

UNIVERSITY FOR DEVELOPMENT STUDIES

**KNOWLEDGE AND PRACTICE OF DIABETES MELLITUS SELF-MANAGEMENT
AMONG DIABETIC CLIENTS AT THE TAMALE TEACHING HOSPITAL**

BRIDGET PARWAR

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AMONG DIABETIC CLIENTS AT THE TAMALE TEACHING HOSPITAL**

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**A THESIS SUBMITTED TO THE DEPARTMENT OF PUBLIC HEALTH, SCHOOL OF
ALLIED HEALTH SCIENCES, UNIVERSITY FOR DEVELOPMENT STUDIES IN
PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF
MASTER OF SCIENCE DEGREE IN COMMUNITY HEALTH AND DEVELOPMENT**



March, 2018

DECLARATION

I hereby declare that this submission is my own work to the University for Development Studies 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 degree, except where due acknowledgement has been made by way of reference.

Signature.....

Date.....

BRIDGET PARWAR

(UDS/CHD/0035/11)

I declare that the preparation and presentation of this dissertation were supervised in accordance with the guidelines on supervision of the thesis laid down by the University for Development Studies;

Signature.....

Date.....

DR. PAUL ARMAH ARYEE (PhD)



ABSTRACT

Diabetes Mellitus is a prevalent and costly metabolic disorder characterized by substantial morbidity and mortality. Adopting effective self-management practices is key in managing diabetes and its related complications. There is a greater responsibility on health care professionals to assist diabetic patients to acquire the requisite knowledge, skills and attitude towards self-management. The fundamental aim of this study was to assess knowledge on diabetes and the effectiveness of self-management practices among diabetic patients at the Tamale Teaching Hospital. The study was a cross sectional one involving the administration of a semi-structured questionnaire. A convenient sampling technique was used to select the participants for the study. The sample size comprised 94 diabetic patients with either type 1 or type 2- diabetes. Results from the analysis showed that response of diabetic patient's knowledge on self-management practices had a significant positive influence on only the patient's type of foot wear preferred ($p = 0.001$), but had no significant relationship with monitoring blood sugar level ($p = 0.199$), diabetes medication ($p = 0.361$) and diabetes education ($p = 0.195$) of self-management practices. Again, results showed an insignificant statistical relationship between level of knowledge on diabetes and social support ($p=0.100$). Further analysis showed that patients' demographic characteristics such as sex had no significant effect on level of knowledge on diabetes ($p=0.537$) but household income ($p=0.007$), ethnic background ($p=0.003$), occupation ($p=0.001$), religion ($p=0.004$), education background ($p=0.002$), marital status ($p=0.005$) and age ($p=0.007$) had a significant relationship. The study concludes that the knowledge on diabetes among diabetic patients who seek medical care at the Tamale Teaching Hospital is quite low and most likely has a negative effect on their self management practices.



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DEDICATION

This research work is dedicated to Almighty God and my family for their enormous support and encouragement which propelled me to pursue this program to a successful end.



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LIST OF ABBREVIATION

AACE's	–	American Association of Clinical Endocrinologist's
AADE	–	American Association of Diabetes Education
DM	-	Diabetes Mellitus
GDM	–	Gestation Diabetes Mellitus
IDF	–	International Diabetes Federation
IGT	–	Impaired Glucose Tolerance
MODY	–	Maturity Onset Diabetes of the Young
NICE	–	National Institute for Clinical Excellence
NIDDM	–	Non-Insulin Dependent Diabetes Mellitus
SMBG	–	Self-Monitoring of Blood Glucose
SPSS	–	Statistical Package for the Social Science
TTH	–	Tamale Teaching Hospital
UDS	–	University for Development Studies
UN	–	United Nation
WHO	–	World Health Organization



CHAPTER ONE

INTRODUCTION TO THE STUDY

1.0 Introduction

This chapter present background to the study, problem statement, research question, justification of the study, conceptual framework, scope of the study and structure of study.

1.1 Background to the Study

Diabetes is a disorder of the endocrine system which results in abnormal fluctuations in blood sugar level and is usually characterized by defects in glucose metabolism and insulin production (Dunning, 2003). Diabetes is a global health problem and accounts for a substantial proportion of morbidity and mortality cases. According to Guthrie & Guthrie (2009), even though the prevalence of diabetes varies widely in various countries, the rate has generally increased across the world.

The International Diabetes Federation (IDF) projections have shown that the total number of people living with diabetes across the globe is expected to increase from 366 million in 2011 to 552 million by 2030 (IDF, 2011). Estimates from the World Health Organization also suggests that diabetes was directly accountable for almost 1.5 million deaths in 2012 and more than 80% of these deaths occurred in low- and middle-income countries (WHO, 2013).

Diabetes continues to afflict the global population in pandemic proportions. The disease has devastating consequences on people living with diabetes, healthcare systems, the economy and the society at large. Diabetes will be the seventh leading cause of death in



the world by the year 2030. In Africa the prevalence of diabetes is 4.9% and about 19.8 million adults who live on the continent have diabetes (WHO, 2013). According to the International Diabetes Federation (2014), about 440,000 of the entire adult population of Ghana live with diabetes. This figure is even further projected to increase to 819,000 by the year 2035 (WHO, 2013).

Numerous studies suggest that there is a knowledge deficit on diabetes among diabetic patients in sub Saharan Africa (Adisa et al., 2010; Ogbomo, 2013; Ruhembe et al., 2014). Similarly, Amissah (2014) asserts that diabetes knowledge is quite low among diabetic patients in Ghana.

According to Mybanya (2009), even though existing literature on diabetes self-management practices abound, a lot of diabetic patients are still not able to self-manage their diabetic conditions effectively.

Fitzgerald et al (1998) contends that managing diabetes and its related complications effectively largely depends on the willingness of the diabetic patients to self-manage their health condition on a daily basis. Similarly, Wing et al (1986) asserts that adopting certain self-care behaviors such as restricting caloric intake, engaging in regular exercise, increasing fiber intake and reducing fat intake are prerequisites to manage diabetes effectively. Fu et al (2003) have indicated that the most crucial step in enhancing self-management is reinforcing patient's ability to successfully care for themselves. Self-management of diabetes has the propensity to mitigate the burden of diabetes on the general population.



1.2 Problem Statement

According to the Ghana Health Survey annual report (2007), diabetes is among the top 10 causes of mortality at the Tamale Teaching Hospital (TTH). Nevertheless, most of the studies [such as Amissah (2014); Boakye (2014); Abokyi et al (2013)] which have been carried out to assess diabetes patient's knowledge on diabetes were carried out in the southern parts of the country, with little or no research work reported for Northern Ghana. In addition, information on self-management of diabetes in Ghana is very scarce. It is in the light of this situation that this study which seeks to assess diabetic patient's knowledge on diabetes and the effectiveness of their self-management practices was undertaken at the TTH.

1.3 Objectives of the Study

1.3.1 Main Objective

The aim of this study was to assess the knowledge on diabetes and the effectiveness of self-management practices among diabetes patients at the Tamale Teaching Hospital.

1.3.2 Specific Objectives

Specifically, the study sought to:

- To assess the knowledge of diabetic patients on diabetes at the TTH
- To ascertain the effectiveness of diabetes self-management practices among diabetic patients at the TTH
- Identify the factors that influence diabetes self-management among diabetics at the TTH



1.4 Research Questions

The following research questions have been set to guide the study:

- What is the level of knowledge of diabetic patients on diabetes at the TTH?
- What is the level of effectiveness of diabetes self-management practices among diabetic patients at the TTH?
- Which factors influence diabetes self-management among diabetics at the TTH?

1.5 Justification of the Study

Adopting effective self-management techniques is key in managing diabetes and its associated complications. According to Yousefzadeh et al (2014), inadequate knowledge on diabetes by people living with diabetes has adverse consequences on diabetes management.

The study seeks to highlight the knowledge of diabetic patients at Tamale Teaching Hospital about the condition and how they manage it. Knowing the knowledge of diabetic patients towards self-management will help to develop better public health interventions to enhance biomedical health seeking behavior for the condition. Other issue of interest is how patients' perceptions affect self-management of the condition using both personal and social resources available to deal with diabetes. Results from this research would provide information to public health experts on how to improve strategies and interventions to meet the needs of diabetic patients in Ghana with regards to self-care. This study will add to existing literature in the area of illness perception and diabetic management. This will also form the basis for further studies to enhance knowledge.



1.6 Conceptual Framework

1.6.1 Orem's Self-Care Theory

Research in the field of health science and self-care practices of chronic disease (i.e. diabetes) supports Orem's theory of self-care through various definitions and relationships. This study is therefore carried out within the context of Orem's self-care theory (1995).

Orem's (1995) self-care theory is founded on four fundamental concepts which enhance self-care practices. These fundamental concepts are detailed below.

1.6.2 Self-care agency

Self-care agency is basically concerned with an individual's power or ability to engage in self-care. When patients are able to undertake self-care activities effectively, it gives an indication that they are mindful of their health condition. The success of the self-care agency concept depends on the patient's age, level of education, socio-economic status and marital status among others (Mapanga and Andrews, 1995). Self-care agency focuses on the performance or practice of activities that individuals initiate and perform on their own behalf to ensure a healthy lifestyle.

1.6.3 Therapeutic self-care

Therapeutic self-care measures the totality of the self-care actions that are to be performed for some specified duration. Therapeutic self-care is aimed at achieving specific self-care requisites by using valid methods and related set of actions. Therapeutic self-care is a complex phenomenon and develops through day to day practice. It can however be modified through the assistance and guidance of health professionals.



Therapeutic self-care requires self-care ability and is mostly applied by adults to manage and regulate decisions that they make concerning their personal health.

1.6.4 Nursing system

Nursing system is the product of a series of relations between a legitimate nurse and legitimate patient. Nursing system is activated when the patient's therapeutic self-care demands exceeds the available self-care agency, leading to the need for nursing. There are three distinct types of this system namely: the supportive-educative nursing system; the partial compensatory nursing system and the wholly compensatory nursing system. The type of nursing system that is employed at any given time depends on the extent to which the patient is able to engage in the prescribed self-care activities.

1.6.5 Self-care deficit

Self-care deficit delineates when nursing is required. Nursing is required when a patient is incapable to continuously engage in effective self-care or when the patient's care giver is unable to provide effective self-care continuously.

1.7 Scope of the Study

Even though this study accomplished its objectives, the scope of the study was limited under two main areas. These were in terms of the concept and location that were used during the study. The concept of the study focused on the classification of diabetes, diagnosis criteria for diabetes, risks factors associated with diabetes, the current status of diabetes self-management, complications associated with diabetes and the factors that inhibit self-management of diabetes.



The location was limited to the Tamale Metropolis alone and the respondents comprised diabetes patients who sought medical review at the Tamale Teaching Hospital (TTH). It would have been more appropriate if the study was conducted in all the hospitals within the Tamale metropolis.

1.8 Structure of the Study

This study is organised into six chapters. Chapter one which is captioned introduction considers the background of the study, the problem statement, objectives of the study and the research questions. The remaining part of the chapter considers the justification of the study, scope of the study and the structure of the study.

Chapter two is titled literature review. The review focused on diabetic patient's knowledge on diabetes and diabetes self-management practices. The first part of the chapter looked at diabetes, types of diabetes, diagnostic criteria for diabetes, self-management of diabetes and the actual status of diabetes self-management practices. The final part of this chapter looks at American Association of Clinical Endocrinologist's (AAACE's) guidelines on self-management of diabetes and the factors that influence self-management of diabetes.

Chapter three considers the research design, the sampling technique that was employed, the study area and the source of data. The latter part of the chapter is concerned with the data analysis process, research ethics and the limitations of the study.

Chapter four presents the findings of the study. Chapter five discusses the findings of the study. The last chapter which is chapter six presents the conclusion of the study and outlines the recommendations based on the findings of the study.



CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

In order to understand the background of this study, the chapter commences by providing an overview of diabetes, types of diabetes and classification of diabetes. A brief overview of the diagnosis criteria for diabetes, risks factors of diabetes, complications associated with diabetes and self-management of diabetes are also considered in this chapter. The chapter further considers the actual status of self-management of diabetes and the guidelines required to self-manage diabetes. The chapter concludes by looking at the factors that inhibit self-management of diabetes.

2.1 Overview of Diabetes

The prevalence of diabetes is on the ascendency and increasingly becoming a global health concern. Diabetes is a metabolic disorder which is characterized by high blood glucose levels (hyperglycemia). Diabetes occurs due to lack of insulin secretion, reduced insulin production or reduced insulin action (WHO, 2007). This anomaly interferes with carbohydrate, protein and fat metabolism.

Persistent high blood sugar level is a common outcome of uncontrolled diabetes and over time damages a lot of systems in the body including that of the cardiovascular and nervous system. Notable symptoms associated with diabetes include extreme hunger, increased urge to urinate, excessive thirst, weight loss, blurred vision and excessive fatigue. An individual is diagnosed with diabetes if the person persistently experiences hyperglycemia.



2.2 Earlier Classifications of Diabetes

The first widely accepted classification of diabetes was published in 1980 by the World Health Organization. This classification was subsequently revised in 1985. The 1980 Expert Committee proposed two classes of diabetes mellitus namely non-insulin dependent diabetes mellitus (NIDDM) and insulin dependent diabetes mellitus (IDDM). The 1985 classification required staging of diabetes based on a clinical descriptive criteria and a supplementary etiological classification. The 1980 classification represents a compromise between etiological and clinical classification as diabetes patients were classified based on clinical diagnosis even when the specific cause or etiology of the diabetes condition was unknown.

