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SOCIAL COST OF MOTORCYCLE ACCIDENTS-A CASE STUDY OF THE BOLGATANGA MUNICIPALITY

BY

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THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FUFILMENT OF THE REQUIREMENTS FOR THE AWARD OF **MPH HEALTH POLICY, PLANNING AND MANAGEMENT** DEGREE.

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DECLARATION

I hereby declare that with the exception of articles and books which have been quoted, cited and duly acknowledged in the references of this project, all information produced from this project is as a result of my own hard work and diligence in obtaining data. To the best of my knowledge, no part of this work has been obtained from a previous publication or accepted for the award of any degree in any University or institution of higher learning except where due acknowledgement is made in this text.

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DEDICATION

This work is dedicated to Achengebe, my wife, Namaal-yir and Tuuromwin-song my lovely daughters.

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I would like to thank the Almighty God for seeing me through this program successfully.

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Abstract

Background

Road traffic accidents are the leading cause of fatal and non-fatal injuries in Ghana. The purpose of this study is to estimate the social costs of motorcycle accidents in the Bolgatanga Municipality..

Method

The study was a retrospective cross-sectional cost study. Data on direct, indirect and intangible costs were obtained from patients and their families using a structured questionnaire. The costs are calculated from the social perspective which includes out-of-pocket expenditure and productivity loss to patients and families, and cost to health facilities

Results

One hundred and sixty (I60) motor cycle accident victims were interviewed. The social cost of motor cycle accidents was found to be GH ¢1,630,979.60 per annum. Direct cost accounted for 64% of the total cost whilst indirect cost accounted 36% and on average twenty (20) days school absenteeism per student was established. It also imposes suffering such as pain, mostly waist pain, chronic headache and anxiety on victims and families. The working ability of victims reduced whereas a few were permanently disabled, reducing their quality of life.On average, motor cycle accident victims incurred direct costs of GH¢187, GH¢15, and GH¢128.15 respectively at the in-patient, out-patient and household level treatment , with time lost for normal activities averaging 32.5 days and 31.7days respectively for victims and caretakers respectively. The average cost of repair and replacement of damaged motor bikes were GH¢120.4 and GH¢1,106.21

respectively whilst the average item lost by victims was valued on average at GH¢186.99. The average cost of traditional funeral also averaged GH¢640.15.

Conclusion

Motor cycle accident costs the Bolgatanga municipality GH¢1,630,979.60 in social cost per annum. It also imposes pain, grief and suffering on victims and relations and in extreme situations where it involved permanent disability, it impacts negatively on health related quality of life of the victims. This calls for the allocation of appropriate resources and the enforcement of the existing legislation to nib this emerging epidemic in the bud.

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LIST OF ABBREVIATIONS AND DEFINITION OF TERMS

BRRI...Building and Road Research Institute

DALYs...Disability Adjusted life years

DVLA...Drivers Vehicle and Licensing Authority

FGD...Focused Group Discussion

GRSP...Global Road Safety Partnership

HIC...High Income Country

LIC...Low Income Country

MCA...Motorcycle Accident

MMTU... Motor Traffic and Transport Unit

NRSC...National Road Safety Commission

OPD...Out Patient Department

QALYs...Quality Adjusted Life years

RTA...Road Traffic Accidents

RTI... Road Traffic Injury

TBI...Traumatic Brain Injury

TRL...Transport Research Laboratory

WHO... World Health Organization

WTP...Willingness to Play

OPERATIONAL DEFINITIONS

For the purpose of this study,

Motorcycle refers to a two –wheeled Motorized Vehicle

Motorcycle accident is defined as any accident occurring on a public road involving a motorcycle and which results in a casualty in at least one person or damage to the motor bike or both

CHAPTER ONE

1. Introduction

1.1 Background of study

Road traffic injuries and deaths caused by motor vehicles are a growing public health problem all over the world (Agnitotri and Joshi 2006). Several studies have shown that road traffic injuries are a major cause of death and disability globally, with a disproportionate number occurring in developing countries (Banthia et al, 2006). Road crashes are the second leading cause of death globally among young people aged 5 to 29 and the third leading cause of death among people aged 30 to 44 years (WHO, 2004). Road crashes kill 1.2 million people every year and injure or disable as many as 50 million more. Without immediate action to improve road safety, it is estimated that road traffic deaths will increase by 80% in low and middle-income countries by 2020 (WHO, 2004)

Ghana is rated among the leading six accident-prone countries in the world. In 2008, 1,518 died and 8,037 injured through road accidents (Yirenkyi, 2009). Between 1996 and 2006 in Ghana, 117,685 vehicles were involved in accidents, out of which 17,164 persons lost their lives, 56,277 persons got injured seriously whilst a total of 85,032 persons were slightly injured. Sixty percent of fatalities were within the age group 18-55, the economically active group (Obiri-Yeboah and Beckley, 2008). Road traffic accident consistently appeared in the top ten causes OPD attendance, hospital admission as well as the top ten causes of death in the Bolgatanga municipality between 2006 and 2008, (Bolgatanga Municipal Health Administration, Annual Reports, 2006, 2007, and 2008).

Motorcycles account for over ninety percent of vehicles in the Upper East Region. In the year 2008 alone, out of the 4816 vehicles registered by DVLA in the region, 4724, of them, representing over 90% were motor cycles. Between the year 2001 and 2007, the average growth rate of motorcycles in Bolgatanga is estimated to be about 10 per cent per annum (Drivers and Vehicle Licensing Authority (DVLA) Bolgatanga, 2008). Casualties have increased correspondingly.

Motorcycles are the most dangerous form of motorized transportation. Per vehicle miles travelled, motorcycles are about three times as likely as passenger car occupants to be injured in a crash, and 16 times as likely to die (Branas and Krudson, 2001). Motorcycle riders due to small size of vehicle represent a vulnerable group of road users. Contrary to a car crash, in a motorcycle crash, the riders often absorb all kinetic and compressive energy resulted from the crash (Janmohammadi et al, 2009).

The easy maneuverability of the motorcycle can be tempting to most ill-experienced riders, thus reducing the level of caution exercised by riders, hence their proneness to road transport accident. Compared with other vehicles and consequent to its maneuverability and speed, motorcycle crash victims undergo more movement and impact, thus they sustain more severe injuries. This risk is heightened by the poor state of most roads in the Bolgatanga Municipality and may be less likely with other vehicles which are less maneuverable.

Motorcycle users are vulnerable on the road and represent an important group to target for reducing RTAs in the Bolgatanga Municipality. According to Peden et al, (2004), even in developed countries where morbidity and mortality rates from motorcycle

accidents are low, the risk of dying for every kilometer travelled from a motorcycle crash is 20 times higher than from a motor vehicle crash. The riders often ignore safety measures, making them more vulnerable to accidents with other motorized vehicles (Oluwadiya et al, 2004).

Not only are road traffic accident a major health concern, they also threaten to reverse the developmental gains made in many countries. At the household level, they can place a severe financial strain on families, who often have to absorb the direct medical and rehabilitation costs, as well as the indirect costs created by a victim's inability to continue earning, or by the reallocation of work within his/her career. At the national level, road traffic injuries place a heavy burden on a country's economy through the direct impacts on health care and rehabilitation services as well as through the indirect costs.

The annual costs of road traffic crashes in low income and middle-income countries are estimated to be between $65 billion and $100 billion, more than the total annual amount received in development aid (UN, 2007). The estimated costs as a percentage of the Gross National Product (GNP) in most African countries range from about 0.8% in Ethiopia and 1% in South Africa to 2.3% in Zambia and 2.7% in Botswana to almost 5% in Kenya (Odero, 2003).

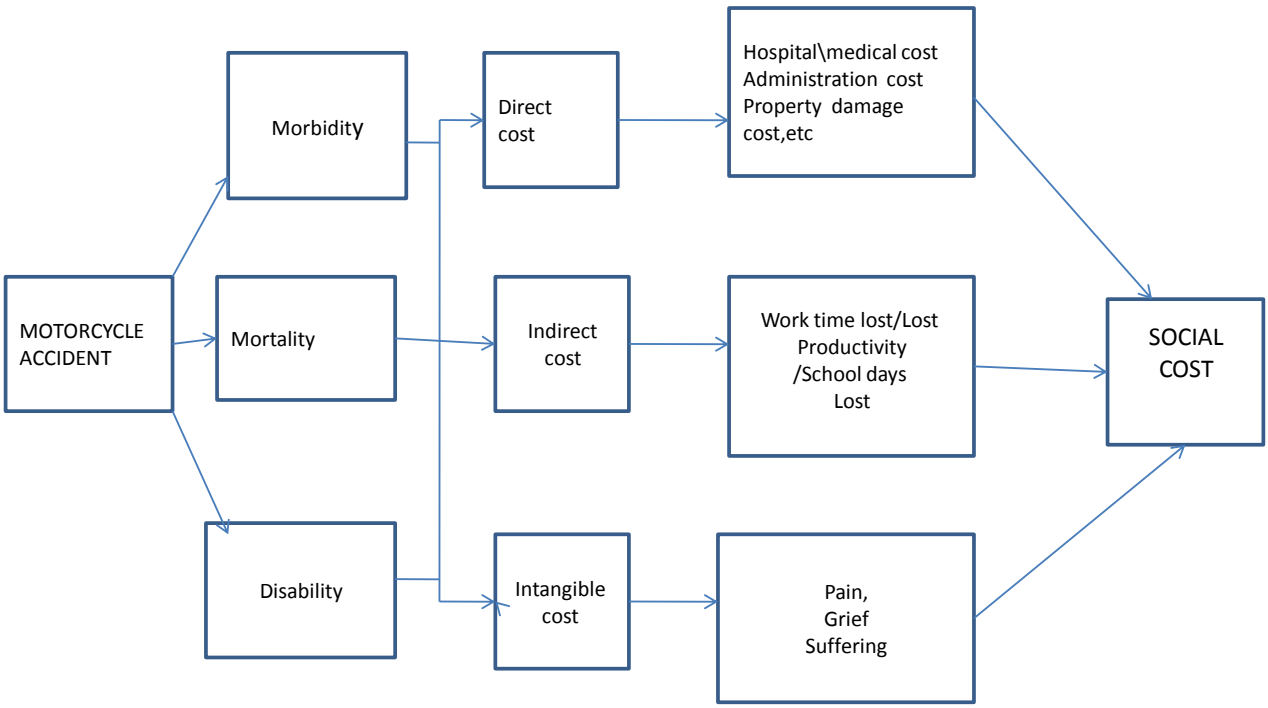
Road Traffic Crashes is estimated to cost Ghana 1.6% of GDP which translates to US$ 165 million (Obiri-Yeboah and Beckley, 2008). There is apparently lack of cost data (direct and indirect costs) from motor cycle accidents in the country, a gap this study attempts to address.

