality.

Day and night time injuries are expected to vary in incidence and burden. For example, the incidence of RTAs may be expected to be more at night than by day because of visibility difficulties. It is in this regard that in Ghana, articulated vehicles are not permitted to travel at night.

Accessibility problems including (transport, cost, and health staff attitude) coupled with general traditional way of life have great influence on the health agency to choose for health care. For instance, means of transport to treatment agencies at night can be problematic in some settings especially, the rural communities. Furthermore, vehicles that the injured persons use to a health agency can either contribute to the successful management of injuries or complicate the injury. In the event that severe injuries are not properly diagnosed and managed, they can result in serious complications eg infection, thrombosis etc.

Where the injury victim is health insured, illegal and exploitative charges sometime deprive the health clients from accessing the most appropriate health care. The cost of injury treatment can be very high especially for patients who are not registered with the health insurance schemes and pose as great barriers for accessing the appropriate health care. The total number of days a victim

is hospitalized for treatment of injury can also add up to the burden of injury in terms of pain and suffering, as well as personal and institutional resource used in managing the injury.

The quality of health care and severity of an injury can significantly influence the choice and number of visits to a health facility with cost implications. There is always some cost consideration in choosing a public rather than a private provider or a traditional healer, for the treatment of both chronic and acute illnesses/ injuries.

In a study in America of 951 children for three years following their fifth birthday, injuries that required medical treatment occurred in 32 percent of the sample. In 15 percent of the injured children, the injuries were severe enough to require two or more hospital visits or hospitalization. The risk of injury was increased among males (American Family physician 1989).

2.5.0 Post injury outcome on patients

2.5.1 Injury Impact on Households

Injuries represent a significant public health problem because apart from the pain on victims and resources used in treating injuries, some of the injured are often left with disabling health conditions which are sometimes permanent. The magnitude of loss of life and disability due to injury can be quantified in terms the Disability Adjusted Life Years (DALYs), (Sethi D *et al* ed., 2004). One DALY can be thought of as one lost year of ‘healthy’ life and the burden of disease measured as the gap between the current health status and an ideal situation where everyone lives into old age free of disease and disability. (WHO, 2008).

In a study to assess the burden of injury in India, financial burden on households was found to be much higher if treated in a private sector institution, having no insurance coverage, undergoing a longer duration of treatment. Furthermore, the study showed that poor households are the main victims of the inefficient health care system and do not stand a chance to break the vicious circle of poverty, indebtedness, low productivity, malnutrition and disease. Above all, the burden on households, even after controlling for socio-economic status, residence and type of provider, was higher for treatment of injury than other diseases (Gumber, A 1987).

Major injuries can affect the services that victims need or receive; institutional health care and related home care can present substantial problems to households. This is because victims are expected by themselves to bath, eat, walk about and earn their livelihood. Gun shots, RTAs and severe burns are some frequent causes of victims' inability to care for themselves, move about, return to normal activity etc.

2.6.0 Global initiatives for injury control.

There have been a number of global initiatives, made to reduce the burden of injury over the years especially in the developed world. These have been supported by national efforts; for example the enforcement of road traffic regulations which is done with significant difficulties in Ghana.

The World Health Organization (1977) in its International Classification of Diseases explained injuries in terms of external causes (agents) and their associated outcomes. The classification has helped a great deal in addressing the issues of acute effects and long-term disability resulting

from injury; however, it failed to provide adequate attention to the associated socioeconomic consequences of injuries, (Gumber., 1987)

2.6.1 The Road Traffic Injury Research Network (RTIRN)

The RTIRN is an initiative of the Global Forum for Health Research supported by the WHO and the World Bank. It is a global partnership which promotes, conducts and utilizes research for the prevention of road traffic injuries in low and middle income countries. In 2004, RTIRN invited applications from developing countries to set up secretariats to among other things maintain coherence, collaboration and communication among different RTIRN activities. (RTIRN 2008).

2.6.2 WHO Safe Community Initiative.

All human beings have an equal right to health and safety and it was based on this that the Safe Communities concept was generated. To be designated "Safe Community", Falköping, in Sweden approached injury control in a comprehensive way for all ages, environments and situations. This was accomplished by collaborative efforts of existing organisations, associations, and welfare functions. In 1978, Falköping initiated its injury registration programme, followed by an injury programme in 1979. In three years, there was a 27% reduction in injuries at work, domestic and traffic areas. As a result, Falköping was designated a WHO Safe Community in 1991. Since 1989, several communities have been formally designated "Safe Communities", with populations ranging from 2,000 to 2,000,000, (Sundstrom., 2007).

2.6.3 The US Centre for Disease Control and Prevention (CDC)

The CDC Division of Injury Response has a mission to increase the capacity to prevent injuries and their adverse health effects in the US by working with partners to develop, evaluate and promote evidence-based surveillance, prevention and care practices using public health injury surveillance and prevention programmes as well as a national violent death reporting system.(CDC 2006/2007).

The World Health Organization (WHO), in collaboration with CDC, also published in 2002 the Injury Surveillance Guidelines aimed primarily at researchers and practitioners. (Sethi D *et al.*, 2004). These guidelines are used extensively in numerous developed countries whereas little has been done with them in resource-poor countries including Ghana.

2.7.0 Injury control initiatives in Africa

2.7.1 The Injury Prevention Initiative for Africa (IPIFA)

The Injury Prevention Initiative for Africa (IPIFA) is a network of individuals and institutions involved in violence and injury prevention on the African continent. The initiative is composed of countries including: Uganda , Kenya , Ethiopia , Nigeria , Egypt , South Africa , Ghana , Zambia , Zimbabwe and Mauritius. IPIFA Secretariat is at the Injury Control Center- Uganda (ICC-U). IPIFA undertakes research, advocacy, and training programmes in injury prevention and control, both nationally and internationally. It is a WHO supported non-governmental organization and a brain child of the Injury Control Centre of Uganda. It is the hope of IPIFA to make its work known to all stakeholders of health service provision (ICC-U., 2008).

2.7.2 ICC-U

The Injury Control Center–Uganda (ICC –U) started its work in 1996 in response to the escalating burden of injury in that country to reduce the incidence and impact of injury through research, advocacy, design and evaluation of interventions, and implementation of injury management programs both nationally and internationally (ICC-U 2008). It is a non-governmental, non-profit organization. The importance of such a centre for injury prevention in the Bolgatanga municipality as well as other turbulent parts in the Upper East Region cannot be over-emphasized.

2.8.0 Economic benefits of some interventions in Ghana

2.8.1 National Health Insurance Scheme (NHIS)

The Bolgatanga municipality started its insurance scheme in November 2004 and has been operating since then. Since its inception, the average annual coverage as at November 2008 is 49.58% of the municipal population. Even though the MHIS is a very good provision for financial access to health care, it is common to see vulnerable persons without health insurance coverage. However, quite a good number of injury victims have admitted having financially benefited from the MHIS in excess of what they have contributed.

2.8.2 The National Ambulance Service (NAS)

RTAs, Domestic accidents, natural disasters are some major causes of medical emergencies and injuries. Ghana has been experiencing an increasing number of RTAs and other non-communicable diseases and it is estimated that RTAs account for 1.7% of DALYs in adults

(Yayemain., 2007). As a result, the NAS was introduced in 2004 by the Government to handle pre-hospital emergencies. It was started in the Bolgatanga municipality in 2008 and for NAS head injury resulting from RTA is a major and leading health problem.

At the time of this survey, transport cost within the region was taken care of by the service while victims referred outside the region were expected to provide fuel for the transport. However, more public awareness programmes are required to put the service in full flight. Close collaboration and coordination with other stakeholders of injury control especially the Regional Hospital and the Police are also needed to make their service efficient and effective.

The Ghana government has directed that two percent of the common fund be set aside for education and advocacy purposes to serve the needs of persons with disability⁵. This is an opportunity for all injury stakeholders but most are yet to be aware of it.

2.8.3 Domestic Violence and Victim Support Unit (DOVVSU)

According to the Ghana Police Service, Upper East region, the domestic violence and victim support unit of the Ghana Police Service was established in October 1998 as WAJU. Cases reported to the unit include defilement, indecent assault, and these are all risk factors of severe injury. DOVVSU supports the vulnerable victims to pursue their cases.

⁵ source; daily graphic Monday, November 3, 2008)

CHAPTER THREE

3.0.0 METHODOLOGY

3.1.1 Scope of the research

Persons living in the Bolgatanga municipality at the time of the survey were the reference population surveyed, all considered to be at risk.

3.1.2 Study Population

The study population was all victims who sustained any severe type of injury related to Road traffic, occupational, and interpersonal incident and others during the reference period; from 1st November, 2007 to 31st October, 2008 which led to restriction of normal activities for more than one day. In the event that an individual sustained more than one severe injury during the reference period (1st November 2007-31st October 2008) all episodes were counted and included as separate. Injury on any part of the body was included. Patients who died on the spot or during admission were also included.

3.1.3 Exclusion criteria

Injuries that did not lead to restriction of up to one day's normal activities were not considered. Injuries caused principally by factors such as cellulites, worms, elephantiasis and cancers were not included. Injuries due to surgical operations were also excluded.

3.1.4 Study Type / Study design

The study was cross-sectional; a community based survey that described and compared the distribution of severe injuries in the urban and rural areas of the Bolgatanga municipality. It was a household survey.

3.2.0 Study Method

Even though a sample size of one hundred and eighty-six (186) households was calculated, a total of two hundred (200) was covered to interview people who were injured during the reference period; 100 in the urban and 100 in the rural communities of the municipality. The group of people who most often lived together, shared and ate the same food source was counted in each of the 200 households and noted. Questionnaire was used to collect some demographic factors of household members who sustained an injury in the past one year that resulted in losing one or more days of 'normal' activity (e.g. not being able to work or go to school). The person injured or the head of household or any other responsible person was interviewed to obtain information about the household members.

The questionnaire was also used to obtain data related to the circumstances surrounding the medical care and treatment practices of the injured. Great effort was made to interview the injured person if an adult, otherwise an informed member of the injured person's household was interviewed. Provision was made in the questionnaire design for all victims to comment further to the questions posed, especially those who experienced major injuries (≥ 30 disability days).