The 1980 and 1985 reports also considered other minor classes of diabetes such as gestational diabetes mellitus (GDM) and impaired glucose tolerance (IGT). The 1980 and 1985 classifications of diabetes and the other related categories of glucose intolerance comprised both statistical risk classifications and clinical classification. The 1985 classification is widely accepted and recognized internationally. It was officially recognized during the International Nomenclature of Diseases in 1991.

2.3 Present-Day Classification of Diabetes

Kuzuya & Matsuda (1997) indicates that the current classification comprises both etiological types and clinical stages of diabetes and the other categories of hyperglycemia. The clinical staging concept emphasizes that diabetes regardless of its etiology, progresses through several clinical stages during its natural history. Moreover, individual subjects may move from stage to stage in either direction. Individuals who have, the potential of developing diabetes or those who have already developed diabetes



can be categorized by stage according to their clinical characteristics, even in the absence of information concerning the underlying etiology (cause). The classification by etiological type ensures that the causes of diabetes are well understood. According to Joslin et al (2005), there are three major types of diabetes and they are type-1 diabetes, type-2 diabetes and gestational diabetes. These major types of diabetes are looked at in more details below.

2.3.1 Type-1 Diabetes

Yoon & Jun (2005) posit that type-1 diabetes is an autoimmune disorder which occurs when activated macrophages, TH1 CD4+ T cells, and beta cell-cytotoxic CD8+ T cells act synergistically to destroy the insulin-producing pancreatic beta cells. Lin et al. (2012) asserts that this self-destruction process incapacitates the pancreas' ability to secrete insulin which is required to regulate blood glucose level. Type-1 diabetes is usually associated with total insulin deficiency (Yoon & Jun, 2005). Type-1 diabetes is sometimes referred to as juvenile onset diabetes because it is generally diagnosed in children (Krentz, 1996). Patients living with this type of diabetes require daily administration of insulin to aid metabolic activities. Bellenir (2008) suggests that type-1 diabetes accounts for approximately 10% of the entire diabetic cases.

2.3.2 Type-2 Diabetes

Type-2 diabetes is the most predominant type of diabetes. According to the World Health Organisation (1999), type-2 diabetes describes a metabolic disorder of multiple etiologies and is characterized by chronic hyperglycemia which interrupts carbohydrate, protein and fat metabolism. People living with type-2 diabetes are not able to produce enough insulin to meet their metabolic needs or are unable to effectively use the insulin secreted by the



pancreas. Braun & Anderson (2007) posit that this type of diabetes is characterized by insulin resistance and a steady decline in insulin secretion. Type-2 diabetes accounts for about 90% of all the total diabetes cases that is reported across the globe (Bellenir, 2008). Unlike type-1 diabetes that requires insulin to manage, type-2 diabetes is non-insulin dependent. Type-2 diabetes is sometimes referred to as adult-onset diabetes because it is widely diagnosed in the adult population.

2.3.3 Gestational Diabetes

Gestational diabetes is associated with persistent high blood sugar level during pregnancy. It is experienced by only pregnant women and usually occurs during the second and third term of pregnancy. The prevalence of gestational diabetes is estimated to be in the range of 2 to 5 % of the entire pregnant women population (Joslin et al., 2005). Gestational diabetes is usually diagnosed through prenatal screening rather than through reported symptoms.

2.4 Other Types of Diabetes

Laura & McEntyre (2004) assert that about 95% of all diabetes cases which are reported across the globe fall into three major categories namely type 1, type 2 and gestational diabetes. There are however other less common forms of diabetes and each has its peculiar cause. These less common forms of diabetes can be categorized based on their causes as maturity onset diabetes of the young (MODY), genetic defects in insulin action, drug induced diabetes, diseases of the exocrine pancreas and endocrinopathies (WHO, 1999). These forms of diabetes are elaborated in more details below



2.4.1 Maturity Onset Diabetes of the Young (MODY)

According to the American Association of Diabetes Educators (2011), maturity onset diabetes of the young (MODY) is a form of monogenic diabetes caused by a genetic defect of the beta cell and it constitutes between 1% to 5% of all diabetes cases which are recorded among children. According to Kadowaki et al (1994), maturity onset diabetes of the young is a highly heritable disease with a transmission rate of about 50% if either parent carries the genetic defect. Maturity onset diabetes of the young is inherited in an autosomal dominant pattern and generally occurs in individuals with normal body weights below the age of 25 years (WHO, 1999). MODY is usually first misdiagnosed as type 1 diabetes when hyperglycemia is detected in children (Hansen & Pederson 2005). MODY is characterized by abnormal insulin secretion and does not require insulin treatment (Kadowaki et al 1994).

2.4.2 Genetic Defects in Insulin Action

Genetic defects in insulin action are rare medical conditions. These genetic defects arise when the insulin receptors mutate. The metabolic abnormalities associated with the insulin receptor mutations may range from hyperinsulinemia and modest hyperglycemia to severe symptomatic diabetes (Haneda et al., 1984). Rabson-Mendenhall and leprechaunism syndromes are two rare pediatric syndromes which are associated insulin receptor mutations. Robson-Mendenhall syndrome is characterized by defects of the teeth, nails and the pineal gland whereas leprechaunism syndrome which is generally deadly in infants also presents similar facial traits (ADA, 2010).



2.4.3 Diseases of the Exocrine Pancreas

According to the National Institute of Health (2014), damages to the pancreas from trauma or diseases such as cystic fibrosis, pancreatitis and pancreatic carcinoma may give rise to diabetes. The damage to the pancreas must be extensive for diabetes to occur unless the injury was caused by a carcinoma.

2.4.4 Endocrinopathies

Some hormones such as cortisol, glucagon, growth hormone, epinephrine among others have the potential to impede insulin action (WHO 1999). Diseases associated with large secretions of these hormones such as Cushing's syndrome, glucagonoma, acromegaly, pheochromocytoma, hyperthyroidism, aldosteronoma, somatostatinoma among others may result in diabetes. This type of diabetes is usually normalized when the elevated hormonal levels are rectified.

2.4.5 Drug Induced Diabetes

According to the World Health Organization (1999), certain drugs interfere with the normal functioning of insulin in the body. Although these diabetes induced drugs may not in themselves directly cause diabetes, they have the propensity of triggering diabetes in patients by altering insulin action. Some notable diabetes induced drugs includes vacor, glucocorticoids, dialantin, pentamidine, diaxozide, nicotine acid, γ -interferon, thyroid hormone, b-adrenergic agonists and thiazides (ADA, 2010).

2.5 Risk Factors of Diabetes

The risk factors for the various types of diabetes vary quite considerably. The risk factors of type-1 diabetes include family history of type-1 diabetes, age, genetics and race



(Poretsky, 2009). The primary risk factor of type 1 diabetes is a family history of the health condition. Having family members with diabetes is a major risk factor to type-1 diabetes. The American Diabetes Association recommends that anyone with a first-degree relative who has type-1 diabetes should get screened for diabetes. Type-1 diabetes can be diagnosed through a simple blood test. Laakso (1999) asserts that injuries to the pancreas and certain infections of the pancreas can damage the pancreas and may eventually give rise to type-1 diabetes.

In the last decade, a number of studies have been conducted to investigate environmental factors such as early exposure to cow's milk, increased height and weight development, increased maternal age at delivery, deficiency in vitamin D, viruses, obesity and toxins as an etiology to type-1 diabetes (Holt et al., 2010).

Copstead & Banasik (2005) posits that the risk factors of type-2 diabetes include sedentary lifestyle, aging, genetic factors, obesity, impaired blood glucose tolerance and a history of gestational diabetes. African Americans are usually more susceptible to type-2 diabetes than those of other ethnic backgrounds (Boulton et al, 2005).

According to Bellenir (2008), the risk factors for gestational diabetes encompass obesity, family history of type-2 diabetes and a history of impaired glucose tolerance.

Over the last decade, numerous studies have been undertaken to investigate stress, hypertension, low birth weight, smoking maternal malnutrition during pregnancy and exposure to pesticides as an etiology to type-2 diabetes (Holt et al., 2010).



According to the IDF (2011), significant variations in dietary intake and the level of physical activity are largely accountable for the remarkable surge in diabetes mellitus in developing countries.

2.6 Complications Associated with Diabetes

Diabetes related complications account for about 65% of all deaths among diabetes patients. According to the American Diabetes Association (2010), people living with diabetes are two to four folds more susceptible to developing cardiovascular and peripheral vascular diseases than non-diabetics.

Diabetes related complications can broadly be segregated into acute and long term complications. Duning (2003) claims that prolonged diabetes conditions may result in the long term complications while temporary variations in blood glucose level has the tendency of resulting in acute complications. According to Stratton et al. (2000), acute complications of diabetes include hypoglycaemia (low blood sugar level) and hyperglycaemia (high blood sugar level). In addition, the author notes that the long term complications of diabetes include neuropathy, cardiovascular diseases, foot problems and retinopathy. Fagan and Sowers (1999) contend that people living with diabetes are more vulnerable to developing cerebrovascular diseases. Lipoprotein metabolism abnormalities and hypertension are often associated with diabetic conditions (Herman et al., 2009).

Diabetes complications may have devastating consequences on various organs including the heart, eyes, nerves, kidneys and blood vessels.

Diabetes in pregnancy can have a devastating impact on the health of both the mother and that of the unborn child if not managed properly. Poor management of gestational



diabetes may give rise to congenital deformities, stillbirths, obstetric complications as well as maternal mortality. According to the World Health Organization (2013), gestational diabetes increases pregnant women susceptibility to eclampsia, foetal macrosomia and shoulder dystocia during and after pregnancy. The adverse outcomes of diabetes can however be prevented or delayed by keeping the levels of blood glucose, blood pressure and blood lipids within recommended ranges. Diabetes related complications are generally multifaceted and require a comprehensive medical therapy to curb the menace.



2.7 Diagnostic Criteria for Diabetes

Table 1: Diagnostic Criteria Chart for Diabetes

Condition	2-Hour Glucose	Fasting Glucose	HbA _{1c}
Unit of measurement	mmol/l	mmol/l	%
Normal	<7.8	<6.1	<6.0
Impaired fasting glycaemia	<7.8	≥ 6.1 - <7.0	6.0 to 6.4
Impaired glucose tolerance	≥7.8	<7.0	6.0 to 6.4
Type-2 diabetes	≥11.1	≥7.0	≥6.5
Type-1 diabetes	≥11.1	≥7.0	≥6.4

According to the World Health Organization (WHO) diagnostic criteria (2006), an individual is considered to have impaired fasting glucose if the fasting blood glucose level ranges from 6.1 to 6.9 Mmol/L. Similarly, a blood glucose measure of 7.8 to 11.1 Mmol/L two hours after ingesting a 75 gram oral glucose load is diagnosed as impaired glucose tolerance.

According to Saydah et al (2001), diabetes occurs due to recurrent hyperglycemia. The author posits that an individual is diagnosed of diabetes if the person exhibits any one of the following:

- Fasting blood glucose level ≥ 7.0 mmol/L
- Blood glucose ≥ 11.1 mmol/L two hours after a 75 gram oral glucose load as in a glucose tolerance test
- Symptoms of hyperglycemia and casual blood glucose ≥ 11.1 mmol/L
- Glycated hemoglobin (Hb A1C) $\geq 6.5\%$



Saydah et al (2001) contends that a positive result in the absence of unequivocal hyperglycemia should be confirmed by a repeat of any of the above diagnostic methods on a different day. The author recommends the measure of fasting blood glucose level because it is relatively easy to measure and does not require a lot of time to carry out. According to the current definition, two fasting glucose measurement above 7.0 mmol/L is sufficient to diagnose a person as diabetes.

2.8 Treatment of diabetes

The United Nations (UN) General Assembly has highlighted the importance of preventing and controlling non-communicable diseases such as diabetes, calling for improved primary health care services and strengthening of population based interventions (WHO, 2013). Once a person is diagnosed with diabetes the emphasis shifts from prevention to that of controlling the health condition. Diabetes is non-curable and the fundamental objective of diabetes management is to keep the blood glucose level within acceptable limits so as to curb the incidence of diabetes related complications.

Blood sugar level can either be measured by way of an HbA1c measure or a blood glucose measure. The HbA1c measures the level of blood glucose over a period of two to three months while the latter measures the concentration of glucose in the blood at any specific time. The National Institute for Clinical Excellence (NICE) guidelines on diabetes treatment recommends that diabetes patients who are less prone to hypoglycemia should ensure that their HbA1c measure does not exceed 48 mmol/mol while those who are susceptible to hypoglycemia must ensure that their HbA1c measure is below 58 mmol/mol (NICE, 2009). People living with diabetes can control their blood glucose



level if they adhere to medication and comply with their self-management practices. In addition to dietary changes, diabetes patients can also control their blood glucose by engaging in exercise on a regular basis (Tulomilehto, 2001). The National Institute for Clinical Excellence guidelines on diabetes treatment stresses that health service providers must provide diabetes patients with the requisite medication, diabetes related information and monitor their diabetic condition regularly so as to help curtail diabetes related complications (NICE, 2009).

