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**SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA**



**HOUSEHOLD COST OF ROAD TRAFFIC ACCIDENT-RELATED
INJURIES: A CASE STUDY OF ST. JOSEPH HOSPITAL, KOFORIDUA**

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**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA,
LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE
AWARD OF MASTER OF PUBLIC HEALTH DEGREE**



DECLARATION

I hereby declare that excluding the references which I have duly acknowledged, this submission is my own work towards my MPH dissertation and that, to the best of my knowledge, it does not contain any previously published material by any other person nor material which has already been accepted in any University or elsewhere for the award of any other degree.



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INTEGRI PROCEDAMUS

DEDICATION

To my dad, mom, siblings, wife, and the entire family. For their kind support, love, and fervent prayers before, during, and after this programme. I am very much grateful.



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TABLE OF CONTENTS

DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF ABBREVIATIONS	x
ABSTRACT	xi
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background	1
1.2 Problem Statement	3
1.3 Objective of the Study	4
1.3.1 General Objective	4
1.3.2 Specific Objectives	4
1.4 Research Questions	4
1.5 Justification	5
1.6 Conceptual Framework.....	5
1.7 Organization of the Study	8
CHAPTER TWO	9
LITERATURE REVIEW	9
2.0 Introduction.....	9
2.1 Theoretical Framework.....	9
2.1.1 Human Capital Theory (HCT).....	9
2.2 Cost Of Injuries.....	10
2.2.1 Direct cost of RTAs on the households of patients.....	10
2.2.2 The Indirect cost of RTAs to the household of patients	12
2.2.3 Intangible costs associated with road traffic accidents to patients and their families	13
2.3 The quality of life of patients with road traffic accidents	14
2.4 Empirical Review.....	15
2.5 Summary of Literature	17
CHAPTER THREE	18
METHODS	18

3.0 Introduction.....	18
3.1 Study Design.....	18
3.2 Study Site.....	18
3.3 Study Population.....	19
3.4 Sample Size Determination.....	19
3.5 Sampling	19
3.6 Inclusion and exclusion criteria	20
3.6.1 Inclusion criteria	20
3.6.2 Exclusion criteria	20
3.7 Data collection methods and instruments	20
3.8 Quality Control	21
3.9 Study Variables.....	21
3.9.1 Dependent variables.....	21
3.9.2 Independent variable.....	22
3.10 Data Analysis.....	22
3.11 Ethical Consideration.....	23
CHAPTER FOUR.....	25
4.0 RESULTS	25
4.0 Introduction.....	25
4.1 The Background Characteristics of Patients.....	25
4.2 Direct cost of Road Traffic Accident Management.....	26
4.3 Indirect cost of Road Traffic Accident Management	28
4.4 Economic cost of RTA Management.....	28
4.5 Sensitivity Analysis of the Cost of Road Traffic Accident.....	29
4.6 Intangible Cost.....	31
CHAPTER FIVE	32
DISCUSSION.....	32
5.1 The direct cost of road traffic accidents in patients and their families	32
5.2 The indirect cost of road traffic accidents in patients and their families	34
5.3 The intangible costs associated with road traffic accidents in patient' households	34
CHAPTER SIX	37
CONCLUSION AND RECOMMENDATION	37
6.1 Conclusion	37
6.2 Recommendations.....	37

REFERENCES.....	39
APPENDIX I: INFORMATION SHEET	44
APPENDIX II: CONSENT FORM.....	46
APPENDIX III: QUESTIONNAIRE.....	47
APPENDIX IV: ETHICAL CLEARANCE	55



LIST OF TABLES

Table 4.1 Background characteristics of patients (N=291)	26
Table 4.2: Direct Cost Estimates	27
Table 4.3: Indirect Cost Estimates	28
Table 4.4 Sensitivity analysis of the cost of road traffic accident	30



LIST OF FIGURES

Figure 1.1: Conceptual framework 7

Figure 4.1: Direct and Indirect cost distribution 29

Figure 4.2: Intangible burden on patients 31



LIST OF ABBREVIATIONS

CHAG	-	Christian Health Association of Ghana
DVLA	-	Driver and Vehicle Licensing Authority
GDP	-	Gross Domestic Product
GHSERC	-	Ghana Health Service Ethics Review Committee
HCA	-	Human Capital Approach
HCT	-	Human Capital Theory
KBTH	-	Korle Bu Teaching Hospital
LOS	-	Length of Stay
NHIS	-	National Health Insurance Scheme
NHIA	-	National Health Insurance Authority
PDE	-	Patient Day of Equivalent
PRISMA	-	Preferred Reporting Items for Systematic Reviews and Meta-Analysis
PTSD	-	Post-Traumatic Stress Disorder
RTA	-	Road Traffic Accidents
RTI	-	Road Traffic Injury
RTC	-	Road Traffic Crashes
SDGs	-	Sustainable Development Goals
SSA	-	sub-Saharan Africa
UNDP	-	United Nations Development Programme
WHO	-	World Health Organization



ABSTRACT

Background: Road traffic accidents were ranked as the number eight cause of mortality and also a leading cause of death for children and adults between ages 5 and 29 years, ranking it above tuberculosis and malaria in 2016. It is projected that Road Traffic Accident (RTA) will be the fifth global cause of mortality by 2030. There are more than 1.3 million Road Traffic Injury (RTI)-associated deaths and about 50 million RTI cases each year with Africa bearing a brunt of this. Road traffic accident presents a physical and economic burden to individuals, households, and governments.

Objective: To assess the economic cost of Road Traffic Accidents in St Joseph Hospital, Koforidua.

Methods: A cross-sectional survey was conducted at the Emergency Unit of the St. Joseph Hospital with a sample size of 291. Summary statistics such as summation, mean and standard deviation were used to estimate the direct, indirect, and intangible costs to the patient.

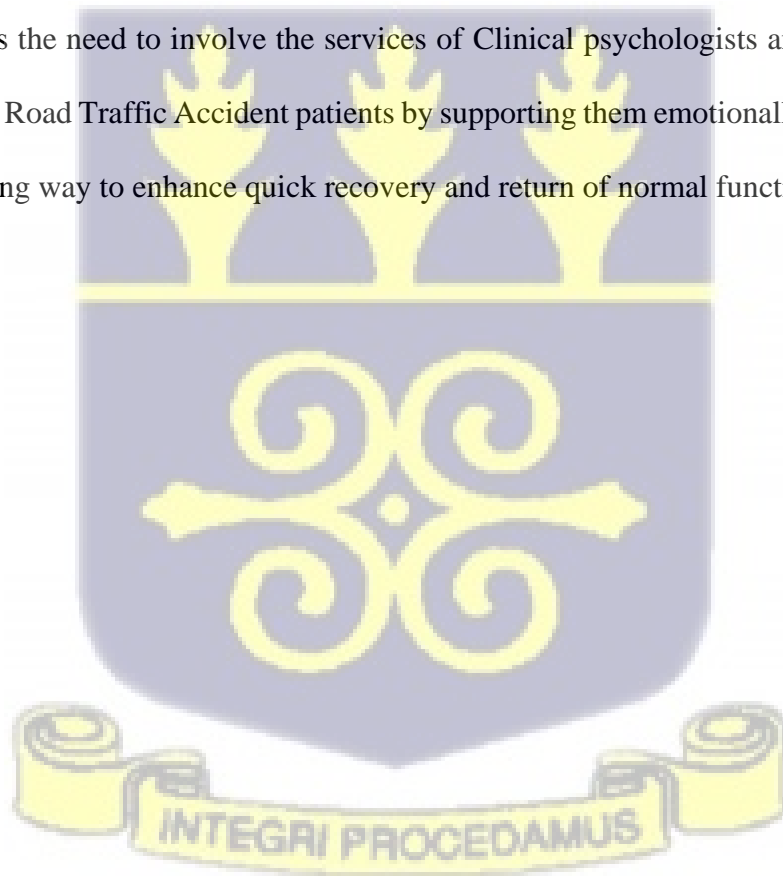
Results: The study found that the total direct and indirect cost of Road Traffic Accidents was approximately GHS1,973,801.28 (US\$164,483.44) and GHS520,309.46 (US\$43,359.12) respectively which represents 79.2% and 20.8% of the total cost. The total economic cost was GHS2,494,110.74 (US\$207,842.56). Intangible cost was also found to be high, with many patients rating their RTA burden to be between moderate and severe.

Conclusion: The study concludes that there were high direct, indirect, and intangible costs associated with road traffic injuries managed in St. Joseph Hospital, Koforidua, Ghana. The study recommends that the Ghana Health Service and stakeholders concerned should encourage enrollment in NHIS as this could go a long way to substantially reduce the catastrophic health expenditure incurred by RTA patients and families. Also, the NHIA should provide coverage for the cost and treatment for victims of road traffic accidents especially those

with open fractures which are orthopedic emergencies that may need stabilization with an external fixator.

In addition to this, the Ministry of Roads and Transport as well as Ghana Highways Authority must make conscious efforts in reducing or curbing Road Traffic Accidents in cities and on the highways by enforcing speed limits, building pedestrian and cyclist lanes, putting up speed ramps, adequate training and education for drivers and motorists by the Driver and Vehicle Licensing Authority (DVLA), deployment of more police personnels on our highways, proper roadworthy examination on vehicles, to ban the use of tricycles on our major roads, repairing of potholes, prosecuting of 'drink and drive' drivers, and ensuring the use of seatbelts in all passenger and private vehicles.

Moreso, there is the need to involve the services of Clinical psychologists and counsellors in the treatment of Road Traffic Accident patients by supporting them emotionally and spiritually, this will go a long way to enhance quick recovery and return of normal functions.



CHAPTER ONE
INTRODUCTION

1.1 Background

Road Traffic Accidents (RTAs) were ranked as the eighth leading cause of mortality in the world and the top rising cause of death among children, adolescents, and young adults between the ages of 5 and 29 years, ranking it above tuberculosis and malaria in 2016 (World Health Organization [WHO], 2018; WHO, 2017). With this data, it has been projected that road traffic injuries (RTIs) will be the fifth global cause of mortality by 2030 (Hyder et al., 2017). The Sustainable Development Goals (SDGs) have some targets to address the burden of RTIs, though global mortality rates continue to remain at 18 per 100,000 population. Additionally, there are over 1.3 million RTI-associated mortalities and about 50 million RTI cases every year (United Nations Development Programme [UNDP], 2019; (World Health Organization, 2018). The majority incidence of the RTAs is affected mostly by developing countries in South-East Asia and Africa. Furthermore, RTI-associated mortality in Africa, which is 26.6 per 100,000 population, is the highest globally and is three times that of Europe (World Health Organization., 2018).

