

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

**HOUSEHOLD COST OF USING PROSTHETICS AND ORTHOTICS DEVICES
IN MANAGING PHYSICAL DEFORMITIES FOR PATIENTS ATTENDING THE
ORTHOPEDIC TRAINING CENTER, NSAWAM**

BY

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DECLARATION

I, declare that apart from works of other people which have been cited and duly acknowledged, this proposal is an output of my own research and initiative conducted under supervision, and that this research proposal has neither in whole nor in part been presented elsewhere.

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Date

DEDICATION

I dedicate this thesis to all the staff of the Orthopaedic Training Center, Nsawam and all persons with physical disability seeking care at the center. I fervently hope that this work would help formulate appropriate policy for improved prosthetics and orthotics care as well as advocate for increased financial access for persons with physical disability in Ghana.

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LIST OF ABBREVIATION

| | |
|------|----------------------------------|
| COI | Cost of Illness |
| GHC | Ghana Cedi |
| HCA | Human Capital Approach |
| HICs | High Income Countries |
| LICs | Low-Income Countries |
| NHIS | National Health Insurance Scheme |
| OTC | Orthopedic Training Center |
| P&O | Prosthetics and Orthotics |
| SA | Sensitivity Analysis |
| WTP | Willingness to Pay |
| WHO | World Health Organization |

SUMMARY OF PROPOSAL

Background: Mobility is one of the most important aspect of human existence but this is sometimes curtailed by diverse reasons including chronic conditions, malnutrition, war, aggressive behavior at home, the environment, and road traffic accidents. Assistive devices are significant in rehabilitation and support services, ensuring that people with disabilities and impairment have access and, mobility with little or no assistance. Costs of management of deformities with assistive devices service can be extremely high and sometimes unbearable for patients and their households.

Objective: This study seeks to estimate the household cost of using prosthetics and orthotics devices in managing physical deformities for patients attending Orthopedic Training Center, Nsawam.

Methodology: A descriptive cross-sectional cost-of-illness study design was used in the study. A structured questionnaire was used to collect data at the Orthopedic Training Center, for estimating Household Cost of Using Prosthetics and Orthotics Devices in Managing Physical Deformities. Data was obtained from two hundred and fourteen (214) patients. A systematic random sampling method was used to sample participants for the study. Direct costs was estimated from prosthetic and orthotics related and non-prosthetic and orthotics related services such as consultation, standard prosthetics and orthotics devices and repairs, food and transportation costs respectively. Indirect cost was estimated valuing the productivity losses to patients and household due to seeking care. Likert's Scale was used for the description of intangible cost of anxiety, pain and emotional trauma. Data would be sorted, cleaned and entered into STATA (version 14) for analysis and presentation of results.

Results: The total cost of the management of physical deformities using Prosthetics and Orthotics devices was estimated to be GHC 123151.67 (USD 26258.35) with an average cost

of GHC 575.4750935 (USD 122.7) per patient. The direct cost was estimated to be GHC 105574 (USD 22510.4) translating into 85.7% of the total cost while indirect was estimated to be GHC 17577.67 (USD 3747.9) translating into 14.27 % of the total cost. Cost of standard prosthetic and orthotics device was the highest price estimated to be GHC 69110 (USD 14735.60) of representing 56.1% of the total score. The intangible cost with the highest mean was the feeling of hopeless due to your disability (3.58) while the least dimension was the feel of aching discomfort when I am walking (2.3)

Conclusion

The cost incurred by household in managing physical deformities services is high. Policy and decision makers need to consider this in their strategic planning and budgeting for rolling interventions for persons with physical disability.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Assistive devices are significant in rehabilitation and support services, ensuring that people with disabilities and impairment have access and, mobility with little or no assistance. Prosthetics and Orthotics services are required by the majority of people with varying degree of physical disabilities, impairment, loss of limb or arm which might be brought about by various reasons including chronic conditions, malnutrition, those harmed by land mines, war, brutality, aggressive behavior at home, environment, road traffic accidents, domestic wounds, wounds caused by amusements and work related wounds among others (Staats, 1996).

A prosthetic device is an externally applied device used to compensate for the absence or loss of a body structure and body functions. An orthotic device is an externally applied device to stabilize, improve, or restore impaired body functions and structure, related to the neuromuscular and skeletal system. Both prosthetic and orthotic devices can also prevent medical complications and impairments (WHO, ISPO, & USAID, 2017)

According to the World Health Organization (WHO) about 600 million individuals worldwide are debilitated translating into around 10% of the total world populace. Of those individuals, 80% currently live in low-Income Countries (LICs) (Development, 2004). The World Health Survey completed in 2004 found out that, in over 59 nations, the prevalence of handicap in the grown-up populace to be 15.6%, of this 11.8% represent High Income Countries (HICs) compared to 18% in LICs (Marino et al., 2015). The Fifty-Eighth World Health Assembly, in reviewing reports on disability in tandem with administration and rehabilitation asserted that 600

million people live with disabilities of various forms worldwide and also opined that there is an ever increasing number of persons with disabilities (World Health Assembly, 2005). According to the WHO report on Improving Access to Assistive Technology for Everyone, Everywhere. The number of people needing assistive products globally would be beyond two billion by 2050 and one in 10 people with impairment of various sort in need have access to assistive devices (WHO, 2016). The disability population in the low-income countries represents 80% of the 650 million worldwide living with some form of disability (World Health Organisation, 2011). (Helander & UNDP, 1993) projected that by 2035 the population of disabled in low-income countries in need of rehabilitative service will reach 125 million with roughly 30 million people in low income countries in need of prostheses (Chamie, 2011)

Diverse disease conditions require the services of Prosthetics and Orthotics ranging from amputation, diabetes, stroke and also aging. A study conducted by Gould et al, (2011) has shown that over 50% of stroke survivors in Ghana are chronically disabled (Gould et al., 2011) and may require a prostheses or orthoses to function normally. Diabetes is a non-communicable disease which may sometimes lead to amputation and hence requiring use of the prosthetics and orthotics services (Arifin et al., 2017) (WHO, 2006)

Data from the 2010 Ghana Population and Housing Census indicated that there are 737,743 persons with some form of disability, representing 3 percent of the total population. According the report, people with physical challenges represented 25.4% of the disability population with second highest being visual or sight impairment (40.1%) (PHC, 2012)

In Ghana, the National Health Insurance Scheme does not entirely cater for treatment and rehabilitation through prosthetics and orthotics care. The NHIS pays for Out Patient Department folders and cards. Out-of-pocket expenditures plays a key role in Prosthetics and Orthotics

services with these payment covering the cost of transtibial prostheses ,transfemoral prosthesis, chopart, splints, clutches, calipers among others. The cost of prosthetics and orthotics varies across different centers, affected by the importation levy on raw materials such fibre glass, polypropylene, resin, pylon, suction foot and equipment such as routers, ovens, fabrication station, administrative and other miscellaneous charges in the manufacture and rendering of services. The cost of a new transfemoral prostheses ranges between GHC 2000 to GHC3500 cedis, transtibial prostheses cost between 1000 to 1500 cedis, Syme 1500 cedis to 2000 cedis. Other expenses such as transport to facility for care, work time lost, loss of productivity, waiting time, cost of feeding during treatment poses a burden to the individual with disability as well as the household.

The study therefore seeks to determine the household economic cost associated with use of assistive devices, mainly prosthetics and orthotics devices to manage physical deformities at a specialized center in Ghana.

1.2 Statement of Problem

The number of persons with disability globally is increasing. The World Report on Disability estimates between 110 and 190 million grown-ups encounter huge troubles in functioning (World Health Organisation, 2011). The American Academy of Orthotists and Prosthetists asserted in a special study that a number of health trends are partly leads to increase the demand for P&O services. These to include an increase in diabetes (15.3 million new cases since 1980); heart disease (projected more than a 26% increase in cases by 2030); and obesity (up more than 22% since 1960). In the low-income countries, however, the demand for prosthetics and orthotics devices results from conflict, infectious diseases, industrial or traffic injuries (World Health Organisation & International Society for Prosthetics and Orthotics, 2005). Aging has also been

identified as a factor that determines the demand for P&O services (United Nations Population Division, 2016).

Persons with disabilities often need prosthetic and orthotic services to gain mobility. Restoration of mobility is vital towards enjoying fundamental rights such as access to accommodation, food and education; gaining employment, finding a job and earning wages; and for the most part having equal opportunities as every member of the society. Assistive devices may also prevent falls, injuries and other impairments. Consequently, acquiring assistive devices has a long term dividend as it enhances productivity, improves quality of life and its associated economic challenges and a reduction in cost of healthcare. (Chamie, 2011) opined that to enjoy the benefits of assistive devices, patients will usually incur some cost including purchase of the device, regular check-ups and even psychosocial burdens associated with being disabled. Amputee face debilitating physical, mental, and monetary difficulties like exploring hostile landscape, emotional issues, loss of wages, and social dismissal most often (Marino et al., 2015).

The cost of a new transfemoral prostheses ranges between GHC 1500 to GHC2500cedis, transtibial prostheses cost between 1000 to 1500 cedis, Syme 1500 cedis to 2000 cedis. Efforts have being made by government and private entities at providing efficient cost effective prostheses. Regardless of these endeavours, around 95% of the amputee populace in low income countries including Ghana need access to legitimate prosthetic care but are unable to afford the assistive devices.

In Ghana, the main facilities that provide P& O services are Orthopaedic Training Center (OTC) and National Prosthetic and Orthotics Center (NPOC). The cost of management of simple conditions such as the genu valgus and genu varus ranges between GHC 500 for the

conventional model to GH 2000 for the plastic model while drop foot ranges between GH¢ 700 for single and 1500 for bilateral .

While there have been attempts to reduce the cost borne by the patient, caregivers and household with the introduction of the National Health Insurance Scheme, the NHIS only cover basic and OPD services such as outpatient folder leaving the more demanding bill such the transtibial prostheses, transfemoral prosthesis, chopart, physiotherapy for the patient.

Again, research to ascertain the cost borne by persons with physical deformities and their households in the management of the condition in Ghana remains a grey area. This study sought to assess the cost borne by persons with physical deformities and their households.

1.3 Study Objectives

1.3.1 General objective

The general objective of the study is to estimate the household cost of using prosthetics and orthotics devices in managing physical deformities for patients attending the Orthopedic Training Center (OTC), Nsawam

1.3.2 Specific Objectives

1. To estimate the direct cost of using P&O devices to manage physical deformities at the Orthopedics Training Center (OTC)
2. To estimate the indirect cost of using P&O devices to manage physical deformities at the Orthopedic Training Center (OTC).
3. To determine the intangible cost associated with using P&O devices to manage physical deformities at the Orthopedic Training Center (OTC)

1.4 Research Questions

The study seeks to answer the following questions:

1. What are the direct costs of using P&O devices to manage physical deformities at the Orthopedic Training Center (OTC)?
2. What are the indirect costs of using P&O devices to manage physical deformities at the Orthopedic Training Center (OTC)?
3. What are the intangible costs associated with using P&O devices to manage physical deformities at the Orthopedic Training Center (OTC)?

1.5 Conceptual Framework

Patients attending OTC require diverse services which are not only limited to P& O services but include rehabilitation and counselling. The cost incurred by households for their family member receiving care at OTC in this study would comprise all cost born by the client and family member in the treatment or management of their disability. This will be estimated under three broad categories, namely direct costs, indirect costs and intangible costs.