2.9 Care and Management of Diabetes

The cost associated with diabetes care is quite substantial. According to IDF (2011), the annual global healthcare expenditure that was used to prevent and manage diabetes and its associated complications in 2010 was about 376 billion USD. According to Gilmer (2005), this annual expenditure is even projected to exceed 490 billion USD by 2030. The IDF also indicates that a significant proportion of this expenditure is used to treat diabetes related cardiovascular diseases.

The efforts required to curb diabetes is challenging and labour-intensive for both health practitioners and patients. This is partly because diabetes is usually diagnosed in its advanced stages when most of the patients have already developed complications.

In the last decade, remarkable advances have been made by numerous researchers on how to prevent and effectively manage diabetes. Interventions aimed at reversing impaired glucose regulation at an early stage might be the key to avert the onset of diabetes.



Type-2 diabetes is a heterogeneous disorder which is characterized by insulin resistance coupled with impaired insulin secretion by the β -cells in the pancreas. As such, treatment strategies aimed at rectifying these metabolic defects might contribute immensely by improving insulin sensitivity and enhance β -cell functioning among people living with type-2 diabetes (Kahn et al, 2006).

Adopting a diabetes management plan which is based on good nutrition, increased physical activity and adherence to medication has the propensity to significantly improve insulin sensitivity and its secretion.

Gill et al. (2009) contends that the main challenge faced by diabetes patients in developing countries is the lack of constant access to diabetes drugs at an affordable cost. According to Kirigia et al. (2009), the direct expenditure required for diabetes management for a person living with diabetes is estimated at 25% of the gross national income per capita in the 12 most affluent countries while that of the 34 poorest countries is around 125%.

Justin-Temu et al. (2009), indicates that the late diagnosis of diabetes coupled with inadequate accessibility to anti-diabetic drugs results in early onset of diabetes complications and premature deaths. The dire consequence of diabetes on patients and its economic burden on the entire society has made its prevention a major public health concern in both developed and developing countries.

Accessibility to diabetes drugs, provision of public health education on diabetes and adoption of effective self-care practices must underpin any diabetes management plan if the war against diabetes is to see the light of day.



2.10 Self-Management of Diabetes

Diabetes self-management refers to a set of skilled behaviors undertaken to manage one's own illness. These skilled behaviors include dietary modification, engaging in physical activity and complying with medication (Roggiero, 1997). Orem (1991) on the other hand describes self-management as a self-care agency- which is concerned with the ability of oneself to assess, monitor and take decision on behalf of one's own life situation. Self-management of diabetes is complex as it requires life-long practice and life-style adjustments.

Etzwiler, (1994) suggest that majority of day-to-day care that diabetes patients undergo are handled by the patients themselves and/or their families. The author therefore stresses that managing and preventing diabetes related complications depends largely on the personal decision of the diabetes patient.

According to the American Association of Diabetes Educators (2010), diabetes self-management activities is defined as a set of activities undertaken by either diabetics or people who are at risk of diabetes in order to successfully manage the disease on their own.

There are six vital self-management activities that must be carried out by a diabetes patient in order to effectively manage the diabetes condition. These activities are healthy eating, being physically active, monitoring blood sugar levels on a regular basis, adhering to medications, skin care and managing stress (AADE, 2010).

Povey et al, (2007) asserts that undertaking self-management activities has the tendency to enhance blood sugar regulation, reduce diabetes related complications and enhance



quality of life of people living with diabetes. Shobhana et al, (1999) agrees to a large extent with this assertion and emphasizes that the dietary and lifestyle modifications must be supplemented with a supportive healthcare team to maintain a high level of self-confidence required for a successful behavioral change.

2.10.1 Actual Status of Self-Management

According to the American Diabetes Association (1991), implementing self-management activities successfully requires an active patient participation, a dedicated health-care team and adherence to the scheduled interactions between patient and the health-care team.

Non-compliance to self-management activities account for about 33% to 75% of the diabetes related complications among diabetes patients (Michell, 1995). The author observed that diabetes patients complied more with their medication, followed by self-monitoring of blood glucose level, then their physical activity level and finally their dietary recommendation. Approximately 75% of people living with diabetes reported that they deviated significantly from the recommended dietary guidelines at least once every week.

Jiang (1999) observed in his study that about 40% of diabetic patients under report their blood sugar levels on at least half their recordings. According to Tracy (1991), about half of the diabetes population does not follow foot-care guidelines. Non-adherence to exercise programs among people living with diabetes is around 70% (Kinra et al, 2010).



2.11 Guidelines on Self-Management of Diabetes

The American Association of Clinical Endocrinologists (AACE) suggests that the set of guidelines for implementing diabetes self-management activities can be divided into three major phases. These phases are:

- Phase I: Initial assessment
- Phase II: Follow-up assessment
- Phase III: Assessment of complication

These phases are looked at in more details below;

2.11.1 Phase I: Initial Assessment Phase

Phase I which is also referred to as the initial assessment phase is the first and foremost step in the three-step process. During phase I, the health care practitioner initially assesses the health status of the diabetes patient. After this initial assessment, the health professional sensitizes the diabetes patient on diabetes and then designs a customized therapeutic plan for the patient. The therapeutic plan that is designed depends on the health status of the patient, the results of the laboratory test and presence of risk factors that has the tendency of predisposing the patient to diabetes related complications (AACE, 2000). The therapeutic plan must be based on the following six components:

2.11.1.1 Appropriate Nutrition Therapy

Nutrition therapy constitutes an integral part of any comprehensive diabetes self-management strategy. Funnel et al (1992) claims that about a third of diabetes patients can use their dietary intake to satisfactorily keep their blood glucose level within acceptable range. Savoca and Miller (2001) suggest that it is essential for health workers



to augment nutrition therapies with dieting strategies so as to help diabetes patients comply with dietary guidelines.

Adequate dietary intake helps maintain optimal glucose levels, attain reasonable body weight, prevent or delay the onset of diabetes related complications (AACE, 2000).

Eating is a complex activity for diabetes patients. It involves minimizing the ingestion of simple sugars and fats, monitoring daily caloric intake and maximizing the intake of fruits and vegetables. It also involves eating smaller portions of food, more frequent meals and consuming the largest meal during midday. Glasgow et al, (1997) indicates that dietary guidelines on self-management of diabetes are relatively difficult to follow.

2.11.1.2 Exercise and Increased Physical Activity

Exercise must be a critical component of any therapeutic plan which is aimed at managing diabetes and its associated complications. Higher physical activity level is inversely related to body mass index measure (Popkin, 1995). Exercise also reduces insulin resistance and enhances metabolism in the body. Engaging in regular physical activities reduces the level of triglycerides and very low density lipoprotein (VLDL) in diabetes patients. The IDF (2011) recommends that diabetes patients should engage in moderate physical activity such as walking, cycling, dancing or swimming on a regular basis. Increased sensitivity to insulin occurs when engaging in physical activities and continues for the next 48 hours after engaging in that physical activity. This helps reduce the need for medication and reduce the susceptibility of patients to diabetes related complications. Zazworsky et al. (2006) indicates that diabetes patients can increase their carbohydrate metabolism, enhance weight control, decrease insulin resistance and lower their blood pressure levels if they undertake adequate exercise.



Colberg et al (2010) asserts that engaging in regular physical activity has the propensity of controlling blood glucose level and enhances insulin action. The author further asserts that engaging in appropriate physical activity levels helps reduce blood lipids, blood pressure and curb the incidence of heart related deaths.

Health professionals must however be extremely careful when prescribing exercise for diabetes patients. The prescription must be based on the health status of the diabetes patient. Engaging in regular physical activity yields better outcomes, than engaging in sporadic physical activity. AACE (2000) recommends that diabetic patients should engage in at least 20 minutes of exercise within every 48 hours.

2.11.1.3 Medication

Oral hypoglycemic agents and insulin are widely used in diabetes management and are vital aspects of self-management. As with all other medications, people living with diabetes must understand the use of the glucose-lowering therapies, comply with prescription and must know their potential side effects (AACE, 2000). According to Zazworsky, et al. (2006), diabetes is a complex and progressive metabolic health condition which requires various types of treatments for controlling blood glucose levels.

Insulin therapy helps people with type-1 diabetes to keep their blood sugar level within the normal range. This therapy is administered by way of an injection since the digestive system can easily destroy insulin. Conversely people with type-2 diabetes use non-insulin dependent drugs to keep their blood sugar level within the normal range. The most widely used type-2 diabetes medications include glynase, actos, glyset, metformin, lantus



and glucovance. Adherence to medication is imperative for diabetes patients as it is positively associated with enhanced blood glucose regulation (Krapek et al., 2004).

2.11.1.4 Foot, Skin and Dental Care

Foot, skin and dental care must be incorporated into the therapeutic plan. Routine foot care reduces the incidence of lower extremity morbidity. Lower extremity amputations can be reduced by 40% if at least 80% of all diabetics who are vulnerable to lower extremity amputations receive effective foot care and adequate self-care instruction. At least 50% of all lower extremity amputations can be prevented by proper self-management (AACE, 2000). The application of lotion on dry neuropathic feet has the tendency to reduce the risk of ulceration by approximately 50%.

Furthermore, the supporting tissue of teeth is prone to the systematic effects of diabetes. Periodontal disease or infections can interfere with dietary intake and affect glycemic control. Thus adequate skin and dental care is essential for people living with diabetes (AACE, 2000).

2.11.1.5 Self-Monitoring of Blood Glucose

Self-monitoring of blood glucose (SMBG) is a critical aspect of diabetes therapeutic plan. SMBG helps avert diabetes related complications such as hypoglycemia and hyperglycemia. Diabetes patients who self-monitor their blood glucose level can also acquire information about their blood glucose levels which can enable them to ascertain how their diabetes condition is progressing and how well they are coping with their diabetes therapeutic plan.



Michell et al, (1995) suggests that SMBG results can be of immense benefit to health care professionals since they can use it as a basis for adjusting medication, physical activity and dietary intake. According to the American Diabetes Association (2000), about 50% of SMBG results generated by diabetes patients are inaccurate. There is therefore the need to empower patients so as to enable them measure their blood glucose level with much precision.

2.11.1.6 Stress and Psychosocial Adjustment

Behavior modification and psychological support are essential components of any effective diabetes management program (Davison, 1998). Stress is a major contributor to hyperglycemia and can serve as a precursor to the onset of diabetes and its related complications.

As a result of the impact of chronic illness on lifestyle, there is always the need for health professional to incorporate stress relieving coping strategies into the therapeutic plan. This is vital as it has the propensity to mitigate the impact of stress on the diabetes patient (AACE, 2000).

2.11.2 Phase II: Follow-Up Assessment

The follow-up phase (phase II) provides the platform for interim assessments of the patient's physical condition, their reaction to medication and assessing extent of understanding of the diabetes self-management activities (AACE, 2000).

The ultimate aim of each follow-up assessment is to assess the patient's physical condition, extent of blood glucose control and degree of adherence to the diabetes self-management guidelines. On the basis of the results generated from the follow-up



assessment, the physician and patient may decide to revise any or all aspects of the therapeutic plan.

Due to the susceptibility of diabetes patients to coronary artery diseases, dyslipidemia and hypertension, lipid levels and blood pressure levels must be strictly monitored and controlled. Follow-up assessment should be scheduled at intervals of at most every 3 months (ADA, 2011).

2.11.3 Phase III: Assessment of Complication

Phase III is concerned with continuously assessing diabetes related complications, re-education of the diabetes patients and motivating people who live with diabetes to continue to manage their blood sugar levels within the acceptable range (AACE, 2000). The goal of phase III is to assess the presence and intensity of complications associated with diabetes. Retinopathy, cardiovascular diseases, foot complications and neuropathy are the cardinal complication assessed during phase III. On the basis of the patient's history and findings on the current examination, health workers then determine the frequency of follow-ups, the need for more intensive testing and the need for referral (ADA, 2011).

2.12 Factors that Influence Self-Management of Diabetes

The factors that influence self-management of diabetes include demographic factors, extent of diabetic's knowledge about diabetes, health beliefs, public health service, social support and effectiveness of diabetes education.



2.12.1 Demographic Factors

Adherence to self-management activities depends on socio-economic factors such as the diabetes patient's age, marital status, level of education among others (Mapanga and Andrews, 1995). According to Tracy (1991), age plays a vital role in determining how diabetes patients complied with their diabetes medication. The author observed that older people with type-2 diabetes complied with their medication more effectively than younger people. Similarly, Carter (1998) suggests that diabetes patients who are married and/or above 60 years of age tend to comply with self-care activities.

2.12.2 Extent of Knowledge about Diabetes

There is a positive correlation between the extent of knowledge that patients have about diabetes and their ability to self-manage their diabetes condition. According to Orem (1995), when patients undertake self-care effectively, it indicates that they have acquired adequate knowledge or awareness about themselves and their disease condition. Hawthorne et al (1999) stresses that compliance to self-management activities increases with the amount of knowledge that the patients possessed about diabetes. This assertion is largely held by Michell (1995) who suggests that inadequate diabetes education has the penchant to inhibit the self-management process.

2.12.3 Health Belief

Health beliefs of diabetics have a direct influence on the effectiveness of how they self-manage their diabetes condition. Perceived severity of illness and perceived benefits of treatment were associated with effective self-management of diabetes practices (Tracy, 1991).