1.2 Statement of Problem

For the past four years, RTA consistently appeared in the Top ten causes of OPD attendance, admissions, and death in the Bolgatanga Municipality. (Bolgatanga Municipal Health Administration, Annual Report, 2008). However, anecdotal evidence from the Bolgatanga Regional Hospital and which was corroborated by the Regional Coordinator of the National Road Safety Commission suggest that for the past five years motor cycle related accidents account for over 80% of all RTA cases in the Municipality; the most affected being the youth and the economically active members of the community.

Even though every accident is a cost to the victim, the family and the nation, a scientific-based road accident cost information database required for the formulation, funding, sensitization and implementation of a comprehensive road safety plan is not available in Bolgatanga. Policy makers and advocates however need this information to take informed decisions. Studies conducted in Ghana focused mainly on the trend of RTA and associated cost of hospitalization (Atta-Poku, 2006, Afukaar et al, 2003) without considering other direct, indirect and intangible costs**.** This study therefore attempts to provide some data on cost of motorcycle accidents to inform road safety investments in future.

Figure:1 Conceptual framework for motorcycle Accident costing



Most motorcycle accidents will usually result in morbidity, mortality or fatality to the motorcyclist owing to the rider's vulnerable position on the vehicle. An accident with no casualties can be classified as "damage only". The consequence of a road traffic casualty can be analysed in terms of various costs comprising direct, indirect and intangible cost as shown in figure 1 above.

The direct cost includes hospital cost, property damage cost and administration cost. Costs of damage to vehicles and damage to public and private property including personal effects, fences and street furniture and costs relating to the loss of use of the damaged vehicle and hire of a replacement vehicle constitute the property damage cost.

Administration cost is made up of police and insurance administration cost. This comprises of the resources it takes to deal with each different type of accident by way of investigations.

Hospital cost is made up of cost of medication, OPD charges, physiotherapy and X-ray cost and the cost of transporting victim(s) to the hospital.

The intangible costs are the cost of pain, grief and suffering endured by the victims and family members as a result of the accident.

Loss of productivity is an indirect cost incurred regarding the loss of casualties' productive working time as a result of an accident. It also includes the number of days spent by care givers of the accident victims and school absenteeism due to the motorcycle accident.

From the discussions above, it could be concluded that every casualty would lead to extra expenses to be met either directly or indirectly. The direct costs that a casualty has to cover can be defined as the money required to pay for the damage to vehicles, medical treatment, administration and any other expenses caused by the accident. These costs fall into two broad groups: medical costs and non-medical costs. The indirect costs are the loss of earnings due to non-productivity of the casualty and the costs that reflect pain, grief and suffering owing to physical, mental and behavioural problems from an injury. The summation of the direct, indirect and intangible cost yields the social cost.

1.4 Justification of Study

One way of bringing the importance of road safety to the attention of governments and society is to show its cost. The study will expand knowledge on the impact of motorcycle accidents on the economy and to assess their implications in socio-economic terms. It is hoped that decision makers will use the results to improve the evaluation process, increase the resources devoted to road safety and thereby reduce accident levels. The study therefore seeks to use cost as a tool for influencing road safety campaigns and interventions. The study will be a retrospective cross-sectional study of reported cases of motorcycle accident, accident victims and their relations using qualitative and quantitative techniques for data collection.

CHAPTER TWO

2: Literature Review

Road traffic accident has been on the radar of the world health organization in recent years due to its magnitude and quantum of hardship it imposes on mankind-a public health concern. It is in this light that the WHO is playing the lead role in monitoring and drawing the attention of the world to the socio-economic losses it inflicts on society. This literature review looks at motor cycle accidents from socio-economic perspectives**.**

Road traffic accidents-A public health concern

Road traffic injuries are a major but neglected global public health problem, requiring concerted efforts for effective and sustainable prevention. According to the World Health Organisation (2004), of all the systems that people have to deal with on a daily basis, road transport is the most complex and the most dangerous. Worldwide, the number of people killed in road traffic crashes each year is estimated at almost 1.2 million, while the number injured could be as high as 50 million. (WHO, 2004).The tragedy behind these figures regularly attracts less media attention than other, less frequent but more unusual types of tragedy.

What is worse, without increased efforts and new initiatives, the total number of road traffic deaths worldwide and injuries is estimated to rise by some 65% between 2000 and 2020 (Kopit and Crooper, 2005, Murray and Lopez, 1996), and in low-income and middle-income countries deaths are expected to increase by as much as 80%. The

majority of such deaths are currently among “vulnerable road users” – pedestrians, pedal cyclists and motorcyclists.

In high-income countries, deaths among car occupants continue to be predominant, but the risks per capita that vulnerable road users face are high. (Peden et al, 2004).

In Africa, it has been estimated that 59,000 people lost their lives in road traffic crashes in 1990 and that this figure will be 144,000 people by 2020, a 144% increase (Nantulya and Reich, 2002). By contrast, developed countries have experienced a decreasing trend since the 1960s. Because road traffic injuries have long been considered to be inevitable and caused by random, unpredictable events, the international community's response to this worldwide public health crisis came relatively late. The World Health Organization (WHO) arranged a consultation meeting in April 2001, which led to a report, entitled “A 5-year WHO strategy for road traffic injury prevention” that summarizes the main recommendations from the working group (Peden et al 2004).

In 2003, the United Nations Secretary-General sounded the alarm with an official statement (United Nations General Assembly ,2003) describing the global public health challenge posed by road traffic injuries and encouraging Member States to address the problem. One of the recommendations is to promote and facilitate research on this subject, especially in low-income countries where knowledge gaps often jeopardize appropriate resource allocation. Much needs to be done, especially in motor cycle accidents.

Global research and development funding for road traffic injuries were estimated in 1996 to range from US$24 to US$33 million, compared with more than US$900 million for

HIV/AIDS (WHO, 1996). Moreover, the overwhelming majority of this money is spent in developed countries (Lagarde , 2007)

Around 85% of all global road deaths, 90% of the disability-adjusted life years lost due to crashes, and 96% of all children killed worldwide as a result of road traffic injuries occur in low-income and middle-income countries. Over 50% of deaths are among young adults in the age range of 15–44 years (Peden et al, 2002). Among both children aged 5–14 years, and young people aged 15–29 years, road traffic injuries are the second-leading cause of death worldwide (Peden et al, 2002).

Compared to other epidemics, road traffic injuries are largely influence by choices at the policy and individual level, which indicates that the problem can be controlled. It is therefore tenable to study RTA from the public health and economics perspective. The public health approach to road traffic injury prevention is based on science. The approach draws on knowledge from medicine, biomechanics, epidemiology, sociology, behavioural science, criminology, education, economics, engineering and other disciplines.

While the health sector is only one of many bodies involved in road safety, and usually not even the leading one -it nonetheless has important roles to play. These include:

Discovering, through injury surveillance and surveys, as much as possible about all aspects of road crash injury – by systematically collecting data on the magnitude, scope, characteristics and consequences of road traffic crashes; researching the causes of traffic crashes and injuries, and in doing so trying to determine causes and correlates of road crash injury, factors that increase or decrease risk, factors that might be alterable through

interventions; exploring ways to prevent and reduce the severity of injuries in road crashes, by designing, implementing, monitoring and evaluating appropriate interventions; helping to implement, across a range of settings, interventions that appear promising, especially in the area of human behaviour, disseminating information on the outcomes, and evaluating the cost-effectiveness of these programmes; working to persuade policy-makers and decision-makers of the necessity to address injuries in general as a major issue, and of the importance of adopting improved approaches to road traffic safety; translating effective science-based information into policies and practices that protect pedestrians, cyclists and the occupants of vehicles; promoting capacity building in all these areas, particularly in the gathering of information and in research. (Peden et al, 2002*).* Cross-sectoral collaboration is essential here, and this is something the public health sector should promote.

Medical treatment costs incurred from road traffic injuries encompass immediate post crash emergency treatment and pre- hospitalization cost, initial medical cost, and the cost of long term care and rehabilitation. Ganveer and Tiware (2005) conducted a cross sectional study in India and found that fractures were the commonest injury sustained by victims of non-fatal road traffic accidents which commonly involved motorized two wheelers and motor vehicles. The study also revealed that most of the accidents occurred in the economically active age group of the populations. This results in the country suffering a double loss. Firstly expenditure is incurred in the treatment of these victims and secondly being the most economically active group, it results in huge productive man days lost (Ganveer and Tiware, 2005). The fact that effective preventive strategies do

exist makes this situation all the more unacceptable. The success of some countries in reducing the toll of deaths and injuries on their roads clearly demonstrates that strong political commitment and comprehensive measures provide substantial benefits in health gains for the resources invested

Socio-economic costs of road accidents

There have been some attempts to quantify the cost of road traffic accidents in economic terms. According to Jacobs et al, (2000), the costs of road crash injuries is estimated at roughly 1% of gross national product in low income countries ,1.5% in middle income countries and 2% in high income countries.

The direct economic costs of global road crashes have been estimated at US$ 518 billion, with the costs in low-income countries – estimated at US$ 65 billion – exceeding the total annual amount received in development assistance, Jacob et al, (2000). Furthermore, the costs estimated for low-income and middle-income countries are probably significant underestimates.

Using more comprehensive data and measurement techniques, the estimated annual costs (both direct and indirect) of road crash injury in European Union (EU) countries alone, which contribute 5% to the global death toll, exceed €180 billion (US$ 207 billion) Murray and Lopez, (1996). For the United States of America, the human capital costs of road traffic crashes in 2000 were estimated at US$ 230 billion (Blincoe et al 2002).

According to Keith et al, (2007) motor vehicle collisions generated $18 billion in social costs in Ontario in 2004. Fatalities in those collisions were the largest single contributor to social costs at $11 billion. Also significant were the costs of injuries, at $4 billion and property damage at $2 billion. Other major contributors to the social costs of motor vehicle collisions were: traffic delays; out-of-pocket expenses; hospital/health care; tow trucks; and police, fire and ambulance services.

