SCHOOL OF PUBLIC HEALTH

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UNIVERSITY OF GHANA

INSTITUTIONAL COST OF WOUND CARE IN THE TREATMENT OF BURULI ULCER PATIENTS AT AMASAMAN HOSPITAL

BY

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

JULY 2012

DECLARATION

I hereby declare that except for other peoples' investigation which have been duly acknowledged, this dissertation is a result of my own work and that this dissertation either in whole or in part has not been presented elsewhere for another degree.

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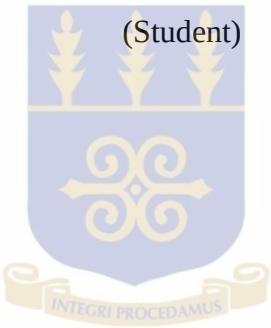
Kofi Hene Asare

(Student)



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Dr. Moses Aikins

(Supervisor)

ABSTRACT

Background: Buruli Ulcer (BU) is a debilitating skin disease caused by *mycobacterium ulcerans.* BU disease generally occurs in underprivileged communities. BU is the third most common mycobacterium disease in a hale and hearty individual after tuberculosis and leprosy. BU disease results in severe skin and soft tissue destruction leading to the formation of extensive ulcers. Wound care is thus an essential part of BU treatment. Ghana has over 30 BU treatment centres nationwide which provide BU treatment free of charge to the affected persons. The cost at which the wound care service is provided to the BU patients by the BU treatment centres is not known.

Objectives: The objective of the study was to estimate the financial and economic cost of wound care to the health facility in the treatment of Buruli ulcer patients. Specifically, it estimated the annual financial and annual economic cost of wound care to the health facility.

Methods: The research was a cross sectional cost of illness study from the perspective of a health provider. It involved retrospective analysis of the cost data by the health facility during the treatment of the wounds of Buruli ulcer patients. The study area was the Amasaman Government Hospital. Desk review, observation and face to face interviews were the techniques used in the data collection. Data for expenditure on capital and recurrent items were collected. The annual financial cost was estimated as a sum of the cost of the annual capital and recurrent expenditure. The annual economic cost was also estimated as a sum of the cost of annual capital and recurrent expenditure however, this included the cost of donated items and volunteer time.

Results: The estimated annual financial cost of BU wound care to the Amasaman Hospital was GH₵ 196,326.42 (US$ 104,196.17). The estimated annual economic cost of BU wound care to the Amasaman Hospital was GH₵ 232,646.92 (US$ 123,472.52). Of the estimated annual financial cost of BU wound care, 99% was due to recurrent expenditure and 1% was due to capital expenditure. The estimated economic cost of BU wound care revealed that, cost of recurrent items accounted for 93% whiles the cost of capital items accounted for 7% of the estimated cost. The annual cost of wound care for one BU patient was estimated to be about GH₵ 4,652.94 (US$2,469.45).

Conclusion: The cost of BU wound care is enormous. BU wound care is a significant source of cost to the BU treatment centres.

DEDICATION

I dedicate this work to all the Buruli Ulcer Treatment Centres in Ghana and the patients they attend to. I trust my work would help improve the management of Buruli Ulcer disease in Ghana.

ACKNOWLEDGEMENT

My principal gratitude goes to my Lord Jesus Christ, thank you for the grace that has brought me this far. My deepest gratitude also goes to my supervisor, Dr. Moses Aikins for his fatherly encouragement comments and suggestions that made the completion of this work possible.

My sincere gratitude also goes to the Municipal Health Director, management and staff of Ga West Municipality for granting me the permission and supporting me to carry out this research in the municipality. I also appreciate the management and staff of Amasaman Hospital especially the staff of Buruli Ulcer ward. .

I am also eternally indebted to my family especially my wife for her support and commitment to see me do well.

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LIST OF ACRONYMS

Acronym	Meaning
BU	Buruli Ulcer
CDC	Center Disease Control and Prevention
CSSD	Central Sterile Supply Department
GBUI	Global Buruli Ulcer Initiative
GHS	Ghana Health Service
KBTH	Korle Bu Teaching Hospital
MOH	Ministry of Health
NBUCP	National Buruli Ulcer Control Programme
NHIS	National Health Insurance Scheme
NTDs	Neglected Tropical Diseases
WAWLC	World Alliance for Wound and Lymphedema Care
WHO	World Health Organization

LIST OF DEFINITIONS

Term	Definition
Capital cost	Cost incurred in the purchase of items with a useful life of more than 1 year.
Economic cost	Value of resources used in the provision of services. Resources may be purchased or donated.
Financial cost	Value of resources and services at purchase price.
Institutional cost	cost incurred by the health facility in the provision of health services
Recurrent cost	Cost incurred in the purchase items or services with a useful life of less than 1 year
Wound care	Treatment of wounds. It includes wound dressing, surgical excision (with or without skin grafting).

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background.

Mycobacterium Ulcerans disease was first described by Sir Robert Cook in 1897 in Uganda an East African country (Aiga et al., 2004). It is popularly called Buruli Ulcer (BU) because of it was exceedingly prevalent in the Buruli County in Uganda in the nineteen sixties according to World Health Organization (WHO, 2007). Buruli ulcer is the third most common mycobacterium disease in a hale and hearty individual after tuberculosis and leprosy. Tuberculosis and leprosy are ranked first and second respectively in the mycobacterium disease category. Buruli Ulcer is caused by *mycobacterium ulcerans*. The causative organism was first described in Bairnsdale, Australia in 1940 by MacCullum (WHO, 2006; Asiedu & Etuaful, 1998).The mode of transmission of Buruli ulcer is not known. A number of studies propose that trauma to the human skin followed then by an introduction of the causal organism from a source of contamination is most likely how the infection begins. The use of a river or pond as a source of water has constantly been identified as a risk factor. Furthermore, residing near a river or pond has been observed as a risk factor (Aiga et al., 2004; Asiedu & Etuaful, 1998).

Buruli Ulcer disease generally occurs in underprivileged communities. Poor environmental and personal hygiene are landmarks in these deprived communities. Residents in these areas usually have low levels of education. Financial as well as geographical access to health care is usually inadequate in these disadvantaged

communities (WHO, 2006). Buruli Ulcer is a disease that is said to affects all age groups. Children under-fifteen years of age are however mostly affected. Those between the ages of 2-14 years are the most susceptible (WHO, 2006). There is no sex difference in the distribution of Buruli Ulcer Disease. Some studies however have suggested that, in adults, the disease is more prevalent in female than male (WHO, 2006).

Buruli ulcer was first reported in Ghana by Bayley in 1971(Aiga et al, 2004). Worldwide, Ghana is the second most endemic country for Buruli Ulcer (Agumah, 2011). Amofah et al., (2002) reported that when they undertook a nationwide search for cases of BU in Ghana in 1999, 5619 patients were identified. These patients presented with over 6000 clinical lesions. The lesions were of various stages. On the average, the National Buruli Ulcer Control Programme (NBUCP) is said to record over 1000 new BU cases every year. As at 2006, the total cumulative cases of Buruli Ulcer recorded by the NBUCP was 4194. These cases were identified in about 138 health districts (NBUCP, 2008). According to the National Buruli Ulcer Control Programme, in early 2008, 166 new cases were detected.

The control of Buruli Ulcer Disease has been integrated into the provision of health services in Ghana. There are over thirty Buruli Ulcer treatment centers in six regions of Ghana, (NBUCP, 2008). These centers provide services in the treatment, care and overall management of BU. According to WHO (2006) management of BU involves antibiotics, surgical excision (with or without skin grafting), wound care and appropriate rehabilitation of the affected individual.

BU treatment in Ghana is generally financed through public funds. Treatment of the disease is free in all the treatment centers in Ghana. Unfortunately, there is limited knowledge on the cost of managing the disease at these Buruli ulcer treatment centers. The work done by Asiedu and Etuaful (1998) seems to be the only study that gives us an insight into these costs. No known study to estimate the financial and economic cost of wound care to the BU treatment centers as they manage this debilitating disease have been done.

1.2 Problem statement.

Buruli ulcer disease results in severe destruction of the skin and soft tissues. This leads to the formation of extensive ulcers especially on the arms and legs. Affected persons who are not treated often develop lifelong deformities. Cases of Buruli Ulcer are increasing with the National Buruli Ulcer Control Programme recording over 1000 new cases annually. Most of these cases report to the health facility with ulcers. More than half of the Buruli Ulcer cases recorded in Ghana between 2003 and 2006 presented with ulcers. According to the National Buruli Ulcer Control Programme, more than sixty percent of the new cases detected in early 2008 were in the ulcerative stages. Wound care is thus an essential part of Buruli Ulcer treatment. Wounds are acknowledged to be a very significant source of cost to both the patient and the health care providers (Drew et al., 2007).

Asiedu and Etuaful (1998), in their publication indicated that wound dressing and surgery only (components of wound care) accounted for more than thirty percent of total direct cost of Buruli Ulcer treatment cost to the St. Martins catholic hospital at Agroyesum,

between 1994 and 1996. Even though wound care is a significant source of cost to the health facility, the cost at which the Buruli Ulcer treatment centers which are in poor communities and most likely poorly resourced treat the wounds of Buruli Ulcer patients is not known.