In addition, the questionnaire included questions of the post-injury outcomes including days missed from normal vocation/ activity, social network support, disability status, and other socio-economic factors.

An interview guide was also administered to appropriate staff of Health Insurance Schemes, the Regional Hospital, the Police Service, Municipal Assembly and NAS to collect secondary data.

TABLE 3: Sampled urban and rural communities of Bolgatanga municipality used for the study

<i>URBAN COMMUNITIES</i>	<i>RURAL COMMUNITIES</i>
<i>Junior Staff Quarters</i>	Yorigo Madina
<i>Tanzue</i>	kalbeo
<i>SSNIT</i>	Nayire
<i>Estates</i>	Zaare Avombisi
<i>Soe Central</i>	Yarigabisi
<i>Daporetindongo</i>	Gambibigo
<i>Sawaba</i>	Amogrebisi
<i>Pobaga</i>	kulbia
<i>Atulbabisi</i>	Yariga Central
<i>Tindonshio</i>	Tindonsobigo

3.2.1 Data Collection Techniques and Tools.

Data collection techniques included administering written questionnaire, observing and use of available data like voters ID, hospital cards of the injured patients in households to collect and confirm primary data. Use of available data and interviewing of appropriate staff of Health Insurance Schemes, the Regional Hospital, Police Service and NAS were done to collect secondary data. Questionnaires, interview guide, were some tools used to collect data. In situations where respondents were not met the first time, a second attempt was made to interview them.

3.2.2 Sampling Techniques

The sampling unit was the household and a two-stage sampling design was adopted; the first stage was a simple random sampling among the one hundred and ten (110) communities to select twenty (20) communities for the survey. Ten communities each from the urban (21) and rural (89) communities were selected by simple random sampling. For the second stage units, three social places such as markets, clinics, churches, schools from different locations in each of the twenty communities were listed and one selected by simple random sampling. The location of the obtained social place was then chosen and a ruler thrown to determine the direction and nearest household used to begin the household survey. Every adjacent household was included in the survey until a total of ten were covered per day as determined by the pre-test.

3.2.3 Sample Size Calculation

According to the 2006 annual health report of the municipality, the average household size was 4.5. A research carried out by Bennett *S et al.*, 1998 (cited in Sethi ed., 2004) in Ghana involving injuries that resulted in death or at least one day of lost activity found the incidence of minor injuries to be 383.2 per 1000 person-years in the Brong Ahafo Region.

Thus, an estimate of the injury prevalence in the Bolgatanga Municipality was assumed to be 38.3%. Using a 95% confidence level, 5% margin of error and design effect of 2 and a non-response rate of 10%, the sample size for the study was calculated as follows in view of the fact that the total population of the municipality is at risk of injury.

$N = \frac{4 (r) (1-r) (f) (1.1)}{(e^2) (p) (n_h)}$ (Sethi D ed., 2004)

$$[(e^2) (p) (n_h)]$$

Where,

N = the required sample size,

4 = a factor to achieve 95% level of confidence (95% certainty of obtaining the same results if the survey were to be repeated).

r = the anticipated prevalence of the outcome being measured = 0.3832

1.1 = a factor necessary to raise the sample size by 10% to allow for non-responses.

f = the design effect = 2

e = the margin of error to be tolerated = 0.05

p = the proportion of the total population that the study subgroup comprise (=1 because whole population is at risk)

n_h = the average household size.

$$\begin{aligned} \text{Thus } N &= \frac{4(0.3832)(1-0.3832)(2)(1.1)}{(0.05^2)(1)(4.5)} \\ &= 2.08/0.01125 \\ &= 186 \text{ households.} \end{aligned}$$

3.2.4 Pre-test

Pre-test was done by the principal investigator in the Zebilla District to identify potential problem areas. The pre-test found out that the number of households to be covered in a day was ten. It also showed that:

- Some respondents were unwilling to answer questions about the number of household members.
- Some questions were particularly difficult to answer?

- A good number of questions were well understood by the respondents?
- It was extremely difficult to get detail information of household members who were not injured.
- The local dialect, English and Hausa were the main languages well understood by the interviewers and by the respondents?

The questionnaire was modified afterwards and used for the main study.

3.2.5 Selection and Training of Research Assistants

A total of 4 community health nurses; 2 males and 2 females, were recruited for the study and given one-day training and then deployed to the communities. The survey tools were translated into Gruni (the most widely spoken language of the study area), and back translated into English, before the survey

3.2.6 Ethical Considerations

The Municipal Health Administration was informed for ethical clearance and support. Elders and participants were also informed of the objectives of the study in order to have their consent for the study. The questionnaire was confidential and anonymous. All questionnaires were processed and held safely. No information was passed on to anyone that could allow for the possibility of identifying persons completing the forms. As much as possible data and information were kept electronically. However, most participants volunteered to be identified should it become necessary to locate them.

Mutual respect, respect for the culture of the people, use of the language that the participant understands, were some core values employed in the study. All participants were treated fairly and equally. Health education was given after the interview when necessary and possible.

3.2.7 Data Collection Plan

Motor-bikes and fuel were arranged for use by field workers and small amount of cash provided to them each day to cover the day-to-day and any unexpected expenses. The necessary tools; notebooks, large envelopes, staplers, pens, pencils and erasers were purchased well in advance of the survey. Completed questionnaires were returned to the principal investigator on a daily basis as instructed.

3.2.8 Quality Control

Returned questionnaire were inspected daily with field workers in order to include only quality data that is reliable, complete, and accurate. The principal investigator was responsible for all aspects of the project and was available to supervise it throughout. Respondents were also made to understand the questions before giving their responses. Facilitative supervision was occasionally used to improve the quality of data collected.

3.2.9 Data analysis Plan

The unit of analysis was an injury episode. Data collected was entered into a computer as soon as possible. Variables were categorised mostly into nominal scale of measurement and a few ordinal ones and the frequencies analyzed using SPSS computer software version 11 to assess for

outliers, proportions, and means. The chi square was also used to test for significance.

3.3.0 LIMITATIONS OF THE STUDY

Published injury literature in the municipality was difficult to come by and so sample size calculation for example, was based on estimates of a study done in the Brong Ahafo Region and Ashanti Region. In addition, since it was a household survey, cases involving the homeless poor were probably excluded. A clinical injury severity assessment was also not possible.

3.3.1 Self- reporting

The study relied on self-reporting by respondents therefore the accuracy of responses could not be fully and independently verified, for example ages were largely estimates for most adults. In addition, injuries caused by sexual violence, female genital mutilation, and domestic violence for example were not reported in all communities and were perhaps concealed because of reluctance on the part of respondents to disclose that they have been victims of sexual violence or domestic abuse. This and the recall limitation were minimized by repeating the questions and use of available records for confirmation.

3.3.2 Recall Bias

There was a general desire to report events occurring outside the reference period as if they had occurred within it especially for most minor injuries indicating that the accuracy of the answers was probably influenced by memory decay. This situation was further influenced by cases where the real victim of the injury could not be contacted and proxy respondent became necessary.

3.3.3 Generalizability

There were great differences, say in the environmental, occupation and socio-cultural factors between different parts of the municipality. Age was not standardized and the incidence calculated was crude. These do not permit generalization of the survey findings to other parts of the country and so similar studies in other places are important.

3.3.4 Use of Research Assistance

Even though the data collection tool for the primary data was originally designed as a questionnaire, research assistants were used to administer and read them mainly because the majority of respondents were illiterate especially in the rural areas. The research assistants were motivated to exhibit a high sense of commitment during the data collection. This resulted in the collection of data exactly according the set targets. They were very willing to go through the questionnaire according to the wish of the principal investigator

3.4.0 ASSUMPTIONS

- Members of the reference population had an equal chance of sustaining an injury
- Every injured patient in the municipality was assumed as having equal chance of being included in the study.
- Injury prevalence was 38.3%, design effect of 2, a non-response rate of 10%.
- All victims surveyed at the time of the survey had been staying in the municipality for the whole reference period of one year.
- Responses were exactly the way real situation was in the Bolgatanga municipality at the

time of the survey

3.5.0 Tables of study variables

Table iv: Demographic variables used for the study

VARIABLE	OPERATIONAL DEFINITION	INDICATOR	SCALE OF MEASUREMENT	TECHNIQUES	OBJECTIVE ADDRESSED
Age	Age at time of injury and death in years	As answered by informants	Numeric in years	Interview/questionnaire	1&2
Sex	Gender of the victim	As answered by informant	1=Male, 2=Female	Interview/questionnaire, observation	1&2
Marriage	Marital status of injury victim	As answered by informant	1=Married 2= Single 3= Divorced / separated 4= widowed,5= other	Interview/questionnaire, observation	1&2
Education	Level of full-time education by victim.	As answered by informant	1=No education 2=JSS/ O' Level 3=SSS/ A Level 4=Post SSS/ A Level,5=other	Interview/questionnaire	1&2
Religion	Belief of access to the almighty God	As answered by informant	1= Muslim, 2=Christian, 3=traditional, 4=other	Interview/questionnaire	1&2
Vocation	major source of income of victim at time of injury	As answered by informant	1=Student, 2=self employment, 3=regular employment, 4=casual employment5=unemployed 6=others	Interview/questionnaire	1&2
Household number	A group of people who most often not only live together but also eat and share the same food source	As told by informant	numerical	Interview/questionnaire	1&2&4
Marital status	Staying under one roof with the opposite sex as husband or wife.	As answered by informant	1=married 2=single 3=divorced/ separated 4=widowed 5=other	Interview/questionnaire	1&2
Language	Languages that victim speak	As answered by informant	1= Gruni 2= English 3= Hausa 4=other	Interview/questionnaire	1&2

TABLE v: Variables of Medical care and treatment practices of injury used for the survey