In a study on patterns of road traffic accidents in Ghana; implications for control, (Afukaar et al, 2003) concluded that out of pocket medical payment were estimated at $100.05 plus or minus $228.80 per transport related injuries in urban areas compared with $21.09 plus or minus $64.31 for transport related injuries in rural areas. The study provided the overall cost of hospital care per injury without taking into account productivity, property and the human cost of pain, grief and suffering.

Clearly, it is as difficult to accurately determine the economic burden of Africa's road traffic accidents, as it is to collate accident data in the first place. There are the problems of under-reporting to contend with, as well as different countries adopting different criteria-such as defining a road traffic accident fatality. Some countries define a fatality as one occurring on the scene, others for periods of 24 hours, three days or 30 days after the event.

Expressed as a percentage of GDP, the cost of road traffic accident ranges from 0.3 percent in Vietnam to almost 5 percent in USA. The values indicate that the estimates for

Low income countries (LICs) as a percent of GDP are in general lower than those in high income countries (HICs).

One however needs to be careful in drawing conclusions from such numbers as that would mean that road safety measures have a higher justification in HICs than in LICs. The estimates for HICs are based on more detailed and comprehensive calculations including the willingness to pay, QALYs and DALYs, etc. On the other hand, such concepts have not been used in making estimates in LICs.

As mentioned by Mohan D (2001), the official estimates for traffic crash injuries in India could be underestimated by an order of magnitude. He indicated that if the willingness to pay concept, effect on quality of life, etc. is properly accounted for, it is likely that the road crash costs in India would be 2 per cent of the GDP or greater. At the intuitive level, this makes sense on the basis that accidents generally are under reported in LICs. This assertion is corroborated by a study in Bangalore that found that death resulting from road accidents were underestimated by 5 percent and the number injured who needed treatment in hospitals by more than a factor of two (Gururaj et al. 2004).

In order to estimate the effect of road traffic injury on a household in a least developed country, a survey was conducted in 2007 by the Coalition for Road Safety in the peri-urban middle-income district of Mukh Kampul in Cambodia, (Ericson , 2008).It came out that MDGs 1,2,3,4,and 5 are negatively impacted by RTAs. He found out that the pre accident income of the household surveyed was reduced by 45% in the short term and 68% in the long term. Fourteen percent of the household surveyed reported that their children dropped out of school whilst 88% of women spent time caring for the injured.

The source continued that the child mortality rate of the surveyed household was 71 per 1000 live birth which was more than double the provincial rate of 30 deaths per 1000 live births.

A study carried out by the Transport Research Laboratory (TRL) for the Global Road Safety Partnership (GRSP), took a closer look at the direct economic impact of road traffic crashes resulting in death or serious injury on individual urban and rural households in Bangladesh and Bangalore, India, (Global Road Safety Partnership, 2002). It came out from the study that though it may be only one person that is involved in a road crash, the whole household can be affected. Costs to families include funeral costs, loss of work time, loss of the person generating the main, or a substantial proportion, of household income. Often debt is incurred by the bereaved family as a result of loans being taken out to pay funeral costs or to cover lost earnings. From the same source, the findings revealed that where a road crash results in serious injury to a family member, costs include medical costs, costs of searching for new work (often lower paid), expenditure on long term care and rehabilitation and the value of lost earnings of the carer of a family member – the vast majority of households with a serious injury had to have at least one family member give up work to care for the injured. Again many of the poorer households (over 60%) borrowed in order to cope with costs.

Fatalities affect a country in several ways but when it involves highly talented individuals and educated people whose contributions improve national productivity, then RTA represent a huge lost to the nation economically. This was exemplified by the loss of the three Urologist of the Korlebu Teaching Hospital on the Accra -Kumasi highway on the

27th of August, 2005. The huge cost involved in their training notwithstanding, the pains, anguish and probably death of patients who will miss their services is too huge to ignore, considering the fact that at the time of the accidents, there were only seven Urologists in Ghana.

Studies have shown that motor vehicle crashes have a disproportionate impact on the poor and vulnerable in society. These are also the people with usually little influence over policy decisions (Nantulya and Reich 2002, Laflamme and Diderchsen, 2002). Even in high-income countries, poor children are at greater risk than children from more prosperous families (Laflamme and Diderchsen , 2002).

Poorer people comprise the majority of casualties and lack ongoing support in the event of long-term injury. Lower socioeconomic groups have limited access to post-crash emergency health care (Mock et al, 1997). In addition, in many developing countries, the costs of prolonged medical care, the loss of the family breadwinner, the cost of a funeral, and the loss of income due to disability can push families into poverty (Hijar et al, 2003). In Mexico, the second commonest cause of children being orphaned is traffic crashes (Hijar et al, 2003).

In developing countries, the population groups exposed to the highest risks of injury and death from road crashes – for example, pedestrians and users of motorized two-wheelers are from lower socioeconomic groups (Nantulya and Reich, 2002). They face a greater

likelihood of injury, since affordable transport poses higher risks in these places than private car use.

Methods available to cost road crashes

The cost of road crashes will be influenced by the valuation method used. In their papers on the cost of traffic accidents and evaluation of accident prevention in developing countries, (Hill and Jones-Lee,1981,1983 and Jacobs,1995) identified six different methods that have been proposed for placing a cost on road accidents.

These methods are gross output, net output, life insurance, court award, implicit public sector valuation, and willingness to pay. Out of the six methods proposed by Jones et al(1983), it is only two of them, the willingness to pay and the Human capital approach that have been used extensively.

Gross output or human capital method is based on the assessment of economic consequences, usually supplemented by a notional sum to reflect the pain, grief, and suffering of victims and their family members.

Willingness-to-pay method (WTP) estimates the amount of money people affected would pay to avoid a road accident.

Using the human capital method to estimate the cost of accidents in Thailand and Vietnam, it came out that, loss of output and human cost (pain grief and suffering) was a heavy burden on the economies of both countries. For example in Vietnam the loss output and human cost was D[1] 154.62million, compared to the D 20.7million calculated

[1] (One Vietnamesse Dong (D) is equivalent to 0.000054US dollars)

for property damage and medical cost. Similar trend showed in Thailand. The highest cost was the loss output, followed by human cost, property damage, medical and administration cost (Cost of road accident in Vietnam, cost of road accident in Thailand, AC5, ACI0).The differences in the two studies however is that whereas in Thailand the human cost was calculated using 20% of total fatal accident cost, 50% total serious accident cost and 1% total cost of slight injury, the Vietnam study used 28% of total cost of fatal and 50% of injury cost.

The human capital approach seems well suited for Developing countries and as such, will be employed in this study. According to the human capital method, six cost components, including hospital and medical cost, output lost, property damage cost, insurance administrative cost, emergency medical service cost, and human cost, are all considered to determine economic losses. (Babtie Ross & Silcock 2003)

While the willingness-to-pay method is commonly used in developed countries, this method is extremely difficult to use in developing countries because extensive surveys to obtain perceived risk and acceptable payment to avoid a given hypothetical level of risk is difficult or impossible to conduct (Accident Costing Report AC 10: Viet Nam). In Ghana and for that matter in Bolgatanga, where accidents are regarded as the 'work of God', people will feel reluctant to place a price tag on their lives, such a method will therefore be extremely difficult to use. This study will therefore estimate the social cost of motor cycle accidents in Bolgatanga using the human capital approach.

Cost of motorcycle accidents (MCA)

Max et al, (1998) estimated that aggregate hospital costs of motorcycle-related head injuries in California fell from $36.6 million in 1991 to $15.9 million in 1992, after the state's universal helmet law went into effect. During this time, the share of medical costs accounted for by head injuries fell from 46 percent to 31 percent.

Begg et al, (1994) compared the costs of traffic collisions, traffic non-collisions, and non-traffic crashes for motorcyclists in New Zealand. This is an important distinction for motorcycles, unlike most other vehicles. Because of a motorcycle's relative instability, injuries can frequently occur without collision with another vehicle or object. And motorcycles are often ridden off-road. They found that traffic collisions incur much higher average medical costs (NZ$6,942) than traffic non-collisions (NZ$3,342) or non-traffic crashes (NZ$2,617).

Braddock et al, (1992) concluded that Motorcycle injuries contribute significantly to Connecticut's mortality, morbidity, and medical costs. This study suggested that a uniform helmet law would save an estimated 10 lives and prevent more than 90 nonfatal injuries in Connecticut each year at a cost savings to the state of $5.1 million. These data are crucial in advocating re-enactment of motorcycle helmet laws. The weaknesses of this study however is that the reported cost estimates appear to be based on hospital charges, rather than payments. This would bias the cost estimates upwards. On the other hand, the

charges do not appear to include physician charges, which would cause the cost estimates to be understated.

Care of motorcycle trauma consumes a substantial portion of public health care funds in California. This could be reduced by legislative action concerning helmet use, licensing, and rigid enforcement of compulsory insurance (Szabo et al, 1985)

Hahn et al, (2008) estimated the cost of traumatic brain injury (TBI) in Hanoi, Vietnam. The costs were calculated from the perspective of the injured patients and their families, and included quantification of direct, indirect and intangible costs. They found out that on average, patients with severe, moderate and minor TBI incurred direct costs at USD 2,365, USD 1,390 and USD 849, respectively; the direct cost accounted for the largest proportion, with costs rising with the severity of TBI. Further research is warranted to explore the actual social and economic cost of motorcycle accidents.

Apart from acute medical costs, relatively little attention has been devoted to the costs of motorcycle injury in the literature. Yet Miller et al.(1998) estimate that total medical costs (not just acute) account for only about 6 percent of the total costs of motorcycle injuries. Work loss represents 29 percent of the total cost, while pain, suffering, and reduced quality of life represent 63 percent.

Max et al, (1998) also considered the productivity losses resulting from California motorcycle fatalities. About 80 percent of the motorcyclists who died were under 40 years of age, so the years of potential life lost were quite large. In 1991, 512 fatalities resulted in an estimated 24,435 years of potential life lost, or 3,824 years per 100,000

registered motorcycles. At a discount rate of 3 percent, the productivity losses came to $603 million.

The fatalities examined by Max et al, (1998) do not exhaust the productivity losses resulting from motorcycle crashes. Survivors of serious injuries will lose work while they are being treated at a hospital or rehabilitation facility, and some will continue to convalesce at home for some time after discharge. The worst injuries can result in long-term disability, which might impair the crash victim's earning capacity for life. Even without these nonfatal work loss costs, they estimate the cost of productivity losses at roughly six times the cost of medical treatment. Miller et al. (1998) attempted a more comprehensive national estimate of productivity losses due to fatal and nonfatal injury, put work loss costs at nearly five times medical costs.