The focus of this study therefore is to estimate the financial and economic cost borne by a Buruli Ulcer Treatment Center in the management of the wounds of Buruli Ulcer patients.

1.3 Justification

Research activities into Buruli Ulcer is one of the key strategies recommended by the World Health Organization in the control of Buruli Ulcer in countries where the disease endemic. This is because there is limited understanding about Buruli Ulcer as compared to the other human mycobacterium diseases such as tuberculosis and leprosy (Ackumey et al., 2011). According to the guidelines for controlling Buruli Ulcer Disease in the WHO Africa region, studies to estimate the economic cost of the disease is particularly essential. The knowledge of these costs would assist in strategic planning and budgeting which is useful in effective management of the disease. Furthermore, knowing the cost of wound care which is an essential component of the management of Buruli Ulcer would help in assessing and prioritizing the control strategies used in Buruli Ulcer control. Moreover, knowing the cost of health services provided by a health facility would help the health facility keep track of its spending thereby aiding in accountability.

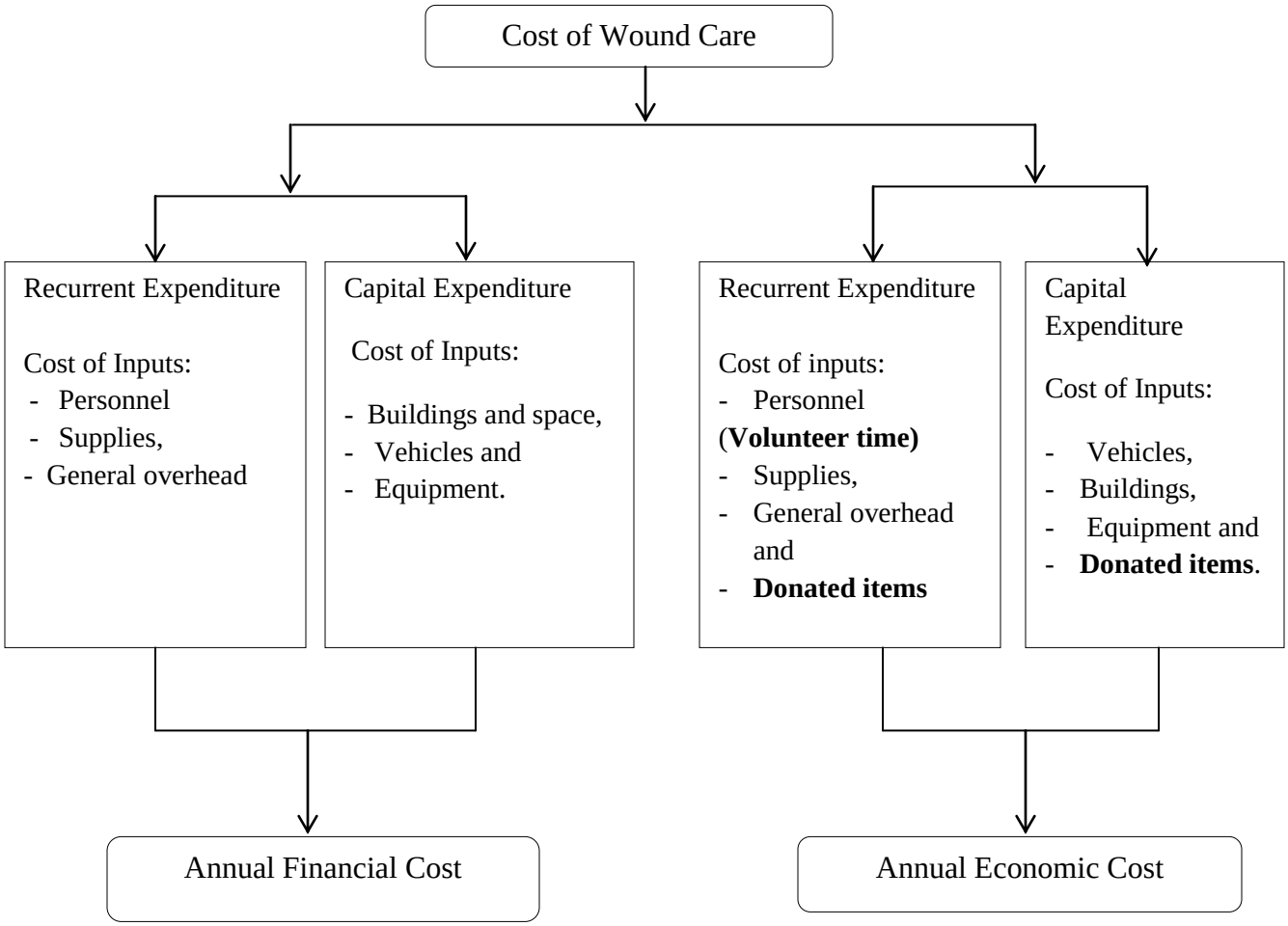
Also, knowledge of the cost involved in providing health services would help the health facility properly estimate the future cost of health inputs and services

To crown it all, knowing the cost of wound care to the health facility and comparing it with other health budget allocations can help the Buruli Ulcer endemic health districts and their treatment centers advocate for more resources for adequate provision of health services if they are not adequate.

1.4 Conceptual Framework

This conceptual framework represents the various cost components that make up the cost of wound care in the treatment of Buruli Ulcer patients. The wound care cost is made up of recurrent and capital expenditure. The inputs of the capital expenditure include the cost of buildings space, vehicles and other equipment with a life span of more than one year. The recurrent expenditure has personnel remuneration, operations and maintenance cost, general overhead cost, cost of non-medical and medical consumables, cost of drugs and other miscellaneous expenditure. The recurrent and capital expenditure make up the annual financial and economic costs. The economic cost component also contains the cost of donated items and volunteer services. Figure 1 is a diagrammatic representation of the conceptual framework.

Figure 2: Conceptual framework of wound care cost of Buruli Ulcer Patients



1.5 Objectives

1.5.1 General Objective

The general objective of this study is to estimate the financial and economic cost of wound care to the health facility in the treatment of Buruli ulcer patients.

1.5.2 Specific Objectives

The specific objectives are:

1. To estimate the annual financial cost of wound care to the health facility

2. To estimate the annual economic cost of wound care to the health facility.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Neglected tropical diseases

Neglected Tropical Diseases (NTDs) are a group of chronic debilitating and poverty-promoting parasitic, bacterial, viral and fungal infections which usually affects the poor (Herrara et al, 2011; Fenwick et al, 2009). According to the European Foundation Initiative for African Research into Neglected Tropical Diseases (2012), these infectious diseases that can be prevented, eliminated or even eradicated affect about one billion poor people. These diseases are neglected at the community, national and global level. The World Health Organization puts 17 diseases in this category and this includes Buruli Ulcer (WHO, 2012).

According to the Centre for Disease Control and Prevention (CDC), 100% of low income countries are affected by at least five of the neglected tropical diseases simultaneously. Furthermore, affected individuals often have more than one infection or parasite at a time and the cost of treatment for NTDs mass drug administration is estimated to cost less than fifty United States of America cents (CDC, 2011).

Herrara et al., (2011) indicated that the global burden of NTDs can be compared to that of other infectious diseases such as malaria and tuberculosis. Globally, NTDs accounts for 57million Disability Adjusted Life Years (Conteh et al, 2010) and for about 500,000 deaths annually (Herrara et al, 2011). In the Latin Americas and the Caribbean NTDs account for 8.8% of disability adjusted life years, (Herrara et al., 2011). In Sub-Saharan

Africa, according to Hotez and Kamath (2009) NTDs affects about 500 million poor people. Hotez and Kamath (2009) further state that the burden of NTDs is approximately half that of malaria and twice that of tuberculosis. Zhang et al, (2010) concludes that Sub Saharan Africa has the largest burden for many of these neglected tropical diseases.

Given the importance of NTDs globally and especially in Africa, as documented by Herrara et al., (2011), Conteh et al., (2010), and Hotez and Kamath (2009), it is clear that NTDs are serious health burden. In view of the fact that BU is classified as one of the NTDs and that it is endemic in some areas in Ghana, it is surprising to note that the Ghana Control Strategy for the control of NTDs does not include Buruli Ulcer. The strategy focuses on the control of five NTDs namely schistosomiasis, onchocerciasis, trachoma, lymphatic filariasis and soil transmitted helminthiasis (MOH, GHS, 2007).

2.2 History of Buruli Ulcer

Although worldwide the third most common mycobacterium disease of healthy humans is Buruli Ulcer after leprosy and tuberculosis (Asiedu and Etuaful, 1998), in Ghana, according Amofah et al, (2002), BU comes second to tuberculosis.