VARIABLE	OPERATIONAL DEFINITION	INDICATOR	SCALE OF MEASUREMENT	TECHNIQUES	OBJECTIVE ADDRESS
Time of injury	Whether day or night	As told by informant/records	1= Day 2= night	observation/questionnaire	3&4
Mechanism of injury	Description of how the injury was inflicted.	As told by informant	1= RTAs 2=interpersonal, 3=occupational 4=others	Interview/questionnaire	3&4
Health Agency Treated	Place of treatment of the injury?	As told by informant	1=Government 2= Private hospital 3=Pharmacy 4= Traditional Healer 5= Other	Interview/questionnaire	3&4
Visits to treatment place	No of visits to health agency/treatment place	Answer as given by informant	1= once 2= 2-3 times 3= more than 3 times	Interview/questionnaire	3&4
Home-facility distance	Number of kilometres to furthest facility for treatment	As told by informant, observation	Numeric in kilometres	Interview/questionnaire/observation	3&4
Mode of transport to agency	Vehicle the injured person used to a health agency.	Answer as given by informant	1=By foot, 2=By private car, 3=By taxi, 4= By public transport, 5= By ambulance, 6=By bicycle 7=By animal 8=cart, 9=other	Interview/questionnaire	3&4
Severity of Injury	Total number of days victim was hospitalized for treatment of injury	Answer as given by informant Available records	Numeric	Interview/questionnaire /	3&4
Insurance status	Whether victim is health insured or not	Insurance card	1=Insured, 2= not insured 3= other	Interview/questionnaire	3&4
Cost of treatment	Out-of-pocket payment for injury of treatment.	Amount in Ghana cedis as told by informant	Numerical in cedis	Interview/questionnaire	3&4
Patient satisfaction of service	Perception of injury victim that facility treatment is satisfactory	Answer as given by informant	1=Very satisfied 2=somewhat satisfied, 3=somewhat dissatisfied 4=dissatisfied 5= very satisfied	Interview/questionnaire	3&4

Table vi: Variables of Post injury outcome used for the study

VARIABLE	OPERATIONAL DEFINITION	INDICATOR	SCALE OF MEASUREMENT	TECHNIQUES	OBJECTIVE ADDRESSED
Self-Care	Whether the injury affect the victim's ability to care for himself	As told by informant	1 Yes, fully 2 Yes, but with some problems 3 No	Interview/questionnaire/observation	3&4
Usual Activities	Whether the victim is able to return to the same level of usual activity as before the injury	As told by informant	1 Yes, fully 2 Yes, but with some problems 3 No	Interview/questionnaire/observation	3&4
Loss of employment	Whether victim lost employment as a result of being injured?	As told by informant	1= Yes 2=No 3=other	Interview/questionnaire	3&4
Loss days of work or school	Whether a household member lost days of work or school in order to care for the victim?	As told by informant	1 Yes 2 No	Interview/questionnaire	3&4
Mobility	Whether the injury affected the victim's ability to move about	As told by informant	1 Yes, fully 2 Yes, but with some problems 3 No	Interview/questionnaire/observation	3&4
Pain/Discomfort	Whether the injury has resulted in permanent pain or discomfort	As told by informant	1 Yes, fully 2 Yes, but with some problems 3 No	Interview/questionnaire/observation	3&4
Sale of property	Whether the household had to sell household items to meet costs of treatment or the funeral for the injury victim.	Answer as given by informant	1=Yes, 2= No, 3=others	Interview/questionnaire observation	3&4
Socio-economic impact	Whether the household had to borrow money to pay for medical care of the victim or to make up for lost income.	Answer as given by informant	1=Yes, 2= No, 3=others	Interview/questionnaire observation	3&4
Anxiety/Depression	Whether the injured has some worry and apprehension.	Answer as given by informant	1 Yes, fully 2 Yes, but with some problems 3 No	Interview/questionnaire observation	3&4

4.0.0 CHAPTER FOUR

4.0.0 RESULTS

4.1.0 Incidence rate of severe injuries

A total of 200 households in both urban and rural communities were surveyed resulting in the coverage of 1702 persons. 100 households and 826 persons were covered in the rural communities, whilst in 100 households, 867 persons were covered in the urban communities. The average household size was 8.76 and 8.28 in urban and rural communities respectively.

Of the total sample, 111 persons reported as having sustained a severe injury that kept them away from their normal activity for at least one day during the reference period. Generally, a larger proportion of injuries were recorded in rural than urban communities; 56.8% vrs 43.2%; (63 vrs 48) (see table 7). Day injuries (6am-6pm) were generally in a larger proportion than night injuries 65.8% vrs 34.2%; (73 vrs 38). Day injuries were 73.0% (46) and 56.3% (27) of the rural and urban injuries respectively.

Table 7: Trend of severe injury in urban and rural communities of the Bolgatanga Municipality.

Community	Frequency	Percentage
Urban	48	43.2
Rural	63	56.8
Total	111	100.0

Source: FIELD SURVEY, 2008

RTAs were the leading cause of injuries in general; 54.5% (60), followed by occupational injuries 18.2% (20). However, RTAs associated injuries constituted 74.5% (35) and 39.7% (25) of the urban and rural community injuries respectively; and whilst occupational injuries ranked second 25.4% (16) in the rural communities, interpersonal injuries ranked second 10.6% (5) in urban communities. (see table 8)

Table 8: Trend of severe injury by mechanism of injury in urban and rural communities in the Bolgatanga municipality.

Mechanism of Injury	Community		Total
	Urban	Rural	
RTAs	35 74.5%	25 39.7%	60 54.5%
Interpersonal	5 10.6%	7 11.1%	12 10.9%
Occupational	4 8.5%	16 25.4%	20 18.2%
Other	3 6.4%	15 23.8%	18 16.4%
Total	47 100.0%	63 100.0%	110 100.0%

Source: FIELD SURVEY, 2008

Most injuries were unintentional 93.7% (104). The proportion of unintentional injuries in urban compared with rural communities was almost the same; 93.8% (45) and 93.7% (59) respectively.

4.1.1 Injury deaths

There were three (3) deaths recorded in the survey all occurring in the rural communities; two were as a result of RTAs whilst one was as a result of a wall collapsing on an old lady.

4.2.0 Demographic factors related to severe injury

The rural sample had a larger proportion of the injured aged 50 years and above; 28.6% (18) compared to the urban area 6.3% (3). Generally injuries were normally distributed about age as shown in figure 2 below. The minimum and maximum ages of the injured were 3 and 70 respectively. The mean age of the injured was 33.75 years (standard deviation 15.182). 2 (1.8%) of under-five injuries were recorded, all in the rural area and comprising of one resulting from burns and one from a fall (see table 9)

Table 9: Trend of severe injury by age in urban and rural communities in the Bolgatanga municipality

Age at Time Of Injury	Community		Total
	Urban	Rural	
0 thru 4		2 3.2%	2 1.8%
5 thru 19	1 2.1%	12 19.0%	13 11.7%
20 thru 49	44 91.7%	31 49.2%	75 67.6%
50 thru 70	3 6.3%	18 28.6%	21 18.9%
Total	48 100.0%	63 100.0%	111 100.0%

Source: FIELD SURVEY, 2008

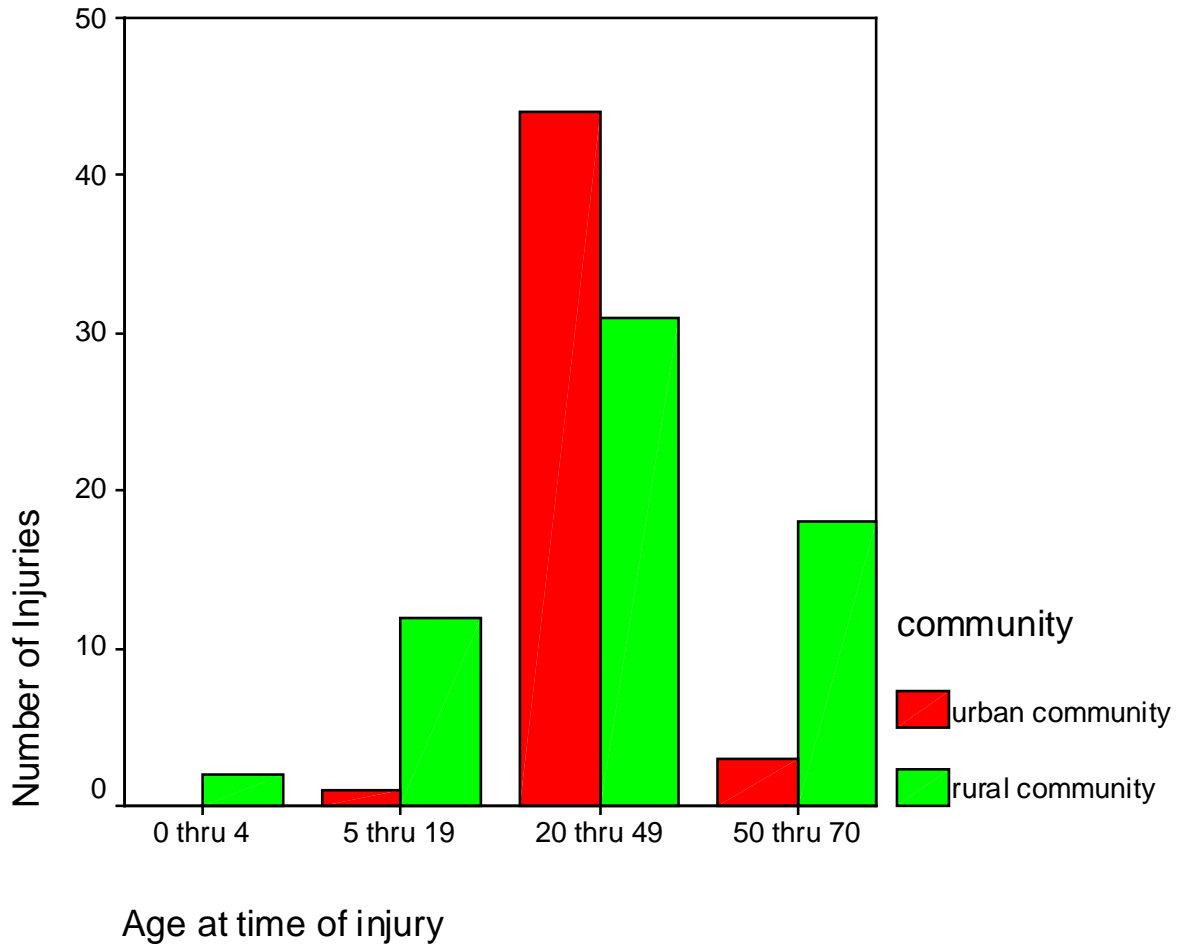
Generally, ages between 20 and 49 accounted for most of the injuries 67.6% (75). This included 91.7% (44) and 49.2% (31) of urban and rural communities injuries respectively, (table 9). In addition, age ranges 50 -70 and 5- 19 accounted mostly for occupational and interpersonal injuries respectively, (table 10)