A few studies considered the cost of pain, suffering, and lost quality of life. Miller et al. (1998) estimated the total lost quality of life from US motorcycle crashes in 1993 at $11.5 billion - about 80 percent larger than medical costs and productivity losses combined. Thus, they estimate that 63 percent of the total costs of motorcycle crashes come from lost quality of life.

Wang et al, (1999) estimate "economic" costs (medical, work loss, and property damage) at $6.5 billion per year in 1989-93 and "comprehensive" costs at $22.6 billion. The difference between Wang et al.'s two measures, $16.1 billion, is the estimated cost of intangible losses, such as pain and suffering. Thus, Wang et al. estimate intangible costs as 71 percent of the total costs.

Stutts et al, (1991) compared the expected payers of victims of motorcycle injuries to those of other road trauma patients. They found that motorcyclists were more likely to be uninsured (42.7 % vs. 35.5%) but less likely to rely on Medicare or Medicaid (7.9% vs. 13.9 %). This should not be surprising, given that motorcyclists tend to be younger than the driving population at large, and therefore rarely eligible for Medicare, but old enough to drive, and therefore rarely eligible for Medicaid coverage of children. Motorcyclists were found to be about as likely to be privately insured as other road trauma patients (49.4 % vs. 50.9%).

According to Karlson and Quade (1994), universal helmet use by all motorcyclists in Wisconsin during 1991 potentially would have prevented 60 brain injuries, 13 skull fractures with no intracranial injury, 8 contusions, and 14 deaths. It could also have saved society more than $400,000 in medical charges for initial hospital admissions.

While literature has widely explored acute medical costs, research is sparse in the areas of long-term medical and work-loss costs. For victims of serious head injury, acute hospital care might be only the first stage of a long and costly treatment program. For many crash victims, lost wages from missed work days will outweigh medical costs. And for victims who are permanently disabled, their earnings might be reduced for the rest of their lives. This study will therefore attempt to provide data on long term medical and work-loss costs.

2.1: Objectives

2.1.1: General objective

The general objective of the study is to estimate the social cost of motorcycle accidents in the Bolgatanga municipality.

2.1.2: Specific objectives

The Specific objectives are to;

1. Estimate the direct cost incurred by victim(s) of motorcycle accidents.
2. Estimate the indirect cost incurred by victims and relations of motor cycle accidents.
3. Estimate the total cost of motor cycle accidents.

CHAPTER THREE

3.0: METHOD

3.1 Study area

The Bolgatanga Municipal is the capital of the Upper East Region. The Upper East Region (figure2) is located in the north-eastern corner of Ghana between longitude 0° and 1° West and latitudes 10° 30²N and 11°N. It has two international boundaries; namely Burkina Faso to the north and the Republic of Togo to the East.It is bounded to the west by the Upper West Region and to the south by Northern Region.

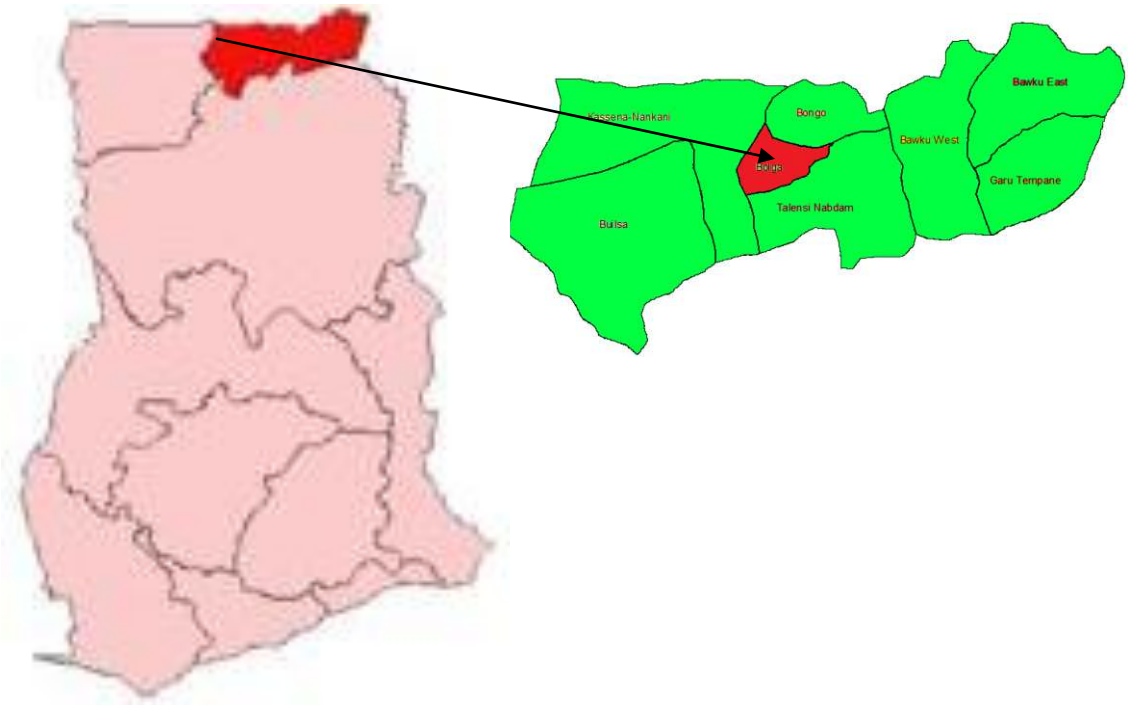
The population of the municipality is 147,729 with a growth rate of 1.7% and a high population density of 141.2 persons per square kilometer. About 47.7% of the population fall under the age of 15 years, 50.8% fall between 15 and 64 years and 1.5 % are above 64 years. The rural population is predominantly indigenous; the Grunis (MHA, Annual Report, 2008).

In Bolgatanga Municipal, most people get around on bicycles and motorcycle. Streets of Bolgatanga are usually full of motorcycle, especially during peak hours and on market days. On market days, scores of people are seen carrying their wares mostly goats, sheep, artifacts and guinea fowls on their motor bikes to the market centre.

In the study settings, friends and family members travel from far and near to visit sick relations or to attend funerals of relations and love ones spending between three to seven days in the process.; when the accidents results in morbidity or physical inactivity, some members of the family are made to stop work to care for the victim.

In the case of death and depending on the sex of the victim, differential quantities or amounts of items such goats, sheep, fowls, guinea fowls, bowls of banbara beans, kola nuts, tobacco, guinea corn, shear butter, local gin (akpeteshe) are used for the performance of the funeral

Figure 2: Map of Ghana showing Upper East Region and Bolgatanga (Highlighted)



3.2: Study Design

The study was a retrospective cross-sectional cost study of reported cases of motorcycle accidents in the Bolgatanga Municipal. It was a cost analysis design covering direct, indirect and intangible cost

3.3: Study population

The study populations were: (a) treated accident cases at hospitals in the municipality (b) official registered vehicles in the Municipality.

3.4: Sampling Method and Sample size calculation

Hospital Record As a result of lack of data specifically on motor cycle accidents in the Municipality, a complete census of all in-patient hospital data of RTA cases reported at the Regional Hospital from January 2008 to May 2009 was undertaken. The period of hospitalization, the outcome of the accidents and the costs of treatment were extracted from the records. A census of out-patient records of RTA cases at Afrikids (A private Hospital which does not admit patients as at the time of the study) was taken, due to the difficulty of obtaining out-patient accident data at the Regional Hospital.

Motor cycle accident victims: Motor cycle accident victims were purposively sampled from the Bolgatanga Municipality. From the 2008 Annual Report of the Municipal Health Administration, a total of 2353 people were involved in RTA accidents (i.e. 2034 cases at OPD and 319 In-patients). According to the expert opinions of the Senior Nurse In-charge of the accident and emergency ward and the Regional Coordinator of National Road safety Commission, Motorcycle accidents accounts for over 80% of all RTA cases in the municipality for the past five years.

The sample size was determined Using Epi-Info version 3.4.1 of 2007. With 2353 RTA cases and expected frequency of factor under study (motor cycle accident) at 80%, using 74% as the worst acceptable results and confidence level of 95% yielded a sample size of 160. One hundred and sixty victims were interviewed.

Registered vehicles Data on all registered vehicles from 2004 to 2008 were collected. Police record of motorcycle accidents within the study period was also collected.

3.5: Study Variables

The study variables were direct Costs (i.e., Property damage cost, administration cost, and medical cost, out of pocket expenditure cost), indirect cost (i.e., loss of productivity cost) and intangible cost (pain, grief, sufferings). Other variables were number of registered motor bikes, demographic characteristics of motorcycle accident victims, and number of days lost from work by victims and care takers.

3.6 Data Collection Techniques\ Methods and Tools

In-dept- Interviews

There were four in-depth- interviews, one with the police, one with the In-charge of the Accident and Emergency Unit of the Bolgatanga Regional Hospital, one with a representative of the insurance companies (Star Assurance), and the last with the regional officer of Driver and Vehicular Licensing Authority (DVLA). The interview at the hospital covered issues on the proportion of motorcycle accident among accident cases reported at the hospital; the most affected age group; cost of hospitalization and how motor cycle accident generally affects the operation of the hospital. At the police station,

the process of police investigation of accident cases, resources involved, number of vehicles involved were ascertained. The process and cost of obtaining a motor bike license, the number of registered vehicles were obtained from the Officers In- charge of DVLA. The average amount paid by insurance companies to motor cycle accident victims and how it affects their operations were obtained from the Regional Sales Manager of Star Assurance. Interview guides were used to gather the appropriate data.

Focused Group Discussion

Two focused group discussions (FGD) (i.e. male and female group) were organised. The male group consisted of fourteen members whilst the female group consisted ten. Membership of the group was selected based on their appreciation, understanding and involvement in motor cycle accidents. The assistance of a member of the community was sought to select the group members.The setting for the FGD for the male was sited near a popular motor bike repairers shop around the ADB bank in the municipality. The FGD for the women was conducted near a popular hair dressing saloon near Hotel Saint Joseph in the municipality. Each group consisted of victims and relations and other people who have been affected in a way by motorbike accidents. A moderator facilitated the discussions and a recorder listened and took notes. The discussions covered causes of accidents, wearing of helmets, ages affected by accidents, properties damaged as a result of the accidents, effects of motorcycle accidents on immediate families and society. The sessions were conducted in English, Asante Twi and Hausa lasted one to two hours each. The discussions were recorded and the recordings transcribed. The analysis was done

manually according to themes. An FGD guide was used .The focus groups were conducted in May 2009.