Awah et al., (2007) suggest that health beliefs, perceptions, knowledge and health behaviour interact strongly in most of the rural and urban settings in Africa. The authors also indicate that due to misconceptions embedded in health beliefs, a significant proportion of the populace on the African continent fail to adopt appropriate measures aimed at preventing and controlling diabetes. Obesity is still perceived as a sign of affluence and many people still associate it with influence and respect. According to Kiawi et al (2006), these perceptions are largely borne out of a contextual environment, in which majority of the population are poor, deprived and hungry, and as such, view obesity as a benchmark for affluence. Deprivation and pervasive poverty across most part of the African continent indicates that traditional perceptions about risk factors associated with diabetes are unlikely to alter significantly in the years to come unless pragmatic health promotion campaigns are adopted.

2.12.4 Public Health Service

Access to adequate health care is an essential variable which determines the efficacy of any diabetes self-management plan. Diabetes patients must have adequate care from health care providers who have the requisite expertise in managing diabetes. Good communication between health care providers and diabetes patients results in effective self-management outcomes. On the other hand, inadequate communication between health care providers and diabetes patients was associated with poor compliance rates to the self-management guidelines. In most developing countries, the affordability of health care services is a determinant in diabetes patient's ability to effectively self-manage their condition (AACE, 2000).



2.12.5 Social Support

The demands of diabetes regimens are quite extensive and this creates the need for social support. According to Heisler and Piette (2005), social support enhances compliance with diabetes regimen especially in areas of adherence to physical activity and dietary intake.

Chiou et al (2009) suggests that there is a positive correlation between social support and self-management of diabetes. Tracy (1991) suggests that there are differential effects of social support on men and women living with diabetes. The author indicates that satisfaction with social support was correlated with better self-management behavior among women with diabetes than men. Encouraging and assisting diabetes patients on a regular basis plays a crucial role in helping diabetes patients to self-manage their health condition more effectively. Oftedal et al, (2009) stresses that the more social support and assistance that people living with diabetes receive, the more they undertake diabetes self-care activities.

2.12.6 Diabetes Education

Diabetes education is a kind of intervention which aims to adequately equip diabetics with the requisite diabetes related information so as to improve their ability to comply with their self-management activities (Michell et al, 1995). Formal diabetes education program can considerably enhance diabetes patient's ability to self-manage their health condition and boost their metabolic control (Jiang, 1999). The author further posits that formal diabetes education programs have the propensity to trigger behavior modification than traditional diabetes education programs.

Incorporating adequate practical skills into diabetes education program is imperative so as to improve their ability to self-manage diabetes (Michell et al, 1995). Pun et al (2009)



assert that poor vision and illiteracy has the propensity to inhibit diabetes patient's ability to acquire the requisite diabetes related knowledge.

Existing literature on health literacy and health outcomes on diabetes (Bains & Egede, 2011; Mancuso, 2010; Kim et al, 2004; McCleary-Jones, 2011) found a positive link between health literacy and diabetes self-management practices such as dietary intake, exercise, foot care, smoking cessation and adherence to medication. These findings is largely consistent with that made by Al-Sayah et al, 2013 who asserts that health literacy has a positive influence on diabetes self-management practices.

Diabetes patients generally feel that they need more diabetes related information than what they actually receive (Ahola & Groop, 2013). This presupposes that the diabetes related information that people living with diabetes receive from health care providers is not sufficient to satisfy all of their information needs. Inadequate health literacy on diabetes impedes patient's ability to remember instructions regarding their medication (Schillinger et al, 2002).

2.13 Benefits of Possessing Adequate Diabetes Knowledge

Lack of knowledge on diabetes (Nagelkerk, et al 2006; Pun et al, 2009) coupled with poor understanding of diabetes self-management practices (Ahola & Groop, 2013) has been found to have an adverse effect on self-management regimes. Similarly, Sekelly et al (2006) also posits that there is a positive correlation between diabetes knowledge and self-management practices and contends that lack of diabetes knowledge impedes self-management practices. Providing adequate knowledge on diabetes has the tendency of empowering, motivating and improving the level of efficacy of self-management



practices of people living with diabetes (Beverly et al, 2008; McCloskey et al, 2010; Broom et al, 2004).

2.14 Barriers to Diabetes Management

Barriers to diabetes management have adverse impact on the quality of diabetes care. These barriers have the tendency of hindering diabetic's ability to comply with their recommended dietary intake, physical activity level and prescribed medication. A study conducted by Sekhar et al., (2013), revealed that 56% and 63% of the respondents were not able to adhere to their dietary and exercise recommendations respectively. This largely accounted for the high HbA1C measure observed among most of the study participants. A similar study conducted in Mexico by Lerman et al., (2004) also revealed that, only 26% of the respondents who were sampled complied with their prescribed therapy. These results are largely in sync with the findings made by Tan et al (2011) who also observed low levels of compliance among respondents.

Al-Kaabi et al., (2009) deduced that, only 3% of respondents with type 2 diabetes met their stipulated recommendation level of physical activity. In another study, factors such as pain, time constraint, tiredness and inadequate family support were reported as the main impediments inhibiting respondents' ability to comply with their physical activity prescription.

A study conducted by Yusuf et al., (2008), deduced that majority of the respondents did not adhere strictly to their orthodox medication due to financial constraints, perceived side effects associated with orthodox medication and availability of traditional medication (local herbs). Lee et al., (2013) contends that patients' generally preferred



alternative medication to that of orthodox medication because they perceived the former to be associated with little or no side effects. Other studies carried out by Weinger & Beverly (2010); Kent et al. (2010); and Mohebi et al., (2013) also revealed factors such as embarrassment, pains and stigma as barriers to insulin therapy adherence. One study however revealed a high adherence to diabetes medication among the sampled respondents (Grant et al., 2003).

Forgetfulness and high cost of medications were mentioned as unintentional adherence barriers whereas being fed up with diabetes medication and inconveniences associated with diabetes medication were identified as the intentional adherence barriers to diabetes (Adisa et al., 2009). In situations when diabetics had to take many different drugs for their condition and concurrent conditions, low levels of compliance were observed among diabetes patients (Reasner & Goke 2002). These findings are largely consistent with the findings made by Paes et al., (1997) who found poly-pharmacy as a barrier to compliance.

Negative attitudes of health care professionals towards diabetes patients, ineffective communication and poor health care delivery service were identified as the main barriers to diabetes management (Bhojani et al., 2013). A similar study conducted by Abioye-Akanji, (2013) also identified financial difficulties, poor nutritional habits and misconceptions about diabetes as the major barriers hindering diabetes management.



CHAPTER THREE

METHODOLOGY

3.0 Introduction

Chapter three gives an overview of the methodology that was employed during the study. The chapter commences by looking at the study area, the type of sampling technique that was used, the research design that was employed and the data collection process. The chapter further looks at quality control, the data analysis process and ethical consideration.

3.1 Research Design

A cross-sectional design (survey method) was used in gathering the requisite data for this research work. During the survey, a semi structured questionnaire was used as the main data collection instrument. The rationale for using the cross-sectional survey method was to enable the researcher to assess the knowledge on diabetes and the effectiveness of self-management practices among diabetes patients at the Tamale Teaching Hospital at the same point in time.

The researcher used the survey method because it was cost effective as it enabled the researcher to generate findings that was representative of the entire population without collecting data from the entire population. Secondly, it also enabled the researcher to collect a broad range of data from the respondents. Finally, the survey method was relatively easy to undertake.



3.2 Sample Size

Because the number 217 patients registered in 2013 was small, it was decided to select 2/3 of the expected patients using the 2013 figure of 217 and that gave a sample size of 144. However, at the end of the study 94 patients responded.

3.3 Sampling Technique

The study comprised diabetes patients who sought medical care at the Tamale Teaching Hospital. The researcher used convenient sampling technique to select the study participants for the study. The sample size of this study comprised 94 diabetic patients with either type-1 or type-2 diabetes who are seeking medical care at the Tamale Teaching Hospital. The study participants were selected based on their willingness to participate in the study.

3.4 Geographical Location

The study was conducted at the Tamale Teaching Hospital which is the main referral centre in the Tamale metropolis, the Capital of the Northern Region. The study area is mostly inhabited by the Mole-Dagomba linguistic group. According to the 2010, population census, the metropolis inhabits about 247,946 people. The Metropolitan area shares boundaries with Sagnarigu District to the west-north, Mion District to the east, East Gonja District to the south and Central Gonja District to the south-west.

Tamale metropolis is quite large and covers a land mass of approximately 750 km² which is about 13% of the entire area of the Northern Region. Tamale is located in the northern part of Ghana and is about 373 miles north from the national capital. The metropolis is



the hub for most of the commercial activities that takes place within the Northern region. Tamale doubles as the political, financial and economic capital of the region.

The rate of urbanization is on the ascendency and the metropolis can boast of witnessing remarkable transformation within the last decade. Tamale metropolis has rural, peri-urban and urban localities predominantly populated by Dagombas who speak Dagbani. Christianity and African Traditional Religion constitute the second and third religions respectively practiced within the metropolis after Islam. Religious tolerance is quite high within the metropolitan area.

The economy of the Tamale metropolis is largely agriculture driven and about sixty percent (60%) of the entire inhabitants engage in agriculture. The vegetation cover of the study area is that of guinea savannah. This vegetation supports crops such as maize, yam, groundnuts and beans among others. Cattle, goats, sheep and poultry are the most predominantly produced animals within the study area.

3.5 Study Population

This study targeted diabetic patients who sought for medical care at the Tamale Teaching Hospital. The Tamale Teaching Hospital (TTH) is a tertiary hospital and receives referral cases from other primary and secondary health care providers within the Tamale Metropolis. Thus the sample used in this study is representative of the entire study population.



3.6 Data Collection Method

Primary data was mainly gathered from the respondents during this study using face to face interview. The researcher collected data on the demographic characteristics of the respondents, their knowledge on diabetes and the effectiveness of their self-management of diabetes.

A semi-structured questionnaire was used in the data collection process to basically solicit for responses from the study participants. A sample of the semi-structured questionnaire used to gather the primary data is attached in the appendix. This data collection instrument helped the respondents to give precise information which facilitated the data analysis process. The data collection process took place at the diabetes unit of the TTH. There was the need for researcher to establish personal contacts with the respondents since the study was largely descriptive in nature. The major questions contained in the questionnaire sort to find answers to the research questions. The flexible nature of these data collection instruments enabled the researcher to further probe some of the responses obtained from the study participants. Respondents were also given the chance to give further explanation when the need arose during the data collection process. The questionnaires were administered from 21st March 2015 to 19th April 2015.

3.7 Quality Control

A pilot study was carried out to test the suitability of the questionnaire and the data collection procedure. The pilot study focused on issues pertaining to reliability of the questions and its validity. Five diabetic patients who were eventually excluded from the actual data collection process took part in the pilot study.



Those who took part in the pilot study were asked if in their view they felt some of the questions should be altered, but no suggestions were made concerning the modification of the questions. The pilot study gave the researcher a rough estimate of the time that will be required to complete each questionnaire during the data collection process.

3.8 Data Analysis

Statistical Package for the Social Science (SPSS) and excel were used to analyze the data that were collected from the study participants. The use of these statistical tools played a critical role during the data analysis process as it enabled the researcher to interpret the findings of the research.

3.9 Research Ethics

First and foremost, due to ethical concerns, the researcher first sought for ethical clearance from the Ethics Committee of the Tamale Teaching Hospital before commencing with the study. In seeking ethical clearance from the Tamale Teaching Hospital, a cover letter from the School of Medicine and Allied Health Sciences of the University for Development Studies was presented to the ethics committee of the Tamale Teaching Hospital to affirm the authenticity of the research and the studentship of the researcher.

Secondly, the researcher used an ethics declaration form to reassure all the study participants that any data that will be collected during the data collection process would be used for only academic purposes and that all the data collected would be treated with utmost confidentiality.



In addition, the researcher also sought the consent of the respondents before they were enrolled as study participants. It was only after they had given their consent that they were enrolled as study participants.

Furthermore, all those whose ideas were used through published books, articles and journals among others have been duly acknowledged to help avoid plagiarism in this study.

3.10 Limitations of the Study

Even though this study accomplished its objectives, the study encountered some limitations. First and foremost, due to time and logistical constraint, the study was limited to diabetic patients who sought medical review at the Tamale Teaching Hospital (TTH). It would have been more appropriate if the study was conducted in all the hospitals within the Tamale metropolis.

Secondly, since most of the study participants could not read, write, understand and speak English, the questionnaires were administered by a research assistant who was fluent in the local dialect.

Finally, even though diabetic patients generally exhibit similar characteristics, there might be certain characteristics which might be peculiar to the study participants. In addressing this limitation, an objective questionnaire was used to collect data from the respondents in order to reduce sampling error.



CHAPTER FOUR

PRESENTATION OF RESULTS

4.0 Introduction

This chapter presents the results of the study. The analyzed results are presented in a form of tables. The chapter is made up of two major sections. The first section considers the socio-demographic characteristics of respondents who participated in the study while the second section presents findings of the study from the respondents.

4.1 Socio-Demographic Characteristics of the Respondents

Table 1 below indicates that majority of the respondents were females (61.7%) while the remaining 38.3% of the respondents who participated in the study were males.

