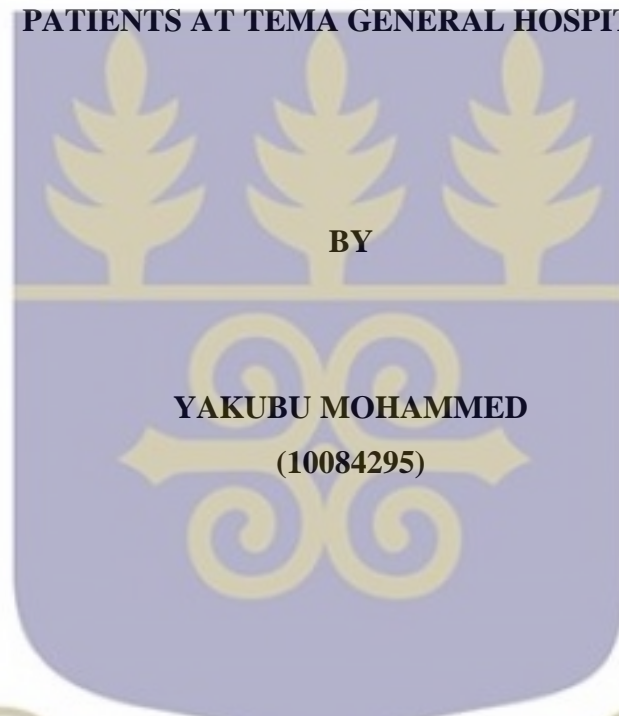


**SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCE
UNIVERSITY OF GHANA**

**HOUSEHOLD COST OF PHYSIOTHERAPY SERVICES FOR STROKE
PATIENTS AT TEMA GENERAL HOSPITAL**

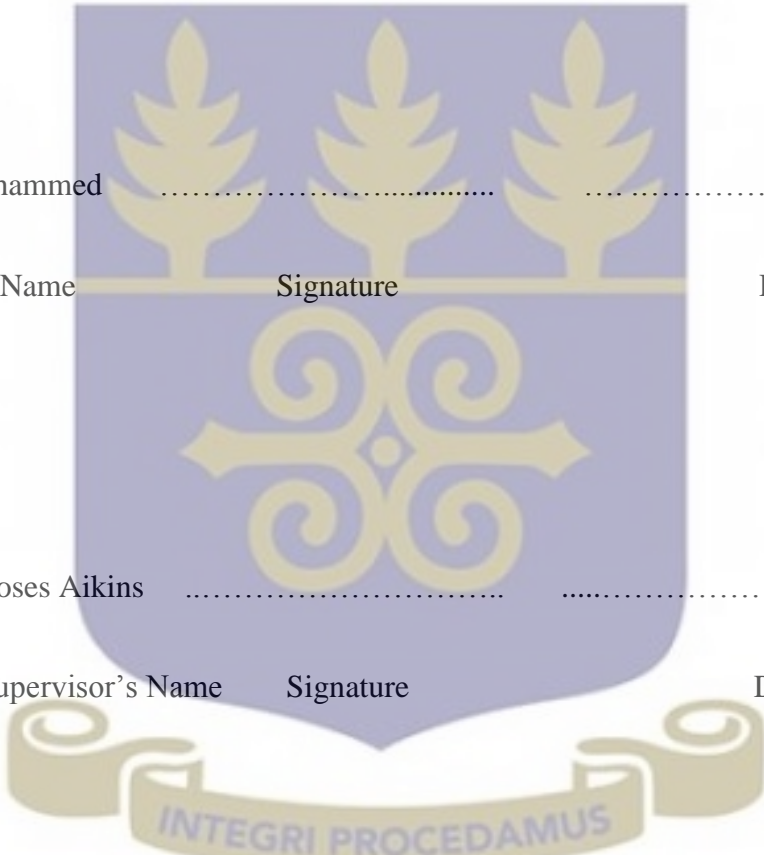


**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA,
LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE
AWARD OF MASTER OF PUBLIC HEALTH (MPH) DEGREE**

JULY, 2015

DECLARATION

I, Yakubu Mohammed, hereby declare that this thesis is my own work towards the Master of Public Health (MPH) degree and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.



Yakubu Mohammed
Student's Name Signature Date

Professor Moses Aikins
Academic Supervisor's Name Signature Date

INTEGRI PROCEDAMUS

DEDICATION

I dedicate this thesis to all the staff of Physiotherapy Departments at public hospitals in Ghana and all the stroke patients they attend to. I fervently hope that this work would help formulate appropriate policy for improved physiotherapy care as well as advocate for increased financial access for stroke patients in Ghana.



ACKNOWLEDGEMENTS

This thesis did not see the light of day without the cooperation and support of several people and a couple of institutions. First of all, I thank Almighty God for granting me good health and fortitude to embark on this discourse.

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I wish to register my indebtedness to all the lecturers of the School of Public Health especially the faculty in the Department of Health Policy, Planning and Management for their tutelage and mentorship which widened my horizon about public health practices.

My gratitude also goes to the management of the Tema General Hospital for permitting me to use the Physiotherapy Department for the study. I am especially grateful to the entire staff of the Physiotherapy Department for their invaluable support and cooperation accorded. I am equally thankful to my research assistants and all those who contributed in many ways towards the successful execution of the thesis.

Finally, I must express my profound gratitude to my wife, Rafatu Salifu, and lovely daughters for their understanding, sacrifices and prayers during those trying moments.

ABSTRACT

Background

Stroke is one of the major determinants of mortality and a significant contributor to the global disease burden. It is the leading cause of morbidity and mortality in developed and developing countries imposing enormous economic burden on individuals and society. Available data indicate that stroke is an emerging problem in Sub-Saharan Africa. Most stroke survivors usually experience limitation in physical functioning and require physiotherapy and rehabilitative services in physiotherapy to regain lost personal functions and live normal lives. Costs of seeking physiotherapy service can be extremely high and sometimes unbearable for stroke patients and their households. This study therefore seeks to estimate the household cost of physiotherapy services for stroke patients attending Tema General Hospital.

Methods

Cross-sectional cost-of-illness study design was used. Data was collected at the Physiotherapy Department of the Tema General Hospital from stroke patients and their households for the estimation of physiotherapy cost. Standard cost-of-illness methods were employed in determining the cost incurred by stroke patients. Direct costs were estimated from therapy related and non-therapy related such as exercise therapy, walking stick, tripod, quadripod and transportation costs respectively. Indirect cost was estimated by valuing the productivity losses to patients and household due to stroke. Consequences of stroke on the patients relative to fear, pain and emotional sufferings were evaluated using the Likert's Scale for the description of intangible cost.

Results

The total cost of physiotherapy services estimated was GHS53,369.79 (US\$12,829.30), with direct and indirect cost constituting 30% and 70% of the total cost

respectively. The average monthly cost of physiotherapy services incurred per patient was estimated at GHS539.09 (US\$129.59). The median monthly household income was GHS600.00 (US\$144.23). About 94% and 86% of patients felt embarrassed in social situations and feared of falling down in public as a result of their illness respectively (mean scores of 3.5 and 3.2 respectively). Patients bothered by the uncertainty of their health, think about their health more than before the stroke and because of physical health their future are of concern to them were the least affected by patients due to stroke.

Conclusion

The cost of physiotherapy services incurred by stroke patients and household is high. There is therefore the urgent need for policy and decision makers to consider this in their strategic planning and budgeting for rolling out physiotherapy service centres to help ameliorate the financial burden on stroke patients.

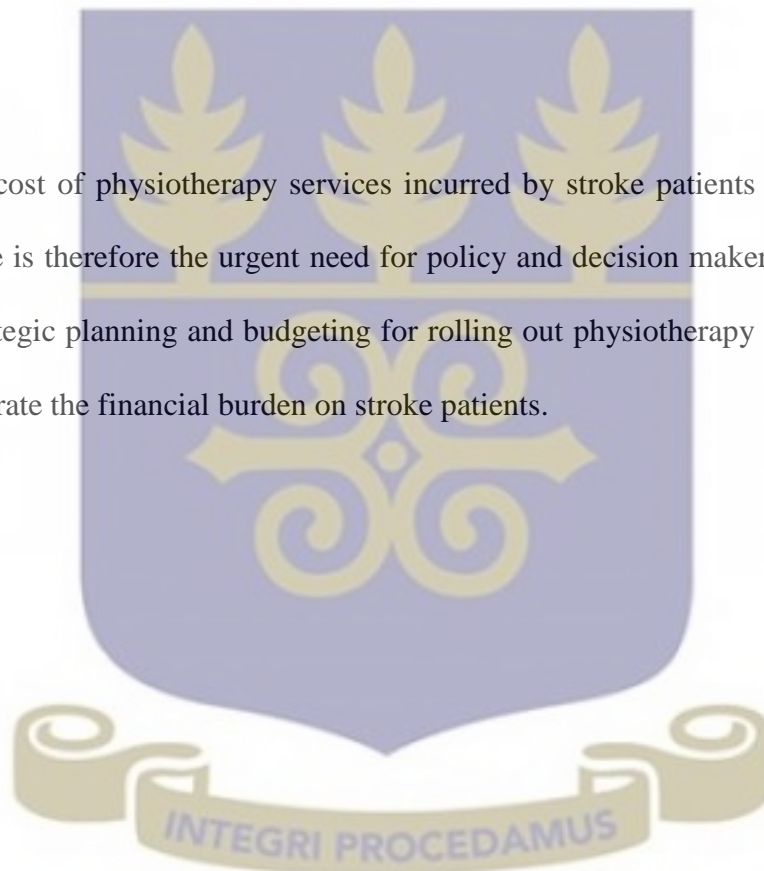


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LIST OF ABBREVIATIONS

COI	Cost-of-Illness
CVA	Cerebrovascular Accident
DALY	Disability Adjusted Life Years
FCA	Friction Cost Approach
HCA	Human Capital Approach
NCD	Non Communicable Disease
NHIS	National Health Insurance Scheme
OPD	Out Patient Department
PAF	Population- Attributable Fraction
PNF	Proprioceptive Neuromuscular Facilitation
QALY	Quality Adjusted Life Years
ROM	Range of Motion
TGH	Tema General Hospital
TIA	Transient Ischemic Attack
TZS	Tanzanian Shillings
UK	United Kingdom
WHF	World Heart Federation
WHO	World Health Organisation
WTP	Willingness to Pay

OPERATIONAL DEFINITIONS

Item	Operational Definition
Disability	Limited or restricted capacity due to injury or illness to carry out an activity in a manner or within the range considered normal
Direct cost	Actual cost of expenditure incurred by patients and households in seeking physiotherapy service
Household	A group of people living in the same house and eating from the same pot
Indirect cost	Invisible costs associated with productivity lost and income due to ill health, disability or death
Intangible cost	Costs which cannot be directly expressed in monetary terms and include pain, fear as well as emotional suffering born by patients and family members as a result of the stroke
Physiotherapy	Physical treatment of injuries and disabilities
Stroke patient	Individual with history of a major stroke



CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Stroke is one of the major determinants of mortality and a significant contributor of disease burden in the world. The World Health Organisation (2014) ranked stroke as the second leading cause of death globally with an annual mortality rate of 6.7million. The World Heart Foundation (WHF) estimated that over 30 million people across the world suffer a stroke while five million are left permanently or with some level of disability (WHF, 2014). Stroke is ranked the third most common cause of disability-adjusted life-years (DALYs) (Thrift et al., 2014). Furthermore, stroke accounts for over 80% of all deaths in low- income and middle- income countries (Connor *et al.*, 2007). Though stroke is most common among the elderly, it is a condition capable of occurring at any age group of life.

In Sub-Saharan Africa, stroke is increasingly becoming a major public health issue and adversely contributing to the already precarious disease landscape. In 2009, 483,000 new cases of stroke were registered among people aged 15 years which is equivalent to 81.2 (13.2– 94.9) per100,000 person years with 1.89 million stroke survivors among the same age brackets compared with 535,000 (87.0–625.3) new stroke cases and 2.09 million (2.06–4.93) stroke survivors, in 2013 (Adeloye, 2014). However, community – based survey revealed that 10% of all deaths due to stroke occur in Sub-Saharan Africa (Agyemang *et al.*, 2012).

In Ghana, 50% of stroke survivors are chronically disabled and it is a top killer in Accra (Donkor *et al.*, 2014). De -Graft Aikins (2010) attributed stroke as the second largest cause of death in the Greater Accra region of Ghana. Though the exact

burden of stroke is unknown in Ghana, it can affect all ages (De-Graft Aikins *et al.*, 2013). Stroke which hitherto was a disease of the affluence is now the frequent cause of admission to hospitals in Accra, and disability resulting from stroke generate numerous challenges to healthcare staff, patients, households and the wider community (Gould *et al.*, 2011).

Moreover, studies have shown that over 50% of stroke survivors in Ghana are chronically disable (Gould *et al.*, 2011) and require physiotherapy services to restore physical independence and functional abilities approach (Pollock *et al.*, 2008). It also emerged that over 50% of all stroke patients tend to have mobility and locomotive challenges following medical treatment and thus making physiotherapy intervention a necessity (Wade *et al.*, 1992).

The social and economic burdens associated with stroke interventions are enormous and varied across countries (Birabi *et al.*, 2012). In the United States the annual direct cost of stroke treatment was estimated to be \$71.55 billion in 2012 and the cost was projected to increase to \$183.13 billion while the indirect annual cost (due to productivity losses) was estimated to soar from \$33.65 billion to \$56.54 billion by 2030 (Ovbiagele *et al.*, 2013). This implies that the overall cost of stroke interventions in the US is estimated at \$240.67 billion by 2030. In contrast, the cost of care and productivity losses from stroke accounts for £8.9 billion annually in the United Kingdom with total treatment costs estimated to be around 5% of total UK National Health Service budget (Saka *et al.*, 2009).