Interview with Selected Motorcycle Accident Victims

The generally unreliable house numbering system in the Municipality, coupled with the tendency for accident victims to provide false house addresses for fear of being tracked by the police to aid in further investigations, made it extremely difficult to reach the motor cycle accident victims using the house addresses obtained from the Police and hospital sources

Subsequently, the study employed the Snowball technique to reach and interview the victims of motorcycle accidents using motorcycle repairers, traditional bone setters (TBS) and the Casualty wards record. Data on treatment and rehabilitation costs, employment and support, number of days spent recuperating and the impact of the accident on the family was obtained from victims and their families using a structured questionnaire. All the financial data collected for the study covered the period from January 2008 to May 2009. All the Similarly, the amount of money spent by victims in repairing damaged motor bikes and the value of valuable items lost, if any were also obtained from the victims.

3.7 Quality Control

Questionnaire was pre-tested on the field to ensure its suitability and adjustments were made to suite the environment the study settings. Field workers with the requisite skills and competence were recruited, trained and monitored whilst on the field. All of the field recruited field workers could speak the local dialects .The research assistants were trained to go through the questionnaire after every interview to ensure consistency and to make sure that no space will be left unfilled. Risk of multiple entries was minimized by coding the questionnaire and entering them in ascending order, identifying records that have been entered more than once and removing the duplicated records. Attempt was also be made to enter all data at the end of every day. Filled questionnaires were kept under key and lock to prevent unauthorized people from gaining access to them.

3.8 Data Processing and Analysis

Entry, compilation, editing and coding of hospital data was done using Microsoft office excel, 2007 after which it was imported to Epi-Info version 3.4.1 2007 for analysis. Data from the survey was entered; compiled, edited and analyzed using Epi Info version 3.4.1 2007. Quantitative analysis of cost was done manually whilst graphical presentations were done using both Epi Info and Microsoft Excel.

3.9 Methods of Cost Estimation

Direct costs estimation

The direct cost is made up of the following component: (i).Medical treatment cost (In-patient treatment cost, Out-patient treatment cost, Out of pocket payment, usually at the household level), (ii) Property damage cost (i.e. repair/replacement cost, lost of valuables) (iii) Administration Cost (i.e. Police administration cost, Insurance Administration cost) and (iv) Funeral Cost

Medical treatment cost Medical treatment cost is made up of (a) In-patient cost, (b) Out-Patient cost and (c) Out-of-pocket expenditure**.** In estimating medical treatment cost, it was assumed that all casualties received proper treatment and cares both at home and at the hospitals.

(a) ***In-patient cost***: This was obtained by firstly estimating the total number of in-patient motorcycle accident victims; the average in-patient cost was computed using data obtained from the Regional Hospital. The estimated number of in-patient motor cycle accident victims was then multiplied by the average in-patient cost to obtain the total In-patient cost.

(b) ***Out-patient cost: This*** was obtained by estimating the number of outpatient motorcycle accident victims for the year 2008 and then multiplied by the average outpatient treatment cost obtained from Afrikids.

(c***) Out-of- pocket expenditure*:** This was computed by multiplying the average out of pocket expenditure obtained from the survey by the estimated number of motorcycle accident victims for the year 2008.

The overall medical treatment cost was thus computed by summing the In-patient cost, the out-patient cost and the out-of-pocket expenditure.

Property damage cost Property damage cost is made of (a) Motorcycle repair cost (b) Motor cycle replacement cost, (c) Cost of lost valuables For property damages, particularly damaged motor cycles, it was assumed that they were repaired or replaced (where applicable) as closely as possible to their condition before the accident according to manufacturer's specifications. It was also assumed that at least one motor cycle was involved in each motor cycle accident.

Motorcycle repair cost. The average cost of repair of motorcycle obtained from the survey was multiplied by the estimated number of victims whose bikes were damage as a result of the accident to obtain the estimated motor cycle repair cost.

Motor cycle replacement cost. This was computed by first of all determining the average cost of replacing a motor bike and then multiplied the number by the estimated number of victims of accident whose bikes were damaged beyond repairs.

Cost of lost valuables. The cost of valuable items lost was computed by determining the average cost of items lost by victims at the time of the accident, and then multiply the figure by estimated number of victims who lost items at the time of the accident. The total property damage cost was thus calculated by summing the motor cycle replacement cost, repair cost and the cost of lost items.

Administration cost this is made up of ((a) Police investigating cost and (a) insurance cost.

Insurance cost; in estimating the insurance Administration cost, it was assumed that all insured motor bikes received some amount of support from the insurance companies at the time of the accidents.

Police Investigation cost; the average amount paid by insurance companies per motorcycle accident was obtained and multiplied by the proportion of victims whose bikes were insured at the time of the accident. The average police investigation cost was determined by first determining the process involved in investigating an accident case by the police, the rank of the officers involved, their gross monthly salaries, man hours spend. From the gross salary, the gross hourly wage of the police officers was manually computed and multiplied by the average time spent on the investigation, to give, man hour cost per motorcycle accident investigation. Other resources that are used such as stationary and fuel were also estimated per motorcycle accident case and quantified in monetary terms. The value obtained was added to the average cost of man hour estimated to get the average cost of police investigation per motorcycle accident. The proportion of accident cases investigated was multiplied by average police investigation cost to give the total police administration cost.

The sum of the insurance administration cost and the Police investigation cost yields the total Administration cost.

Funeral Cost

It was assumed that all fatalities were given funeral services and buried according to the Frafra tradition and custom because the Frafras are the most predominant tribe in the municipality.

To estimate the funeral costs therefore, the various items required for the performance of the funeral of an adult were determined. The prices of the items were determined from the market from which the average cost was estimated to serve as the average cost of performing a funeral in the municipality. The estimated number of death due to motorcycle accidents in the Municipality was estimated. The estimated funeral cost was obtained by multiplying the average funeral performance cost with the estimated number of deaths.

Indirect Cost

The indirect cost refers to the loss of productivity by victims and relations. The following assumptions were made: Firstly, apart from students, all casualties were employed and were productive members of the society before the accident. The second assumption was that all of them were paid the minimum wage, their income was constant over their productive years and females have the same economic opportunity as males. Thirdly, all casualties as employees retire at sixty (60) years old. Another assumption was that the permanently disabled accident victims receive the best and proper medical treatment and home care until the rest of their lives.

Loss of Productivity

Loss of productivity was calculated by multiplying the daily minimum wage rate by the number of days of workdays lost. Similar computation was done for care takers of the victims. Days lost by students were quantified in days of school absenteeism

For fatalities, potentially productive years of life lost as a result of the accident were considered and the calculation was performed over the rest of their expected productive working life. The difference between the average age of fatalities and the compulsory retirement age of 60 years for both men and women was determined, which served as the average lost years per fatality. Using the current minimum wage, value of lost incomes was derived. Without data on patient's economic profile, the study assumed that all the victims are working with capabilities to earn this wage. Lost labour output of fatalities was computed using the cumulative present values of the assumed wages of the lost years of the fatalities.

The sum of the loss of productivity of victims, the caretakers and fatalities less that of students, yielded the estimated loss of productivity.

Intangible cost

The intangible cost of pain, grief and suffering was not quantified in monetary terms. Victims were asked to recall if any, pain, grief or suffering endured as a result of the accident. Responses were analyzed using Epi Info.

3.10 Limitations

The limitations of the study were;

(i) Underreporting of accident cases to the police;

(ii) The practice of not separating reported cases of accidents into the various types of vehicles involved by the police hampered the estimation of total motorcycle accidents.

(iii) Reliance of self reports of respondents as there was no way to independently verify the truth or otherwise of the answers provided may have resulted in some inacuracies

3.11 Ethical Considerations.

The study sought and obtained approval and the consent of the Research Ethics Committee of the Ghana Health Service. The consent of the managements of the Bolgatanga Regional Hospital, Afrikids, the Municipal Police (MTTU), and DVLA was sought. The participants were told about the general nature of the study as well as about any potential harm or risk that the study may cause. Respondents were told that the study posed no potential harm or risk to their being, however, the outcome of the study could influence policy in the area of road safety in general and motorcycle accidents in particular. The respondents were also assured of confidentiality of the data to be collected; they were told they had freedom to decline participation. In addition, they were offered the opportunity to receive a report about the results and conclusions of the study. They were also assured that data collected will be kept in a well secured place to ensure that people who have nothing to do with the study will not have access to them.

CHAPTER FOUR

RESULTS

4.1: Demographic characteristics of study population

About seventy one percent (71%) of the study population of the accident victims interviewed were men, over seventy seven percent of them were within the age group 20-39 and students formed about 33%. health workers and teachers accounted for 7% and 11% of respectively.

Over three-quarters (78%) of the motorcycle accident victims were riders (drivers) at the time of the accidents. Pillions (Passengers) and pedestrians accounted for about 12% and 10% respectively. Only 16.3% of accident cases were reported to the police.

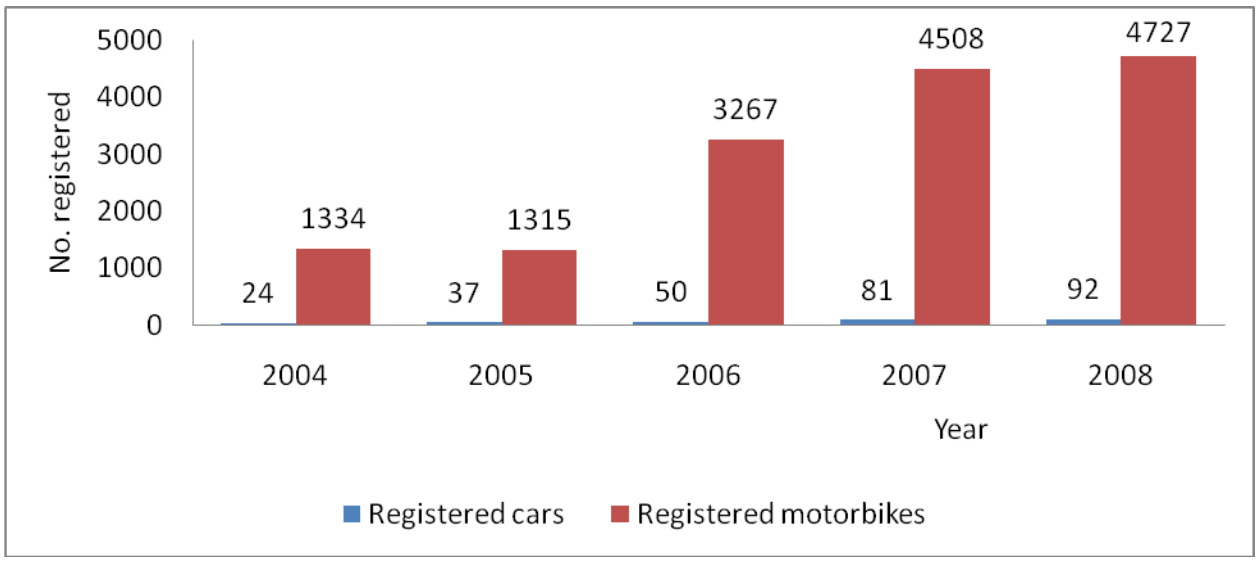
4.2: Other characteristics of the study population

Among the riders, 71.2% of them did not wear crash helmet at the time of the accident, about 30% had not insured their motor bikes whilst about 70% of them did not posses licenses at the time of the accident.