Buruli Ulcer was first described by British physician, Sir Albert Cook in 1897. It was however not until 1948 that Peter Mac Callum and his team isolated the causative organism as mycobacterium ulcerans (WHO, 2007). Buruli ulcer is said to be present in almost all West African countries. Endemic status have been established in the following countries; Benin, Cote d' Ivoire, Ghana, Guinea, Liberia, Nigeria, Sierra Leone, and Togo (WHO, 2006). Buruli ulcer is found mainly in tropical and subtropical regions (Pouillots et al, 2007).

The work of Aiga et al (2004) reveals that Buruli ulcer was first identified in Ghana in 1971. This first case was found in the Greater Accra region of Ghana. After this case, many other cases have been identified in other regions of the country and by the end of 1998 approximately 1200 case had been reported (Amofah et al., 2002). Summary statistics indicators for Buruli ulcer in Ghana from 2003 to 2006 reveals that by 2006 there were over 4000 cases of Buruli ulcer in Ghana and the disease was endemic in 35 administrative districts in 6 regions of Ghana (NBUCP, 2008)

2.3 Epidemiology of Buruli Ulcer

Geographically, most of the endemic countries in Africa are found in West Africa. These countries have recorded cases that cumulatively range from 1000 to 20,000 cases (WHO, 2006). In Ghana the disease has been reported in 138 health districts (NBUCP, 2008).

The disease commonly affects children less than 15 years of age compared to adults (Aiga et al., 2004) with peak age of onset in the children found to be between 10 years and 14 years and that of adults was between 75 years and 79 years (Boleira et al, 2010). This peak in adult onset is attributed to the relatively low immunity status of the elderly. There is no sex difference noted in the distribution of the disease among children (Aiga et al, 2004), however in adults it is suggested that the disease is more common in females than males (WHO, 2006). Boleira et al., 2010 however indicates that men older than 59 years had a higher chance of developing the disease than women.

WHO (2006) reports that Buruli ulcer usually affects people living in poor communities, and areas where personal and environmental hygiene are deprived. In a community and

family matched case control study by Pouillot et al. (2007) low levels of education was identified as a risk factor for developing Buruli ulcer. Also Aiga et al., (2004) in their study found that swimming and other water related activities have been identified as risk factors for Buruli ulcer development. Certain human activities such as damming of rivers and streams, mining activities and deforestation aid in creating the favorable environmental conditions that aid the mycobacterium's survival (WHO, 2006).

Overall it may be concluded that Buruli ulcer affects mainly children (Aiga et al., 2004) who live in deprived communities where the environment has been compromised through human activities (WHO, 2006) and this in turn may perpetuate the poverty cycle (Pouillot et al., 2007).

2.4 Diagnosis, treatment and control of Buruli ulcer

Buruli ulcer affects the skin. It usually starts as a nodule, papule, plague or oedema and this is mostly painless. This commonly advances into a similarly painless ulcer (Pouillots et al., 2007). Patients are classified as new cases or recurrent cases. New cases are patients without any previous history or treatment of Buruli ulcer. A patient with previous history of surgical treatment who reports again with a new lesion either at the same site or another site within one year from end of last treatment is considered a recurrent case. The disease is recognized as being active or inactive clinically (Asiedu et al, 2000).

Management of Buruli ulcer is dependent on the stage of the disease. Antibiotics and surgery are the main ingredients used in treating Buruli ulcer. Rifampicine and

streptomycin are usually used. In complicated ulcers, surgery which may or may not involve skin grafting is done (WHO, 2006).

In 1998, the WHO established the Global Buruli Ulcer Initiative (GBUI) to help develop strategies for Buruli ulcer control (WHO, 2000.) According to the guidelines for controlling Buruli ulcer in the Africa region, control strategies involve six operational areas which include case finding; case management; monitoring and evaluation; training; advocacy and resources mobilization; and priority research. In Ghana, the National Buruli Ulcer Control Programme leads and coordinates the control of Buruli Ulcer disease (NBUCP, 2008). One of the key strategies in the control of the disease in Ghana is the early detection and subsequent treatment of the affected individual. If this can be achieved it would have a great impact on the control of the disease in Ghana as indicated by Etuaful and others, (2005)

2.5 Burden of Buruli ulcer in Ghana

Since the first case of Buruli ulcer was reported in Ghana in 1971, the number of cases of Buruli ulcer has increased to a national prevalence of 20.7 per 100,000 people (Adamba & Owusu, 2011). In some endemic communities, the prevalence is as high as 150 per 100,000 persons. This has made Buruli ulcer a burdensome disease. This burden has both social and economic dimensions (Adamba & Owusu, 2011).

The economic burden of the disease is highlighted in the publication of Grietens et al (2008) who indicated that households in Cameroon spend about 25% of their annual earnings on BU treatment even though treatment is supposedly free of charge. Adamba & Owusu (2011) confirms these findings in their study in some BU endemic areas in

Ghana. In their study they report that in order to cope with the high cost of medical care, BU patients resort to using up their entire savings. Sixteen percent of the households they interviewed borrow money and 27% sell off their assets to cater for medical cost incurred in the treatment of BU.

Asiedu and Etuaful (1998) in their study indicated that about US$80,000 was spent in treating Buruli ulcer over a 3 year period (1994-1996) at St Martin's Hospital in Agroyesum a BU endemic community in Ghana. Meanwhile, during that same period of time, the entire district health budget was only US$59,000. This study further reveals that in 1994, the Amansie West district would have spent 83% of its total health budget in treating 36 Buruli ulcer patients. Socially Buruli ulcer patients and their families tend to be stigmatized in the communities they live as confirmed by Adamba & Owusu, (2011) who state that over 60% of Buruli ulcer patients suffer various forms of stigmatization which is a great social burden.

2.6 Burden of chronic wounds

Chronic wounds are classified as wounds that fail to heal within three months (Mustoe, 2005). The World Alliance for Wounds and Lymphedema Care recognizes Buruli Ulcer as one of the aetiologies of chronic wounds (WAWLC, 2012). The worldwide burden of chronic wounds is not known. However, the developed world has good records of its economic burden according to Macdonalds & Asiedu, (2010). In North America, about six million chronic wounds occur each year (WHO, 2010).

Furthermore, chronic wounds are a major health burden and their management leads to a large drain of health care resources (Harding & Patel, 2002). Frykberg and others (2000) reveal that several billions of United States of American Dollars is spent annually on managing chronic wounds.

Moreover, Harding and Patel (2002) indicate that, in the United Kingdom, the management of diabetic foot ulcers cost the National Health Service about 17million pounds a year and in the United States treatment of a similar condition costs 150million US Dollars annually.

In 2006-2007, the cost of wound care to the United Kingdom was estimated as 9.89million pounds and this represents 1.44% of the health budget (Macdonalds & Asiedu, 2010).

Also, Asiedu and Etuaful (1998) in their 3- years study on Buruli Ulcer reveal that wound dressing alone accounted for 26% of the direct cost involved in managing Buruli Ulcer which is about $23,000.

The economic loss and impaired quality of life that people with chronic ulcer experience is not indicated in these direct costs (Harding & Patel, 2002). Macdonalds and Asiedu (2010) indicate that loss of self-esteem; continuous pain and possible depression are some of the difficult to quantify costs of chronic wounds.

As revealed by Macdonalds & Asiedu, (2010) the overall cost of wound care is yet to be quantified as the currently available estimates do not cover the economic cost of the

disease. However the available costs provided by Harding & Patel (2002) and Macdonalds & Asiedu, 2010 reveal that the costs of wound care is enormous.

2.7 Cost of health services

Information concerning the cost at which health services are provided in Ghana is rare (Amofah, 2010). Aboagye et al, (2010), indicate that, this scarcity in information is due to the fact that costing studies are not well established in Ghana and Africa as a whole. Amofah (2010) then explains that this is so because in Ghana for example, most health facilities have poor data capturing methods.

Costing studies however are necessary for effective and efficient management of health facilities. Also they are needed to help health policy makers make policies to help improve health delivery services (Aboagye, et al 2010). Adam, (2003), suggest that because of the importance of the knowledge of the cost of health services, the WHO have made great efforts to collect and collate cost data from health services in many countries.

In estimating the cost of health services, Drummond and others (2005) suggest that first of all, the resources to be used must be identified, after which they must be measured and then finally valued. Mogyorosy and Smith (2005) indicate that, in measuring the resources used for cost studies, two main approaches can be used. These they explain are the bottom-up or micro costing approach, the top-down or gross costing approach. A mixture of the two methods can also be used.

The bottom-up approach estimates the cost of a health service by aggregating the costs of the various resources used in the provision of that service (Waters and Hussey, 2004).

Tsilaajav in 2009 in the final report of costing study for selected hospitals in the Philippines and the study by Mogyorosy and Smith (2005) suggest that, the bottom-up approach to cost measurement even though is more expensive and time consuming yields more accurate results.

According to Walter and Hussey (2004), in the top-down approach to cost measurement, the total institutional expenditure for a given period of time is broken down into cost for specific services using various cost allocating methods. Tsilaajav's 2009 publication indicates that the top down approach is cheap and less time consuming compared to the bottom-up approach. Walter and Hussey (2004) as well as Mogyorosy and Smith (2005) agree with Tsilaajav's suggestion.

