

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,

KUMASI, GHANA

COLLEGE OF HEALTH SCIENCES

SCHOOL OF MEDICAL SCIENCES

DEPARTMENT OF COMMUNITY HEALTH



**HOUSEHOLD COST OF SEEKING DIABETIC HEALTHCARE IN THE TANO
NORTH DISTRICT OF THE BRONG AHAFO REGION**

GIFTY KUMI-AMPOFO, BSc. Human Biology, MB. ChB.

SEPTEMBER, 2014

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By

GIFTY KUMI-AMPOFO, BSc. Human Biology, MB. ChB.

**A THESIS SUBMITTED TO THE DEPARTMENT OF COMMUNITY HEALTH,
KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY IN
PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF PUBLIC HEALTH IN HEALTH SERVICES PLANNING AND
MANAGEMENT**

SEPTEMBER, 2014

DECLARATION

I hereby declare that excluding precise references which have been duly acknowledged, this submission is my own work towards the MPH and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University or elsewhere.

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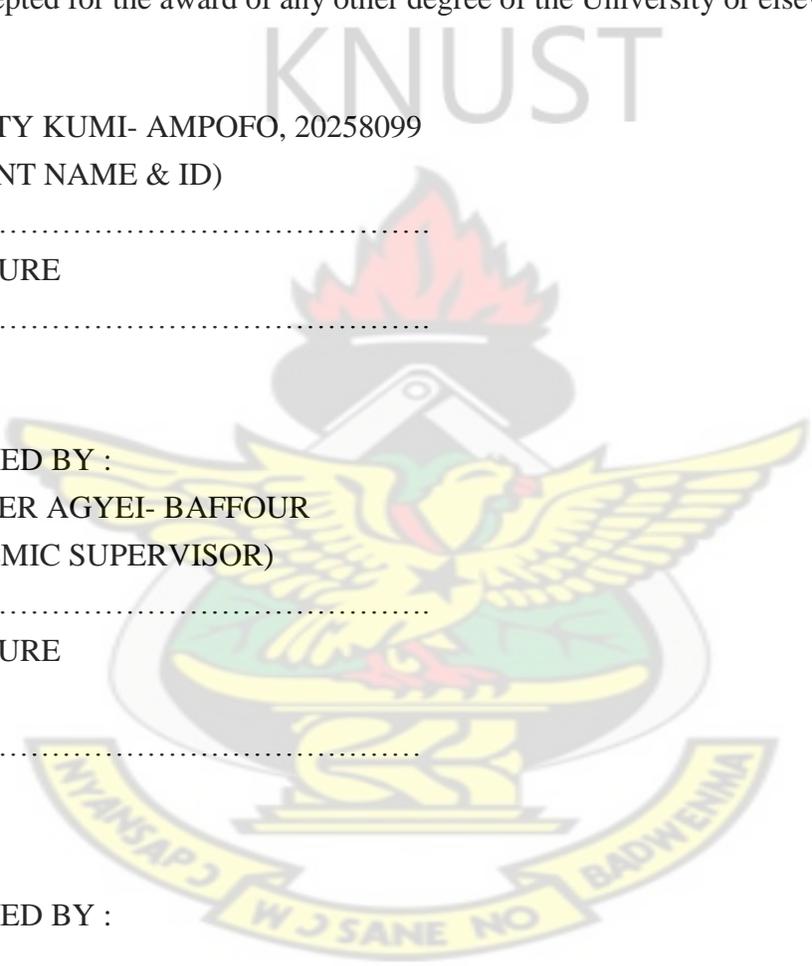
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DEDICATION

I dedicate this thesis to my husband, Dr. Andrew Nii Okai Amugi and my children: Gracia and Justin Amugi. Their love, care and support gave birth to my success story.

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DEFINITION OF TERMS

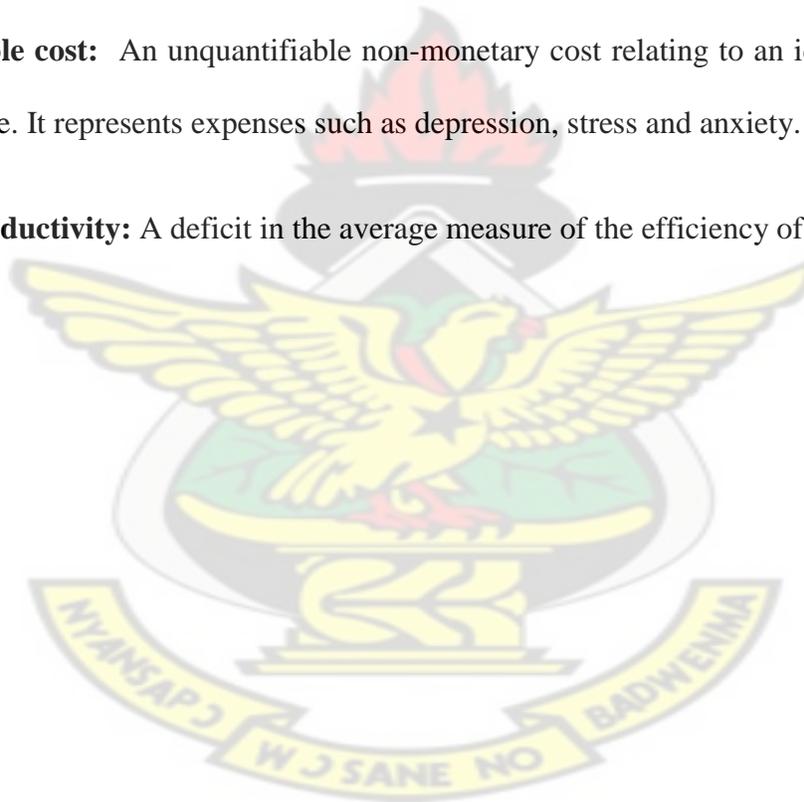
Household cost: The complete cost borne by the client as they seek for healthcare.

Direct cost: The cost borne by the healthcare system, community, and patients' families which could be traced to efforts at addressing the illness.

Indirect cost: Cost which could not be directly traced to efforts at addressing the illness or productivity losses attributed to treatment of the illness.

Intangible cost: An unquantifiable non-monetary cost relating to an identifiable illness or disease. It represents expenses such as depression, stress and anxiety.

Lost productivity: A deficit in the average measure of the efficiency of production.



ACRONYMS AND ABBREVIATIONS

CDC: Chronic Disease and Health promotion

CIA: Central Intelligence Agency

GDP: Gross Domestic Product

GH¢: Ghana Cedis

GNA: Ghana News Agency

IDF: International Diabetes Federation

MOH: Ministry of Health

NHIS: National Health Insurance Scheme

PSM: Psychological Stress Measure

SD: Standard Deviation

USD: United States Dollars

WHO: World Health Organization

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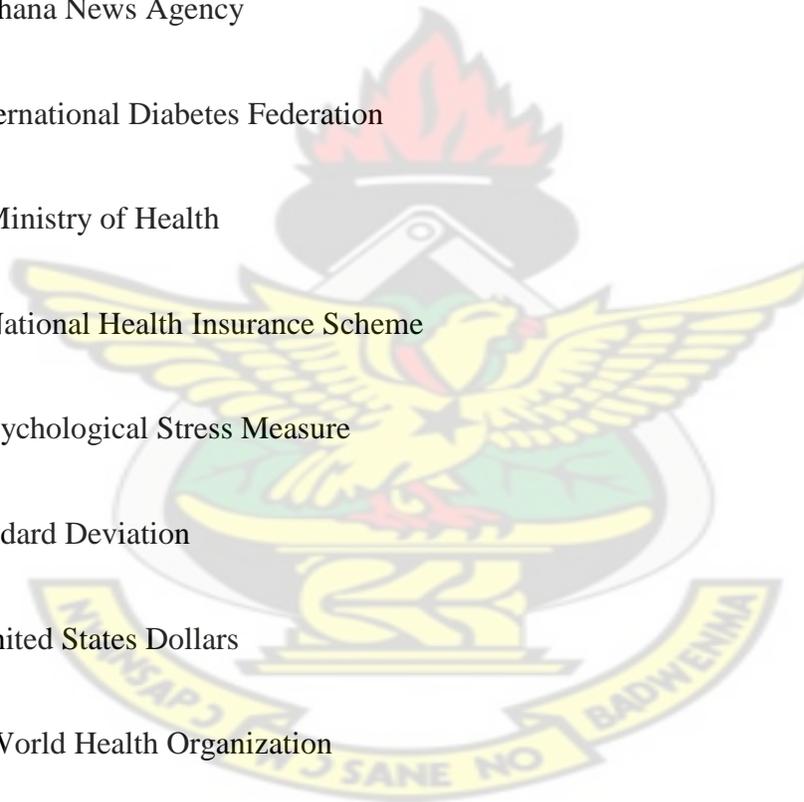


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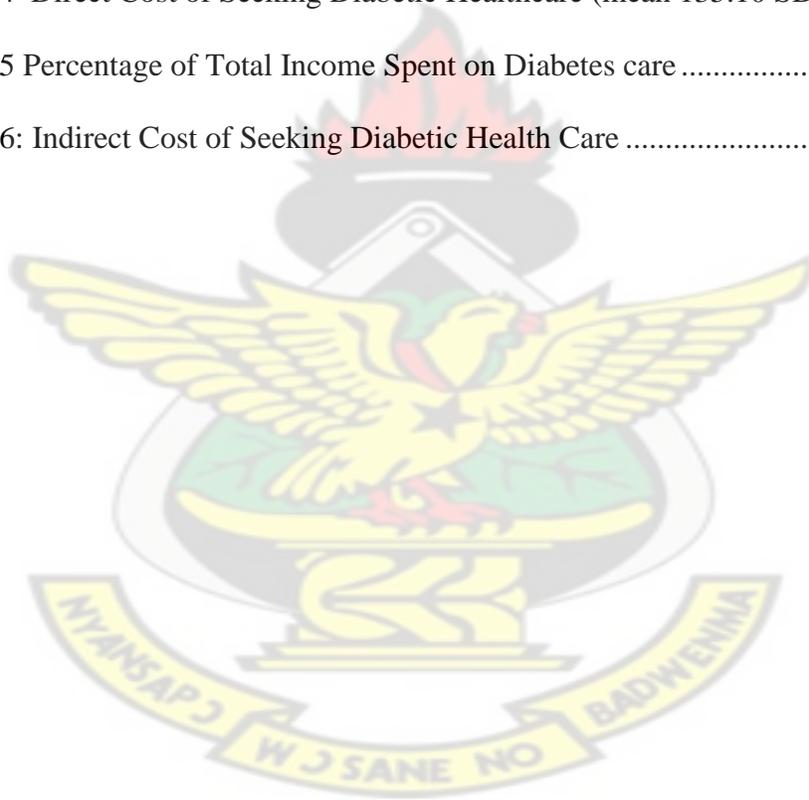
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ABSTRACT

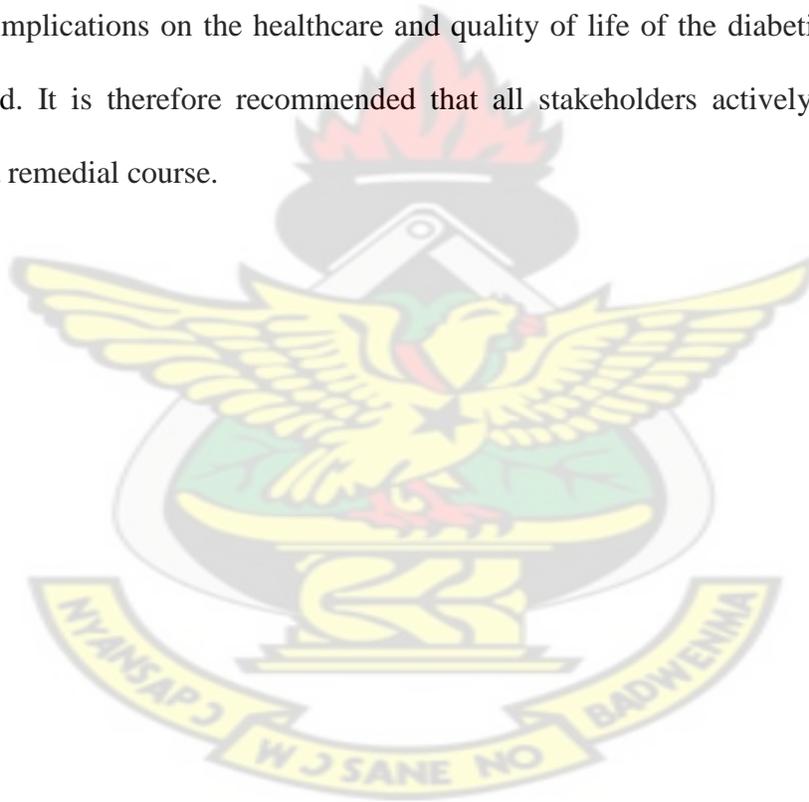
Background: Diabetes Mellitus is now a pandemic. Globally it exerts a huge toll on sufferers and their households both financially and emotionally. The chronicity and complexity of the disease leads to diverse financial and psychological stress especially at the household level. This study sought to estimate the household cost of diabetes mellitus to aid stakeholders forge a better and more effective remedial course in ensuring that diabetic patients and their households live a longer and better life.

Methods: A cross-sectional study was conducted from July to October, 2013 among 424 diabetic patients aged between 12 and 80 years who attended the Specialized Diabetes Clinic at St. John of God Hospital in the Tano North District of the Brong Ahafo Region, Ghana. Participants were interviewed using a structured questionnaire and secondary data was reviewed from hospital records. The variables for the study were analyzed at the univariate, bivariate and multivariate levels at 95% confidence interval in STATA software. Sensitivity analyses for the cost estimates were done to ascertain the robustness of the data.

Results: The mean household cost of seeking diabetic health care was GH¢ 146.70 (USD 58.64) (SD=79.78) monthly, per diabetic patient out of which the mean direct cost constituted about 92.16% [GH¢ 135.10 (USD 54.04); (SD= 79.59)] (which forms about 66.3% of the mean income [GH¢250.45 (USD 100.18); (SD= 65.06)] of each patient). Cost of preparation of special diet formed the highest component [GH¢108 (USD 43.2)] of the mean direct cost of seeking diabetic health care. The mean indirect cost constituted about 7.84% [GH¢ 11.50 (USD 4.6) (SD=5.42)] of the mean household cost per month

for each diabetic patient. Losses due to productivity were mainly due to the time spent by patients when seeking diabetic healthcare (mean number of hours spent out of work was 15.74 (SD= 7.83). Household cost of seeking diabetic health care per patient could increase by about 7.7% per annum assuming the discount rates of: 3%, 5% and 7% and the current inflation rate of 13.5% (excluding any inflationary changes).

Conclusion: The household cost; both financial and non- financial of diabetes mellitus is significant, accounting for more than two- thirds of the household's income and has adverse implications on the healthcare and quality of life of the diabetic patient and his household. It is therefore recommended that all stakeholders actively get involved in forging a remedial course.



CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

The non-communicable disease- mellitus is a pandemic (IDF Diabetes Atlas, 2011). As at 2013, about three hundred and eighty-two million people globally were known to have diabetes mellitus (IDF Diabetes Atlas, 2013). This menace continues to grow and if unchecked the global prevalence of the disease is projected to reach five hundred and ninety-two million by the year 2035 (IDF Diabetes Atlas, 2013).

Globally, most diabetics are aged between forty and fifty-nine years (IDF Diabetes Atlas, 2013). In the year 2011, gender difference in the global number of people with diabetes mellitus was found to be very small (four million more men than women had diabetes). This gender difference is however expected to decrease by two million by the year 2030 (IDF Diabetes Atlas, 2011).

Diabetes mellitus is the 9th leading cause of death worldwide (World Rankings, 2010). Globally, diabetes mellitus caused about 4.6 million deaths in the year 2011 (IDF Diabetes Atlas, 2012). Africa had a regional prevalence of 3.8% in the year 2011 (IDF Diabetes Atlas, 2012). The predominant type of diabetes mellitus in high income countries is type 2 diabetes (making up 85% to 95% of all diabetics). In Sub Saharan Africa, type 2 diabetes mellitus make up well over 90% of all diabetic cases (Hall *et al.* 2011). A study conducted in Sub Saharan Africa in the year 2011, revealed that the prevalence of diabetes mellitus did not differ significantly by gender (Esayas *et al.* 2012).