Data on RTIs associated with disability in Africa are modeled rather than from direct observation. That notwithstanding, the continent has been estimated to account for 3% and 21.6% of total RTIs associated with healthy life lost as well as disability-adjusted life years, respectively (World Health Organization, 2017). With this, RTIs are classified as the third disease/health event burden in SSA (Kourouma et al., 2019). Data on the financial burden suffered by individuals, their families, and society, in general, is under-reported (Ryan-Coker et al., 2021; World Road Association, 2019). Insurance and Social Security Protection Schemes do not have extensive coverage in many countries in sub-Saharan Africa (SSA). Thus, expenses

associated with RTIs are borne by individuals and their families (Wijnen et al., 2019). In that regard, patients of RTIs and their families can become impoverished due to the exorbitant costs of medical care and income loss due to RTIs (Ryan-Coker et al., 2021). These losses have negative effects on the household and the economy and overall development nationally. This has been corroborated by a report that revealed that many countries lose between 1-3% of their Gross Domestic Product (GDP) annually as a result of RTIs (World Health Organization, 2021). These economic and developmental burdens are more profound in SSA countries with developing economies and underdeveloped health systems (Rissanen et al., 2020). This is demonstrated by the 0.8-9% loss of GDP in these countries (Ryan-Coker et al., 2021).

Management of RTIs requires hospitalization and trauma care which are usually expensive. In that regard, some studies have reported on RTIs and their cost, focusing on the cost of treatment and loss in productivity, which measures the aggregate economic impact on GDP. However, these estimates have methodological shortcomings, which include their inability to tell the impact of RTIs on the economic burden suffered by victims and their households, as some of this economic burden is borne by the state through subsidized public facilities. Additionally, there is a possibility some of the burdens are shifted into the future as households with victims of RTIs tend to incur debt or collateralize/sell household assets to fund the health care for these victims (Alam & Mahal, 2016; Rissanen et al., 2020; Wijnen, 2021). Data on costs associated with RTIs are valuable for implementing road safety policies and justifying the need for more investment in road safety (Wijnen, 2021). In that regard, several international reviews have been conducted to assess the cost of RTIs in various parts of the developed world (Wijnen et al., 2019; Wijnen & Stipdonk, 2016) and some few studies have been conducted in Africa (Abdallah et al., 2016; Mofadal & Kanitpong, 2016). In Ghana, studies conducted on RTIs have mainly focused on their epidemiology and associated outcomes of RTIs without the need

to focus on the economic burden and the well-being of sufferers of RTIs (Blankson & Lartey, 2020; Hesse & Ofori, 2014). Therefore, it is imperative to determine the economic burden and the expected well-being of individuals involved in road traffic accidents.

1.2 Problem Statement

Road Traffic Accidents are one of the top neglected issues in public health which is highly noted for their mortality and morbidity in the whole world. Road traffic accidents are considered the 8th cause of mortality worldwide (WHO, 2018; WHO, 2017). The economic burden of RTA contains direct and indirect costs as well as family members, mental issues, loss of work, damage to property, and hospital stay. Generally, between 1% to 3% have been lost by countries (estimated to be over US\$500bn) of their GDP to road traffic injuries annually (WHO, 2018). The economic consequences and complications in sub-Saharan Africa (SSA) are dire. Many SSA countries with their economies and underdeveloped health systems lose their GDP due to RTA, which is between 0.8% and 9% (Peden et al., 2013).

About 72 individuals found in every 100,000 Ghanaians averagely suffered in one way or the other with injuries to the body. Meanwhile, about 8 out of that figure died of RTAs in the past years. Moreover, over sixty percent of reported RTA injuries are found among children and young adults below the age of 35 years (Hesse & Ofori, 2014). Meanwhile, Korle-Bu Teaching Hospital (KBTH) located in Accra, for example, RTA accounted for sixty-two percent of all mortalities in the Emergency Unit. Surprisingly, out of the mortalities which were caused by RTAs, over fifty percent occurred in pedestrians and also thirty-one percent in passengers, and finally, 18.7% occurred in motorists (Blankson & Lartey, 2020).

Ghana spends more than 1.2 trillion cedis (€94 million, US\$128 million) every year on road traffic accidents according to the deputy director of research, monitoring, and evaluation of the National Road Safety Commission as cited by Boakye et al. (2013). Furthermore, the cost

incurred in road traffic accidents means that 1.6% of the country's GDP annually is channeled into solving the road traffic injuries situation (Hayes, 2007). Moreover, the financial burdens that victims and their families, as well as employers and societies, bear due to RTAs in the country are underreported. Further, data on the burden of RTAs in Ghana are lacking, and accurate household information regarding the costs of RTAs in Ghana is scarcer. To prioritize and also implement cost-effective interventions for road safety governments must appreciate the economic burden of this public health problem. This study is aimed at understanding the economic cost of RTA on households.

1.3 Objective of the Study

1.3.1 General Objective

To estimate the economic cost of individuals involved in road traffic accidents in St Joseph Hospital, Koforidua.

1.3.2 Specific Objectives

1. To assess the direct cost of road traffic accidents to patients and their families.
2. To estimate the indirect cost of road traffic accidents to patients and their families.
3. To assess the intangible costs associated with road traffic accidents patients.

1.4 Research Questions

1. What are the burdens of direct costs of RTAs on the families and individuals involved in Road Traffic Accidents?
2. What are the indirect costs incurred by patients due to Road Traffic Accidents?
3. Which intangible costs are associated with road traffic accidents patients?

1.5 Justification

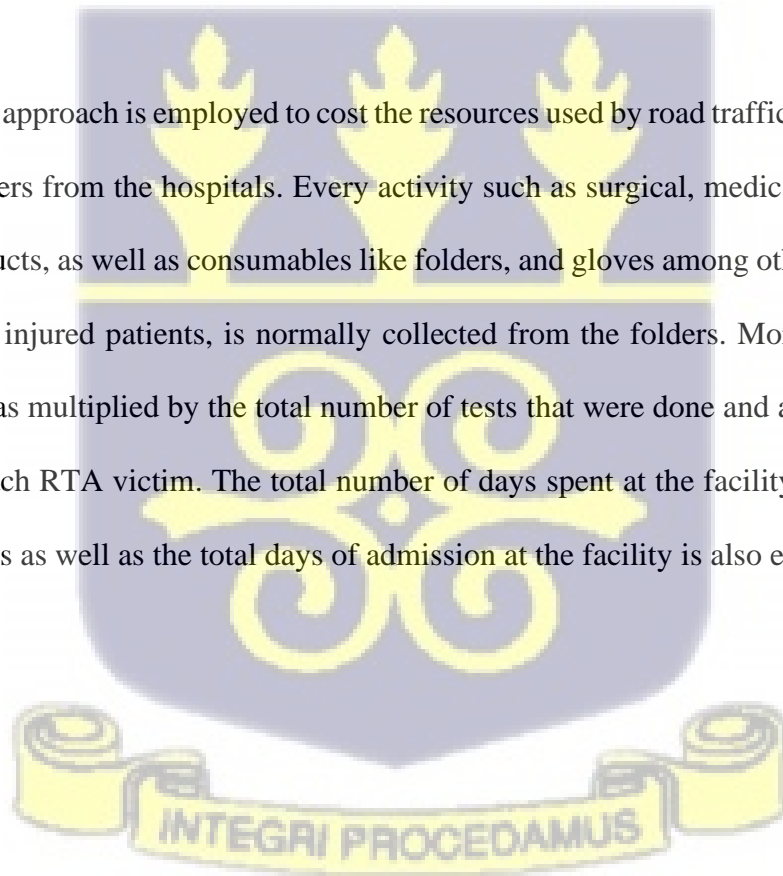
Information regarding epidemiology, as well as the economic effects of RTIs in developing countries like Ghana, are lacking compared to high-income and developed countries. Additionally, information on the costs associated with RTIs is even scarce though RTIs continue as a significant public health issue causing significant economic and developmental losses. Therefore, it is prudent to obtain up-to-date information on the economic burden as well as the well-being of victims who suffered RTIs in Ghana. This will enable relevant stakeholders like the National Road Safety Commission to implement targeted and cost-effective solutions for reducing the incidence of RTIs and their associated economic and developmental burdens. In this regard, this current study seeks to determine the economic cost and also well-being of individuals and households involved in RTIs at St Joseph Hospital in Koforidua.

1.6 Conceptual Framework

Figure 1.1 shows the conceptual framework of the cost incurred by road accident injury patients and their families. The costs related to the management of road accident injuries are divided into three main components, namely, direct, indirect, and intangible costs. When an individual incurs a road accident injury, the individual and their family incur direct costs such as medical and non-medical costs. Direct medical costs comprise costs for registration, consultation, admissions, laboratory and other diagnostic tests, medicines/drugs, and surgery. The non-medical cost comprises transportation, food and drinks, water, etc. The indirect costs denote productivity losses incurred by the road accident injury and comprise absenteeism, travel, and waiting for a physician. Intangible costs, on the other hand, are referred to as the pain and suffering of patients because of the injury, which is usually determined by the decrease in quality of life.

The framework shows how individual elements under direct cost and indirect costs interrelate to constitute the total cost of road traffic injuries to road traffic accident patients and their households. From the framework, employees' compensation is mostly used in place of staff salaries annually and is used to cost this top-down approach. The patient day equivalent (PDE) percentage for the road traffic accident patient helps to allocate costs in the top-down approach. The RTC PDE percentage was multiplied by the total operational and human resource costs of the hospital to obtain the proportion used by the RTC injured patients. The cost per each patient which is based on the length of stay (LOS) as well as the cost of illness (RTC admission) was calculated. PDE is an indicator that measures how a hospital spends available funds and is a sign of efficiency.

The bottom-up approach is employed to cost the resources used by road traffic accident victims using their folders from the hospitals. Every activity such as surgical, medication, laboratory, and blood products, as well as consumables like folders, and gloves among others used by road traffic accident injured patients, is normally collected from the folders. Moreover, the cost for each activity was multiplied by the total number of tests that were done and added to have the total cost for each RTA victim. The total number of days spent at the facility is estimated for the RTA victims as well as the total days of admission at the facility is also estimated.