Table 10: Trend of severe injury by age and mechanism of injury in the communities of the Bolgatanga municipality

Mechanism Of Injury	Age at time of injury				Total
	0 thru 4	5 thru 19	20 thru 49	50 thru 70	
RTAs		4	48	8	60
		30.8%	64.9%	38.1%	54.5%
Interpersonal		4	5	3	12
		30.8%	6.8%	14.3%	10.9%
Occupational		2	14	4	20
		15.4%	18.9%	19.0%	18.2%
Other	2	3	7	6	18
	100.0%	23.1%	9.5%	28.6%	16.4%
Total	2	13	74	21	110
	100.0%	100.0%	100.0%	100.0%	100.0%

Source: FIELD SURVEY, 2008

Figure 2: Trend of severe injury by age in urban and rural communities in the Bolgatanga municipality.



Source: FIELD SURVEY, 2008

Generally, Christians were the most injured 54.1% (60), followed by traditional worshippers 31.5% (35), (table 11). In the urban communities Moslems ranked second to Christians whilst in rural communities, traditional worshippers suffered injuries the most followed by Christians.

Government health facilities were the ones most patronised by all religious groups, and even though Christians were the group sustaining injuries the most, a lower proportion of them reported to government facility than Moslems; 55% vrs 73.3% (33 vrs 11), (table 11). However, traditional worshippers were the most likely to visit traditional healers after attending a government health facility; 17.1% (6). see table 11.

Table 11: Trend of severe injury by religion and the facility victim was treated in the communities of the Bolgatanga municipality.

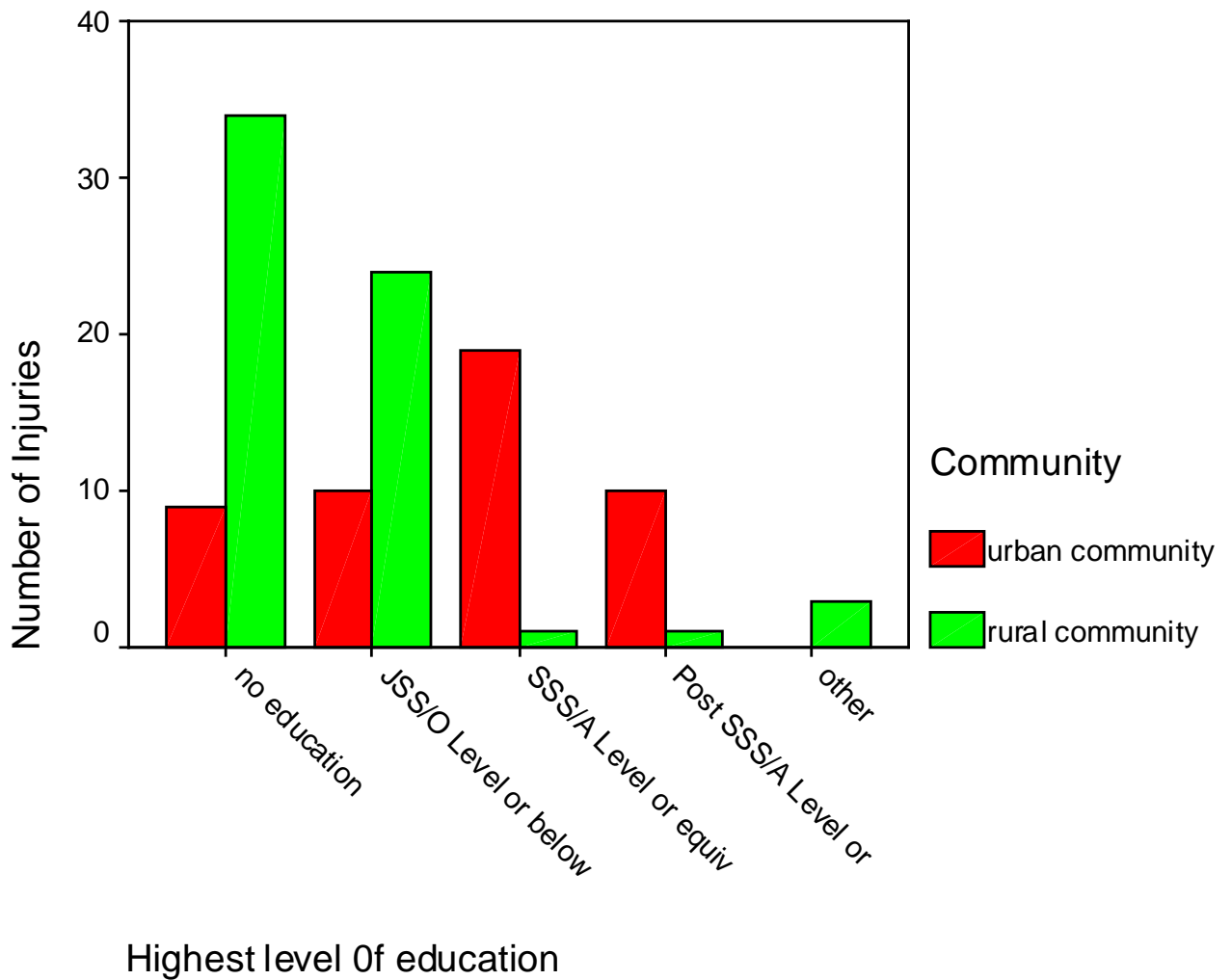
		Religion of victim				Total
		Muslim	Christian	Traditional	Other	
Facility victim was treated	Government facility	11	33	10		54
		73.3%	55.0%	28.6%		48.6%
	Private hospital	1	9	2		12
		6.7%	15.0%	5.7%		10.8%
	Pharmacy/chemical shop		2	3		5
			3.3%	8.6%		4.5%
	Traditional healer		4	9		13
			6.7%	25.7%		11.7%
	Other		1	2		3
			1.7%	5.7%		2.7%
Government facility and traditional	1	8	6		15	
	6.7%	13.3%	17.1%		13.5%	
Private hospital and traditional			1		1	
			2.9%		.9%	
Other two health agencies	2	3	2	1	8	
	13.3%	5.0%	5.7%	100.0%	7.2%	
Total	15	60	35	1	111	
	100.0%	100.0%	100.0%	100.0%	100.0%	

Source: FIELD SURVEY, 2008

Males were more involved in injuries than females; 65.8% vrs 34.2% (73 vrs 38) and still dominated among all age groups as categorized for the study.

Educational status was higher in the urban area and the frequencies of injuries generally showed an inverse proportion with level of education; participants with no education sustained more injuries (38.7%) compared with persons who were involved in any other levels of education. Persons with the highest level of education were associated with the least frequency of injuries (see figure 3).

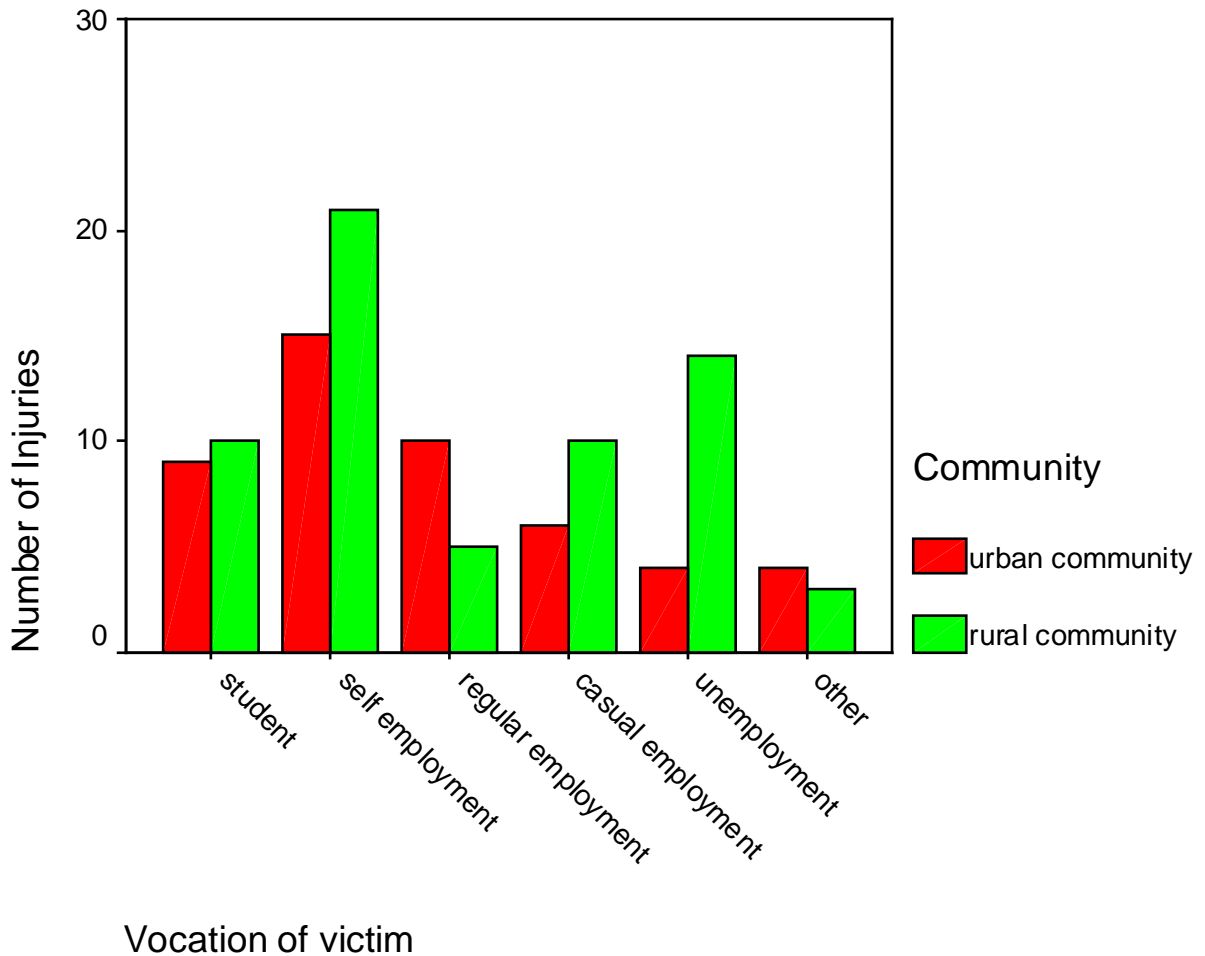
Figure 3: Trend of severe injury by level of education in urban and rural communities in the Bolgatanga municipality.