The number of diabetics aged between forty and fifty- nine years living in low and middle income countries formed more than three quarters of the total number of diabetics in this age group globally (IDF Diabetes Atlas, 2011). In the year 2011, the total number of diabetics aged between twenty and seventy-nine years in Africa were about 14.7 million (IDF Diabetes Atlas, 2012).

More than 80% of deaths attributable to diabetes mellitus occur in low- and middle income countries (WHO, 2013). In the year 2011, diabetes mellitus caused more than one million and two hundred deaths among diabetics aged between twenty and seventy-nine living in low-to-middle income countries (IDF Diabetes Atlas, 2012).

Literature on studies done on diabetes mellitus in Ghana is very scanty. In the year 2002, a community based study on diabetes mellitus conducted in Ghana showed a crude prevalence of 6.3%. In this study, diabetes mellitus was found to be more prevalent in males than females (7.7% vs. 5.5%; $P < 0.05$) (Amoah *et al.* 2002). Information on the prevalence of the disease by age and type is not yet available.

Diabetes mellitus continues to form a greater proportion of healthcare budgets as the number of people with the disease increase worldwide. Globally, diabetes accounted for at least USD 548 billion dollars in health expenditure in the year 2013 and formed 11% of the total healthcare spending in adults in the same year (IDF Atlas, 2013). The healthcare expenditure due to diabetes in the African region (where about 80% of diabetics live) formed between 7% and 14% of their total healthcare expenditure (Zhang *et al.* 2010). In the year 2011, the total annual healthcare expenditure attributable to diabetes mellitus was USD 67.03 billion (Hall *et al.* 2011). In Ghana the healthcare cost

due to diabetes mellitus for the year 2010 fell between USD 23,073.09 and USD 41,475.67 (Zhang *et al.* 2010).

A diabetic patient may be unable to continue working or work as effectively as he or she could prior to the onset of the condition. Globally, the cost due to lost productivity attributable to diabetes mellitus may be as enormous as or even more than the global direct healthcare cost. The psychological and emotional stress that diabetics and their families go through daily may influence their quality of life (WHO, 2013).

Research into this aspect of the disease still remains a grey area in Ghana hence the need to study the household cost of seeking diabetic healthcare.

1.2 Problem Statement

Globally, diabetes mellitus exerts a huge toll on health expenditure. Sub Saharan Africa (where most of the countries are in the low- and middle income levels) bears an immense economic burden as result of diabetes mellitus (IDF Diabetes Atlas, 2011). For instance in the year 2008, in Mali where the per capita GDP was USD 900 a city dweller diabetic patient had to spend about USD 21.24 monthly on transport, insulin and laboratory test for fasting blood glucose alone. In that same year, the per capita GDP in Kenya was USD 1200 and though diabetics in Kenya enjoyed health subsidies from government most patients were still unable to afford diabetic health care (Zevedo and Alla, 2008).

Estimates from several studies reviewed by WHO suggested that cost due to loss of productivity as a result of diabetes mellitus may be equal to or even more than the direct

healthcare cost attributable to the disease. For instance a review of indirect cost estimates from twenty- five Latin American countries showed that cost of lost production attributable to the disease may be five times that of the direct healthcare cost (WHO, 2013). Again in 2012, the United States of America estimated the direct healthcare cost due to diabetes mellitus as USD 176 billion and the indirect cost USD 69 billion (American Diabetes Association, 2013).

To add this burden of huge costs, diabetic patients and their families commonly go through diverse forms of psychological and emotional stress due to the chronicity and complications associated with the disease (IDF Diabetes Atlas- African Region, 2007).

In the year 2012, the Ghana News Agency reported that about four million people may be affected with diabetes mellitus in Ghana (GNA, 2012). In the Tano North district of the Brong Ahafo region of Ghana, incidence of diagnosed diabetes mellitus rose from 23 in the year 2010 to 73 by the end of the year 2012 (Tano North Health Directorate report, 2012).

Ghana's GDP per capita was GH¢ 8,500 (USD 3,400) at a rate of 8.2% in the year 2012 (CIA World Factbook, 2012). The current minimum wage for the country stands at GHS 5.24 (USD 2.08) (AfricaPay/Ghana, 2013). The inflation rate at the end of the year 2013 was 13.5% (Trading Economics, 2013). Currently, about 36% of Ghanaians are enrolled on the NHIS (Ghana New Agency, 2013). Though reports on healthcare expenditure in Ghana attributable to diabetes mellitus are not yet readily available, the literatures reviewed suggest that Ghana like other developing countries may be bearing an enormous household burden due to the disease. Sadly however, research to ascertain the cost borne

by diabetics and their households in the management of the disease in Ghana still remains a grey area.

This study sought to assess the cost borne by diabetics and their households in the management of the disease and how this affects the socioeconomic welfare of the diabetic and his/her household.

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1.3 Rationale for the Study

People living with diabetes mellitus together with their household commonly encounter fiscal, psychosocial and emotional crisis once too often as a result of the disease. Knowledge of the healthcare cost (direct, indirect and intangible) borne by diabetics in the management of the disease is a key ingredient to improving the quality of the management of the disease. This same knowledge will help health policymakers to map out better and more effective educational, preventive and disease management campaigns.

If a study is not conducted in this area of the disease in Ghana, medical professionals will remain oblivious to the actual facts on the ground (concerning total healthcare cost for diabetes mellitus and its impact on the household management of the disease) and continue to manage the condition routinely which will yield satisfactory results. Similarly policymakers may not gain enough insight needed to improve the quality and effectiveness of the educational, preventive and disease management campaigns

1.4 Conceptual Framework

The household cost incurred in the management of diabetes mellitus comprises direct costs, indirect costs and intangible costs. These costs were measured using the prevalence based cost of illness approach.

Direct costs assessed in the study consisted of expenses made on:

- diagnostic tests (lipid profile, proteinuria, blood glucose, kidney function, HBA1c and electrocardiogram)
- medications (insulin and oral anti diabetic medications)
- devices for injecting insulin (syringes)
- personal blood glucose monitoring machine (glucometer)
- Out-of-pocket expenses borne by patients and their household, including NHIS levy, health service provider consultation fees (applies to patients who are either not registered on the NHIS or have their health insurance expired), transportation diet, exercise and physiotherapy.

For the indirect costs incurred, the study assessed the opportunity cost of time lost due to morbidity and temporary and permanent disability attributable to the disease. The morbidity- related costs included the productivity loss of time spent by patients in out-patient consultations; travel to and from hospital, absenteeism from work due to diabetes mellitus and productive time lost by caregivers.

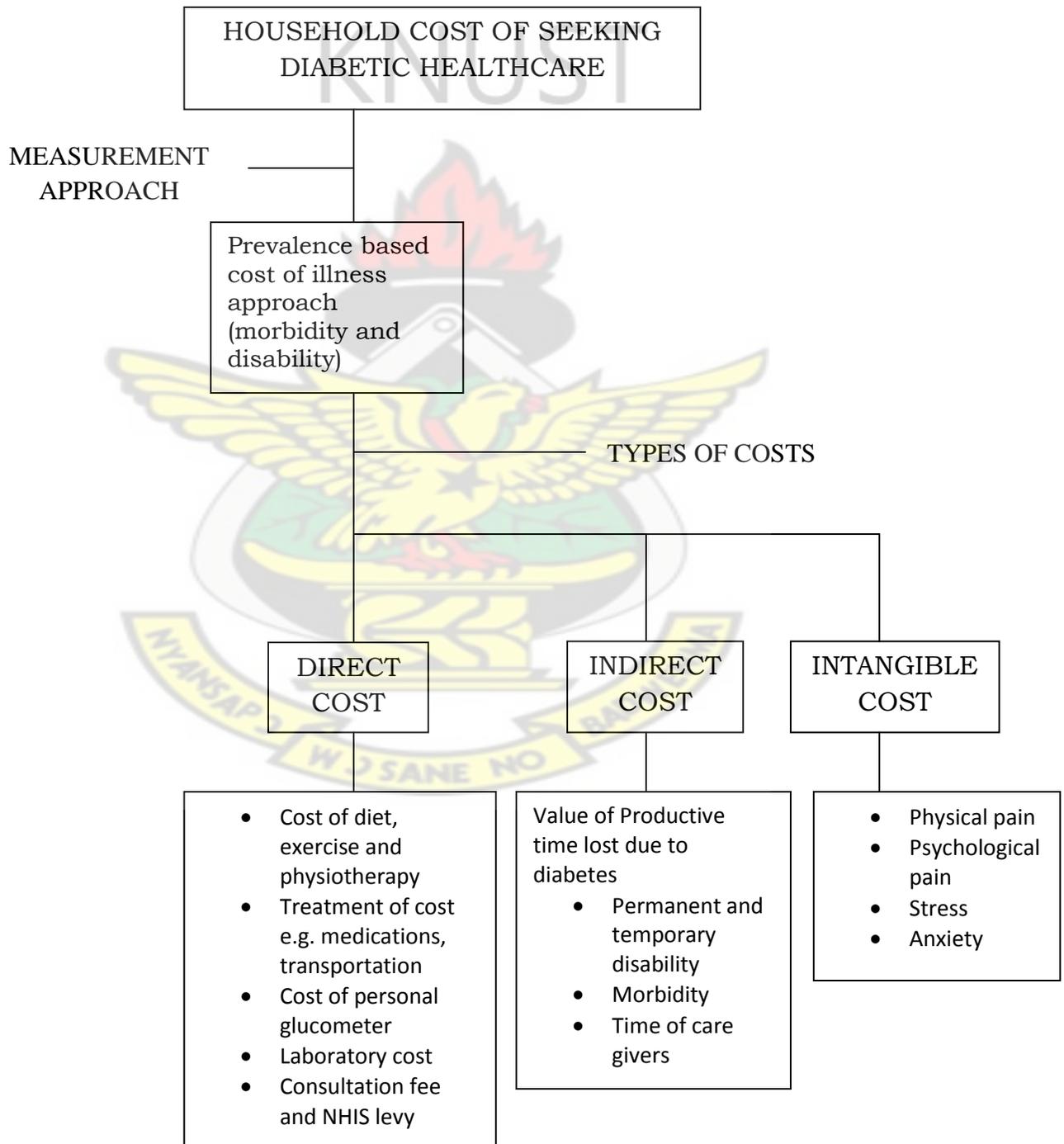
The intangible costs assessed in the study consisted of wellbeing losses due to the physical and psychological pain, stress and anxiety experienced by diabetics and their household as a result of diabetes mellitus.

The conceptual framework was designed to bring out the various facets of the household cost of seeking diabetic healthcare. These facets were studied and analyzed accordingly to give a holistic picture of the household cost of seeking diabetic healthcare.



Figure 1: Conceptual Framework of the Household Cost of Seeking Diabetic Health Care. Adapted from: Economic burden of diabetes mellitus in the WHO African region, Kirigia *et al.* 2009.

A diagrammatic Conceptual Framework of Household cost of Seeking Diabetic Health Care.



1.5 Research Questions

- I. What is the direct cost of seeking healthcare in the management of diabetes mellitus?
- II. What is the indirect cost of seeking healthcare in the management of diabetes mellitus?
- III. What is the intangible cost incurred in the management of diabetes mellitus?
- IV. How is the cost of seeking of diabetic healthcare statistically associated with the socioeconomic disposition of patients suffering from diabetes mellitus?

1.6 Study Objective

1.6.1 General Objective

To assess household cost of seeking diabetic healthcare to inform policy.

1.6.2 Specific Objectives

- II. To estimate the direct cost of seeking healthcare in the management of diabetes mellitus.
- III. To estimate the indirect cost of seeking healthcare in the management of diabetes mellitus.
- IV. To estimate the intangible cost incurred in the management of diabetes mellitus.
- V. To statistically determine the association between the socioeconomic disposition of diabetic patients and the cost of seeking diabetic healthcare.

1.7 Scope of the Study

The study focused on the household cost of seeking diabetic healthcare for diabetics between the ages of 12 and 80 years. This age group was chosen to capture both type 1 and 2 diabetics as well as both the working class (the bread winners) and the non-working class (the dependents) diabetics. The individual level and sociocultural factors were examined. The study focused on the household cost of diabetic healthcare from the patient's perspective. Healthcare providers were not interviewed. This is because sufferer of this chronic disease is the best person to tell the reality on the ground (the costs they bear with their household as a result of the disease). The various aspects of the direct, indirect and intangible costs were looked into. Secondary information on the costs of diagnostic tests done for diabetics, medications, registration and consultation fees were obtained from the hospital and examined.

1.8 Organisation of the Report

The Thesis is organized into six chapters. The first chapter presents the background information on diabetes mellitus with focus on the challenges that the country, diabetics and their households face as they deal with the costs incurred in the management of diabetes mellitus. The chapter also presents the problem statement, rationale of the study, study objectives and conceptual framework.

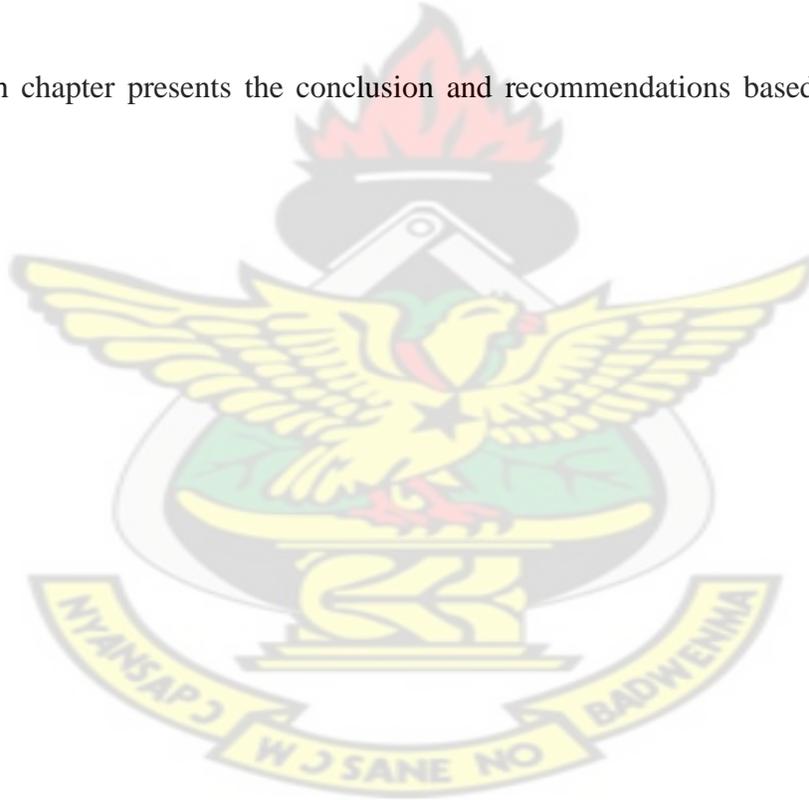
The second chapter looks at literature of related works on household cost of seeking diabetic healthcare in Africa and the world as a whole.

Chapter three looks at the methodology of the study. It presents the study methods and design, data collection techniques and tools, study population, study area, sampling techniques, ethical consideration and data analysis.

The fourth chapter presents the findings from the interviews and records reviewed on some aspects of the direct costs incurred by participants.

Chapter five presents the discussion on the results and compares findings with other comparable studies as revealed in chapter two.

The sixth chapter presents the conclusion and recommendations based on the research findings.



CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 OVERVIEW

Diabetes mellitus is a huge burden on the individual, healthcare system and a nation's economy (Wild *et al.* 2004). For all age-groups the worldwide prevalence of diabetes was estimated to be 2.8% in the year 2000 and projected to rise to 4.4% by the year 2030 (from 71 million to 366 million) (Wild *et al.* 2004).

“Diabetes epidemic” will continue even if levels of obesity remain constant (Wild *et al.* 2004). Diabetes prevalence is higher in men than women (Wild *et al.* 2004). Interestingly, there are more women with diabetes than men (Wild *et al.* 2004). The urban population in developing countries is projected to double within thirty years (between the years 2000 and 2030) and the most significant demographic change to diabetes prevalence across the world seems to be the rise in diabetic prevalence among people older than sixty-five (Wild *et al.* 2004).

Apart from the excess healthcare expenditure, diabetes also leads to large economic losses in the form of lost productivity and foregone economic growth (American Diabetes Association, 2008). In the year 2007, the total estimated cost of diabetes healthcare was USD174 billion (American Diabetes Association, 2008). In that same year, the US economy lost about USD58 billion, which is equivalent to about half of the direct healthcare expenditure on diabetes as a result of lost earnings attributable to absenteeism,

restricted activity days, lower productivity at work, mortality and permanent disability caused by diabetes (American Diabetes Association,2008).