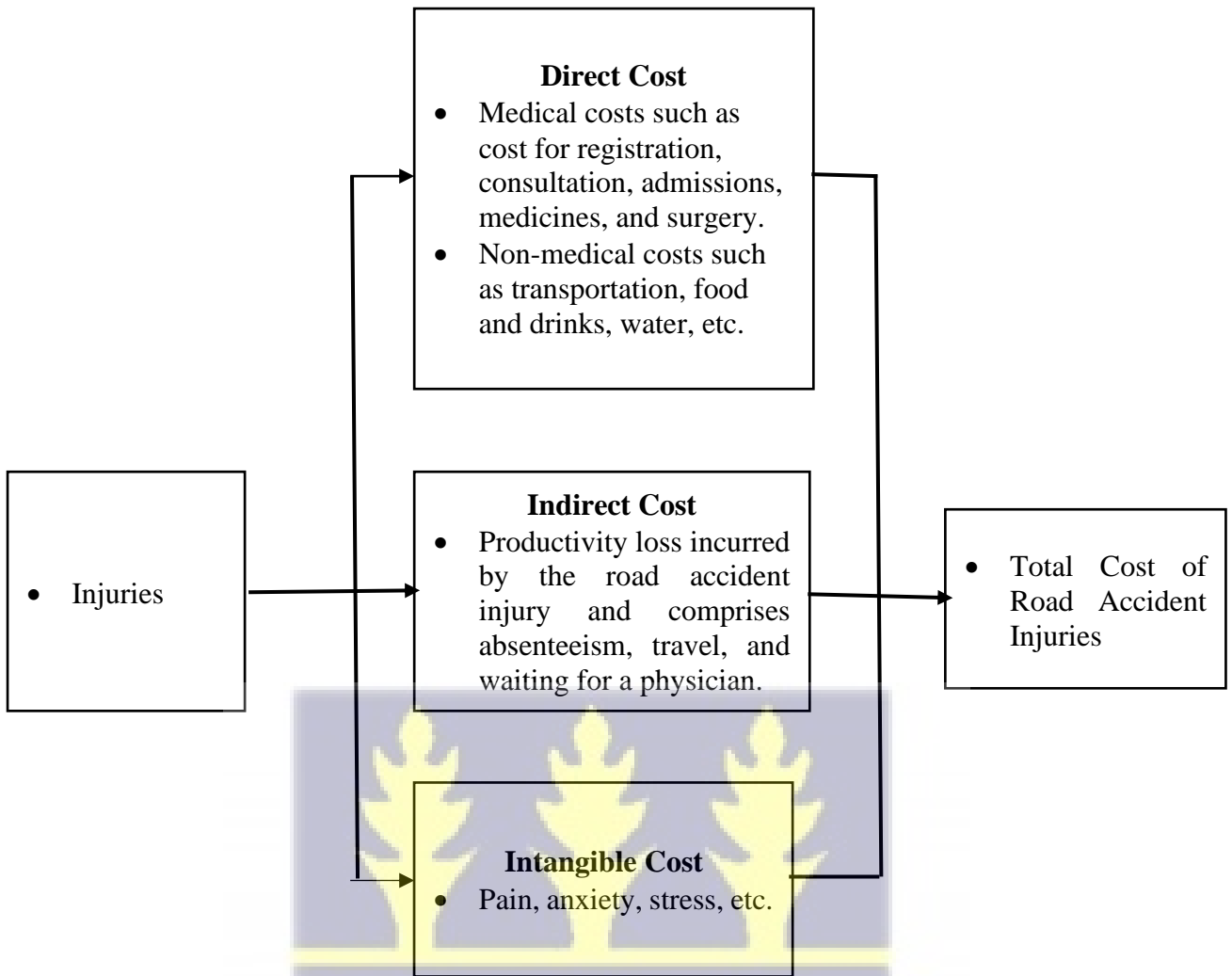


Figure 1.1: Conceptual framework for the cost of Road Traffic Accident Injuries



1.7 Organization of the Study

The study is organized into six chapters. Chapter one which is the introduction of the study provided the background to the study, problem statement, main and specific objectives of the study, research questions, the justification of the study, the conceptual framework, and the organization of the study. The second chapter of the study presents a conceptual, theoretical, and empirical review of the literature. Chapter three describes the methods used in the study. Chapter four presents the results and chapter five presents the discussion. The chapter provides the conclusion and recommendations.



CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

According to Arlene (2010), reviewing related literature to a problem involves a critical examination of publications and other relevant scientific works concerning the problem being studied. For the current study, the review of literature is premised on the objectives of the study as well as relevant theoretical underpinnings related to the cost, burden, and quality of life of victims of road traffic accidents.

2.1 Theoretical Framework

The human capital theory was the theory used in this study.

2.1.1 Human Capital Theory (HCT)

The human capital theory is normally used to determine the loss of productivity by victims as well as families (Jo, 2014). Thus concerning road traffic accidents, the human capital theory helps to measure productivity losses due to road traffic accidents (Jo, 2014; Matiwane & Mahomed, 2018; Silcock & Silcock, 2003). The theory further postulates that the value of work that was lost is tantamount to the money the individual was supposed to pay to perform that same work (Alam & Mahal, 2016; Blankson et al., 2020). Human capital has been defined as the ideas, skills, information acquired, and knowledge (Becker, 2007). Additionally, the Human Capital Theory (HCT) approach indicates loss of productivity as the discounted market price of the output that was produced by a person or a discounted value of foregone income for reasonable periods (Silcock & Silcock, 2003). For instance, in cases of fatality, the period that was considered correlates to an expected lifetime of a person, in cases of injuries, the period, as well as the level of disability, should be taken into account the discounted value of future production be considered in real sense which would have been achieved, In case the person

was not involved in RTAs (Silcock & Silcock, 2003). For this study, loss of productivity can be defined as the value of lost income which is due to a reduction in the potential of human capital on a person as a result of temporary or permanent disability caused by RTA and the absolute productivity loss in road traffic injuries.

2.2 Cost of Injuries

Costs of an illness are paid by either the household or the institution/state where the patient works, thus, they are generally divided into direct, indirect, and intangible costs.

2.2.1 Direct cost of RTAs on the households of patients

According to Anders et al. (2013), the term "direct costs" describes the use of resources with a specific value to directly affect the delivery of treatment. Direct cost comprises healthcare and non-healthcare costs. Healthcare direct costs are costs associated with diagnosis, treatment, ongoing care, rehabilitation, and end-of-life care. However, the non-healthcare direct cost relates to the use of non-healthcare resources, such as transportation to and from medical facilities, some household expenses, relocating and individual property loss costs, legal and judicial fees, and informal care from the wounded person's relatives or volunteers (Tarricone, 2006).

Road transport accidents have direct effects on the household of patients. A recent study found that several SSA countries have weak and expensive insurance and social protection schemes which make households of those involved in road traffic accidents directly bear expenses (Ryan-Coker et al., 2021). The direct costs borne by patients or their households include

- i. Surgical costs (Agyapong et al., 2020; Schoeters et al., 2020)

- ii. Medical costs such as cost of medicines, surgical, laboratory analysis, first aid, cost of medical records, X-rays, other treatments thus physiotherapy as well as diet therapy (Abdallah et al., 2016; Matiwane & Mahomed, 2018; Schoeters et al., 2020).
- iii. Non-medical costs such as traveling to and from the hospital for medical review, purchasing food and other necessary consumables, damage to properties, and unexpected costs as a result of injuries suffered from road traffic accidents (Chantith et al., 2021; Ryan-Coker et al., 2021).

A recent study in Ghana found that per the level of our population, the cost incurred due to road traffic accidents was estimated to be sixty percent (US\$6,730,862.89) out of the total cost of the household expenditure, which was higher than the actual cost of other injuries put together (Blankson et al., 2020). Within this, the direct cost component of all the total cost comprises 82% of the total economic cost of injuries which constituted over four times compared to the indirect component cost (Blankson et al., 2020). This finding suggests that direct costs of road traffic accidents tend to send an already impoverished household of a road traffic accident patient into deeper levels of poverty. A recent report on the global status of road safety indicated that over fifty percent of Road Traffic Accident-related mortalities are related to motorcyclists and pedestrians (WHO, 2018). This may derail efforts aimed at achieving target 6 of the Sustainable Development Goal (SDG) 3 which has a reduction of 50% in the number of mortalities and associated injuries from RTA by 2030 (WHO, 2018).

Chantith et al.(2021) found that a higher number of the direct costs which are associated with road traffic accidents are borne by mostly younger adults. Specifically, the age group of the first three age groups (<18 years, 18-29 years, and 30-39 years) demonstrate over seventy percent of the entire cost involved in becoming disabled in post-RTAs (Chantith et al., 2021).

The findings of Chantith et al. (2021) corroborate previous findings of WHO (2018) found out that higher number of the direct costs which are associated with Road Traffic Accidents (RTAs) are borne by mostly younger adults.

2.2.2 The Indirect cost of RTAs to the household of patients

According to Tarricone (2006), indirect costs are the productivity losses brought on by a disease. The computation of indirect cost is based on the assumption that the patient's or the relative's income during the illness is equivalent to the marginal product of labor. According to Xie et al. (2016), estimated indirect costs could be three times higher than direct expenses, accounting for as much as 80% of all costs associated with treating patients, therefore they could be very significant.

Indirect costs of RTAs mostly relate to productivity losses by patients and caregivers (Alam & Mahal, 2016). The loss of productivity is estimated as the income lost due to short-term absenting from work, long duration of disability with early mortality as a result of accidents, and also premature death due to road traffic accidents (Ryan-Coker et al., 2021). Extant literature shows that costs of productivity losses which result in a longer period of disability, injury, and early mortality are often assessed by using the Human Capital Theory (HCT) approach (Blankson et al., 2020; Chantith et al., 2021; Matiwane & Mahomed, 2018; Wijnen, 2021). The human capital approach estimates the current discounted value of the future income of persons who have been assigning monetary value by the use of the wage rate (Wijnen, 2021). According to Blankson et al. (2020), some of the indirect costs to RTA patients and their households include the hours spent in seeking healthcare by the patient which include the period of treatment, as well as reviews due to the aetiology of injury.

According to Chantith et al. (2021), road traffic accidents affect the measure of the productivity of a nation as many people who were involved in RTA obviously may not be able to further produce due to the fact that the disabled and those who are injured will not enjoy the same kind of productivity as they used to (Chantith et al., 2021). A study conducted in South Africa found that the total cost of road traffic accidents was US\$815,865 which is equivalent to 2.4% of the total 2015/2016 expenditure of a tertiary hospital in Mpumalanga Province (Matiwane & Mahomed, 2018). Direct road traffic accident costs accounted for 54% (US\$444,138) while indirect costs accounted for 46%. In a similar study conducted in Ghana, the total household expenditure on road traffic injuries was estimated at US\$1276.15. Meanwhile, the direct cost comprised 82% with the indirect cost constituting 18%. From the two studies, it can be deduced that RTA patients and their households spend less amount of their resources on indirect costs concerning RTAs compared to direct costs.

2.2.3 Intangible costs associated with road traffic accidents to patients and their families

Intangible costs are related to road traffic accidents related to the patient's emotional pain and discomfort that was experienced due to the road traffic accidents or injuries (Blankson et al., 2020). The emotional stress that patients and their households go through due to road traffic accidents cannot be overestimated. A recent study in Ghana found that though most RTA victims appraised their injuries as a threat but well controlled, several patients with injuries due to road traffic accidents were found to develop what we called psychosocial distress (40.6%) and most importantly Post-traumatic Stress Disorder (22.0%) (Assah, 2020).

Another study conducted in Croatia also found that RTA survivors reported substantial rates of Post-traumatic Stress Disorder (32.3%), depression (17.4%) symptoms, and low rates of anxiety (5.8%) (Kovacevic et al., 2020). Depression symptoms were related to below-average

self-perceived economic status, irreligiousness, medication use, psychiatric medication use, and injury-related factors. PTSD symptoms were associated with female gender, below-average self-perceived economic status, previous psychiatric illness, medication use, psychiatric medication use, not being at fault in the relevant RTA, claiming compensation, and injury-related factors (Kovacevic et al., 2020).