The direct cost refers to the actual expenditure or treatment that would be borne by patient attending P&O services at OTC. The direct cost would be broken down into direct service cost and direct non-service cost.

Direct service cost expenses emerge from the cost of resources to treat a disease, impairment or disability. These include the cost of medicine, facility stay and outpatient medicinal and nursing services rendered. The direct non-service cost is the expenditure that is incurred due the consequences of the illness or treatment, but which is not incurred in the healthcare sector or the funds are not allocated directly to the medical or healthcare provider. For example, these include

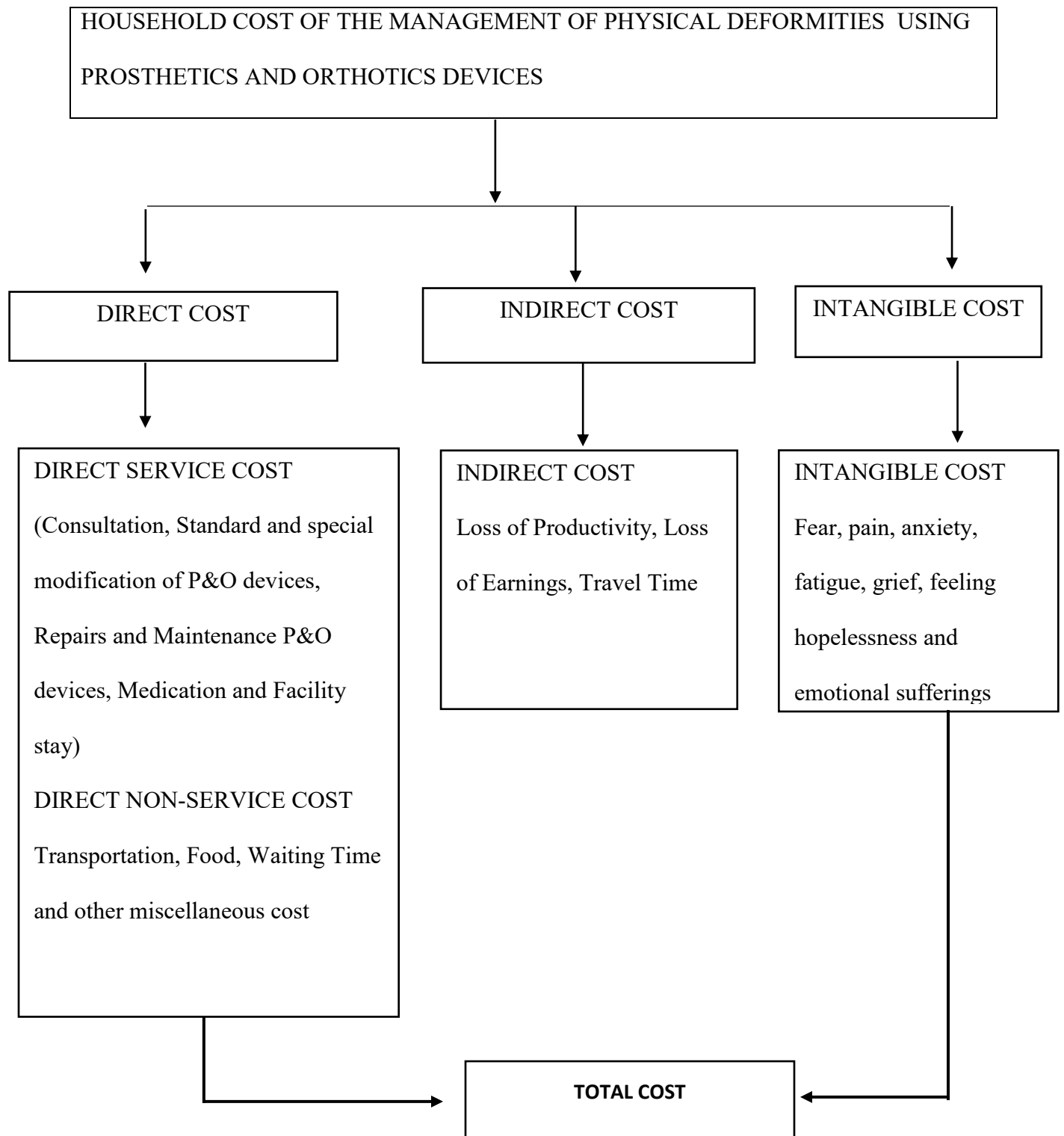
expenditure or illness-related conversion of homes, travel expenses or household assistance (Telsler, Fischer, Leukert, & Vaterlaus, 2011)

The direct cost for this study was divided into direct P&O services cost and direct non-P&O related services cost. In this study, the direct P&O service cost would include the cost of standard P&O devices, repairs of P&O devices, medication and accommodation. The direct non-P&O related services would include food and drinks purchased by the patient, waiting time, transportation and other miscellaneous cost incurred in attending care to OTC.

The indirect costs incurred in the study would assess the loss of productivity due to attending care at OTC. The study would assess the opportunity cost of time lost due to morbidity, temporary and permanent disability attributable to attending care at OTC. The morbidity-related costs would include the productivity loss of time spent by patients and caregiver in out-patient consultations; travel to and from hospital and time lost by patient or persons who accompany the patient seeking care and earning lost by patients and caregiver.

The intangible cost would include issues relating to fear, pain, anxiety, fatigue, grief, feeling hopelessness and emotional sufferings encountered by the patient, caretakers and household due to disability. The conceptual framework draws direct, indirect and intangible cost aspects of attending P&O services at OTC.

Fig 1. Conceptual framework on the household cost of management of physical deformities using P&O Services



1.6 Justification of the study

Prosthetics and Orthotics services provide immense support and improvement for person with disabilities aiding them to become productive, independent, active, contribute to society and reduce the burden associated with most diseases. This, however, comes with a cost which affects the service provision, accessing the service and quality of service provided to the service user.

Knowledge of the healthcare cost (direct, indirect and intangible) incurred by patients seeking care at a typical P& O setting is of great significance in diverse ways such as advancement in the quality of the services rendered, knowing the burden the use of P&O services have on the household and devising cost-effective procedures for P&O services. Health policy reforms, strategic plans and financing or subsidy for P&O services are immense knowledge that can be derived.

The study will facilitate data collection and soliciting the opinions of stakeholders, this would be a formidable line of reference that would be useful in P&O service development, health policy reforms, strategic planning and financing or subsidy for P&O services are immense knowledge that can be derived. Information obtained can also be used by other researchers as references to improve on research conducted in this area.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter looks at relevant literature of various studies that have been undertaken in relation to the study under review. The chapter contains literature on health seeking behaviour for prosthetic and orthotic services. The cost of disease approach that informs the study was explained. The chapter ends with literature on direct, indirect and intangible cost of prosthetics and orthotics.

2.1 History of prosthetics and orthotics

To comprehend the advancement and progress of prosthetics and orthotics, it is imperative to consider the historical perspective to gain a holistic understanding. The historical backdrop of orthotic and prosthetic practice is traceable to ancient times. There is no established fact and no settled actuality relating to where and when the main prosthesis was made ,however, there have been artefact resembling prosthesis and orthoses of as far back with Indian writings portraying artificial legs as early as 1500 (Fliegel & Feuer, 1966) . The Egyptians were the early architects of prosthetic technology. They fabricated rudimentary, prosthetic limbs were made of fibre and these were worn for artistic and to supplement the missing body part without any special attention to its ability to perform the task of the missing limb.

The advancement and development in prosthetics and orthotics is tightly related to amputation and surgery carried out for various reasons such as lifesaving and pain relief during battles and from the aftermath of battle. Wooden prostheses and metal braces were the main resort to by injured comrades after battle since advancement in technology had not yet being achieved. It

quite intriguing to realize that the most significant contributions, improvement in techniques, skills and development in prosthetics and orthotics is deeply rooted in the major world wars and epidemic such polio (Pearlman et al., 2008). Since there was no established and set standard for the prosthetics and orthotics, the practice required more experienced and prior knowledge skills and craft work as such prosthetics and orthotics services were carried out by individual craftsmen such as blacksmith, armour makers and skilled artisans who mostly fabricated artificial limb using wood and metal braces until the World War II (Patel, 2012). The development of prosthetics and orthotics as a health discipline is credited to the World War II and the subsequent period that followed the war.

2.2 Physiotherapy in prosthetics and orthotic services

Physiotherapy also known as physical therapy is one of the major tenant in health care in general and P&O services in particular. Physiotherapy services are often easily available even at a small or moderate health facility. Physiotherapy involves detailed and routine training and care for persons with disability, illness, postoperative and post illness to evolve, maintain, and enhance development potential and functional ability throughout the lifespan.

Physiotherapy aids maintain and enhance wellbeing for all age group, helping patients to deal with discomfort, improve mobility and productivity and furthermore forestall origin and spread of ailment. Physiotherapy is of great significance and one of the key elements in P&O services. Physiotherapy in P&O service takes a different routine from the type rendered at other health facilities.(World Confederation for Physical Therapy, 2011)

Orthopedic approach is one of the most established and widely used forms of physiotherapy and suited towards the treatment of musculoskeletal afflictions – the muscle and bones of the body and rehabilitation of post orthopedic surgery. Orthopedic approach stresses on detailed and

routine training and care for enhancing muscle impairment and stiffness, treatment of chronic impairment, stroke, arthritis, amputation to mention a few emphasizing on joint mobilization, hot or cold packs, electrical stimulation and strength training are usually used (Therapy, 2013)

Geriatric approach on the other hand deals with special and unique movement needs of patients. It is the best approach when dealing with that aged as difficulty arise to adapt to stress placed on the body, the generic approach also takes into account the bio psychosocial needs and challenges of the patient of local and foreign source including finance, home security, transportation and response to stimuli which differs with age. Geriatric approach is done making use of constant repetition at a slow rate as compared to other forms of physiotherapy. Physiotherapy services in management of deformities in P&O services are very key as the manufacture of the prosthetics and orthotics devices. Physiotherapy services train the patients on how to use the devices by talking the patient through routine exercises and therapy in order to determine the strongest and point of weakness of the patient. With this in the mind, the patient would be advised on the appropriate method to care for and use the P&O devices and also to how to adjust and maintain the device in line with diverse factors such as change in weather or season; the terrain; age and educational status

A review of literature in 2006 on unmet needs in Tonga established that 41% of people with disabilities expressed a need for medical advice for their disability with only more than twice the proportion of people received such advice. Also, out of 20% of people with disabilities in need of physiotherapy services, only 6% received it translating to a major cause and increase in physiotherapy related ailment (World Health Organization), 2011)

2.3 Cost-of-Illness (COI) Studies

Cost of illness is one of the primitive, most important method and most acceptable analysis in evaluating the overall economic impact of health care cost and disease. COI is the most widely employed to identify and measure all the costs associated with of a particular disease using all available indicators. Establishing appropriate COI analysis is of great significance but the perspective in which the COI is undertaken is very critical to its effectiveness and it clearly defines the COI. Cost-of-illness analysis can be undertaken from diverse perspectives with each perspective looking at different makers. The use of these different makers or perspective such as; societal, economic, provider, public payer perspective may lead to varying outcome or cost for the same illness. Societal perspective is keenly interested in the estimation of costs to the general public, health care system, outside payers, business sectors, the legislature, and the members of their household

The provider perspective measures the opportunity cost incurred by the facility in rendering services and the patient perspective focuses on the estimation of expenses borne by the patient entirely (Segel, 2006). This perspective is significant in provision of an insight into the cost or burden of disease and in health policy, planning and management. COI studies uses the economics principle of demand and supply delving into money or income gained or lost to a disease or health services provided. This helps in measuring and establishing accepted health care cost not entirely disease cost borne by health care users, health care provider, households, age grouping and gender (Jo, 2014a)

Pertinent needs and interventions formulation is attributed to COI. A broader perspective of the cost accrued or associated with a particular disease, service delivery or cost of care helps in establishing a scale of order in resource and intervention delivery using the available the resource

at hand and a projected or expected funds or resource. This helps in establishing a reference point or benchmark which can be used to measure and determine the usefulness of health policies and interventions, programs, or any sorts of mediations that are intended to decrease or kill the impeding illness impacts and also improving quality of care and service delivery. (Jo, 2014a)

COI estimates is very useful in resource allocation and funding as it is appropriately target the wants, needs and available resource. It is important to know whether a specific disease of interest involves the greater medical and/ or social costs and requires to be addressed urgently by health care and prevention policy. Additionally, the improvement of cost estimates can be a good baseline measure to determine the efficacy of health policies, programs, or any types of interventions that are designed to reduce or eradicate the detrimental disease effects.