Diabetes mellitus seems to be most prevalent amongst people of low socio-economic class amongst whom the socio-economic effect of the disease is gravely felt (Connolly *et al.* 2000).

A community based study was conducted in Middlesbrough and East Cleveland in the United Kingdom in 1998. The purpose of the study was to establish the relation between socioeconomic status and the age-sex specific prevalence of type 1 and type 2 diabetes mellitus. The study revealed that there was a unique trend between the prevalence of type 2 diabetes and the deprivation score in men and women (χ^2 for linear trend, $p < 0.001$). In men the prevalence in the least deprived was 13.4 per 1000 (95% confidence intervals (95% CI) 11.44, 15.36) compared with 17.22 per 1000 (95% CI 15.51, 18.92) in the most deprived. For women the prevalence was 10.84 per 1000 (95% CI 9.00, 12.69) compared with 15.48 per 1000 (95% CI 13.84, 17.11) in the most deprived (Connolly *et al.* 2000).

The chronic illness diabetes mellitus is a group of metabolic disorders characterized by elevated blood glucose, either as a result of the inability of the pancreas to produce enough insulin, or the pancreatic cells are irresponsive to the insulin produced. There are three main types of diabetes namely: type 1, type 2 and gestational diabetes. Diabetes mellitus may occur due to an autoimmune reaction, a genetic predisposition or lifestyle changes such as: unhealthy dietary lifestyle, aging, obesity and sedentary lifestyle. It usually presents with typical signs and symptoms such as: polyuria, polydipsia, weight

loss, fatigue, blurred vision lack of sensation in hands and feet, retinal changes and pedal edema (Southern Cross Healthcare Group, 2012).

Diabetes mellitus is diagnosed in a patient when the:

- fasting whole blood glucose level (capillary blood) is greater than or equal to 6.1mmol/l (110mg/dl) OR
- plasma glucose is greater than or equal to 11.1mmol/l (200mg/dl) two hours after a 75g oral glucose load (WHO,1999) OR
- glycated haemoglobin (HbA1c) value greater than or equal to 6.5%. However a value of less than 6.5% does not exclude diabetes diagnosed using glucose tests (WHO, 2011).

The disparities in the criteria adopted by MOH in Ghana for diagnosing diabetes mellitus are:

- fasting whole blood glucose level (capillary blood) of 5.7mmol/l or more OR
- random whole blood glucose , taken two hours after a meal or after a 75g glucose load is 7.8mmol/l or more (MOH, 2010).

No special reason has yet been stated for this disparity in criterion adopted by MOH, Ghana.

Some of the complications that may arise from diabetes mellitus are: cardiovascular diseases, retinopathies, ketoacidosis, nephropathies and diabetes related foot pathologies.

The regimens for the management of diabetes consist of lifestyle modification, oral anti-diabetic medications and insulin injections (Southern Cross healthcare group, 2012).

2.2 Direct Cost of Seeking Diabetic Health Care

The global health expenditure on diabetes is continually increasing as the number of diabetic patients increase worldwide and the direct health care cost from the disease is no exception. Largely direct cost of diabetic health care is between 2.5% and 15% of yearly health care budgets depending on the local diabetes prevalence and the complexity of the accessible treatment (WHO, 2013).

Recently, a study was done in the U.S. to estimate the economic cost of diabetes mellitus for the year 2012. This study used the prevalence based cost of illness approach, focusing on costs along gender, racial and ethnic lines. This study revealed that direct cost formed about 71.8% (USD 176 billion) of the total healthcare cost due to diabetes mellitus. Some of the large components of the direct medical expenditure were:

Medications-12%, Consultation fees and out-of pocket expenses during hospital visits-9% and prescription medications for treatment of complications-18% (American Diabetes Association, 2013). A similar study was done in Latin America in the year 2003, using the prevalence cost of illness approach. Though the study revealed that direct cost of diabetes mellitus formed a lesser proportion (16%-USD 10,721) of the total health care expenditure attributable to diabetes as compared to the study done in the U.S., the components of the direct cost were appreciable: Medications-44%, Consultations-23.4%,

Care of complications-23% (Barceló *et al.* 2003). In India, a study conducted to assess the economic impact of diabetes mellitus showed that direct health care cost for the disease formed about 36% of the total expenditure attributable to diabetes mellitus. Cost of medications formed about 17% and consultations formed 12% while diagnostics and monitoring formed 22% of the total direct cost of diabetic healthcare (Kapur, 2007).

Again in India, a study conducted to assess the cost on healthcare incurred by diabetics concluded that urban and rural diabetic subjects spent a large proportion of their income on the management of the disease and that the total direct cost of the disease management had doubled between the years, 1998 to 2005. The study revealed that urban dwellers had a higher annual family income than rural dwellers (rupees [Rs] 100,000 or USD 2,273 for urban dwellers and Rs 36,000 or USD 818 for rural dwellers) ($P = 0.001$). It was also observed that lower-income groups spent a bigger proportion of their income on diabetes care (urban poor 34% and rural poor 27%) (Ramachandran, 2007).

Type 2 diabetes forms a large proportion of the varying forms of diabetes mellitus (Hall *et al.*, 2011). In the year 2009, a study was done in Iran to estimate the health care expenditure attributable to Type 2 diabetes. The study used the prevalence based cost of illness approach and revealed that direct cost of Type 2 diabetes formed about 54% (USD 2.04 billion) of the healthcare expenditure attributable to the disease. Of this proportion, medications formed 23.8%, care for complications 48.9% and diagnostics 9% for Type 2 diabetes alone (Mehdi *et al.* 2009).

A prevalence based cost of illness study conducted in Thailand showed that the direct cost of the disease formed 63% of the total cost of diabetic illness. Direct medical cost

formed 23% of the total direct cost incurred out of which anti-diabetic medications formed about 14.4% and laboratory investigations formed 9.07%. Direct non-medical costs formed about 40% of the total direct cost out of which cost of informal care formed 70% and transportation to and from clinic constituted about 4.9% (Chatterjee, 2011).

A study conducted in the WHO African region using the standard-cost-of-illness method showed that direct cost of diabetic health care formed about 56.93% of the total health care expenditure attributable to diabetes. The Western and Eastern group of countries (Ghana inclusive) incurred the greatest proportion (about 56.1%) of the total direct cost of diabetic healthcare in the entire WHO African region studied. The cost of insulin accounted for the greatest proportion of the direct cost incurred amongst all the African groups studied and it formed an even greater chunk (32.06%) of the direct cost incurred by the Western and Eastern African countries (Ghana inclusive). Diagnostics, out-of-pocket expenses and oral anti-diabetic medications similarly accounted for relatively bigger proportions (8.77%, 4.12% and 2.06% respectively) of the direct cost of the disease incurred by the Western and Eastern group of countries as compared to the other groups. Other components of the total direct medical expenditure incurred by the Western and Eastern group of countries studied were: Cost of syringes-3.22%, cost of glucose meters-0.06%, cost of oral medications-2.06%, consultations-0.93%, diagnostics-8.77% and out-of-pocket expenses-4.12% (Kirigia *et al.* 2009). A study conducted in Ghana on the structural barriers to coping with type 1 diabetes mellitus concluded that in the year 2008 when the NHIS membership coverage was about 55%, most type 1 diabetics struggled to keep up with a regular dose of insulin and acquisition of glucose meters and test strips were far from their financial reach (Kratzer, 2012).

2.3 Indirect Cost of Seeking Diabetic Health Care

Due to the chronicity and complexity of the disease, many diabetic patients may either be unable to work or work as effectively as they could prior to the onset of the disease (WHO, 2013). More often than not this leads to loss or reduced productivity (WHO, 2013).

A recent study done in the U.S. revealed that indirect cost formed about 28% of the total health care expenditure attributable to diabetes mellitus. Inability to work as a result of disease- related disability formed the largest component (30.1%) of the indirect cost incurred. Other components of the indirect cost incurred were: Reduced productivity while at work for the employed population-30.1%, increased absenteeism-7.2% and reduced productivity for those not in the labor force-3.9% (American Diabetes Association, 2013).

In many countries where estimates of the indirect cost incurred in the management of the diabetes mellitus were made, it became clear that the cost of lost production may be as great or even greater than the direct health care cost (WHO, 2013). This was evident in the year 2003 when a study done in Latin America and the Caribbean showed that the indirect cost incurred in the management of diabetes mellitus formed 84% (USD 54,496) of the total health expenditure attributable to the disease. The prevalence based cost of illness approach was used for the study. Similar to the results obtained from the study done in the U.S, inability to work as a result of disease- related disability formed the largest component (94%) of the indirect cost incurred (Barceló *et al.* 2003). Consistent with the study above, a study done in five European countries to ascertain the economic

burden of diabetes mellitus revealed that indirect cost formed about 52% while the direct cost formed about 48% of the total diabetic healthcare cost. Of the indirect cost incurred absenteeism formed the largest proportion (46.5%) of the productivity losses (Kanavos, Aardweg and Schurer, 2012). Again in India in the year 2007, a community based survey of the cost of diabetes mellitus showed that the indirect cost incurred in the management of the disease formed more than half (64%) of the total healthcare expenditure due to diabetes mellitus. Productivity losses accounted for the greatest proportion (71.8%) of the indirect cost and family and personal income loss also accounted for an appreciable proportion (about 28%) of the cost (Kapur, 2007).

Interestingly, the prevalence based cost of illness approach employed in a study done in Thailand to ascertain the cost of diabetes and its complications revealed that indirect cost formed a lesser proportion (37.5%) of the total health care expenditure due to diabetes mellitus though an appreciable amount. Productivity losses due to permanent disability formed about 30% of the total indirect cost incurred whilst work absenteeism formed 3.3% (Chatterjee *et al.* 2011)

In the WHO African region, a study done using the standard-cost-of illness approach showed that the indirect cost incurred in the management of diabetes mellitus was almost as great as the direct cost resulting from the disease (direct cost was 57% and indirect cost was 43%). Productivity losses due to permanent disability accounted for most of the indirect cost incurred for all the three groups of African countries. Amongst the Western and Eastern African countries (Ghana inclusive), components of the indirect cost are as follows: Productivity losses due to permanent disability-37.94%, productivity losses due

to temporary disability-0.46% and productivity losses for caregivers-0.50% (Kirigia *et al.* 2009).

In Ghana studies on the indirect cost of diabetes mellitus still remains a grey area and information concerning this aspect of the disease is not yet publicly available.

2.4 Intangible Cost of Seeking Diabetic Health Care

Physical and psychological pain, stress and anxiety are intangible costs which adversely affect the quality of life of diabetics. Diabetic patients may experience: discrimination at the workplace, more difficulty finding a job and complications of the disease may lead to a shortened work life. The management of the disease especially administration of insulin and self-monitoring of blood glucose may be inconvenient, time-consuming and a potential source of psychological stress (WHO, 2013).

A study conducted in Australia to investigate the cost of diabetes mellitus employed the EQ-5D to assess the quality of life of patients. The study used the five dimensions of the EQ-5D namely: mobility, self-care, usual activity, pain or discomfort and anxiety or depression. The study concluded that most of the patients lived with pain and discomfort (42%) and an appreciable number of them had developed depression or anxiety tendencies (34%), problems with mobility (33%), and inability to undertake usual activities with ease (30%). A few of the patients however battled with self-care (8%) (Donald *et al.*, 2012). Congruent with the study above, in the year 2001, a research was done in the US to estimate the odds and prevalence of clinically significant depression in

adults with type 1 or type 2 diabetes. Information from MEDLINE and PsycINFO databases and other published references were used to identify studies that reported on the prevalence of depression in diabetes. The study showed that in the controlled studies, the odds of depression in the diabetic group were twice that of the non diabetic comparison group (OR = 2.0, 95% CI 1.8–2.2) and did not differ by sex, type of diabetes, subject source, or assessment method (Anderson *et al.* 2001).

A meta-analysis of information from MEDLINE and psycINFO was done to examine the relationship between depression and treatment non-adherence in patients with type 1 and type 2 diabetes. This study concluded that there was a significant association between depression and treatment non adherence in patients with diabetes mellitus (Gonzalez *et al.* 2008).

A cohort study was done in Italy to measure the level of psychological stress among type 2 diabetic patients using the using the Psychological Stress Measure (PSM). The study showed significantly lower PSM scores among type 2 diabetics (Trovato *et al.* 2006).

A study to ascertain the level of psychological morbidity in the youth with type 1 diabetes and their parents revealed that a diabetic child or adolescent stood an equally higher risk of developing psychological morbidity as other children with other chronic illnesses. In their bid to cope with diabetes mellitus, the adolescents and children experience varying mood disorders such as: depression, anxiety, withdrawal and dependency. About 30% of such children develop clinical adjustment disorder and if this goes unchecked such children stand a high risk of developing psychological difficulties later on in life. If the clinical adjustment disorder goes untreated, it may become a

precipitating factor for maladaptive practices, long term problems with blood glucose control and earlier than expected onset of complications (Cameron *et al.* 2007).

Although the impact of intangible cost of diabetes have not been studied at length in Africa especially in the Sub Saharan region, the research conducted in the WHO African region on the economic impact of diabetes re-echoes the fact that intangible costs incurred the management of diabetes contributes significantly to the overall cost attributable to the disease (Kirigia *et al.* 2009).

2.5 Association between the Socioeconomic Disposition of Diabetic Patients and the Cost of Seeking Diabetic Health Care.

This study sought to assess how socioeconomic factors such as gender, educational level, ethnicity and marital status influenced the depth of the household cost borne by diabetics and their household as a result of the disease.

A retrospective, cross-sectional cost of illness study conducted in Brazil showed that the direct medical cost of type 1 diabetes mellitus was comparable among females than males (51%-females and 49%-males; [P-value 0.294]). Patients aged 30 years and older incurred the most cost (25% of the total cost [P-value 0.223] and patients who had high socioeconomic status also incurred the most cost (31% of the total cost, [P-value 0.000] as a result of the disease (Cobas *et al.* 2013).

A study was done in Ontario- Canada to identify the patient- reported barriers that contribute to the gap between current and optimal diabetes care. Employing the random-

digit dialing method, the study revealed that an annual household income less than USD 30,000 was an independent predictor of skipping blood glucose testing (OR 1.88, 95% CI 2.29-5.15) and eating unhealthy foods (OR 3.44, 95% CI 2.29-5.15) as a result of cost. In addition to this absence of supplemental insurance was an independent predictor of skipping medications (OR 5.17, 95% CI 3.07-8.72) and blood glucose testing (OR 4.37, 95% CI 2.71-7.05) also due to cost, but educational level was not (Kwan *et al.* 2008).

A study was done by Smith in the U.S. in the year 2007 to investigate the salient diabetes prevalence patterns across important socioeconomic status indicators. The research concluded that people who had low education had a higher risk of getting diabetes mellitus, an even a greater risk of living with medically undiagnosed and consequently unmanaged diabetes mellitus and they see the successful management of the disease as even more daunting (Smith, 2007).

In the same vein, the center for chronic disease and health promotion (CDC) in U.S. conducted a study to investigate the socioeconomic status of women with diabetes living in the U.S. in the year 2000. Analyzing secondary data from the Behavioral Risk Factor Surveillance System (BRFSS), the study revealed that women with diabetes were more likely than women without the disease to be 45 years or more, non-white, divorced, separated, living alone, widowed or unable to work. For diabetic women who were 25 years or older, the proportion who were unable to complete high school (27.7%; 95% CI) were more than twice the number of non-diabetic women who had not completed high school (12.2%: 95% CI). The study also showed that diabetic women were twice as likely (40.4%; 95% CI) as women without diabetes (22%; 95% CI) to have a yearly household income which was less than USD 25,000 (CDC, 2002).

A study done in India to ascertain the impact of socioeconomic factors on diabetes care reiterated the fact that the low socioeconomic status more often than not had a negative impact on diabetes care. The study revealed that the uneducated and unemployed people, particularly those living in semi urban or rural areas either could not afford or did not have access to basic health care facilities. These people were likely to be diagnosed late and develop or have at presentation diabetes related complications (due to delay in diagnosis and or improper treatment). This brings out a notable socioeconomic significance: those people, who will need more advanced or expensive care for diabetes related complications, are often the ones who cannot afford such care. Some of these less privileged people may still be able to afford routine care but when faced with complications requiring advanced, expensive care their socioeconomic status will be greatly challenged and many of them may never be able to afford such care (Rayappa *et al.* 1999).