2.3 The quality of life of patients with road traffic accidents

Loss of quality of life is a major cost as a result of RTAs that are not fatal. According to Kovačević et al. (2020), the decreased well-being of an individual as a result of RTAs demonstrated a specific correlation regarding the reduced state of socio-economy of the RTA casualties. Research indicates that the physical as well as mental components of health-related quality of life are found to decrease at the end of the day, especially with RTA victims with fewer complications (Littleton et al., 2011). Quality of life persistently as well as separately foresees the recurring pre-injury employment and engagement among RTA victims that usually suffered a mild degree of injuries (Gopinath et al., 2015).

Other studies have shown that mental disorders associated with RTA victims drastically reduce their quality of life especially Post Traumatic Stress Disorder (Kovacevic et al., 2020), depressive disorder, and anxiety disorders (Gopinath et al., 2017). Other significant conditions which determine the well-being of survivors of RTAs are their expectations concerning recovery, level of pain, social support, degrees of injury, claims of compensation, and early detection of complication cases (Assah, 2020; Blankson et al., 2020; Kovačević et al., 2020; Ryan-Coker et al., 2021).

A current study by Gopinath et al. (2020) established that factors that were indirectly related to injury such as hospitalization of RTA patients, days of hospital stay, surgical interventions, unconsciousness at the time of RTA as well as Post RTA rehabilitation, may have a severe negative effect on the quality of life after RTA. This suggests that a vast range of factors independently affect the quality of life such as injury and socio-demographic indices and pre-injury, psychological, health, injury, and accident-related factors.

2.4 Empirical Review

Chantith et al. (2021) conducted a study in Thailand on the value of loss of productivity which was due to RTAs in the year 2017. Moreso, data collection as well as the evaluation was done to help in the computation of income losses over a period in case of fatalities. The results revealed that, at the end of 2017, the total cost of productivity loss which was as a result of RTAs alone was approximated to be 121 billion Baht (3,516,114,800 US dollars) (45 billion in case of fatalities, 7 billion in case of disabilities, 67.5 billion in case of severely injured patients and 1.5 billion for less injured patients), or approximate to 0.8% of the country's GDP that was found to be reasonable. The risk age groups are assessed in all the cases and it was found that the 16–25-year group bears the highest implication in all cases of RTA that occurred (Chantith et al., 2021)

Matiwane and Mahomed (2018) conducted a study to determine the cost of inpatient management of RTA victims in a tertiary hospital in Mpumalanga Province between the 1st of April, 2015 to 31st of March, 2016. Mixed costing approach was adopted to analyze patient care following a road traffic accident. A retrospective analysis of folders was taken to retrieve necessary information on patients during admissions between the period of 1st of April, 2015 and the 31st of March, 2016. Records of the patients for that period were also used to extract their expenditures. The bottom-up approach and top-down approach were however employed

to determine and evaluate the direct costs as well as indirect costs accordingly. Sensitivity analysis was also employed to assess and analyze the changes in the use of resources to manipulate the average expenses incurred. The study also found that the majority of the population that were proactive economically, especially the males are in the higher groups due to an increase in surgical intervention and the cost of drugs administered. Management of clients directly results in increased costs. The findings of Chantith et al (2021) and Matiwane and Mahomed (2018) have similarities and that younger adults mostly bear direct costs and the highest burden in all types of RTAs that occurred.

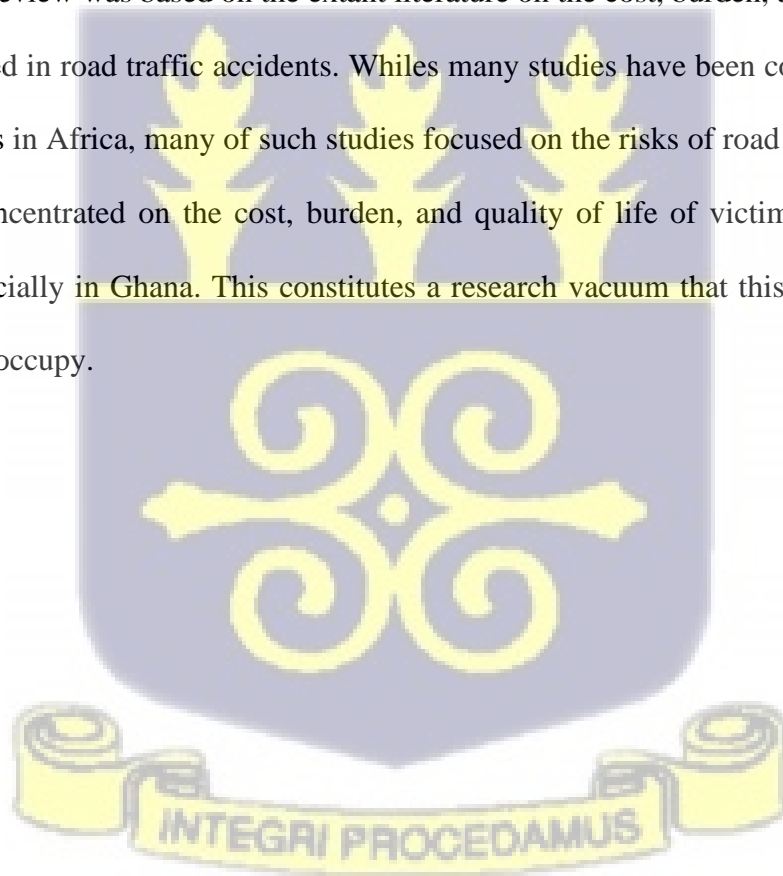
Ryan-Coker et al. (2021) conducted a systematic review which was aimed at exploring and synthesizing the current literature regarding direct and indirect expenditure on RTAs in SSA, the state of the current facts, the methodologies that were employed to examine and produce these expenses, and their facilitating factors using PRISMA guidelines to verify the publications. It was found that while there is availability of limited data in most cases, facts indicate clearly that the economic burden of RTA has increased in sub-Saharan Africa. Specifically, delayed stay in facilities, surgical interventions, and the degrees of injury was noted as the top factors relating to cost. This suggests that inconsistencies and variations in costing approaches among others affect the generalisability of cost reports.

In a study done in Ghana by Blankson et al. (2020) to evaluate the costs of RTA cases at the accident and emergency unit of the KBTH in Ghana by employing the cross-sectional retrospective cost-of-illness approach, 301 participants were sampled after reviews by all RTA victims folders between the period of January to December in 2016. The direct cost comprised of fees for consultation, surgical interventions, drugs, transport to and fro, and loss of property was assessed. Indirect cost was also estimated using the HCA. Moreso, they employed the

Likert scale to estimate the intangible cost. Additionally, the total household expenditure cost of different RTA-associated injuries together with intangible costs had also been estimated. This study found that the overall yearly household expenditure of RTA victims that were managed at Korle-Bu Teaching Hospital was US\$11,327,461.96, and out of this, 82% was as a result of direct cost and the total incurred household expenditure of Road Traffic Accidents victims was US\$1,276.15. Moreso, RTA injuries were however rated the highest. The study concluded that RTA-injured victims obtained higher costs in treatment and supposedly high levels of intangible cost in most cases.

2.5 Summary of Literature

This literature review was based on the extant literature on the cost, burden, and well-being of persons involved in road traffic accidents. Whiles many studies have been conducted on road traffic accidents in Africa, many of such studies focused on the risks of road traffic accidents. Only a few concentrated on the cost, burden, and quality of life of victims of road traffic accidents, especially in Ghana. This constitutes a research vacuum that this current research will attempt to occupy.



CHAPTER THREE

METHODS

3.0 Introduction

This presents description of the study site, study design, data collection tools as well as procedures, sample size, sampling method, quality assurance, data analysis, data management, and ethical issues.

3.1 Study Design

The study used a descriptive cross-sectional survey. It is appropriate for this study as it allowed for the data collection to be conducted during the same period. It enabled the collection of data on the direct, indirect, and intangible costs of road accident injury patients at Saint Joseph Hospital in Koforidua. The quantitative approach was used to obtain information on intangible costs through the administration of questionnaires to address the objectives of the study.

3.2 Study Site

This research was carried out at Saint Joseph Hospital in Koforidua. The hospital is an Orthopaedic facility that operates as a member of the Christian Health Association of Ghana (CHAG). It is located in New Juaben North Municipality located in Eastern Region, Ghana. This hospital has an estimated 180 beds and it is a centre of excellence in healthcare delivery in Ghana and in the sub-region which serves as the major referral centre in Orthopaedics and Trauma with a strategic location that connects to the Volta Region, Greater Accra Region and the Ashanti Region. However, due to the growing demand for healthcare from the public, the hospital has expanded to provide services to include General Surgery, General Medicine, Obstetrics and Gynaecology, ear, nose, and throat, eye care, child healthcare services, and institutional public health.

3.3 Study Population

This comprised of the respondents that have undergone treatment for Road Traffic Accident (RTA) related injuries at the Emergency Unit of the Saint Joseph hospital.

3.4 Sample Size Determination

This was determined at a confidence level of 95% by the use of a single sample for the infinite population formula:

$$Ss = \frac{(z^2 \times \sigma^2)}{d^2}$$

where $Z = z$ - value (e.g., 1.96 for 95% confidence level)

σ = Standard Deviation

d = distance on either side of the mean in the confidence interval

The research conducted approximated the household mean out-of-pocket cost of injuries was US\$11 ± 58 in Ghana (Mock et al., 2003). Hence, using the estimated the US\$11 ± 58 with an assumed $d=7$, then sample size was to be calculated as;

$$Ss = \frac{(1.96^2 \times 58^2)}{7^2} = 263.74 \approx 264$$

With a non-response rate of 10%, the minimum sample size = $(264 \times 0.10) + 264 = 291$.

Hence the required number of participants for the study is 291.

3.5 Sampling

The Emergency Unit records were reviewed. Data on the cost of registration, consultation, surgical interventions applicable, laboratory services/investigations, medicines, and other diagnostics services were extracted. All patients who were attended to from January, 2021 to

December, 2021 on accident and emergency cases were captured from the review. In instances where there was incomplete information, available folders were retrieved for verification. Concerning the selection of participants, patients were required to come for regular reviews at the center. Such reviews were conducted at the outpatient department (OPD) of the St. Joseph Hospital and the theater waiting area for those requiring wound inspection. On such clinic days, simple random sampling was used to select participants for interviews. All injured patients who met the inclusion criteria stood an equal chance of being selected as study participants. Based on this assumption, we employed the simple random sampling technique in selecting study participants through the balloting method. 'yes' and 'no' were written on pieces of paper and folded into a box. Injured patients were then asked to pick one each, those that picked 'yes' were included after consent was obtained. Those that picked 'no' were not included. This was repeated on each clinic day until the sample size of 291 was reached.

3.6 Inclusion and exclusion criteria

3.6.1 Inclusion criteria

This current research is comprised of injured patients who have been managed for RTA at the Emergency Unit of Saint Joseph Hospital and who have willingly demonstrated their consent to participate in this research.