The COI gives an understanding of how much society is spending on a specific sickness, and also suggests the sum that would be spared if the ailment were cured.

COI can be described using the data source and the method of estimation. The epidemiological data makes use of the prevalence and incidence approach while economic evaluation makes use of the top down and bottom-up. The prevalence approach estimates the direct cost incurred as well as the loss of productivity due to illness and is compounded annually. The incidence approach, however, stresses on the lifetime costs attributed to a new occurrence in a given period of time (Jo, 2014b) The incidence and prevalence approach stresses on mostly on the disease occurrence over a time period, they both have different assumptions and underpinning which differentiates them and also serves as variance in the cost both estimate. With the prevalence approach, disease costs, ailments, disability and loss of production is associated with the year in which the disease occur while the incidence approach involves estimating the lifetime costs of a

disease, disability and loss of productivity. In using this approach in this study, the COI would be estimated from the first time the patients start to attend care at the OTC, receives the necessary needed treatment and would also include subsequent follow ups. The bottom-up and top down involves an estimation of the lifetime cost incurred as a result of a disease. Using this, data needed for estimating the cost of illness must be readily available and well organized

2.4 Direct Cost

Globally, there has been an increase in amputation, physical deformities and disability in general as a result of ageing, chronic conditions, malnutrition, war, brutality, road traffic accidents to mention a few, this coupled with the ever-increasing expenditure in health care and health service translates into significant increase in the direct cost of health borne by the patient and the household in general. P&O have varying impact on the morbidity and productivity not only for individual or patients attending care but also the household. P&O services make use of diverse procedure which may prevent, enhance and restore impairment or disability and improving the health condition of the individual which comes at a cost

The direct cost refers to the expenditure the individual, household, health facility and health system incurs. In this study, the direct cost would express the expenditure that would be borne by patient or household attending or seeking care. The direct cost would be broken down into direct service cost and direct non-service cost. Direct cost expenses are total monetary estimation cost from the consumption or usage of the facility or resource to treat a disease, impairment or disability. This may include, cost of diagnosis, cost of medicine, facility stays and outpatient medicinal and nursing services as well as physiotherapy service rendered. The direct non-service cost is the expenditure that is lost or forgone due to the illness or treatment, but which is not incurred in the healthcare sector or funds allocated directly to the medical or healthcare provider.

For example, these include expenditure on illness-related conversion of homes, travel expenses or household assistance (Telser, Fischer, Leukert, & Vaterlaus, 2011)

A lot of varying factors and technicalities factor into the direct cost such as out of pocket payment, travel distance and severity of the disease hence there is a direct relationship between the travel distance, severity of disease, availability of medical supply to mention a few, with an increase in one of the factors translating into an ever-increasing cost of seeking care. Direct Cost can be estimated using different approaches, but the main and most appropriate approach of determining and calculating direct cost are namely; top down approach (epidemiological or attributable), Bottom-up and econometric approach (Carey & Stefos, 2011). The top down approach for calculating cost, emphasis on calculating cost by an estimation of medical and other health seeking charges which are related to a particular disease due to exposure to the risk factor or attributable factor of the disease. The top-down approach uses all known total cost expenditures and apportions these costs to broad severity and categories. The bottom-up approach requires the estimation of costs associated with a treatment or service and utilization making inferences to the quantity of health care inputs used and the cost of each input used. The expenses are then assessed by duplicating unit costs by the amounts. The information required and accessible will change with the extent of the examination. For example, in calculating the average cost of P&O services by using the bottom-up approach, the quantity of P&O inputs used and the cost of each P&O input used would be used in the estimation. 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. (Carey & Stefos, 2011). The econometric or incremental approach evaluates the distinction in costs between a people in need of healthcare

and those who do not. The econometric approach usually does not require large data and does not represent the true cost hence not often used

2.5 Indirect Cost

Indirect cost is the money related estimation of a patient, caregiver or family member wage lost because of ailment related nonappearances from both paid and non-paid work in order to attend care (Byford, Torgerson, & Raftery, 2000). The indirect costs incurred in the study would assess the loss of productivity due to work hours lost through absenteeism or lateness. The study would assess the opportunity cost of time lost due to morbidity, temporary and permanent disability attributable to attending care at OTC.

In seeking care, patients and household incur the opportunity cost of time lost due to morbidity, temporary and permanent disability attributable to attending care and travel. The aforementioned indicators would have been used in revenue, non-revenue and leisure which make up productivity in diverse ways would be forgone. Questions are usually raised with regards to the efficacy of indirect cost in estimation, however, indirect cost gives a vivid understanding in terms of cost estimation since all the opportunity or effort forgone have direct effect or impact on cost estimation (Boccuzzi, 2003)

There are diverse ways in estimating indirect cost, however, the most common methods are the human capital approach (HCA) and the willingness-to-pay (WTP). HCA deals with productivity lost hence calculates the indirect cost using the individual's gross wage that would have been earned except for the onset of disease multiplied by the duration of absence. HCA gives an estimation of the economic loss as a result of poor health conditions making use of three indicators namely; loss of allocated working works, premature mortality and excess medical expenditure.(Mullahy, 2009) . In using the HCA, an individual is seen as driving force tasked

with productivity within a time frame, hence cost can be estimated with indirect measures such as illness, impairment, disability and mortality which transforms into output and productivity loss. HCA is easy to conduct as compared willingness-to-pay (WTP) as it requires less data set which can be acquired with ease. However, the HCA has a couple of setbacks ranging from methodology used and ethical consideration.(Department of Health and Ageing and enHealth Council, 2003) in the review of literature realized that in using HCA, the definition of health by the WHO as a “state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” is not taken into full account as the HCA fails to account for intangible variables of pain and mental well-being. The HCA approach was used by(Xie et al., 2008)to estimate indirect cost for Patients with Knee Osteoarthritis in Singapore by estimating percentage of productivity lost pre and post Osteoarthritis and also finding the product nonattendance days from work on account of Osteoarthritis, with the normal per capita income per day for working patients by the average earnings per capita income each day for working patients. Indirect costs per year using the HCA was estimated at US\$1008 accounting for 2.8% annual household income.

Willingness-to-pay approach (WTP) is a measure or valuation of the amount an individual is likely to pay in order to forgo an illness and stay healthy. It measures the opportunity cost an individual willing to forgo to stay healthy (Tarricone, 2006) . Willingness to pay has some major underpinning that act as a driving force and translates greatly into the amount an individual is willing to pay, these include; the salary earned, the efficacy of the intervention in treating the disease or ailment and government policies about a disease. Willingness-to- pay approach is quite cumbersome to undertake as it takes into account preferences or thought of people with regards an ailment. This therefore leads to increase in the estimates of the value of life as

compared to the human capital approach. (Segel, 2006) conducted a willingness to pay study using surveys for communicable disease and asserted that WTP captures only partial cost as people turn to put their needs and interest first without fully taking into account the general needs of the populace making the WTP not feasible for a cost-of-illness study. Indirect cost in this study would be estimated using the HCA.

2.6 Intangible Cost

Intangible costs take into account the psychological burden of an illness which cannot be measured in monetary terms. Intangible cost includes pain, discomfort, fear, anxiety, stress and depression. The Psychological burden is most often underlined by various factors such as age, sex, stress, type of amputation performed, value placed on the lost limb, expectations from rehabilitation, capital available. A study conducted in by (Cansever, Uzun, Yildiz, Ates, & Atesalp, 2003) in Turkey asserted that the prevalence of depression of 34.7% and 51% among two kinds of amputation; traumatic amputee and surgical amputee respectively. (Cansever et al., 2003) study was in line with an earlier study by (Schubert, Burns, Paras, & Sioson, 1992) which asserted prevalence of depression in 35% to 60% of patients after an amputation The intangible costs, however, is often not used in costing because there is no standardized measure for pain, discomfort, fear, anxiety, stress and depression. 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 intangible cost (Beran, 1999). However, Likert's scale will be used for the description of the variables; fear, pain, anxiety, fatigue, grief, feeling hopelessness and emotional sufferings for the intangible cost components of the study

2.7 Likert scale

Likert scale is a psychological measurement scale that is most often used in attitude measurement in survey research. The Likert Scale gauge attitudes, values, and opinions by having respondent complete a series of closed ended questions indicating the extent to which they agree or disagree to the questionnaire (Joshi, Kale, Chandel, & Pal, 2015). Named after its creator Rensis Likert, likert measurement of altitude was formulated in his doctoral thesis in 1932. This scale of measurement contradicted what many psychologists at his time thought. Many psychologists believe that their field of work should be based on observable behaviour not unobservable behaviour like attitude which cannot be measured. The likert scale is ubiquitous in survey research based on various reasons but most importantly been due to the fact that it is simple and versatile (Johns, 2010). Likert scale normally has five to seven indicators and markers which try to ascertain the level of respondent feeling about a phenomenon ranging from strongly agree or strongly disagree. (Harland, Dawkin, & Martin, 2015). (Addo, Nonvignon, & Aikins, 2013) in their study the household cost of mental health illness in Ghana, the likert scale was used to estimate the intangible cost of mental care to both patients and their household attending care at Ho Municipal Hospital. In a study conducted on the household cost of buruli ulcer at Obom sub-district of the Ga South Municipality, (Amoakoh & Aikins, 2013) estimated the intangible cost of illness borne by the patients and household using the 5 point Likert scale. The Likert scale was used to measure the intangible costs of pain and stigma. The use of the five to seven point scale has, however, been questioned on its validity and usefulness on various grounds, (Cummins & Gullone, 2000) asserted that five-to-seven-point Likert scales are too restrictive, and stated that they are 'hardly likely to exploit the discriminative capacity of most people in terms of their perceived well-being'. Due to the difficulty in quantifying pain, fear,

anxiety and depression borne by patients and households attending care at a typical orthopaedic setting, the five point description would be employed for the study.