Another study involving 31 European clinics to determine whether there were socioeconomic differences in diabetes control and complications in people with type 1 diabetes concluded that healthy lifestyles were more prevalent in better educated men and women but these were not reflected in the development of complications like cardiac disease among high and low level educated men (Chaturvedi *et al.* 1996).

CHAPTER THREE

3.0 METHODOLOGY

Introduction

This chapter presents detailed information of the study area and the methods and techniques used for the study. It also looks at the study area and population, sampling procedure and techniques, sample size, data collection tools and techniques. The ethical considerations, limitations and assumptions for the study are also described in this chapter.

3.1 Study Type, Design and Steps

A cross-sectional study was conducted from 11th of July, 2013 to 3rd October, 2013 among diabetics aged between 12 and 80 years living in the Tano North district who attend the diabetes clinic organized at the St. John of God Hospital. It is the only hospital serving the district and it has a well-organized diabetes clinic for all diabetics in the district which began about six years ago. The clinic links up with other services in the hospital such nutritional education, foot care, post limb amputation care and eye care. The clinic operates once a week (on Thursdays) and has about 530 patients. It was a hospital based study (at the out-patients' department) and prevalence cost of illness approach was used to estimate the costs of diabetic healthcare.

3.2 Profile of the Study Area

The Tano North District is one of the twenty two administrative districts of the Brong Ahafo Region created by a Legislative Instrument established it in 2004. It was part of the Sunyani district until 1989 when it became part of the Tano District. In 2004 the Tano North District was created with its administrative capital at Duayaw Nkwanta.

The land size measures about 700 square km. The district is bounded by Sunyani Municipality at the north-western section, Asutifi District at the south-western section, Ahafo Ano South District (in the Ashanti Region) at the Southern section, Tano South District at the South-eastern section and Offinso District (also in Ashanti Region) at the north-eastern section. The estimated population of the district projected from the 2010 Population and Housing Census for 2012 was 83,694. The annual growth rate was estimated to be 2.5%.

The ethnic groups mainly found in this district are: Akan, Hausa, Kusasi, Moshie, Bimobas, Sissalas, Grunshies, Dagarti and Ewe. There are three main religious groups in the district namely: Christianity, Islam and Traditional Religion. The main economic activities of most of the people are farming (mostly peasant farmers). They are thus physically very active. There are however quite a number traders as well as public and civil servants employed in various institutions and mining companies whose activities involve less physical exertion. Studies on the BMI status of the people in the district have not yet been done.

The road linking Duayaw Nkwanta to the other smaller towns and villages within the district are third class roads and as such it makes it difficult to travel to most rural communities especially during the rainy season. Each of the five sub-districts has a health centre and three CHPS compound will be started in three villages by the end of the year 2013. These health centers are mainly situated in the heart of these villages; just a few meters from most homes.

Most of the inhabitants in the Tano North district live below the poverty line. Their meals are mainly composed of huge portions of carbohydrate, with very little protein, fat and vitamins. Under-five malnutrition is one of the main health problems among children in the district (Health Directorate Report, 2013). Most men and very few women in the district habitually drink lots of alcohol (locally brewed alcohol) and smoke local tobacco and cigarettes. Respiratory tract infections, liver diseases, diabetes and hypertension are the main diseases among the adult population in the district (Health Directorate Report, 2013). The Tano North District Assembly (TNDA), headed by a District Chief Executive (DCE), is the administrative authority of the district. The District Health Directorate (DHD), which is an administrative arm of the TNDA, is responsible for health administration. It is also situated at Duayaw Nkwanta.

3.3 Data Collection Techniques and Tools

A 62- item structured questionnaire in English (with closed and open ended questions) was used. Secondary information on the costs of anti- diabetic medications, laboratory

diagnostics, registration, consultations and physiotherapy were obtained from the review of hospital records.

Three interviewers were recruited and trained for the data collection. These interviewers were nurses who were on their annual leave during the data collection period. The interviewers who spoke fluent Twi and English were further trained to accurately translate the English questionnaire to Twi in order to obtain appropriate responses from participants. The principal investigator was also involved in the data collection. Interviewer administered face to face interviews were used to collect all the needed information from the participant. These interviews were done in either Twi or English and lasted between 30 and 35 minutes. The filled questionnaires returning from the field were checked at the close of day to ensure completeness and then processed for entry.

3.4 Study Population

Diabetic patients living in the Tano North District who attend the diabetes clinic at the St. John of God Hospital were used for the study. The study was conducted on types 1 and 2 diabetics who form the majority of patients with diabetes mellitus and remain on a life-long treatment. Patients who had been medically diagnosed to have diabetes mellitus and had been attending the diabetes clinic for at least six months were eligible to participate in the study. This criterion was used because patients who had had the disease for at least six months were the most appropriate people to tell how the household cost of seeking diabetic healthcare had impacted on their lives and that of their households. Diabetic patients between the ages of 12 and 80 years were chosen for the study. This was to

capture both types 1 and 2 diabetics as well as both the working class (the bread winners) and non- working class (those who depend on others for their livelihood) diabetics. For eligible participants who were below 18 years, consent was sought from a parent or guardian prior to their inclusion into the study.

The household in this study was defined as all persons who live in a given home namely: parents, children and domestic attendants and eat from a common bowl and sleep under the same roof. This was to help tailor the study to assessing the household cost of the disease on the diabetic patient and his immediate family.

Diabetic patients who were severely ill (for instance patients having complications such as ketoacidosis, end stage renal failure or end stage cardiac disease) were excluded from the study as they may not be able to participate fully in the study. Diabetic in-patients were also excluded from the study as they may not be well enough to respond appropriately to questions asked. Households who had had a deceased diabetic as a family member were also excluded from the study as the study focused on the household cost of the disease from the patients' perspective.

3.5 Study Variables

Table 1: Logical Framework of the Household Cost of Seeking Diabetic Health Care

Objective	Dependent variable	Conceptual definition of dependent variable	Scale of measurement	Indicators	Data collection method	Type of statistical analysis
To estimate the direct cost of healthcare management of diabetes	Direct cost of healthcare	the costs of organizational and operational hospital services and into the out-of-pocket expenses borne by the patients and their families	Nominal	Chi-square, confidence interval, histogram	Questionnaire, records	Logistic regression, correlations, mean, standard deviation, t-test
To estimate the indirect cost of healthcare management of diabetes	The indirect cost of diabetic healthcare	The of opportunity cost of time lost due to morbidity (temporary disability and permanent disability)	Nominal	Mean cost, mean hours of work	Questionnaire,	t-test, correlation, regression
To estimate the intangible cost of healthcare for the management of diabetes.	Intangible cost of healthcare for the management of diabetes.	Wellbeing losses due to the physical and psychological pain and stress	Ordinal	Mean cost, QALY	Questionnaire	Regression, Chi square, t- test
To statistically determine the association between the background characteristics of diabetic patients and the cost of diabetic management.	Background characteristic in relation with the cost of diabetes management	Relation between the socioeconomic position and the cost of diabetic management	Nominal and ordinal	Percentages and proportions	Questionnaire	Descriptive , logistic regression, Chi square

3.6 Sample size

The sample size was estimated based on the assumption that about 50% of all diabetics in the Tano North District attend the diabetes clinic.

Using the formula: $S = [z^2 (p_0 \cdot q_0)] \div d^2$, the sample size was calculated.

Where z: coefficient of reliability at 95% CI=1.96

P_0 : estimated proportion of diabetics who attend clinic=0.5

q_0 : $(1-p) = 0.5$

d: deviation= 0.05

S= sample size

$$S = [1.962 (0.5 \times 0.5)] \div 0.05$$

$$S = 384$$

Therefore the sample size was estimated at 384 plus 10% of this estimate (about 38) to make up for any non-response, approximating to **424** participants.

3.7 Sampling

About 60 patients attend the diabetes clinic weekly and about 98% of them are between the ages of 12 and 80 years. A systematic random sampling method was employed in the study. A sample frame was obtained from the hospital records and the total number of diabetics was divided by the calculated sample size for the study. Every second patient who attended the diabetes clinic was interviewed as he or she patiently waited to see the

doctor provided that patient met the inclusion criterion and consented into the study. If a participant was found to be ineligible for the study the next eligible participant was selected. This practice was used until the sample size was obtained. All the 424 participants responded well to the questioned asked on the questionnaire and thus response rate was 100%.

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3.8 Pre- Testing

The data collection tool was pre- tested at Bechem Government Hospital in the Tano South District of the Brong Ahafo Region on the 13th of June, 2013. The necessary modifications and elaborations were made in the questionnaire after it was pre- tested. For instance the question on benefits received by diabetic patients from employers was further elaborated to include the form and amount of the benefit(s) monthly. Other sources of income received by diabetics were also included on the study. This was done to help obtain the relevant answers needed in the analysis of the study.

3.9 Data Handling

Every questionnaire was given a unique code and all forms were arranged orderly and neatly in a file. Filled questionnaires returning from the field were entered weekly in Microsoft excel by a data entry clerk and exported to STATA software. All the research assistants were trained to handle the questionnaires neatly and cautiously.

3.10 Data Analysis

All participants were interviewed once during the data collection period. Any participant who visited the facility more than once during the data collection period was interviewed on his/her first visit date. Each participant was given a code number to keep and a few relevant questions were asked prior to the interview.

Statistical software (STATA version 11) was used in the analysis of the data.

The direct costs of diabetic healthcare were estimated as a total cost of all direct spending on diabetic healthcare. This included the cost of transportation, syringes, special diet, glucose meter and other laboratory examinations. The indirect costs were on the other hand based on the total time lost to productivity. This assessment was made on the basis of total time clients had to leave the workplace to visit the facility on a normal diabetic check up or due to complications. The current minimum wage is GH¢ 5.24 (Ghana Statistical Service, 2014) and the average working hours per day is 8 years. This put the cost of one working hour at GH¢ 0.66. The cost of one working hour was then multiplied by the total hours a client spent at the hospital per visit to arrive at the cost of each visit per client. Based on the average number of visits per month, the indirect cost of diabetes care was estimated. The mean total cost of seeking diabetic health was computed as the sum of the mean total direct and indirect costs.

A sensitivity analysis was further conducted to estimate the time values of the costs of diabetic care, taking into consideration as assumed discount rate, time period and the inflation rate of 13.8% (Trading Economics, 2014).

The cost estimates at time t, was based on the formula;

$$\text{Estimated cost at time } t = EC_0 (1+r)^t \dots\dots\dots (1)$$

Where EC_0 is the current estimated costs and r is the estimated discount rate and t is time period.

A real discount rate was deduced using the current inflation values based on the formula

$$r_t^{\text{real}} = (r_e - i) / (1+i) \dots\dots\dots (2)$$

where r_t is the real discount rate and i is the current inflation rate.

Descriptive statistics was measured using frequency and proportions to depict the socio-demographic characteristics, body mass index and fasting blood glucose levels. The students' t-test was employed for continuous variables. Univariate logistic regression was used to statistically determine the association between the socio economic disposition of diabetic patients and the direct cost of seeking diabetic healthcare. Bivariate analysis was used to analyze the socio demographic factors influencing diabetic management. Statistical significance for the study was set at an alpha value of 0.05 with a 95% confidence interval.

3.11 Ethical Consideration

The study protocols were submitted to the Ethics committee of KNUST for review and clearance. Letters were sent to the Tano North District and the St. John of God Hospital to seek permission which was duly granted and also to inform them about the intent of

the research. The chief, elders, and heads of institutions and corporations in the Tano North district were briefed especially on the intent and benefits of the study.

3.12 Limitations of the Study

- I. Medically diagnosed diabetics who did not attend the diabetes clinic were not included in the study due to difficulty in locating them.
- II. For active NHIS card bearers, most aspects of the direct cost were accounted for using the NHIS levy. The NHIS levy covered most of the expenses such as: medications, most laboratory investigations and consultation for its members. This obscured to some extent the assessment of the true impact of the direct cost of the disease on diabetic patients and their household.
- III. The monetary value of the intangible cost incurred was not considered in the study.
- IV. The study relied solely on the responses given by participants. The conclusions drawn were from these responses (be they true, fairly true or false).

3.13 Assumptions of Study

- I. The study design was appropriate to investigate the problem understudied.
- II. The tools used for data collection and analysis were accurate.
- III. It was assumed that about 50% of the total number of diabetics in the Tano North District attend the Specialized Diabetes Clinic.

- IV. A confidence interval of 95% was assumed for the study (5% level of significance).
- V. Discount rates of 3%, 5%, 7% were assumed during the sensitivity analysis of the cost estimates.
- VI. Inflation rate is 13.5% ; excluding any inflationary changes
- VII. The responses from the participants were true and reflect the true household cost of diabetics in the Tano North District.



CHAPTER FOUR

4.0 RESULTS

Introduction

This chapter presents results of the study. Data from a total of 424 respondents were analyzed. Results were presented based on responses from participants and are illustrated in tables and figures. Results were obtained from responses from a single hospital visit. Analysis was done at the univariate, bivariate and multivariate levels. A sensitivity analysis was conducted to estimate the time values of the costs estimates of diabetic healthcare.

4.1 Background Characteristics of Respondents

Table 4.1 presents results of the background characteristics of respondents involved in the study. The mean age of the respondents was 53years (SD=13.7) and majority of the respondents were above 44years. Only 7.1% were below 35 years and 42.5% were above 54years. Majority 62.3% were females and 75.4% were married. Majority (62.3%) had basic education (primary and JSS) and only 0.71% had tertiary education. About 26% however had no formal education. About 30% of the respondents were farmers and 31% were traders. Unemployed, students and those on retirement constituted 25.2% of the respondents. About 46% had more than four people in their household and about 23% had three persons in their household.

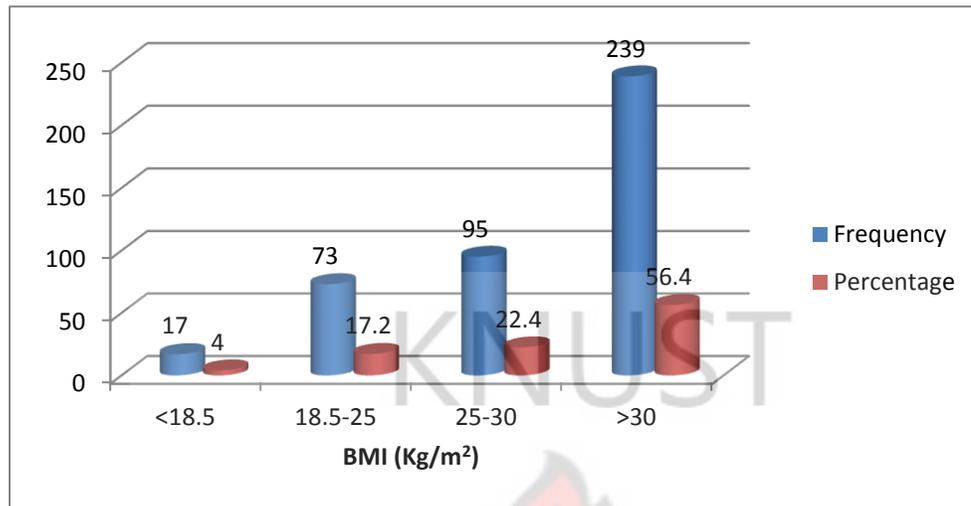
As shown in Figure 4.1, majority, (56.4%) of the respondents were obese, (that is they had BMI higher than 30Kg/m²) whereas 4% were underweight (BMI less than 18.530Kg/m²). Ninety- five of the respondents representing 22.4% had BMI of 25 to 30 Kg/m² (overweight) whereas 17.2% had BMI of 18.5 - 25 Kg/m²(normal weight). The mean BMI was 31.73 (SD=6.79).