Deductions from Table 1 show that 43.6% of the respondents who were sampled were aged between 41 to 60 years. The breakdown of the results shows that 1 of the respondents (1.1%) was less than 20 years. The table also indicates that 14.9% of the respondents were aged between 21 to 40 years while 37.2% of them were aged between 61 to 80 years. Further deductions from the table reveal that 3.2% of the entire respondents who were sampled were above 81 years.

Of the total of 94 respondents, traders were 36.2% in table 1 below. Farmers were 17%, public servants were 14.9% and 31.9% were Unemployed.

Table 1 below also indicates that majority of the respondents (73.4%) were married and about a quarter (26.6%) were single which included never married, divorced and



widowed. A total of 53 out of 94 respondents (56.4%) were illiterates and 43.6% were literates per the indication in table 1 below.

Table 2: Socio-Demographic Characteristics of the Respondents

Characteristics	Frequency	Percentage
Sex		
Male	36	38.3
Female	58	61.7
Age distribution		
Less than 20yrs	1	1.1
21 – 40	14	14.9
41 – 60	41	43.6
61 – 80	35	37.2
Above 80yrs	3	3.2
Occupation		
Farmer	16	17
Trader	34	36.2
Public servant	14	14.9
Unemployed	30	31.9
Marital status		
Single	26	27.7
Married	68	72.3
Ethnic background		
Dagomba	57	60.6
Gonja	7	7.4
Others	30	32
Educational Background		
Illiterate	53	56.4
Literate	41	43.6
Religion		
Muslim	73	77.7
Christian	21	22.3
Respondent's household monthly income		
Low monthly income	50	53.3
High monthly income	44	46.8
Total	94	100

Source: Field data, 2015



A total of 73 out of 94 respondents (77.7%) were Muslims and 22.3% were Christians per the indication in table 1 above. Of the total of 94 respondents, table 1 shows that 53.2% of the respondents were low monthly income earners and 46.8% were high monthly income earners.

4.2 Assessing Diabetic Clients' Knowledge about DM Self-Management

The clients were asked ten (10) diabetes and self-management questions of which the scores obtained for each one are indicated below. The range of possible knowledge scores for each respondent in this study was from 0 to 10 with a maximum possible score of 10. Thus, the knowledge score of the clients that was recorded ranged from 30% to 70%.

Table 3: Assessing respondents' knowledge on diabetes mellitus

No:	Knowledge Questions	Correct	Wrong
		Frequency n (%)	Frequency n (%)
1.	Is it possible for blood sugar to return to normal after it has decreased	73 (78%)	21 (22%)
2.	Is it possible for blood sugar to return to normal after it has increased	84 (89%)	10 (11%)
3.	Can skipping of Meals reduce Blood Sugar Level	71 (76%)	23 (24%)
4.	Urinating frequently is a symptom of diabetes	63 (67%)	31 (33%)
5.	Feeling hungry frequently is a symptom of diabetes	19 (21%)	75 (79%)
6.	Feeling thirsty frequently is a symptom of diabetes	47 (50%)	47 (50%)
7.	Weight loss is a symptom of diabetes	22 (23%)	72 (77%)
8.	Vision problems is a complication associated with	51 (54%)	43 (46%)
9.	diabetes	12 (13%)	82 (87%)
10.	Kidney problem is a complication associated with	15 (14%)	79 (84%)
	diabetes		
	Foot problem is a complication associated with diabetes		

Source: Field data, 2015



A breakdown of the knowledge scores for each question suggests that, 78% of respondents knew that it was possible for blood sugar level to return to its normal level after it had decreased. Similarly, 89% respondents knew that it was possible for blood sugar level to return to its normal level after it had increased. Furthermore, 76% of the respondents were able to report correctly that skipping of meals could reduce blood sugar level.

The table also indicates that 84% of respondents who were sampled were not aware that foot problem was a complication associated with diabetes. Similarly, 87% and 46% respondents did not know that poor vision and kidney problems were complications associated with diabetes respectively. Likewise, 79% and 77% respondents were not aware that feeling hungry and weight loss were symptoms of diabetes, respectively. On the other hand, 67% of the respondents knew that urinating frequently is a symptom of diabetes.

4.3 Assessing the Level of Knowledge

From the composite scores of the individual respondents and using a cut-off point of 5, levels of knowledge were categorized. Any respondent who scored 5 and above was considered as having adequate knowledge and those scoring below 5 as having inadequate knowledge as shown in the table below.



Table 4: Level of Knowledge

	Frequency	Percentage
Adequate	43	45.7
Inadequate	51	54.3
Total	94	100

Source: Field data, 2015

The table 4 indicates that 45.7% of the respondents who were sampled had adequate knowledge on diabetes and its self-management and 54.3% of respondents had inadequate knowledge respectively. Overall, level of knowledge was therefore average.

Split between adequate and inadequate knowledge.

4.4 Assessing the influence of socio-demographic characteristics on Level of Knowledge

The relationship between the socio-demographic characteristics and the knowledge levels was assessed and has been presented in Table 5 below.



Table 5: Socio-demographic on Level of Knowledge

Socio-Demographics	Level of Knowledge		Total	P value
	Adequate	Inadequate		
Sex				
Male	15 (34.9%)	21 (41.25)		0.537
Female	28 (65.1%)	30 (58.8%)		
Total	43 (45.7%)	51 (54.2%)	94 (100%)	
Age of respondents				
21 – 50	0 (0%)	45 (88.2%)		0.007
51+	43 (100%)	6 (11.8%)		
Total	43(46%)	51 (54.2%)	94 (100%)	
Marital Status				
Single	0 (0%)	26 (51%)		0.005
Married	43 (100%)	25 (49%)		
Total	43 (45.7%)	51 (54.2%)	94 (100%)	
Educational Background				
Illiterate	2 (4.7%)	51 (100%)		0.002
Literate	41 (95.3%)	0 (0%)		
Total	43(46%)	51(54%)	94 (100%)	
Religion of the Respondents				
Muslim	22 (51.2%)	51 (100%)		0.004
Christian	21 (48.8%)	0 (0%)		
Total	43(46%)	51(54%)	94 (100%)	
Household monthly income				
Low income	0 (0%)	50 (98%)		0.007
High income	43 (100%)	1 (2%)		
Total	43(46%)	51(54%)	94 (100%)	
Ethnicity				
Dagomba	6 (14%)	51 (100%)		0.003
Gonja	7 (16.3)	0 (0%)		
Other	30 (69.7%)	0 (0%)		
Total	43(46%)	51(54%)	94 (100%)	
Occupation				
Farmer	0 (0%)	16 (31.4%)		<0.001
Trader	0 (0%)	34 (66.7%)		
Public servant	13 (30.2%)	1 (1.9%)		
Unemployed	30 (69.8%)	0 (0%)		
Total	43(46%)	51(54%)	94 (100%)	

Source: Field data, 2015. Bolded p-values are significant.



From Table 5, it was observed that no statistical significant relationship was found between diabetic patient's sex on the level of knowledge on diabetes mellitus ($p=0.537$). In other words, both males and females were at par in terms of knowledge levels.

However, table 5 clearly depicts statistical significant relationships between the remaining social demographic of the diabetic patient's responses on the level of knowledge on diabetes and its self management. Age of respondents had a significant positive relationship on level of knowledge on diabetes ($p=0.007$), which means that the older respondents were more likely to have adequate knowledge. Again, the marital status of diabetic patients had a significant positive relationship on level of knowledge on diabetes ($p=0.005$) with the married respondents having adequate knowledge than the single respondents. Furthermore, Educational background had a significant positive relationship on level of knowledge on diabetes ($p=0.002$) with literate respondents more likely to have adequate knowledge levels than their illiterate counterparts.

It can also be seen from table 5 that religious difference of respondents had a significant positive relationship on level of knowledge on diabetes ($p=0.004$) with Muslims more likely to have inadequate knowledge levels. Household income level had a significant positive relationship on level of knowledge on diabetes ($p=0.007$) with high earners more knowledgeable than low earners. Again, ethnic background of respondents had a significant positive relationship on level of knowledge on diabetes ($p=0.003$) and Occupation of respondents also had a significant positive relationship on level of knowledge on diabetes ($p=0.001$).



4.5 Diabetes Mellitus Self-Management Practices

Considering the question on whether respondents were practicing self-managing of their condition, figure 1 below clearly shows that 18% of the respondents said yes and 82% said no.

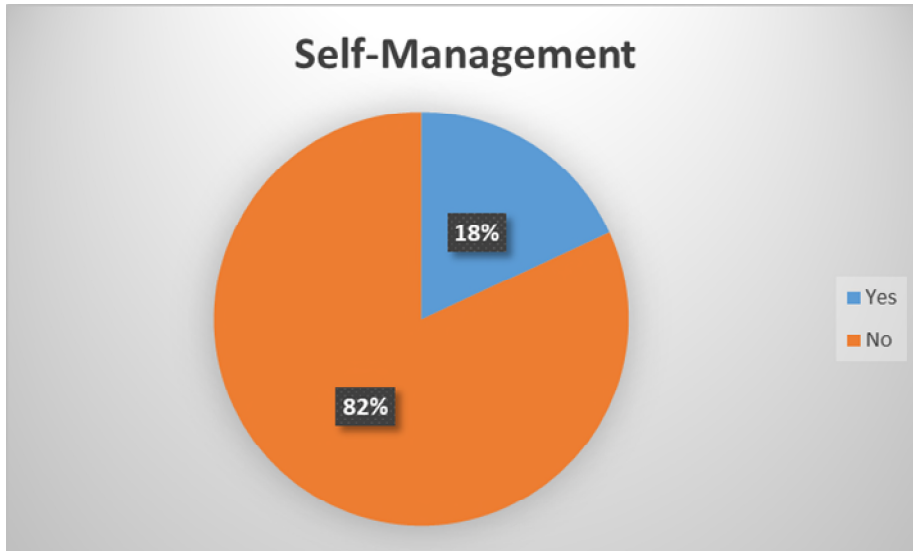


Figure 1: Diabetes mellitus Self-Management practice

The table below shows a breakdown of the actual self-management practices indulged by the respondents. The table has revealed that 43.6% of respondents' complied or adhered to their diabetes mellitus medications whilst the majority (56.4%) did not adhere to their medications.

Again, the table has presented the respondents monitoring of blood sugar level. It was shown that 41.5% monitored their blood sugar levels regularly whilst 58.5% did not regularly monitor blood sugar levels.

With reference to the footwear preferences as a self-management tool of diabetes mellitus, the table below revealed that 68.1% preferred tight footwear and 31.9%



preferred loose footwear. Furthermore, the table has shown that 37.2% were available for diabetes mellitus education whilst 62.8% did not avail themselves for diabetes education.

Table 6: Self-Management of Diabetes Mellitus

	N (%)
Regularly Monitor Blood sugar level	
Yes	39 (41.5%)
No	55 (58.5%)
Total	94
Diabetes Medication Compliance	
Adhere	41 (43.6%)
Don't Adhere	53 (56.4%)
Total	94
Preferred Footwear	
Tight	64 (68.1%)
Loose	30 (31.9%)
Total	94
Available for Diabetes Education	
Yes	35 (37.2%)
No	59 (62.8%)
Total	94

Source: Field data, 2015

4.6 Assessing the factors that influence Self-Management of DM

It is evident from table 7 that, the level of knowledge of respondents did not have statistically significant effect on regular monitoring of blood sugar level in self-management of diabetes ($p=0.199$). The level of knowledge also revealed no significant relationship with respondents' compliance to diabetes medication in self-management of diabetes mellitus ($p=0.361$).

However, further analysis of the level of knowledge of respondents revealed that it had a statistically significant effect ($p=0.001$) on the type of foot wear preferred in the self-management of diabetes. In this case, respondents with adequate knowledge were more



likely to prefer tight fitting footwear whils those with inadequate knowledge preferred loose fitting footwear. It can also be seen from table 7 that level of knowledge of respondents did not have statistically significant effect on their availability for diabetes education in the self-management of diabetes mellitus (p= 0.195).

Table 7: Knowledge level on Self-Management of Diabetes Mellitus

	Knowledge Level n(%)		Total	P value
	Adequate	Inadequate		
Regularly Monitor Blood sugar level				
Yes	4 (10%)	36 (90%)	40 (42.6%)	0.199
No	14 (25.9%)	40 (74.1%)	54 (57.4%)	
Total	18	76	94	
Diabetes Medication Compliance	Adequate	Inadequate		
Adhere	39 (100%)	0 (0%)	39 (41.4%)	0.361
Don't Adhere	0 (0%)	55 (100%)	55 (58.6%)	
Total	39	55	94	
Preferred Footwear	Adequate	Inadequate		
Tight	70 (100%)	0 (0%)	70 (74.5%)	<0.001
Loose	0 (0%)	24 (100%)	24 (25.5%)	
Total	70	24	94	
Availability for Diabetes Education	Adequate	Inadequate		
Yes	34 (91.9%)	3 (8.1%)	37 (39.4%)	0.195
No	7 (12.3%)	50 (87.7%)	57 (60.6%)	
Total	41	53	94	

Source: Field data, 2015

The table 8 below shows the relationship between social support and self-management of diabetes mellitus of respondents. It can be seen that social support had a significant relationship on self-management (p=0.047).