Source: FIELD SURVEY, 2008

Persons who were not married sustained fewer injuries 37.8% (42) compared with those who were married 62.2% (69) and persons who were self-employed got involved in injuries the most in both urban and rural communities. This was followed by those with regular employment in urban areas and the unemployed in rural areas (Figure 4)

Figure 4: Trend of severe injury by employment in urban and rural communities in the Bolgatanga municipality



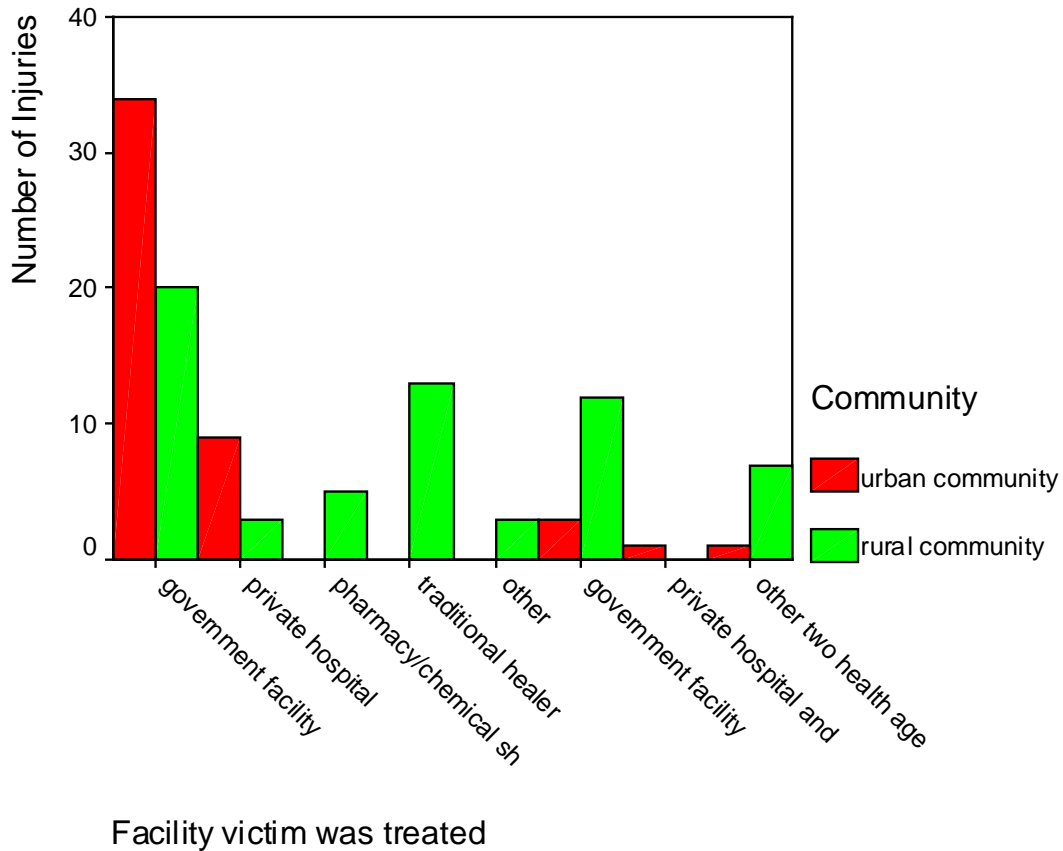
Source: FIELD SURVEY, 2008

74.6% (47) and 16.7% (8) of injured persons surveyed in the rural and urban communities respectively spoke only Gruni, and as much as 60.4% (29) in the urban community spoke two widely spoken languages in the municipality compared with 19% (12) in the rural communities.

4.3.0 Medical and treatment practices of practices associated with severe injury

48.6% (54) of all injuries were reported to government health facilities alone and this far exceeded that of traditional healers alone 11.7% (13). This was made up of 70.8% (34) of urban community injuries and 31.7% (20) of the rural community injuries. In general, 13.5% (15) of injuries were reported to both government facilities and traditional healers. The least number of cases of injuries were reported to both private health facilities and traditional healers. (see Figure 5).

Figure 5: Trend of severe injury by place of treatment in urban and rural communities in Bolgatanga Municipality.



Source: FIELD SURVEY, 2008

49 (45%) of the injured were not admitted. 39.4% (43) were admitted for just one day. The furthest distance travelled for treatment involved one person (0.9%) who travelled to Koforidua (over 600kilometres) for treatment as a result of an RTA. 80.9% (78) of injuries were treated within 2 km radius in the municipality. For people who travelled furthest, between 5 and 10 km within the municipality for treatment, only 3.7% accessed government facilities alone, 15.4% accessed traditional healers alone and 35.7% accessed both.

The most frequent means of transport used by the injured to treatment places was by taxi 34.5% (38) followed by foot. In the urban area, 64.6% (31) of the injured travelled by taxi followed by private cars 14.6% (7). In the rural area, however, motor-bike /bicycles were most frequent; 25.8% (16), followed by foot, 22.6% (14). The least used means of transport was the ambulance in both urban and rural communities (Table 12).

Table 12: Trend of severe injury by means of transport used by victims to place of treatment in urban and rural communities of Bolgatanga municipality.

Kind of Vehicle Used to Health Facility	Community		Total
	Urban	Rural	
By foot	6	14	20
	12.5%	22.6%	18.2%
By private car	7	7	14
	14.6%	11.3%	12.7%
By taxi	31	7	38
	64.6%	11.3%	34.5%
By public transport		6	6
		9.7%	5.5%
By ambulance	1	1	2
	2.1%	1.6%	1.8%
By motor-bike/bicycle	3	16	19
	6.3%	25.8%	17.3%
Other		4	4
		6.5%	3.6%
Not applicable		7	7
		11.3%	6.4%
Total	48	62	110
	100.0%	100.0%	100.0%

Source: FIELD SURVEY, 2008

36.0% (40) of the injured were generally health insured with more of the registration skewed towards the urban compared with rural communities; 52.1% vrs 23.8% (25 vrs 15). 70 % (28) said they were covered by health insurance and yet made some form of payment to treat themselves. A proportion of 6.3% (7) persons who were not health insured had difficulties in renewing their health insurance registration.

72.8% (80) of injured persons said they were satisfied with the places they went for treatment whilst 3.6% (4) of people, all treated with the traditional healers in rural communities said they were very dissatisfied (see table 13). Generally, only 9.7% of persons in the rural communities expressed dissatisfaction with the treatment they received. 74.5% (82) concluded that if they were to treat the same injury they would prefer the government health facilities and this was followed by traditional healers, 15.5% (17).

Table 13: Urban and rural level of satisfaction at place of treatment in the Bolgatanga municipality

Level of Victim Satisfaction With Treatment	Community		Total
	Urban	Rural	
Very satisfied	35 72.9%	17 27.4%	52 47.3%
Somewhat satisfied	13 27.1%	15 24.2%	28 25.5%
Somewhat dissatisfied		2 3.2%	2 1.8%
Very dissatisfied		4 6.5%	4 3.6%
Not applicable		24 38.7%	24 21.8%
Total	48 100.0%	62 100.0%	110 100.0%

Source: FIELD SURVEY, 2008

4.4.0 Post injury outcome of severe injury

In general, two persons (1.8%) reported having lost their ability to care for themselves at the time of the survey and 89.1% said they had no problem caring for themselves. 6.4% had moderate restrictions in caring for themselves. 1.8 % (2) lost their ability to move about compared with 81.8% (90) that had no problem moving about at the time of the survey. 13.6% (15) moved with moderate difficulty.

3.6% representing four persons experienced major injuries (lost normally activity for up 30 or more days, at the time of the survey) whilst 70.3% (78) were able to do their normal activities without restrictions. Of all the injured persons, one lost his employment as a result of injury. 20.7% (23) of the injured had their relatives fully taking care of them while on admission

compared with 51.4% (57) who did not. 27.9% (31) were partially taken care of by their relatives. 5.4% (6) said they experienced permanent pain as a result of their injury whilst 67.6% (75) did not. 24.3% (27) said they experience partial pain.

Availability of any worry or apprehension related to injury was assessed and 67.3% (74) did not have any, whilst 8.2% (9) said something could have been done to avert the injury they experienced or to compensate them. Bad roads, over speeding, etc were some of the concerns. 20.7% (23) of the injured sold items, mostly animals in order to treat themselves and 79.3% (88) used available money, (figure 14). 81.8% (90) used their own resources to treat their injuries whilst 16.4% (18) had to borrow money in order to treat themselves (figure 15).

Table 14: Urban and rural sale of household property as a result of severe injury in the Bolgatanga municipality.

Sale of household property	Community		Total
	Urban	Rural	
Yes	3 6.3%	20 31.7%	23 20.7%
No	45 93.8%	43 68.3%	88 79.3%
Total	48 100.0%	63 100.0%	111 100.0%

Source: FIELD SURVEY, 2008

Table 15: Urban and rural borrowing of money as a result of severe injury in the Bolgatanga municipality.