In Nigeria, the cost of stroke treatment per intervention was estimated at US\$2,730 of which US\$ 721.00 was attributed to physiotherapy services (Birabi *et al.*, 2012). Patients with stroke are usually managed medically and continued subsequently with routine physiotherapy care. Indeed, the role of physiotherapy

cannot be understated in the rehabilitation processes of stroke survivors. Aside helping survivors to regain physical ‘autonomy’, physiotherapy services integrated with routine exercise also prevents future and subsequent acute relapse and thereby achieving optimum balance, strength, and coordinative functions in stroke patients (Canada Physiotherapy Association, 2012). In Ghana, the treatment and rehabilitation of stroke through physiotherapy are covered by the National Health Insurance Scheme. However, stroke patients and their households are prone to out-of-pocket expenditures simply because most of the services are provided at the OPD level. The study therefore seek to determine the type of physiotherapy services available to stroke patients as well as estimate the costs involved in accessing the services.

1.2 Statement of the problem

De-Graft Aikins *et al* (2013) projected stroke morbidity and its related disabilities to soar largely due to urbanisation, poor socio-economic status and change in demographic structure of the population. Increase in stroke incidence would invariably translate into high utilisation and overt quest for physiotherapy services by stroke patients. Stroke survivors required rehabilitative care in physiotherapy to regain their lost personal functions.

For the past three years, stroke rehabilitation services consistently appeared in the top ten cases of OPD attendance in the Tema General Hospital. It accounts for 25 % of attendance in 2011, 38% in 2012 and 40 % in 2013 (TGH Annual Reports 2011-2013). Within this period of three years, the hospital provided physiotherapy services to a total of 7,295 stroke patients at the Out-Patient Department (OPD), representing 35% of all physiotherapy cases attended to in the hospital. This implies that about 30% of the resources at the hospital are being expended on stroke patients. Out-Patient

department based care involves out-of-pocket expenditures such as bus transport, work time lost, loss of productivity, waiting time, cost of feeding during treatment among others which are all incurred by the patient and household members.

This indeed imposes a huge economic burden on stroke patients and households. Notwithstanding free medical care in Ghana, stroke patients accessing physiotherapy services are inclined to expend a proportion of cost since the services are largely provided at the OPD level. There is paucity of economic burden of physiotherapy studies in Ghana. This study therefore estimates the cost of physiotherapy services to patients and their households.



1.3 General Objective

The general objective of the study is to estimate the household cost of physiotherapy services for stroke patients attending Tema General Hospital

1.3.1 Specific Objectives

The specific objectives are:

1. To determine the type of physiotherapy services for stroke patients at the hospital.
2. To estimate the direct cost of physiotherapy services incurred by household of stroke patients.
3. To estimate the indirect cost of physiotherapy services incurred by household of stroke patients.
4. To determine the intangible costs associated with seeking physiotherapy services.

1.4 Research Questions

In order to estimate the household cost of physiotherapy services for stroke patients attending TGH, as well as realize the research objectives, the study posed the following questions:

1. What types of physiotherapy services are available for stroke patients at the Tema General Hospital?
2. What direct costs are incurred by stroke patients and household in seeking physiotherapy services?
3. What indirect costs are incurred by stroke patients and household in seeking physiotherapy services?

4. What intangible costs are associated with stroke patients and households in seeking physiotherapy services?

1.5 Conceptual Framework

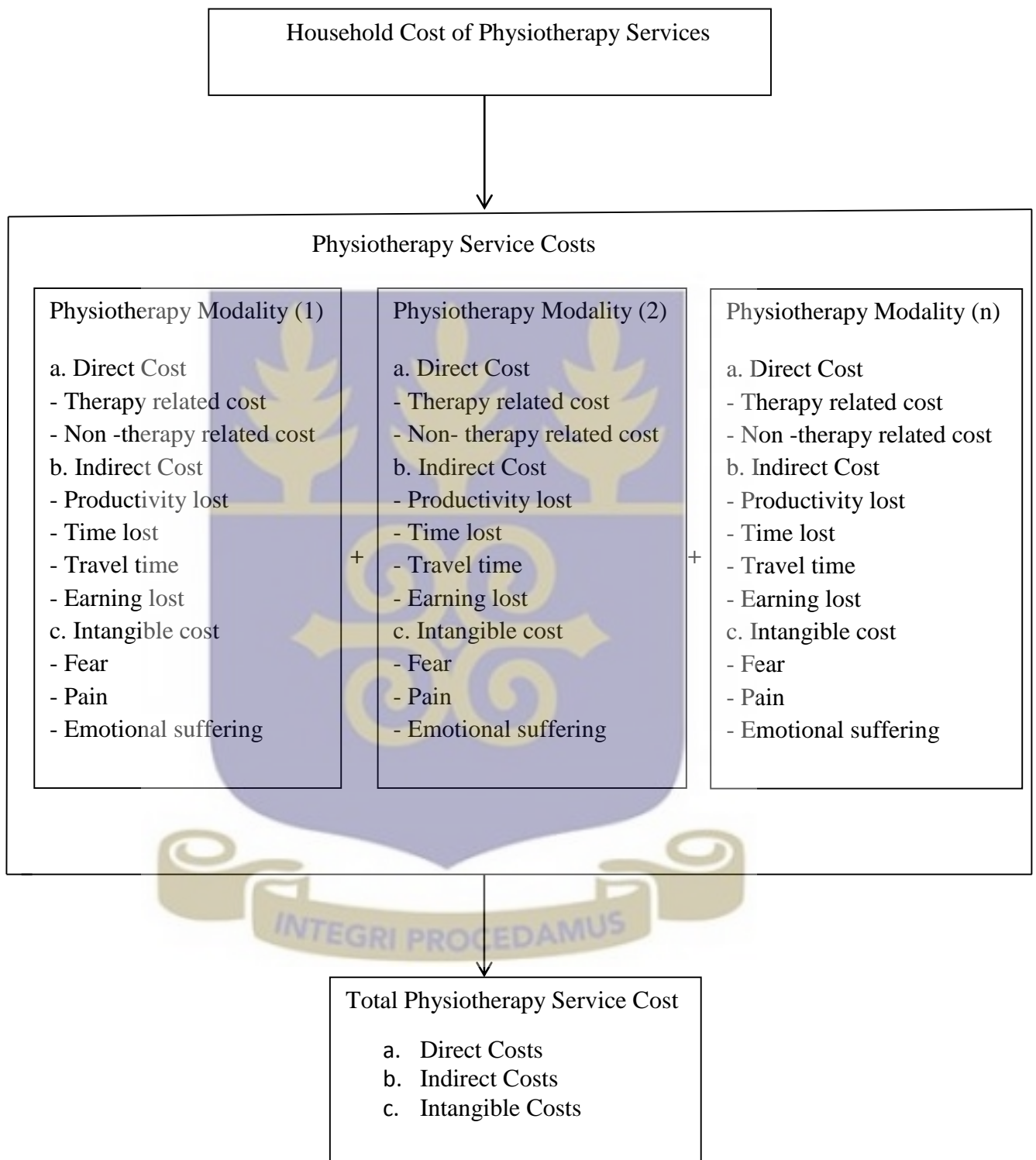
Stroke patients can undergo more than one physiotherapy modalities on prescription by the physiotherapist. The cost components incurred by stroke patients and households in seeking OPD based physiotherapy modalities can be classified into three broad categories as shown in figure 1. These are the direct cost, indirect cost and intangible cost. The direct cost refers to the actual expenditure incurred by patients in respect of seeking physiotherapy treatments. The direct cost can be categorized into therapy related cost and non-therapy related cost. Therapy related cost describes the cost of seeking actual treatment such as therapies and aids. The non-therapy related cost refers to costs which do not directly relate to treatment but contribute to seeking physiotherapy care. Such cost include food/ drinks, waiting time, transportation and other miscellaneous cost expenditures incurred in seeking rehabilitation. Food/drinks which are also known as feeding cost refer to the payment for food and drinks by patients and households from food sellers while seeking physiotherapy treatment. Transportation cost refers to the cost of travels or bus fares of patients and households from home to the physiotherapy rehabilitation facility and back. It excludes cost of transportation to hospital to seek care for other sicknesses.

Indirect costs refer to the invisible costs associated with loss of productivity owing to disability or death (Bloom *et al.*, 2011). Thus loss of productivity is an indirect cost incurred in relation to the loss of patient's working time or absence from work as a result of the stroke. It also includes the number of days the household spent with the stroke patient. Loss of earnings due to non-productivity of the stroke patient also constitutes one of the indirect costs inherent in accessing physiotherapy care.

The intangible costs describe costs which cannot be directly express in monetary terms. They include; pain, fear, as well as emotional and psychological suffering borne by patients and family members as a result of the stroke. This results in stroke patients and their household expending direct, indirect and intangible cost in accessing physiotherapy services.



Figure 1: Conceptual framework of household cost of physiotherapy services



1.6 Justification of the study

One way of drawing the attention of policy makers and government to the importance of accessible and affordable physiotherapy services is to quantify the economic burden of seeking the services. Quantifying and estimating the household cost of physiotherapy services should be deemed significant for many reasons. Firstly, the study will provide an overall perspective on the economic burden of physiotherapy care to patients with stroke and their households. Moreover, cost estimation of the burden of physiotherapy services for patients with stroke will inform government and policy makers about adequate resource allocation as well as the options for preventive and intervention programmes for stroke patients. Also, estimating the cost would be useful in strategic planning and budgeting for rolling out physiotherapy rehabilitation centres in selected communities or other health facilities for easy accessibility.

Apart from specifically quantifying the household cost of physiotherapy services at the Tema General Hospital, this study aims at providing relevant information in terms of cost for future studies. The study therefore seeks to use cost as a tool to advocate for increased financial access for stroke patients seeking physiotherapy services in Ghana. The study will be a prospective cross-sectional study of stroke patients and their households using qualitative and quantitative techniques for data collection.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter looks at the literature of the various studies that have been undertaken in the area of cost of physiotherapy services relative to stroke in order to provide a link between current knowledge and the research problem under investigation. The review of literature highlights the research strategies or tactics, and the specific procedures and instruments earlier researchers used in their studies in estimating household cost of care for stroke patients.

Therefore, the literature review in this chapter looks at theory, methods and techniques which are maximally suitable for the research problem under investigations with emphasis on similarities and different ways earlier researchers have carried out. The review also attempts to identify gaps in the existing literature.

2.2 Stroke

Stroke is one of the non-communicable diseases of public health importance. Stroke is said to have occurred when blood flow to the brain is completely or partially blocked. The World Health Organization (1970) defined stroke as a "neurological deficit of cerebrovascular cause that persists beyond 24 hours or is interrupted by death within 24 hours". The 24-hour limit divides stroke from transient ischemic attack (TIA), which is a related symptom of stroke that tend to resolve completely within 24 hours. In the past, stroke was popularly called Cerebro-Vascular Accident (CVA). However, in recent times the term 'stroke' is widely preferred.

According to Kumar & Clark (2005) stroke 'refers to a focal neurological deficit which results from a vascular lesion, usually characterised by rapid onset and lasts more than twenty four hours. He further classified stroke as complete when the neurological deficit reaches its peak, in-evolution when signs and symptoms are getting worse, and minor or transient when a patient recovers without significant deficit.' Stroke could also be categorised into haemorrhagic and cerebral infarction.

Hypertension, diabetes, obesity, aging, previous stroke, estrogen containing some level of hormonal contraception, migraine with aura and thrombophilia and severe rare disorders constitute important associated factors (Gelb, 2005). The Framingham study which is on-going for the past decades established a strong association between cardiovascular diseases, obesity and cigarette smoking with stroke and hence they are also risk factors (Framingham Heart Study, 2008).

In Ghana, hypertension, diabetes and obesity are the main risk factors associated with stroke (Sarfo *et al.*, 2014). De-Graft Aikins *et al* (2013) projected stroke morbidity and its related disabilities to soar largely due to urbanisation, poor socio-economic status, lifestyle, and emerging aging population.

2.3 Burden of Stroke

The WHO (2014) described strokes as one of the main non-communicable diseases of public health importance and the second leading cause of death globally with an annual mortality rate of 6.7million. It was also estimated that 16.9 million stroke cases occurred globally in 2010 or one every 2 seconds (Eich, 2008). The WHO factsheet indicated further that the prevalence of stroke among the white population was 500/600 per 100 000 while the prevalence of stroke in New Zealand was 793/100

000, Finland was 1030/100 000, the prevalence of France was the highest at 1445/100 000. In developing countries, the prevalence was lower than that of the developed countries, for instance in India stroke stood at 58/100 000 with Tanzania at 76/100 000. In the United Kingdom, the total direct and indirect costs of stroke were estimated at £9 million a year or 5.5% of the total health care expenditure (Saka et al., 2009). This excludes the cost of physiotherapy services. However, stroke accounts for over 80% of all deaths in low-income and middle-income countries (Connor, Walker, Modi, & Warlow, 2007).

Stroke accounts for 49 million DALYs and even projected to rise from about 38 million DALYs globally in 1990 to 61million DALYs in 2020 (World Health Organization, 2014). The increase in DALYs is due to the disability resulting from stroke. Sarfo *e tal* (2015) posited that the burden of stroke was rising in sub-Saharan African countries with a standardized annual incidence rate of 316 per 100,000 and age adjusted prevalence rate of up to 981 per 100,000. They concluded that stroke mortality in the sub-continent could be the highest in the world. In terms of epidemiological transition from communicable infections to chronic non-communicable disease, stroke is predicted by many studies to increase due to low level of awareness coupled with several risk factors (Sarfo *e tal.*, 2015).

In Nigeria, where about 50% of the population lives on less than US\$2, the cost of stroke treatment per intervention was estimated to be US\$2,730. Out of this, an average of 27% was attributed to physiotherapy services incurred by stroke patients for a minimum of 12 weeks (Birabi *et al.*, 2012). Also, in Tanzania, a study involving 16 stroke patients for six months in 2005/2006 found an overall mean cost per case to be TZS 256,338 (US\$ 220) of which physiotherapy constituted 15% of the total stroke treatment and 97% productivity loss per patients (Gregory *et al.*, 2013)

In Ghana stroke ranks among the top three causes of mortality (De-Graft Aikins, 2007) and seen to be assuming an increasing trend (Donkor et al., 2014). The rate of hospital admissions of stroke cases per 1000 admission has also been progressively increasing from 5.68 in 1985 to 13.85 in 2010 (Sarfo *et al.*, 2015). This therefore implies that more resources would be committed into providing care to stroke patients. However, rehabilitation of stroke patients usually takes a longer period and hence expensive for both the healthcare and the stroke patients. The burden of stroke can be defined with respect to the direct cost of providing therapy to patients, the indirect cost relative to lost productivity as well as the intangible cost in the form of fear, pain and emotional suffering.