2.8 Cost of Illness studies

Cost of illness (COI) measures the economic burden of a disease (Siegel, 2006). These studies are particularly useful because knowing the cost of an illness can help policy makers prioritize health care and prevention policies (Siegel, 2006). There are many perspectives to COI studies. These include the societal, provider patient and purchaser perspectives (Mogyorosy and Smith, 2005). The purpose of the study determines the perspective from which the study is done. This is because; the several different perspectives include slightly different cost (Siegel, 2006). The different types of cost measured in COI studies include direct and indirect cost. Direct cost focuses on measuring the opportunity cost of resources used in treating a particular disease. The indirect cost measures the value of resources lost as a result of a particular disease (Siegel

2006). The WHO (1994) distinguishes the two essential categories of resources as capital (fixed) resources and recurrent (variable) resources.

In the estimation of cost in a COI studies, both Drummond (2005) and Siegel (2006) suggest that a discount rate of 3% should be used. Siegel further suggest that because of the high degree of uncertainties in COI estimations, sensitivity analysis should be undertaken and this can be done by using different discount rates. COI studies may be incidence- based or prevalence-base. Prevalence-based studies estimates annual cost and are more common than incidence- based studies which estimates lifetime cost of a disease (Siegel 2006).

2.9 Summary

The various literatures which have been reviewed point out the burdensome nature of Buruli Ulcer disease especially the chronic and devastating wounds it gives to those who are affected by it. It has also highlighted how little is known about the cost involved in managing this disease especially its accompanying chronic wounds even though the importance of knowing the cost of health services have been adequately established. This study would therefore help bridge this knowledge gaps and thus hopefully help in the effective and efficient control and management of this debilitating infectious disease.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Type of study

The research was a cross sectional cost of illness study from the perspective of health provider. It involved retrospective analysis of the cost data by the health facility during the treatment of the wounds of Buruli ulcer patients. The cost data for one full year (2011) was estimated.

3.2 Study Area

The study was conducted at the Amasaman government hospital. The hospital is at located Amasaman, the municipal capital of the Ga west municipality of Ghana's Greater Accra Region. The Amasaman hospital serves as the main municipal hospital and a referral center for the other nine government health facilities in the municipality. It is one of the Buruli ulcer treatment centers in Ghana. The Ga West municipality is the second largest municipality in the Greater Accra Region. It has about 1028 communities and occupies a land area of approximately 710.2 km^2. The municipality has three health sub districts namely, Amasaman, Pokuase and Ofankor.

Farming is the core occupation of the people in the area. It accounts for about 70% of the population's occupation. The Ga West Municipality is ranked fifth in Buruli Ulcer endemic areas in Ghana with a prevalence of about 87.7 per 100,000 persons (Adamba and Owusu, 2011). The municipality also has the highest number of healed and active lesions of Buruli ulcer disease countrywide (Ackumey et al 2011).

The municipality has the highest number of Buruli Ulcer patients in the Greater Accra region (Adamba and Owusu, 2011). According to the 2008 first quarter feedback report by the NBUCP the district reported 181new cases of Buruli ulcer and all these cases were seen at the Amasaman hospital.

3.3 Variables

The dependent variable measured in the study is the total (financial and economic) institutional cost of wound care of Buruli Ulcer patients. The independent variables measured in this study are the recurrent and capital institutional costs. Table 1 summarizes the independent variables that were studied.

Table 1: Table of variables

Variables	Indicators
Economic Cost	Sum of opportunity cost and financial cost. Opportunity cost includes cost of donated items and volunteer time.
Financial Cost	Sum of recurrent and capital expenditure (cost)
Capital cost	- Cost of Building space, - Cost of Vehicles - Cost of Equipment (medical and non-medical) - Cost of furniture
Recurrent Cost	- Salaries and allowances - Administrative cost - Cost of beddings - Cost of Maintenance: vehicle and building - Cost of Utilities like electricity and water - Cost operations: vehicle - Cost of stationary - Cost of drugs - Cost of meals, and , - Cost of medical consumables - Cost of supplies: medical and non-medical

3.4 Study population

The study was conducted at the Amasaman hospital. The hospital has a bed capacity of a 106. It has 10 doctors and 4 medical assistants. The hospital on the average attends to about 200 patients in a day.

3.5 Sampling

Purposive sampling was used in this study. The Ga West municipality was chosen because the study is part of a wider ongoing research into BU by the Noguchi Memorial Institute for Medical Research in the Municipality.

The Amasaman Hospital was chosen because it serves as the largest and main referral centre for the management of BU cases in the Municipality. It is also the only BU treatment centre in the municipality where surgical interventions can be carried out in the management of the wounds of BU cases. Since the study was on wound care which may or may not involve surgical interventions, the Amasaman hospital became the most appropriate health facility for the study.

At the Amasaman hospital, wound care cost involving both out and in- patients seen at the hospital in the year under review was studied. The cost of treating the wounds of all the patients admitted to the BU ward of the hospital over the study year was used in the study. Also, BU patients whose wounds were treated on out patient's basis were also used in the study. Both the recurrent and capital expenditure involved in treating the wounds of BU patients on out and in patients' basis were used in the study.

3.6 Sample size

The sample size used in the study was one government health facility out of the nine in the Ga West Municipality. The Amasaman Hospital was chosen purposefully out of the nine health institutions.

3.7 Data collection technique

In collecting the data for this study, the following data collection techniques were used:

1. Desk review
2. Observation
3. Face to face interviews.

3.8 Data collection tools:

The tools that were used to collect the available expenditure information included the following:

1. Data extraction tool for capital expenditure
2. Data extraction tool for recurrent expenditure
3. Interview guide

3.9 Observation:

The process of wound dressing was observed. The category and number of medical staff involved in the wound dressing were observed and noted. A wound dressing checklist was used for this purpose. The checklist sought to identify the type of wound cleaning

agents used, the type of wound dressing solution and agent used. It also sought to identify the types of instruments used in the wound dressing.

3.10 Face to face interviews:

Face to face interviews were held with the following persons:

1. The nurse in charge of the BU ward.
2. The Administrator of the hospital.
3. The Accountant of the hospital.

The Medical Superintendent who is the head of the hospital was not available during the period of the study. The hospital accountant was interviewed instead.

An interview guide was used for the interviews. The interviews were not recorded by a tape recorder but notes were taken. The interview guide covered areas such as:

- The type of staff and the staff strength of the BU wards.
- How the BU wards are managed.
- The hospital's overhead cost.
- How the hospital is funded.
- The kind of donations the hospital received.
- The type and number of volunteers who work at the hospital.

3.11 Data extraction of capital items

The inventory record book of the BU ward was the source of data on the medical and non-medical equipment. The medical equipment included items such as surgical

instruments, stethoscopes, wound dressing instruments etc. The non- medical equipment consisted of items such as furniture, television, air condition etc. Independent verifications of selected items were done to ascertain the reliability of the inventory record book. The market prices of these items were obtained from private medical equipment trading companies. Multiple prices were collected and the commonly occurring prices were used. Records of other capital items like vehicles were obtained from the office of the hospital administrator. The replacement cost of these items were ascertained and used in the study.

The Hospital has two Buruli ulcer wards; a surgical and non-surgical ward. The floor space being used for Buruli ulcer activities was measured with a standard tape measure. Parts of the non- surgical ward were being used by the hospital for other purposes. These spaces were excluded in the study. The Amasaman Hospital is a non-feeding hospital. However, BU patients are provided with meals twice a day. The floor space of the BU ward kitchen form which these meals are prepared was measured and used in the study. The floor space of the Central Sterile Supply Department (CSSD) was also measured and included in the study. The total floor space measured for each building was multiplied by the standard cost per m^2 charged for land space in the Municipality. This amount was provided by the Land Valuation Department of the Municipal Assembly.

3.12 Data extraction of recurrent items

Data on the type and quantities of recurrent items such as medical supplies, medical consumables, drugs and stationary were obtained from the requisition books of the BU

ward. The type and quantities of food items supplied to the BU kitchen were obtained from the inventory record on the hospital store keeper.

Salaries and allowances of staff of the Buruli ulcer ward, the laundry department and the CSSD were obtained from the staff. The data obtained were verified at the Hospital's Accounts Department. Salaries and allowances of management staff were obtained from the Hospital's Account Department. Some of the patients' caregivers volunteer to prepare meals at the BU kitchen for the patients. The volunteer time of these caregivers were measured and valued.

The Amasaman hospital purchases water from private water providers for its operations. The total amount of money spent in purchasing water was obtained from the Hospital Accounts Department. Like other government hospital in the country, the Amasaman Hospital does not pay for the electricity consumed. The type and quantities of all the items that use electricity in the BU ward were obtained. The total electrical units consumed by these items and the corresponding monthly electricity bills were estimated with the help of experts from the electricity company of Ghana, Amasaman. The total amount of money spent on vehicle and building maintenance was obtained from the Hospitals Accounts Department.

3.13 Quality control

Data collected for the study covered a one year period. To ensure accuracy and consistency in the data collection, the principal investigator carried out most of the data collection. Two field assistants were recruited and trained to help in data collection.