Borrowing of money as a result of the injury	Community		Total
	Urban	Rural	
Yes	2 4.2%	16 25.8%	18 16.4%
No	46 95.8%	44 71.0%	90 81.8%
Other		2 3.2%	2 1.8%
Total	48 100.0%	62 100.0%	110 100.0%

Source: FIELD SURVEY, 2008

Financial distress was the commonest experience reported. This was followed by permanent pain. Loss of relatives and inability to renew health insurance were other important concerns raised.

CHAPTER FIVE

5.0.0 DISCUSSION

5.1.0 Incidence rate of severe injuries

Many significant differences between urban and rural community injuries were found. For instance, all injury-associated deaths and under-five injuries were recorded in the rural communities alone. A total crude incidence rate of fatal, disabling, and recovered injuries was found to be 65.56 per 1,000 persons per year. This was found to be comparable with a previous study in Ghana; 76.24 severe injuries per 1000 persons per year (Mock et al 1999) and relatively higher than another study in Tanzania; 33.44 severe injuries per 1000 persons per year (Moshiro et al 2005).

The average household sizes of 8.76 and 8.28 in urban and rural communities respectively, representing the number of people usually sharing meals together were large and exceeded the household size of 4.5 as stated for the township in the MHMT Annual Report (2006). This situation if combined with injury problems could bring hardships to households in terms of meeting the basic needs of survival in the Bolgatanga municipality and so deserve an intervention.

Transport mechanism was found to be significantly ($X^2 = 15.194$, $p=0.002$) associated with community injuries; being the most frequent injury mechanism, especially in the urban area. The relatively low proportion of transport injuries in the rural areas (table 8) is perhaps a reflection of the lower numbers of motor vehicles there. Transport injuries involving motor-bike alone accounted for 66% of the case fatality rate found to be 2.7. This is in line with the findings of

Afukaar *et al.*, 2007 that among all mechanisms, RTAs is most fatal in rural communities. It agrees with the claim by the NAS that motor-bike related head injuries are their biggest problem and also agrees with the Bolgatanga hospital in-patient data (table 1) which showed that RTAs are a leading and increasing mechanism of injury since the year 2005.

According to Peden *et al.*; (2004) (see Nortin., *at al* 2005), fatigue, use of hand-held mobile telephones, and inadequate visibility of vulnerable road users, are some of the factors that increase the risks of road crashes in HICs. These are also important factors in LMICs like Ghana. Studies in Malaysia clearly showed that motorcyclists who use daytime running lights have a crash risk about 10 to 29 percent lower than those who do not (Radin Umar, *et al* 1996). A survey in Ghana of commercial and public road transport showed that drivers often work long hours and go to work the next day exhausted (see Mock *et al* 1999). Studies and other interventions to address the above in the municipality could yield favourable results.

.
Vehicular load in the municipality is increasing every passing day with more people acquiring private as well as commercial vehicles. Motor-bikes are especially the most popular and the most fatal means of transport as shown by this study and according to NAS. Some risk factors associated with road traffic injuries probably include the non-use of helmets by motor-bike riders, bad nature of roads, indiscipline and consumption of alcohol, ignorance and disrespect for road safety regulations, lack of enforcement of regulations. Bicycle riders and pedestrians are also important users of the road network in the municipality and should be targeted for interventions since this study showed severe injuries associated with them.

Occupation was also found to be an important risk factor of injury especially in the rural communities probably because most of the people there were mostly engaged in peasant farming and other high risk occupations like blacksmithing, leather work, and basket weaving without the use of any protection. The study found no significant ($X^2 = 7.528$, $p=0.184$) relationship between employment/vocation of victims and severe injuries even though a majority of people with casual employment largely got involved in injuries. People with regular employment were associated with the least number of injuries probably because a majority of them were not engaged in high risk jobs.

Generally, the frequency of interpersonal injuries was relatively low, 12 (10.9%). This was supported by very small proportion of intentional injuries (6.3%). Even though this may confirm the thinking that the municipality is peaceful, it is possible that people were not comfortable reporting events like rape, female genital mutilation and domestic violence. For the case of RTAs, for example, one victim refused to take part in the survey claiming that she did not want to remind herself of her ordeal.

Females were also involved in more interpersonal injuries than males (13.2% vrs 9.7%) probably suggesting that they are more at risk of domestic violence. Excessive male dominance in households, use of alcohol and other substances are also risk factors of domestic violence in the municipality and may require some studies.

Furthermore, the study found some negative cultural practices (eg traditional treatment of dog bites) in the municipality some of which resulted in death; three snake bites in the rural areas

were recorded, one of which was treated traditionally. Snake bites, associated with firewood gathering, farm work, shea-nut picking as well as dog bites are of public health importance considering the number of people affected, severity of consequences if not well managed and availability of health logistics for managing the conditions.

Even though found not to be significantly associated with community injuries ($X^2 = 3.401$, $p=0.065$) the study showed that injuries occurring during the day (65.8%) were more frequent than those at night. This is probably suggesting that the problem of inadequate visibility was not a main issue associated with injuries in the municipality and that there are good prospects for primary prevention interventions.

5.2.0 Socio-demographic factors related to severe injuries in the Bolgatanga municipality.

Adults aged 20-49 years were at the highest risk of transport injuries ($X^2 = 22.262$, $p=0.001$). This has great economic impact because these people are in their most productive years and provide support for their families. Males (66.7%) were found to have a bigger overall risk of injury than females which was more pronounced for transport (58.3%). One possible explanation may be that men use more vehicles or spend more time on the roads than females. Another is that males probably are more involved in unsafe road practices and other high risk jobs or behaviours.

Educational status was found to be significantly ($X^2 = 45.670$, $p=0.001$) associated with injury with the least educated getting injured the most, especially in rural areas (see figure 3). This goes to confirm why the objective to achieve universal primary education by the year 2015 is, indeed

a good one for Ghana and other third world countries to pursue. Education could give people choices regarding the kind of occupations and lives they wish to lead in the community and at workplaces.

A significant ($X^2 = 11.034, 0.026$) proportion of the injured were identified as married people, both in the rural and urban communities; a possible explanation is that they are more engaged in high risk jobs in order to address economic burden on their families. A possibility of domestic violence, though not recorded, can not also be entirely ruled out and perhaps requires a specific study. Interventions for the control of injuries can also be targeted at churches, mosques etc, especially in urban communities since religion was found to be significantly associated with injuries, 68.8% in the communities ($X^2 = 22.479, p=0.001$).

Furthermore, the fact that 49.2% of traditional worshippers were involved in injuries and 71.4% of those who did not have education at all were traditional worshippers means that interventions especially in the rural communities should actively include changes in cultural way of life. The study showed that language was also a significant ($X^2 = 36.957, p= 0.001$) demographic factor as far as severe injuries are concerned. Indeed, the language that the injury victim speaks has implications on treatment, distribution of health staff and design of injury interventions.

5.3.0 Medical care and treatment practices of injury patients in the Bolgatanga municipality

When people fall ill or are injured they resort to a number of health care practices in order to maintain and restore their health. Health clients however are neither able to determine the quality

nor volume of health service that they require and so depend completely on decisions made by health care providers. This is associated with some risk, because health care providers can among other things make false claims or exaggerate the volume of health care with cost implications.

This study found government facilities to be the most popular place for injury treatment followed by traditional healers ($X^2 = 37.182$, $p=0.001$). Since a bigger proportion of injuries were reported from urban than from rural communities to the government health facilities, it is possible that in rural areas a large number of injuries are left unreported to government health facilities. This has implications for reliable information made available to inform public health action. Quality of service was found to be an issue in rural communities because all persons who expressed dissatisfaction with treatment were from there. Improper treatment of injuries can lead to complicated disease conditions like tetanus (see table 1), thrombosis etc.

In addition, a significant 63.1% ($X^2= 20.997$, $p=0.001$) of injuries required just one visit to treatment agencies and 60.6% required no admission and/or just one day of admission. This is perhaps an indication that a majority of injuries caused less than 30 days of restriction normal activity and if managed well could be regarded as minor. However, bad management of these injuries could result in serious or complicated outcomes.

This study showed that religion was significantly ($X^2=37.407$ $p=0.015$) related to the place of injury treatment. Even though government health facilities were the most popular place of treatment for most victims, the proportion of traditional worshippers who visited government health facilities alone was comparable to those who visited traditional healers alone 28.6% (10)

vrs 25.7% (9). In addition, 60% (6) of traditional worshippers who visited government health facilities visited traditional healers afterwards. This probably confirms that cultural practice is indeed a strong factor to target for injury interventions (see table 11).

The study discovered that injured patients usually were willing to travel very long distances (5-10km) with severe injuries to consult the traditional healers especially when government facilities failed to sufficiently meet their demands. Treatment payment difficulties were also found to be key factors keeping patient away from government health facilities. These and the dual patronage of other treatment places emphasize the need for improved collaboration between providers of health services especially traditional healers and government health facilities.

The transport used to convey victims was found to be significantly associated with community injuries ($X^2= 43.170$, $p=0.001$) and the use of ambulance services (1.8%) was not found to be encouraging; being the least used among all means of transport studied. Taxis were found to be the leading means of transport used; giving an indication that people may be most interested in conveying victims to the hospital in good time regardless of the consequences. Health education to the general public and first aid training for taxi drivers in relation to injuries could be useful interventions to address this practice. There is also the need for NAS to make their services accessible through public awareness programmes.

Health insurance is a good national intervention for the vulnerable to access health care yet this study showed that, in general a significant 57.7% (64) ($X^2=10,486$, $p=0.005$), of the injured persons were not covered by health insurance at the time of the survey comprising of a majority

of rural persons (66.7% (42) of rural injured victims). This was found to be higher than what was reported by MHIS for 2008 (50.42%) and probably reflects a passive approach to registration of clients in the municipality. Injuries indeed, can sometimes present as very expensive health conditions to treat, and perhaps most persons injured were able to treat their injuries because such injuries did not require many days and expensive resources for treatment. There is the need for the MHIS to adopt more active strategies in order to cover a majority of people in the rural communities.