Table 8: Social Support and Self-Management of Diabetes Mellitus

Social Support	Self-Management		Total	P value
	Yes	No		
YES	60 (70.6%)	25 (29.4%)	85 (90.4%)	0.047
NO	1 (11.1%)	8 (88.9%)	9 (9.6%)	
Total	61	33	94	

Source: Field data, 2015

Table 9 below also shows the relationship between diabetic education and self-management of diabetes mellitus of respondents. It is revealed from the table that, diabetic education had a significant positive relationship on self-management ($p=0.001$).

Table 9: Diabetic Education and Self-Management

Diabetic Education	Self-Management		Total	P value
	Yes	No		
YES	73	10	83	0.001
NO	2	9	11	
Total	75	77	94	

Source: Field data, 2015



CHAPTER FIVE

DISCUSSION

5.0 Introduction

This chapter provides a discussion on the analysis and findings made in the previous chapter having due regard for the various literature that were reviewed in chapter two.

5.1 Respondent's Demographic Characteristics and their Knowledge on Diabetes

In this section, the lens of the discussion is focused on the relationship between respondent's socio-demographic characteristics and their knowledge on diabetes. The discussion is done with due regards to previous studies undertaken in this area.

5.1.1 Respondent's Gender and their Knowledge on Diabetes

Deductions from this study show that respondent's gender had no significant influence on their knowledge on diabetes. This observation is inconsistent with findings made by Hjelm & Mufando (2010) who found that females had more knowledge on diabetes than males due to their active quest in seeking for diabetes related information. Similarly, Eknithiset (2010) also found in his study that the female respondents had in-depth knowledge on their diabetes condition than the male respondents. On the contrary, Upadhyay et al., (2008) deduced from their study that the male respondents had more knowledge about their diabetic condition than the female respondents. The authors attributed the disparity in knowledge on diabetes between the female and male gender to the latter's relatively higher health information-seeking behaviour. In this study, what



might probably account for this lack of gender influence could be attributable to the high levels of illiteracy and poor earnings among respondents of both sexes.

5.1.2 Respondent's Age and their Knowledge on Diabetes

Deductions from the study revealed that respondents who were aged fifty (50) years and above were more likely to be knowledgeable on diabetes than those who were below 50 years. This findings show a positive relationship between respondent's age and their knowledge on diabetes. This may be attributed to the length of time respondents have been exposed to the condition and the likelihood of receiving more information over the years from the diabetic clinic compared to the younger diabetics. This result is largely consistent with findings made by Jasper (2014) who found that respondents who were aged between 51-60 years had in-depth knowledge on diabetes than those in the lower age brackets. The finding of this study is however in sharp contrast with a similar study conducted in Nigeria by Odili et al (2011) who found a negative relationship between respondent's ages and their knowledge on diabetes.

5.1.3 Respondent's Educational Background and their Knowledge on Diabetes

With regards to the respondent's educational background and their knowledge on diabetes, the results revealed that the respondents with higher educational background had more knowledge on diabetes than those with lower educational background. This finding is largely in line with observations made by Khurshid & Othman (2014) who found that respondents who had higher level of education had adequate knowledge on diabetes than those with lower educational background. Similar findings was also made by Zeyana et al (2013) who found a positive correlation between educational level of



respondents and their knowledge on diabetes. Persell et al (2004) asserts that diabetes patients with higher educational background tend to have adequate knowledge on diabetes because they are usually more curious of knowing more about their diabetic condition than those with lower educational background.

5.1.4 Respondent's Household Income and their Knowledge on Diabetes

With regards to the respondent's household income and their knowledge on diabetes, the results revealed that the respondents with higher monthly household income tend to have more knowledge on diabetes than those with lower monthly household income. This findings show a positive correlation between respondent's monthly household income and their knowledge on diabetes. This result is in tune with findings made by cox et al (2004) who also found a positive association between respondent's household monthly income and their level of diabetes knowledge. Further works that corroborate the findings of this study is that undertaken by Rabi et al (2006) who found that the lower-income respondents had relatively little knowledge about their diabetic condition than their higher income counterparts.

5.2 Extent of Respondent's Knowledge on Diabetes

Considering the complications that can arise from diabetes, it is appalling the knowledge gap that still exist on the nature of diabetes, risk factors of diabetes and self-management of the disease. It is instructive to note that of the ten questions that the respondents were asked to respond to, in four of the questions more than 78% could not answer their questions correctly with the highest casualty being that 87% of the respondents did not



know that kidney problem is a complication associated with Diabetes. Respondents' poor performance on knowledge on diabetes-related complications draws attention to the need to increase awareness on this section. Cardiovascular and other non-communicable diseases are major causes of morbidity and mortality among persons with diabetes (Gerstein, 2002) and it would therefore be prudent to intensify diabetic education in this study group using appropriate adult education strategies.

Considering that a large number of the respondents (84%) did not know that foot problem is a complication associated with diabetes is revealing. This is inconsistent with a study by Gulabani and colleagues (2008) in India where 57.4% of respondents reported that foot problem is a complication associated with diabetes. This awareness is critical in the wake of findings that amputations occur every 30 seconds due to diabetes, and diabetes is said to be the commonest cause of non-traumatic lower limb amputation (IDF, 2005).

Deductions from the results contained in table 8 is consistent with findings made by Murata et al. (2003) and Fitzgerald et al. (1998) on the low level of diabetes knowledge among people living with diabetes. Further works that corroborates this knowledge gap are that of (Kamal (2000), and Jabbar et al (2001).

5.3 Factors That Influence Self-Management of Diabetes

In this section the lens of the discussion is focused on the factors that influence self-management of diabetes in the light of works already done.



5.3.1 Social Support

Social support for diabetes remains a critical issue which is concomitantly linked to patients' ability to self-manage diabetes. The result of the study where 90.4% posited that social support was critical to their ability to self-manage diabetes and the positive association between social support and self-management ($p=0.047$) does not deviate from the findings by Jones et al, (2008) who found that sufficient social support was positively associated with high diabetes self-management ability. It can be inferred from the findings that social support plays an integral role in diabetes self-management.

5.3.2 Diabetes Education

That education plays a crucial role in the lives of diabetics cannot be overemphasized. Typically, knowledge is imparted to diabetics during information sessions at the clinic. Fallout from the study indicated that 80% of respondents disclosed that the diabetes education that they received from health facilities were vital to their ability to self-manage their diabetes condition. These findings are consistent with previous works that found education to be predictive of diabetes self-care practices (Xiao-hui et al., 2012). It can be inferred from the results that the diabetes education helps diabetics to demonstrate healthy positive behavior which stimulates their ability to effectively self-manage their diabetic condition.



CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

The chapter presents the summary of key findings as well as the conclusions and recommendations of this study.

6.1 Summary of Key Findings

The key findings of this study are summarized as follows;

- ✚ Majority of respondents were females (61.7%)
- ✚ Majority of the respondents were illiterates (56.4%)
- ✚ Age of respondents had a significant positive relationship on their level of knowledge on diabetes (P-value=0.007)
- ✚ Marital status of respondents had a statistically significant positive relationship on their level of knowledge on diabetes (P-value=0.005)
- ✚ Educational background of the study participants had a significant positive relationship on their level of knowledge on diabetes (P-value=0.002)
- ✚ Monthly household income levels of the respondents had a significant positive relationship on their level of knowledge on diabetes (P-value=0.007)
- ✚ Ethnic background of respondents had a statistically significant positive relationship on their level of knowledge on diabetes (P-value=0.003)
- ✚ Out of the 94 respondents who were sampled, only 46% of them had adequate knowledge on diabetes
- ✚ Social support had a significant relationship on respondents ability to self-manage their diabetes condition (P-value=0.047)



- # Diabetic education had a statistically significant relationship on respondents ability to self-manage their diabetes condition (P-value=0.001)
- # A significant proportion of the total respondents (54.6%) disclosed that they don't adhere strictly to their diabetes medication
- # Most of the study participants (58.5%) indicated that they don't monitor their blood sugar level on a regular basis
- # Majority of the respondents (68.1%) preferred tight footwear whereas 31.9% of them preferred loose footwear
- # A significant proportion of the respondents (82%) do not effectively self-manage their diabetes condition.

6.2 Conclusions

From the study results and discussion above, the following conclusions can be reached;

- # Respondent's knowledge on diabetes was generally average and this is evidenced by the fact that only 54.3% of the entire respondents were able to answer 50% of the diabetes related questions correctly
- # Most of the respondents who seek for medical care at the Tamale Teaching hospital (TTH) do not adhere to the recommended diabetes self-management practices such as compliance to medication, preference for loose footwear and attending their diabetes related checkups on a regular basis.
- # Diabetes education and social support were identified as the significant factors that influence respondents diabetes self-management practices



6.3 Recommendations

Based on the findings of the study, the following recommendations were proposed by the researcher;

- ✚ Ghana Health Service should intensify its public awareness and sensitization campaigns on diabetes so as to enable diabetes patients in particular to acquire more knowledge about their health condition
- ✚ The Ministry of Health should collaborate with Ghana Health Service (GHS) to create more public education on the benefits associated with self-management of diabetes. This recommendation will help people living with diabetes to make conscious effort to self-manage their diabetes condition more effectively.
- ✚ Diabetes related training should be organized on a regular basis for health workers who provide diabetes care so as to enable them to provide adequate health care for people living with diabetes
- ✚ The research community, Non-Governmental Organizations and other advocacy groups should advocate for more resources to be committed towards diabetes prevention and its management



REFERENCES

- Abioye-Akanji, Oluseyi Grace (2013). *"An Exploration of the Barriers to Diabetes Management Among West African Immigrants in the United States"* Master of Science in Nursing. Paper 21. http://digitalcommons.ric.edu/school_of_nursing/21
- Abokyi S., Koffour G.A., Oveneri-Ogbomo G., and Abokyi E., (2013). Knowledge of Diabetes and its Associated Ocular Manifestations by Diabetic Patients: A Study at Korle-Bu Teaching Hospital, Ghana. *Nigerian Medical Journal*. 2013 Jul-Aug; 54(4): 217–223.
- Adisa R, Alutundu MB and Fakeye TO (2009). Factors Contributing to Non-adherence to Oral Hypoglycaemic Medications Among Ambulatory Type 2 Diabetes Patients in Southwestern Nigeria. *Pharmacy Practice*. (internet) 7(3):163-169.
- Ahola AJ, Groop PH. Barriers to self-management of diabetes. *Diabetes Med*. 2013 Apr; 30(4):413–20.
- Al-Kaabi J, Al-Maskari F, Saadi H, Afandi B, Parkar H, Nagelkerke N (2009). *Physical activity and reported barriers to activity among type 2 diabetic patients in the United Arab Emirates. Rev Diabet Stud*. Winter;6(4):271-8.
- Al Sayah, F., Majumdar, S. R., Williams, B., Robertson, S., & Johnson, J. A. (2013). Health Literacy and Health Outcomes in Diabetes: A Systematic Review. *Journal of General Internal Medicine*, 28(3), 444-452. doi: 10.1007/s11606-012-2241-z
- American Diabetes Association [ADA] (2013). Standards of Medical Care in Diabetes. *Diabetes Care*. 36 (Suppl. 1):S11-S66.
- American Diabetes Association (2011). Standards of medical care in diabetes. *Diabetes Care* 2011, 34 (Suppl 1):S11-S61.
- American Association of Diabetes Educators (2011). *The Art & Science of DSME Desk Reference*. Chicago, Illinois: Ed: Carole Mensing



- American Association of Diabetes Educators (2010). Seven care behaviors framework. Retrieved March 19, 2010, from Website:
<http://www.diabeteseducator.org/Professional/AADE/>
- American Diabetes Association [ADA] (2010). Diagnosis and Classification of Diabetes Mellitus. Position Statement. *Diabetes Care*. 35 (Suppl. 1):S62-S69.
- American Diabetes Association (2000). Diagnosis and classification of Diabetes Mellitus. *Diabetes Care*, Volume 33, Supplement 1.
- American Diabetes Clinical Endocrinologists (2000). The AACE System of intensive Diabetes Self-Management –2000 Update. *Endocrine Practice Vol,6 No 1 January/February*
- Amissah, I. (2014). Diabetes Knowledge and awareness among people with diabetes mellitus attending the Cape Coast Regional Hospital, Ghana. *Journal of Basic & Applied Sciences*,1 (2), 1-11
- Awah P.K, Kengne A.P, Fezeu L.L, Mbanya J.C, (2007) Perceived risk factors of cardiovascular diseases and diabetes in Cameroon. *Health Education*; 25: 23–29.
- Bains, S. S., & Egede, L. E. (2011). Associations between health literacy, diabetes knowledge, self-care behaviors, and glycemic control in a low income population with type 2 diabetes. *Diabetes Technol Ther*, 13(3), 335-341.
- Bellenir, K. (Ed.). (2008). *Diabetes: Sourcebook (4th ed.)*. Detroit: MI: Omni-graphics.
- Beverly, E. A., Miller, C. K., & Wray, L. A. (2008). Spousal support and food-related behavior change in middle-aged and older adults living with type 2 diabetes. *Health Educ Behav*, 35(5), 707-720.
- Bhojani , U., Mishra, A., Amruthavalli, S., Devadasan, N., Kolsteren, P., Henauw, S. D. and Criel, B. (2013). Constraints faced by urban poor in managing diabetes care: Patient’s perspectives from South India .Global Health Action. Retrieved from <http://www.globalhealthaction.net/index.php/gha/article/view/22258>