2.7 Conclusion of reviewed literature

It can be deduced from the reviewed literature that the economic and social burden in managing physical deformities using Prosthetics and Orthotics is enormous and cannot be underestimated. Physical Deformities results in functional impairment of its victims, reduced earnings, and reduced ability to carry out routine house chores and loss of productivity. Persons with physical disability therefore, to a large extent, experience role changes resulting in functional dependency on others and the society. Additionally, the family of Person with physical deformities is affected in their dwindled earnings and productivity as well as reduction in household income. Managing physical deformities takes a longer period and hence expensive for the healthcare provider, households and the person with physical disability. Long-term direct costs including prosthetics and orthotics devices are even higher and the indirect cost attributable to loss of productivity is greater than

The cost of illness study would be conducted from the patients' perspective therefore becomes relevant as it will not only bridge the knowledge gap in this field but also provide useful information for individuals and policy makers in the health sector on the burden physical deformities in Ghana.

CHAPTER THREE

MEDOTHOLOGY

3.1 Introduction

This chapter presents information on the methodological approach employed. These include the study design, study area, population, sampling procedure and techniques, sample size, data collection and analysis. The ethical considerations and limitations of the study would be described in this chapter

3.2 Study design

A descriptive cross-sectional cost-of-illness study was used to estimate the household cost of using prosthetics and orthotics devices in managing physical deformities for patients attending the Orthopedic Training Center, Nsawam.

3.3 Study location /area

The study was conducted at the Orthopedic Training Center in the Nsawam-Adoagyiri Municipality of the Eastern Region of Ghana. The Municipality formerly known as the Akuapem South is bordered to the south with the Ga West District, to the east Akuapem South District, to the north by the Ayensuano District and west by the Upper West Akim District. Nsawam-Adoagyiri Municipality has a land area of 205 square kilometres (Ghana Statistical Service, 2012). Orthopedic Training Center was established in 1961 to serve the needs of the physically challenged by providing assistive devices and rehabilitation for persons with disability. The center serves as the referral centre for government, private hospitals and clinics in and around the country. The center also has a health training institution which runs a diploma in Prosthetics and Orthotics program

3.4 Study variables

The variable of this study would look at the cost associated with seeking care at OTC. The costs that would be incurred in the study are; direct, indirect, and intangible.

Table 1: Description of study variable

| Type of Cost | Category of Cost | Description |
|-----------------|-----------------------------------|---|
| Direct cost | Direct Service Cost | Cost of consultation, standard P&O devices, repairs of P&O devices, and medication |
| | Direct Non-Service Cost | Travel cost, food and drinks, accommodation and other miscellaneous cost that would be incurred |
| Indirect cost | Productivity loss | Patient: Waiting time, Travel in and out and wage lost |
| | | Household: Wage lost and care giving hours |
| Intangible cost | Psychosocial dimension of illness | fear, pain, anxiety, fatigue, grief, feeling hopelessness and emotional sufferings |

3.5 Study Population

The study population were patients receiving care at OTC between July 2018 and August 2018.

3.6 Sample Size Calculation

On the average, the total number of attendance per month is 375 patients

The minimum required sample size will be calculated using Yamane (1967) for a representative and feasible sample for the study

Yamane equation

$$n = N$$

$$1 + N(e)^2$$

Where n = desired sample size,

N = the study population

e = desired level of precision set at 5%

$$= 375$$

$$1 + 375(0.05)^2$$

$$= 193.45$$

$$= 194$$

10% adjustment would make up for any non-responsiveness,

$$= 0.1 \times 194 = 19.4$$

$$= 20$$

Hence the Total minimum required sample size for the study will be

$$194 + 20 = 214$$

3.7 Sampling Method

About 47 patients attended the Orthopedic Training Center on weekly basis. A systematic random sampling method was employed in the study. The K^{th} term was calculated by dividing the sample frame obtained from the facilities records by the calculated sample size for the study to give an approximate figure of 2. A ballot was made among the first 10 patients at the Out-Patient Department to know the first person to be issued the questionnaire. Adding the constant K^{th} term of 2, subsequent patient were interviewed as they patiently waited to see the doctor provided that patient met the inclusion criterion and consent to the study. Participant found to be ineligible for the study were not selected. This practice was used until the sample size 214 is obtained.

3.7.1 The inclusion

All patients who were seeking care at the facility were willing and consented to participate in the study were included. They were also in a good state of mind to participate in the study. For children under 18, permission and consent were obtained.

3.7.2 The exclusion

Patients who were severely ill and could not walk were excluded. Also patients who were unconscious and not in fairly stable mind state were excluded. Also, patient who decide not to consent will be excluded

3.8 Data collection technique and tools

A structured questionnaire was used in data collection for this study. The questionnaire covered four main parts namely; socio-demographic characteristics, direct cost, indirect cost and intangible associated the management of physical deformities using prosthetics and orthotics devices.

The questionnaire was interviewer administered. This approach afforded the researcher the opportunity to clarify concepts and any misunderstanding. This approach was useful in dealing with patients who were not literate. Data was collected with the help two trained research assistants. Daily meetings were held by the Principal Investigator with the Research Assistant to discuss the challenges and the way forward and examine the completed questionnaire

3.9 Quality control

Adequate mechanisms were put in place to safeguard and guarantee data accuracy, quality and devoid of biases. The measures included

3.9.1 Training of research assistants

Two research assistants with a diploma in Prosthetics and Orthotics Technology conversant with P&O modalities were recruited for training. The trained research assistants recruited were able to read and write English language and were also fluent in two local dialects (Twi and Ga). The training involved explanation of the questionnaire, ethics and how to seek informed consent from the study participants. The research assistants were involved in administering the questionnaires at the pre-testing phase.

3.9.2 Pretesting of questionnaire

The questionnaire was pre-tested prior to final administration to the patients and their accompanying household members attending care at the St Joseph Hospital in the New Juaben District of the Eastern Region. This was undertaken by the Principal Investigator and the trained research assistants and helped reduce problems regarding wording of questions, instructions to delete or add on. It also helped assess the Research Assistants understanding of the questionnaire to prevent interviewer bias.

3.9.3 Data collection

The Principal Investigator visited the study site on daily basis to ensure compliance with research guidelines. All questionnaires were given special codes which indicated the specific day the questionnaire is administered. Measures were put in place to make sure no study participant was interviewed twice. Meetings were held at the end of each data collection day, discussed 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 plan for the next day.

3.10 Data entry and processing

All participants were interviewed once during the data collection period. Participant who visited the facility more than once during the data collection period were interviewed on his/her first visit date. Each questionnaire was given a unique code and arranged systematically in a file. The data collected were thoroughly screened within 24 hours before entry into Epi Info version 7 by the Principal Investigator. After entry, data set were be crosschecked for errors with hard copies one after another to ensure every variable defined was in the right place. The cross-checked data was imported into STATA version 14 for analysis

3.11 Data analysis

The various costs incurred by patients and households in the management of deformities using P&O services were estimated.

3.11.1 Background characteristics of study participants

The background characteristics of the study participants were analysed using Microsoft Excel and the results were presented in a table. The socio-economic status of study participants was estimated using wealth quintile.

3.11.2 Estimation of direct cost

The direct cost was estimated as the costs incurred by patient with physical deformity and accompanying households as result of seeking care at OTC. The direct cost was be made up of direct service cost and direct non-service cost. The direct service cost included consultation, the cost of standard P&O devices, repairs of P&O devices, consultation and Medication. The direct non-service cost included cost of travel, food, water among others.

Table 2: The direct service estimation approach is shown in table 2

| Type of Cost | Cost Estimation approach |
|------------------------|--|
| Consultation | This was be calculated by summing the cost of registration and consultation of the patient during the study period |
| Standard P&O devices | This was be calculated by summing the cost of the Standard P&O devices of the patient during the study period |
| Repairs of P&O devices | This was be calculated by summing the cost that would be incurred in the repairs of P&O devices |
| Medication | This was be calculated by summing the cost of any medication incurred by the patient during the study period |
| | |

3.11.3 Estimation of direct non-service cost

The direct non-Prosthetics and Orthotics was estimated by summing up travel cost, cost of food and drinks, other service cost incurred such as cost of phone calls as a result of seeking care as wells households' productivity lost time spent on care giving. The estimation approach employed is shown in Table 3.

Table 3: Estimation of Direct Non-service cost

| Type of Cost | Cost Estimation approach |
|---------------------------|--|
| Travel | This was calculated by summing all transportation cost that would be incurred by the patient and his/her caregiver for travelling to and from the center during the study period |
| Food | This was calculated by summing all the cost incurred by patient and his/her caregiver on food items including beverages and water during the study period |
| Miscellaneous cost | This was calculated by summing all the cost that would be incurred by the patient and his/her caregiver such telephone calls, phone credits and other items purchased because of the patient's condition during the study period |
| Accommodation cost | This was calculated by summing the standard that would be incurred by the patient during the study period |
| Total P&O Cost | This was calculated by summing cost of travel, food and other expenses that will be |

| | |
|--|---|
| | incurred by the patient and his/her caregiver during the study period |
|--|---|

3.11.4 Total direct cost

This was calculated by summing the direct P&O service cost and direct non-service P&O cost

3.11.3 Estimation of indirect cost

The human capital approach (HCA) was used to calculate the indirect cost. This would be obtained by multiplying the daily minimum wage rate by the number of workdays lost for by patient and his/her caregiver. Productivity loss was valued using the 2018 national minimum wage of Ghana (that is GHC 9.80 per day)

Table 4: Estimation of indirect cost

| NO | Category | Cost estimation approach |
|----|---|--|
| | Days lost to patients(employed) | This is was the summation of days lost due to seeking care per month |
| | Days lost to household members | Days lost to household members as result of caring for person with deformity per month |
| | Productivity loss due to travelling time | This was the summation of the total number of hours spent by patient and household members as travelling time to treatment per month |
| | Valued productivity loss due to travelling time | This was estimated by multiplying total number of work hours lost by patient and household members travelling to the center to |

| | |
|---------------------|--|
| | seek care and from the facility to their homes during the study period keeping in mind the daily minimum wage |
| Total Indirect cost | This was the overall aggregation of the total valued productivity losses of patients and household members as a result seeking treatment |

3.11.4 Intangible cost

Intangible costs consider the psychological burden of deformities which cannot be measured in monetary terms. The Intangible cost is described using the Likert scale.

For this study, the Likert scale had a five- dimensional scale in which patients and family members were asked to rate the statements under each dimension with respect to anxiety, pain, hopelessness, fatigue, grief, and fear. The mean of the responses for each dimension and their individual items under them was estimated for patients and household. This was used to quantify the intangible cost of deformities on patients and their household.

Table 5. Composite Intangible Cost

| No | Domain | Dimension | Score range |
|----|-------------------------|---|-------------|
| 1. | Anxiety | 1. Not at all 2. A little 3. Moderate 4. Quite a bit 5. Extremely | 4-15 |
| 2. | Pain | 1. Not at all 2. A little 3. Moderate 4. Quite a bit 5. Extremely | 3-15 |
| 3. | Feeling Hopelessness | 1. Most of the time 2. A good bit of the times 3. Some of the time 4. A little of the time 5. None of the times | 3-15 |
| 4. | Fatigue | 1. Most of the time 2. A good bit of the times 3. Some of the time 4. A little of the time 5. None of the times | 2-10 |
| 5. | Grief | 1. Most of the time | 4-20 |

| | | | |
|----|-------|--|-------|
| | | 2. A good bit of the times 3. Some of the time 4. A little of the time 5. None of the times | |
| 6. | Fear | 1. Not at all 2. A little 3. Moderate 4. Quite a bit 5. Extremely | 3-15 |
| | Total | | 90 |
| | Range | | 19-90 |

Composite Intangible Score

The composite score was obtained by summing up the dimension in each domain and multiplying by the number of questions. The composite score is then reclassified into Low, Moderate and High intangible cost with the corresponding ranges using the descriptive statistics tertile approach as shown in Table below

Table 6. Composite Intangible Score ranges

| NO. | Dimension | Range |
|-----|-----------|-------|
| 1. | Low | 19-42 |
| 2. | Moderate | 43-66 |
| 3. | High | 67-90 |

3.11.5 Sensitivity Analysis

To determine the robustness of the cost estimates, sensitivity analysis was performed on cost the cost of standard P&O devices. This was done by varying the standard cost of P&O devices and the wage rate by 3%, 5% and 10% respectively.