The study revealed evidence of cash payment for health services in spite of health insurance coverage. This comprise 80% (12) and 64% (16) of injured persons in rural and urban communities respectively but this was not found to be significant ($X^2=0.694$, $p=0.707$). These payments included direct purchases from chemical stores and cash-and-carry payments at rural government health facilities especially and are probably a result of lack of health logistics in these rural facilities and general irrational use of medicines.

Whilst all injured persons in the urban community got satisfied with where they went to treat their injuries, ($X^2=35161$, $p=0.001$). 9.7% (6) of the rural persons who patronised traditional health services expressed dissatisfaction citing success of treatment as grave concerns ($X^2=108.32$, $p=0.001$). This and the fact that 74.5% of people prefer government facilities if given a second chance means that with better organised government health facilities and education, a large proportion of community injuries would be brought to public health facilities. Studies on treatment practices of traditional medicine are also important.

5.4.0 Post injury outcome of severe injury.

Financial distress was found to be a common untoward experience reported. In fact, there was a general indication of financial drain on patients for both fatal and nonfatal injuries. Few people with long-term problems such as persistent headache and pain resorted to self medication with various analgesics and this has obvious consequences. Regular reviews of injury treatment at public sector health facilities can help solve this problem.

Loss of relatives who were bread winners, as expected, was a major concern raised as distressing injury outcomes. Up to 89.1% of injured especially the uninsured, did not get any kind of support and had to do everything all by themselves and at all cost. Obviously this can be a big problem for the uninsured.

2.7% (3) of the victims, even though severely injured, could not report for any form of treatment because of financial reasons. Productivity losses included lost of employment and wages mostly of the casually employed and loss of ability to perform normal household responsibilities but these could not be quantified in the study.

A victim's inability to care for himself / herself means that a relative is required to bath, feed, clothe the victim etc. This adds up to the economic cost of the injury burden. This study found two persons (1.8%) reporting loss of ability to care for themselves at the time of the survey. The implication is that a small proportion of injury victims experienced major disability.

67.3% (74) of persons did not have any worry or apprehension probably assuming that their injuries were related to unavoidable events requiring no compensation. 8.2% (9) did not follow

up for redress though they believed something could have been done to avert the injury they experienced; citing bad roads, over speeding, etc as some concerns. Thus health education should include the fact that injuries can be preventable.

CHAPTER SIX

6.0.0 CONCLUSIONS AND RECOMMENDATIONS

6.1.0 Conclusion

The findings of this study have demonstrated many significant aspects of severe injury in the Bolgatanga Municipality with important implications for planning injury interventions.

This survey is among the few studies done on injuries in the Bolgatanga municipality and was able to identify specific groups of individuals in rural and urban communities as having a greater risk of experiencing certain mechanisms of injuries as well as some issues that require further research.

Some significant aspects the study included the high incidence rate of RTAs and occupational injuries, Transport used to convey the injured to treatment places, MHIS coverage of injured clients, treatment with the traditional healers, Government facility as a favourable place for injury treatment, marriage status as a risk factor of injury etc.

Based on the burden of injury and death as demonstrated by this survey, prevention measures in both urban and rural communities in the Bolgatanga municipality should include RTAs, especially associated with motor-bikes and occupational injuries as top priorities.

Despite its limitations, my knowledge of the study area makes me confident that this study has generated reliable information that could be useful for injury prevention at the local level. This information is important for raising the level of awareness among stakeholders since the problem of injury receives relatively little attention in Ghana as a whole. It is also useful in setting

priorities when planning injury interventions.

In general, medical practitioners, health care managers and researchers are expected to benefit from this study. However, more specific studies are required, especially on sensitive events such as domestic violence which according to radio discussions is a problem in the municipality. A more specific study is also required with regard to traditional medicine, cash-and-carry payment by persons covered by health insurance etc.

6.2.0 Recommendations

- Strategies to reduce the incidence of severe injury in the communities of the Bolgatanga municipality should include RTAs and occupational injuries as top priorities.
- Strategies to reduce complications of injury cases and other post-injury outcomes should involve injury related health education for communities associated with peculiar high risk occupations as well as treatment reviews for major injuries.
- A coordinator for NAS activities as well as improved collaboration between the regional hospital, NAS, traditional healers and MHIS to make their services efficient and economically beneficial to injury victims.
- Health education on the treatment of dog and snake bites in the municipality.
- Improved enforcement of traffic regulations by the relevant authorities with particular focus on motor-bike riders.
- Monitoring of stock of health commodities and training of sub-district managers on procurement procedures in all health facilities at sub-district level.

- Specific studies on domestic violence, traditional medicine, health insurance scheme.
- Training of taxi drivers on the correct transport of victims of injury without causing harm.
- Flexible mechanism of payment for health insurance registration and renewal as well as extension of the period of coverage to two years or more.
- Implementation of behaviour change committees and national selection of sentinel sites for sustainable violence injury surveillance and reporting systems in especially turbulent parts of the country.

REFERENCES

Afukaar Francis k, Antwi Phyllis, Offosu-Amaah Samuel., 2002. *Patterns of Road Traffic Injuries in Ghana: Implications for Control* [Internet]. Available at: <<http://www.bvsde.paho.org/bvsacd/cd53/pattern.pdf> > [accessed 20th December 2007]

Afukaar K Francis Afukaar ,Antwi Phyllis, Ofosu-Amaah Samuel., 2007 *Patterns of Road Traffic Injuries in Ghana: Implications for control* . [Internet]: Available at: <<http://www.mdconsult.com/das/journal/view/N/13526294?PAGE=1.html&source=MI&ANCHOR=abs> - > [accessed 2nd march 2008]

AMERICAN FAMILY DOCTOR., 1989. *Preschool behavioral problems and subsequent risk of injuries* [Internet]. Available at: <http://findarticles.com/p/articles/mi_m3225/is_n5_v39?pnun=2&opg=7621821> [Accessed 10th March 2008] [accessed 2nd march 2008]

CDC., 2007. *Injury Response Activities 2006-2007*. [online] CDC Available at: <www.cdc.gov/ncipc/dir/DIR_Annual_Report_Combo.pdf > [accessed 12th December 2008]

Ghani E, Nadeem M, Bano A, 2003. *Splinters & Fragments* [Internet]. Available at: <<http://injuryprevention.bmj.com/cgi/content/full/9/3/288> > [accessed 20th December 2007]

GUMBER, ANIL., 1987. *Burden of injury in India; Utilization and Expenditure Pattern* [Internet]. Available at: <<http://www.hsph.harvard.edu/takemi/rp165.pdf>> [accessed 10th December 2007]

HOLDER H, PEDEN M, KRUG E, LUND J, GURURAJ G, KOBUSINGYE O. eds., 2001. *Injury surveillance guidelines* [online] Geneva, World Health Organization. Available at: <<http://www.who.int/publications/2001/9241591331.pdf> > [Accessed 10th December 2007]

ICC-U 2008). *Reducing the incidence and impact of injury* [online] ICC-U Available at: <<http://www.iccu.or.ug/about/> > [accessed 2nd November 2008]

Matzopoulos Richard G, Krug Etienne, Friday Jennifer, no date. *Estimating the South African trauma caseload as a basis for injury surveillance*. [Internet]: Available at: <[URLhttp://www.sahealthinfo.org/violence/injurypreventionarticle.pdf](http://www.sahealthinfo.org/violence/injurypreventionarticle.pdf)> [accessed 2nd march 2008]

Mock CN, Abantanga F, Cummings P, Koepsell T. D., 1999 *Incidence and outcome of injury in Ghana; a community-based survey* [Internet] Available at: <[http://libdoc.who.int/bulletin/1999/Vol77-No12/bulletin_1999_77\(12\)_955-964.pdf](http://libdoc.who.int/bulletin/1999/Vol77-No12/bulletin_1999_77(12)_955-964.pdf). > [accessed 20th June 2008]

MOSHIRO CANDIDA, RHEUCH IVA, NORDREHAUG ANNE ASTROM, SETEL PHILIP, GUUNNAR KVALE HEMED YUSSIF., 2005. *Injury morbidity in an urban and a rural area in Tanzania: an epidemiological survey* [Internet]. Available at:

<URL:<http://www.biomedcentral.com/1471-2458/5/11> > [accessed 20th December 2007]
QueryCat .,2007-2008. *Frequently Asked Question; How do I calculate my OSHA ‘Injury and Illness Incidence rate’?* [online] QueryCat. Available at:
<<http://www.querycat.com/faq/b866b29e9a3edbc03914e2052700a99e>> [accessed 12th December 2008]

RTIRN., 2008., *The Road traffic Injuries Research Network.*, [online] RTIRN. Available at: <<http://www.rtirn.net>>[accessed 10th June 2008]

Robyn Norton, Adnan A. Hyder, David Bishai, and Margie Peden.,2005 *Injuries and Violence* [online] world bank Available at:
<<http://files.dcp2.org/pdf/expressbooks/injurie.pdf#page=4>>[accessed 10th June 2008]

Radin Umar, Radin Sohadi 1996. *The value of daytime running headlight initiatives on motorcycle crashes in malaysia* [Internet] Available at:
http://www.unescap.org/ttdw/Publications/TPTS_pubs/bulletin74/bulletin74_ch2.pdf [accessed 10th June 2008]

RUSSELL STEVEN., 1996. *Ability to pay for health care; concepts and evidence of violence;* [online]: Oxford University Press Available at:
<URL:<http://heapol.oxfordjournals.org/cgi/reprint/11/3/219>>[Accessed 10th March 2008]

SETHI D, HABIBULA S, MCGEE K, PEDEN M, BENNETT S, HYDER AA, KLEVENS J, ODERO W, SURIYAWONGPAISAL P., eds., 2004., *Guidelines for conducting Community surveys on injuries and violence* [online]. Geneva, World Health Organization. Available at: < URL:www.whglibdoc.who.int/publications/2004/924156484.pdf> [accessed 10th December 2007]

Moa Sundstrom., 2007; *WHO Collaborating Centre on Community Safety Promotion* [online] Karolinska Institutet Available at: <http://www.phs.ki.se/csp/who_introduction_en.htm> [accessed 10th November 2008]

Thomas Songer., 2008. *Lecture Notes Injury Epidemiology; an introduction.* [online] niversity of Pittsburg Available at:
<<http://www.pitt.edu/~epi2670/lecture1/Introductionlecture.ppt#313,22,Definitions>> [accessed 10th November 2008]

UN., 2005. *The Millennium Development Goals Report 2005* [online] United Nations Available at: < <http://www.un.org/summit2005/MDGBook.pdf>> [accessed 10th November 2008]

Yayemain Daniel., 2007. *Ghana Health Service Annual Report 2007; Your health our concern* [online] Available at: < <http://www.ghanahealthservice.org/> > [accessed 2nd march 2008]

WHO (2007). *Summary of the Report from the WHO collaborative Study on Alcohol and Injuries: Alcohol and injury in Emergency Departments* [online]. Geneva, World Health Organization, 2007 Available at:
<http://www.who.int/substance_abuse/publications/alcohol_injury_summary.pdf> [accessed 10th December 2007]

WHO (2008) *Disability Adjusted Life Years* [online]. Geneva, World Health Organization, 2008<<http://www.who.int/healthinfo/boddaly/en/>> [accessed 10th May 2007]

APPENDICES

APPENDIX – I

FORM 1: DATA COLLECTION FORM FOR HOUSEHOLD SURVEY.