- Boakye M., (2014). Knowledge on diabetes among adults in the Kwahu South District
<http://ir.knust.edu.gh/handle/123456789/6893?mode=full>
- Boulton AJ, Vinik AI, Arezzo JC, Bril V, Feldman el, Freeman R, Malikra, Maser RE, Sosenko JM, Ziegler D (2005): Diabetic neuropathies: a statement by the American Diabetes Association. *Diabetes Care*; 28:956-962.
- Braun, C., & Anderson, C. (Eds.). (2007). *Pathophysiology: Functional alterations in human health Philadelphia: PA: Lippincott William & Wilkins*
- Broom, D., & Whittaker, A. (2004). *Controlling diabetes, controlling diabetics: moral language in the management of diabetes type 2*. *Soc Sci Med*, 58(11), 2371-2382.
- Burns, N & Grove, S (1997): *The practice of nursing research conduct, critique and utilization. 3rd edition. Philadelphia: WB Saunders.*
- Carter, P. (1998). Self-care agency: the concept and how it is measured. *Journal of Nursing Measurement*, 6(2), 195-207.
- Chiou, C; Bai, Y. & Chang, Y. (2009). Self-care behavior and related factors in older people with type 2 diabetes. *Journal of Clinical Nursing*, 18, 3308-3315.
- Cockram C.S., (2000). The epidemiology of diabetes mellitus in the Asia-Pacific region. *HKMJ* 6:43-52
- Colberg, S. R., Sigal, R. J., Fernhall, B., Regensteiner, J. G., Blissmer, B. J., Rubin, R. R., American Diabetes Association. (2010). *Exercise and type 2 diabetes: The American College of Sports Medicine and the American Diabetes Association [Joint position statement]*. *Diabetes Care*, 33(12), 147-167.
- Copstead, L., & Banasik, J. (Eds.). (2005). *Pathophysiology (3rd ed.)*. St. Louis: MO: Elsevier Saunders.
- Davidson, M. B. (1998). *Diabetes Mellitus Diagnosis and Treatment*. 4th ed. Philadelphia, PA: WB Saunders Company. Pp. 365-375



- Deshpande, A. D.; Harris-Hayes, M. & Schootman, M. (2008). Epidemiology of Diabetes and Diabetes-Related Complications. *Diabetes Special Issue. Physical Therapy*. Vol. 88, No. 11, 1254-1263.
- Dunning, T. (2003). Complementary therapies and diabetes. *Complementary Therapies in Nursing and Midwifery*. 9(2):74-78.
- Etzwiler D.D, (1994): Diabetes translation: a blueprint for the future. *Diabetes Care*, 17 (Suppl. 1):1-4.
- Fagan TC, Sowers J. Type 2 diabetes mellitus (1999): Greater cardiovascular risks and greater benefits of therapy. *Arch Intern Med*;159:1033-4.
- Fitzgerald, J., Funnell, M., Hess, G., Barr, P., Anderson, R., Hiss, R., et al. (1998). The reliability and validity of a brief diabetes knowledge test. *Diabetes Care*, 21(5), 706–710.
- Fu, D., Fu, H., McGowan, P., Shen, Y., Zhu, L., Yang, H., et al. (2000). Implementation and quantitative evaluation of chronic disease self-management programme in Shanghai, China: Randomized controlled trial. *Bulletin of the World Health Organization*, (3), 174–182.
- Ghana Statistical Service (GSS), Ghana Health Service (GHS), and Macro International (2007) “Demographic and Health Survey 2007”, ([http// www.measuredhs.com](http://www.measuredhs.com)), (Retrieved on November 30, 2015)
- Gill GV, Mbanya J-C, Ramaiya KL and Tesfaye S. 2009. A sub-Saharan African perspective of diabetes. *Review. Diabetologia* 52: 8-16.
- Glasgow R (1997). Personal model beliefs and Social environmental barriers related to diabetes self-management. *Diabetes care*, 20: 556-61
- Grant RW, Devita NG, Singer DE and Meigs JB (2003). *Polypharmacy and Medication Adherence in Patients with Type 2 Diabetes. Diabetes Care* 26: 1408-1412.



Guthrie, D. W., & Guthrie, R. A. (2009). *Management of diabetes mellitus: A guide to the pattern approach*. New York, NY: Springer.

Haneda M, Polonsky KS, Bergenstal RM, et al.(1984): *Familial hyperinsulinemia due to a structurally abnormal insulin. Definition of an emerging new clinical syndrome. New England Journal of Medicine* 310:1288–1294.

Hansen L, Pedersen O., (2005): "Genetics of type 2 diabetes mellitus: status and perspectives." *Diabetes, Obesity and Metabolism*. 7: 122-135.

Hawthorne K. & S.Tomlinson (1999). Parkistani Moslems with Type 2 diabetes mellitus: effect of sex, literacy skills, known diabetic complications and place of care on diabetic knowledge, reported self-monitoring management and glycaemic control. *Diabetic Medicine Vol. 16*, 591-7

Heisler, M. & Piette, J. (2005). *I Help You, and You Help Me. Facilitating telephone peer support among patients with diabetes. The Diabetes Educator*, 31(6), 869-879.

Heisler, M., Bouknight, R. R., Hayward, R. A., Smith, D. M., & Kerr, E. A. (2002). The relative importance of physician communication, participatory decision making, and patient understanding in diabetes self-management. *Journal of General Internal Medicine*, 17(4), 243-252.

Herman W., Kinmonth A., Wareham N., Rhys W.,. (2009): *The Evidence Base for Diabetes Care. John Wiley & Sons, New Jersey, USA. Pp 358.*

Holt, R., Cockram, C., Flyvbjerg, A., & Goldstein, B. (Eds.). (2010). *Textbook of diabetes (4th ed.)*. West Sussex: UK: Wiley-Blackwell Publishing.

International Diabetes Federation. (2014). *Risk factors Retrieved October 16, 2011, from* <http://www.idf.org/node/2137>

International Diabetes Federation (2013). *Diabetes surge hits every nation.* https://www.idf.org/sites/default/files/Global_WDD_Final.pdf



- International Diabetes Federation. (2011). *Management of diabetes* Retrieved 20 December, 2011, from <http://www.idf.org/treatment-diabetes>
- Jabbar A., Contractor Z., Ebrahim M. A., Moahmood K. (2001). *Standard of knowledge about their disease among patients with diabetes in Karachi, Pakistan. Journal of Pakistan Medical Association, 51(6), 216-218.*
- Jiang Li Der (1999). *The Assessment of the function and effect of diabetes education programs in Taiwan Diabetes Research and Clinical Practice 46, 177-182*
- Jones, R; Alexander, G; Blankenship, J; Hinton, I; Moore, C; Steeves, R. (2008). Family interactions among African Americans diagnosed with type 2 diabetes. *The Diabetes Educator, 34(2),318-326.*
- Joslin, C., Weir, G., King, G., Moses, A., Smith, R., & Jacobson, A. (2005). *Definition, diagnosis, and classification of diabetes mellitus and glucose homeostasis. In C. Joslin, G. Weir, G. King, A. Moses, R. Smith & A. Jacobson (Eds.), Joslin's Diabetes mellitus (14th ed.): Lippincott Williams & Wilkins.*
- Justin-Temu, M., Nondo, R. S. O., Wiedenmayer, K., Ramaiya, K. L., & Teuscher, A. (2009). *Anti-diabetic drugs in the private and public sector in Dar Es Salaam, Tanzania. East African Medical Journal, 85(3), 110-114.*
- Kahn, S.,E., Hull, R.,L., & Utzschneider, K.,M. (2006). *Mechanisms linking obesity to insulin resistance and type 2 diabetes. Nature, 444, 840-846.*
- Kamal A., Biessels G. J., Duis S. E. J., Gispen W. H. (2000). *Learning and hippocampal synaptic plasticity in streptozotocin-diabetic rats: Interaction of diabetes and ageing. Diabetologia, 43, 500-506.*
- Kadowaki T , Kadowaki H, Mori A. (1994). A subtype of diabetes mellitus associated with a mutation of mitochondrial DNA. *N Engl J Med.;330:962–968.*
- Kent D, Haas L, Randal D, Lin E, Thorpe CT, Boren SA, Fisher J, Heins J, Lustman P, Nelson J, Ruggiero L, Wysocki T, Fitzner K, Sherr D and Martin AL (2010).



Healthy Coping: Issues and Complications in Diabetes Education and Care. *Population Health Management*. 13(5):227-233.

Kiawi, E., Edwards, R., Shu, J., Unwin N., Kamedjeu, R., & Mbanya, J. (2006). *Health beliefs, perceptions, knowledge and practices relative to diabetes and its major risk factors among urban residents in Cameroon: a qualitative survey*. *Ethnicity and disease*, 16 (2): 503-509.

Kim, S., Love, F., Quistberg, D. A., & Shea, J. A. (2004). Association of Health Literacy With Self-Management Behavior in Patients With Diabetes. *Diabetes Care*, 27(12), 2980-2982.

King, R., Donald, B. K. and Wiley, B. (1998). *Global Prevalence of Diabetes*. *Diabetes Atlas* 1998. 11, 25-28.

Kinra S, Bowen LJ, Lyngdoh T, Prabhakaran D, Reddy KS, Ramakrishnan L (2010): *Socio-demographic patterning of non-communicable disease risk factors in rural India: a cross sectional study*. *BMJ*, 341:c 4974.

Kirigia JM, Sambo HB, Sambo LG and Barry SP. 2009. *Economic burden of diabetes mellitus in the WHO African region*. *BMC International Health and Human Rights*, 9:6.

Krapek, K., King, K., Warren, S., George, K., Caputo, D., Mihelich, K., et al. (2004). *Medication adherence and associated hemoglobin A1c in type 2 diabetes*. *Annual Pharmacotherapy*, 38(9), 1357–1362.

Krentz, A. J. (Ed.). (1996). *Diabetes* (1 ed.): Churchill Livingstone

Kowalczyk (2014): *Research Variables: Dependent, Independent, Control, Extraneous & Moderator; available at <http://study.com/academy/lesson/research-variables-dependent-independent-control-extraneous-moderator.html>*. Accessed: February 24, 2014.

Kuzuya T. and Matsuda A. (1997). *Classification of diabetes on the basis of etiologies versus degree of insulin deficiency*. *Diabetes Care*; 20:219–220.



- Laakso M. Hyperglycemia and cardiovascular disease in type 2 diabetes. *Diabetes* 1999; 48: 937–42.
- Laura D., and McEntyre J (2004). *The Genetic Landscape of Diabetes*
<https://www.ncbi.nlm.nih.gov/books/NBK1667/> Retrieved August 2016
- Lee WC, Lee PY and Ng CJ (2013). *A qualitative study on health care professionals' perceived barriers to insulin initiation in a multi-ethnic population*. *BMC Family Practice*. 13(1):1.
- Lin C. Y., Ni C. C., Yin M. C., Lii C. K. (2012). *Flavonoids protect pancreatic beta-cells from cytokines mediated apoptosis through the activation of PI3-kinase pathway*. *Cytokine* 59, 65–711
- Mancuso, J. M. (2010). Impact of health literacy and patient trust on glycemic control in an urban USA population. *Nurs Health Sci*, 12(1), 94-104.
- Mapanga, K & Andrews, C. (1995). The influence of family and friends' basic conditioning factors and self-care agency on unmarried teenage primiparas' engagement in contraceptive practice. *Journal of community health Nursing*, 12(2), 89-100.
- Martha Michell (1995). National Standards for Diabetes Self-management Education programs. *Diabetes Care Vol. 18, No. 1*
- Mayer B. Davison (1998). *Diabetes mellitus diagnosis and treatment. Fourth Edition, Los Angeles, California 435*
- McCleary-Jones, V. (2011). Health literacy and its association with diabetes knowledge, self-efficacy and disease self-management among African Americans with diabetes mellitus. *Abnfj*, 22(2), 25-32.
- Mohebi S, Azadbakht I, Feizi A, Sharifirad G and Kargar M (2013). *Structural role of perceived benefits and barriers to self-care in patients with diabetes. Journal of Education & Health Promotion*. 2:37.