3.6.2 Exclusion criteria

However, it excluded patients who were involved in RTA but whose health conditions could not permit them to communicate effectively.

3.7 Data collection methods and instruments

Data was collected using a data extraction form for the desk review of all the medical records of the injured patients. Also, structured questionnaires were used in collecting data. The questionnaire was composed of both open and closed-ended questions which focused basically

on how to identify the kind of cost patients incurred. It also gave further enlightenment on the degree of emotional suffering, pain, and level of fear the patients were subjected to to be able to measure the intangible cost. Thus, questionnaires were structured into four main sections. The first section comprised the background characteristics of patients. The second section and third sections comprised both direct and indirect costs associated with the management of RTA. The final section comprised questions to gather data on the intangible cost associated with RTA.

3.8 Quality Control

For absolute assurance of the quality of the data, tools that were used for the data collection were assessed by pre-testing. Five (5) Research Assistants (RAs) were trained by the Principal Investigator a week before data collection. My Research Assistants were also trained on how to collect data and consenting processes. The final day for training was used to pre-test data collection tools. After pre-testing, questions were modified to ensure the same interpretation across the board. Ambiguous questions were modified.

3.9 Study Variables

3.9.1 Dependent variables.

The study explored three (3) main dependent variables. These variables include direct, indirect, and intangible costs

- **Direct cost:** This cost comprised of surgical intervention, medical and non-medical costs (thus the cost of transportation to and from the health facility, cost of food, medicines, etc.).
- **Indirect cost:** This cost comprised absenteeism from work by respondents as well as caregivers from various workplaces, travel in and out of the facility (travel time), and their waiting time. Thus, productivity losses.

- **Intangible cost:** This comprised the kind of pain, fear, and emotional challenges the respondents experienced.

3.9.2 Independent variables

The independent variable in this study was the background characteristics (age, sex, religion, occupation, level of education, and marital status).

3.10 Data Analysis

Data were collected by using the Kobo-Collect software and exported to Microsoft Excel for data cleaning. Data analysis was done with Excel and STATA 17/MP. Data were cleaned and checked for response appropriateness in Microsoft Excel 2016. Multiple imputation techniques were used to handle missing data. Means, standard deviation, frequency, and proportions were used to summarize data. Costs were estimated as;

- **Direct cost estimation:** Direct costs consisted of medical and non-medical costs. Direct medical cost comprising registration, consultation, laboratory & diagnostic test, medicines/drugs, surgery, and cost of the specific tool was estimated by summing and dividing the total number of participants that incurred this cost.
- **Indirect cost estimation:** Concerning indirect cost estimation, the HCA was employed with a daily minimum wage. Key parameters; days lost at work, loss of productivity as a result of traveling, loss of productivity as a result of waiting time, and days lost by relatives by taking care of patients were considered. Days lost at work by the patient were defined by adding all working days lost by employed patients for the period of diagnosis and management. Loss of productivity as a result of traveling was obtained by the accumulation of lost hours by participants and families who accompanied them during the hospital stay. Lastly, loss of productivity as a result of waiting time was obtained by summing all hours spent while awaiting consultation. The overall indirect cost was then estimated as the entire loss of participants' resources. Moreso, the

assessment of standard indirect cost and the total sum were divided by the total of participants. All values were calculated in both Ghanaian Cedis (GHS) and US dollars (US\$) with the conversion rate for US\$1 taken as GHS12

(Bank of Ghana interbank exchange rate, 13 December 2022).

- **Intangible cost estimation:** Intangible cost was estimated using a structured questionnaire (Appendix III).
- **Sensitivity analysis (SA):** SA was conducted by determining the robustness of estimated costs. Values of key variables such as wage and medicines/drugs were subjected to variation to see if they had any significant effect on the results; total, direct, and indirect cost estimates. The one-way sensitivity analyses (SA) was conducted to change the cost of medicines/drugs. Variations at three percent (3%), five percent (5%), and seven percent (7%) raise in cost were considered in the entire estimated cost. This key variable was identified and included in the sensitivity analyses due to the uncertainty associated with it.

3.11 Ethical Consideration

Ethical approval for the study was sought from the Ghana Health Service (GHS) Ethics Review Committee (ERC). The Ethical review approval number is GHS-ERC:034/09/22. Further approval again was obtained from the Hospital Director of Saint Joseph Hospital. Written consent was also sought from all selected respondents after thorough explanations were given regarding the aims/objectives of the study as well as the gains, risks as well as procedures to be undertaken for the respondents. Eligible candidates however were enlightened on the fact that, their partaking in the study is voluntary and that one can decide to quit as he/she wishes. However, withdrawal from the study would not affect service delivery. They were also made to understand that, there would be no compensation for participating in this study. The data collected was safely kept with the knowledge of the main investigator and supervisor. Codes

were however assigned to the respondents for easy identification to ensure absolute anonymity during the collection of the data.



CHAPTER FOUR

4.0 RESULTS

4.0 Introduction

This chapter presents the findings that address the objectives of the study. It presents the findings of the direct cost, indirect cost, and intangible cost of patients involved in road traffic accidents which were extracted from folders collected over the period of January to December 2021, and the administration of questionnaires to patients.

4.1 The Background Characteristics of Patients

A total of 291 injured patients fulfilled the inclusion criteria and completed the questionnaire making a response rate of 100%. Table 4.1 shows the summary of the background characteristics of the participants. More than half (66.0%) of the participants were males. In addition, 72 (24.8%) of the participants belonged to the age group 30 – 39 years. Over half 153 (52.6) of the participants were married and 61.5% of the participants were employed. Finally, 60.5% of the participants were beneficiaries of the National Health Insurance Scheme (NHIS) and 43.3% of the participants had injuries caused by RTA- Pedestrian.

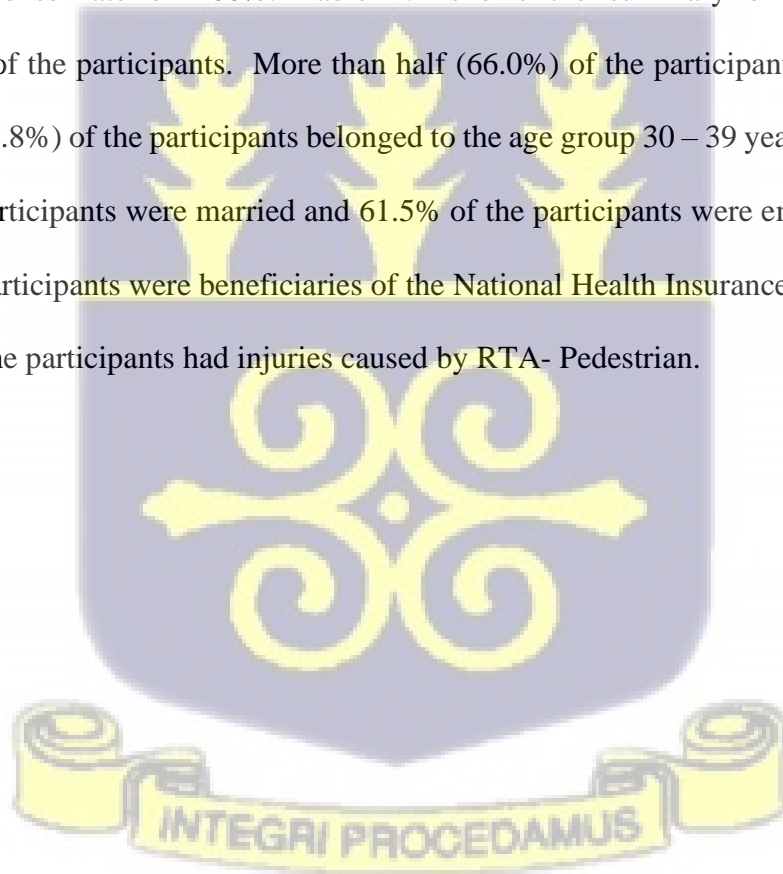


Table 4.1 Background characteristics of patients (N=291)

Characteristics	Frequency	Percentage (%)
Sex		
Male	192	66.0
Female	99	34.0
Age group (years)		
<18	28	9.6
18 – 29	55	18.9
30 – 39	72	24.8
40 – 49	52	17.9
50 – 59	35	12.0
60+	49	16.8
Marital status		
Single	138	47.4
Married	153	52.6
Employment status		
Employed	179	61.5
Unemployed	24	8.2
Student/Apprentice	57	19.6
Retiree	31	10.7
NHIS beneficiary		
Yes	176	60.5
No	115	39.5
Cause of the injury sustained		
RTA- Motorist	51	17.5
RTA- Passenger	114	39.2
RTA- Pedestrian	126	43.3

4.2 Direct cost of Road Traffic Accident

Table 4.2 presents the estimated direct cost of RTA. From Table 4.2, the total direct cost for RTA was approximately GHS1,973,801.28 (US\$164,483.44). The direct cost comprises medical cost, which was estimated at GHS1,130,617.92 (US\$94,218.16), and the cost of non-medicals which was estimated at GHS843,183.36 (US\$70,265.28). On average, for direct medical costs, registration cost was GHS123.28 (US\$10.27), consultation cost was GHS346.43 (US\$28.87), laboratory and other diagnostic tests cost was GHS110.47 (US\$9.21), medicines/drugs cost was GHS681.09 (US\$56.76), other diagnostics cost was GHS144.94 (US\$12.08) and the surgical cost was GHS2,479.07 (US\$206.59). On average, for direct non-medical costs, the cost of hospital stay was GHS1,067.75 (US\$88.98), transportation was GHS212.76 (US\$17.73), food and drinks were GHS596.60 (US\$49.72), water was GHS475.33

(US\$39.61), and other non-medical cost including toiletries, recharge cards etc. was GHS545.11 (US\$45.43). Averagely, a patient spends an estimated, GHS6,782.82 (US\$565.24) as a total direct cost on a road traffic accident, of which medical cost consumes approximately 57.3% whereas non-medical cost covers 42.7% of all the cost involved.