2.4 Economic and Social Burden of Stroke

The World Health Organization (WHO) (2012) classified strokes as one of the key non-communicable diseases of public health concern and the second leading cause of mortality globally. The organization acknowledges the difficulty in obtaining reliable estimates for stroke prevalence worldwide. Stroke is ranked the third most common cause of disability-adjusted life-years (DALYs) (Thrift *et al.*, 2014) and therefore remains an expensive disease for individual, family and society (Birabi *et al.*, 2012). According to Mapulanga *et al.* (2014) 'stroke affects mostly the productive age group and leaves about 65% of its victims disabled leading to increased loss of manpower both at individual and national levels.' Over the years, developing countries had a lagging of prevalence of stroke but trends have since been shifted from communicable infections to a balance between communicable and non-communicable infections (Mbanya, 2001).

Stroke burden is anticipated to go up from around 38 million DALYs globally in 1990 to 61 million DALYs in 2020 (World Health Organization, 2008). The rise in DALYs is due to the disability resulting from stroke. Stroke results in functional impairments; with 20% of survivors requiring institutional care after 3 months and 15%-30% being permanently disabled (Birabi *et al.*, 2012). Mapulanga *et al* (2014) found that 64% of stroke survivors experienced role changes resulting in functional dependency on others and the society. Rehabilitation of stroke patients takes a longer period and hence expensive for the healthcare provider, households and the stroke survivors. Long-term direct costs including physiotherapy care are even higher and indirect costs attributable to premature mortality and lost productivity for stroke survivors are greater than all direct costs combined. The burden of stroke seems to be assuming increasing rate. Feigin *et al.*,(2014) found that in 2010 people with first stroke were (16.9 million), stroke survivors (33 million), stroke-related deaths (5.9 million), and DALYs lost (102 million) and 5.2 million (31%) strokes in children (aged <20 years old) and young and middle-aged adults (20–64 years), to which children and young and middle-aged adults from low-income and middle-income countries contributed almost 74 000 (89%) and 4.0 million (78%), respectively of the burden.

Additionally, the study revealed that more than 62% of new strokes, 69.8% of prevalent strokes, 45.5% of deaths from stroke, and 71.7% of DALYs lost because of stroke were in people younger than 75 years.

Stroke like all other illnesses has the ability to cause complex social and economic effects on individuals, households and communities. Economically, these costs comprise the direct costs of treatment and medication, opportunity costs of lost employment and the costs of informal care-provision within the household (Lloyd-

Sherlock, 2009). The cost of treatment interventions for cardiovascular disease (stroke) though varied widely was estimated to be US\$ 863 billion in 2010 and projected to rise to US\$ 1.04 trillion in 2030 globally (Bloom et al., 2011).

In the United Kingdom, the cost of total direct and indirect costs of stroke intervention was estimated to be about £9 billion a year or 5.5 % of total health care expenditure (Saka et al, 2009). Of this, about half was related to direct cost (hospital treatment and medication), 24% was indirect costs (lost lifetime earnings due to premature mortality) and 27% represented informal form of care. It has been estimated that the average lifetime cost of an ischemic stroke in the UK is US\$105,000 (Palmer *et al.*, 2005). In the United States, the annual direct cost of stroke treatment was estimated to be \$71.55 billion in 2012 and the cost was projected to increase to \$183.13 billion while the indirect annual cost (due to productivity losses) was estimated to soar from \$33.65 billion to \$56.54 billion by 2030 (Ovbiagele *et al.*, 2013). In Australia, the average cost per stroke treatment during the first 12 months and over a lifetime was estimated to be A\$18 956 (US\$14 361) and A\$44 428 (US\$33 658), respectively in 1997. The most important categories of cost during the first year were acute hospitalization costing A\$154 million, inpatient rehabilitation costing A\$150 million (Dewey *et al.*, 2001). Stroke costs the Canadian economy C\$3.6 billion a year in physician services, hospital costs, lost wages, and decreased productivity (Birabi *et al.*, 2012).

However, in developing countries very little research has been carried out to ascertain the economic impact of stroke on households (Lloyd-Sherlock, 2009). The only available large-scale survey is in respect of China which revealed out-of-pocket payment of over 10% of income for the majority of households and therefore put many at risk of impoverishment (Heeley et al., 2009). Surprisingly, only 37% of

stroke patients and their families fell below a US\$1 a day poverty line within three months of experiencing stroke. In Nigeria, the cost of stroke treatment per intervention was estimated to be US\$2,730 (Birabi *et al.*, 2012).

The reason for this stark economic impact is that emergency stroke treatments tend to be very expensive. A study of six developing countries found that the cost for treating the “clot-busting” in stroke patients ranged from US\$1,200 to US\$2,300 per treatment episode. This excludes other costs, such as hospitalisation. Another reason for the high cost of stroke is that majority of stroke survivors experience permanent and serious disability, reducing their earning capacity and leading to substantial care needs (Lloyd-Sherlock, 2009).

Stroke events has a wide range of social consequences for stroke survivors. A study conducted by (Daniel *et al.*, 2009) found that 5-54% of stroke survivors encountered negative behaviour from family relations, 5-76% had deteriorated sexual life, 24 -33% faced economic difficulties and 15-79% experienced deteriorated leisure activities.

2.5 The Role of Physiotherapy in Rehabilitation of Stroke Patients

Physiotherapy is basically concerned with the provision of care and services to individuals, who are ill or injured to develop, maintain and restore optimal movement and functional ability throughout natural life (Ghana Physiotherapy Association, 2014). It involves the provision of physical care in situations where normal locomotion and function are threatened by the process of aging or injury or disease. Physiotherapy entails identifying and maximizing movement potential in the areas of promotion, prevention, treatment and rehabilitation (Ghana Physiotherapy Association, 2014).

Physiotherapy is undoubtedly one of the key components of rehabilitation for stroke patients and has over the years proven to exert positive effects on the outcome of most stroke patients (Davidson & Waters, 2000). Therefore its importance cannot be underestimated.

Firstly, stroke rehabilitation care involving physiotherapy reduces mortality as compared to standard care (Foley et al., 2007). Physiotherapy in stroke rehabilitation also contributes to improved functional outcomes for patients (Ottenbacher & Jannell, 1993).

Additionally, stroke rehabilitation involving physiotherapy prevents the recurrence of acute stroke events and supports the individual's ability to live independently through planned and targeted interventions aimed at improving balance, strength, coordination and function. It is thus a key component in the continuum of care by providing support in the transition from hospital to home. More so, physiotherapy services following stroke decrease the risk for poor health outcomes, enhance and promote personal activities of daily living and cut the costs to the health care system (Ontario Physiotherapy Association, 2013). Physiotherapy at the OPD level is reported to be cost-effective and estimated to be around \$2000 per patient for 8-12 weeks of therapy compared with 2-3 weeks at a cost of about \$10,000 per patient at the in-patient level in Canada. Physiotherapy following stroke has a positive impact on disability, physical and social function and quality of life and reduces the risk of poor health outcomes. Therefore, increasing the availability of out-patient physiotherapy resources for stroke patients would lead to significant savings and an increase in the effective use of health care resources.

2.6 Approaches to Physiotherapy Rehabilitation for Stroke Patients

The usual pattern of care for people who suffer stroke is admission to hospital followed by a period of multidisciplinary rehabilitation with physical management conducted primarily by physiotherapists (Wiles *et al.*, 2004). There are considerable uncertainties in the physiotherapy profession concerning the optimal timescale and effectiveness of physiotherapy interventions due to paucity of research and differences in evidence as to the type or approach to physiotherapy treatment after stroke.

However, irrespective of the treatment approach, the primary goal remains to achieve sensorimotor control of the upper and lower limbs; sitting and standing, balance and dexterity; mobility; activity within daily living and health related quality of life (Pollock *et al.*, 2008). Furthermore, the type of approach depends largely on the extent to which a physiotherapist's skill has a bearing on a patient's outcome and whether the functional outcome of the patient is directly related to the amount of treatment received (Khan *et al.*, 2012). Pollock *et al.*, (2014) identified the common approaches to physiotherapy rehabilitation. Orthopaedic approach primarily consists of corrective exercises related to contraction and relaxation of muscles with emphasis on regaining physical function. This approach focuses on re-establishing function to the musculoskeletal system involving joints, tendons, ligaments, and bones. The methods and strategies commonly used include stretching (lower and upper limbs mobilization exercises), strength training, endurance exercises (bracing), hot and cold packs, ultrasound, electrical muscle stimulation and joint mobilization through progressive strengthening exercises (Pollock *et al.*, 2014 : Ping *et al.*, 2014). Unlike the Orthopaedic approach, neurological/neurophysiological approach involves interventions in the recovery of the paretic side. This is the most popular approach

used in rehabilitation of stroke patients. It is also known as the Bobath method (Davidson & Waters, 2000). Physiotherapists using this approach concentrates on teaching stroke patients to adapt to mobility, balance, visual, muscle loss impairments for activities of daily living (Pollock *et al.*, 2008). Geriatric approach on the other hand deals with special and unique movement needs of patients. The goal of geriatric physiotherapy is to help regain mobility, reduce pain, accommodate physical limitations and increase physical fitness of stroke patients (Pollock *et al.*, 2014).

Cardiopulmonary Approach focuses on assisting patients who suffer from cardiovascular and pulmonary conditions, such as heart attacks, chronic obstructive pulmonary disease (COPD), and pulmonary fibrosis. The aim is to increase endurance and improve functional independence of patients (Davidson & Waters, 2000). Ping *et al.*, (2014) identified other approaches such as proprioceptive neuromuscular facilitation (PNF), the motor learning approach, and the functional approach. The Bobath concept is most widely preferred approach and used by physiotherapists as a technique to aid patients to regain movement and balance control, as well as mobility, using sensorimotor key points of control and reflex-inhibiting pattern control of the affected limbs and trunk (Davidson & Waters, 2000; Ping *et al.*, 2014). The PNF involves the use of proprioceptive stimulation to strengthen and relax a particular group of muscles and advocates the use of peripheral inputs, such as stretch and resisted movements to reinforce the existing motor response and mostly used for stroke rehabilitation by physiotherapists in India (Khan *et al.*, 2012). The emphasis of the motor relearning approach is task specific training and involves usually given a feedback to patients during the practice of context-specific motor tasks aims at promoting learning and motor recovery. It essentially aims at improving the smoothness and accuracy of movement (Ping *et al.*, 2014). The principle of the

functional approach is to use the remaining motor capabilities of a patient to compensate for those that were lost.

The treatment strategies of this approach include the use of task-specific training and drilling on the task or part of the task, such as bed to chair transfer, walking, and stair climbing strengthening exercises. Research indicates that a combination of approaches such as manual therapy, acupuncture, transcutaneous electrical nerve stimulation, hydrotherapy as well as task-oriented training, gait training, balance training and constraint-induced movement therapy are crucial to induce improvement in functional outcomes of rehabilitation of stroke patients (Ping *et al.*, 2014 : Jette *et al.*, 2005). This study therefore aims at determining the approaches or modalities being used by physiotherapists in the rehabilitations of stroke patients at Tema General Hospital.

2.7 Cost-of-Illness (COI) Studies

Cost-of-illness analysis is one of the key methods of assessing the overall economic impact of a disease. Such studies have often been used in setting priorities for health care policies and programmes as well as to describe resource allocations for various ailments (Saka *et al.*, 2009). Cost-of-illness (COI) studies categorize various components of costs of particular ailments or disease-related complications in different spectrum of the society which could have been saved if the diseases did not occur. This information enables governments, key stakeholders and policy makers to better understand the economic burden of the diseases or complications and justify any interventions for them (Saha & Gerdtham, 2013). Furthermore, COI studies provide detailed and vivid descriptions in monetary terms in relation to the burden of the disease on the basis of characteristics of supply and demand. Such studies measure

health care cost not only by disease, but also by health care provider and by age and sex of health care users (Heijink et al., 2008).

Also, cost-of-illness studies facilitate the identification of the key cost components and their incidence over total costs. This assists health policy makers in defining and or limiting various cost containment policies to those cost categories that weigh heavily on total costs as well as controlling for the actual implementation of previous health policies (Tarricone, 2006). More so, costs-of-illness studies quantify the adverse effects of ailments or injuries into monetary values for decision makers and the policy formulators to appropriately define the enormity of the disease or injury in monetary terms, justify intervention programs, allocation of research funding on specific diseases, provide a basis for policy and planning relative to prevention and control initiatives as well as to provide an economic framework for program evaluation (Rice, 2000).

Cost-of- illness studies has several uses; firstly, understanding the costs of an illness helps policy makers to determine which disease condition requires to be addressed urgently by health care and prevention policy. Additionally, these studies can indicate which diseases intervention would be valuable in mitigating the burden of ailments. Cost-of-illness studies are capable of pinpointing the financial impact a disease has on public health programs such as Medicare and Medicaid. For employers, such studies can indicate which diseases have an especially large effect on their costs.

Moreover, cost-of-illness studies provide key information for cost-effectiveness and cost-benefit analyses as well as provide the framework for estimating costs. Lastly, COI is useful in educating, informing and enlightening policy makers in planning, financing as well as relevant in chronic diseases that weigh heavily on health expenditures (Costa *et al.*, 2012).

2.8 Cost of Physiotherapy Services in Ghana

In Ghana, cost of medical care is free under the national health insurance scheme. The Scheme covers over 95% of disease conditions affecting the citizenry including physiotherapy services. However, most physiotherapy services are provided at the OPD level after discharge to continue with further rehabilitative services while at home (DeJong *et al.*, 2011). Even though the service is free of charge, stroke patients and households seeking physiotherapy care are prone to incur some amount of cost. Essentially, the cost of a service is the value of a resource, conceptually described as the value that could be gained by using the resource in an alternative way (Saha & Gerdtham, 2013). The category of costs to be incurred by stroke patients and their households can be classified into direct, indirect and intangible costs. It must, however, be noted that these costs are not only akin to physiotherapy services but commonly associated with all types of services.