3.12 Assumptions

An assumption was made for the study that the national minimum wage of the country is reflective of the average income earned per day by the respondent.

3.13 Ethical Considerations/Issues

The following ethical procedures were upheld during the study

3.13.1 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 Administration of the Orthopedic Training Center at Nsawam-Adoagyiri before data was collected.

3.13.3 Description of study participants

The study population were be patients who were attending the Orthopedic Training Center, Nsawam during the data collection period

3.13.4 Informed consent

Patients were not forced or coerced to take part in the study. The patients were clearly briefed that participation is voluntary and participants had the right to refuse or withdraw from the study

at any time without it affecting their ability to access Orthopedic Training Center in the future. The participants informed consent was sought by either signing or thumb printing the consent form after the information required for their consent have been read and duly explained to them

3.13.5 Privacy/confidentiality/anonymity

Each patient or relative were interviewed on individual basis to maintain privacy and confidentiality. Questionnaires were administered without the names of study participants and used solely for this study. Interviews were conducted in an enclosed place to achieve maximum privacy.

3.13.6 Potential risk and benefits

There are no foreseeable risks associated with study. The study population and other stakeholders in Prosthetics and Orthotics and health care will benefit positively.

3.13.7 Data storage and usage

The questionnaires were coded and kept under lock and the key would was kept by the Principal Investigator. Data collected were coded and entered within 24hours of collection, and also saved under a password known to only to the principal investigator. The soft copy of data is stored on a CD-ROM and external hard drive as well. The data collected are being kept by the Principal Investigator for 3-4 years to allow for publication of the research after which questionnaires will be destroyed.

3.13.8 Description of contenting process

Once approval for the proposal was granted by the ERCRIHS, permission was obtained from the Orthopedic Training Center Authorities to use the hospital as the study site, to obtain the

necessary information from the study patients and records for the purposes of the study only. Informed consent was obtained from patients after presenting the purpose, risks and benefits of the research. The patients were made aware of their right to refuse to participate and right to opt out of the study. They were assured of anonymity and confidentiality of each patient's information. There was also no financial compensation for participation. Finally, once a patient were fully abreast with the issues relating to the study, his/her right as a participant, and agreed to take part in the study, a written consent or thumbprint was required thereafter. Each patient was spoken to in a language that he or she understands very well and speaks fluently.

3.13.9 Compensation

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

3.13.10 Protocol Amendment

During the field study, when there are changes in the approved protocols as a result of any field observations and interactions, the Ethics Committee will be informed appropriately of the changes with stated reasons.

3.13.11 Declaration of Conflict of interest

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

3.13.12Funding

The funding of this study was the sole responsibility of the principal investigator

3.13.13 Limitations

The total number of days lost as well as time spent in respect of care giving, travelling and waiting for physiotherapy service will be based on the recall of persons with physical disability and relatives and therefore might not be accurate and exact. Besides, the fear, pain, suicidal thought, social isolation, anxiety, fatigue, grief, feeling hopelessness and emotional sufferings relative to the intangible will not be determined in monetary terms but described using the Likert's scale

3.14 Quality assurance

The researcher trained all research assistants to ensure that they understood the research topic, objectives and the sensitivity of the topic and the need for confidentiality, before administering the questionnaire. The training also ensured that they were adequately equipped to undertake the data collection. Supervision was carried out by the researcher during the entire period of the field work

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter presents the finding of the study covering the following: the demographic characteristics of the patients and household, direct cost, indirect cost and intangible cost. A total of 214 respondents were interviewed and the responses from the participants are illustrated in tables and figures.

4.2 Demographic Characteristics of Respondents

A total of 214 questionnaires were administered to patients and their household seeking care at the Orthopedic Training Center. The response rate for the study was 100%. Out of the respondents, 119 of the respondents were male and 94 of the respondent were representing 56% and 44% respectively.

The oldest respondent was 85 years while the youngest was 11 years with a mean age of 42(SD: 19.4). About 14% of the respondents were below the age of 19, 36% of were between the age of 20 and 39 years, 23% were between the age of 40 and 59 while 27% of the respondents were above the age of 60. About 121 of the respondents were married while 93 of the respondent not married. With regards to employment status, 39% of the respondents were employed, 28.5% were unemployed, 46% of were retired while 10.7% were students or apprentice. About 59.8% of the respondent's monthly income was less than GHC 500. About 22% had monthly income between GHC500 and GHC 1000 while 9.8% of the respondent had monthly income of GHC 1001 and GHC 200. The results indicate that 3.7% of the respondent had no formal education, 43.9% had primary education, and 35.5% had secondary education while 16.8% had tertiary

education. Table (7) presents the summary of the results on the demographic characteristics of the respondents.

Table 7. Background and characteristics of respondents

| Variable | Number | % |
|---------------------------|---------------|----------|
| Sex | | |
| Male | 119 | 55.6 |
| Female | 95 | 44.4 |
| Age | | |
| 0<19 | 31 | 14.4 |
| 20-39 | 76 | 35.5 |
| 40-59 | 50 | 23.4 |
| 60 or more | 57 | 26.6 |
| Level of Education | | |
| No Education | 8 | 3.7 |
| Primary/JSS | 94 | 43.9 |
| Secondary level | 76 | 35.5 |
| Tertiary level | 36 | 16.8 |
| Marital Status | | |
| Married | 121 | 56.5 |
| Not Married | 93 | 43.5 |
| Employment Status | | |
| Employed | 84 | 39.3 |

| | | |
|---------------------|-----|------|
| Unemployed | 61 | 28.5 |
| Retired | 46 | 21.5 |
| Student/Apprentice | 23 | 10.7 |
| Income (GH¢) | | |
| 0<500 | 128 | 59.8 |
| 501-1000 | 47 | 22 |
| 1001-2000 | 21 | 9.8 |
| 3000-4000 | 1 | 0.5 |

4.3 Direct Cost of Prosthetics and Orthotics service

The total direct cost P&O service was estimated to be GH¢ 727574.00, constituting 97.64% of the cost profile of P&O services

4.3.1 Direct service cost

The total direct cost was estimated at GH¢ 75,660(USD 16132.1) representing about 61.43% of the total cost (see table 8). Standard P&O devices constituted the highest component and was estimated at GH¢ 69110 (USD 14735.6) of the direct service cost representing 56.11% of the total cost. This was followed by repairs of P&O devices and medication which represented 4.48% and 0.48 translating into GH¢ 5520(USD 1176.9) and GH¢ 600(USD 127.9) respectively. Consultation service incurred the least cost estimated at GH¢430 (USD 91.3) representing 0.34%. Direct service cost constituted 61.3% of the total cost

4.3.2 Direct non-service Cost

Direct Non-Service Cost contributed about 24.29% of the total cost of treatment of physical deformities using P&O services. It was estimated to be GHC105574 (USD22510.44). Travel cost was the highest component of the direct Non-Service Cost estimated at GHC11191 (USD2386.14) representing 9.08% of the total cost. Food and drinks constituted the second highest component of the direct Non-Service Cost was estimated at GHC 8686.00(USD1852.02) representing 7.05% of the total cost. Accommodation and other miscellaneous cost was estimated at GHC 7645(USD1630.06) and GHC 2392(USD510.02) representing 6.02% and 1.94 % respectively.

Table 8. Cost profile

| Cost Component | GHC | USD | % |
|--------------------------------|--------------|----------------|--------------|
| Direct Cost | | | |
| Direct Service Cost | | | |
| Consultation (Cost Incurred | 430.00 | 91.6 | 0.34 |
| Standard P&O devices | 69110 | 14735.6 | 56.11 |
| Repairs of P&O devices | 5520 | 1176.9 | 4.48 |
| Medication | 600 | 127.9 | 0.48 |
| Subtotal | 75660 | 16132.1 | 61.43 |
| Direct non-service cost | | | |
| Travel cost | 11191 | 2386.14 | 9.08 |
| Food and Drink | 8686 | 1852.02 | 7.05 |
| Accommodation | 7645 | 1630.06 | 6.02 |

| | | | |
|------------------------------------|------------------------|------------------------|---------------------|
| Other miscellaneous cost | 2392 | 510.02 | 1.94 |
| Subtotal | 29914 | 6378.25 | 24.29 |
| <i>Total Direct Cost</i> | <i>105574</i> | <i>22510.44</i> | <i>85.72</i> |
| Indirect Cost | | | |
| Valued work days lost by patient | 5914.48 | 1261.08 | 4.80 |
| Valued travel time spent | 1726.67 | 368.15 | 1.40 |
| Valued waiting time | 1656.49 | 353.19 | 1.34 |
| Valued caregiving time by relative | 1049.07 | 223.68 | 0.85 |
| Valued absenteeism due to relative | 7230.96 | 1541.78 | 5.87 |
| <i>Total indirect cost</i> | <i>17577.67</i> | <i>3747.90</i> | <i>14.27</i> |
| Total Cost | 123151.67 | 26258.35 | 100 |

4.3 Indirect Cost

The indirect cost was estimated to be GHC 17,577.67 of the total cost representing 14.27% of the total cost. Table 9 shows the productivity days lost to patient and household.

Table 9. Valued hours and associated lost by patient in seeking care

| Category | Hours | GHC | USD | % |
|--|--------------|------------|------------|----------|
| Patient | | | | |
| Days within the last one month have you absented yourself from work because of you seeking care at OTC | 4888 | 5914.48 | 1261.08 | 33.64 |
| Travelling time | 1427 | 1726.67 | 368.15 | 9.82 |
| Days spent seeking Prosthetics and Orthotics Services | 1369 | 1656.49 | 353.19 | 9.4 |
| Household | | | | |
| How many hours in a day does a household member spend in taking care of you out of patient | 867 | 1049.07 | 233.68 | 5.96 |
| Days absented from work to accompany relative to access Prosthetics and Orthotics Related Service | 5976 | 7230.96 | 1541.7 | 41.13 |
| Subtotal | 14527 | 17577.67 | 3747.90 | 100 |

Ghana's minimum wage as at June 2018 was GHC 9.68 <https://mywage.org/ghana/salary/minimum-wages/>

4.4 Total cost of P& O care

The total cost of treating physical deformities using P&O services was estimated to be GHC 123151.67. Total direct service costs constituted 86% of the total cost while indirect service cost constituted 14% of the total cost as shown in Figure 2.