DATE.....

COMMUNITY.....

1=Urban

2 = Rural

PREAMBLE

The problem of injuries is quite widespread, and can affect anyone severely, yet has not received much public health attention. In Ghana, this is partly so because information available on injuries which makes the size of the problem visible to policy-makers is generated mainly from public sector health facilities and is not complete leaving quite a good number of injuries in the communities

This study is therefore being conducted to describe the significant aspects related to the following in order to provide recommendations for improvement in injury management:

- Incidence rate of severe injury
- Socio-demographic factors related to severe Injury
- Medical care and treatment seeking behaviour of the injured
- Post injury outcome.

CONFIDENTIALITY

This questionnaire is confidential and anonymous. All questionnaires will be processed and held safely. No information will be passed on to anyone that could allow for the possibility of identifying persons completing them.

A: Demographic factors

1 What is/was the age of victim at time of injury / death in years?

2.What is/was the sex of the victim (Please tick)

1 = Male

2 = Female

3 Please indicate the highest level of educational qualifications the victim has/had at the time of injury:

- 1= No education
- 2= JSS/ O' Level (or below)
- 3= SSS/ A Level (or equivalent)
- 4= Post SSS/A Level (or equivalent)
- 5=Other (specify below)

4 What is/was your marital status?

- 1= Married
- 2= Single
- 3= Divorced/ seperated
- 4= widowed
- 5= other specify below

5 What is/was the religion of the victim?

- 1= Muslim
- 2=Christian
- 3=traditional
- 4=other (specify below)

6 What is/was the major source of income of the victim at the time of injury?

- 1= Student
- 2= Self employment
- 3= Regular employment
- 4= Casual employment
- 5= Unemployed
- 6= Other (specify below)

7 What number of you most often lives together and shares the same food source?
.....

8 What Language did / does the victim speak?

1= Gruni

2= English

3= Hausa

4= Other (specify below)

B: Medical and Treatment Practices

9 What was the month and year of the injury. -----

10 Which of the following best describes the time of the injury?

1= Day

2= Night

11 Which of the following best describes the injury experienced?

1= Road traffic

2= Interpersonal

3= Occupational

4= Other (specify below)

12 Which of the following best describes your injury?

1= Intentional

2= Unintentional

3= other (specify below)

13 Where did the injured person seek medical attention after the injury?

1=Government

2= Private hospital

3= Pharmacy/chemical store

4= Traditional Healer

5= Other (specify below)

14 What number of visits to the health agencies did the injured make for the treatment?

1= Once

2= 2- 3 times

3= More than 3 times

4= Not applicable (specify below)

15 What was the furthest place you were required to travel for treatment?

16 What vehicle did the injured person use to a health agency?

1= By foot

2= By private car

3= By taxi

4= By public transport

5= By ambulance

6= Motor-bike /bicycle

7= Other

8= Not applicable (specify below)

17 What numbers of days were you hospitalized for treatment of the injury? -----

18 Were you registered with a health insurance scheme at time of injury?

1= Yes

2= No

3= other

19 What is the estimate of the Out-of-pocket payment you made as cost of treatment?

.....

20 How satisfied were you with the facility that treated you?

1= Very satisfied

2= Somewhat satisfied

3= Somewhat dissatisfied

4= Very dissatisfied

5= Not applicable (specify below)

21 If you were to treated the same injury again, which of the following would prefer most?

1= Government facility

2= Private hospital

3= Pharmacy

4= Traditional Healer

5= Others(specify)

6= Not applicable (specify below)

C : Post injury impact

22 In your opinion, has the injury now affected the victim's ability to care for himself as at today?

1= Yes, fully (specify below)

2= Yes, but partially (specify below)

3= No

4= Not applicable

23 Has the injury now affected the victim's ability to return to the same level of usual activity as before the injury?

1= Yes, fully, (specify below)

2= Yes, but partially (specify below)

3= No

4= Not applicable

24 In your opinion, did the victim lose employment/school as a result of being injured?

1= Yes, fully , (specify below)

2= Yes, but partially (specify below)

3= No

4= Not applicable

25 Did a household member lose days of work or school in order to care for the victim?

1= Yes, fully (specify below)

2= Yes, but partially (specify below)

3= No,

26 In your opinion, do you think the injury has now affected the victim's ability to move about?

1= Yes, fully (specify below)

2= Yes, but partially (specify below)

3= No

4= Not applicable

27 In your opinion, do you think the injury has resulted in permanent pain or discomfort?

1= Yes, fully (specify below)

2= Yes, but partially (specify below)

3= No

4= Not applicable

28 In your opinion, does the injured person/household have some worry and apprehension with regard to the injury?

1= Yes, fully (specify below)

2= Yes, but partially (specify below)

3= No

29 In your opinion did the injury result in the selling of household items to meet costs of treatment or the funeral of the injury victim.

1= Yes

2= No

3=other (specify below)

30 Did the household had to borrow money to pay for medical care of the victim or to make up for lost income.

1= Yes

2= No

3= other (specify below)

31 After the injury what most distressful experience did you or your household endure?.....

32 Which of the following best describes your experience

- 1= None
- 2= Mild
- 3= Moderate
- 4= Severe
- 5= Overwhelming
- 6= Don't Know

33 Have you received anything from outside your household within the last year and in relation to the injury that you think helped to promote your welfare?

- 1= Yes, once
- 2= Yes, twice
- 3= Yes, sometimes
- 4= Several times
- 5= No

34 If yes, what kind(s) of support?

- 1= Money
- 2= Food items
- 3= Medicine
- 4= Relief items
- 5= Job engagement
- 6= Other (specify)
- 7= Not applicable

35 If yes, where did the support(s) come from?

1= Neighbours

2= Local community

3= NGOs

4= District Assembly

5= Gov.t agency

6= Co-operatives

7= Other (specify below)

8= Not applicable

36. In your opinion do you agree to contribute to the maintenance of community injury surveillance?

1= Strongly agree

2= Agree

3= Uncertain

4= Disagree

5= Strongly disagree

6= Other (specify below)

Thank you for your cooperation in completing this questionnaire

At some time in the future, I may like to ask some of you some more questions in order to examine some of these issues in greater detail. If you would be willing for me to contact you again, please give your name and address below so that I can do so.

Name.....

Family name

Telephone

APPENDIX – II

FORM 2: DATA COLLECTION FORM FOR REGIONAL HOSPITAL/ OTHER GOVERNMENT FACILITIES

DATE..... FACILITY.....

PREAMBLE

The problem of injuries is quite widespread, and can affect anyone severely, yet has not received much public health attention. In Ghana, this is partly so because information available on injuries which makes the size of the problem visible to policy-makers is generated mainly from public sector health facilities and is not complete leaving quite a good number of injuries in the communities.

This study is therefore being conducted to describe the significant aspects related to the following in order to provide recommendations for improvement in injury management:

- Incidence of severe injury
- Socio-demographic factors related to severe Injury
- Medical care and treatment seeking behaviour of the injured
- Post injury outcome.

1 In your opinion what is the magnitude, scope, and characteristics of the injury problem in the hospital? (Look at when, where, what and how the injury happened).

2 What are the challenges in managing severe injuries in the hospital? (eg transport)

3 In your opinion, what are the major factors that increase the risk and burden of injury?

4 After a severe injury, what are the advantages of the different places of treatment?

5 After a severe injury, what are the disadvantages of the different places of treatment?

6 Which factors are potentially modifiable? (i.e. understand how and why injuries happen).

7 In your opinion, What is the most important burden of severe injury to you? What suggestion or measures can be taken to prevent or reduce the burden of severe injury? How can we especially protect the vulnerable?

APPENDIX – III

FORM 3: DATA COLLECTION FORM FOR MHS / NAS/GHANA POLICE SERVICE/MUNICIPAL ASSEMBLY

DATE.....

FACILITY.....

PREAMBLE

The problem of injuries is quite widespread, and can affect anyone severely, yet has not received much public health attention. In Ghana, this is partly so because information available on injuries which makes the size of the problem visible to policy-makers is generated mainly from public sector health facilities and is not complete leaving quite a good number of injuries in the communities

This study is therefore being conducted to describe the significant aspects related to the following in order to provide recommendations for improvement in injury management:

- Incidence rate of severe Injury
- Socio-demographic factors related to severe Injury
- Medical care and treatment seeking behaviour of the injured
- Post injury outcome.

1 Are severe injuries part of your concern? What are the challenges if severe injuries are to be included in your scope of work?

2 Do you think as an organization we can help reduce the burden of severe injury? In what way? How can we especially protect the vulnerable? (Stakeholders, individuals and transport)