There was also pre-testing the data collection tools. The pre-testing of the data collection tools was carried out at the Amasaman Hospital. The needed modifications to ensure that they give precise and apposite information were carried out. Various triangulation methods such as crosschecking of data obtained with other departments were carried out to ensure the accuracy of data collected. Double data entries were carried out to ensure accurateness of data entered. Data was entered into Microsoft Excel, 2010 edition.

3.14 Data analysis

Data was analyzed with the aid of Microsoft Excel, 2010 edition.

3.14.1 Financial cost analysis

To estimate for the financial cost, the capital expenditure portion of the financial cost was first estimated. This was done by listing all the items/ inputs accounting for the capital expenditure such as vehicles, equipment, Building etc. Their replacement cost (C) and also the working or useful life (N) of each item was then determined. The annual financial cost of each item was determined by dividing the replacement cost of the item by its working life in years (C/N). The sum of the annual costs of all the capital items/ inputs indicated the subtotal capital financial cost. After this a cost sharing or allocation method was used to apportion a proportion of the cost to wound care and this proportion became the total annual capital expenditure of wound care.

In calculating the recurrent cost portion of the financial cost, a list all the recurrent expenditure inputs e.g. Personnel such as nursing staff, supplies such as medical consumables, operating and maintenance expenditure for capital items such as vehicles

and building was made. For the personnel, their annual gross salaries were used. For the medical and non-medical supplies the quantities supplied in the course of the year 2011 and their replacement cost were used. The quantities of medical consumables supplied and their replacement cost was used in the analysis. The entire cost of some of the recurrent inputs such as medical supplies and consumables were used in the analysis. Proportions of some of the recurrent inputs such as the staff salaries and the cost of non-medical supplies were used in the analysis. A sum of the cost of all these inputs represented the total recurrent expenditure.

A sum of the annual recurrent and capital expenditure on wound care became the estimated total annual financial cost of wound care.

3.14.2 Economic cost analysis

In estimating the economic cost of wound care, both the recurrent expenditure and the capital expenditure incurred was used. In calculating the economic cost of recurrent expenditure, the cost of all recurrent items was summed in addition to the cost of all donated recurrent items such as food items and the cost of volunteer time. In calculating the economic capital costs, values of capital items including donated items would be annualized. The Annualization took into consideration the cost of purchase, the useful life span and the value if resources were invested. A discount rate of 3% was used.

In calculating the recurrent cost portion of the economic cost, all the recurrent expenditure inputs e.g. Personnel such as nursing staff, supplies such as medical consumables, operating and maintenance expenditure for capital items such as vehicles

and building was made. The personnel also included the care givers who volunteer as cooks for the BU kitchen. For the personnel, their annual gross salaries were used. The annual gross salaries for cooks of a nearby private canteen were used for the volunteer cooks of the BU kitchen. For the medical and non-medical supplies the quantities supplied in the course of the year 2011 and their replacement cost were used. The non-medical supplies included donated food items. The quantities of medical consumables supplied and their replacement cost was used in the analysis. The entire cost of some of the recurrent inputs such as medical supplies including the donated food items and consumables were used in the analysis. Proportions of some of the recurrent inputs such as the staff salaries and the cost of non-medical supplies were used in the analysis. A sum of the cost of all these inputs represented the total recurrent expenditure.

A sum of the annual recurrent and capital expenditure on wound care became the estimated total annual economic cost of wound care.

3.15 Allocation of cost proportions

Various proportions of the estimated cost of capital and recurrent items were allocated to BU wound care services. For the personnel cost estimated, the proportions allocated was based on the number of days worked. For example, the staffs at the BU ward work for twenty out of the twenty-eight days in a month and so 71% of their annual gross salaries were allocated to BU wound care. The same proportion was given to the cooks at the BU kitchen. Four percent of the management staffs' salaries were allocated to BU wound care because management meetings were held once in a month i.e. 1 out of 28 days. The same proportions were used for the theatre staff because surgeries are done once in a

month. The same cost proportion used for the staff was used for the medical equipment and instruments they use in providing the services.

For the cost of building maintenance, 13% was allocated to BU wound care because there are 20 buildings in the hospital and BU uses 3 of these buildings. There were 22 water storage points in the hospital and 3 of these points are dedicated to the BU wards thus 14% of the water cost was allocated to BU wound care. The Hospitals' Laundry Department does the laundry of the BU ward once a month i.e. 1 out of 20 days and so 5% of the laundry cost was allocate to BU wound care. The Central Sterile Supply Department (CSSD) of the hospital sterilizes for the BU thrice a week, thus 43% of the cost of CSSD was allocated to BU wound care. Four percent of the vehicle cost was allocated to BU wound care. The same proportion used for the management was used for the vehicles.

3.16 Assumptions used in the study

The following assumptions were made in this study:

- It was assumed that all the medical consumables and drugs supplied to the BU ward in 2011 were all used up in the same year.
- In estimating the unit cost of BU wound care it was assumed that the resources used were used by the 50 BU patients who were admitted and had the full wound care services.

- In apportioning part of the cost of building maintenance to BU wound care, it was assumed that the maintenance was evenly distributed among all the building in the hospital.
- In apportioning part of the cost of water to BU wound care, it was assumed that the rate of water usage was equal in all the wards and departments of the hospital.

3.17 Ethical considerations

3.17. 1 Ghana Health Service Ethical approval

Ethical approval was sought from the Ghana Health Service Ethical Review Committee of the Research and Development Division of the Ghana Health Services.

3.17.2 Approval of Study area

Approval was also sought from the medical superintendent of the Amasaman hospital as well as the Municipal director of health service of the Ga West Municipality.

3.18 Limitations of the study

There were two principal limitations to this study. These are as follows:

- There was some level of uncertainty about the availability and reliability of some of the hospital data needed for the study because of poor record keeping. This made data collection wearisome and time consuming. As an example, the record on donated food items had some donations not being dated and others without proper quantities of the items donated. These were however excluded from the study. There is the need to improve upon the current hospital information

management system to help make data collection for costing studies more accurate.

- There was considerable difficulty in finding and reviewing literature on hospital costing studies undertaken in Ghana mainly because such studies may not be common in Ghana. Academic and research institutions' must therefore be encouraged and funded to undertake such important studies. They are needed for effective planning and efficient delivery of health services in Ghana.

CHAPTER FOUR

4.0 RESULTS

4.1 Background characteristics of study population

The study was conducted at the Amasaman hospital, a 106 bed capacity health facility which also serves as the municipal hospital of the Ga West municipality. It is also one of the BU treatment centres in Ghana.

Within the period under review, 49,714 patients were attended to at the hospitals out patients department. About 0.2% (95) out of the 49,714 outpatient attendants were BU patients. Fifty- three percent of the BU patients (50) were admitted and managed at the BU wards of the hospital. The BU wards have a total bed capacity of 34 which represents 32% of the hospitals bed capacity.

In the 2011 financial year, the revenue component of the hospitals internally generated funds was GH₵ 1,261,096.74. Also, the total expenditure within this same period of review was GH₵ 1,466,659.32. Table 2 summarizes the background characteristics of the Amasaman Hospital.

Table 2 Characteristics of Amasaman Hospital

Characteristics	Responses
Type of health facility	Municipal Hospital
Total hospital bed capacity	106
BU wards bed capacity	34
Total Out Patient attendance	49,714
BU cases diagnosed	95
BU patients admitted	50
Total expenditure	GH₵ 1,466,659.32
Total revenue	GH₵ 1,261,096.74

4.2 Annual financial and economic cost of BU wound care

Table 3 summarizes the annual financial and economic costs incurred by the Amasaman hospital in providing wound care services to BU patients

Table 3 Annual financial and economic cost of BU wound care

Cost description	Financial cost (GH₵)	Cost profile (%)	Economic cost (GH₵)	Cost profile (%)
Capital items				
Buildings/space	87.49	0.1	9,786.25	4.2
Vehicle	412.87	0.2	450.76	0.2
Medical devices	981.18	0.5	4,969.47	2.1
Non-medical devices	231.42	0.2	1,026.89	0.5
Subtotal	1,712.95	1.0	16,233.36	7.0
Recurrent items				
Personnel	143,101.12	72.9	163,551.70	70.3
Utilities	6,706.04	3.4	6,706.04	2.9
Maintenance	13,938.41	7.1	13,938.41	6.0
Medical consumables and supplies	21,674.24	11.0	21,674.24	9.3
Non-medical supplies	4,993.67	2.5	4,993.67	2.1
Bed and feeding	4,200.00	2.1	5,549.50	2.4
Subtotal	194,613.47	99.0	216,413.55	93.0
Total cost	196,326.42	100.0	232,646.92	100.0

4.2.1 Annual financial cost of BU wound care

The annual financial cost of BU wound care services incurred by the Amasaman Hospital in 2011 was GH₵ 196,326.42. This amount represented the total cost of both recurrent and capital items used in providing the wound care services to the BU patients.