4.3: Trend of vehicular Registration in the Upper East Region

Figure 4.1 shows that the number of motorcycles registered in the region have been increasing steadily for the past five years. It accounts for over 90% of vehicles registered in the region.

Figure: 3 Trend of Vehicular Registration in the Upper East Region



4.4: Motor Cycle Accidents and outcome

Types of accident: Sixty nine percent (69%)of accident victims got injured as well as damaging their bikes whilst about 12% and 19% damaged only motor bike and sustained only physical injury respectively

Accident outcome: Head injury accounted for about 32% of cases treated at In-patient departments of the hospital, fracture and lacerations followed with 25% and 17% respectively. Over 90% of cases were treated and discharged, 3.8% died whilst 2.2% were referred.0.5% them however abscond

Extend of t motorcycle damage: A little over 69% of the motorcycles that were damaged could be repaired where as almost 12% damaged beyond repairs.

".....You see, most of the bikes are "mapukas", which is made up of about 90% rubber(plastics), as a result, there is no way any of these rubber bikes will fall without getting damaged, if even it knocks a lizard, definitely part of it will get damaged"

Loss of valuable properties: Over 71% of victims lost valuable properties at the time that the accident occurred. The results of the FGD throws more light of the common items victims of motorcycle accidents usually lose. It came out that apart from the motorbikes that are obvious properties that get damage due to the accidents, other valuables such as mobile phones, watches, helmets, shoes, text books, exercise books and sometimes laptops get damage due to the accidents. Most of the women however mentioned food stuffs (from the markets) as part of the properties that get damaged apart from those mentioned above. A few of them, about 10% also mentioned goods meant for the market especially on market days such as animals and artifacts as some of the properties that get damaged. On the extent of damage caused to the bikes, it was agreed that in some occasions, the bikes are damage beyond repairs but generally, the damaged bikes are repairable. They unanimously agreed that the extent of the damaged varies with the seventy of the accidents and the type of the bike involved; they all agreed that the worst victim is the Sukida bike. The quotes below perhaps throw more light on this.

4.5: Direct cost of motorcycle accidents.

***Medical Treatment Cost*.**

The total in-patient cost was found to be GH¢46,677.75, out -patient treatment cost was estimated at GH¢24,405.00 whilst Out of pocket expenditure for both in-patient and out-patient yielded GH¢241,178.30, thus motor cycle accidents costs the Municipality GH¢309,954.40 in medical treatment. Averagely, in-patient treatment and out-patient treatment cost victims GH¢183.05 and GH¢15 respectively, out of pocket payment at the household level on average cost victims GH¢128.15.The quote from the FGD throws more light on it. Results of FGD indicated that the major portion of costs borne at home

were incurred on medication (including tonics and painkillers) and rehabilitation in the form of physical therapy such as physiotherapy, traditional bone setters and herbal charges to improve health status. Lorry fares to treatment centers also contributed significantly to the home treatment costs at the household level. On the average, it cost GH ¢271.97, GH¢168.94 and GH¢106 respectively to treat fractures, head injury and lacerations in the municipality.

Administration and funeral cost

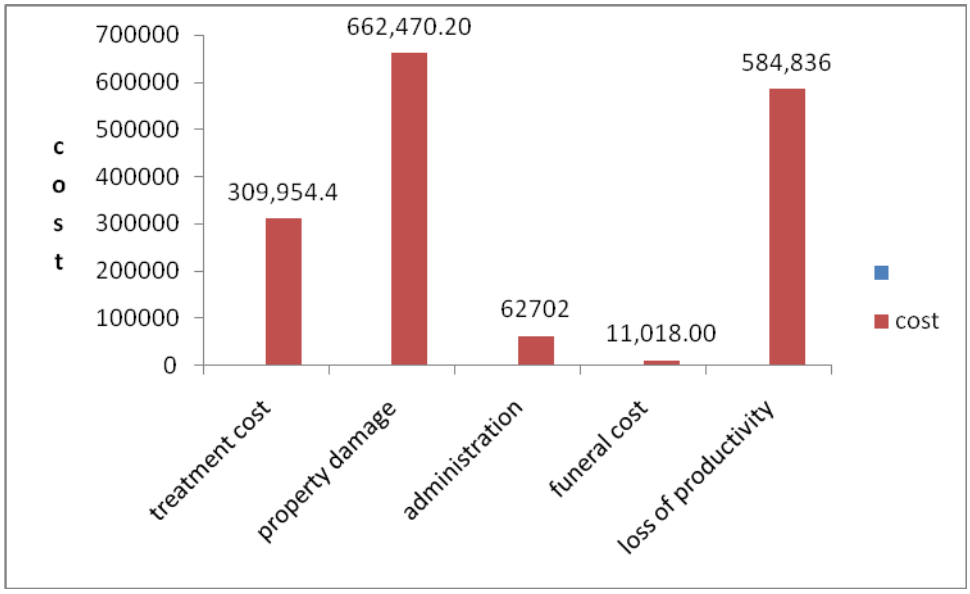
Administration and funeral costs were estimated to be GH¢62,702.00 and GH¢11,018.00 respectively.

Property damage yielded GH¢666,470.20 in cost.

Total Direct Cost

Thus the total direct cost for the year 2008 was estimated at GH¢1,046,144.60. The cost components of the direct cost are shown in Figure 3.

Figure 4:Cost components of Direct cost.



4.6: Indirect Cost

The indirect cost refers to the loss of productivity by victims and relations of motorcycle accidents.

Loss of Productivity cost:

The injury period was marked by a diminished ability to work or to conduct normal activities. Eighty-six percent of victims could not resume work or implement their usual daily activities, seventy-six percent of victims needed support from a caregiver at home after the accident. Both victims and caretakers on the average lost 31 days to the accidents.

The estimated annual loss of productivity due to morbidity was GH¢154,968 and the loss due to fatality estimated at GH¢429,867. Students accounted for about 44% of victims who could not resume normal activities immediately after the accident and in the process lost a total 10,380 days.

Total indirect cost estimated per annum was GH¢584,835 and estimated number of days of school absenteeism at 20 days per student.

From the results of the focused group discussion (FGD), participants indicated that most of the victims are the bread winners of their various families; whatever affects them adversely affects the entire family in one way or the other. They also agreed that, most of the time, some family members are made to stop work to cater for the injured victims, further reducing the overall earning ability of the entire family. Some children are not able to go to school due to the hardships imposed on their guardians as a result of the accident. A JSS graduate shared his experience with the group.

"As I am here, I am supposed to be in school, but ask why am here? Last year, I picked a co-tenant's bike, had an accident with it and the bike got spoilt, my father had no option than to replace the bike with money he had saved towards my going to school. I could not go to school as a result. As for me, I have learnt my lessons.

4.7: Intangible cost

Over sixty four percent of respondents suffered some form disability, such as pain, mostly waist pain, chronic headache and anxiety. The working ability of 38.8% of respondents reduced whereas 3.6% of them cannot work at all.33.1% of respondents sold properties to settle bills imposed on them by the accidents. Pain, suffering and grief, stress were mentioned as the costs imposed on both victims and society at large which could not be quantified in monetary terms. These quotes from The FGD throw more light.

"Can you imagine the psychological trauma you go through when you pick someone from his office to go solve a computer problem for you, only for you to be involved in an

accident, you survive and the person dies?, that is exactly what I am going through. I have never forgiven myself ever since that accident occurred"

"Last year, barely a week after I had secured a job with one of these telecommunication companies, my boy friend was involved in an accident and was transferred to Dua Yaw Nkwanta, I was compelled to go and take care of him much against the wishes of my employees, we spent about six weeks there, I lost such a lucrative job in the process and have since remain jobless. As I speak, he manages to walk with the aid of clutches, but for friends, some of whom are gradually getting fed up, things will have been difficult for us, we only take consolation in the fact that we still have our lives, others did not leave to tell their stories"

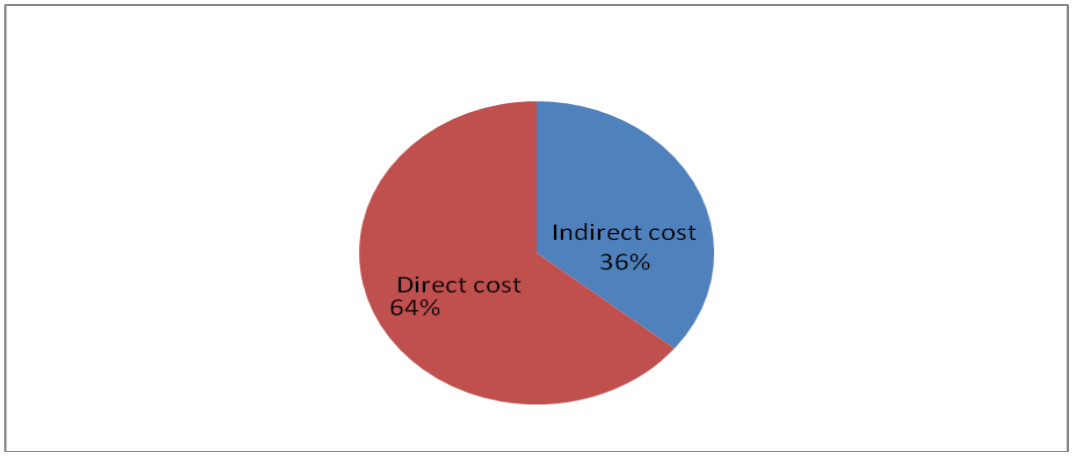
4.8: Social Cost of Motorcycle accidents

The total direct and indirect cost of motor cycle accident in Bolgatanga per anum was estimated at GH¢1,630,979.60 .Of this, 64% was due to direct cost and the remaining 36% indirect costs (Figure 4.) Students who were involved in motorcycle accidents on the average lost 20 school days per student. It also imposes suffering such as pain, mostly waist pain, chronic headache and anxiety on victims and families. The working ability of victims reduced whereas a few were permanently disabled, reducing their quality of life.