Table 4.2: Direct Cost Estimates

Costs	Sum GHS (US\$)	Mean GHS (US\$)	SD GHS (US\$)	Min GHS (US\$)	Max. GHS (US\$)	Cost profile (%)
Direct Medical						
Registration	35,875.08 (2,989.59)	123.28 (10.27)	72.19 (6.02)	11.00 (0.92)	501.00 (41.75)	1.8
Consultation	100,811.80 (8,400.98)	346.43 (28.87)	198.63 (16.55)	30.00 (2.50)	1,000.00 (83.33)	5.1
Laboratory & other diagnostic tests	32,146.71 (2,678.89)	110.47 (9.21)	82.14 (6.85)	3.00 (0.25)	690.00 (57.50)	1.6
Medicines/drugs	198,196.20 (16,516.35)	681.09 (56.76)	566.10 (47.18)	6.00 (0.50)	690.00 (57.50)	10.1
Other diagnostics	42,177.83 (3,514.82)	144.94 (12.08)	103.10 (8.59)	15.00 (1.25)	1,000.00 (83.33)	2.1
Surgical	721,410.30 (60,117.53)	2,479.07 (206.59)	1,104.29 (92.02)	100.00 (8.33)	18,600.00 (1,550.00)	36.6
Total direct medical	1,130,617.92 (94,218.16)	3,885.28 (323.77)	2,126.45 (177.20)	3.00 (0.25)	18,600.00 (1,550.00)	57.3
Direct non-medical						
Number of days on admission	310,715.52 (25,892.96)	1,067.75 (88.98)	596.18 (49.68)	207.00 (17.25)	5,748.00 (479.00)	15.8
Transportation	61,912.32 (5,159.36)	212.76 (17.73)	182.33 (15.19)	23.00 (1.92)	1,100.00 (91.67)	3.1
Food & drink	173,609.28 (14,467.44)	596.60 (49.72)	419.70 (34.98)	30.00 (2.50)	4,000.00 (333.33)	8.8
Water	138,319.68 (11,526.64)	475.33 (39.61)	392.17 (32.68)	30.00 (2.50)	2,800.00 (233.33)	7.0
Other non-medical	158,626.56 (13,218.88)	545.11 (45.43)	398.40 (33.20)	8.00 (0.67)	1,252.00 (104.33)	8.0
Total direct non- medical	843,183.36 (70,265.28)	2,897.54 (241.46)	1,988.78 (165.73)	8.00 (0.67)	5,748.00 (479.00)	42.7
Total direct	1,973,801.28 (164,483.44)	6,782.82 (565.24)	4,115.23 (342.94)	3.00 (0.25)	18,600.00 (1,550.00)	100.0

Note: SD=Standard Deviation, Min=Minimum Value, Max.= Maximum Value

4.3 Indirect cost of Road Traffic Accident Management

Table 4.3 presents the estimated indirect cost of RTA. The total indirect cost was GHS520,309.46 (US\$43,359.12). Total productivity lost regarding the victims and their close family members was GHS433,185.82 (US\$36,098.82) and GHS87,123.64 (US\$7,260.30) respectively. Also, on average, the estimated cost of days lost for being absent from work was GHS622.63 (US\$51.89), the period of traveling from the health facility was GHS419.57 (US\$34.96), and the waiting time before being attended to by a doctor or health officer was GHS446.41 (US\$37.20). Averagely, a patient spends an estimated GHS1,788.01 (US\$149.00) as total indirect cost on RTA, of which productivity lost consumes approximately 83.3%.

Table 4.3: Indirect Cost Estimates

Costs	Sum GHS (US\$)	Mean GHS (US\$)	SD GHS (US\$)	Min GHS (US\$)	Max. GHS (US\$)	Cost profile (%)
Absenteeism	181,184.03 (15,098.67)	622.63 (51.89)	390.01 (32.50)	0.00 (0.00)	2,451.00 (204.25)	34.8
Travel	122,096.13 (10,174.68)	419.57 (34.96)	389.37 (32.45)	0.00 (0.00)	2,331.00 (194.25)	23.5
Waiting	129,905.66 (10,825.47)	446.41 (37.20)	319.69 (26.64)	0.00 (0.00)	18,121.00 (1,510.08)	25.0
Patient total indirect	433,185.82 (36,098.82)	1,488.61 (124.05)	1,099.07 (91.59)	0.00 (0.00)	18,121.00 (1,510.08)	83.3
Another person accompanying the person	87,123.64 (7,260.30)	299.39 (24.95)	149.00 (12.42)	39.50 (3.29)	4,539.50 (378.29)	16.7
Total indirect	520,309.46 (43,359.12)	1,788.01 (149.00)	1,248.07 (104.01)	0.00 (0.00)	18,121.00 (1,510.08)	100.00

Note: SD=Standard Deviation, Min=Minimum Value, Max.= Maximum Value

4.4 Economic cost of RTA Management

The estimated total cost of RTA is GHS2,494,110.74 (US\$207,842.56). The direct and indirect cost estimates for road traffic accidents were 79.2% and 20.8% respectively as shown in figure 4.1.

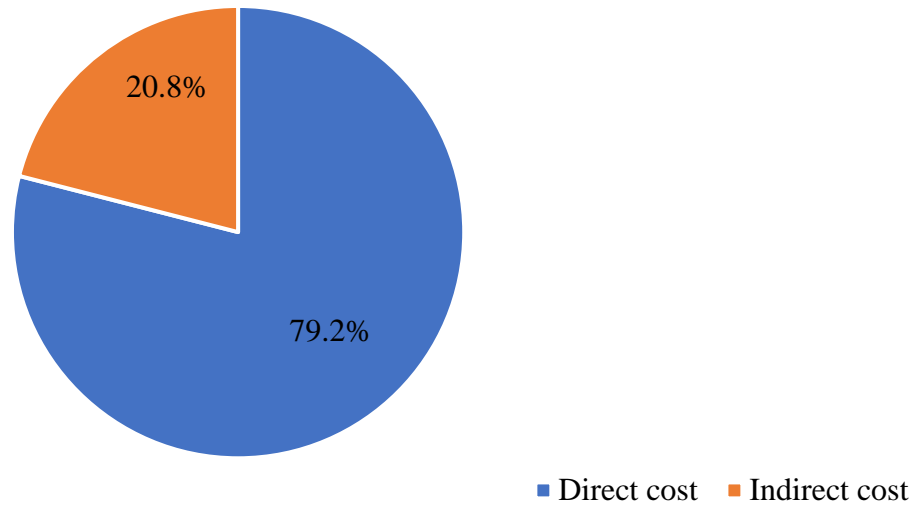


Figure 4.1: Direct and Indirect cost distribution

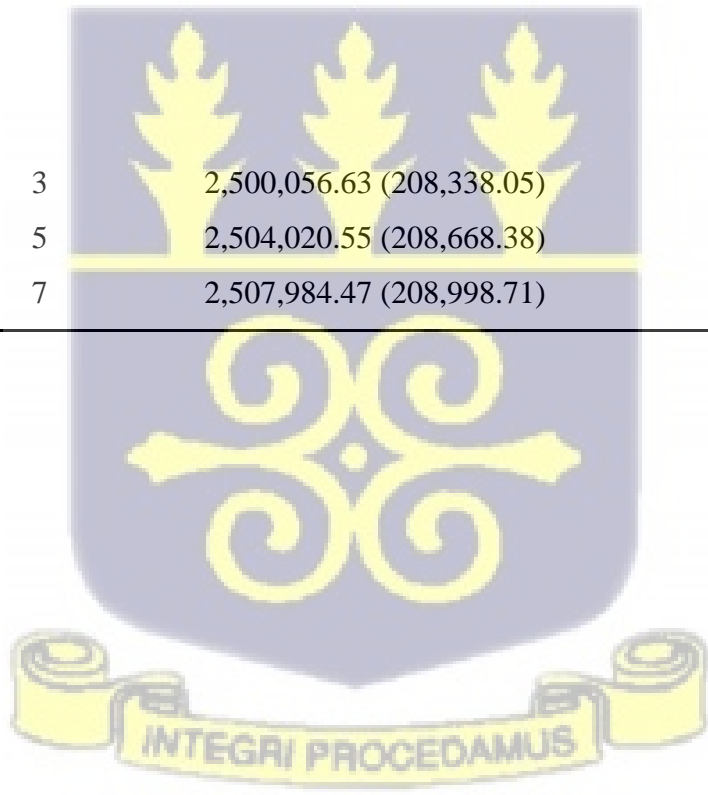
4.5 Sensitivity Analysis of the Cost of Road Traffic Accident

Table 4.4 provides details of sensitivity analysis of the cost of managing road traffic accidents. The one-way sensitivity analysis of cost was done using the cost of medication. The cost of medication incurred by patients and relatives during management was selected due to its high volatility. A definite increase in the cost of medication leads to a rise in total cost. As shown in Table 4.4, an increase in medication by 3% leads to a 0.24% increase in total cost. Similarly, an increase in medication cost by 5% and 7% leads to an increase in total cost by 0.40% and 0.56% respectively.



Table 4.4 Sensitivity analysis of the cost of road traffic accident

Scenario	Cost component	% change in parameter	Total cost GHS(US\$)	% change in the total cost
Basic Scenario			2,494,110.74 (207,842.56)	
Variation (One-way sensitivity analysis)	Medicines/drugs	3	2,500,056.63 (208,338.05)	0.24
		5	2,504,020.55 (208,668.38)	0.40
		7	2,507,984.47 (208,998.71)	0.56



The direct cost with regards to the component of the overall cost increased by 0.3% (thus from 79% to 79.3%) as shown in Table 4.4. The results of the sensitivity analysis in Table 4.4 showed that the cost estimates in this study were sensitive to changes in medicines/drugs and wages cost variables.

4.6 Intangible Cost

Figure 4.2 shows the overall intangible burden among patients. An estimated 54.2% of patients had mild to moderate burden. The rest had little or no burden (33.6%), moderate to severe burden (10.8%), and severe burden (1.4%).

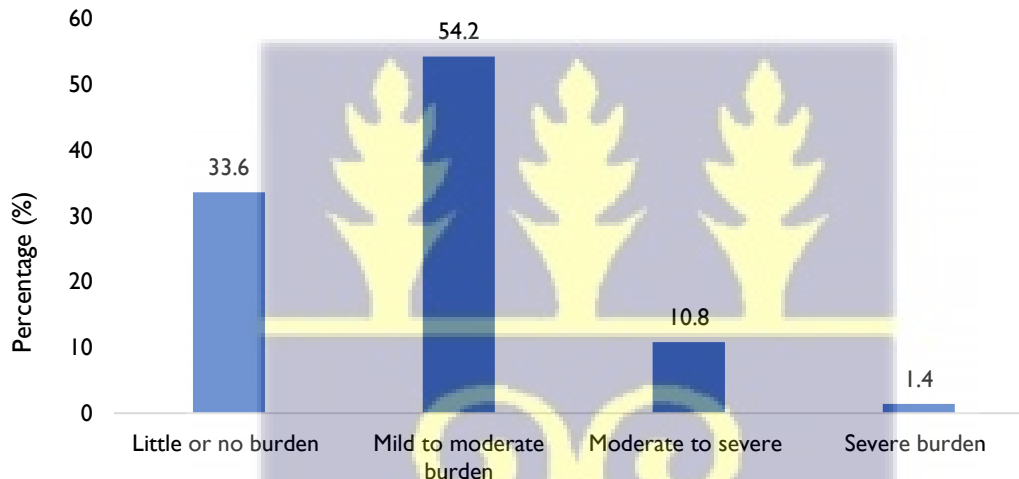


Figure 4.2: Intangible burden on patients



CHAPTER FIVE

DISCUSSION

5.1 The direct cost of road traffic accidents in patients and their families

Road traffic injuries have a significant financial impact on people and their families. Due to the lack of widespread insurance and social protection programs in many SSA nations, victims and their families are responsible for paying these costs. In Ghana, despite the availability of a national insurance scheme, the cost of road accidents is not catered for by the scheme. As a result of the immediate medical costs of seeking care, as well as the loss of income brought on by the accident and seeking care, RTI victims and their families may endure poverty, bankruptcy, or catastrophic health expenses. RTIs cost nations around the world between 1% and 3% of their annual gross domestic product (GDP), or more than US\$500 billion (WHO, 2018).