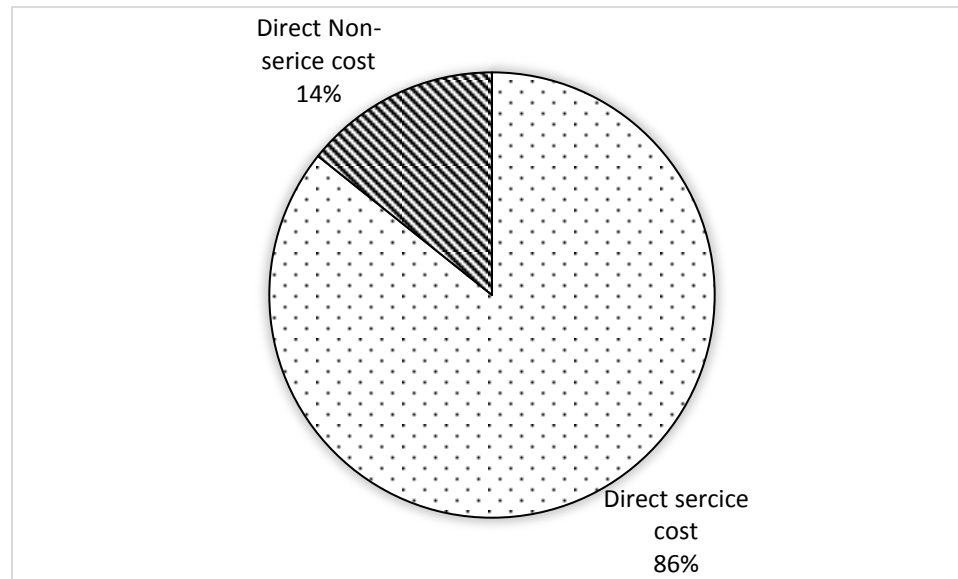


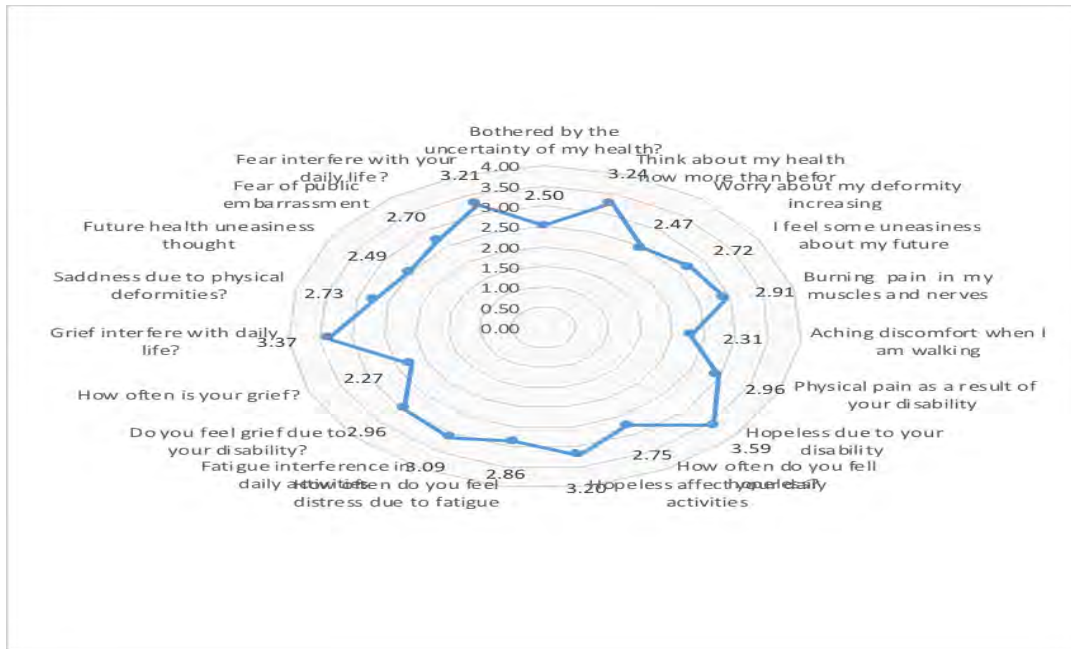
Figure 2. Total household cost of the management of physical deformities using prosthetics and orthotics (direct and indirect cost)

4.5 Intangible cost of physical deformities

Intangible costs considered the psychological burden of deformities which cannot be measured in monetary terms. About 19 Likert scale items were analysed using various dimensions. The dimension with the highest mean was the feeling of hopelessness due to your disability (3.58) while the least dimension was the feel of aching discomfort when I am walking (2.3). The means of grief due to disability and physical pain due to disability were both 2.96 while burning pain in

muscles, distress due to fatigue, saddened by physical deformity and fear of public embarrassment were 2.91, 2.86, 2.73, and 27.0 respectively.

Figure 3: Means of intangible prosthetics and orthotics cost for persons with physical disability



4.6 Composite intangible physical deformity score

A composite score was also used to describe the intangible cost of prosthetics and orthotics for persons with physical deformities. The composite scores was reclassified into Low, Moderate and High intangible burden. The highest composite score was the dimension making up 48 % (157) of the total score. This was followed by moderate dimension making up 33 % (109). The low dimension was the least score range constituting 19 % (61) as shown in Figure 4.

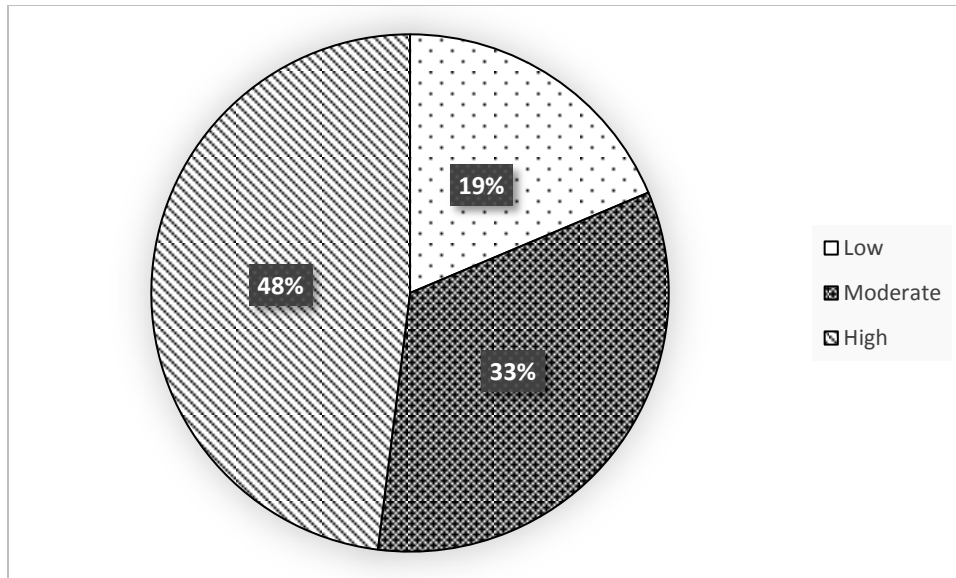


Figure 4 composite score of intangible burden

4.6 Cost burden of Prosthetics and Orthotics by wealth quantile

Table 10: Cost burden of Prosthetics and Orthotics by wealth quantile

| Quintile | Mean Income | Mean cost (GHC) | Mean cost (USD) | Proportion of burden to income |
|----------------|-------------|-----------------|-----------------|--------------------------------|
| Poorest | 122.57 | 109.49 | 23.75 | 89.3 |
| Poorer | 391.18 | 167.19 | 36.27 | 42.7 |
| Middle | 623.42 | 219.31 | 47.57 | 35.2 |
| Richer | 878.39 | 406.40 | 88.16 | 46.3 |
| Richest | 1648.70 | 414.16 | 89.84 | 25.1 |

In the poorest quintile, the respondents with mean income of GHC122.57 (USD26.13) a month spent 89.3% of their total monthly income on seeking care with Prosthetics and orthotics services with the lowest average cost GHC109.49. The respondents in the middle quintile spent about

47.57% of their income in seeking care whereas the respondents in the richest quantile spent 25.1% of their income in seeking care. The respondents in the poorest wealth quantile suffered the greatest cost burden whilst the richest wealth quantile suffered the least cost burden. The respondent in the richer wealth quantile incurred the highest cost GHC 406.40 for seeking care

4.7 Sensitivity analysis

Both the one- way and two-way sensitivity test were done on the standard cost of P&O devices and the wage rate. The analysis was done by varying the standard cost of P&O devices and the wage rate by 3%, 5% and 7% respectively which translated into 1.68, 2.81 and 3.93 respectively

Table 11.Sensitivity analysis

| Scenario | Cost component | Percentage change in parameter | TOTAL COST | | Percentage change in total cost | Proportion of Total cost | | Percentage change in proportions of cost | |
|--|----------------------------------|--------------------------------|------------|----------|---------------------------------|--------------------------|---------------|--|---------------|
| | | | GHC | USD * | | Direct cost | Indirect cost | Direct cost | Indirect cost |
| Base Scenario | | 0.00 | 123151.67 | 26258.35 | 0.00 | 85.73 | 14.27 | 0.00 | 0.00 |
| Variation(One-way Sensitivity Analysis) | Standard P&O devices | 3.00 | 125224.97 | 26700.42 | 1.68 | 85.96 | 14.04 | 0.28 | -1.66 |
| | | 5.00 | 126607.17 | 26995.13 | 2.81 | 86.12 | 13.88 | 0.45 | -2.73 |
| | | 7.00 | 127989.37 | 27289.84 | 3.93 | 86.27 | 13.73 | 0.63 | -3.78 |
| Variation(One-way Sensitivity Analysis) | Wage rate ** | 3.00 | 123679.00 | 26370.79 | 0.43 | 85.36 | 14.64 | -0.43 | 2.56 |
| | | 5.00 | 124030.55 | 26445.75 | 0.71 | 85.12 | 14.88 | -0.71 | 4.26 |
| | | 7.00 | 124382.11 | 26520.71 | 1.00 | 84.88 | 15.12 | -0.99 | 5.94 |
| Variation(Multi-way Sensitivity Analysis) | Standard P&O devices & Wage rate | 3.00 | 125752.30 | 26812.86 | 2.11 | 85.60 | 14.40 | -0.14 | 0.87 |
| | | 5.00 | 127486.05 | 27182.53 | 3.52 | 85.52 | 14.48 | -0.24 | 1.43 |
| | | 7.00 | 129219.81 | 27552.20 | 4.93 | 85.44 | 14.56 | -0.33 | 1.98 |

* US1.00 is equivalent to GHC4.69 (Bank of Ghana monthly interbank exchange rate for July, 2018)

**National minimum wage of GHC9.68 per day was used to value lost productivity The Table presents the one-way SA conducted on Standard prosthetic and orthotics devices and wage and the Multi-way SA conducted on Standard PO devices and wage concurrently.

Also, sensitivity analysis conducted on wage rate with 3%, 5%, 7% resulted in a 0.43%, 0.7% and 1% percentage increase respectively to total cost. Sensitivity analysis carried out concurrently on standard Prosthetics and orthotics and wage rate by 3%, 5%, 7% yielded percentage fall in the direct cost proportion to total cost and thus an increase in the indirect cost proportion to total cost. However, there was an overall 2.11%, 3.52% and 4.93% increases in the concurrent wage and standard prosthetic and orthotics device cost. The results from the sensitivity analysis indicated that the cost estimate of this study were sensitive to changes in standard prosthetic and orthotics device cost and wage

CHAPTER FIVE

DISCUSSION

Persons with physical disability face adverse problems daily with regard to mobility and independence. Prosthetics and Orthotics services are keen in helping persons with physical disability to gain mobility with little or no assistance. This, however, comes with a huge economic burden on the patient and the household. Few studies have been carried out on the cost of management of physical deformities using Prosthetics and Orthotics in Ghana even though persons with physical disability rank as the second (25.4%) of the disability population (Ghana Statistical Service, 2012). This study was conducted from the perspective of the patient and the household on the cost of management of physical deformities. The key findings of the study are;

The total cost of the management of physical deformities using prosthetic and orthotics was estimated to be GHC 123151.67 (USD 26258.35) with an average cost of GHC 575.4750935 (USD 122.7) per patient. The direct cost was estimated to be GHC 105574 (USD 22510.4) translating into 85.7% of the total cost while indirect was estimated to be GHC 17577.67 (USD 3747.9) translating into 14.27 % of the total cost. Cost of standard prosthetic and orthotics device was the highest price estimated to be GHC 69110 (USD 14735.60) of representing 56.1% of the total score while the least dimension was the feel of aching discomfort when I am walking (2.3).