Table 1:Cost Components of Social Cost

COMPONENT **(Direct Cost)**	Amount	Cost Profile (%)
Treatment cost	309,954.40	19.
Property damage cost	662,470.20	40.6
Administration cost	62,702.00	3.8
Funeral cost	11,018.00	0.6
Subtotal	**1,046,144.60**	64
(Indirect Cost)		
Loss of Productivity	584,835	36
Subtotal	585,839	
TOTAL	1,630,979.60	**100.00**

Figure 5: Direct and Indirect Cost of Motorcycle accidents in the Municipality



CHAPTER FIVE

5.0 DISCUSSION

This study is the first estimate of the social costs of motorcycle accidents in the Bolgatanga Municipality; it is intended to provide information that will be useful for planning realistic and effective efforts at reducing road traffic accidents. In particular, the study sought to determine the cost imposed on the society as a result of motor cycle accidents, so as to influence policy makers to devote more resources towards motor cycle accident interventions.

The results indicated that for the year, 2008, more young adults, particularly those in the economically active age group, were involved in accidents as 49.4% of the respondents were in the age group 20-29. This figure may reflect the fact that motorcycle users tend to be at t he younger end of the age group in employment. This study also indicated that more males (70.6%) were involved in accidents than females (20.94%). Students were found to be majority of the victims, (32.5%), about seventy one percent of victims were riders (motor cycle drivers). These findings compare favourably with the findings of Hahn et al, (2008) and Widyastuti and Mulley,(2005) .The mean age for the group was 33.2 years, with almost half (45.2%) between 20 to 29 years. Students accounted for 22.6%, three-quarters (74%) were motorcycle drivers at the time of the accident.

If the current trend continues, what will happen is that more young adult males in the economically active age group will continue to die or get injured as a result of RTA, thus reducing productivity in the municipality and the county at large. Kopit et al, (2003) estimates that without efforts and new initiative, the total road traffic deaths will increase

by 80% in low and middle income countries and the majority of the death will be among vulnerable road users such as pedestrians, pedal cyclist and motor cyclists.

In the study settings where women are not encouraged to engage in serious economic activities, coupled with the fact that the average age of mortality is 31 years, if the trend continues, the municipality is likely to witness a very high number of young widows with very young orphans to cater for. This scenario apart from being a social welfare problem has the tendency to compel the widows to do all sorts of jobs in other to survive, especially at a time where the communal spirit is gradually been eroded by the influx of foreign culture.

Majority of the victims were also found to be students, consequently, efforts aimed at intervention should be focused and centered on the young adult male.

The high fatality rate observed particularly among young adult males is a pointer to the need to control RTA in this community. However, it is noteworthy that most of the victims did not use crash helmets or indeed any protective devices at the time of the accident. As suggested in Vietnam, helmets should be made mandatory to mitigate the effects of head injuries in the municipality. The enforcement of this law however should consider the socio-cultural context of the municipality. Young motorcycles riders were responsible for the majority of cases and fatalities in the present study. This prominence is an important socio-economic development that requires well thought out actions to stem the tide.

The study estimated conservatively the average direct cost of motor cycle accident to be GH¢1,047,151 per annum, about 709,932 US dollars (1USD=¢1.475) Property damage cost accounted for over 50.2 % of the direct cost, Thus this finding also collaborates the findings of the Surabaya study where motor bike repair cost accounted for over 60% of direct cost. The findings however differ from the Hanoi study in that the Hanoi study did not incorporate property damage cost in its estimates. The importance of incorporating damage cost to property is that it attempts to bring the accurate picture of the cost of accident which then influences the type of intervention.

The huge property damage cost in this study is due to the fact that over 90% of the brands of bikes used in the municipality are made up of over 90% plastics, as a result, the moment it is involved in an accident, irrespective of the severity; most of the parts that get damage require replacement and not repairs. The strategy to reduce this trend resides in a well thought out strategy and a well resourced and committed law enforcing agency.

Loss of valuable items contributed significantly to property damage cost. Previous studies to determine the cost of accidents did not consider damage to valuables. Both studies in Surabaya and Hanoi did not consider loss of valuables, the non-inclusion of this cost will seriously under estimate the overall property damage cost and invariably lead to the under valuation of the worsening economic effects imposed on the municipality by the motor cycle accidents. The common items mentioned by respondents were mobile phones, diaries, reading glasses and laptops. The huge monetary loss of these valuables notwithstanding, their loss constitutes a serious socio-economic and security threat not only to the victims, but also to their immediate families and the institutions for which

they work. It is therefore important to include them in the estimation of the cost of accidents so as to attract more necessary attention and resources to confront road safety interventions.

Funeral cost also contributed to the direct costs in this study. In fatal accidents where victims die on the spot, the non-inclusion of funeral cost will grossly under estimate the real cost because if any cost is to be incurred at the health facility at, it will be the mortuary charge which is minimal compared to the medical charges. It is however important to point out that the estimated funeral cost does not give the right estimate due to a number of reasons. However, under the circumstances, that was the best study could come out with. Other incidental charges such us the lorry fares of mourners some of whom travel from very far places could not be factored into the estimation, the estimated value of¢11,018 therefore gives an idea of how much is spent on the performance of funerals of an adult.

The administration cost constitutes the cost incurred by the insurance administration and police in the processing and payments of insurance claim and investigating motor cycle accidents respectively. Though there is no data with regards to how much the police incur in investigating a single motorcycle accident case, the study was able to come out with an estimate. The level of reportage notwithstanding, the study used the number of respondents who said their accidents were reported to the police to calculate the overall costs incurred by the police. This might be overestimation of the police cost since the number of respondents who claimed they reported their accidents far exceeds the reported cases of accidents to the police. However, this over estimation in anyway does not affect

credibility of the value estimated since in actual fact, the police is supposed to record and investigate all accident cases within the municipality, and if they do that, that is how much they will incurred. The figure could therefore still be used to demand for a fair share of resources in road safety intervention. This might not entirely be the case since from experience in our settings, not all insured vehicles eventually get paid in accident situations.

The indirect cost is the cost of loss of time being productive as a result of the accident, such as time spent in hospital and care at home by victims and relations. The study indicated that the injury period was marked by a diminished ability to work or to conduct normal activities.

The findings however differ significantly from Hills et al, (2008) in the mean number of days of inactivity by victims and relations. In their study, they found out that the period of inactivity ranges between 38.4 weeks to 13 weeks for victims, the reason for the huge disparity in the mean number of days could be explained by the relatively longer period it takes for brain injury to heal.

This study estimated the productivity loss using the minimum wage whilst Hill et al, (2008) estimated using the actual wages of the victims and relations. Computation of the productivity loss using the minimum wage will definitely lead to underestimation of the estimated indirect cost. In the municipality, apart from the students, those who own and ride motor cycles belong to a social class that will certainly not earn the minimum wage. However, due to the general difficulty in obtaining information regarding the wages and salaries of people, the study relied on the minimum wage in the computation with the

assumption that every worker at least earns the minimum wage. Again, in the study settings, people travel from far and near to visit sick relations with attendant losses in productivity which the study did not incorporate, contributing in part to the underestimation. The productivity loss attributed to students was not also considered since they were assumed not be working at the time the accident occur. Regular school attendance improves the chances of successes in examination which in tend provides the avenue for the development of skills needed for a high paying jobs in future. If the current trend of motor cycle accidents where 44% of the victims who suffer days of inactivity are students continue; with an average of about 20 days of inactivity per student accident victim, then the youth of the municipality will be losing a chunk of their future earnings to motor cycle accidents if the reverse of the above is true; this should be a great course for concern to authorities and policy makers.

The study indicated that 64.4% of the victims suffered some forms of pain, partial or permanent disabilities. Most respondents suffered from chronic waist pains and headaches. The persistence pains apart from having the potential of compromising normal activities continually, it also imposes serious socio-economic problems on the society.

Financially, victims will continue to spend substantial amount of family resources on pain killers, denying other members of the family to invest same on productive ventures. The reduction in working ability of victims means reduction in family earning if victims are the bread winners. In a study to estimate the effect of road traffic injury on a household in a least developed country, (Ericsson, 2008) found out that the pre accident

income of the household surveyed was reduced by 45% in the short term and 68% in the long term. 14% of the household surveyed reported that their children dropped out of school whilst 88% of women spent time caring for the injured. This will send the family down the poverty line. In many developing countries, the costs of prolonged medical care, the loss of the family breadwinner, the cost of a funeral, and the loss of income due to disability can push families into poverty (Hijar et al, 2003).

The scale and magnitude of the effects of road accidents on the lives of the people involved and the society in general must be clearly defined for purposes of raising awareness and as an input to the planning and evaluation of the government's road safety intervention measures. Road safety has long being viewed as the role of the law enforcing agencies. But the result of this study has shown that it is also a huge cost to the society. Its' intervention therefore requires the concerted efforts of all stakeholders with health personnel playing the lead role.

Road traffic accident is one of the leading preventable causes of illnesses and premature deaths, policy makers must implement effective policies to encourage people especially the males to adapt a more responsible way of riding. Accidents exert a high cost the society. Public health officers in the municipality are encouraged to approach RTA education with the same vigor used in their campaign for most childhood diseases.

CHAPTER SIX

6.1 Conclusion

Motor cycle accident costs the Bolgatanga municipality GH¢1,630,979.60 in social cost per annum. Of this, 64% is due to direct cost which is mostly borne by the victims and relations; significant time off work for patients and caregivers reduces family income. Some victims resort to borrowing, using savings and/or selling assets, and resulting in financial stress. An appreciable number of the victims (33%) were found to be students, withdrawing from school as a result of the accidents has far reaching social consequences. The accident also imposed pain, grief and suffering on victims and relations and in extreme situations where it involved permanent disability, it impacted negatively on health related quality of life of the victims.

6.2 Recommendation

The study recommends the following:

(1) Law enforcing agencies

Law enforcing agencies especially the police should ensure that riders put on crash helmets and that the registration of accident vehicles, (e.g. motor cycles) in the Municipality is thorough.