Table 4.1: Background characteristics of respondents

Variable	Frequency	Percentage
Age (n=424)		
– <25	14	3.3
– 25-34	16	3.8
– 35-44	90	21.3
– 45-54	124	29.3
– >54	180	42.5
Mean (SD)	52.8 (13.7)	
Gender (n=424)		
– Male	160	37.7
– Female	264	62.3
Marital status (n=406)		
– Single	32	7.9
– Married	306	75.4
– Divorced	16	3.9
– Widowed	12	12.8
Place of residence (n=424)		
– DuayawNkwanta	232	54.7
– Other	192	45.3
Educational level (n=424)		
– illiterate	111	26.2
– basic school level	264	62.3
– secondary level	46	10.9
– tertiary level	3	0.71
Occupation (n=424)		
– Farmer	129	30.4
– Trader	130	30.6
– Clergy	4	0.9
– Civil servant	44	10.4
– Unemployed /student /Retired	107	25.2
– Other	10	2.5
Number of people in household (n=424)		
– 1	23	5.4
– 2	38	9.0
– 3	98	23.1
– 4	71	16.8
– >4	194	45.8
Mean (SD)	4 (2)	

Source: Field Data, 2013

Figure 4.1 Distribution of Body Mass Index of Respondents [mean=31.73 (+6.79)]



Source: Field Data, 2013

4.2 Respondents Income and Spending

Tables 4.2 and 4.3 present respondents' income as well as health spending. As shown in Table 4.2, majority of the respondents earned less than GH¢ 500 (USD 200) monthly with only 13.7% earning more than GH¢ 1,000 (USD 400). The mean income was GH¢ 250.45 (USD 100.18); (SD= 65.06). More than 70% stated that they do not receive any form of benefits (in terms of allowance, payment of educational bills for their wards and payment of hospital bills for their household) from their employers. Majority of those who received these benefits however indicated it was in kind and 26% quantified the benefits to be GH¢ 200.00 (USD 80) whereas 63.2% stated it amounted to GH¢ 50.00 (USD 20). Two hundred and three respondents constituting 48.2% disclosed that they were breadwinners. Majority of the patients spent up to GH¢ 20.00 (USD 8) on health yearly while only 5% spent more than GH¢ 50.00 (USD 20) on health annually.

Majority, 51.4% of the respondents spent less than GH¢ 100.00 (USD 40) monthly on housekeeping whereas 10.5% stated that they did not contribute to housekeeping. Among those who spent on remittances, 92.4% spent GH¢ 100.00 (USD 40) monthly whereas 7.6% spent less than GH¢ 100.00 (USD 40) monthly.

Table 4.2: Distribution of Respondents income and spending

Variable	Frequency	Percentage
Monthly income (n=211)		
– <GH¢ 300	41	19.4
– 300-500	79	42.2
– 500 – 1000	52	24.6
– >1000	29	13.7
<i>Mean (SD) GH¢</i>	<i>250.45 (65.06)</i>	
<i>Mean USD</i>	<i>100.18</i>	
Receive any benefits from your employers (n=196)		
– yes	50	25.5
– no	146	74.5
If unemployed, what is the reason? (n=27)		
– By choice	5	18.5
– Cannot find work	4	14.8
– Due to diabetes	18	66.7
Are you the bread winner? (n=421)		
– Yes	203	48.2
– No	218	51.8
How many household members support household? (n=272)		
– 1	239	87.8
– 2	19	7.0
– 3	14	5.2

Mean (SD)	1.17 (0.49)	
Amount spent on health yearly (n=421)		
– <GH¢ 10.00	5	1.2
– GH¢ 10-20.00	209	49.6
– GH¢ 20.1-30.00	111	26.4
– GH¢ 30.1-50.00	75	17.8
– >GH¢50.00	21	5.0
Mean (SD) GH¢	18.55 (6.80)	
Mean USD	7.42	
Amount spent on housekeeping monthly (n=420)		
– Do not contribute	44	10.5
– <GH¢ 100.00	216	51.4
– GH¢ 100-200.00	82	19.5
– GH¢ 200.1-300.00	39	9.3
– GH¢ 300.1-500.00	33	7.9
– >GH¢500.00	6	1.4
Mean (SD) GH¢	101.22 (94.04)	
Mean USD	40.49	
Amount spent on remittance monthly (n=92)		
– <GH¢ 100	85	92.4
– GH¢ 100	7	7.6
Mean (SD) GH¢	39.84 (25.68)	
Mean USD	15.94	

Source: Field Data, 2013

As shown in Table 4.3, majority of the clients in this study earned less than GH¢ 100.00 (USD 40) in cash and in kind from farming activities. About 33% who were involved trading activities earned GH¢ 100-300 (USD 40-120) and 50% of those who had income from trading in kind earned less than GH¢ 100.00 (USD 40). Majority of respondents

who received remittances in both cash and kind received less than GH¢ 100.00 (USD 40). In total, majority earned less than GH¢ 300.00 (USD 120) in cash and in kind. Specifically, 27.6% received less than GH¢ 100.00 (USD 40) whereas 18.9% earned from GH¢ 300-500.00 (USD 120- 200). Only 6.1% earned above GH¢ 500.00 (USD 200) monthly.

Table 4.3 Distribution of Respondents' sources of income

Sources of income	In cash (%)	In kind (%)
Farm	N=395	N=176
– GH¢<100	55.2	69.9
– GH¢100-300	22.5	27.8
– GH¢300-500	14.2	2.3
– GH¢>500	7.8	-
<i>Mean (SD) GH¢</i>	85.90 (33.68)	
<i>Mean USD</i>	34.36	
Trading	N= 222	N=124
– GH¢<100	30.2	50.0
– GH¢100-300	32.9	34.7
– GH¢300-500	24.8	15.3
– GH¢>500	12.2	-
<i>Mean (SD) GH¢</i>	215 (98.62)	
<i>Mean USD</i>	86	
Remittance	N=113	N=63
– GH¢<100	61.1	73.0
– GH¢100-300	36.3	27.0
– GH¢300-500	2.6	-
– GH¢>500	-	-
<i>Mean (SD) GH¢</i>	95.50 (48.90)	
<i>Mean USD</i>	38.2	
	25.28	
Other	N=84	N=177
– GH¢<100	58.3	34.5
– GH¢100-300	39.3	46.9
– GH¢300-500	2.4	10.7
– GH¢>500	-	7.9
<i>Mean (SD) GH¢</i>	98.75 (56.37)	
<i>Mean USD</i>	39.5	
Total	N=424	N=329
– GH¢<100	27.6	44.4
– GH¢100-300	47.4	32.9
– GH¢300-500	18.9	13.7
– GH¢>500	6.1	2.1
<i>Mean (SD) GH¢</i>	245.60 (163.68)	
<i>Mean USD</i>	98.24	

Source: Field Data, 2013

4.3 The Direct Cost of Seeking Health Care in the Management of Diabetes Mellitus

Table 4.4 and 4.5 as well as Figures 4.2 to 4.5 present results on the direct cost of seeking healthcare in the management of diabetes mellitus among respondents. As shown in Table 4.4, majority of the clients visited health facility 6 times or more in a year. On respondents' cost of transportation to hospital due to diabetes, about 43% spent more than GH¢ 3.00 (USD 1.20) whereas 45.8% indicated that they walk to the facility thereby incurring no transport cost. Majority, 52.4% also spent between GH¢ 1.00 and GH¢ 3.00 (between USD 0.40 and 1.20) on food.

About 91% were able to follow doctor's advice on dietary control of diabetes. Reasons for not following dietary advice among 38 (9%) of the respondents included '*I eat what I get (29.3%)*', '*due to work (25%)*' and '*lack of funds (31.6%)*'. Majority of those who prepared special diets spent GH¢ 100.00 or more. More than 90% of the clients did not have glucose meters at home and interestingly, 92.8% of them stated they don't know about the glucose meter, Figure 4.3. Among the few clients who had the glucose meter, majority were spending an average of GH¢ 55 (USD 22) a month to keep it running. One hundred and thirty-four clients (32.3%) were on insulin injections and 63.5% of this group spent more than GH¢ 3.00 (USD 1.20) on syringes every month. Almost all the respondents, 98.8% were on NHIS and 98.8% stated that they spend GH¢ 15.00 (USD 6.00) on NHIS monthly. More than 95% of the respondents disclosed that they had never gone for laboratory investigations outside the health facility. Among the few (12 respondents) who underwent laboratory investigations outside the health facility, about 58% spent GH¢ 2.00 (USD 0.80) or above on the investigations. Majority, 94.7% were

also not on any physiotherapy or special exercise for their conditions and for those on physiotherapy, most (81%) of them had their cost catered for by the NHIS.

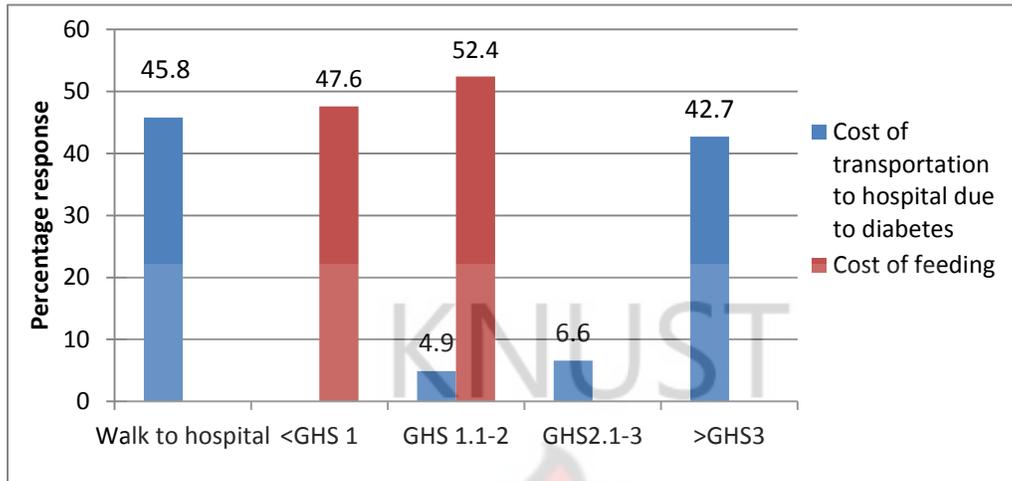
Table 4.4 Responses on direct cost of seeking care for diabetes

Variables	Frequency	Percentage
How often do you visit health facility? (n=424)		
– 4 times	6	1.4
– 5 times	2	0.5
– 6 times	227	53.5
– >6 times	189	44.6
<i>Mean (SD)</i>	7.3 (2.9)	
Are you able to follow the doctor's advice on dietary control of diabetes? (n=424)		
– Yes	386	91.0
– No	38	9.0
How much do you spend monthly on the preparation of your special diet? (n=382)		
– GH¢<100	80	20.9
– GH¢100-200	212	55.5
– GH¢200-300	90	23.6
<i>Mean (SD) GH¢</i>	108	
<i>Mean USD</i>	(55.06)	
	43.2	
Do you have a use personal glucometer at home? (n=421)		
– Yes	19	4.5
– No	402	95.5
Are you on insulin injections? (n=415)		
– Yes	134	32.3
– No	281	67.7
How much spent on syringes (n=137)		
– GH¢ 1.00	7	5.1
– GH¢ 2.00	3	2.2
– GH¢ 3.00	40	29.2
– >GH¢ 3.00	87	63.5
<i>Mean (SD) GH¢</i>	4.83 (1.30)	
<i>Mean USD</i>	1.93	
Are you currently actively registered with the NHIS?		

(n=421)	416	98.8
– Yes	5	1.2
– No		
Are some medications prescribed that you have to purchase from pharmacy shops? (n=418)		
– Yes	26	6.2
– No	392	93.8
In a year how often are you asked to go for laboratory investigations outside the NHIS? (n=421)		
– Often	2	0.5
– Rarely	10	2.3
– Never	409	97.2
Amount spend on laboratory investigations (n=12)		
– Paid by NHIS	2	16.66
– GH¢ 10-20	3	25
– GH¢20.1-30	2	16.66
– GH¢>30.00	5	41.66
Mean (SD) GH¢	30(11.37)	
Mean USD	12	
Are you on any physiotherapy or special exercise for your condition? (n=417)		
– Yes	22	5.3
– No	395	94.7

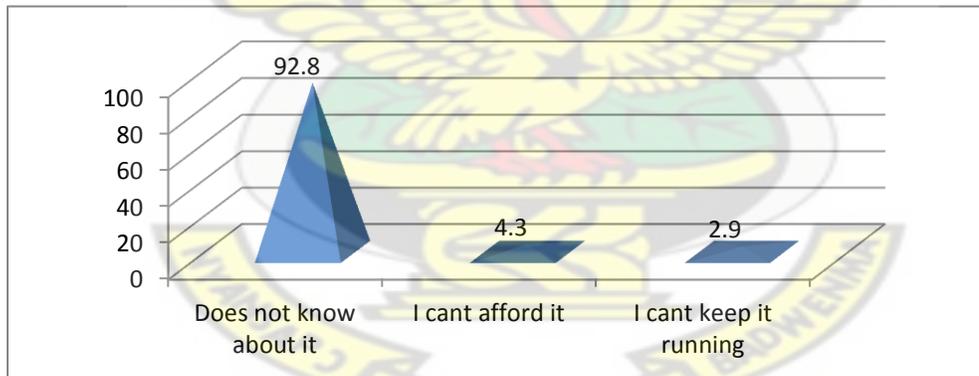
Source: Field Data, 2013

Figure 4.2 Cost of Transportation and Feeding due to Diabetes Mellitus



Source: Field Data, 2013

Figure 4.3: Reasons for not having Glucose Meter

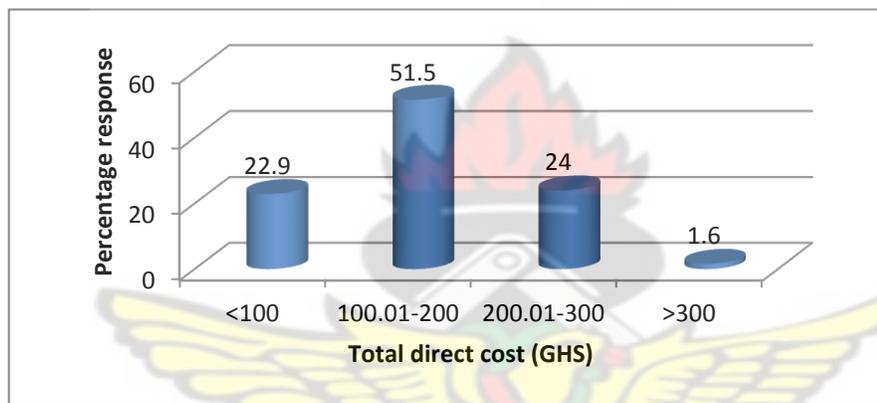


Source: Field data, 2013

As shown in Figure 4.4, the mean monthly direct cost per diabetic patient was GH¢ 135.10 (USD54.04) (SD=79.78) and this was about 66.3% of the mean total income of the respondents (GH¢ 250.45 (USD 100.18); SD= 65.06). About 41% of the respondents spent more than 60% of their total income as direct cost of diabetes care. About 23.1%

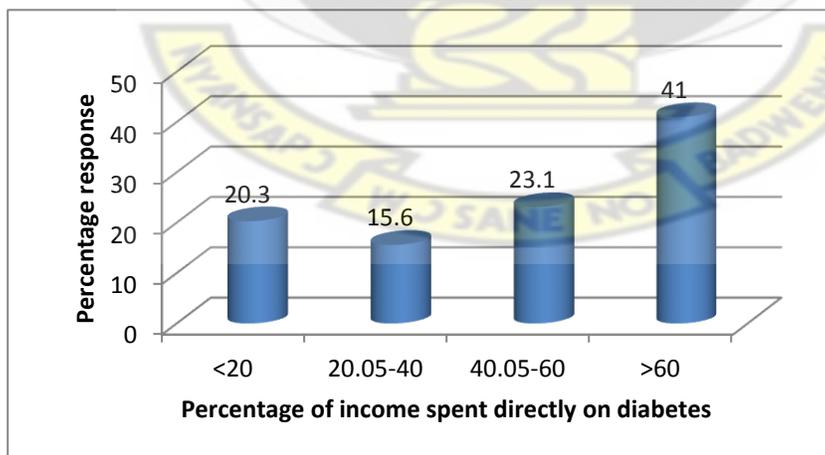
also spent 40-60% whereas 15.6% spent 20-40% as detailed in Figure 4.4. Majority (51.1%) of the respondents spent between GH¢ 100.01 and GH¢ 200.00 (between USD 40 and 80) as direct cost of seeking healthcare. Twenty-four per cent of the respondents also spent up to GH¢ 300.00 (USD 120) and about 23% spent up to GH¢ 100.00 (USD 40).

Figure 4.4 Direct Cost of Seeking Diabetic Healthcare (mean 135.10 SD=79.78)



Source: Field data, 2013

Figure 4.5 Percentage of Total Income Spent on Diabetes care



Source: Field data, 2013

As shown in Table 4.5, cost of preparation of special diabetic diet formed the highest component of the mean direct cost while expenses made on syringes constituted the least component of the mean direct cost.