5.1 Direct cost of managing physical deformities using prosthetics and orthotics

The direct cost was the GHC 105574(USD 22510.44) with an average of GHC 493.3 (USD 105.18) per patient per month. This constituted 85.7% of the total cost profile. The direct services cost of this study, included the cost of standard prosthetics and orthotics devices, repairs of prosthetics and orthotics devices, consultation and medication which were all subcategorized

under direct service cost constituted the greatest proportion of the direct household cost of GHC 75660 and the direct non-service cost included travel cost and in and out, food and drinks and accommodation subcategorized under direct non service cost accounting for the remaining GHC 29914 of the direct cost profile. Standard Prosthetics and Orthotics devices made up the highest percent of 56.11 of the total cost profile. High cost standard prosthetic and orthotics devices in this study is due to the fact that most of the materials used in the manufacture the of the devices are imported hence subjected to higher importation taxes and levies which are transferred to the patient needing the device. The high direct cost of 86% obtained this is study is in line with a study conducted by (Blankson, 2017). In estimating the household cost of injuries at the casualty and accident center at the Korle bu teaching hospital, (Pearlman et al., 2008) estimated that direct cost contributed 96.2% even though the cost variable vary in this study. A significant part of the household direct non-service cost was due to travelling in and out to seek care translating into 9% of the total cost profile and 37.4% of the total direct non-service cost profile. This can be attributed the fact that patients seeking care must travel longer distance to reach the facility translating into a higher cost since there is a direct relation between the travel distance and the cost incurred.

5.2 Indirect cost of managing physical deformities using prosthetics and orthotics

Total indirect cost estimated for the study was GHC 17577.67 (US\$ 3747.904051), constituting the lowest proportion 14.2% of the total cost of managing physical deformities using prosthetics and orthotics services. Human capital method employed in the study used the current minimum daily wage of GHC 9.68 GHC per day. Valued productivity lost by the relative was the highest component of the indirect cost estimated to be GHC 7230.96 (USD1541.78) translating into 5.7% of the total cost profile. This can be attributed to the fact that persons with physical

disability seeking care using prosthetics and orthotics services need assistance with regards to mobility hence relatives spend most of their valued productive hours accompanying the patients to seek care.

The indirect proportion of 14.2% is in line with other cost of illness studies, several others have also reported a higher proportion of indirect cost, as demonstrated by studies on and stroke (Joo et al., 2014) excess weight (Ricci & Chee, 2005) while (Gustavsson et al., 2011) estimated indirect cost attributed to 40% of the cost of brain disorder in Europe. The findings of this study is contrary to the findings by (Sarker et al., 2013) who reported a high indirect cost proportion of 75.4% for cholera in high risk Bangladesh urban area. The estimated indirect cost of this study may not be a true reflection because some employee may be overestimate or underestimate their wages and employment status. Additionally, productivity losses could have been over or undervalued because of recall and respondents not knowing the exact and actual hours lost due to seeking care and taking of relatives. .

5.4 Intangible cost

The findings of this study revealed that dimension with the highest mean were the feeling of hopeless due to your disability with a mean score of (3.58). This can attributed to the fact that persons with physical disability need assistance in carrying out their daily activities and feel hopeless in the absence of personal assistance. The findings were further buttressed with patient's grief about their physical disability affecting their daily activity with a mean score of 3.37. Persons with physical disability therefore endured some level of emotional sufferings resulting from the illness.

The least dimension was the feel of aching discomfort when I am walking with a mean score of (2.3). Which implied that persons with physical disability were not bothered so much by the uncertainty of their health. Although the persons with physical disability could have considered their conditions as a burden to their relatives, this was not ascertained and hence a limitation of this study. This can ,however, be addressed in subsequent further studies when questionnaires are administered at the household level with the intangible cost of each member of the household estimated, and the mean taken as the household intangible cost

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The total cost of treating physical deformities using P&O services was estimated to be GHC 123,151.67 (USD 26,258.35) with an average cost of GHC575.47 (USD 122.70) per patient month. Total direct costs constituted 85.7% of the total cost while indirect cost indirect cost constituted 14.27% of the total cost. Direct prosthetics and orthotics cost contributed significantly to the direct cost with an average cost of GHC 353.5514019 (USD 75.38).

Households of persons with physical disability seeking care with prosthetics and orthotics devices incur significant cost since the patients need new prosthetics and orthotics devices and repairs within regular interval. Patients in poor socioeconomic groups incur higher cost of seeking care with prosthetics and orthotics than those in the richest group. Also, patients with physical disability suffer endue a significant feeling of hopeless, grief and physical pain due to disability

6.2 Recommendation

The following recommendation has being made based on the findings of this study;

1. The estimated household cost of managing physical deformity using prosthetics and orthotics devices in this study should serve as a reference for future health policy and planning of issues with regards to persons with physical disability needing care with prosthetics and orthotics devices.
2. Further studies must be conducted by researchers to estimate the intangible cost of managing physical deformities using prosthetics and orthotics devices

3. Further studies must be conducted by researchers to estimate the total costs of managing physical deformities using prosthetics and orthotics devices from societal perspective across centres which provide care for persons with physical disability using prosthetics and orthotics devices.

REFERENCES

- Addo, R., Nonvignon, J., & Aikins, M. (2013). Household costs of mental health care in Ghana. *Journal of Mental Health Policy and Economics*, 16(4).
- Amoakoh, H. B., & Aikins, M. (2013). Household cost of out-patient treatment of Buruli ulcer in Ghana: A case study of Obom in Ga South Municipality. *BMC Health Services Research*, 13(1). <https://doi.org/10.1186/1472-6963-13-507>
- Arifin, N., Hasbollah, H. R., Hanafi, M. H., Ibrahim, A. H., Wan Abdul Rahman, W. A., & Che Aziz, R. (2017). Provision of prosthetic services following lower limb amputation in Malaysia. *Malaysian Journal of Medical Sciences*, 24(5), 106–111. <https://doi.org/10.21315/mjms2017.24.5.12>
- Blankson, P. (2017). HOUSEHOLD COSTS OF INJURIES : A CASE STUDY OF THE CASUALTY AND ACCIDENT CENTRE OF KORLE. *Ugspace, unpublishe*(10198895).
- Bocuzzi, S. (2003). Indirect Health Care Costs. *Cardiovascular Health Care Economics SE - 5*, 63–79, 63–79. https://doi.org/10.1007/978-1-59259-398-9_5
- Byford, S., Torgerson, D. J., & Raftery, J. (2000). Economic Note: Cost of illness studies. *BMJ*, 320(7245), 1335–1335. <https://doi.org/10.1136/bmj.320.7245.1335>
- Cansever, A., Uzun, O., Yildiz, C., Ates, A., & Atesalp, A. S. (2003). Depression in men with traumatic lower part amputation: a comparison to men with surgical lower part amputation. *Military Medicine*, 168(2), 106–109.
- Carey, K., & Stefos, T. (2011). Measuring the cost of hospital adverse patient safety events. *Health Economics*, 20(12), 1417–1430. <https://doi.org/10.1002/hec.1680>
- Cummins, R. A., & Gullone, E. (2000). Why we should not use 5-point Likert scales: The case for subjective quality of life measurement. Proceedings Second International Conference on Quality of Life in Cities. In *Proceedings Second International Conference on Quality of Life in Cities* (pp. 74–93).
- Department of Health and Ageing and enHealth Council. (2003). Guidelines for Economic Evaluation of Environmental Health Planning and Assessment, 1(January), 70.
- Development, I. (2004). DISABILITY KAR : ASSESSING CONNECTIONS TO DFID ‘ S POVERTY AGENDA Department for International Development. *Development*, (March).
- Fliedel, O., & Feuer, S. (1966). Historical Development of Lower-Extremity Prostheses. *Orthopedic & Prosthetic Appliance Journal*, 47(5), 313–324.
- Gustavsson, A., Svensson, M., Jacobi, F., Allgulander, C., Alonso, J., Beghi, E., ... Olesen, J. (2011). Cost of disorders of the brain in Europe 2010. *European Neuropsychopharmacology*. <https://doi.org/10.1016/j.euroneuro.2011.08.008>
- Harland, N. J., Dawkin, M. J., & Martin, D. (2015). Relative utility of a visual analogue scale vs a six-point Likert scale in the measurement of global subject outcome in patients with low back pain receiving physiotherapy. *Physiotherapy (United Kingdom)*, 101(1), 50–54. <https://doi.org/10.1016/j.physio.2014.06.004>
- Helander, E., & UNDP, N. Y. (USA). I. P. for D. P. eng. (1993). Prejudice and dignity: an introduction to community-based rehabilitation. New York (USA) UNDP.
- Jo, C. (2014a). Cost-of-illness studies: concepts, scopes, and methods. *Clinical and Molecular Hepatology*, 20(4), 327. <https://doi.org/10.3350/cmh.2014.20.4.327>
- Jo, C. (2014b). Cost-of-illness studies: concepts, scopes, and methods. *Clinical and Molecular Hepatology*, 20(4), 327. <https://doi.org/10.3350/cmh.2014.20.4.327>
- Johns, R. (2010). Likert Items and Scales. *Survey Question Bank: Methods Fact Sheet*, 1(March),

1–11.