(2) Health Care Providers

Health care providers should improve on the recording RTA cases by indicating the types and make of vehicles involved, and the age, sex, place of residence and address of victims.

(3) The general public:

The public and particularly the young male adults should be educated on the importance of using crash helmet. They should also be advised to attend safety classes and obtain motorcycle driving license.

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APPENDICES

Appendix 1: Consent form for the study entitled social cost of motorcycle accident, A Case Study of the Bolgatanga Municipality

I am a postgraduate student from the School of Public Health, University of Ghana. Together with my assistants, we are carrying out a study in this community to estimate the cost of motor cycle accidents. We are very happy to invite you to take part in the study. We would be very glad if you could kindly read this consent or let someone read it to so that you can decide taking part in the study or not.

Accepting to take part in this study will take about 30 minutes of your time and all we need from you is to answer the questions attached to this form. The questions are basically about how you have been affected, socially or financially as a result of motor cycle accident. Though by taking part in this study, you would not have any immediate or direct benefits; your responses would help formulate an advocacy tool and recommendations to the appropriate authorities to put in more measures to reduce the motor cycle accidents within the municipality.

The discomfort, if any that you would face by accepting to take part in this study perhaps is your time.

If you decide to take part, you are allow to withdraw whenever you wish and you are also allow to skip answering any of the questions that you are not very comfortable with, however, the information you would provide, is going to be identified by a special code

number and would be treated strictly as confidential. Apart from the research team and members of the ethics committee no body shall have access to the information since it shall be under lock and key. We assure you that your name shall not appear or be mention in any report that might come out from this study.

PARTICIPANT'S CONSENT

I have read or I have let somebody read or translated all the necessary information that I need to know concerning this study and have fully understood it. I have decided on my own accord without any coercion to take part in this study. However by deciding to participate in this study, I am not waiving any of my personal rights by signing or thumb printing this consent form.

Signature: OR

…….. L/R Thumb Print

CONTACTS FOR MORE INFORMATION ABOUT THIS STUDY

In case you need more clarification concerning this study, you may contact any of the following at the School of Public Health, University of Ghana, Legon.

Dr.KOKU Awoonor Tel: 0244-564120 Email address: kawoonor@gmail.com

Michael Kudebong; Tel: 0244-601234 Email address: mkudebong@yahoo.com

Appendix 2: Questionnaire

Interview Date: __ /__ / __

Name of community…… of

Name of Interviewer……..

Respondent's Number…….

Questionnaire Code Number.....

A. PERSONAL DETAILS

For statistical purposes we would be grateful if you could give us some information about yourself.

1. **SEX.** (1) Male [ ] (2) **Female** [ ] (Please tick)

2. **AGE.....**

Please tick the age group you belong to

(1) Under 20 [ ] **(2)** 21 – 29 [ ] **(3)** 30 – 39 [ ] **(4)** 40- 49 [ ]

(4) 55- 59 [ ] **(5)** 60 + [ ]

3. Educational Background

(1) No Education [ ] (2) Primary Education and below [ ]

(3) JSS\Middle Education [ ] (4) SSS/SHS [ ]

(5) Tertiary Education [ ]

4 Marital Status

(1) Married [ ] (2) Not Married [ ]

5. Religion

(1) Christian [ ] (2) Muslim [ ] (3) African Traditional [ ]
(4) Others specify [ ]

6. Number of Children under 18 if any?

(1) One [ ] (2) Two [ ] (3) Three [ ] (4) Four [ ] (5) Five and above [ ] (6) None

7. Occupation

1 .Teacher [ ] 2. Social worker [ ] 3. Farmer [ ]
4. Health worker [ ] 5. Private Businessman/woman [ ]
6. Student [ ] 7. Unemployed [ ] 8.Driver [ ]
9. Others specify _____

8. By your estimation, how much do you make, on the average from all sources in a month?

(1) Salary..... (2) Other jobs.....
(3) Other Sources a.....
b.....
c.....

TOTAL INCOME ----------

9. Apart from children, do you have relations/friends who depend on you directly?

(1) Yes [ ] (2) No [ ] Skip 10 if you tick 2.

10. If yes, list them. Number

(1) Children above 18 years ----------
(2) Parents ----------
(3) Friends ----------
(4) Other relations (Specify) ----------

Total number of Direct dependents _____

11. Do you own a motor bike**?**

(1) Yes [ ] (2) No [ ]

12. If yes, is your motorcycle insured?

(1) Yes [ ] (2) No [ ] (3)N/A [ ]

(I3). If you answered yes to 12 above, what is the type of insurance**?**

(1) Comprehensive [ ] (2) Third party [ ] **(3)** Others please specify……

(14). What make is your motor bike or the one with which you had the accident?

(1) Sukida[ ] (2) Jialing[ ] (3) Yamaha[ ] (4)Honda[ ] (5) Others(specify)…….

(15). What are your reasons for using a motorcycle? (Please tick all that apply)

(1) Work/ Farm [ ] (2) Leisure\Visits [ ] (3) Errands [ ] (4) All of the above [ ]

(5) (Others please specify) .....

(16). Have you registered with the Health Insurance Scheme?

(1) Yes [ ] (2) No [ ]

(17). If yes, do you have an NHIS card?

(1) Yes [ ] (2) No [ ]

B. MOTOR BIKE ACCIDENT

(18). When did the motorcycle accident occur?

(1) Less than one month ago [ ] (2) Between 1-6 months ago [ ]

(3) 6-12 months ago [ ] (4) More than 1 year ago [ ]

(19). Which one of the following describes you at the time of the accident?

(1) Rider [ ] (2) Pedestrian [ ] (3) Pillion [ ] (Skip 20 if you tick 2 or 3)

(20). Did you posses a motorcycle license at the time that the accident occurred?

(1)Yes [ ] (2) No [ ]

(21). At the time that the accident occurred, were you wearing a safety helmet?

(For riders and pillions only) (1)Yes [ ] (skip to 23) (2) No [ ]

(22). If no to Q21, why?

(1) Too costly [ ] (2) Because of the hot weather condition [ ]

(3) Too heavy [ ] (4) Spoils hairdo [ ] (5) Inconvenience to carry around [ ]

(6) Others specify ..... (7) Do not know [ ]

(23). What caused the accident?

(1) Hit the back of another vehicle [ ] (2) Hit by another vehicle [ ]

(3) Knocked a pedestrian [ ] (4) Knocked an animal [ ]

(5) Hit the pavement [ ] (6) Hit by a motor bike [ ]

(7) Whilst negotiating a curve [ ] (8) Others, please specify.....

(24). What kind of accident was it? Did it involve (Please tick)

(1) Motorcycle Damage Only [ ] (2) Physical Injury Only [ ]

(3) Both Motorcycle Damage and Physical Injury [ ]

(25). Where did you treat the injury sustained, if any, as a result of the accident?

(1) Hospital\Clinic [ ] (4) Traditional bone setter [ ]

(2) Herbalist [ ] (5) Chemical/Pharmacy shop [ ]

(3) Self treatment at Home [ ] (6) Others (Specify)----------

(26) If you ticked (1) for Q25 above, from which of the following health facilities within the municipality did you seek treatment?

(1) Bolgatanga Regional Hospital [ ] (2) Afrikids [ ] (3) Bolgatanga health center [ ]

(4) Soe health center [ ] (5) Sumbrungu health center [ ] (6)Zuarungu health center[ ]

(7) Others specify _____

(27) Were you detained at the treatment center? (1) YES [ ] (2) NO [ ] (3) NA [ ]

(28) If yes how many days?.....

(29). Did you report the accident to the police?

1. YES [ ] 2. NO [ ]

DIRECT COST

Cost of treatment

(30). Can you please provide the following information on the costs you incurred(out of pocket) concerning the treatment of the injury sustained as a result of the accident?

ITEM	COST
i. Medicine	.....
ii Feeding	.....
iii..Hospital\Herbal charges	.....
iv Transport	.....
Others (Specify)	.....

Total medical charges =

Property damage cost

(31). If you damaged the motor bike as a result of the accident, what was the extent of damage?

(1) Beyond repairs [ ] (2) Repairable [ ]

(32). If you repaired it, about how much did it cost in total to repair it? _____

33. Did you damage or lose any valuable item(s) at the time of the accident?

(1) Yes [ ] (2) No [ ]

(34). If yes, list them.

ITEM	**VALUE**
1.	.....
2.	.....
3.	.....
TOTAL PROPERTY DAMAGE COST	**…..……..**

INDIRECT COST

Loss of output

(35). Did the accident result in you absenting yourself from work/farm/school etc.

(1) Yes [ ] (2) No [ ]

(36). If yes about how many days did you absent yourself from work\farm\school as a result of the accident? ..... days.

(37). During the time that you were injured, did any member(s) of your family have to stop work\school to care for you whilst you were recuperating?

(1) Yes [ ] (2) No [ ]

(38). If yes, how many were they and the number of days spent ----------

Name	**Occupation**	**Number of days spent**
1.	**…..**	**.. ….....**

2. ....

3. .... ……..... ….....

(39). Did any of your children/wards have to stop schooling due to your inability to pay school fees as a result of the accident?

(1) Yes [ ] (2) No [ ] (3) N/A [ ]

INTANGIBLE COST

(40). Did you suffer any form of disability, partial or permanent as a result of the accident?

(1)Yes [ ] (2) No [ ]

(41). If yes, which of the following disabilities did you suffer?

Disability in:

(1) Seeing [ ] (2) Communicating [ ] (3) Amputation of part of arm. [ ]

(4) Amputation of part of leg. [ ] (5) Deformity of spine. [ ] (6) Chronic pains [ ]

(7) Stress [ ] (8).Others please specify.....

(42). What has been the impact of the accident on your working ability?

(1) Can still work (2) Working ability reduced (3) Cannot work at all

OTHER COSTS

(43). Did you have to sell any property to take care of your self as a result of the accident?

(1)Yes [ ] (2) No [ ]

(44). If yes, tick the appropriate property that you sold

(1) Land [ ] (2) Cattle [ ] (3) Goat\sheep [ ] (4). Personal effects [ ]

(5) Others please specify.....

(45). Did you have to borrow to pay part of your bill?

Appendix 3: Instrument for collecting Hospital Data

Folder number	Sex	Age	Date of admission	Date of discharge	Diagnosis	Treatment outcome	Cost of treatment

Appendix 4: Instrument for collecting data for the estimation of funeral cost

Item	Quantity	Unit Price	Total Cost