This study found that, with so much economic burden on affected individuals and household, Ghanaian household spends an average of US\$565.24 (GHS6,782.82) on the direct cost of injuries sustained through RTAs. This represents 79.2% of the total cost of managing road traffic accidents. The direct cost comprises medical cost, which was estimated at US\$94,218.16 (GHS1,130,617.92) and the cost of non-medicals which was approximated at US\$70,265.28 (GHS843,183.36). The average direct cost of RTA in this study (US\$565.24) is lower than the average direct cost of RTA of US\$1,289.40 reported in a previous study in Ghana (Blankson et al., 2020). The main reason why this average direct cost is relatively lower than the previous study and the previous study demonstrated a clear fact that the previous study was conducted in Korle-Bu Teaching Hospital in Accra, but this study was conducted in a mission hospital and a district hospital of which the cost of living, hospital charges and implants were relatively cheaper as compared to that of a teaching hospital in the capital city thus is Korle-Bu Teaching

Hospital. However, the mean direct cost of road traffic accidents in this study was higher than what was reported in Iran, where the median was estimated at US\$214 for direct costs (Karimi et al. 2017). This disparity in the average direct cost is because, in the Iran study, the authors limited their data to non-fatal road traffic injuries whereas in the current study, both fatal and non-fatal injuries data were used.

Furthermore, the study has shown that most of the victims of RTA had to undergo a surgery as definitive treatment. Implants that are mostly used in this regard to fix or stabilize the fractures are quite expensive which results in increase in the direct cost as compared to the indirect cost. It was also found that the number of days spent at the ward facility largely depends upon the severity of the cases whereby respondents with multiple fractures or polytraumas stayed longer as compared to those with simple fractures. This is due to the fact that they had to undergo series of surgeries for absolute stabilization of their fractures and then at the end need to engage in rehabilitation or physiotherapy in order to regain their lost functions prior to discharge. All these treatments contribute to the high direct costs incurred by patients and their families.

The study also revealed that, children and RTA victims below the age of 18 years responded to treatments faster as compared to the adults leading to a reduction in their hospital stay as well as reduction in indirect cost. Moreover, it was established that those who had open fractures spent more days in the facility since they had to undergo a procedure to open reduction and external fixation to stabilize the fractures and the repair of the soft tissue by the process referred to as skin grafting which is another direct cost. Meanwhile, others who had closed fractures without complications or co-morbidities had a short admission stay often a successful surgery leading to a reduction in both the indirect and direct costs. So comparatively the increase in the direct cost as compared to indirect cost largely depend on the severity of the case, especially

those associated with open fractures who had to undergo surgeries or series of interventions with use of implants.

5.2 The indirect cost of road traffic accidents in patients and their families

From this study, the indirect cost of RTA was estimated at US\$43,359.12 (GHS520,309.46) representing 20.8% of the total cost of managing road traffic accidents. That is, on average, the indirect cost of RTA was estimated at US\$149.00 (GHS1,788.01). Also, on average, the estimated cost of days lost for being absent from work was US\$51.89 (GHS622.63), the transport cost was US\$34.96 (GHS419.57), and the waiting time before being attended to by a doctor or health officer was US\$37.20 (GHS446.41). The average indirect cost is lower than the average indirect cost of RTA of US\$398.25 in Ghana (Blankson et al., 2020). Further, the total productivity loss to patients was about twice that of an accompanying relative. In addition, the estimated cost associated with traveling was also higher than the productivity loss to the accompanying relative.

5.3 The intangible costs associated with road traffic accidents in patient' households

The study further explored the intangible burden of road traffic accidents. The study defined intangible burdens as those costs associated with injury-related changes in pain and suffering (Umar, Fusheini & Ayanore 2021). These elements are often captured through the patient-reported questionnaire. This current study has found that most victims of road traffic accidents experienced mild to moderate burden or pain depending upon the cause of the road traffic accident and the severity of the injury. Polytrauma and multiple fractured patients experienced more pain as compared to those with simple fractures.

Moreso, others who had neurological associated injuries especially spine injuries or fracture dislocating scored higher levels in the pain assessment. Meanwhile, the elderly who also undergone various surgeries tend to have severe pains during the rehabilitation period and found it difficult to regain their lost functions in time as a result of the degenerative changes that usually occurred at this stage in life. Furthermore, the study observed that only few of them experienced severe burden or pain of which some with non-complicated cases were found to be exaggerating their pain which was later established during the interview that they were of the view that some kind of compensation or reimbursement would be made available to them. Another study conducted in Croatia found out that road traffic accident survivors reported substantial rates of Post-Traumatic Stress Disorder (PTSD) (32.3%) depression symptoms (17.4%), and with low rates of anxiety (5.8%) (Kovacovic et. al., 2020).

Meanwhile, our study found out that none of our road traffic accident survivors experienced any kind of the above-mentioned symptoms which may be solely due to the duration of our study and the category of the respondents recruited for the study. Additionally, the indicated that, those symptoms were associated with previous psychiatric illness, its medication use of which none of our respondents had any such health conditions. Only a few experienced severe burdens or pain. This study is the first to report the intangible burden of road traffic accidents. However, a study conducted by Ricardo and colleagues has found that unplanned and unexpected expenditure with diminished income has severe repercussions in the long run which may adversely affect the economies and consequently induced families deeply into perpetual hardship (Pérez-Núñez et al. 2012).

There were some limitations. There were insufficient previous studies in the research area. Additionally, there was the possibility of respondent biases which could lead to inaccurate

participant responses in any self-reported questionnaire. There is social desirability bias where some participants may have provided information to make themselves appear better to the interviewers. Finally, because the study is cross-sectional, causal inferences cannot be made.



CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The economic cost of managing road traffic accidents is enormous and the results and findings in this study are necessary and important for the implementation of health policy in Ghana. This research establishes clear evidence as well as estimates of the total cost of road traffic injuries managed in St Joseph Hospital, Koforidua. It further estimated the direct and indirect costs of road traffic accidents for patients and their families. Moreover, it assessed the intangible costs which are associated with road traffic accidents in patients' households.

The study concludes that there was a high direct cost associated with road traffic injuries managed in St. Joseph Hospital, Koforidua, Ghana. The study also concludes that there was a high indirect cost associated with road traffic injuries managed in St Joseph Hospital, Koforidua, Ghana. Finally, the study concludes that there was a high intangible cost associated with road traffic injuries managed in St. Joseph Hospital, Koforidua

6.2 Recommendations

1. The Ghana Health Service and the stakeholders concerned should encourage enrollment in NHIS as this could go a long way to substantially reduce the catastrophic health expenditure incurred by RTA patients and families. And additionally, provide coverage for Road Traffic Accident patients with open fractures that may need stabilization with an external fixator as an emergency treatment.
2. In addition to this, the Ministry of Roads and Transport as well as Ghabanhways Authority must make conscious efforts in reducing or curbing Road Traffic Accidents in cities and on the highways by enforcing speed limits, building pedestrian and cyclist

lanes, putting up speed ramps, adequate training and education for drivers and motorists by the Driver and Vehicle Licensing Authority (DVLA), deployment of more police personnels on our highways, proper roadworthy examination of vehicles, to ban the use of tricycles on our major roads, repairing of potholes, prosecuting of ‘drink and drive’ drivers, and ensuring the use of seatbelts in all passenger and private vehicles.

3. Moreso, there is the need to involve the services of Clinical psychologists and counsellors in the treatment of Road Traffic Accident patients by supporting them emotionally and spiritually which will go a long way to enhance quick recovery and return of normal functions.



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APPENDIX I: INFORMATION SHEET

Purpose of the study

The study seeks to examine the Economic Cost of Road Traffic Accident-Related Injuries: A case study of St. Joseph Hospital, Koforidua.

What Participation Involves

If you agree to participate in this study, you will be required to fill out a questionnaire with or without assistance from a research assistant.

Confidentiality

We promise that any information that you will give during the study will be treated confidentially. Your name will not be needed or used for the final analysis.

Risks

There is no harm involved in this study. All questions are structured in a way that they will not cause any discomfort to you.

Rights

You are reminded that participation in this study is voluntary. In as much as your participation will be helpful, you are free to withdraw even if you have given consent at any time during the study.

Benefits

Your participation in the study will inform policymakers as well as stakeholders to provide interventions to address the Economic Cost of Road Traffic Accident Related Injuries: A case study of St. Joseph Hospital, Koforidua

Compensation

There will be no fee paid for participation however you will be duly acknowledged in the final work for your participation, cooperation, and contribution.

Contact for Additional Information

Feel free to ask any questions about the survey and also seek clarification on any issue concerning the survey. If any aspect of the study bothers you at a later time, contact these numbers or email for further information or clarification:

The student investigator: Petit Amenuveve Kpe

Telephone number: 0554460509/ 0506767915



APPENDIX II: CONSENT FORM

"I have read or have had someone read all of the above, asked questions, received answers regarding participation in this study, and am willing to give consent for participation". I will not have waived any of my rights by signing this consent form. Upon signing this consent form, I will receive a copy for my records."

Name of Participant

Signature or mark of Participant

Date

If the participant cannot read and or understand the form themselves, a witness must sign here:

I was present while the benefits, risks, and procedures were read to the volunteer. All questions were answered and the volunteer has agreed to take part in the research.

Name of witness

Signature of witness / Mark

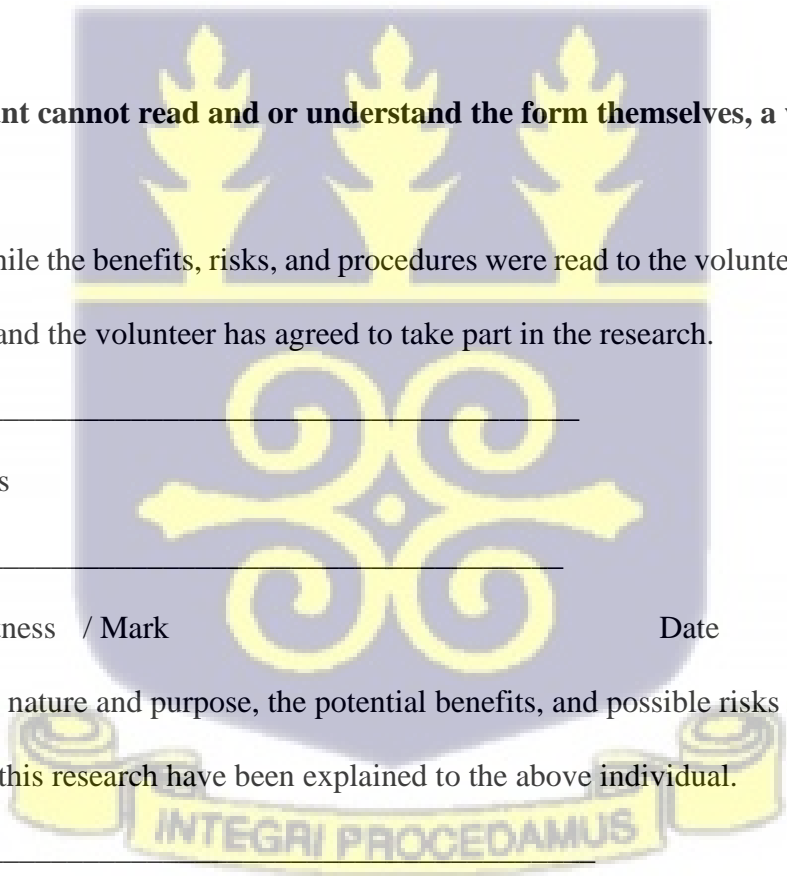
Date

I certify that the nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual.