- Joo, H., George, M. G., Fang, J., & Wang, G. (2014). A literature review of indirect costs associated with stroke. *Journal of Stroke and Cerebrovascular Diseases : The Official Journal of National Stroke Association*.
<https://doi.org/10.1016/j.jstrokecerebrovasdis.2014.02.017>
- Joshi, A., Kale, S., Chandel, S., & Pal, D. (2015). Likert Scale: Explored and Explained. *British Journal of Applied Science & Technology*, 7(4), 396–403.
<https://doi.org/10.9734/BJAST/2015/14975>
- Marino, M., Pattni, S., Greenberg, M., Miller, A., Hocker, E., Ritter, S., & Mehta, K. (2015). Access to prosthetic devices in developing countries: Pathways and challenges. *Proceedings of the 5th IEEE Global Humanitarian Technology Conference, GHTC 2015*, 45–51.
<https://doi.org/10.1109/GHTC.2015.7343953>
- Mullahy, J. (2009). Econometric Modeling of Health Care Costs and Expenditures: A Survey of Analytical Issues and Related Policy Considerations. *Medical Care*, 47(7_Supplement_1).
- Patel, J. (University of R. I. (2012). Evolution of Prosthetics. *BME 181 First Presentation*, (June).
- Pearlman, J., Cooper, R., Krizack, M., Lindsley, A., Wu, Y., Reisinger, K., ... Noon, J. (2008). Lower-limb prostheses and wheelchairs in low-income countries: An Overview. *IEEE Engineering in Medicine and Biology Magazine*, 27(2), 12–22.
<https://doi.org/10.1109/EMB.2007.907372>
- PHC. (2012). 2010 Population and housing census: Final results. *Ghana Statistical Service, Final Results*. <https://doi.org/10.1016/j.adolescence.2008.08.001>
- Ricci, J. A., & Chee, E. (2005). Lost productive time associated with excess weight in the U.S. workforce. *Journal of Occupational and Environmental Medicine*, 47(12), 1227–1234.
<https://doi.org/10.1097/01.jom.0000184871.20901.c3>
- Sarker, A. R., Islam, Z., Khan, I. A., Saha, A., Chowdhury, F., Khan, A. I., ... Khan, J. A. M. (2013). Cost of illness for cholera in a high risk urban area in Bangladesh: An analysis from household perspective. *BMC Infectious Diseases*, 13(1). <https://doi.org/10.1186/1471-2334-13-518>
- Schubert, D. S. P., Burns, R., Paras, W., & Sioson, E. (1992). Decrease of depression during stroke and amputation rehabilitation. *General Hospital Psychiatry*, 14(2), 135–141.
[https://doi.org/10.1016/0163-8343\(92\)90039-D](https://doi.org/10.1016/0163-8343(92)90039-D)
- Segel, J. E. (2006). Cost-of-Illness Studies — A Primer. *Diabetes*, (January), 1–39.
- Tarricone, R. (2006). Cost-of-illness analysis What room in health economics ?, 77, 51–63.
<https://doi.org/10.1016/j.healthpol.2005.07.016>
- Telser, H., Fischer, B., Leukert, K., & Vaterlaus, S. (2011). Healthcare expenditure and illness-related costs.
- Therapy, P. (2013). Physical Therapy for Fractures and Orthopedic Disorders Prof . Shehab M . Abd El-Kader.
- WHO. (2006). Definition and Diagnosis of Diabetes Mellitus and Intermediate Hyperglycemia. *Who2*, 50. <https://doi.org/ISBN 92 4 159493 4>
- WHO. (2016). Priority Assistive Products List, 13.
- WHO (World Health Organization). (2011). World report on disability 2011. *American Journal of Physical Medicine Rehabilitation Association of Academic Physiatrists*, 91, 549.
<https://doi.org/10.1136/ip.2007.018143>
- World Confederation for Physical Therapy. (2011). Description of physical therapy: Policy

- statement. *The World Confederation for Physical Therapy*, (appendix 1), 1–12.
- World Health Assembly. (2005). Fifty-Eighth World Health Assembly, (May), 1–159.
- World Health Organisation. (2011). World Report on Disability. Retrieved from https://www.unicef.org/protection/World_report_on_disability_eng.pdf
- World Health Organisation, & International Society for Prosthetics and Orthotics. (2005). Guidelines for training Personnel in Developing countries for Prosthetics and Orthotics Services. *WHO Library Cataloguing-in-Publication Data*.
- Xie, F., Thumboo, J., Fong, K. Y., Lo, N. N., Yeo, S. J., Yang, K. Y., & Li, S. C. (2008). A study on indirect and intangible costs for patients with knee osteoarthritis in Singapore. *Value in Health*, 11(SUPPL. 1), S84–S90. <https://doi.org/10.1111/j.1524-4733.2008.00371.x>

APPENDICES

Appendix 1: Informed Consent Form

Project Title: Household Cost of Management of Deformities with Assistive Devices, For Patients Attending Orthopedic Training Center, Nsawam

Background

My name is Adelaku Shittu Moibi, a student from the School of Public Health, University of Ghana, Legon. I am carrying out a study on the Household Cost of Management of Deformities with Assistive Devices, For Patients Attending Orthopedic Training Center, Nsawam.

Procedures

This study would involve answering a closed-ended structured questionnaire about the cost incurred by patients and household members in the Management of Deformities with Assistive Devices. 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

Anonymity and Confidentiality

The study would ensure that participation remains anonymous. All information provided would be kept confidential, private and would not be shared with anybody who is not part of the study team.

Risks and Benefits

This research poses no potential risk to either the study population or the society. 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

prosthetics and orthotics services. Secondly, quantification of household cost of prosthetics and orthotics services for patients with deformities can be used to set the stage for informing government and policymakers about the economic burden associated with accessing prosthetics and orthotics services. Finally, it will provide useful information for strategic planning and budgeting for establishing prosthetics and orthotics service centers for patients with deformities at designated communities

Right to Refuse and Confidentiality

Your participation in this study is voluntary and you are at liberty to withdraw at any time. There will not be any penalty in opting out of this study or not answering any question during questionnaire administration.

Thank you.

PARTICIPANT CONSENT FORM

I..... have been thoroughly briefed on the entire methodology and significance of the ongoing study which is being conducted by Adelaku Shittu Moibi. On my own free will, I hereby consent to be part of the study, based on my understanding of what the study entails.

I am doing this on condition that under no circumstance should my references be made to my actual identity to any other person(s) after providing all the information requested from me for this particular study as promised by the researcher.

Respondent signature..... Date

Witness' signature Date

Researcher signature..... Date

If you have questions later, you may contact, Researcher: Adelaku Shittu Moibi (0246136374) E-mail: smadelaku@st.ug.edu.gh or

Administrator, Ghana Health Service Ethical Review Committee, Miss Hannah Frimpong (0507041223/0243235225) OR Miss Nana Abena Kwaa Addai-Donkor (0244712919)

Appendix II: Questionnaire

**TITLE: Household Cost Of Management of Physical Deformities with Assistive Devices,
For Patients Attending Orthopedic Training Center, Nsawam**

Dear Respondent,

This is a research carried out on Household Cost of Management of Physical Deformities with Assistive Devices, For Patients Attending Orthopedic Training Center, Nsawam 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 be mentioned in my research reports.

Questionnaire number:

Date of Interview:

ID NO.....

SECTION ONE: BACKGROUND CHARACTERSTICS

1. Gender M/F2. Age.....
 3. Educational level: illiterate/ primary level/ secondary level/tertiary level/others
 4. Marital status: Married / Not Married
 5. Employment status: Employed /Unemployed
- Answer question 6 if employed.
6. What is your monthly income.....
 7. What type of Prosthetics and Orthotics services do you require?

Choose what applies

1. Consultation 2. Standard P&O devices 3. Repairs of P&O devices
 4. Medication 5. Other specify

8. Do you have a valid National Health Insurance? Yes/No

If yes, answer question 9

9. What services does the National Health Insurance cover

1. Consultation 2. Standard P&O devices 3. Repairs of P&O devices
 4. Medication 5. Other specify

10. How do you pay for the Prosthetics and Orthotics services?

1. By myself 2. By my employer 3. By relative

11. What was your occupation before the illness?

1. Public Work 2. Private Work 3. Self –employed
 4. Unemployed 5. Apprentice 6. Other (specify)

SECTION TWO (DIRECT COST)

12. How much have the household spent on the following through seeking Prosthetics and Orthotics services for the last one month?

Prosthetics and Orthotics Related Service

| Section 2 | Direct cost information | |
|------------------------|--------------------------------|------------------------|
| | Cost Incurred Cash GH¢ | Cost Incurred NHIS GH¢ |
| Type of Service | | |
| Consultation | | |
| Standard P&O devices | | |
| Repairs of P&O devices | | |
| Medication | | |

| | | |
|----------------|--|--|
| Other(Specify) | | |
|----------------|--|--|

13. Non Prosthetics and Orthotics cost

| 13 | Non Prosthetics and Orthotics Related Service | Response |
|----|--|----------|
| | (a) Travel cost (transportation) | |
| | (b) Food during visit and Drink during visit | |
| | (c) Accommodation | |
| | (d) Other miscellaneous cost (e.g. phone calls | |

SECTION THREE (INDIRECT COST)

14. How many days within the last one month have you absented yourself from work because of you seeking care at OTC?

15. How many hours did you spend travelling in and out to seek Prosthetics and Orthotics Related Service in the last visit?.....

16. How many hours did you spend seeking Prosthetics and Orthotics Services?
Household (To be answered by household head or his/her representative)

17. How many days within the last one month have you absented yourself from work because you had to take your relative to access Prosthetics and Orthotics Related Service?

18. 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)

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

| ANXIETY | | | | | | |
|-------------------------|--|------------------|-------------------------|------------------|----------------------|-------------------|
| No | | Not at all | A little | Moderately | Quite a bit | Extremely |
| 19a | I am bothered by the uncertainty of my health? | 1 | 2 | 3 | 4 | 5 |
| 19b | I think about my health now more than before my disability? | 1 | 2 | 3 | 4 | 5 |
| 19c | Because of my physical disability, my future is of concern to me | 1 | 2 | 3 | 4 | 5 |
| 19d | I am always worry about my deformity increasing | 1 | 2 | 3 | 4 | 5 |
| | | | | | | |
| 19e | When I think about my future health, I feel some uneasiness | 1 | 2 | 3 | 4 | 5 |
| PAIN | | | | | | |
| No | | Not at all | A little | Moderately | Quite a bit | Extremely |
| 20a | I always feel burning pain in my muscles and nerves | 1 | 2 | 3 | 4 | 5 |
| 20b | I feel aching discomfort when I am walking | 1 | 2 | 3 | 4 | 5 |
| 20c | Do you suffer physical pain as a result of your disability? | 1 | 2 | 3 | 4 | 5 |
| FEELING OF HOPELESSNESS | | | | | | |
| NO | | Most of the time | A good bit of the times | Some of the time | A little of the time | None of the times |
| 21a | Do you feel hopeless due to your disability | 1 | 2 | 3 | 4 | 5 |
| 21b | How often do you feel hopeless due to your disability | 1 | 2 | 3 | 4 | 5 |
| 21c | Does your feeling of hopeless affect your daily activities | 1 | 2 | 3 | 4 | 5 |

| FATIGUE | | | | | | |
|---------|--|------------------|-------------------------|------------------|----------------------|-------------------|
| NO | | Most of the time | A good bit of the times | Some of the time | A little of the time | None of the times |
| 22a | Do you feel some distress due to fatigue? How often do you feel distress due to fatigue | 1 | 2 | 3 | 4 | 5 |
| 22b | Does fatigue interfere with your daily activity? (e.g., household chores, cooking, bathing, dressing, working) | 1 | 2 | 3 | 4 | 5 |
| GRIEF | | | | | | |
| NO | | Most of the time | A good bit of the times | Some of the time | A little of the time | None of the times |
| 23a | Do you feel grief due to your disability? | 1 | 2 | 3 | 4 | 5 |
| 23b | How often do you feel grief due to your disability? | 1 | 2 | 3 | 4 | 5 |
| 23c | Does your grief interfere with your daily life? | 1 | 2 | 3 | 4 | 5 |
| 23d | How often are you saddened by the fact that you have physical deformities? | 1 | 2 | 3 | 4 | 5 |
| FEAR | | | | | | |
| NO | | Not at all | A little | Moderate | Quite a bit | Extremely |
| 24a | When I think about my future health, I feel some uneasiness | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|------------|--|---|---|---|---|---|
| 24b | I fear I might embarrass myself in public | 1 | 2 | 3 | 4 | 5 |
| 24c | Does your fear interfere with your daily life? | 1 | 2 | 3 | 4 | 5 |
| Thank You. | | | | | | |