Table 4.5 Main components of the mean direct cost of seeking diabetic healthcare

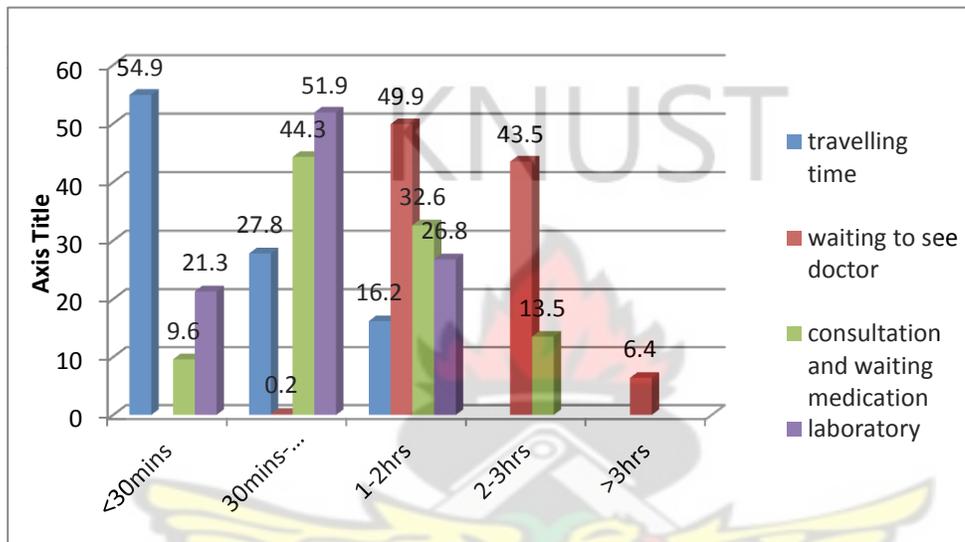
COMPONENTS	COST
FOOD PREPARATION	GH¢ 108.0
GLUCOSE METER	GH¢ 55.0
LABORATORY INVESTIGATIONS	GH¢ 30.3
SYRINGES	GH¢4.8

4.4 Indirect Costs of Seeking Health Care in the Management of Diabetes Mellitus

This section describes the indirect cost borne by clients on diabetes treatment. Table 4.6, Table 4.7 and Figure 4.6 present results of indirect costs of seeking healthcare. As shown in figure 4.6, majority of the respondents spent less than 30 minutes to reach facility. However, about 16.2% spent one to two hours to reach the facility. Almost half of the respondents also spent 1-2hours waiting at the facility to see a doctor whereas 43.5% spent 2-3hours. About 27% and 13.5% also spent 1-2hours for laboratory investigations and consultations respectively. About 15% of the clients had developed disabilities as a result of diabetes mellitus and 75.8% of this group had permanent disability. 50.6% out of 180 respondents also stayed 4 days or more out of work annually due to complications. About 23% of respondents were accompanied by someone when attending the diabetes

clinic and about 68.1% of those who accompanied them were employed. Majority (65.4%) were prepared to pay 30% of their daily income to someone to be in their stead at work while seeking diabetes treatment.

Figure 4.6: Indirect Cost of Seeking Diabetic Health Care



Source: Field Data, 2013

Table 4.6 Indirect Cost of Seeking Diabetic Health Care

Variable	Frequency	Percentage
Have you developed any disability as a result of diabetes mellitus? (n=421)		
– Yes	62	14.7
– No	359	85.3
If yes is it (n=62)		
– Permanent	47	75.8
– Temporary	15	24.2
How often are you ill and frail as a result of diabetes mellitus in a year? (n=418)		
– Very often	50	12.0
– Often	135	32.3
– Occasionally	226	54.0
– Never	7	1.7
Hours taken from work when visiting hospital (n=326)		
– 4hrs	7	2.1
– 5hrs	16	4.9

– 6hrs	66	20.
– >6hrs	66	20.
– Whole day	171	52.5
Mean (SD)	15.74(7.83)	
Number of days absent from work due to complications including disabilities (n=180)		
– None	17	9.4
– 1day	13	7.2
– 2 days	21	11.7
– 3 days	38	21.1
– 4days or more	91	50.6
Mean (SD)	4(1.43)	
Does anyone accompany you to the hospital when you are attending the diabetes clinic? (n=418)		
– Yes	95	22.7
– No	323	77.3
If yes, is he or she employed? (n=94)		
– Yes	64	68.1
– No	30	31.9
What's his/her monthly income? (n=61)		
– < GH¢200	21	34.4
– GH¢ 200-300	17	27.8
– GH¢ 300-500	14	22.9
– > GH¢ 500	9	14.9
Mean (SD)/ GH¢	195.26(72.1)	
Mean USD	78.10	
How much are you prepared to pay to someone in a day to do your work for you while seeking diabetes treatment? (n=327)		
– 10%of daily income	7	2.1
– 20%of daily income	20	6.1
– 30%of daily income	214	65.4
– 50%of daily income	86	26.3

Source: Field data, 2013

Table 4.7 summarizes the cost estimates for the mean direct and indirect cost. The mean monthly indirect cost per diabetic patient was GH¢11.50(4.60) (SD=5.42). Most of the indirect cost incurred was due to the time spent by respondents when seeking diabetic healthcare. More than half of the respondents (52.5%) took the whole day from work

when visiting the hospital. The mean household cost of seeking diabetic healthcare was GH¢ 146.70 (USD58.68) (SD=79.78). The mean direct cost formed about 92.16% of the total household cost of seeking diabetic healthcare while the mean indirect cost formed 7.84% of this cost.

As shown in Table 4.8, the total household cost of seeking diabetic healthcare could rise assuming the discount rates of 3%, 5%, and 7% and at an inflationary rate of 13.5%, excluding any inflationary changes. Under this assumption, the mean household cost per diabetic patient is expected to rise at a rate of about 7.7% at the end of one year.

Table 4.7 Summary of costs of diabetes healthcare

Cost of Diabetes Mellitus	Frequency	Percentage
Direct cost (GH¢)		
– < GH¢100	97	22.9
– GH¢100-200	218	51.5
– GH¢200.01-300	102	24.0
– > GH¢300	7	1.6
Mean (SD)/ GH¢	135.10 (79.59)	
Mean USD	54.04	
Indirect cost (GH¢)		
– < GH¢10	196	46.2
– GH¢10-19.99	216	50.9
– GH¢20-29.99	-	-
– GH¢>20.99	12	2.9
Mean (SD)/GH¢	11.50 (5.42)	
Mean USD	4.6	
Total cost (GH¢)		
– < GH¢100	117	27.6
– GH¢100-200	204	48.1
– GH¢200.01-300	92	21.7
– > GH¢300	11	2.6
Mean (SD)/GH¢	146.70 (79.78)	
Mean USD	58.68	

Source: Field data, 2013

Table 4.8 Sensitivity analysis of cost of Diabetes Mellitus

Cost of DM	Mean cost of DM				
	Present value	Value at year one			
		3% discount rate	5% discount rate	7% discount rate	
Direct cost					
– GH¢	135.10(79.59)	147.25 (86.750)	145.91 (85.95)	143.21 (84.36)	
– USD	54.20	58.90	58.36	57.28	
Indirect cost					
GH¢	11.50 (5.42)	12.53 (5.86)	12.42 (5.86)	12.19 (5.75)	
– USD	4.60	5.01	4.97	4.88	
Total cost					
– GH¢	146.70 (79.78)	159.79 (86.96)	158.33 (86.16)	155.40 (84.57)	
– USD	58.64	63.91	63.33	62.16	

Source: Field Data, 2013

Table 4.9 shows the incidence of diabetes mellitus obtained from secondary records. Given the rate of incidence increase between the year 2012 and 2013, this projection is likely to be an under estimation. However there is not enough trend data to produce a more robust forecast. It is also possible that the spike in incidence between the year 2012 and 2013 was a one-off incidence though anecdotal evidence might suggest otherwise.

Table 4.9: Overview of diabetic incidence from the year 2010 to 2012 and projected incidence of Diabetes Mellitus from the years 2014 to 2018

YEAR	INCIDENCE
2010	23
2011	30
2012	73
2013	500
2014	525
2015	672
2016	820
2017	967
2018	1,115

Source: Hospital Records, 2010-2012

Table 4.10 shows the five year projection of cost estimates of the household cost of seeking diabetic healthcare assuming an average annual inflation rate of 13.5% and assuming the cost per person remains constant. Thus collectively, the mean household cost of seeking diabetic healthcare is expected to rise at a yearly average rate of 37% within the next five years.

Table 4.10: Projected estimate of the total cost of seeking diabetic healthcare within a five year period

	Year 2014	Year 2015	Year 2016	Year 2017	Year 2018
Estimated mean household cost per patient per year	GH¢ 1,759 USD 703.6	GH¢1,997 USD 798.8	GH¢ 2,266 USD 906.4	GH¢ 2,572 USD 1,028.8	GH¢ 2,919 USD 1,167.6
Estimated annual inflation	13.5	13.5	13.5	13.5	13.5
Incidence of diabetes	525	672	820	967	1,115
Estimated mean household cost of seeking diabetic healthcare (all diabetics)	GH¢923,580 USD369,432	GH¢ 1,342,576 USD 537,030.4	GH¢ 1,857,868 USD 743,147.2	GH¢ 2,487,821 USD 995,128.4	GH¢ 3,254,001 USD 1,301,600.4
Annual rate of rise in cost	45%	38%	34%	31%	

4.5 Intangible cost of seeking diabetic healthcare

Table 4.11 presents the intangible costs of seeking diabetic healthcare. Out of 392 respondents, about 33% disclosed that they were often saddened due to their illness whereas 16.6% were saddened very often. Majority 64.9% were not able to enjoy their hobbies as they did prior to their diagnosis of the disease. Reason for not being able to enjoy hobbies included disability (25.3%), frequent general malaise (59.2%) and frequent weakness and tiredness (15.5%). About 20.3% often felt uncomfortable and stressed out with the routine insulin injections.

Some effects on quality of life of household of respondents due to diabetes mellitus included stress from routine medicine intake, losing babies due to diabetes, blurred vision and unable to work well, frequent weakness, polyuria and not being able to participate in family activities. Some effects of diabetes on marriage of clients included sexual weakness which is straining their marriage and frequent quarrel due to sexual weakness.

Table 4.11 Intangible Cost of Seeking Diabetic Health Care

Variables	Frequency	Percentage
How much physical pain do you suffer as a result of the disease? (n=410)		
– None	182	44.4
– Very little	167	40.7
– Moderate	51	12.4
– Severe	10	2.4
How often are you saddened by the fact that you have diabetes? (n=392)		
– Never	43	11.0
– Occasionally	155	39.5
– Often	129	32.9
– Very often	65	16.6
Are you side-lined at work? (n=51)		
– Yes	4	7.8
– No	47	92.2
Did you retired at the standard age set for retirement? (n=67)		
– Yes	35	52.2
– No	32	47.8
If no, was the premature retirement as a result of the diabetes? (n=32)		
– Yes	28	87.5
– No	4	12.5
Are you able to enjoy your hobbies as you did prior to the diagnosis of the disease? (n=413)		
– Yes	143	35.1
– No	268	64.9
How often do you feel uncomfortable or stressed out when you have to administer insulin injection? (n=123)		
– Never	34	29.3
– Occasionally	33	26.8
– Often	25	20.3
– Very often	29	23.6
How do people in community relate to you (n=418)		
– Cordial	159	38.0
– Good	259	62.0

Source: Field Data, 2013

4.6 The socioeconomic disposition of diabetic patients and the cost of seeking diabetic healthcare

Table 4.12 presents results of bivariate analysis to determine the influence of socio-demographic characteristics on direct and indirect cost of managing diabetes mellitus. As shown, the mean cost for seeking treatment varied significantly with the age of the respondents ($p=0.001$). The mean cost of seeking diabetic healthcare increased with increasing age up to 54years. The mean direct cost again varied significantly with the marital status ($p<0.001$) and the educational level of the respondents ($p<0.001$). The mean waiting time at the facility also differed significantly with the household size of the respondents ($p<0.001$). The cost of seeking diabetic healthcare again increased with increasing household size.

Table 4.12: Bivariate results of socio-demographic factors influencing cost of diabetic management

Variable	Value	Cost of diabetes management			
		Mean total cost (GHC)	p-value	*Mean total waiting time (minutes)	p-value
Age	<34	112.33 (67.2)		255 (42.9)	
	35-44	120.44 (83.9)	0.001	270.7 (65.9)	0.121
	45-54	164.59 (72.8)		279 (67.5)	
	>54	152.99 (79.7)		263.1 (62.4)	
Gender	Male	152.35 (85.3)	0.248	279.1 (65.8)	0.010
	Female	143.11 (76.2)		262.4 (61.7)	
Marital status	Single	89.93 (75.4)		129.5 (49.7)	
	Married	150.41 (79.1)	<0.001	152.9 (69.4)	0.772
	Divorced	160.68 (88.8)		183.5 (48.9)	
	Widowed	165.51 (76.7)		175.8 (48.9)	
Educational level	Illiterate	134.95 (77.3)		266.8 (79.9)	
	basic school level	144.99 (74.4)	<0.001	267.9 (55.0)	0.399
	secondary level	189.19 (63.1)		281.6 (69.5)	
	tertiary level	65.91 (37.0)		231.7 (76.5)	
Occupation	Farmer	131.45 (54.9)		268.2 (64.5)	
	Trader	157.07 (67.0)	0.256	273.4 (56.3)	0.318
	Civil servant	202.28 (99.1)		282.3 (68.0)	

	Unemployed	187.25 (51.4)		256.2 (78.0)	
	/student /Retired				
	Other	153.92 (80.3)		275.1 (69.7)	
People in household	1	124.09 (62.3)	<0.001	246.3 (47.4)	<0.001
	2	131.87 (86.9)		301.9 (56.4)	
	3	159.58 (81.2)		238.7 (57.3)	
	>3	143.86 (78.4)		277.6 (63.8)	
BMI (kg/m2)	<18.5	136.07 (54.4)		263.9 (34.4)	
	18.5-25	138.67 (89.1)	0.060	264.1 (67.7)	0.623
	25-30	131.98 (85.1)		264.3 (68.6)	
	>30	155.81 (75.6)		272.7 (61.9)	

Test: One way ANOVA **Total waiting time (sum of all waiting times)*

Table 4.13 presents the regression results of the influence of socio-demographic factors on cost of diabetic healthcare. The log likelihood ratio (LR) statistic is significant at one percent, meaning that the predictor variables jointly influence the direct cost of managing diabetes mellitus. The results indicate that the total cost of managing diabetes mellitus is significantly different for the BMI of the clients and resulted in 25% increase in the cost of managing diabetes, holding other variables constant. The cost of diabetes healthcare also increased with increasing age of the clients.

Table 4.13: Regression results of influence of socio-demographic factors on cost of diabetic care

Independent variables	Coefficients	95% CI	Std. Err	t-stat
Age	1.671***	0.93, 2.41	0.37	4.44
Gender	-6.602	-22.29, 9.09	7.98	-0.83
Marital status	12.727*	0.72, 24.74	6.20	2.08
Education	26.204***	13.36, 39.04	6.52	4.01
Household size	-1.119	-9.87, 7.63	4.45	-0.25
BMI	2.552***	1.38, 3.72	0.59	4.29
-cons	-85.905	-155.87, -15.93	35.59	-2.42
N	406			
Prob> F	<0.001			
R-squared	0.7172			

p<0.05; **p<0.01; *p<0.001 Outcome variable: cost of managing DM*

CHAPTER FIVE

5.0 DISCUSSION

Introduction

This chapter presents the discussions of the study. It involves the discussion of the findings of the study in relation to published literature on cost of diabetes mellitus treatment. It is outlined based on the objectives of the study.

5.1 Background

Diabetes Mellitus is of great public health concern as a result of the increasing number of Diabetes Mellitus patients and the huge burden it imposes on the individual, healthcare system and a nation's economy at large (Wild *et al.* 2004). Diabetes Mellitus is also associated with indirect cost of healthcare as a result of absenteeism, restricted activity days, lower productivity at work, mortality and permanent disability which also causes large economic burdens in the form of foregone economic growth (American Diabetes Association, 2008). According to the IDF Diabetes Atlas (2011), sub-Saharan Africa bears an immense household burden as result of diabetes mellitus. However, there is little empirical evidence on the cost borne by diabetics and their households in the management of the disease in most countries in the sub-region including Ghana. This cross-sectional study was therefore conducted to assess the cost borne by diabetics and their households in the management of the disease and how this affects the socioeconomic welfare of the diabetic and his/her household.