Name of Person who Obtained Consent

Signature of Person Who Obtained Consent

Date



APPENDIX III: QUESTIONNAIRE

Qn. No.	Questions	Response
Respondent ID: __ __		
Section 1	SOCIO-DEMOGRAPHIC INFORMATION	
1	What is your sex 1. Male 2. Female	
2	What is your age in years?	__ years
3	What is your current marital status? 1. Married 2. Never Married 3. Cohabiting 4. Divorced	<input data-bbox="1246 864 1329 943" type="checkbox"/>
4	What is your employment status? 1. Employed 2. Unemployed (<i>If Unemployed, answer Qs. 6 & 7</i>) 3. Student/Apprentice 4. Housewife 5. Retiree	<input data-bbox="1243 1234 1326 1272" type="checkbox"/>
5	If Unemployed, why are you not working now? 1. Unable to work due to illness 2. Other (please specify).....	<input data-bbox="1246 1603 1329 1641" type="checkbox"/>

6	<p>If Unemployed, have you been looking for a job in the last 6 months?</p> <p style="text-align: center;">1. Yes 2. No</p>	<input type="checkbox"/>
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7	<p>If employed, in which sector are you employed?</p> <p style="text-align: center;">1. Formal sector 2. Informal sector</p>	<input type="checkbox"/>
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8	<p>If Employed, what is your average monthly income? (i.e., salary plus other monies from other sources)</p>	GHS.....
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9	<p>Are you an NHIS beneficiary?</p> <p style="text-align: center;">1. Yes 2. No</p>	<input type="checkbox"/>
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Section 2	DETAILS OF INJURIES SUSTAINED	
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10	<p>What was the cause of the injury sustained?</p> <p style="text-align: center;">01. RTA- Motorist 02. RTA- Passenger 03. RTA- Pedestrian</p>	<input type="checkbox"/> <input type="checkbox"/>
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Section 3	DIRECT COST INFORMATION	
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11	Overall Medical cost per visit:	GHS
	(a) Surgical intervention(s) if applicable	
	(b) Registration	
	(c) Consultation	
	(d) Laboratory investigations	

	(e) Medicines/drugs	
	(f) Other diagnostic tests (such as scans etc.)	
	(g) Any allied procedures such as diet therapy, physiotherapy	
	(h) Other, specify: _____	
12	Overall Non-medical cost: how much did you spend/pay for (you and accompanying relative) per visit?	GHS
	(a) Estimate of total travel cost (to and from the facility)	
	(b) Food cost	
	(c) Drinks/water cost	
	(d) Other miscellaneous costs (i.e., phone calls/phone credits, other consumables used due to this illness)	
	(e) Others, kindly specify: _____	
13	Did you rely on financial help from another source (s) for treatment, apart from normal income? 1. Yes 2. No	<input type="checkbox"/>
14	What are the sources (multiple responses possible)? 1. Relative 2. Friend 3. Savings 4. Loan/Grant 5. Other (Specify)	<input type="checkbox"/>

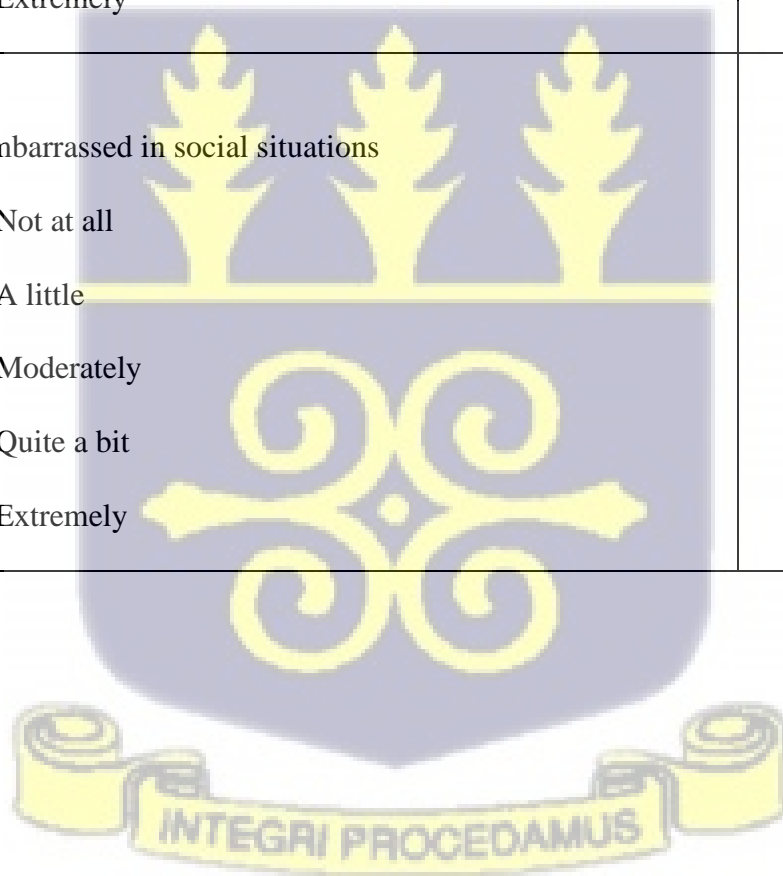
15	How much money did you receive from the identified source(s)?	GHS.....
Section 4 INDIRECT COST INFORMATION PER VISIT		
16	How many hours in total do you estimate to have spent traveling to and from the health facility, aside from the days lost (if applicable)?	_ _ _ hrs <input type="text"/> days
17	How many minutes did you spend waiting before you were called to see the doctor or health officer for treatment aside from the days lost (if applicable)?	_ _ _ hrs <input type="text"/> days
18	Did anyone from your household accompany you from home to the health facility? 1. Yes 2. No	<input type="text"/>
19	If anyone did accompany you to the health facility, what is his or her employment status? 1. Employed 2. Unemployed 3. Student 4. Housewife 5. Retired 6. Other, specify: _____	<input type="text"/>
20	Did the person who accompany you, come with you from the house and stay with you for treatment and take you back home? 1. Yes	<input type="text"/>

	2. No	
If yes in Q22 above, use the same time as the patient's in Q 17 & 18 for Q 23 & 24		
21	How many hrs/days in total did he/she travel to and fro to be with you in the health facility?	__ __ __ days
22	How many hours/days in total did he/she spend with you when you were receiving treatment in the health facility?	__ __ __ hrs
23	The total number of days spent at the facility during admission?	__ days
Section 5	INTANGIBLE COST INFORMATION	
	<i>Please, select from the following statements concerning FEAR due to the injury sustained, from “not at all” to ‘extremely’ depending on how it applies to you.</i>	
24	Because of the injury sustained, my future is of concern to me <ol style="list-style-type: none"> 1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely 	<input type="checkbox"/>
25	I am always worried about sustaining another injury <ol style="list-style-type: none"> 1. Not at all 2. A little 3. Moderately 	<input type="checkbox"/>

	<p>4. Quite a bit</p> <p>5. Extremely</p>	
26	<p>When I think about my future health, I feel some uneasiness</p> <p>1. Not at all</p> <p>2. A little</p> <p>3. Moderately</p> <p>4. Quite a bit</p> <p>5. Extremely</p>	<input type="text"/>
<p><i>Now kindly select again, from the following statements concerning PAIN due to the injury sustained, from “not at all” to ‘extremely’ depending on how it applies to you.</i></p>		
27	<p>I always feel burning pain around the site of the injury</p> <p>1. Not at all</p> <p>2. A little</p> <p>3. Moderately</p> <p>4. Quite a bit</p> <p>5. Extremely</p>	<input type="text"/>

28	<p>I have lost the sense of temperature at the region of injury and am not able to differentiate between warm and cold</p> <ol style="list-style-type: none"> 1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely 	<input data-bbox="1235 271 1350 327" type="text"/>
<p><i>Now kindly select again, from the following statements concerning EMOTIONAL SUFFERING due to the injury sustained, from “not at all” to ‘extremely” depending on how it applies to you.</i></p>		
29	<p>I suffer emotionally because I constantly worry about my condition</p> <ol style="list-style-type: none"> 1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely 	<input data-bbox="1230 1010 1345 1066" type="text"/>
33	<p>I suffer emotionally because I constantly worry about my condition</p> <ol style="list-style-type: none"> 6. Not at all 7. A little 8. Moderately 9. Quite a bit 10. Extremely 	<input data-bbox="1230 1525 1345 1581" type="text"/>


30	<p>I think I am a burden to others because of my illness</p> <ol style="list-style-type: none"> 1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely 	<input data-bbox="1230 76 1350 132" type="text"/>
31	<p>I am constantly worried about exhibiting the loss of function resulting from the injury in a public</p> <ol style="list-style-type: none"> 1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely 	<input data-bbox="1222 445 1337 504" type="text"/>
32	<p>I feel embarrassed in social situations</p> <ol style="list-style-type: none"> 1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely 	<input data-bbox="1225 1032 1340 1090" type="text"/>



APPENDIX IV: ETHICAL CLEARANCE

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted.



Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Digital Address: GA-050-3303
Mob: +233-50-3539896
Tel: +233-302-681109
Email: ethics_research@ghs.gov.gh
16th November, 2022

My Ref. GHS/RDD/ERC/Admin/App/22/529
Your Ref. No.

Petit Amenuveve Kpe
St. Joseph Hospital
P.O. Box KF 40
Effiduase, Koforidua

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	GHS-ERC: 034/09/22
Study Title	Economic Cost of Road Traffic Accident Related Injuries: A Case Study of St. Joseph Hospital, Koforidua
Approval Date	16 th November, 2022
Expiry Date	15 th November, 2023
GHS-ERC Decision	Approved

This approval requires the following from the Principal Investigator

- Submission of a yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

You are kindly advised to adhere to the national guidelines or protocols on the prevention of COVID -19

Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....
Dr. Naa-Korkor Allotey
(Ag. Head, Ethics & Research Management Department)

INTEGRAL PROCEEDINGS

Cc: The Director, Research & Development Division, Ghana Health Service, Accra