2.9 Direct Cost

The direct cost of an ailment basically describes the actual household cost incurred in seeking appropriate treatment and may include all the direct therapy related cost and direct non-therapy related costs. Direct therapy related costs are expenditures for therapies (physical, cognitive and psychological treatments), aids (walking aids, tripod or quadripod) continuing care, rehabilitation, and terminal care for an illness (DeJong *et al.*, 2011). Direct non- therapy related costs are the costs of non-health care resources, such as transportation to and from health care providers, households food and drinks expenditures, costs of relocating and certain property losses, phone calls, user fee and informal care (Costa *et al.*, 2012; Saha & Gerdtham, 2013).

Direct costs borne by household or family include out-of-pocket payments for therapies. Informal care is the care provided by family members or friends to the sick person. Direct costs are sometimes influenced by the nature and severity of the disease as well as the prevailing living conditions (Costa *et al*, 2012). According to Xie *et al*, (2008) charges or fees are often used as a surrogate for cost since cost are treated with confidentiality.

A study in Nigeria revealed that US\$734 of the total direct cost of managing stroke in the acute and immediate post-acute stages excluding nursing care charges was spent on physiotherapy/ rehabilitation services (Birabi *et al.*, 2012). There are several methods for estimating economic direct cost of disease conditions. Sage (2006) identified three main approaches for quantifying cost. Namely, top down approach which is also known as epidemiological or attributable risk approach involves estimating the proportion of medical/therapeutic cost attributable to a particular disease due to exposure to the disease or risk factor. This approach depends on aggregated data along with a population-attributable fraction (PAF) to determine the attributable cost. One disadvantage of the top-down approach is that not all costs are usually included in the database (e.g., costs for informal care and the patient's time cost are not included). For complex diseases, the top-down approach may underestimate or overestimate the costs caused by comorbidities related to the disease of interest and there is a risk of misclassification if a diagnosis-based classification is used (Saha & Gerdtham, 2013). The Bottom-up approach on the other hand, estimates the average cost of treatment of a disease and multiplying it by the prevalence of the disease.

Average cost of treatment is estimated by summing up the various pieces of treatments. For example, the average cost of stroke rehabilitation per visit can be estimated by multiplying the number of a physiotherapist visit by the number of stroke patient visits. This is repeated for each type of service to arrive at the total average cost per case, which is then multiplied by the prevalence of the disease to get an estimate of the total direct costs.

Also, the bottom-up approach of cost estimating is more appropriate and useful for calculating cost of ailments which are rare or chronic in nature. The approach, however, necessitates collection of data from different sources of cost units and utilisation pattern of the same ailment. The econometric or incremental approach quantifies the variance or different in costs between a group of the population with the disease and a section of the population without the disease. The two groups are then matched using regression analysis. The two methods often employed within the econometric approach are estimating costs are the mean differences approach and the multistage regression approach. This approach proves to be an effective means of direct cost estimation because of its ability to measure incremental difference between individuals. Econometric studies tend to be good and useful for analysing large national data sets and thus require minimal data collection.

2.10 Indirect Cost

Indirect cost refers to the productivity lost due to morbidity and mortality (Saha & Gredtham, 2013). To Sage (2006) indirect costs represent the other portion of estimated costs and include mortality costs, morbidity costs due to absenteeism and presenteeism, informal care costs (in terms of the opportunity cost of hiring outside

care) transportation to and from rehabilitation centre, waiting time to seek physiotherapy services, and earning lost due to loss of employment. Indirect costs describe the productivity loss incurred by an illness and are imperative in cost-of-illness studies as they can be substantial. For example, several studies have shown that estimated indirect costs were three times higher than direct costs and accounted for about to 80% of total costs in patients with Osteoarthritis (Xie *et al.*, 2008).

Another study in Indonesia by Finkelstein, Chay, & Bajpai, (2014) on the economic burden of Non-Communicable Disease (NCD) revealed that indirect cost associated with stroke treatment was In\$0.29 billion in 2010, representing 8% of out-of-pocket of the Indonesia's national health expenditure. In Tanzania, a study involving 16 stroke patients for six months in 2005/2006 found an overall mean cost per case to be TZS 256,338 (US\$ 220) of which physiotherapy constituted 15% of the total stroke treatment and TZS 247,930 mean productivity loss per patients (Richard *et al.*, 2013).

Human Capital Approach (HCA), willingness-to-pay (WTP) and friction cost methods are some of the primary approaches employed for quantifying indirect costs. Human Capital Approach (HCA) is the commonest method for estimating loss of productivity cost in the societal or communal perspective studies (Costa *et al.*, 2012). The HCA is based on the neoclassical economic theory that states that marginal value of an employee equals the labour costs. It measures the productivity loss in relation to lost earnings of a patient or caregiver including the cost of household activity mostly valued as the opportunity cost of engaging a replacement from the labour market (Segel, 2006). This method also employs the prevailing minimum daily wage in estimating the productivity lost estimated by multiplying the earnings lost due to illness at each age by the likelihood of living to that age (Sahel and Gerdtham, 2013;

Segel, 2006). Despite criticism against this approach for overestimating indirect cost, advocates argue that limitations of the HCA should not pose a challenge since most workers do not work on reporting to work (Johannesson & Karlsson, 1997). A closely related and useful substitute for estimating indirect cost is the friction cost approach (FCA). Unlike the HCA, this approach basically describes the time it takes to replace a worker due to ill health, disability and mortality (Johannesson & Karlsson, 1997). It assumes that short-term work losses can be made up by an employee and the loss of an employee only result in the costs in time it takes for employing, training and inducting a new employee known as the friction period (Segel, 2006).

Additionally, using the friction cost method to estimate indirect costs essentially implies that the price of labour (i.e. the opportunity cost of labour) is set close to zero after the friction period and reduced during the friction period. Whereas FCA only estimates the actual productivity lost during the time it takes to replace the ill worker, the HCA reflects lost productive potential; the FCA measures actual production losses.

Nevertheless, the friction cost method is seldom used in estimating indirect cost because it needs detailed data only to estimate the losses in the friction alone (Segel, 2006). It is based on implausible assumptions which are not supported by neoclassical economic theory since it set the price of labour close to zero thereby making it unsuitable for economic evaluation of healthcare programmes (Johannesson & Karlsson, 1997).

The willingness-to-pay approach (WTP) on the other hand measures the amount an individual would pay in order to reduce the probability of disease or mortality (Johannesson, 1996). The individual willingness to pay could be determine by examining the wages for jobs with high risks, examining the demand for products that

lead to greater health or safety such as tripod or quadripod for stroke patients (Joo *et al.*, 2014).

Willingness-to- pay approach often with higher estimates of the value of life than the human capital approach attempts to solve these problems. The approach is extremely difficult to implement in cost-of-illness studies because extensive surveys of people's preferences may be required for specific illnesses although the results depend heavily on people's responses to vary specific hypothetical questions about their willingness to avoid certain illnesses or risk. It is therefore not feasible for cost-of-illness studies (Segel, 2006). This particular method will not be suitable for estimating indirect cost of physiotherapy care for stroke patients because households may feel reluctant to place a price on their lives. This study will therefore estimate indirect cost of physiotherapy services for stroke patients and their households using the human capital approach due to its capacity to quantify productivity loss.

2.11 Intangible Cost

The intangible costs entail the psychological dimensions of illness that stroke patients endure. Examples include pain, fear, anxiety, emotional and psychosocial sufferings, changes in social functioning and activities of daily living (Saha & Gerdtham, 2013;). The intangible costs often receive less attention because they are very difficult to estimate in a standardized fashion. Quality of life has attracted much of the focus for consideration of intangible costs, and there has been a concerted effort to establish quantifiable tools and instruments which could be used to measure them (Beran, 1999). However, Likert's scale will be used for the description of the variables; fear, pain, and emotional suffering for the intangible cost components of

this study. This is because of the difficulty in quantifying these variables in monetary terms.

2.12 The Likert's Scale

It is a psychometric scale commonly used in measuring attitudes. The scale was developed in 1932 by Rensis Likert for measuring attitudes or personality traits. The typical Likert's scale is a 5- or 7-point ordinal scale used by respondents to rank the level or degree to which they agree or disagree with a statement (Scales & Sullivan, 2013) . The scale was developed in response to the difficulty of measuring attitudes, character, and personality traits and the procedure for transferring these qualities into a quantitative measure for data analysis purposes (Boone *et al.*, 2012). In other words, the difficulty in quantifying pain, fear and emotional sufferings endured by stroke patients and households makes it appropriate to describe them using six and five dimensions for patients and household members.

Furthermore, ordinal scale responses can be rated or ranked, but the distance between responses is not measurable. Thus, the differences between “not at all,” a little “moderately,” quite a bit “and “extremely” on a frequency response Likert scale should not necessarily be equal. It implies that one should not assume that the difference between responses is equidistant even though the numbers assigned to those responses are. Addo *et al* (2013) in a cost-of-illness study described the intangible costs of mental patients and their households attending the Ho Municipal Hospital in Ghana using the Likert Scale. Also, Amoakoh and Aikins (2013) estimated household economic costs of buruli ulcer in Ghana and described the

intangible cost suffered by bruli ulcer patients and their households using the Liker Scale.

The study therefore intends using five dimensions for households' members and six dimensions for stroke patients. Boone *et al.*, (2012) attempted to differentiate between Likert-type items and Likert scales. The Likert-type items refer to single questions that use some aspect of the original Likert response alternatives in which multiple questions may be used in a research instrument but with combined response items into a composite scale. A Likert scale, on the other hand, is made up of a series of four or more Likert-type items that are combined into a single composite score/variable for easy analysis. The combined items provide a qualitative measure of a character or personality trait of interest (Allen *et al.*, 2011). However, the Likert's scale and descriptive statistics of the mean for central tendency and standard deviations for variability would be used for this study.

2.13 Conclusion

It is abundantly clear from the reviewed literature that the economic and social burden in accessing physiotherapy care by stroke patients is enormous and cannot be underestimated. Stroke results in functional impairments of its victims, reduced earnings, and reduced ability to carry out routine house chores and loss of productivity. Stroke survivors therefore, to a large extent, experienced role changes resulting in functional dependency on others and the society. Additionally, the family of stroke patients is affected in their dwindled earnings and productivity as well as reduction in household income. Rehabilitation of stroke patients takes a longer period and hence expensive for the healthcare provider, households and the stroke survivors. Long-term direct costs including physiotherapy care are even higher and

indirect costs attributable to premature mortality and lost productivity for stroke survivors are greater than all direct costs combined. In Ghana, cost of medical care is free under the national health insurance scheme (NHIS). However, most physiotherapy services are provided at the OPD level and as such stroke patients and households seeking physiotherapy care are prone to incur some costs. These costs comprise the direct costs of treatment and medication, opportunity costs of lost employment and the costs of informal care-provision within the household.

The economic burden of accessing physiotherapy services by stroke patients is determined through the estimation of therapy related cost and non-therapy related cost, indirect cost and intangible cost. The relative amount of direct and indirect cost borne by stroke patients in seeking physiotherapy care is dependent on the components of cost estimated under each cost category. However, the dominant costs incurred by households are the indirect costs. The Human Capital Approach (HCA) is the most widely method employed in estimating indirect cost. The intangible cost which entails the psychological dimensions of illness such as pain, fear and emotional sufferings that stroke patients endured is often not estimated due to its complexity but described using psychometric scale. Few studies have employed the willingness-to-pay (WTP) approach in estimating intangible cost because of the complex nature of its application. To this end, most studies either do not estimate it or simply describe it.

This study will use the HCA to estimate the indirect cost in view of the fact that it seeks to quantify the productivity loss to stroke patients in seeking physiotherapy services and not to the employer as the friction cost approach does. Consequently, the intangible cost will not be quantified but described using Likert's scale due to unavailability of data. It is therefore envisaged that this cost-of-illness study in respect of physiotherapy care for stroke patients will provide a basis for cost-

effectiveness that will inform policy makers and government in the allocation of the requisite health resources to make physiotherapy services more accessible and affordable.



CHAPTER THREE

METHODS

3.1 Introduction

This section provides a detailed description of the research methodology employed in this study. The issues to be discussed include the research design, study location/area, study variables, study population, sample size, sampling procedure, data collection technique/methods and tools, quality control, pre-data collection stage, data processing and analysis, estimation of direct, indirect and intangible costs, statistical methods, ethical consideration/issues, description of subjects, potential risk/benefits, and finally data usage and storage.

3.2 Study design

The study was a cross-sectional cost-of-illness study which estimates the household cost of physiotherapy services for stroke patients attending Tema General Hospital.

3.3 Study Location /Area

The study was conducted at the Tema General Hospital in the Greater Accra Region of Ghana. The Tema General Hospital was constructed in 1954. The hospital serves as the referral centre for private hospitals and clinics in and around the metropolis. It thus serves the people of Tema and the surrounding communities including Ashaiman, Nungua, Ningo, Prampram, Kpone, and Ada. It is a hospital of about three hundred (300) bed capacity with fourteen (14) functional wards.

The Physiotherapy Department of the hospital became operational in 2002. The department provides a wide range of physiotherapy services to the people of Tema and its environs including patients from the Eastern Region and beyond. The average daily attendance of patients seeking various physiotherapy services is fifty five (55) patients. Twenty (20) stroke patients visit the department on daily basis (TGH Annual Reports, 2011, 2012, 2013). The metropolis has a population of 402,637 with an annual growth rate of 2.6%. The economic activities in Tema Metropolitan area vary widely from production, transport services, fishing to manufacturing. Tema is an industrial city of Ghana (GSS, 2012).

3.4 Study Variables

Table 1 provides the description of the study variables. It encompasses the type of cost and the explanation of the categories of costs that were estimated in the study. Furthermore, the table describes the components of the cost incurred by households, which were added up to obtain the direct and indirect costs incurred by stroke patients in seeking physiotherapy services. The intangible costs were described using the components of fear, pain and emotional sufferings. The physiotherapy treatment modalities provide the various types of costs associated with treatment of stroke. The physiotherapy modalities are; (1) Exercise therapy; (2) Massage therapy; (3) Heat/thermo therapy; (4) Electrotherapy and (5) Cryotherapy.