5.2 Direct cost of Seeking Diabetic Health Care

The increasing rise in number of diabetic patients is associated with a concurrent increase in the direct health care cost from the disease. According to the WHO (2013), the direct cost of diabetic health care has been estimated between 2.5% and 15% of yearly health care budgets depending on the local diabetes prevalence and the complexity of the accessible treatment. Direct cost of Diabetes Mellitus has been measured by the cost of medications, treatment of complications, consultations, diagnosis, transportation and other out of pocket expenses.

Results from this study revealed that the mean cost of seeking diabetic healthcare was GH¢146.60 (USD58.64) (SD=79.78) out of which the mean direct cost constituted about 92.16% [GH¢135.10(USD 54.20) (SD= 79.59)]. The mean direct cost of diabetic healthcare formed about 66.3% of the mean income [GHC 250.45 (USD 100.18) (SD= 65.06)] of the respondents. About 41% of the respondents spent more than 60% of their total income as direct cost of diabetic care and 23.1% also spent 40-60% whereas 15.6% spent 20-40%. This indicates that the diabetic patient spends more than half of his disposable income on seeking diabetic health care and this could put a strain on his spending capabilities in other aspects of his life; hence affecting his quality of life. This is congruent with the results from the study done by the American Diabetes Association (2013), where the direct cost of diabetic healthcare formed about 71.8% (USD176 billion) of the total cost of diabetic healthcare. Similarly, the results from the study conducted by Kirigia *et al.* (2009) showed that the direct cost of diabetic healthcare (56%) though comparatively lesser in proportion, formed a greater portion of the total cost of diabetic healthcare. It is evident from this study and most of the other studies

reviewed that the direct cost formed a greater proportion of the total cost of seeking diabetic healthcare. This could possibly be attributed to the fact that generally the components of the direct cost of diabetic health care could be costly or the indirect cost is under estimated. Contrary to the results obtained in this study, the study done by Barceló et al (2003) revealed that the direct cost of diabetic healthcare formed a lesser proportion (16%-USD 10,721) of the total cost of diabetic healthcare. This could possibly be attributed to cultural differences.

Results of this study also showed that cost of preparation of special diet constituted the greatest proportion [GH¢ 108.00 (SD= 55.06) (USD 43.2)] of the mean direct cost of diabetic healthcare (Table 4.5). The study area where this study was conducted forms part of the food basket of Ghana. The high cost of food preparation may therefore be attributed to the fact that the household prepares two separate meals each meal time (special diet for the diabetic patient and another meal for the rest of the household). The results indicated that about 91% of the diabetic patients studied followed doctor's dietary advice and more than 75% of this group spent more than GH¢ 100.00(USD 40) monthly on preparation of special diets. This could however be a huge financial burden to majority of clients in this study as majority of them earned GH¢ 300.00 (USD 120) or less monthly (Table 4.4). This was also evident as about 32% of clients who could not follow doctor's dietary advice attributed it to lack of funds.

A study conducted by the American Diabetes Association (2013) showed that the biggest proportion of the direct cost of diabetic healthcare was attributable to the cost of prescribed medications for treatment of complications (18%- 31.68 billion) and similarly

the study done by Barceló et al (2003) also showed that the cost of medications formed the highest proportion of the direct cost of diabetic healthcare (41% - USD 4,395.61).

In the same vein, a recent study in Ghana by Kratzer (2012) revealed that most type 1 diabetics struggled to keep up with a regular dose of insulin due to financial barriers in spite of the fact that most of them were members of the National Health Insurance Scheme. Similarly, the study by Kirigia *et al.* (2009) also showed that the cost of insulin accounted for the greatest proportion of the direct cost incurred amongst all the African groups studied and it formed an even greater chunk (32.06%) of the direct cost incurred by diabetic patients from Western and Eastern African countries including Ghana. Results of this study showed that the effect of the cost of medications was possibly masked by the fact that most of the medications used in the management diabetes are currently covered under the NHIS Scheme and all of the respondents were NHIA members (NHIS medication Tariffs, 2012).

Results of this study further showed that among the few clients who had glucose meters, majority were spending an average of GH¢55 (USD 22) a month to keep it running. On the average, this constitutes about 21.9% of a client's total monthly income and this could be considered an appreciable financial strain on the client. More than 90% of the clients did not have glucose meters at home and some attributed it to the inability to afford or keep it functioning. The study by Kirigia *et al.* (2009), estimated the direct cost of diabetic management in Africa. The cost of glucose meters and strips (USD 16.8) for diabetic patients in the Western and Eastern part of Africa including Ghana was similar to that obtained in this study.

Further in this study, the cost of syringes was shown to be part of the direct cost of managing Diabetes Mellitus among some diabetic patients. About 32.3% of the respondents were on insulin injections and 63.5% of this group spent more than GH¢ 3.00 (USD 1.2) on syringes every month. The average spending on syringes was GH¢ 4.83 (USD 1.93). The study by Kirigia *et al.* in 2009 also named cost of syringes as a component of direct cost of managing diabetes mellitus. The cost for diabetic patients in the Western and Eastern part of Africa was however higher (USD 5.75) than that obtained in this study. Although majority of the respondents did not utilize laboratory services outside those provided by the NHIS, the few (2.8% of the respondents) who did admitted having spent less GH¢ 30 (USD 12) since the onset of the disease on these services.

This study further showed that diabetic patients spent on other non-medical costs in assessing healthcare. Most diabetic patients in this study visited health facility 6 times or more in a year and about 43% spent more than GH¢ 3.00 (USD 1.2) per month on food whiles visiting the hospital. Majority, 52.4% also spent between GH¢ 1.00 (USD 0.4) and GH¢ 3.00 (USD 1.2) on food whiles visiting the hospital. The study by Chatterjee in 2011 revealed that the direct non-medical costs of diabetic care constituted an appreciable proportion (40%) of the mean direct cost.

5.3 Indirect Cost of Seeking Diabetic Health Care

The arduous task of managing Diabetes Mellitus is not limited to direct pocket spending but extends to other indirect costs. This is manifested as loss of productivity as a result of

absenteeism and client's inability to engage in productive ventures. The chronicity and complexity of the disease may make diabetic patients either unable to work or work as effectively as they could prior to the onset of the disease (WHO, 2013). According to the WHO (2013), estimates of the indirect cost incurred in the management of the diabetes mellitus in many countries shows that the cost of lost production may be as great as or even greater than the direct health care cost. This was evident in the results of the study done by Barceló *et al.* (2003) in which the total indirect cost formed 82% (USD 54,949) of the total cost of diabetic care. Similarly, the community based survey of the cost of diabetes mellitus in India in the year 2007 showed that the indirect cost incurred in the management of the disease formed more than half of the total healthcare expenditure due to diabetes mellitus (Kapur, 2007). Similarly, the study done by Kirigia *et al.* (2009), in the WHO African region using the standard-cost-of illness approach showed that the indirect cost incurred in the management of diabetes mellitus was almost as great as the direct cost resulting from the disease (direct cost was 57% and indirect cost was 43%). However the results of this study showed that the mean indirect cost formed a small proportion of the total cost of diabetic health care [7.84%- GH¢11.50 (USD 4.6) (SD=5.42)]. This might be as a result of differences in cultural lifestyle. Consistent with this study was the one done by Chatterjee *et al.* (2011) in Thailand which revealed that the indirect cost of diabetic health care constituted less than half (37.5%) of the total cost of diabetic health care. Similarly, a recent study by American Diabetes Association (2013) revealed that indirect cost formed less than a quarter (28%) of the total health care expenditure attributable to diabetes mellitus

The result of this study further showed the extent of productivity loss due to indirect cost of seeking diabetic health care. Respondents in this study spent long waiting times at the facility for consultations, laboratory investigations and at the dispensary. Some respondents also spent up to two hours to reach facility and about 43.5% spent 2-3hours waiting at the facility to see a doctor. These long waiting times reflected in the length of time clients took from work to visit the health facility. More than half of the respondents (52.5%) took the whole day from work when visiting the hospital. The contributing factors to the long waiting times could be: the client to staff ratio and the degree of coordination of the systems in the health facility. This shows the level of contribution of absenteeism to indirect cost of diabetes management. Similarly, a study by the American Diabetes Association (2013) also documented the extent of economic loss from absenteeism and low productivity due to diabetes care. According to the study, diabetic management leads to about 30.1% reduction in productivity while at work among diabetic patients who are employed and also constitutes 7.2% increased absenteeism. The study done in India by Kapur in 2007 on the cost of diabetes mellitus showed that productivity losses accounted for the greatest proportion (71.8%) of the indirect cost and family and personal income loss also accounted for an appreciable proportion (about 28%) of the cost.

The indirect cost of diabetic care also involves losses due to temporal and permanent disabilities. In this study, about 15% of the clients had developed disabilities as a result of diabetes mellitus and 75.8% of this group had permanent disability. Almost 51% of the respondents stayed 4 days or more out of work due to complications and this has great economic implications. The opportunity cost in terms of what patients were prepared to

lose while seeking diabetic health care was about 30 -50% of their daily income. These patients might be ready to part with such a huge percentage of their daily wage because they might have considered the appreciable number of hours they spend at the health facility and also that most of their jobs needed a lot of manpower.

The recent study by American Diabetes Association (2013) revealed that inability to work as a result of disease-related disability formed the largest component (30.1%) of the indirect cost incurred. Again a study by Barceló *et al.* (2003) also indicated that inability to work as a result of disease-related disability formed the largest component (94%) of the indirect cost incurred by diabetic patients. Productivity losses due to permanent disability also accounted for most of the indirect cost incurred in the study by Kirigia *et al.* (2009). Components of the indirect cost amongst the Western and Eastern African countries of which Ghana is inclusive included productivity losses due to permanent disability (37.94%) and productivity losses due to temporary disability (0.46%) (Kirigia *et al.* 2009).

These losses further extend to the caregivers of the patients who had to forfeit work in order to accompany them to the health facility. In this study about 22.7% of the respondents were always accompanied by caregivers when they visited the hospital as a result of diabetes mellitus. About 68% of the caregivers were employed earning a monthly income of about GH¢ 195(USD 75.10) (SD=72.1). Thus employing the current minimum wage of GH¢ 5.24(USD 2.1), every caregiver could lose about GH¢ 42(USD 16.8) monthly in productivity. Considering the current minimum wage in Ghana, (GH¢ 5.24; USD 2.08) at the current rate of inflation (13.5%) this could cause an appreciable financial toll on the household. Congruent with this study is the study by Kirigia *et al.*

(2009) which showed that the total indirect cost formed about 43% of the total cost of diabetic health care among the Eastern and Western countries. Of this proportion, about 0.5% was due to productivity losses for caregivers which translate into about USD 21.6 productivity loss per caregiver.

Projections from the results of this study revealed that the mean household cost of seeking diabetic health care per patient could increase averagely by 7.7% within a year assuming the discount rates of 3%, 5% and 7% and at the current inflation rate of 13.5%; excluding any inflationary changes. These estimates highlights the increasing burden of the household cost of seeking diabetic healthcare on patients in the Tano North district of the Brong Ahafo region of Ghana. Under these same assumptions further projections from the results of this study indicates that collectively, the estimated mean household cost of seeking diabetic healthcare could rise at an average yearly rate of 37%.

5.4 Intangible Cost of Seeking Diabetic Health Care

The cost of managing diabetes further extends to physical and psychological pain, stress and anxiety which adversely affect the quality of life of diabetics. Diabetic patients may experience: discrimination at the workplace, more difficulty finding a job and complications of the disease may lead to a shortened work life. Again, the management of the disease especially administration of insulin and self-monitoring of blood glucose may be inconvenient, time-consuming and a potential source of psychological stress (WHO, 2013). Research on the impact of intangible cost of diabetes has not been given much attention in Africa especially in the Sub Saharan region. However, the research

conducted in the WHO African region on the economic impact of diabetes emphasized the fact that intangible costs incurred on the management of diabetes contributes significantly to the overall cost attributable to the disease (Kirigia *et al.* 2009).

Depression has been shown to be one of the outcomes of diabetes. According to results from this study about 33% out of 392 respondents disclosed that they were often saddened due to their illness whereas 16.6% were saddened very often. This could be as a result of the chronicity of the disease and its accompanying complications or from the fear of premature death from the disease. This is consistent with the study by Anderson *et al.* (2001) to estimate the odds and prevalence of clinically significant depression in adults with diabetes. The outcome of that study indicated that the odds of depression in the diabetic group were twice that of the non-diabetic comparison group (OR = 2.0, 95% CI 1.8–2.2) and did not differ by sex or type of diabetes. The study by Trovato *et al.* (2006) also showed association between diabetes and psychological stress. Similarly, a recent study conducted in Australia to investigate the cost of diabetes mellitus concluded that most of the patients lived with pain and discomfort (42%) and an appreciable number of them had developed depression or anxiety tendencies (34%) (Donald *et al.* 2012). These depressions which result out of their disabilities could further impact negatively on their treatment adherence as concluded in the study by Gonzalez *et al.* (2008).

The intangible cost of diabetes was further seen in problems with mobility as a result of disability, frequent general malaise and frequent weakness and tiredness. Majority (64.9%) of the respondents were therefore not able to enjoy their hobbies as they did prior to their diagnosis of the disease and could not work and participate in family activities. Most (70.7%) respondents often felt uncomfortable and stressed out with the

routine insulin injections. Marriage clients also reported sexual weakness which is straining their marriage and frequent quarrel due to sexual weakness. Similar to this study results, respondents from the study by Donald et al (2012) reported problems with mobility (33%), and inability to undertake usual activities with ease (30%) and a few of the patients however battled with self-care (8%).

The results of this study revealed that most (92.2%) of the respondents did not face any form of discrimination at their workplace as a result of their illness.

5.5 The Socioeconomic Disposition of Diabetic Patients and the Cost of Seeking Diabetic Health Care

This study further assessed the differences in cost of seeking diabetic healthcare with respect to the socio-demographic background of the patients. The mean age of the respondents in this study was 53years (SD=13.7) and majority of the respondents were above 44years whereas 7.1% and 42.5% were below 35 above 54years respectively. This shows that diabetes was more prevalent among the elderly. The study by CDC also showed that women with diabetes were more likely than women without the disease to be 45 years. This study found a significant association between age and cost of diabetic care (cost of diabetic care was higher among patients between the ages of 45 and 54). This could possibly be explained as the active working class carefully followed as far as possible all the guidelines for the effective management of diabetes mellitus and hence the higher cost. This was congruent to the study by Cobas *et al.* (2013) where patients aged 30 years and older incurred the most cost. This study further found significant

influence of marital status and household size and cost of managing diabetes. Majority of the respondents were married and direct cost of diabetic care was highest among those divorced. An increase in household size was associated with a significant decrease in the cost of managing diabetes mellitus by 32%, holding other variables constant.

Majority of respondents in this study were females and results showed no significant influence of gender of respondents on cost of accessing diabetic healthcare with the mean direct cost being significantly higher among male than female clients. This was consistent with a retrospective, cross-sectional cost of illness study conducted in Brazil which found no significant association between gender and direct cost of diabetes care. However, their study showed that the direct medical cost of type 1 diabetes mellitus was higher in females than males (51%-females and 49%-males). This could be as a result of differences in socio-cultural and healthcare settings of the two study areas.

Majority of the diabetic patients studied had basic education (primary and JSS) and only 0.71% had tertiary education. About 26% however had no formal education. This indicates a generally low level of education among the diabetic patients. A study conducted by the center for chronic disease and health promotion (CDC) in U.S.A. also reported that the proportion who were unable to complete high school (27.7%; 95% CI) were more than twice the number of non-diabetic women who had not completed high school (12.2%; 95% CI). This study further reported a statistically significant association between educational background of respondents and the cost of diabetic care with the mean total cost being highest among those with secondary education and lowest among those with no formal education. This could possibly be due to the fact that the more

literate patient followed all the principles for effective management of diabetes more strictly than the less literate patient.

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CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

This chapter summarizes the major conclusions of the study and makes recommendations to improve the current situation.

6.1 Conclusions

6.1.1 Background characteristics

The study concluded that the mean age of diabetic patients in the Tano North District of the Brong Ahafo Region was 53 years (SD= 13.7). Majority of the patients were females (62.3%) and most of the diabetic patients (62.3%) had only basic education. About 30% of the patients were farmers and another 25.2% of the patients were either unemployed, retired or students. More than half of the patients (56.4%) were obese and about 46% of the patients had more than four people in their household.