The cost of the capital items represented about 1% (GH₵1, 712.95) of the total annual financial cost. Medical devices such as medical equipment and instruments represented the major capital cost item (0.5%) used in providing the wound care services.

The recurrent component of the annual financial cost of BU wound care services was GH₵ 194,613.47. The cost of personnel and the cost of medical consumables and supplies were the two major recurrent cost items. They accounted for 73% and 11% respectively of the annual financial cost of BU wound care. The cost of building and vehicle maintenance was also significant. It was GH₵ 13,938.41 accounting for 7% of the total annual financial cost. The cost of providing a bed and feeding was the least recurrent cost incurring item (2%) for the annual financial cost of BU wound care services.

4.2.2. Annual Economic Cost of BU Wound care

In providing wound care services to BU patients in 2011, the Amasaman hospital incurred an annual economic cost of GH₵ 232,646.92.

The cost of capital items in the annual economic cost of BU wound care was GH₵ 16,233.36. This constitutes 7% of the annual economic cost of BU wound care. However, unlike the capital component of the annual financial cost, the major capital cost item for

the estimated annual economic cost was the cost of building. It amounted to GH₵ 9,786.25 representing 4% of the estimated annual economic cost. The other major capital cost item was the cost of medical devices which was GH₵ 4,969.47 constituting 2% of the estimated annual economic cost of BU wound care. The cost of vehicle was GH₵ 450.76 and it represented the least cost incurring item of estimated annual economic cost of BU wound care.

According to the estimated annual economic cost of BU wound care, GH₵ 216,413.55 was spent on recurrent items. This constituted 93% of the estimated annual economic cost. Three recurrent items were the major cost incurring items of the estimated annual economic cost. Together they account for about 85% of the estimated annual economic cost. They include the cost of personnel which amounted to GH₵ 163, 551.70, the cost of medical consumables and supplies which amounted to GH₵ 21, 674.24 and the cost of maintenance (vehicle and building) which amounted to GH₵ 13,938.41. Individually, these costs represented 70%, 9%, and 6% respectively of the estimated annual economic cost of BU wound care. The cost of non-medical supplies such as stationary, laundry and cleaning supplies represented the least recurrent cost incurring item constituting about 2% of the estimated economic cost.

4.2.3 Costs of BU wound care

The costs of BU wound care estimated were the annual financial cost and the annual economic cost. Both cost types have recurrent and capital components. The recurrent cost components in both estimated costs constituted the major cost constituent. In the estimated annual financial cost, the recurrent cost formed about 99% of the estimated

amount. Also, in the estimated economic cost, it produced about 93% of the estimated amount. Figures 1 and 2 graphically depict these findings.

Figure 2 Estimated annual financial cost of BU wound care

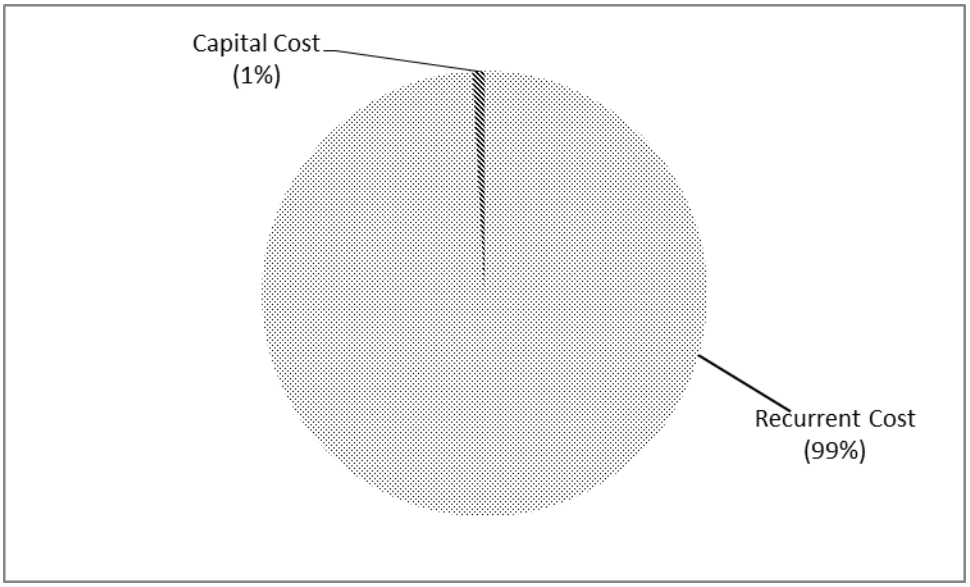
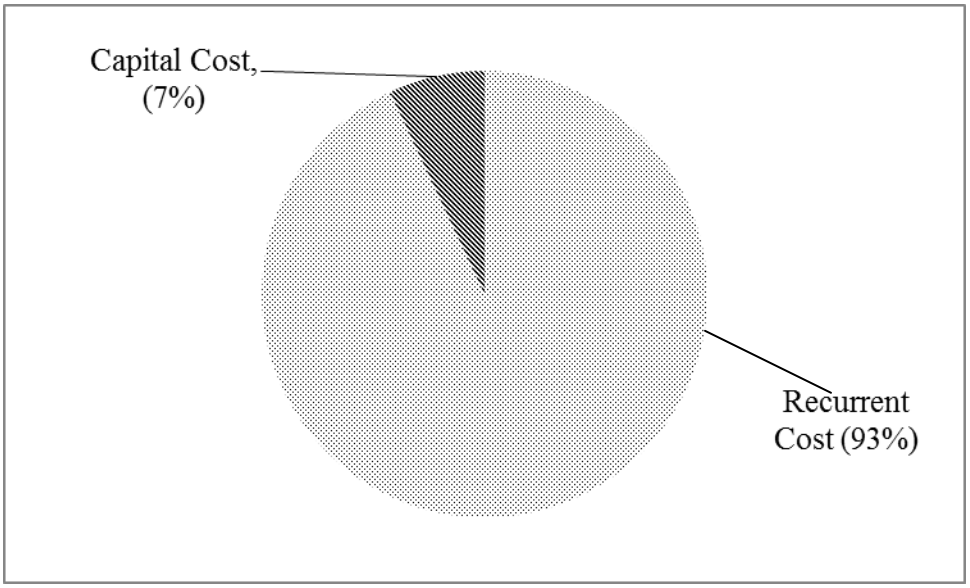


Figure 3 Estimated annual economic cost of BU wound care



4.3 Sensitivity analysis

A sensitivity analysis was conducted to test the robustness of the estimated annual financial and economic cost of BU wound care. Different variations were made to the results of the capital and recurrent items used for the costs estimations. These include the following:

- The discount rate for capital items was increased to 10%.
- The percentage of the vehicle cost allocated to BU wound care was increased to 10%
- The percentage of BU ward staff salaries and benefits was reduced to 50%
- The cost per bed per day was increased by 1.3 times.

Table 4 summarizes the results of the sensitivity analysis.

Table 4 Sensitivity analysis for financial and economic cost of BU wound care

Type of cost	Estimated Cost (%)		Sensitivity Analysis			
			Using 10% discount rate for capital items	Using vehicle allocation rate of 10%	Using BU ward staff salary allocation of 50%	Using regional hospital's daily cost per bed charge
Financial cost	Recurrent	99.0	99.0	99.8	98.9	99.2
	Capital	1.0	1.0	1.2	1.1	0.8
	Total	100.0	100.0	100.0	100.0	100.0
Economic cost	Recurrent	93.0	88.0	92.8	91.4	93.2
	Capital	7.0	12.0	7.2	8.6	6.8
	Total	100.0	100.0	100.0	100.0	100.0

CHAPTER FIVE

5.0 DISCUSSION

The study revealed that in 2011, the Amasaman Hospital spent an amount of GH₵ 196,326.42 (US$ 104,196.17) in providing for the wound care services of BU patients. The true cost of BU wound care services to the Amasaman Hospital is however revealed in the estimated economic cost of BU wound care which amounted to GH₵ 232,646.92 (US$ 123,472.52).

The cost of BU wound care estimated can be divided into two types. These are the financial cost of BU wound care and the economic cost of BU wound care. The financial cost represents the amount of money the Amasaman Hospital spent on Bu wound care services. This amount of money was as a result of the expenditure on capital items and the expenditure on recurrent items. The economic cost estimated indicates the cost of total resources used in the provision of BU wound care services. Even though the estimated economic cost also covers expenditure on capital and recurrent items, unlike the estimated financial cost of BU wound care, it included the cost of donated items and volunteer services employed by the Amasaman Hospital in the cause of providing wound care services to BU patients.

In both the estimated financial and economic costs of BU wound care, the cost of recurrent items constituted the largest proportions. It formed 99% and 93% respectively of the estimated financial and economic costs. The cost of capital items was not prominent in both the estimated financial and economic cost of BU wound care.

It accounted for 1% of the estimated financial cost and 7% of the estimated economic cost of BU wound care.