Table 1: Description of study variables

Type of Cost	Category of Cost	Description
Direct Cost	Therapy related cost	1. Actual cost of therapies including cost of card, folder and consultation
	Non-therapy cost	1. Cost of mobility aids, e.g. tripod, quadripod etc. 2. Cost of travel 3. Cost of food and drinks for patients and caregiver 4. Other miscellaneous cost (e.g. cost of phone call during physiotherapy service)
Indirect Cost	Cost of productivity loss	1. Productivity loss to the patient (i.e., waiting time, days lost and travel time) 2. Productivity lost to household members (i.e., waiting time, days lost and travel time)
Intangible Cost	Intangible Cost	1. Fear 2. Pain 3. Emotional suffering

3.5 Study Population

The study population consisted of stroke patients and their households who attended the Physiotherapy Department of the Tema General Hospital to seek physiotherapy care between May 2015 and June 2015.

The inclusion criteria for the study were all stroke patients who had been seeking physiotherapy services in the department within the last one month but not more than two years regardless of the sex and age. Stroke patients who were conscious and were in good state of mind were interviewed. The exclusion criteria were stroke patients who had not been seeking physiotherapy services in the department within the last one month but not more than two years. Stroke patients who were severely ill and could not talk were not interviewed.

3.6 Sample Size

The mean cost per visit per stroke patient per year was GHS523.50 with a standard deviation of GH¢198.00 (TGH Annual Report, 2013). However, to detect a 30% difference for this mean cost, 0.80 power and 0.05 alpha were used for the study. Using STATA 12.0, a sample size of 152 stroke patients was calculated and used for the study. Therefore a sample size of 152 was selected from the sampling frame for the study.

3.7 Sampling procedure

The individual folders of stroke patients who had been attending Tema General Hospital were used to compile the sampling frame for the selection of study participants. The folders were used because the general attendance register did not contain diagnoses of patients accessing various physiotherapy services and as such it was difficult to distinct stroke patients from non-stroke patients. The frame was then numbered to determine the total number of stroke patients in the sampling frame. Consequently, the total number of stroke patients in the frame was found to be 212 patients. Random numbers between 1-212 patients were generated using Microsoft

Excel random number generator and 152 patients were randomly sampled. Stroke patients whose numbers came up were then selected for administration of questionnaires. All patients whose numbers came up and they were unwilling to take part in the study were dropped. It was realized that patients were scheduled for four different times and batches at their chosen and appointed convenient times for the respective physiotherapy services. The usual days were Mondays and Wednesdays, Tuesdays and Thursdays as well as Wednesdays and Fridays. Physiotherapy services started in earnest at 8:30am to 9:30am for the first batch of patients at the gymnasium. This was followed by the second batch of patients who entered the gymnasium from 9:30am to 10:30am to undergo their physiotherapy modalities. The third batch of patients took their turns at 10:30am to 11:30am. The last batch of patients had their care from 11:30am to 12:30pm. Attendance was usually heavy between the times of 8:30am to 11:30am and low between 11:30am to 12:30pm. In all a total of 20 working days were used for the data collection with a minimum of 7 patients per day. Finally, questionnaires were administered to patients and accompanying caregivers at the hospital with their consent.

3.8 Data Collection Technique/Methods and Tools

Structured questionnaires were employed for data collection. The questionnaire was made up of both open and closed ended questions covering relevant information on patients' demographic information, employment status, and occupation. The questionnaire was focused on identifying the type of cost incurred by stroke patients as well as the type of therapies, services and the duration of patients receiving the service. It was further intended to elicit information on the intangible cost such as fear, emotional suffering and pain endured by patients.

3.9 Quality Control

Adequate mechanisms were put in place to safeguard and guarantee data accuracy, quality and devoid of biases. The measures included training of research assistants, pre-testing of questionnaires and data entry and processing. Research assistants were also monitored on daily basis. All completed data were validated and entered on daily basis. Furthermore, the dataset was cleaned before analysis.

3.10 Pre-data Collection Stage

3.10.1 Training of Research Assistants

Two research assistants conversant with physiotherapy services and stroke patients, who could read and write English language as well as fluent in two local dialects (Twi and Ga) were recruited and trained for a period of three days. The training involved explanation of the questionnaire, ethics and how to seek informed consent from the study participants. They were offered the opportunity on the last day to administer the questionnaires at the pre-testing phase. This was to make sure that accurate administration of the questionnaires was achieved.

3.10.2 Pre-testing of Questionnaire

The questionnaire was pre-tested prior to final administration to the study participants. Pre-testing was conducted on stroke patients and their accompanying household members at the Physiotherapy Department of the Tema General Hospital. This exposed any anticipated problems regarding wording of questions, instructions to delete or add on etc. It also offered the interviewer a better understanding of the questionnaire as well as the appropriate answers for the questions that were asked by the study population.

3.10.3 Data Collection Stage

The Principal Investigator visited the study site on daily basis to ensure compliance with research guidelines. Meetings were held at the end of each data collection day for discussion of issues bordering on validation and cross checking of completed questionnaire with the research assistants. This was done to ensure completeness of questionnaire as well as planned for the next day.

3.10.4 Data Entry and Processing

The data collected were thoroughly screened or validated, serialized and coded within 24 hours before entry into Epi Info version 7.1.5. After entry, the data set was crosschecked for errors with hard copies one after another to ensure every variable defined was in the right place. Microsoft Excel 2010 was used for analysis.

3.11 Data Analysis

The various costs incurred by stroke patients and households from May 2015 and June 2015 were estimated. That is a recall period of one month.

3.11.1 Estimation of Direct Cost

For this study, total direct cost was estimated by summing all direct costs incurred by stroke patients and accompanying family members for therapy and non - therapy costs. Therapy cost which included modality cost, cost of mobility aids (tripod, quadripod etc.) were added together. Non-therapy cost such as transport cost, cost of food and drinks for patient and caregivers, and miscellaneous cost (cost of phone call during care) were all summed up.

Therapy related cost: This was calculated by finding the proportion of stroke patients who patronized any of the physiotherapy modalities such as exercise, massage, electrotherapy etc. This was then multiplied by the cost of each modality to arrive at the cost of therapy.

Cost of mobility (walking) aids: A proportion of stroke patients who were encountered using mobility aids such as tripod, quadripod was determined and multiplied by the cost of each mobility aid.

The total therapy related cost was obtained by summing the cost of each modality and the mobility aids.

The non- therapy related cost was calculated as follows:

Transportation cost: This was computed by adding up the travel cost incurred by patients in seeking physiotherapy services.

Cost of food and drinks for patient and caregiver during treatment: This was calculated by summing the cost of food and drinks incurred by family members for patients and caregivers during physiotherapy care.

Other miscellaneous costs: The costs of other miscellaneous such as phone call made during care were computed by adding up the miscellaneous costs incurred by households in seeking physiotherapy service.

The total non-therapy related cost was therefore calculated by adding up total cost of transportation, total cost of food and drinks for patients and caregivers during treatment and total miscellaneous costs.

The total direct cost was determined by summing the total cost of therapy related and the total non-therapy related costs.

3.11.2 Estimation of Indirect Cost

The human capital approach which measures output losses by lost earnings was used in estimating the indirect cost. Productivity loss was therefore valued using the 2015 national minimum wage in the country (that is GHS7.00 per day).

Productivity losses: The estimation of household indirect cost is shown in the Table 2:

Table 2: Estimation of household indirect cost in seeking physiotherapy services

No	Category	Cost Estimation Approach
1	Days lost to patients (employed)	This is the summation of days lost to patients who are employed due to stroke per month
2	Days lost to household members	This is the summation of days lost to household members as a result of stroke per month
3	Productivity loss due to travelling time	This is the summation of the total number of hours spent by household members as travelling time to seek physiotherapy service per month
4	Total Indirect cost	This is the overall aggregation of the total valued productivity losses of patients and household members as a result of the stroke

The productivity days lost to an employed stroke patient was quantified by the estimated average number of days lost to patients who were gainfully employed. Furthermore, the productivity days lost to a family member due to the stroke was computed by the estimated average productivity days lost by family members as a

result of the stroke. Also, productivity days lost to an accompanying family member as travelling and waiting time to seek physiotherapy service was determined by the estimated average number of days lost as travelling and waiting time to seek physiotherapy service respectively.

The overall cost was estimated by the summation of the total direct cost and total indirect cost. The average cost per patient was determined by dividing the overall cost by the number of stroke patients sampled.

3.11.3 Intangible Cost

The Intangible cost was not quantified in monetary terms. However, it was described using the Likert scale. For this study, the Likert scale had a five dimension scale in which patients and family members were asked to rate the statements under each dimension as (1) 'not at all' (2) 'a little' (3) 'moderately' (4) 'quite a bit' (5) 'extremely' in respect of the fear, pain and emotional sufferings. The mean of the responses for each dimension and their individual items under them was estimated for patients and household members. This was then used to describe the effect of stroke on stroke survivors and their family members. The results were then displayed graphically using radar in Microsoft Excel 2010. Table 3 indicates the scale and scores of the intangible cost.

Table 3: Composite intangible physiotherapy cost

No	Domain	Scale	Score range
1.	Fear	1. Not at all 2. A little 3. Moderate 4. Quite a bit 5. Extremely	5-25
2.	Pain	1. Not at all 2. A little 3. Moderate 4. Quite a bit 5. Extremely	3-15
3.	Emotional suffering	1. Not at all 2. A little 3. Moderate 4. Quite a bit 5. Extremely	5-25
	Total		295
	Range		13-295

1 Scores estimated from 5 questions by 5 responses

2 Scores estimated from 3 questions by 5 responses

3 Scores estimated from 5 questions by 5 responses

3.11.4 Composite Intangible Physiotherapy Score

The total composite score was obtained by summing up the responses in each domain and multiplying by the number of questions. The results from the respective domains were subsequently aggregated. The total scores were then used to determine the dimension of low, moderate and high intangible cost with the corresponding range of 13-107, 108-202 and 203-295 respectively using the descriptive statistics tertile approach as shown in Table 4. The score with the range 13-107 was described as low, 108-202 constituted moderate and 203-295 represented high.

Table 4: Composite intangible physiotherapy score ranges

No.	Dimension	Range
1.	Low	13-107
2.	Moderate	108-202
3.	High	203-295

3.12 Statistical Methods

The type of data analysis employed was descriptive statistics of mean, median and standard deviation. Proportions of direct and indirect costs were displayed in pie chart. Subsequently, the average or mean and median costs were displayed in tabular form.

3.13 Ethical Considerations/Issues

3.13.1 Ghana Health Service Ethical Approval

Before the commencement of data collection, ethical approval was sought from the Ghana Health Service Ethical Review Committee of the Research and Development Division of the Service.

3.13.2 Approval from study area

Permission and approval was sought from the Hospital Administration of the Tema General Hospital where the research was carried out before data were collected.

3.13.3 Description of subjects involved in the study

The study population was stroke patients who were attending Tema General Hospital to access physiotherapy service in the last one month or more prior to the collection of data.

3.13.4 Potential Risk /Benefits

This research poses no potential risk to either the study population or the society. The study was envisaged to be beneficial to both the study population and the society in many ways. To begin with, the study will provide the study population knowledge about their annual expenditure on physiotherapy services. Secondly, quantification of household cost of physiotherapy services for stroke patients can be used to set the stage for informing government and policymakers about the economic burden associated with accessing physiotherapy services. Finally, it will provide useful information for strategic planning and budgeting for establishing special physiotherapy service centres for stroke patients at designated communities.

3.13.5 Privacy/confidentiality

Each patient or relative was interviewed on individual basis to maintain privacy and confidentiality. Questionnaires were administered without the names of study participants. Interviews were conducted in an enclosed place to achieve maximum privacy. Data was also reported in aggregates to minimize the likelihood of tracing information to respondents.

3.13.6 Voluntary Consent/Withdrawal

A written informed consent was sought from study participants and their accompanying family members prior to data collection. Participation was totally voluntary and the study participants were given the opportunity to withdraw from the study at any point in time.

3.14.7 Data Usage and Storage

All questionnaires were serialized and coded and kept under key locked up. The coded questionnaires were entered into Epi Info Version 7 and password by the Principal Investigator within 24 hours. Soft copy of the data was stored on external hard drive, pen drive and CD-ROM. The data will be kept by the Principal Investigator for a period of 3-4 years after which the data will be deleted from the external drives, pen drives and CD-ROM. Hard copies will be destroyed.

3.13.8 Compensation

No compensation in any form was given to stroke patients and accompanying family members for taking part in the study. However, their ideas and contributions were duly considered and appreciated.

3.13.9 Funding Information

This study was self-financed from own resources.

3.13.10 Declaration of Conflict of Interest

The study is purely for academic purpose and of public health importance. I therefore declared that I have no other personal interest in the study.

3.14 Assumption

The key assumption made in this study was that the prevailing national minimum wage in the country is reflective of the average income earned per day by respondents.

3.15 Limitations

The total number of days lost as well as time spent in respect of care giving, travelling and waiting for physiotherapy service was largely based on the recall of stroke patients and relatives and therefore might not be accurate and exact. Besides, fear, pain and emotional sufferings relative to the intangible cost were not determined in monetary terms but described using the Likert's scale.



CHAPTER FOUR

RESULTS

4.1 Background Characteristics of Respondents

A total of 152 questionnaires were administered to stroke patients and their household attending Tema General Hospital to access physiotherapy care. There was a 100% response rate. Sixty-one percent of the total respondents were male while thirty-nine percent constituted female respondents. The oldest respondent was 86 years and the youngest 19 years with a mean age of 58 years and a median age of 58 years. The age standard deviation was 11 years.

The respondents who were married constituted 89.5% with only 10.5% not married. Table 5 indicates that tertiary constituted the highest level of education for respondents accounting for 34%. This was followed by respondents with Middle school/Junior High School that made up 25.0%. The least recorded level of education among respondents was primary. Most of the respondents interviewed were employed constituting 81.6% prior to their sickness.

The most accessed modality therapy by respondents was exercise therapy accounting for 92.8% with electrotherapy constituting the second service of 5.9%. Most of the respondents were National Health Insurance Scheme (NHIS) card bearing members making up 73.7% of total respondents. Of all the respondents, 31.6% worked in the public sector. Respondents who were self-employed constituted 25.7% while pensioners accounted for 21.1% of the total respondents. The respondents who worked for someone else or other person was 62.5% while self-employed represented 27.0% of the total respondents. The least reported income earned in a month by a household was GHS500.00 (US\$120.19) while the highest reported monthly income

was above GHS 4000 (US\$961.54) as shown in Table 5. Again, the mean and median reported household income was GHS539.09 (US\$129.59) and GHS600.00 (US\$144.23). The most common modality therapy was exercise therapy.