6.1.2 Direct Cost of Seeking Diabetic Health Care

It can be concluded from the discussions that direct cost of seeking diabetic health care poses huge financial stress on diabetic patients in the Tano North district of the Brong Ahafo region of Ghana. The mean monthly direct cost was GH¢ 135.10 (USD 54.04) (SD=79.59) per diabetic patient which formed about 92.16% of the total cost of seeking diabetic health care and 66.3% of the mean income of participants [GHC 250.45 (USD

100.18); (SD= 65.06)]. About 80% of the mean direct cost was due to the cost of preparation of special diet. Considering the direct cost estimates of this study and assuming the discount rates of 3%, 5% and 7% at the current inflation rate of 13.5%, the mean total direct cost of seeking diabetic health care could increase by a rate of about 7.7% within a year.

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6.1.3 Cost of Seeking Diabetic Health Care

Diabetes mellitus and its related complications have a huge implication on productivity and leads to economic losses. Indirect costs of Diabetes Mellitus care among clients in the Tano North district manifested as absenteeism and loss of productive hours. The mean total indirect cost was GH¢ 11.5 (USD 4.60) (SD=5.42) which constituted about 7.84% of the total cost of seeking diabetic health care. This was mainly due to long waiting times at the facility for consultations and at the dispensary (mean hours lost from work as a result of hospital visits due to diabetes mellitus was 15.74 hours (SD=7.83). The mean number of days absent from work due to complications including disabilities was 4 (SD=1.43). Caregivers who accompanied respondents to the hospital for diabetic healthcare lost about GH¢ 42(USD 16.8) in productivity monthly.

Projections from the results show that the mean household cost of seeking diabetic health care per patient would increase averagely by 7.7% within a year assuming the discount rates of 3%, 5% and 7% and at the current inflation rate of 13.5% (excluding any inflationary changes and that all cost estimates remain constant). Collectively, the estimate household cost of diabetes (GH¢ 923,580, USD 369,432) is expected to rise

averagely by 37% per annum, within the next five years with the increasing rate of diabetes incidence and at an inflation rate of 13.5% (excluding any inflationary changes and assuming all the cost estimates remain constant.

6.1.4 Intangible Cost of Seeking Diabetic Health Care

Intangible cost of Diabetes Mellitus management among clients in the Tano North district included physical and psychological pain, stress and anxiety which adversely affect the quality of life of diabetics. Some of the participants were often depressed and saddened. The intangible cost of diabetes was further seen in problems with mobility as a result of disability, frequent general malaise and frequent weakness and tiredness.

6.1.5 The Socioeconomic Disposition of Diabetic Patients and the Cost of Seeking Diabetic Health Care

The cost of seeking diabetic healthcare among clients in the Tano North district is influenced by age, marital status, educational background, BMI and household size. An increase in BMI was associated with a significant increase in the cost of managing diabetes mellitus among the clients.

6.2 Recommendations

6.2.1 Ministry of health/Government of Ghana/ other stakeholders

- I. This study implied that preventing complications through the use of more effective treatment regimens is important in order to control the healthcare costs of the disease. With early detection and treatment, it is likely that the serious health consequences of diabetes can be prevented or delayed and thus the costs can be reduced. There should therefore be efforts to institute programmes to promote early detection and care of diabetes to avoid complications which comes along with huge financial burden on the individual and the state in general.
- II. This study further showed differences in cost of diabetes healthcare with respect to various socio-demographic groups. Most clients however did not have to pay for some services because they were subscribed to the NHIS. To reduce the inequity in healthcare expenditures in different groups, healthcare reform needs to focus on the reforms of medical insurance system and redistribution of patients in different levels of hospitals.
- III. The government should also provide supportive services for clients with diabetes mellitus to enable them access healthcare as and when necessary.
- IV. There should be subsidies on the cost of purchasing and maintaining glucose meters to promote the proper management of the disease.

6.2.2 Individual, Household and community level

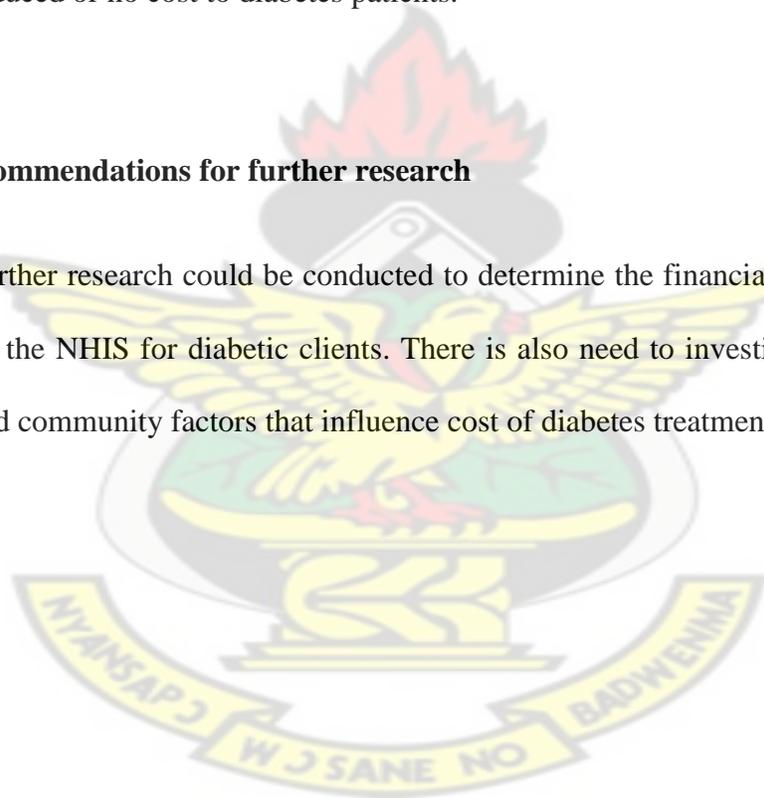
- I. The study results showed reduced physical activity among diabetics as a result of complications. These often lead to stress and depression. Diabetic patients should

therefore be supported at the household and community level to help minimize stress among these clients.

- II. There should be education at the community level to encourage people to seek early detection of diabetes and further treatment to avoid complications which often comes along with huge costs.
- III. At the individual level, diabetic patients should join and access mutual and national health insurance schemes that seeks to offer some health services at a reduced or no cost to diabetes patients.
- IV.

6.2.3 Recommendations for further research

- I. Further research could be conducted to determine the financial protection offered by the NHIS for diabetic clients. There is also need to investigate the household and community factors that influence cost of diabetes treatment and care.



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APPENDICES

APPENDIX 1: Participant Information Leaflet and Consent Form

This leaflet must be given to all prospective participants to enable them know enough about the research before deciding to or not to participate

Title of Research: Household cost of seeking diabetic healthcare in the Tano North District of the Brong Ahafo Region.

This study is being conducted by Dr. Peter Agyei- Baffour(PhD) (KNIST-SMS; Community Health Department) and Dr. Gifty Kumi- Ampofo , a student at the KNUST-SMS; Community Health Department as part of the requirement in pursuing an MPH programme.

This study seeks to bring to light the actual cost borne by diabetic patients and their household in the management of the disease and how the management of the disease is affected by it.

A structured questionnaire (with closed and open ended questions) covering all aspects of the objectives of the study will be developed and used as the data collection tool.

For the participants who are on the NHIS the amount paid for consultation, medications and laboratory investigations will be sought from the hospital records. In total I expect to interview 384 participants for this study. The interview will take some of your time and might be an inconvenience. It might take about 30 minutes to complete the questionnaire.

Participants will gain a better insight into the cost of managing the disease, the control measures to take and ways of improving the quality of the management of the disease. It will also inform policy makers on better and more effective ways of developing safety interventions and preventive educational campaigns in addition to beefing up the scanty literature on cost of diabetes management in Ghana.

All information collected in this study will be given code numbers. No name will be recorded. Data collected cannot be linked in any way to any participant. No name or identifier will be used in any publication or reports from this study.

Diabetic patients shall participate in the study from their own free will and not obligatorily.

If a patient chooses not to participate, this will not affect the quality of service(s) offered the patient in this hospital in any way.

A participant may also choose not to answer any question he/she find uncomfortable or private. A participant may also choose to stop the interview at any time.

There will be no consequence, loss of benefit or care if a participant chooses to withdraw from the study.

Every participant will be given a sugar free, filled biscuit for his/her time and the inconvenience and to show our appreciation for his/her participation.

If you have any question concerning the conduct of this study, please do not hesitate to contact Dr. Gifty Kumi-Ampofo on 0208 157435.

Further, if you have any concern about the conduct of this study, your welfare or your rights as a research participant, you may contact:

The Office of the Chairman

Committee on Human Research and Publication Ethics

Kumasi

Tel: 03220 63248 or 020 5453785



APPENDIX II: CONSENT FORM

Statement of person obtaining informed consent:

I have fully explained this research to _____ and have given sufficient information about the study, including that on procedures, risks and benefits, to enable the prospective participant make an informed decision to or not to participate.

DATE: _____ NAME: _____

Statement of person giving consent:

I have read the information on this study/research or have had it translated into a language I understand. I have also talked it over with the interviewer to my satisfaction.

I understand that my participation is voluntary (not compulsory).

I know enough about the purpose, methods, risks and benefits of the research study to decide that I want to take part in it.

I understand that I may freely stop being part of this study at any time without having to explain myself.

I have received a copy of this information leaflet and consent form to keep for myself.

NAME: _____

DATE: _____ SIGNATURE/THUMB PRINT: _____

Statement of person witnessing consent (Process for Non-Literate Participants):

I _____ (Name of Witness) certify that information given to _____ (Name of Participant), in the local language, is a true reflection of what I have read from the study Participant Information Leaflet, attached.

WITNESS' SIGNATURE (maintain if participant is non-literate):

MOTHER'S SIGNATURE (maintain if participant is under 18 years):

MOTHER'S NAME: _____

FATHER'S SIGNATURE (maintain if participant is under 18 years):

FATHER'S NAME: _____

APPENDIX 111: QUESTIONNAIRE

KWAME NKRUAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

COLLEGE OF HEALTH SCIENCES: SCHOOL OF MEDICAL SCIENCES

(COMMUNITY HEALTH DEPARTMENT)

**RESEARCH TITLE: HOUSEHOLD COST OF SEEKING DIABETIC
HEALTHCARE IN THE TANO NORTH DISTRICT OF THE BRONG AHAFO
REGION.**

**QUESTIONNAIRE FOR ASSESSING THE HOUSEHOLD COST OF SEEKING
DIABETIC HEALTHCARE IN THE TANO NORTH DISTRICT IN THE BRONG
AHAFO REGION.**

Introduction

Good morning/afternoon. My name is Gifty Kumi-Ampofo- a student at School of Medical Sciences, KNUST. I am pursuing an MPH programme and I will be conducting several meetings with people like you in the Tano North district to find out your views and ideas about household cost of seeking diabetic healthcare in the Tano North district. Your opinions are highly essential at the same time vital as they will help us to improve the kind of service we provide. Whatever you say will be treated confidential, so feel at ease to express your candid opinion. Be assured that your responses will not in any way be linked to your identity. You are kindly requested to answer the questions below by indicating a tick or writing the appropriate answer when needed. THANK YOU.

Questionnaire number:

Date of Interview:

ID NO.....

SECTION A: BACKGROUND CHARACTERISTICS

1. Age 2. BMI..... 3. Gender M/F

4. Marital status: single/married/divorced/widowed/others.....

5. Place of residence

6. Educational level: illiterate/ primary level/ secondary level/tertiary level/others (specify)

7. Occupation: farmer/ trader/ clergy/ civil servant/ retired/ others (specify).....

8. Number of people in the household

ROLE IN THE FAMILY

SECTION B: DIRECT COST OF SEEKING DIABETIC HEALTHCARE

9. How often do you visit the doctor as a result of diabetes per year? Once/ Twice/ Thrice/ Four times/ Others (specify).....

10. Are you able to follow the doctor's advice on the dietary control of diabetes?
YES/NO

11.If yes, how much do you spend monthly on the preparation of your special diet?.....

12.If no, why?.....

13. How much do you spend on transportation (for yourself and accompanying relative where applicable) to and from the hospital to your home anytime you visit the hospital as a result of the diabetes?.....

14. How much do you spend on feeding (for yourself and your accompanying caregiver where applicable) anytime you visit the hospital as a result of the diabetes?.....

15. Do you have a use personal glucometer at home? YES/NO

16.If yes, how much do you spend monthly to keep the machine running?.....

17.If no, why?.....

18. Are you on insulin injections? YES/NO

19.If yes, how much do you spend on syringes monthly?.....

20. Are you currently actively registered with the NHIS? YES/NO

If yes, answer questions 21 to 25

21. How much do you pay for the NHIS levy annually?.....

22. Are some medications prescribed that you have to purchase from pharmacy shops?
YES/NO

23. If yes, how much do you spend monthly on such medications?.....

24. In a year, how often are you asked to go for laboratory investigations outside the
NHIS list? OFTEN/ RARELY/ NEVER/ OTHERS.....

25. How much do you spend on such laboratory investigations per
year?.....

26. If not on NHIS, how much do you spend monthly on:

- Consultation fees?.....
- Anti diabetic medications?.....
- Laboratory tests?.....

27. Are you on any physiotherapy or special exercise for your condition? YES/NO

28. If yes, how much do you pay monthly for this therapy?.....

Answer question 29 if employed.

29. What is your monthly income.....

If employed by an another person or organisation answer question 30.

30. Do you receive any benefits from your employers (in terms of allowances, payment of educational bills for your wards, payment of hospital bills for your household)?

YES/NO

If yes, answer question 31.

31. In which form is it?.....

32. How much do these benefits amount to yearly?.....

33. How much income do you receive or get from these sources?

Source	In cash	In kind
Farm		
Trading		
Remittance		
Other		
Total		

Answer question 34 if unemployed.

34. If unemployed, what is the reason? By choice/student/housewife or househusband/
due to the diabetes/others (specify).....

35. Are you the bread winner? YES/NO

36. How many of your household members support the household
financially?.....

37. How much do you spend on health every month?.....

38. How much do you spend on housekeeping every month?.....

39. How much do you spend on remittance every month?.....

SECTION C: THE INDIRECT COST OF SEEKING DIABETIC HEALTHCARE

40. How much time do you spend when attending the diabetes clinic:

- Travelling to and from the clinic?.....
- Waiting to see the doctor?.....
- During consultations and waiting to receive
medications?.....
- For laboratory tests?.....

41. Have you developed any disability as a result of diabetes mellitus? YES/NO

42. If yes, is it permanent or temporary?.....

43. How often are you ill and frail as a result of diabetes mellitus in a year? VERY OFTEN/OFTEN/ OCCASSIONALLY/ NEVER/ OTHERS (specify).....

Answer questions 44 and 45 if employed;

44. How many hours do you take from work when visiting the hospital as a result of the diabetes?.....

45. How often (number of days) are you absent from work as a result of minor and major complications including disabilities from diabetes mellitus in a year?.....

46. Does anyone accompany you to the hospital when you are attending the diabetes clinic? YES/NO

If yes, answer question 47 and 48.

47. If yes, is he/she employed? YES/NO

48. What is his/her monthly income?.....

49. How much are you prepared to pay to someone in a day to do your work for you while seeking diabetes treatment?

30% of daily income

50% of daily income

100% of daily income

150% of daily income

200% of daily income

Other (specify).....

SECTION D: THE INTANGIBLE COST OF SEEKING DIABETIC HEALTHCARE

50. How much physical pain do you suffer as a result of the disease? None/ very little/ moderate/ severe/ very severe

51. How often are you saddened by the fact that you have diabetes?

Never/ occasionally/ often/ very often

Answer question 52 if employed by another person or organizational body.

52. Are you sidelined at work? YES/NO

If yes, answer question 53.

53. If yes, why?.....

Answer the next question if retired.

54. Did you retire at the standard age set for retirement? YES/NO

If No, answer question 55.

55. If NO, was the premature retirement as a result of the diabetes? YES/NO

56. Are you able to enjoy your hobbies as you as you did prior to the diagnosis of the disease? YES/NO

57. If no, why?.....

Answer next question if you are on insulin injectable medication.

58. How often do you feel uncomfortable or stressed out when you have to administer insulin injection? Never/ occasionally/ often/very often

59. In your opinion how has the quality of life of your household been affected by your condition?.....

.....

60. How has diabetes affected your marriage?.....

61. How do people in your community relate to you?.....

62. How else how have you been affected because of your current condition?.....

.....

THANK YOU FOR YOUR TIME.