The results of this study make known that, the GH₵ 196,326.42 (US$ 104,196.17) spent on BU wound care by the Amasaman Hospital represented about 13% of the hospitals annual expenditure in 2011. The amount also represents about 16% of the revenue it generated in the same year. The estimated economic cost which reveals the true cost of resources used in BU wound care represents about 16% and 19% of the hospitals 2011 annual expenditure and revenue respectively.

The study also shows that, the annual cost of wound care for one BU patient is estimated to be about GH₵ 4,652.94 (US$2,469.45). Drew et al (2007) established the fact that wounds are a significant source of cost to health care providers. The results of this study agree with this assertion since such enormous parts of the hospitals resources were spent on a few (95) of the total number of patients they attended to (49,714) in 2011.

The cost of capital items is not a major cost component of the estimated financial and economic costs of BU wound care and this is similar to the findings reported by Tsilaajav (2009) when costing studies were undertaken in some hospitals in Philippines. Even though the percentages in that study was higher, capital item was lower than the cost of recurrent items. It indicates how the cost of BU wound care cannot be reduced by merely reducing investment in capital items. The cost of building component of the estimated financial cost of BU wound care was the least significant cost item because the BU wards and kitchen directly involved in BU wound care were donated to the health facility. These cost therefore become significant in the estimated economic cost.

This brings to the fore the fact that in providing wound care services to BU patients, recurring or continuous costs are more important than the initial investments in assets. This fact ought to be considered in starting or setting up new treatment centres.

The cost of vehicles was not noteworthy because the hospital has one vehicle and it is not actively involved in BU wound care activities. The results of this study also show that, the cost of medical devices which comprises the costs of medical instruments and equipments, in the estimated financial cost of BU wound care quadruples in the estimated economic cost of BU wound care. This was not due to majority of these items being donated as was the case of the building cost but the difference was due to the fact that the major cost accounting items were the medical equipment and these even though few were mostly donated items.

The results of the study have also shown that, the cost of non-medical devices (furniture and non-medical equipment) increased significantly (about four times) in comparing the estimated financial and economic costs of BU wound care. This immense increase was due to the fact that most of these items were donated to the health facility as was the case of the building cost.

Overall, the capital cost of BU wound care in the estimated economic cost is about nine times higher than that of the estimated financial cost. This phenomenon highlights the importance of donations in the capital expenditure of BU wound care service provision.

Majority of the cost estimated for BU wound care was from the cost of recurrent items. Of this recurrent expenditure, cost of personnel was the most significant in both the

estimated financial and economic cost of BU wound care. This phenomenon attest to the fact that personnel cost (staff salaries and benefits) are a major component of hospital expenditure as indicated by Aboagye et al (2010) and Tsilaajav (2009). The high levels of personnel cost however differs significantly from what Mills et al (1993) reported when they studied the cost of districts hospitals in Malawi. They reported that salaries and wages of staff accounts for as low as 27% to 39% of the hospitals cost.

Another recurrent item that notably affected the cost of BU wound care was the cost of medical consumables and supplies which was estimated to be GH₵ 21,674.24 (US$ 11,503.15). This represents about 11% and 9% in the estimated financial and economic costs of BU wound care respectively. The results indicate the high cost of dressing materials. This is however lower than that reported by Drew et al (2007). That study estimated the cost or dressing materials to be about 17% - 22% of the total cost of wound care. This result further make known the fact that when BU is detected and treated early (pre-ulcerative stages) the cost of management of the disease can be reduced as suggested by WHO (2007). The study further show that, the cost of maintenance which comprises the costs of building and transport maintenance was significant in both the estimated financial and economic cost of BU wound care. This further emphasizes the importance of recurring cost to the BU treatment centres.

The WHO (2007) indicates that, the average cost of treating BU disease in 1994-1996 was about US$ 780. This study shows that currently, the estimated cost of BU wound care is about GH₵ 4,652.94 (US$2,469.45). This suggests an increase of about three

times. This increase in the cost of providing health services in BU treatment may be due to an increase in inflation over the over a decade period in between the two studies.

The results of the sensitivity analysis conducted for this study reveals the sturdiness of the study findings. When the rate at which capital items were discounted was increased to 10% from the original 3% used in the study, the cost of recurrent items was still strikingly high accounting for 88% of the estimated economic cost of BU wound care. Four percent on the cost of vehicles was allocated to the BU wound care services in the study. Increasing the allocation to 10% did not still change the trend of the cost components making recurrent cost still the most outstanding cost component. The cost per bed per day used in the study was more than doubled when the cost per bed per day for the Greater Accra Regional Hospital was used in the sensitivity analysis. The cost of recurrent items still remained the largest proportions of the estimated costs of BU wound care. In the study 71% of the salaries and benefits of the staff of the BU ward was allocated to BU wound care. This was reduced to 50% in the sensitivity analysis but this did not sway the cost directions of the estimated financial and economic costs of BU wound care. The cost of recurrent items was still the most important cost accounting component of the estimated financial and economic costs of BU wound care. The two principal limitations of this study mentioned earlier did not affect the results of the study. The results of this study can thus be generalized to other similar BU treatment centres offering same levels of care.

CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATION

6.1 CONCLUSION

This study focused on the cost of health services to a health service provider. The study has drawn attention to how costly BU wound care services are to a BU treatment centre in this case the Amasaman Hospital. The economic burden of wound care places heavy burden on these facilities. Budgeting and resource allocation should take cognisance of this for future financing of the hospital. These facilities should also use this results for advocacy purposes to generate more financial resources.

6.2 RECOMMENDATIONS

The recommendations made from this study include the following:

1. To help reduce the burden that the cost of wound care services places on these BU treatment centres, there is the need to provide extra resources to these health facilities. The National Health Insurance Scheme (NHIS) helps to pay for the anti-tuberculosis drugs used in BU treatment. Wound care services for BU patients can also be included in the services being paid for by the NHIS so that the NHIS can help pay for these services which have been proved to be expensive.
2. This study focused on the cost of BU wound care to a health facility (health service provider). It is needful to conduct further research to ascertain the societal cost of BU disease and thereby help establish the full economic burden of BU disease to these endemic areas and country as a whole.

CHAPTER SEVEN

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APPENDICES

8.0 APPENDICES

8.1 Data collection tools

Personnel (Management, healthcare delivery staff, other support staff)

No	Personnel name	Job title	Full time /Part time / volunteer	Percentage of time per month spent on BU Wound care	Salary and Benefits	
					Gross Salary	Benefits and Allowances
1.						
2.						

Recurrent supplies: Medical supplies

No.	Name of Supply	Total amount/qty Received				COST				Total amount
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
1.										
2.										

Recurrent supplies: Medical Consumables and drugs

No.	Name of Supply	Total amount/qty Received				COST				Total amount
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
1.										
2.										

Recurrent supplies: Stationary

No.	Name of Supply	Total amount/qty Received				COST				Total amount
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
1										
2										

Recurrent supplies: Maintenances (Transport and buildings)

No.	Name of Supply	Total amount/qty Received				COST				Total amount
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
1	Building Maintenance									
2	Transport maintenance									
3	Fuel									

Costs of Utilities

No	Description	Monthly amount												Total
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	Water													

Capital Cost: Buildings/Space

	Description	Purchased / Donated	No. of Items	SPACE (m^2)	Cost / Value GH₵	Useful life (yrs)
1						
2						

Capital Cost: Non -Medical Equipment

No.	Item Description	Purchased/ Donated	No. of Items	Unit Cost GH₵	Useful life (yrs)
1					
2					

Capital Cost: Medical Equipment

No.	Item	Purchased/ Donated	Quantity	Unit Cost GH₵	Useful life (yrs)
1					
2					

Capital Cost: Vehicles

No.	Item	Make/Model	Purchased/ Donated	Quantity	Unit cost (GH₵)	Useful life (yrs)
1						
2						

Capital Cost: Furniture

No.	Item	Purchased/ Donated	Quantity	Purchased/ donated	Unit cost (GH₵)	Useful life (yrs)
1						
2						

Data collection tool check list

No	Tool title	Completed	Not Completed	Remark
	Interview 1: Administrator			
	Interview 2: Accountant			
	Interview 3: Nurse in charge, BU ward			
R. 1	Personnel			
R.2	Recurrent supplies: Medical supplies including drugs			
R.3	Recurrent supplies: Consumables			
R.4	Recurrent supplies: Stationary			
R.5	Recurrent supplies: Maintenances (transport and buildings)			
R.16	Recurrent: Utilities			
C .1	Capital Cost: Building/ space			
C .2	Capital Cost: Non- Medical Equipment			
C .3	Capital Cost: Medical Equipment			
C .4	Capital Cost: Vehicles			
C .5	Capital Cost: Furniture			

Informed Consent

Project Title: Institutional cost of wound care in the management of Buruli Ulcer patients at Amasaman Hospital

Background

I am Kofi Hene Asare, a student from the School of Public Health, University of Ghana, Legon. I am undertaking a study on the Institutional cost of wound care in the management of Buruli Ulcer Patients at Amasaman Hospital. The main objective of this study is to determine the cost incurred by the hospital in the treatment of the wounds of Buruli Ulcer patients.