4.2 Type of Physiotherapy Services at Tema General Hospital

The following types of physiotherapy services for stroke patients were identified at the Physiotherapy Department of the Tema General Hospital; (a) Exercise therapy; (b) Massage therapy; (c) Heat/thermo therapy; (d) Electrotherapy; and (f) Cryotherapy

4.3 Direct Cost of Physiotherapy Service

The total direct cost of physiotherapy service was estimated to be GHS16,123.05 (US\$3,875.93), constituting 30% of the cost profile of physiotherapy services. The average direct cost was estimated to be GHS162.86 (US\$39.15).

4.3.1 Therapy Related Cost

The total therapy related cost of physiotherapy service estimated was GHS2,299.65 (US\$552.82). Exercise therapy accounted for the highest component of the total therapy related cost estimated and 3.2% of the total cost profile as depicted in Table 6. This was followed by electrotherapy and heat/thermotherapy accounting for 1.1% and 0.1% respectively. Massage therapy was the least therapy accessed by stroke patients.

Table 5: Background characteristics of respondents

Variables	Number (%)
Sex	
Male	92 (60.5)
Female	60 (39.5)
Age (years)	
< 20	1 (0.7)
20-39	34 (22.4)
40-59	50 (32.9)
60 and above	67 (44.1)
Level of Education	
No Education	11 (7.2)
Primary	19 (12.5)
Middle/JHS	38 (25.0)
Secondary/Vocational	32 (21.1)
Tertiary	52 (34.2)
Marital Status	
Married	136 (89.5)
Not Married	16 (10.5)
Past Employment Status	
Self-employed	39 (25.7)
Private work	20 (13.2)
Public work	48 (31.6)
Pensioner	32 (21.1)
Unemployed	11 (7.2)
Others	2 (1.4)
Type of Therapy Modality	
Exercise therapy	141 (92.8)
Massage therapy	2 (1.3)
Electrotherapy	9 (5.9)
Payment Status	
NHIS valid card holders	112 (73.7)
'Cash and carry patients'	40 (26.3)
Current Employment Status	
Unemployed	28 (18.4)
Employed	124 (81.6)
Reported Monthly Income	
0-500	39 (43.8)
501-1000	23 (25.8)
1001-2000	22 (24.7)
2001-3000	3 (3.4)
3001-4000	2 (2.3)

4.3.2 Non-therapy Related Cost

The non-therapy related cost components constituted the largest profile of the total cost of physiotherapy services (26%). It was estimated to be GHS13,823.40 (US\$3,322.93). Walking stick remained the second largest component of the non-therapy related cost of the cost profile estimated at GHS3,320.00 (US\$798.08) translating into 6% after other related cost that made up of GHS5,220.00 (US\$1,254.81). Transportation cost equally accounted for GHS3,286.00 (US\$789.9). Total cost of drink incurred by patients during treatment was estimated to be GHS95.50 (US\$22.96).



Table 6: Cost profile of physiotherapy services

Cost Component	GHS	(US\$)*	Cost profile (%)
Direct Costs			
Therapy related costs			
Exercise therapy (NHIS Insured Patients)	1,269.99	305.29	2.4
Exercise therapy	430	103.37	0.8
Massage therapy	20	4.81	0.04
Heat/thermotherapy	45	10.82	0.1
Electrotherapy (NHI)	24.66	5.93	0.1
Electrotherapy	510	122.6	1
Subtotal	2,299.65	552.82	4.4
Non-therapy related costs:			
Walking stick	3,320.00	798.08	6.19
Tripod	1,070.00	257.21	2
Quadripod	337	81.01	0.6
Other cost	5,220	1,254.81	9.7
Travel	3,286	789.9	6.1
Food	145.2	34.9	0.3
Drink	95.5	22.96	0.2
Miscellaneous	349.7	84.06	0.7
Subtotal	13,823.40	3322.93	25.79
Total direct cost	16,123.05	3,875.93	30.21
Indirect costs ***			
Valued days lost by patients	27,706.00	6,660.10	51.9
Valued productivity lost by household members	9,415.00	2,263.22	17.6
Valued travel time	125.74	30.23	0.2
Subtotal	37,246.74	8,953.55	69.8
Grand total	53,369.79	12,829.28	100

* US\$ equivalent in brackets

** Exchange rate used was GHS4.16 as of June 16, 2015

*** National minimum daily wage for the year 2015 was used to value productivity days lost by households

4.4 Indirect Cost of Physiotherapy Services

The total indirect cost estimated for physiotherapy care was GHS37,246.74 (US\$8,953.55). Table 7 shows the productivity days lost to patients and household due to the stroke. Total days lost by patients were estimated to be 3,958 days while household members spent a total of 1,345 days in giving care to stroke patients which was valued as GHS9,415.00 (US\$2,263.22). Care giving by household member was

1% of the cost profile. Days lost by employed patients was the highest cost profile accounting for GHS2,7706.00 (US\$6,660.10). Productivity loss due to lost employment was estimated at 18% patients who had lost employment as a result of the stroke and translated into GHS9,415.00 (US\$2,263.22). This constituted the second highest cost profile of the total physiotherapy care. The total travel by patients and caregivers was estimated to be 5 days which was valued to be GHS125.75 (US\$30.32) as indicated in table 6. On the whole, the total indirect cost represented 70% of the total cost profile.

Table 7: Household productive day lost

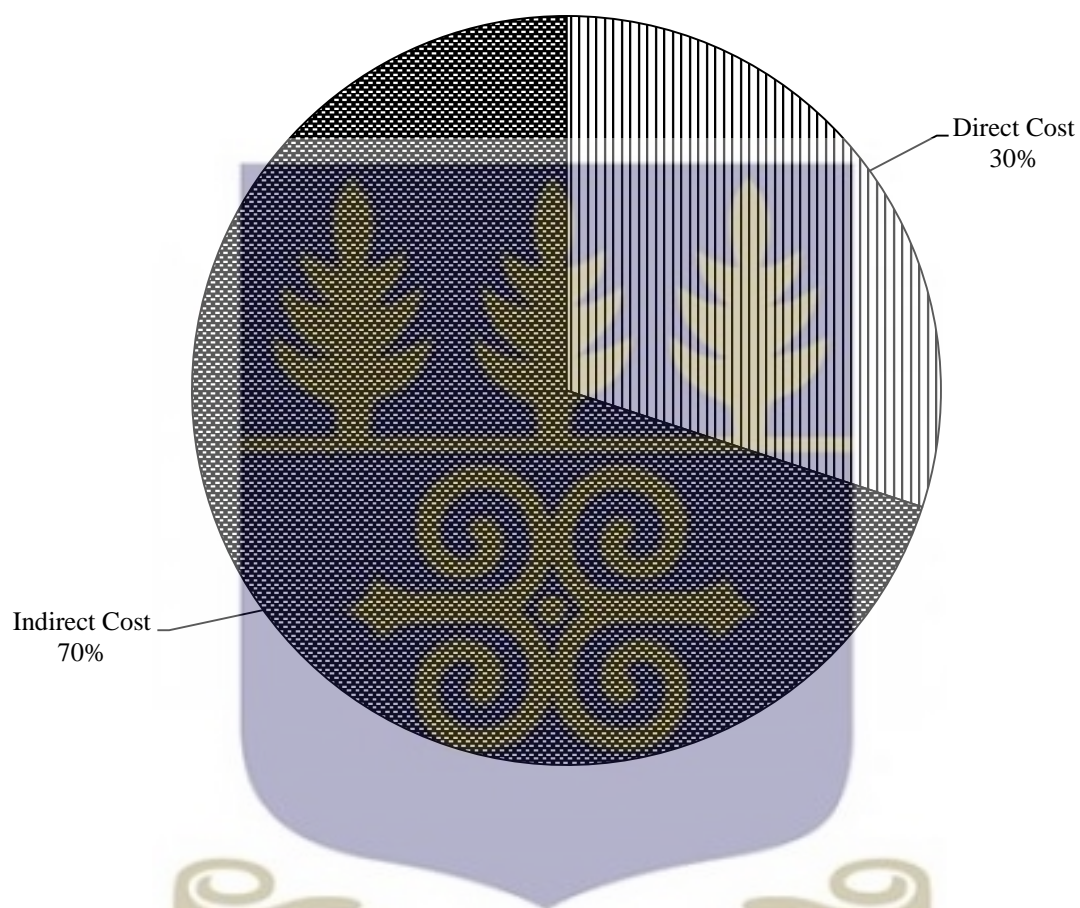
Category	Days lost
Care giving:	
Care giving by household members	1345
Subtotal	1345
Due to stroke illness:	
Days lost by employed patients	3,246
Days lost by unemployed patients	712
Subtotal	3,958
Physiotherapy care:	
Days lost by household members	44
Travel time*	5
Subtotal	49
Total	5,352

*Travel time was collected in minutes and hours and subsequently converted to days using 24 hours =

1day

4.5 Total Cost of Physiotherapy Services

Figure 2: Total household cost of physiotherapy services for stroke patients



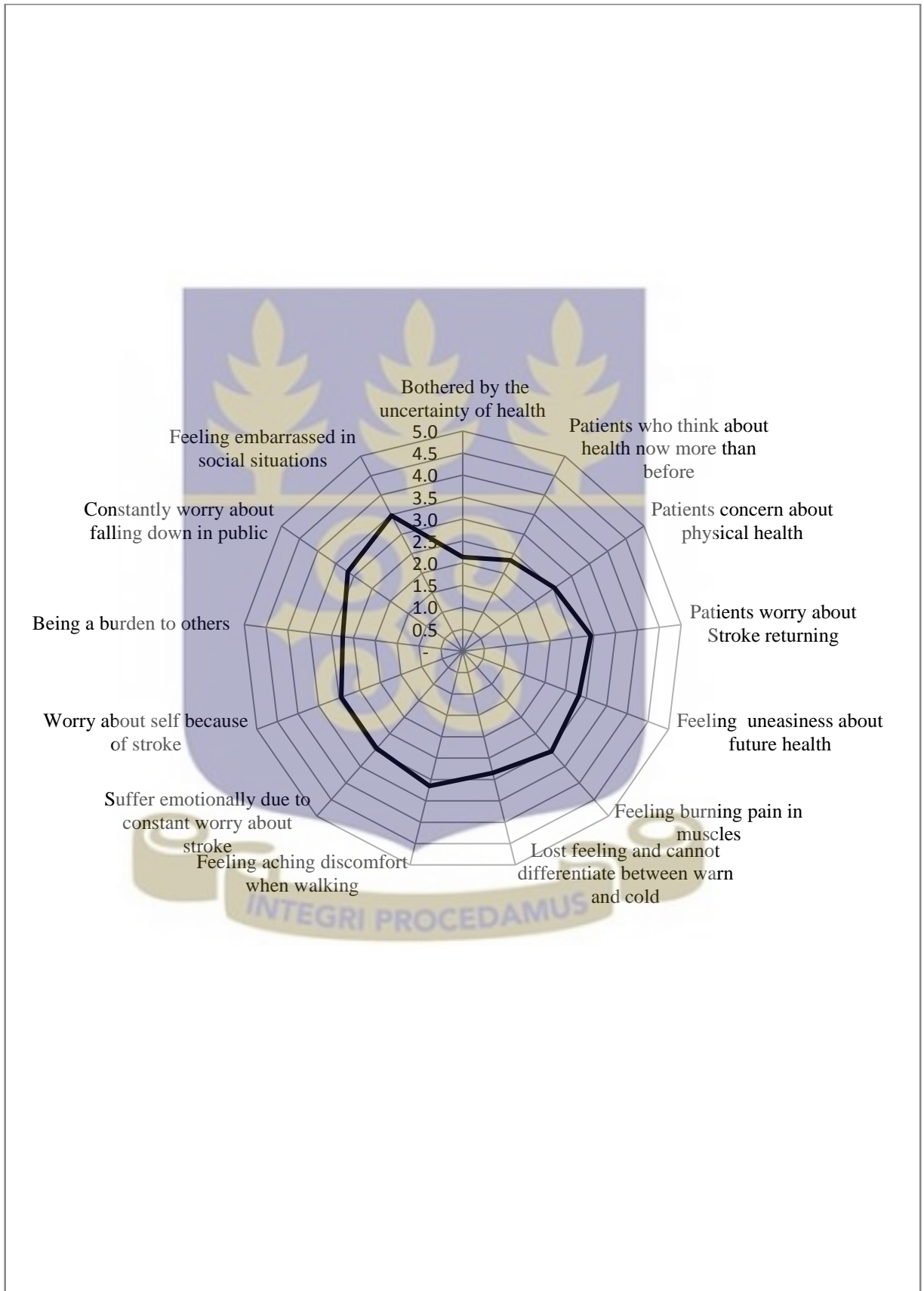
The total cost of physiotherapy services was estimated to be GHS53,369.79 (US\$12,829.30). The total indirect costs constituted the highest proportion (70%) of the total cost as depicted in figure 2. Direct cost accounted for the remaining 30%. Of the direct cost, non-therapy related cost was estimated to be the highest (86%). Therapy related cost estimated constituted the rest of the total direct cost (14%).

4.6 Intangible Cost of Physiotherapy Services

The means of the thirteen intangible cost dimensions for stroke patients is presented in the Figure 3. The dimension with the highest mean was patients feeling embarrassed in social situations (3.5) whereas the one with the least mean was patients bothered by the uncertainty about their health (2.1). The estimated means for constant fear of falling down in public, worry about stroke returning, feeling uneasiness about future health, feeling burning pain in muscles, and being a burden to others were 3.2, 2.9, 2.8, 3.0, and 2.7 respectively. The respective means of all items under the dimensions stated are shown in Appendix III.