- Murata, G. H., Shah, J. H., Adam, K. D., Wendel, C. S., Bokhari, S. U., Solvas, P. A., Hoffman, R. M., Duckworth, W. C. (2003). *Factors affecting diabetes knowledge in type 2 diabetic veterans*. *Diabetologia*, 46, 1170–1178.
- Mutch, W. J., & Dingwall-Fordycet, I. (1985). *Is it a Hypo? Knowledge of the Symptoms of Hypoglycaemia in Elderly Diabetic Patients*. *Diabetic Medicine*, 2(1), 54-56.
- Mybanya, JC. (2009). Activity Report 2006/2009. Brussels: *International Diabetes Federation*; Available at: <http://www.idf.org/webdata/docs/IDF-Activityreport-06-09.pdf>. Accessed: February 24, 2014.
- Nagelkerk, J., Reick, K., & Meengs, L. (2006). Perceived barriers and effective strategies to diabetes self-management. *Journal of Advanced Nursing*, 54(2), 151-158.
- NICE (National Institute for Health and Care Excellence), 2009. [Web page]. Type 2 diabetes; the management of type 2 diabetes. [Ref. 12 March 2015]. Available at <https://www.nice.org.uk/guidance/cg87/chapter/1-guidance#oral-glucosecontrol-therapies-1-metformin-insulin-secretagogues-and-acarbose>
- National institute of health (2014) Diabetes Overview. National Diabetes Information Clearing House website.<http://diabetes.niddk.nih.gov/dm/pubs/overview/> - other. Accessed August 18, 2014.
- Oftedal, B; Bru, E and Karlsen, B. (2009). Life values and self-regulation behaviours among adults with type 2 diabetes. *Journal of Clinical Nursing*, 19, 2548–2556
- Orem, DE. (1995). *Nursing Concepts of practice*. (5th edition). St Louis: Mosby Year Book Inc.
- Paes AHP, Baker A and Soe-Agnie S-J (1997). *The Impact of Dosage Frequency on Patient Compliance*. *Diabetes Care*. 20:1512-17.
- Ping Z., Xinzhi Z., Jonathan B. B., Dorte V., Richard A. S., Jonathan S., Gregory A. N., (2010): *Economic impact of Diabetes*. IDF Diabetes Atlas fourth edition. Pp 9



- Popkin B. M. (1995). Dietary and environmental correlates of obesity in a population study in China. *Obesity research* Vol.3, 35-42
- Poretzky L (2009). *Principles of diabetes mellitus* (2nd ed). New York: Springer. P 3
- Povey R.C, Clark-Carter D. (1997): *Diabetes and healthy eating: A systematic review of the literature. Diabetes Educ*, 33(6):931-959
- Pun, S. P. Y., Coates, V., & Benzie, I. F. F. (2009). Barriers to the self-care of type 2 diabetes from both patients' and providers' perspectives: literature review. *Journal of Nursing and Healthcare of Chronic Illness*, 1(1), 4-19.
- Reasner CA and Goke B (2002). Overcoming Barriers to Effective Glycaemic Control for Type 2 Diabetes. *British Journal of Diabetes & vascular Diseases*. 2(4): 290-295.
- Riccardi G. (2000). *Can diabetes mellitus be prevented by diet? Diab. Nutr. Metb.*2, 259-62
- Roggiero. L (1997). *Diabetes self-management: self-reported recommendations and patterns in a large population. Diabetes care*, 20: 568-76
- Rosal MC, Benjamin E, Pekow PS and Lemon SC (2008). *Opportunities and challenges for diabetes prevention at two community health centers. Diabetic Care*. 31(2):247-254.
- Savoca, M & Miller, C (2001): Food selection and eating patterns: themes found among people with type 2 diabetes mellitus. *Journal of Nutrition Education*. 33(4):224-338.
- Saydah, S., & Lochner, K. (2010). Socioeconomic Status and Risk of Diabetes-Related Mortality in the U.S. *Public Health Reports*, 125 (3), 377-388.
- Sekhar S TVD, Kodali M, Burra KC, Muppala BS, Guta P and Bethanbhatla MK (2013). *Self-Care activities, diabetic distress and other factors which affected the glycemic control in a tertiary care teaching hospital in South India. Journal of Clinical & Diagnostic Research*. 7(5): 857-860.
- Shobhana R, Begum R, Snehalatha C, Vijay V, Ramachandran A (1999): Patients' adherence to diabetes treatment. *J Assoc Physicians India*, 47(12):1173-1175.



- Skelly, A. H., Dougherty, M., Gesler, W. M., Soward, A. C., Burns, D., & Arcury, T. A. (2006). African American beliefs about diabetes. *West J Nurs Res*, 28(1), 9-29; discussion 30-41.
- Tan SL, Suhana S and Sakinah H (2011). *Dietary compliance and its association with glycaemic control among poorly controlled Type 2 Diabetic Outpatients in hospital Universiti Sains Malaysia. Malaysian Journal of Nutrition*. 17(3): 287-299.
- Tracy A (1991): Self-management of Diabetes Mellitus: A critical review. *Health psychology*, 10(1)1-8
- Tuomilehto, J., Lindstrom, J., Eriksson, J. G., Valle, T. T., Hamalainen, H., Ilanne-Parikka, P., Finnish Diabet Prevention Study, G. (2001). *Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. New England Journal of Medicine*, 344(18), 1343-1350.
- Weinger K and Beverly EA (2010). *Barriers to Achieving Glycaemic Target: Who Omits Insulin and Why? Diabetes Care*. 33(2): 450-452.
- Wild S, Roglic G, Green A, Sicree R, King H (2004): Global prevalence of diabetes: Estimates for the year 2000 and projections for 2030. *Diabetes Care*, 27(5):1047-1053
- Wing, R. R., Lamparski, D. M., Zaslowsky, S., Betschart, J., Siminerio, L., and Becker, D. (1985). *Frequency and accuracy of self-monitoring of blood glucose in children: Relationship to glycemic control. Diabetes Care*, 8, 214–218.
- World health organization (2013). Diabetes – Factsheet.
<http://www.who.int/mediacentre/factsheets/fs312/en/index.html>
- World Health Organization/International Diabetes Federation (2006). Report of WHO/IDF consultation. Definition and diagnosis of diabetes mellitus and intermediate hyperglycaemia. Geneva: WHO Press:1–46.



World Health Organization (1999). *Definition and classification of diabetes and its complications: Report of WHO Consultation. Part 1: Geneva, World Health Organisation (WHO/NCD/NCS/99.2).*

Xian-Ren Pan (1997). Effects of diet and exercise in preventing NIDDM in people with impaired glucose tolerance The Da Qing IGT and Diabetes Study *Diabetes care* vol.20, Nub, 4, April, 537-44

Yoon J., & Jun H,. (2005): *Autoimmune destruction of pancreatic beta cells.*
<http://www.ncbi.nlm.nih.gov/pubmed/16280652> Retrieved on 23 July 2015

Yousefzadeh G, Shokoohi M, Najafipour H (2014): *Inadequate control of diabetes and metabolic indices among diabetic patients: A population based study from the Kerman Coronary Artery Disease Risk Study.*
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4417630> Retrieved: February 24, 2015.

Yusuf KB, Obe O and Joseph BY (2008). *Adherence to Anti-Diabetic Drug Therapy and Self-Management Practices among Type 2 Diabetics in Nigeria. Pharmacy World & Science.* 30(6): 876-883.

Zazworsky, D., Bolin, J., & Gaubeca, V. (Eds.). (2006). *Handbook of diabetes management.* New York: NY: Springer Science.



APPENDIX

**UNIVERSITY FOR DEVELOPMENT STUDIES
GRADUATE SCHOOL OF COMMUNITY HEALTH AND DEVELOPMENT
PARTICIPANT INFORMATION SHEET
ASSESSING DIABETIC PATIENT KNOWLEDGE ON DIABETES AND SELF
MANAGEMENT AT TAMALE TEACHING HOSPITAL**

UNIVERSITY FOR DEVELOPMENT STUDIES

This questionnaire has been designed to solicit information for a research work being undertaken to assess diabetic patient knowledge on diabetes and self-management at Tamale Teaching Hospital in partial fulfillment of the requirements for Masters of Community Health and Development.

Your opinions are important to the study and any information you provide will be treated as confidential and for academic purposes only.

1. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason. []
2. I confirm that I have read and understand the questions for the above study and have had the opportunity to ask questions. []
3. I agree to participate in the above study. []

Name of Participant	Date	Signature
---------------------	------	-----------

Name of Researcher	Date	Signature
--------------------	------	-----------

Thank you.



11. Which health insurance membership card do you have National health insurance [] Private health insurance [] None []
12. Who do you live with Husband [] Wife [] Wife and children []
Husband and children [] Children [] Alone []
13. Has any of your first degree relatives ever been diagnosed of diabetes mellitus
Yes [] No []
14. If yes, please specify Mother [] Father [] Sister []
Brother []
15. Has any of your second degree relatives ever been diagnosed of diabetes mellitus
Yes [] No []
16. If yes specify Auntie [] Uncle [] Nephew []
Niece []
17. Have you ever smoked Yes [] No []
If no skip to question 19
18. If yes are you currently smoking Yes [] No []
19. If you no longer smoke did you stop smoking because of your diabetes condition
Yes [] No []
20. How long have you been diagnose of diabetes

KNOWLEDGE ON DIABETES

SECTION B

21. What are the major signs of diabetes
Body temperature rises []



- Feels faint []
- Sweat profusely []
- Urinate frequently []
- Diarrhea []
- Headache []
- Eat food frequently []
- Drink water frequently []
- Sugar in urine []
- Weight loss []

22. If a diabetics blood sugar level decreases is it possible to increase to nits right level

Yes [] No []

23. If a diabetics blood sugar level increases is it possible to reduce it again

Yes [] No []

24. Diabetes is associated with a certain hormone in the body, do you know the hormone Yes [] No []

25. If yes what is the name of this hormone

26. Do you know the complications of diabetes Yes [] No [] I don't know []

27. If yes mention the complication

Vision problem []

Kidney problem []

Obesity []



Lung problem []

Stroke []

Foot problem []

Diarrhea []

Coughing []

28. Do you know any other thing that can be used to reduce blood sugar level other than injecting insulin Yes [] No []

29. If yes please specify

30. If a diabetic skips meals can it affect his or her blood sugar level
Yes [] No []

SECTION C

GENERAL HOSPITAL MANAGEMENT AND SELF MANAGEMENT AT HOME

31. How often do you visit the hospital Weekly[] Once every 2 weeks [] Monthly [] Any time my diabetes condition deteriorates []

32. How often do you check your blood sugar level.....

33. Do you receive general counseling at the hospital Yes[] No []

34. Do you receive nutritional counseling at the hospital Yes [] No []

35. Have you received any diabetes health care management guideline
Yes [] No []



36. Do health workers inspect your feet at the hospital yes[] no[]

37. How often do you take your medication

Regularly [] occasionally [] When my blood sugar level goes high []

38. Have you ever combine traditional medication with orthodox medication

Yes [] No []

39. If yes which traditional medication did you use.....

40. Do you monitor your blood glucose level at home Yes []

No []

41. If yes what instrument do you use to monitor your blood glucose level at home.....

42. Does medication intake depends on your blood glucose level measure at home

Yes [] No []

43. Do you prefer wearing your shoes or sandals.....

Tight [] Loose [] No particular preference []

44. What can diabetic patient do at home to improve their condition.....

.....
.....

45. Have you received diabetes education Yes [] No []

46. Do you have family or relations who support you manage the diabetic condition

Yes [] No []



47. If no why

.....

.....

48. Is there any traditional believe about the cause of diabetes Yes []

No []

49. If yes what are the traditional believes of the cause of diabetes.....

.....

50. Do you receive any social support at home Yes [] No []

51. What do you expect health professionals to do for you to improve your condition.....

.....

52. Which of these factors influence your ability to self-manage your diabetes condition

Social Support []

Diabetes Education []

Religious Factor []

Accessibility to Public Health Services []

Thank you.



Appendix 4: knowledge score of respondents

Knowledge Questions	Frequency	
	Correct	Wrong
Is it possible for blood sugar to return to normal after it has decreased	73	21
Is it possible for blood sugar to return to normal after it has increased	84	10
Can skipping of Meals reduce Blood Sugar Level	71	23
Urinating frequently is a symptom of diabetes	63	31
Feeling hungry frequently is a symptom of diabetes	19	75
Feeling thirsty frequently is a symptom of diabetes	47	47
Weight loss is a symptom of diabetes	22	72
Vision problems is a complication associated with diabetes	51	43
Kidney problem is a complication associated with diabetes	12	82
Foot problem is a complication associated with diabetes	15	79



Department of Research & Development

Tamale Teaching Hospital



TTH/R&M/SR/13/117
20/03/2015

TO WHOM IT MAY CONCERN

CERTIFICATE OF AUTHORIZATION TO CONDUCT RESEARCH IN TAMALE TEACHING HOSPITAL

I hereby introduce to you **MADAM BRIDGET PARWAR**, a student of the Department of Allied Health Sciences, School of Medicine and Health Sciences of the University for Development Studies, who has been duly authorized by Management to conduct a study titled "**Assessing Diabetic patient's knowledge on Diabetics and Self-Management.**"

Please accord her the necessary assistance to be able to complete her study. If in doubt, kindly contact the Research Unit at the 2nd floor of the administration block or on Telephone 0209281020. In addition, kindly report any misconduct of the Researcher to the Research Unit for necessary action, please.

Thank You.

**ALHASSAN MOHAMMED SHAMUDEEN
(HEAD, RESEARCH & DEVELOPMENT)**



UNIVERSITY FOR DEVELOPMENT STUDIES
(School of Medicine and Health Sciences)

Tel: 03720-93295

Our Ref: UDS/CHD/0035/11

Your Ref:



P.O. Box 1883
Tamale, Ghana

Date: 03/03/2015

Department of Allied Health Sciences

**THE CHIEF EXECUTIVE OFFICER
TAMALE TEACHING HOSPITAL
TAMALE.**

Dear Sir,

LETTER OF INTRODUCTION


I write to introduce to you **MADAM BRIDGET PARWAR**, a student of the Department of Allied Health Sciences, School of Medicine and Health Sciences of the University for Development Studies.

She is carrying out a survey in your hospital titled: **“Assessing Diabetic patients’ knowledge on Diabetics and Self Management.”**

Kindly assist her to collect the appropriate data to answer her research questions.

Thank you.

Yours sincerely,


Mr. Boakye Akwesi Yiadom
(Head of Department)