Procedures

The study will involve observing the procedure of dressing the wounds of Buruli Ulcer patients. It will also include answering questions in an in-depth interview using an interview guide about the treatment of the wounds of Buruli Ulcer patients and the cost incurred by the health facility in providing this service. Nobody would be forced to participate in this study. The study is for academic purposes only.

Risks and Benefits

This research does pose any health risks to the health institution. The Amasaman Hospital would benefit from this study because they would know the cost at which they treat the wounds of Buruli Ulcer patients and this would help them budget and plan appropriately for health services provision.

Right to Refuse

All the participants in this study would participate voluntarily. They can choose to answer or not answer any of the questions they would be asked. They can also opt out of the

study at any time. They are however encouraged to participate fully as the findings of the study would benefit the health facility and the municipal health management team.

Anonymity and Confidentiality

No part of the data obtained in this study would be shared with anybody outside of the study team. This is an assurance.

Dissemination of Results

The results of the study will be presented to Amasaman Hospital. It will also ne presented to the Municipal Health Directorate as well as the National Buruli Ulcer Control Programme. This would help in efficient planning and budgeting.

Before taking Consent

Please do have any questions to ask about the study? Y e s ☐ No ☐

(If yes, please, indicate your questions

here)……

……

……

Consent

I ……., hereby declare that the purpose, procedures, risks and benefits of this study have been explained to me in English language and I do understand.

I do hereby agree to participate in the study

Signature of participant……. Date ……..

Interviewers Statement

I, the undersigned, have explained this consent to the participant in English language and that she/he clearly understands the purpose of the study, procedures to be followed, as well as the risks and benefits of the study and the participant has agreed to participate in the study.

…….. ……

Signature of Interviewer Date

Contact information

Details of principal investigator:

Name: Kofi Hene Asare

Address: c/o school of public health, dept of HPPM, Legon, Accra.

Contact: 020-630-1519

For further enquires or queries you could contact the following persons:

(i) My Supervisor and head of department of the Health Policy, Planning and Management department of the School of Public Health, Dr. Moses Aikins on +233 208 152 200 or by email at maikins57@yahoo.com.

(ii) The Administrator of the Ethical Review Committee, Ms. Hannah Frimpong on +233 244 516 482.

Key Informant Interview/ In-Depth Interview Guide

Interview Schedule with Key Informants

Introduction

You are one of the key informants to be interviewed in this study. The information you give us would be key in the identification of the institutional cost of wound care in the treatment of Buruli Ulcer patients at Amasaman.

You are assured that the information you give us would be kept confidential.

Please do you consent to participate in this important study? YES/NO

Name of Key Informant			
Title of Key Informant			
Department			
Name of Interviewer			
Date of Interview			
Time (Start)		Time (end)	

Questions

1. Overview of Buruli Ulcer in Ghana
    a. What is the burden of Buruli ulcer?
    b. Do you know about any Buruli Ulcer policy?
    c. Do you receive any support from the NBUCP?

2. Overview of Buruli Ulcer ward of the hospital
    a. When were they built and who built it?
    b. How many rooms are in the ward?
    c. What is the staff strength and their work schedule?
    d. How many times in a week are the BU patients wounds dressed

Overview of overhead cost

3. What is your General Overhead cost
    a. Quarterly?
    b. Annual?

4. How is the hospital funded?
    a) Is it regular?
    b) Do you have an annual proposed budget, allocated budget and expenditure report?

5. Do you receive any donations?
    a. What kinds of donations do you receive?
    b. Who donates them?

6. Do any volunteers work in the hospital?
    a. How many are they?
    b. Does the hospital give them any allowance?

c. How many hours do they work in a day?

Observation Checklist for Wound Dressing

1	Wound cleaning agent	Response
	Normal Saline	
	Methylated Spirit	
	Hydrogen Peroxide	
	Others (specify)	
	Others (specify)	
2	Wound dressing solution	
	EUSOL	
	Gentian Violet	
	Iodine Solution	
	Others (specify)	
	Others (specify)	
3	Wound dressing agent	
	Gauze	
	Gauze Bandage	
	Plaster	
	Others (specify)	
	Others (specify)	

4	Wound dressing instrument	
	Galipot	
	Receiver	
	Dissecting Forceps	
	Scissors	
	Others (specify)	

8.2 LIST OF CAPITAL ITEMS

List of Capital Items	
Item Description	Useful Life (Years)
Building/Space	
BU Ward(Surgical)	30
BU Ward (Non-Surgical)	20
BU Kitchen	20
Central Sterile Supply Department	30
Vehicle	
Nissan Pickup	5
Medical Supplies And Instruments	
Sponge Holding Forceps	10
Tissue Forceps	10
Thermometer	5

Apron	8
Mackintosh	4
Scissors	10
Dissecting Forceps	10
Artery Forceps(Straight)	10
Curved Artery Forceps	10
Hand Towels	8
Stethoscope	10
Rubber Kidney Dish	4
Bed Sheets	8
Theatre Gowns	8
Kidney Dish	10
Gully Pot	10
Skin Graft Blade Holder	10
Dissecting Forceps	10
Cat Pole Retractor	10
Artery Forceps	10
Tissue Holding Forceps	10
Towel Clips	10
Needle Holder	10
Surgical Blade Holder	10
Scissors	10
Skin Retractor	10

Boyd Scope	10
Medical Equipment	
Screen	10
Wheel Chair	10
Small Bowl With Stand	10
Weighing Scale	10
Operating Table	10
Theatre Light(Twin Head)	10
Anaesthetic Machine	10
Instrument Trolley	10
Ambu Bag	10
Mayor Trolley	10
Oxygen Cylinder	10
Skin Graft Mesher	10
Stretcher	10
Couch	10
Trolleys	10
Drip Stand	10
Veronica Bucket	4
Rubber Bucket	4
Sphygmomanometer	10
Autoclave	10
Mattress	8

Bedside Lockers	12
Hospital Bed	12
Furniture	
Metal Table	12
Metal Cardboard	12
Wooden Table	10
Wooden Chairs	10
Wooden Bench	10
Plastic Table	4
Plastic Chairs	4
Non-Medical Equipment	
Wall Clock	6
21" Television	6
29" Television	6
Polytank	10
Air-Condition	10
Glass Cabinet	14
Deep Freezer	10
Ceiling Fan	10
Table Top Fridge	10
Tea Kettle	10
Solar Lamp	6
Mop And Bucket	4

8.3 LIST OF RECCURENT ITEMS

List of Recurrent items	
Personnel	Quantity
Management	5
Healthcare delivery staff	21
Support staff	13
Non-Medical Materials And Supplies	
Trash Bags(pieces)	2450
Parazone(gallon)	108
Savlone(gallon)	37
Liquid Soap(gallon)	31
Key Soap(bar)	10
Dettol (gallon)	14
Toilet Roll(pieces)	95
Hand Sanitizer(bottle)	11
Prescription Forms(sheets)	2000
Nurses Notes (sheet)	1,000
Doctors Treatment Sheet	1,000
Pens(pieces)	210
Continuation Sheet	200
Foolscap Note Book(pieces)	10
A4 Sheet(packs)	3
Treatment Chart (sheets)	500

Temperature Chart (sheets)	500
Daily Ward State(sheet)	1,000
Laboratory Request Forms(sheets)	200
X-Ray Request Forms(sheets)	300
Consent Forms(sheets)	1000
Staple Pins(packs)	7
Flat Files(pieces)	54
Medical Consumables And Drugs	
Methylated spirit(gallon)	6
Normal Saline(500mls bottle)	460
Vaseline Gauze(pack)	39
5% Dextrose(500 mls bottle)	70
Pethidine (ampoule)	3
Ringers Lactate(500mls bottle)	80
Haematinic Capsules	1,500
Fesolate Tablets	5,000
Multivite tablets	7,000
Antacid Suspension(bottle)	10
Folic Acid Tablets	7,000
Dextrose Saline(500mls bottle)	80
Vitamin B Complex tablets	2,000
Water for injection	1,000
Paracatamol tablets	1,000

Vitamin C tablets	4,200
Cotton Rolls	677
Gauze Rolls	264
Crepe Bandage (pieces)	1,608
Examination Gloves (pieces)	46,000
Disposable Caps (packs)	7
Syringes and Needles 10cc(pieces)	4,600
Plaster Roll 4" (pieces)	353
Plaster Roll 6" (pieces)	18
Face Mask(packs)	26
Surgical Gloves (packs)	32
Disposable Shoe Cover(packs)	2
Cannula(pieces)	30
Giving Set (pieces)	25
Scalpel Blade (packets)	14
Food Items	
Gari(olonka)	5
Maize(bag)	2
Rice(50kg bag)	1
Rice (25kg bag)	6
Rice(5 Kg bag)	1
Rice (1kg bag)	1
Sugar (25kg bag)	1

Salt (250g pack)	4
Yam (tuber)	3
Cooking Oil (gallon)	2
Sachet of water	66
White Bread(loaves)	19
Evaporated Milk(packs)	2
Sugar Cubes(packs)	6
Milo(tin)	12
Sardine(pack)	1