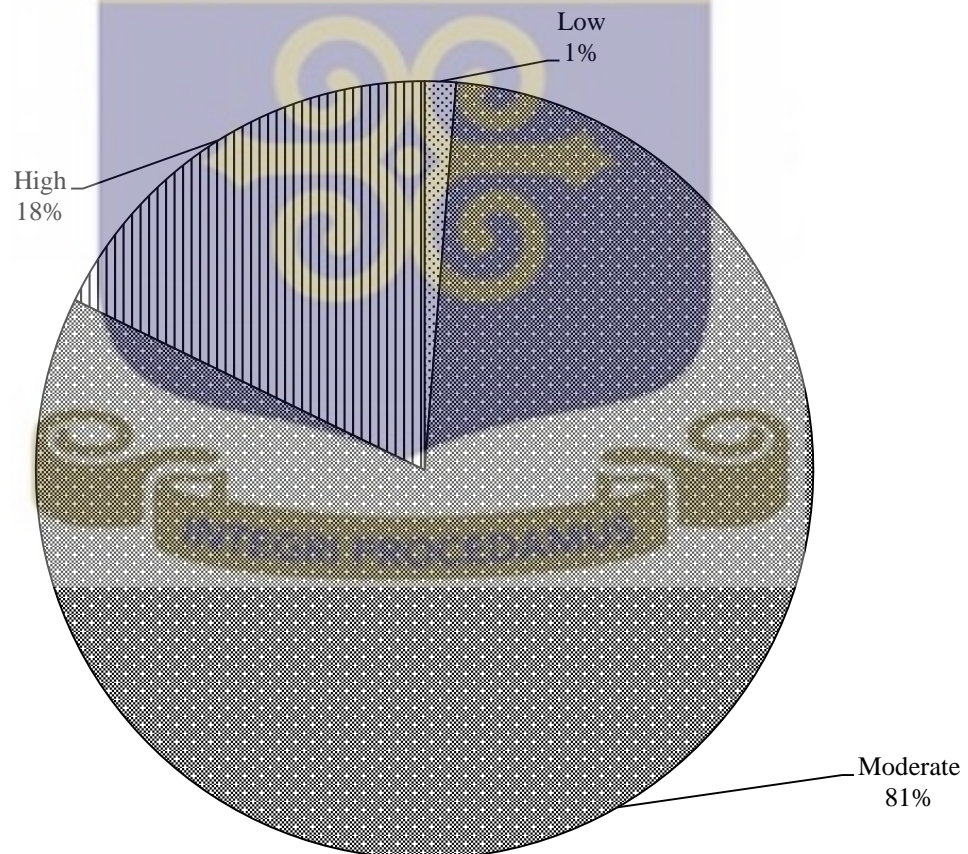
Figure 3: Means of intangible physiotherapy cost for stroke patients



4.7 Composite Intangible Physiotherapy Score

The intangible cost for stroke patients accessing physiotherapy services was further described using the respective composite scores in the dimension of low, moderate and high. The dimension with the least number was 2 and the highest number was 123. The highest composite physiotherapy score was moderate dimension accounting for 81% (123) of the total score. This was followed by a high dimension representing 18% (27). The least score was the low dimension constituting 1% (2). Figure 5 shows details of the various dimensions.

Figure 4: Composite intangible physiotherapy score



CHAPTER FIVE

DISCUSSION

The types of physiotherapy services determined at the Physiotherapy Department of the Tema General Hospital were exercise therapy, massage therapy, heat/thermo therapy, electrotherapy and cryotherapy.

The total cost of physiotherapy services was estimated to be GHS53,369.79 (US\$12,829.30) with indirect cost accounting for 70%. Direct cost which constituted 30% of the total cost had 86% being non-therapy related expenses and 14% therapy related expenditure. The mean of intangible cost estimated for stroke patients was highest for feeling embarrassed 3.5 and least for uncertainty about health (2.1).

5.1 Types of Physiotherapy Services at the Physiotherapy Department of TGH

Exercise therapy is a form of physical activity intended to achieve specific therapeutic goals. Stroke patients were usually engaged in various supervised exercise regimens targeted at the affected body parts mostly the hands, arms, shoulders, and legs. Exercise therapy was therefore categorized into range of motion (ROM), arm strengthening, hand and leg exercises as well as balance exercises. ROM involved moving the joints of patients in different directions to help keep the joint flexible, minimize pain and improve balance and strength. ROM could be passive, active or active assistive. The arm strengthening exercise entails gradual and slow movement of the arms of stroke patients against resistance or using either dumbbells or theraband in order to overload the muscle to become stronger. Hand exercise was concerned with picking up grains of maize by stroke patients one at a time transferring each one to the palm of the other hand and holding onto it as the next grains of maize were being

picked up. Other hand exercises were stack pennies, playing checkers, and putting puzzles together. This was meant to improve fine motor skills as well as restore hand function. Leg exercises comprised foot and ankle circles, sitting knee extension, squats, standing knee extension among others. Balance exercises which were meant to prevent falls and improve activities of daily living composed of weight shift side to side, weight shift forward and back. Other forms of exercises for stroke patients include walking, stair climbing, riding static and elliptical cycles as well as holding and squatting using wall bar.

Another physiotherapy treatment available at the department was massage therapy. It encompasses rubbing and manipulating defective muscles and joints of stroke patients to increase blood circulation, decrease anxiety and stress as well as reduce muscle stiffness. The physiotherapist usually made the patient comfortable in bed at screened area and squeezed fluid into her hands and started rubbing the areas with motor loss applying little pressure, using the thumbs and asking the patients whether to go deeper with the rubbing or not. Essentially, all body parts of stroke patients (face, neck, thighs, knees, shoulders, foot, calves etc.) were therapeutically massaged by physiotherapists except the genitals and breast.

Additionally, physiotherapists applied heat at the regions with motor loss to improve blood flow and thus enhance healing. The thermotherapy devices used on patients were paraffin wax, hot packs, infrared heat and shortwave diathermy.

Electrotherapy modality comprises placing electrodes on the skin of stroke patients which caused changes in the muscles to enhance the body's natural ability to stimulate and control the healing and repair processes. The clinical effects were to relieve pain, reduce edema and increase circulation. This modality also requires the

use of ultrasound machine and lumber traction for stimulating the bodies of stroke patients.

Cold therapy or cryotherapy as the name implies involves the application of cold to the body parts of stroke patients with musculoskeletal challenges. The main aim was to relieve patients of pain, minimize swelling and edema formation. It was seen to be useful after deep kneading massage for stroke patients as well as during acute strains and sprains conditions. The most common types of cold therapy employed were cold or ice packs, ice massage and cold gel pack.

5.2 Direct Cost of Physiotherapy Services

The direct cost estimated was 30% of the total cost of physiotherapy services. This is less as compared to that estimated by Birabi *et al* (2012) in Nigeria which made up of 46% of the total cost of physiotherapy intervention. This difference can be attributed to the components of cost calculated and the perspective of the cost study. Birabi *et al* (2012) estimated cost of physiotherapy intervention from government and private hospital (Provider) perspectives whilst this study looked at the cost from the patient perspective only. Societal perspective looks at the cost of both the patient and the provider's viewpoint. Birabi *et al* (2012) estimated the direct cost to the care provider which comprised cost of medication and medical investigations whereas this study explored only the cost to the patient and the household. However, of the cost incurred by patients and households, therapy related cost constituted only 14% of the total direct cost.

The findings of this study are consistent with those of Addo *et al* (2013) and Casado *et al* (2006). In evaluating the household cost of mental health, Addo *et al*

(2013) found direct cost to constitute 26% of the total direct cost even though components of cost estimated varied slightly with this study. The study basically evaluated direct and indirect costs of mental illness to patients and their families. Casado *et al* (2006) also found direct cost accounting for a large proportion (60%) of the total cost of multiple sclerosis. The cost components evaluated included cost of ambulatory assistance, rehabilitative exercise, transport, mobility aids and informal care provided by relatives.

Out of the total direct cost estimated, therapy related cost and non-therapy related accounted for 14% and 86% respectively. This corroborates the findings of Amoakoh and Aikins (2013) where medical cost constituted 3% and non-medical 97%. Components of cost estimated in each case were, however, different for direct cost. Additionally, Das Gupta and Guest (2002) estimated the non-healthcare direct medical cost of mental healthcare as 79% of the total direct cost, which further firms up the findings of the study. Their direct medical cost accounted for the direct mental healthcare and treatment (in-patient days costs and out-patient cost) and non-direct treatment (for example medical treatment in non-mental health settings). The non-therapy related cost constituted 86% of the total direct cost. This is comparable to that of Amoakoh and Aikins (2013) and Saka *et al* where it constituted 97% and 60% respectively. The components of costs calculated were fundamentally the same accounting for the observed similarities. Travel/transportation cost comprised 23.8% of the total non-therapy related cost.

5.3 Indirect Cost of Physiotherapy Services

The total indirect cost estimated for physiotherapy services was GHS37,246.74 (US\$8,953.55), constituting the highest proportion (70%) of the total cost of physiotherapy services. This concurs with the findings of Addo *et al* (2013) and Das Gupta and Guest (2002). Addo *et al* estimated indirect cost as total productive losses which were as a result of the negative effect of mental illness on the patient's capacity to work. The overall output losses evaluated was 74% of the total cost of mental illness. Besides, Das Gupta and Guest (2002) estimated the indirect cost to be 76.9% of the total bipolar disorder in the United Kingdom. Out of this, excess unemployment constituted 85% whereas the cost estimated for productivity days lost by stroke patients who were gainfully employed was 51.9% of the total indirect cost in this study. The cost due to care giving by household members made up the second highest proportion (17.6%) of the total indirect cost of physiotherapy services incurred by stroke patients at the Tema General Hospital.

However, in contrast to this study, the estimated indirect cost of out-patient treatment of buruli ulcer in Ghana by Amoakoh and Aikins (2013) constituted 4% of the total indirect cost because of the fact that respondents were residents at home coupled with being students whose productivity was not valued. This is not the case in this study. Casado *et al* (2006) found indirect cost to be 40% of the total cost of multiple sclerosis. This therefore affirms the findings of this study.

It must be noted that the estimated indirect cost of this study may have been overestimated or underestimated simple because some employee may in reality be earning more or less than the approved national daily minimum wage in the country that was applied to value the productivity days lost. This defect could be rectified in future studies when patients and household members endeavour to disclose the right

estimate of their monthly incomes. Additionally, productivity losses could have been over or undervalued because of recall and respondents not knowing the exact and actual hours lost due to stroke. This limitation can also be addressed if a prospective study is undertaken rather than a retrospective study such as this study.

5.4 Total Cost of Physiotherapy Services

The total cost of physiotherapy services was estimated to be GHS53,369.79 (US\$12,829.28). However, there was no marked difference among the various cost components incurred by the respondents. The average monthly cost of physiotherapy services incurred per patient was estimated at GHS539.09 (US\$129.59). This is higher in comparison to that estimated by Addo *et al* (2013) (GHS103.77 per month per patient). The difference between these costs can be attributed to the respective cost components that were estimated as well as the various perspectives of the cost of illness study. The mean cost is, however, consistent with that of Amoakoh and Aikins's (2013) that arrived at a mean cost of US\$521.04. It is significant to note also that the studies of Addo *et al* (2013) and Amoakoh and Aikins (2013) as well as this study dwelt on only the cost incurred by patients and their household and did not include the actual cost of providing physiotherapy services to stroke patients. It is therefore clear that the cost of physiotherapy services estimated is largely based on the perspective of cost of illness and the components of cost estimated relative to stroke patients.

Moreover, with the reported median monthly income of respondents being GHS600.00 (US\$144.23) and the cost of physiotherapy services per stroke patient per month as GHS539.09 (US\$129.59), it can be estimated that cost of physiotherapy

service accounts for 89.8% of the income accruing to them on monthly basis. However, under the National Health Insurance Scheme Act, (Act 852) (2012) stroke patients have a maximum of 12 sessions out-patient department physiotherapy services irrespective of the type of modality to undergo at the gymnasium. In spite of this, stroke patients intending to access physiotherapy care have to incur some cost including cost of mobility aids and transportation which serves as a huge financial burden to both the patients and their household. It therefore presupposes that adequate provision has not been made in the National Health Insurance Scheme to fully cater for the physiotherapy care of stroke patients.

The direct non-therapy related cost including cost of walking stick, quadripod and tripod constituted 86% of the total direct cost can be reduced if sufficient provisions were made for these mobility aids and other costs in the Scheme. Again, the 12 sessions approved for stroke patients in seeking physiotherapy service under the Scheme is woefully inadequate since stroke patients required 18 or more sessions of the various physiotherapy interventions to achieve and maintain sensorimotor control of the upper and lower limbs, dexterity as well as activities of daily living (Pollock *et al.*, 2008). The remaining 6 sessions have to be borne by patients and their household at the point of service delivery. The aggregate of physiotherapy care for stroke patients would have been higher if intangible costs were to be quantified in monetary terms. The study by Xie *et al* (2008) pointed out that intangible cost forms the highest proportion of cost of illness. To this end, the total cost of physiotherapy services arrived at in this study may not be the true reflection of the real household cost of physiotherapy services for stroke patients. This shortcoming can be adequately addressed in future studies by valuing the intangible cost in monetary terms.

5.5 Household Intangible Cost of Physiotherapy Services

The findings of this study revealed that 94.3% of stroke patients felt embarrassed in social situations as a result of their illness (mean score of 3.5). As such they were unable to attend and mix well with other people at social gatherings. This assertion was further buttressed by 86.3% (mean score of 3.2) of stroke patients who constantly expressed their apprehension and anxiety of falling down in public due to their conditions. Stroke patients therefore endured some level of emotional sufferings resulting from the illness. Similar proportion of patients indicated feeling arching discomfort when walking. On the hand, stroke patients who expressed burning pain in their muscles, nerves and around their shoulder had a mean score of 3.0, suggesting that pain was the next component of the intangible cost that bother stroke patients.

However, the least mean score in the domain of pain was 2.1 which implied that stroke patients were not bothered so much by the uncertainty of their health. Household members (mean score of 2.7) postulated that stroke patients were not a burden to them. The emotional suffering and perhaps the condition of stroke patients could have been worsened if household members had perceived stroke patients to be burden to them. Although the stroke patients could have considered themselves to be burden to their relatives, this was not ascertained and hence a limitation of this study. This defect can be corrected in further studies when questionnaires are administered at the household level and intangible cost of each member of the household estimated, and the mean taken as the household intangible cost.

5.6 Composite Intangible Physiotherapy Score

The intangible cost for stroke patients seeking physiotherapy services was further described using the composite scores to determine the variations of patients' response to the combined intangible cost items. The highest composite physiotherapy score was moderate dimension making up 81% (123) of the total score. This was followed by the high dimension representing 18% (27). The least score was the low dimension constituting 1% (2).

The highest composite physiotherapy score in the dimension of moderate implies that the response of more than two-thirds of stroke patients to the composite intangible cost items was marginal as compared with their reactions to the individual intangible cost items. The scores further revealed that less than one-third of stroke patients responded above average or were significantly affected by the composite intangible cost variables. Only two stroke patients were little and minimally affected by the composite variables. However, irrespective of the level of dimension, stroke patients to a large extent express fear, endure some level of pain and suffer emotionally and therefore need treatments. Whilst stroke patients who scored moderate and high dimensions are likely to continually seek physiotherapy services and counseling, those in the score of low dimension may not necessarily need much physiotherapy care and counseling since they are not much affected. Household members and caregivers can therefore play significant roles in managing the effects of these variables on stroke patients.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The cost of physiotherapy services for stroke patients and their households can be categorized into direct, indirect and intangible costs. Based on the findings of the study a number of conclusions were drawn.

Firstly, direct non-therapy related costs such as walking stick, tripod, quadripod, travel and other costs made up one-third of the total direct therapy cost which was borne by stroke patients and their households.

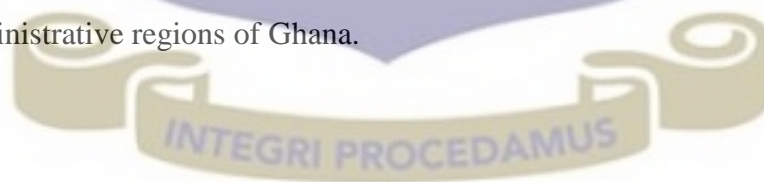
Secondly, indirect cost constituted two-thirds of the total cost of physiotherapy services for stroke patients estimated. To this end, patients and their households should be made aware that costs associated with physiotherapy rehabilitation could be exorbitant and hence the need for households to financially support stroke patients to undergo rehabilitation.

The study further identified that stroke patients suffer emotionally in the form of embarrassment in social situations as well as constant fear of falling down in public as a result of the stroke. In this regard, household members and caregivers can help in managing the emotional aspects associated with stroke.

6.2 Recommendations

This study aimed at estimating the cost incurred by stroke patients in seeking physiotherapy services at one of the public hospitals in the country. The following recommendations are therefore made in respect of the findings of the study;

1. The total household cost of physiotherapy services estimated in this study should serve as a reference point for strategic planning and budgeting for future physiotherapy services, informing government and health policy makers in instituting a financial framework as well as options for preventive, promotive and intervention programmes for stroke patients.
2. There is the need for regular psycho-social counseling for stroke patients and their caregivers to mitigate the emotional sufferings associated with stroke. Households should be encouraged to offer financial supports to stroke patients to enable them to undergo physiotherapy rehabilitation.
3. Finally, further studies should be conducted into estimating the total cost of physiotherapy services for stroke patients from the societal perspective at various levels of physiotherapy rehabilitation centres and across all the administrative regions of Ghana.



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APPENDICES

Appendix I: Informed Consent for participation

Research Title: **Household Cost of Physiotherapy Services for Stroke Patients at Tema General Hospital.**

Introduction

My name is Yakubu Mohammed, a student from the School of Public Health, College of Health Sciences, University of Ghana, Legon. I am carrying out a study on the Household Cost of Physiotherapy Services for Stroke Patients at Tema General Hospital. The main objective of the study is to estimate the household cost of physiotherapy services for stroke patients attending Tema General Hospital.

Procedures

The study will involve answering questions from a closed-ended questionnaire about the cost incurred by patients and household members in seeking physiotherapy services. Participation in the study is absolutely voluntary and no coercion to obtain responses from participants. It will be much appreciated if you could participate in this study. The study is purely academic and forms part of the requirements for the award of a Master degree in Public Health.

Risks and Benefits

This research poses no potential risk to either the study population or the society. There is no direct benefit to you for participation or monetary gain. However, the study is envisaged to be beneficial to both the study population and the society in many ways. To begin with, the study will provide the study population knowledge about their annual expenditure on physiotherapy services. Secondly, quantification of household cost of physiotherapy services for stroke patients can be used to set the stage for informing government and policymakers about the economic burden associated with accessing physiotherapy services. Finally, it will provide useful information for strategic planning and budgeting for establishing special physiotherapy service centres for stroke patients at designated communities.

Voluntary Participation

Participation in this study is voluntary and you can choose not to answer any individual question or all the questions. You are free to withdraw from the study at any time. However, you are kindly requested to fully participate in the study since

your answers are important to help estimate the cost of physiotherapy services to the household.

Anonymity and Confidentiality

You are assured that all information provided will be kept confidential, privacy and would not be shared with anybody who is not part of the study team.

Dissemination of Results

A durbar (including hospital staff, patients’ households and other key stakeholders of health) will be held at the hospital to disseminate the findings of the study at Tema General Hospital. A copy of the study will be kept in the hospital as reference.

Before taking Consent

Do you have any questions you wish to ask about the study? Yes No

If yes, please, indicate the questions below).....
.....

In case you have any questions later please, do not hesitate to contact **Yakubu Mohammed**, Department of Health Policy, Planning and Management (Tel: 0202698585). School of Public Health, University of Ghana. Email: yakumoha@yahoo.com.

Also, if you need further clarifications about this study please, kindly contact the Administrator of the Ghana Health Service Ethical Review Committee, **Hannah Frimpong** (0243235225 or 0507041223). Email: Hannah.Frimpong@ghsmaail.org.

Voluntary Consent

I have read the information provided above, or the information above has been read to me and I understand. I have been given the opportunity to ask questions regarding this study; questions have been answered to my satisfaction. I now voluntarily agree, and also voluntarily agree for my relative to participate in this study knowing that I have the right to opt out and also withdraw my relative from this study at any time without affecting future health care services.

.....
.....
.....
.....
Name of household head/relative Signature Thumbprint Date

.....
Name of witness Signature Thumbprint Date

.....
Name of researcher Signature Thumbprint Date

.....
Name of interviewee Signature Thumbprint Date

Interviewers Statement

I, the undersigned, have explained this consent to the subject in English language/Ga/Twi, and that she/he understands the purpose of the study, procedures to be followed, as well as the risks and benefits of the study.

The participant has fully agreed to participate in the study.

Signature of Interviewer.....

Date.....

Address.....



Appendix II: Questionnaire

TITLE: Household Cost of Physiotherapy Services for Stroke Patients at Tema

General Hospital

Dear Respondent,

This is a research carried out on **Household Cost of Physiotherapy Services for Stroke Patients at Tema General Hospital**. I will therefore like to take a few minutes of your precious time to answer these questions as candidly as possible. You are assured that the answers you give will be strictly confidential and your name will not be mentioned in my research reports.

Qns No.	Questions	Response
	Respondent ID	_ _ _ _ _ _ _
Section one	Demographic Information	
1.	Sex 2. Male 3. Female	_ _
2.	Age in years (above 18 years)	/_ _ /_ _ /
3.	What is your current level of education? 1. No education 2. Primary 3. Middle/JHS 4. Secondary/Vocational 5. Tertiary	_ _
4.	What is your marital status? 1. Married 2. Not married	_ _
5.	Employment status 1. Unemployed 2. Employed	_ _

6.	<p>What type of therapy modality are you seeking at the physiotherapy department?</p> <ol style="list-style-type: none"> 1. Exercise therapy 2. Massage therapy 3. Heat/thermo therapy 4. Electrotherapy 5. Cryotherapy 6. Other(Specify) 	_ _
7.	How many times in a week did you come for therapy?	_ _ _ _
8.	<p>Do you have a valid National Health Insurance Scheme card for this year?</p> <ol style="list-style-type: none"> 1. Yes 2. No 	_ _
9.	<p>If no how did you pay for your therapy fee?</p> <ol style="list-style-type: none"> 1. By myself 2. By employer 3. By relative 	_ _
10.	<p>What was your occupation before the illness?</p> <ol style="list-style-type: none"> 1. Self-employed 2. Private work 3. Public work 4. Apprentice 5. Pensioner 6. Unemployed 7. Farmer 8. Other (specify)..... 	_ _
11.	<p>Were you doing this work for a member of your family, for someone else, or were you self-employed</p> <ol style="list-style-type: none"> 1. Family member 2. Someone else 3. Self-employed 	_ _
12.	<p>Were you paid in cash or kind for this work or you were not paid at all?</p> <ol style="list-style-type: none"> 1. Cash only 2. Cash and kind 3. In kind only 4. Not paid 	_ _
13.	If paid in cash, how much were you paid in cedis?	_ _ _ _ _ _ _ . _ _ _ _

14.	Are you still working? 1. Yes 2. No	<input type="text"/>
15.	If yes to question 14, has there been a reduction in your pay or salary? 1. Yes 2. No	<input type="text"/>

SECTION TWO (DIRECT COST)

16. How much have the household spent on the following through seeking physiotherapy services for the last one month?

Therapy Related Cost

Type of therapy	Cost category	
	NHI GHS	Cash GHS
1. Exercise		
2. Massage		
3. Heat/thermo		
4. Electrotherapy		
5. Cryotherapy		
6. Others (Specify)		
Mobility Aids		
7. Walking Stick		
8. Tripod		
9. Quadripod		
10. Others (Specify).....		

17. Non-Therapy related Cost

Cost Category	Amount paid for each category GHS
Travel cost (transportation)	
Food during therapy	
Drink during therapy	
Other miscellaneous cost (e.g. phone calls)	

SECTION THREE (INDIRECT COST)

18. How many days within the last one month have you absented yourself from work because of your stroke? |___|___|

Household (To be answered by household head or his/her representative)

19.	How many hours did you spend travelling in and out to seek physiotherapy service in the last visit?	___ ___ . ___ ___
20.	How many hours did you spend seeking physiotherapy service?	___ ___ . ___ ___
21.	How many days within the last one month have you absented yourself from work because you had to take your relative to access physiotherapy services?	___ ___ ___
22.	How many hours in a day does a household member spend in taking care of you out of his/her own usual activities?	___ ___ . ___ ___

SECTION FOUR (INTANGIBLE COST)

23. Please, rate the following statements from “not at all” to ‘extremely’ depending on how it applies to you.

FEAR		
23a.	I am bothered by the uncertainty of my health 1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely	___
23b.	I think about my health now more than before I had my stroke 1. Not at all 2. A little 3. Moderately	___

	<p>4. Quite a bit 5. Extremely</p>	
23c.	<p>Because of my physical health, my future is of concern to me</p> <p>1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely</p>	____
23d.	<p>I am always worry about my stroke returning</p> <p>1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely</p>	____
23e.	<p>When I think about my future health, I feel some uneasiness</p> <p>1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely</p>	____
PAIN		
24a.	<p>I always feel burning pain in my muscles, nerves and around my shoulders</p> <p>1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely</p>	____
24b.	<p>I lose my feeling and not able to tell the different between warm and cold</p> <p>1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely</p>	____
24c.	<p>I feel aching discomfort when I am walking</p> <p>1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely</p>	____
EMOTIONAL SUFFERING		
25a.	<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 type="text"/>
25b.	<p>I feel worry about myself 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 type="text"/>
25c.	<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 type="text"/>
25d.	<p>I am constantly worry about falling down in public</p> <ol style="list-style-type: none"> 1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely 	<input type="text"/>
25e.	<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 type="text"/>

THANK YOU.



Appendix III: Means of Intangible Cost Items

Intangible cost	Frequency					Mean
	Not at all	A little	Moderately	Quite a bit	Extremely	
Fear						
Bothered by the uncertainty of health	44	64	27	13	4	2.13
I think about my health now more than before I had the stroke	26	66	47	9	4	2.33
Patients concern about physical health	33	35	61	16	7	2.53
Always worry about my stroke returning	18	39	48	29	18	2.93
I feel uneasiness about my future health	19	40	54	26	13	2.82
Pain						
I always feel burning pain in my muscles, nerves and around my shoulders	17	34	47	34	20	3.04
Lost feeling and cannot differentiate between warm and cold	24	39	46	22	21	2.85
Feeling aching discomfort when walking	12	27	54	44	15	3.15
Emotional Sufferings						
Suffer emotionally due to constant worry about condition	21	31	48	39	13	2.95
Worry about self because of stroke	14	43	50	27	18	2.95
I think I am a burden to others because of my illness	24	45	44	24	15	2.74
Constantly worry about falling down in public	18	28	42	38	26	3.17
Feel embarrassed in social situations	16	23	33	32	48	3.50

Appendix IV: Ghana Health Service Ethical Approval

GHANA HEALTH SERVICE ETHICAL REVIEW COMMITTEE

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



*My Ref. :GHS-ERC: 3
Your Ref. No.*

Research & Development Division
Ghana Health Service
P. O. Box MB 190
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Email: Hannah.Frimpong@ghsmail.org

23rd March, 2015

Mohammed Yakubu
School of Public Health
University of Ghana
Legon, Accra

ETHICAL APPROVAL - ID NO: GHS-ERC: 66/02/15

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

“Household Cost of Physiotherapy Services for Stroke Patients at Tema General Hospital”

This approval requires that you inform the Ethical Review Committee (ERC) when the study begins and provide Mid-term reports of the study to the Ethical Review Committee (ERC) for continuous review. The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Please note that any modification without ERC approval is rendered invalid.

You are also required to report all serious adverse events related to this study to the ERC within seven days verbally and fourteen days in writing.


You are requested to submit a final report on the study to assure the ERC that the project was implemented as per approved protocol. You are also to inform the ERC and your sponsor before any publication of the research findings.

Please note that this approval is given for a period of 12 months, beginning March 23rd 2015 to March 22nd 2016.

However, you are required to request for renewal of your study if it lasts for more than 12 months.

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

SIGNED.....


DR. CYNTHIA BANNERMAN
(GHS-ERC CHAIRPERSON)

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

